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Shop Manual
Part I

VEBM180101

WA470-5H
WA480-5H

WHEEL LOADER

MODEL	SERIAL NUMBER
WA470-5H	WA470H50051 AND UP
WA480-5H	WA480H50051 AND UP

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local KOMATSU distributor for those items you may require. Materials and specifications are subject to change without notice.
- WA470-5 and WA480-5 mount the SAA6D125-3 engine.
  For details of the engine, see the 125-3 Series Engine Shop Manual

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Safety

Safety notice

IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for the safe operation of your machine. The service and repair techniques recommended and described in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed for the purpose.

To prevent injury to workers, the symbol ⚠ is used to mark safety precautions in this manual. The cautions accompanying these symbols should always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

General precautions

Mistakes in operation are extremely dangerous. Read the OPERATION & MAINTENANCE MANUAL carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
    - Always wear safety glasses when hitting parts with a hammer.
    - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.
6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.

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Preparations for work

1. Before adding oil or making repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.

2. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.

3. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.

4. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

Precautions during work

1. When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out. Before disconnecting or removing components of the oil, water or air circuits, first remove the pressure completely from the circuit.

2. The water and oil in the circuits are hot when the engine is stopped, so be careful not to get burned. Wait for the oil and water to cool before carrying out any work on the oil or water circuits.

3. Before starting work, remove the leads from the battery.
   ALWAYS remove the lead from the negative (-) terminal first.

4. When raising heavy components, use a hoist or crane. Check that the wire rope, chains and hooks are free from damage. Always use lifting equipment which has ample capacity. Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.

5. When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.

6. When removing components, be careful not to break or damage the wiring, Damaged wiring may cause electrical fires.

7. When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips on to the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.

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8. As a general rule, do not use gasoline to wash parts. In particular, use only the minimum of gasoline when washing electrical parts.

9. Be sure to assemble all parts again in their original places. Replace any damaged part with new parts.

    • When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.

10. When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also check that connecting parts are correctly installed.

11. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.

12. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.

13. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.

14. Take care when removing or installing the tracks of track-type machines. When removing the track, the track separates suddenly, so never let anyone stand at either end of the track.

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General

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following sections. These sections are further divided into each main group of components

General

This section lists the general machine dimensions, performance specifications, component weights, and fuel, coolant and lubricant specification charts.

Structure and Function

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

Testing, Adjusting and Troubleshooting

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs. Troubleshooting charts correlating “Problems” to “Causes” are also included in this section.

Disassembly and Assembly

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

Maintenance Standard

This section gives the judgement standards when inspecting disassembled parts.

NOTE
The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your distributor for the latest information.

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How to read the shop manual

Volumes

Shop manuals are issued as a guide to carrying out repairs. They are divided as follows:

Chassis volume: Issued for every machine model

Engine volume: Issued for each engine series

Electrical volume: Each issued as one to cover all models

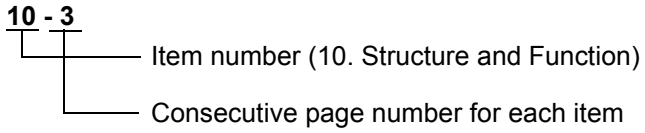
Attachment volume: Each issued as one to cover all models

These various volumes are designed to avoid duplication of information. Therefore to deal with all repairs for any model, it is start any work.

Filing method

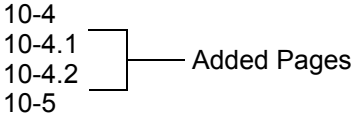
1. See the page number on the bottom of the page. File the pages in correct order.
2. Following examples show how to read the page number.

   Example 1 (Chassis volume):

3. Additional pages: Additional pages are indicated by a point (.) and number after the page number.
   File as in the example.

   Example:

Revised edition mark

When a manual is revised, an edition mark (① ② ③…) is recorded on the bottom of the pages.

Revisions

Revised pages are shown at the LIST OF REVISED PAGES between the title page and SAFETY page.

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Symbols

So that the shop manual can be of ample practical use, important safety and quality portions are marked with the following symbols:

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Weight	Weight of parts of systems. Caution necessary when selecting hoisting wire, or when working posture is important, etc.
	Tightening torque	Places that require special attention for the tightening torque during assembly.
	Coat	Places to be coated with adhesives and libricants, etc.
	Oil, water	Places where oil, water or fuel must be added, and the capacity.
	Drain	Places where oil or water must be drained, and quantity to be drained.

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Hoisting instructions

Hoisting

Heavy parts (25kg or more) must be lifted with a hoist, etc. In the DISASSEMBLY AND ASSEMBLY section, every part weigthing 25 kg or more is indicated clearly with the symbol:



If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:

1. Check for removal of all bolts fastening the part to the relative parts.
2. Check for existence of another part causing interference with the part to be removed.

Wire ropes

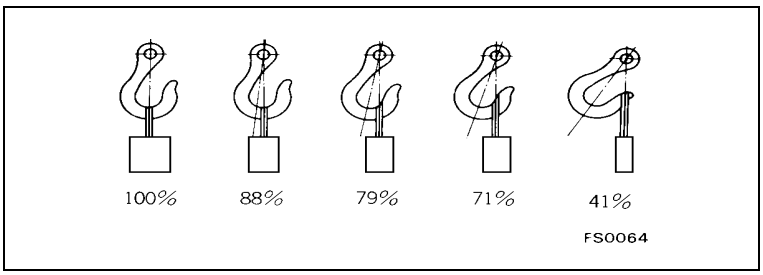
1. Use adequate ropes depending on the weight of parts to be hoisted, refering to the table below:
   - The allowable load in tons, is given by vertical tensible force.
   - The allowable load value is estimated to be one-sixth or one-seventh of the breaking strength of the rope used.

Wire ropes: (Standard "Z" or "S" twist ropes without galvanizing)	
Rope diameter (mm)	**Allowable load (tons)**
10	1.0
11.2	1.4
12.5	1.6
14	2.2
16	2.8
18	3.6
20	4.4
22.4	5.6
30	10.0
40	18.0
50	28.0
60	40.0

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2. Sling wire ropes from the middle portion of the hook.

   Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.

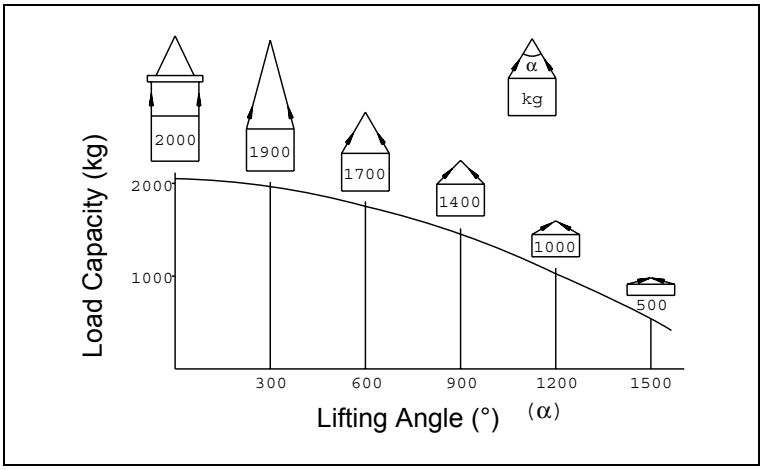


3. Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound onto the load.

Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident.

4. Do not sling a heavy load with ropes forming a wide hanging angle from the hook.

   When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles.
   The table below shows the variation of allowable load (kg) when hoisting is made with two ropes, each of which is allowed to sling up to 1000 kg vertically, at various hanging angles.
   When two ropes sling a load vertically, up to 2000 kg of total weight can be suspended. This weight becomes 1000 kg when two ropes make a 120° hanging angle. On the other hand, two ropes are subjected to an excessive force as large as 4000 kg if they sling a 2000 kg load at a lifting angle of 150°.



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Coating materials

The recommended coating materials prescribed in the shop manuals are listed below.

Category	Code	Part No.	Quantity	Container	Main applications, features
Adhesives	LT-1A	790-129-9030	150 g	Tube	• Used to prevent rubber gaskets, rubber cushions and cork plugs from coming out
	LT-1B	790-129-9050	20 g (2 pes.)	Polyethylene container	• Used in places requiring an immediately effective, strong adhesive. • Used for plastics (except polyethylene, polypropylene, tetrafluoroethylene, and vinyl chloride), rubber, metal and non-metal.
	LT-2	09940-00030	50 g	Polyethylene container	• Features: Resistance to heat, chemicals • Used for anti-loosening and sealant purposes for bolts and plugs.
	LT-3	790-129-9060 (Set of adhesive and hardening agent)	Adhesive: 1 kg Hardening agent: 500 g	Can	• Used as adhesive or sealant for metal, glass or plastic.
	LT-4	790-129-9040	250 g	Polyethylene container	• Used as sealant for machined holes.
	Holtz MH 705	790-126-9120	75 g	Tube	• Used as heat-resisting sealant for repairing engine.
	Three bond 1735	179-129-9140	50 g	Polyethylene container	• Quick hardening type adhesive. • Cure time: within 5 sec. to 3 min. • Used mainly for adhesion of metals, rubbers, plastics and woods.
	Aron-alpha 201	790-129-9130	2 g	Polyethylene container	• Quick hardening type adhesive. • Quick cure type (max. strength after 30 minutes). • Used mainly for adhesion of rubbers, plastics and metals.
	Loctite 648-50	79A-129-9110	50 cc	Polyethylene container	• Features: Resistance to heat, chemicals • Used at joint portions subject to high temperature.
Gasket sealant	LG-1	790-129-9010	200 g	Tube	• Used as adhesive or sealant for gaskets and packing of power train case, etc.
	LG-3	790-129-9070	1 kg	Can	• Features: Resistance to heat • Used as sealant for flange surfaces and bolts at high temperature locations; used to prevent seizure. • Used as sealant for heat resistant gasket for at high temperature locations such as engine pre-combustion chamber, exhaust pipe.

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Category	Code	Part No.	Quantity	Container	Main applications, features
Gasket sealant	LG-4	790-129-9020	200 g	Tube	• Features: Resistance to water, oil • Used as sealant for flange surface, thread. • Also possible to use as sealant for flanges with large clearance. • Used as sealant for mating surfaces of final drive case, transmission case.
	LG-5	790-129-9080	1 kg	Polyethylene container	• Used as sealant for various threads, pipe joints, flanges. • Used as sealant for tapered plugs, elbows, nipples of hydraulic piping.
	LG-6	09940-00011	250 g	Tube	• Features: Silicon based, resistant to heat, cold. • Used as sealant for flange surface, thread. • Used as sealant for oil pan, final drive case, etc.
	LG-7	09920-00150	150 g	Tube	• Features: Silicon based, quick hardening type. • Used as sealant for flywheel housing, intake manifold, oil pan, thermostat housing, etc.
	Three bond 1211	790-129-9090	100 g	Tube	• Used as heat-resisting sealant for repairing engines.
Molybdenum disulphide lubricant	LM-G	09940-00051	60 g	Can	• Used as lubricant for sliding parts (to prevent squeaking).
	LM-P	09940-00040	200 g	Tube	• Used to prevent seizure or scuffing of the thread when press fitting or shrink fitting. • Used as lubricant for linkage, bearings, etc.
Grease	G2-LI	SYG2-400LI SYG2-350LI SYG2-400LI-A SYG2-160LI SYGA160CNLI	Various	Various	• General purpose type
	G2-CA	SYG2-400CA SYG2-350CA SYG2-400CA-A SYG2-160CA SYG2-160CNCA	Various	Various	• Used for normal temperature, light load bearing at places in contact with water or steam.
	Molybdenum disulphide lubricant	SYG2-400M	400 g (10 per case)	Belows type	• Used for places with heavy load.

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Standard tightening torque

Standard tightening torque of bolts and nuts

The following charts give the standard tightening torques of bolts and nuts. Exceptions are given in DISASSEMBLY AND ASSEMBLY.

Thread diameter of bolt	Width across flats		
mm	mm	Nm	kgm
6	10	13.2 ± 1.4	1.35 ± 0.15
8	13	31.4 ± 2.9	3.20 ± 0.3
10	17	65.7 ± 6.8	6.70 ± 0.7
12	19	112 ± 9.8	11.5 ± 1.0
14	22	177 ± 19	18 ± 2.0
16	24	279 ± 29	28.5 ± 3
18	27	383 ± 39	39 ± 4
20	30	549 ± 58	56 ± 6
22	32	745 ± 78	76 ± 8
24	36	927 ± 98	94.5 ± 10
27	41	1320 ± 140	135 ± 15
30	46	1720 ± 190	175 ± 20
33	50	2210 ± 240	225 ± 25
36	55	2750 ± 290	280 ± 30
39	60	3280 ± 340	335 ± 35

Thread diameter of bolt	Width across flats	
mm	mm	Nm	kgm
6	10	7.85 ± 1.95	0.8 ± 0.2
8	13	18.6 ± 4.9	1.9 ± 0.5
10	14	40.2 ± 5.9	4.1 ± 0.6
12	27	82.35 ± 7.85	8.4 ± 0.8

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Tightening torque of hose nuts

Use these torques for hose nuts.

Nominal No.	Thread diameter	Width across flat	Tightening torque	
	mm	mm	Nm	kgm
02	14	19	24.5 ± 4.9	2.5 ± 0.5
03	18	24	49 ± 19.6	5 ± 2
04	22	27	78.5 ± 19.6	8 ± 2
05	24	32	137.3 ± 29.4	14 ± 3
06	30	36	176.5 ± 29.4	18 ± 3
10	33	41	196.1 ± 49	20 ± 5
12	36	46	245.2 ± 49	25 ± 5
14	42	55	294.2 ± 49	30 ± 5

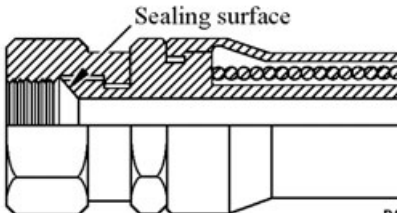
Tightening torque of split flange bolts

Use these torques for split flange bolts.

Thread diameter	Width across flat	Tightening torque	
mm	mm	Nm	kgm
10	14	65.7 ± 6.8	6.7 ± 0.7
12	17	112 ± 9.8	11.5 ± 1
16	22	279 ± 29	28.5 ± 3

Tightening torque for flared nuts

Use these torques for flared part of nut.



Thread diameter	Width across flat	Tightening torque	
mm	mm	Nm	kgm
14	19	24.5 ± 4.9	2.5 ± 0.5
18	24	49 ± 19.6	5 ± 2
22	27	78.5 ± 19.6	8 ± 2
24	32	137.3 ± 29.4	14 ± 3
30	36	176.5 ± 29.4	18 ± 3
33	41	196.1 ± 49	20 ± 5
36	46	245.2 ± 49	25 ± 5
42	55	294.2 ± 49	30 ± 5

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Tightening torque for 102 engine series (bolts and nuts)

Use these torque values for bolts and nuts (unit: mm).

Thread diameter	Tightening torque	
mm	Nm	kgm
6	10 ± 2	1.02 ± 0.20
8	24 ± 4	2.45 ± 0.41
10	43 ± 6	4.38 ± 0.61
12	77 ± 12	7.85 ± 1.22

Tightening torque for 102 engine series (eye joints)

Use these torque values for eye joints (unit: mm).

Thread diameter	Tightening torque	
mm	Nm	kgm
6	8 ± 2	0.81 ± 0.20
8	10 ± 2	1.02 ± 0.20
10	12 ± 2	1.22 ± 0.20
12	24 ± 4	2.45 ± 0.41
14	36 ± 5	3.67 ± 0.51

Tightening torque for 102 engine series (tapered screws)

Use these torque values for tapered screws (unit: inch).

Thread diameter	Tightening torque	
inch	Nm	kgm
1/16	3 ± 1	0.31 ± 0.10
1/8	8 ± 2	0.81 ± 0.20
1/4	12 ± 2	1.22 ± 0.20
3/8	15 ± 2	1.53 ± 0.41
1/2	24 ± 4	2.45 ± 0.41
3/4	36 ± 5	3.67 ± 0.51
1	60 ± 9	6.12 ± 0.92

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Electric wire code

In the wiring diagrams, various colors and symbols are employed to indicate the thickness of wires. This wire code table will help you understand WIRING DIAGRAMS.

EXAMPLE:
05WB indicates a cable having a nominal number 05 and white coating with black stripe.

Classification by thickness

Nominal number	Copper wire			Cable O.D. (mm)	Current rating (A)	Applicable circuit
	Number of strands	Dia. Of strand (mm)	Cross section (mm)			
0.85	11	0.32	0.88	2.4	12	Starting, lighting, signal etc.
2	26	0.32	2.09	3.1	20	Lighting, signal etc.
5	65	0.32	5.23	4.6	37	Charging and signal
15	84	0.45	13.36	7.0	59	Starting (Glow plug)
40	85	0.80	42.73	11.4	135	Starting
60	127	0.80	63.84	13.6	178	Starting
100	217	0.80	109.1	17.6	230	Starting

Classification by color and code

Priority	Circuits Classification		Charging	Ground	Starting	Lighting	Instrument	Signal	Other
1	Primary	Code	W	B	B	R	Y	G	L
		Color	White	Black	Black	Red	Yellow	Green	Blue
2	Auxiliary	Code	WR	—	BW	RW	YR	GW	LW
		Color	White & Red	—	Black & White	Red & White	Yellow & Red	Green & White	Blue & White
3		Code	WB	—	BY	RB	YB	GR	LR
		Color	White & Black	—	Black & Yellow	Red & Black	Yellow & Black	Green & Red	Blue & Red
4		Code	WL	—	BR	RY	YG	GY	LY
		Color	White & Blue	—	Black & Red	Red & Yellow	Yellow & Green	Green & Yellow	Blue & Yellow
5		Code	WG	—	—	RG	YL	GB	LB
		Color	White & Green	—	—	Red & Green	Yellow & Blue	Green & Black	Blue & Black
6		Code	—	—	—	RL	YW	GL	—
		Color	—	—	—	Red & Blue	Yellow & White	Green & Blue	—

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Conversion tables

Method of using the conversion table

The Conversion Table in this section is provided to enable simple conversion of figures. For details of the method of using the Conversion Table, see the example given below.

EXAMPLE:
Method of using the Conversion Table to convert from millimeters to inches.

1. Convert 55 mm into inches.
    a. Locate the number 50 in the vertical column at the left side, take this as , then draw a horizontal line from ①.
    b. Locate the number 5 in the row across the top, take this as ②, then draw a perpendicular line down from ②.
    c. Take the point where the two lines cross as ③. This point ③ gives the value when converting from millimeters to inches. Therefore, 55 millimeters = 2.165 inches.
2. Convert 550 mm into inches.
    a. The number 550 does not appear in the table, so divide by 10 (move the decimal one place to the left) to convert it to 55 mm.
    b. Carry out the same procedure as above to convert 55 mm to 2.165 inches.
    c. The original value (550 mm) was divided by 10, so multiply 2.165 inches by 10 (move the decimal one place to the right) to return to the original value. This gives 550 mm = 21.65 inches.

Millimeters to inches ② **1 mm = 0,03937 inch**

		0	1	2	3	4	5	6	7	8	9
	0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
	10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
	20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
	30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
	40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
							③				
①	50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
	60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
	70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
	80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
	90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

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Millimeters to inches **1 mm = 0,03937 inch**

	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Kilogram to pound **1 mm = 0,03937 inch**

	0	1	2	3	4	5	6	7	8	9
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.53	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

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Liter to U.S. Gallon **1 L = 0.2642 U.S. Gallon**

	0	1	2	3	4	5	6	7	8	9
0	0	0.264	0.528	0.793	1.057	1.321	1.585	1.849	2.113	2.378
10	2.642	2.906	3.170	3.434	3.698	3.963	4.227	4.491	4.755	5.019
20	5.283	5.548	5.812	6.076	6.340	6.604	6.869	7.133	7.397	7.661
30	7.925	8.189	8.454	8.718	8.982	9.246	9.510	9.774	10.039	10.303
40	10.567	10.831	11.095	11.359	11.624	11.888	12.152	12.416	12.680	12.944
50	13.209	13.473	13.737	14.001	14.265	14.529	14.795	15.058	15.322	15.586
60	15.850	16.115	16.379	16.643	16.907	17.171	17.435	17.700	17.964	18.228
70	18.492	18.756	19.020	19.285	19.549	19.813	20.077	20.341	20.605	20.870
80	21.134	21.398	21.662	21.926	22.190	22.455	22.719	22.983	23.247	23.511
90	23.775	24.040	24.304	24.568	24.832	25.096	25.361	25.625	25.889	26.153

Liter to U.K. Gallon **1 L = 0.21997 U.K. Gallon**

	0	1	2	3	4	5	6	7	8	9
0	0	0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.950	4.179
20	4.399	4.619	4.839	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.699	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.778
50	10.998	11.281	11.438	11.658	11.878	12.098	12.318	12.528	12.758	12.978
60	13.198	13.418	13.638	13.858	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.037	18.257	18.477	18.697	18.917	19.137	19.357	19.577
90	19.797	20.017	20.237	20.457	20.677	20.897	21.117	21.337	21.557	21.777

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kgm tp ft. lb. **1 kgm = 7.233 ft. lb.**

	0	1	2	3	4	5	6	7	8	9
0	0	7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	296.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	1005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.63	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4

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kg/cm² to lb/in² **1 kg/cm² = 14.2233 lb/in²**

	0	1	2	3	4	5	6	7	8	9
0	0	14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.4	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.1	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	995.6	1010	1024	1038	1053	1067	1081	1095	1109	1124
80	1138	1152	1166	1181	1195	1209	1223	1237	1252	1266
90	1280	1294	1309	1323	1337	1351	1365	1380	1394	1408
100	1422	1437	1451	1465	1479	1493	1508	1522	1536	1550
110	1565	1579	1593	1607	1621	1636	1650	1664	1678	1693
120	1707	1721	1735	1749	1764	1778	1792	1806	1821	1835
130	1849	1863	1877	1892	1906	1920	19324	1949	1963	1977
140	1991	2005	2034	2048	2062	2077	2091	2105	2119	
150	2134	2148	2162	2176	2190	2205	2219	2233	2247	2262
160	2276	2290	2304	2318	2333	2347	2361	2375	2389	2404
170	2418	2432	2446	2460	2475	2489	2503	2518	2532	2546
180	2560	2574	2589	2603	2617	2631	2646	2660	2674	2688
190	2702	2717	2731	2745	2759	2773	2788	2802	2816	2830
200	2845	2859	2873	2887	2901	2916	2930	2944	2958	2973
210	2987	3001	3015	3030	3044	3058	3072	3086	3101	3115
220	3129	3143	3158	3172	3186	3200	3214	3229	3243	3257
230	3271	3286	3300	3314	3328	3343	3357	3371	3385	3399
240	3414	3428	3442	3456	3470	3485	3499	3513	3527	3542

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Temperature

Fahrenheit Centigrade Conversion; a simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vise versa is to enter the accompanying table in the center or boldface column of figures. These figures refer to the temperature in either Fahrenheit or Centigrade degrees. If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left. If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

°C		°F	°C		°F	°C		°F	°C		°F
-40.4	-40	-40.0	-11.7	11	51.8	7.8	46	114.8	27.2	81	117.8
-37.2	.35	-31.0	-11.1	12	53.6	8.3	47	116.6	27.8	82	179.6
-34.4	-30	-22.0	-10.6	13	55.4	8.9	48	118.4	28.3	83	181.4
-31.7	-25	-13.0	-10.0	14	57.2	9.4	49	120.2	28.9	84	183.2
-28.9	-20	-4.0	-9.4	15	59.0	10.0	50	122.0	29.4	85	185.0
-28.3	-19	-2.2	-8.9	16	60.8	10.6	51	123.8	30.0	86	186.8
-27.8	-18	-0.4	-8.3	17	62.6	11.1	52	125.6	30.6	87	188.6
-27.2	-17	1.4	-7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
-26.7	-16	3.2	-7.2	19	66.2	12.2	54	129.2	31.7	89	192.2
-26.1	-15	5.0	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-25.6	-14	6.8	-6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
-25.0	-13	8.6	-5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
-24.4	-12	10.4	-5.0	23	73.4	14.4	58	136.4	33.9	93	199.4
-23.9	-11	12.2	-4.4	24	75.2	15.0	59	138.2	34.4	94	201.2
-23.3	-10	14.0	-3.9	25	77.0	15.6	60	140.0	35.0	95	203.0
-22.8	-9	15.8	-3.3	26	78.8	16.1	61	141.8	35.6	96	204.8
-22.2	-8	17.6	-2.8	27	80.6	16.7	62	143.6	36.1	97	206.6
-21.7	-7	19.4	-2.2	28	82.4	17.2	63	145.4	36.7	98	208.4
-21.1	-6	21.2	-1.7	29	84.2	17.8	64	147.2	37.2	99	210.2
-20.6	-5	23.0	-1.1	30	86.0	18.3	65	149.0	37.8	100	212.0
-20.0	-4	24.8	-0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
-19.4	-3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
-18.9	-2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
-18.3	-1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
-17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
-17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
-16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
-16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
-15.6	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
-15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
-14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
-13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
-13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
-12.8	9	48.2	6.7	44	111.2	26.1	79	174.2	76.7	170	338.0
-12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	175	347.0

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Units

In this manual, the measuring units are indicated with International System of units (SI).

As for reference, conventionally used Gravitational System of units are indicated in parentheses { }.

EXAMPLE:

N	{kg}
Nm	{kgm}
MPa	{kg/cm²}
kPa	{mmH_2O}
kPa	{mmHg}
kw/rpm	{HP/rpm}
g/kwh	{g/HPh}

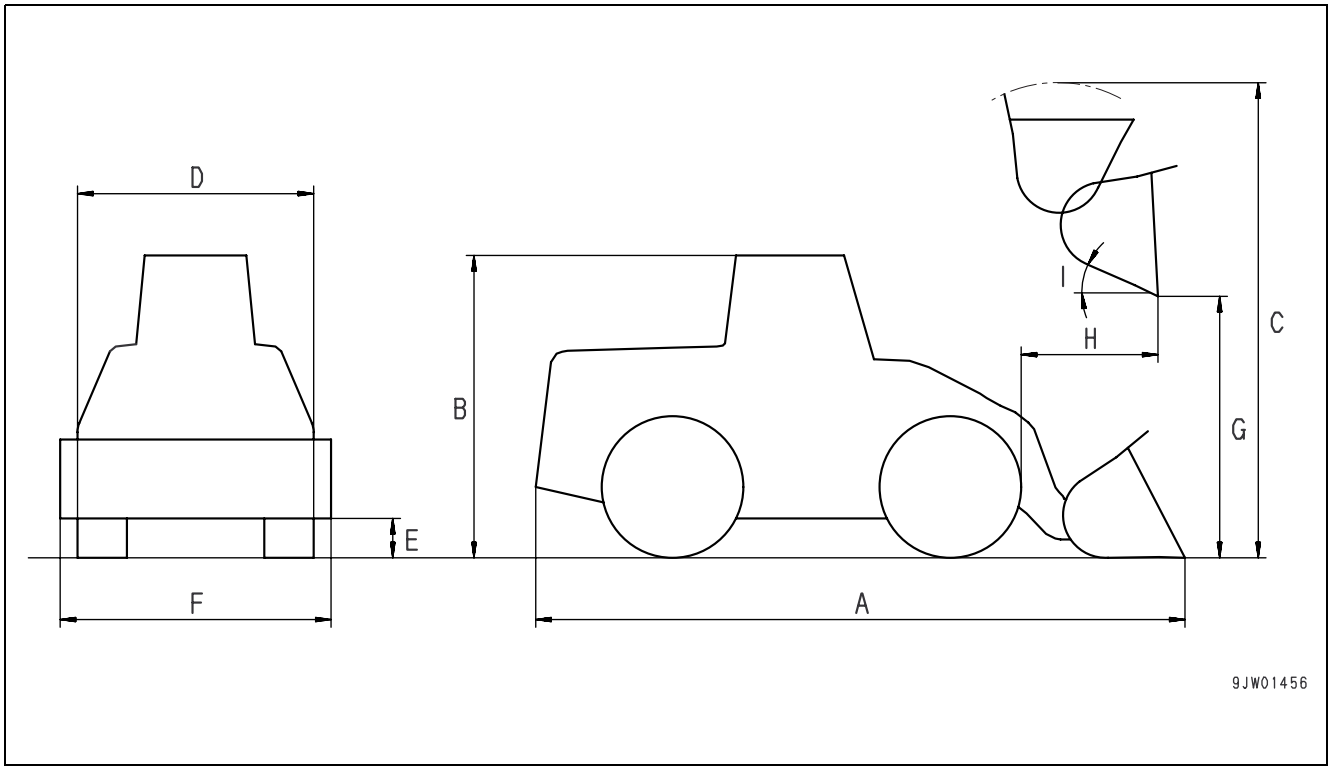
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01 GENERAL

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General assembly drawing



	Item	Unit	WA470-5	WA480-5
A	Overall length	mm	8,815	9,155
B	Overall height	mm	3,395	3,500
C	Overall height when bucket is raised	mm	5,895	6,175
D	Overall width	mm	2,920	3,010
E	Min. ground clearance	mm	460	525
F	Bucket width	mm	3,170	
G	Dumping clearance (tip of BOC)	mm	3,205 (3,120)	3,300 (3,205)
H	Dumping reach (tip of BOC)	mm	1,260 (1,305)	1,370 (1,410)
I	Bucket dump angle	deg.	45	

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Specifications

Machine model				WA470-5		WA480-5	
Serial No.				WA470H50051 and up		WA480H50051 and up	
Weight	Operating weight		kg	22,520		24,065	
	Distribution (front) SAE travel posture		kg	10,260		10,335	
	Distribution (rear) SAE travel posture		kg	11,260		13,730	
Performance	Bucket capacity (piled)		m^3	4.2		4.6	
	Rated load		kg	6,720		7,820	
				N mode	P mode	N mode	P mode
	Travel speed	FORWARD 1st	km/h	5.0	5.8	5.7	6.3
		FORWARD 2nd	km/h	9.4	11.2	11.0	12.1
		FORWARD 3rd	km/h	17.1	20.2	20.0	21.6
		FORWARD 4th	km/h	27.7	33.1	32.0	34.3
		REVERSE 1st	km/h	5.3	6.1	6.1	6.6
		REVERSE 2nd	km/h	10.1	11.9	11.7	12.8
		REVERSE 3rd	km/h	18.3	21.4	21.3	22.8
		REVERSE 4th	km/h	29.6	34.7	34.1	35.8
	Max. rimpull	FORWARD	kN {kg}	171.6 {17,500}	208.9 {21,300}	167.7 {17,100}	193.2 (19,700}
		REVERSE	kN {kg}	160.8 {16,400}	195.8 {19,970}	157.9 {16,100}	182.1 {18,570}
	Gradeability		deg	25		25	
	Min. turning radius	(Center of outside wheel)	mm	5,900		5,900	
		(tip of BOC)	mm	6,940/6,980		6,990/7,030	
Dimensions	Overall length (with BOC)		mm	8,815		9,155	
	Overall width (chassis)		mm	2,920		3,010	
	Bucket width (with BOC)		mm	3,170		3,170	
	Overall height (top of cab)		mm	3,395		3,500	
	Overall height (Bucket approx. raised to max.)		mm	5,895		6,175	
	Wheel base		mm	3,450		3,450	
	Tread		mm	2,300		2,300	
	Min. ground clearance		mm	460		525	
	Max. height of bucket hinge pin		mm	4,295		4,505	
	Dumping clearance (tip of BOC)		mm	3,205/3,120		3,300/3,205	
	Dumping reach (tip of BOC)		mm	1,260/1,305		1,370/1,410	
	Steering angle		deg	40		40	
	Bucket dump angle (max. height)		deg	45		49	
	Bucket tilt angle (travel posture)		deg	50		52	
	Bucket tilt angle (max. height)		deg	65		60	
	Digging depth (10° dump) (tip of BOC)		mm	420/380		395/355	

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Machine model			WA470-5		WA480-5	
Serial No.			WA470H50051 and up		WA480H50051 and up	
Engine	Model		Komatsu SAA6D125E-3			
	Type		4-cycle, water-cooled, in-line, 6-cylinder, direct injection with turbocharger, aftercooler			
	No. of cylinders - bore × stroke	mm	6 - 125 × 150			
	Piston displacement	l {cc}	11.04 {11,040}			
			N mode	P mode	N mode	P mode
	Flywheel horsepower	kW {HP}/rpm	181.1/2,000 {243/2,000}	195.0/2,000 {261/2,000}	186.9/2,000 {250/2,000}	202.4/2,000 {271/2,000}
	Maximum torque	Nm {kgm}/rpm	1,167/1,400 {119/1,400}	1,245/1,400 {127/1,400}	1,216/1,400 {124/1,400}	1,294/1,400 {132/1,400}
	Min. fuel consumption ratio	g/kWh {g/HPh}	201{154}	201{154}	201{154}	201{154}
	High idling speed	rpm	1,870 ± 50	2,140 ± 50	2,020 ± 50	2,140 ± 50
	Low idling speed	rpm	775 ± 25	775 ± 25	775 ± 25	775 ± 25
	Starting motor		24 V 7.5 kW			
	Alternator		24 V 35 A			
	Battery		24 V 150 Ah × 2			
Power train	Torque converter		3-element, 1-stage, 1-phase 3-element, 1-stage, 2-phase (with lockup clutch)			
	Transmission		Mulch-shaft power shift, spur gear, constant-mesh multiple disc, hydrualically actuated, modulation type			
	Reduction gear		Spiral bevel gear, splash lubrication			
	Differential		Conventional differential gear			
	Final drive		Planetary gear single stage, splash lubrication			
Axle, wheel	Drive type		Front-, rear-wheel drive			
	Front wheel		Fixed to frame, half-floating type			
	Rear wheel		Center pin support, half-floating type			
	Tire		23.5-25-20PR		26.5-25-20PR	
	Wheel rim		19.50-25WTB		22.00 - 25WTB	
	Inflation pressure Front tire	kPa {kg/cm²}	392 {4.0}		412 {4.2}	
	Rear tire	kPa {kg/cm²}	319 {3.25}		343 {3.5}	
Brakes	Main brake		4 wheels brake, Front-, rear-wheel independent system control, sealed multiple-disc wet-type disc brake, Hydraulically controlled, with hydraulic booster			
	Parking brake		Transmission output shaft brake, sealed wet type disc brake, hydraulically released spring type			

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Machine model					WA470-5	WA480-5
Serial No.					WA470H50051 and up	WA480H50051 and up
Steering control	Type				Articulated steering	
	Control				Hydraulic control	
Hydraulic system	Hydraulic pump	Torque converter pump				
			• Type		Gear type	
			• Delivery	l/min	251	
		Steering pump				
			• Type		Gear type	
			• Delivery	l/min	146	
		Hydraulic pump				
			• Type		Gear type	
			• Delivery	l/min	303	
		Switching pump				
			• Type		Gear type	Gear type
			• Delivery	l/min	120	135
		Pilot control pump				
			• Type		Gear type	
			• Delivery	l/min	47	
		Cooling fan pump				
			• Type		Variable displacement piston type	
	Cylinder	Steering cylinder	Type		Reciprocating piston type	Reciprocating piston type
			Cylinder inner diameter	mm	100	100
			Piston rod diameter	mm	50	50
			Stroke	mm	441	441
			Max. length between pins	mm	1,296	1,296
			Min. length between pins	mm	855	855
		Boom Cylinder	Type		Reciprocating piston type	Reciprocating piston type
			Cylinder inner diameter	mm	180	180
			Piston rod diameter	mm	95	95
			Stroke	mm	764	881
			Max. length between pins	mm	2,167	2,382
			Min. length between pins	mm	1,403	1,501
		Bucket cylinder	Type		Reciprocating piston type	Reciprocating piston type
			Cylinder inner diameter	mm	200	225
			Piston rod diameter	mm	100	120
			Stroke	mm	575	572
			Max. length between pins	mm	1,795	1,855
			Min. length between pins	mm	1,220	1,283

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Machine model				WA470-5	WA480-5
Serial No.				WA470H50051 and up	WA480H50051 and up
Hydraulic system	Control valve	Work equipment control valve • Type • Set pressure	 MPa {kg/cm²}	 2-spool type 20.6 {210}	
		Travel control valve • Type • Set pressure	 MPa {kg/cm²}	 Spool type 20.6 {210}	
	Motor	Cooling fan motor • Type		 Fixed displacement piston type	
Work equipment	Link type Bucket edge type			Single link Flat edge with BOC	

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Weight table

★ This weight table is a guide for use when transporting or handling components.

Unit: kg

Machine model	WA470-5	WA480-5
Serial No.	WA470H50051 and up	WA480H50051 and up
Engine (without coolant and oil)	1,200	1,200
Radiator (without coolant)	83	83
Transmission (including torque converter)	919	919
Transmission (including torque converter, with lockup clutch)	958	958
Center drive shaft	32	32
Front drive shaft	31	31
Rear drive shaft	22	21
Front axle	1,260	1,260
Rear axle	1,158	1,158
Axle pivot (rear axle)	144	144
Wheel (each)	228	251
Tire (each)	250	421
Steering valve	24	24
Steering cylinder assembly (each)	38	38
Emergency steering pump (op)	2.6	2.6
Emergency steering motor (op)	13	13
Brake valve (R.H.)	8.5	8.5
Brake valve (L.H.)	5.3	5.3
Hydraulic tank (without hydraulic oil)	232	232
Torque converter, work equipment, PPC pump (3 tandem pump)	47	47
Steering, switching pump (2 tandem pump)	29	31
PPC valve	3	3
Work equipment valve	113	113
Boom cylinder assembly (each)	200	211
Bucket cylinder assembly	216	299
Engine hood	167	167
Front frame	1,866	1,957
Rear frame	1,605	1,622
Bucket link	89	108
Bell crank	390	410
Boom (including bushing)	1,470	1,571
Bucket (width: 3,170 mm, with BOC)	2,050	2,259
Counterweight	1,950	2,970

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Unit: kg

Machine model	WA470-5	WA480-5
Serial No.	WA470H50051 and up	WA480H50051 and up
Fuel tank (without fuel)	205	209
Battery (each)	36	36
Operator’s Cab (op)	700	700
Air conditioner unit (op)	12.5	12.5
Operator’s seat	36	36
Floor board	313	313
Oil cooler	6.2	6.2
Torque convertor oil cooler	23	23
Cooling fan drive pump	25	25
Cooling fan drive motor	13	13

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List of lubricant and coolant

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE -22 -4 14 32 50 68 86 104 122°F -30 -20 -10 0 10 20 30 40 50°C
Engine oil pan	Engine oil	SAE30 SAE10W SAE10W-30 SAE15W-40
Transmission case		SAE10W
Hydraulic system		SAE 10W-30
Axle (*4) (with anti-slip differential)	Axle oil	See Next Page (*6)
Axle (with conventional differential)		AX075 (*5)
Fuel tank	Diesel fuel (*2)	ASTM D975 No. 2 (*1)
Pins	Grease	NLGI No. 2
Pins (with auto-greasing system)		(*3) NLGI No. 2
Greasing system		NLGI No. 2
Cooling system	Water	Add antifreeze

Unit: l

CAPACITY	WA470-5		WA480-5	
	Specified	Refill	Specified	Refill
Engine oil pan	47	38	47	38
Transmission case	65	60	65	60
Hydraulic system	280	186	295	186
Axle (each)	52	52	55	55
Fuel tank	390	—	417	—
Cooling system	50	—	50	—

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- **Use only diesel fuel.**
- **The engine mounted on this machine employs electronic control and a high-pressure fuel injection device to obatain good fuel consumption and good exhaust gas characteristics. For this reason, it requires high precision for the parts and good lubrication.**
- **If kerosene or other fuel with low lubricating ability is used, there will be a significant drop in durability.**

*1: ASTM D975 No. 1

*2: Use only diesel fuel.

*3: If a machine equipped with an auto-greasing system is operated at temperatures below -20°C (-4°F), use lithium-based grease No. 0.

If the machine is operated at temperatures below -20°C (-4°F), a seperate device is needed, so please consult your Komatsu distributor.

If a machine equipped with optional auto-greasing system is operated at -20°C (-4°F), set the greasing time to 20 minutes.

*4: The letters "ASD" are stamped on the name plate of machines equipped with the anti-slip differential axle.

*5: For the conventional differential, except for "AX075", the oil for machines equipped with the anti-slip differential in the table below and EO30 can be used. However, in the case of "EO30", depending on conditions such as the wayt he brakes are used and the oil temperature, the brakes may squel just before the machine stops, but there is no problem with the brake performance or durability.

*6: For machines equipped with the anti-slip differential axle, select from the oil given in the table below.

Maker	Brand	Remarks
SHELL	DONAX TD 5W-30	North American manufactured DONAX TD 20W-40 must not be used
ESSO	TORQUE FLUID	North American manufactured must not be used
MOBIL	MOBILFLUID 424	
FUCHS	RENOGEAR HYDRA ZF 20W-40	

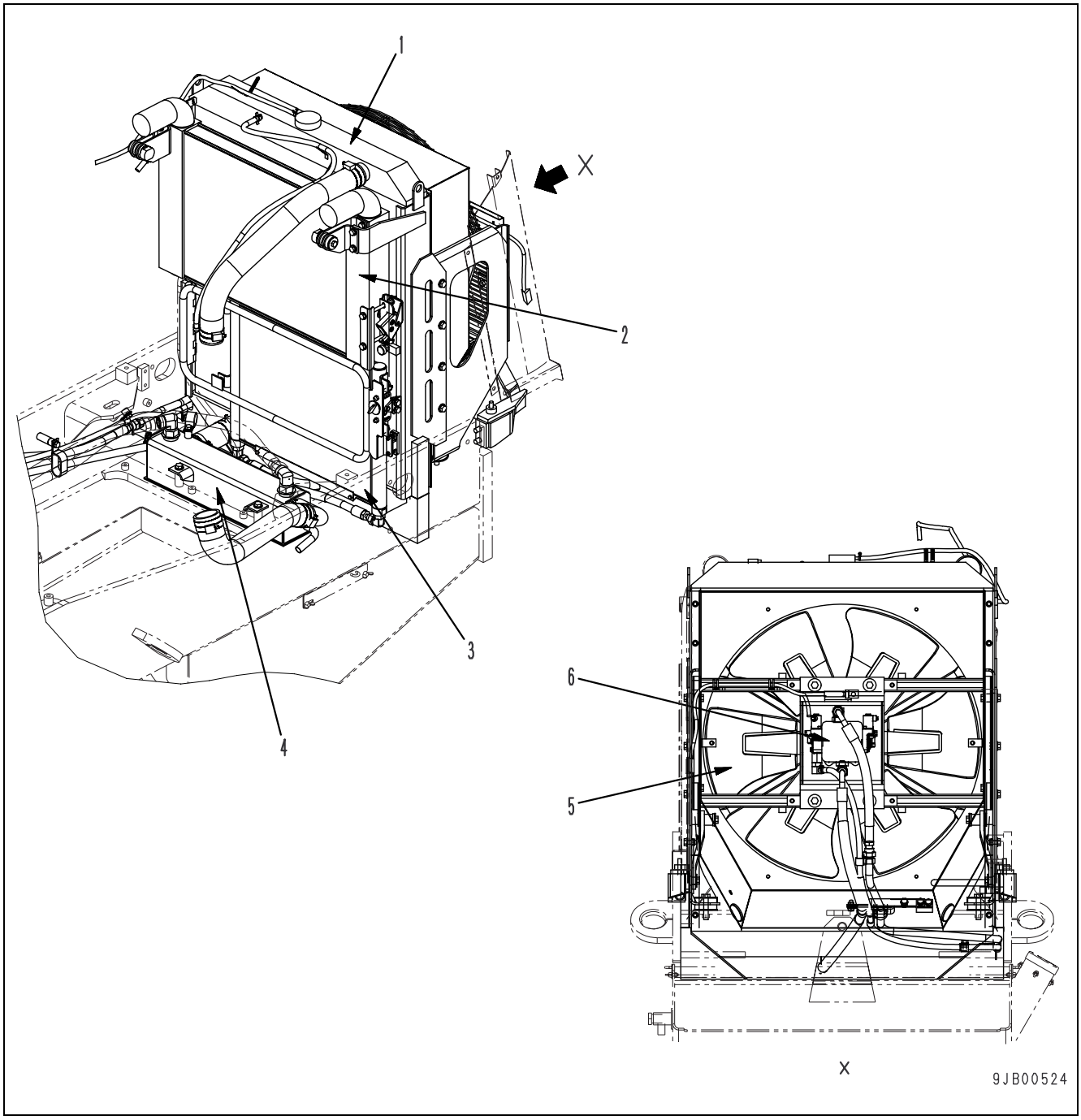
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10 STRUCTURE AND FUNCTION, MAINTENANCE STANDARD

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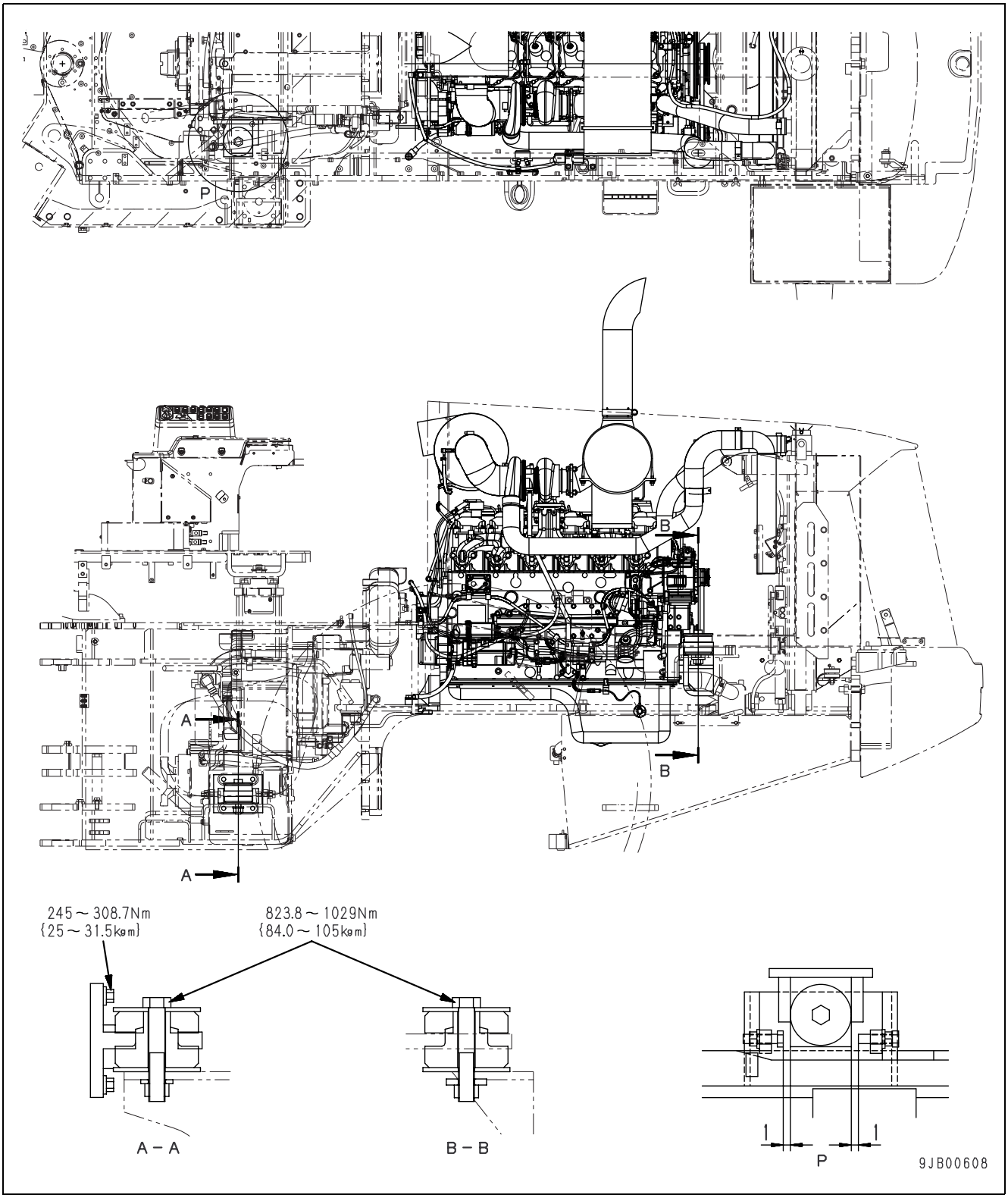
Radiator, oil cooler



1. Radiator
2. Aftercooler
3. Oil cooler
4. Torque converter cooler
5. Cooling fan
6. Cooling fan drive hydraulic motor

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Engine mount, transmission mount

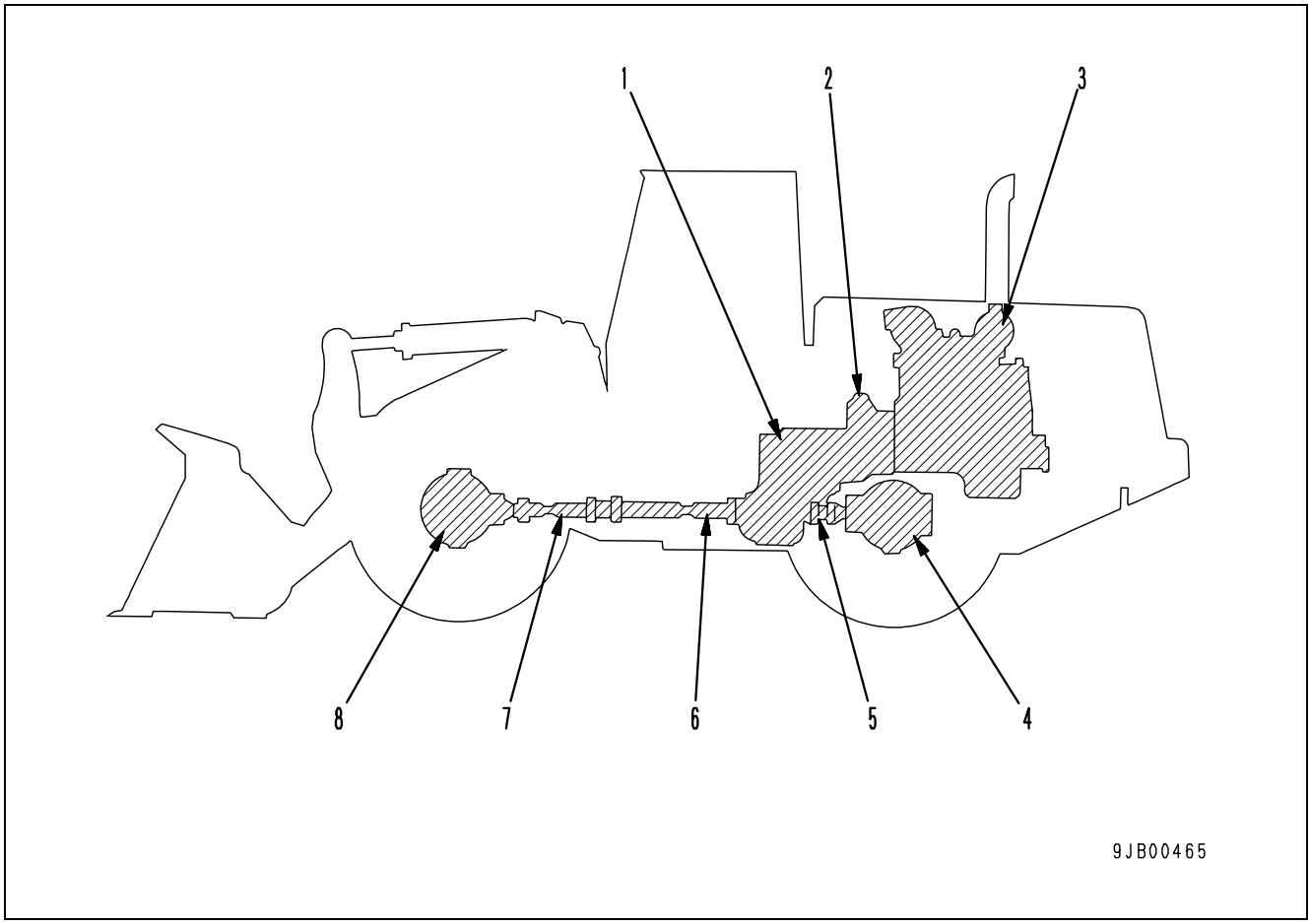


Unit: mm

No.	Check item	Criteria	Remedy
1	Clearance between transmission mount bracket and adjustment bolt	1 ~ 1.5	Adjust

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Power train



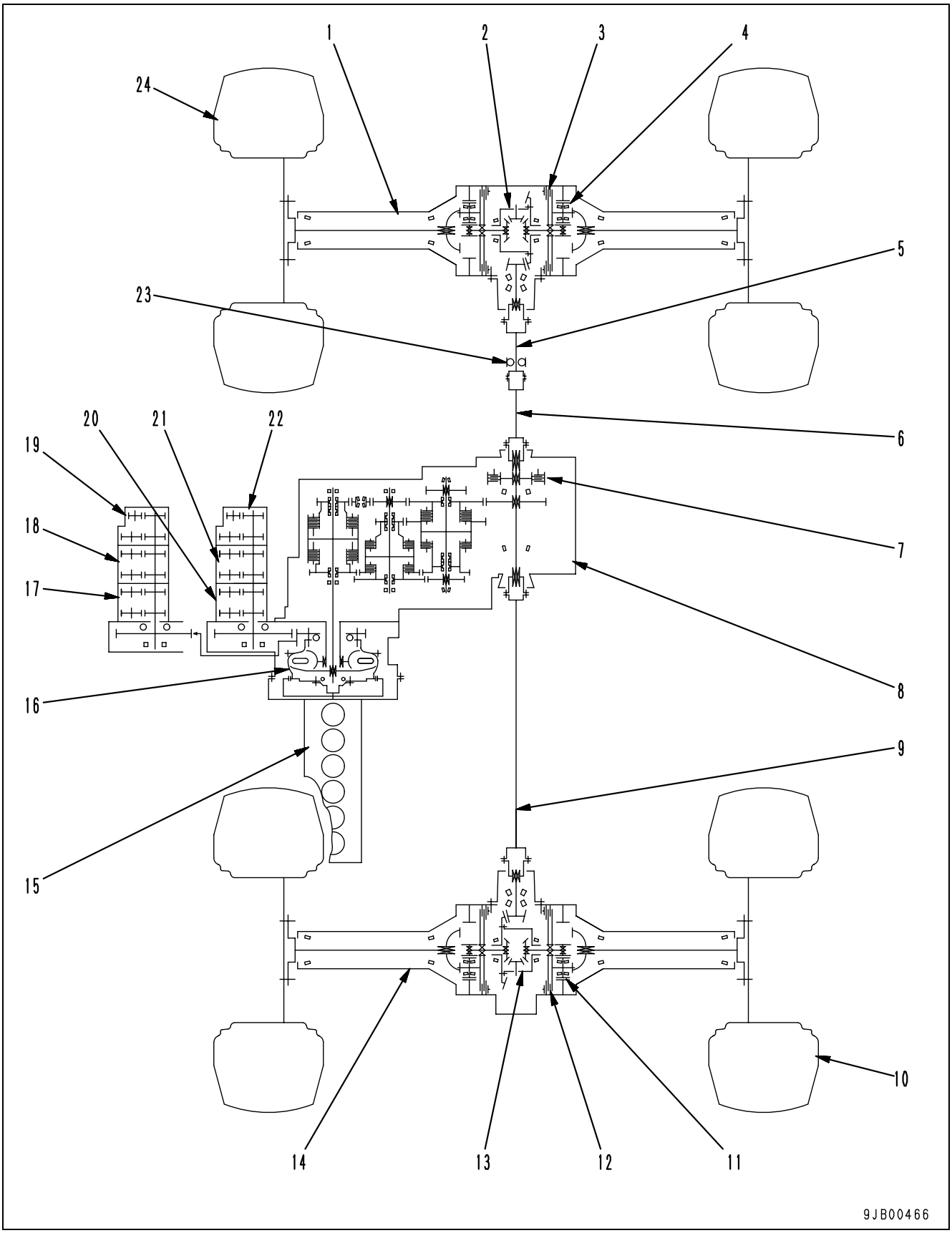
1. Transmission
2. Torque converter
3. Engine
4. Rear axle
5. Rear drive shaft
6. Center drive shaft
7. Front drive shaft
8. Front axle

- The power from engine (3) is transmitted through the engine flywheel to torque converter (2). The turbine in the torque converter is connected to the input shaft of transmission (1).
- The transmission has 6 hydraulically operated clutches. These provide 4 FORWARD and REVERSE speeds.
- The power from the transmission output shaft passes through center drive shaft (6), front drive shaft (7) and rear drive shaft (5), and is transmitted to front axle (8) and rear axle (4) to drive the wheels.

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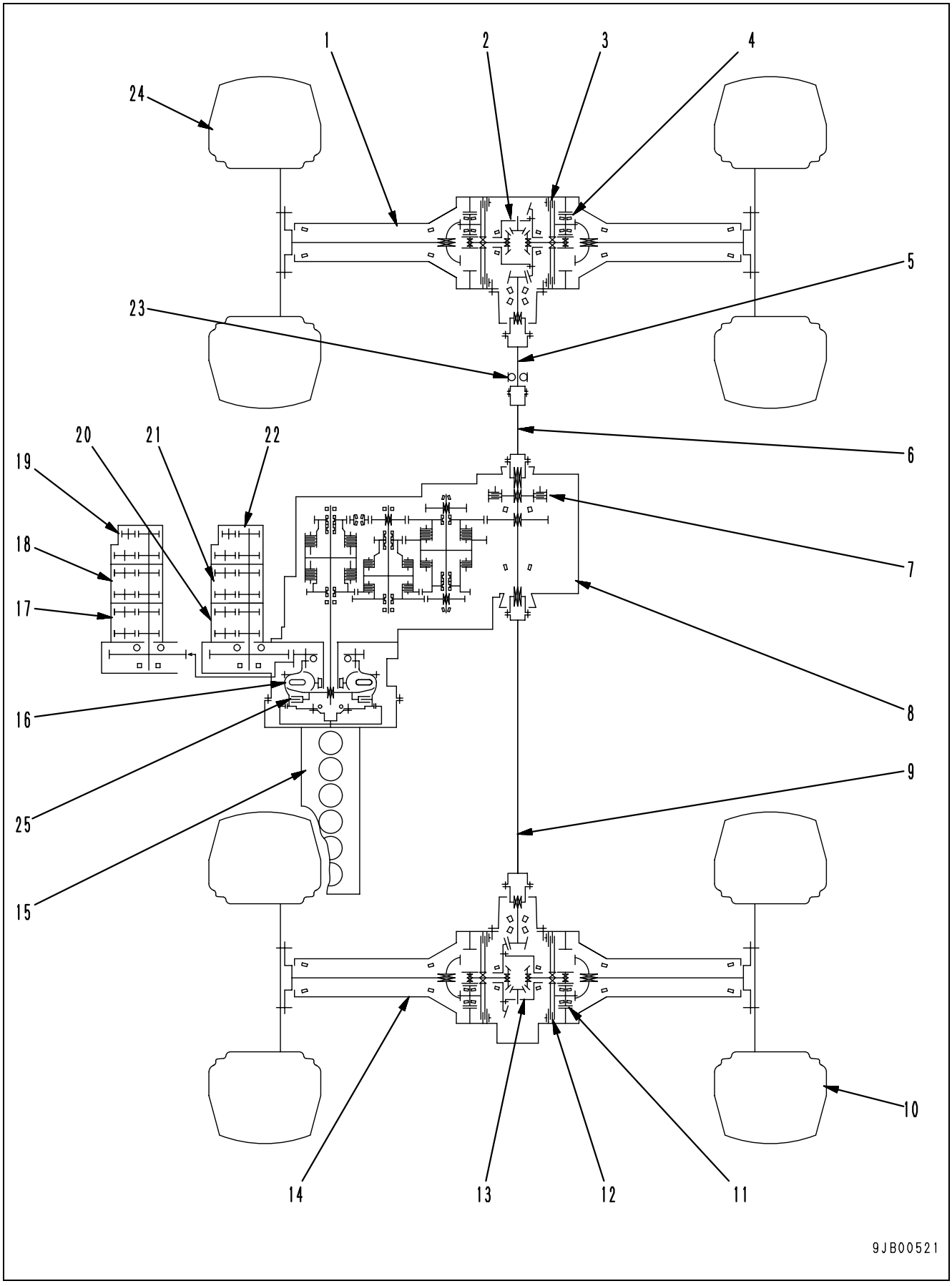
Power train system diagram

Without torque converter lock-up clutch



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With torque converter lock-up clutch



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1. Front axle
2. Differential
3. Wet-type multiple-disc brake
4. Final drive
5. Front drive shaft
6. Center drive shaft
7. Parking brake (wet-type multiple-disc)
8. Transmission (multiple-shaft)
9. Rear drive shaft
10. Rear tire
11. Final drive
12. Wet-type multiple-disc brake
13. Differential
14. Rear axle
15. Engine
16. orque converter
17. Torque converter charging pump
18. Work equipment hydraulic pump
19. PPC pump
20. Steering pump
21. Switch pump
22. Cooling fan drive pump
23. Flange bearing
24. Front tire
25. Torque converter lock-up clutch

Outline

- The power from engine (15) is transmitted through the flywheel to torque converter (16).
  The torque converter uses oil as a medium to vary the transmission torque according to the change in the load. It transmits the power to the transmission input shaft.
  The power from the engine passes through the torque converter pump drive gear and is transmitted to steering pump (20), switch pump (21), cooling fan drive pump (22), transmission and torque converter charging pump (17), work equipment hydraulic pump (18), and PPC pump (19) to drive these pumps.

- Transmission (8) operates the directional valves and speed valves in the transmission to actuate the 6 hydraulically operated clutches and select one of the 4 FORWARD or REVERSE speeds.

- Parking brake (7) is applied by an electromagnetic valve that is actuated when the parking brake switch is operated. It is a wet-type multiple-disc brake installed to the front of the output shaft to stop the machine.

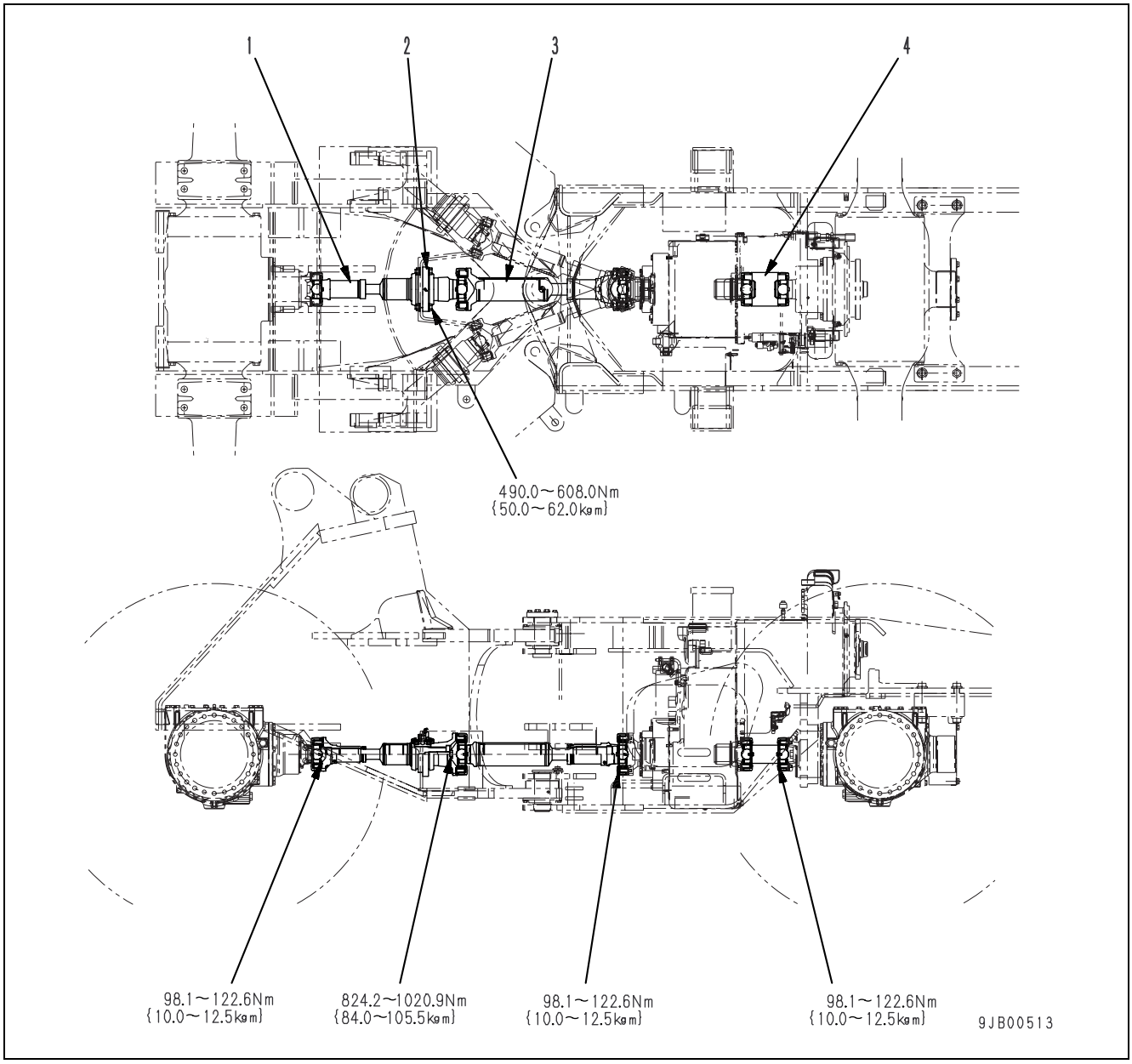
- The power from the output shaft of transmission (8) is transmitted to the front and rear axles. At the front, the power is transmitted to front axle (1) through center drive shaft (6), flange bearing (23), and front drive shaft (5).
  At the rear, it is transmitted to rear axle (14) through rear drive shaft (9).

- The power transmitted to front axle (1) and rear axle (14) is reduced by the pinion gear in differentials (2) and (13), and is transmitted through the differential mechanism to the sun gear shaft.

- The power from the sun gear is further reduced by planetary-type final drive (11) and is transmitted to the wheels through the axle shaft.

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Drive shaft (propeller shaft)



1. Front drive shaft
2. Flange bearing
3. Center drive shaft
4. Rear drive shaft

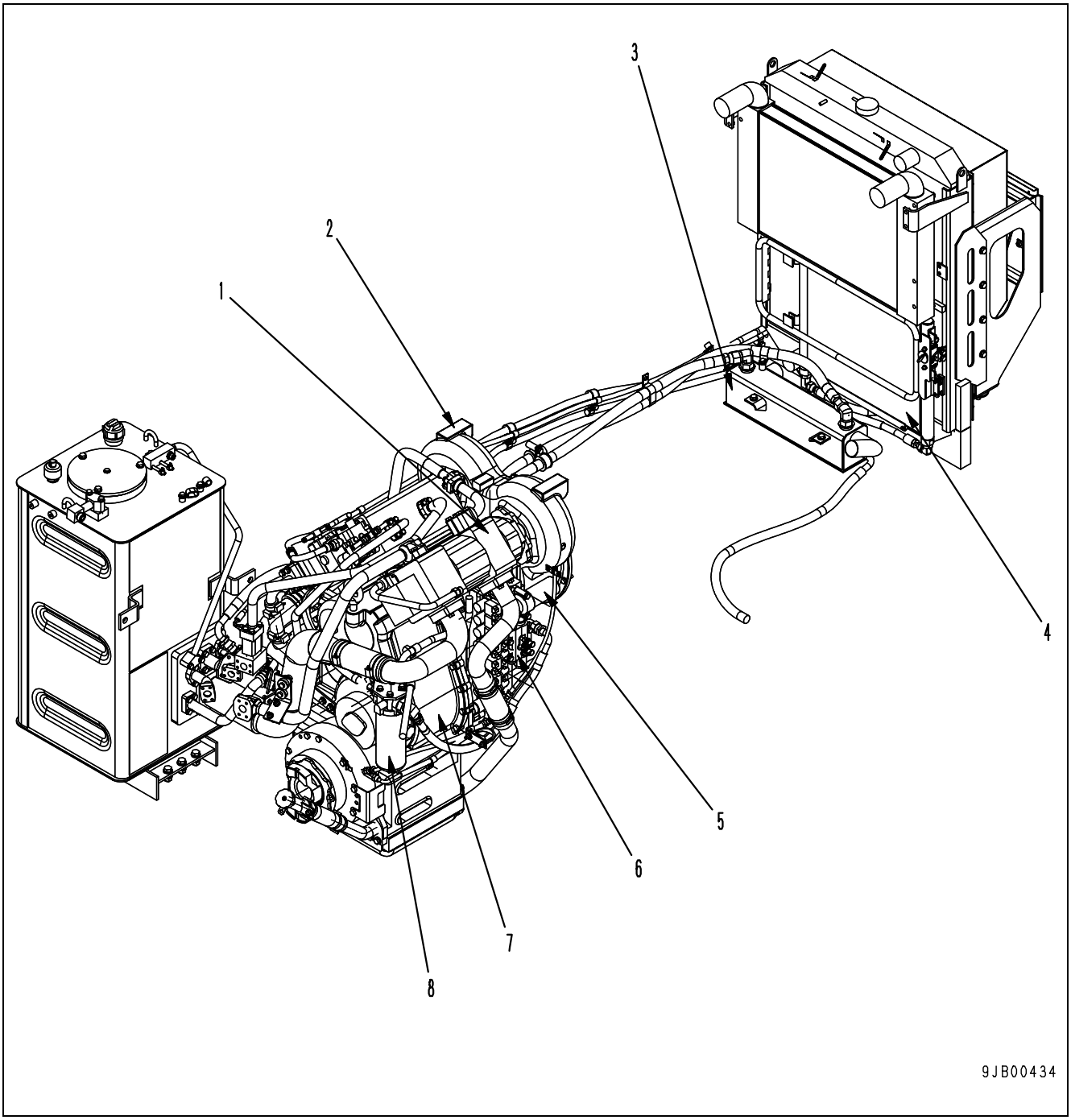
Outline

- The power from the transmission output shaft passes through center drive shaft (3), front drive shaft (1), and rear drive shaft (4), and is transmitted to the front axle and rear axle.
- When the body is articulated, or when the machine is traveling and there is shock from the ground surface, or when there is shock during operations, the position of the transmission and the front and rear axles changes.

  The transmission is designed so that even if the position of the components changes as a result of such shock, power can be transmitted without damage to any parts. With this design, the drive shafts have universal joints and flange bearings that enable them to handle any changes in the angle and length.

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Torque converter, transmission piping

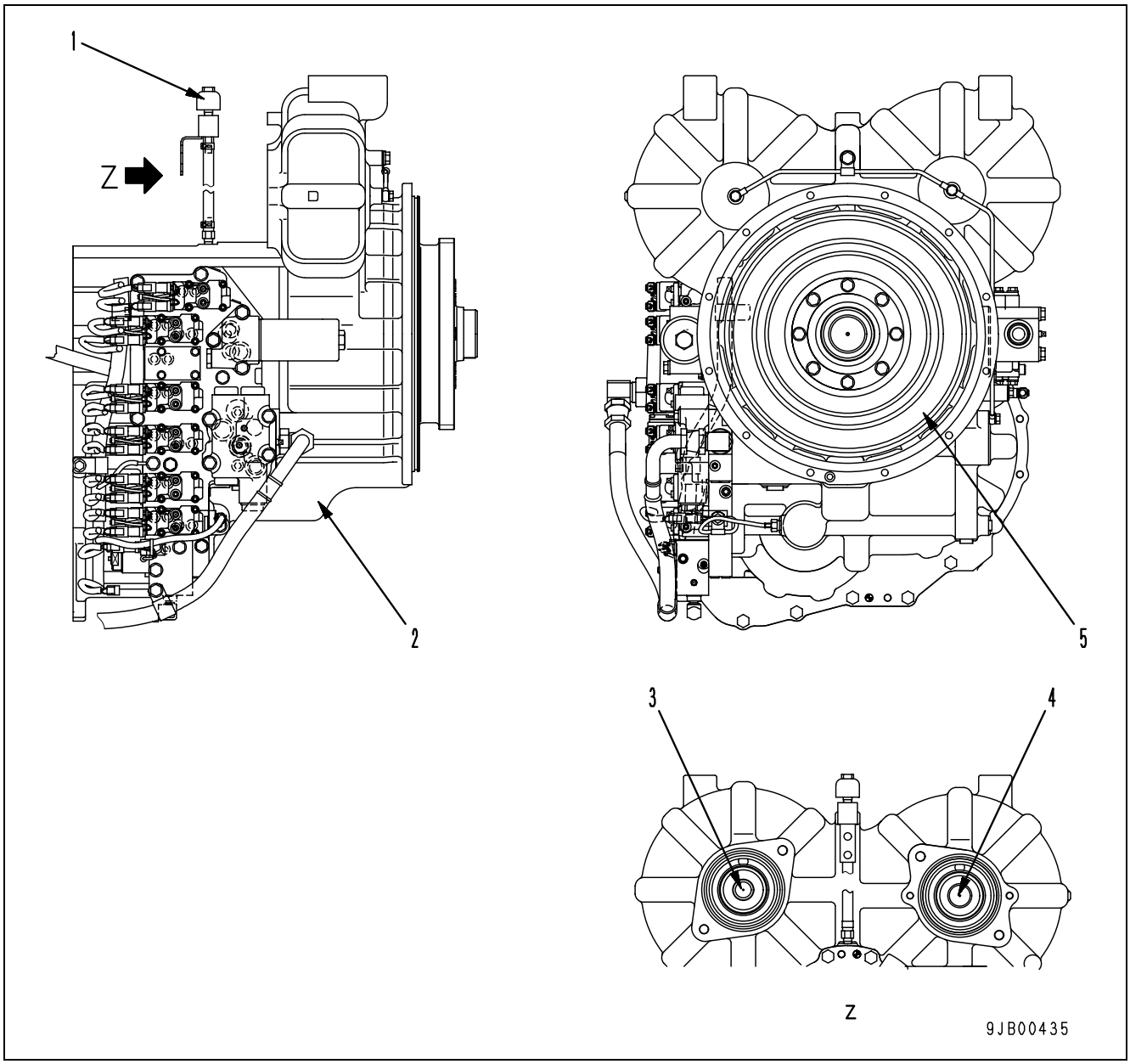


1. Torque converter charging pump
2. Torque converter
3. Torque converter oil cooler
4. Hydraulic oil cooler
5. Last-chance filter
6. Transmission control valve
7. Transmission
8. Oil filter

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Torque converter

Without lock-up clutch

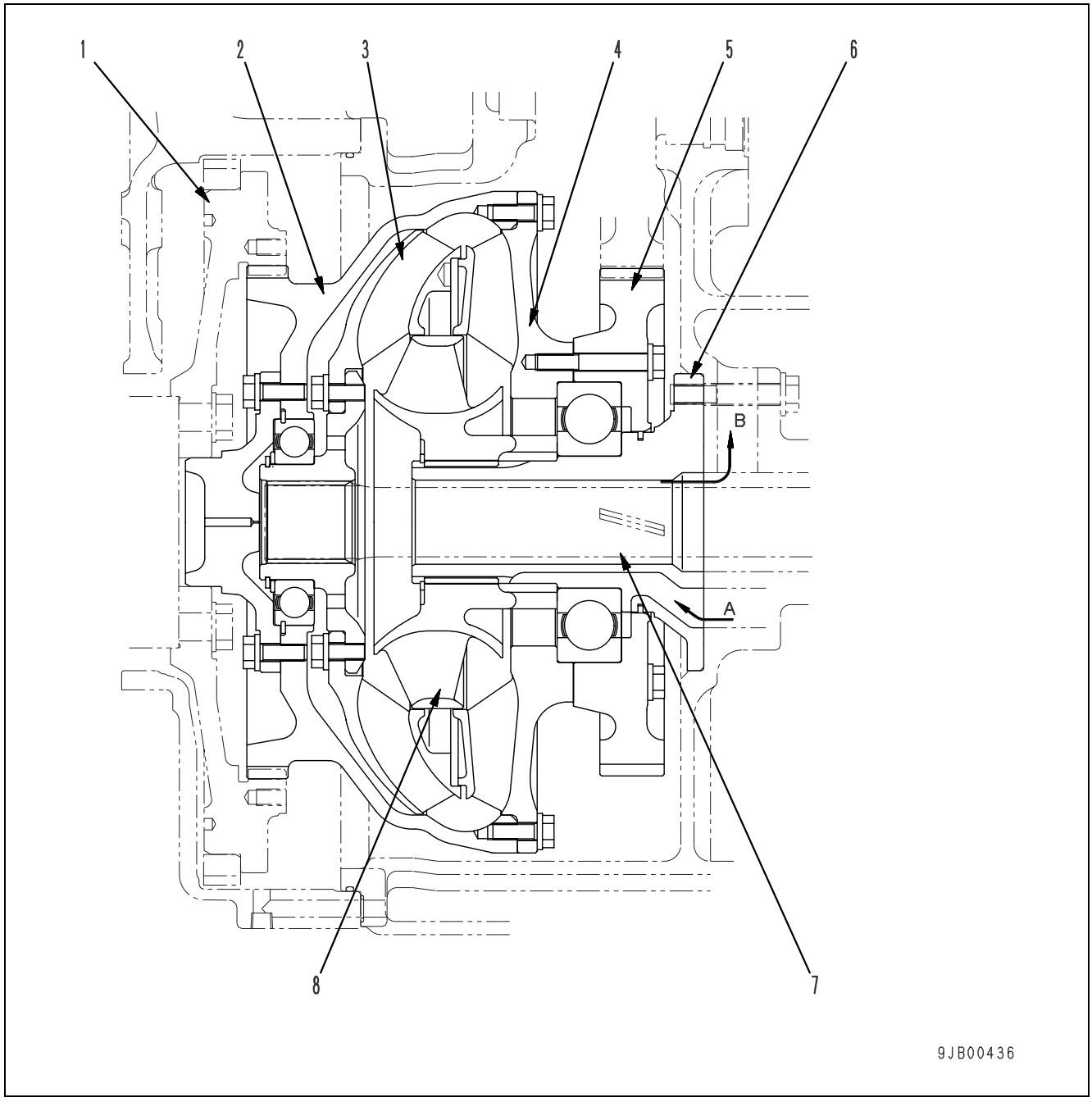


1. Breather
2. Housing
3. Mount for steering, switch, cooling fan drive pumps
4. Mount for torque converter charging, work equipment hydraulic, PPC pumps
5. Torque converter

Specifications

Type	3-element, 1-stage, 1-phase
Stall torque ratio	2.39

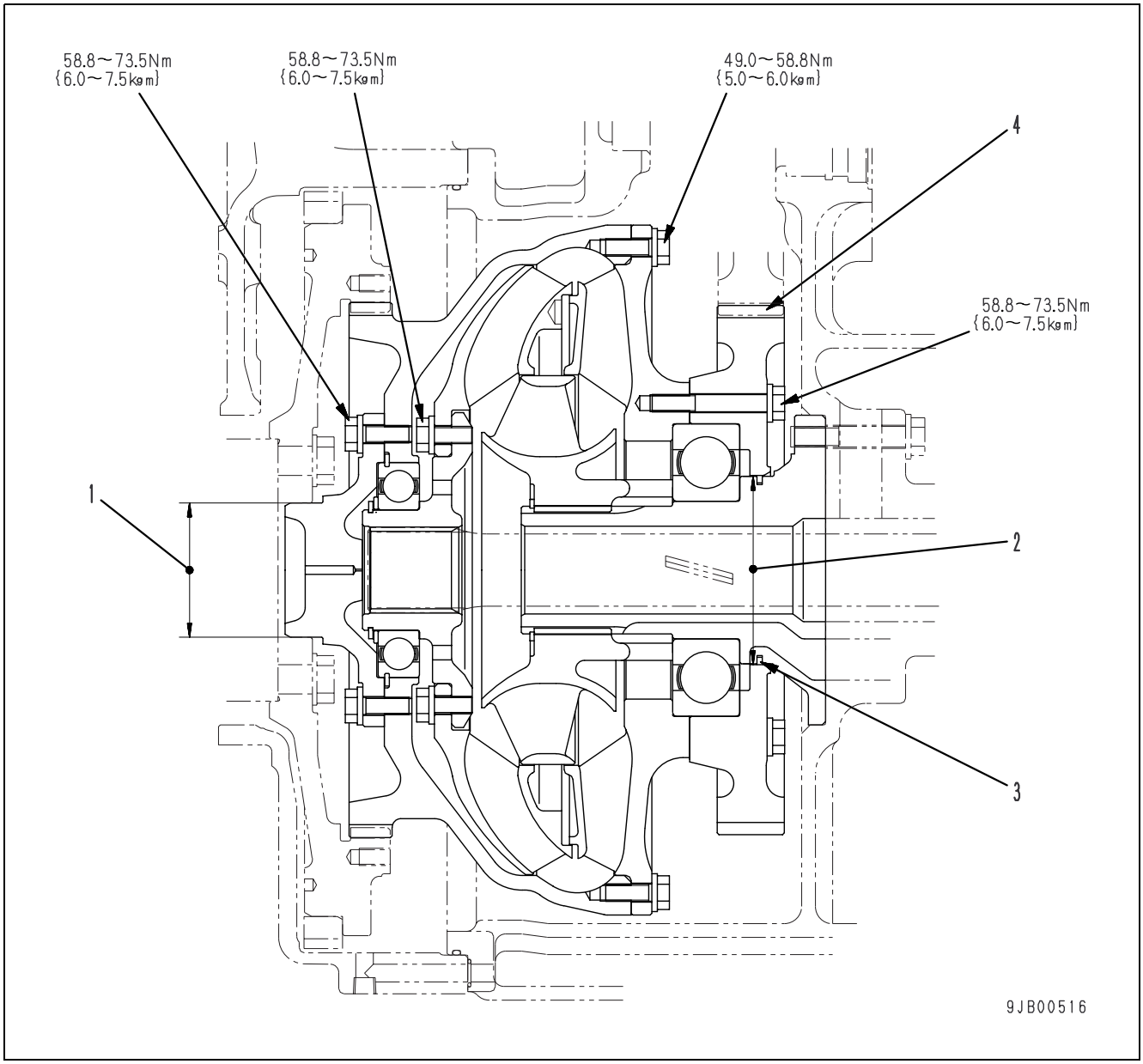
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1. Flywheel
2. Drive case
3. Turbine
4. Pump
5. PTO drive gear
6. Stator shaft
7. Transmission input shaft
8. Stator

A. Inlet port
B. Outlet port

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Unit: mm

No.	Check item		Criteria			Remedy
1	Outside diameter of pilot		Standard size	Tolerance	Repair limit	Repair hard chrome plating or replace
			Ø 78	-0.010 -0.040	Ø 77.75	
2	Inside diameter of PTO gear seal ring sliding portion		Ø 110	+0.035 0	Ø 110.5	
3	Wear of stator shaft seal ring	Width	3	0 -0.10	2.7	Replace
		Thickness	4.3	±0.1	3.9	
4	Backlash of PTO drive gear and drive gear		0.17~0.44			

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Path of power transmission

Flow of power

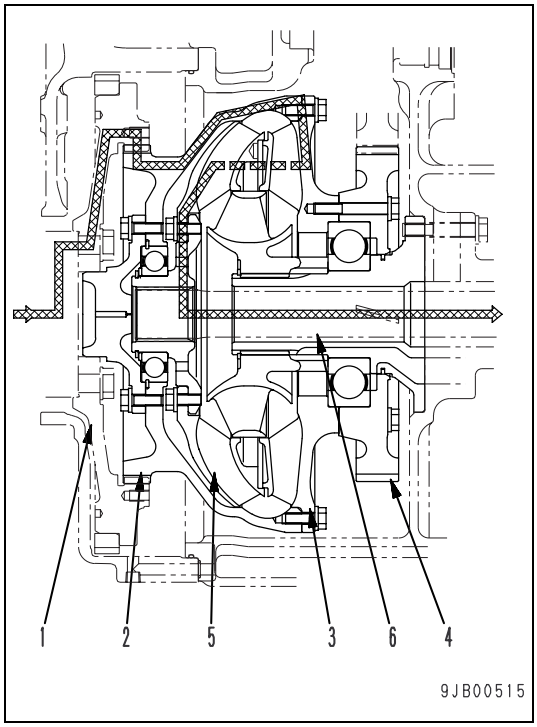
- The torque converter is installed between the engine and transmission.

  The power from the engine goes from flywheel (1) and enters drive case (2).

  Drive case (2), pump (3), and PTO gear (4) are each fixed by bolts and are rotated directly by the rotation of the engine.

- The power from pump (3) uses oil as a medium to rotate turbine (5) and transmit the power to transmission input shaft (6).

  The power from drive case (2) passes through PTO gear (4) and is used as the power to drive the gear pump.

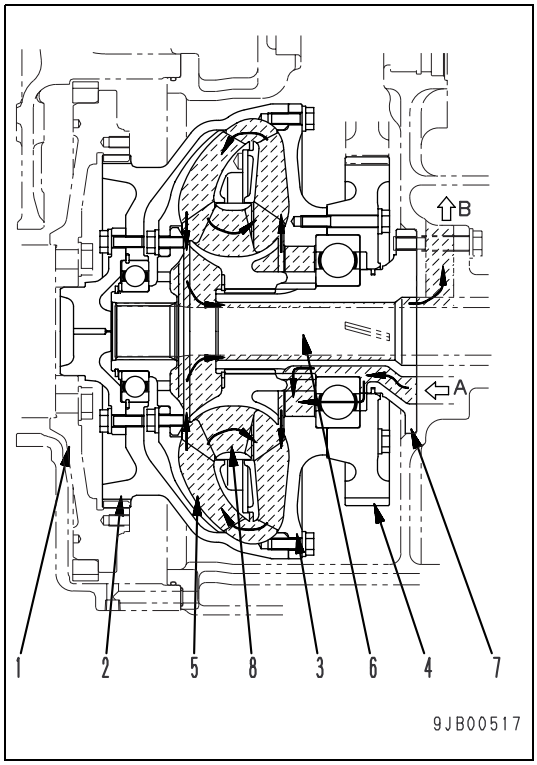


Flow of oil

- The oil passes through the main relief valve and its pressure is adjusted by the torque converter relief valve so that it is less than the set pressure. It then enters inlet port A, passes through the passage in stator shaft (7), and flows to pump (3).

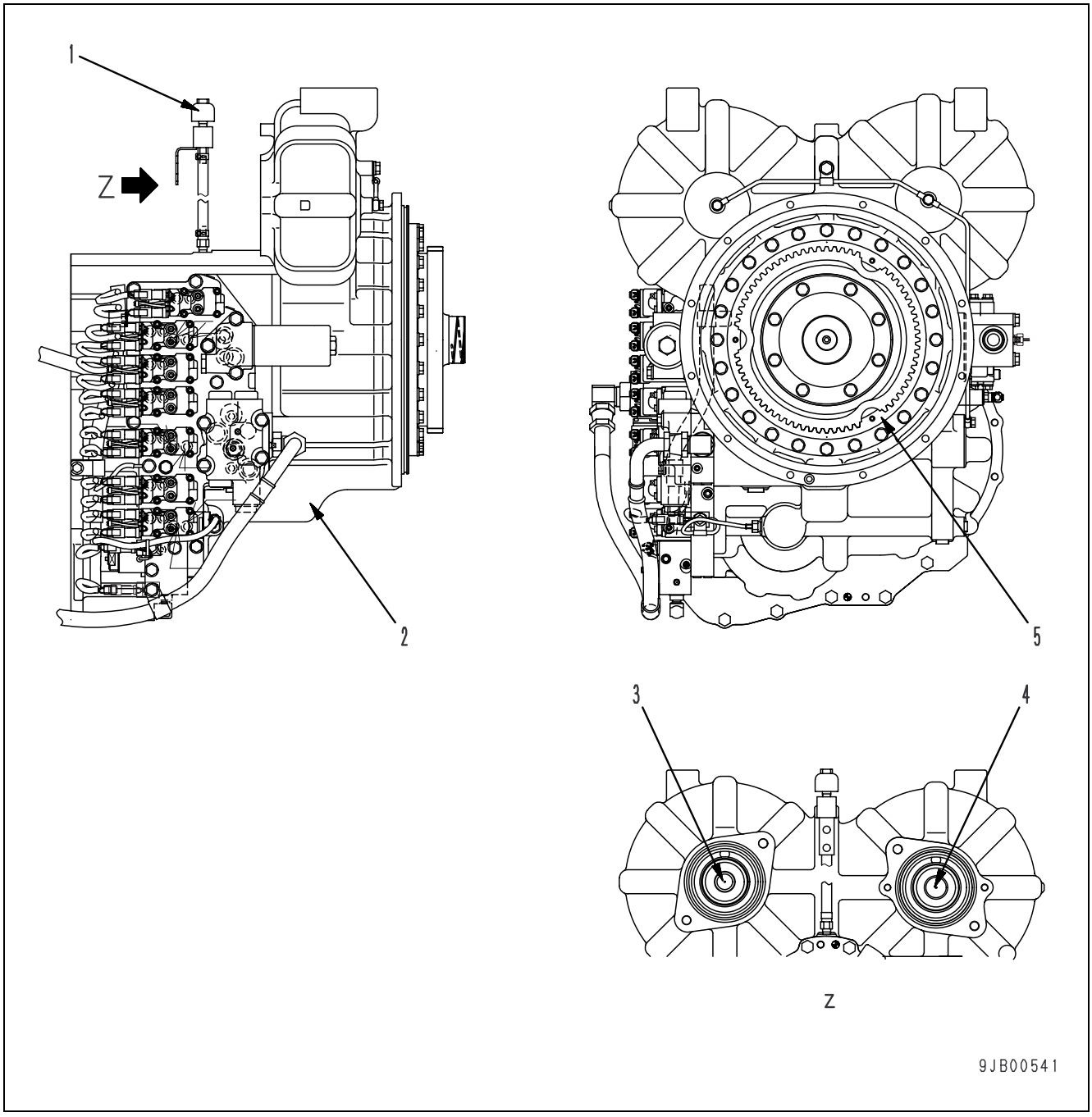
  The oil is given centrifugal force by pump (3). It then enters turbine (5) and transmits the energy of the oil to the turbine.

- Turbine (5) is fixed to transmission input shaft (6), so the power is transmitted to the transmission input shaft. The oil from turbine (5) is sent to stator (8), and enters the pump again. However, part of the oil is sent from stator (8) through outlet port B to the cooler.



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With lock-up clutch

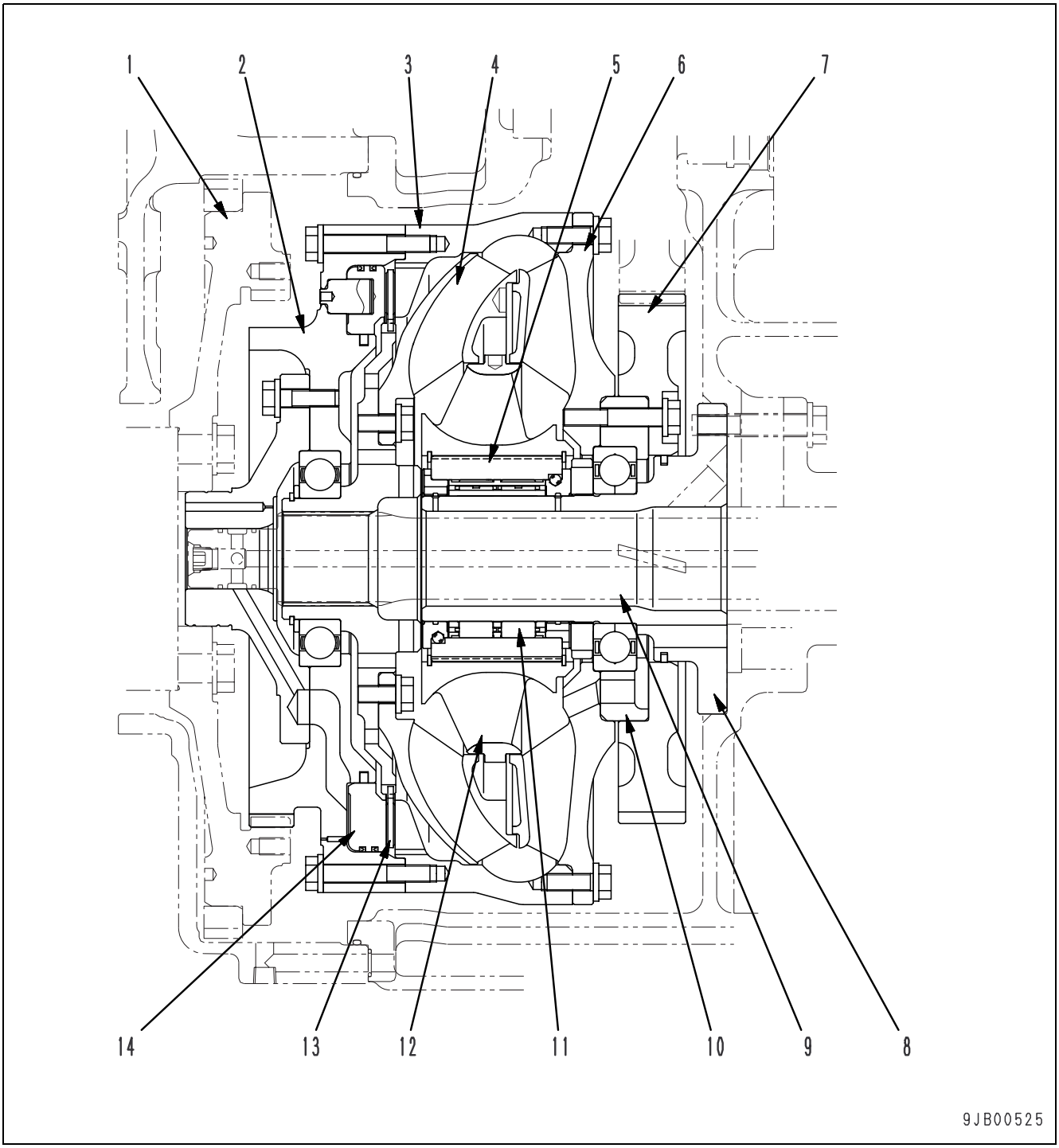


1. Breather
2. Housing
3. Mount for steering, switch, cooling fan drive pumps
4. Mount for torque converter charging, work equipment hydraulic, PPC pumps
5. Torque converter (with lock-up clutch)

Specifications

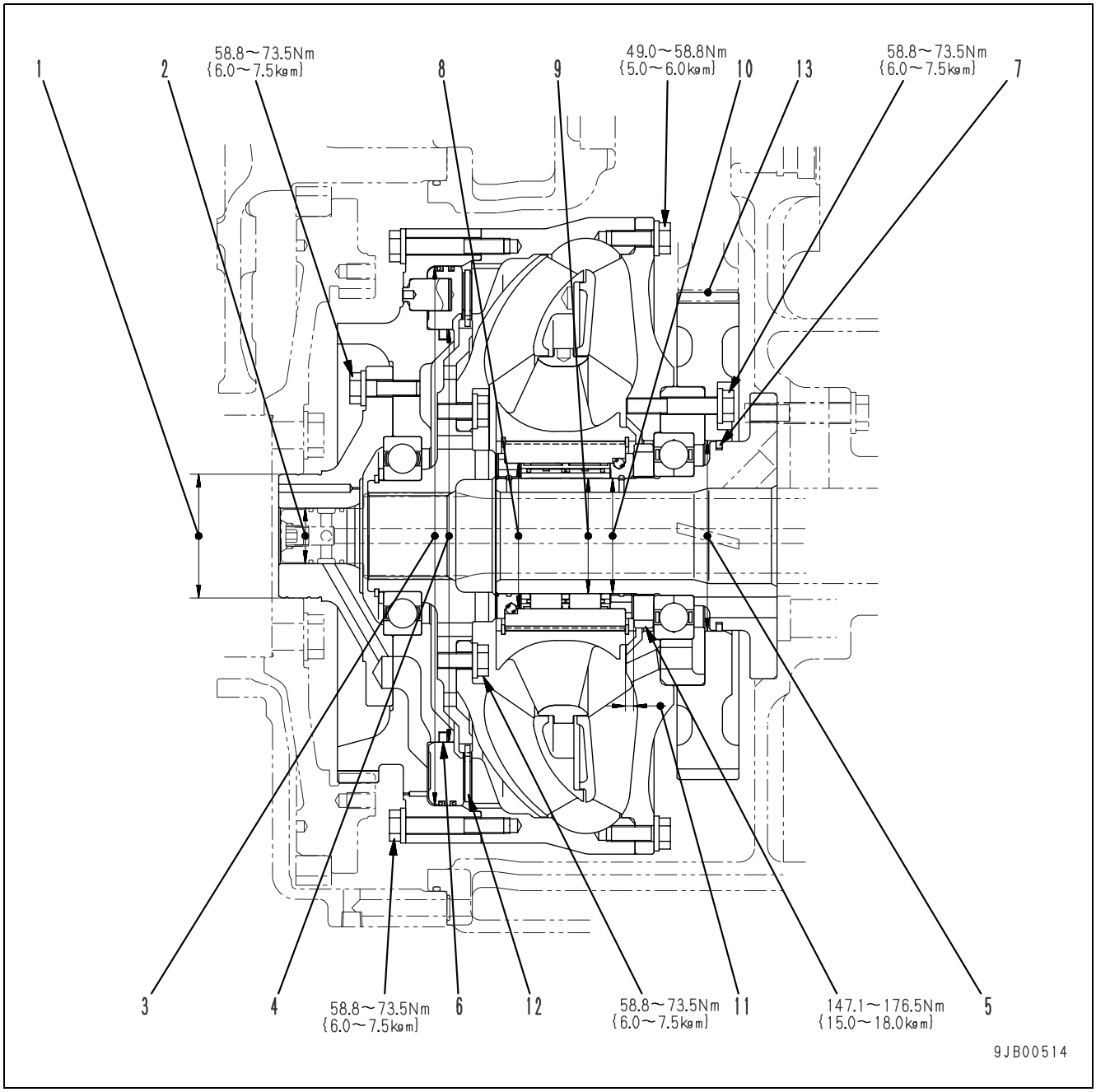
Type	3-element, 1-stage, 2-phase
Stall torque ratio	2.16

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1. Flywheel
2. Clutch housing
3. Drive case
4. Turbine
5. Race
6. Pump
7. PTO drive gear
8. Stator shaft
9. Transmission input shaft
10. Guide
11. One-way clutch
12. Stator
13. Disc
14. Piston

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Unit: mm

No.	Check item		Criteria			Remedy
1	Outside diameter of pilot		Standard size Ø 78	Tolerance -0.010 -0.040	Repair limit Ø 77.75	Repair hard chrome plating or replace
2	Outside diameter of input shaft seal ring sliding portion		Ø 35	+0.025 0	Ø 35.5	
3	Inside diameter of clutch housing seal ring sliding portion		Ø 340	+0.089 0	Ø 340.1	
4	Inside diameter of clutch piston seal ring sliding portion		Ø 260	+0.081 0	Ø 260.1	
5	Inside diameter of PTO gear seal ring sliding portion		Ø 120	+0.035 0	Ø 120.5	
6	Wear of clutch housing seal ring	Width	5	-0.01 -0.04	4.5	Replace
		Thickness	6	±0.15	5.85	
7	Wear of stator shaft seal ring	Width	3.95	0 -0.10	3.55	
		Thickness	4.6	±0.1	4.14	
8	Inside diameter of outer race one-way clutch rolling surface		Ø 91.661	±0.008	Ø 91.691	
9	Outside diameter of outer race one-way clutch rolling surface		Ø 72.661	+0.008 -0.005	Ø 72.631	
10	Inside diameter of bushing sliding portion		Ø 72.775	+0.015 0	Ø 72.855	
11	Thickness of bushing sliding portion		5	0 -0.10	4.5	
12	Thickness of clutch disc		5	±0.1	4.4	
13	Backlash of input shaft and PTO gear		0.17~0.44			

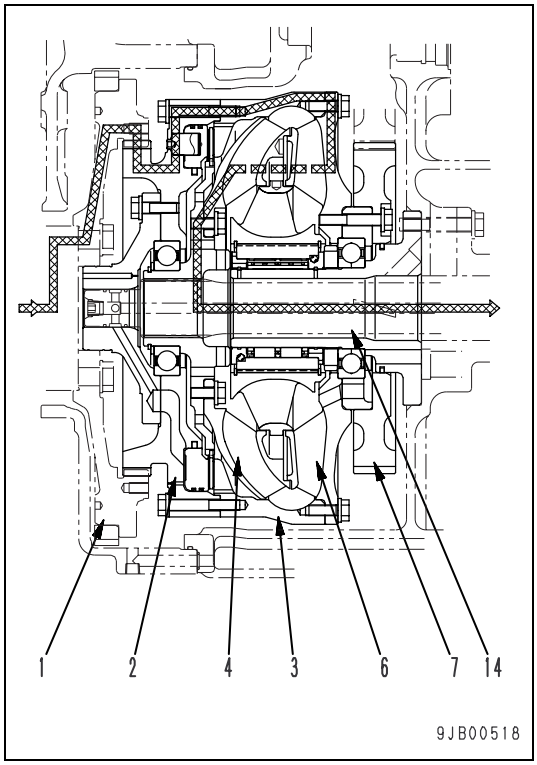
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Path of power transmission

Lock-up clutch disengaged

- When the lock-up clutch is disengaged, the connection of drive case (3) and turbine (4) is disconnected, and the torque converter functions as normal.

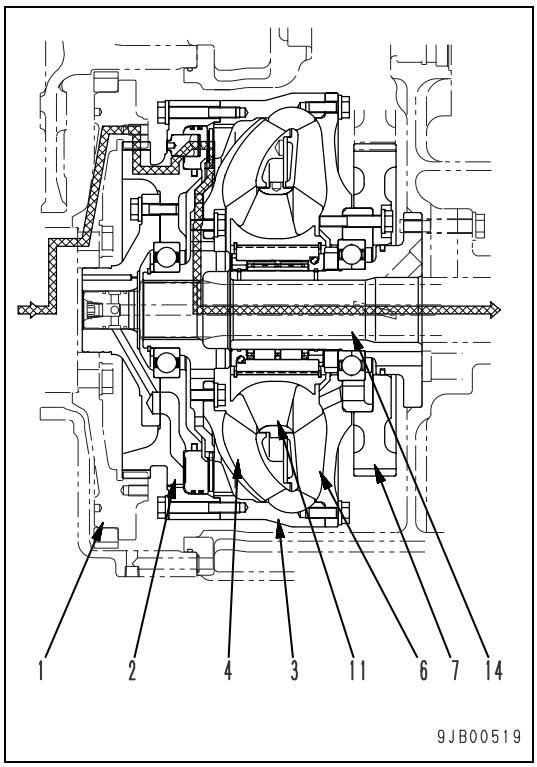
  The power generated by the engine is transmitted from flywheel (1) to clutch housing (2), and rotates drive case (3) and pump (6) as one unit.The power from pump (6) uses oil as a medium to rotate turbine (4) and transmits the power from turbine (4) to transmission input shaft (14).



Lock-up clutch engaged

- When the lock-up clutch is engaged, drive case (3) and turbine (4) are connected and form one unit. Stator (11) is rotated by the rotation of pump (6) and turbine (4).

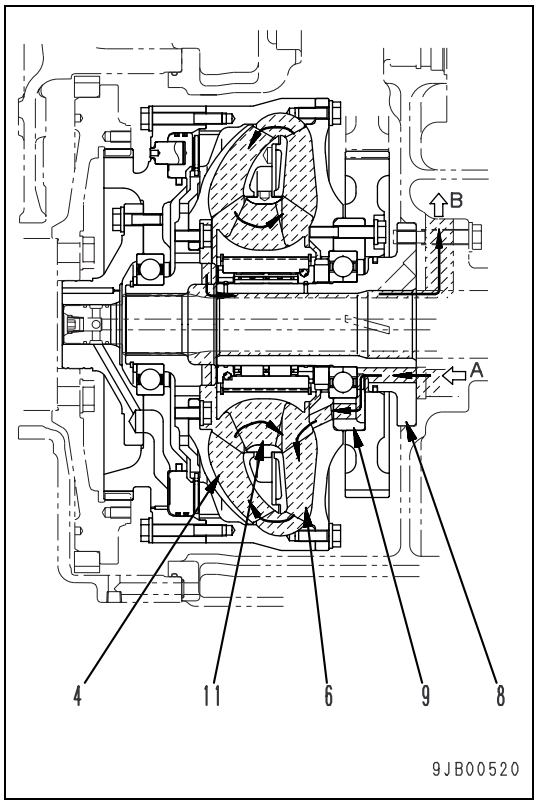
  The power generated by the engine is transmitted from flywheel (1) to clutch housing (2), and rotates drive case (3) and pump (6) as one unit.In addition, drive case (3) and turbine (4) are connected by the clutch, so the power is transmitted directly from turbine (4) to transmission input shaft (14) without using oil as a medium.



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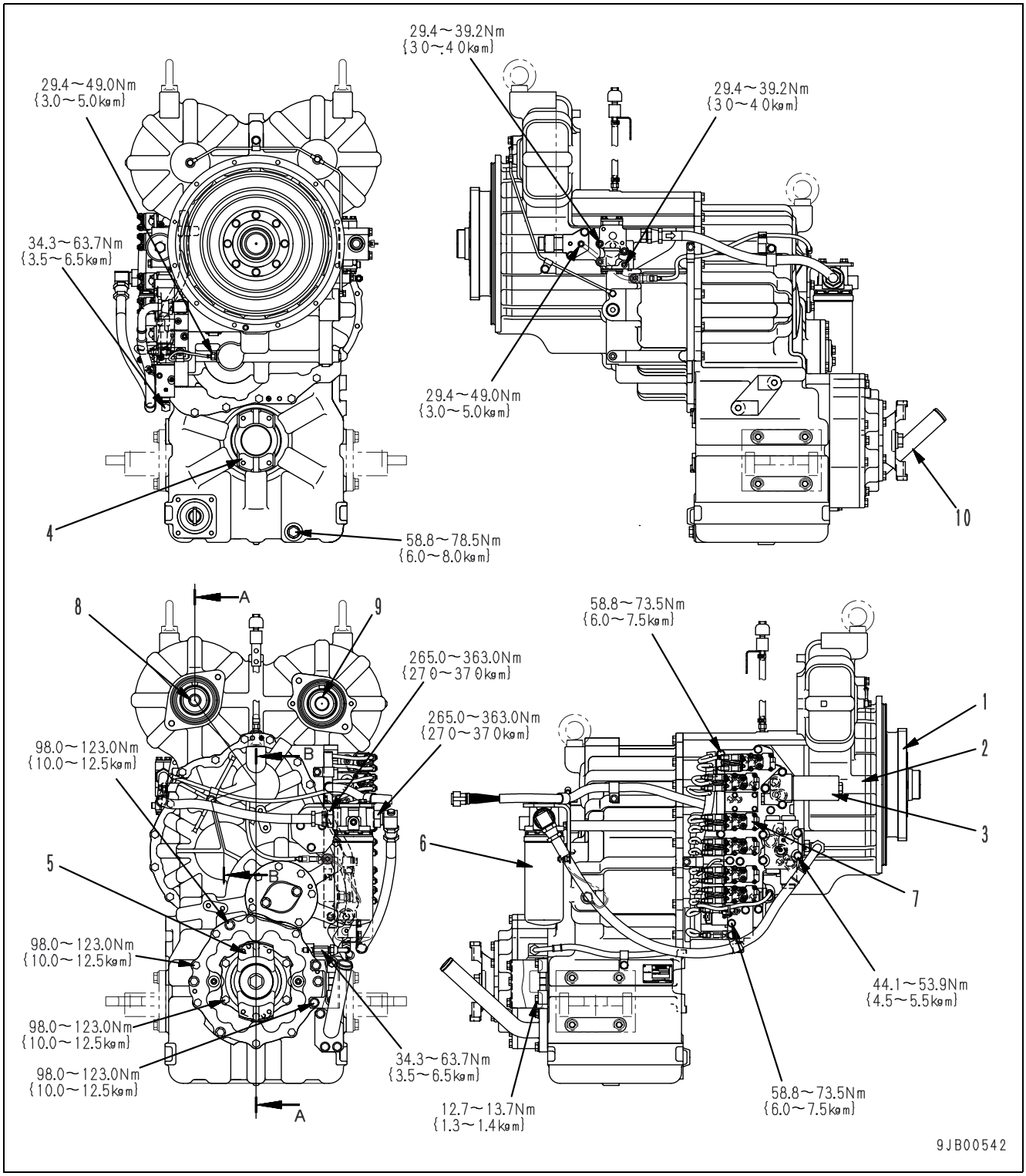
Flow of oil

- The oil passes through the main relief valve and its pressure is adjusted by the torque converter relief valve so that it is less than the set pressure. It then enters inlet port A, passes through the passage in stator shaft (8) and guide (9), and flows to pump (6). The oil is given centrifugal force by pump (6). It then enters turbine (4) and transmits the energy of the oil to turbine (4).
- The oil from turbine (4) is sent to stator (11), and enters pump (6) again. However, part of the oil passes between turbine (4) and stator shaft (8), and is sent through outlet port B to the cooler.



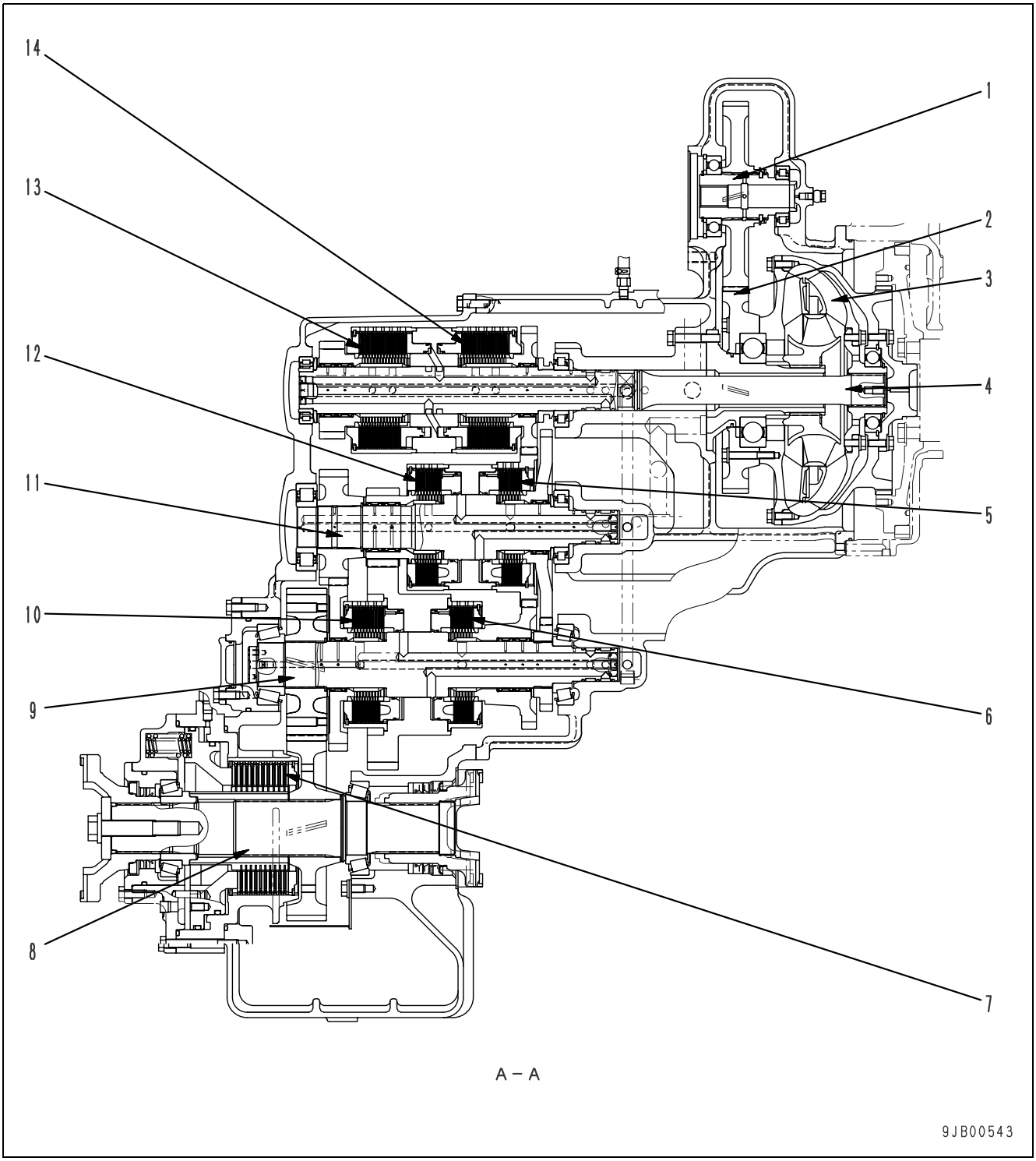
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Transmission



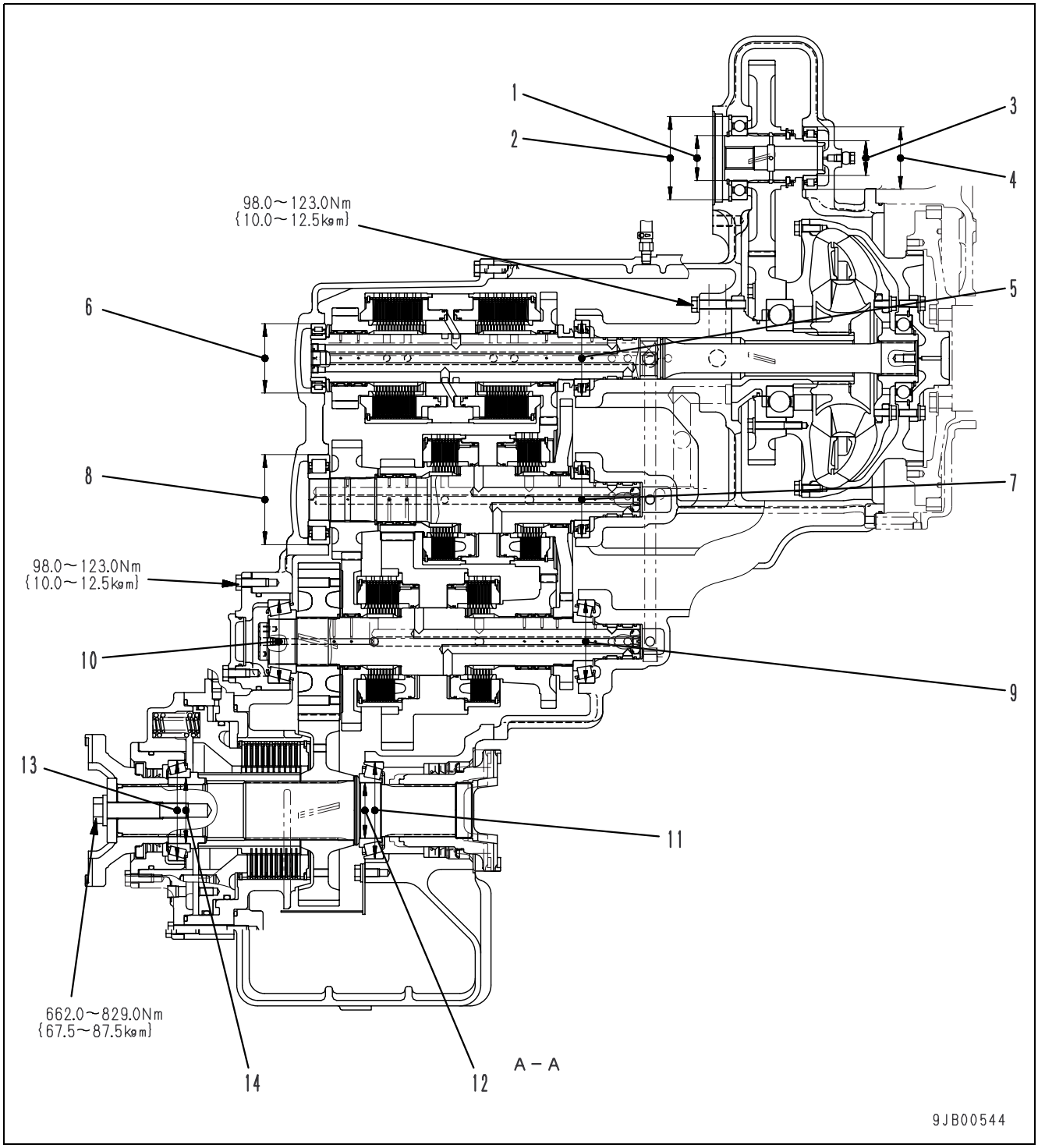
1. Torque converter
2. Torque converter housing
3. Oil filter (last-chance filter)
4. Rear output coupling
5. Front output coupling
6. Oil filter
7. Transmission control valve (ECMV)
8. Mount for steering, switch, cooling fan drive pumps
9. Mount for transmission, work equipment, PPC pumps
10. Transmission oil filler

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1. PTO
2. PTO gear
3. Torque converter
4. Input shaft
5. 4th clutch
6. 3rd clutch
7. Parking brake
8. Output shaft
9. Lower shaft
10. 2nd clutch
11. Upper shaft
12. 1st clutch
13. R clutch
14. F clutch

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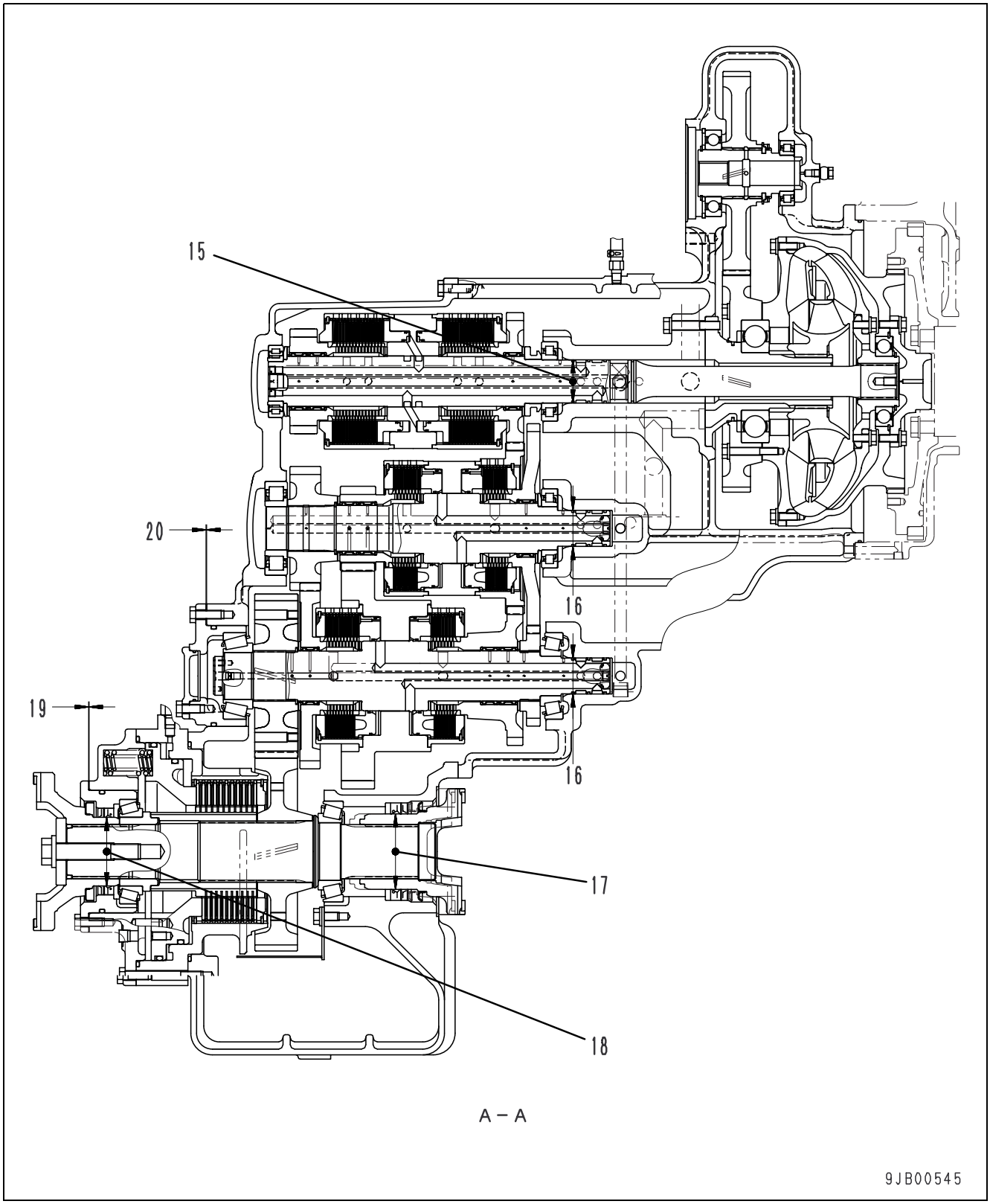


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Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between pump drive shaft and bearing	Ø 65	+0.030 +0.011	0 -0.015	-0.045 ~ -0.011	—	Replace
2	Clearance between pump drive gear bearing and housing	Ø 120	0 -0.015	+0.030 0	0 ~ 0.045	—	
3	Clearance between pump drive shaft and bearing	Ø 50	+0.020 +0.009	0 -0.012	-0.032 ~ -0.009	—	
4	Clearance between pump drive shaft bearing and housing	Ø 90	0 -0.015	+0.030 0	0 ~ 0.045	—	
5	Clearance between F-R clutch bearing and housing (R)	Ø 110	0 -0.015	+0.030 0	0 ~ 0.045	—	
6	Clearance between F-R clutch bearing and housing (F)	Ø 100	0 -0.015	+0.030 0	0 ~ 0.045	—	
7	Clearance between 1st-4th bearing clutch and housing (R)	Ø 110	0 -0.015	+0.030 0	0 ~ 0.045	—	
8	Clearance between 1st-4th bearing clutch and housing (F)	Ø 130	0 -0.018	+0.030 0	0 ~ 0.048	—	
9	Clearance between 2nd-3rd bearing clutch and housing (R)	Ø 120	0 -0.018	0 -0.035	-0.035 ~ 0.018	—	
10	Clearance between 2nd-3rd bearing clutch and housing (F)	Ø 120	0 -0.018	0 -0.035	-0.035 ~ 0.018	—	
11	Clearance between output shaft bearing and housing (R)	Ø 140	0 -0.020	-0.018 -0.058	-0.058 ~ 0.002	—	
12	Clearance between output shaft and housing (R)	Ø 80	+0.039 +0.020	0 -0.020	-0.059 ~ -0.020	—	
13	Clearance between output shaft bearing and housing (F)	Ø 145	0 -0.020	-0.018 -0.058	-0.058 ~ 0.002	—	
14	Clearance between output shaft and housing (F)	Ø 95	+0.045 +0.023	0 -0.020	-0.065 ~ -0.023	—	

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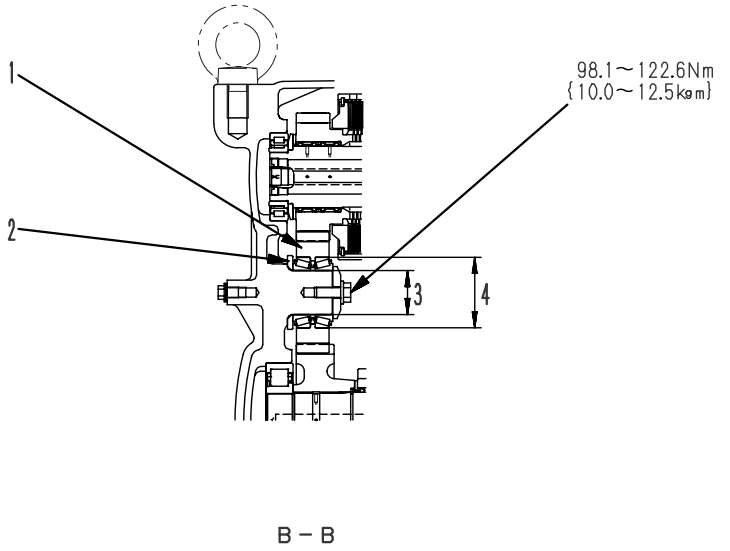


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Unit: mm

No.	Check item	Criteria			Remedy
15	Inside diameter of seal ring contact surface	Standard size	Tolerance	Repair limit	Replace
		Ø 60	+0.05 0	Ø 60.1	
	Width of seal ring groove	3.2	+0.076 0	3.5	
	Width of seal ring	3.1	±0.05	2.8	
	Thickness of seal ring	2.29	0 -0.10	2.1	
16	Inside diameter of seal ring contact surface	Ø 50	+0.05 0	Ø 55.1	
	Width of seal ring groove	3.2	+0.076 0	3.5	
	Width of seal ring	3.1	±0.05	2.8	
	Thickness of seal ring	2.29	0 -0.10	2.1	
17	Outside diameter of coupling oil seal sliding surface (R)	Ø 105	0 -0.087	Ø 104.8	
18	Outside diameter of coupling oil seal sliding surface (F)	Ø 95	0 -0.087	Ø 94.8	
19	Clearance between retainer and housing	Standard clearance		Clearance limit	
		0.73~1.53 (Standard shim thickness: 1.15)		—	
20	Clearance between cage and case	1.27~2.01 (Standard shim thickness: 1.60)		—	

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1. R idler gear (No. of teeth: 28)
2. Spacer

Unit: mm

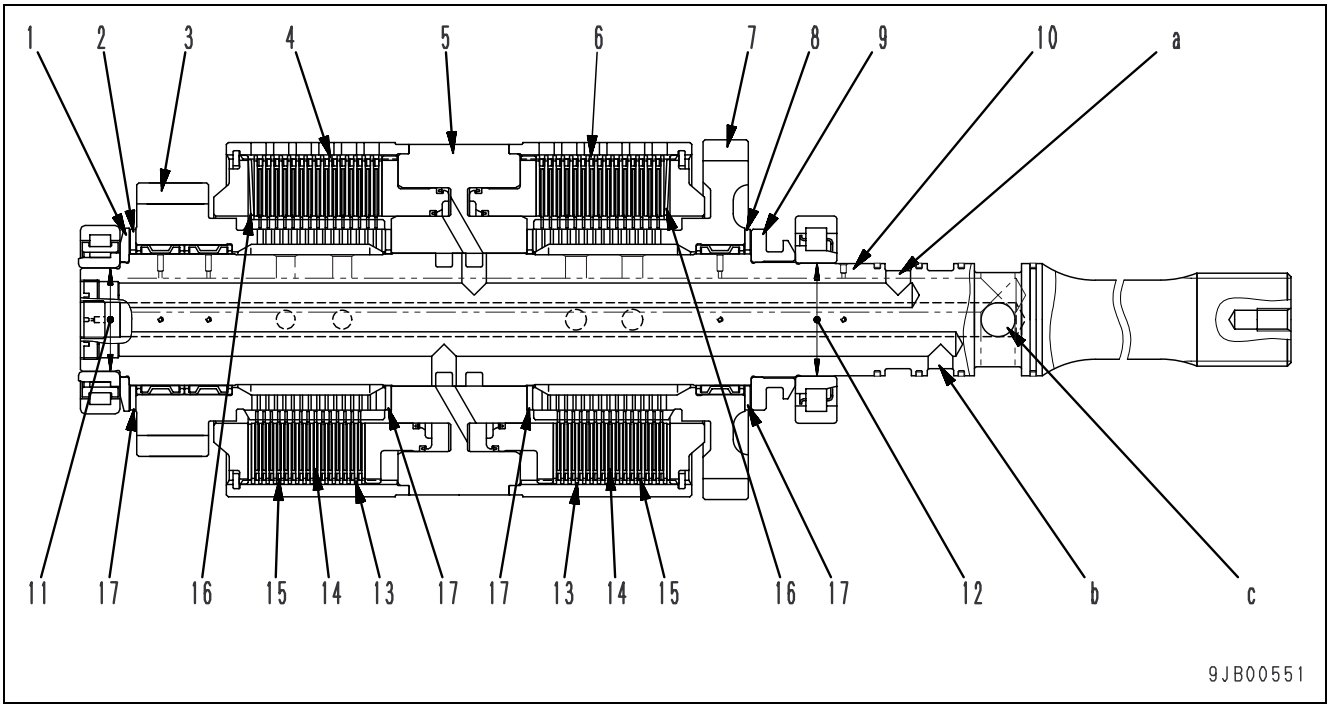
No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
3	Clearance between R idler gear bearing and case	Ø 50	+0.027 +0.002	0 -0.012	-0.039 ~ -0.002	—	Replace
4	Clearance between R idler gear bearing and R idler gear	Ø 80	0 -0.016	-0.021 -0.051	-0.051 ~ -0.005	—	

Outline

- The transmission is installed after the torque converter. The power from the torque converter passes through the transmission input shaft and enters the transmission.
- The transmission has an F-R clutch and 4 speed clutches. The combination of these clutches shifts the power of the input shaft to FORWARD 1st-4th or REVERSE 1st-4th and transmits this to the output shaft.

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F-R clutch (without lock-up clutch)



1. Spacer
2. Thrust washer
3. R gear (No. of teeth: 30)
4. R clutch
5. F-R cylinder
6. F clutch
7. F gear (No. of teeth: 40)
8. Thrust washer
9. Spacer
10. Input shaft

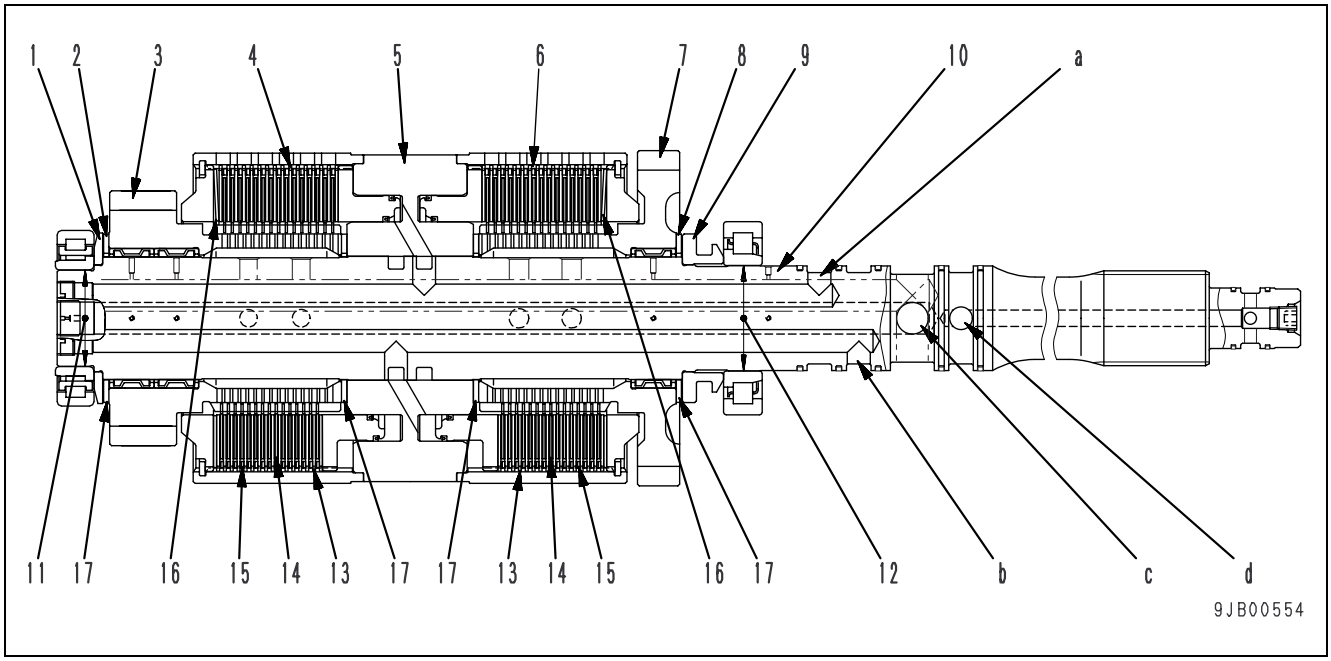
a. R clutch oil port
b. F clutch oil port
c. Lubrication oil port

Unit: mm

No.	Check item		Criteria					Remedy
11	Clearance at press-fitting portion of F-R clutch shaft bearing (F)		Standard size	Tolerance		Standard clearance	Clearance limit	Replace
				Shaft	Hole			
			Ø 55	+0.034 +0.021	0 -0.015	-0.049 ~ -0.021	—	
12	Clearance at press-fitting portion of F-R clutch shaft bearing (R)		Ø 60	+0.034 +0.021	0 -0.015	-0.049 ~ -0.021	—	
13	Separator plate		Standard size	Tolerance		Repair limit		
		Thickness	1.7	±0.05		1.5		
		Distortion	—	0.1		0.15		
14	Friction plate	Thickness	2.2	±0.08		1.6		
		Distortion	—	0.1		0.25		
15	Load of wave spring (height: 2.2 mm)		1,010 N {103 kg}	±101N {±10.3 kg}		859 N {87.6 kg}		
16	Curvature of spring plate		1.4	±0.2		1.2		
17	Thickness of F-R clutch thrust washer		3	±0.1		2.7		

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F-R clutch (with lock-up clutch)



1. Spacer
2. Thrust washer
3. R gear (No. of teeth: 30)
4. R clutch
5. F-R cylinder
6. F clutch
7. F gear (No. of teeth: 40)
8. Thrust washer
9. Spacer
10. Input shaft

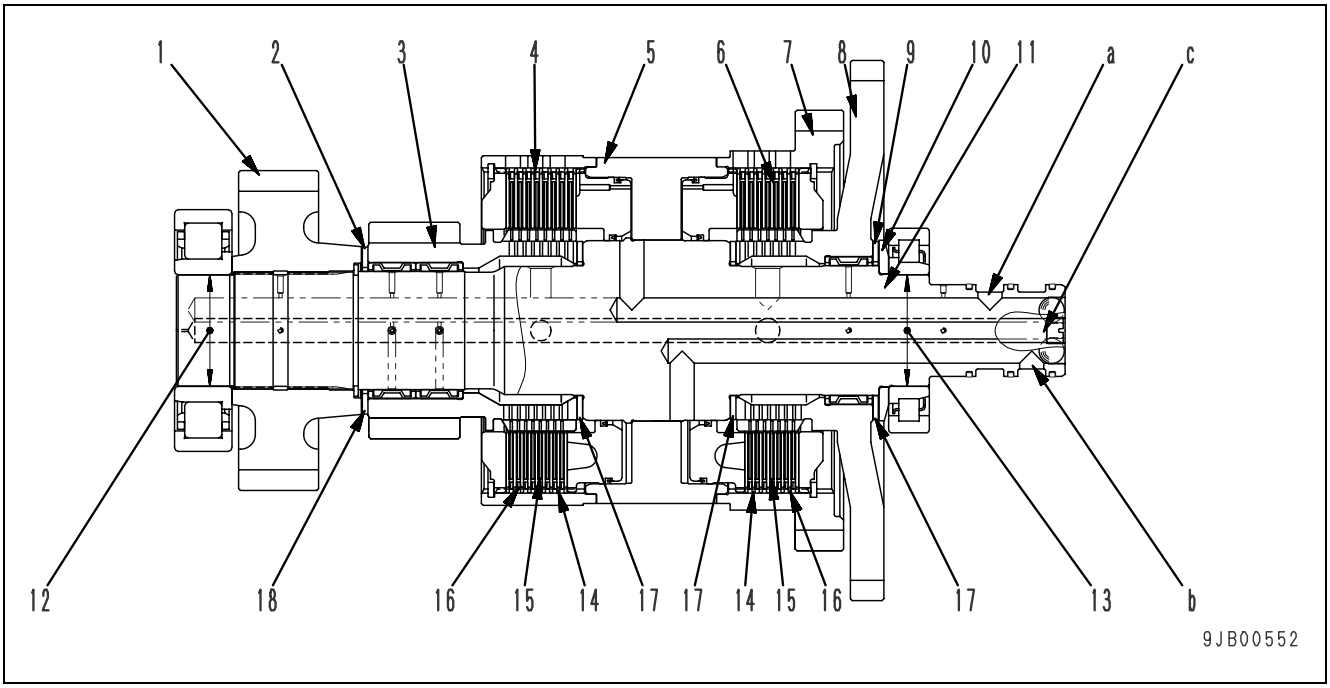
a. R clutch oil port
b. F clutch oil port
c. Lubrication oil port
d. Lock-up clutch oil port

Unit: mm

No.	Check item		Criteria				Remedy
11	Clearance at press-fitting portion of F-R clutch shaft bearing (F)		Standard size	Tolerance		Standard clearance	Clearance limit	Replace
				Shaft	Hole		
			Ø 55	+0.034 +0.021	0 -0.015	-0.049 ~ -0.021	—
12	Clearance at press-fitting portion of F-R clutch shaft bearing (R)		Ø 60	+0.034 +0.021	0 -0.015	-0.049 ~ -0.021	—
13	Separator plate		Standard size	Tolerance		Repair limit	
		Thickness	1.7	±0.05		1.5	
		Distortion	—	0.1		0.15	
14	Friction plate	Thickness	2.2	±0.08		1.6	
		Distortion	—	0.1		0.25	
15	Load of wave spring (height: 2.2 mm)		1,010 N {103 kg}	±101N {±10.3 kg}		859 N {87.6 kg}	
16	Curvature of spring plate		1.4	±0.2		1.2	
17	Thickness of F-R clutch thrust washer		3	±0.1		2.7	

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1st-4th clutch



1. Idler gear (No. of teeth: 36)
2. Thrust washer
3. 1st gear (No. of teeth: 23)
4. 1st clutch
5. 1st-4th cylinder
6. 4th clutch
7. 1st-4th cylinder gear (No. of teeth: 51)
8. 4th gear (No. of teeth: 64)
9. Thrust washer
10. Spacer
11. Upper shaft

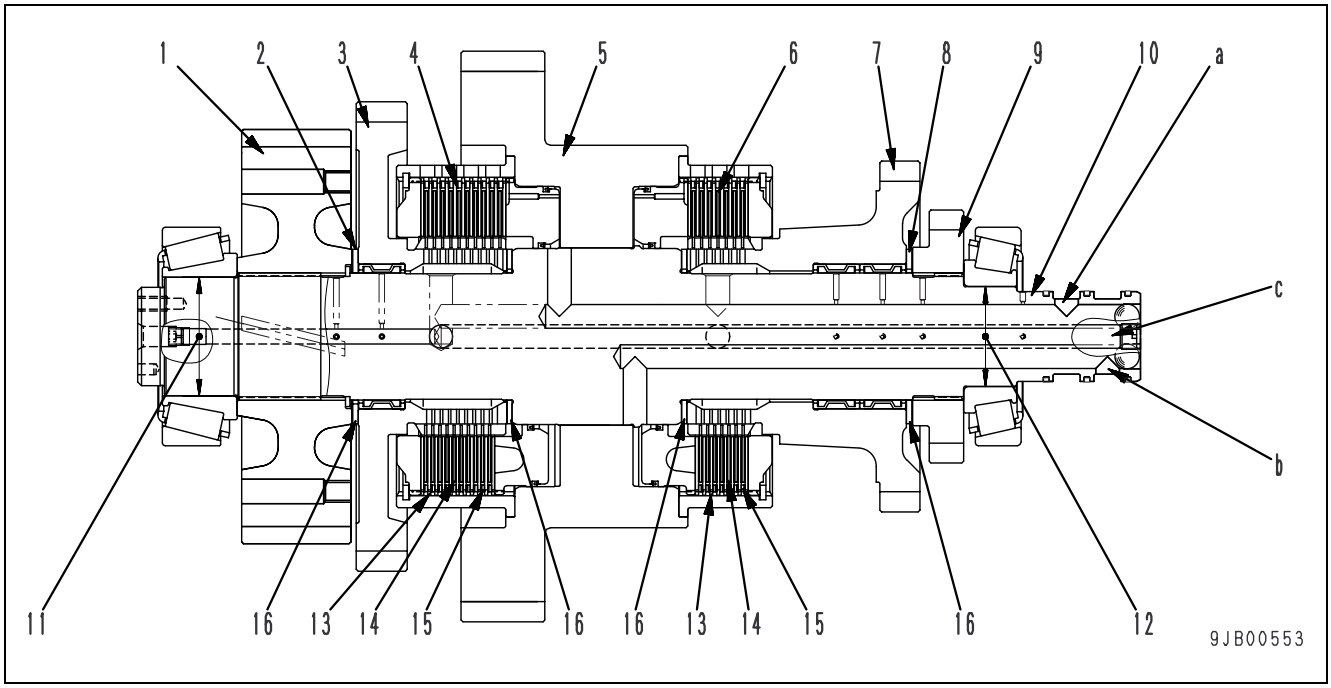
a. 1st clutch oil port
b. 4th clutch oil port
c. Lubrication oil port

Unit: mm

No.	Check item		Criteria					Remedy
12	Clearance at press-fitting portion of 1st-4th clutch shaft bearing (F)		Standard size	Tolerance		Standard clearance	Clearance limit	Replace
				Shaft	Hole			
			Ø 60	+0.054 +0.044	0 -0.015	-0.069 ~ -0.044	—	
13	Clearance at press-fitting portion of 1st-4th clutch shaft bearing (R)		Ø 60	+0.034 +0.021	0 -0.015	-0.049 ~ -0.021	—	
14	Separator plate		Standard size	Tolerance		Repair limit		
		Thickness	1.7	±0.05		1.5		
		Distortion	—	0.1		0.15		
15	Friction plate	Thickness	2.2	±0.08		1.6		
		Distortion	—	0.1		0.25		
16	Load of wave spring (height: 2.2 mm)		1,010 N {103 kg}	±101N {±10.3 kg}		859 N {87.6 kg}		
17	Thickness of 1st-4th clutch thrust washer		3	±0.1		2.7		
18	Thickness of 1st clutch thrust washer		3	±0.1		2.7		

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2nd-3rd clutch



1. Output gear
2. Thrust washer
3. 2nd gear (No. of teeth: 54)
4. 2nd clutch
5. 2nd-3rd cylinder gear (No. of teeth: 68)
6. 3rd clutch
7. 3rd gear (No. of teeth: 41)
8. Thrust washer
9. 4th gear (No. of teeth: 29)
10. Lower shaft

a. 1st clutch oil port
b. 4th clutch oil port
c. Lubrication oil port

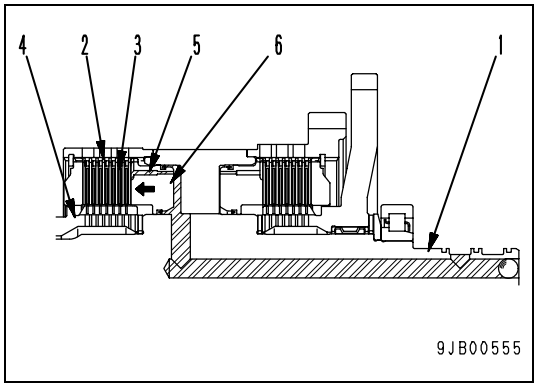
Unit: mm

No.	Check item		Criteria				Remedy
11	Clearance at outside diameter of press-fitting portion of 2nd-3rd clutch shaft bearing (F)		Standard size	Tolerance: Shaft	Tolerance: Hole	Standard clearance	Clearance limit	Replace
			Ø 65	+0.055 +0.045	0 -0.015	-0.070 ~ -0.045	—	
12	Clearance at outside diameter of press-fitting portion of 2nd-3rd clutch shaft bearing (R)		Ø 55	+0.039 +0.020	0 -0.015	-0.054 ~ -0.020	—	
13	Separator plate		Standard size	Tolerance	Repair limit			
		Thickness	1.7	±0.05	1.5			
		Distortion	—	0.05	0.15			
14	Friction plate	Thickness	2.2	±0.08	1.6			
		Distortion	—	0.10	0.25			
15	Load of wave spring (height: 2.2 mm)		1,010 N {103 kg}	±101N {±10.3 kg}	859 N {87.6 kg}			
16	Thickness of 2nd-3rd clutch thrust washer		3	±0.1	2.7			

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Operation of clutch

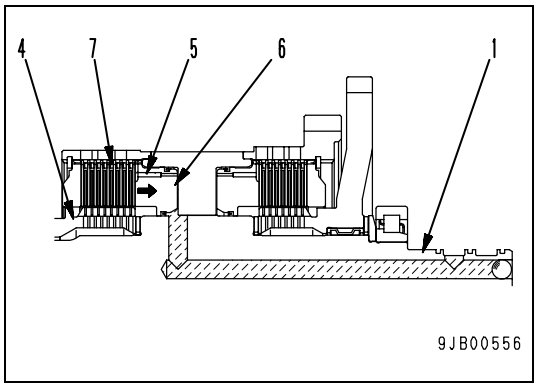
Clutch engaged



- The oil sent from the transmission valve passes through the passage inside shaft (1), goes to the back face of piston (6), and actuates piston (6).
- When piston (6) is actuated, separator plate (2) and friction plate (3) are pressed together, so shaft (1) and clutch gear (4) form one unit, and transmit the power.

  When this happens, the oil is drained from oil drain hole (5), but the amount of oil drained is less than the amount of oil supplied, so there is no influence on the operation of the clutch.

Clutch disengaged

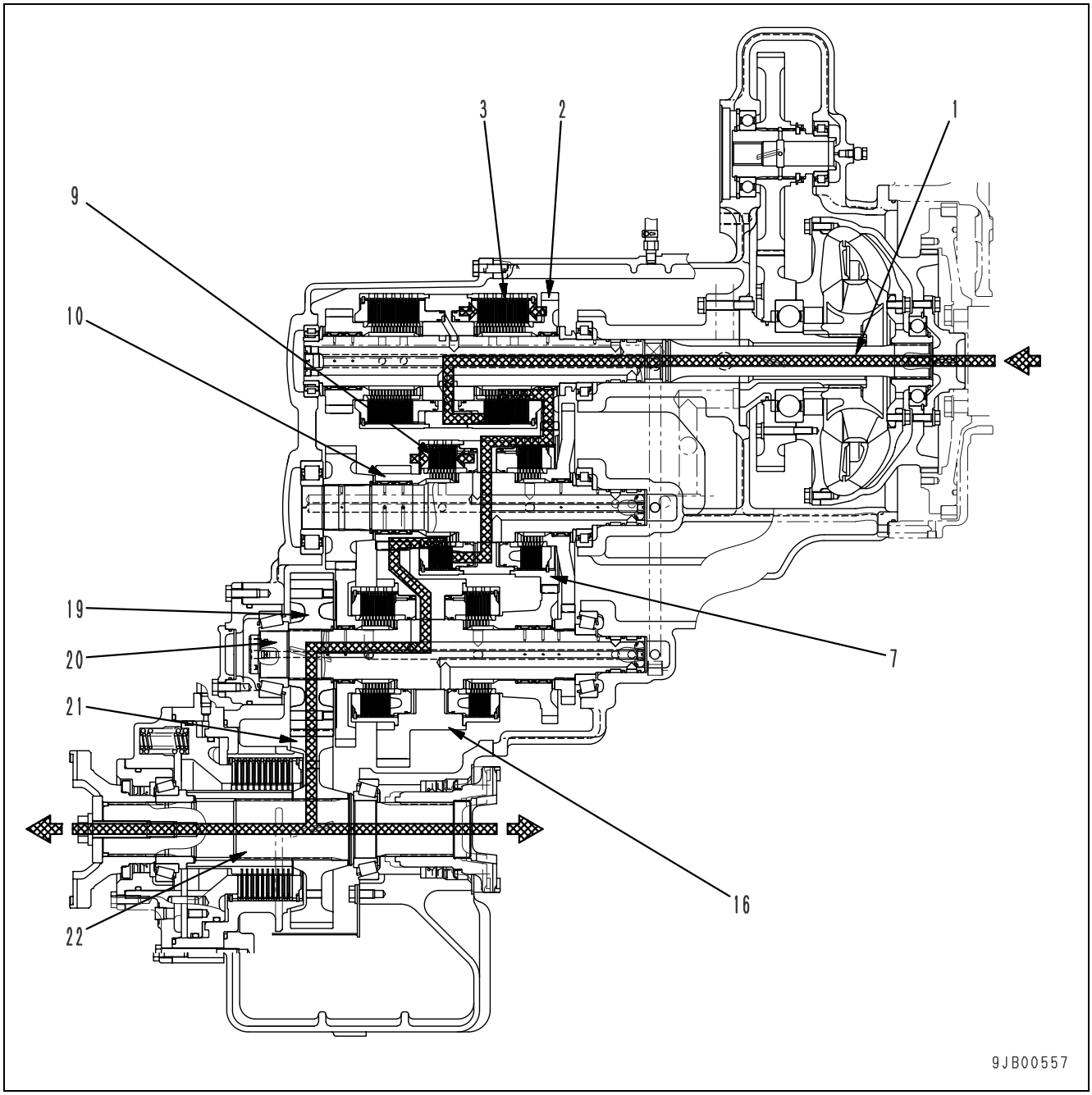


- The oil sent from the transmission valve is shut off, so the pressure of the oil acting on the back face of piston (6) drops.
- Piston (6) is returned to its original position by wave spring (7), and shaft (1) and clutch gear (4) are separated.
- When the clutch is disengaged, the oil at the back face of the piston is drained through oil drain hole (5) by centrifugal force to prevent the clutch from remaining partially engaged.

★ Oil drain hole (5) is provided only in the 1st, 2nd, 3rd, and 4th clutches.

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Forward 1st

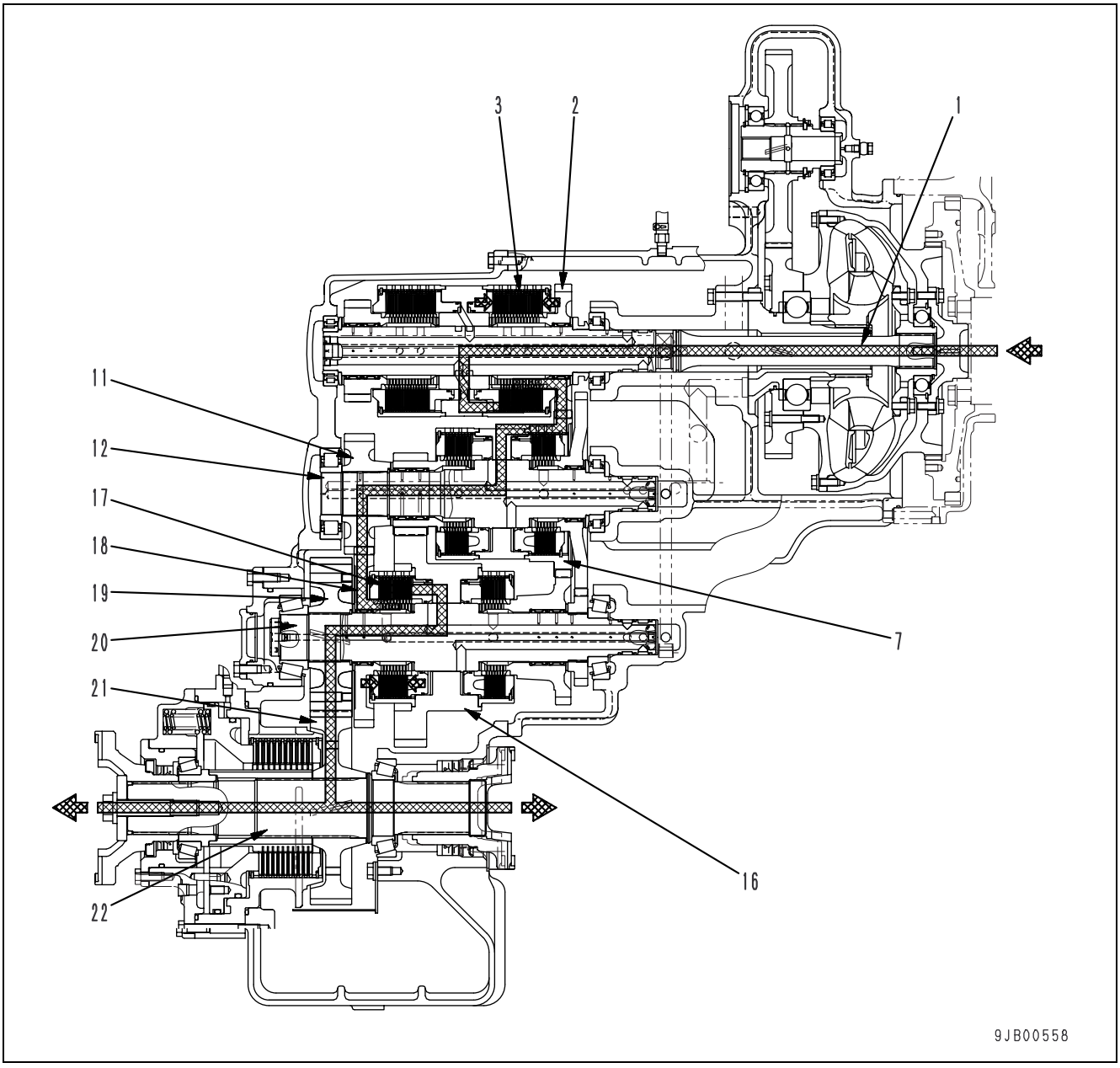


Operation

- In the case of FORWARD 1st, F clutch (3) and 1st clutch (9) are engaged. The power transmitted from the torque converter to input shaft (1) is transmitted to output shaft (22).
- The clutch discs of F clutch (3) and 1st clutch (9) are fixed by the hydraulic pressure applied to the clutch piston.
- The power from the torque converter goes from input shaft (1) through F clutch (3) to F gear (2), and is transmitted to 1st-4th cylinder gear (7).
- 1st clutch (9) is engaged, so the power transmitted to 1st-4th cylinder gear (7) goes through 1st clutch (9) and is transmitted from 1st gear (10) to 2nd-3rd cylinder gear (16). From here, it passes through lower shaft (20), output gear (19), and output gear (21), and is transmitted to output shaft (22).

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Forward 2nd

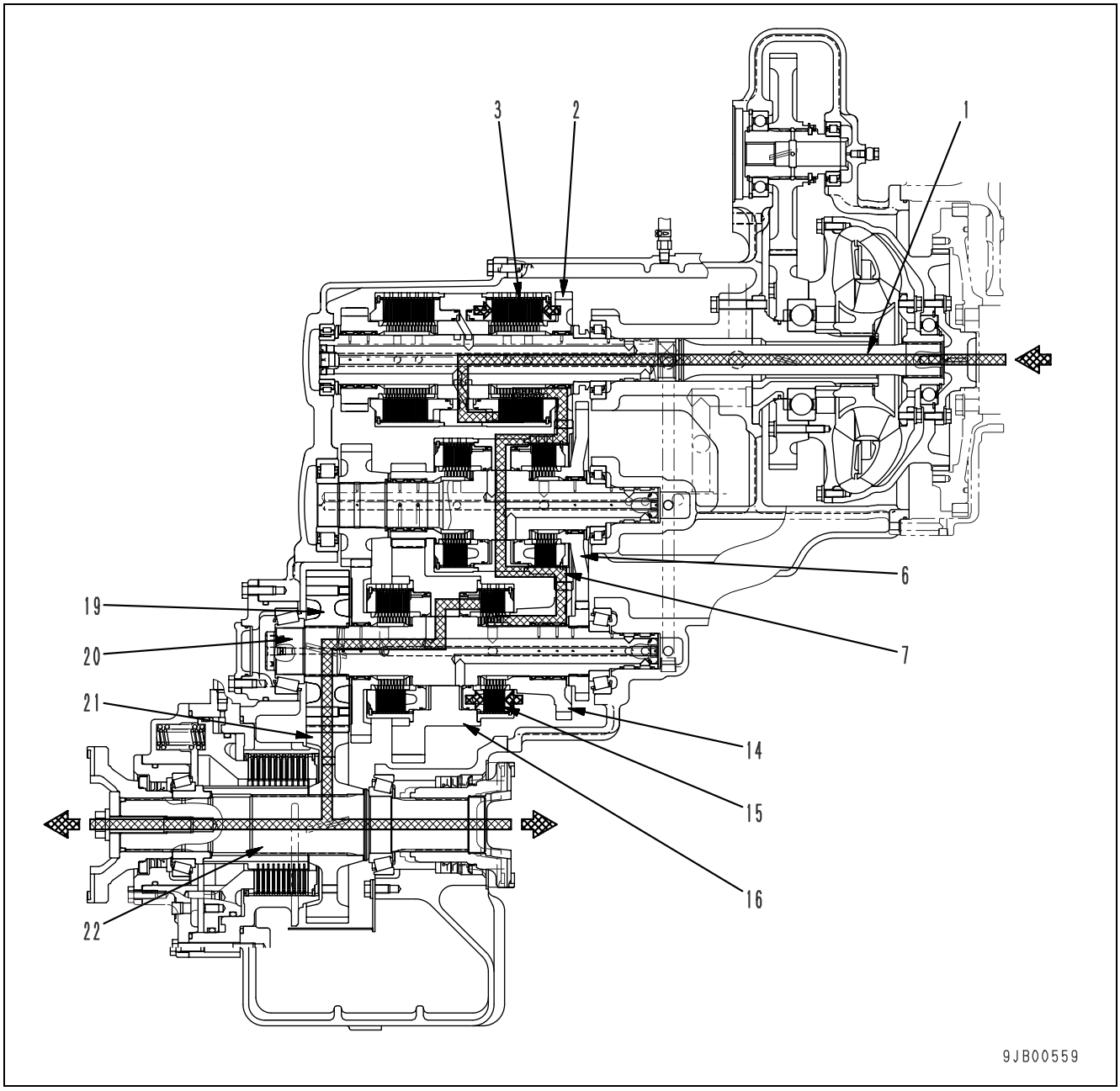


Operation

- In the case of FORWARD 2nd, F clutch (3) and 2nd clutch (17) are engaged. The power transmitted from the torque converter to input shaft (1) is transmitted to output shaft (22).
- The clutch discs of F clutch (3) and 2nd clutch (17) are fixed by the hydraulic pressure applied to the clutch piston.
- The power from the torque converter goes from input shaft (1) through F clutch (3) to F gear (2), and is transmitted through 1st-4th cylinder gear (7), upper shaft (12), and idler gear (11) to 2nd gear (18).
- 2nd clutch (17) is engaged, so the power transmitted to 2nd gear (18) goes through 2nd clutch (17) and is transmitted to 2nd-3rd cylinder gear (16). From here, it passes through lower shaft (20), output gear (19), and output gear (21), and is transmitted to output shaft (22).

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Forward 3rd

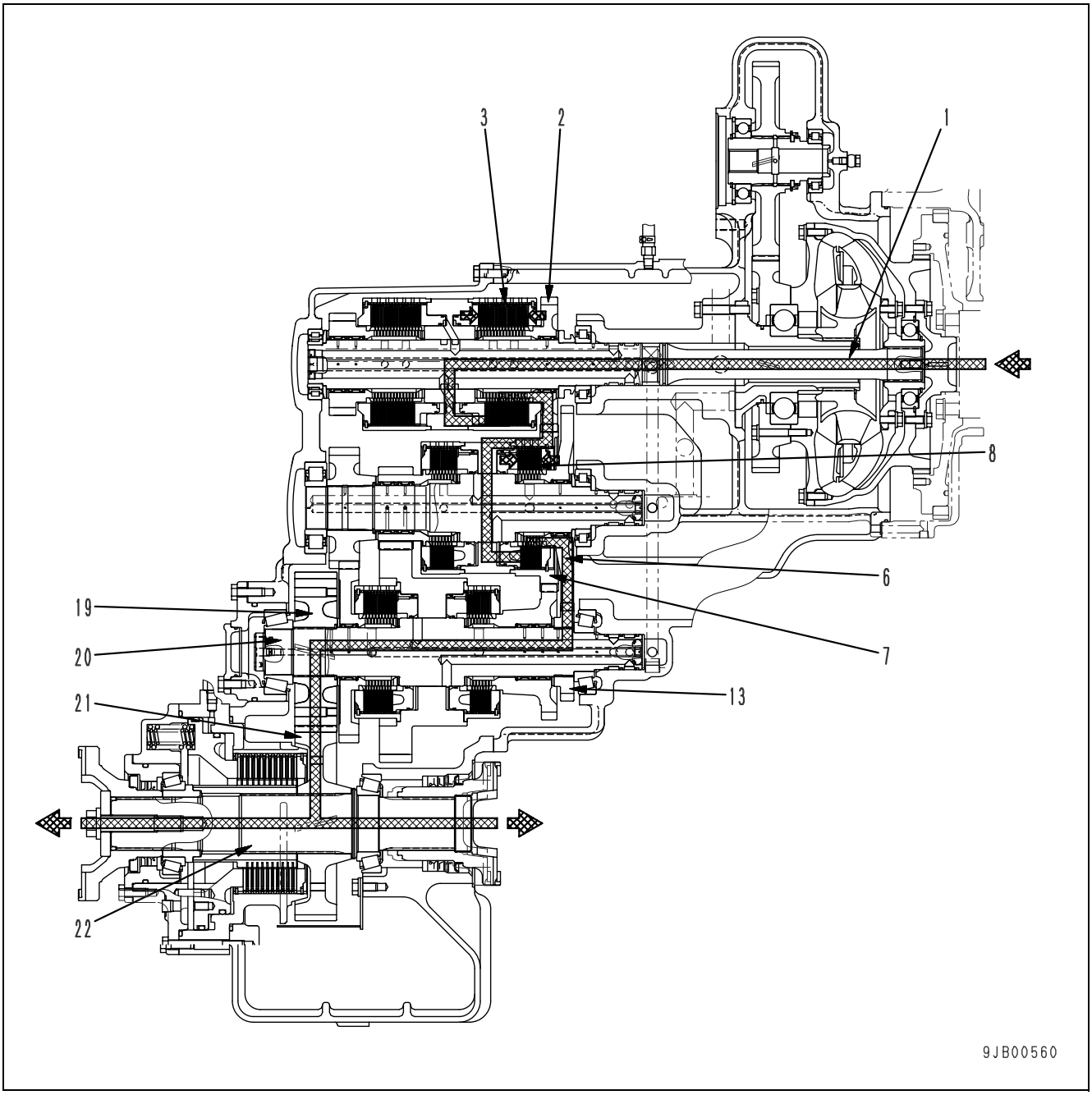


Operation

- In the case of FORWARD 3rd, F clutch (3) and 3rd clutch (15) are engaged. The power transmitted from the torque converter to input shaft (1) is transmitted to output shaft (22).
- The clutch discs of F clutch (3) and 3rd clutch (15) are fixed by the hydraulic pressure applied to the clutch piston.
- The power from the torque converter goes from input shaft (1) through F clutch (3) to F gear (2), and is transmitted through 1st-4th cylinder gear (7) to 3rd gear (14).
- 3rd clutch (15) is engaged, so the power transmitted to 3rd gear (14) goes through 3rd clutch (15) and is transmitted to 2nd-3rd cylinder gear (16). From here, it passes through lower shaft (20), output gear (19), and output gear (21), and is transmitted to output shaft (22).

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Forward 4th

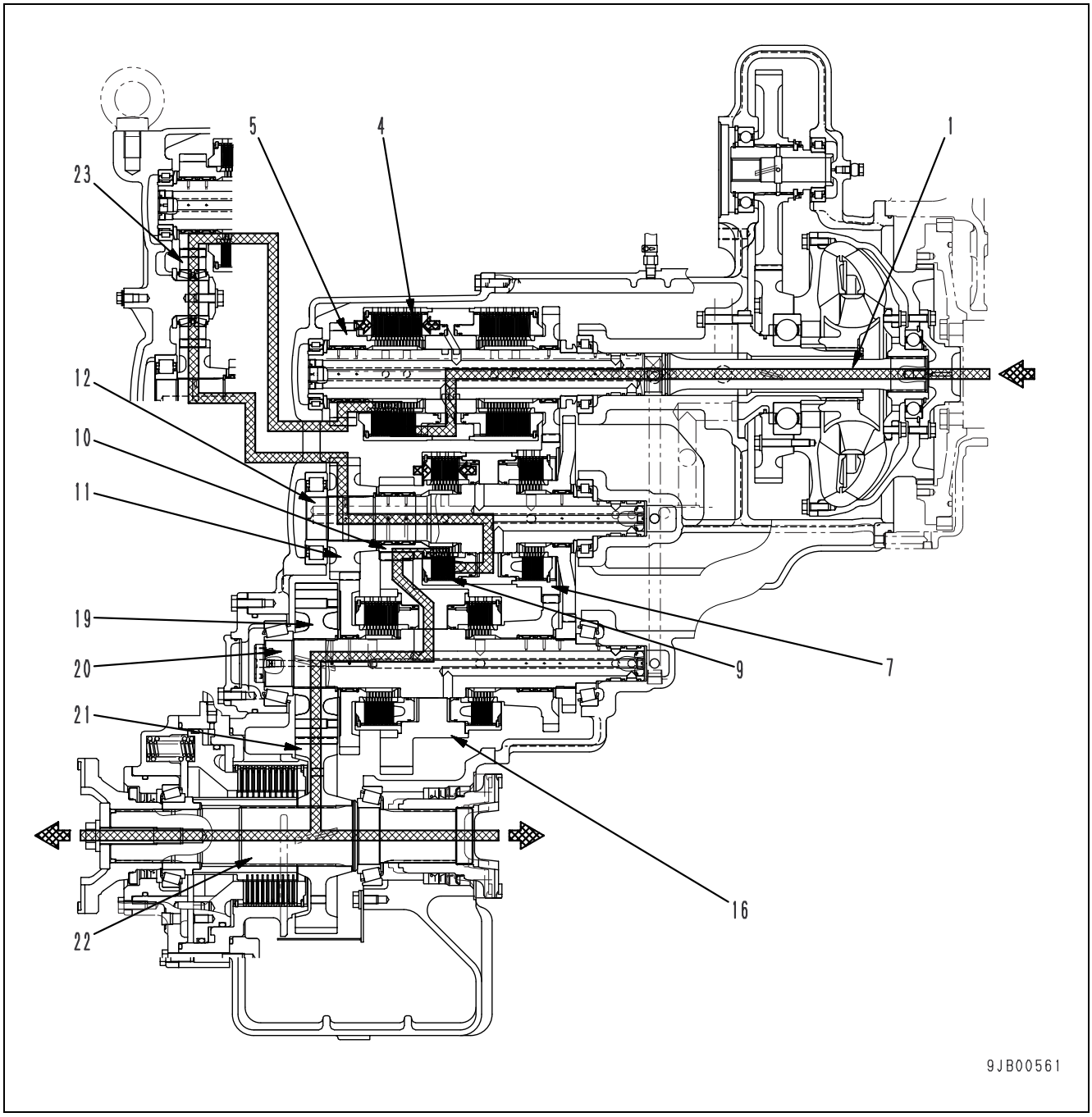


Operation

- In the case of FORWARD 4th, F clutch (3) and 4th clutch (8) are engaged. The power transmitted from the torque converter to input shaft (1) is transmitted to output shaft (22).
- The clutch discs of F clutch (3) and 4th clutch (8) are fixed by the hydraulic pressure applied to the clutch piston.
- The power from the torque converter goes from input shaft (1) through F clutch (3) to F gear (2), and is transmitted to 1st-4th cylinder gear (7).
- 4th clutch (8) is engaged, so the power transmitted to 1st-4th cylinder gear (7) goes through 4th clutch (8) and is transmitted from 4th gear (6) to 4th gear (13). From here, it passes through lower shaft (20), output gear (19), and output gear (21), and is transmitted to output shaft (22).

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Reverse 1st



Operation

- In the case of REVERSE 1st, R clutch (4) and 1st clutch (9) are engaged. The power transmitted from the torque converter to input shaft (1) is transmitted to output shaft (22).
- The clutch discs of R clutch (4) and 1st clutch (9) are fixed by the hydraulic pressure applied to the clutch piston.
- The power from the torque converter goes from input shaft (1) through R clutch (4) to R gear (5). The direction of rotation is reversed by idler gear (23), and is transmitted through idler gear (11) and upper shaft (12) to 1st-4th cylinder gear (7).
- 1st clutch (9) is engaged, so the power transmitted to 1st-4th cylinder gear (7) goes through 1st clutch (9) and is transmitted from 1st gear (10) to 2nd-3rd cylinder gear (16). From here, it passes through lower shaft (20), output gear (19), and output gear (21), and is transmitted to output shaft (22).

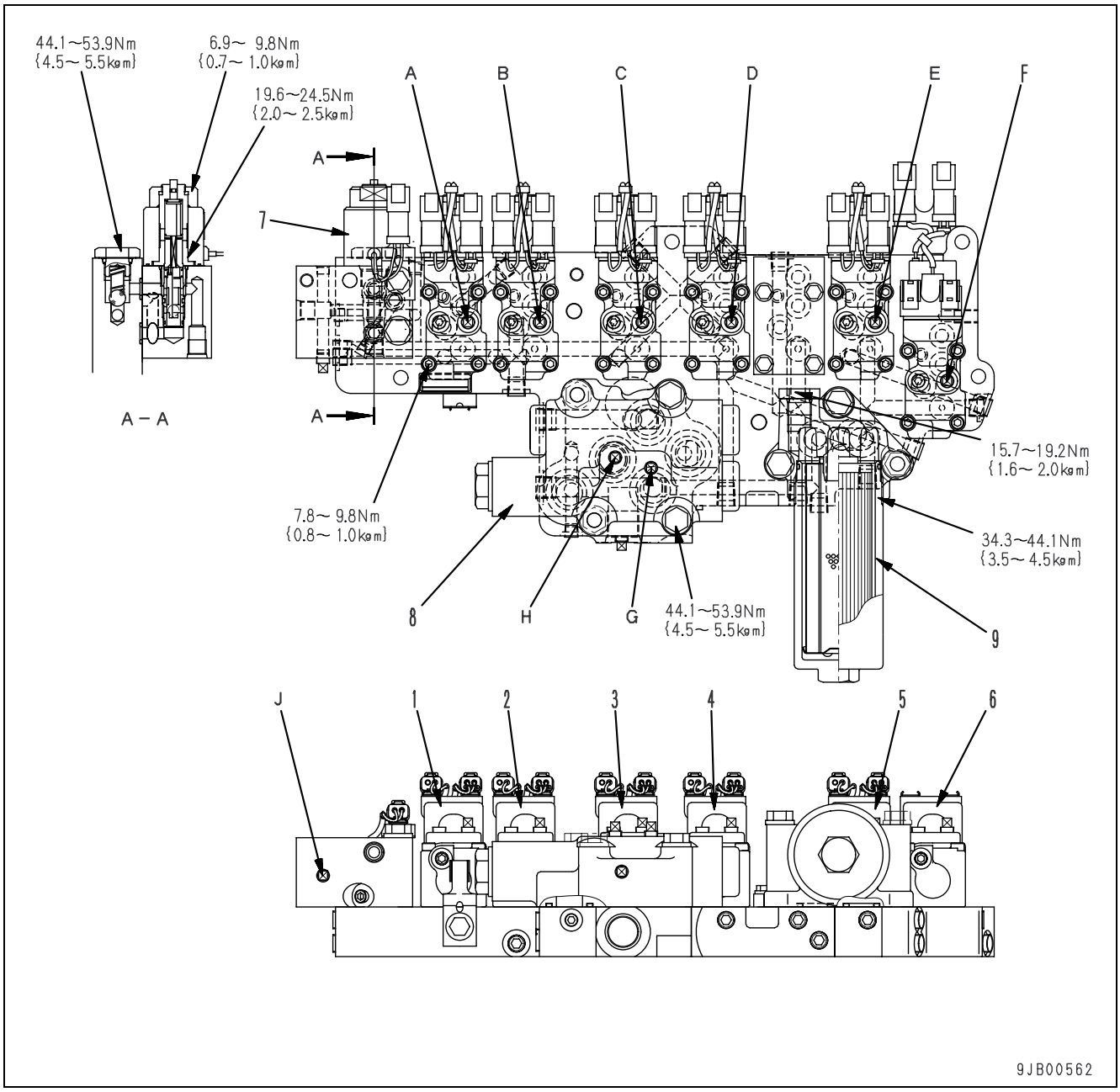
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Blank for technical reason

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Transmission control valve

Without lock-up clutch



A. 2nd clutch oil pressure detection port
B. 3rd clutch oil pressure detection port
C. 1st clutch oil pressure detection port
D. 4th clutch oil pressure detection port
E. R clutch oil pressure detection port
F. F clutch oil pressure detection port
G. Main relief oil pressure detection port
H. Torque converter relief oil pressure detection port
J. Parking brake oil pressure detection port

1. ECMV (for 2nd clutch)
2. ECMV (for 3rd clutch)
3. ECMV (for 1st clutch)
4. ECMV (for 4th clutch)
5. ECMV (for R clutch)
6. ECMV (for F clutch)
7. Parking brake solenoid valve
8. Main relief, torque converter relief valve
9. Last-chance filter

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ECMV actuation table

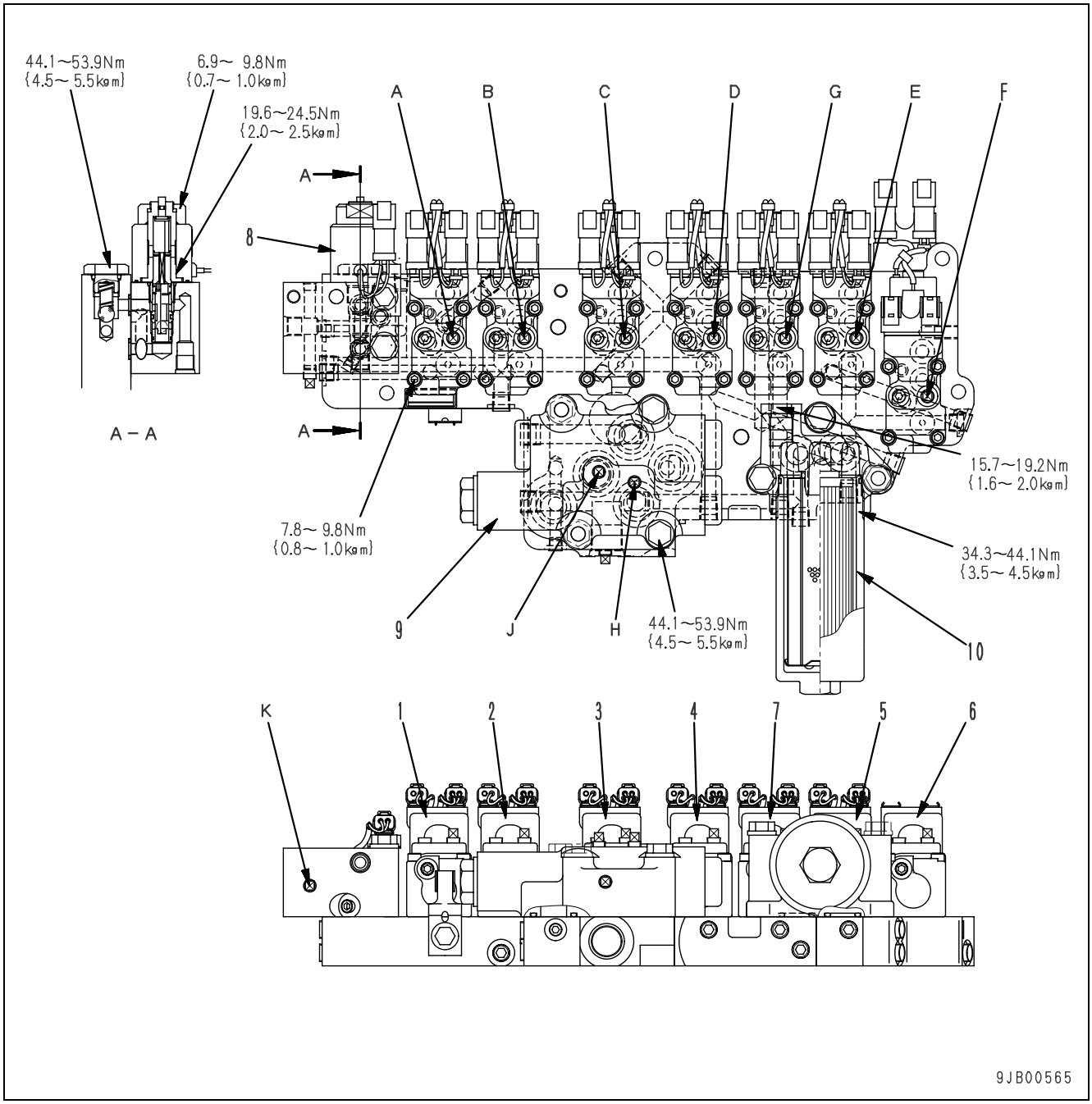
		ECMV					
		F	R	1st	2nd	3rd	4th
Gear speed range	F1	○		○			
	F2	○			○		
	F3	○				○	
	F4	○					○
	R1		○	○			
	R2		○		○		
	R3		○			○	
	R4		○				○

Outline

- The oil from the pump passes through the flow valve, is filtered by the oil filter, enters the transmission control valve, and is separated into the main relief circuit and clutch actuation circuit.
- The oil pressure adjusted by the main relief valve and flowing to the clutch actuation circuit passes through the last-chance filter and actuates the clutch and parking brake. The oil relieved by the main relief valve is supplied to the torque converter.
- When the transmission shifts gear, the ECMV uses the command current from the transmission controller to raise the clutch oil pressure smoothly in order to reduce the transmission shock. In addition, it keeps the clutch pressure constant when the machine is traveling.
- By switching the F, R, and 1st-4th ECMVs, the adjusted oil pressure is supplied to the selected clutch to provide the necessary speed range.

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With lock-up clutch



A. 2nd clutch oil pressure detection port
B. 3rd clutch oil pressure detection port
C. 1st clutch oil pressure detection port
D. 4th clutch oil pressure detection port
E. R clutch oil pressure detection port
F. F clutch oil pressure detection port
G. Lock-up clutch oil pressure detection port
H. Main relief oil pressure detection port
J. Torque converter relief oil pressure detection port
K. Parking brake oil pressure detection port

1. ECMV (for 2nd clutch)
2. ECMV (for 3rd clutch)
3. ECMV (for 1st clutch)
4. ECMV (for 4th clutch)
5. ECMV (for R clutch)
6. ECMV (for F clutch)
7. ECMV (for lock-up clutch)
8. Parking brake solenoid valve
9. Main relief, torque converter relief valve
10. Last-chance filter

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ECMV actuation table (with lock-up clutch)

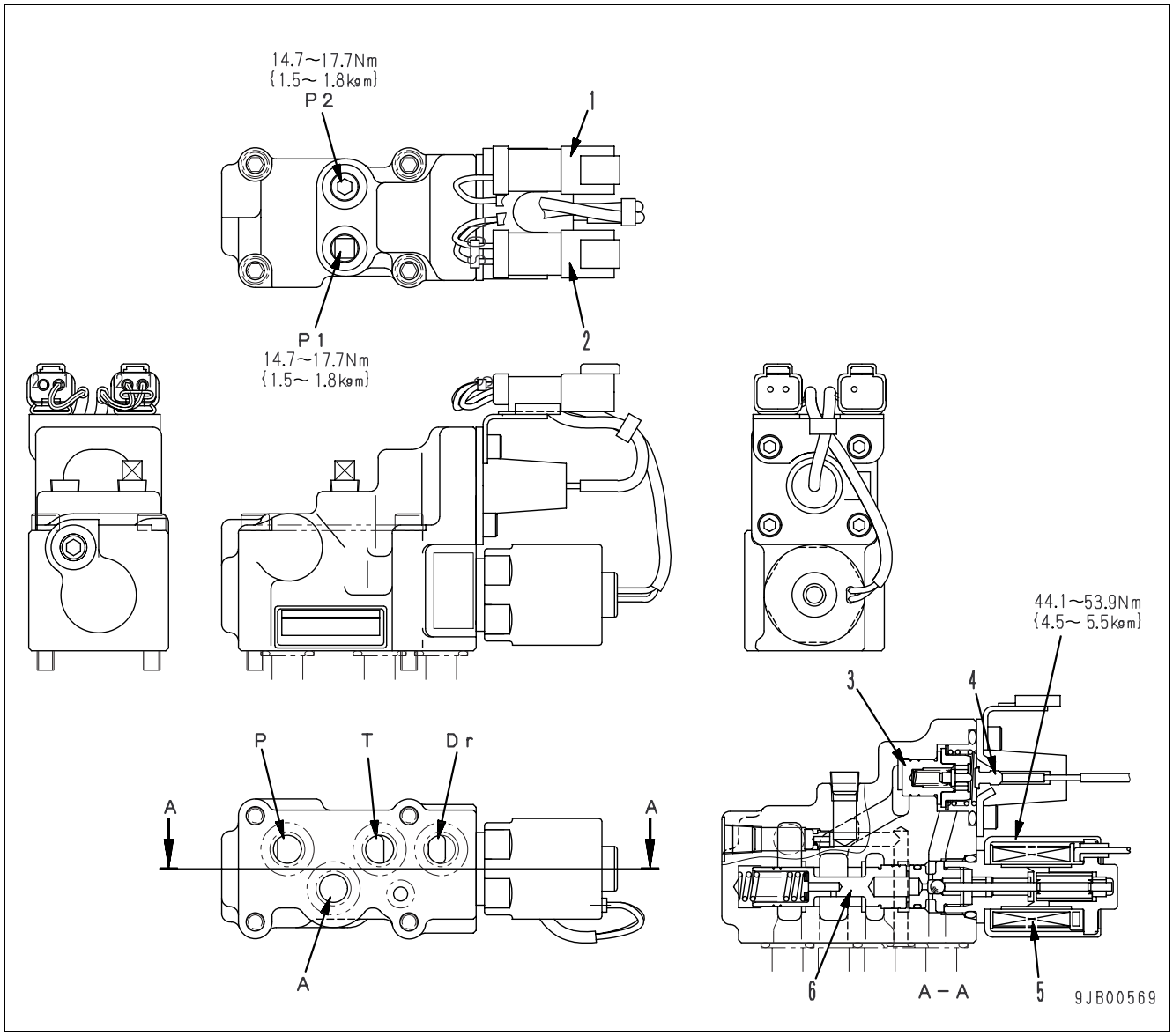
		ECMV						
		F	R	1st	2nd	3rd	4th	Lock up
Gear speed range	F1	○		○				
	F2	○			○			
	F3	○				○		○
	F4	○					○	○
	R1		○	○				
	R2		○		○			
	R3		○			○		
	R4		○				○	○

Outline

- The oil from the pump passes through the flow valve, is filtered by the oil filter, enters the transmission control valve, and is separated into the main relief circuit and clutch actuation circuit.
- The oil pressure adjusted by the main relief valve and flowing to the clutch actuation circuit passes through the last-chance filter and actuates the clutch and parking brake. The oil relieved by the main relief valve is supplied to the torque converter.
- When the transmission shifts gear, the ECMV uses the command current from the transmission controller to raise the clutch oil pressure smoothly in order to reduce the transmission shock. In addition, it keeps the clutch pressure constant when the machine is traveling.
- By switching the F, R, and 1st-4th ECMVs, the adjusted oil pressure is supplied to the selected clutch to provide the necessary speed range.
- When traveling in 3rd or 4th, the lock-up ECMV is actuated at a speed greater than the set speed of the transmission controller.

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ECMV (Electronic Control Modulation Valve)



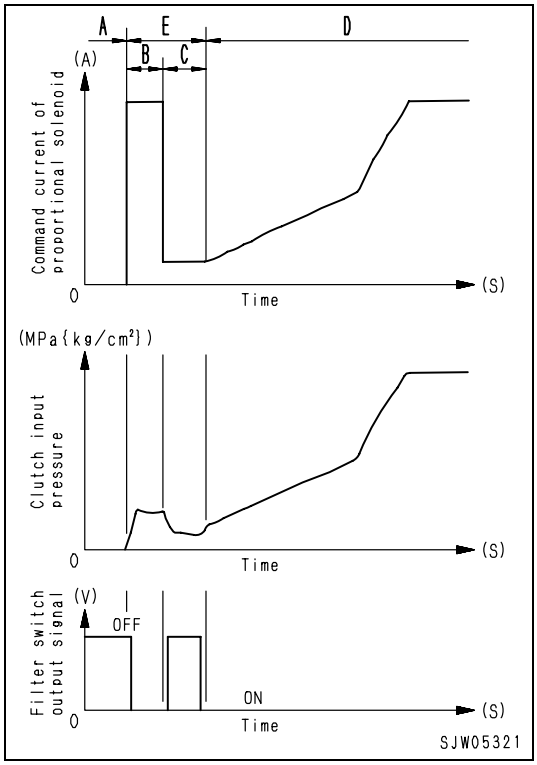
A. To clutch
P. From pump
T. Drain
Dr. Drain
P1. Clutch oil pressure detection port
P2. Pilot oil pressure detection port

1. Connector for fill switch
2. Connector for proportional solenoid
3. Oil pressure detection valve
4. Fill switch
5. Proportional solenoid
6. Pressure control valve

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ECMV for speed clutch

Outline of ECMV



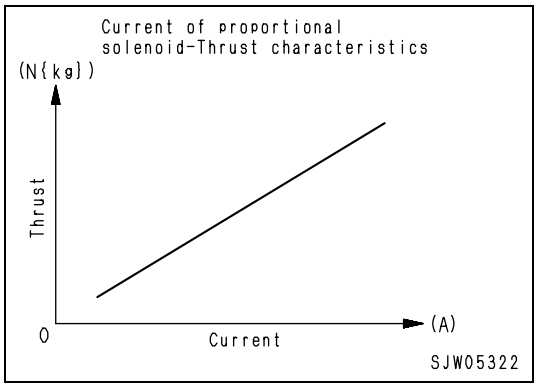
- The ECMV (Electronic Control Modulation Valve) consists of two components: the pressure control valve and the fill switch.
- Pressure control valve
  The proportional solenoid receives the flow of electricity sent from the transmission controller, and the pressure control valve converts this into hydraulic pressure.
- Fill switch
  The fill switch detects when the clutch is filled with oil. It has the following functions.

  a. When the clutch is filled with oil, it sends a signal (fill signal) at the same time to the controller to inform the controller that the filling is completed.

  b. While oil pressure is applied to the clutch, it outputs a signal (fill signal) to the controller to inform the controller of the existence of the oil pressure.

  Range A: Before shifting gear (when draining)
  Range B: Start of fill (during trigger)
  Range C: Completion of fill
  Range D: Pressure adjustment
  Range E: During filling

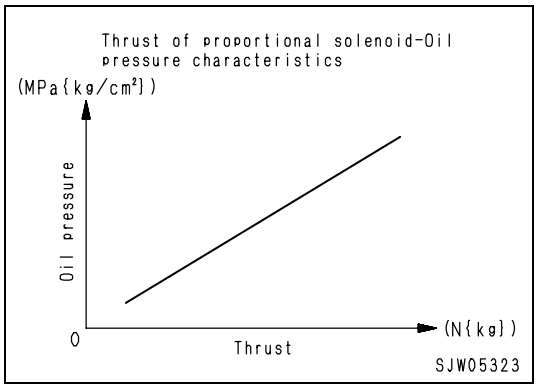
ECMV and proportional solenoid



- There is one proportional solenoid installed to each ECMV.

  It generates propulsion force as shown in the diagram below according to the command current from the controller.

  The propulsion force generated by the proportional solenoid acts on the pressure control valve spool and generates oil pressure as shown in the diagram below. In this way, the command current flow is controlled and the propulsion force varies to actuate the pressure control valve and control the oil flow and oil pressure.



ECMV and fill switch

- There is one fill switch installed to each ECMV.

  When the filling of the clutch is completed, the fill switch is turned on by the clutch pressure. With this signal, the oil pressure starts the build-up.

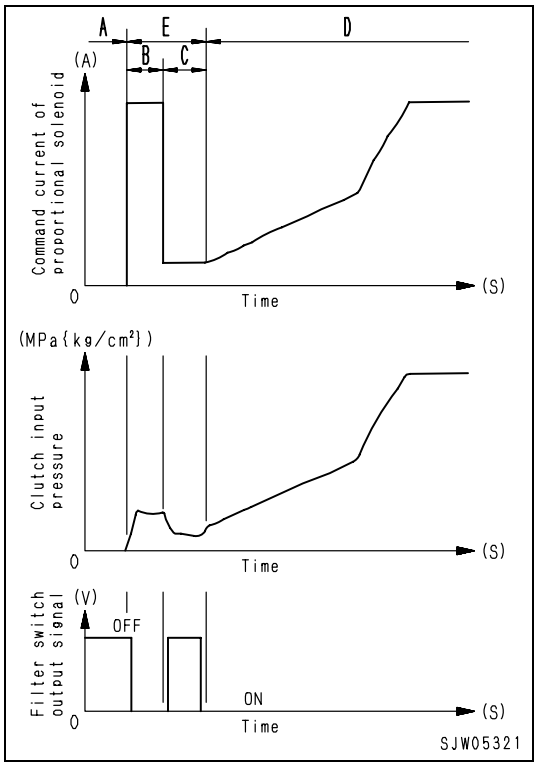
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Actuation of ECMV

- The ECMV is controlled by the command current from the controller to the proportional solenoid and the fill switch output signal.

  The relationship between ECMV proportional solenoid command current and the clutch input pressure and fill switch output signal is as shown in the diagram below.

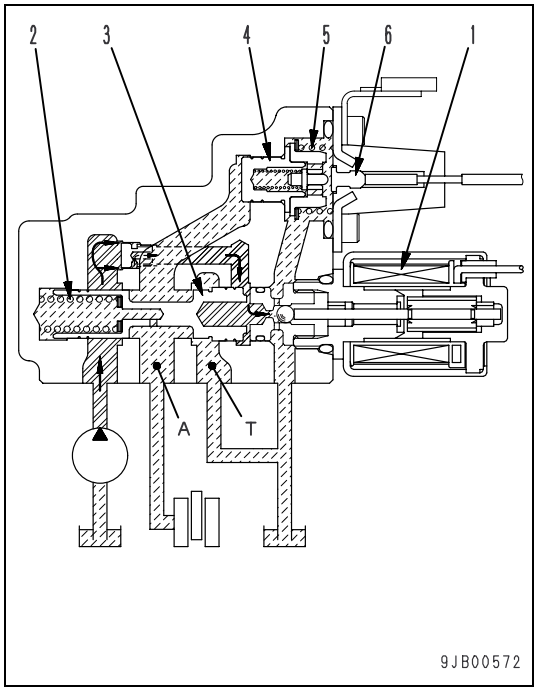
  Range A: Before shifting gear (when draining)
  Range B: Start of fill (during trigger)
  Range C: Completion of fill
  Range D: Pressure adjustment
  Range E: During filling



1. Before shifting gear (when draining) (range **A** in graph)

   When no current is flowing to proportional solenoid (1), pressure control valve spool (3) drains the oil at clutch port **A** through drain port T.

   When this happens, there is no hydraulic force acting on oil pressure detection valve spool (4), so fill switch (6) goes OFF.

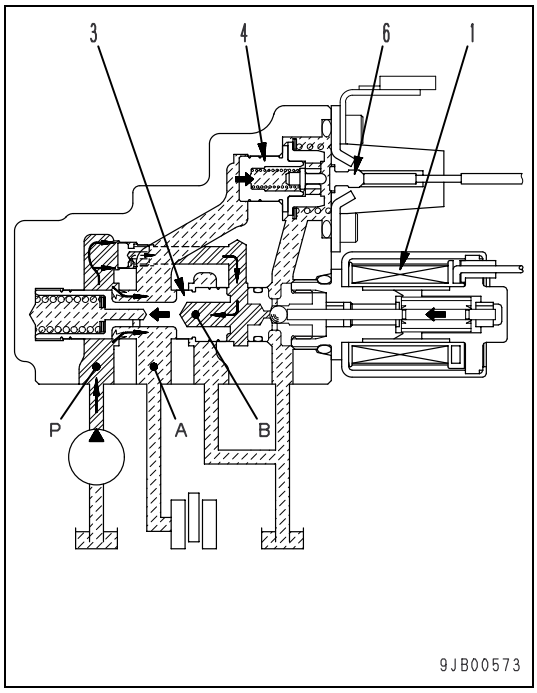


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2. Start of fill (when trigger command is input to pressure control valve) (ranges **B** and **C** in graph)

   When there is no oil inside the clutch, if current is applied to proportional solenoid (1), oil pressure is applied in chamber **B** to balance with the force of the solenoid, and pressure control valve (3) is pushed to the left.

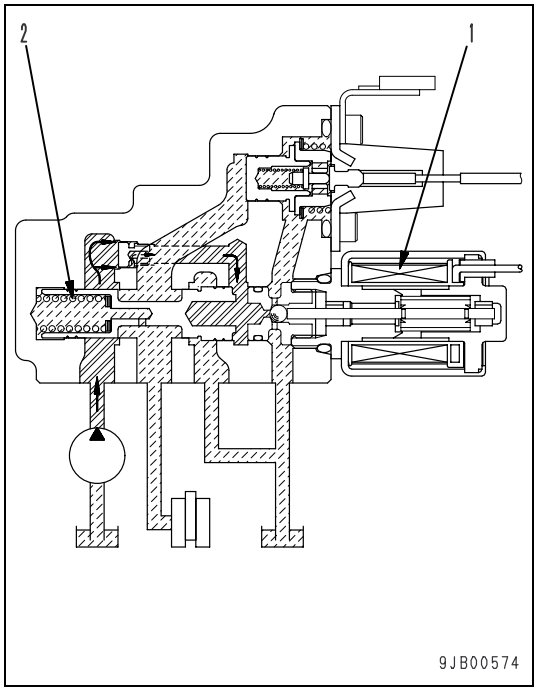
   As a result, pump port **P** and clutch port **A** open, and oil starts to fill the clutch. When the clutch is filled with oil, oil pressure detection switch (4) is actuated, and fill switch (6) comes ON.



3. Adjusting pressure (range **D** in graph)

   When electric current flows to proportional solenoid (1), the solenoid generates a propulsion force proportional to the current.

   The total of this propulsion force of the solenoid and the propulsion force of the oil pressure at the clutch port and the reaction force of pressure control valve spring (2) is adjusted so that it is balanced.



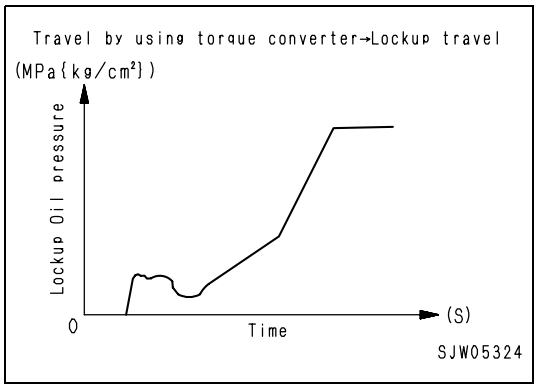
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ECMV for lock-up clutch

Outline

- This ECMV sets the lock-up clutch hydraulic pressure to the specified pressure, and also switches the lock-up clutch.

  It has a modulation wave pattern, which engages the lock-up clutch smoothly, and reduces the shock when shifting gear. Furthermore, it prevents the generation of peak torque in the power train. As a result, the machine gives a good ride, and the durability of the power train is greatly increased.

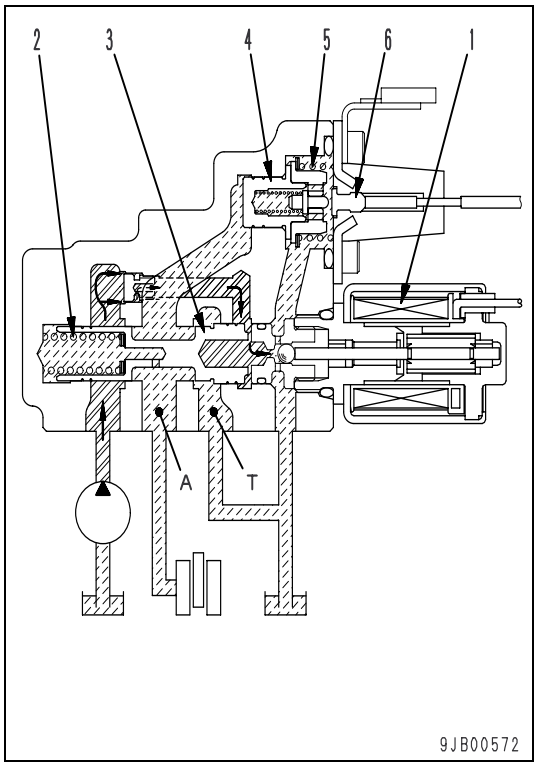


Operation
When traveling in torque converter drive

- When the machine is traveling in torque converter drive, no electric current is flowing to proportional solenoid (1).

  Pressure control valve (3) drains the oil from clutch port **A** through drain port **T**, and the lock-up clutch is released.

  At the same time, there is no hydraulic force acting on oil pressure detection valve (4), so fill switch (6) goes OFF.



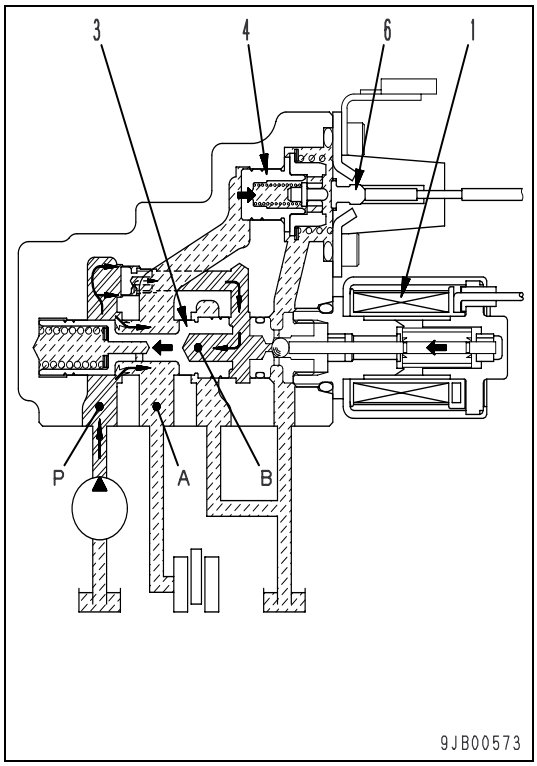
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When traveling in direct drive
(Changing from torque converter drive -> direct drive)

4. During filling

   When the transmission shifts to direct drive (lock-up), if current is applied to proportional solenoid (1) by an electric signal, oil pressure is applied in chamber B to balance with the force of the solenoid, and pressure control valve (3) is pushed to the left.

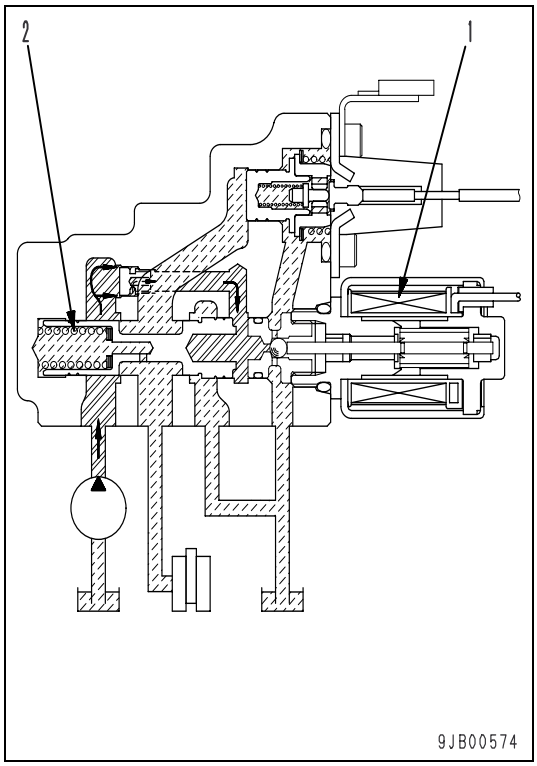
   As a result, pump port **P** and clutch port **A** open, and oil starts to fill the clutch. When the clutch is filled with oil, oil pressure detection switch (4) is actuated, and fill switch (6) comes ON.



5. Adjusting pressure

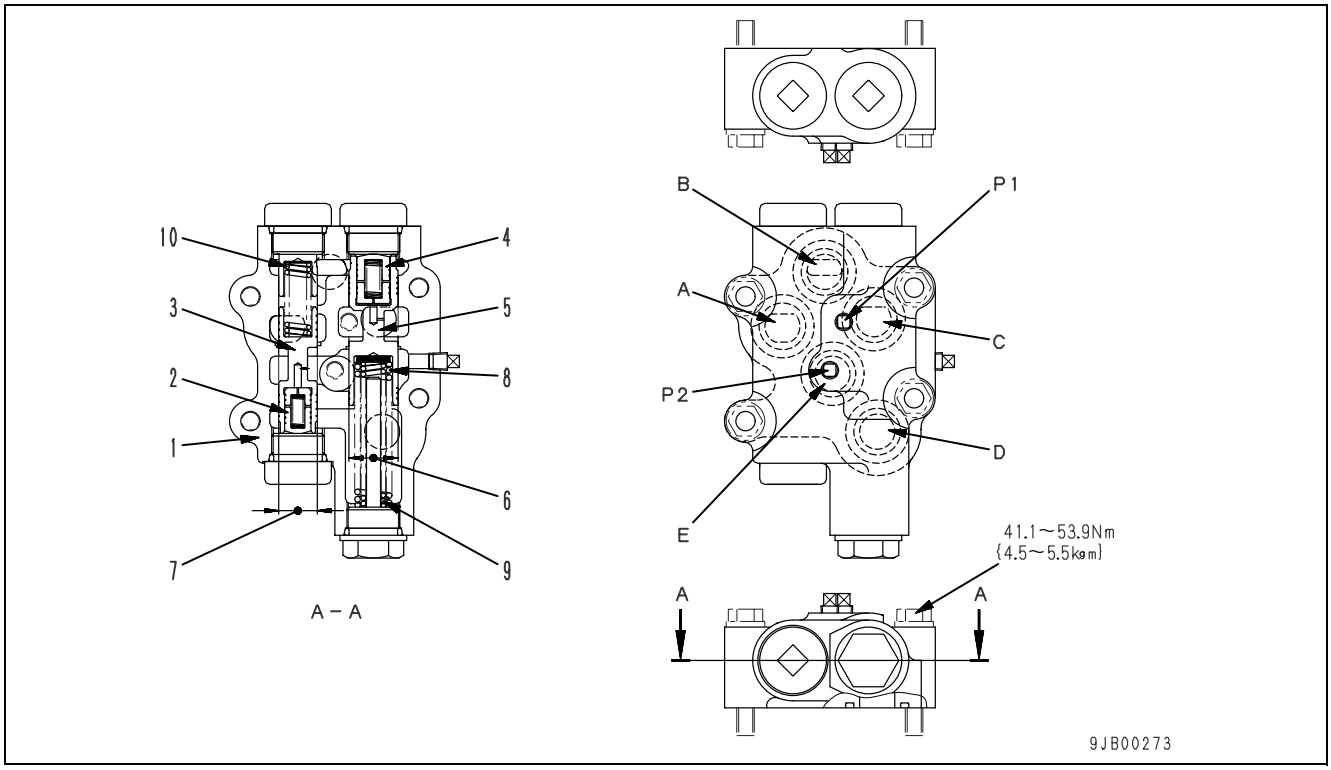
   When electric current flows to proportional solenoid (1), the solenoid generates a propulsion force proportional to the current.

   The total of this propulsion force of the solenoid and the propulsion force of the oil pressure at the clutch port and the reaction force of pressure control valve spring (2) is adjusted so that it is balanced.



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Main relief, torque converter relief valve



A. Drain (torque converter relief)
B. Drain
C. From pump
D. Drain
E. To torque converter
P1. Main relief oil pressure detection port
P2. Torque converter oil pressure detection port
1. Body
2. Torque converter relief valve
3. Valve spring
4. Piston
5. Piston spring
6. Main relief valve

Unit: mm

No.	Check item	Criteria					Remedy
6	Clearance between main relief valve and valve body	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		Ø 28	-0.035 -0.045	+0.013 0	0.035 ~ 0.058	0.078	
7	Clearance between torque converter relief valve and valve body	Ø 22	-0.035 -0.045	+0.013 0	0.035 ~ 0.058	0.078	
8	Main relief valve spring (outer)	Standard size			Repair limit		
		Free length	Installed length	Installed load	Free length	Installed load	
		122	81.3	392 N {40.0 kg}	118.3	373 N {38.0 kg}	
9	Main relief valve spring (inner)	108	81.3	329N {33.5 kg}	104.8	312 N {31.8 kg}	
10	Torque converter relief valve spring	50	43	134 N {13.7 kg}	48.5	128 N {13.0 kg}	

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Outline

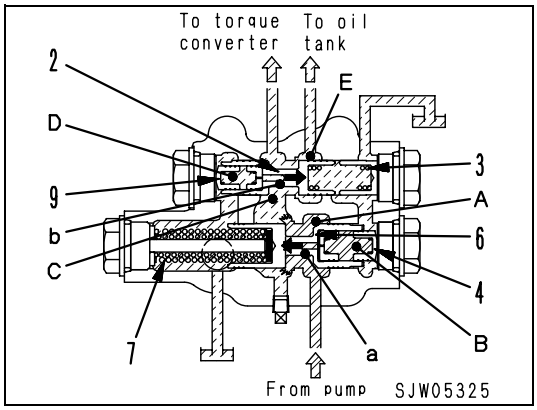
Torque converter relief valve
The torque converter relief valve is installed in the torque converter inlet port circuit. It acts to keep the oil pressure in the torque converter inlet port circuit at or below the set pressure and protects the torque converter from abnormally high pressure.
Set pressure: 0.86 MPa {8.83 kg/cm²} (cracking pressure)

Main relief valve
The main relief valve maintains the oil pressure in the transmission and parking brake at the set pressure.
Set pressure: 2.93 MPa {29.9 kg/cm²} (engine at rated speed)

Operation

Torque converter relief valve

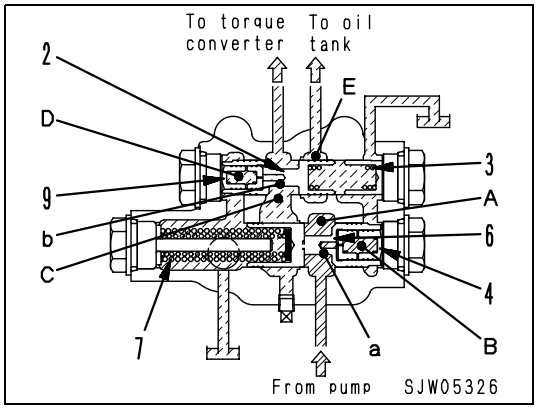
- The oil relieved from the main relief valve flows from port **C** into the torque converter, and at the same time, passes through orifice **b** of spool (2) and enters port **D**.
  When the oil fills the circuit to the torque converter, the oil pressure starts to rise.



- When the oil pressure in the circuit to the torque converter rises, the oil entering port **D** pushes piston (9). The reaction compresses valve spring (3), and moves spool (2) to the right to open port **C** and port **E**.
  When this happens, the oil from port **C** is relieved to port **E** and is drained to the oil tank.
  The oil pressure at port **C** at this point is 0.86 MPa {8.83 kg/cm²} (cracking pressure)

Main relief valve

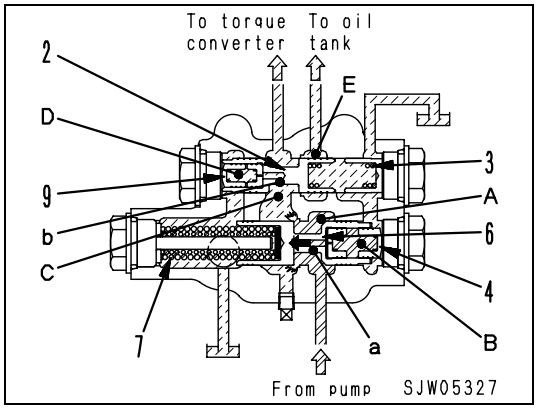
- The oil from the hydraulic pump passes through the filter, enters port **A** of the main relief valve, and then passes through orifice a in spool (6) and enters chamber **B**.
  When the oil from the pump fills the circuit, the oil pressure starts to rise.



- When the oil pressure in the circuit rises, the oil entering port B pushes piston (4). The reaction compresses valve spring (7) and moves spool (6) to the left to open port A and port **C**.

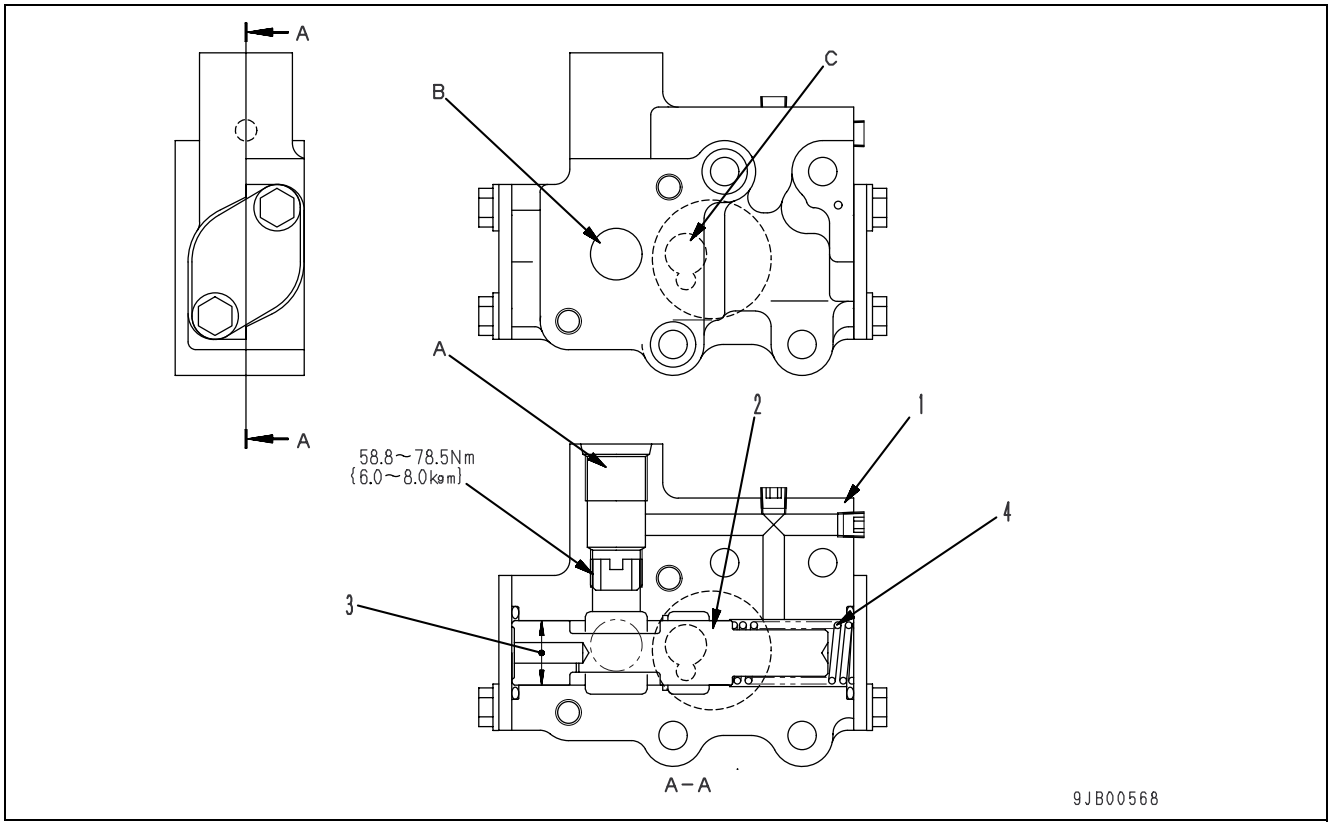
  When this happens, the oil from the pump is relieved from port **A** to port **C**, and flows from port **C** into the torque converter.

  The oil pressure at port **A** at this point is 2.93 MPa {29.9 kg/cm²} (engine at rated speed).



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Flow valve



1. Valve body
2. Valve spool

A. To transmission valve circuit
B. From pump
C. To transmission lubrication circuit

Operation

- The oil from the pump flows to the transmission valve circuit, but if it goes above the specified amount, the flow valve acts to send it to the transmission lubrication circuit.
- If the flow of oil from the pump goes above the specified amount, valve spool (2) moves and sends part of the oil from the pump to the transmission lubrication circuit.

Unit: mm

No.	Check item	Criteria					Remedy
3	Clearance between flow control valve and body	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		25	-0.020 -0.030	+0.013 0	0.020 ~ 0.043	0.06	
4	Flow control valve spring	Standard size			Repair limit		
		Free length	Installed length	Installed load	Free length	Installed load	
		63.8	47	79.5 N {8.11 kg}	61.9	75.5 N {7.7 kg}	

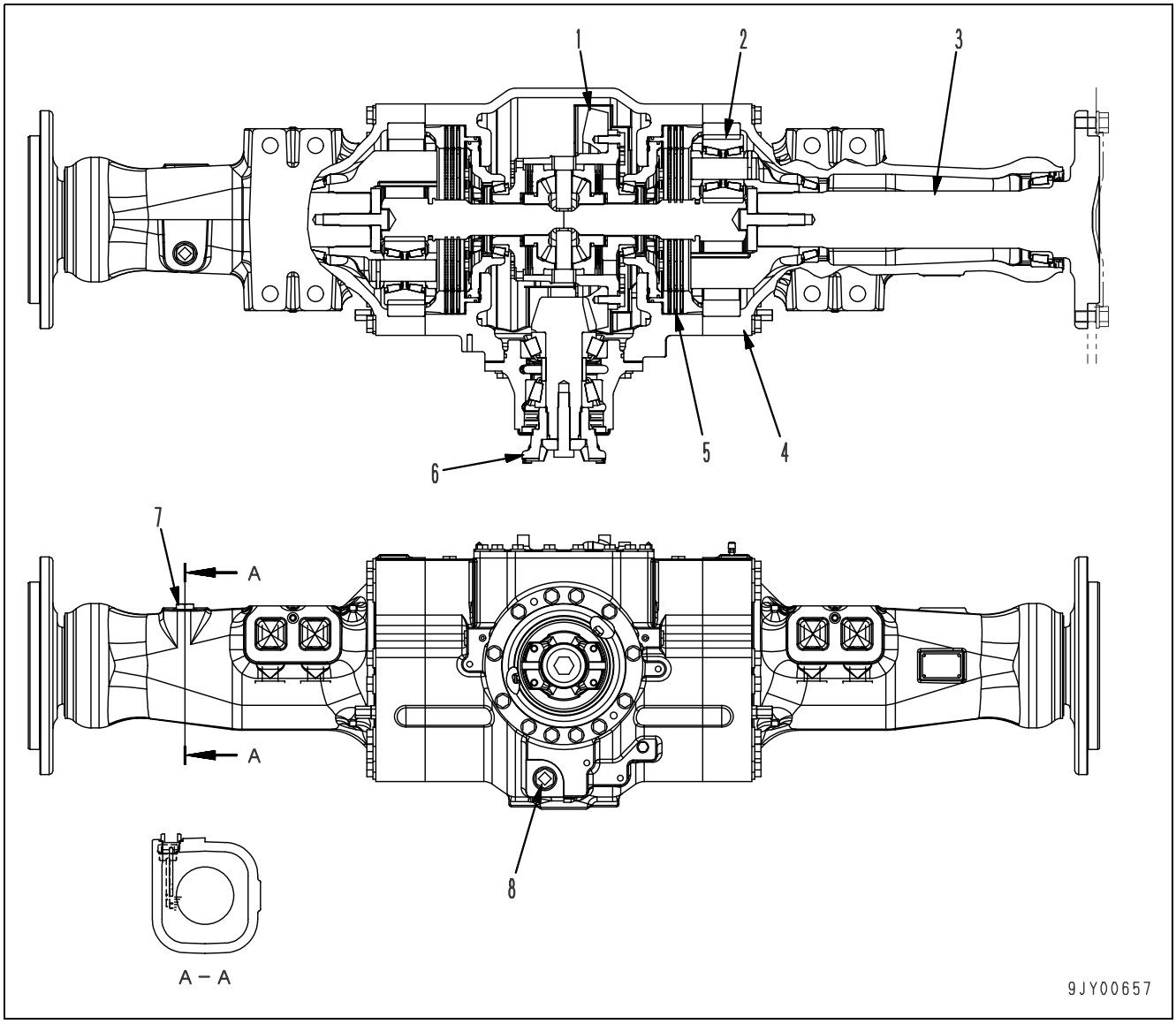
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Axle

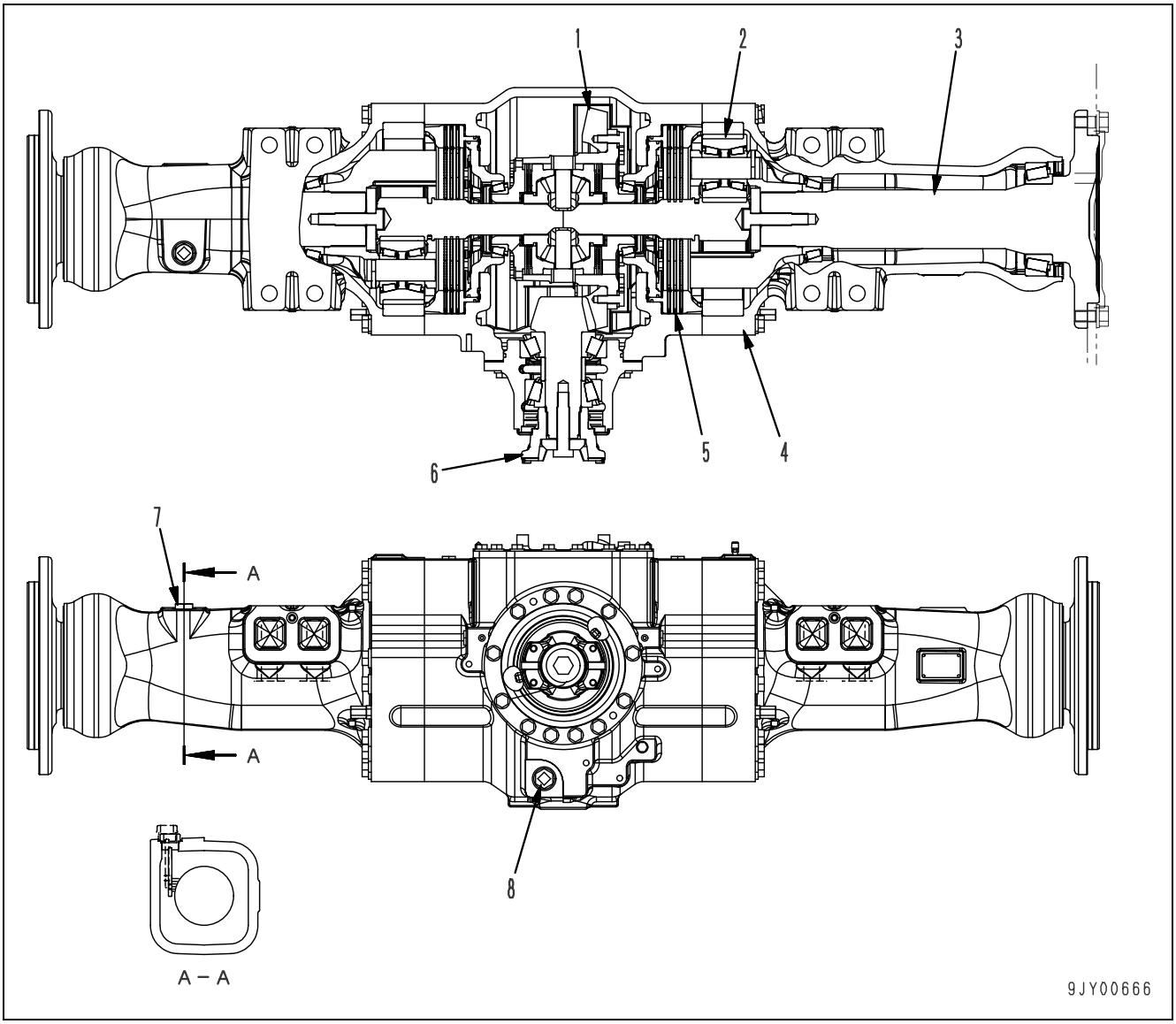
Front axle – WA470-5



1. Differential
2. Final drive
3. Axle shaft
4. Axle housing
5. Wet-type multiple-disc brake
6. Coupling
7. Oil filler port/level plug
8. Drain plug

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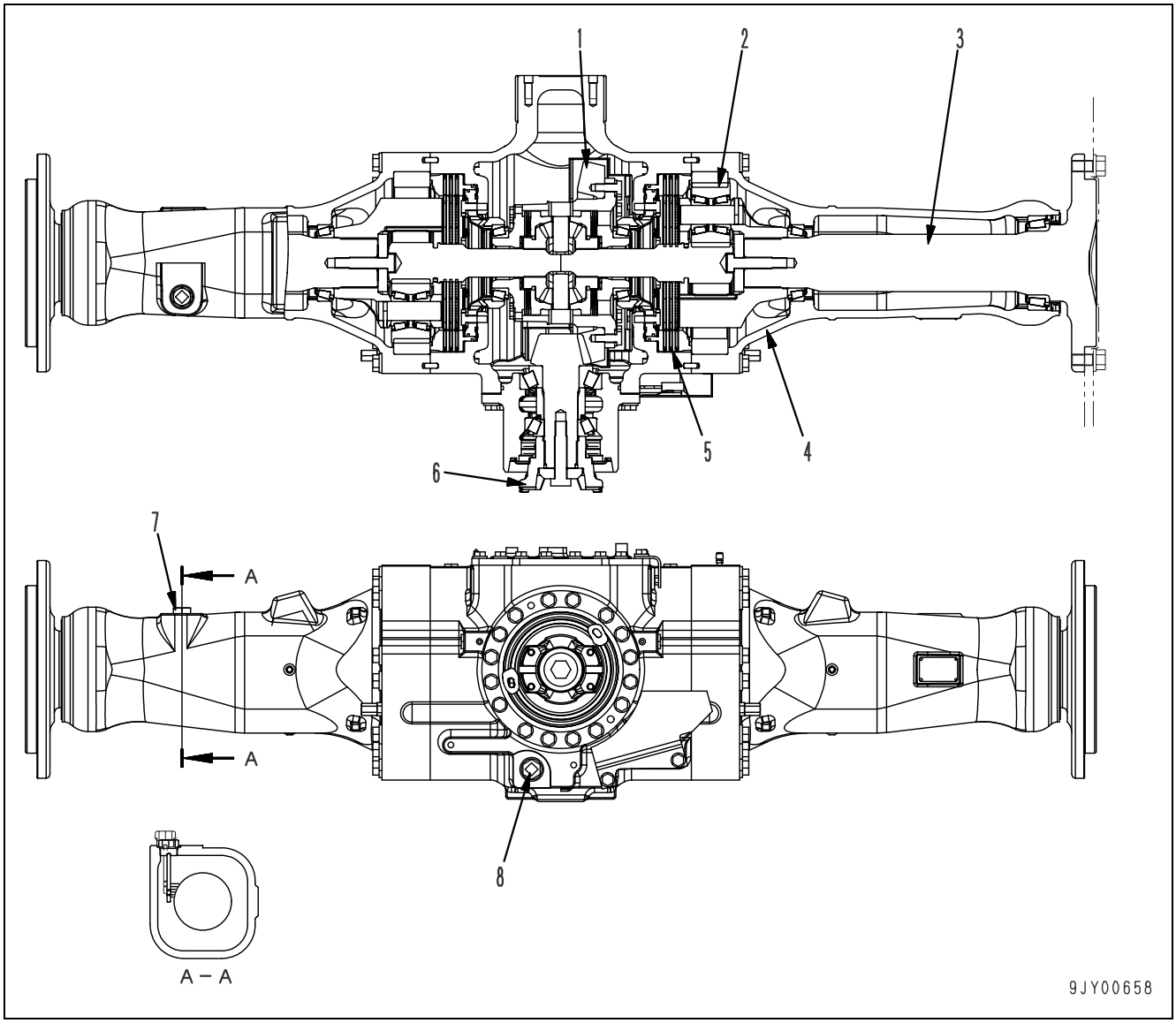
Front axle – WA480-5



1. Differential
2. Final drive
3. Axle shaft
4. Axle housing
5. Wet-type multiple-disc brake
6. Coupling
7. Oil filler port/level plug
8. Drain plug

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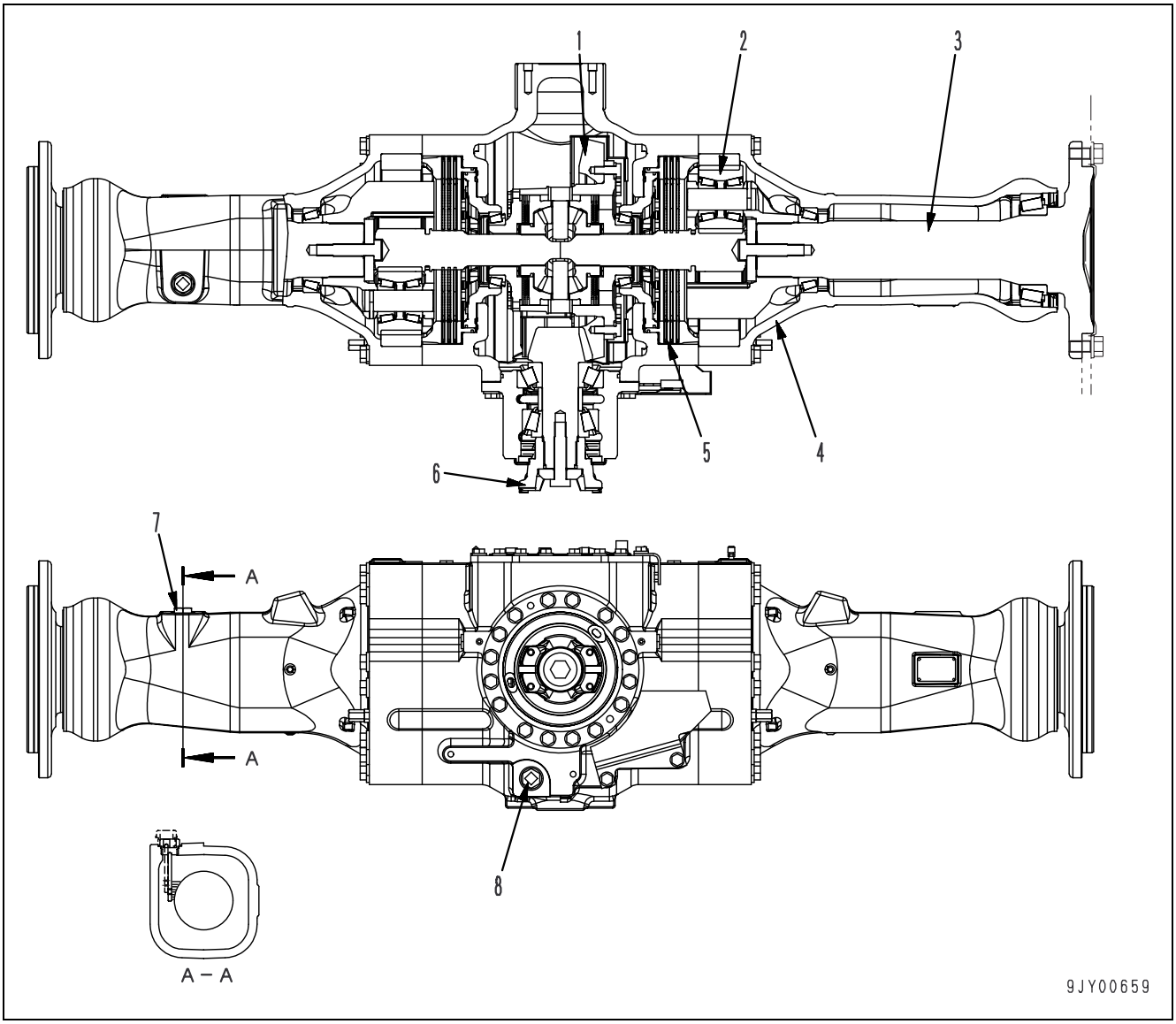
Rear axle – WA470-5



1. Limited slip differential
2. Final drive
3. Axle shaft
4. Axle housing
5. Wet-type multiple-disc brake
6. Coupling
7. Oil filler port/level plug
8. Drain plug

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Rear axle – WA480-5

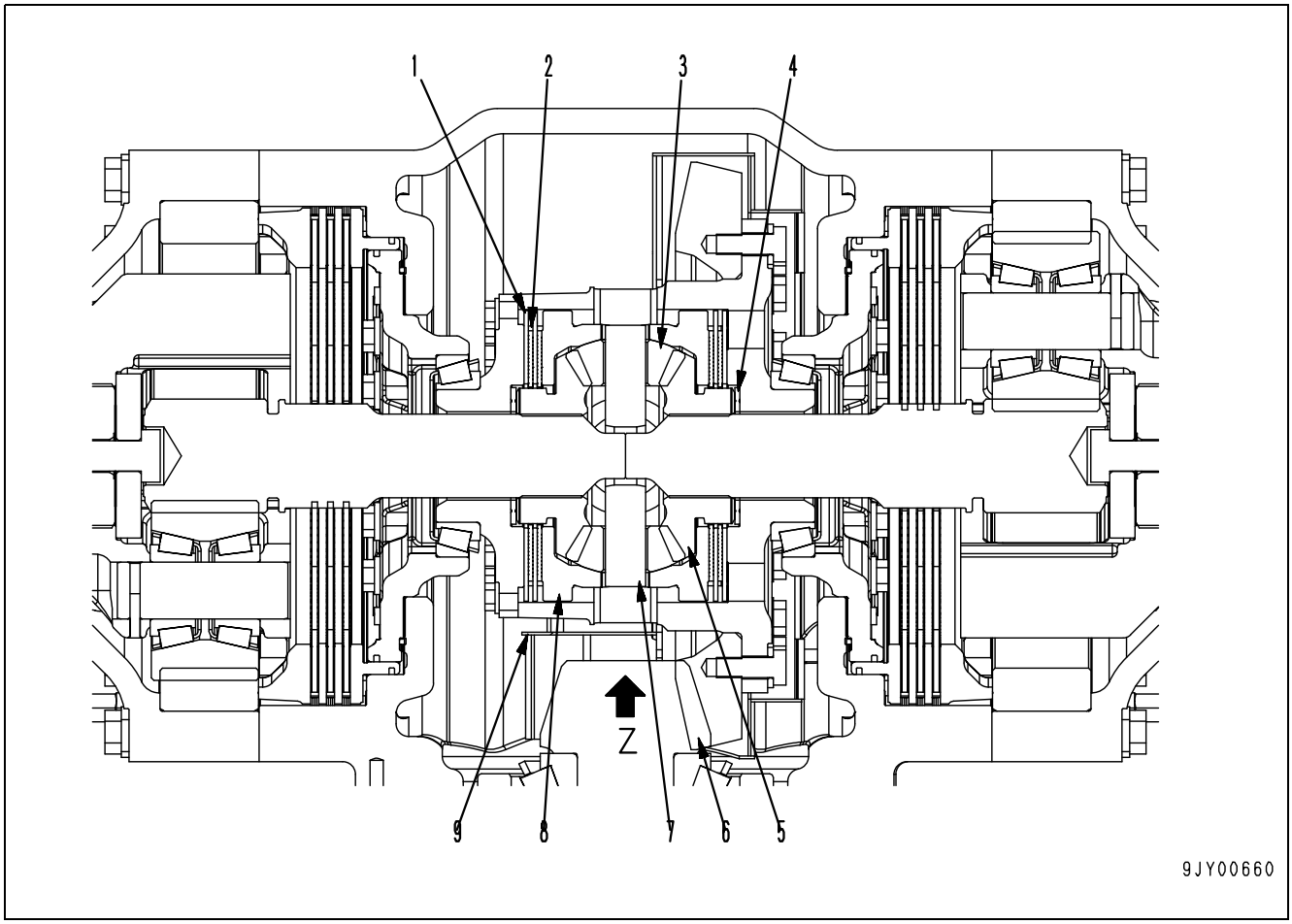


1. Differential
2. Final drive
3. Axle shaft
4. Axle housing
5. Wet-type multiple-disc brake
6. Coupling
7. Oil filler port/level plug
8. Drain plug

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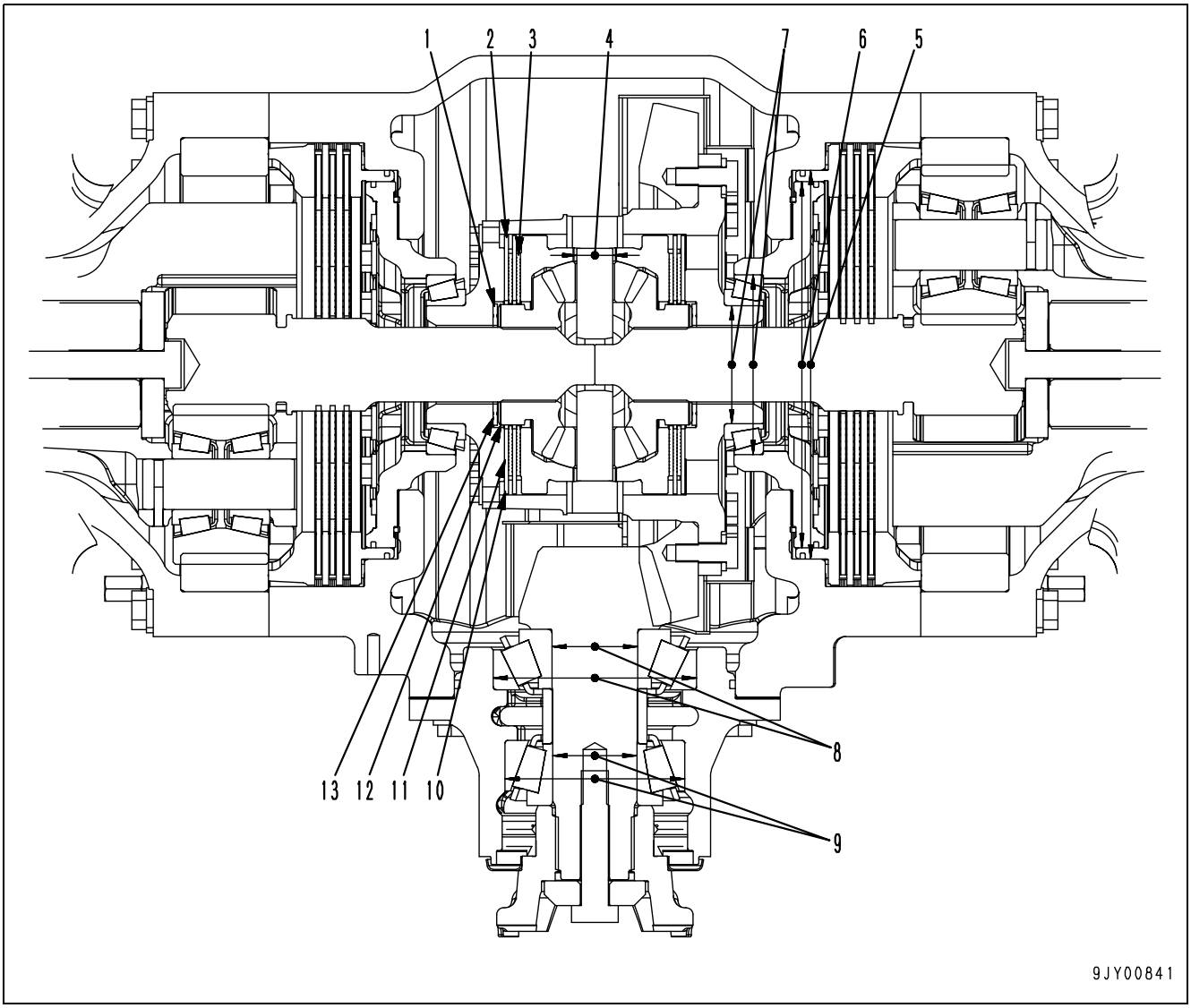
Differential

Anti-slip differential



1. Plate
2. Disc
3. Pinion
4. Washer
5. Side gear
6. Bevel pinion
7. Shaft
8. Pressure ring
9. Case

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WA470-5 FRONT
WA480-5

Unit: mm

No.	Check item	Criteria					Remedy
1	Washer thickness	Standard size		Tolerance	Repair limit		Replace
		4		±0.05	3.8		
		4.1					
2	Plate thickness	3.4		±0.03	3.3		
		3.5					
3	Disc thickness	3.6		+0.04 -0.03	3.55		
4	Clearance between spider and differential pinion gear	Standard size	Shaft	Hole	Standard clearance	Clearance limit	
		35	-0.11 -0.16	+0.050 0	0.110 ~ 0.210	0.3	
5	Piston assembly portion of bearing carrier (piston, carrier)	326	-0.125 -0.214	+0.089 0	0.125 ~ 0.303	—	
6	Piston assembly portion of differential housing (housing, piston)	346	-0.125 -0.214	+0.089 0	0.125 ~ 0.303	—	
7	Clearance at differential side bearing — Outer race	160	0 -0.025	-0.045 -0.085	-0.085 ~ -0.020	—	
	Clearance at differential side bearing — Inner race	105	+0.059 +0.037	0 -0.020	-0.079 ~ -0.037	—	
8	Clearance of bearing at pinion shaft gear end — Outer race	180.975	+0.025 0	-0.025 -0.054	-0.079 ~ -0.025	—	
	Clearance of bearing at pinion shaft gear end — Inner race	76.2	+0.065 +0.046	+0.013 0	-0.065 ~ -0.033	—	
9	Clearance of bearing at pinion shaft coupling end — Outer race	160	0 -0.025	-0.041 -0.076	-0.076 ~ -0.016	—	
	Clearance of bearing at pinion shaft coupling end — Inner race	75	+0.039 +0.020	0 -0.015	-0.054 ~ -0.020	—	
10	Backlash between case and plate	0 ~ 0.5					
11	Clearance between disc and plate	0.2 ~ 0.6					
12	Backlash between side gear and disc	0.13 ~ 0.32					
13	End play (one end) of side gear in axial direction	0.2 ~ 0.4					

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WA470-5 REAR

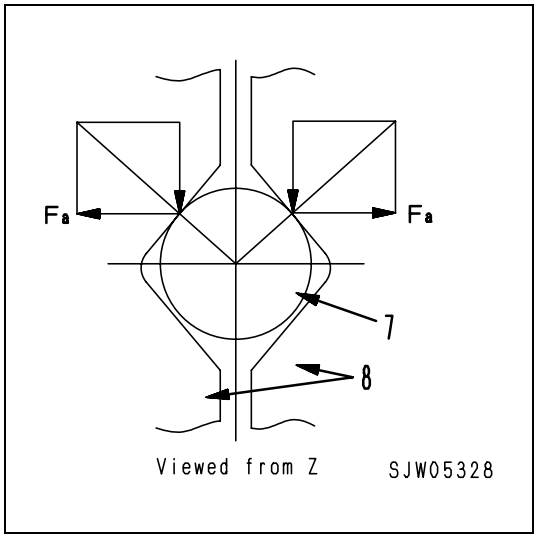
Unit: mm

No.	Check item		Criteria					Remedy
1	Washer thickness		Standard size		Tolerance	Repair limit		Replace
			4		±0.05	3.8		
			4.1					
2	Plate thickness		3.1		±0.03	3		
			3					
3	Disc thickness		3.45		+0.02 -0.03	3.40		
4	Clearance between spider and differential pinion gear		Standard size	Shaft	Hole	Standard Clearance	Clearance limit	
			35	-0.11 -0.16	+0.050 0	0.110 ~ 0.210	0.3	
5	Piston assembly portion of bearing carrier (piston, carrier)		307	-0.110 -0.191	+0.081 0	0.110 ~ 0.272	—	
6	Piston assembly portion of differential housing (housing, piston)		327	-0.125 -0.214	-0.089 0	0.125 ~ 0.303	—	
7	Clearance at differential side bearing	Outer race	160	0 -0.025	-0.045 -0.085	-0.085 ~ -0.020	—	
		Inner race	105	+0.059 +0.037	0 -0.020	-0.079 ~ -0.037	—	
8	Clearance of bearing at pinion shaft gear end	Outer race	171.45	+0.025 0	-0.025 0	-0.088~ -0.030	—	
		Inner race	76.2	+0.062 +0.043	+0.013 0	-0.054 ~ -0.020	—	
9	Clearance of bearing at pinion shaft coupling end	Outer race	150	0 -0.020	-0.050 -0.075	-0.076 ~ -0.026	—	
		Inner race	70	+0.039 +0.020	0 -0.015	-0.054 ~ -0.020	—	
10	Backlash between case and plate		0 ~ 0.5					
11	Clearance between disc and plate		0.2 ~ 0.6					
12	Backlash between side gear and disc		0.13 ~ 0.32					
13	End play (one end) of side gear in axial direction		0.2 ~ 0.4					

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Operation of anti-slip differential

The power transmitted from the transmission is transmitted from bevel gear (6) to case (9), pressure ring (8), shaft (7), pinion (3), and gear (5), and is divided to the left and right shafts.



The brake system, consisting of discs (2) and plates (1) is installed at the rear face of side gear (5). A brake torque is generated that is proportional to the torque transmitted from pressure ring (8) to shaft (7).

This brake torque acts to limit the rotation in relation to side gear (5) and case (9), so it is difficult for left and right side gears (5) to rotate mutually and the operation of the differential is limited.

Brake torque generation mechanism of left and right side gears (5).

Shaft (7) is supported at the cam surface cut into the facing surfaces of left and right pressure rings (8).

The power (torque) transmitted from pressure rings (8) to shaft (7) is transmitted at the cam surface, but force Fa separating left and right pressure rings (8) is generated in proportion to the torque transmitted according to the angle of this cam surface.

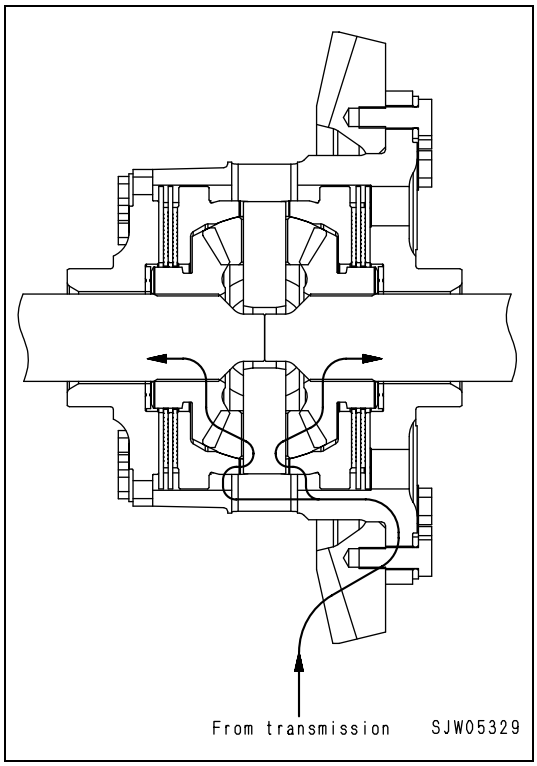
This separation load Fa acts on the brake at the rear face of left and right side gears (5) and generates the brake torque.

When traveling in a straight line

1. When there is no imbalance between drive force of left and right wheels [Road surface condition (friction coefficient) and load for left and right wheels are uniform and load on bucket is centered exactly].

   The power from the transmission is divided equally to the left and right by the differential gear. In this case, the wheel slip limit of the left and right wheels is the same, so even if the power from the transmission exceeds the wheel slip limit, both wheels will slip and the differential will not be actuated.

   There is no load on the brake at the rear face of the side gears.



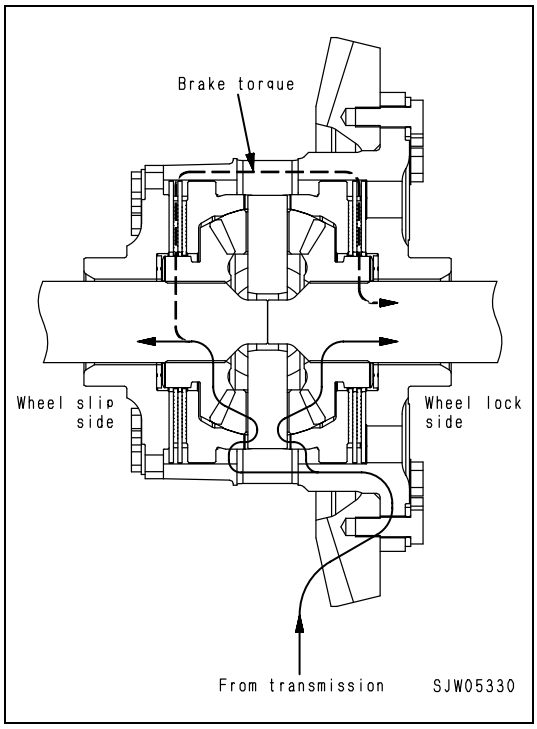
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2. When there is imbalance between drive force of left and right wheels [Road surface condition (friction coefficient) and load for left and right wheels are not uniform and it is easier for wheel on one side to slip]

   Example 1.
   When digging, and wheel on one side is on soft surface

   Example 2.
   When clearing snow, and wheel on one side is on snow and wheel on other side is on asphalt

   Example 3.
   When traveling on slope, and there is imbalance between load on left and right wheels



The power from the transmission is divided equally to the left and right by the differential gear. However, when the drive force exceeds the wheel slip limit on the side where the wheel is slipping, the amount of the force exceeding the wheel slip limit passes through the brake and case at the rear face of the side gear and is transmitted to the brake on the opposite side (locked side) and is sent to the wheel on the locked side.

If this excess portion of the drive force becomes greater than the braking force, the differential starts to work.

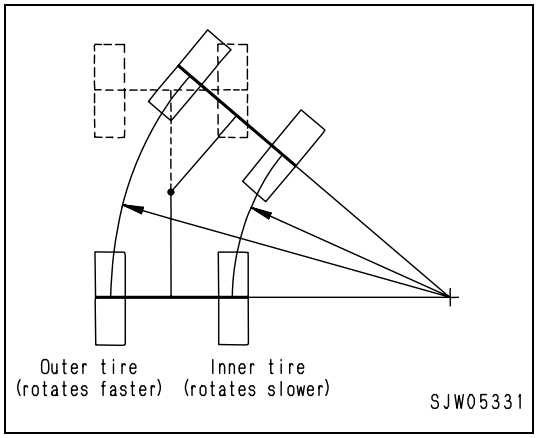
Difference in wheel drive force for each type of differential when wheel on one side slips

	Wheel drive force (when one wheel is slipping)		
	Slipping wheel	Locked wheel	Total (ratio)
Limited slip differential	1	2.64 (F)	3.64 (1.82)
Normal differential	1	1	2 (1)

On road surfaces where the wheel on one side is likely to slip, the limited slip differential increases the drive force by 1.82 times more than the normal differential.

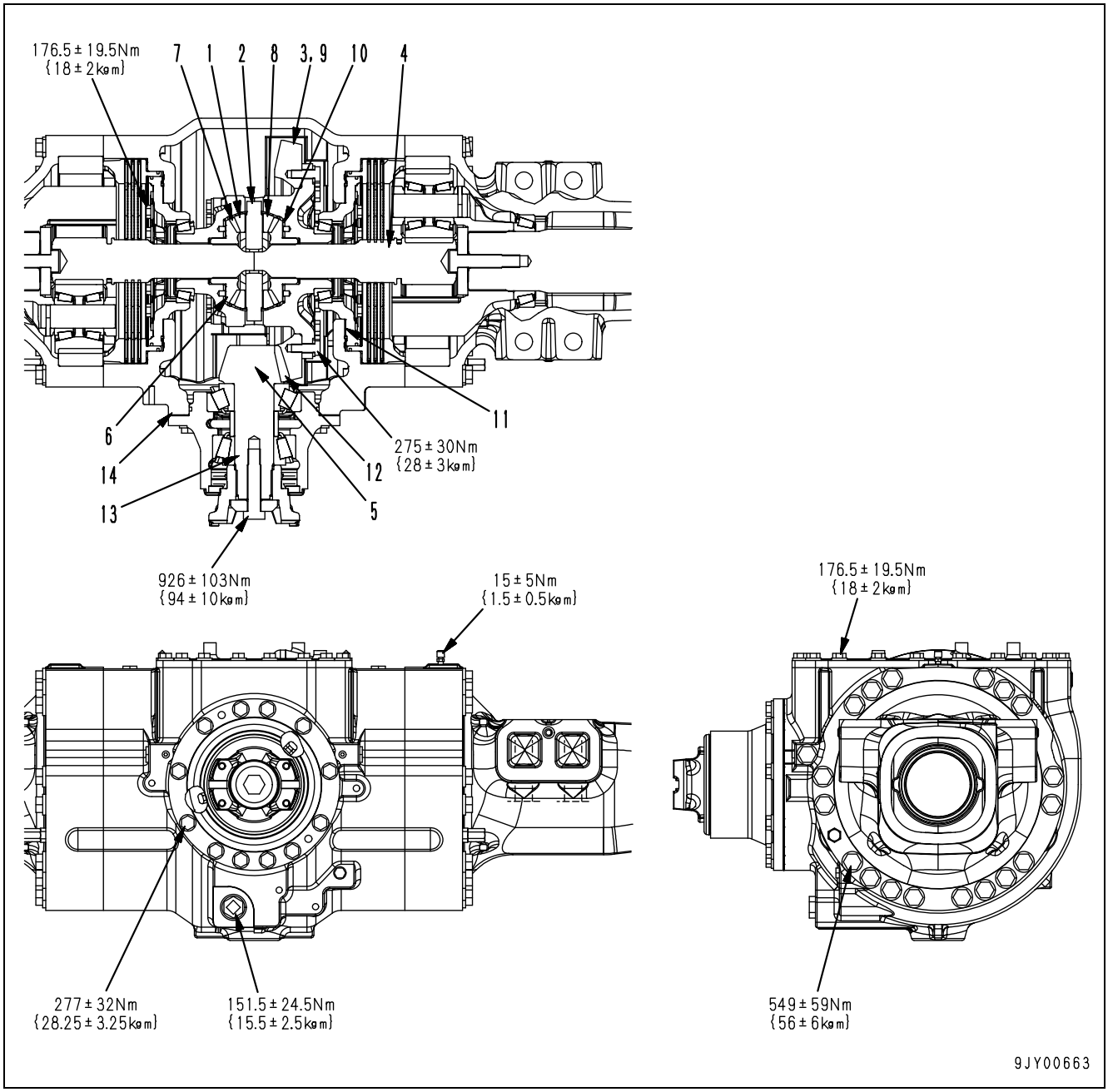
When turning

The differential gears built into a anti-slip differential are the same as the gears used in a normal differential, so the difference in rotation between the inside and outside wheels when turning the machine can be generated smoothly.



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Front differential



1. Pinion gear (No. of teeth: 12)
2. Shaft
3. Bevel gear (No. of teeth: 41)
4. Sun gear shaft
5. Bevel pinion (No. of teeth: 10)
6. Side gear (No. of teeth: 24)

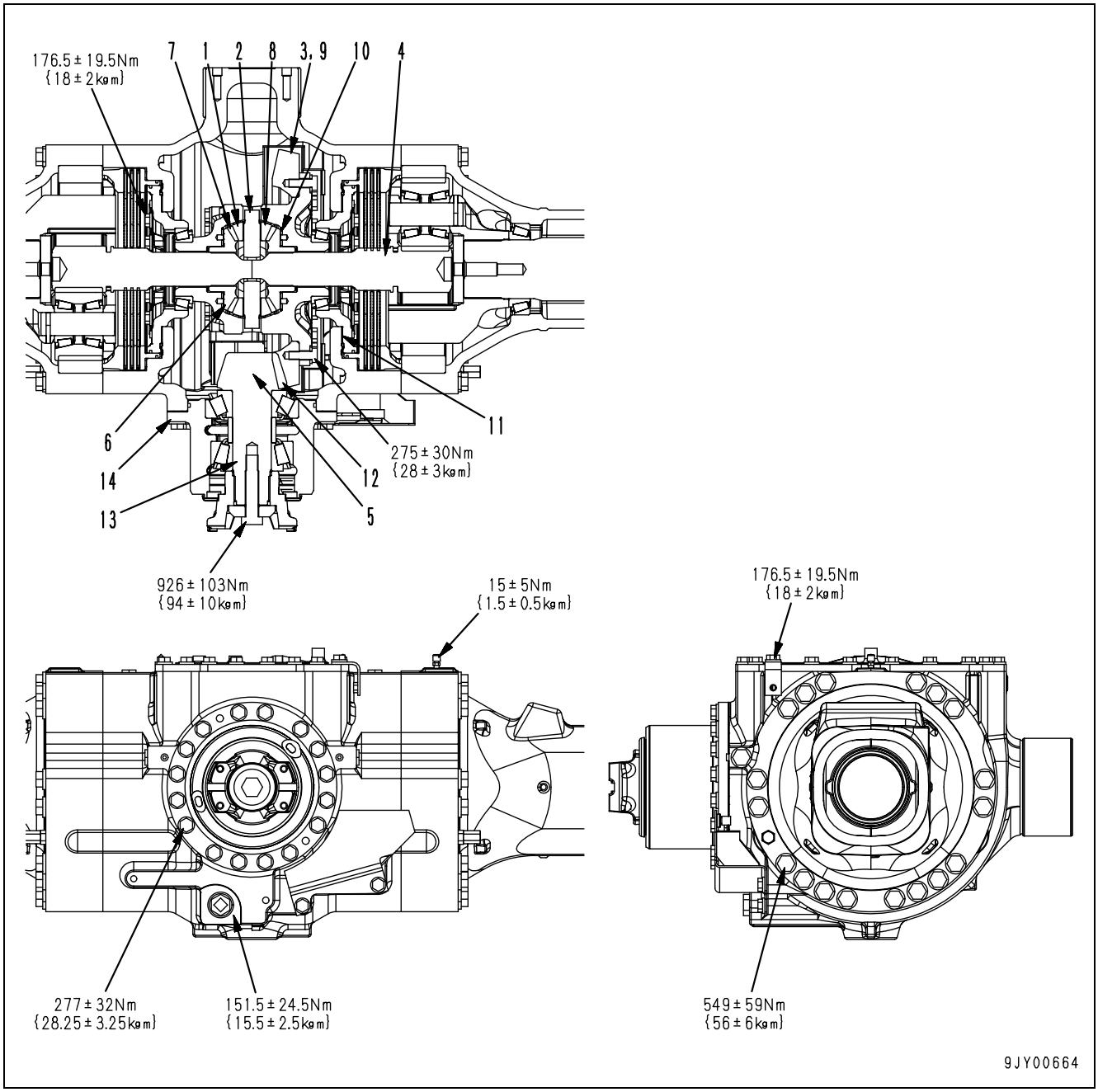
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Unit: mm

No.	Check item	Criteria			Remedy
7	Backlash of differential gear	0.18 ~ 0.23			Adjust
8	Thickness of pinion gear washer	Standard size	Tolerance	Repair limit	Replace
		3	±0.08	2.8	
9	Thickness of side gear washer	4	±0.05	3.8	
10	Starting rotation force of bevel gear	34.3~51.0 Nm {3.5~5.2 kgm} (Outside diameter of bevel gear)			Adjust
11	Thickness of shim (one side) at differential side bearing carrier portion	0.3 ~ 1.25			
12	Backlash of bevel gear	0.30 ~ 0.41			
13	End play of pinion gear	0.19			
14	Thickness of shim at differential housing and cage assembly	1.49 ± 0.38			

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Rear differential



1. Pinion gear (No. of teeth: 12)
2. Shaft
3. Bevel gear (No. of teeth: 41)
4. Sun gear shaft
5. Bevel pinion (No. of teeth: 10)
6. Side gear (No. of teeth: 24)

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WA470-5

Unit: mm

No.	Check item	Criteria			Remedy
7	Backlash of differential gear	0.18 ~ 0.23			Adjust
8	Thickness of pinion gear washer	Standard size	Tolerance	Repair limit	Replace
		3	±0.08	2.8	
9	Thickness of side gear washer	4	±0.05	3.8	
10	Starting rotation force of bevel gear	35.3~52.9 Nm {3.6~5.4 kgm} (Outside diameter of bevel gear)			Adjust
11	Thickness of shim (one side) at differential side bearing carrier portion	0.3 ~ 1.25			
12	Backlash of bevel gear	0.30 ~ 0.41			
13	End play of pinion gear	0.19			
14	Thickness of shim at differential housing and cage assembly	1.26 ± 0.34			

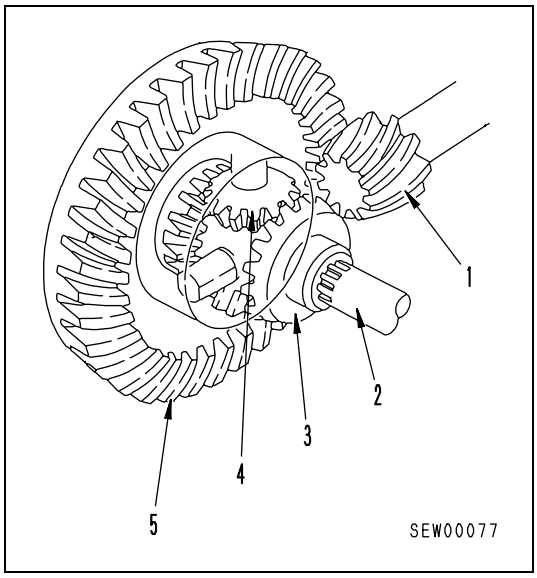
WA480-5

Unit: mm

No.	Check item	Criteria			Remedy
7	Backlash of differential gear	0.18 ~ 0.23			Adjust
8	Thickness of pinion gear washer	Standard size	Tolerance	Repair limit	Replace
		3	±0.08	2.8	
9	Thickness of side gear washer	4	±0.05	3.8	
10	Starting rotation force of bevel gear	34.3~51.0 Nm {3.5~5.2 kgm} (Outside diameter of bevel gear)			Adjust
11	Thickness of shim (one side) at differential side bearing carrier portion	0.3 ~ 1.25			
12	Backlash of bevel gear	0.30 ~ 0.41			
13	End play of pinion gear	0.19			
14	Thickness of shim at differential housing and cage assembly	1.49 ± 0.38			

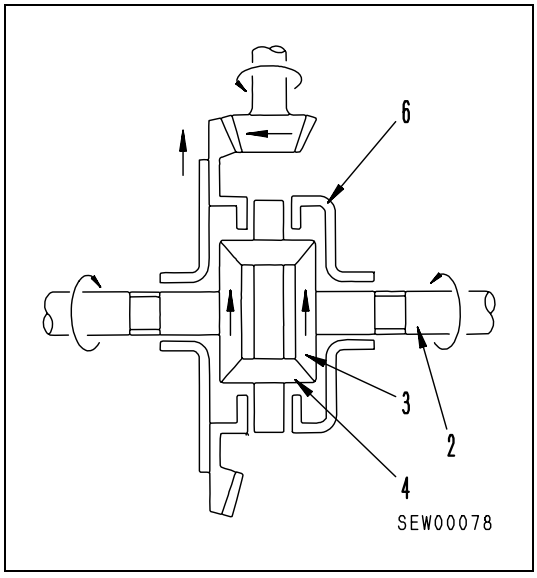
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Outline



- The power from the engine passes through the torque converter, transmission, and drive shafts, and is transmitted to the front and rear axles.
- Inside the axle, the power is transmitted from bevel pinion (1) to bevel gear (5) and the direction is changed 90°. It is also reduced and passes through pinion gear (4) and is transmitted to sun gear shaft (2).
- The power of the sun gear is further reduced by the planetary gear type final drive and is transmitted to the axle shaft and wheels.

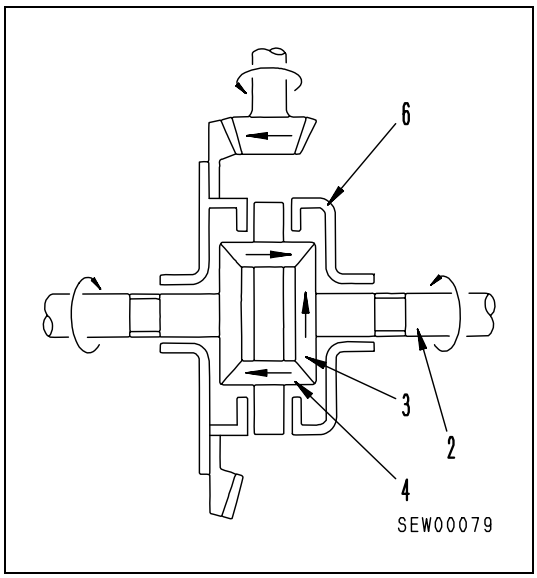
When traveling in a straight line



- When traveling in a straight line, the rotating speed of the left and right wheels is the same, so pinion gear (4) inside the differential assembly does not rotate.

  The power of carrier (6) passes through pinion gear (4) and side gear (3), and is transmitted equally to the left and right sun gear shafts (2).

When turning



- When turning, the rotating speed of the left and right wheels is different, so pinion gear (4) and side gear (3) inside the differential transmit the power of carrier (6) to sun gear shaft (2) while rotating in accordance with the difference between the left and right rotating speeds.

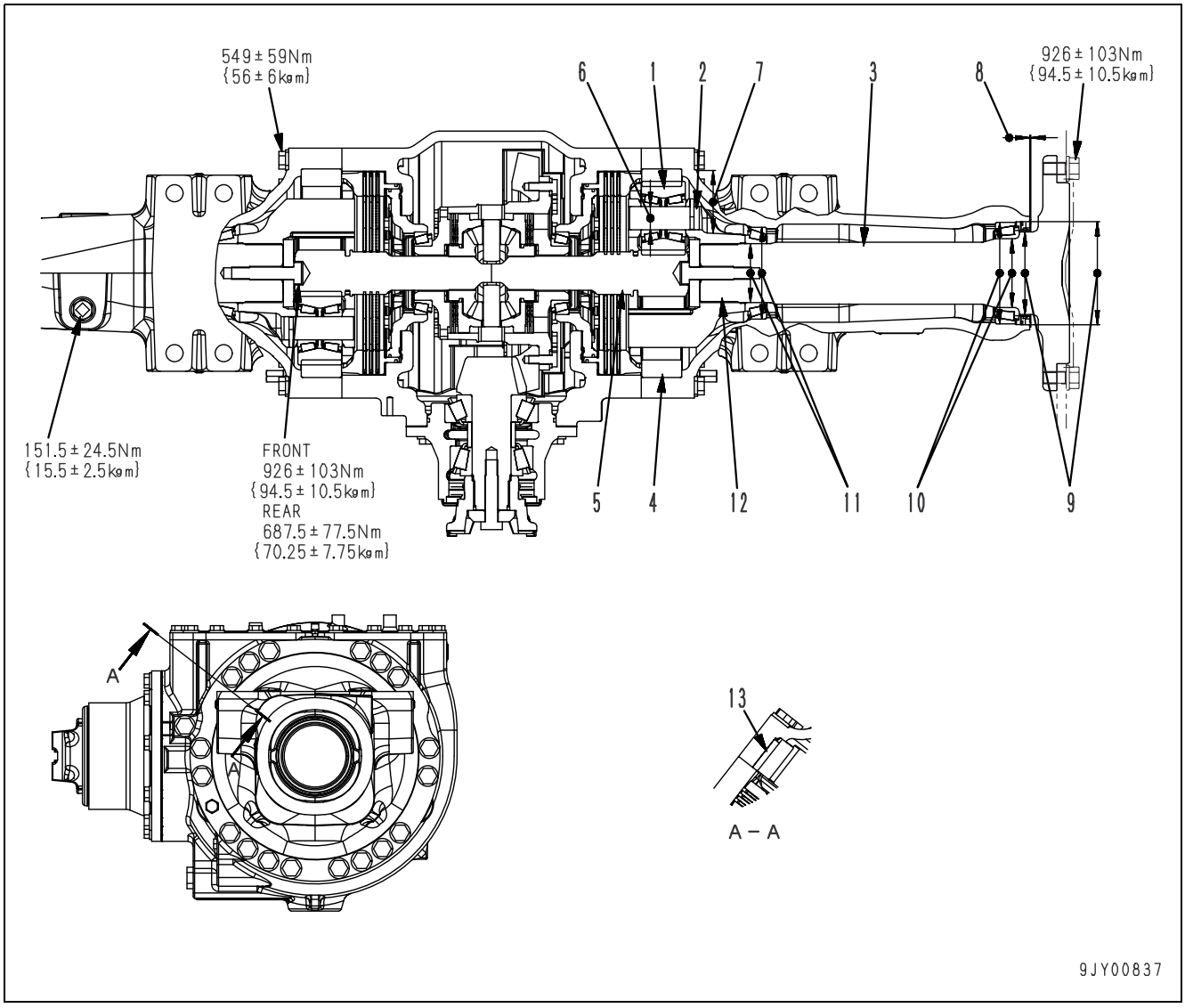
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Final drive

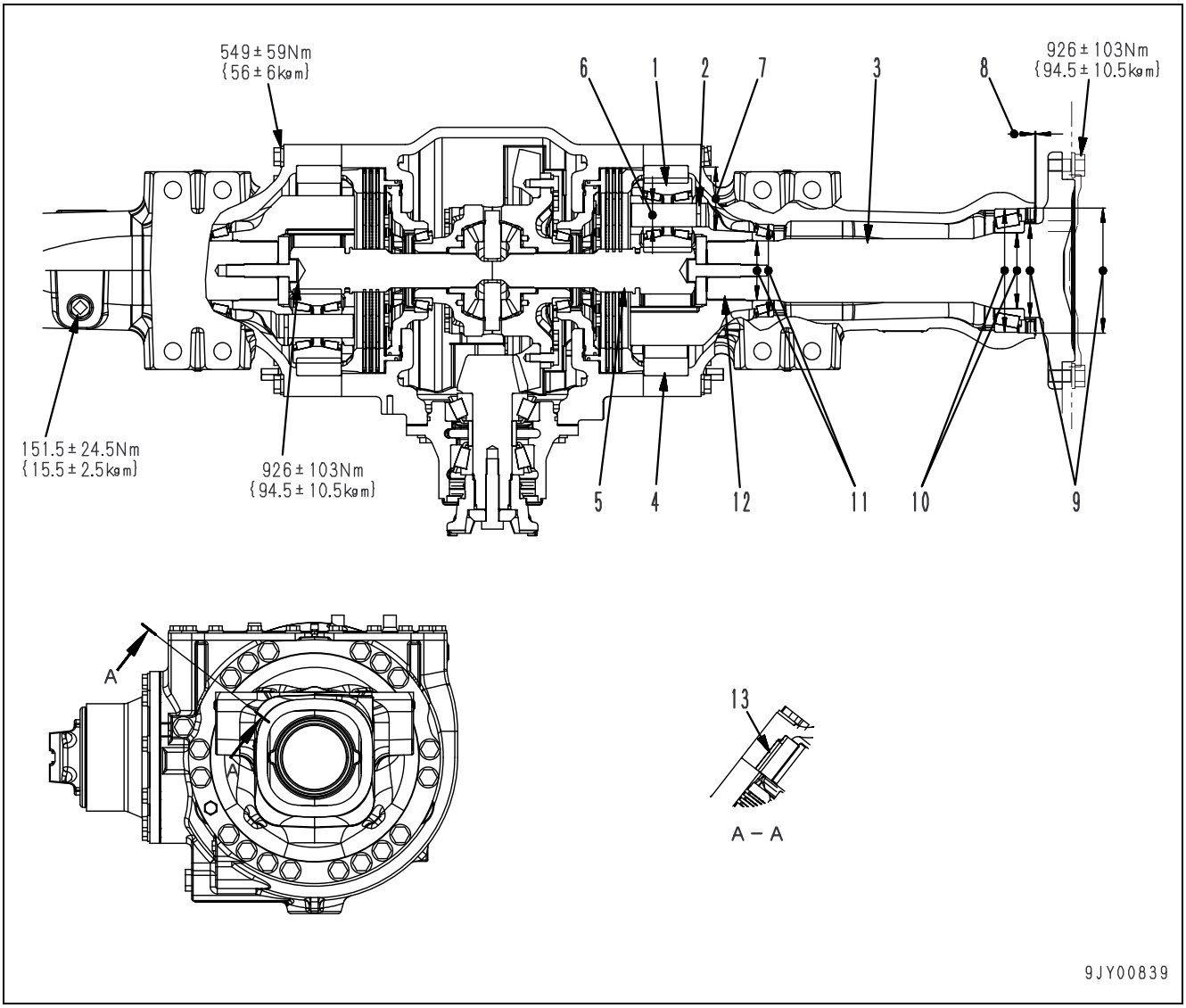
WA470-5



1. Planet gear (No. of teeth: 26)
2. Planetary carrier
3. Axle shaft
4. Ring gear (No. of teeth: 69)
5. Sun gear shaft (No. of teeth: 15)

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WA480-5



1. Planet gear (No. of teeth: 26)
2. Planetary carrier
3. Axle shaft
4. Ring gear (No. of teeth: 69)
5. Sun gear shaft (No. of teeth: 15)

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WA470-5 FRONT
WA480-5

Unit: mm

No.	Check item		Criteria					Remedy
6	Clearance between pinion gear bearing and shaft		Standard size	Tolerance		Standard clearance	Clearance limit	Replace
				Shaft	Hole			
			45	+0.013 +0.002	0 -0.012	-0.025 ~ -0.002	—	
7	Clearance between axle housing and ring gear		404	0	0	0	—	
8	Clearance between oil seal and housing		Max. 0.2					Adjust
9	Press-fitting portion of axle shaft seal	Housing	200	+0.500 +0.300	+0.072 0	-0.050 ~ -0.028	—	Replace
		Shaft	160	0 -0.063	-0.300 -0.500	-0.500 ~ -0.237	—	
10	Clearance at press-fitting portion of axle housing bearing	Outer race	177.8	+0.058 +0.036	-0.020 -0.060	-0.085~ -0.020	—	
		Inner race	114.3	+0.058 +0.036	+0.025 0	-0.058 ~ -0.011	—	
11	Clearance at press-fitting portion of axle housing bearing	Outer race	196.85	+0.025 0	-0.014 -0.060	-0.085 ~ -0.014	—	
		Inner race	133.35	+0.068 +0.043	+0.025 0	-0.068 ~ -0.018	—	
12	End play of axle shaft		0 ~ 0.1					Adjust
13	Clearance of guide pin		12	+0.025 +0.007	+0.207 +0.145	0.120 ~ 0.200	—	Replace

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WA470-5 REAR

Unit: mm

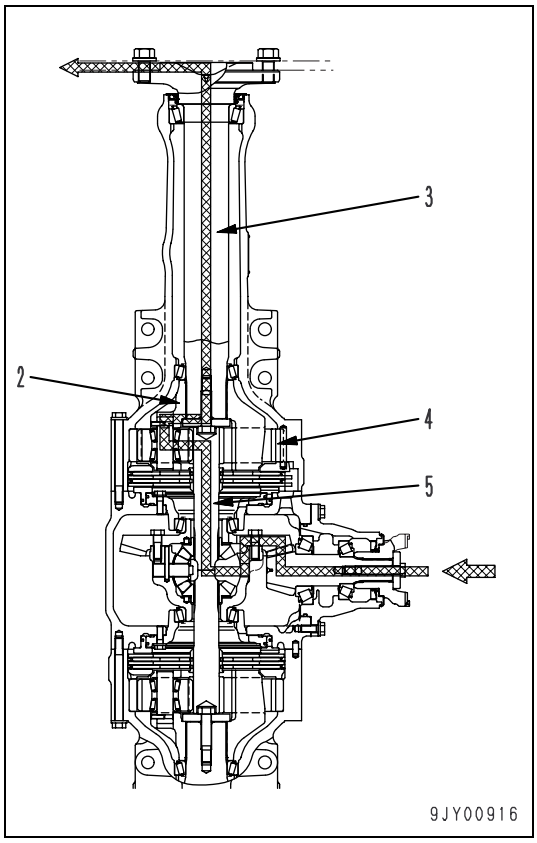
No.	Check item		Criteria					Remedy
6	Clearance between pinion gear bearing and shaft		Standard size	Tolerance		Standard clearance	Clearance limit	Replace
				Shaft	Hole			
			40	+0.013 +0.002	0 -0.012	-0.025 ~ -0.002	—	
7	Clearance between axle housing and ring gear		382	+0.100 0	+0.100 0	0	—	
8	Clearance between oil seal and housing		Max. 0.2					Adjust
9	Press-fitting portion of axle shaft seal	Housing	200	+0.500 +0.300	+0.072 0	-0.050 ~ -0.228	—	Replace
		Shaft	160	0 -0.063	-0.300 -0.500	-0.500 ~ -0.237	—	
10	Clearance at press-fitting portion of axle housing bearing	Outer race	196.85	+0.025 0	-0.014 -0.060	-0.085~ -0.014	—	
		Inner race	133.35	+0.068 +0.043	+0.025 0	-0.068 ~ -0.018	—	
11	Clearance at press-fitting portion of axle housing bearing	Outer race	160	0 -0.025	-0.045 -0.085	-0.085 ~ -0.020	—	
		Inner race	105	+0.035 +0.013	0 -0.020	-0.055 ~ -0.013	—	
12	End play of axle shaft		0 ~ 0.1					Adjust
13	Clearance of guide pin		12	+0.025 +0.007	+0.207 +0.145	0.120 ~ 0.200	—	Replace

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Outline

- The final drive reduces the speed of the power from the engine and increases the drive force.
- Ring gear (4) is press fitted to the axle housing and is fixed in position by a pin.
- The power transmitted from the differential and passing through sun gear shaft (5) has its speed reduced by the planetary gear mechanism and the drive force increased.

  The increased drive force passes through planetary carrier (2) and axle shaft (3) and is transmitted to the wheels.

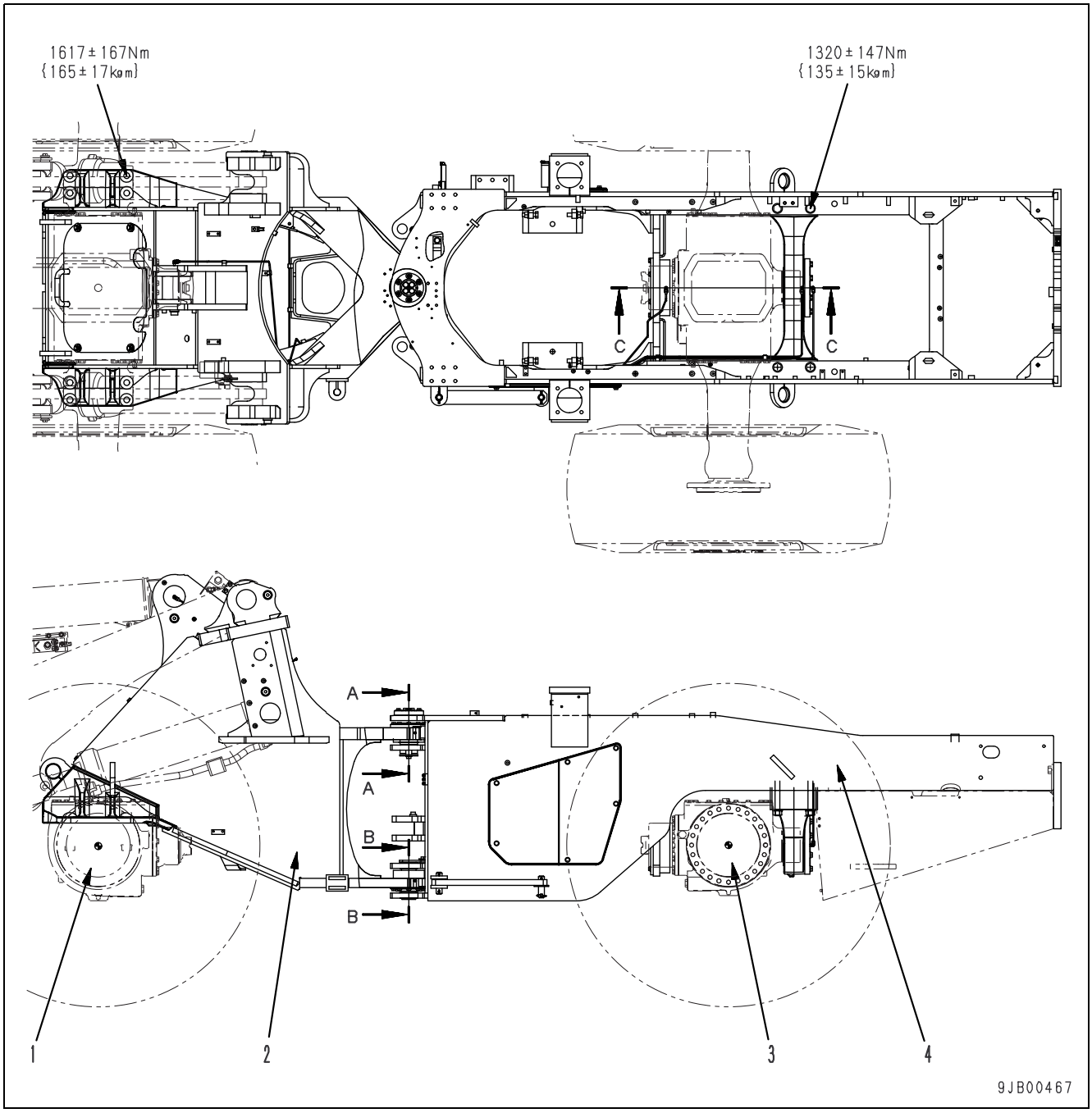


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Axle mounting, center hinge pin

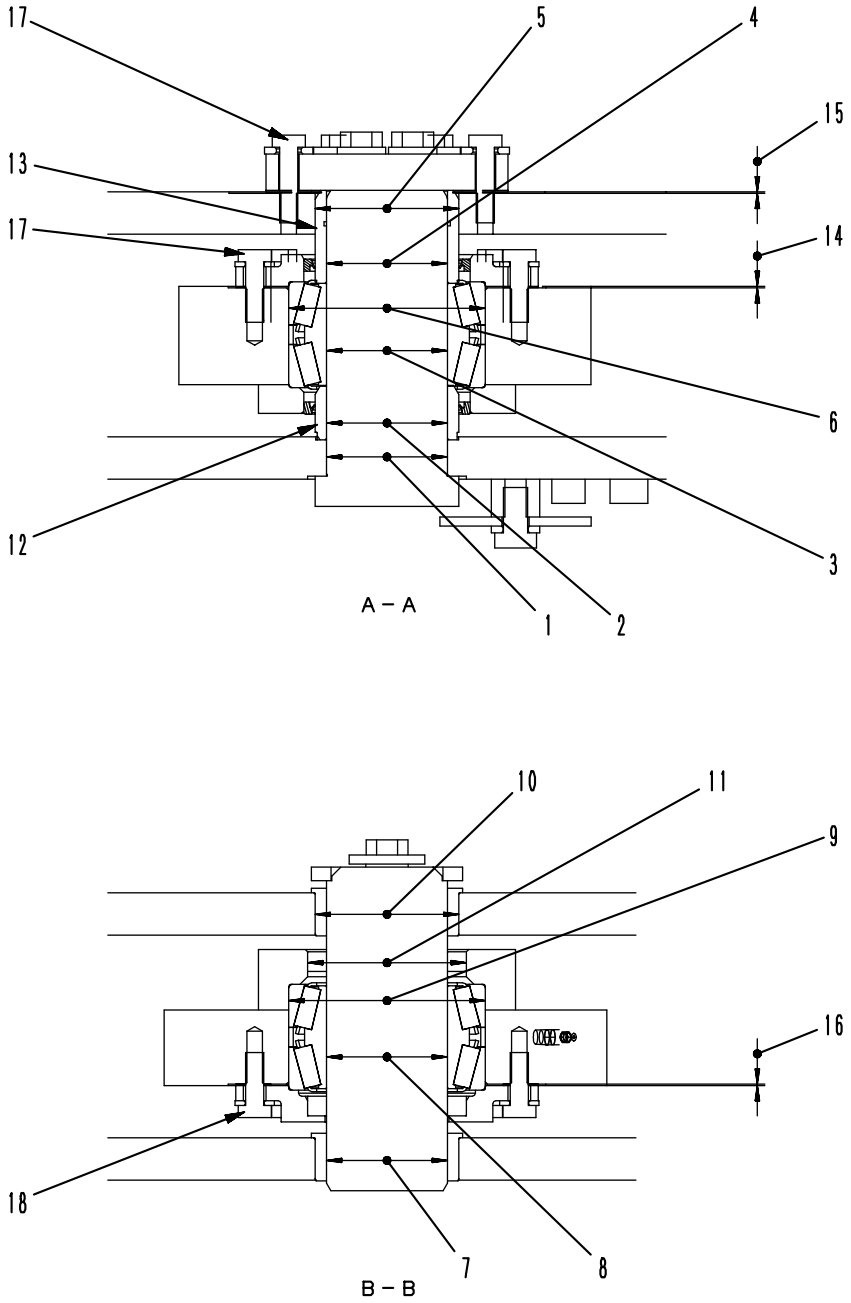


1. Front axle
2. Front frame
3. Rear axle
4. Rear frame

Outline

- The front frame and rear frame are joined through a bearing by the center hinge pin. In addition, the left and right steering cylinders are connected to the front and rear frames, and the articulation angle of the frame (the steering radius) is adjusted by the movement of the cylinder.

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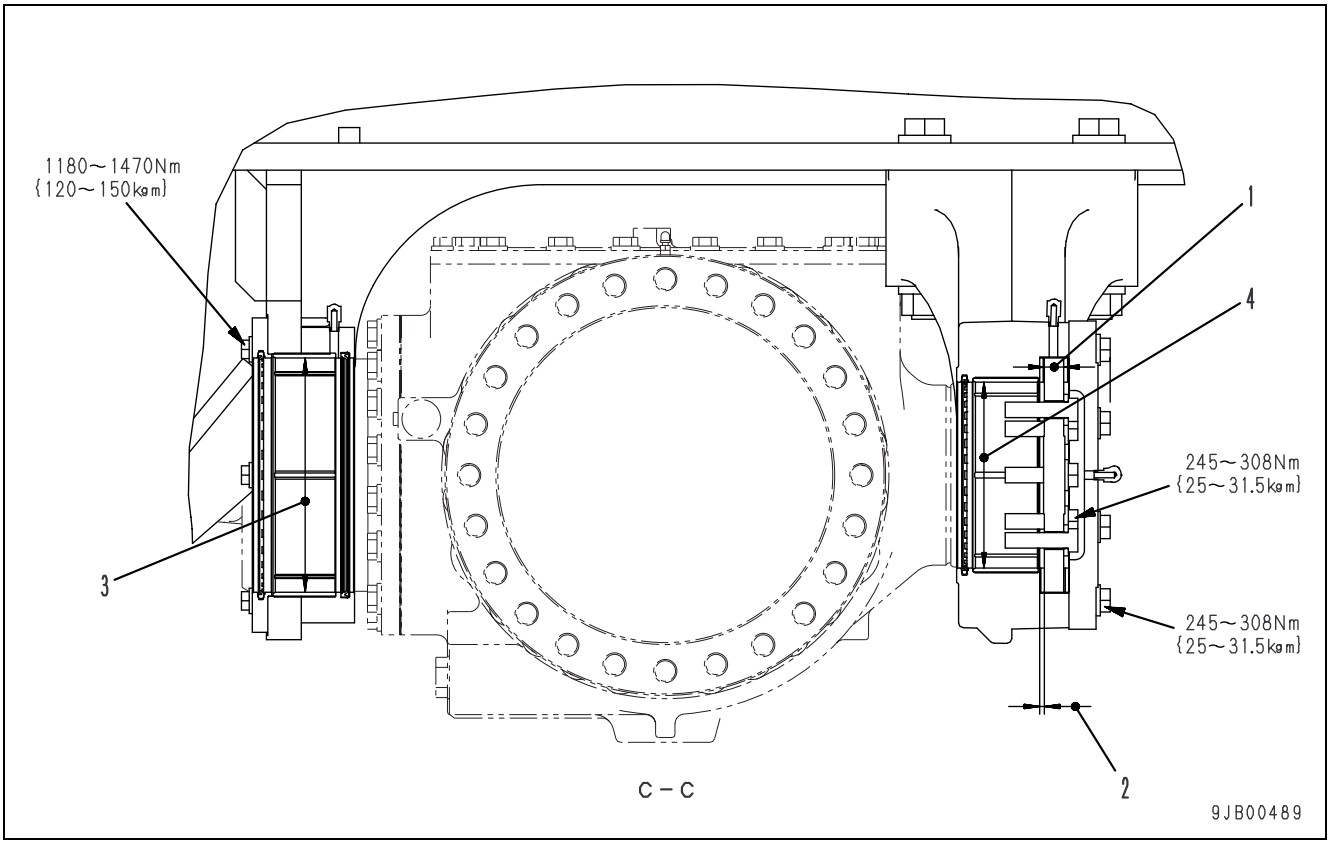


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Unit: mm

No.	Check item	Criteria					Remedy
1	Clearance between upper hinge pin and rear frame	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		80	-0.030 -0.049	+0.060 +0.030	0.060 ~ 0.109	—	
2	Clearance between upper hinge pin and spacer (small)	80	-0.030 -0.049	+0.060 +0.030	0.060 ~ 0.109	—	
3	Clearance between upper hinge pin and bearing	80	-0.030 -0.049	0 -0.015	0.015 ~ 0.049	—	
4	Clearance between upper hinge pin and spacer (large)	80	-0.030 -0.049	+0.030 0	0.030 ~ 0.079	—	
5	Clearance between rear frame and spacer (large)	95	-0.036 -0.071	+0.071 +0.036	0.072 ~ 0.142	—	
6	Clearance between front frame and upper hinge bearing	130	0 -0.025	-0.048 -0.088	-0.088 ~ -0.023	—	
7	Clearance between lower hinge pin and rear frame bushing	80	-0.030 -0.076	+0.067 +0.027	0.057 ~ 0.143	—	
8	Clearance between lower hinge pin and bearing	80	-0.030 -0.076	0 -0.015	-0.015 ~ -0.076	—	
9	Clearance between front frame and lower hinge bearing	130	0 -0.025	-0.048 -0.088	-0.088 ~ -0.023	—	
10	Clearance between rear frame and bushing	95	+0.089 +0.054	+0.054 0	-0.089 ~ 0	—	
11	Clearance at seal press-fitting portion of lower hinge pin	105	+0.17 +0.08	+0.054 0	-0.17 ~ -0.026	—	
12	Height of upper hinge spacer (small)	Standard size		Tolerance		Repair limit	
		36		±0.1		—	
13	Height of upper hinge spacer (large)	61.5		±0.1		—	
14	Shim value for upper hinge and retainer	Standard size					Adjust
		1					
15	Shim value for upper hinge and retainer	2					
16	Shim value for lower hinge and retainer	1					
17	Tightening torque for upper hinge retainer mounting bolt	20±2 Nm {2±0.2kgm} (When adjusting shim)					
		98 ~ 123 Nm {10 ~ 12.5 kgm} (Final value)					
18	Tightening torque for lower hinge retainer mounting bolt	20±2 Nm {2±0.2kgm} (When adjusting shim)					
		98 ~ 123 Nm {10 ~ 12.5 kgm} (Final value)					

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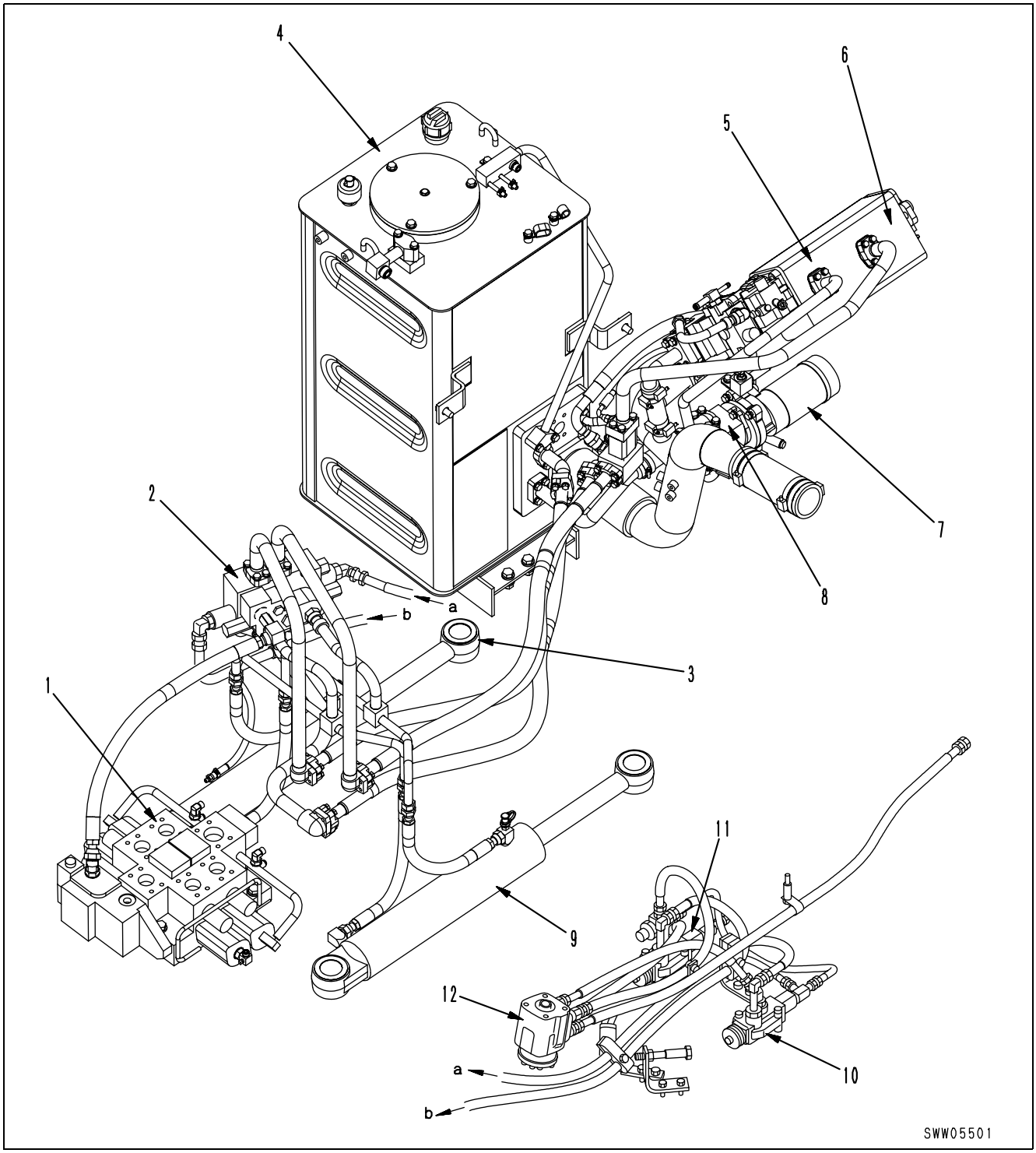


Unit: mm

No.	Check item	Criteria					Remedy
1	Thickness of thrust plate	Standard size		Tolerance		Repair limit	Replace
		20		1.4 ~ 2.8		—	
2	Thickness of wave plate	5		1.4 ~ 2.8		—	
3	Clearance between hole and shaft at front support end	Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
		240	-0.050 -0.122	+0.439 +0.023	0.073 ~ 0.561	—	
4	Clearance between hole and shaft at rear support end	190	-0.012 -0.137	+0.455 +0.027	0.039 ~ 0.592	—	

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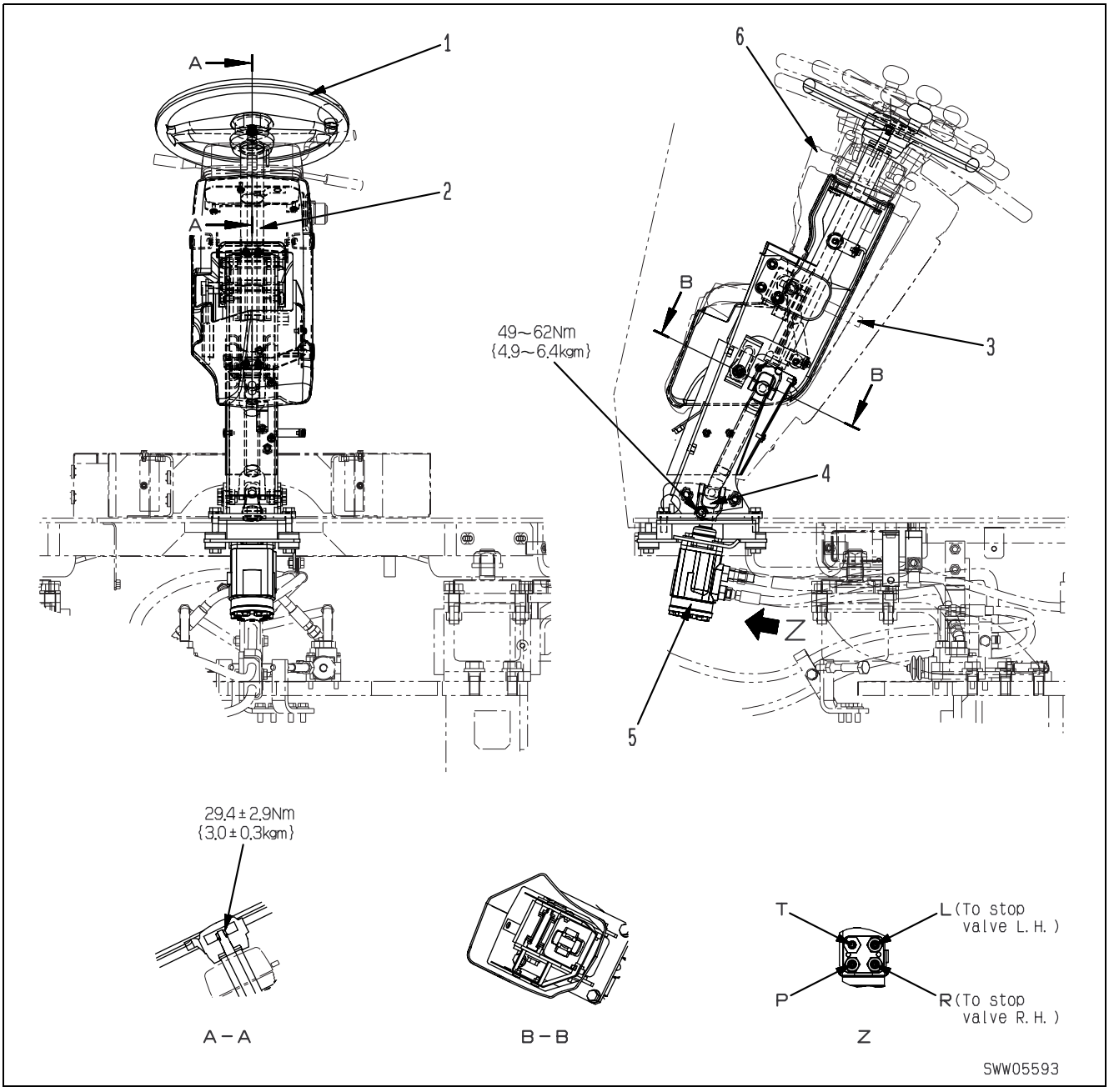
Steering piping



1. Main control valve
2. Steering valve
3. Steering cylinder (right)
4. Hydraulic tank
5. Switch pump
6. Steering pump
7. Emergency steering motor
8. Emergency steering motor
9. Steering cylinder (left)
10. Stop valve (right)
11. Stop valve (left)
12. Orbit-roll

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Steering column, orbit-roll



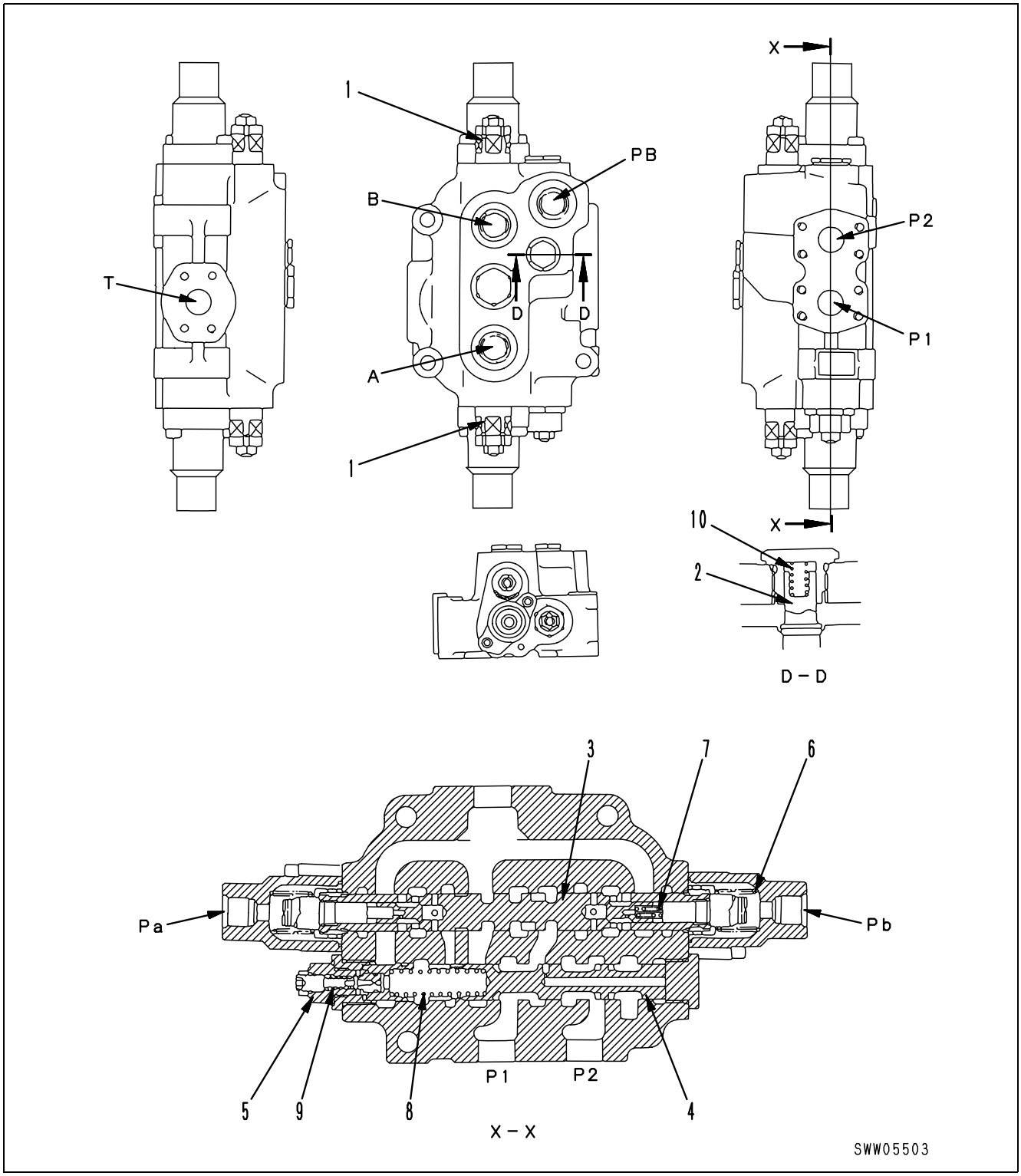
1. Steering wheel
2. Steering column
3. Tilt lever
4. Joint
5. Orbit-roll

Unit: mm

No.	Check item	Criteria					Remedy
6	Clearance between steering shaft and column bearing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		19	0 -0.08	+0.15 -0.05	0.05 ~ 0.23	0.4	

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Steering valve



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1. Overload safety valve
2. Check valve
3. Steering spool
4. Flow control spool
5. Main relief valve

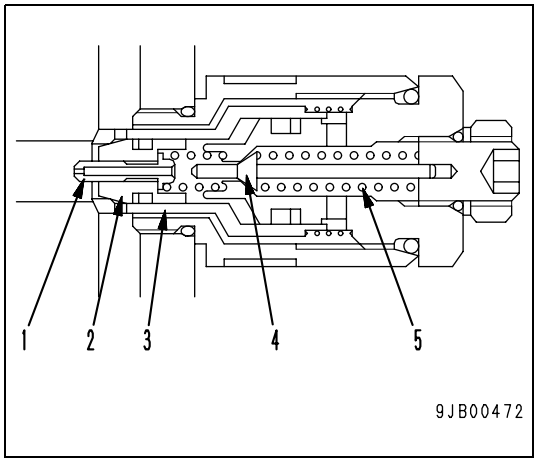
A. To steering cylinder
B. To steering cylinder
Pa. From orbit-roll
Pb. To orbit-roll
P1. From steering pump
P2. From switch pump
PB. To work equipment circuit
T. To tank

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
6	Steering spool return spring	Free length	Installed length	Installed load	Free length	Installed load	
		37.2	32.0	56.9N {5.8 kg}	—	47.1 N {4.8 kg}	
7	Poppet spring	20.9	13.2	9.3±4.9 N {0.95±0.5 kg}	—	7.85 N {0.8 kg}	Replace
8	Demand spool return spring	75.1	68.5	136.1 N {13.88 kg}	—	114.7 N {11.7 kg}	
9	Relief valve spring	24.0	22.19	182 kN {18.6 kg}	—	145 kN {14.8 kg}	
10	Check valve return spring	21.6	17.0	2.26 N {0.23 kg}	—	1.77 N {0.18 kg}	

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Overload relief valve



1. Poppet
2. Relief valve poppet
3. Check valve poppet
4. Pilot poppet
5. Spring

Function

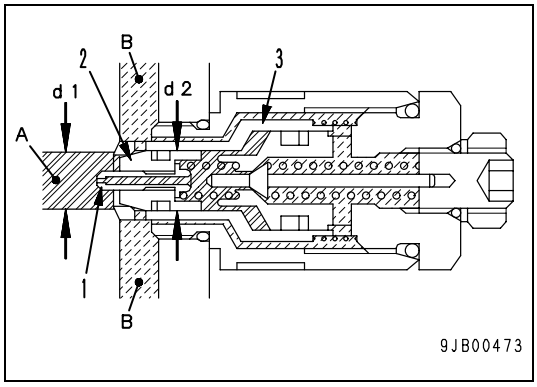
- The overload relief valve is installed to the steering valve.

  If the cylinder is subjected to impact when the steering valve is at neutral and abnormal pressure is generated, this valve functions as a safety valve and relieves the circuit to prevent the damage to the cylinder or hydraulic piping.

  If negative pressure forms at the cylinder end, it functions as a suction valve to prevent the formation of any vacuum.

Operation

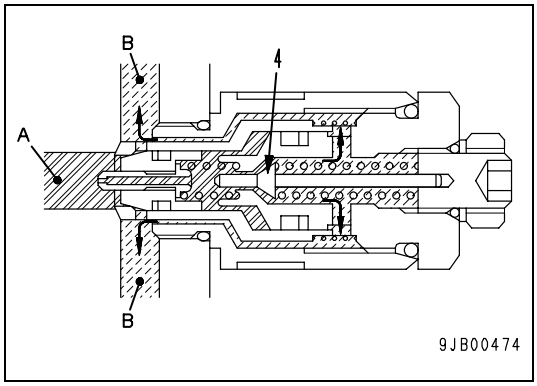
Functioning as relief valve



- Port **A** is connected to the cylinder circuit and port **B** is connected to the drain circuit.

  Oil passes through the center of the hole in poppet (1) and acts on diameters **d1** and **d2**, which have different areas.

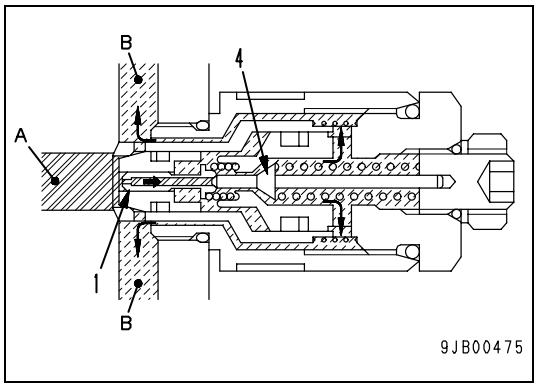
  Check valve poppet (3) and relief valve poppet (2) are seated securely.



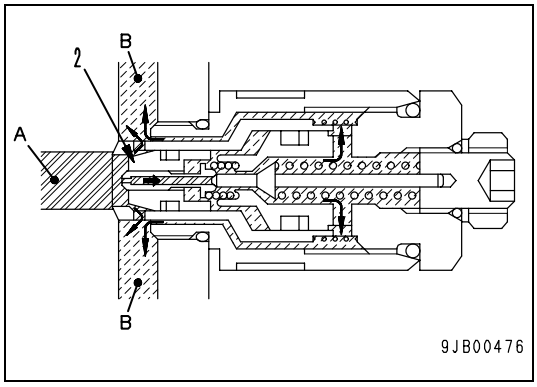
- When the pressure at port **A** reaches the set pressure of the relief valve, pilot poppet (4) opens, and the oil flows around pilot poppet (4), passes through the drill hole, and flows to port **B**.

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- When pilot poppet (4) opens, the pressure behind poppet (1) drops, so poppet (1) moves and seats pilot poppet (4).



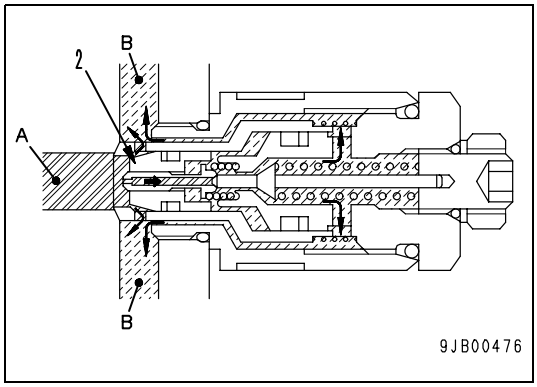
- The pressure on the inside is lower than the pressure at port **A**, so relief valve poppet (2) opens. When this happens, the oil flows from port **A** to port **B** to prevent any abnormal pressure.



Functioning as suction valve

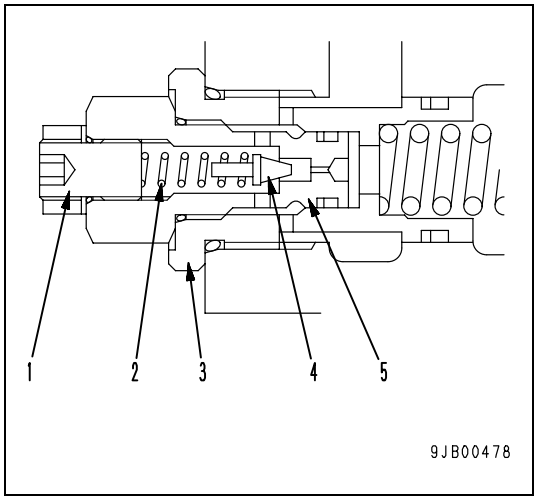
- If negative pressure forms at port **A**, check valve poppet (3) opens because of the difference in area between diameters **d3** and **d4**.

  When this happens, the oil flows from port **B** to port **A** to prevent any vacuum from forming.



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Steering relief valve



1. Adjustment screw
2. Spring
3. Plug
4. Pilot poppet
5. Valve seat

Function

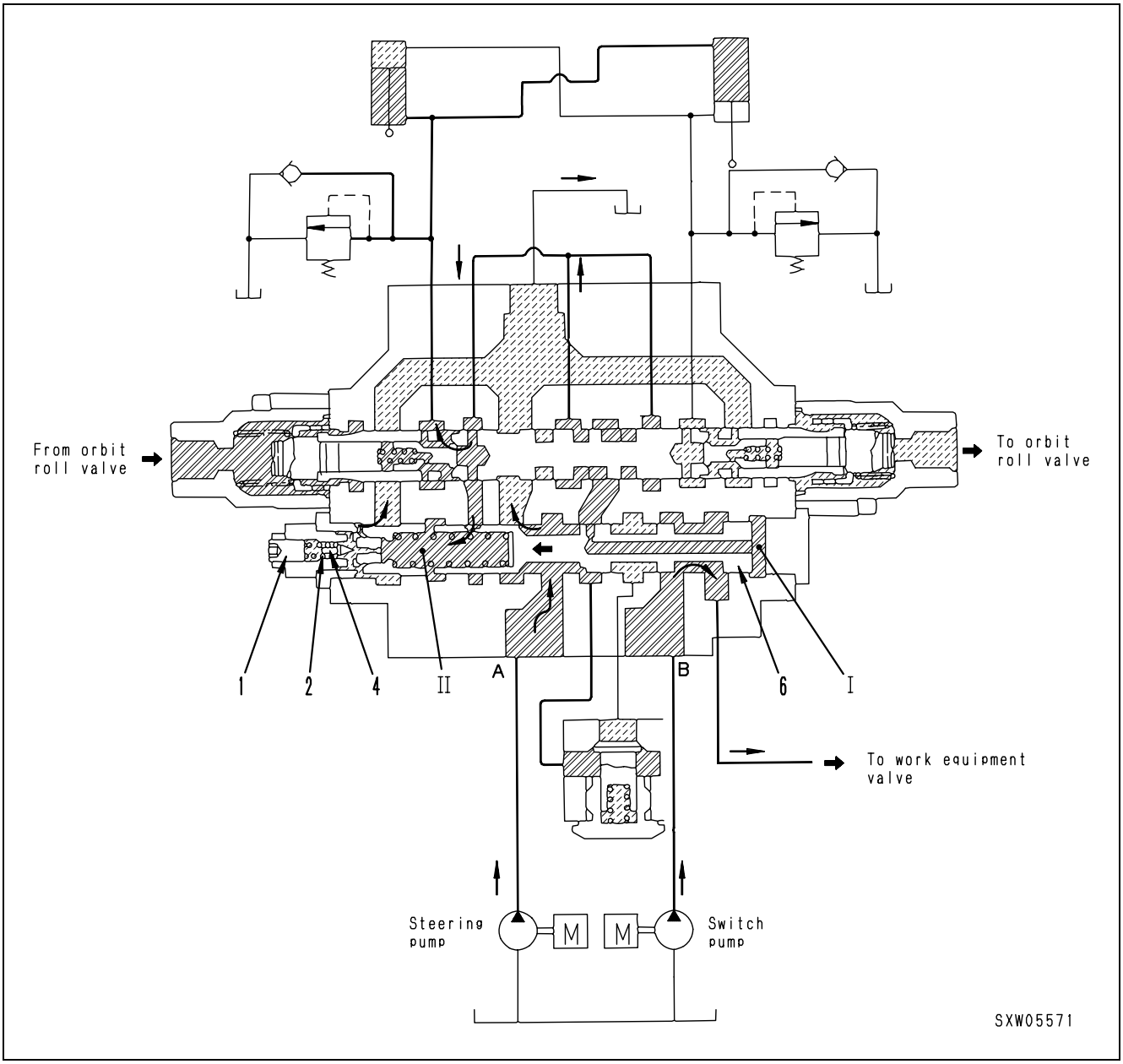
- The steering relief valve is inside the steering valve.

  It sets the maximum pressure in the steering circuit when the steering valve is being operated.

  In other words, when the steering valve is operated, if the pressure in the steering circuit goes above the set pressure of this valve, it relieves the oil from the valve, and by relieving the oil, actuates the flow control spool of the demand valve and drains the oil going to the steering circuit.

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Operation of steering relief valve

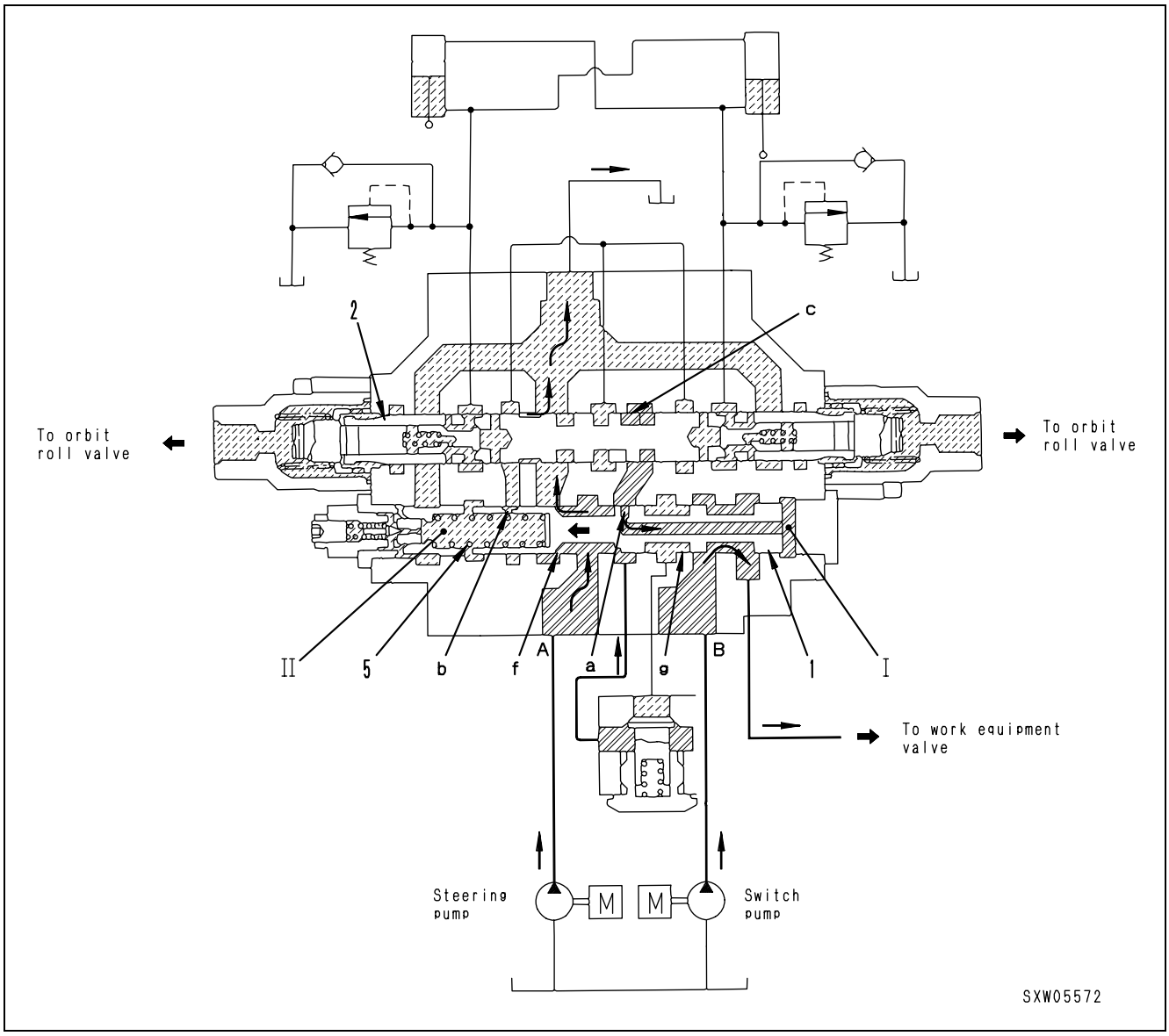


- When the pressure in the circuit rises and reaches the pressure set by adjustment screw (1) and spring (2), pilot poppet (4) opens and drains the oil.
- When this happens, the balance between the pressures in pressure-receiving chamber (I) and the pressure-receiving chamber (II) is lost and flow control spool (6) moves to the left in the direction of the arrow (←).
- When flow control spool (6) moves, the oil from the steering pump is drained and the oil from the switch pump is relieved to the main control valve to prevent the pressure in the steering circuit from going above the set pressure.

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Operation of demand valve

When steering spool is at neutral

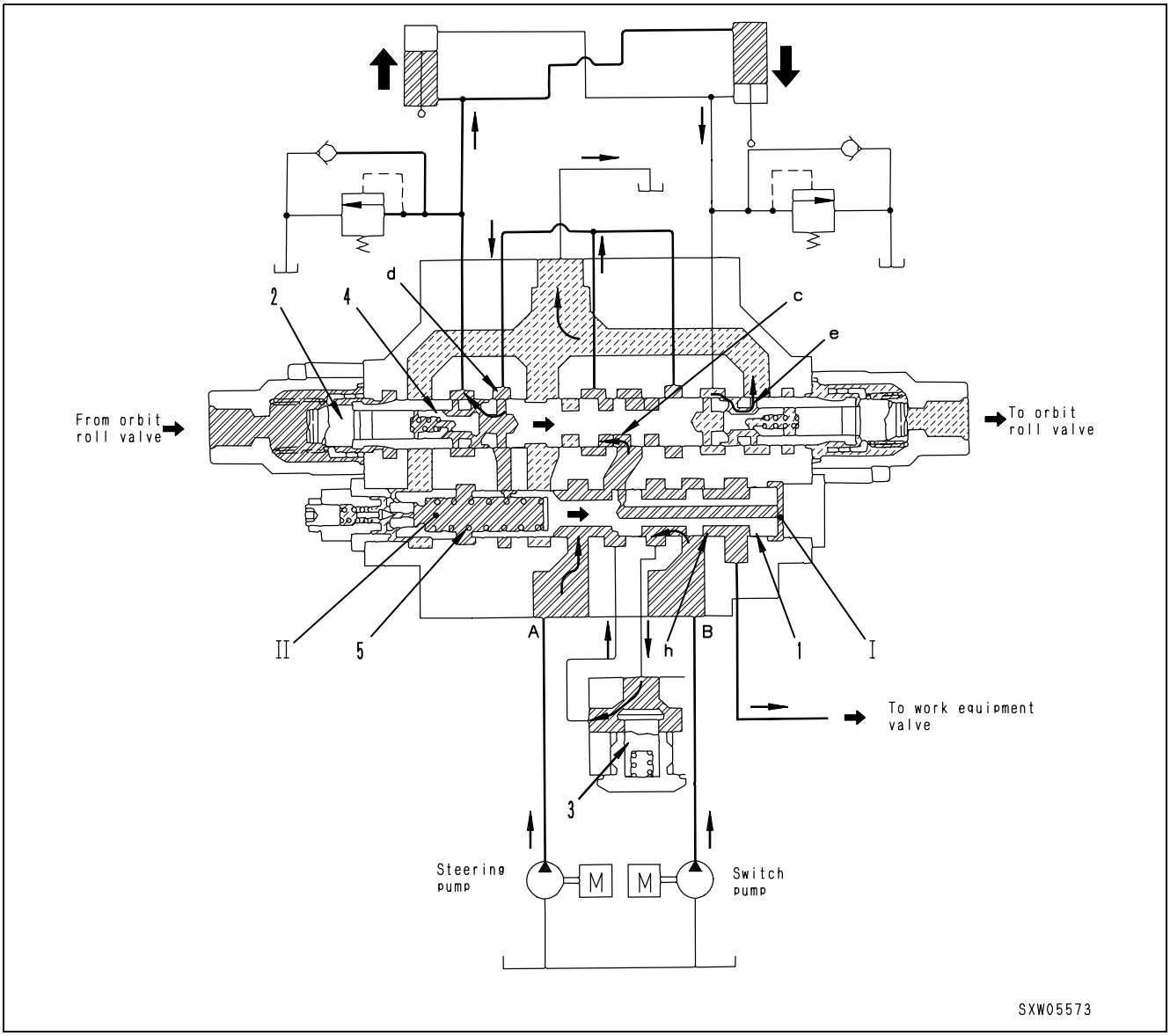


- The oil from the steering pump enters port **A**; the oil from the switch pump enters port **B**.
- When steering spool (2) is at neutral, pressure-receiving chamber (II) is connected to the drain circuit through orifice b; in addition, notch **c** is closed.
- Because notch **c** is closed, the pressure of the oil at port **A** and port **B** rises, and this pressure passes through orifice **a**, is taken to pressure-receiving chamber (I) and moves flow control spool (1) to the left in the direction of the arrow (←).
- When the pressure in the pressure-receiving chamber (I) reaches a certain value (set by spring (5)), notch **f** opens and the oil from the steering pump is relieved to the drain circuit; in addition, notch **g** closes, so all the flow of oil from the switch pump goes to the main control valve.

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When steering spool is operated

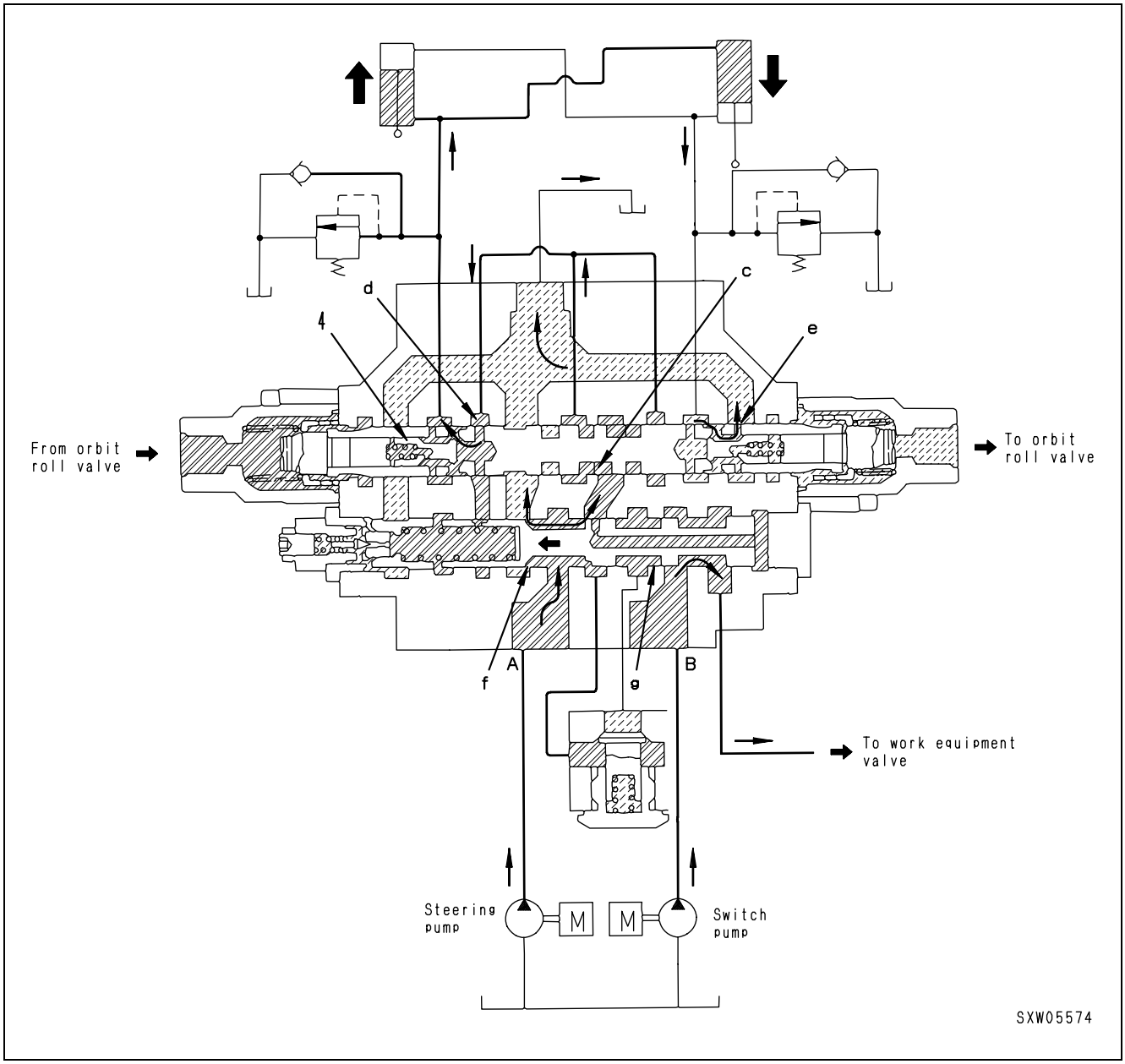
- Engine running at low speed



- When steering spool (2) is pushed (operated), pressure-receiving chamber (II) and the drain circuit are shut off, and at the same time, notch **c** opens.
- As a result, the pressure in pressure-receiving chamber (II) rises, and flow control spool (1) is moved to the right in the direction of the arrow (➔) until notch **h** closes.
- The passage from port **B** to the main control valve is shut off, so the oil from the switch pump pushes up merge check valve (3) and the oil is merged with the oil from the steering pump at port **A**.
- The merged oil passes through notches **c** and **d**, pushes up load check valve (4), and flows to the cylinder. The return oil from the cylinder passes through notch **e** and enters the drain circuit.
- When this happens, the pressure before passing through notch **c** goes to pressure-receiving chamber (I) and the pressure after passing through notch **c** goes to pressure-receiving chamber (II). Flow control spool (1) is actuated so that the difference in pressure on both sides of notch **c** is maintained at a constant value.
- Therefore, an oil flow matching the degree of opening of notch **c** is discharged from the cylinder port. These pressure differences (control pressure) are set by spring (5).

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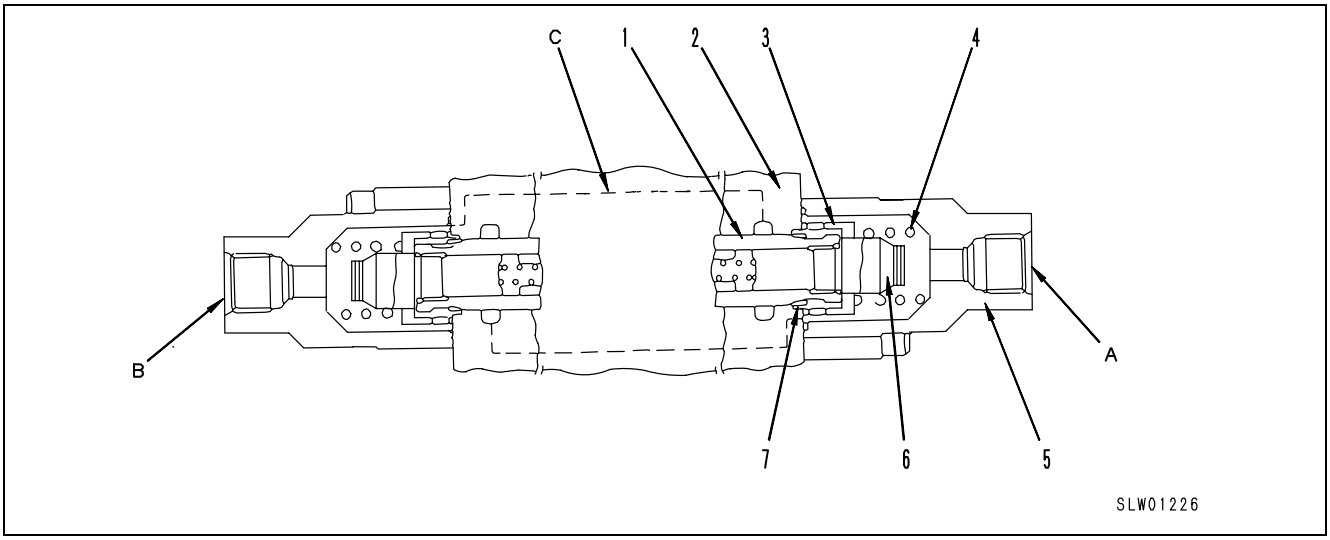
- Engine running at high speed



- No extra oil is needed from the switch pump, so the pressure of the steering pump rises until notch **g** closes and shuts off the merge passage at port **B**.
- The difference in pressure on both sides of notch **c** is controlled only by notch **f**. The excess oil from the steering pump is drained to the drain circuit from notch **f**.
  (When this happens, notch g is completely closed.)
- The oil from the steering pump passes through notches **c** and **d**, pushes up load check valve (4), and flows to the cylinder. The return oil from the cylinder passes through notch **e** and enters the drain circuit.
- Notch **g** is closed, so the oil from the switch pump is sent from port **B** to the main control valve.

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Flow AMP

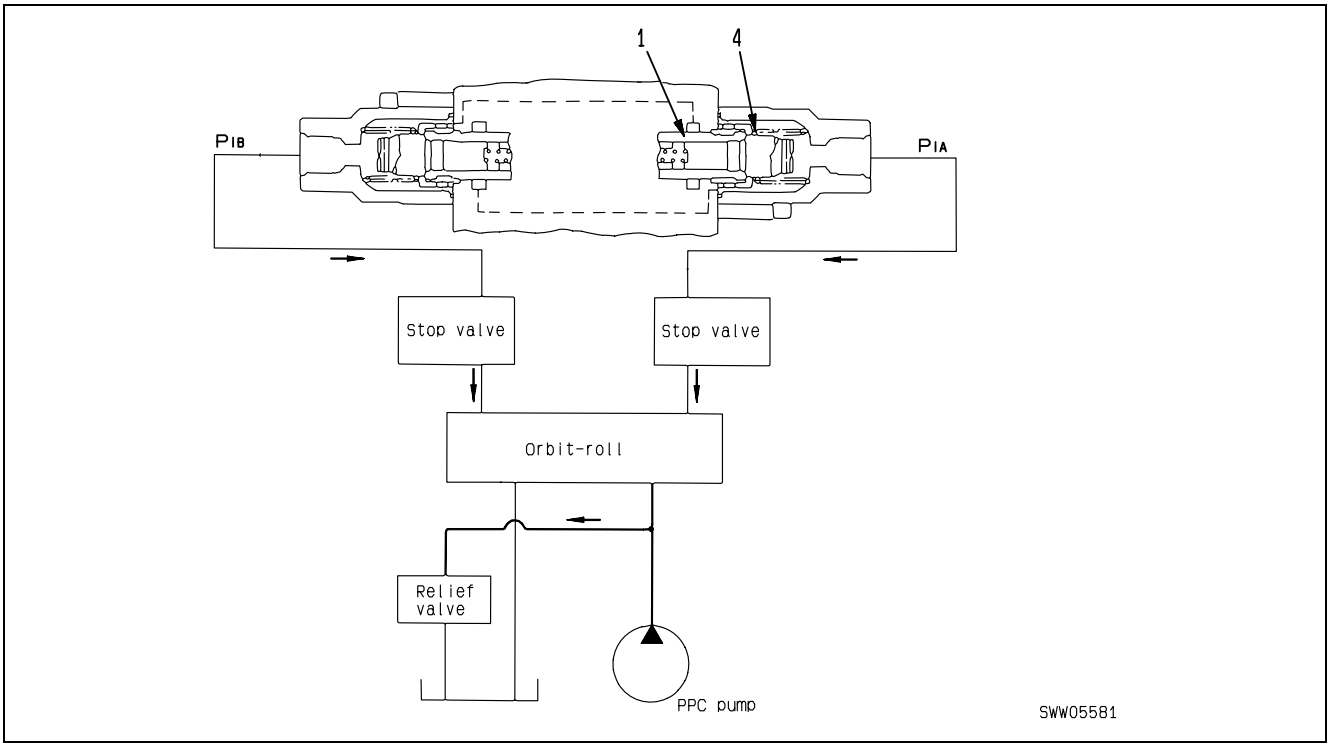


1. Steering spool
2. Valve housing (body)
3. Spring seat
4. Return spring
5. Cap
6. Capscrew
7. Orifice

A. From Orbit-roll valve
B. From Orbit-roll valve
C. Passage (inside housing)

- Operation of flow amp

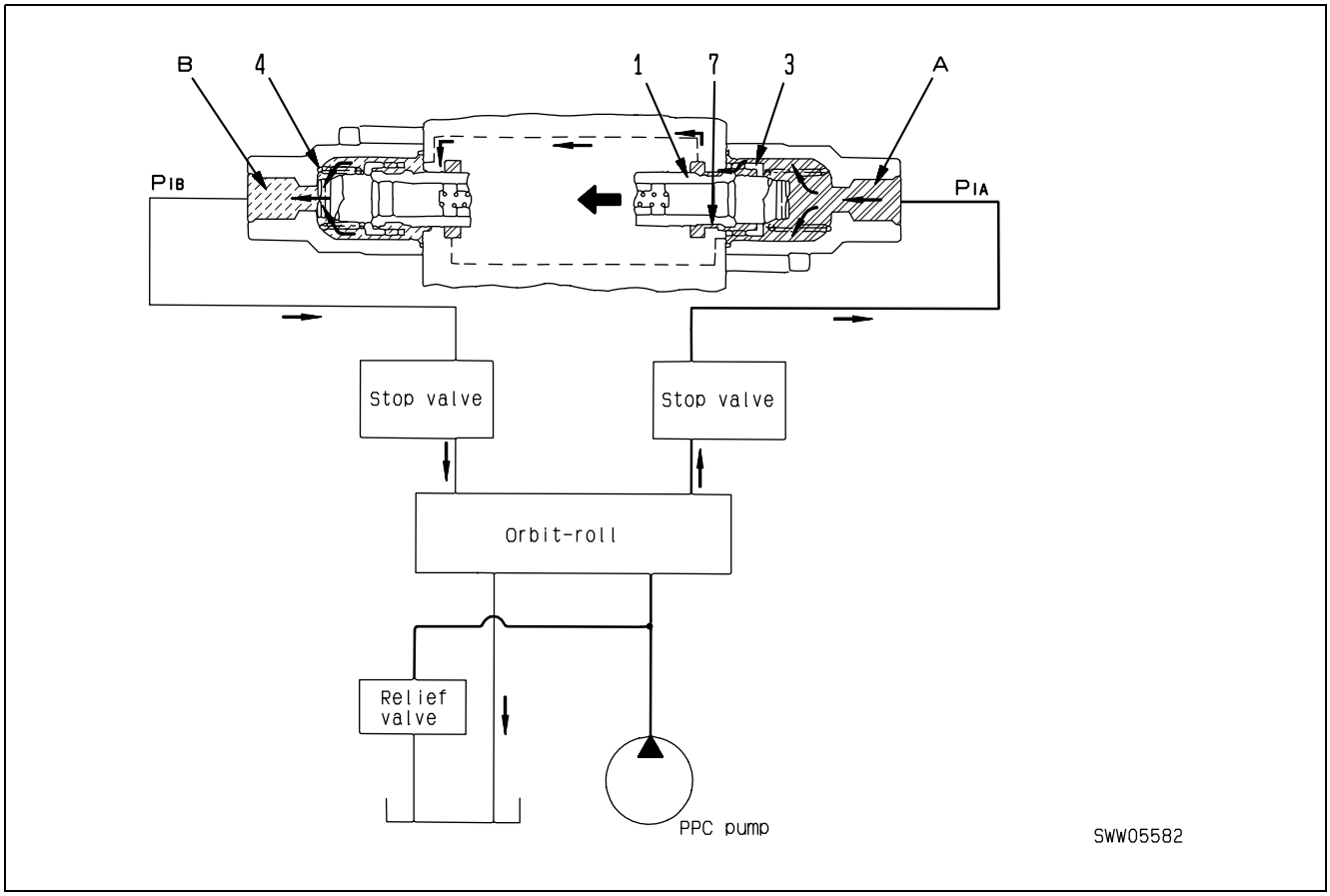
1. Spool at neutral (Orbit-roll valve not actuated)



- When the Orbit-roll vlave is not actuated, both pilot port **PiA** and pilot port **PiB** are connected through the Orbit-roll to the drain (return) circuit, so steering spool (1) is kept at neutral by return spring (4).

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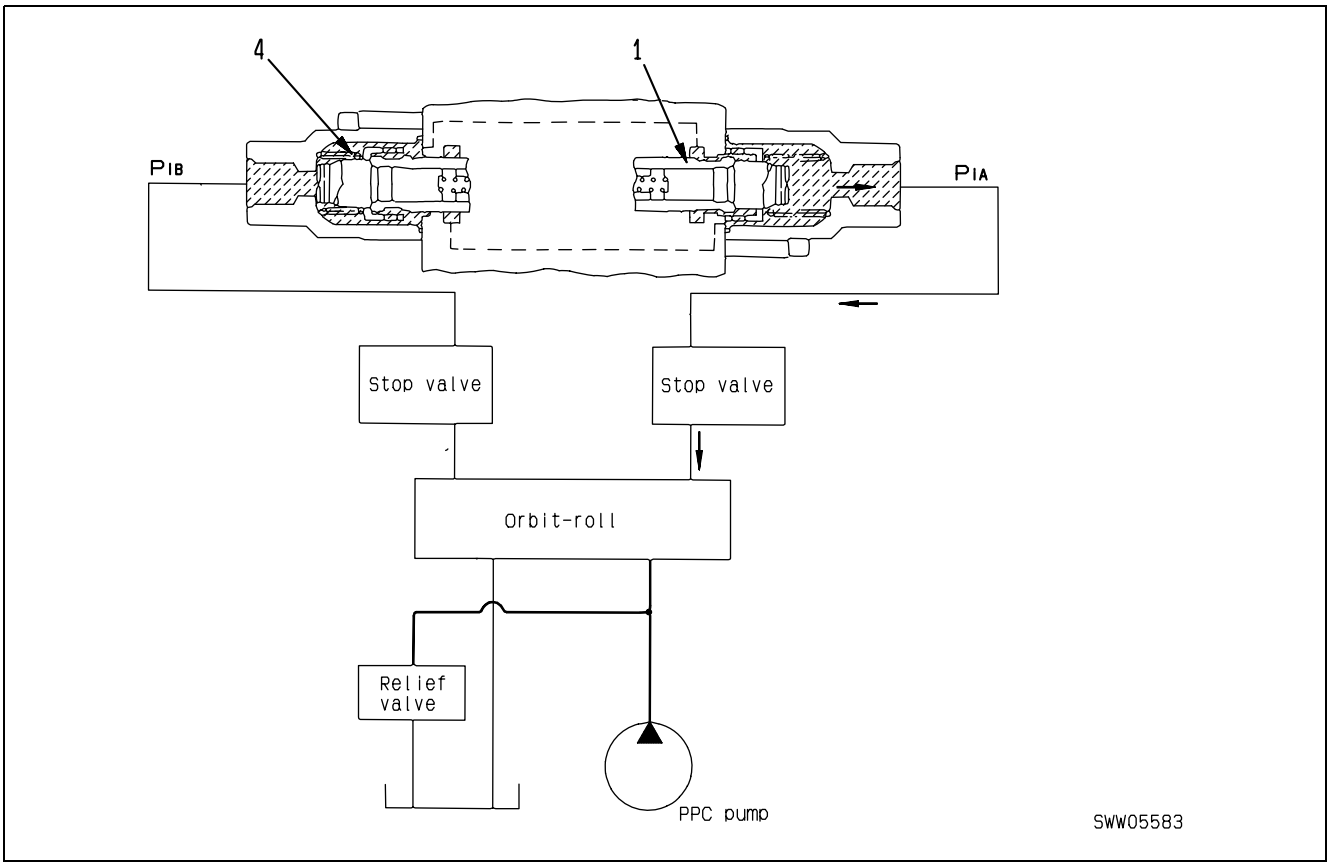
2. Spool actuated (oil flows to port **PiA**)



- When the oil flows to port **PiA**, the pressure inside the cap at end **A** rises and moves steering spool (1) in the direction of the arrow.
- The oil entering for port **PiA** passes through the hole in spring seat (3), through orifice (7) in steering spool (1), and then flows to the opposite end (**B** end).
- Port **PiB** is connected to the drain circuit through the Orbit-roll valve, so the oil flowing to end **B** is drained.
- The pressure generated at port **PiA** is proportional to the amount of oil flowing in, so steering spool (1) moves to a position where the opening of the flow amp notch balances the pressure generated with the force of return spring (4).

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3. Spool returning (steering wheel stopped, flow of oil to port **PiA** cut)

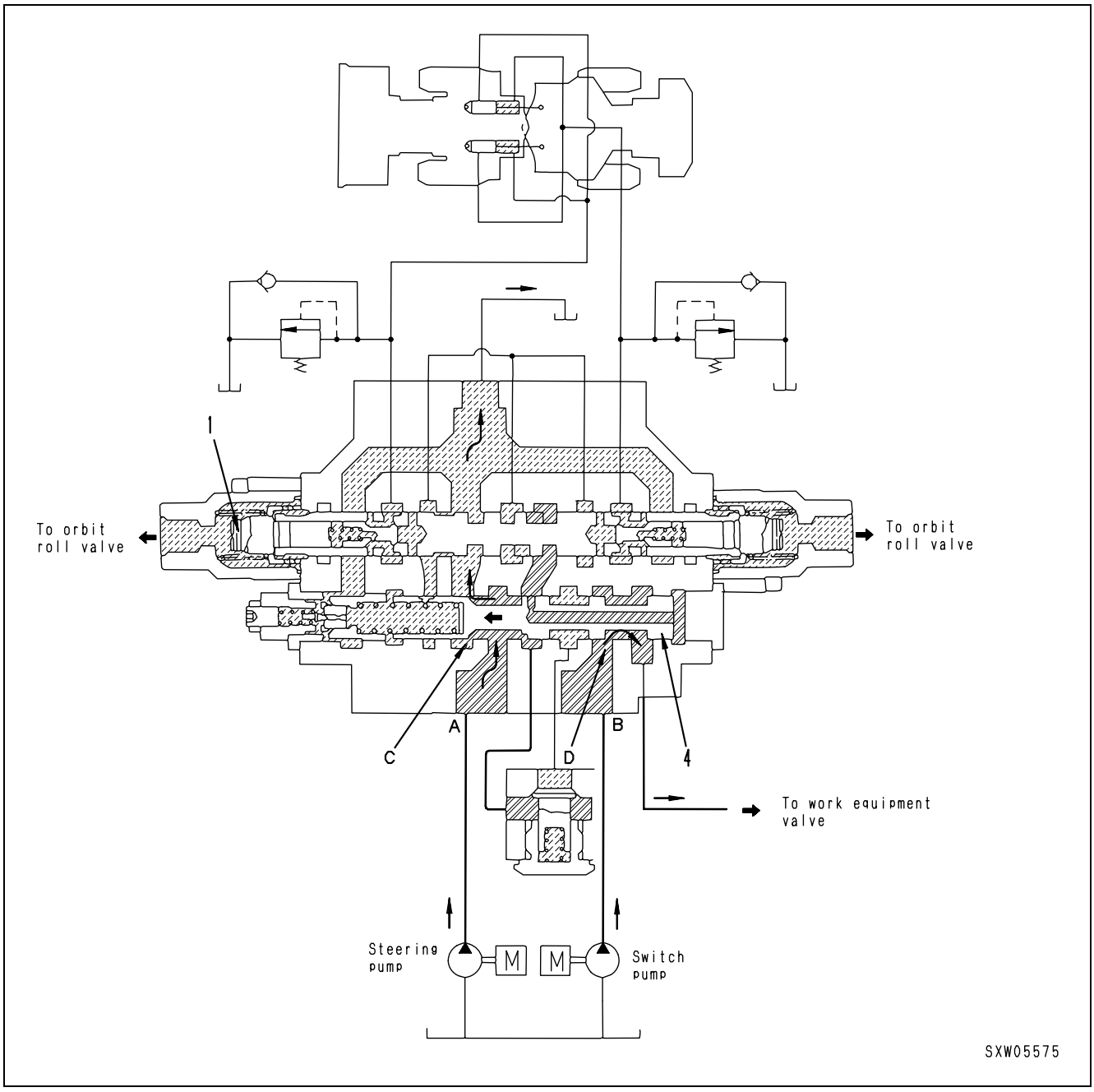


- When the steering wheel (Orbit-roll valve) is stopped, ports **PiA** and **PiB** are both connected to the drain circuit through the Orbit-roll valve. For this reason, steering spool (1) is returned to the neutral position by return spring (4).

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Operation of steering valve

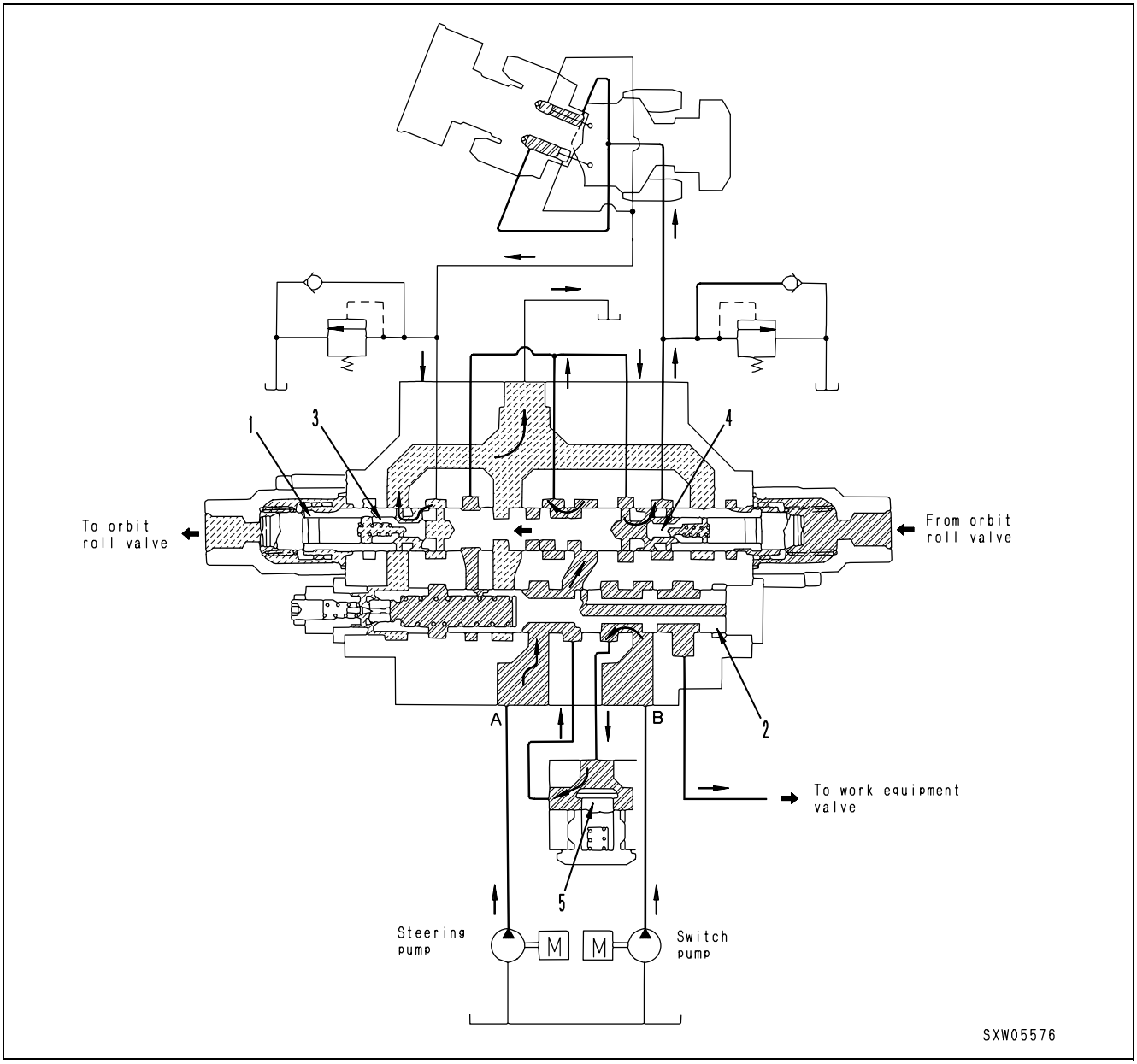
Neutral



- The steering wheel is not being operated, so steering spool (1) does not move.
- The oil from the steering pump enters port **A**. The oil from the switch pump enters port **B**.
- When the pressures at ports **A** and **B** rise, flow control spool (4) is moved to the left in the direction of the arrow (➔), and the oil from the steering pump passes through port **C** of the spool and is drained.
  The oil from the switch pump passes through port **D** and all flows to the main control valve.

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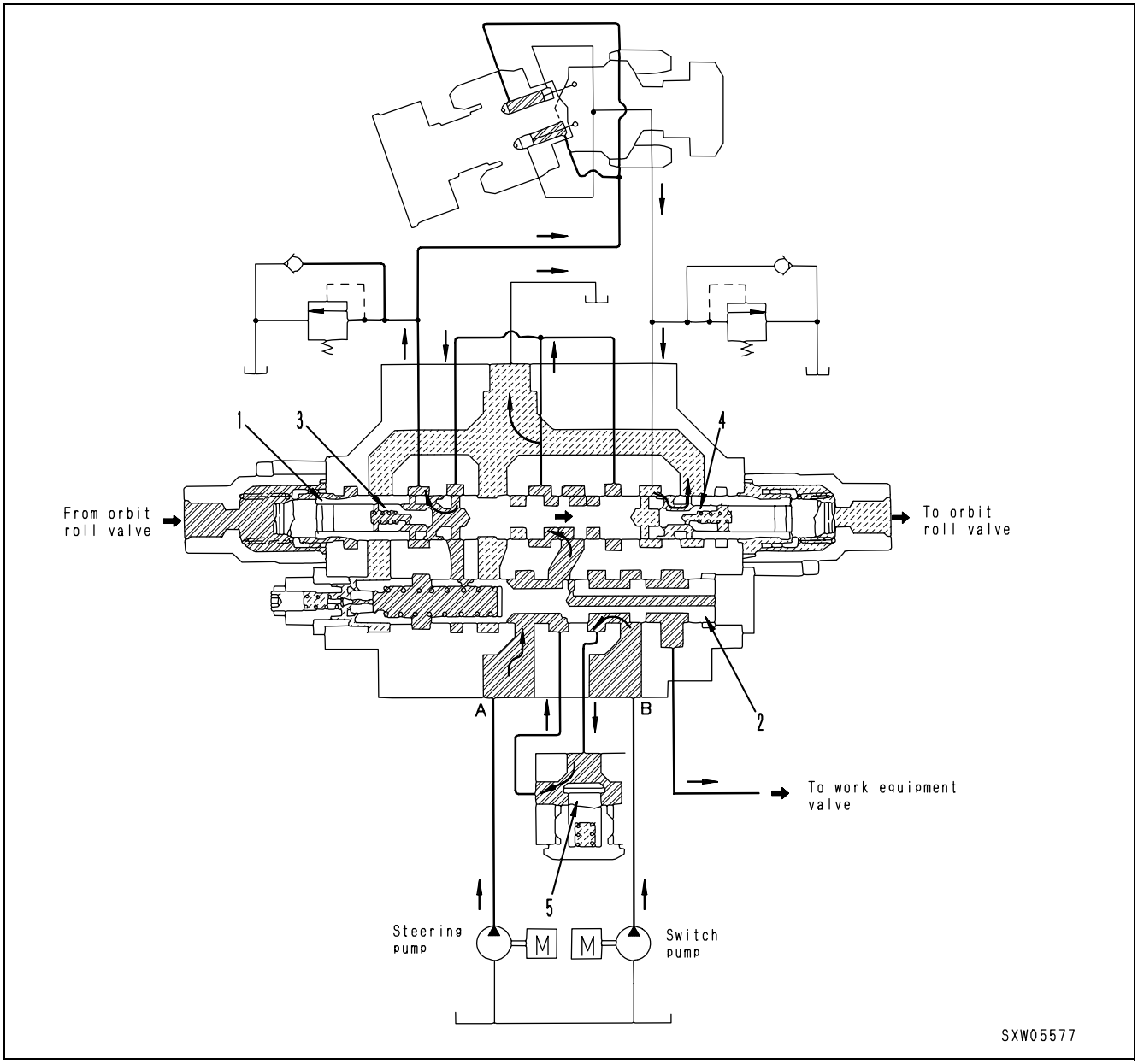
Turning right



- When the steering wheel is turned to the right, the control linkage is actuated and steering spool (1) moves to the left in the direction of the arrow (←).
- The oil from the steering pump enters port **A**, goes through flow control spool (2) and flows to steering spool (1). It then pushes open load check valve (4) of the spool, and flows to the bottom end of the left cylinder and the rod end of the right cylinder to turn the machine to the right.
- The oil at the opposite ends of the left and right cylinders passes through load check valve (3) of the steering spool and is drained.
- The oil from the switch pump enters port **B**, goes through flow control spool (2), pushes open check valve (5), and merges with the oil from the steering pump.

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Turning left



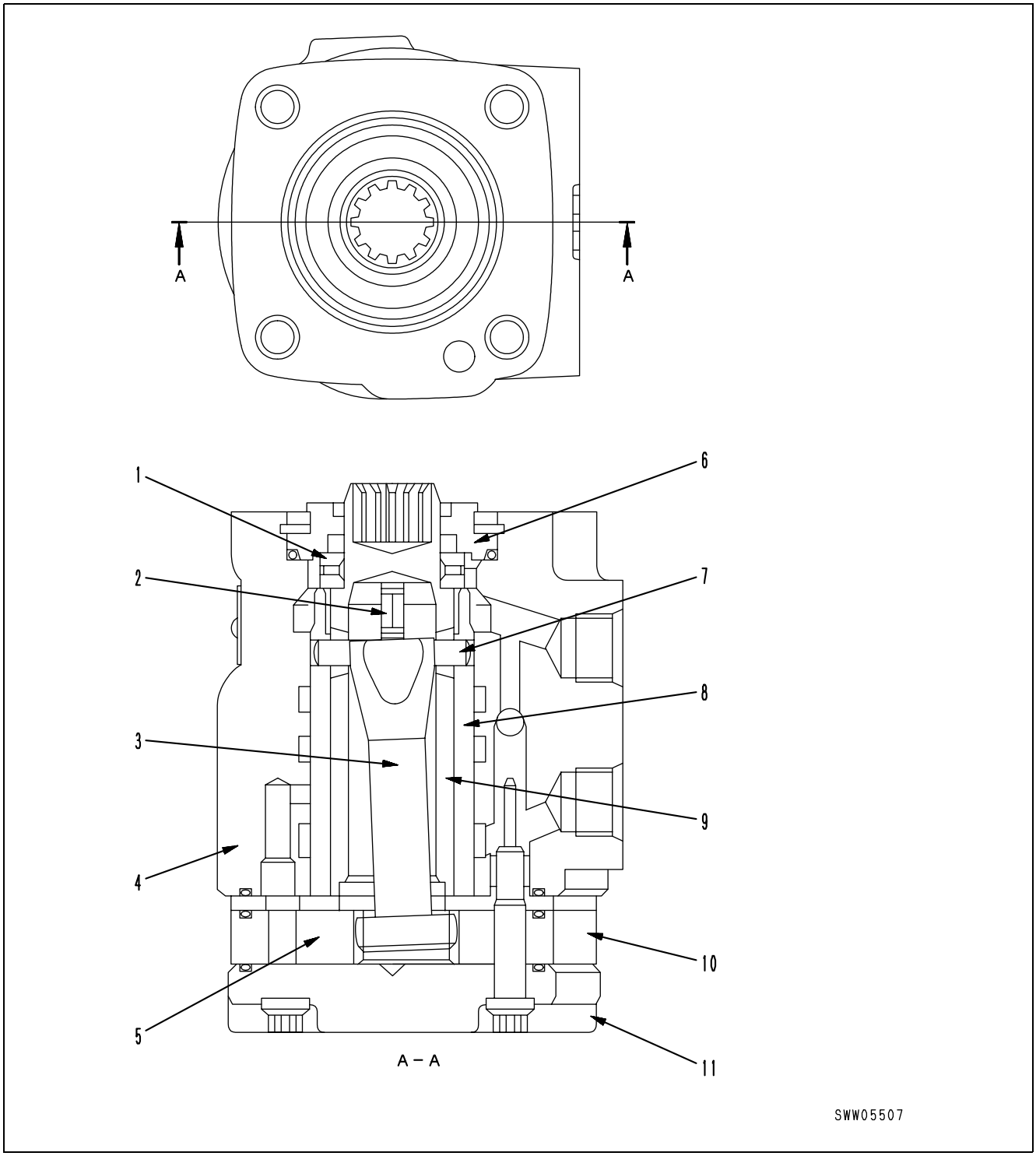
- When the steering wheel is turned to the left, the control linkage is actuated and steering spool (1) moves to the right in the direction of the arrow (➔).
- The oil from the steering pump enters port **A**, goes through flow control spool (2) and flows to steering spool (1). It then pushes open load check valve (3) of the spool, and flows to the rod end of the left cylinder and the bottom end of the right cylinder to turn the machine to the left.
- The oil at the opposite ends of the left and right cylinders passes through load check valve (4) of the steering spool and is drained.
- The oil from the switch pump enters port **B**, goes through flow control spool (2), pushes open check valve (5), and merges with the oil from the steering pump.

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Orbit-roll valve

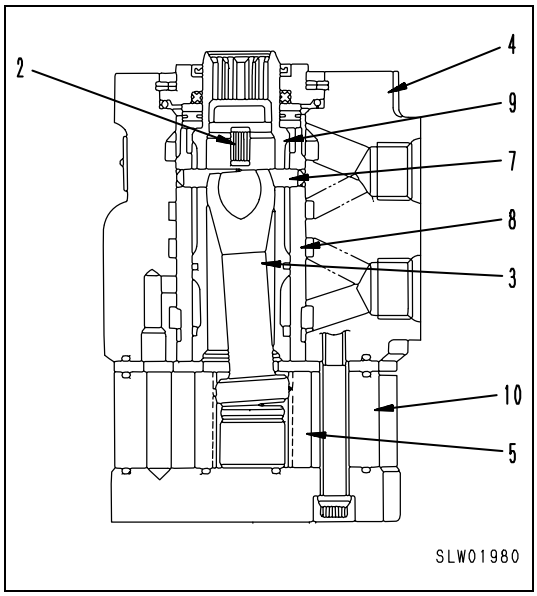


1. Needle bearing
2. Center spring
3. Drive shaft
4. Valve body
5. Rotor
6. Cover
7. Center pin
8. Sleeve
9. Spool
10. Stator
11. Lower cover

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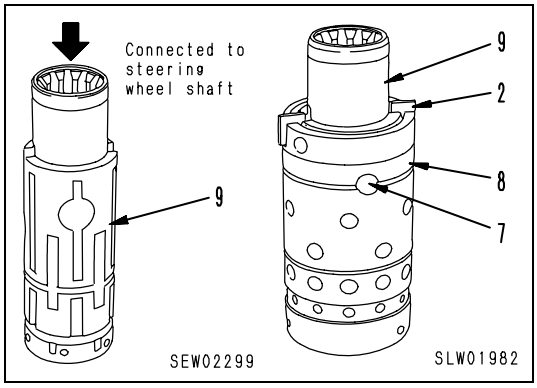
Outline

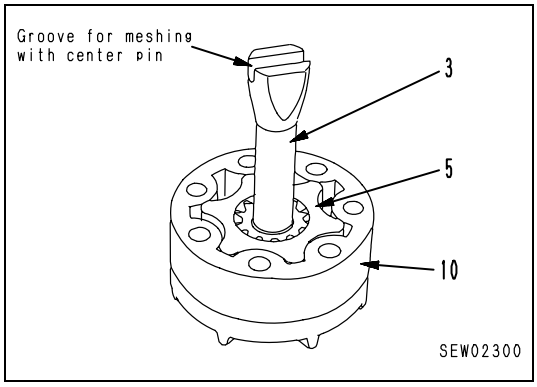
- The steering valve is connected directly to the shaft of the steering wheel. It switches the flow of oil from the steering pump to the left and right steering cylinders to determine the direction of travel of the machine.
- The orbit-roll valve, broadly speaking, consists of the following components: rotary type spool (9) and sleeve (8), which have the function of selecting the direction, and the Girotor set (a combonation of rotor (5) and stator (10)), which acts as a hydraulic motor during normal steering operations, and as a hand pump (in fact, the operating force of the steering wheel is too high, so it cannot be operated) when the steering pump or engine have failed and the supply of oil has stopped.



Structure

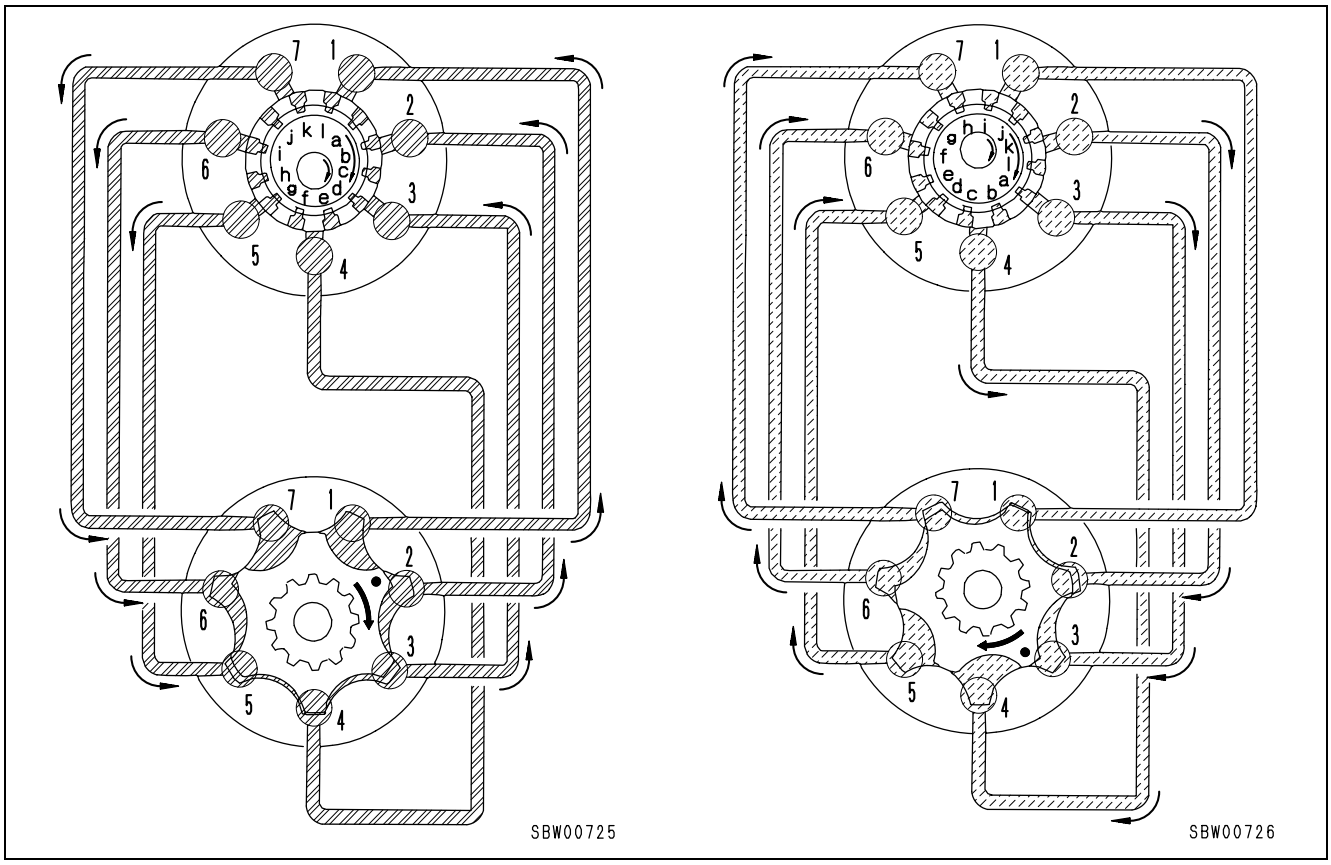
- Spool (9) is directly connected to the drive shaft of the steering wheel, and is connected to sleeve (8) by center pin (7) (it does not contact the spool when the steering wheel is at neutral) and centering spring (2).
- The top of drive shaft (3) is meshed with center pin (7), and forms one unit with sleeve (8), while the bottom of the drive shaft is meshed with the spline of rotor (5) of the Girotor.
- There are four ports in valve body (4), and they are connected to the pump circuit, tank circuit, and the circuits at the head end and bottom end of the steering cylinders. The pump port and tank port are connected by the check vavle inside the body. If the pump or engine fail, the oil can be sucked in directly from the tank by this check valve.





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Connection between hand pump and sleeve

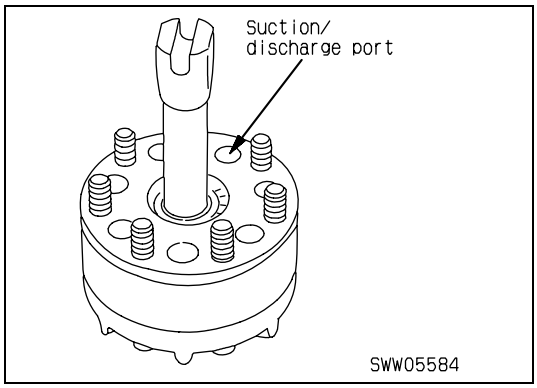


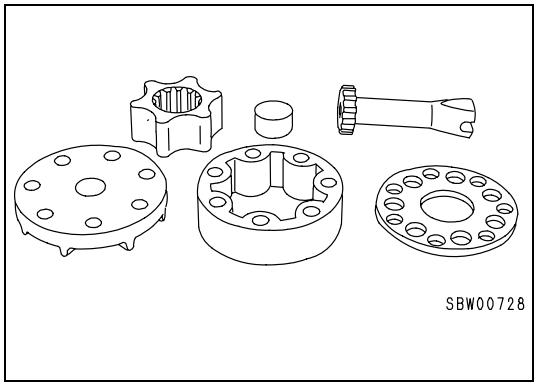
- The diagrams above show the connections with the sleeve ports used to connect the suction and discharge ports of the Girotor.
- If the steering wheel has been turned to the right, ports **a, c, e, g, i** and **k** are connected by the vertical grooves in the spool to the pump side. At the same time, ports **b, d, f, h, j,** and **l** are connected to the head end of the left steering cylinder in the same way.

  In the condition in Fig.1, ports **1, 2,** and **3** are the discharge ports of the Girotor set. They are connected to ports **l, b,** and **d,** so the oil is sent to the cylinder.

  Ports **5, 6,** and **7** are connected and the oil flows in from the pump.

  If steering wheel is turned 90°, the condition changes to the condition shown in Fig. 2. In this case, ports **1, 2,** and **3** are the suction ports, and are connected to ports **i, k,** and **c**. Ports **5, 6,** and **7** are the discharge ports, and are connected to ports **d, f,** and **h**.

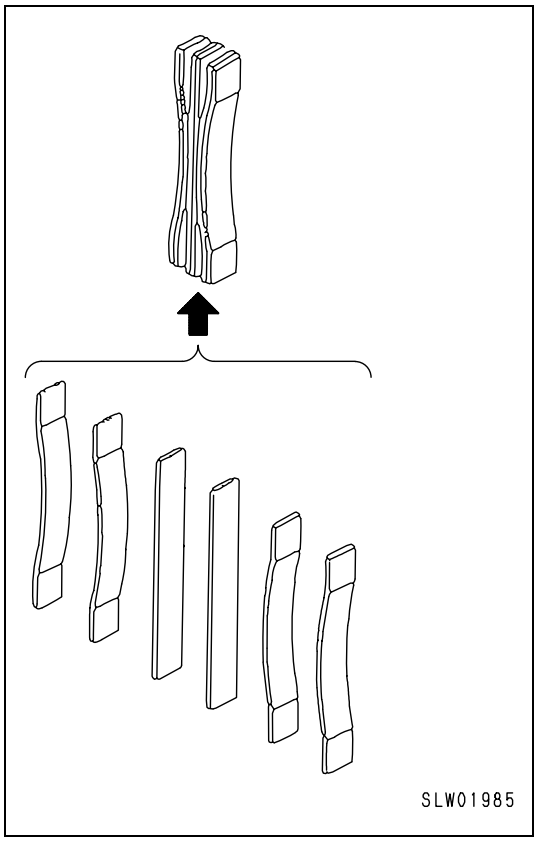




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- In this way, the ports of the Girotor acting as delivery ports are connected to ports which are connected to the end of the steering valve spool. The ports acting as suction ports are connected to the pump circuit.
- Adjusting delivery in accordance with angle of steering wheel:

  For every 1/7 turn of the steering wheel, the inner teeth of the Girotor gear advance one position so the oil flow from the pump is adjusted by this movement. In this way, the oil delivered from the pump is directly proportional to the amount the steering wheel is turned.



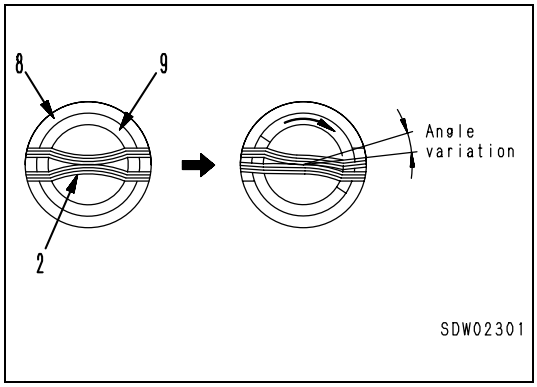
Function of center spring

- Centering spring (2) consists of four layers of leaf springs crossed to form an X shape. The springs are assembled in spool (9) and sleeve (8) as shown in the diagram on the right.

  When the steering wheel is turned, the spring is compressed and a difference in rotation (angle variation) arises between the spool and the sleeve.

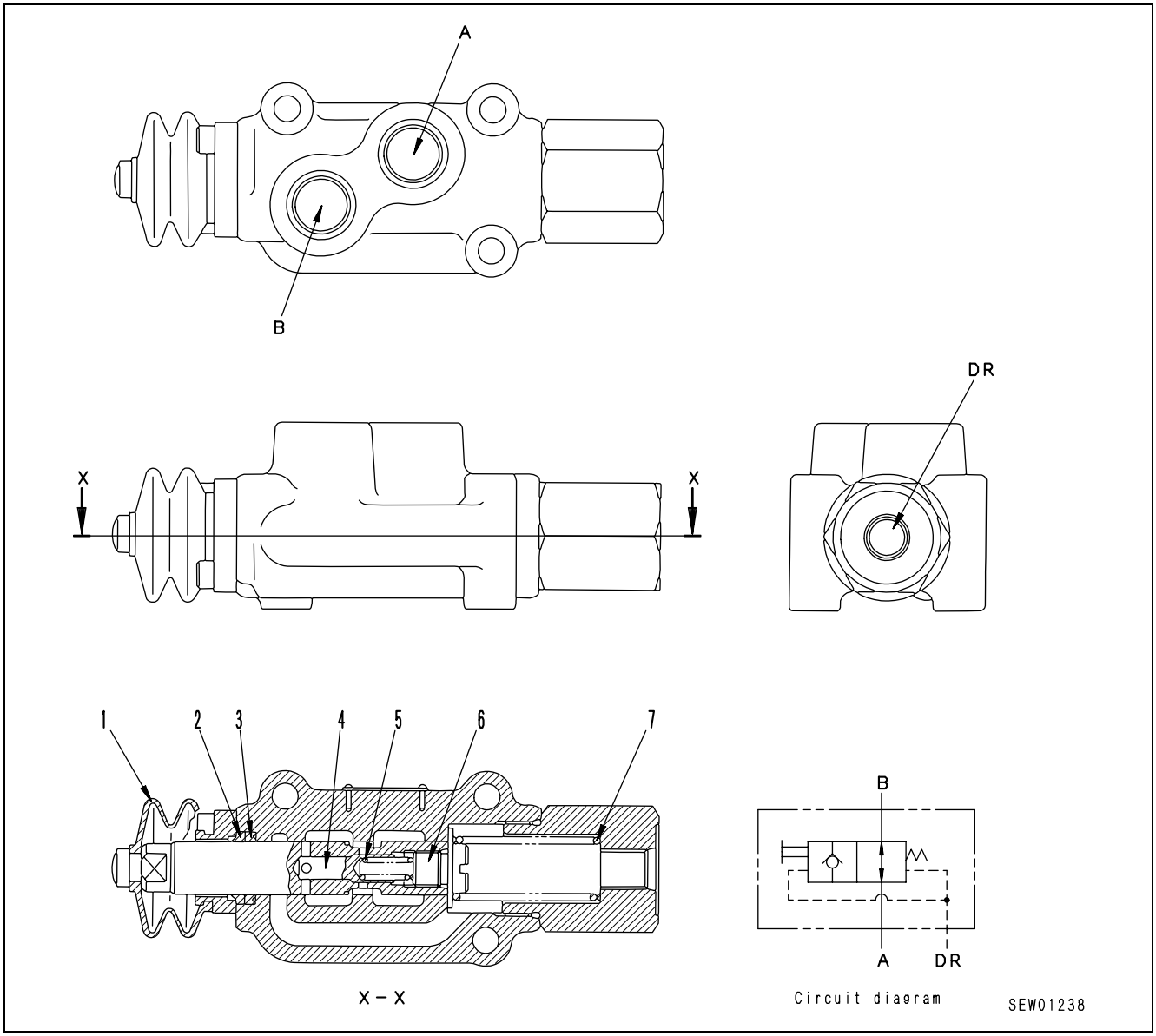
  Because of this, the ports in the spool and sleeve are connected and oil is sent to the cylinder. When the turning of the steering wheel is stopped, the Girotor also stops turning, so no more oil is sent to the cylinder and the oil pressure rises.

  To prevent this, when the turning of the steering wheel is stopped, the action of the centering spring only allows it to turn by an amount equal to the difference in angle of rotation (angle variation) of the sleeve and spool, so the steering wheel returns to the NEUTRAL position.



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Stop valve



1. Boot
2. Wiper
3. Seal
4. Poppet
5. Spring
6. Spool
7. Spring

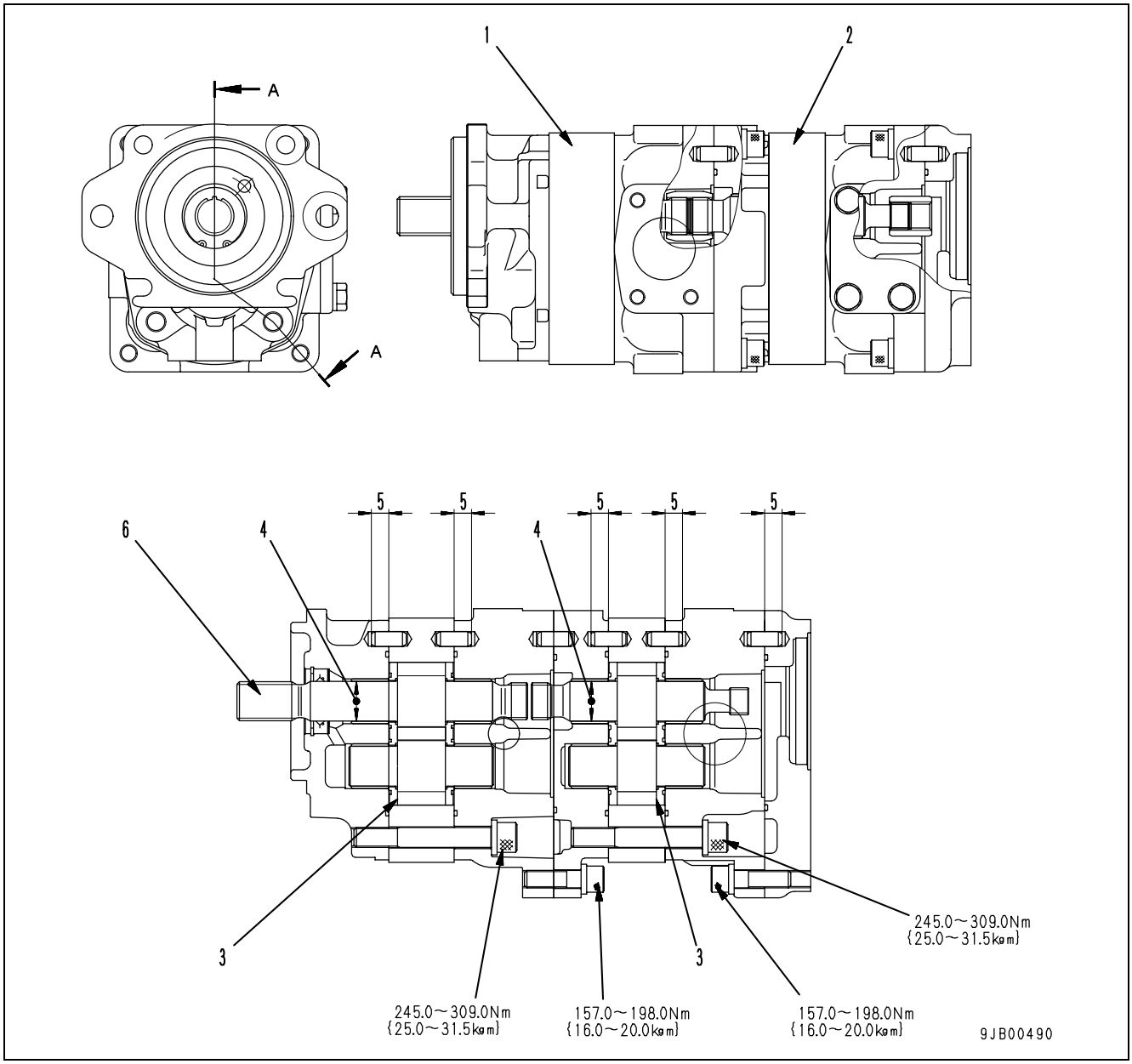
A. From orbit-roll
B. To steering valve
DR. To drain

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Steering pump, switch pump



1. Steering pump
2. Switch pump

Outline

- The steering pump and switch pump are installed to the PTO shaft of the torque converter. When the shaft rotates, the pumps are driven and supply pressure oil to the steering circuit.
- The pressure of the oil supplied from the switch pump is adjusted by the steering valve, and when the pressure in the steering circuit is sufficient to meet the demand, the oil from the switch pump is diverted to the work equipment hydraulic circuit.

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WA470-5 SAL(3)71+56
Unit: mm

No.	Check item	Criteria					Remedy
3	Side clearance	Model	Standard clearance		Clearance limit		Replace
		SAL(3)71	0.10 ~ 0.15		0.19		
		SAL(3)56					
4	Clearance between inside diameter of plain bearing and outside diameter of gear shaft	SAL(3)71	0.06 ~ 0.149		0.20		
		SAL(3)56					
5	Driving depth of pin	Model	Standard size		Tolerance	Repair limit	
		SAL(3)71	14		0 -0.5	—	
		SAL(3)56					
6	Spline rotating torque	13.8 ~ 23.6 Nm {1.4 ~2.4 kgm}					
—	Discharge amount Oil: SAE 10WCD Oil temperature: 45 - 55°C	Model	Speed (rpm)	Discharge pressure (MPa {kg/cm²}	Standard discharge amount (l/min)	Discharge amount limit (l/min)	—
		SAL(3)71	2,500	20.6 {210}	158	119	
		SAL(3)56			129	119	

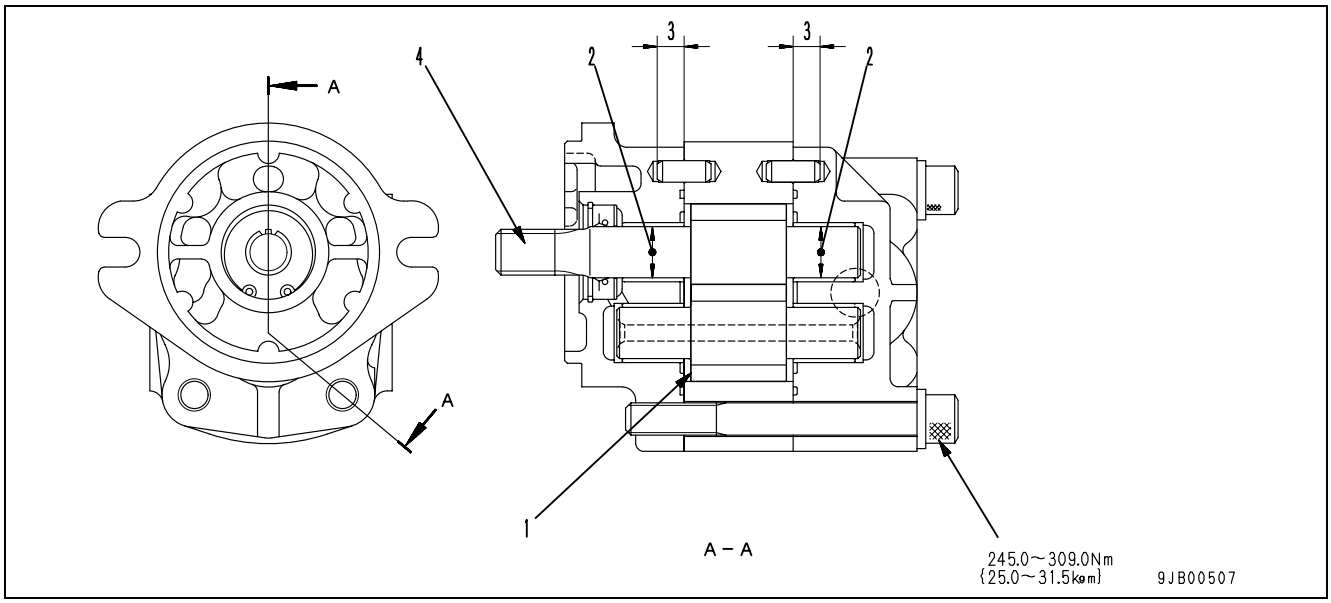
WA480-5 SAL(3)71+63
Unit: mm

No.	Check item	Criteria					Remedy
3	Side clearance	Model	Standard clearance		Clearance limit		Replace
		SAL(3)71	0.10 ~ 0.15		0.19		
		SAL(3)63					
4	Clearance between inside diameter of plain bearing and outside diameter of gear shaft	SAL(3)71	0.06 ~ 0.149		0.20		
		SAL(3)63					
5	Driving depth of pin	Model	Standard size		Tolerance	Repair limit	
		SAL(3)71	14		0 -0.5	—	
		SAL(3)63					
6	Spline rotating torque	13.8 ~ 23.6 Nm {1.4 ~2.4 kgm}					
—	Discharge amount Oil: SAE 10WCD Oil temperature: 45 - 55°C	Model	Speed (rpm)	Discharge pressure (MPa {kg/cm²}	Standard discharge amount (l/min)	Discharge amount limit (l/min)	—
		SAL(3)71	2,500	20.6 {210}	158	119	
		SAL(3)63			145	134	

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Emergency steering pump (op)

SBL (1)21



1. Drive gear
2. Front cover
3. Gear case
4. Rear cover
5. Driven gear

Function

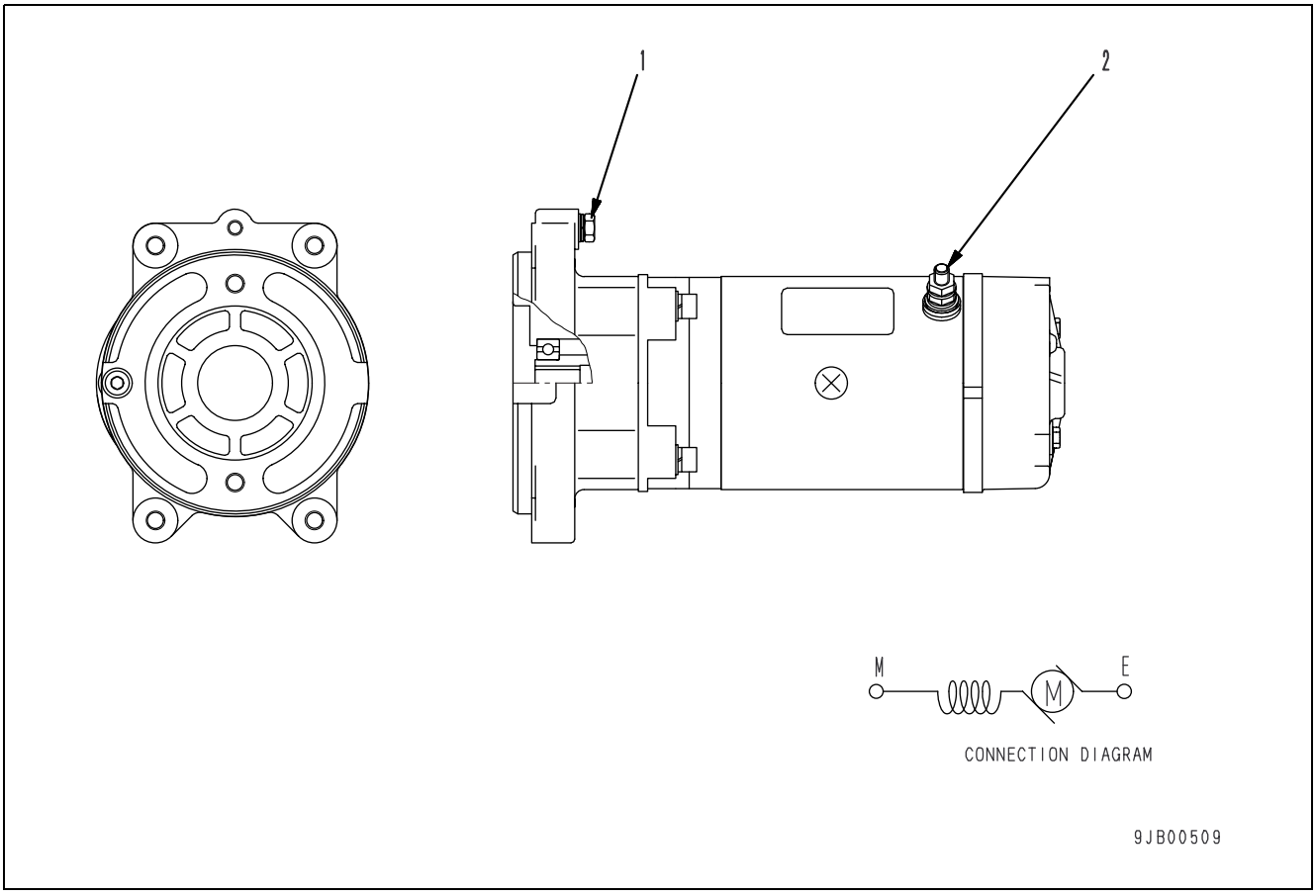
- The emergency steering pump is installed to the transmission together with the emergency steering motor. If the engine stops or if the oil pressure in the steering circuit drops below the set pressure, it supplies oil to the steering circuit.

Unit: mm

No.	Check item	Criteria				Remedy
1	Side clearance	Standard clearance		Clearance limit		Replace
		0.10 ~ 0.15		0.19		
2	Clearance between inside diameter of plain bearing and outside diameter of gear shaft	0.060 ~ 0.119		0.20		
3	Driving depth of pin	Standard size	Tolerance		Repair limit	
		10	0 -0.5		—	
4	Spline rotating torque	2.0 ~ 4.9 Nm {0.2 ~0.5 kgm}				—
—	Discharge amount Oil: SAE 10WCD Oil temperature: 45 - 55°C	Speed (rpm)	Discharge pressure (MPa {kg/cm²}	Standard discharge amount (l/min)	Discharge amount limit (l/min)	
		3,500	20.6 {210}	67.6	62.4	

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Emergency steering motor (op)



1. Terminal E
2. Terminal M

Function

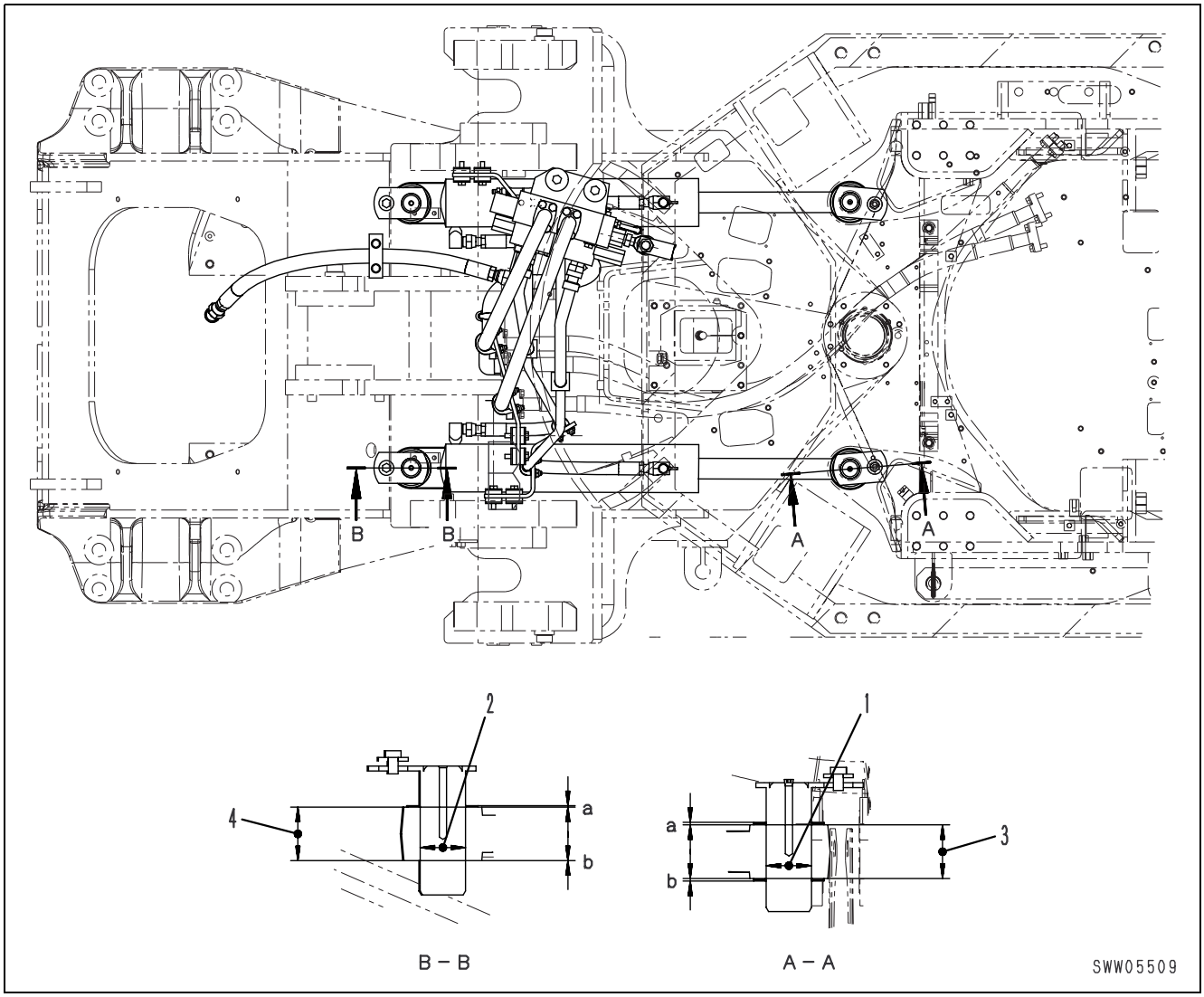
- If there is an abnormal drop in the oil pressure in the steering circuit, the emergency steering motor receives a signal from the transmission controller and drives the emergency pump.

Specifications

Type	DC motor
Rated voltage	24V
Rated output	0.9kW

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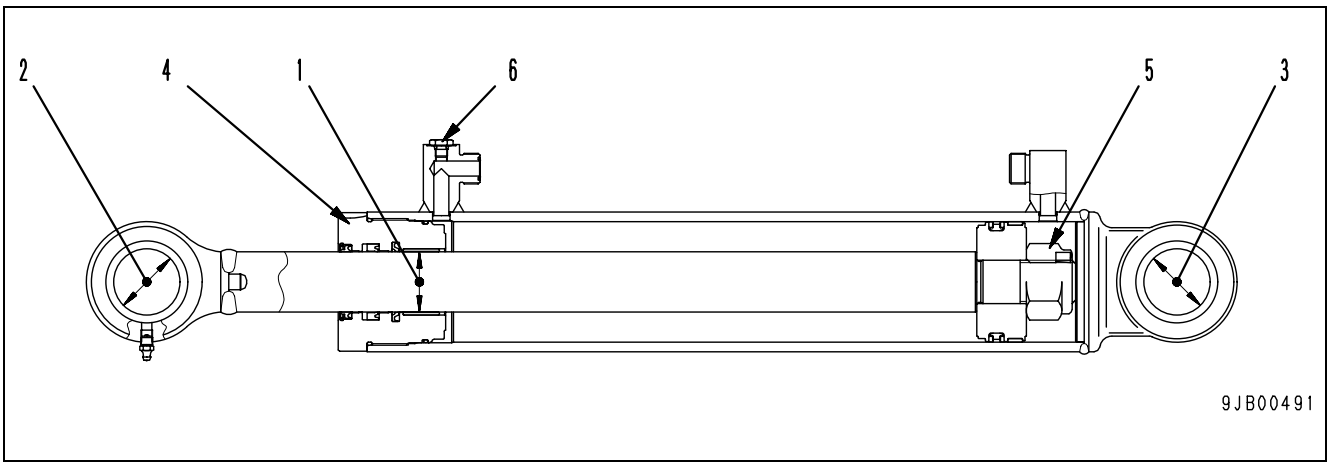
Steering cylinder



Unit: mm

No.	Check item	Criteria					Remedy
1	Clearance between mounting pin and bushing at connection of frame and cylinder rod	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		55	0 -0.046	+0.174 +0.100	0.100 ~ 0.220	—	
2	Clearance between mounting pin and bushing at connection of frame and cylinder bottom	55	0 -0.046	+0.174 +0.100	0.100 ~ 0.220	—	
3	Connection of steering cylinder and front frame	Width of boss		Width of hinge	Standard clearance (a + b)		
		65		67	Max. 0.5 (after adjusting shim)		
4	Connection of steering cylinder and rear frame	65		71.5	Max. 0.5 (after adjusting shim)		

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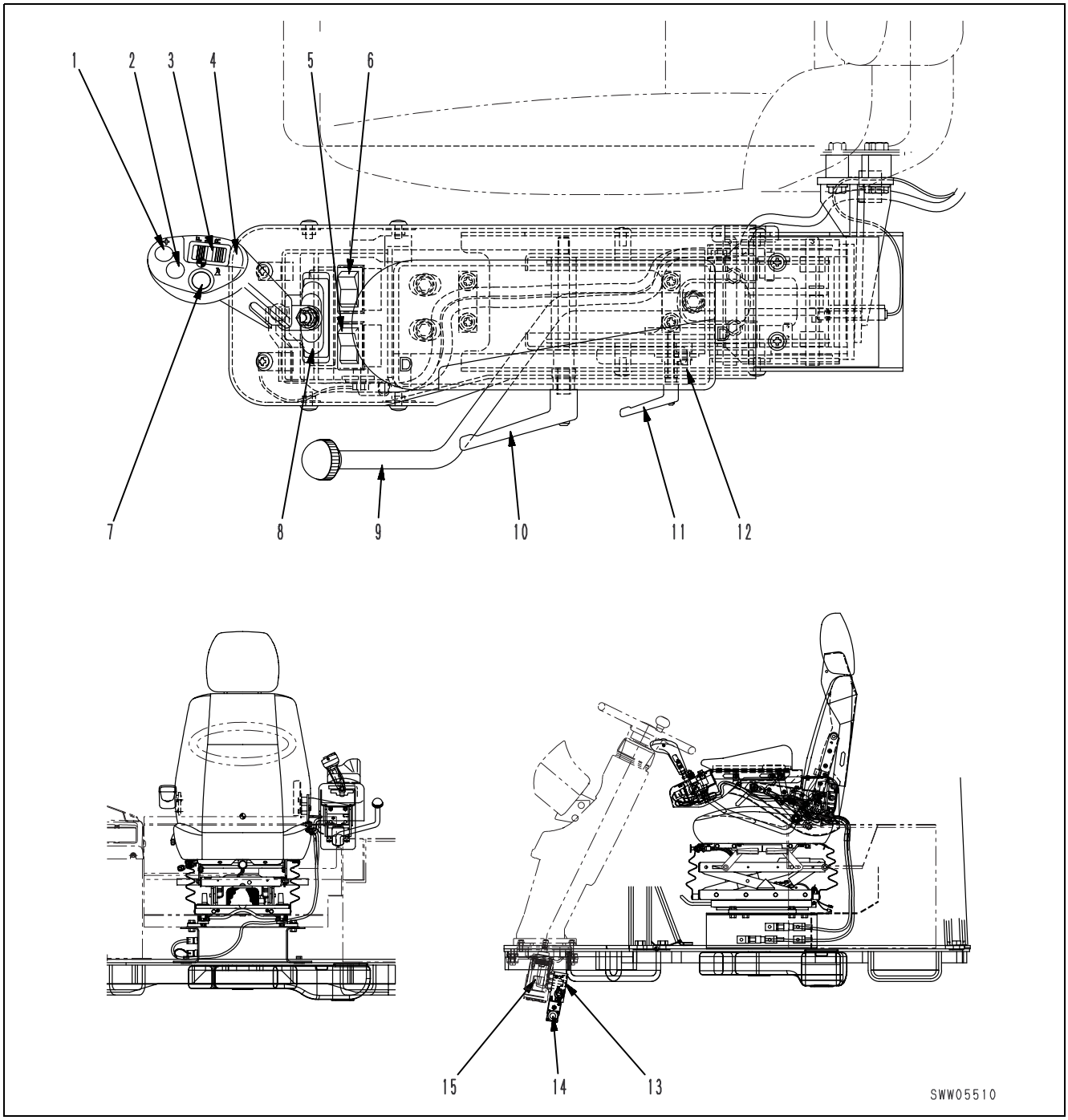


Unit: mm

No.	Check item	Criteria					Remedy
1	Clearance between piston rod and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace pin, bushing
			Shaft	Hole			
		50	+0.025 +0.064	+0.152 -0.005	0.020 ~ 0.216	—	
2	Clearance between piston rod support shaft and bushing	55	0 -0.046	+0.174 +0.100	0.100 ~ 0.220	—	
3	Clearance between cylinder bottom support shaft and bushing	55	0 -0.046	+0.174 +0.100	0.100 ~ 0.220	—	
4	Tightening torque of cylinder head	785 ± 78.5 Nm {80 ± 8.0 kgm}					Tighten
5	Tightening torque of cylinder piston	1.42 ± 0.14 kNm {145 ± 14.5 kgm} (Width across flats: 55 mm)					
6	Connection of steering cylinder and rear frame	9.8 ~ 12.7 Nm {1.0 ~ 1.3 kgm}					

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Joystick steering lever (op)



1. Shift UP switch
2. Shift DOWN switch
3. F-N-R switch
4. Joystick steering lever
5. Joystick ON/OFF switch
6. Hi/Lo switch
7. Horn switch
8. Steering electrical lever
9. Console lock lever
10. Height adjustment lock lever
11. Angle/Postion adjustment lock lever
12. Console
13. Block
14. Solenoid valve
15. Orbit-roll

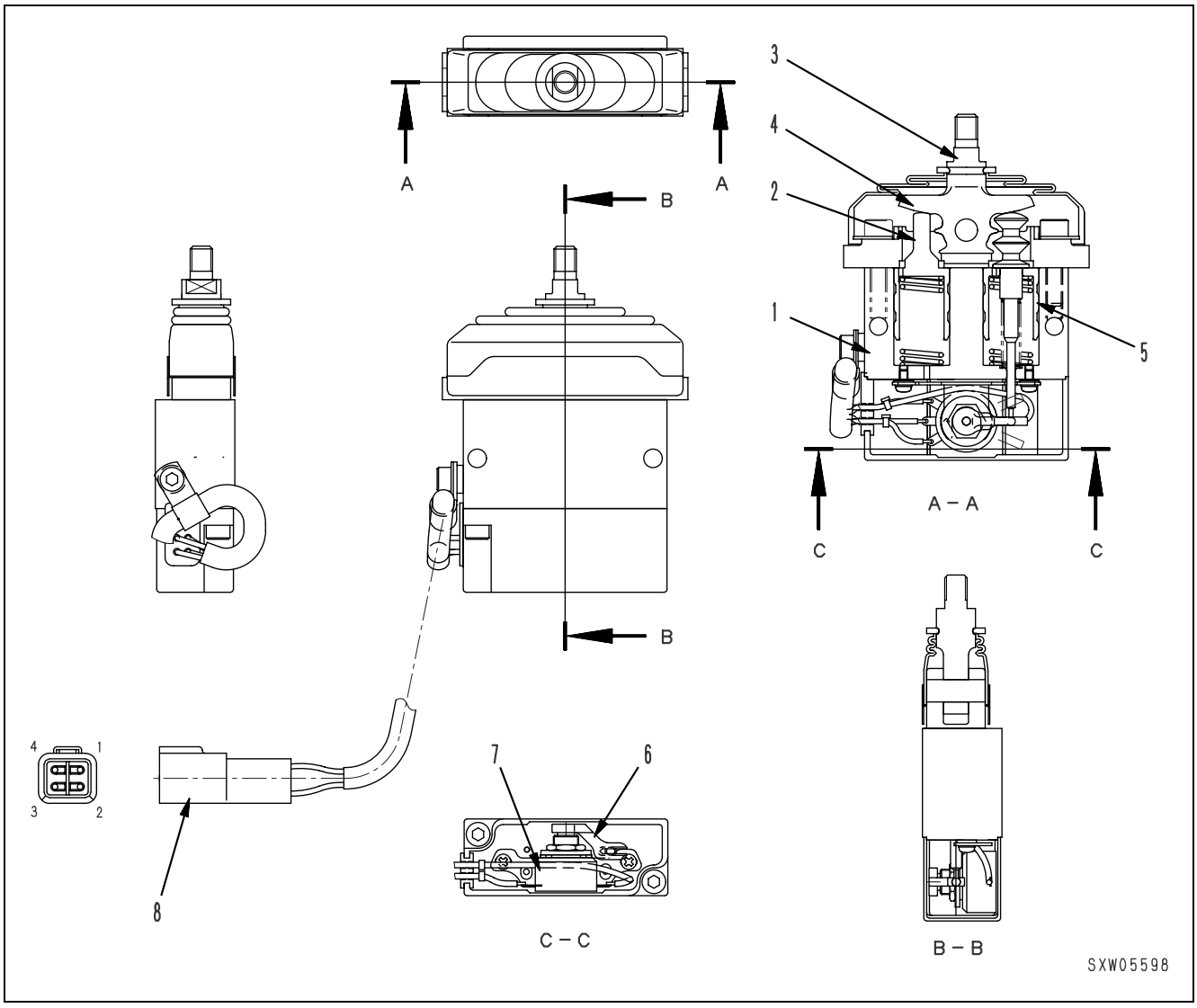
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Steering lever (op)

(For joystick steering lever)

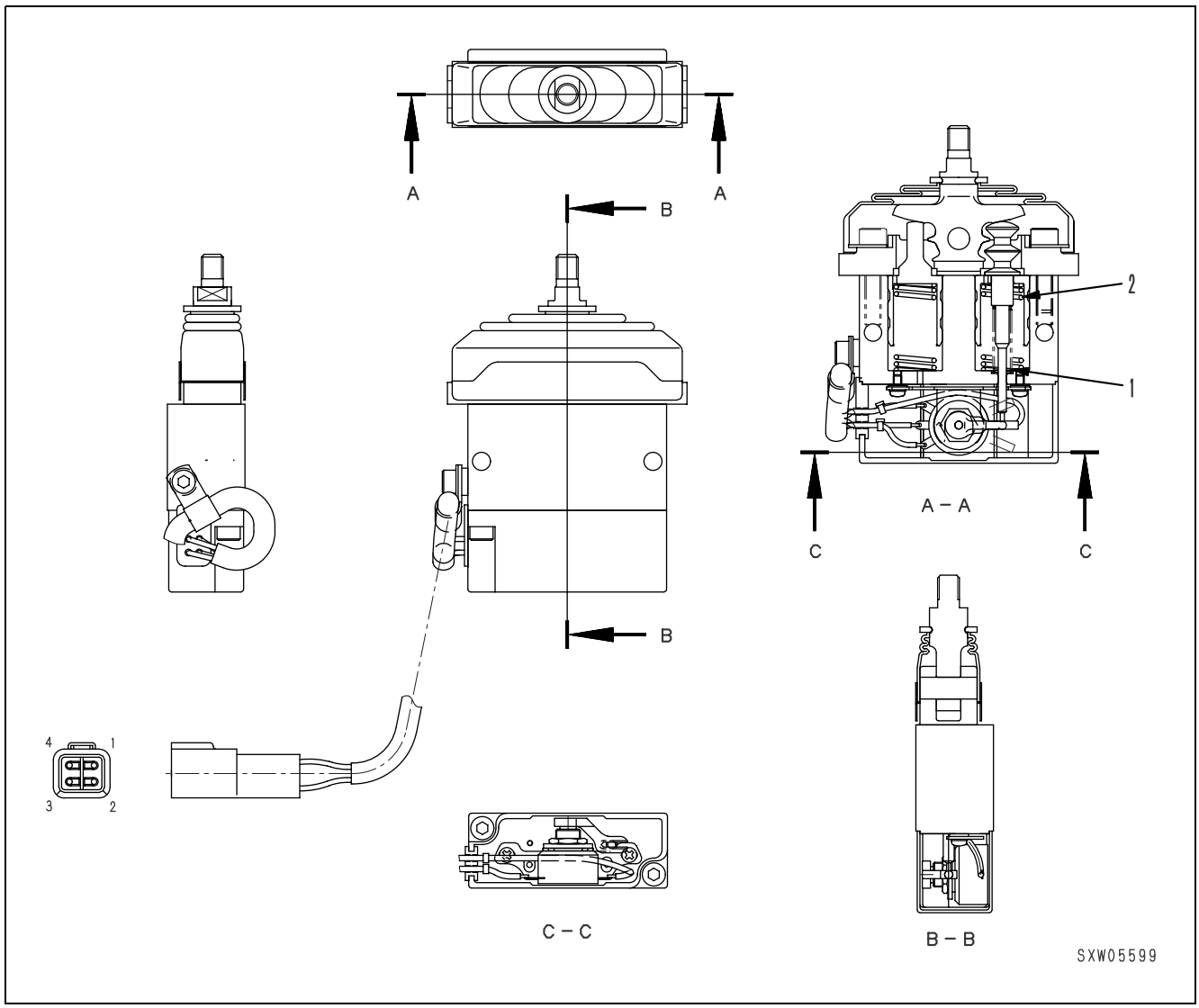


1. Body
2. Piston
3. Lever
4. Disc
5. Retainer
6. Lever
7. Potentiometer
8. Connector

Function

- The steering potentiometer is installed to the left side part of the floor, and is interconnected by a link to the steering end of the monolever. When the monolever is operated in the steering direction, disc (4) is rotated through the link, pushes piston (2) down, and rotates potentiometer (7).
- Steering lever potentiometers sense lever angle and output angle signal to HSS controller.
- Two potentiometers are attached to the steering lever and they output a signal as shown in the diagram.

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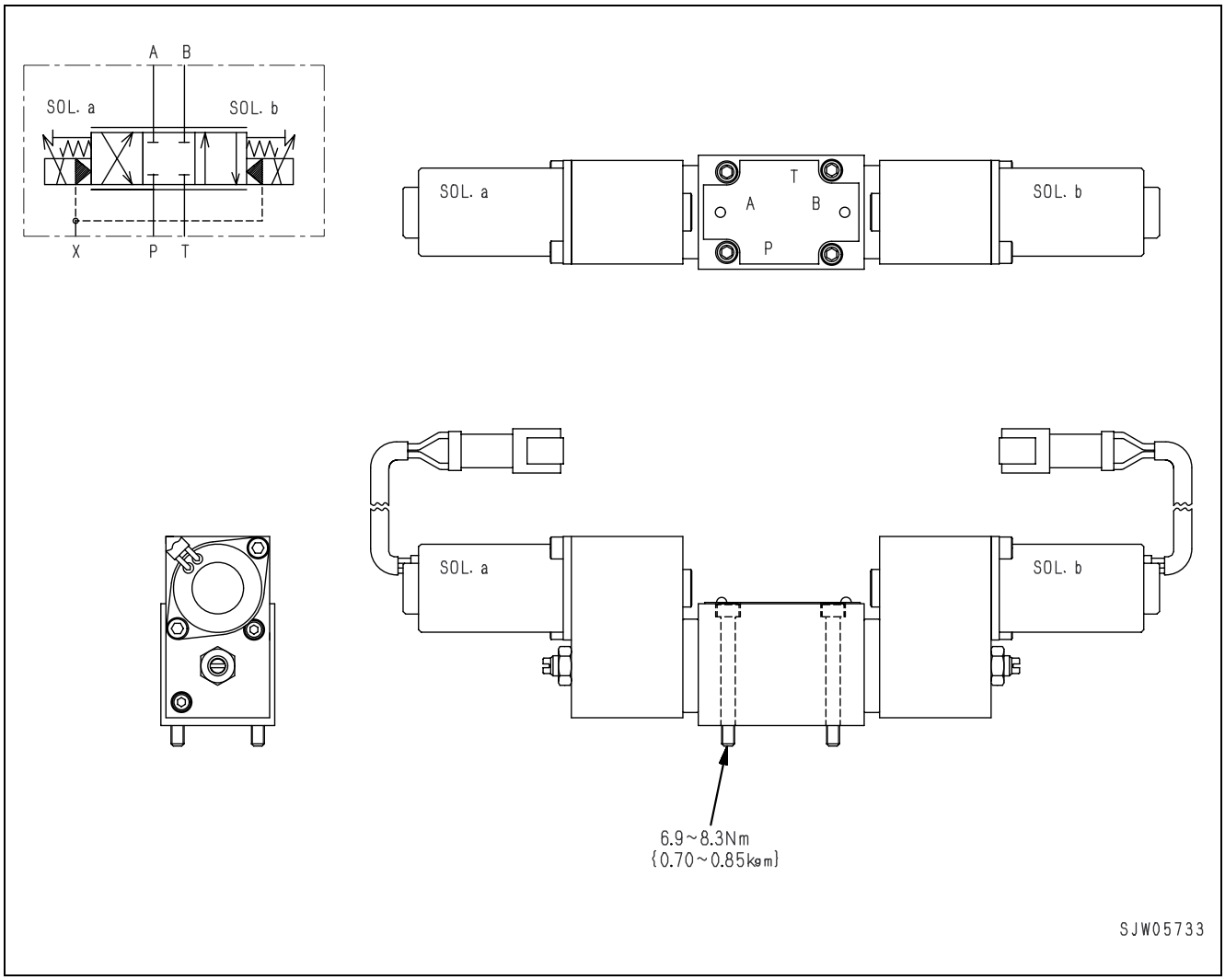
Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
1	Spring	Free length	Installed length	Installed load	Free length	Installed load	Replace spring if damaged of deformed
		45.8 x 15.5	32	93.2 N {9.5 kg}	—	58.8 N {6.0 kg}	
2	Spring	49 x 7.0	25	5.88 N {0.6 kg}	—	4.71 N {0.48 kg}	

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Steering switch valve (op)

(For joystick steering lever)



Operation

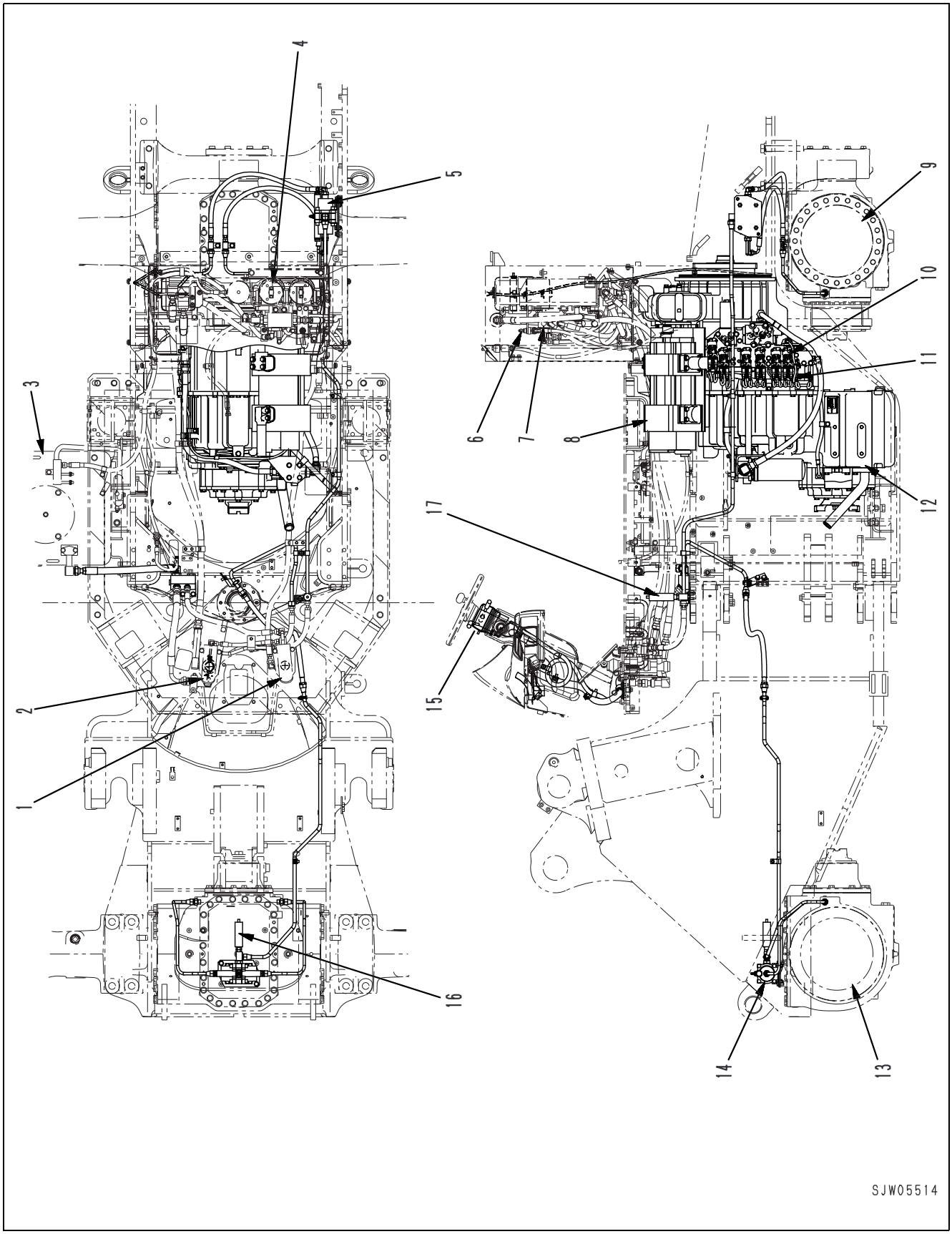
- Steering switch valve switches oil circuit from R.H. steering cylinder circuit to L.H. steering cylinder circuit or in reverse according to the operated direction of steering lever.
- According to the angle of steering lever, steering switch valve controls the oil flow amount.

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Brake piping



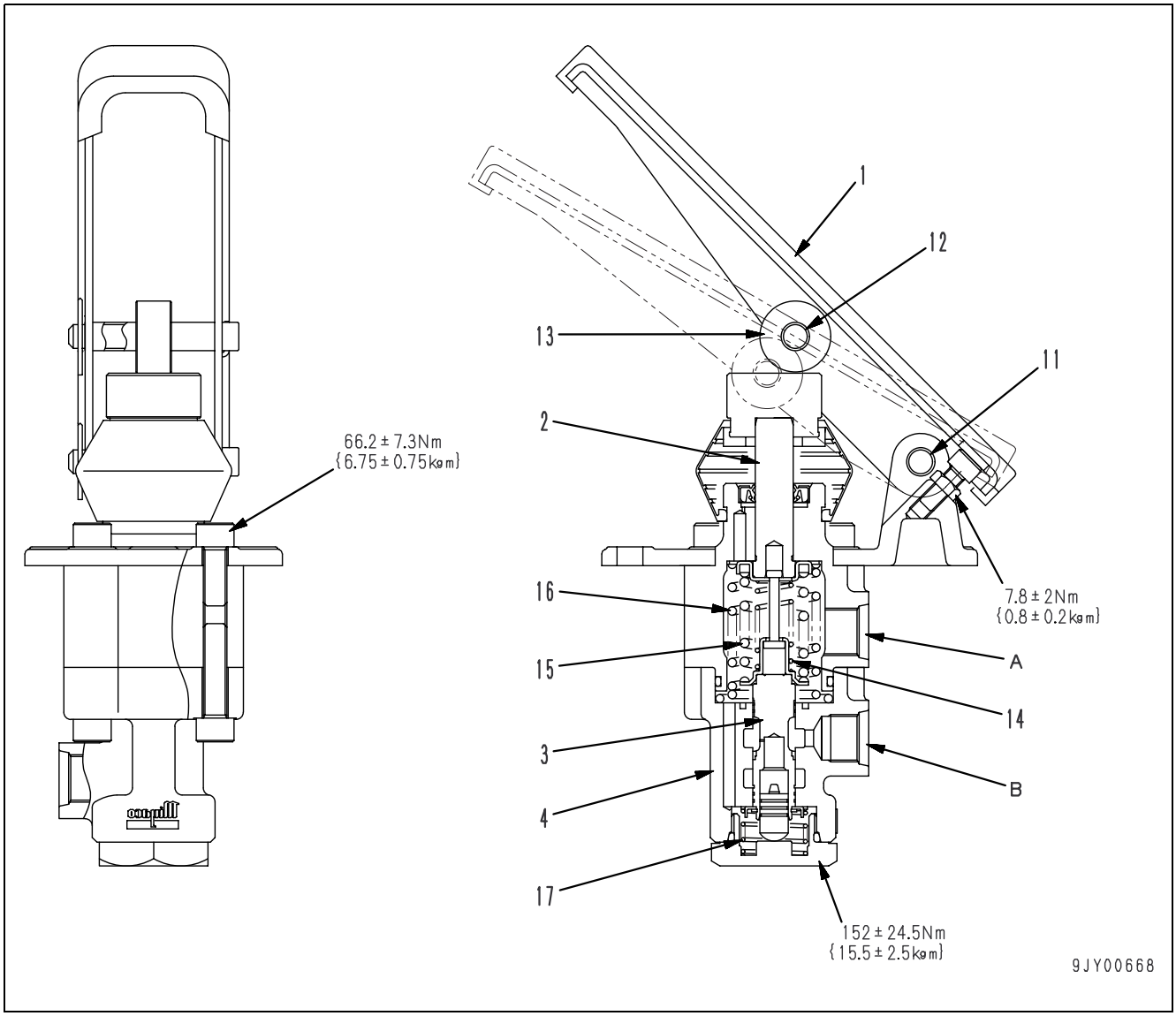
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1. Brake valve (left)
2. Brake valve (right)
3. Hydraulic tank
4. Accumulator
5. Slack adjuster
6. Parking brake emergency release valve
7. Charge valve
8. Pilot pump
9. Rear brake
10. Transmission control valve
11. Parking brake solenoid valve
12. Parking brake
13. Front brake
14. Accumulator
15. Parking brake switch
16. Accumulator (front)
17. Accumulator (rear)

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Brake valve

Brake valve (left)



1. Brake pedal (left, right brake)
2. Rod (left brake)
3. Spool (left brake)
4. Cylinder (left brake)
5. Rod (right brake)
6. Pilot piston (right brake)
7. Spool (right brake)
8. Upper cylinder (right brake)
9. Spool (right brake)
10. Lower cylinder (right brake)

A. Drain port (left, right brake)
B. To pilot port (left brake)
C. Pilot port (right brake)
D. To rear brake (right brake)
E. To front brake (right brake)

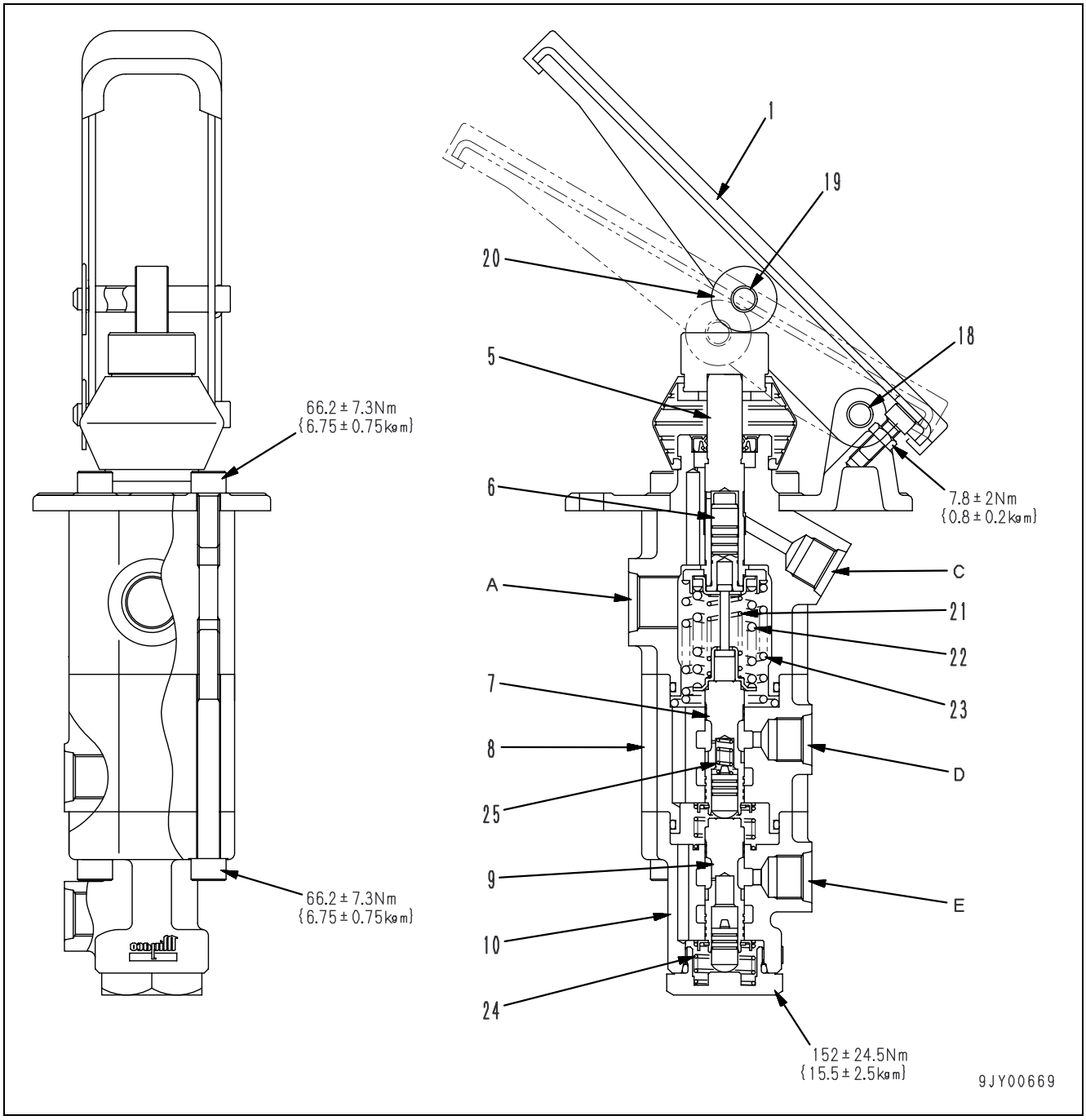
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Unit: mm

<table>
<tr><th>No.</th><th>Check item</th><th colspan="6">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Clearance between pedal mount hole and bracket hole</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard clearance</td><td rowspan="2">Clearance limit</td><td rowspan="10">Replace</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>ø 10</td><td>-0.025
-0.075</td><td>+0.1
0</td><td>0.025 ~
0.175</td><td>0.25</td></tr>
<tr><td>12</td><td>Clearance between roller and pin</td><td>ø 10</td><td>-0.025
-0.075</td><td>+0.1
0</td><td>0.025 ~
0.175</td><td>0.25</td></tr>
<tr><td rowspan="2">13</td><td rowspan="2">Outside diameter of roller</td><td colspan="2">Standard size</td><td>Tolerance</td><td colspan="2">Repair limit</td></tr>
<tr><td colspan="2">30</td><td>0
-0.5</td><td colspan="2">29.2</td></tr>
<tr><td rowspan="3">14</td><td rowspan="3">Control spring</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td></tr>
<tr><td>Free length</td><td>Installed length</td><td>Installed load</td><td>Free length</td><td>Installed load</td></tr>
<tr><td>34</td><td>33.5</td><td>3.82 Nm
{0.39 kg}</td><td>33</td><td></td></tr>
<tr><td>15</td><td>Control spring</td><td>46.3</td><td>46</td><td>11.8 Nm
{1.2 kg}</td><td>45.3</td><td></td></tr>
<tr><td>16</td><td>Return spring</td><td>86.2</td><td>58</td><td>60.8 Nm
{6.2 kg}</td><td>78</td><td></td></tr>
<tr><td>17</td><td>Return spring</td><td>31.5</td><td>19.5</td><td>16.7 Nm
{1.7 kg}</td><td>28</td><td></td></tr>
</table>

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Brake valve (right)



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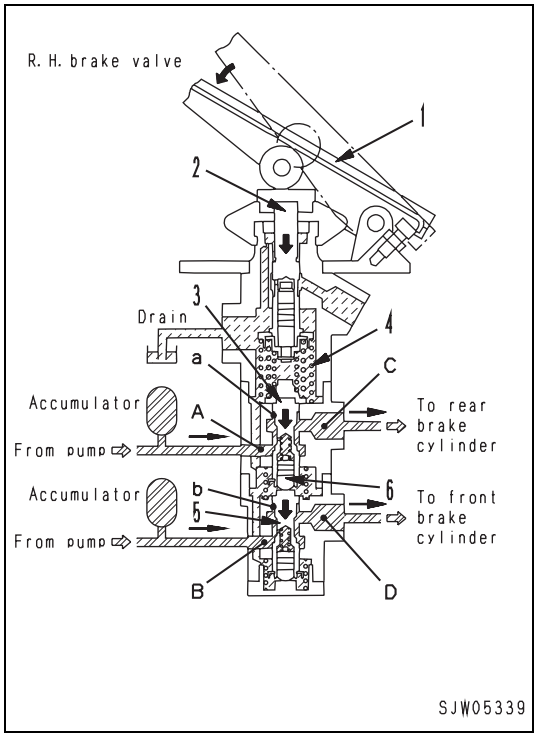
Unit: mm

<table>
<tr><th>No.</th><th>Check item</th><th colspan="6">Criteria</th><th>Remedy</th></tr>
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<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>ø 10</td><td>-0.025
-0.075</td><td>+0.1
0</td><td>0.025 ~
0.175</td><td>0.25</td></tr>
<tr><td>19</td><td>Clearance between roller and pin</td><td>ø 10</td><td>-0.025
-0.075</td><td>+0.1
0</td><td>0.025 ~
0.175</td><td>0.25</td></tr>
<tr><td rowspan="2">20</td><td rowspan="2">Outside diameter of roller</td><td colspan="2">Standard size</td><td>Tolerance</td><td colspan="2">Repair limit</td></tr>
<tr><td colspan="2">30</td><td>0
-0.5</td><td colspan="2">29.2</td></tr>
<tr><td rowspan="3">21</td><td rowspan="3">Control spring</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td></tr>
<tr><td>Free length</td><td>Installed length</td><td>Installed load</td><td>Free length</td><td>Installed load</td></tr>
<tr><td>34</td><td>33.5</td><td>3.82 Nm
{0.39 kg}</td><td>33</td><td></td></tr>
<tr><td>22</td><td>Control spring</td><td>46.3</td><td>46</td><td>11.8 Nm
{1.2 kg}</td><td>45.3</td><td></td></tr>
<tr><td>23</td><td>Return spring</td><td>86.2</td><td>58</td><td>60.8 Nm
{6.2 kg}</td><td>78</td><td></td></tr>
<tr><td>24</td><td>Return spring</td><td>31.5</td><td>19.5</td><td>16.7 Nm
{1.7 kg}</td><td>28</td><td></td></tr>
<tr><td>25</td><td>Return spring</td><td>17</td><td>16.5</td><td>17.7 Nm
{1.8 kg}</td><td>—</td><td></td></tr>
</table>

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Outline

- There are two brake valves installed in parallel at the bottom front of the operator's compartment. They are actuated when the pedal is depressed.
- When the right pedal is depressed, oil is sent to the brake cylinder and the brake is applied.
- When the left pedal is depressed, oil is sent to the right pedal and the brake is applied in the same way as when the right pedal is depressed.
- In addition, when the left brake pedal is depressed, the transmission cut-off switch actuates the transmission solenoid valve electrically to set the transmission to neutral.



Operation

When brake is applied (right brake valve)

Upper portion

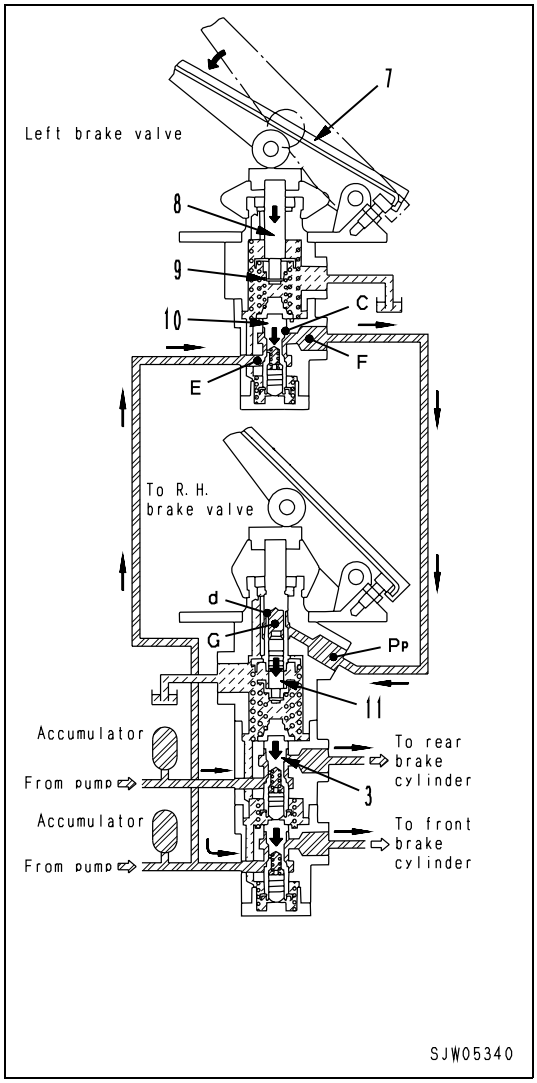
- When pedal (1) is depressed, the operating effort is transmitted through rod (2) and spring (4) to spool (3). When spool (3) goes down, drain port a is closed and the oil from the pump and accumulator flows from port **A** to port **C** to actuate the rear brake cylinder.

Lower portion

- When pedal (1) is depressed, the operating effort is transmitted through rod (2) and spring (4) to spool (3). When spool (3) goes down, plunger (6) moves spool (5) down. When this happens, drain port **b** is closed and the oil from the pump and accumulator flows from port **B** to port **D** to actuate the front brake cylinder.

When brake is applied (left brake valve)

- When pedal (7) is depressed, spool (10) is pushed up by rod (8) and spring (9), and closes drain port **c**. The oil from the pump and accumulator flows from port **E** to port **F**.
- Port **F** of the left brake valve and port **Pp** of the right brake valve are connected by a hose, so the oil flowing into port **F** flows to pilot port **Pp** of the right brake valve.
- The oil entering pilot port **Pp** passes through orifice **d** and enters port **G**, pushes piston (11) and the spring pushes spool (3) down to apply the brake in the same way as when the right brake valve is depressed.



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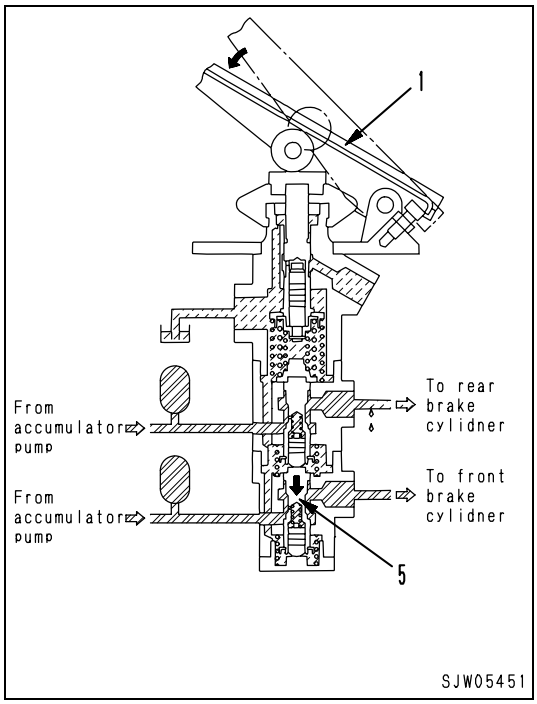
Applying brake (right brake valve) when there is failure in upper valve

- Even if there is leakage of oil from the upper piping, when pedal (1) is depressed, spool (5) is moved down mechanically, so the lower portion is actuated normally.

  The brake for the upper portion is not actuated.

Applying brake (right brake valve) when there is failure in lower valve

- Even if there is leakage of oil from the lower piping, when pedal (1) is depressed, the lower portion is actuated normally.



Balanced operation

Upper portion

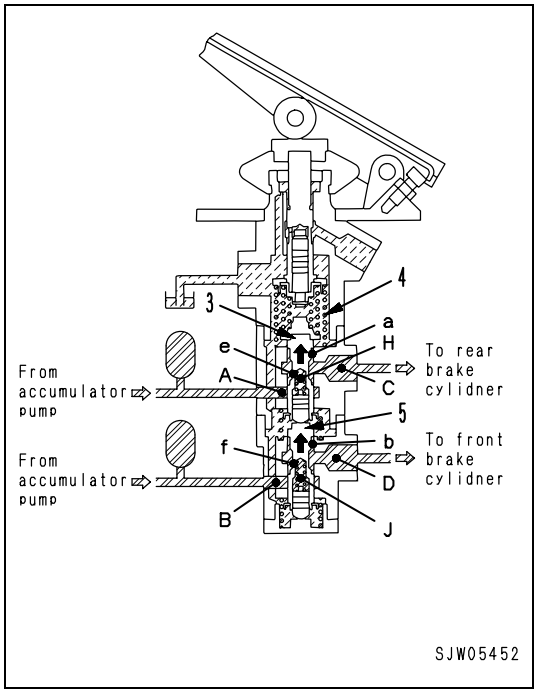
- When the oil fills the rear brake cylinder and the oil pressure between port **A** and port **C** becomes high, the oil entering port **H** through orifice **e** of spool (3) pushes against spring (4) and pushes spool (3) up to shut off port **A** and port **C**. When this happens, drain port **a** remains closed and the oil entering the brake cylinder is maintained, so the brake remains applied.

Lower portion

- Spool **a** in the upper portion moves up, and at the same time as port **A** and port **C** are shut off, the front brake cylinder is also filled with oil and the oil pressure between port **B** and port **D** becomes high. The oil entering port **J** through orifice **f** of spool (5) pushes up the spool by the same amount that spool (3) moves and shuts off port **B** and port **D**.
  Drain port **b** is closed, so the oil entering the brake cylinder is maintained and the brake is applied.

- The pressure in the space in the upper portion is balanced with the operating effort of the pedal, and the pressure in the space in the lower portion is balanced with the pressure in the space in the upper portion. Spools (3) and (5) move the full stroke, and ports **A** - **C** and ports **B** - **D** are opened completely, so the oil pressure in the space in the lower portion and the left and right brake cylinders becomes the same as the oil pressure from the pump.

  Therefore, the amount that the brake is applied can be adjusted by the amount that the pedal is depressed, up to the point where the piston is operated fully.



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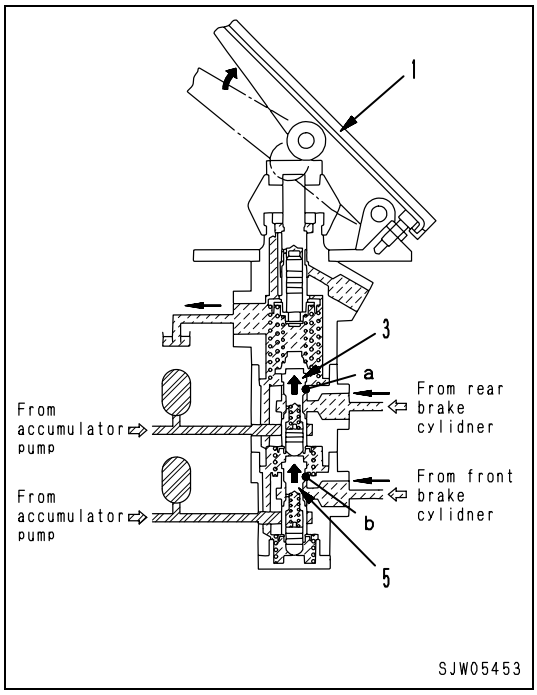
Brake released (right brake valve)

Upper portion

- When pedal (1) is let back and the operating effort on the top of the spool is removed, the back pressure from the brake cylinder and the force of the spool return spring move spool (3) up, drain port a is opened, the oil from the brake cylinder flows to the hydraulic tank return circuit, and the rear brake is released.

Lower portion

- When the pedal is let back, at the same time as spool (3) in the upper portion moves up, the back pressure from the brake cylinder and the force of the spool return spring move spool (5), drain port **b** is opened, the oil from the brake cylinder flows to the tank return circuit, and the front brake is released.

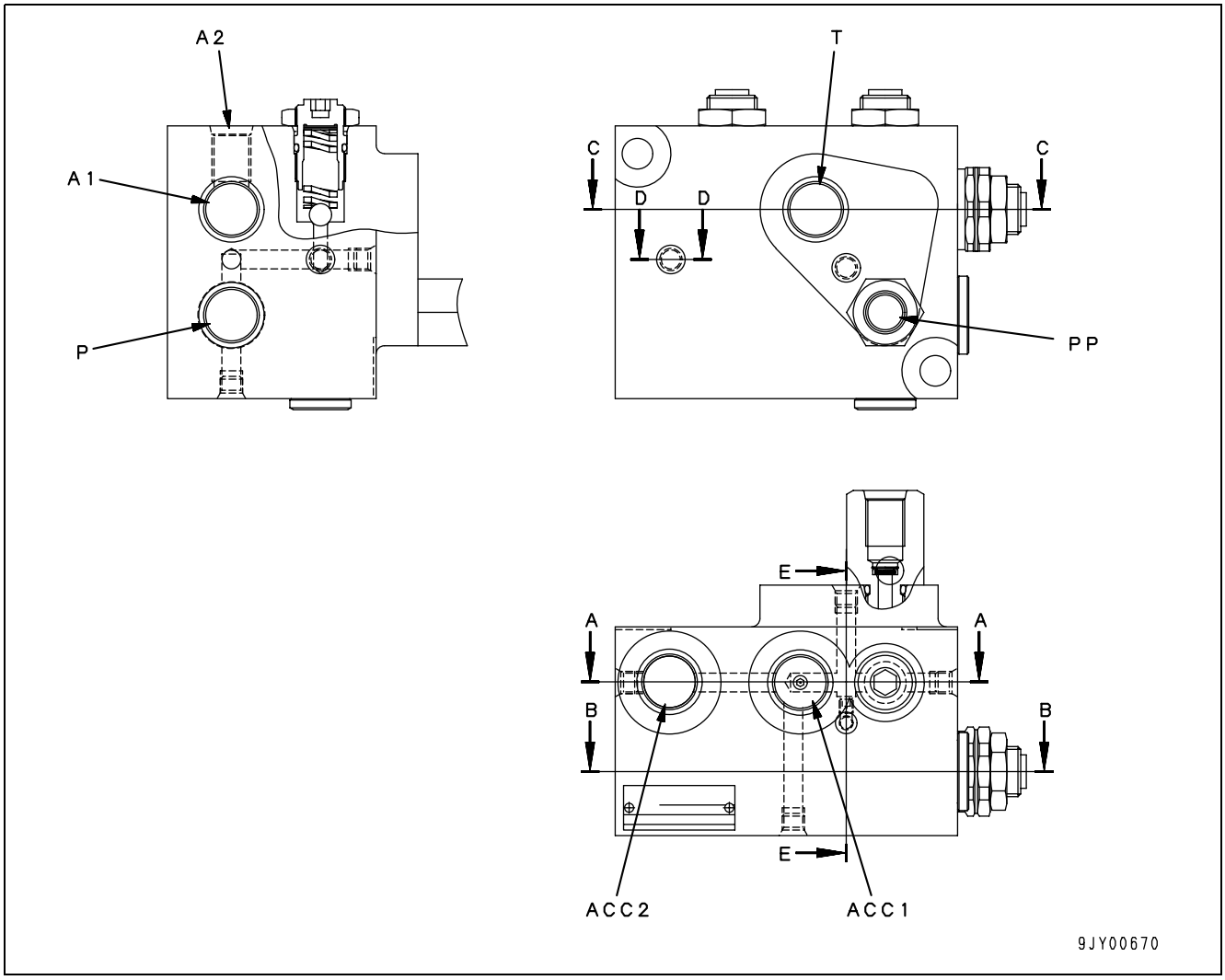


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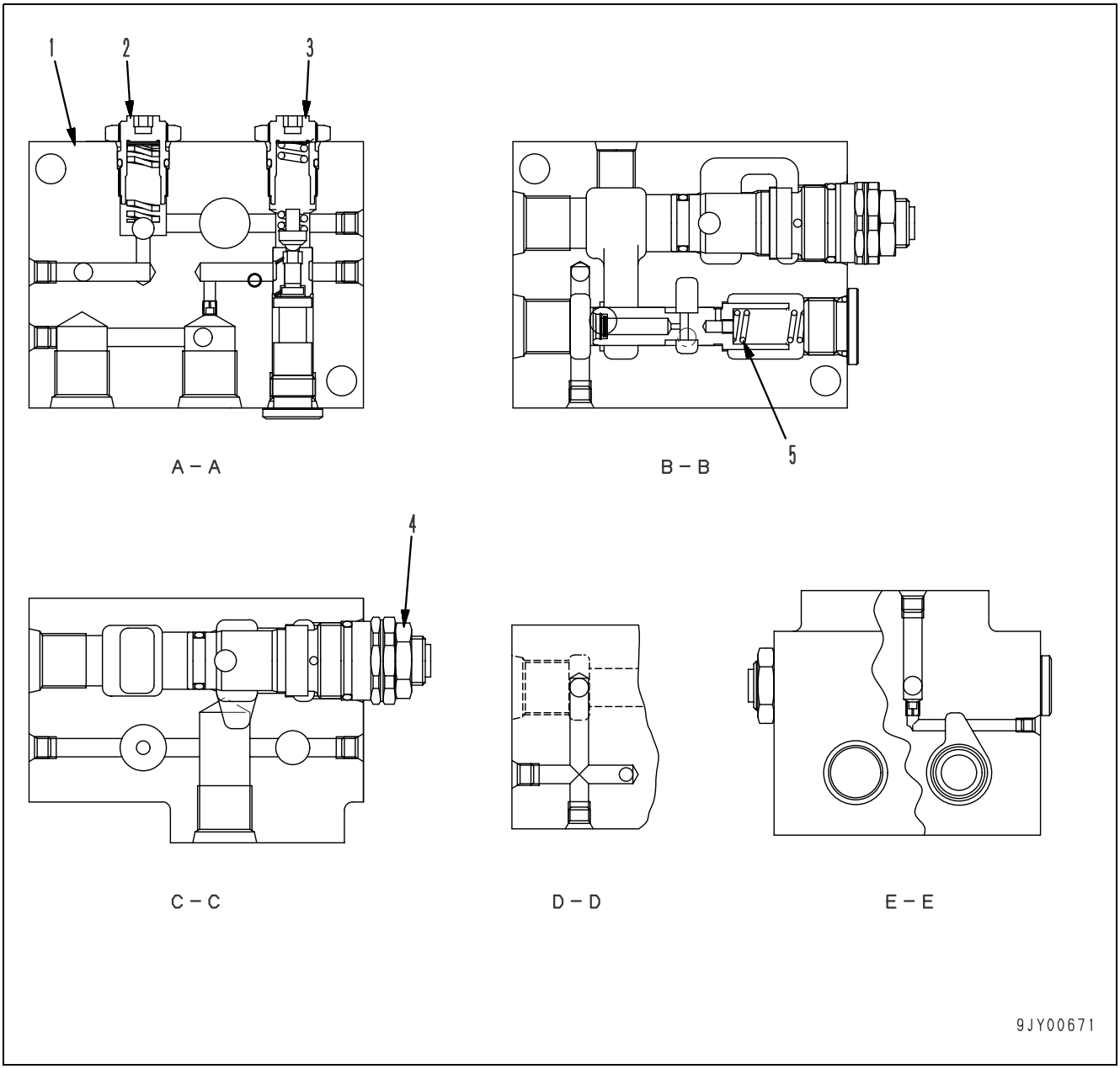
Charge valve



A1. To PPC (EPC*)valve
A2. To fan pump and orbit-roll
ACC1. To brake valve
ACC2. To brake valve
P. From pump
PP. To accumulator
T. Drain

* EPC valves are optional parts.

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1. Valve body
2. Main relief valve (R3)
3. Relief valve (R1)
4. PPC (EPC*) relief valve (R2)
5. Relief valve (H1)

* EPC valves are optional parts.

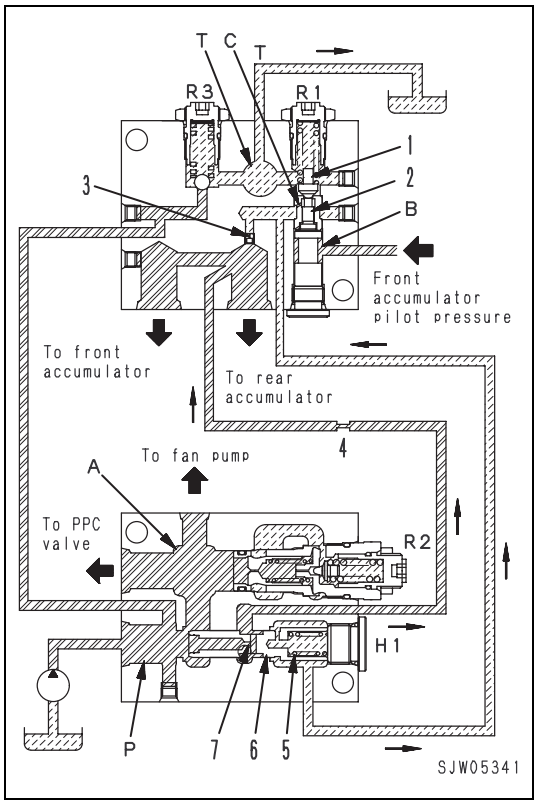
Function

- The charge valve acts to maintain the oil from the pump at the specified pressure and to charge the accumulator.
- When the oil pressure reaches the specified pressure, the oil from the pump is connected to the drain circuit to reduce the load on the pump.

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Operation

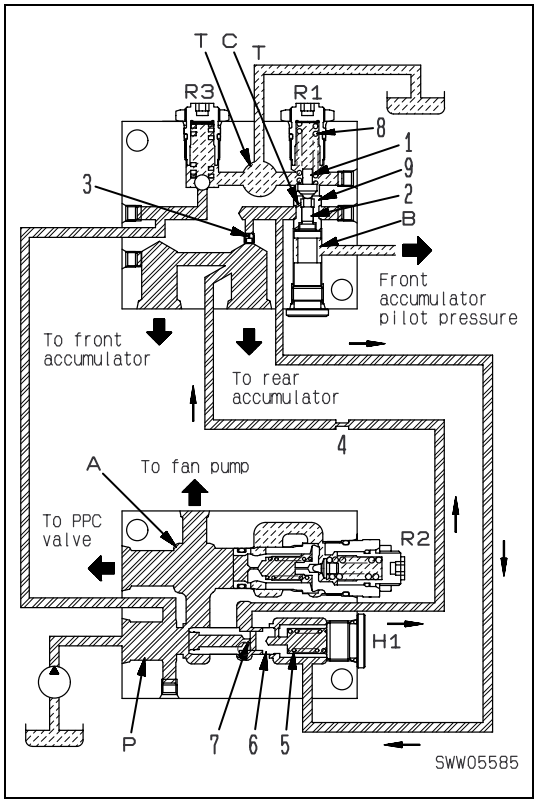
1. When oil is not being supplied to accumulator (cut-out condition)



- The pressure at port **B** is higher than the set pressure of relief valve **R1**, so piston (2) is forcibly pushed up by the oil pressure at port **B** and poppet (1) opens, and port **C** and port **T** are connected.
- The spring chamber at the right end of spool (6) is connected to port **C** of relief valve R1, so it is the tank pressure.
- The oil from the pump enters port **P** and a low pressure equivalent to the load of spring (5) pushes spool (6) to the right, then flows from port **A** to the PPC valve, orbit-roll and fan pump.

  At the same time, it also passes through orifices (7), (4), and (3), and returns to the tank.

2. When oil is being supplied to accumulator



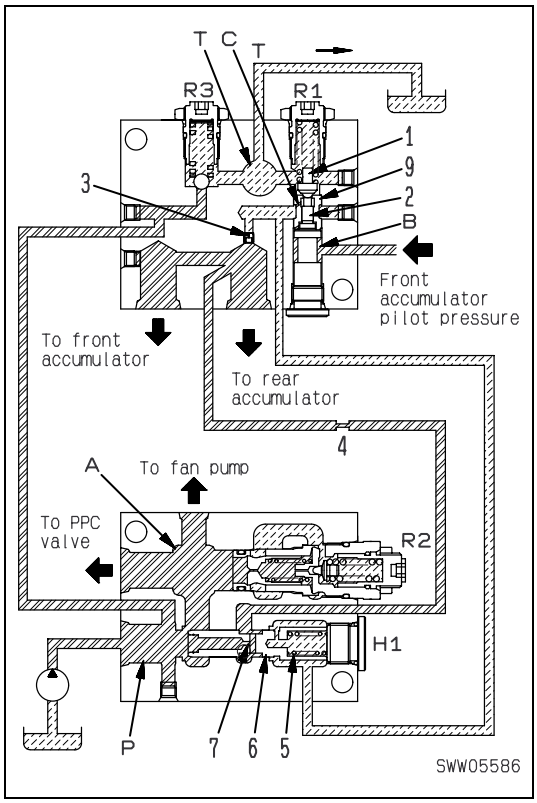
   a. Cut-in condition

   - When the pressure at port **B** goes below the set pressure of relief valve **R1**, piston (2) is pushed back down by spring (8), valve seat (9) and poppet (1) are put in tight contact, and port **C** and port **T** are shut off.
   - The spring chamber at the right end of spool (6) is also shut off from port **T**, so the pressure rises. The pressure at port **P** also rises in the same way.
   - At the moment the pressure at port **P** goes above the pressure of port **B** (accumulator pressure), the supply of oil to the accumulator starts. In this case, it is determined by the size (area) of orifice (7) and the pressure difference generated on both sides of the orifice (equivalent to the load of spring (5)). A fixed amount is supplied, regardless of the speed of the engine, and the remaining oil flows to port **A**.

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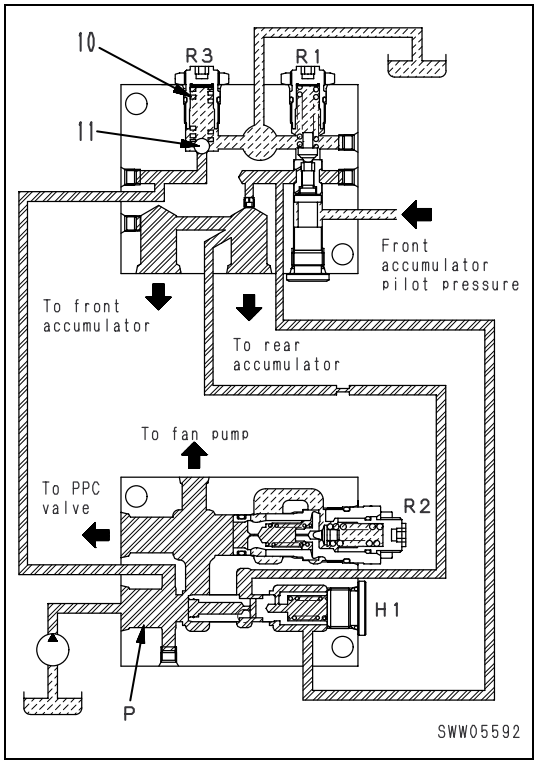
b. When cut-out pressure is reached

- When the pressure at port **B** (accumulator pressure) reaches the set pressure of relief valve **R1**, poppet (1) separates from valve seat (9), the oil flows, and the relief is actuated.
- A difference in pressure at the top and bottom of piston (2) is created by the relief action, so piston (2) moves up or down, forcibly opens poppet (1), and port **C** and port **T** are connected.
- The spring chamber at the right end of spool (6) is connected to port **C** of relief valve **R1**, so it is the tank pressure.
- The pressure at port **P** goes down in the same way to a pressure equivalent to the load of spring (5), and the supply of oil to port **B** is also stopped.



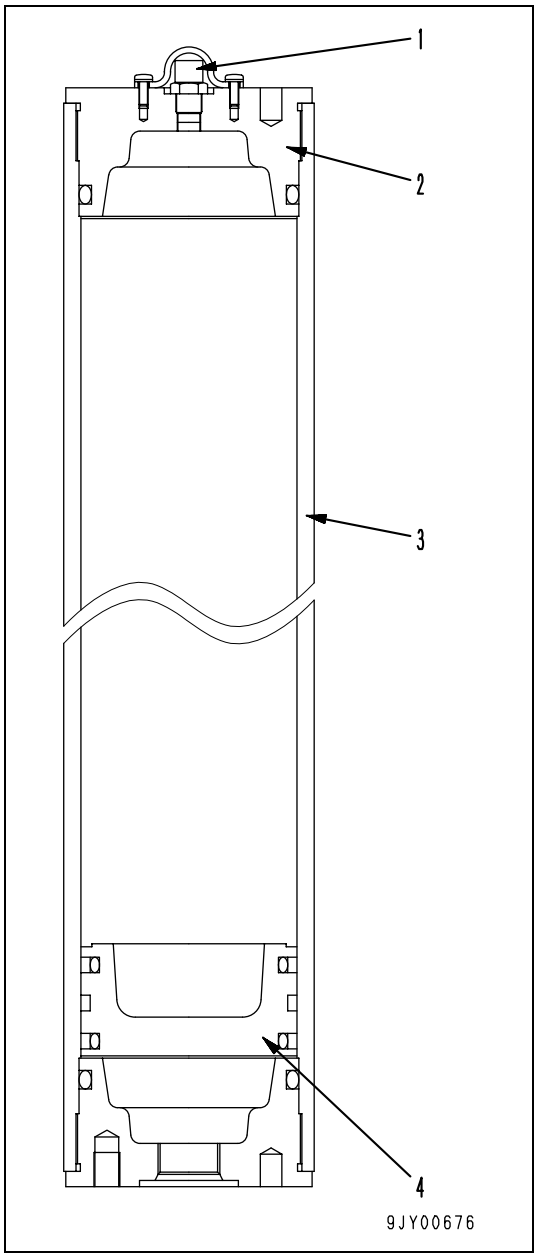
c. Safety relief valve (**R3**)

- When the pressure at port **P** (pump pressure) goes above the set pressure of relief valve **R3**, the oil from the pump pushes against spring (10), pushes up ball (11), and sends the oil to the tank circuit to set the maximum pressure in the brake circuit and protect the circuit.



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Accumulator (for brake)



1. Valve
2. Top cover
3. Cylinder
4. Piston

Function

- The accumulator is installed between the charge valve and brake valve.

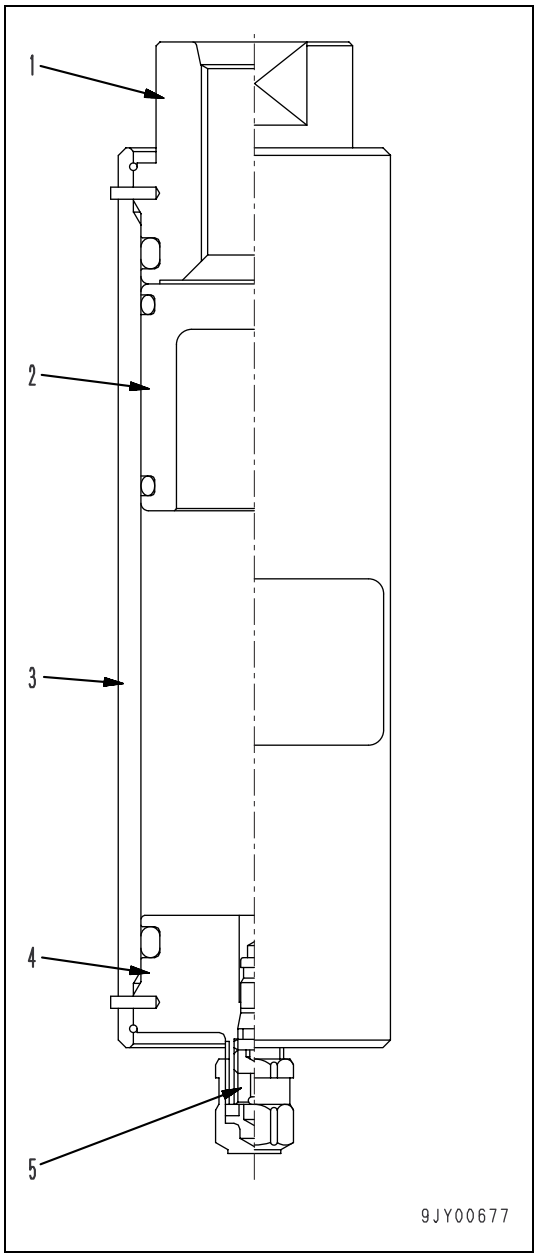
  The area between cylinder (3) and free piston (4) is charged with nitrogen gas. The compression ability of this gas is used to absorb the pulse of the hydraulic pump and to ensure that there is power to carry out braking and operate the machine if the engine stops.

Specifications

Gas used	:	Nitrogen gas
Amount of gas	:	2,850 cc
Charge pressure	:	3.43 ± 0.1 MPa {35 ± 1.0 kg/cm²} (at 20°C)

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1. Top cover
2. Piston
3. Cylinder
4. End cover
5. Core



Function

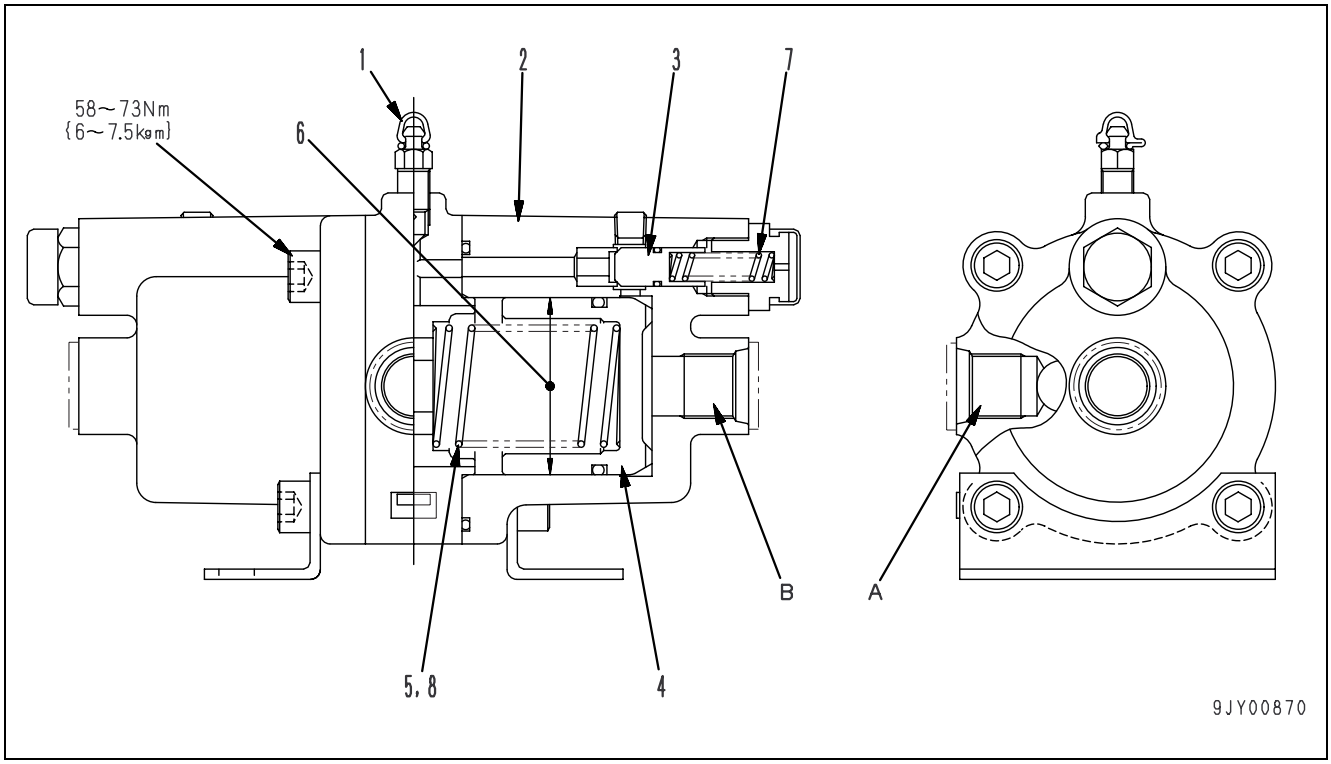
- This is installed between the brake valve and the brake cylinder. The area between cylinder (3) and free piston (2) is charged with nitrogen gas. The compression ability of this gas is used to ensure that there is power to carry out braking and operate the machine.

Specifications

Gas used	Nitrogen gas
Amount of gas	46 cc
Charge pressure	0.29 ± 0.05 MPa {3 ± 0.5 kg/cm²} (at 50°C)

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Slack adjuster



1. Bleeder
2. Cylinder
3. Check valve
4. Piston
5. Spring

A. Inlet port
B. Outlet port

Unit: mm

No.	Check item	Criteria					Remedy
6	Clearance between body and piston	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		55	-0.030 -0.076	+0.074 0	0.030 ~ 0.150	0.25	
7	Spring	Standard size			Repair limit		
		Free length	Installed length	Installed load	Free length	Installed load	
		38.8	33	66.7 Nm {6.8 kg}			
8	Slack adjuster spring	198	38	43.1 Nm {4.4 kg}			

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Outline

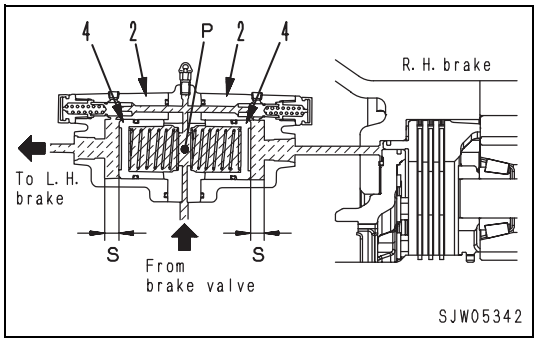
- The slack adjuster is installed in the brake oil line going from the brake valve to the brake piston. It acts to keep the diaphragm constant when the brake is operated.

Piston actuation oil pressure:	0.01 + 0.01 MPa {0.1 + 0.1 kg/cm²}
Check valve cracking pressure:	0.93 ± 0.05 MPa {9.5 ± 0.5 kg/cm²}
Check valve closing pressure:	0.6 ± 0.05 MPa {6.0 ± 0.5 kg/cm²}

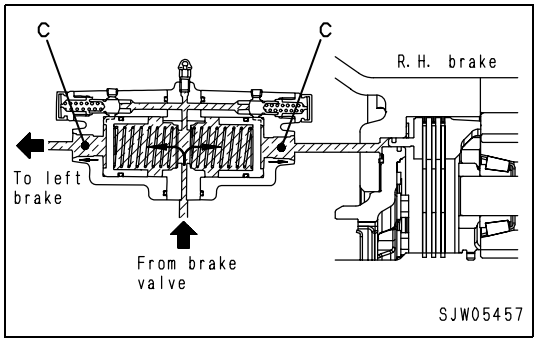
Operation

1. When brake pedal is depressed

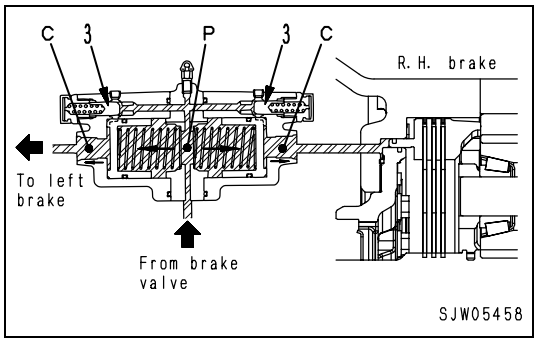
   - Before the brake is depressed, piston (4) is being pushed back by stroke **S** (full stroke). When the brake pedal is depressed, the oil discharged from the brake valve goes from port **P** of the slack adjuster, is divided to left and right cylinders (2), and actuates piston (4) to the left and right by the amount of stroke **S**.



   - As a result, brake piston (6) moves by an amount equal to stroke **S**. When this happens, the relationship between the brake piston and disc is simply that the clearance becomes 0. No braking force is generated.

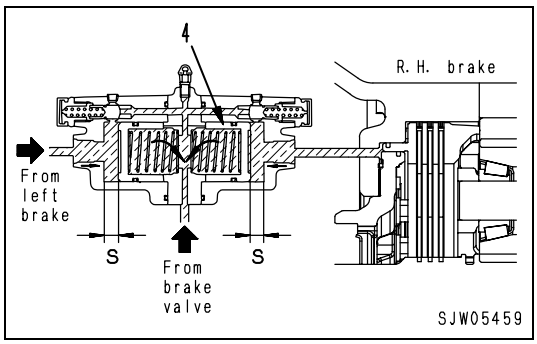


   - If the brake valve continues to be depressed, and the pressure oil discharged from the brake valve goes above the specified pressure, check valve (3) opens, pressure is applied to port **C**, and this acts as braking force.
     Therefore, when the brake is applied, the diaphragm is constant.



2. When brake pedal is released

   - When the brake is released, piston (4) is returned by brake return spring (7) an amount of oil equivalent to stroke **S**, and the brake returns to the open position.
     In other words, return stroke **T** of brake piston (6) is determined by the amount of oil for stroke **S** of the slack adjuster, and the brake diaphragm is maintained constant regardless of the amount of wear of the brake disc.

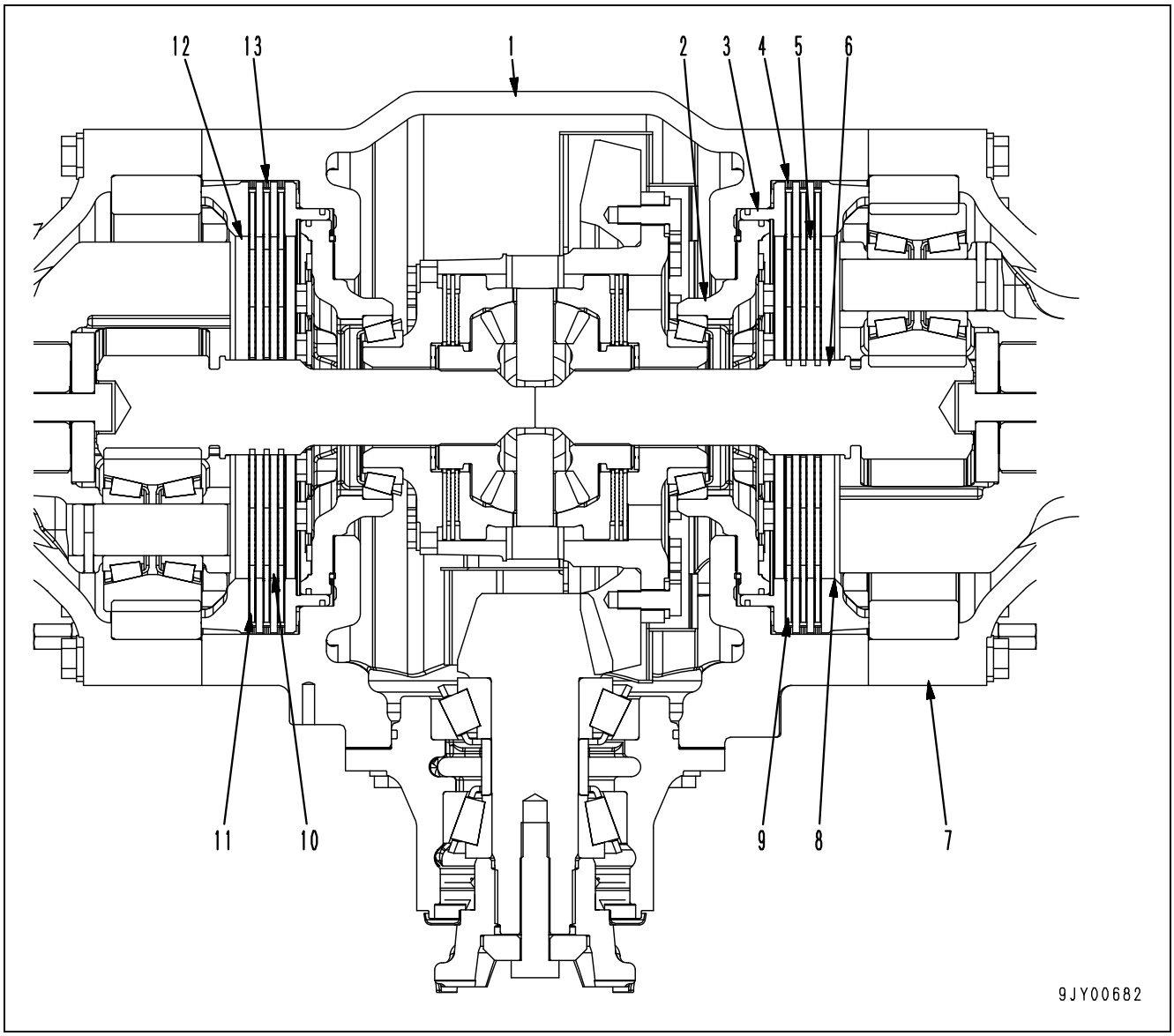


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Brake

Front

★ Figure shows brake with anti-slip differential.



1. Differential housing
2. Bearing carrier
3. Piston
4. Spring
5. Inner ring
6. Sun gear shaft
7. Axle housing
8. Outer ring
9. Discs (×3)

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WA470-5 FRONT
WA480-5

Unit: mm

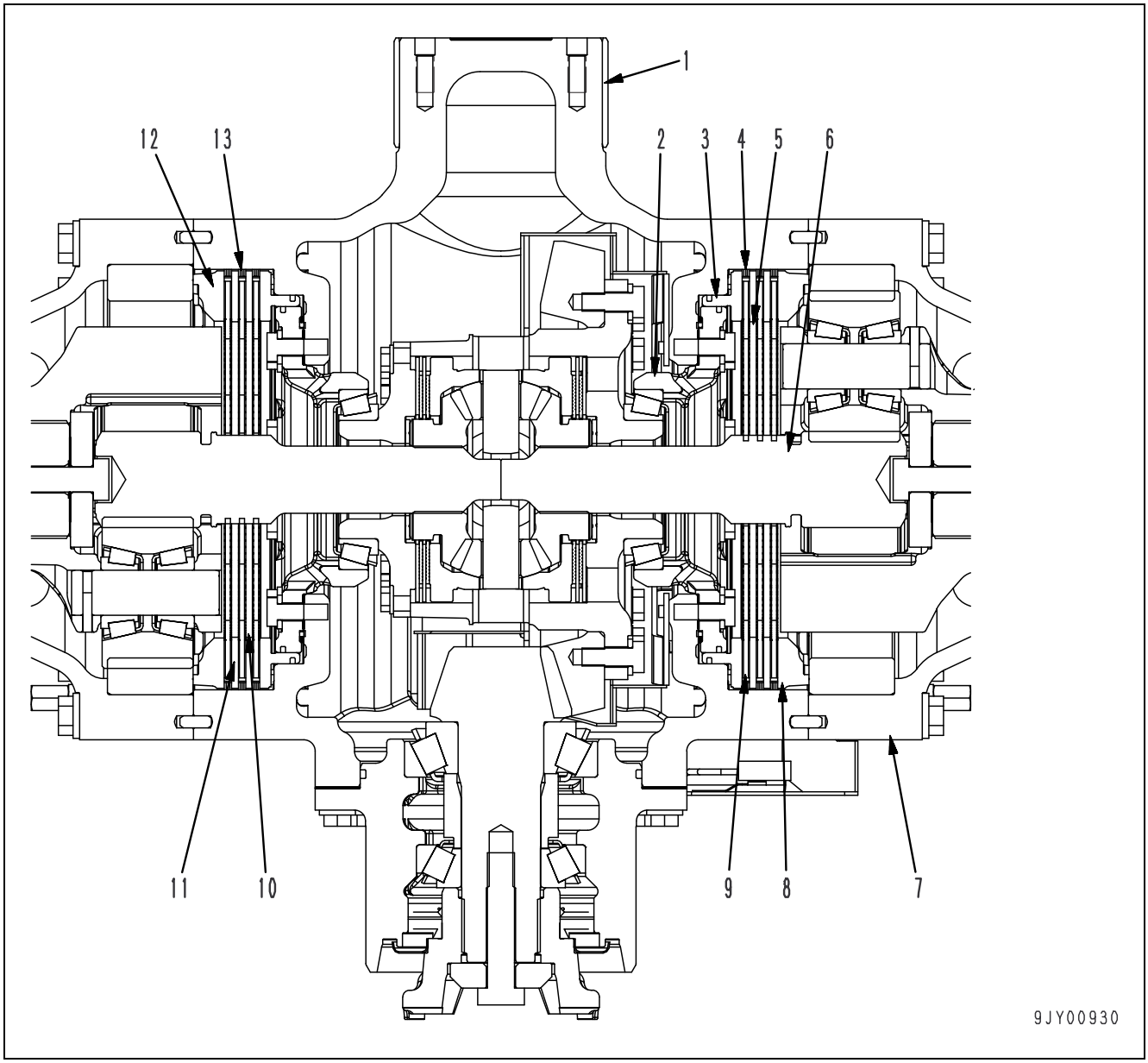
No.	Check item	Criteria			Remedy
10	Thickness of inner ring	Standard size	Tolerance	Repair limit	Replace
		6	±0.1	5.5	
11	Thickness of brake disc	6.5	±0.15	5.7	
	Depth of lining groove	0.8	0.2	0.3	
	Thickness of lining	10	0.9 (Min.)	—	
12	Wear of brake outer ring disc contact surface	41.3	±0.1	0.3	
13	Spring load	Standard size		Repair limit	
		Installed height	Installed load	Installed load	
		7.4	255 N {26 kg}	204 N {21 kg}	

Outline

- The front brake has a wet-type multiple-disc structure, and consists of piston (3), inner ring (5), discs (9), outer ring (8), and spring (4).
- The brake cylinder consists of differential housing (1) and bearing carrier (2), and piston (3) is assembled in it.
  Inner ring (5) and outer ring (8) are joined to the spline portion of axle housing (7).
- Discs (9) have a lining stuck to both sides. They are assembled between inner ring (5) and outer ring (8), and are joined by the spline of sun gear shaft (6).

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Rear



1. Differential housing
2. Bearing carrier
3. Piston
4. Spring
5. Inner ring
6. Sun gear shaft
7. Axle housing
8. Outer ring
9. Discs (×3)

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WA470-5 REAR

Unit: mm

No.	Check item	Criteria			Remedy
10	Thickness of inner ring	Standard size	Tolerance	Repair limit	Replace
		6	±0.1	5.5	
11	Thickness of brake disc	6.5	±0.15	5.7	
	Depth of lining groove	0.8	0.2	0.3	
	Thickness of lining	10	0.9 (Min.)	—	
12	Wear of brake outer ring disc contact surface	41.3	±0.1	0.3	
13	Spring load	Standard size		Repair limit	
		Installed height	Installed load	Installed load	
		7.4	255 N {26 kg}	204 N {21 kg}	

Outline

- The rear brake has a wet-type single-disc structure, and consists of piston (3), inner ring (5), disc (9), outer ring (8), and spring (4).
- The brake cylinder consists of differential housing (1) and bearing carrier (2), and piston (3) is assembled in it.
  Inner ring (5) and outer ring (8) are joined to the spline portion of axle housing (7).
- Disc (9) has a lining stuck to both sides. It is assembled between inner ring (5) and outer ring (8), and is joined by the spline of sun gear shaft (6).

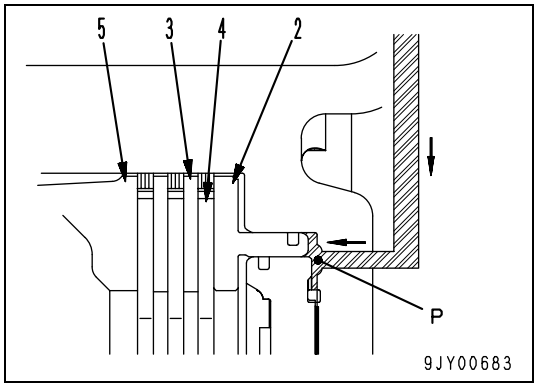
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Outline

When brake is applied

When the brake pedal is depressed, pressure oil **P** goes from the hydraulic tank through the pump and brake charge valve. It acts on the piston inside the brake cylinder and the piston slides.

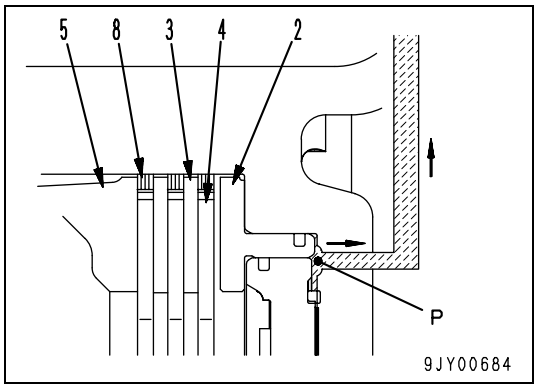
Therefore, piston (2) stops the rotation of discs (4) fitted between inner ring (3) and outer ring (5), and applies the brake to the machine.



When brake is released

When the oil pressure is released, piston (2) is returned to its original position by the force of spring (8), a gap is formed between inner ring (3) and outer ring (5), and discs (4) become free.

Lattice shape grooves are cut into the lining stuck to disc (4), and when disc (4) is rotating, oil flows in the grooves and carries out cooling of the lining.

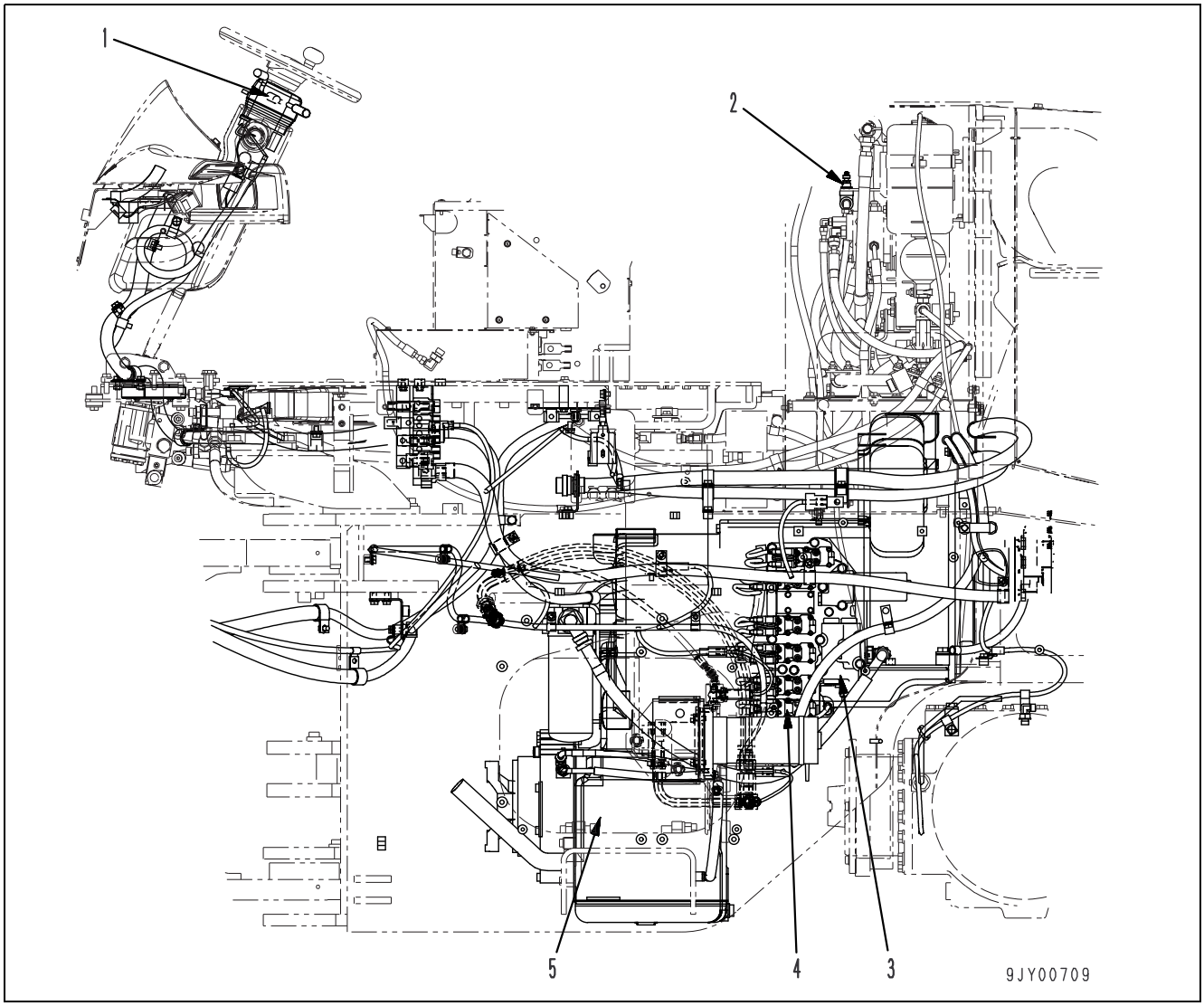


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Parking brake control



1. Parking brake switch
2. Parking brake emergency release valve
3. Transmission control valve
4. Parking brake solenoid valve
5. Parking brake

Outline

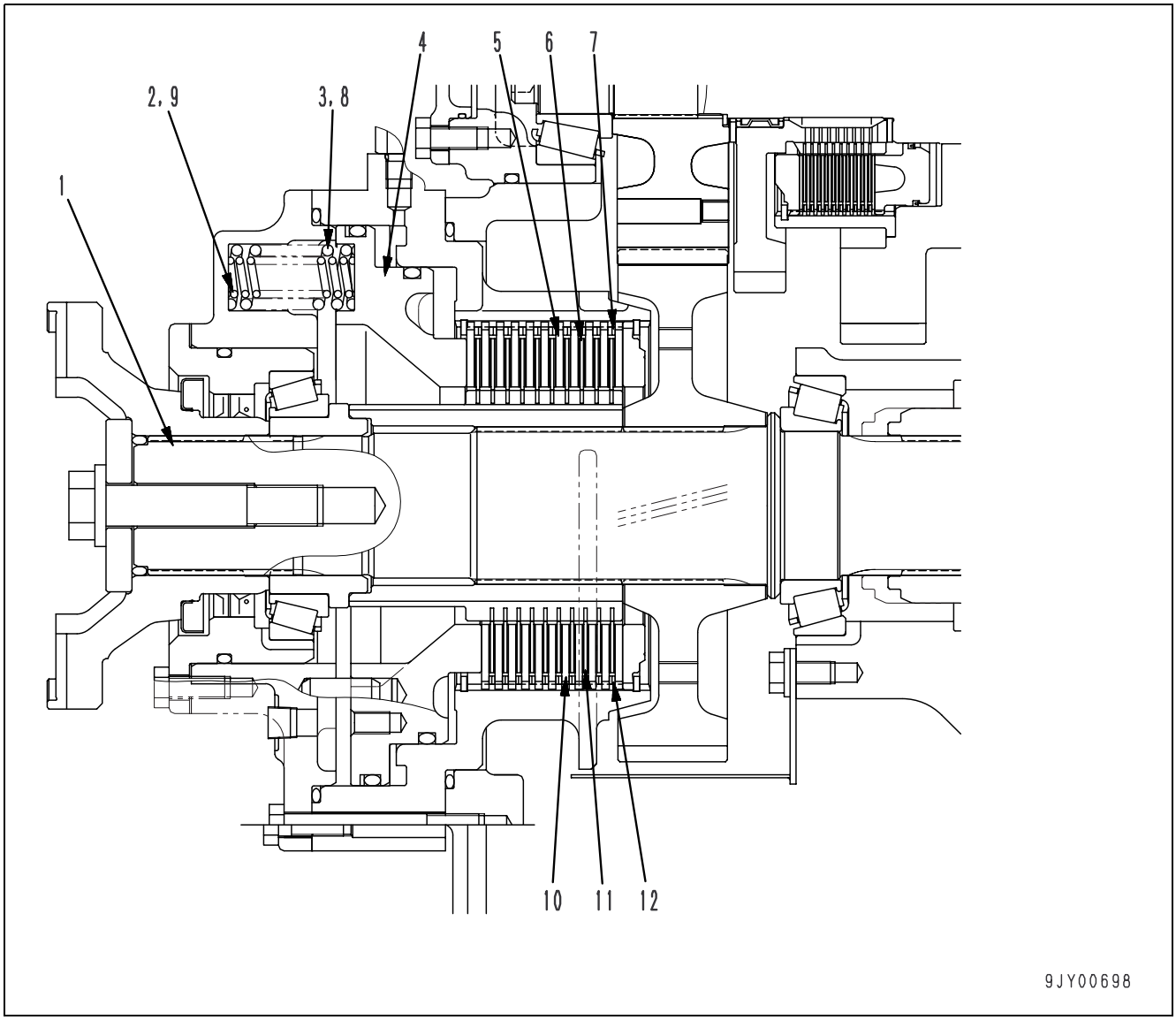
- The parking brake is a wet-type multiple disc brake built into the transmission. It is installed to the bearing portion of the output shaft. It is applied mechanically by the pushing force of a spring, and is released by hydraulic power.
- When the parking brake switch (1) in the operator's compartment is turned OFF, the hydraulic pressure is shut off by parking brake solenoid valve (4) installed to transmission control valve (3), and the parking brake is applied.
- While the parking brake is being applied (when the solenoid is OFF), the signal from the transmission controller to the transmission solenoid valve is cut by the neutralizer signal, and the transmission is held at neutral.
- Parking brake emergency release valve (2) is installed to release the parking brake if it is necessary to move the machine when trouble has occurred in the engine or drive system and the machine remains stopped (the parking brake remains applied).

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Blank for technical reason

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Parking brake



1. Output shaft
2. Spring
3. Spring
4. Piston
5. Parking brake oil port
6. Plate
7. Disc
8. Wave spring

Outline

- The parking brake is a wet-type multiple-disc brake and is applied mechanically by a spring to apply braking force to transmission output shaft (1).
- The tension of spring (3) uses piston (4) to push discs (7) and plates (6) together and stop output shaft (1).
- When the brake is released, oil pressure from parking brake oil port (5) actuates piston (4) to release the force pushing discs (7) and plates (6) together.

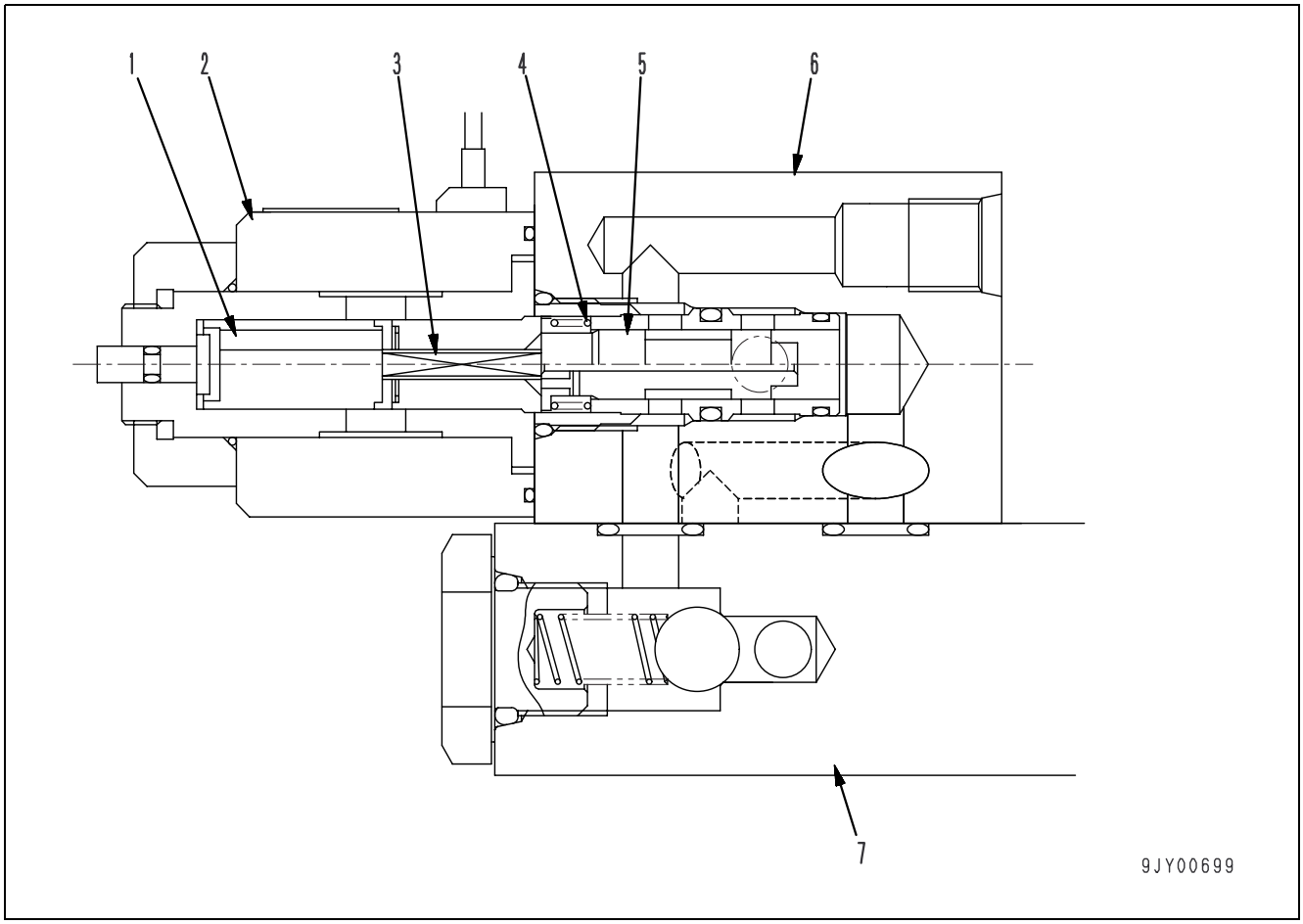
https://truckmanualshub.com/

Unit: mm

<table>
<tr><th>No.</th><th colspan="2">Check item</th><th colspan="5">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="3">9</td><td colspan="2" rowspan="3">Parking brake spring (outer)</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td><td rowspan="8">Replace</td></tr>
<tr><td>Free length</td><td>Installed length</td><td>Installed load</td><td>Free length</td><td>Installed load</td></tr>
<tr><td>94</td><td>76</td><td>1,066 N {108.7 kg}</td><td>91.2</td><td>1,013 N {103.3 kg}</td></tr>
<tr><td>10</td><td colspan="2">Parking brake spring (inner)</td><td>94</td><td>76</td><td>557 N {56.8 kg}</td><td>91.2</td><td>529 N {54.0 kg}</td></tr>
<tr><td rowspan="3">11</td><td rowspan="3">Separate plate</td><td rowspan="2">Thickness</td><td colspan="2">Standard size</td><td>Tolerance</td><td colspan="2">Repair limit</td></tr>
<tr><td colspan="2">4.0</td><td>±0.05</td><td colspan="2">3.9</td></tr>
<tr><td>Distortion</td><td colspan="2">—</td><td>0.05</td><td colspan="2">0.25</td></tr>
<tr><td>12</td><td>Brake disc</td><td>Thickness</td><td colspan="2">3.2</td><td>±0.08</td><td colspan="2">2.97</td></tr>
<tr><td>13</td><td colspan="2">Wave spring load</td><td colspan="2">1,106 N {112.8 kg}
(Height: 3.2 mm)</td><td>±57 N {±5.8 kg}</td><td colspan="2">940 N {95.9 kg}
(Height: 3.2 mm)</td></tr>
</table>

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Parking brake solenoid valve



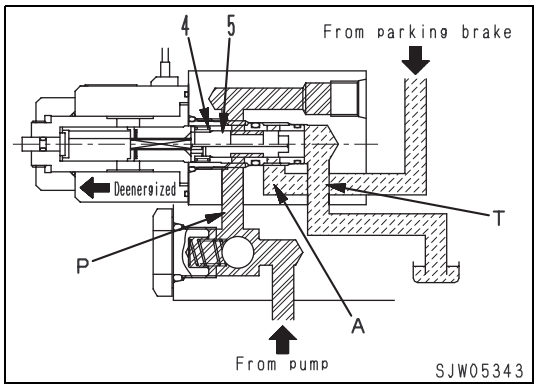
1. Movable iron core
2. Coil
3. Bushing pin
4. Spring
5. Spool
6. alve seat
7. Check valve

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Operation

Parking brake applied (solenoid OFF)

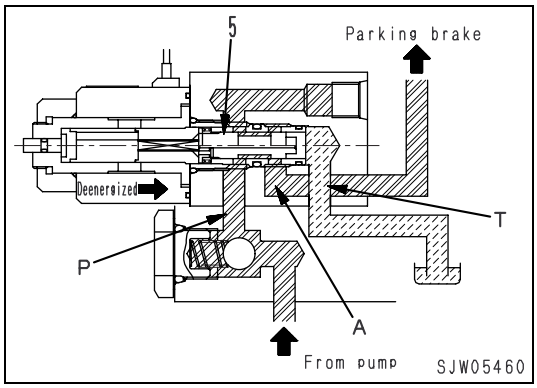
- When the parking brake switch in the operator's compartment is turned ON, the solenoid is turned OFF and spool (5) is pushed to the left by spring (4). When this happens, the circuit between pump port **P** and parking brake port **A** is closed and the pressure oil from the pump does not flow to the parking brake.
- At the same time, the oil from the parking brake flows from port **A** to port **T**, and is drained. As a result, the discs inside the parking brake are pushed by the spring and the parking brake is applied.



Parking brake released (solenoid ON)

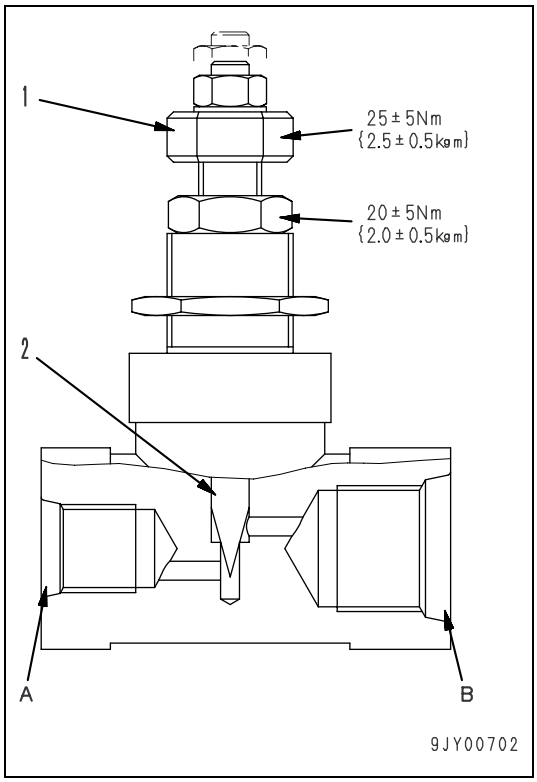
- When the parking brake switch is turned OFF, the solenoid is turned ON and spool (5) moves to the right. When this happens, the pressure oil from the pump goes from port **P** through the inside of spool (5) and flows from port **A** to the parking brake.

  At the same time, port **T** is closed and the oil is not drained. As a result, the spring inside the parking brake is pushed back by the hydraulic force and the parking brake is released.



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Parking brake emergency release valve



1. Grip
2. Valve

A. From accumulator
B. To parking brake solenoid

Outline

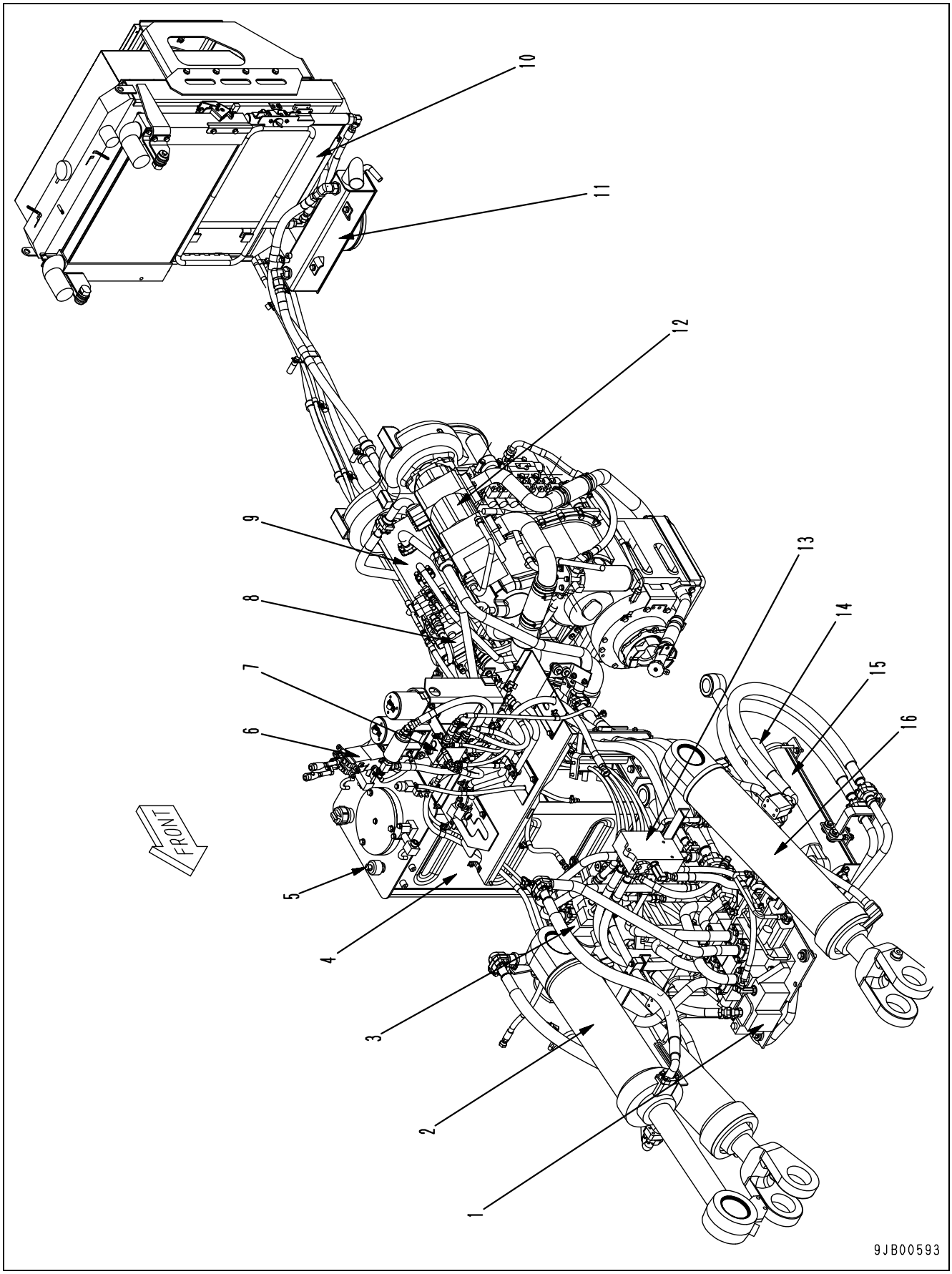
- The parking brake emergency release valve is installed between the brake circuit accumulator and the parking brake solenoid. It is possible to open this valve manually if no pressure oil can be supplied from the transmission pump because of engine failure or other failure. This makes it possible to supply pressure from the brake circuit accumulator to the parking brake cylinder.

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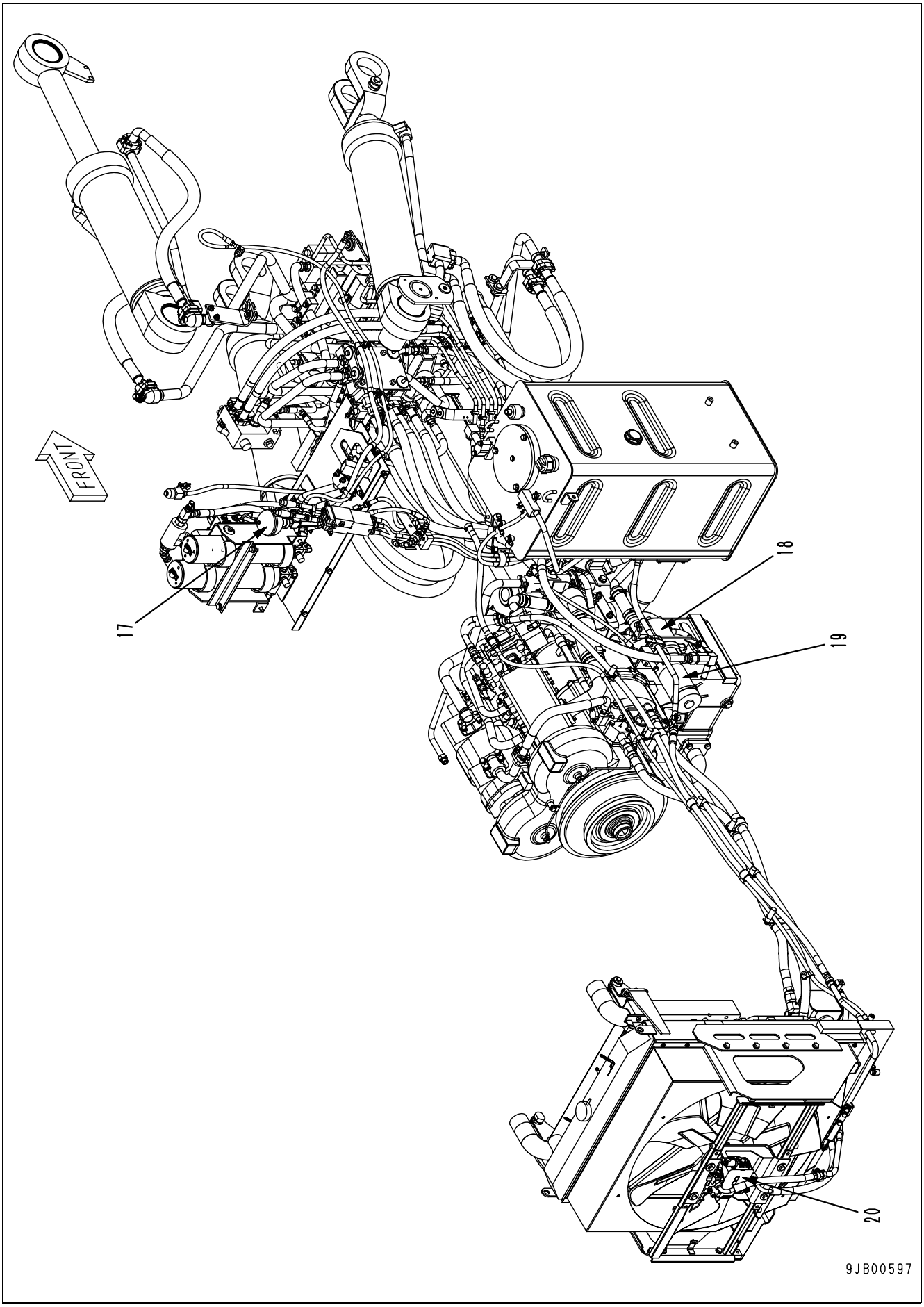
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Hydraulic piping



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1. Work equipment valve
2. Bucket cylinder
3. Steering valve
4. Hydraulic tank
5. Breather
6. PPC valve
7. Accumulator charge valve
8. Fan motor drive pump
9. Steering and switching pumps
10. Oil cooler
11. Torque converter oil cooler
12. Torque converter charging, work equipment, and PPC pumps
13. Travel damper valve
14. Steering cylinder
15. Travel damper accumulator
16. Boom cylinder
17. PPC accumulator
18. Emergency steering pump
19. Emergency steering motor
20. Fan motor

NOTE: If EPV valve is installed, change "PPC valve" to "EPC valve" when reading.

Outline

- The hydraulic system consists of the work equipment circuit and steering circuit. The work equipment circuit controls the operation of the bucket and attachments.
- The oil from hydraulic tank (4) is sent by work equipment pump (12) to work equipment valve (1). If the bucket and boom spools of the work equipment valve are in the HOLD position, the oil is sent through the drain circuit of the work equipment valve, filtered by the filter in the hydraulic tank, and returned to the tank.
- If the work equipment control lever is operated, the bucket or boom spool of the PPC valve moves to operate each spool of the work equipment valve hydraulically. Then, the oil flows from the work equipment valve to boom cylinder (16) or bucket cylinder (2) to move the boom or bucket.
- The maximum pressure in the hydraulic circuit is controlled with the relief valve in the work equipment valve. The bucket cylinder circuit is equipped with the safety-suction valve for protection of the circuit.
- PPC accumulator (18) is installed to the PPC pilot circuit so that the boom can be lowered to the ground even while the engine is stopped.
- Hydraulic tank (4) is pressurized, enclosed, and equipped with breather (5) having the relief valve. Certain pressure is applied to this tank to prevent generation of negative pressure in the tank and cavitation in the pump.
- If the vehicle cannot be steered normally because of a stall of the engine, a trouble in the steering pump, oil leakage from the piping, etc., emergency steering motor (19) drives emergency steering pump (18) so that the vehicle can be steered.
- Fan motor (20) installed to the radiator is driven hydraulically and variably with fan motor drive pump (8).

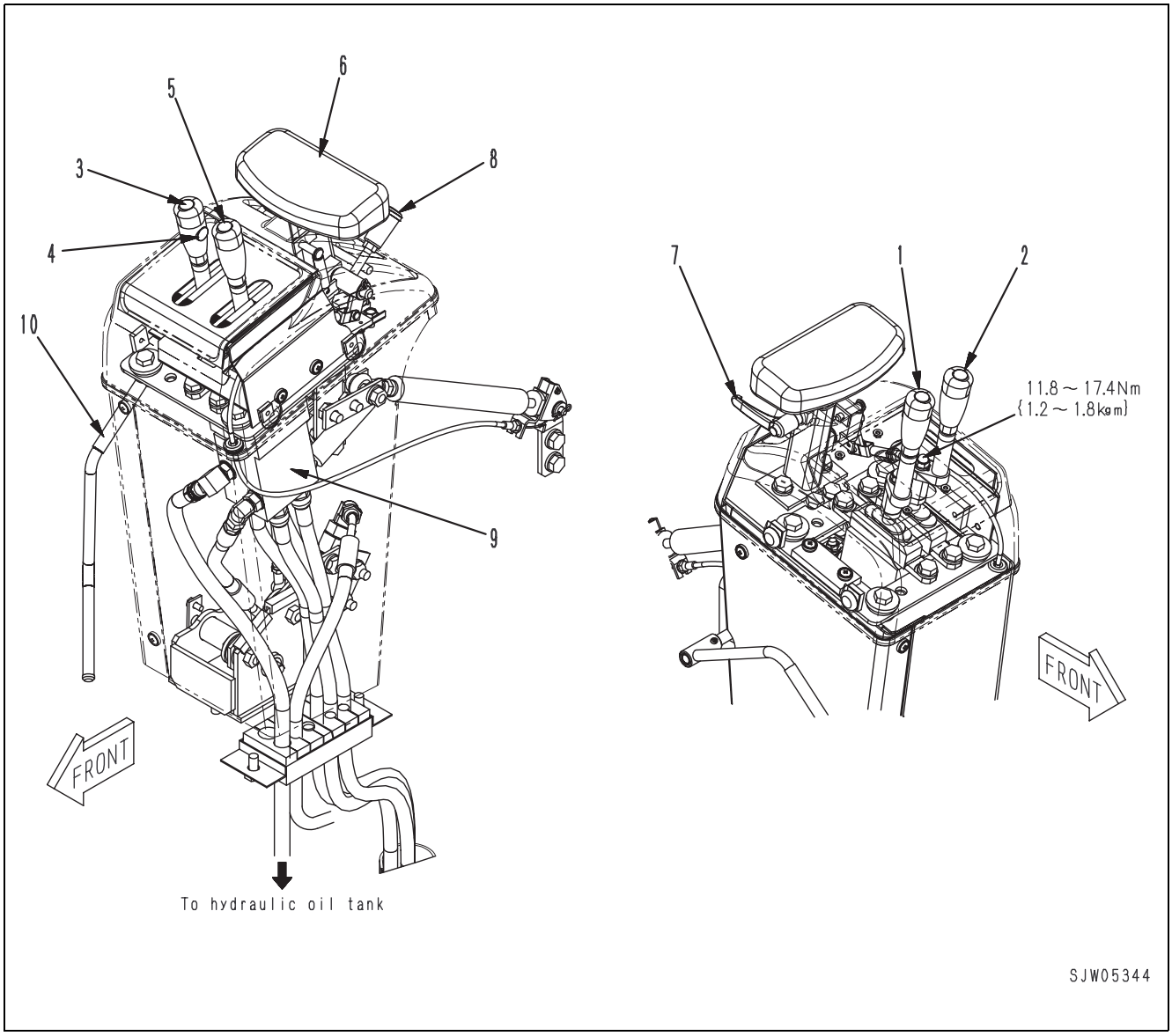
https://truckmanualshub.com/

Blank for technical reason

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Work equipment control lever

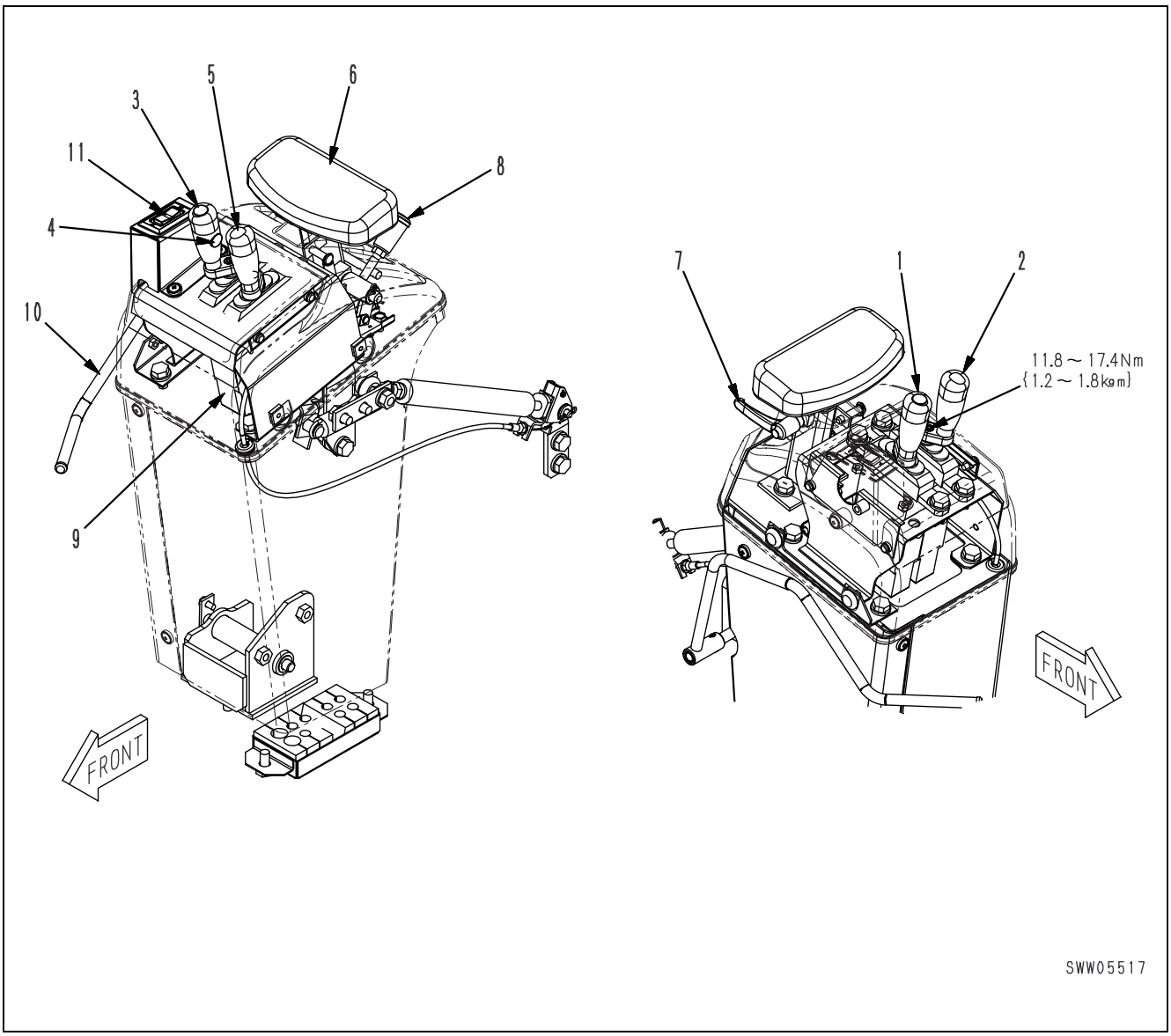
For PPC valve



1. Boom control lever
2. Bucket control lever
3. Kick-down switch
4. Hold switch
5. Cancel switch (Vehicle with load meter specification)
6. Wrist rest
7. Wrist rest adjusting lever
8. Lever stand tilt adjusting lever
9. PPC valve
10. Safety lever

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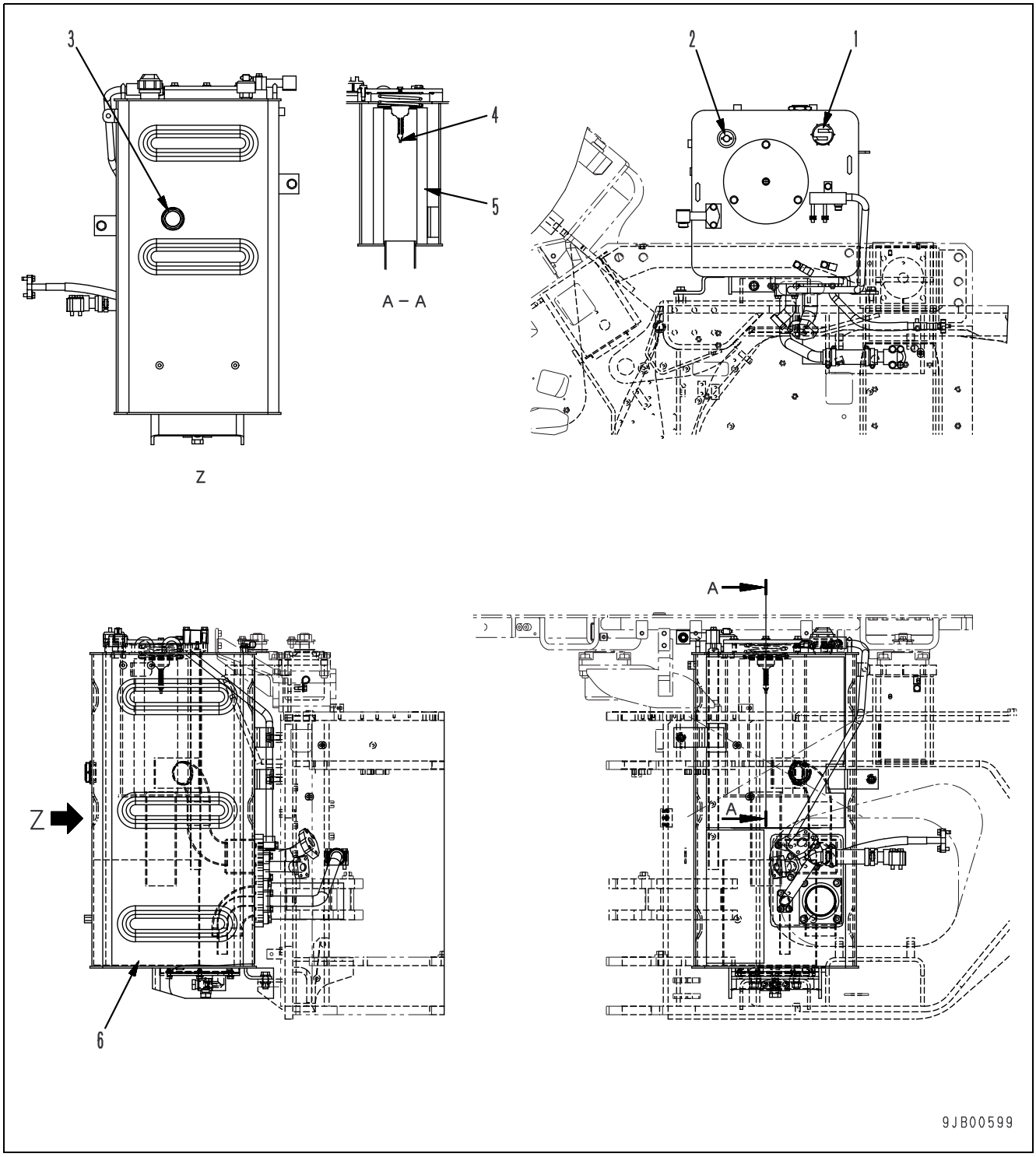
For EPC valve (op)



1. Boom control lever
2. Bucket control lever
3. Kick-down switch
4. Hold switch
5. Cancel switch (Vehicle with load meter specification)
6. Wrist rest
7. Wrist rest adjusting lever
8. Lever stand tilt adjusting lever
9. EPC valve
10. Safety lever
11. Travel direction selector switch

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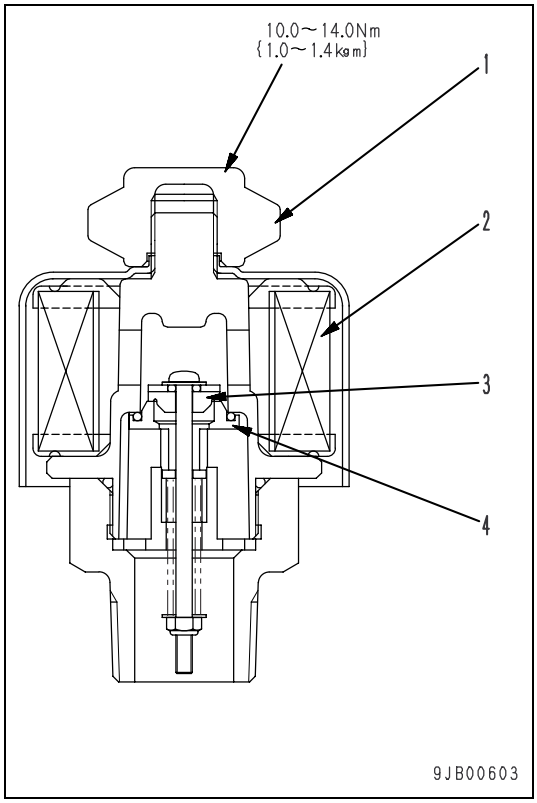
Hydraulic tank



1. Fuel filler
2. Breather
3. Sight gauge
4. Filter suction valve
5. Oil filter
6. Hydraulic tank

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Breather



1. Nut
2. Filter element
3. Poppet
4. Sleeve

Prevention of negative pressure in tank

- Since the tank is pressurized and enclosed, if the fuel control lever in it lowers, negative pressure is generated. At this time, poppet (3) is opened by the differential pressure between the tank pressure and the atmospheric pressure to prevent generation of the negative pressure.

  (Set pressure of suction valve: 2.0 ± 0.03 kPa
  {0.02 ± 0.003 kg/cm²})

Prevention of pressure rise in tank

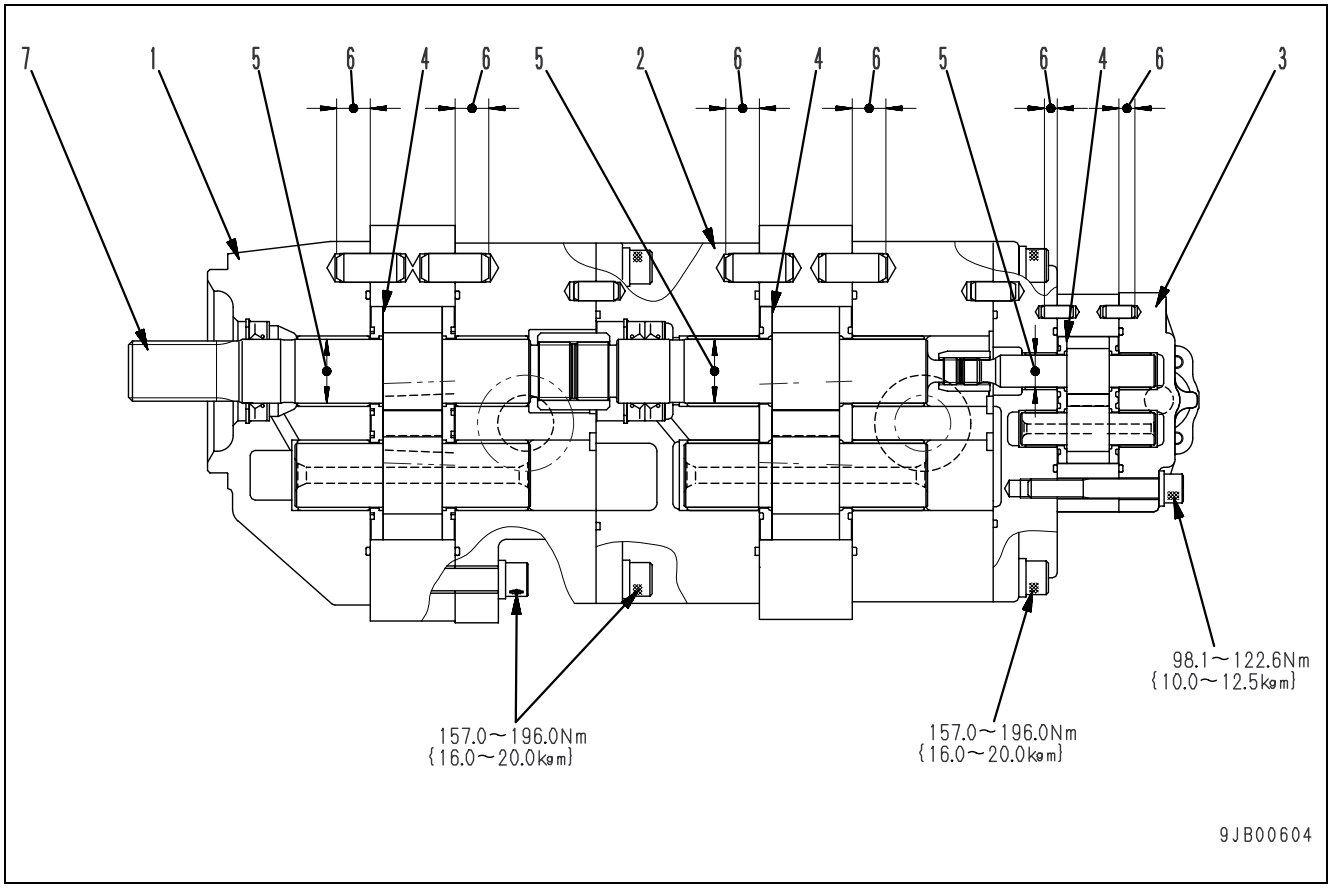
- While the hydraulic circuit is in operation, the oil level in the tank varies as the hydraulic cylinders operate and the temperature rises. Consequently, the pressure in the tank varies, too. If the pressure in the tank rises above the set level, sleeve (4) operates to release the pressure from the tank.

  (Set pressure of exhaust valve: 0.1 ± 0.015 MPa
  {1.0 ± 0.15 kg/cm²})

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Torque converter charging, work equipment, and PPC pumps

SAL (4)125 + 140 + (1)22



1. Torque converter charging pump
2. Work equipment pump
3. Pilot control pump

Outline

- The torque converter charging, work equipment, and pilot control pumps are installed to the PTO shaft of the torque converter and driven by shafts to supply oil to the transmission, work equipment, and PPC circuit.

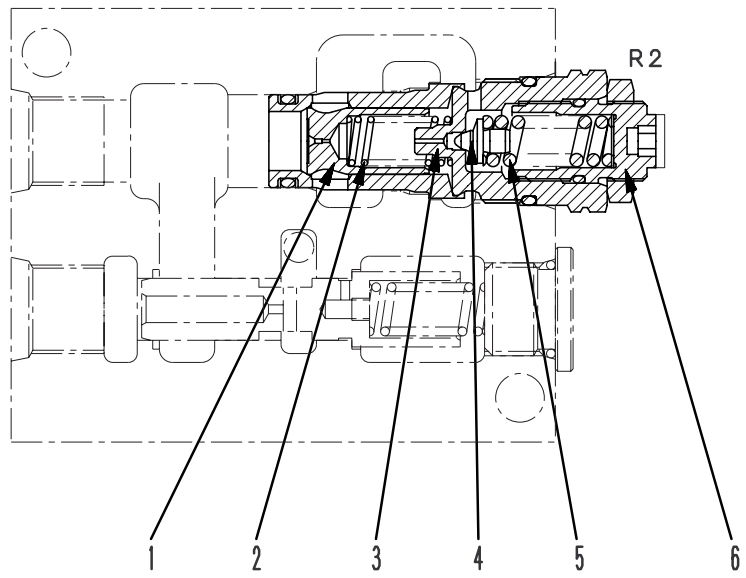
https://truckmanualshub.com/

Unit: mm

<table>
<tr><th>No.</th><th>Check item</th><th colspan="6">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Side clearance</td><td>Model</td><td colspan="2">Standard clearance</td><td colspan="2">Clearance limit</td><td rowspan="10">Replace</td></tr>
<tr><td>SAL(4)125</td><td colspan="2" rowspan="2">0.11 ~ 0.16</td><td colspan="2" rowspan="2">0.19</td></tr>
<tr><td>SAL(4)140</td></tr>
<tr><td>SAL(1)22</td><td colspan="2">0.10 ~ 0.15</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Clearance between inside diameter of plain bearing and outside diameter of gear shaft</td><td>SAL(4)125</td><td colspan="2" rowspan="2">0.06 ~ 0.140</td><td colspan="2" rowspan="2">0.20</td></tr>
<tr><td>SAL(4)140</td></tr>
<tr><td>SAL(1)22</td><td colspan="2">0.064 ~ 0.119</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Driving depth of pin</td><td>Model</td><td>Standard size</td><td colspan="2">Tolerance</td><td>Repair limit</td></tr>
<tr><td>SAL(4)125</td><td rowspan="2">21</td><td colspan="2" rowspan="3">0
-0.5</td><td rowspan="3">—</td></tr>
<tr><td>SAL(4)140</td></tr>
<tr><td>SAL(1)22</td><td>10</td></tr>
<tr><td>7</td><td>Spline rotating torque</td><td colspan="6">21.6 ~ 34.3 Nm {2.2 ~3.5 kgm}</td><td rowspan="4">—</td></tr>
<tr><td rowspan="4">—</td><td rowspan="4">Discharge amount
Oil: SAE10WCD
Oil temperature: 45 - 55°C</td><td>Model</td><td>Speed (rpm)</td><td>Discharge pressure (MPa {kg/cm²}</td><td>Standard discharge amount (l/min)</td><td>Discharge amount limit (l/min)</td></tr>
<tr><td>SAL(4)125</td><td rowspan="3">2,200</td><td>2.9 {30}</td><td>242</td><td>222</td></tr>
<tr><td>SAL(4)140</td><td>20.6 {210}</td><td>287</td><td>366</td></tr>
<tr><td>SAL(1)22</td><td>9.8 {100}</td><td>44</td><td>37</td></tr>
</table>

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PPC relief valve



1. Main valve
2. Spring
3. Valve seat
4. Pilot poppet
5. Spring
6. Screw

Outline

- The PPC relief valve is installed between the PPC pump and PPC valve. While the PPC valve is not in operation or when abnormal pressure is generated in the PPC circuit, the PPC relief valve relieves the oil sent from the pump to protect the pumps and circuits.

NOTE
If EPC valve is installed, change PPC valveto EPC valve when reading.

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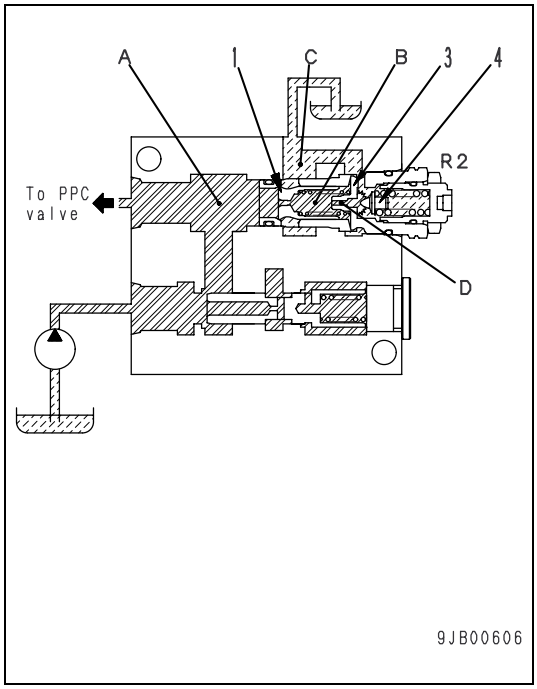
Operation

- The relief valve is installed to the charge valve and ports **A** and **C** are connected to the pump circuit and drain circuit respectively.

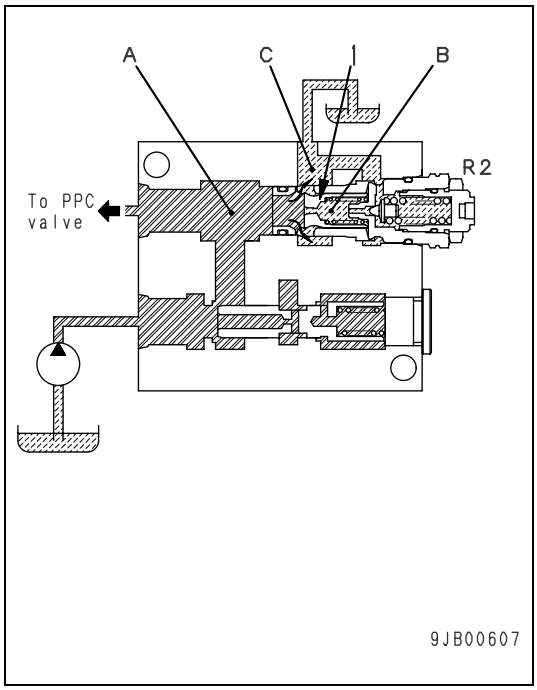
  The oil flows through the orifice of main valve (1) and fills port **B**.

  Pilot poppet (4) is seated at valve seat (3).

- If the pressure in ports **A** and **B** reaches the set level, pilot poppet (4) opens and the pressure in port **B** is released through port **D** into port **C**, and the pressure in port **B** lowers consequently.

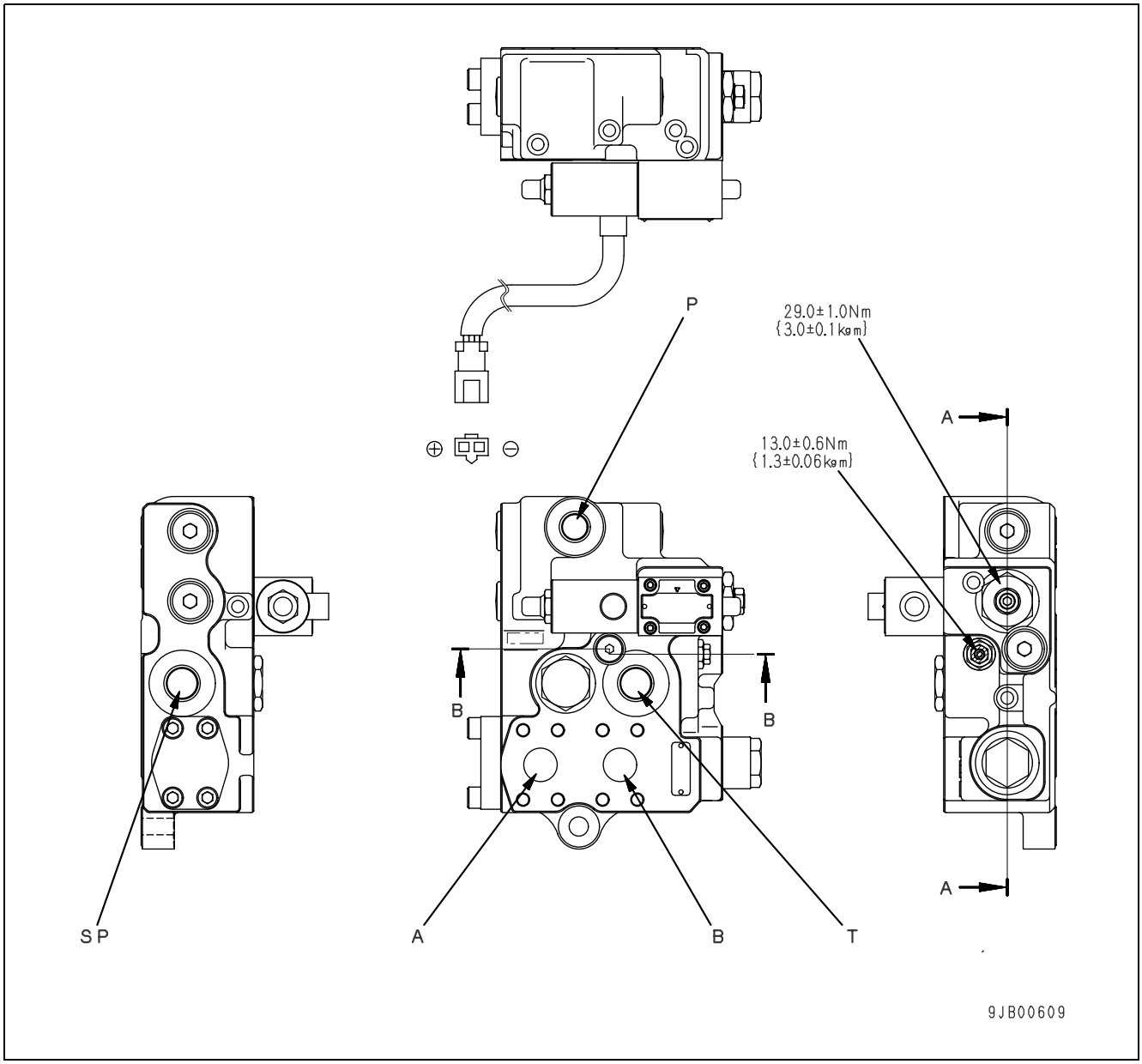


- If the pressure in port **B** lowers, a pressure difference is made between ports **A** and **B** because of the orifice of main valve (1). As a result, main valve (1) is opened by the pressure in port **A** and the oil in port **A** is drained and relieved into port **C**.



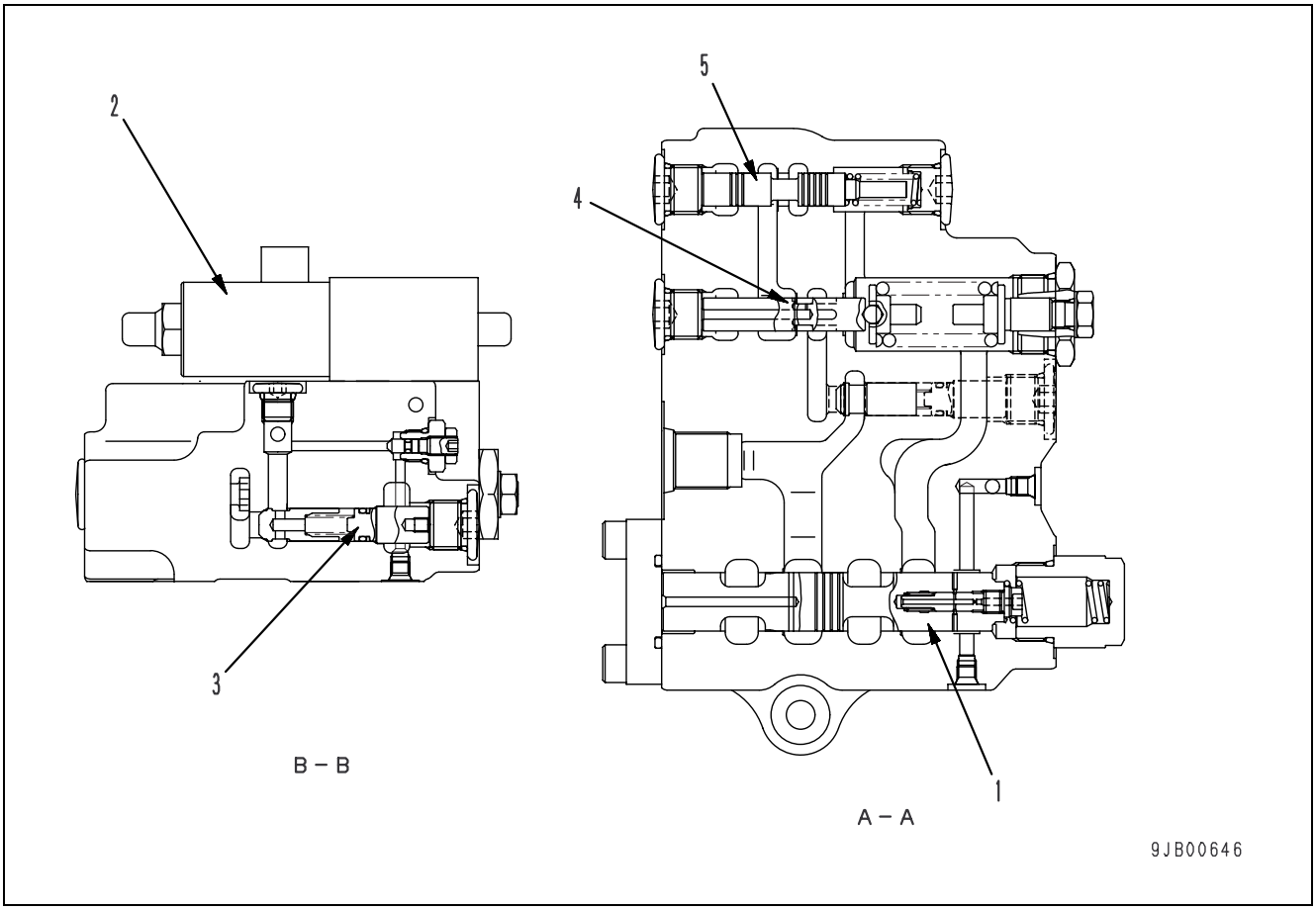
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Travel damper valve (op)



A. From boom cylinder bottom
B. From boom cylinder head
P. From work equipment pump
SP. To travel damper accumulator
T. To tank

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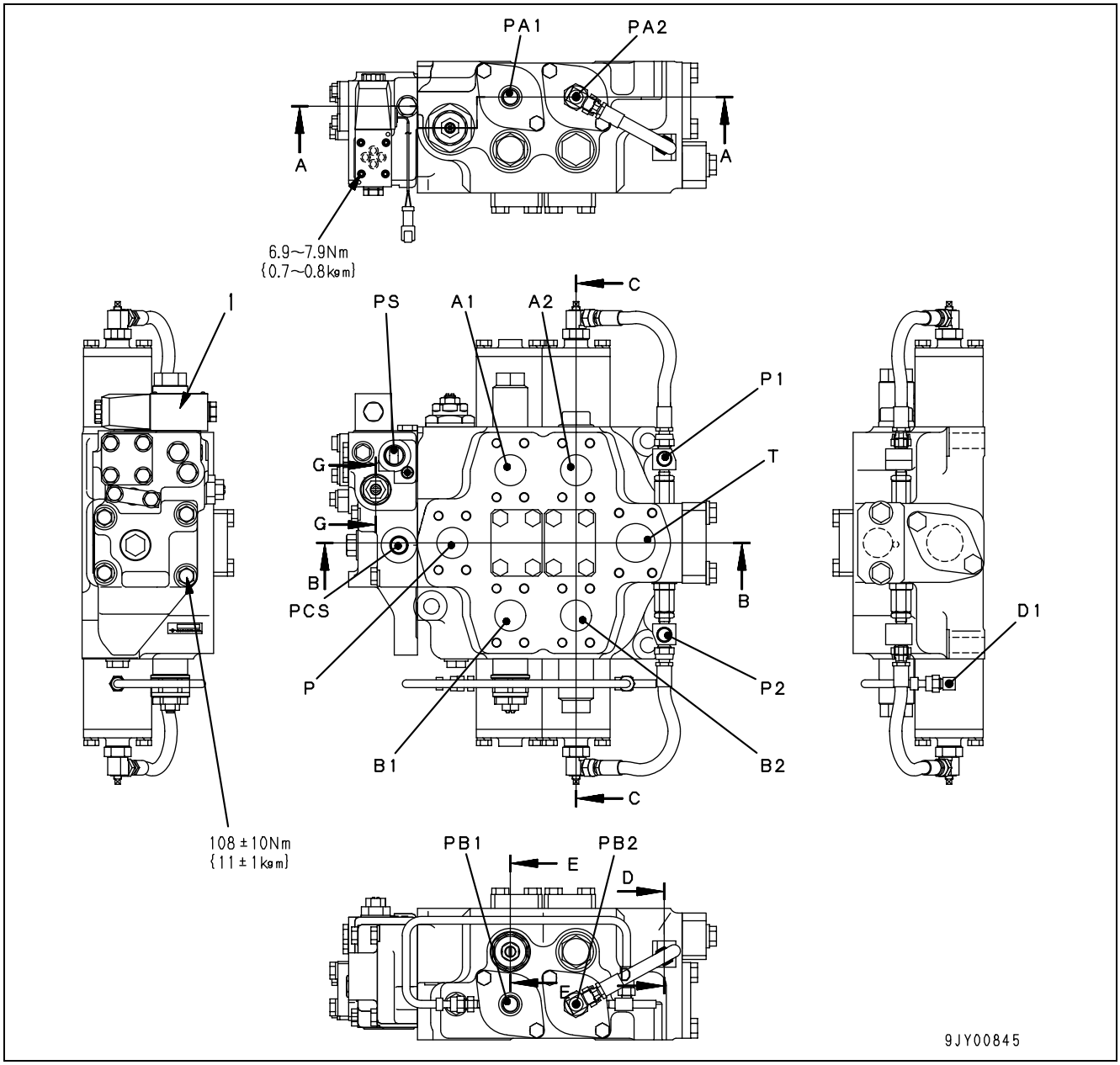


1. Main spool
2. Solenoid valve
3. Flow control valve
4. Shuttle valve
5. Charge valve

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Work equipment control valve

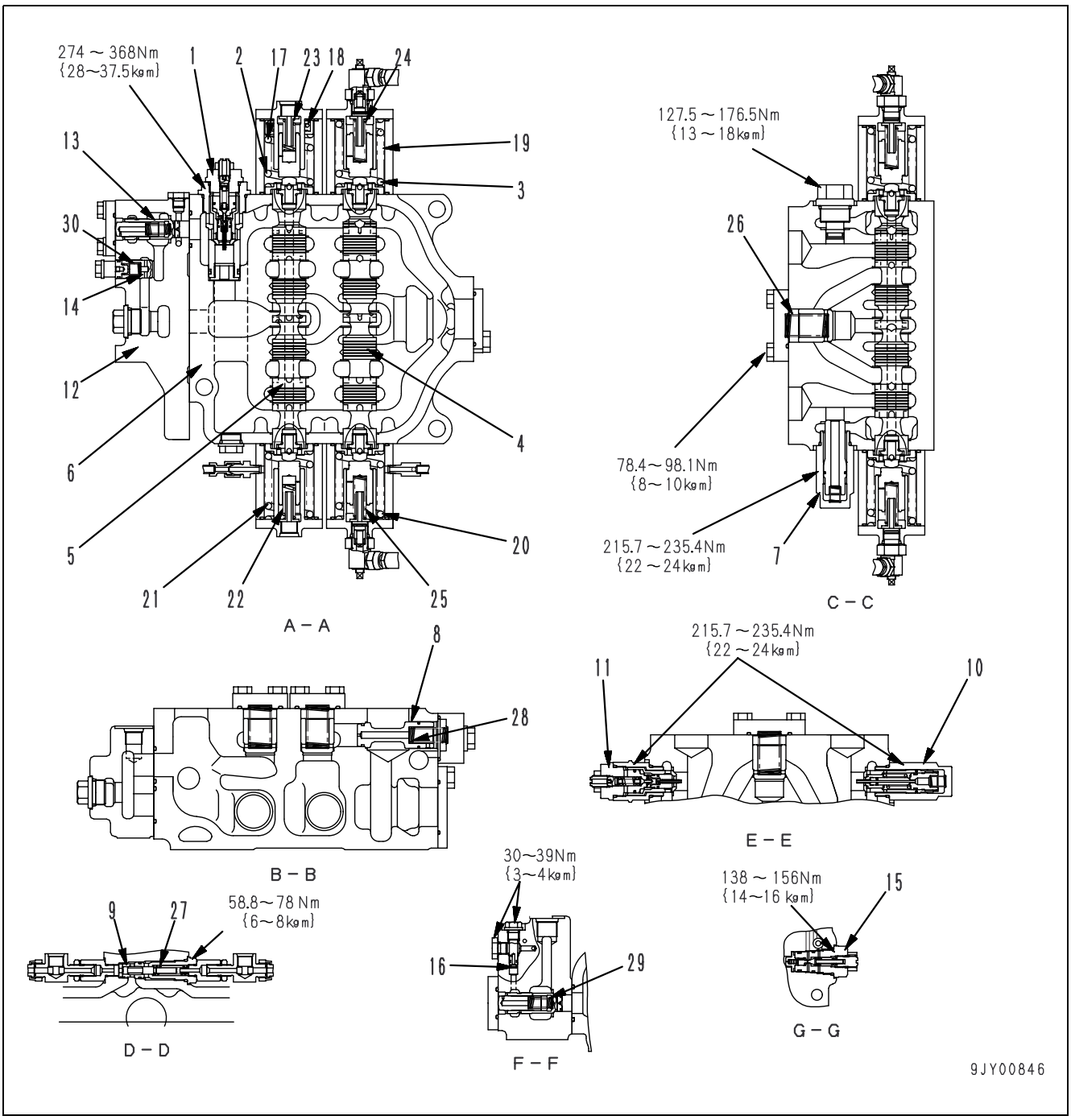
1. 2-spool valve



P. From loader pump
T. To hydraulic tank
A1. To bucket cylinder bottom
A2. To boom cylinder bottom
B1. To bucket cylinder head
B2. To boom cylinder head
D1. Drain
P1. From PPC valve
P2. From PPC valve
PS. From switching pump
PA1. From PPC valve
PA2. From PPC valve
PB1. From PPC valve
PB2. From PPC valve
PCS. To travel damper system

1. Solenoid valve

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1. Main relief valve
2. Bucket spool return spring
3. Boom spool return spring
4. Boom spool
5. Bucket spool
6. Body
7. Suction valve
8. Unload valve
9. Float selector valve
10. Safety-suction valve
11. Safety-suction valve
12. Cut-off valve assembly
13. Unload valve
14. Check valve
15. Cut-off relief valve
16. Screen

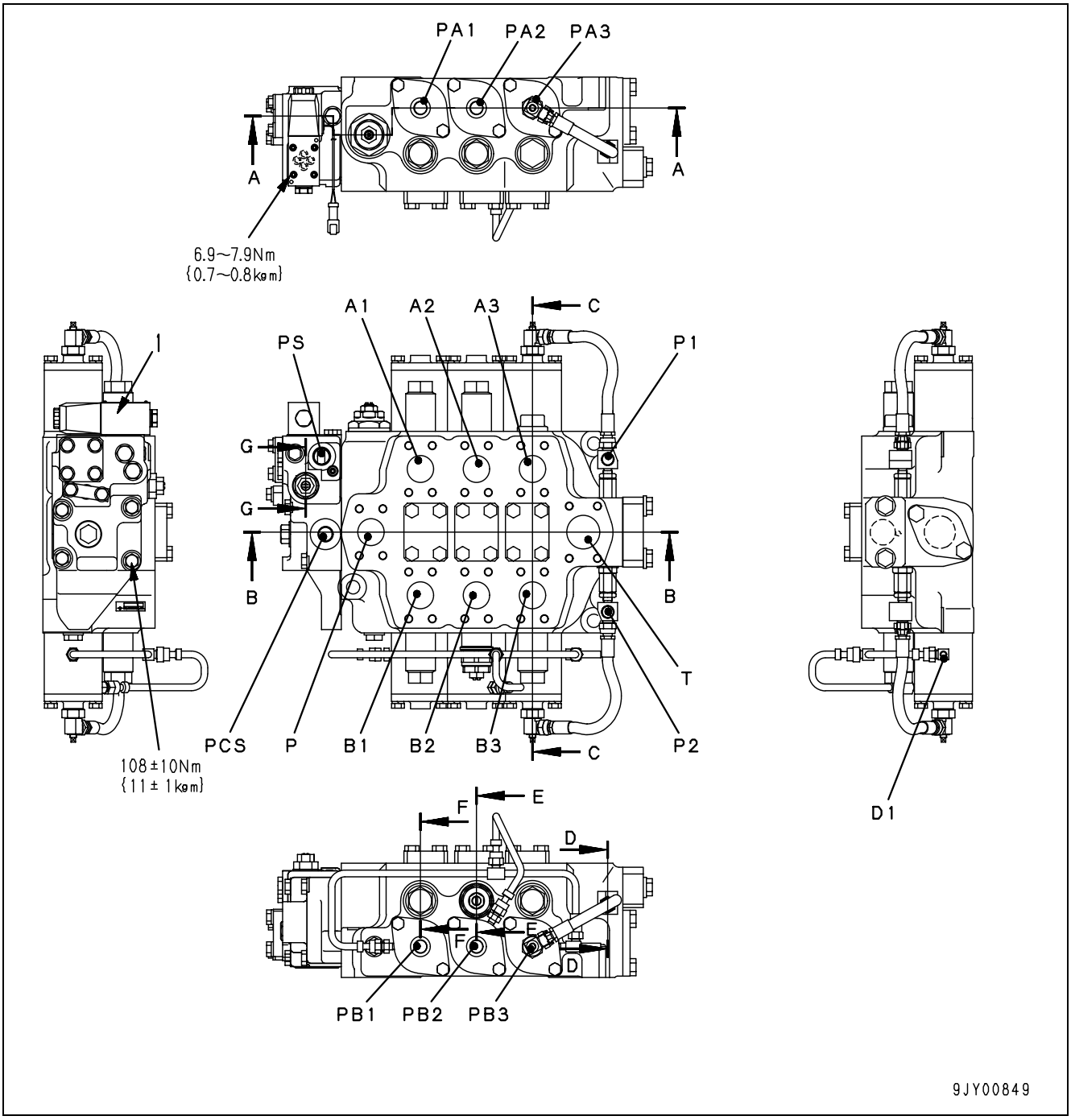
https://truckmanualshub.com/

Unit: mm

No.	Check item	Criteria					Remedy
17	Spool return spring (Large)	Standard size			Repair limit		Replace
		Free length	Installed length	Installed load	Free length	Installed load	If spring is damaged or deformed, replace it
		64.4	63.0	112.8 N {11.5 kg}	—	90.2 N {9.2 kg}	
18	Spool return spring (Small)	18.6	14.9	112.8 N {11.5 kg}	—	90.2 N {9.2 kg}	
19	Spool return spring (Large)	81.8	82.0	86.7 N {8.8 kg}	—	69.4 N {7.0 kg}	
20	Spool return spring (Large)	85.5	82.0	283.4 N {28.9 kg}	—	226.5 N {23.1 kg}	
21	Spool return spring (Large)	83.3	82.0	101 N {10.3 kg}	—	80.4 N {8.2 kg}	
22	Spool return spring (Small)	42.0	42.0	0	—	—	
23	Spool return spring (Small)	39.0	39.0	0	—	—	
24	Spool return spring (Small)	62.6	52.0	31.4 N {3.2 kg}	—	25.5 N {2.6 kg}	
25	Spool return spring	62.6	52.0	31.4 N {3.2 kg}	—	25.5 N {2.6 kg}	
26	Check valve spring	78.2	52.0	18.8 N {1.92 kg}	—	14.7 N {1.5 kg}	
27	Float selector valve spring	53.0	42.1	137.3 N {14 kg}	—	109.8 N {11.2 kg}	
28	Unload valve spring	82.7	47.0	49 N {5.0 kg}	—	39.2 N {4.0 kg}	
29	Unload valve spring	37.0	30.0	35 N {3.6 kg}	—	28.4 N {2.9 kg}	
30	Check valve spring	33.0	23.0	1.3 N {0.13 kg}	—	1 N {0.1 kg}	

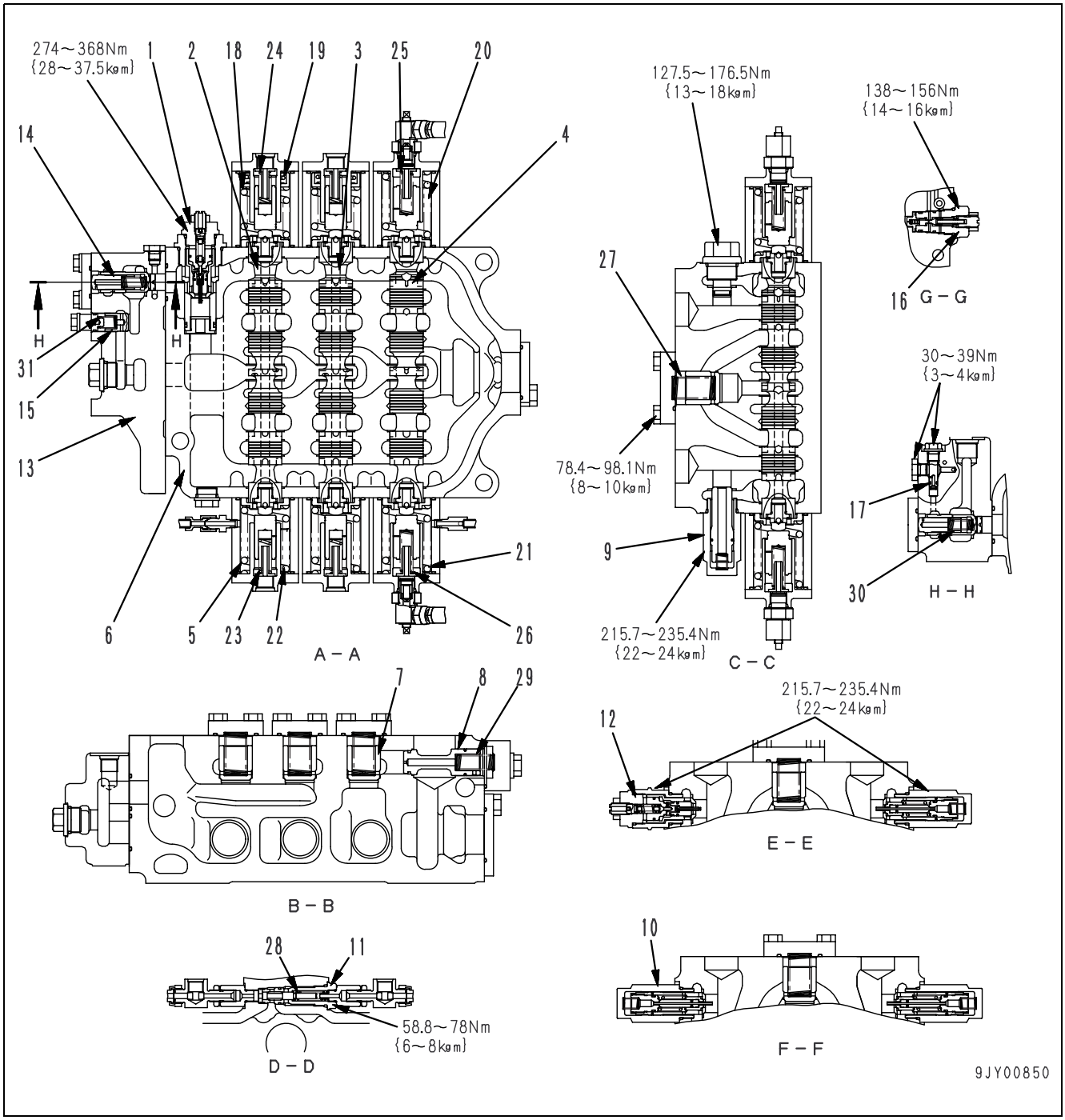
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2. 3-spool valve



P. From loader pump
T. To hydraulic tank
A1. To attachment cylinder
A2. To bucket cylinder bottom
A3. Lift cylinder
B1. To attachment cylinder
B2. To bucket cylinder head
B3. To lift cylinder
D1. Drain
PS. From switching pump
PA1. From PPC valve
PA2. From PPC valve
PA3. From PPC valve
PB1. From PPC valve
PB2. From PPC valve
PB3. From PPC valve
PCS. To travel damper system
1. Solenoid valve

https://truckmanualshub.com/



1. Main relief valve
2. Attachment spool
3. Bucket spool
4. Boom spool
5. Return spring
6. Body
7. Suction valve
8. Unload valve
9. Suction valve
10. Safety-suction valve
11. Float selector valve
12. Safety-suction valve
13. Cut-off valve assembly
14. Unload valve
15. Check valve
16. Cut-off relief valve
17. Screen

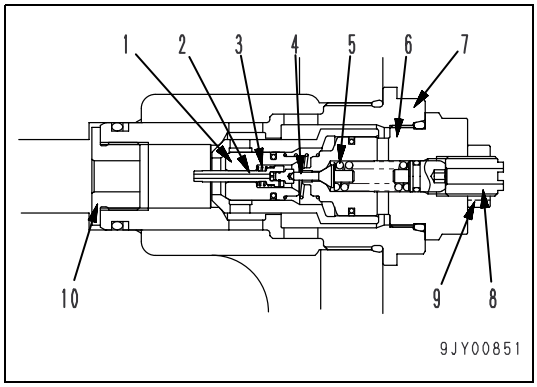
https://truckmanualshub.com/

Unit: mm

No.	Check item	Criteria					Remedy
18	Spool return spring (Large)	Standard size			Repair limit		Replace
		Free length	Installed length	Installed load	Free length	Installed load	If spring is damaged or deformed, replace it
		64.4	63.0	112.8 N {11.5 kg}	—	90.2 N {9.2 kg}	
19	Spool return spring (Small)	18.6	14.9	112.8 N {11.5 kg}	—	90.2 N {9.2 kg}	
20	Spool return spring (Large)	82.8	82.0	86.7 N {8.8 kg}	—	69.4 N {7.0 kg}	
21	Spool return spring (Large)	85.5	82.0	283.4 N {28.9 kg}	—	226.5 N {23.1 kg}	
22	Spool return spring (Large)	83.3	82.0	101 N {10.3 kg}	—	80.4 N {8.2 kg}	
23	Spool return spring (Small)	42.0	42.0	0	—	—	
24	Spool return spring (Small)	39.0	39.0	0	—	—	
25	Spool return spring (Small)	62.6	52.0	31.4 N {3.2 kg}	—	25.5 N {2.6 kg}	
26	Spool return spring	62.6	52.0	31.4 N {3.2 kg}	—	25.5 N {2.6 kg}	
27	Check valve spring	78.2	52.0	18.8 N {1.92 kg}	—	14.7 N {1.5 kg}	
28	Float selector valve spring	53.0	42.1	137.3 N {14 kg}	—	109.8 N {11.2 kg}	
29	Unload valve spring	82.7	47.0	49 N {5.0 kg}	—	39.2 N {4.0 kg}	
30	Unload valve spring	37.0	30.0	35 N {3.6 kg}	—	28.4 N {2.9 kg}	
31	Check valve spring	33.0	23.0	1.3 N {0.13 kg}	—	1 N {0.1 kg}	

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3. Relief valve

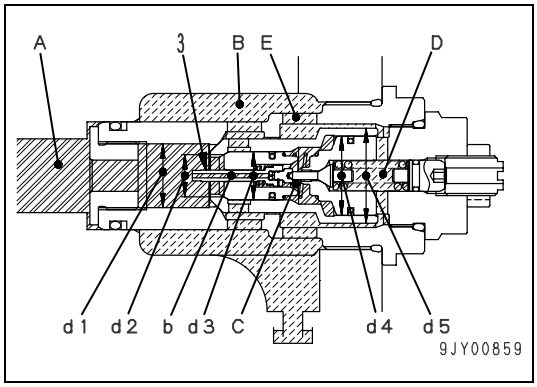


1. Main valve
2. Piston
3. Piston spring
4. Poppet
5. Poppet spring
6. Plug with valve seat
7. Sleeve
8. Adjustment screw
9. Locknut
10. Orifice

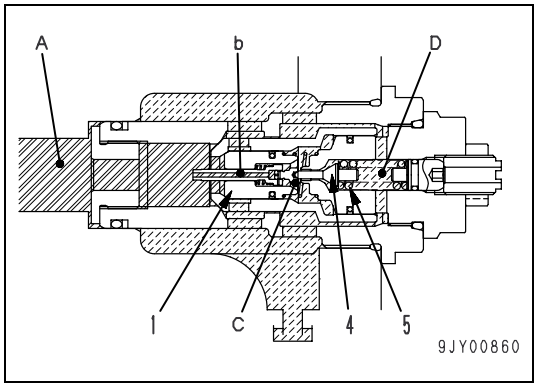
Function

- The relief valve is installed to the inlet of the work equipment valve. When the oil pressure rises above the specified level, this valve drains the oil into the hydraulic tank to limit the maximum pressure of the work equipment circuit and protect the circuit.

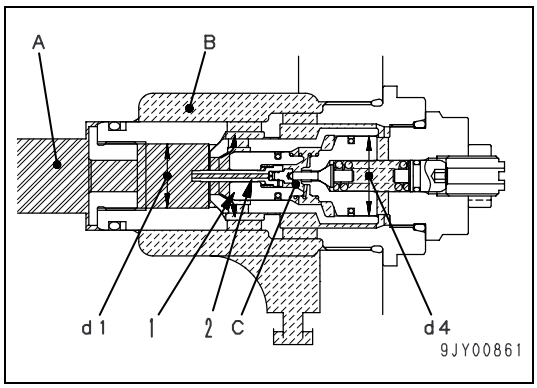
Operation



- Ports **A** and **B** are connected to the pump circuit and drain circuit respectively. The oil pressure in port **A** is applied through the hole of piston (3) to port **C**.
- When the oil pressure is below the set relief pressure, poppet (4) is in contact with the seat of plug (6) and the oil does not flow from chamber **C** into the drain circuit. Accordingly, the oil pressure in port **A** is equal to that in chamber **C**.
- Since **d2** < **d3**, main valve (2) is in contact with the left side. The sectional areas are set in the following order:
  d5 > **d4** > **d1** > **d3** > **d2**.

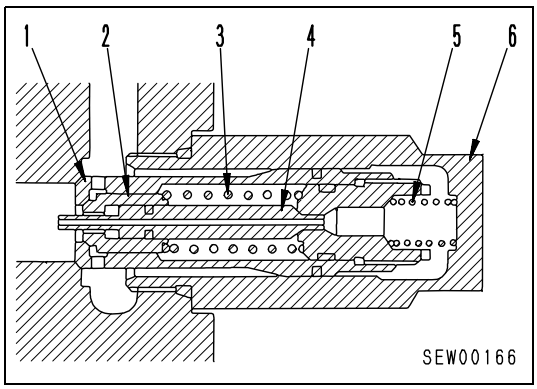


- If the pump pressure is raised by spring (5) to the relief pressure, poppet (4) opens and the oil in chamber **C** is drained through chamber **D**.
- If poppet (4) opens, the oil flows from **A** through **C** to **D**.
- As the oil flows from **A** ➔ **C** [hole through piston (2)], its pressure lowers. As a result, the pressure in chamber **C** is lower than that in port **A**, thus main valve (1) moves to the right.
- Then, the oil flows from port **A** to port **B** and limits the maximum pressure to protect the circuit.



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4. Safety-suction valve



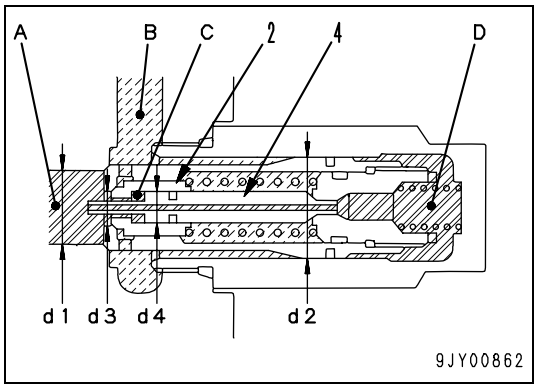
1. Suction valve
2. Main valve
3. Main valve spring
4. Pilot piston
5. Suction valve spring
6. Valve body

Function

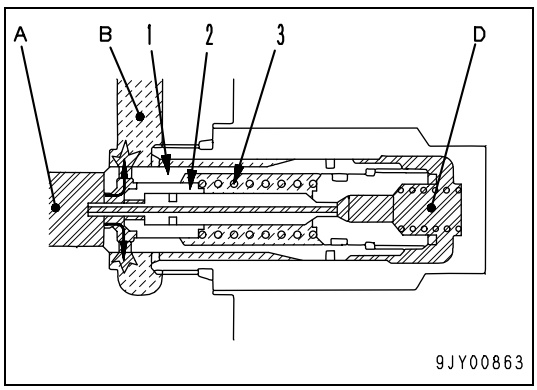
- The safety-suction valve is in the bucket cylinder circuit in the work equipment valve. When the work equipment valve is in neutral, if any impact is applied to the cylinder and abnormal pressure is generated, that pressure is released through this valve to protect the cylinder.
- If negative pressure is generated in the cylinder circuit, this valve works as a suction valve.

Operation

1. Operation as safety valve



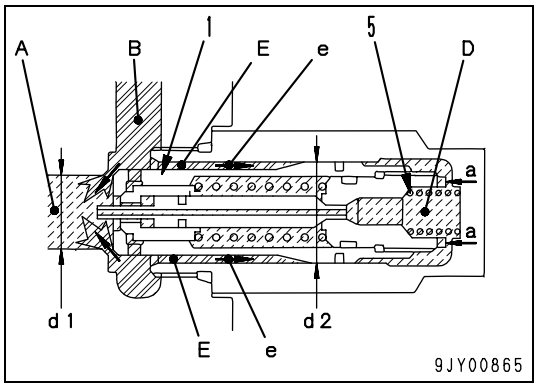
- Ports **A** and **B** are connected to the cylinder circuit and drain circuit respectively.
- The oil pressure in port **A** is applied through the hole of pilot piston (4) to port **D**. It is also applied through the orifice consisting of main valve (2) and pilot piston (4) to port **C**.
- Pilot piston (4) is fixed to the safety valve and the diameters (sectional areas) are set in the following order:
  d2 > **d1** > **d3** > **d4**.



- When abnormal pressure is generated in port **A**, suction valve (1) does not operate since **d2** > **d1**. Main valve (2) receives the oil pressure corresponding to the area difference between **d3** and **d4** of ports **A** and **C**, however, since **d3** > **d4**.
- If the oil pressure applied to main valve (2) reaches the set pressure of main valve spring (3), main valve (2) operates and the oil flows from port **A** to port **B**.

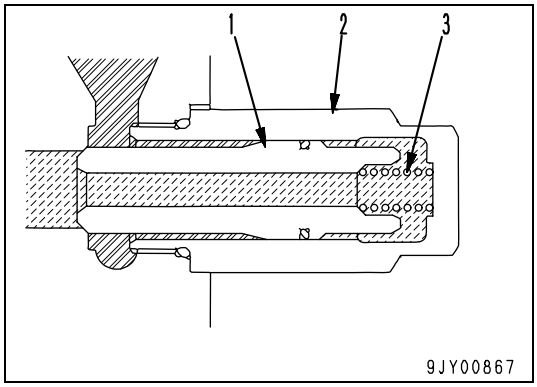
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2. Operation as suction valve



- If negative pressure is generated in port **A**, the pressure in port **D** becomes negative since those ports are connected to each other.
- Since the tank pressure of port **B** is applied to port **E**, the safety valve receives oil pressure e corresponding to the area difference between **d2** and **d1**.
- Accordingly, oil pressure is applied in the opening direction of the valve and oil pressure a is applied in the closing direction of suction valve (1).
- If the pressure in port A lowers to near 0, it is lower than oil pressure **e**.
- When oil pressure e becomes larger than the total of oil pressure **a** and the force of valve spring (5), suction valve (1) opens and the oil flows from port **B** to port **A** to prevent generation of negative pressure in port **A**.

5. Suction valve



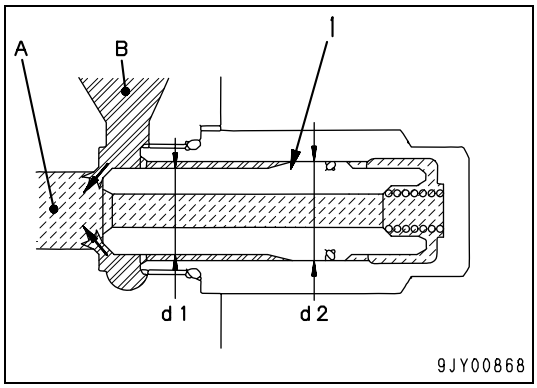
1. Main poppet
2. Sleeve
3. Spring

Function

- The suction valve prevents generation of negative pressure in the circuit.

Operation

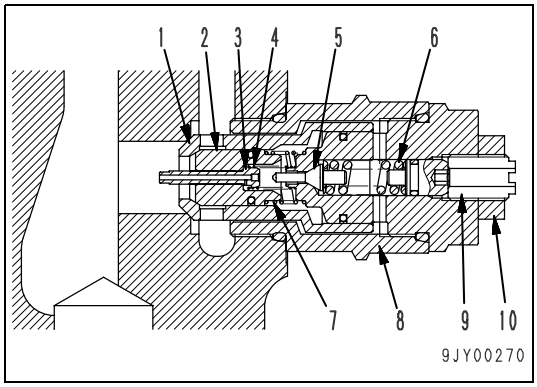
1. Operation as safety valve



- If negative pressure is generated in port **A** (boom cylinder head) (If pressure lower than the pressure in tank circuit port **B** is generated), main poppet (1) opens because of the area difference between **d1** and **d2**, then the oil flows from tank port **B** to cylinder port **A**.

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6. Safety-suction valve



1. Suction valve
2. Main valve
3. Piston
4. Piston spring
5. Poppet
6. Poppet spring
7. Suction valve spring
8. Sleeve
9. Adjustment screw
10. Locknut

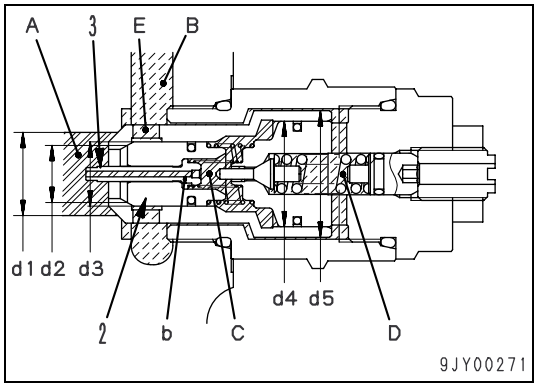
Set pressure: 22.5 MPa {230 kg/cm²}

Function

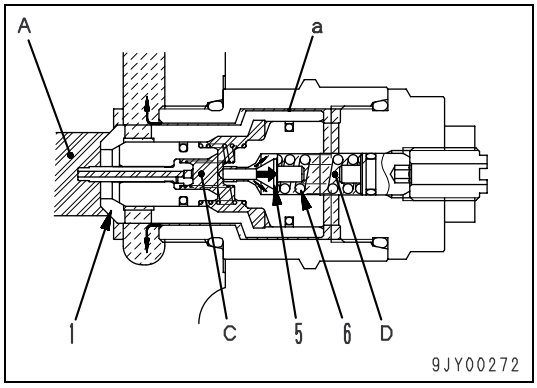
- If any impact is applied to the cylinder and abnormal pressure is generated, that pressure is released through the safety valve to protect the cylinder and the other hydraulic devices.
- If negative pressure is generated in the cylinder circuit, this valve works as a suction valve.

Operation

1. Operation as safety valve



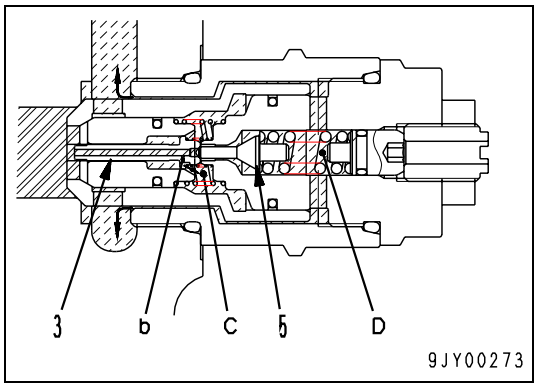
- Ports **A** and **B** are connected to the cylinder circuit and drain circuit respectively.
- The oil pressure in port **A** is applied through the hole of piston (3) to port **C**.
- Main valve (2) is seated to the left side since **d2** < **d3**.
- The diameters (sectional areas) are set in the following order; **d5** > **d4** > **d1** > **d3** > **d2**.
- While main valve (2) is seated, the pressure in port **A** is equal to the pressure in port **C**.



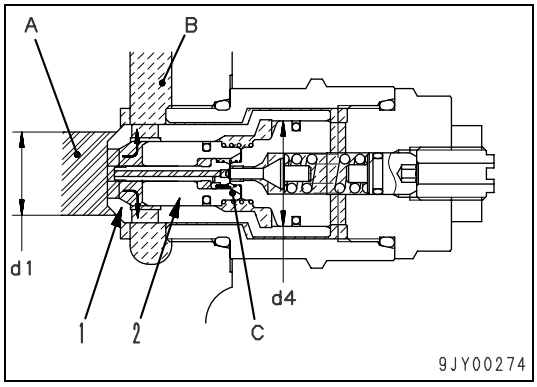
- If abnormal pressure is generated in port **A** and it reaches the set pressure of spring (6), poppet (5) opens and the oil in chamber **C** is drained through chamber **D** and periphery a of suction valve (1).

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- If poppet (5) opens, the oil flows from **A** through **C** to **D**. As the oil flows from **A** to **C** [hole through piston (3)], its pressure lowers.
- As a result, the pressure in chamber **C** is lower than that in port **A**, thus piston (3) moves to the right.
- Piston (3) is in contact with the tip of poppet (4) and the oil is drained through throttle **b** and chamber **D**.
- If oil flows from **A** to **C** through only throttle **b**, its pressure lowers further since the diameter of throttle **b** is short.

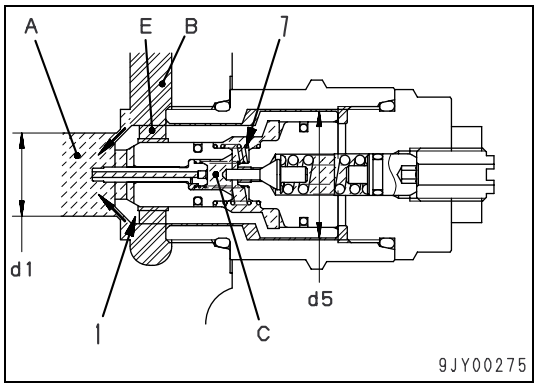


- Since the pressure in chamber **C** is lower than the pressure in port **A**, main valve (2) moves to the right and the oil flows from port **A** to port **B** to prevent generation of abnormal pressure.
- Even if abnormal pressure is generated, suction valve (1) having a longer diameter does not operate since **d1** < **d4**.



2. Operation as suction valve

- If negative pressure is generated in the cylinder circuit, the pressures in ports **A** and **C** become negative since those ports are connected to each other.
- Since the tank pressure of port **B** is applied to port **E**, the suction valve (1) receives oil pressure higher by the area difference between **d5** and **d1**.
- Then, spring (7) is compressed and suction valve (1) is moved to the right.
- Accordingly, the oil flows from port **B** to port **A** to prevent generation of negative pressure in port **A**.



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7. Cut-off valve

Function

- The cut-off valve is installed between the switching pump and work equipment valve. It sends the oil from the switching pump to the work equipment valve or drains it to control the work equipment speed according to the working condition.
- The cut-off valve is operated with the hydraulic system and the electronic governor controller.
- Operating condition of cut-off valve
  ○ = Cuts off (Drains oil)
  ● = Does not operate (Sends oil to work quipment valve)

	Mode	Above 15.7 MPa {160 kg/cm²}	Below 15.7 MPa {160 kg/cm²}	When kick-down switch is "ON"
Standard specification vehicle	Hi	○	●	●
	S	○	●	○
	Lo	○	○	○

Operation

1. When work equipment valve is held

   (When solenoid valve of hyper-specification vehicle is turned OFF)

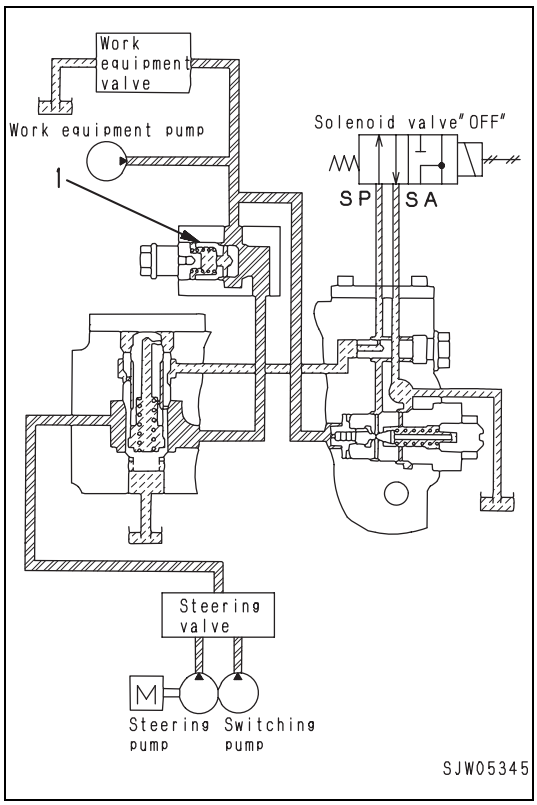
- The oil of the switching pump (The oil from the steering valve) pushes up check valve (1) and merges with the oil from the work equipment pump and then flows into the work equipment valve.

2. When work equipment valve is operated

   (When solenoid valve of hyper-specification vehicle is turned OFF)

   a. When work equipment pump pressure is lower than cut-off pressure

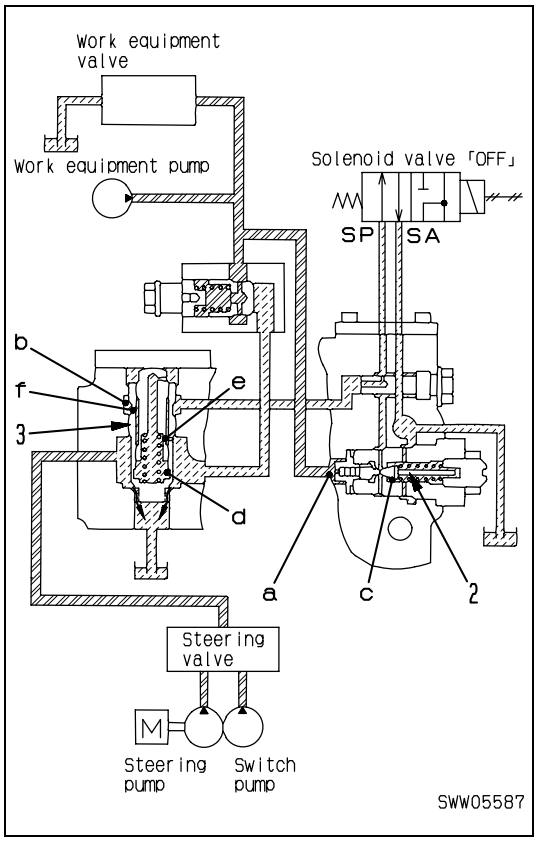
      - Similarly to the state where the work equipment valve is held, the oil of the switching pump (the oil from the steering valve) pushes up check valve (1) and merges with the oil from the work equipment pump and then flows into the work equipment valve.



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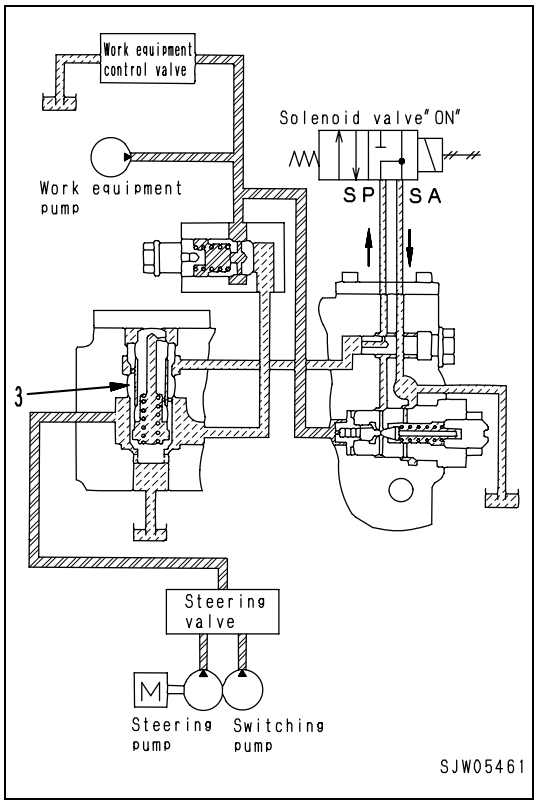
b. When work equipment pump pressure is higher than cut-off pressure

- If the work equipment pump pressure reaches the cut-off pressure, cut-off valve (2) is opened by the oil pressure in chamber a and then the oil in chamber **b** of unload valve (3) is drained through chamber **c** of cut-off valve (2).
- Since the oil in chamber **d** of unload valve (3) flows through orifices **e** and **f** to chamber **b**, the oil pressure in chamber **d** lowers and unload valve (3) opens.
- Accordingly, the oil from the switching pump is drained.



3. When solenoid valve is turned on

- Since port **SP** is connected to the drain circuit, the pilot oil flows along the arrows.
- Then, differential pressure is generated in unload valve (3) and it opens unload valve (3).
- Accordingly, the oil from switching pump (the oil from the steering valve) is always drained, regardless of the level of the work equipment port pressure.

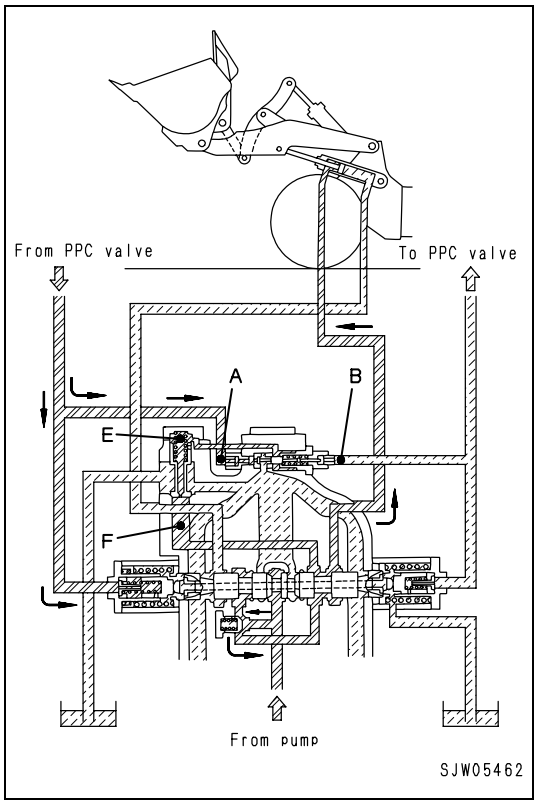


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8. Float selector valve and unload valve

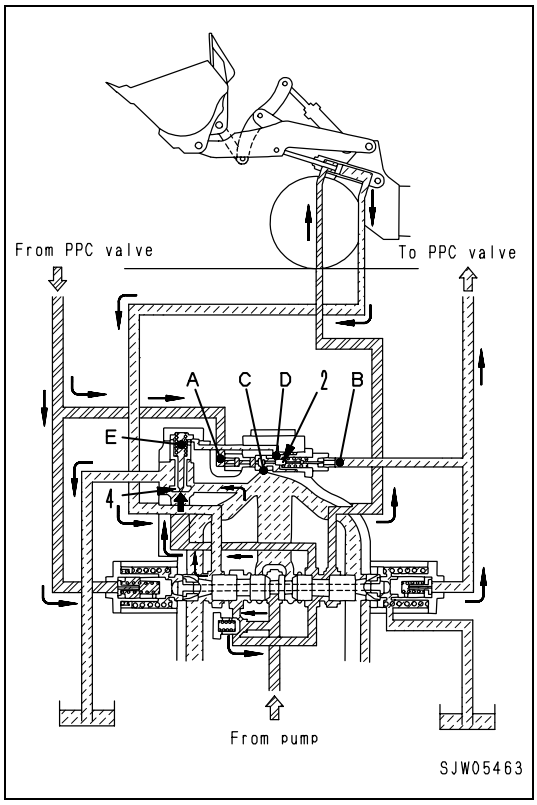
Function

- The float selector valve and unload valve are in the work equipment valve.
- When the boom lever is set in the float position, the float selector valve senses it and works to operate the unload valve to set the boom in the float position.



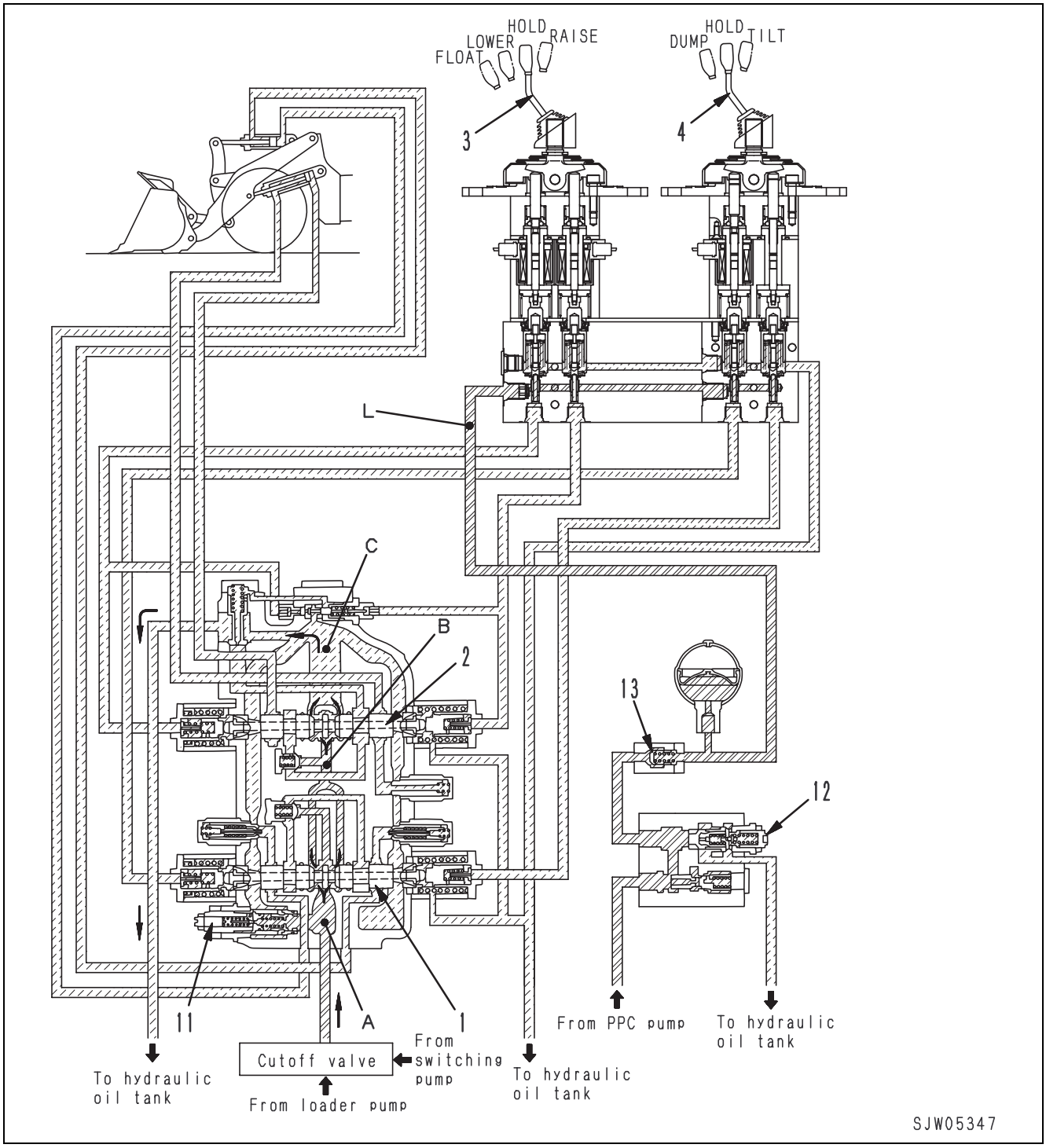
Operation

- If the boom control lever is pushed further from the lower position, it is set in the float position and the PPC valve is set in the same state with the lower position. The pressure in port **A** rises and that in port **B** lowers.
- The oil from the steering valve fills chambers **F** and **E**.
- If the differential pressure between ports **A** and **B** rises above the set level, it moves float selector valve (2) to the right to open ports **C** and **D**.
- If port **C** opens, the oil pressure in chamber **E** lowers and unload valve (4) moves up. As a result, the oil from the steering valve flows into the drain circuit and lift cylinder head.
- The oil in the lift cylinder bottom flows in the drain circuit to set the boom in the float position.



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9. Boom and bucket spool hold position

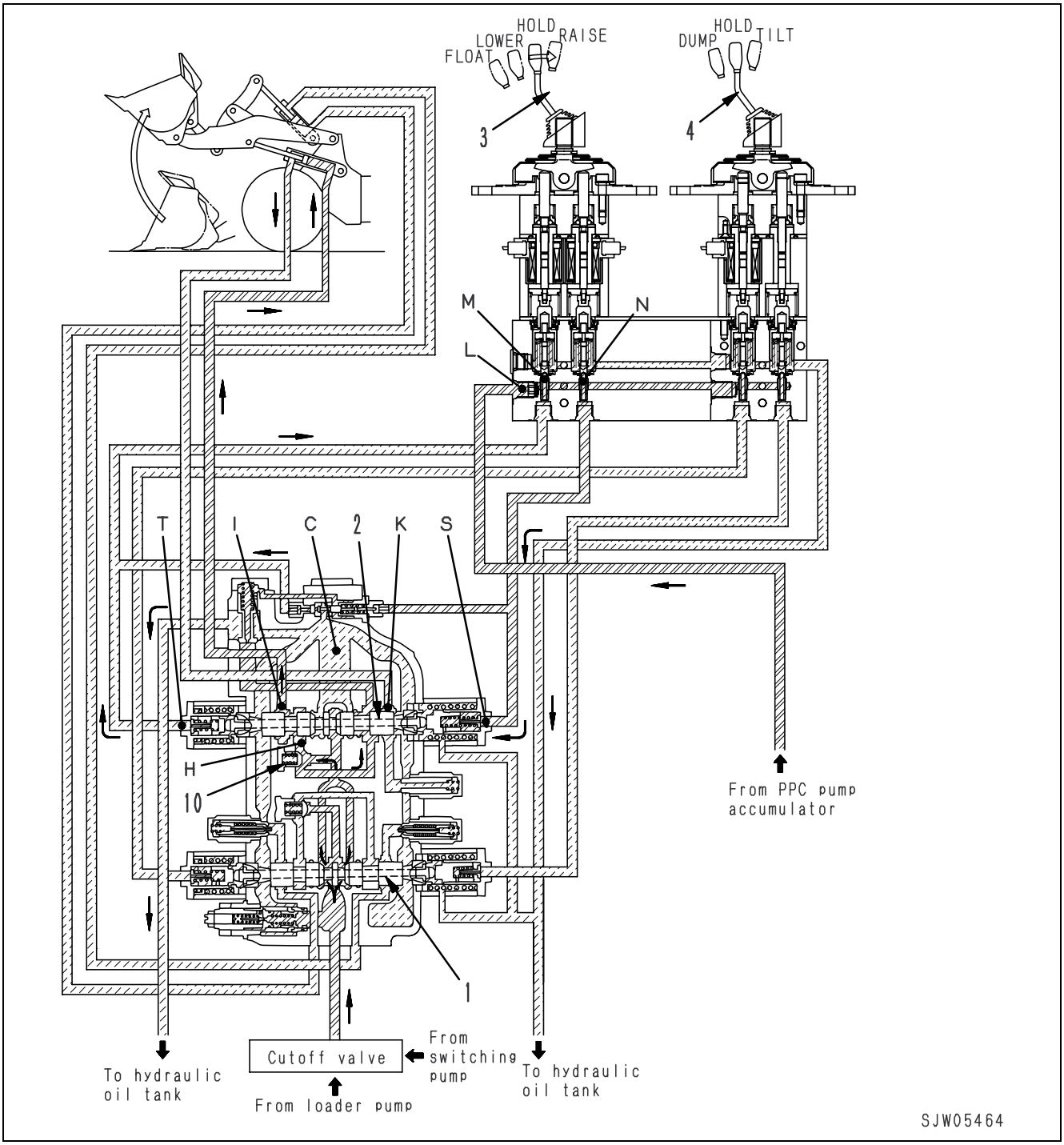


Operation

- The oil flows from the pump to port **A** and its maximum pressure is limited by relief valve (11).
- The bypass circuit of bucket spool (1) is opened to hold the boom. As a result, the oil in port **A** flows around the spool into port **B**.
- Since boom spool (2) is in neutral, its bypass circuit is open. Accordingly, the oil in port **B** flows around the spool into port **C** of the drain circuit and then returns through the filter to the tank.
- The oil from the PPC valve flows through check valve (13) into port **L** of the PPC valve. Since the boom and bucket control levers are in the hold position, however, the oil returns through PPC relief valve (12) to the hydraulic tank.

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10. Boom spool RAISE position

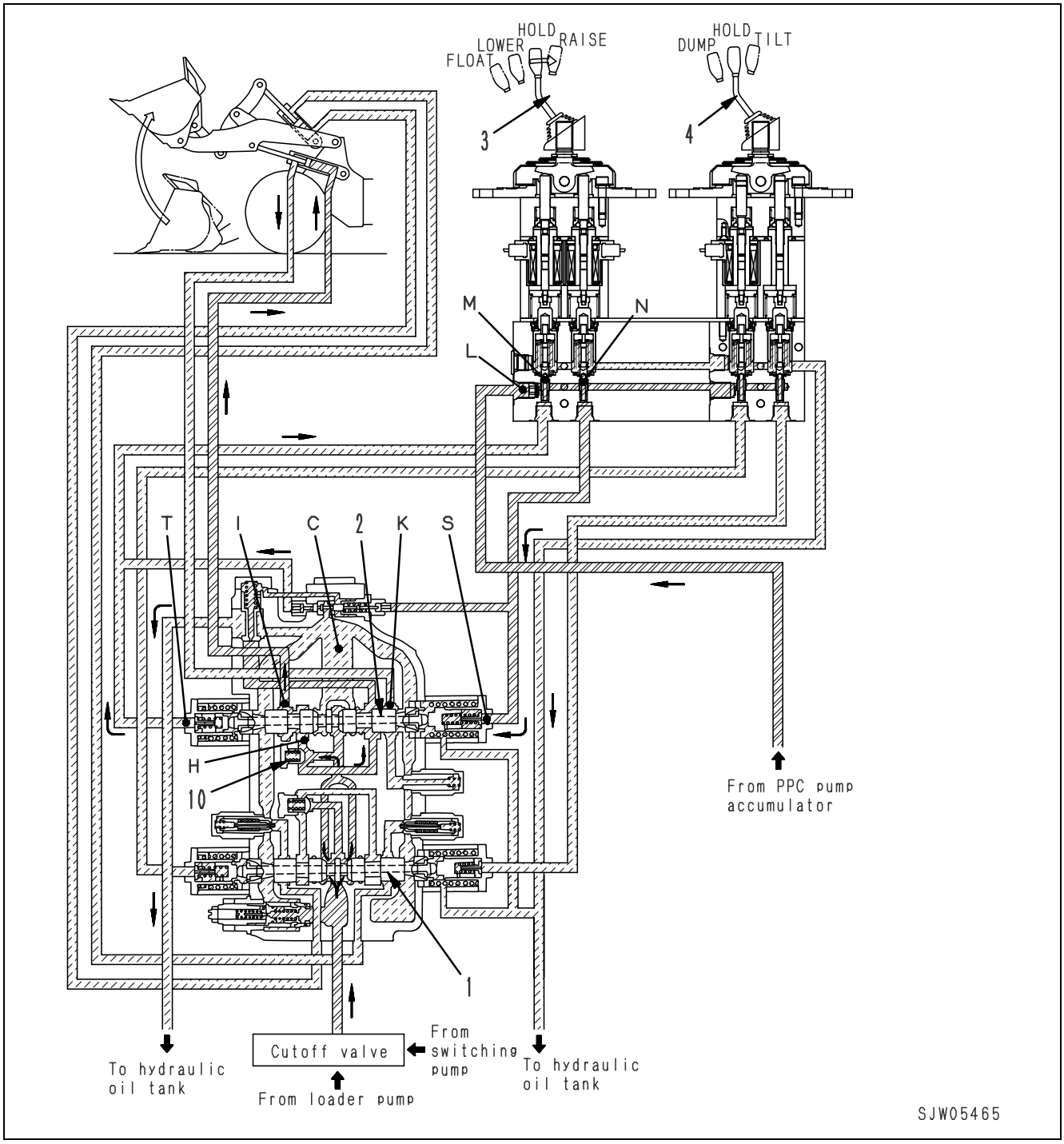


Operation

- If boom control lever (3) is pulled, the oil flows from port **L** of the PPC valve to ports **N** and **S**.
- The oil in port **T** flows through port **M** to the drain circuit. The oil in port **S** pushes boom spool (2) to set it in the RAISE position.
- The oil from the pump flows through the bypass circuit of bucket spool (1) to the bypass circuit of spool (2).
- Since the bypass circuit is closed by boom spool (2), the oil pushes check valve (10) to open.
- The oil flows from port **H** through port **I** to the cylinder bottom.
- The oil in the cylinder head flows through port **K** into drain port **C** and then returns to the tank. Accordingly, the boom is raised.

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11. Boom spool LOWER position

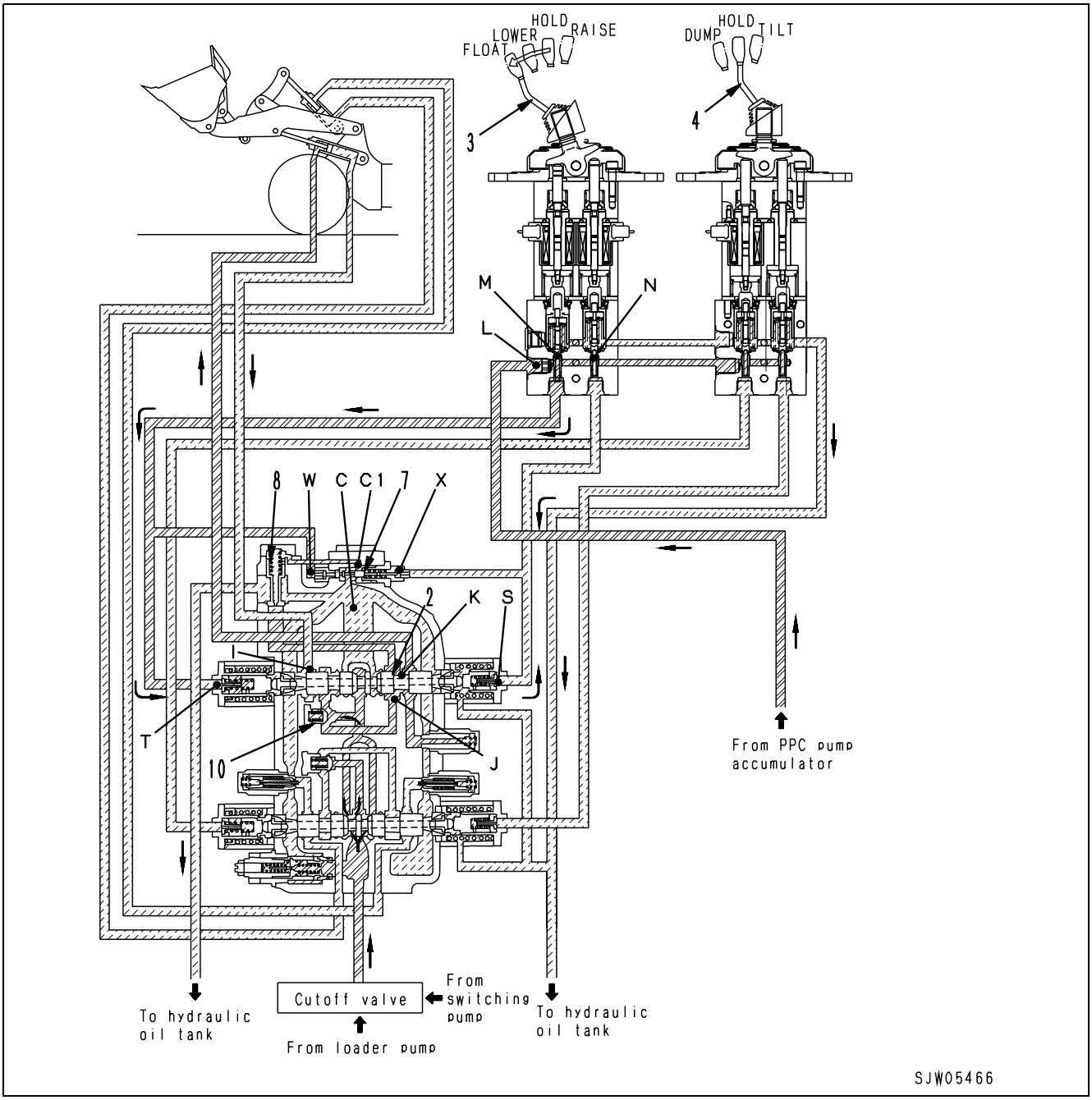


Operation

- If boom control lever (3) is pushed, the oil flows from port **L** of the PPC valve to ports **M** and **T**.
- The oil in port **S** flows to the drain circuit. The oil in port **T** pushes boom spool (2) to set it in the LOWER position.
- The oil from the pump flows through the bypass circuit of bucket spool (1) to the bypass circuit of spool (2).
- Since the bypass circuit is closed by boom spool (2), the oil pushes check valve (10) to open.
- The oil flows from port **J** through port **K** to the cylinder head.
- The oil in the cylinder bottom flows through port **I** into drain port **C** and then returns to the tank. Accordingly, the boom is lowered.

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12. Boom spool FLOAT position

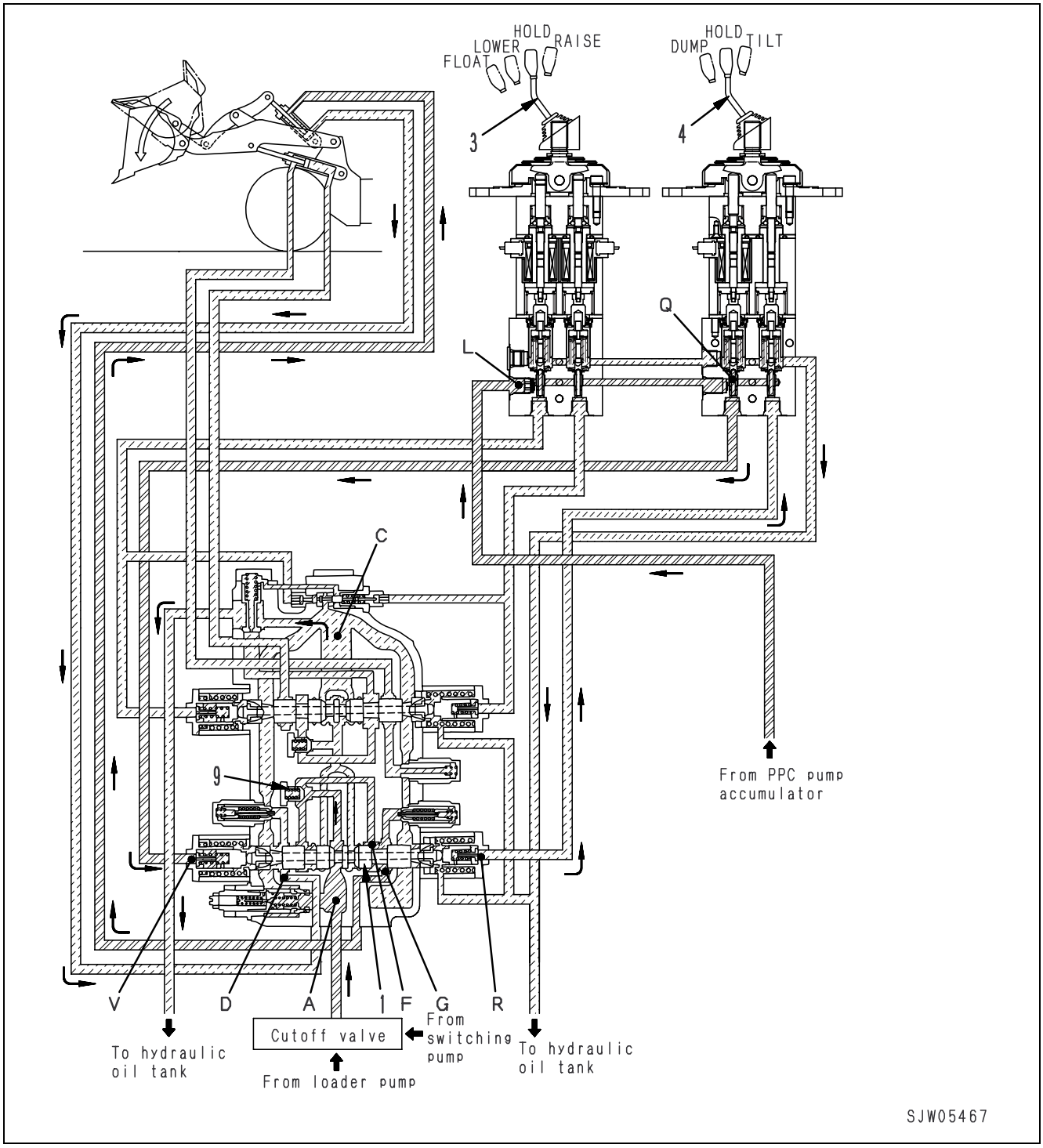


Operation

- If boom control lever (3) is pushed to the float position, the boom spool (2) of the PPC valve moves further to the FLOAT position.
- The oil in port **L** flows to ports **M**, **T**, and **W**. The oil in port **S** flows to port **N**.
- The oil in port **T** pushes boom spool (2) to the lower position.
- If the differential pressure between ports **W** and **X** rises above the set level, valve (7) moves to the right to open ports **C1** and **C** to connect those ports to the drain circuit.
- If port **C1** is connected to the drain circuit, unload valve (8) moves up to let the oil from the pump flow to the drain circuit.
- Accordingly, the oil in the cylinder head flows through port **K** and unload valve (8) to the drain circuit.
- The oil in the cylinder bottom flows through ports I and **C** to the drain circuit. As a result, the boom is floated.

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13. Bucket spool DUMP position

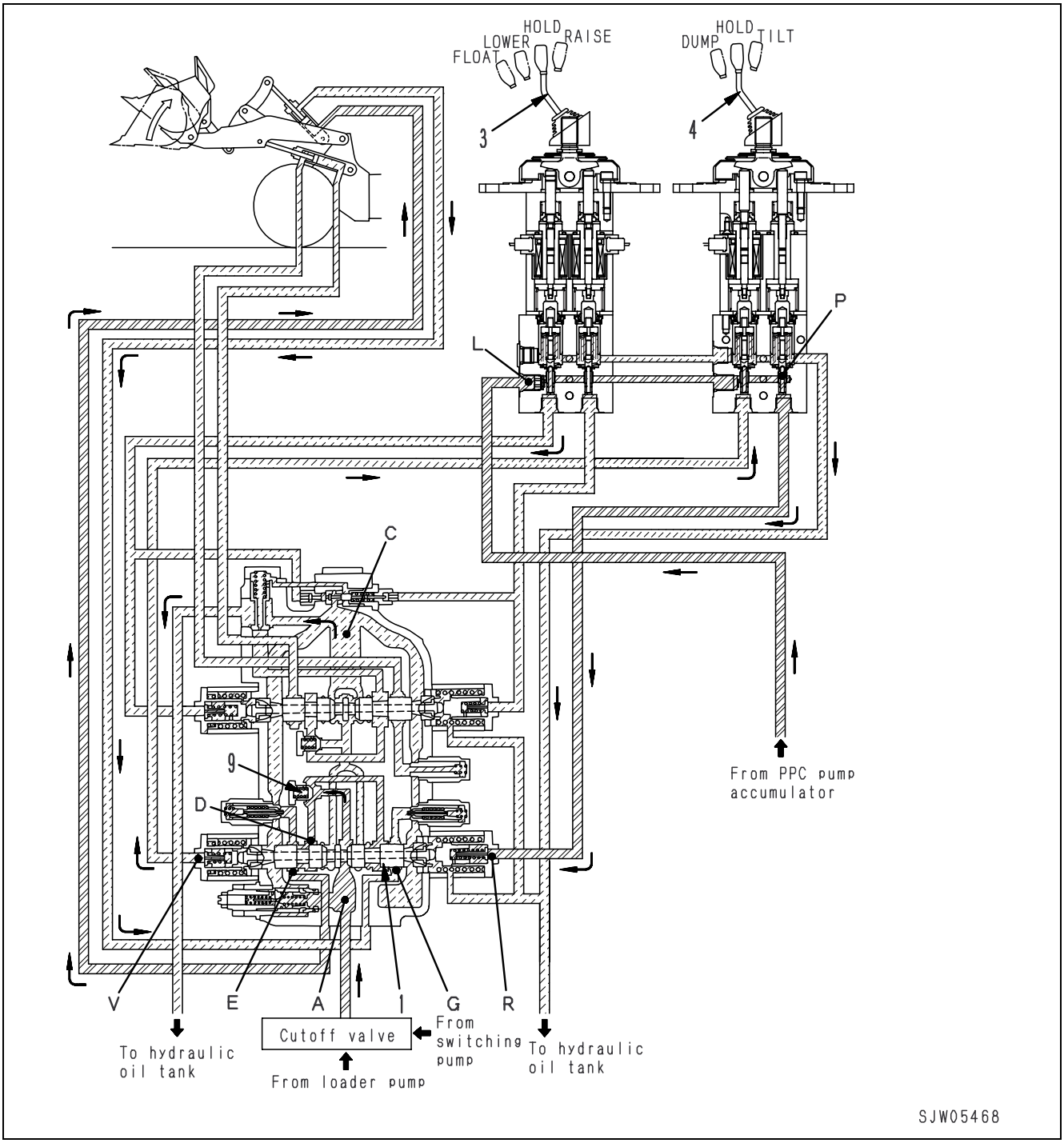


Operation

- If bucket control lever (4) is pushed, the oil in port **L** of the PPC valve flows through port **Q** to port **V**.
- The oil in port **R** flows to the drain circuit. The oil in port **V** pushes bucket spool (1) to set it in the DUMP position.
- Since the bypass circuit is closed by spool (1), the oil from port **A** pushes check valve (9) open.
- The oil from check valve (9) flows through ports **F** and **G** to the cylinder head.
- The oil in the cylinder bottom flows through port **D** into drain port **C** and then returns to the tank. Accordingly, the bucket is dumped.

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14. Bucket spool TILT position

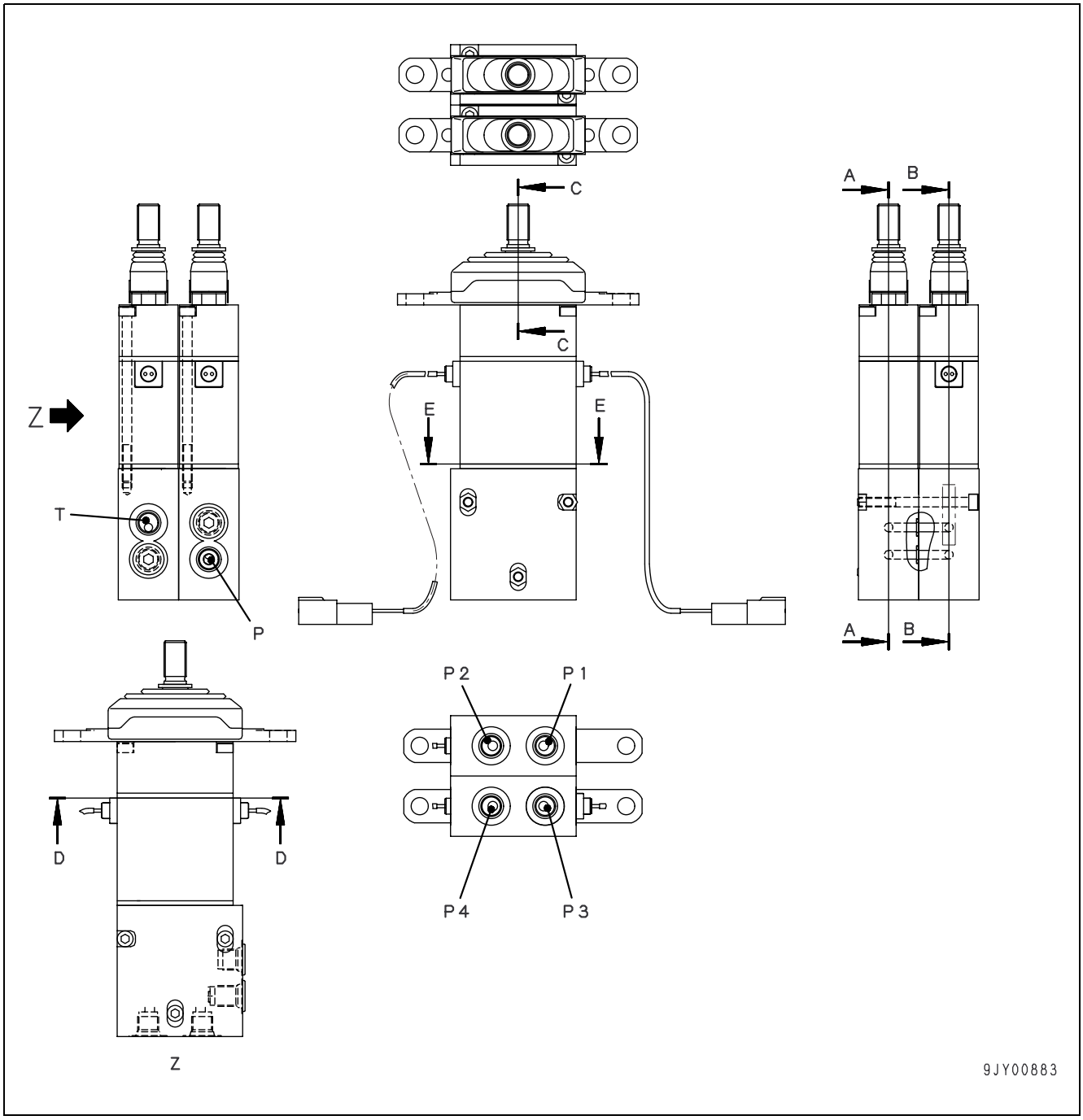


Operation

- If bucket control lever (4) is pulled, the oil in port **L** of the PPC valve flows through port **P** to port **R**.
- The oil in port **V** flows to the drain circuit. The oil in port **R** pushes bucket spool (1) to set it in the TILT position.
- Since the bypass circuit is closed by spool (1), the oil from port **A** pushes check valve (10) to open.
- The oil from check valve (9) flows through ports **D** and **E** to the cylinder bottom.
- The oil in the cylinder head flows through port **G** into drain port **C** and then returns to the tank. Accordingly, the bucket is tilted.

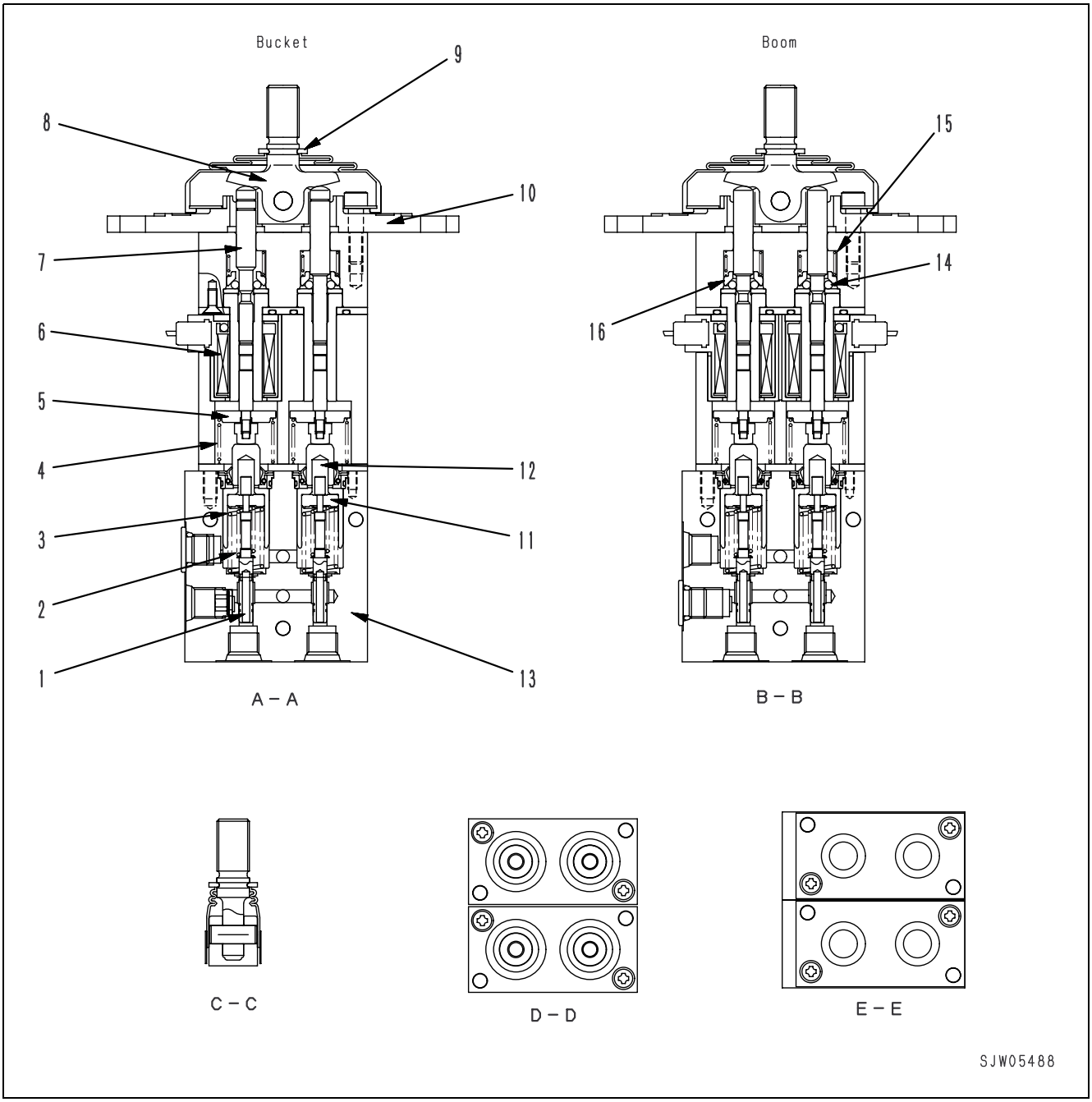
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PPC valve



P. From HST charging pump
T. To hydraulic tank
P1. To bucket TILT valve
P2. To bucket DUMP valve
P3. To boom RAISE valve
P4. To boom LOWER (FLOAT) valve

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1. Spool
2. Metering spring
3. Centering spring
4. Spring
5. Retainer
6. Solenoid
7. Rod
8. Lever
9. Ring
10. Plate
11. Retainer
12. Piston
13. Body
14. Ball
15. Detent spring
16. Retainer

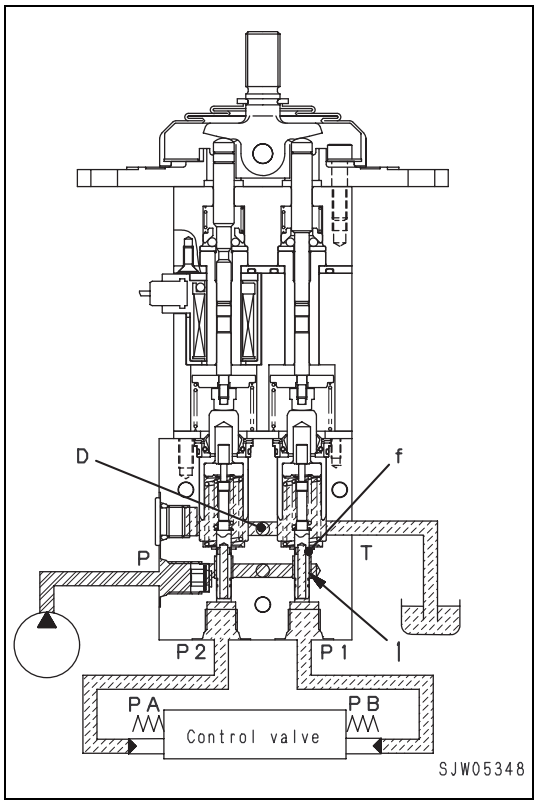
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Operation

1. When in NEUTRAL

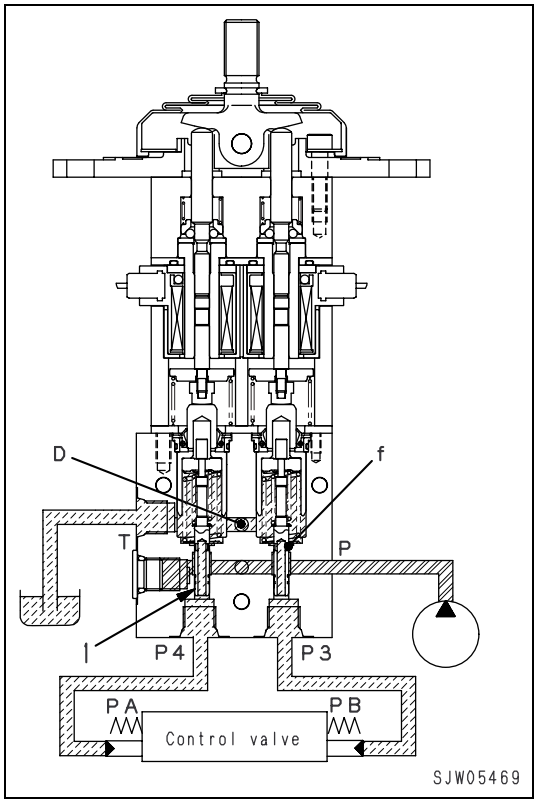
   a. PPC valve for bucket

      • Ports **PA** and **PB** of the bucket control valve and ports **P1** and **P2** of the PPC valve are connected through fine control hole **f** of spool (1) to the drain chamber **D**.



   b. PPC valve for boom

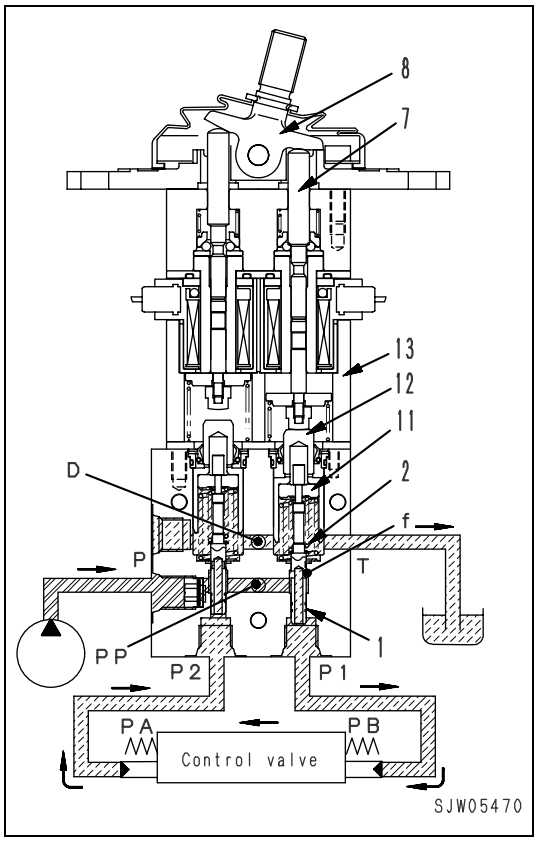
      • Ports **PA** and **PB** of the boom control valve and ports **P3** and **P4** of the PPC valve are connected through fine control hole **f** of spool (1) to the drain chamber **D**.



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2. When in fine control mode
   (NEUTRAL ➔ Fine control mode)

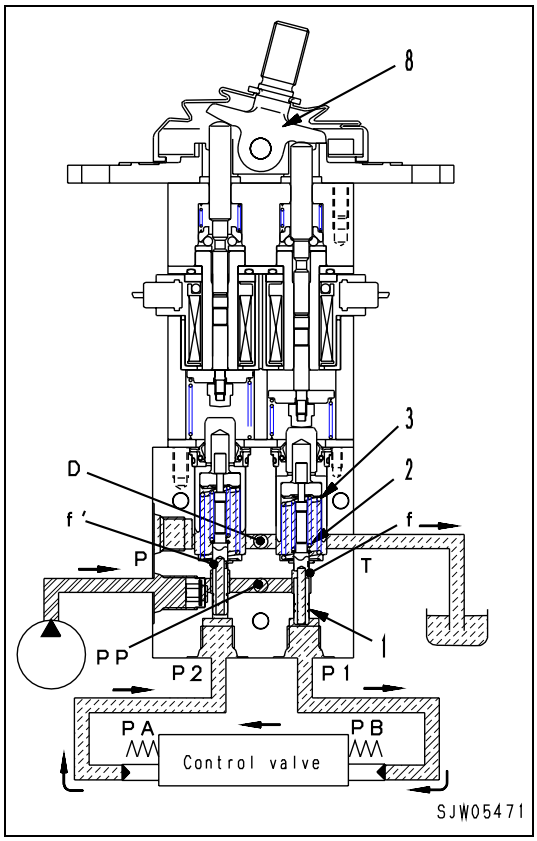
   - If rod (7) and piston (12) are pushed by lever (8), retainer (11) is pushed and spool (1) is also pushed down through metering spring (2).
   - Accordingly, fine control hole **f** is disconnected from drain chamber **D** and connected to pump pressure chamber **PP** almost simultaneously, and then the pilot oil of the main pump flows from port **P1** to port **PB**.
   - If the pressure in port **P1** rises, spool (1) is pushed back and fine control hole **f** is disconnected from pump pressure chamber **PP** and connected to drain chamber **D** almost simultaneously to release the pressure in port **P1**.
   - As a result, spool (1) moves up and down to balance the force of metering spring (2) with the pressure in port **P1**. The positional relationship between spool (1) and body (13) (where fine control hole **f** is between drain chamber **D** and pump pressure chamber **PP**) does not change until retainer (11) comes in contact with spool (1).
   - Since metering spring (2) is compressed in proportion to the stroke of the control lever, the pressure in port **P1** rises in proportion to the stroke of the control lever.
   - Accordingly, the control valve spool moves to a position at which the pressure in the chamber **PB** (equal to the pressure in port **P1**) is balanced with the force of the control valve spool return spring.



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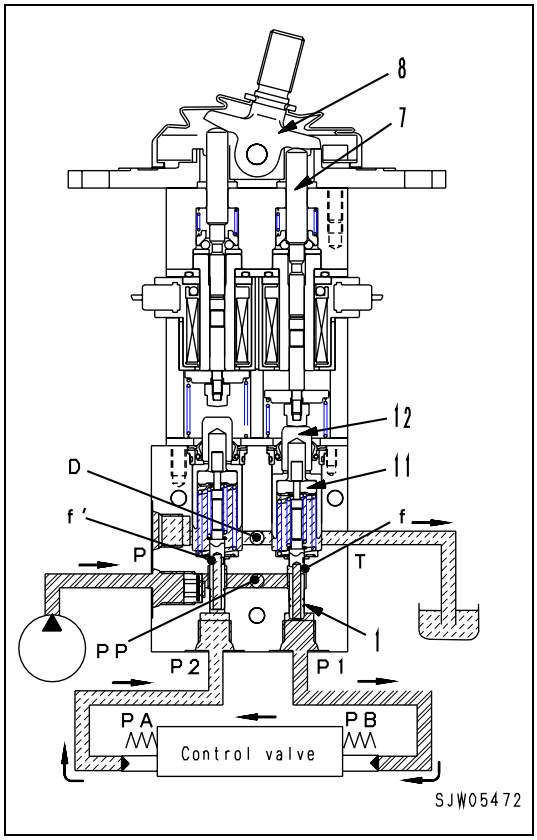
3. When in fine control mode
(When control lever is returned)

- If lever (8) begins to return, the force of centering spring (3) and the pressure in port **P1** push up spool (1).
- As a result, fine control hole **f** is connected to drain chamber **D** and the oil in port **P1** is released.
- If the pressure in port **P1** lowers too much, spool (1) is pushed down by metering spring (2) and fine control hole **f** is disconnected from drain chamber **D** and connected to pump pressure chamber **PP** almost simultaneously. Then, the pump pressure is applied until the pressure in port **P1** is restored to the level corresponding to the position of the lever.
- When the control valve spool returns, the oil in drain chamber **D** flows in through fine control hole **f** of the valve which is not in operation and then flows through port **P2** into chamber **PA**.



4. When lever is operated to stroke end

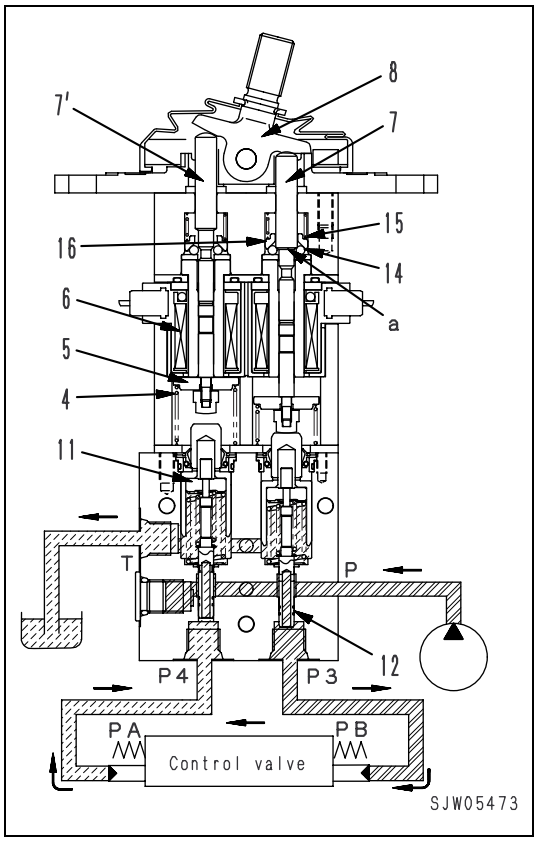
- If lever (8) and rod (7) push down piston (12) and retainer (11) pushes down spool (1), fine control hole **f** is disconnected from drain chamber **D** and connected to pump pressure chamber **PP**.
- Accordingly, the pilot oil from the main pump flows through fine control hole **f** and port **P1** into chamber **PB** and pushes the control valve spool.
- The oil returning from chamber **PA** flows through port **P2** and fine control **f'** into drain chamber **D**.



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5. When boom is "floated"

   - If rod (7) and piston (12) on the "Lower" side of port **P3** are pushed down by lever (8), ball (14) touches projection a of rod (7) in the middle of the stroke (The detent starts to operate).
   - If rod (7) is pushed in further, ball (14) pushes up retainer (16) supported on detent spring (15) and escapes out to go over projection a of the piston.
   - At this time, rod (7) on the opposite side is pushed up by spring (4) through retainer (11).
   - If rod (7') is pushed up and the current is flowing in solenoid (6), retainer (5) is attracted by solenoid (6).
   - Accordingly, rod (7') is kept pushed up and the "float" state is kept even if the lever is released.
   - At the same time, the control valve is also moved to the "float" position and kept at that position.

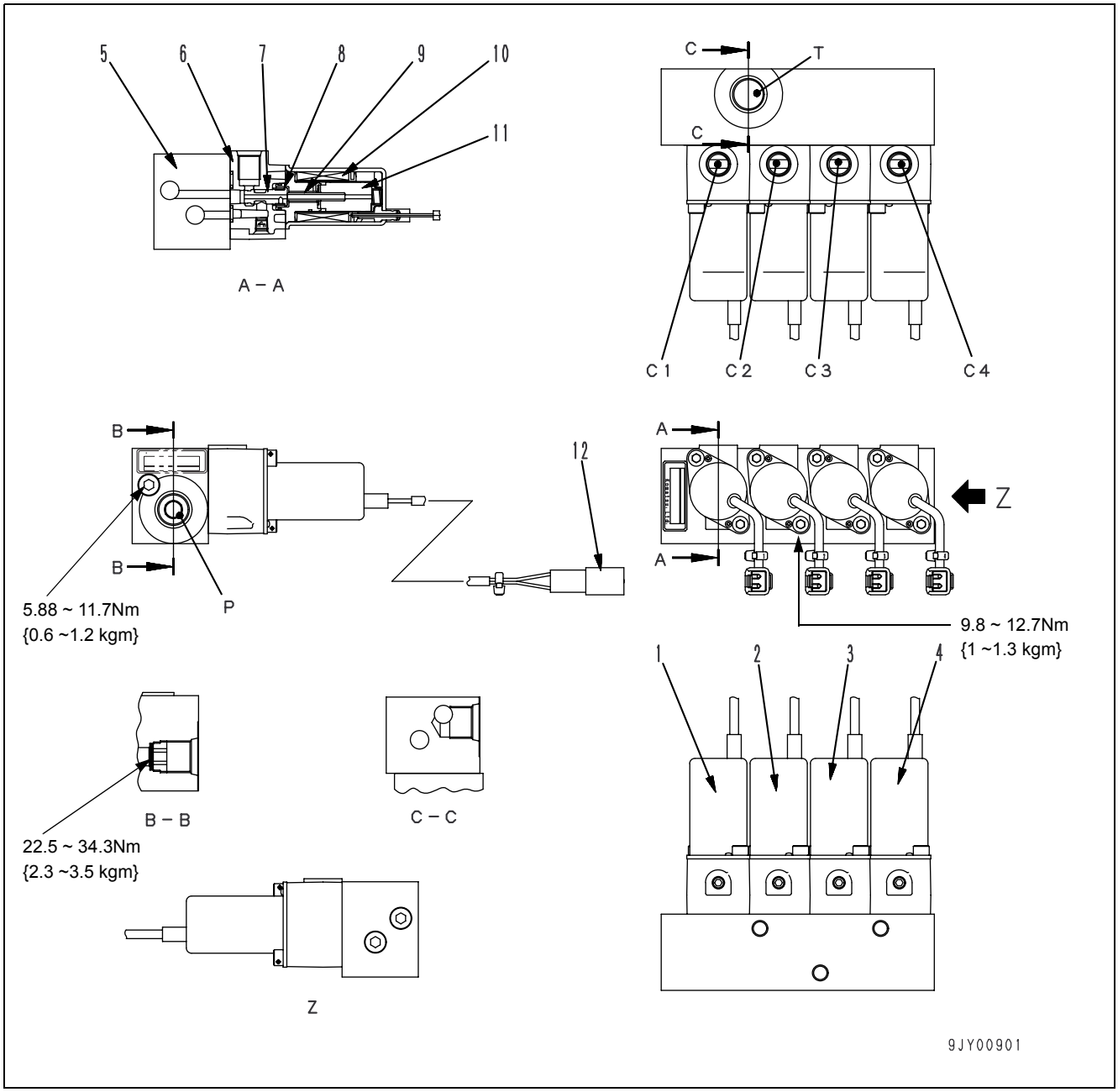


6. When "float" state of boom is reset

   - Lever (8) is returned from the "float" position by pushing it down with a force larger than the attractive force of solenoid (6) and retainer (5).
   - The "float" state also can be reset and the lever can be returned to the neutral position by turning off the current in solenoid (6) (demagnetizing the solenoid).
   - The boom raise and bucket tilt operations are carried out similarly to the above.

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Work equipment control EPC valve (op)



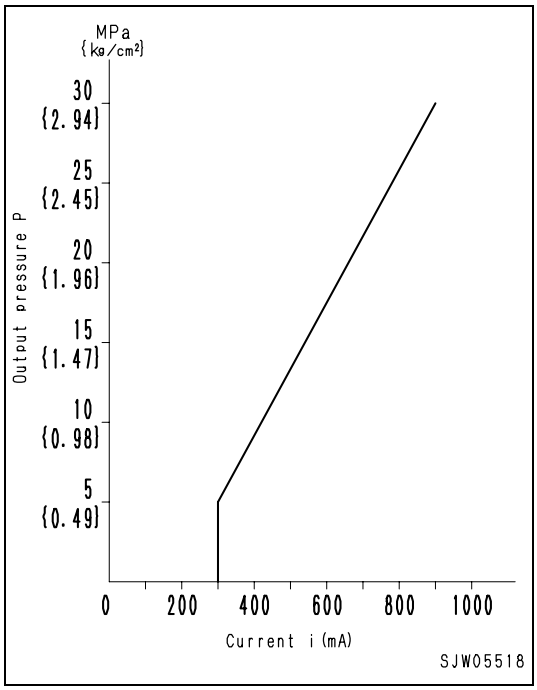
P. From control pump
T. To tank
C1. Bucket TILT
C2. Bucket DUMP
C3. Boom RAISE
C4. Boom LOWER

1. Bucket TILT EPC
2. Bucket DUMP EPC
3. Boom RAISE EPC
4. Boom LOWER EPC
5. Block
6. Body
7. Spool
8. Spring
9. Push pin
10. Coil
11. Plunger
12. Connector

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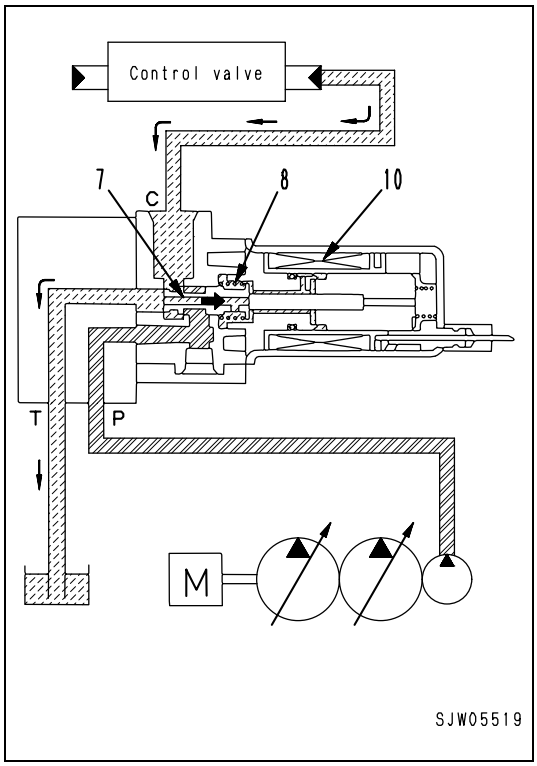
Function

- The EPC valve consists of the proportional solenoid section and the hydraulic valve section.
- On the receiving signal current from the pump controller, the EPC valve generates an EPC output pressure in proportion to the signal current and applies it to the control valve.



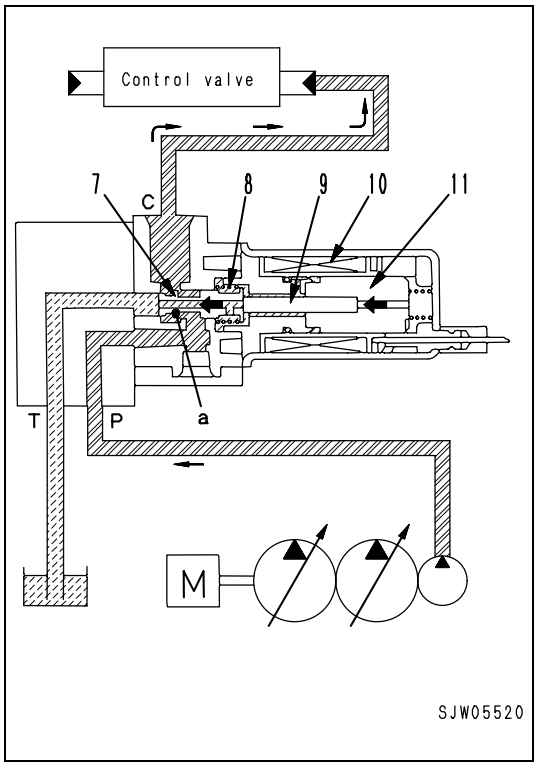
Operation

1. When the signal current is 0 (Coil is demagnetized)
   - While the signal current from the controller is not flowing in coil (10), coil (10) is demagnetized.
   - Accordingly, spool (7) is pressed by spring (8) to the right.
   - Port **P** is closed and the hydraulic oil from the control pump does not flow in the control valve.
   a. Output pressure **P**
   b. Current **i**
   c. Control Valve



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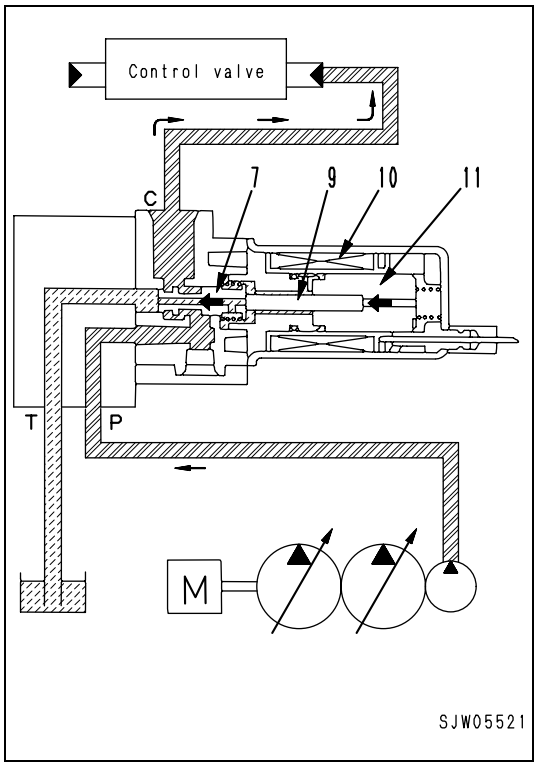
2. When signal current is small
(Coil is magnetized in fine control mode)



- If a small signal current flows in coil (10), coil (10) is magnetized and a thrust to the left is generated in plunger (11).
- Push pin (9) pushes spool (7) to the left and the hydraulic oil from port **P** flows in port **C**.
- The pressure in port **C** rises. If the total of the force applied to face **a** of spool (7) and the load of spring (8) exceeds the thrust of plunger (11), spool (7) is pushed to the right.
- Ports **P** and **C** are disconnected from each other and port **C** and port **T** are connected to each other simultaneously.
- As a result, spool (7) moves to the right or left until the thrust of plunger (11) is balanced with the total of the pressure in port **c** and the load of spring (8).
- Accordingly, the pressure in the circuit between the EPC valve and control valve is controlled in proportion to the signal current.

a. Control valve

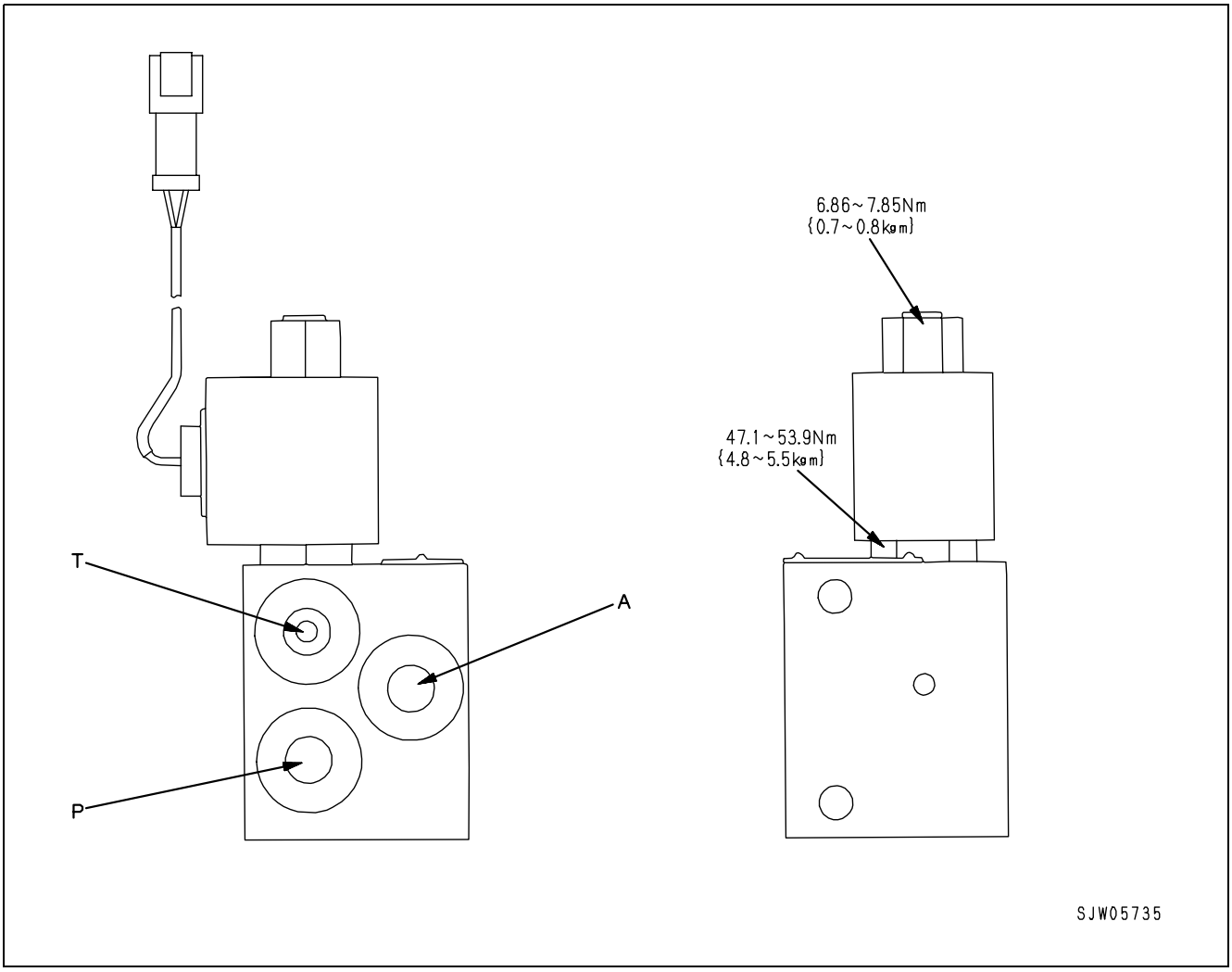
3. When signal current is maximum (Coil is magnetized in full operation.



- If the signal current flows in coil (10), coil (10) is magnetized.
- Since the signal current is at maximum, the thrust in plunger (11) becomes maximum.
- Accordingly, push pin (9) presses spool (7) to the left.
- As a result, the maximum hydraulic oil flows from port **P** to port **C** and the pressure in the circuit between the EPC valve and control valve becomes highest.
- At this time, port **T** is closed and the oil doe s not flow in the tank.

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Shut off valve (op)



A. To EPC valve
P. From pilot circuit pump (Pump from EPC)
T. To hydraulic tank

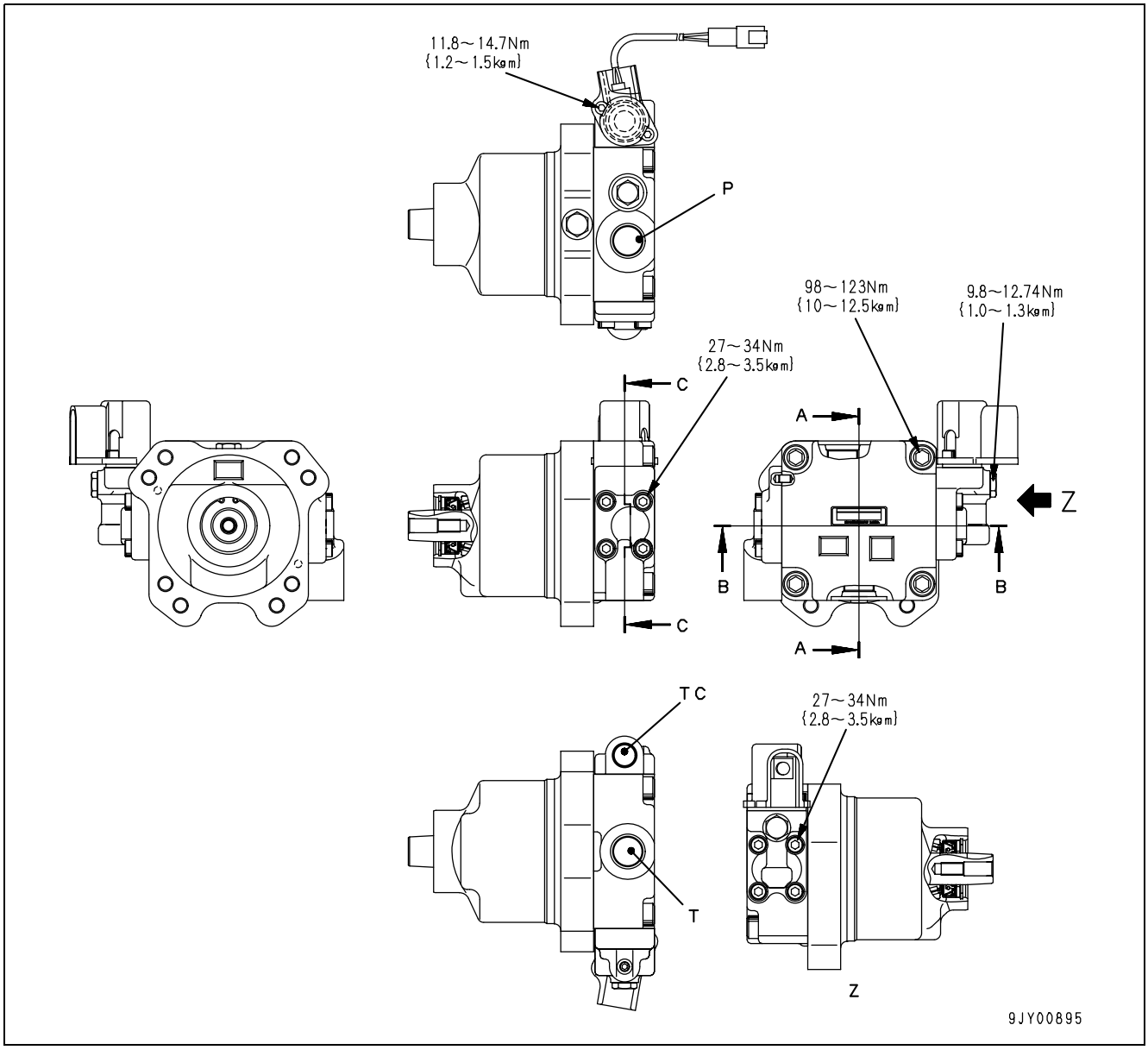
Function

- If the signal from the controller is turned on, the shut-off valve is turned on to connect the oil path from the pilot circuit pump to the EPC valve.

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Cooling fan motor

Model: LMF28



P. From fan pump

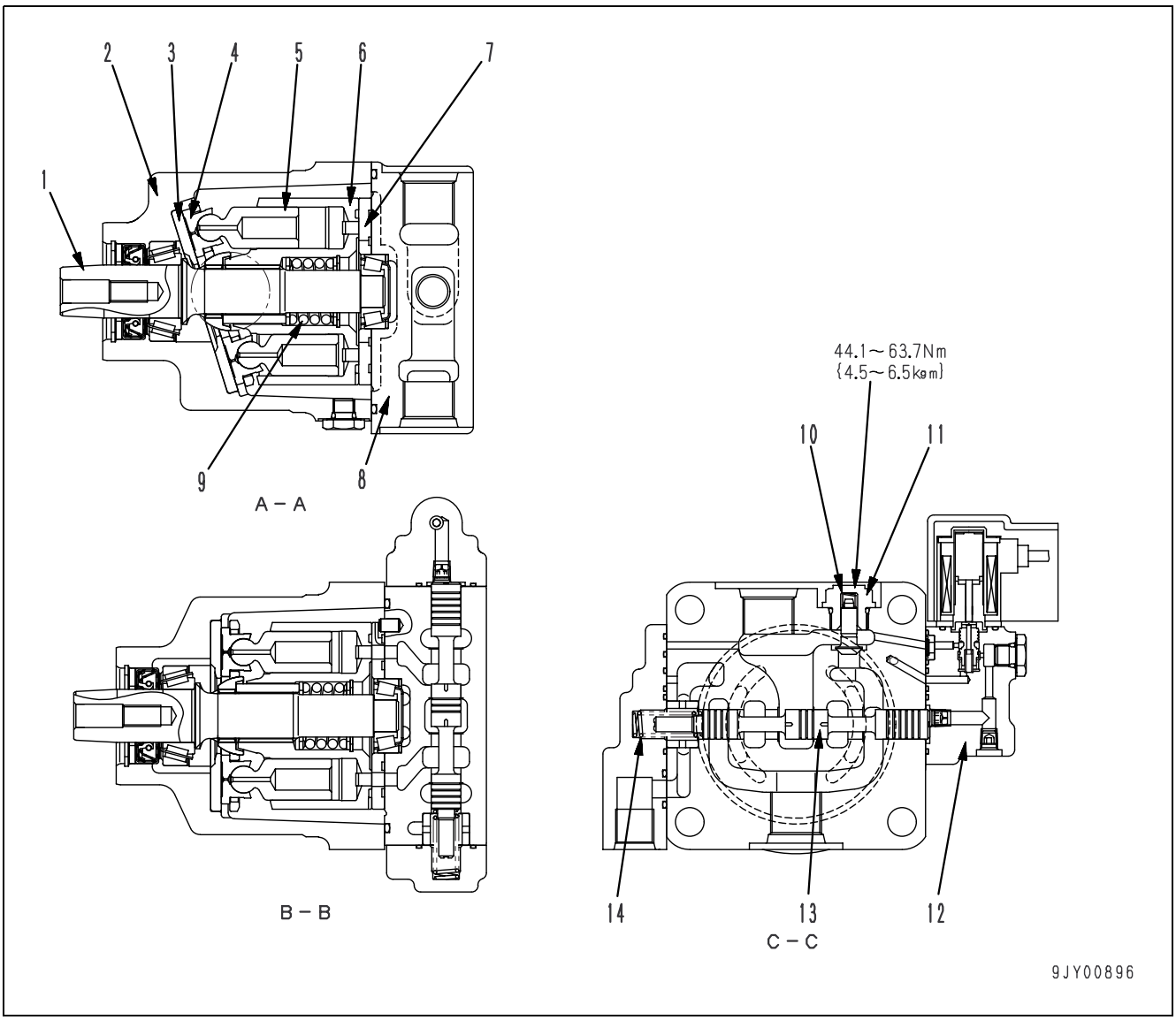
T. From cooler to tank

TC. To tank

Specifications

Model	:	LMF28
Capacity	:	28.0 cc/rev
Rated speed	:	1,400 rpm
Rated flow	:	40 l/min
Cracking pressure of check valve	:	0.044 MPa {0.45 kg/cm²}

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1. Output shaft
2. Case
3. Thrust plate
4. Shoe
5. Piston
6. Cylinder block
7. Valve plate
8. End cover
9. Center spring
10. Check valve spring
11. Check valve
12. Pilot valve
13. Changeover spool
14. Changeover spool spring

Unit: mm

No.	Check item	Criteria					Remedy
10	Spool return spring	Standard size			Repair limit		If spring is damaged or deformed, replace it
		Free length × Outside diameter	Installed length	Installed load	Free length	Installed load	
		13.0 x 6.5	7.0	3.43 N {0.35 kg}	—	2.55 N {0.26 kg}	

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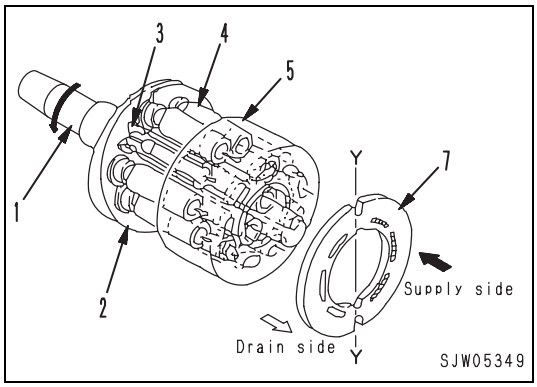
1. Hydraulic motor

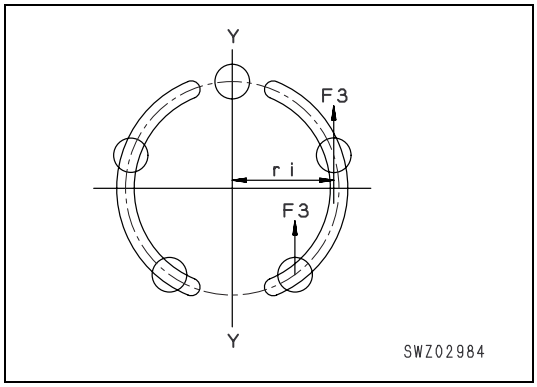
Function

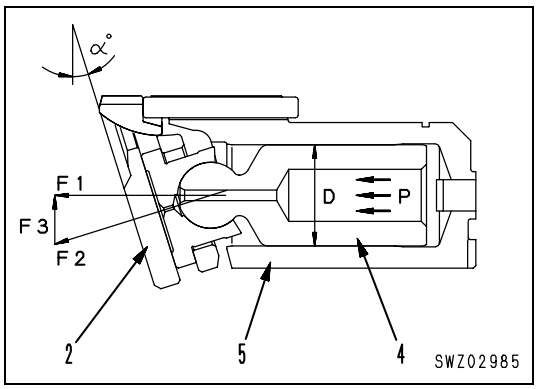
- This hydraulic motor is a swash plate-type axial piston motor, which converts the pressure of the hydraulic oil sent from the hydraulic pump into revolution.

Principle of operation

- The oil sent from the hydraulic port flows through valve plate (7) into cylinder block (5). This oil can flow on only one side of the **Y-Y** line connecting the top dead center and bottom dead center of the stroke of piston (4).
- The oil sent to one side of cylinder block (5) presses pistons (4) (2 or 3 pieces) and generates force **F1**
  (F1 kg = P kg/cm² × π/4 D2 cm²).
- This force is applied to thrust plate (2). Since thrust plate (2) is fixed to the angle of Eo degrees to the output shaft (1), the force is divided into components **F2** and **F3**.
- The radial component **F3** generates torque against the **Y-Y** line connecting the top dead center and bottom dead center (T = F3 x ri).
- The resultant of this torque [T = Σ (F3 x ri)] rotates the cylinder block (5) through the piston.
- Since the cylinder block (5) is coupled with the output shaft by means of spline, the output shaft revolves to transmit the torque.





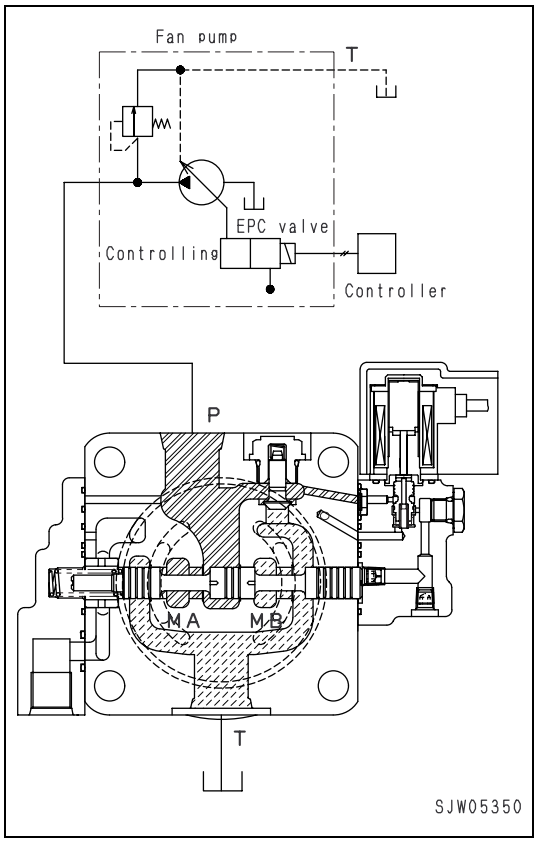


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2. Suction valve

Function

- If the fan pump stops, the hydraulic oil does not flow into the motor. Since the motor continues revolution because of the force of inertia, however, the pressure on the outlet side of the motor rises.
- When the oil stops flowing in from inlet port **P**, the suction valve sucks in the oil on the outlet side and supplies it to the port **MA** where there is not sufficient oil to prevent cavitation.

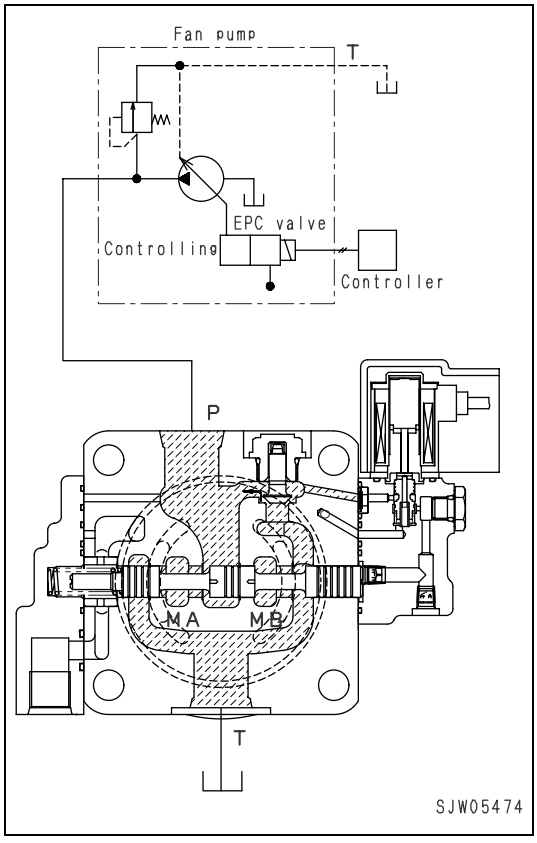


Operation

1. When pump is started
   - If the hydraulic oil from the pump is supplied to port **P** and the pressure on the **MA** side rises and starting torque is generated in the motor, the motor starts revolution. The oil on the outlet **MB** side of the motor returns through port **T** to the tank.

2. When pump is stopped

- If the engine is stopped and the input revolution of the fan pump lowers to 0 rpm, the hydraulic oil from the pump is not supplied to port **P** any more. As the hydraulic oil is not supplied to the **MA** side of the motor, the motor speed lowers gradually to stop.
- If the motor shaft is revolved by the force of inertia while the oil flow in the port **P** is reducing, the oil in port **T** on the outlet side is sent by the suction valve to the **MA** side to prevent cavitation.

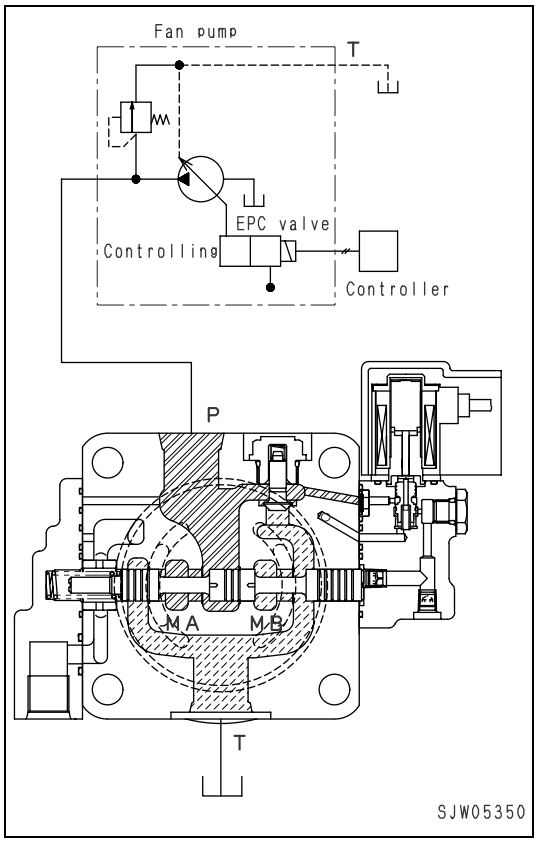


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3. Operation of revolution direction changeover valve

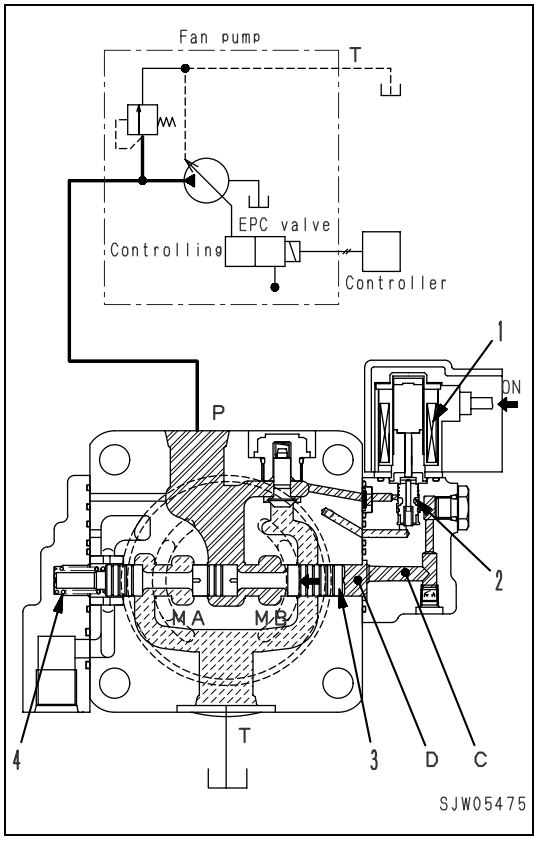
1. When ON-OFF solenoid for changeover valve is turned OFF

   - If ON-OFF solenoid (1) for changeover valve is turned "OFF", the hydraulic oil from the pump is blocked by ON-OFF changeover valve (2) and port **C** is connected to the tank circuit.
   - Accordingly, changeover spool (3) is pushed by changeover spool spring (4) to the right to open motor port **MA** and then the hydraulic oil flows in to revolve the motor forward (clockwise).



2. When ON-OFF solenoid for changeover valve is turned ON

   - If ON-OFF solenoid (1) for changeover valve is turned "ON", ON-OFF changeover valve (2) changes to let the hydraulic oil from the pump flow through port **C** into spool chamber **D**.
   - The hydraulic oil in chamber **D** pushes changeover spool (3) against changeover spool spring (4). As a result, motor port **MB** opens and the hydraulic oil flows in to revolve the motor in reverse (counterclockwise).



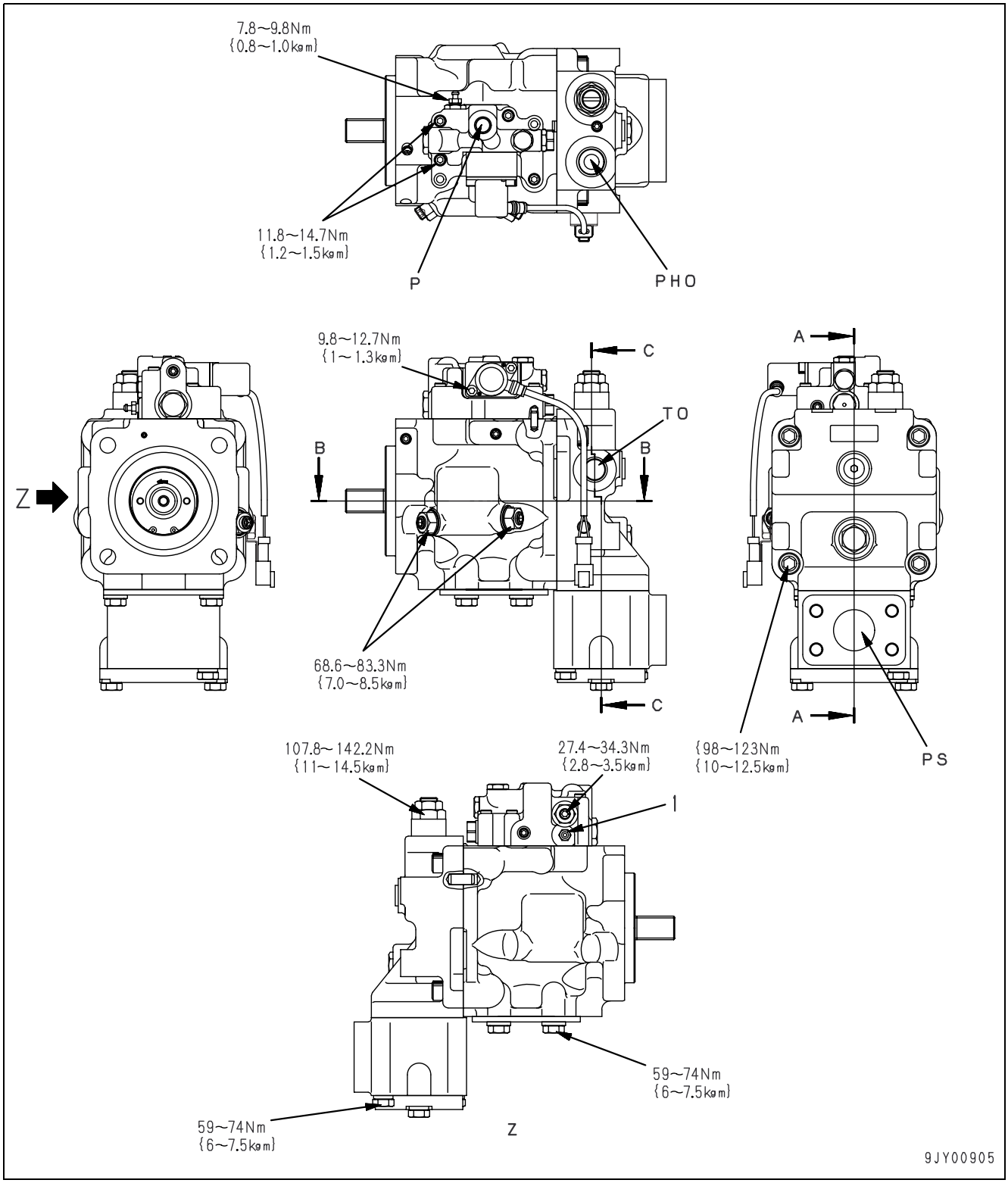
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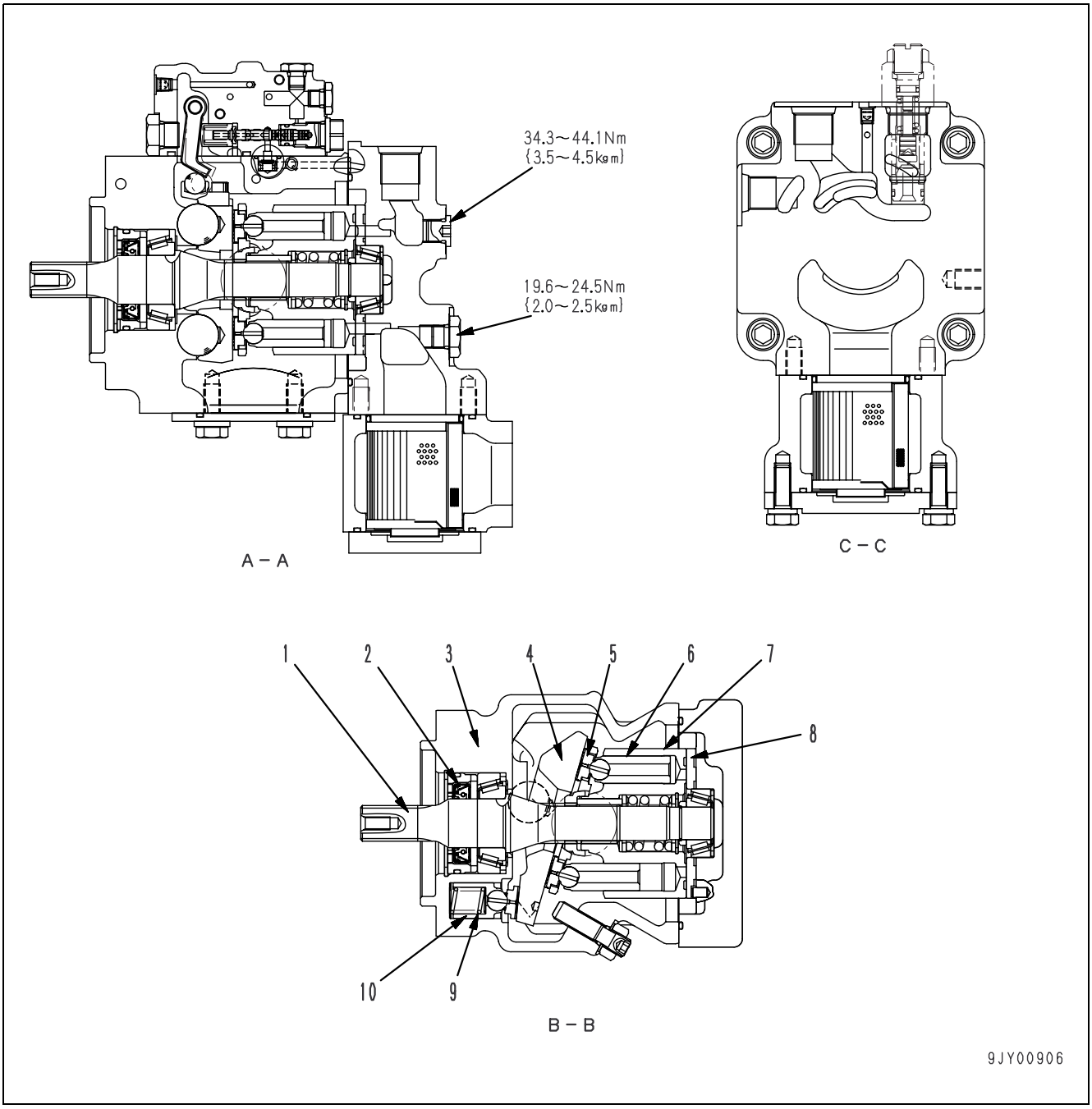
Cooling fan motor drive pump

Model: LPV30



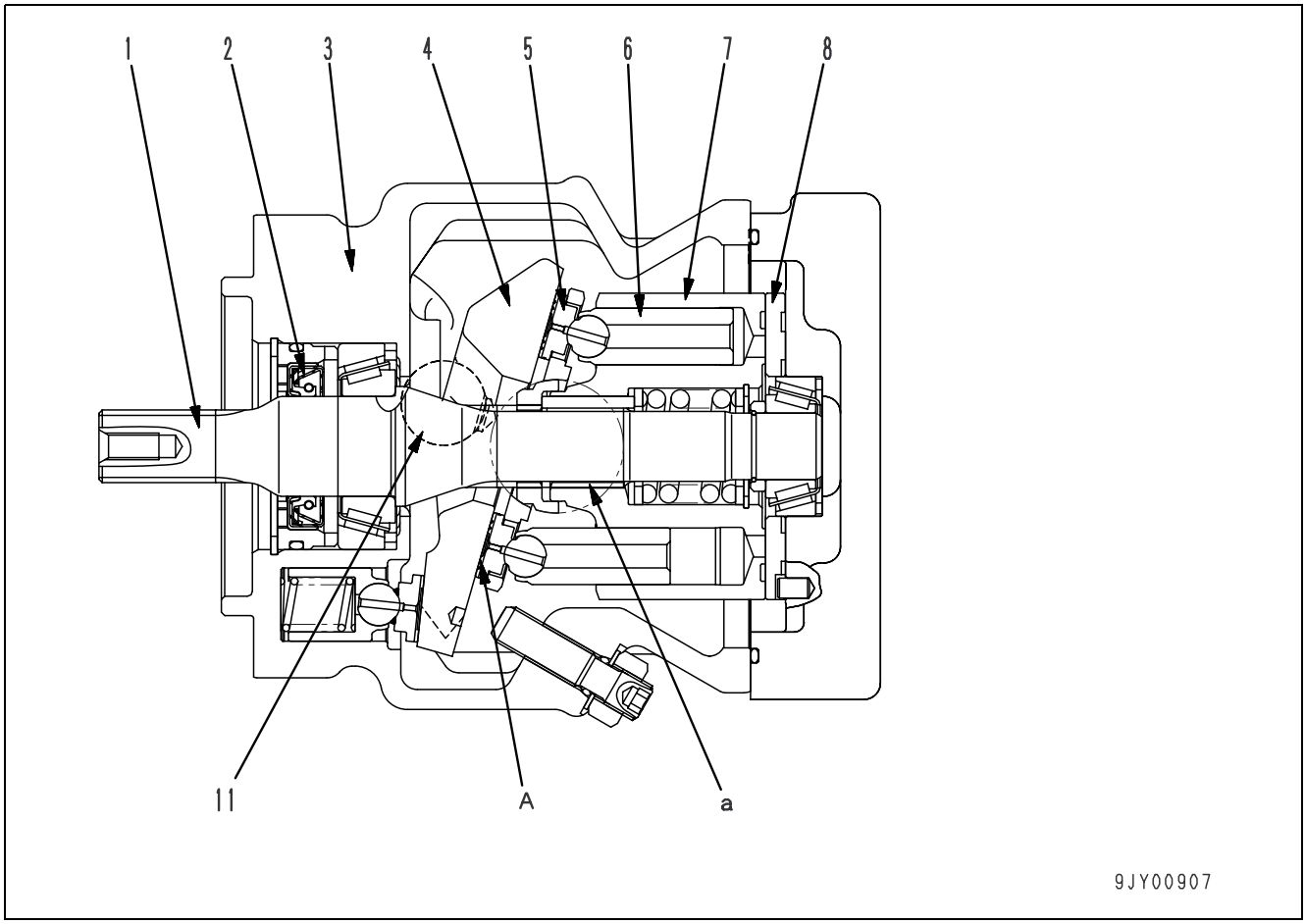
P. EPC valve main pressure
TO. Drain
1. Bleeder
PS. Suction port of pump
PHO. Discharge port of pump

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1. Shaft
2. Oil seal
3. Case
4. Rocker cam
5. Shoe
6. Piston
7. Cylinder block
8. Valve plate
9. Spring
10. Servo piston

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Function

- This pump converts the revolution and torque of the engine transmitted from its shaft into hydraulic energy and discharges hydraulic oil according to the load.
- The discharge amount can be changed by changing the swash plate angle.

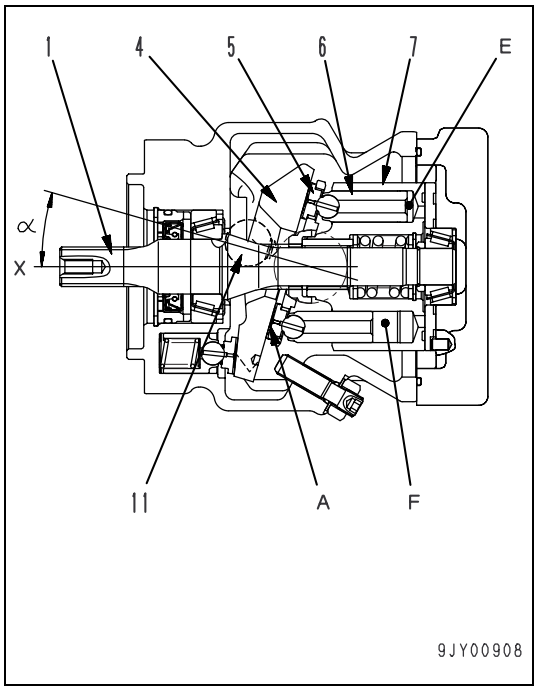
Structure

- Cylinder block (7) is supported on shaft (1) through spline a. Shaft (1) is supported on the front and rear bearings.
- The end of piston (6) has a concave sphere, which holds shoe (5) as a spherical bearing.
- Rocker cam (4) has plane **A**. Shoe (5) is kept pressed against plane **A** and slide circularly. Rocker cam (4) slides around ball (11).
- Piston (6) moves axially and relatively in each cylinder of cylinder block (7).
- Cylinder block (7) revolves relatively against valve plate (8), sealing the hydraulic oil. The hydraulic pressure on the revolving surface of the cylinder block is balanced properly.
- The oil in each cylinder of cylinder block (7) can be drawn and discharged through valve plate (8).

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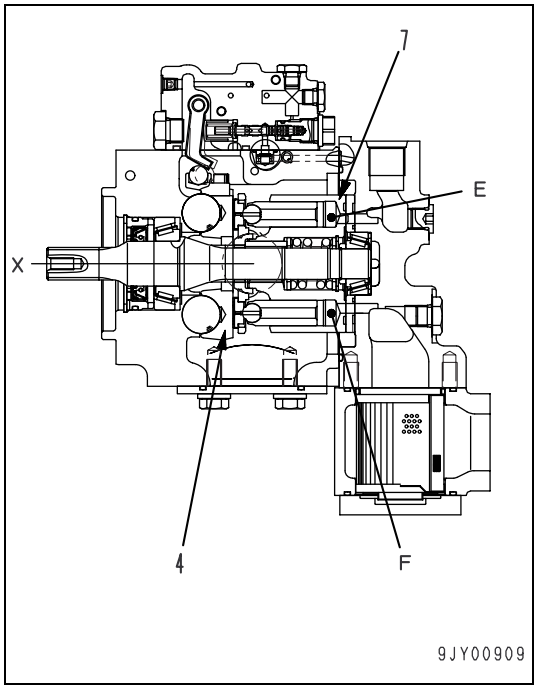
Operation

1. Operation of pump



- Shaft (1) and cylinder block (7) revolve together and shoe (5) slides on plane **A**. As rocker cam (4) slants around ball (11) at this time, angle α between the center line **X** of rocker cam (4) and axis of cylinder block (7) changes. Angle α is called the swash plate angle.
- If the angle between the center line **X** of rocker cam (4) and the axis of cylinder block (7) is α, plane **A** works as a cam for shoe (5).
- Accordingly, each piston (6) slides inside cylinder block (7) and makes difference between volumes **E** and **F** in cylinder block (7) and the oil is drawn and discharged by the difference.
- In short, if cylinder block (7) revolves and volume of chamber **E** is reduced, the oil is discharged. On the other hand, the volume of chamber **F** is increased and the oil is sucked.

  (The figure shows the end of suction process of chamber **F** and the end of discharge process of chamber **E**.)



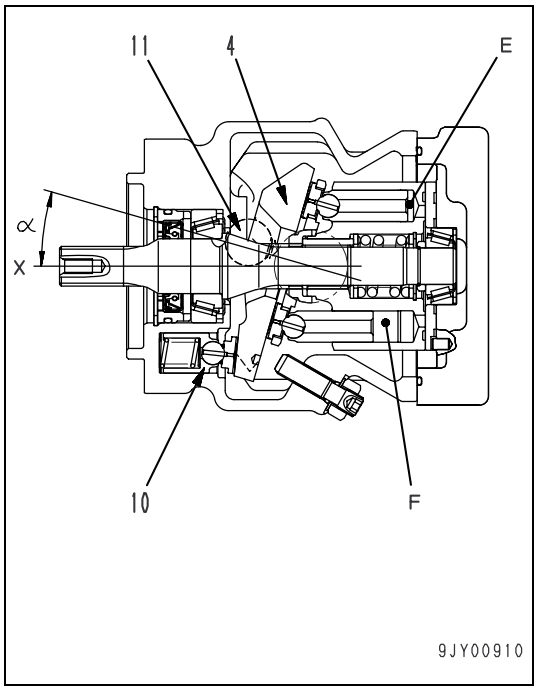
- If center line **X** of rocker cam (4) is in the direction of the axis of cylinder block (7) (Swash plate angle = 0), the difference between volumes **E** and **F** in cylinder block (7) is 0 and oil is not sucked or discharged

  (The swash plate angle is not reduced to 0 actually, however).
- In short, swash plate angle α is in proportion to the discharge of the pump.

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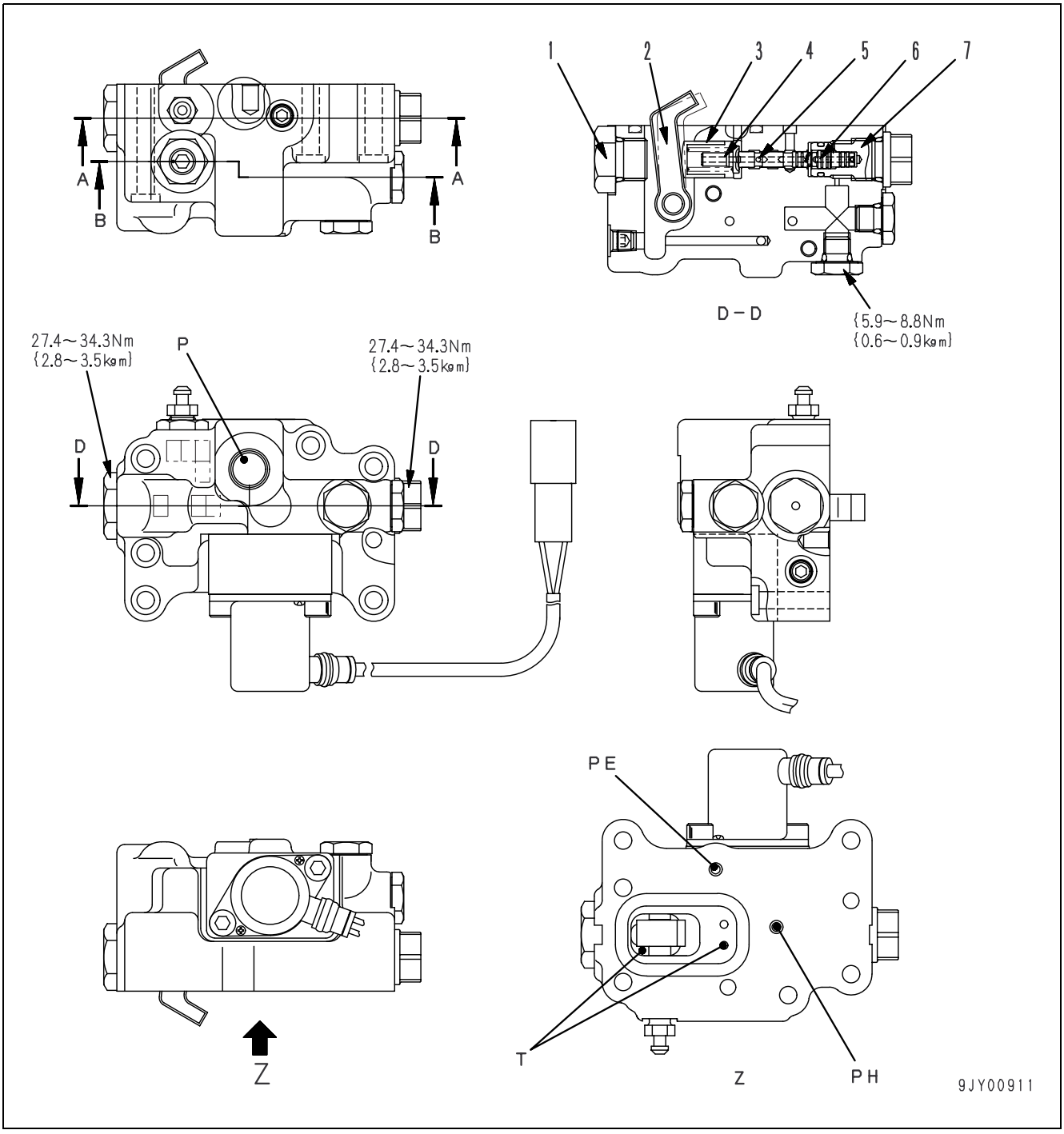
2. Control of discharge

- If swash plate angle α is increased, the difference between volumes **E** and **F**, or discharge **Q**, is increased. Swash plate angle α is changed with servo piston (10).
- Servo piston (10) is reciprocated linearly by the signal pressure of the servo valve. This linear motion is transmitted to rocker cam (4). Rocker cam (4) supported on ball (11) rocks around ball (11).



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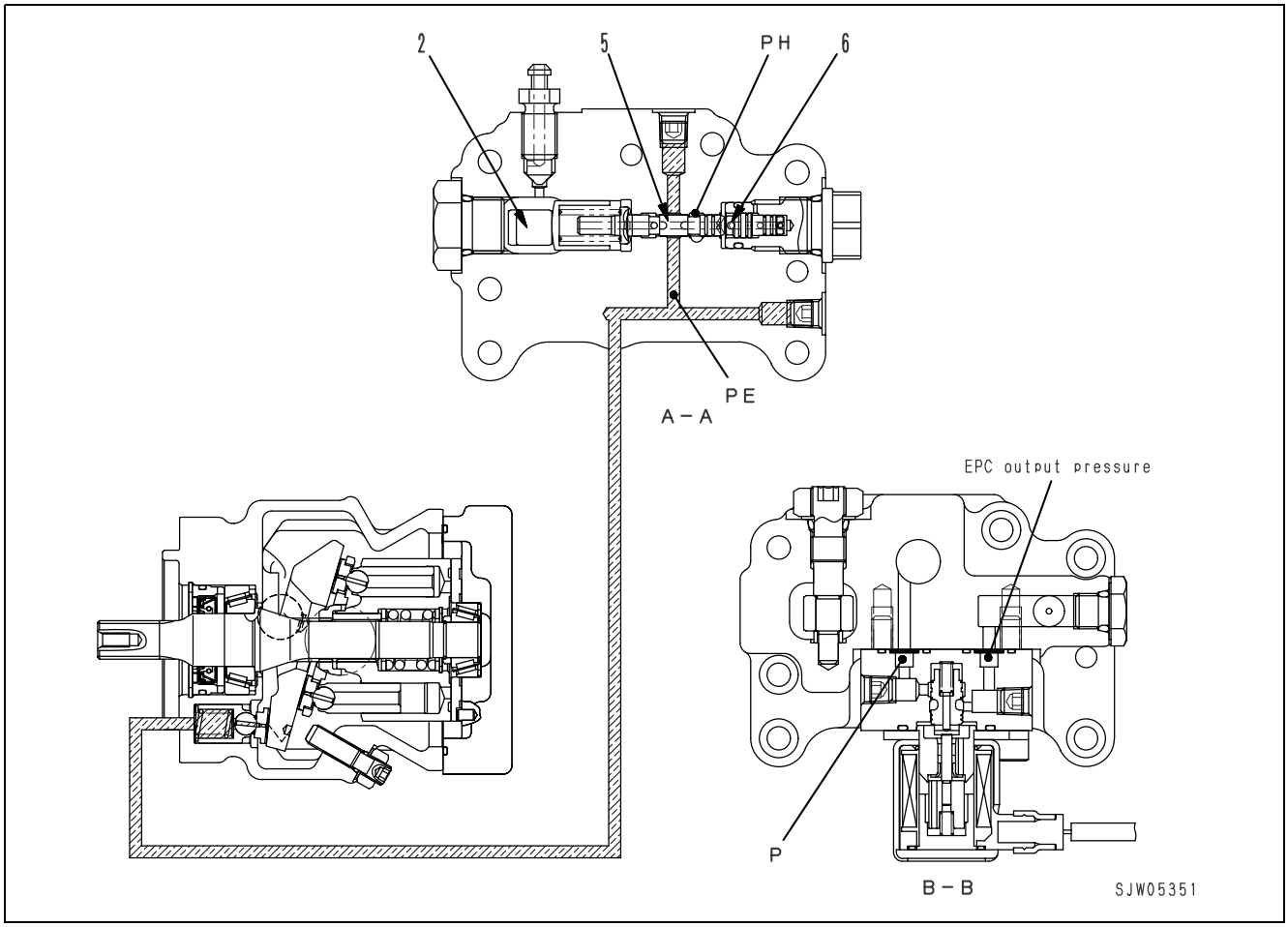
Servo valve



1. Plug
2. Lever
3. Retainer
4. Seat
5. Spool
6. Piston
7. Sleeve

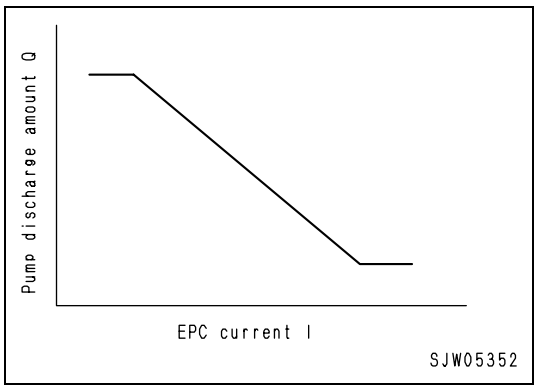
P. EPC valve main pressure
T. Drain
PE. Control piston pressure
PH. Pump discharge pressure

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Function

- The servo valve controls the relationship between the current input to the EPC valve and the swash plate angle as shown below.
- The output oil of the EPC valve flows in the piston chamber to push piston (6). Piston (6) pushes spool (5) until it is balanced with the spring.
- Then, the cut of spool (5) connects the land of the piston pressure path to the pump discharge pressure path and then the discharge oil is sent to the servo piston.
- The servo piston is pushed up by the rocker cam. Then, position feedback is applied and the lever moves in the direction to compress the spring.
- If spool (5) is pushed back, the pump discharge circuit is disconnected from the servo piston circuit and the pressure in the servo piston chamber lowers and then the rocker cam returns toward the maximum swash plate angle.
- These processes are repeated to fix the swash plate to the position at which the EPC output pressure is balanced with the spring force.
- Accordingly, as the EPC output pressure is increased or decreased, the swash plate angle is narrowed or widened.

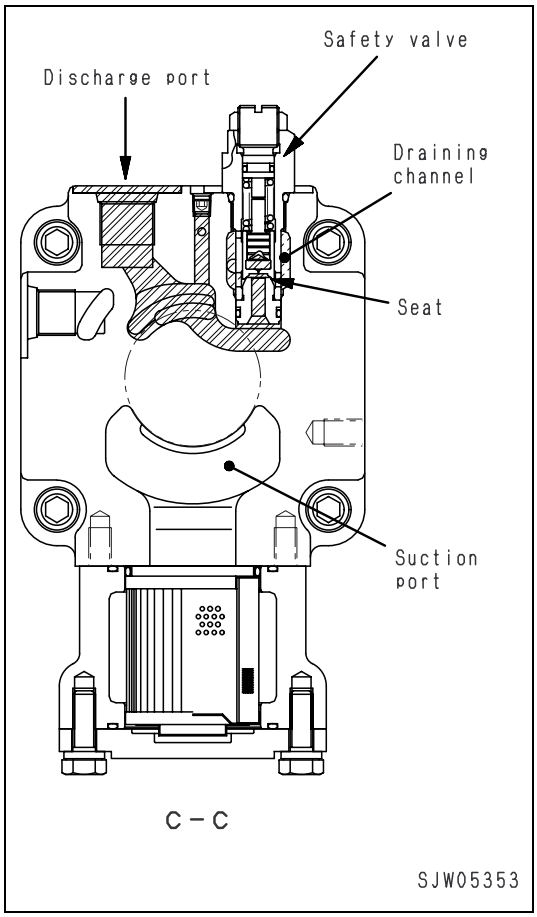


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Safety valve

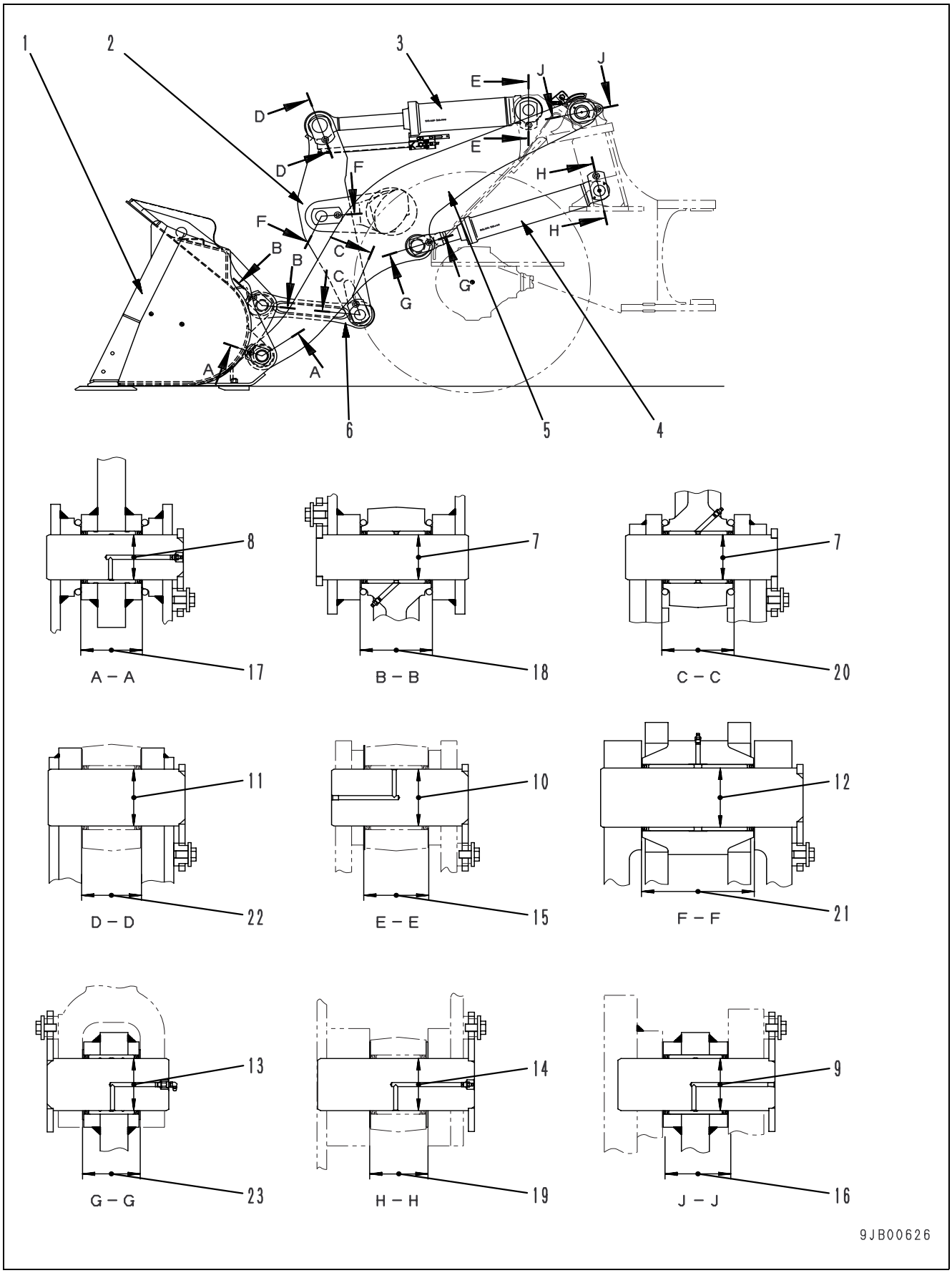
Function

- The discharge pressure of the fan pump rises when the engine is started and when the fan is reversed to stop.
- The safety valve is installed to protect the fan system circuit at these times.
- If the discharge pressure rises above the cracking pressure of the safety valve, the seat of the safety valve opens to release the oil into the drain path to prevent generation of abnormally high pressure in the discharge port.



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Work equipment linkage



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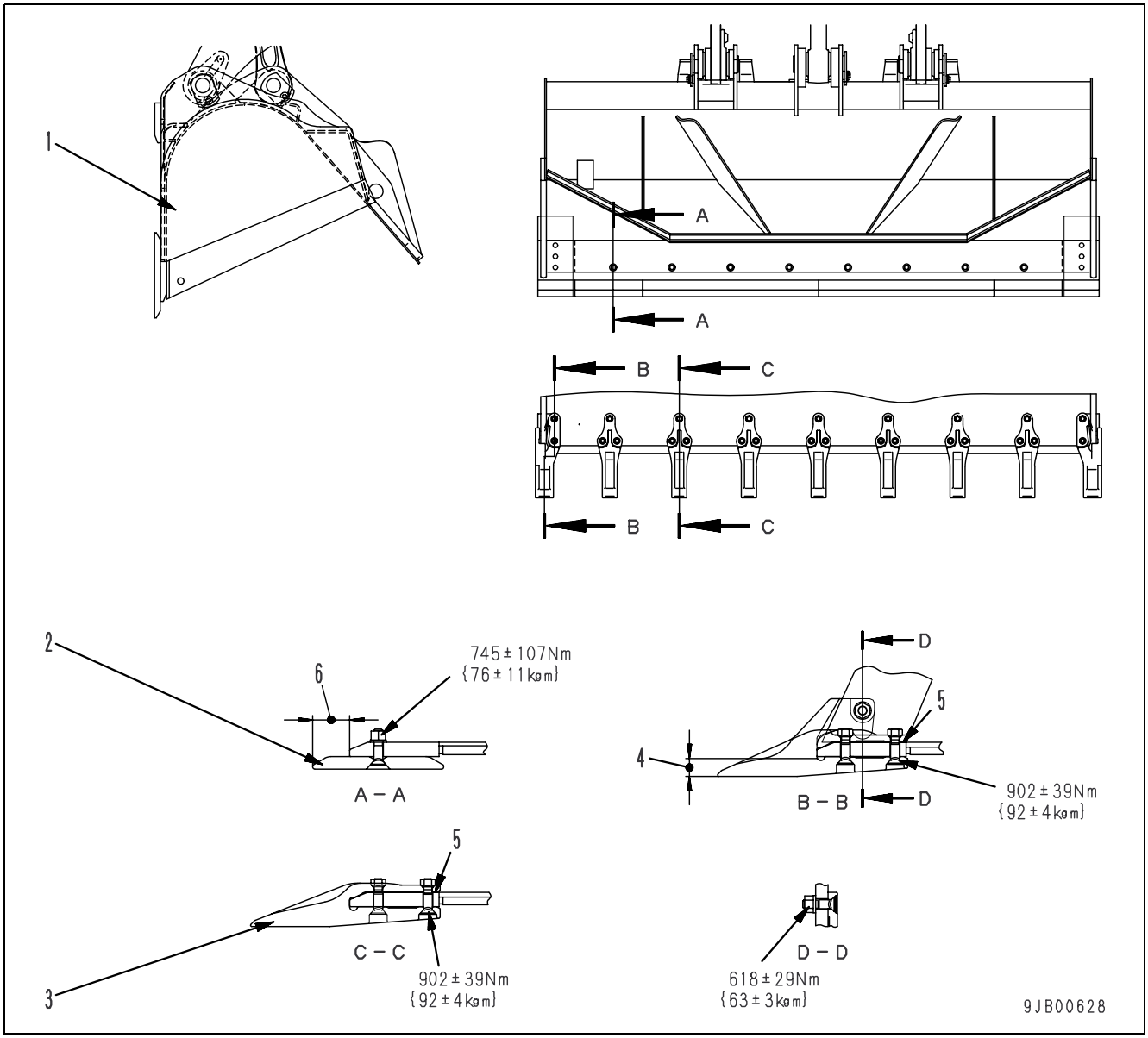
1. Bucket
2. Bell crank
3. Bucket cylinder
4. Boom cylinder
5. Boom
6. Bucket link

Unit: mm

No.	Check item	Criteria					Remedy
7	Clearance between bushing and pin at each end of bucket link	Standard size	Tolerance		Standard clearance	Clearance limit	Replace (Replace if pin has scuff mark)
			Shaft	Hole			
		95	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
8	Clearance between bushing and pin of joint of boom and bucket	95	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
9	Clearance between bushing and pin of joint of boom and frame	110	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
10	Clearance between bushing and pin of joint of bucket cylinder bottom and frame	120	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
11	Clearance between bushing and pin of joint of bucket cylinder rod and lever	120	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
12	Clearance between bushing and pin of joint of bell crank and lift arm	125	-0.043 -0.106	+0.245 +0.145	0.188 ~ 0.351	1.0	
13	Clearance between bushing and pin of joint of boom cylinder rod and frame	110	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
14	Clearance between bushing and pin of joint of boom cylinder bottom and boom	110	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
15	Joint of bucket cylinder and frame	Width of boss		Width of hinge	Standard clearance Clearance of (a + b)		Replace (Insert shims on both sides so that clearance will be 1.5 mm or less on each side)
		125 (0/-0.5)		128 ±0.8	2.2 ~ 4.3		
16	Joint of boom and frame	127 ±2.3		130 (+2.5/0)	0.7 ~ 7.8		
17	Joint of boom and bucket	119 ±2.3		122 (+1.5/0)	0.7 ~ 6.8		
18	Joint of bucket link and bucket	138 (+3/-0.5)		143 (+1.5/0)	2 ~ 7		
19	Joint of boom cylinder and frame	110 (0/-0.5)		115 (+2.5/0)	5 ~ 8		
20	Joint of bell crank and bucket link	138 (+3/-0.5)		143 ±1.5	0.5 ~ 7		Replace
21	Joint of bell crank and boom	220 ±0.5		223 ±0.5	2 ~ 4		
22	Joint of bucket cylinder and bell crank	115 (0/-0.5)		118 ±1.5	1.5 ~ 5.0		
23	Joint of boom and boom cylinder	111 ±2.3		114 ±1.5	0 ~ 6.8		Adjust clearance on each side to 1.5 mm or less

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Bucket



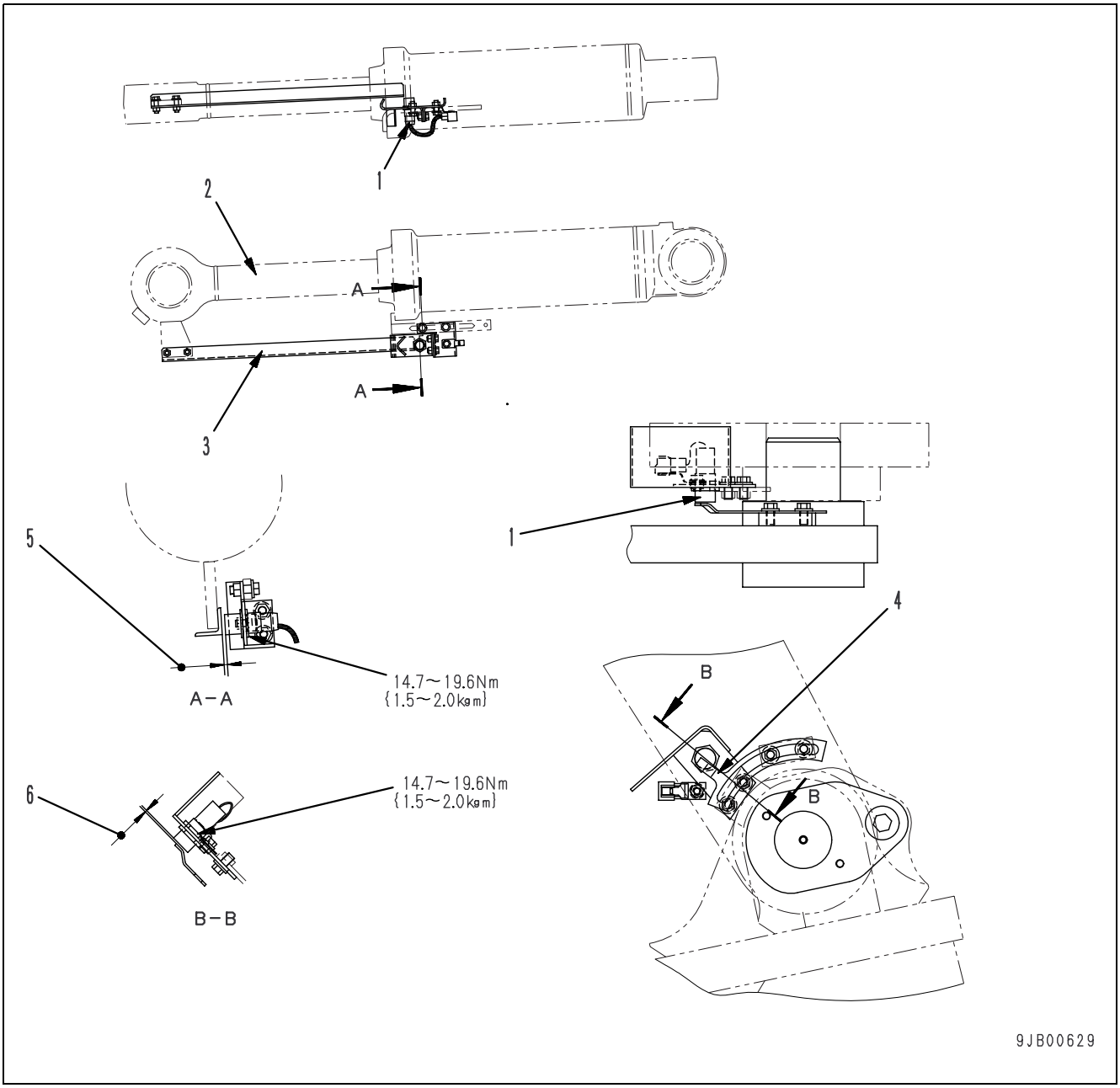
1. Bucket
2. Bolt-on cutting edge
3. Bucket tooth

Unit: mm

No.	Check item	Criteria		Remedy
4	Wear of bucket tooth	Standard size	Repair limit	Replace
		50	18.5	
5	Clearance of fitting part of bucket tooth	Max. 0.5	—	Adjust or replace
6	Wear or cutting edge	93	—	Turn over or replace

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Bucket positioner, lift arm kick-out



1. Proximity switch
2. Bucket cylinder rod
3. Lever
4. Plate

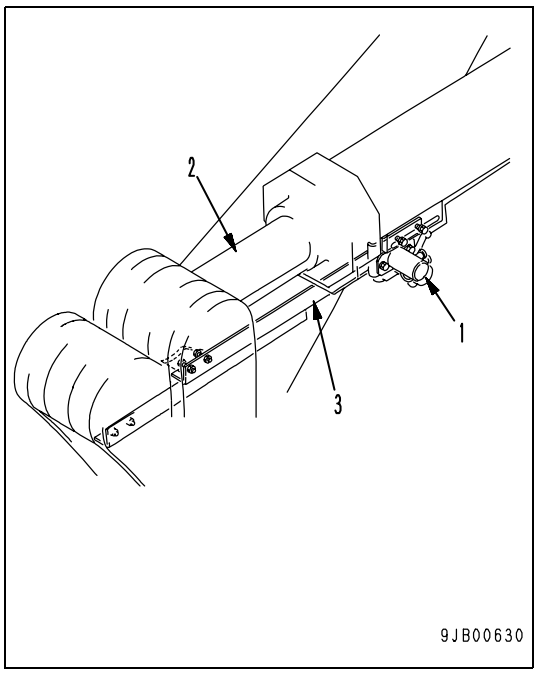
Unit: mm

No.	Check item	Criteria	Remedy
5	Clearance of bucket positioner switch	3 ~ 5	Adjust
6	Clearance of lift arm kick-out switch	3 ~ 5	

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Bucket positioner

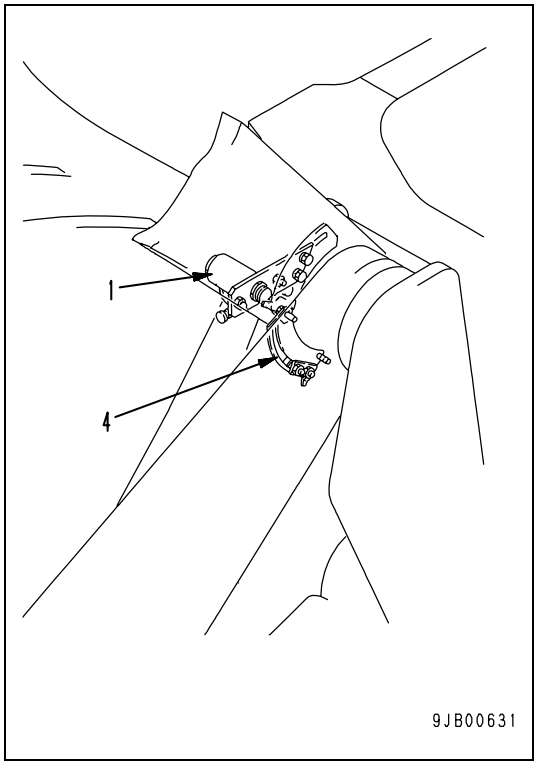
- The bucket positioner is operated electrically and used to return the bucket control lever from the TILT position to the HOLD position to obtain proper digging angle automatically when the bucket is moved from the DUMP position to any bucket angle before the TILT position.
- Lever (3) is bolted to bucket cylinder rod (2) and proximity switch (1) is bolted to the cylinder.
- If the bucket control lever is moved from the DUMP position toward the TILT position, the bucket cylinder rod moves to the front side of the vehicle body and lever (3) moves forward, too. When proximity switch (1) leaves lever (3) at any point, the switch operates to return the bucket control lever to the neutral position.



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Lift arm kick-out

- The boom kick-out is operated electrically and used to return the boom control lever to the hold position to stop the boom when the boom moves to any position before the maximum position.
- Plate (4) is fixed to the boom and proximity switch (1) is fixed to the frame.
- If the boom control lever is moved from the lower position to the raise position, the boom is raised. When the proximity switch and plate come near each other at any point, the switch operates to return the boom control lever to the hold position.

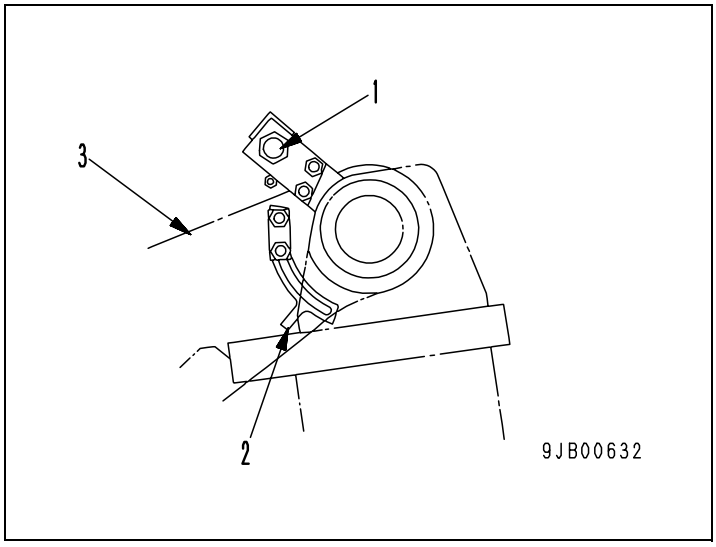


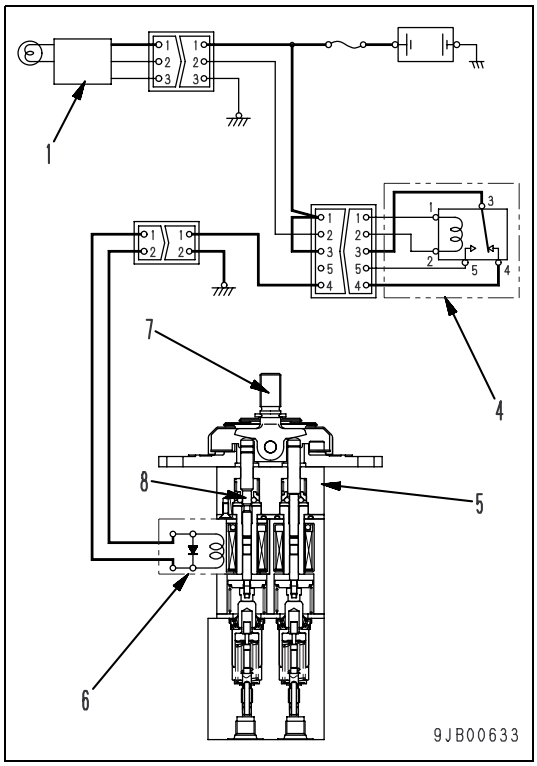
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Operation of proximity switch

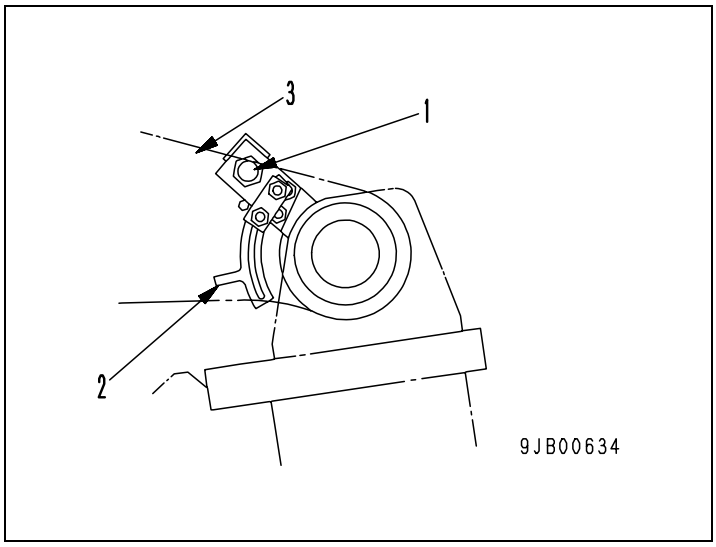
When lift arm is raised

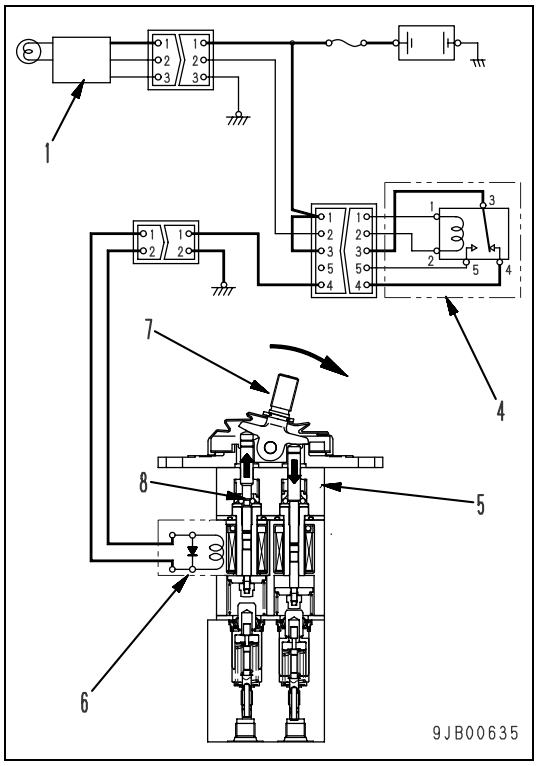
- When lift arm (3) is lower than the set position of the lift arm kick-out, plate (2) is not on the detection plane of proximity switch (1). Lift arm kick-out relay (4) is turned off and the current flows in detent solenoid (6) of PPC valve (5) and the coil is turned on.





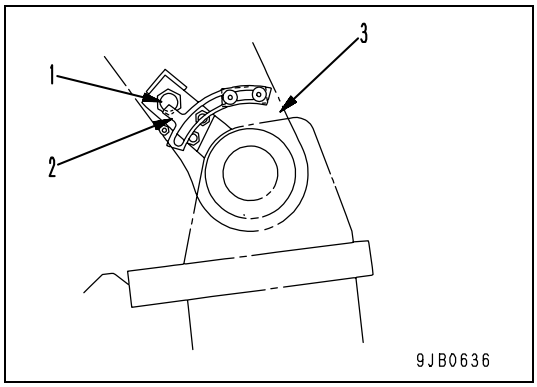
- If lift arm control lever (7) is moved to the raise position, lift arm spool (8) is moved to the position of the arrow and held at that position by the coil turned on by detent solenoid (6). As a result, lift arm control lever (7) is held at the RAISE position and lift arm (3) is raised.





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- If lift arm (3) is raised to the set position of the kick-out, or if plate (2) reaches the detection plane of proximity switch (1), proximity switch (1) lights up and lift arm kick-out relay (4) is turned on. As a result, the circuit of detent solenoid (6) of PPC valve (5) is turned off and the coil is turned off. Accordingly, held lift arm spool (8) receives the reaction force of spring (9) and returns lift arm control lever (7) to the neutral position.



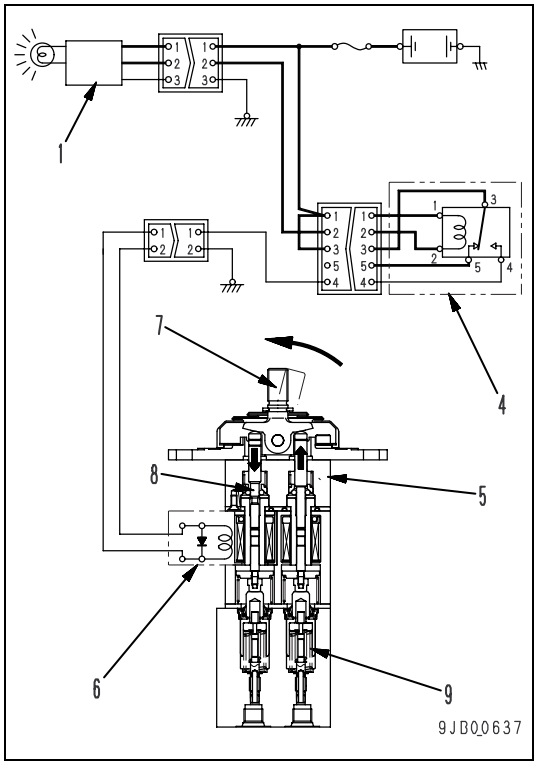
Operation of proximity switch

When part to be detected is apart from detection plane of proximity switch

Pilot lamp of proximity switch	OFF
Lift arm kick-out relay switch circuit	OFF
PPC valve detent solenoid circuit	ON
PPC valve detent solenoid	ON

When part to be detected is on detection plane of proximity switch

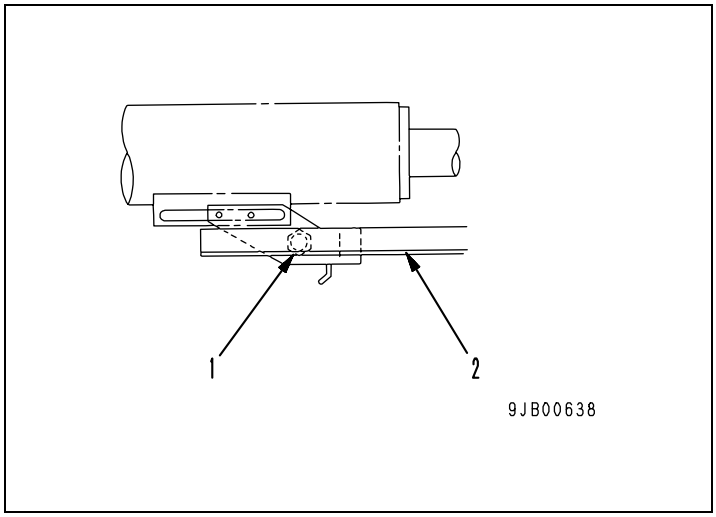
Pilot lamp of proximity switch	ON
Lift arm kick-out relay switch circuit	ON
PPC valve detent solenoid circuit	OFF
PPC valve detent solenoid	OFF

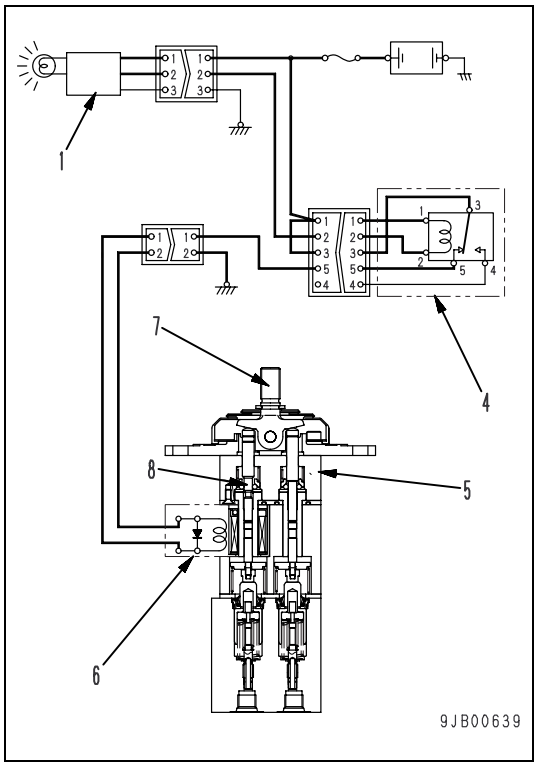


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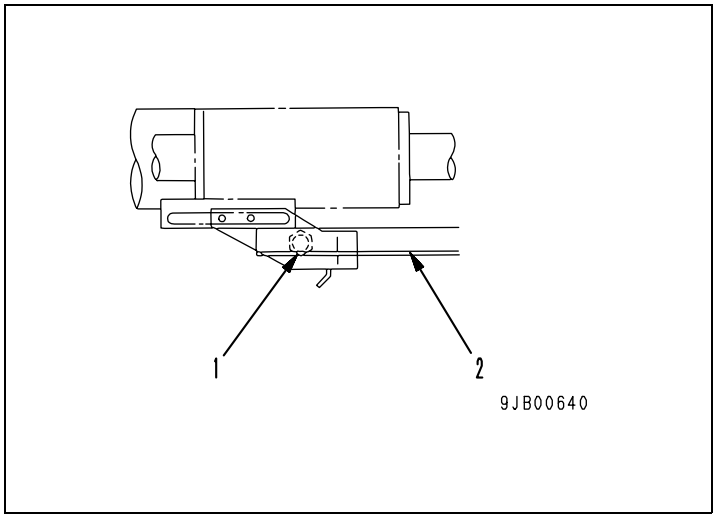
When bucket is tilted

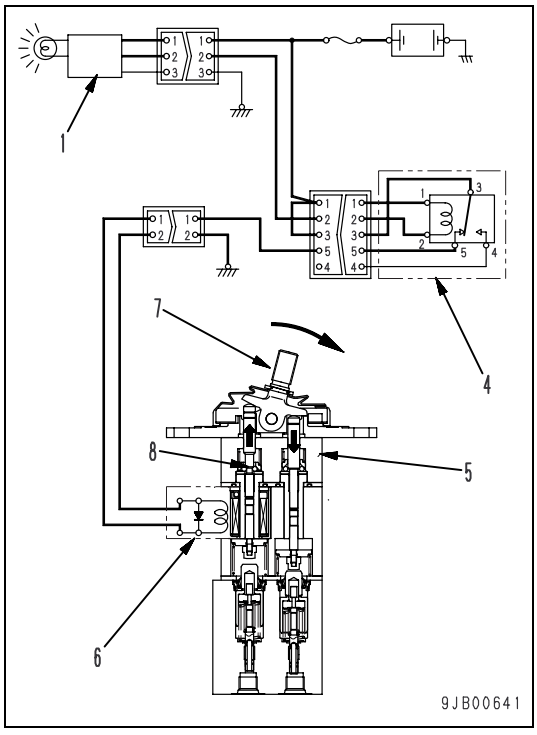
- When the bucket is tilted more than the set position of the bucket leveler, lever (2) is on the detection plane of proximity switch (1) and proximity switch (1) lights up. At this time, bucket positioner relay (4) is turned on and the current flows in detent solenoid (6) of PPC valve (5) and the coil is turned on.





- If bucket control lever (7) is moved to the TILT position, DUMP spool (8) is moved to the position of the arrow and held at that position by the coil turned on by detent solenoid (6). As a result, bucket control lever (7) is held at the TILT position and the bucket is tilted.

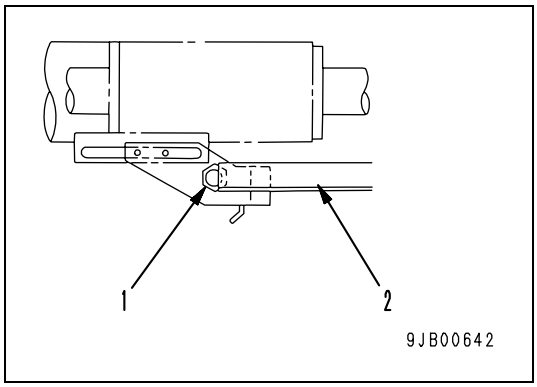




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- If the bucket is tilted to the set position of the bucket leveler, or if lever (2) leaves the detection plane of proximity switch (1), the lamp of proximity switch (1) goes off and boom kick-out relay (4) is turned off. As a result, the circuit of detent solenoid (6) of PPC valve (5) is turned off and the coil is turned off.

  Held dump spool (8) receives the reaction force of spring (9) and returns bucket control lever (7) to the NEUTRAL position.



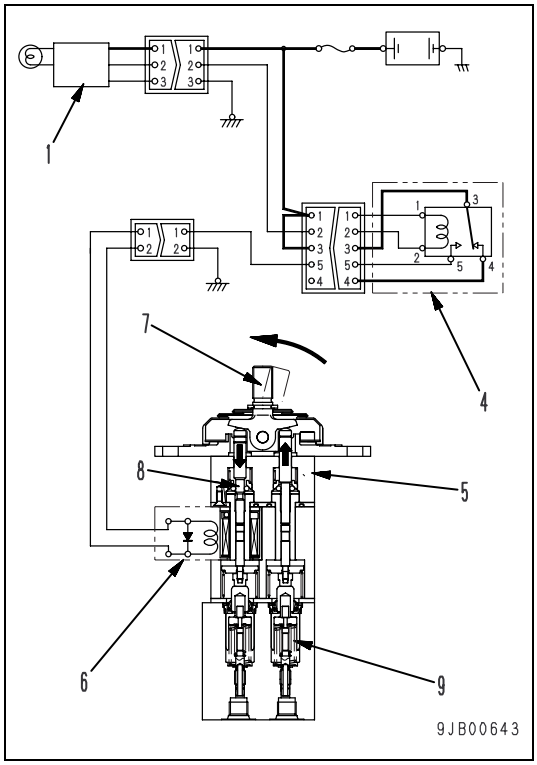
Operation of proximity switch

When part to be detected is apart from detection plane of proximity switch

Pilot lamp of proximity switch	ON
Lift arm kick-out relay switch circuit	ON
PPC valve detent solenoid circuit	ON
PPC valve detent solenoid	ON

When part to be detected is on detection plane of proximity switch

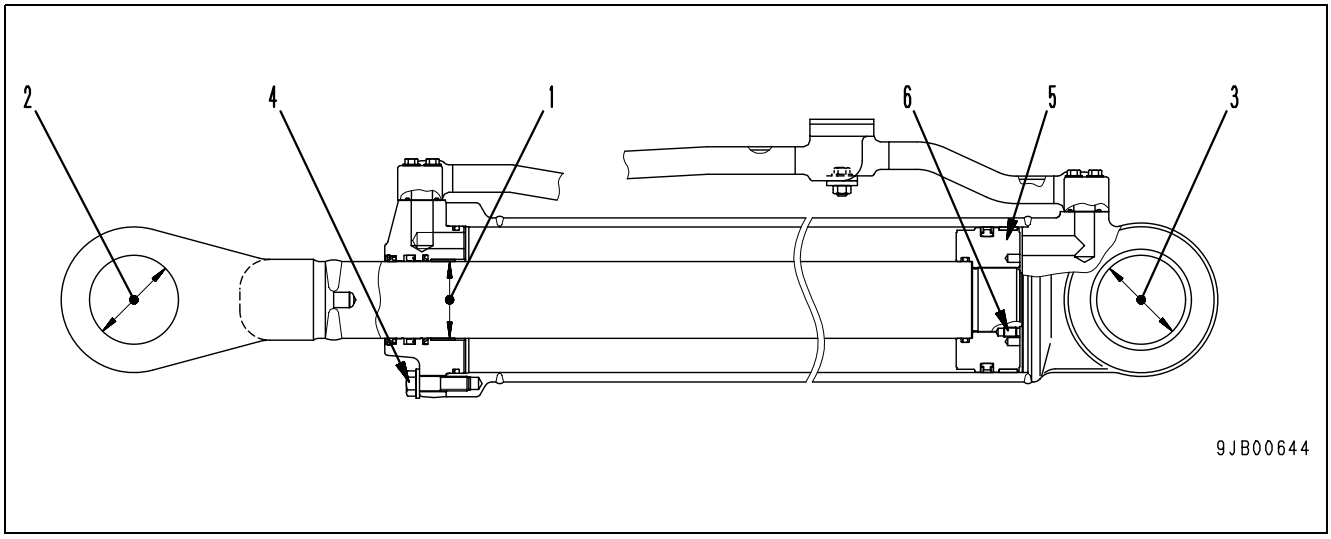
Pilot lamp of proximity switch	OFF
Lift arm kick-out relay switch circuit	OFF
PPC valve detent solenoid circuit	OFF
PPC valve detent solenoid	OFF



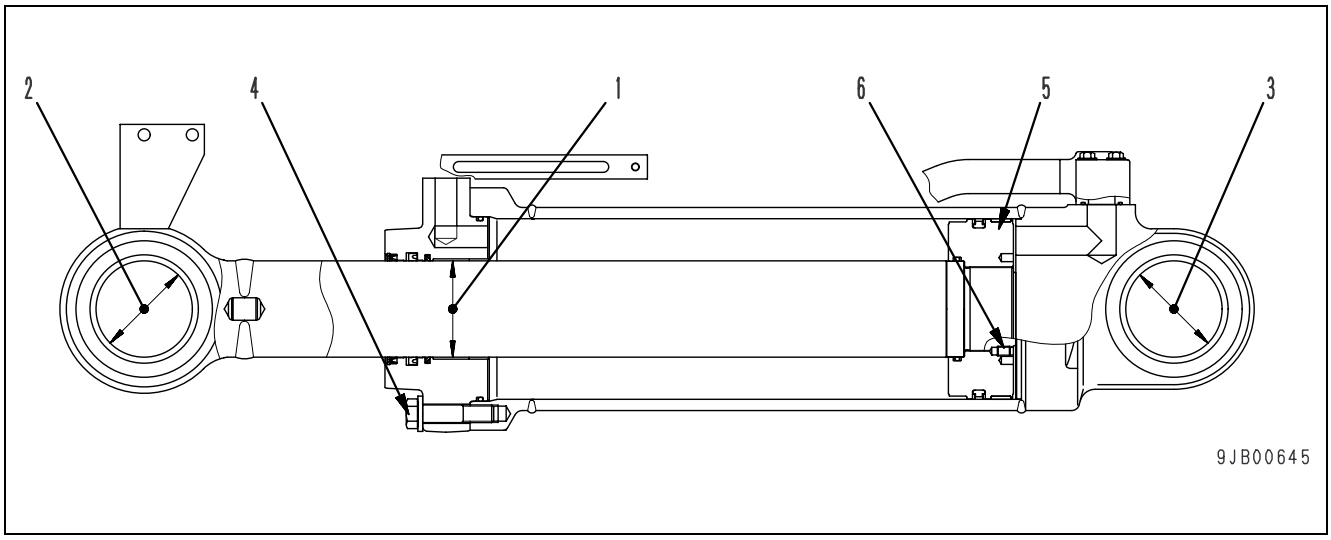
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Work equipment cylinder

Lift arm cylinder



Bucket cylinder



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WA470-5 (Unit: mm)

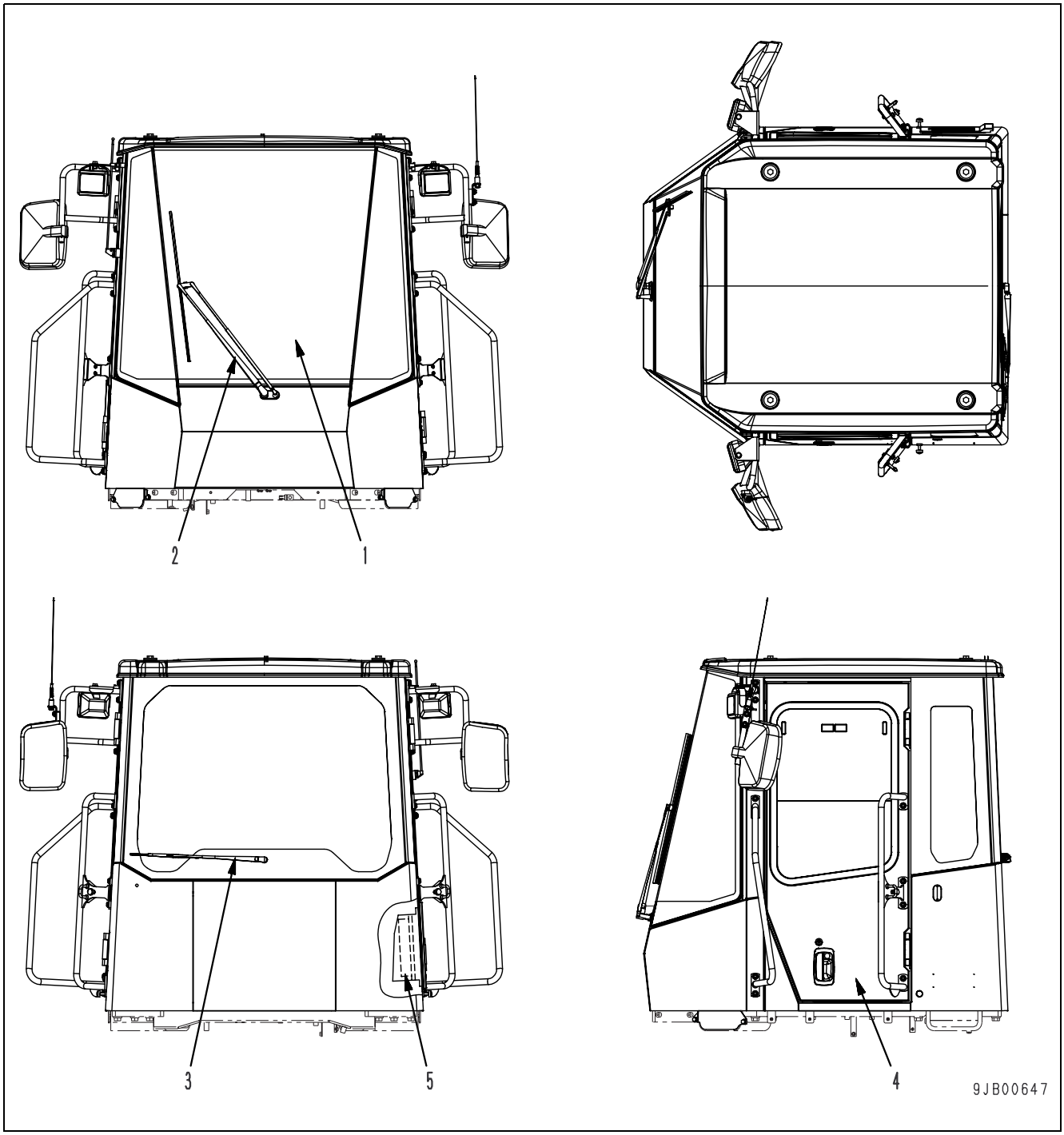
No.	Check item		Criteria					Remedy
		Name of cylinder	Standard size	Tolerance		Standard clearance	Clearance limit	
				Shaft	Hole			
1	Clearance between piston rod and bushing	Boom	ø 95	-0.036 -0.090	+0.222 +0.047	0.083 ~ 0.312	0.612	Replace bushing
		Bucket	ø 100	-0.036 -0.090	+0.257 +0.047	0.083 ~ 0.347	0.647	
2	Clearance between piston rod support shaft and bushing	Boom	ø 110	-0.036 -0.090	+0.35 +0.20	0.236 ~ 0.440	1.0	Replace pin and bushing
		Bucket	ø 120	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
3	Clearance between cylinder bottom support shaft and bushing	Boom	ø 110	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
		Bucket	ø 120	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
4	Tightening torque of cylinder head	Boom	343 ±34 Nm {35 ±3.5 kgm}					Retighten
		Bucket	490 ±49 Nm {50 ±5.0 kgm}					
5	Tightening torque of cylinder piston	Boom	294 ±29.4 Nm {30 ±3.0 kgm}					
		Bucket	294 ±29.4 Nm {30 ±3.0 kgm}					
6	Tightening torque of cylinder piston	Boom	66.25 ±7.35 Nm {6.75 ±0.75 kgm}					
		Bucket	66.25 ±7.35 Nm {6.75 ±0.75 kgm}					

WA480-5 (Unit: mm)

No.	Check item		Criteria					Remedy
		Name of cylinder	Standard size	Tolerance		Standard clearance	Clearance limit	
				Shaft	Hole			
1	Clearance between piston rod and bushing	Boom	ø 95	-0.036 -0.090	+0.222 +0.047	0.083 ~ 0.312	0.612	Replace bushing
		Bucket	ø 120	-0.036 -0.090	+0.263 +0.048	0.084 ~ 0.353	0.653	
2	Clearance between piston rod support shaft and bushing	Boom	ø 110	-0.036 -0.090	+0.35 +0.20	0.236 ~ 0.440	1.0	Replace pin and bushing
		Bucket	ø 120	-0.036 -0.090	+0.307 +0.220	0.256 ~ 0.397	1.0	
3	Clearance between cylinder bottom support shaft and bushing	Boom	ø 110	-0.036 -0.090	+0.207 +0.120	0.156 ~ 0.297	1.0	
		Bucket	ø 120	-0.036 -0.090	+0.307 +0.220	0.256 ~ 0.397	1.0	
4	Tightening torque of cylinder head	Boom	343 ±34 Nm {35 ±3.5 kgm}					Retighten
		Bucket	662 ±73.5 Nm {67.5 ±7.5 kgm}					
5	Tightening torque of cylinder piston	Boom	294 ±29.4 Nm {30 ±3.0 kgm}					
		Bucket	294 ±29.4 Nm {30 ±3.0 kgm}					
6	Tightening torque of cylinder piston	Boom	66.25 ±7.35 Nm {6.75 ±0.75 kgm}					
		Bucket	66.25 ±7.35 Nm {6.75 ±0.75 kgm}					

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Cab (op)

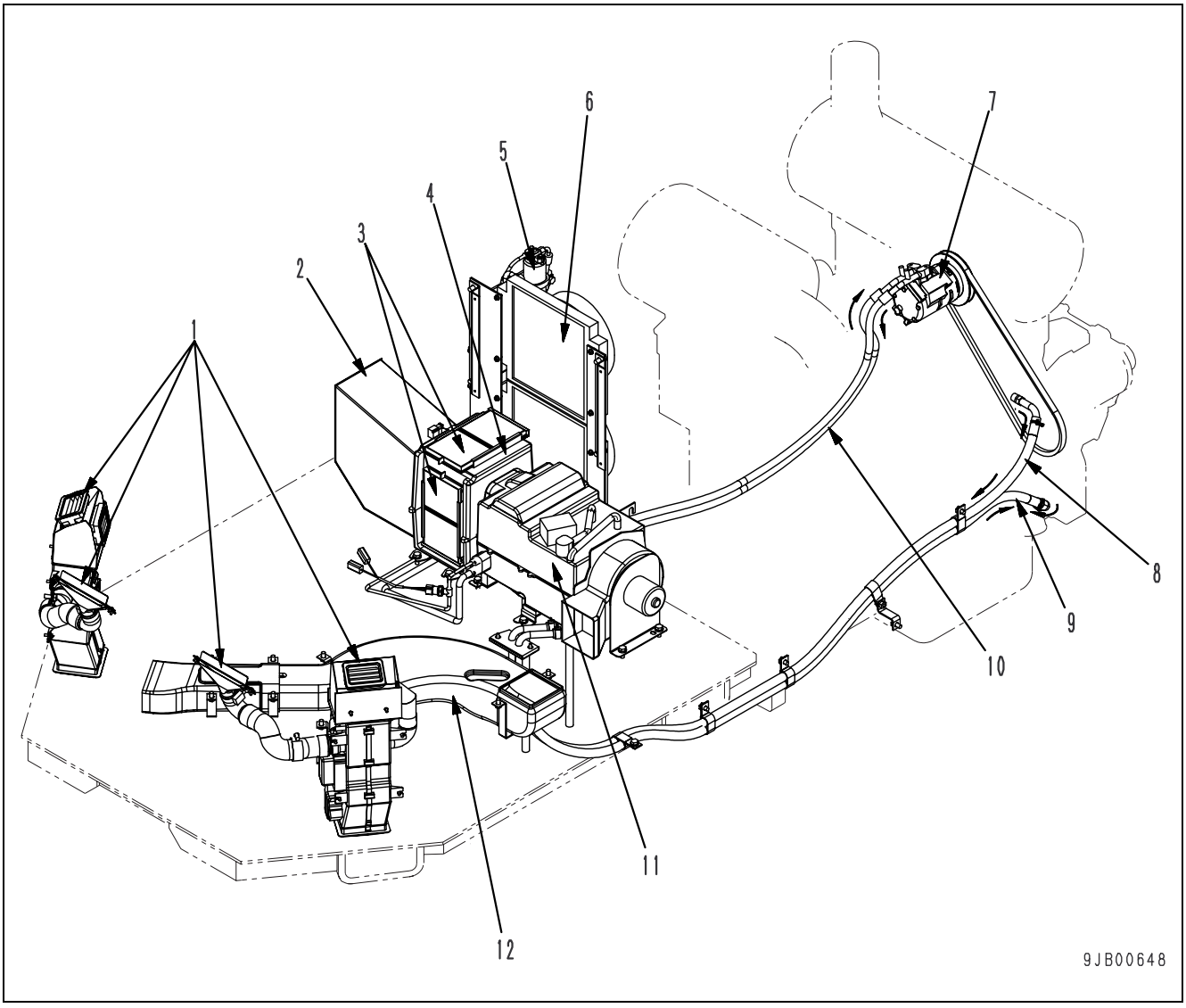


1. Front glass
2. Front windshield wiper
3. Rear windshield wiper
4. Door
5. Air conditioner filter

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Air conditioner (op)

Air conditioner piping



1. Air outlet duct
2. Fresh air suction duct
3. Inside air suction filter
4. Inside-Fresh air changeover damper
5. Receiver tank
6. Air conditioner condenser
7. Compressor
8. Hot water take-out piping
9. Hot water return piping
10. Refrigerant piping
11. Air conditioner unit
12. Floor duct

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Machine monitoring system

Outline

- The machine monitor system uses the sensors and other devices installed to various parts of the machine to observe the condition of the machine. It processes this information swiftly and displays it on the monitor panel to inform the operator of the condition of the machine.
- The machine monitor is available in two different specifications, the standard specification and the load meter specification. As to the load meter specification, machine monitor functions are being supplemented to carry out the necessary load meter calculations and relevant indications, with an optional printer for printing out of the calculated data of the load meter.
- The indications of the machine monitor will be made under the normal mode and under the service mode.
- Normal mode indications are those which are usually being made for ordinary use by the machine operators. The description below applies to the contents of the main indications.

1. Items which are always indicated
    - Meters
      (Travel speedometer or engine tachometer)
    - Gauges (Engine cooling water temperature gauge, torque converter oil temperature gauge, hydraulic oil temperature gauge and fuel level gauge)
    - Pilot indications
    - Service meter

    a. Load meter specification items which are always indicated (Items which are indicated in addition to the standard spec. indications)
        - Weight calculated by the load meter
        - Time

2. Items which will be indicated only when some abnormality occurs
    - Cautions
    - Action code indications (When the machine monitor mode changeover switch (>) is depressed and released while the action code is being indicated, the failure code (6 digits) will be indicated.)

3. When the time comes to change the filter or oil, necessary items for the filter change or oil change will be indicated on the character display. (Maintenance monitoring functions)

4. In addition to the above, this system is equipped with the functions to indicate the travel distance integrating meter (odometer), to reset the filter and oil changing time, to select the telephone number inputting language and to adjust the illuminance of the night time illumination for the machine monitor, by use of the character display and its operation switch, the machine monitor mode changeover switch.

    a. Other functions under the load meter specifications
       With the load meter specification system, functions necessary to make changeovers of the load meter indication mode, to make changeovers of the printer output mode, to execute calibration of the load meter, and to adjust the clock time are being supplemented in addition to the standard specification functions.
        - This machine monitoring system is equipped with the service mode function to facilitate the troubleshooting work for respective controllers (including the machine monitor itself) on the network. The description below applies to the contents of the main functions.

5. Electric fault history
   This function will indicate the electric fault history data of respective controllers being memorized by the machine monitor. Also, it can be used to delete the aforementioned data.

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6. Machine fault history and machine fault history
   This function will indicate the machine fault history and machine fault history data of respective controllers being memorized by the machine monitor.

7. Real time monitor
   This function will make real time indications of the inputting data and outputting data being recognized by respective controllers on the network.

8. Cylinder interruption mode
   This function will be effective to use for purposes such as specifying the particular cylinder which is causing malfunction by interrupting the fuel injection to each cylinder or by cutting off the fuel being injected from the fuel injector.

9. Tuning
   This function is to be used for compensation and adjustment of the installation errors and dispersions in the manufacturing processes of individual parts of sensors, proportional electromagnetic valves.

10. Revising the filter and oil changing time
    This function is to be used for revisions of the preset filter and oil changing time. (Revision of the time for the maintenance monitor operation)

11. Controller initializing function
    This function is being used to effect the settings of this machine monitor before shipment from our factory.

    - Also, the service mode is equipped with the following functions necessary when replacing the machine monitor.

12. Service meter setting
    This function is to be used to make setting of the service meter value being memorized by the machine monitor. However, this setting is valid only toward the direction to increase the current value.

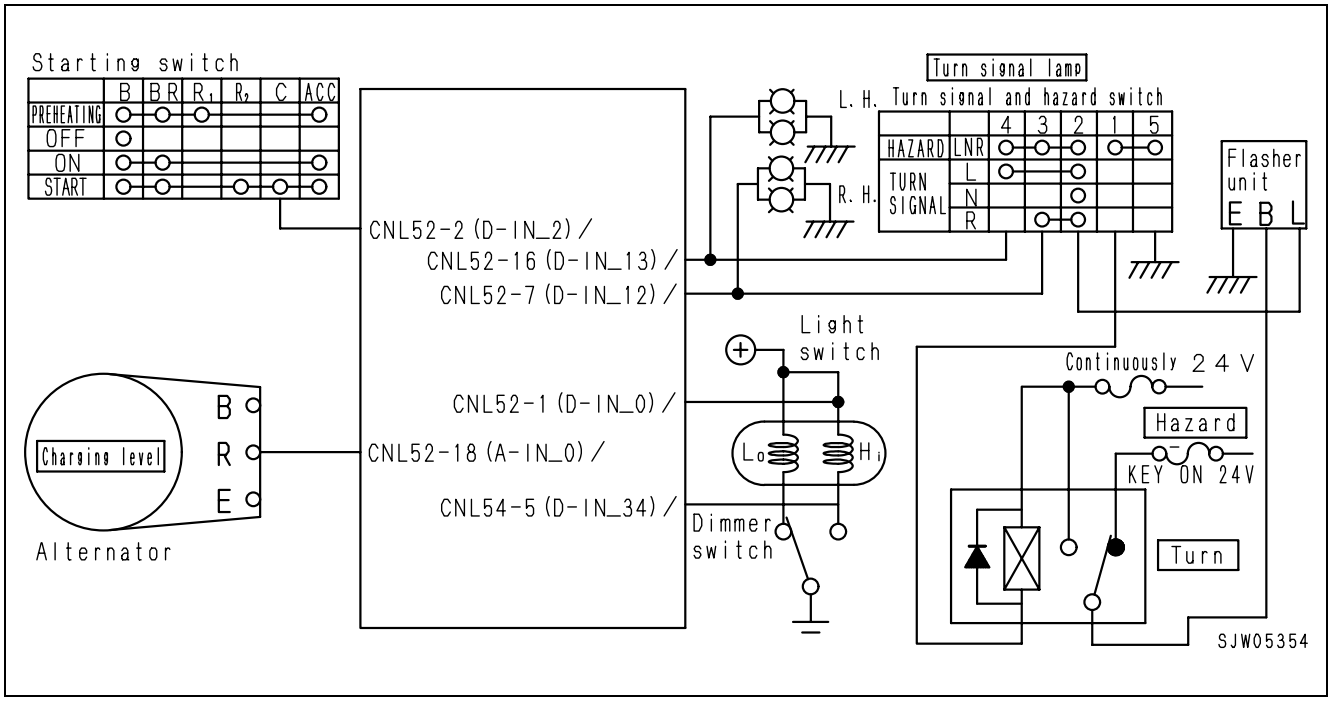
13. Travel distance integrating meter value setting
    This function is to be used to set the travel distance integrating meter value being memorized by the machine monitor. However, this setting is valid only toward the direction to increase the current value.

    - The machine monitoring system consists of the machine monitor proper, buzzer, and switches that are used for inputting data to the machine monitor proper, sensors, respective controller on the network, and relevant switches and sensors.

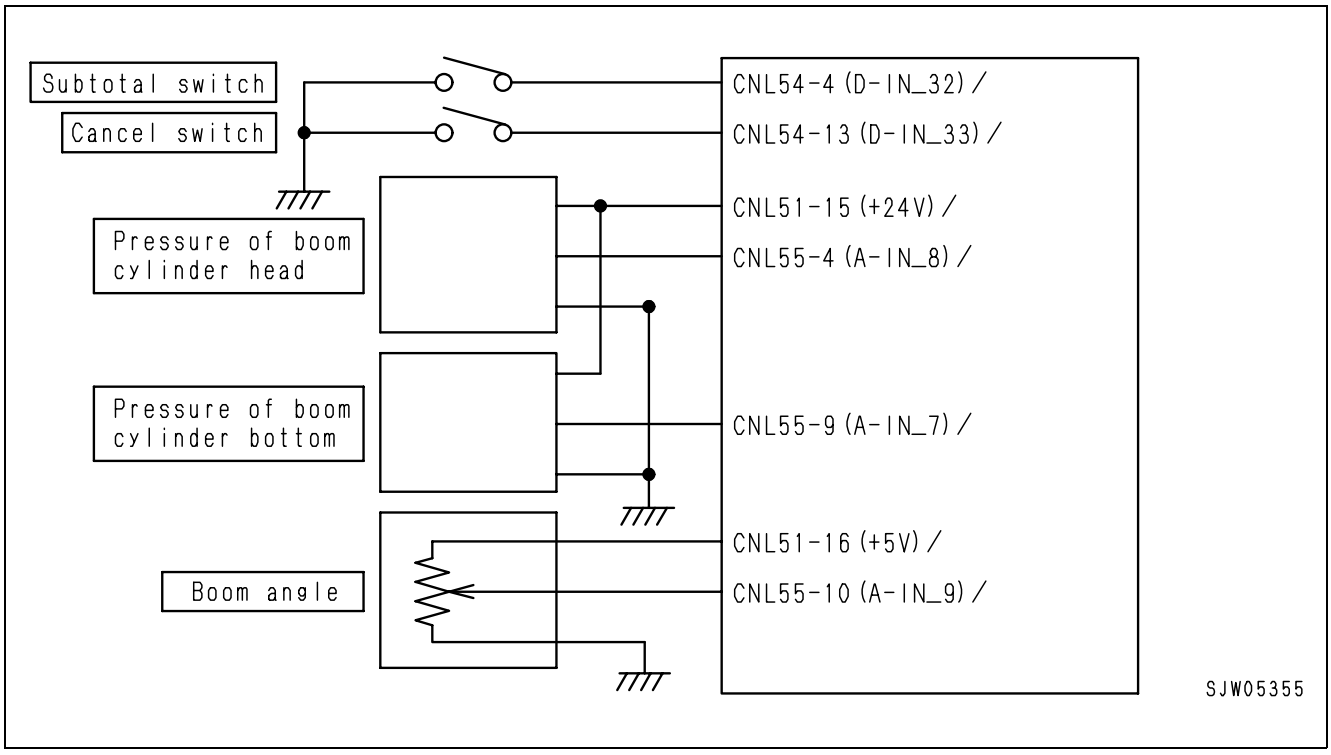
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Individual circuit diagrams of the machine monitor

Starting and lighting functions

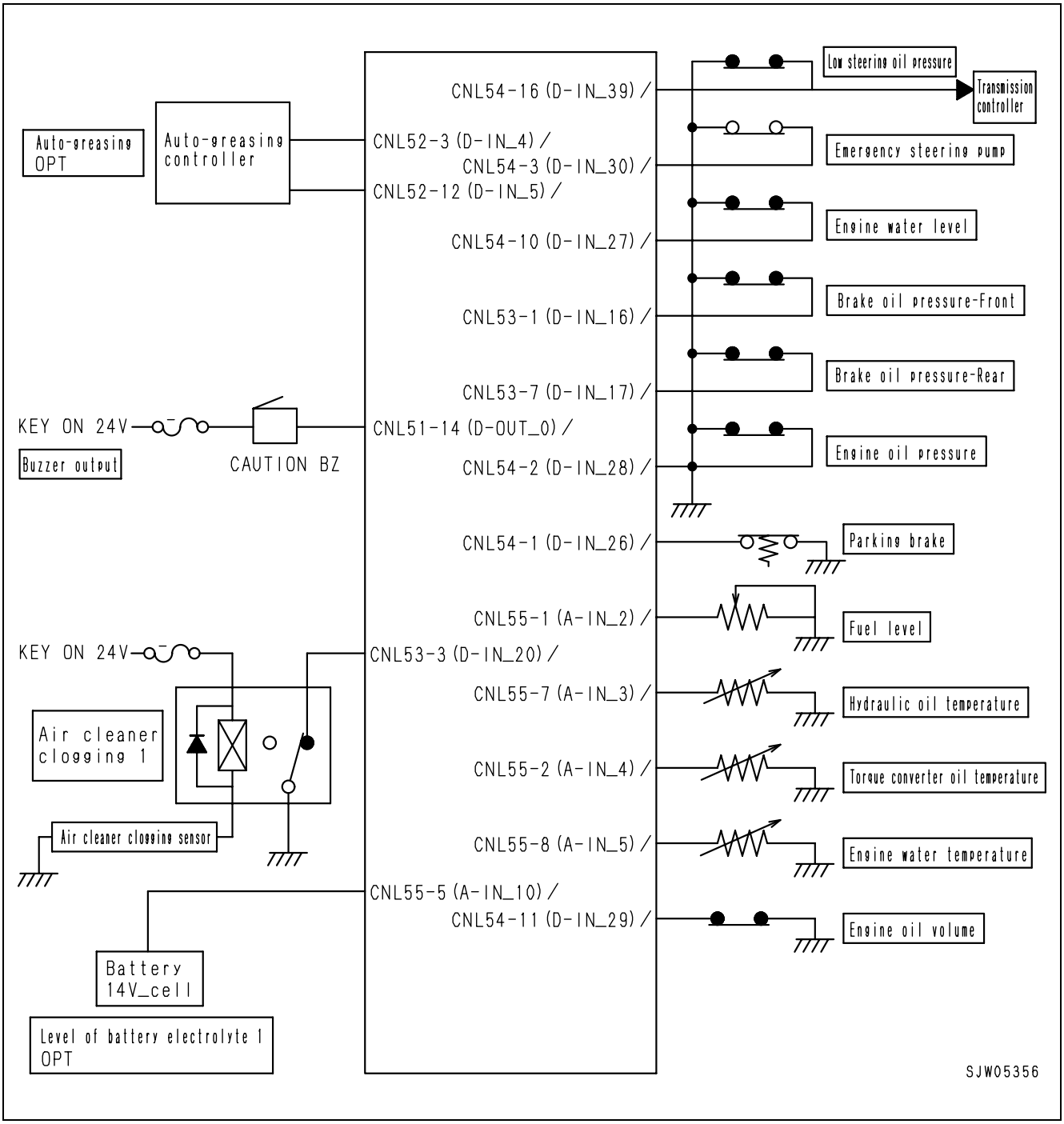


Load meter



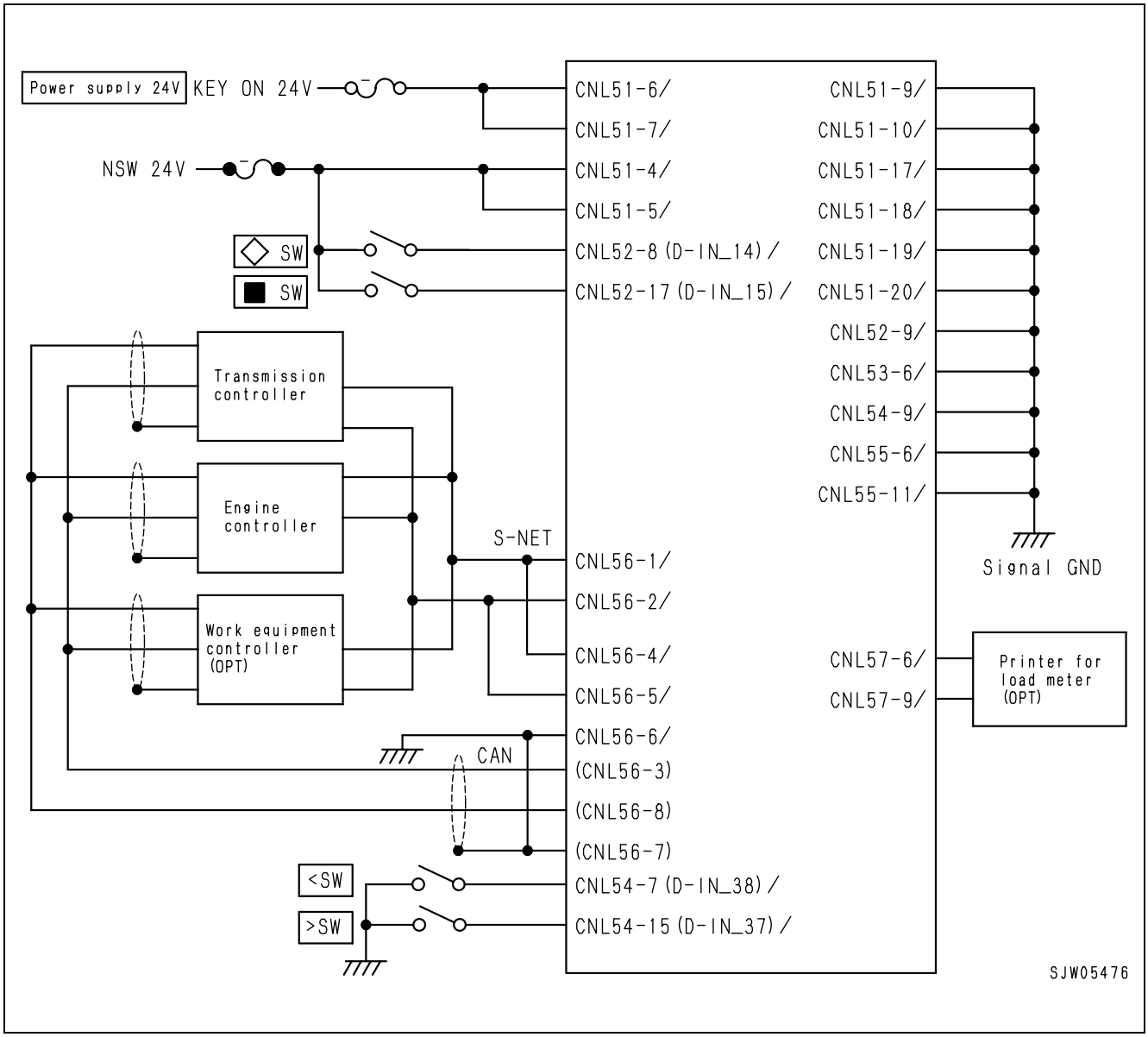
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Sensing functions



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Power supply and network



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S-net output \ S-net input		S-net signal using items			
		Machine monitor	**T/M controller**	**Engine controller**	**Work equipment controller**
Machine monitor	HYD oil temperature		Fan pump control		
	Coolant temperature		Fan pump control		
	T/C temperature		Fan pump control		
	Emergency steering operation signal		Emergency steering self-checks		
	Sensor adjusting mode signal		Compensation		Compensation
	Monitor mode SW signal		Compensation		Compensation
	Automatic pre-heating start signal		Emergency steering self-checks		
	T/M trigger resetting signal		Learning control		
	Machine model selection		Machine model selection		Machine model selection
	Tire selection		Tire selection		Tire selection
	Tire compensation		Tire compensation		Tire compensation
	Controller specification		Communication selection		Communication selection
	Option specification		Option selection		Option selection
	Reduced cylinder mode signal			Reduced cylinder	
	Reduced cylinder command signal			Reduced cylinder	
T/M controller	FNR lever or seesaw SW signal	FNR indications			
	FNR SOL output signal	Actual speed stage indications			
	1, 2, 3 and 4 lever position signals	1 2 3 4 lever positions			
	1, 2, 3 and 4 SOL output signal	Actual speed stage indications			
	FNR seesaw SW selection signal	Indicator			
	T/M hold signal	Indicator			
	Auto-shifting selection signal	Indicator			
	Lock up selection signal	Indicator			
	Travel damper signal	Indicator			
	Fan reversing signal	Indicator			
	Power mode signal	Indicator		Engine mode selection	
	FR changeover signal			Engine stop prevention	
	F signal			Engine stop prevention	
	Trigger learned signal	Hearing control			
	T/M error code	Character inductance			
	Engine revolution signal	Engine tachometer			
	Travel speed signal	Travel speedometer			
	Kick down SW signal				Semi-auto digging
	Kick down mode signal				Semi-auto digging
	Buzzer signal	Operation buzzer			
	I/O state signals	Real time monitor			

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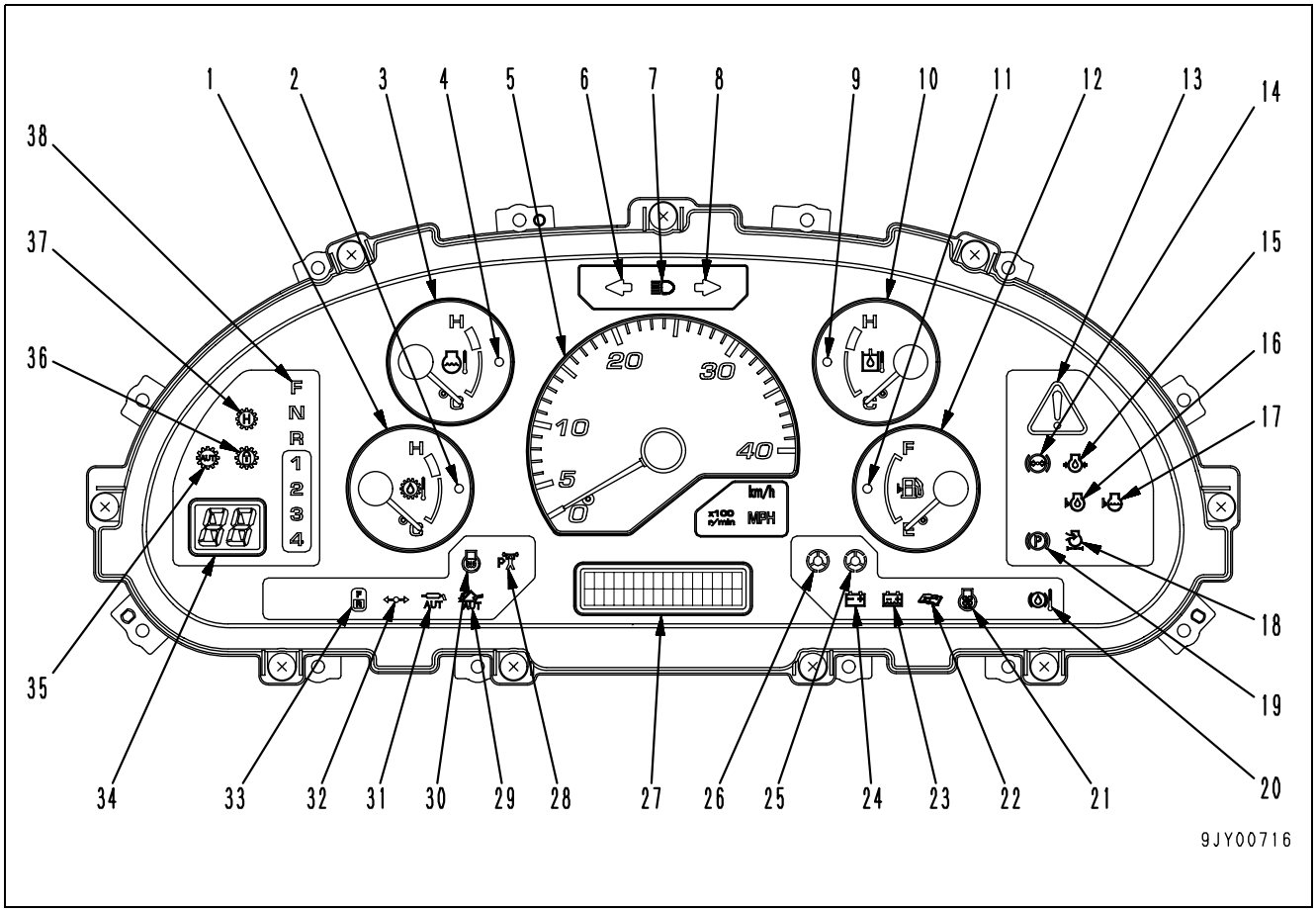
S-net output \ S-net input		S-net signal using items			
		Machine monitor	**T/M controller**	**Engine controller**	**Work equipment controller**
Engine controller	Engine error code	Character indications			
	Fuel consumption (L/H) data	Character indications			
	Reduced cylinder state signal	Reduced cylinder			
	Automatic pre-heating start signal		Emergency steering self check		
	I/O state signals	Real time monitor			
Work equipment controller	Semi-auto digging signal	Indicator			
	Joy-stick neutral signal		Neutral cut		
	Buzzer signal	Operation buzzer			
	I/O status signal	Real time monitor			

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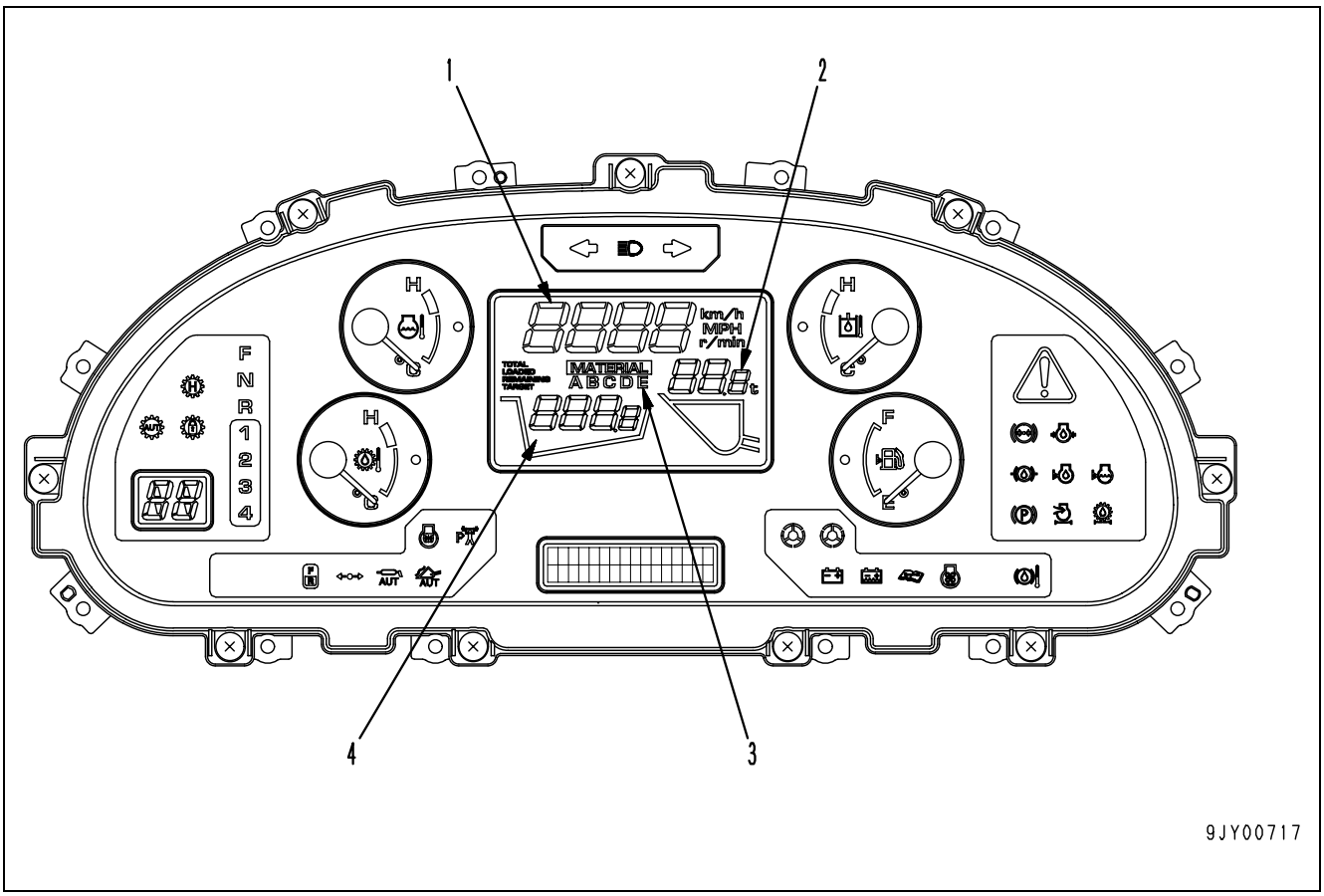
Machine monitor



1. Torque converter oil temperature gauge
2. Torque converter oil temperature caution lamp
3. Engine water temperature gauge
4. Engine water temperature caution lamp
5. Speedometer or engine tachometer
6. Direction indicator pilot lamp (left)
7. Headlamp high beam pilot lamp
8. Direction indicator pilot lamp (right)
9. Hydraulic oil temperature caution lamp
10. Hydraulic oil temperature gauge
11. Remaining fuel level caution lamp
12. Fuel gauge
13. Centralized warning lamps
14. Brake oil pressure caution lamp
15. Engine oil pressure caution lamp
16. Engine oil level caution lamp
17. Engine water level caution lamp
18. Air cleaner caution lamp
19. Parking brake pilot lamp
20. Brake oil temperature caution lamp
21. Fan reverse rotation pilot lamp
22. Maintenance caution lamp
23. Battery fluid level caution lamp
24. Battery charge caution lamp
25. Steering oil level drop caution lamp
26. Emergency steering pilot lamp
27. Character display
28. Engine mode pilot lamp
29. Semi-auto digging pilot lamp
30. Pre-heating pilot lamp
31. Auto greasing pilot lamp
32. Joy-stick pilot lamp
33. FRN changeover pilot lamp
34. Shift indicator
35. Auto shifting pilot lamp
36. Lock up pilot lamp
37. Shift hold pilot lamp
38. Shift lever position pilot lamp

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Load meter specifications (option)



1. Speedometer or engine tachometer
2. Bucket loading weight
3. Load type
4. Addition mode: Total loading weight
   Subtraction mode: Indication of remaining quantity to the targeted load

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Table of monitor indication items

Determination conditions if the engine is in operation:
The engine is to be deemed in operation when 2 of the following 3 conditions are being established.

1. Charge is normal.
2. Engine oil pressure is normal.
3. History of occurrence of IGN_C = 24V when the starting key was turned is being registered.

○ Turns on.

◎ Flashes. (1.6sec 50% Duty)

✧ Intermittent (Cycle 240msec. ON 80msec. OFF 160msec.)

☐ According to separately set conditions.

Category	No.	Items	Device	Night time dimming ○: Occurs. —: Does not occur.	Operating conditions	Operation status								Indication color	Remarks
						Engine stopped				Engine in operation					
						Warning buzzer	Individual indications	Concentrated warning	Message indication	Warning buzzer	Individual indications	Concentrated warning	Message indication		
Concentrated warning lamp	13	Concentrated warning lamp	LED	○	When an error occurs	☐	☐	☐	☐	☐	☐	☐	☐	Red	To be turned on by respective controllers and message will be indicated simultaneously.
					Other cases than above	—	—	—		—	—	—		—	
Back light	—	Back light	LED	○	When the small lamp is turning ON	—	—	—		—	—	—		Orange	
	5	Engine revolution	Pointer: Movement	—		—	—	—		—	—	—		—	The status will be maintained until the starting key is turned OFF when a communication error is occurring.
		Travel speed	(Can be switched over between the engine revolution.)	—		—	—	—		—	—	—			"0" will be indicated in case of communication error.
	11 12	Fuel quantity	Pointer: Movement Indicator: LED	○	Other cases than below	—	—	—		—	—	—		—	
					80 Ω or more	—	○	—		—	○	—		Red	
	10 9	Hydraulic oil temperature	Pointer: Movement Indicator: LED	○	Other cases than below	—	—	—		—	—	—		—	White range: 50 - 110°C Red range: 110 - 135°C
					Warning: 110°C or more	◎	○	○	B@HANS	◎	○	○	B@HANS	Red	
					When abnormality is detected	—	—	—	DGH2KX	—	—	—	DGH2KX	—	
	3 4	Engine water temperature	Pointer: Movement Indicator: LED	○	Other cases than below	—	—	—	—	—	—	—	—	—	White range: 50 - 102°C Red range: 102 - 135°C
					Warning: 102°C or more	—	○	—	—	—	○	—	—	Red	
					Warning: 105°C or more	◎	○	○	B@BCNS	◎	○	○	B@BCNS	Red	
					When abnormality is detected	—	—	—	DGE2KX	—	—	—	DGE2KX	—	
	1 2	Torque converter oil temperature	Pointer: Movement Indicator: LED	○	Other cases than below	—	—	—	—	—	—	—	—	—	White range: 50 - 120°C Red range: 120 - 135°C
					Warning: 120°C or more	—	○	—	—	—	○	—	—	Red	
					Warning: 130°C or more	◎	○	○	B@BCNS	◎	○	○	B@BCNS	Red	
					When an abnormality is detected	—	—	—	DGE2KX	—	—	—	DGE2KX	—	
Unit	—	Engine revolution	LED	○	Turns on when the engine revolution is selected under the service mode option	—	—	—		—	—	—		Green	X r/min
	—	Travel speed	LED	○	To be set to by use of the rotary SW on the monitor while engine revolution is not being selected	—	—	—		—	—	—		Green	km/h or MPH

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Category	No.	Items		Device	Night time dimming ○: Occurs. —: Does not occur.	Operating conditions	Operation status: Engine stopped: Warning buzzer	Engine stopped: Individual indications	Engine stopped: Concentrated warning	Engine stopped: Message indication	Engine in operation: Warning buzzer	Engine in operation: Individual indications	Engine in operation: Concentrated warning	Engine in operation: Message indication	Indication color	Remarks
Speed shifting operations	34	Actual gear shift stage		9 segment LED	—	Upper digits: F, N, R Lower digits: Speed stages Indication will be maintained until the starting key is turned OFF when a combination error has occurred.	—	—	—		—	—	—		—	Speed stage indication will not be made while at the "N" stage.
	38	Shift lever positions	F		○	"F" is being selected (Neutral safety indication when engine is stopped)	✧	○	○	As indicated at right	—	○	—		Green	Normally (Without J/S steering & RH F*N*R signal): DDK6M When J/S steering is being selected: DDK1KM When RH F*N*R is being selected: DDKBKM Indication will be maintained until the starting key is turned OFF when a combination error has occurred.
			N		○	"N" is being selected	—	○	—		—	○	—		Orange	
			R		○	"R" is being selected (Neutral safety indication when engine is stopped)	✧	○	○	As indicated at right	—	○	—		Green	
			4		○	When the 4th speed is being selected	—	○	—		—	○	—		Green	
			3		○	When the 3rd speed is being selected	—	○	—		—	○	—		Green	
			2		○	When the 2nd speed is being selected	—	○	—		—	○	—		Green	
			1		○	When the 1st speed is being selected	—	○	—		—	○	—		Green	
							—	—	—		—	—	—		—	
	35	Auto-shift		LED	○	When auto-shift is being selected	—	○	—		—	○	—		Green	Indication will be maintained until the starting key is turned OFF when a combination error has occurred.
						Other cases than above	—	—	—		—	—	—		—	
	37	Shift hold		LED	○	When auto-shift and shift hold is being selected	—	○	—		—	○	—		Green	Indication will be maintained until the starting key is turned OFF when a combination error has occurred.
						Other cases than above	—	—	—		—	—	—		—	
	36	Torque converter lock up (Optional)		LED	○	When the lock up function is in operation	—	—	—		—	○	—		Green	The LED will not turn on in case of machines without lock up mechanism. Indication will be maintained until the starting key is turned OFF when a combination error has occurred.
						Other cases than above	—	—	—		—	—	—		—	
Other symbols	6 8	Direction indicator		LED	○	When blinker SW is being turned ON (including the time when the starting key is turned OFF)	—	○	—		—	○	—		Green	Interlocked with the blinker SW ((Hazard lamp) will also be turned ON when the starting key is turned OFF.)
	7	High beam		LED	○	When high beam is being turned ON (When the headlamp is turned ON and, also, when the high beam is turned ON)	—	○	—		—	○	—		Blue	
	24	Battery charge		LED	○	Normal voltage	—	—	—		—	—	—		—	When the abnormality was detected while the engine is stopped, the alarm will continue after starting the engine also.
						Charging trouble					◎	○	○	AB00AMA	Red	
						When an abnormality is detected	◎	○	○	AB00L6	—	—	—		Red	
	16	Engine oil quantity		LED	○	Normal oil level (CLOSE)	—	—	—						—	Low oil level alarm is sounded when the starting key is turned ON, and the alarm continues after the engine is started.
						Oil level is low (OPEN)	—	○	—	B@BAZK	—	—	—		Red	
	17	Engine coolant level		LED	○	Normal coolant level (CLOSE)	—	—	—						—	
						Coolant level is low (OPEN)	—	○	—	B@BCZK	—	—	—	B@BCZK	Red	

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Category	No.	Items	Device	Night time dimming ○: Occurs. —: Does not occur.	Operating conditions	Operation status								Indication color	Remarks
						Engine stopped				Engine in operation					
						Warning buzzer	Individual indications	Concentrated warning	Message indication	Warning buzzer	Individual indications	Concentrated warning	Message indication		
Other symbols	15	Engine oil pressure	LED	○	Normal pressure (OPEN)	—	—	—	—	—	—	—		—	When the abnormality was detected while the engine is stopped, the alarm will continue after starting the engine also.
					Less than specified pressure (CLOSE) & when the engine revolution is 500rpm or more & when 15 sec. or more has passed after starting the engine	—	—	—	—	◎	○	○	B@BAZG	Red	
					When an abnormality is detected	—	—	—	DHE4L6	—	—	—		—	
	14	Brake oil pressure Accumulator oil pressure	LED	○	Normal pressure (CLOSE)	—	—	—		—	—	—		—	The alarm will be changed over, not being cancelled by the changeover at 30 sec. after starting the engine.
					Less than specified pressure (F) (OPEN) & when the engine is started (when detecting time continues) & when 30 sec. has passed after starting the engine (without detecting time)	—	—	—		◎	○	○	2G42ZG	Red	
					Less than specified pressure (R) (OPEN) & when the engine is started (when detecting time continues) & when 30 sec. has passed after starting the engine (without detecting time)	—	—	—		◎	○	○	2G43ZG	Red	
					Less than specified pressure (F) (OPEN) & when the engine is started (when detecting time continues) & during 30 sec. after starting the engine (without detecting time)	—	○	—		◎	○	○		Red	
					Less than specified pressure (F) (OPEN) & when the engine is started (when detecting time continues) & during 30 sec. after starting the engine (without detecting time)	—	○	—		◎	○	○		Red	
	18	Air cleaner	LED	○	Normal (CLOSE)	—	—	—		—	—	—		—	When the abnormality was detected while the engine is stopped, the alarm will continue after starting the engine also.
					When sensor 1 is being blinded (OPEN)	—	—	—		—	○	—	AA1ANX	Red	
					When an abnormality is detected with sensor 1	—	—	—	DHA4KA	—	—	—		—	
	25	Emergency steering function is in operation (when the S/T oil pressure is normal) (Optional)	LED	○	When the S/T oil pressure is normal (OPEN)	—	—	—		—	—	—		—	
					When the S/T oil pressure dropped (CLOSE) & when the engine revolution is 500rpm or more	—		—		◎	○	○	DDS5L6	Red	When emergency steering signal is being input while the engine is stopped, the system determines that self-checking of emergency steering is in progress and when the S/T oil pressure is found too low during self-checking of emergency steering, the indicator will be turned ON.
	26	Emergency steering is normal (Emergency steering pump is in operation) (Optional)	LED	○	When the pump operates (for 1 min. or more) (OPEN)	◎	○	○	DY30N1	◎	○	○	DY30N1	Green	
					When the pump operates (for less than 1 min.) (OPEN)	—	○	—		—	○	—		Green	
					When the pump stops (CLOSE)	—	—	—		—	—	—		—	
	23	Battery charge (Optional)	LED	○	Normal	—	—	—		—	—	—		—	
					2V or less	—	○	—		—	○	—	D61AZK	Red	
					When this option is not installed	—	—	—		—	—	—		—	
					When an abnormality is detected	—	—	—	DJBAKX	—	—	—	DJBAKX	—	

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Category	No.	Items	Device	Night time dimming ○: Occurs. —: Does not occur.	Operating conditions	Operation status								Indication color	Remarks
						Engine stopped				Engine in operation					
						Warning buzzer	Individual indications	Concentrated warning	Message indication	Warning buzzer	Individual indications	Concentrated warning	Message indication		
Other symbols	19	Parking brake	LED	○	When the parking brake is in operation (OPEN)	—	○	—		—	○	—		Red	Turns ON as the contact goes OPEN when the parking brake is operated. This indicator will be commonly used with the parking brake dragging prevention LED.
					When the parking brake is released (CLOSE)	—	—	—		—	—	—		—	
	31	Auto greasing (Optional)	LED	○	Not in operation/Not installed	—	—	—		—	—	—		—	
					In operation	—	○	—		—	○	—		Green	
					The tank is empty (1 Hz)	—	◎	—		—	◎	—		Green	
					Abnormal (2 Hz)	—	◎	—		—	◎	—		Green	
	30	Pre-heating (Auto pre-heating)	LED	○	Other cases than below	—	—	—		—	—	—		—	When pre-heating and after heating are not made due to occurrence of some abnormality, the (including output section failure) alarm will not turn on.
					When pre-heating is being made	—	○	—		—	○	—		Red	
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.
	32	J/S changeover (Optional)	LED	○	When this option is not installed	—	—	—		—	—	—		—	
					When the wheel steering is in operation	—	—	—		—	—	—		—	
					When the J/S is being operated	—	○	—		—	○	—		Green	
					"Priority to the FNR lever" caution	✧	◎	○	989G00	✧	◎	○	989G00	Green	
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.
	29	Semi-automatic digging (Optional)	LED	○	When this option is not installed	—	—	—		—	—	—		—	
					When this function is not in operation	—	—	—		—	—	—		—	
					When the automatic digging is operation	—	○	—		—	○	—		Green	
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.
	22	Maintenance monitor	LED	○	Normal	—	—	—		—	—	—		—	
					Less than 30 hours after maintenance	—	◎	—	□	—	◎	—	□	—	Simultaneously, the message display will indicate the content. The indicator will light for 30 sec. only after the starting key is turned ON.
					Less than 30 hours before maintenance or maintenance time has come	—	○	—	□	—	○	—	□	Red	
	33	RH FNR SW changeover (Optional)	LED	○	When this option is not installed	—	—	—		—	—	—		—	
					When column shift is being used	—	—	—		—	—	—		—	
					When the RH FNR SW is being used	—	○	—		—	○	—		Green	
					"Priority to the FNR lever" caution	✧	◎	○	989G00	✧	◎	○	989G00	Green	As for the "priority to the FNR lever" caution, when the optional J/S is being employed, the J/S indicator will flash.
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.

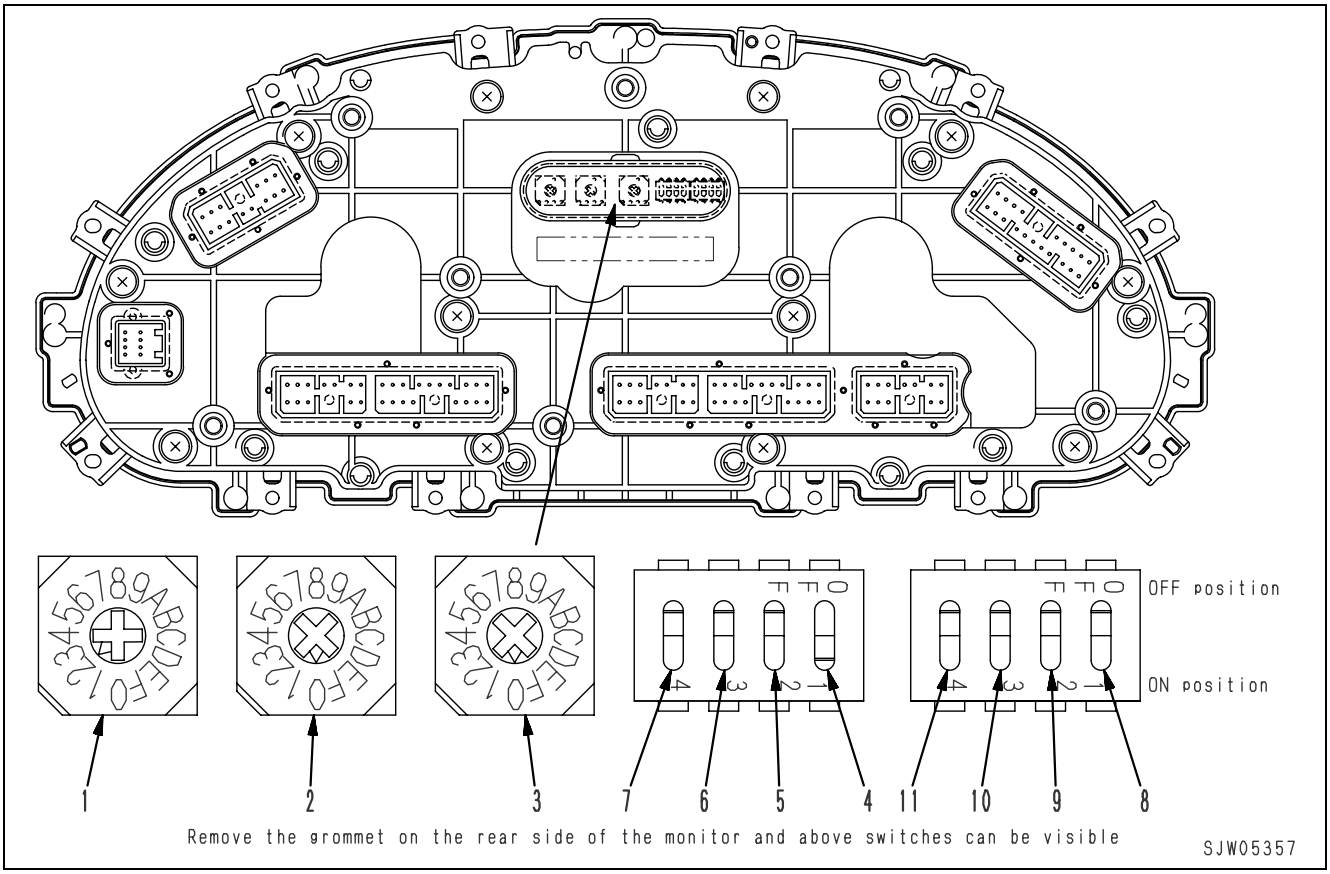
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Category	No.	Items	Device	Night time dimming ○: Occurs. —: Does not occur.	Operating conditions	Operation status								Indication color	Remarks
						Engine stopped				Engine in operation					
						Warning buzzer	Individual indications	Concentrated warning	Message indication	Warning buzzer	Individual indications	Concentrated warning	Message indication		
Other symbols	28	Power mode	LED	○	Power mode = P	—	○	—		—	○	—		Green	Will indicate the state where the power mode is being selected.
					Other cases than above	—	—	—		—	—	—		—	
	21	Fan operation	LED	○	The fan is in forward rotation	—	—	—		—	—	—		—	Will indicate the state where the fan is in forward/reverse rotation.
					The fan is in reverse rotation	—	○	—	As indicated at right (*)	—	○	—	As indicated at right (*)	Orange	
					Fan SW and SOL are not in conformity	—	◎	—	As indicated at right (*)	—	◎	—	As indicated at right (*)	Orange	
	4	Load meter (Load meter specification) (Optional)	Liquid crystal display	○	When the load meter indication is being made	□	□	□	□	□	□	□	□	—	Calculation results will be shown in figures.
					When the load meter indication is not being made	—	—	—	—	—	—	—	—	—	
	20	Brake oil temperature	LED	○	Other cases than below	—	—	—		—	—	—		—	
					When the temperature rises (Rear)	◎	○	○	B@C7NS	◎	○	○	B@C7NS	Red	
					When an abnormality is detected (Rear)	—	—	—	DGR2KA	—	—	—	DGR2KA	—	

Priority degrees of the buzzer sound:
Repetitive (◎) > Intermittent (✧) > Cancellation of operation > Confirmation of receiving the operation

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Setting of the machine monitor



1. Machine model selecting rotary switch [SW1]
2. Spare rotary switch [SW2]
3. Speedometer/Tachometer indication change-over and tire size selecting rotary switch [SW3]
4. Engine controller installation setting dip switch [SW5-1]
5. Work equipment/joy-stick controller installation setting dip switch [SW5-2]
6. Spare dip switch [SW5-3]
7. Spare dip switch [SW5-4]
8. Spare dip switch [SW6-1]
9. Spare dip switch [SW6-2]
10. Spare dip switch [SW6-3]
11. Spare dip switch [SW6-4]

Check the settings or change the settings of the rotary switches, dip switches and check or change the option setting in the following cases:

- In case it becomes necessary to remove the machine monitor once and when reinstalling it
- In case the machine monitor has been replaced with a new monitor
- In case the tire size has been changed (speed compensation settings)
- In case the optional equipment is being installed or being removed

Setting statuses of respective switches can be checked on the real time monitor under the service mode. Refer to the "Real time monitoring function".

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When making settings, turn off the power supply and remove the machine monitor in advance. Refer to the Chapter "Disassembly and Assembly" when removing the machine monitor.
Make settings of respective switches (SW1, 2, 3, 5 and 6) according to the instructions.
When turning the rotary switches, turn them gently using a precision plus head type screwdriver, etc.
With the rotary switches, the triangular projection is the arrow mark for setting.
When changing the settings of the dip switches, move them gently using a precision minus head type screwdriver, etc.
When inserting a tool inside the grommeted hole, be careful not to touch any other parts than the targeted switch.
As for the option setting, the settings can be changed or checked using the "Option Setting" under the service mode. (Refer to the Section "Initial Setting/Adjustment". page10-241 and above)
Depending on the type of the option, it becomes necessary to make the initial state setting. (Refer to the Section "Initial Setting/Adjustment".)
As for the initial stage adjustment, the adjustment can be made by the "Tuning" under the service mode. (Refer to the Section "Initial Setting/Adjustment".)

1. Precautions
   When making settings, observe the instructions.
   When moving the switches, move them gently using a precision screwdriver, etc.
   When inserting a tool inside the grommeted hole, be careful not to touch any other parts than the targeted switch.
   Be careful not to let dust and any other foreign substance enter into the equipment.
   After finishing the setting work, be sure to insert the grommets back to their original positions securely.

2. When making the machine model selection settings (Setting of the rotary switch [SW1])
   Since a single type of machine monitor is being applied to many machine models, it is necessary make the setting for the machine model to which the machine monitor has been installed.
   When the machine monitor has been replaced, it becomes necessary to make machine model selection setting by the rotary switch [SW1] to let the system make proper controls for the machine model to which the machine monitor has been installed.

   Adjustment procedures
   Make the setting indicated in the following Table to fit to the machine model to which the machine monitor has been installed.

Machine model	SW1	Remarks
WA470-5	2	
WA480-5	3	

3. When making the setting of the rotary switch [SW2]
   Make the setting as follows and do not change it.
   Setting position of the SW2: "0"

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4. When making the speedometer/tachometer indication changeover setting and tire size selection setting (Setting of the rotary switch [SW3])
   Since the machine monitor is being set to the tire size of standard tires for speed calculations, when the tire size has been changed, it becomes necessary to adjust to the new tire size by the rotary switch [SW3] for compensation of the speed indications.

Adjustment procedures
Make the setting according to the following Table to fit to the new tire size.

Meter indication changeover	SW3	Tire size	Remarks
km/h indication	0	Small diameter tire	
MPH indication	1	Small diameter tire	Usable in non-SI-unit employing countries only
rpm indication	2	Small diameter tire	
km/h indication	3	Large diameter tire	
MPH indication	4	Large diameter tire	Usable in non-SI-unit employing countries only
rpm indication	5	Large diameter tire	

Tire size	**WA470-5**	**WA480-5**
23.5-25 small	std	No setting
26.5-25 large	op	std

Making the speedometer/tachometer indication changeover setting means to change the indication content of the speed meter located in the central section of the monitor.

Changeover from the speedometer to (engine) tachometer can also be made using the "option setting".

After the above setting is made, the indication unit of the travel distance integrating meter (odometer) will become according to the setting made as above.

Since the MPH indication is only for the countries employing the non-SI-unit only, do not make the MPH indication setting for machines being used in countries employing the SI-unit.

In case other tires than the above or when the speed indications deviate from the actual speed by wears of the tires, it is possible to make tire compensations using the "option setting".

5. When making necessary setting when the engine controller is installed (Setting of the dip switch [SW5-1])
   Make the setting as follows and do not change it.
   Setting position of the SW5-1 in case of machines equipped with the KOMATSU Common Rail engine (WA470-5 and WA480-5): "ON"

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6. When making necessary setting for the work equipment/joy-stick controller (Setting of the dip switch [SW5-2])
   When the work equipment/joy-stick controller is newly installed or removed, make the setting as follows.
   Setting position of the SW5-2 in case the controller has been removed: "OFF"
   Setting position of the SW5-2 in case the controller has been newly installed: "ON"

7. When making the setting of the dip switch [SW5-3]
   Make the setting as follows and do not change it.
   Setting position of the SW5-3: "OFF"

8. When making the setting of the dip switch [SW5-4]
   Make the setting as follows and do not change it.
   Setting position of the SW5-4: "OFF"

9. When making the setting of the dip switch [SW6-1]
   Make the setting as follows and do not change it.
   Setting position of the SW6-1: "OFF"

10. When making the setting of the dip switch [SW6-2]
    Make the setting as follows and do not change it.
    Setting position of the SW6-2: "OFF"

11. When making the setting of the dip switch [SW6-3]
    Make the setting as follows and do not change it.
    Setting position of the SW6-3: "OFF"

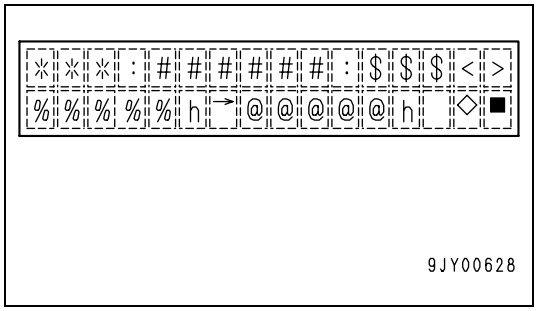
12. When making the setting of the dip switch [SW6-4]
    Make the setting as follows and do not change it.
    Setting position of the SW6-4: "OFF"

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Service mode functions

1. Outline

1) Electric fault history
Use this function to check the electric fault history of respective controllers being memorized by the machine monitor. Regarding the error code being used in the electric fault history, refer to the Chapter "Troubleshooting". When the fault is repaired and after checking and confirming that normal operation has been restored, delete the fault history. The electric fault history indications on the character display are as follows.



***: Indicates which sequence number of fault history counting from the top.

######: Indicates the error code.

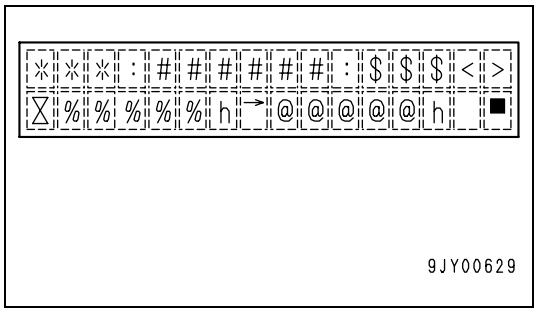
$$$: Indicates the number of times of occurrence of the subject error code

%%%%%: Indicates the elapsed time from the initial occurrence of the same electric fault (the value deducting the service meter value when the electric fault initially occurred from the current service meter value).

@@@@@: Indicates the elapsed time from last occurrence of the same electric fault (the value deducting the service meter value when the electric fault last occurred from the current service meter value).

When the indication is showing the currently occurring electric fault, the error code flashes. Up to max. 20 error codes can be memorized.

2) Machine fault history
Use this function to check the machine fault history of respective controllers being memorized by the machine monitor. Regarding the error code being used in the machine fault history, refer to the Chapter "Troubleshooting". The machine fault history indications on the character display are as follows.



***: Indicates which sequence number of fault history counting from the top.

######: Indicates the error code.
$$$: Indicates the number of times of occurrence of the subject error code.

%%%%%: Indicates the service meter value at the time of initial occurrence of the same machine fault.

@@@@@: Indicates the service meter value at the time of last occurrence of the same machine fault.

When the indication is showing the currently occurring machine fault, the error code flashes. As for the error codes of the machine fault, up to several error codes can be memorized.

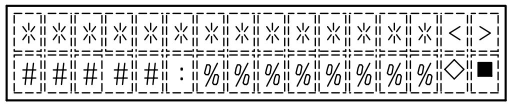
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3) Real time monitor
Use this function to check the inputting and outputting signals being recognized by respective controllers on the network.
The real time monitor indications on the character display are as follows.

***: Indicates the item name.

#####: Indicates the ID number allocated to each item.

%%%* Indicates the data. When a unit is being used, the unit will be shown on the right-hand side of the data.
By designating the ID number allocated to each item, it is also possible to have optional 2 items indicated at the same time.

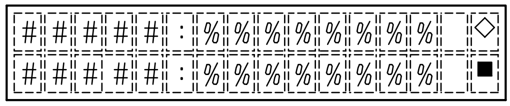


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The indications on the character display when optional 2 items are indicated at the same time are as follows.

***: Indicates the designated ID numbers

%%%* Indicates the data. When a unit is being used, the unit will be shown on the right-hand side of the data.



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4) Reduced cylinder mode
Use this function to indicate the reduced cylinder with the engine and to make settings thereof. Regarding the inspection method using this function, refer to the Section "Reduced cylinder mode operation of engine" in the Chapter "Inspection and Adjustment".

5) Tuning
Use this function to make initial adjustments of the sensors, etc. which are being installed to the machine.
Use this function when sensors, EPC valves or controllers have been replaced or supplemented.

6) Changing the filter and oil changing time
This function is being explained in the section "Filter and oil changing time indication on the character display" in the Chapter "Handling" in the Operation and Maintenance Manual. Use this function when revising the changing time.

7) Settings of the optional equipment and functions
Use this function to indicate the installation status of the optional equipment and to change the settings.
Use this function when optional equipment is installed or removed.

8) Settings of the serial number of the machine
Use this function to indicate the serial number of the machine and to make new settings.
Use this function for the purposes of machine controls, etc.

9) Controller initialization
Since this function is for factory use only, do not touch it.

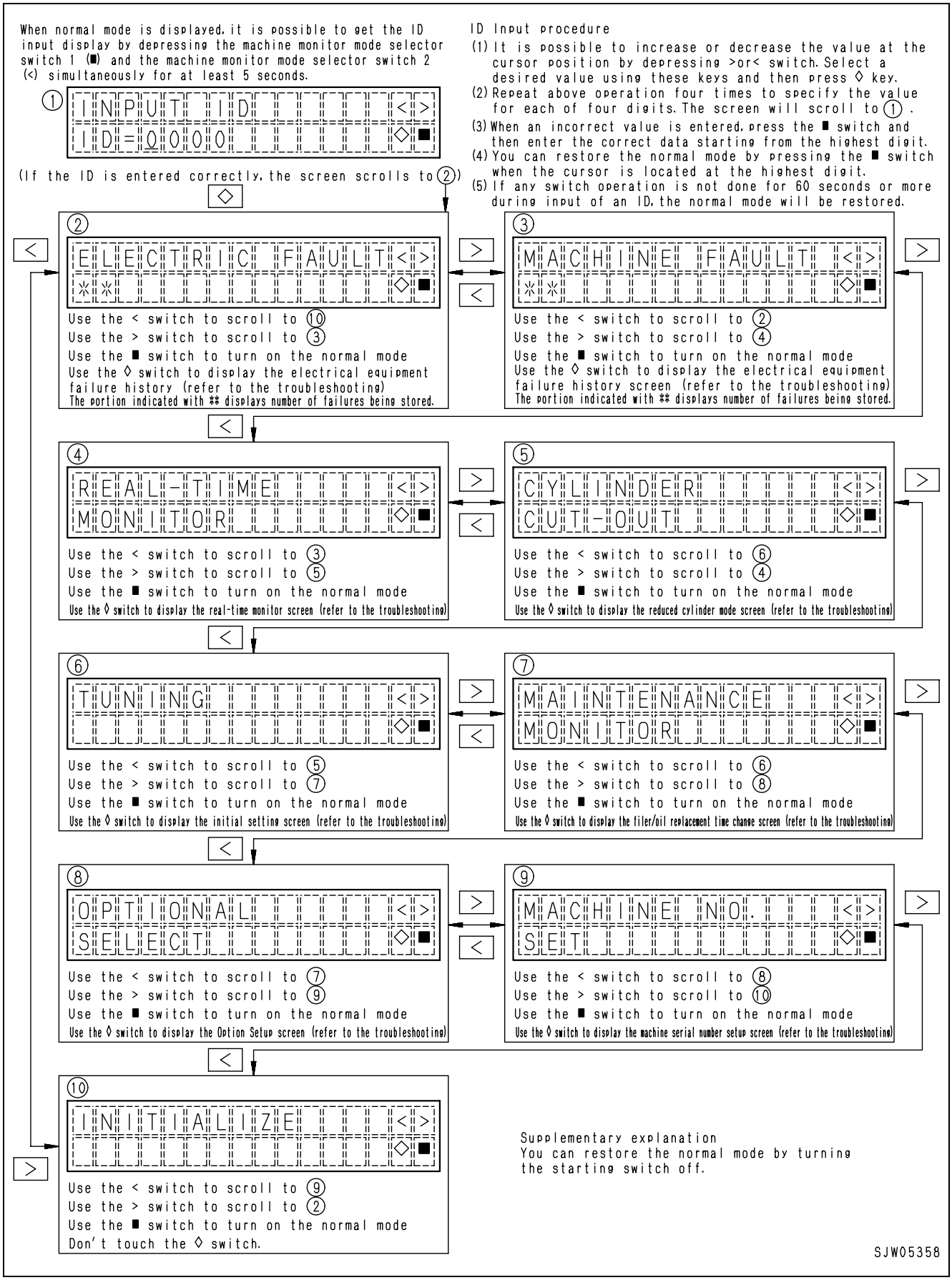
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10) Service meter setting
    Use this function to make the service meter settings when the machine monitor has been replaced with a new monitor.

11) Settings for the travel distance integrating meter value
    Use this function to make settings for the travel distance integrating meter value of the subject machine when the machine monitor has been replaced with a new monitor.

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2. Operation methods



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Items related to the fault history of electric system

1. Selection of displaying and clearing the fault history of electric system

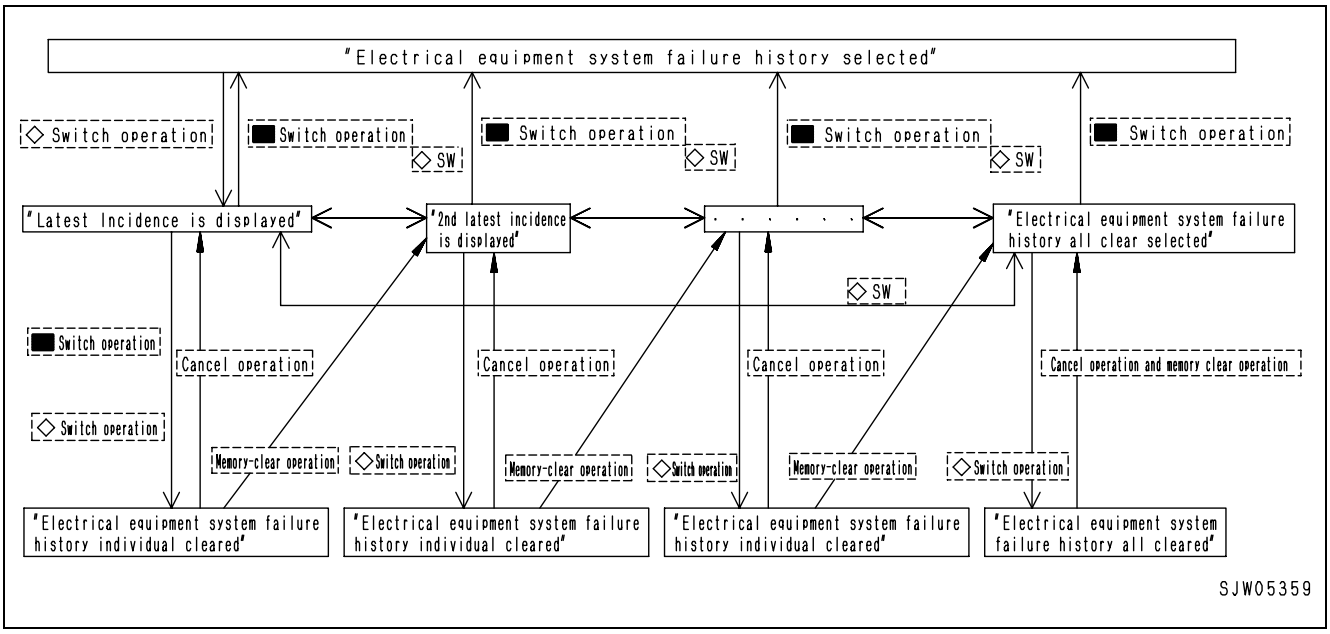
   The fault history is displayed in the order of occurrence with the new fault first.

   A current fault is displayed prior to the restored ones.
   Pressing the > SW displays the next older fault.
   Pressing the < SW displays the next newer fault.

   After the oldest fault in memory was displayed, a screen is displayed allowing to select clearing the entire fault history of electric system of the relevant controller.

   Pressing the ■ SW changes the screen to the [Select displaying abnormalities in electric system] screen on the first layer.

   Pressing the ◇ SW changes the screen to the [Clear individually the fault history of electric system] or [Clear the fault history of electric system] screen.



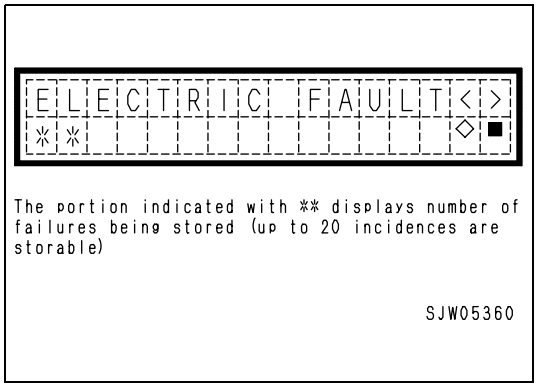
2. Selection of displaying the fault history of electric system (first layer).

   Pressing the > SW changes the screen to the [Select the initializing function] screen.

   Pressing the < SW changes the screen to the [Select displaying the fault history of vehicle system] screen.

   Pressing the ■ SW changes the screen to the ordinary or alert screen.

   Pressing the ◇ SW changes the screen to the [Display abnormalities in electric system] screen.



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3. Selection of displaying the fault history of electric system and clearing the entire fault history of electric system (second layer).

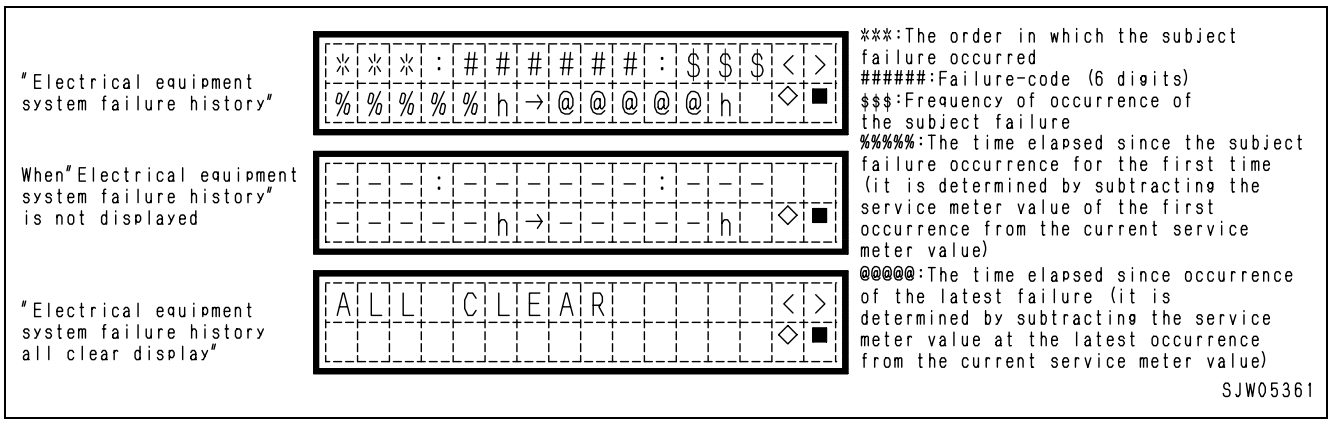
   A current fault is displayed prior to the restored ones.
   Pressing the > SW displays the next older fault.
   Pressing the < SW displays the next newer fault.

   After the oldest fault in memory was displayed, a screen is displayed allowing to select clearing the entire fault history of electric system of the relevant controller.

   Pressing the ■ SW changes the screen to the [Select displaying abnormalities in electric system] screen on the first layer.

   Pressing the ◇ SW changes the screen to the [Clear individually the fault history of electric system] or [Clear the fault history of electric system] screen.

   ※ If the history consisted of one fault, pressing the switch does not change the screen to that for all-out clearing (but change the screen to that for individual clearing).



4. Clearing individually the fault history of electric system, and clearing the entire fault history of electric system (the third layer)

   Select YES or NO with the < or > SW.
   Cursor (_) blinks on the selected item. Pressing the ■ SW changes the display as follows, with the history reset if YES was selected, or not if NO was selected:

   a. If No (cancel) was selected, the display returns to the [Display the fault history of electric system] screen of the relevant fault (i.e., the screen before entering the [Clearing individually (entirely) the fault history of electric system] screen).

   b. If YES (clear) was selected, the display returns to the [Display the fault history of electric system] screen of a fault next to the relevant fault. If the fault history to be shown exhausts, the screen returns to the [Select displaying the fault history of electric system] screen.

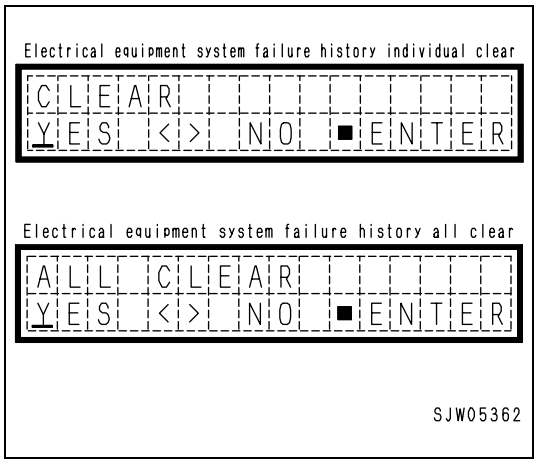
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By default, the cursor is on NO (no reset) to prevent resetting by error.

A current fault cannot be cleared. If it was selected, a peep sounds for one second to notify that the operation is cancelled.

If a fault was cleared, peeps sound (on for 0.1 sec. - off for 0.1 sec. - on for 0.1 sec.) to notify that the operation has been accepted.

If the entire history was cleared, it is considered to have been cleared even if it consisted of only one fault .



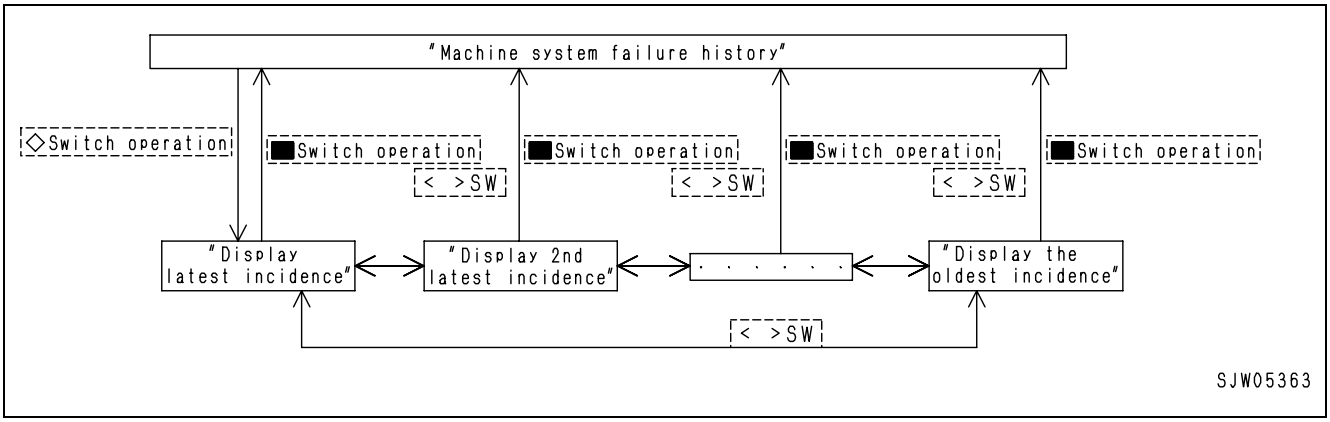
Items related to the fault history of machine system

1. Display of the fault history of vehicle system

   A current fault is displayed prior to the restored ones.
   Pressing the > SW displays the next older fault.
   Pressing the < SW displays the next newer fault.

   After the oldest fault in memory was displayed, a screen is displayed allowing to select clearing the entire fault history of electric system of the relevant controller.

   Pressing the ■ SW changes the screen to the [Select displaying abnormalities in machine system] screen on the first layer.



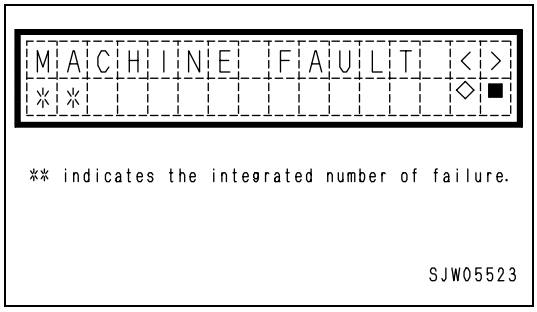
2. Selection of displaying the fault history of machine system (first layer)

   Pressing the > SW changes the screen to the [Select the real-time monitor functions] screen.

   Pressing the < SW changes the screen to the [Select displaying the fault history of machine system] screen.

   Pressing the ■ SW changes the screen to the ordinary or alert screen.

   Pressing the ◇ SW changes the screen to the [Display abnormalities in electric system] screen.



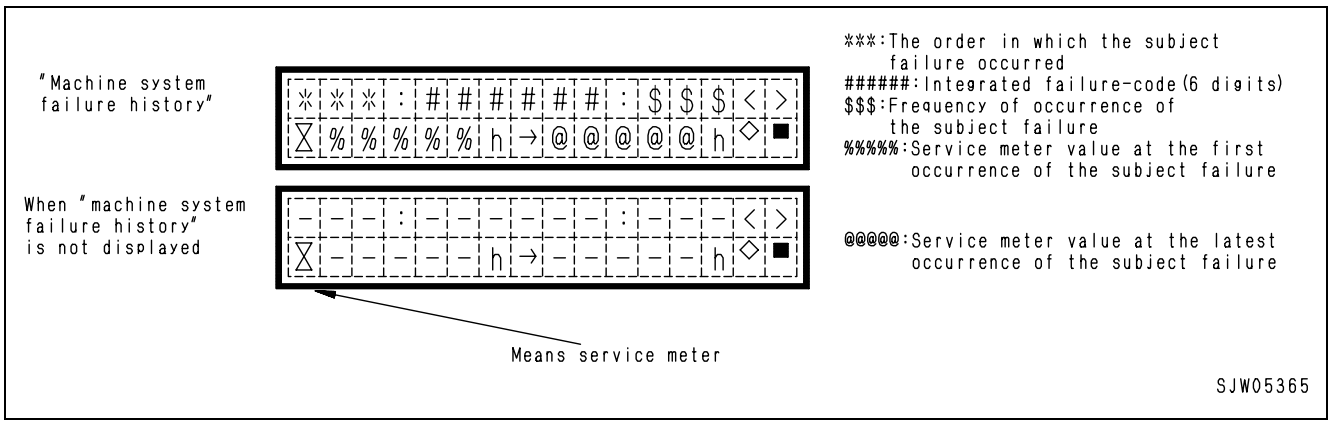
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3. Display of the fault history of vehicle system (second layer)

   The fault history is displayed in the order of occurrence with the newest fault first.

   A current fault is displayed prior to the restored ones.

   The fault history is displayed in the order of occurrence with the newest fault first.
   Pressing the > SW displays the next newer fault.
   Pressing the < SW displays the next older fault.
   Pressing the ■ SW changes the screen to the [Select displaying abnormalities in vehicle system] screen.



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Items related to maintenance monitor

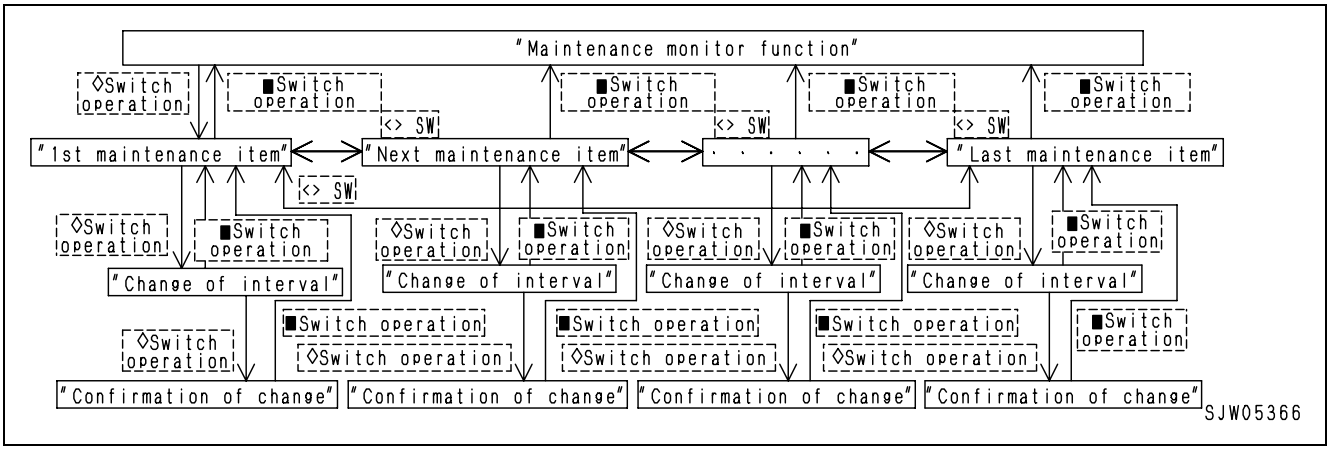
1. Selection/display of the maintenance monitor items

   Each time the > SW is pressed, an item is shown from No.1 in the ascending order.

   Each time the < SW is pressed, an item is shown from No.13 in the descending order.

   Pressing the ■ SW changes the screen to the [Select the maintenance monitor functions] screen.

   Pressing the ◇ SW changes the screen to the [Maintenance interval timer reset] screen.



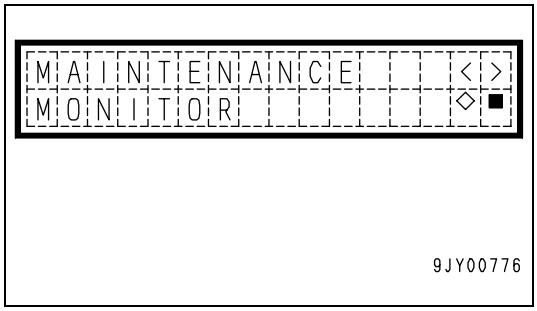
2. Selection/display of the maintenance monitor (first layer)

   Pressing the > SW changes the screen to the [Select the optional functions] screen.

   Pressing the < SW changes the screen to the [Select the cylinder cut-out function] screen.

   Pressing the ■ SW changes the screen to the ordinary or alert screen.

   Pressing the ◇ SW changes the screen to the [Select the maintenance monitor items] screen.



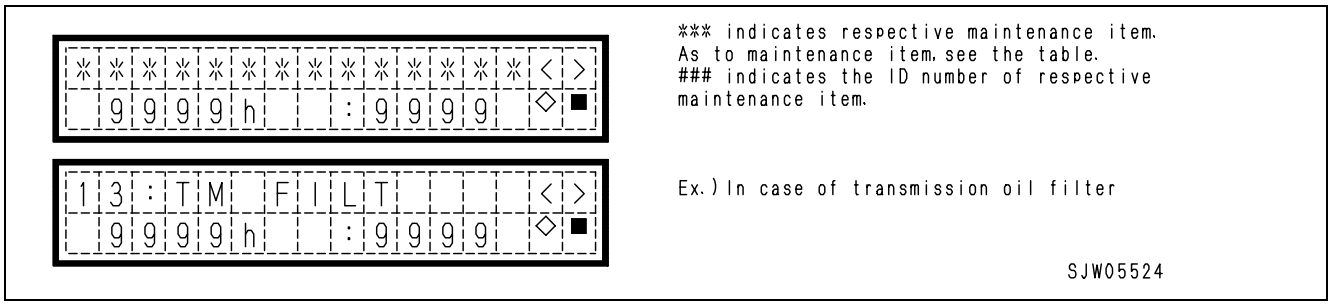
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3. Selection of the maintenance items (second layer)

   The display is the same as that on the maintenance monitor which is included in the functions open to operators, except that the maintenance caution lamp is turned off.

   Pressing the ■ SW changes the screen to the [Select the maintenance monitor functions] screen.

   Pressing the ◇ SW changes the screen to the [Change the maintenance monitor interval time] screen.



4. Changing the maintenance interval time (third layer)

   The change of the maintenance interval time can be set to any value within a range 0-9999h.

   Pressing the ■ SW causes the change of the time skipped, and changes the screen to the [Select the maintenance items] screen. In this case, a peep sounds for one second to notify that the operation is cancelled.

   How to Enter Interval Time

   a. Enter a number from 0-9 in the cursor position.

   b. The cursor is at the highest digit first. Each time the < or > SW was pressed, the number changes by 1 within a range 0-9.

   c. If the desired number was entered, press the ◇SW to apply it.

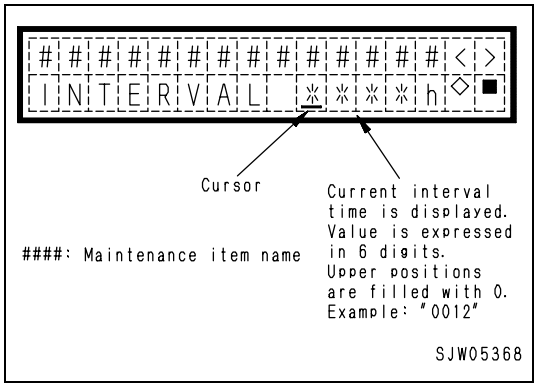
   d. The cursor moves to the second highest digit. Repeat the procedures mentioned in b and c until the last number is filled in the lowest digit.

   e. After the lowest digit was entered, press the ◇ SW.

   f. -1 If the entered value represents the time which can be set, the screen changes to the confirmation screen.

      -2 Otherwise, the screen does not change to the confirmation screen but to the [Select the maintenance items] screen. In this case, a peep sounds for one second to notify that the operation is cancelled.

   g. If a wrong number was entered, return to the [Maintenance items] screen with the ■ SW, and do the procedure from the beginning again.



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5. Confirming the changed maintenance interval time (fourth layer)

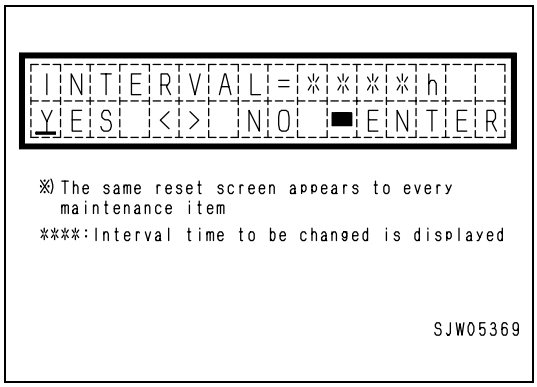
   Select YES or NO with the < or > SW.

   Cursor (_) blinks on the selected item. Pressing the ■ SW returns the display to the [Select the maintenance items] screen, with the change applied if YES was selected, or not if NO was selected:

   The default of the cursor is on NO (no change) to prevent re-setting by error.

   A current fault cannot be cleared. If it was selected, a peep sounds for one second to notify that the operation is cancelled.

   If the change of the time-setting was completed, peeps sound (on for 0.1 sec. - off for 0.1 sec. - on for 0.1 sec.) to notify that the operation has been accepted.



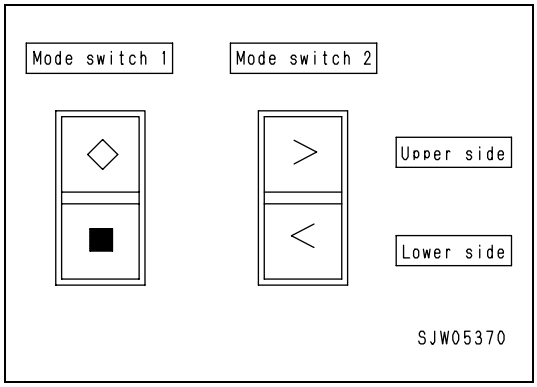
The maintenance interval time is set when the machine is shipped as in the following table:

Items	Interval for replacement (h)	Items shown	ID numbers
Engine oil	500	ENG OIL	01
Engine oil filter	500	ENG FILT	02
Fuel filter	500	FUEL FILT	03
Corrosion resister	1000	CORR RES	06
Transmission oil	1000	TM OIL	12
Transmission oil filter	1000	TM FILT	13
Hydraulic fluid filter	2000	HYD FILT	04
Hydraulic oil tank breather element	2000	HYD BREATH	05
Axle oil	2000	AXLE OIL	15
Hydraulic fluid	2000	HYD OIL	10

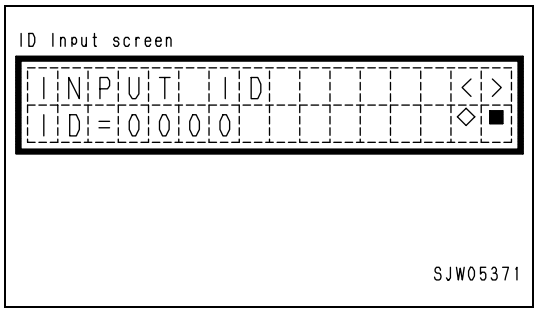
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Engine cylinders cut-out function

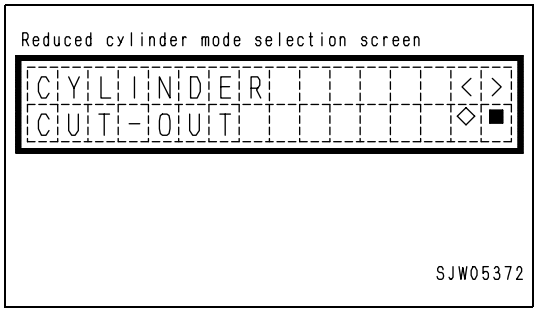
1. Press the ■ SW and < SW for more than five seconds to go to the [ID Entry] screen.



2. Enter ID with the < and > SW, and press the ◇ SW to go to the screen for service persons.



3. Press the < and > SW to display the [Select the cylinder cut-out mode] screen, then press the ◇ SW to fix the screen.



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4. How to operate the cylinder cut-out function

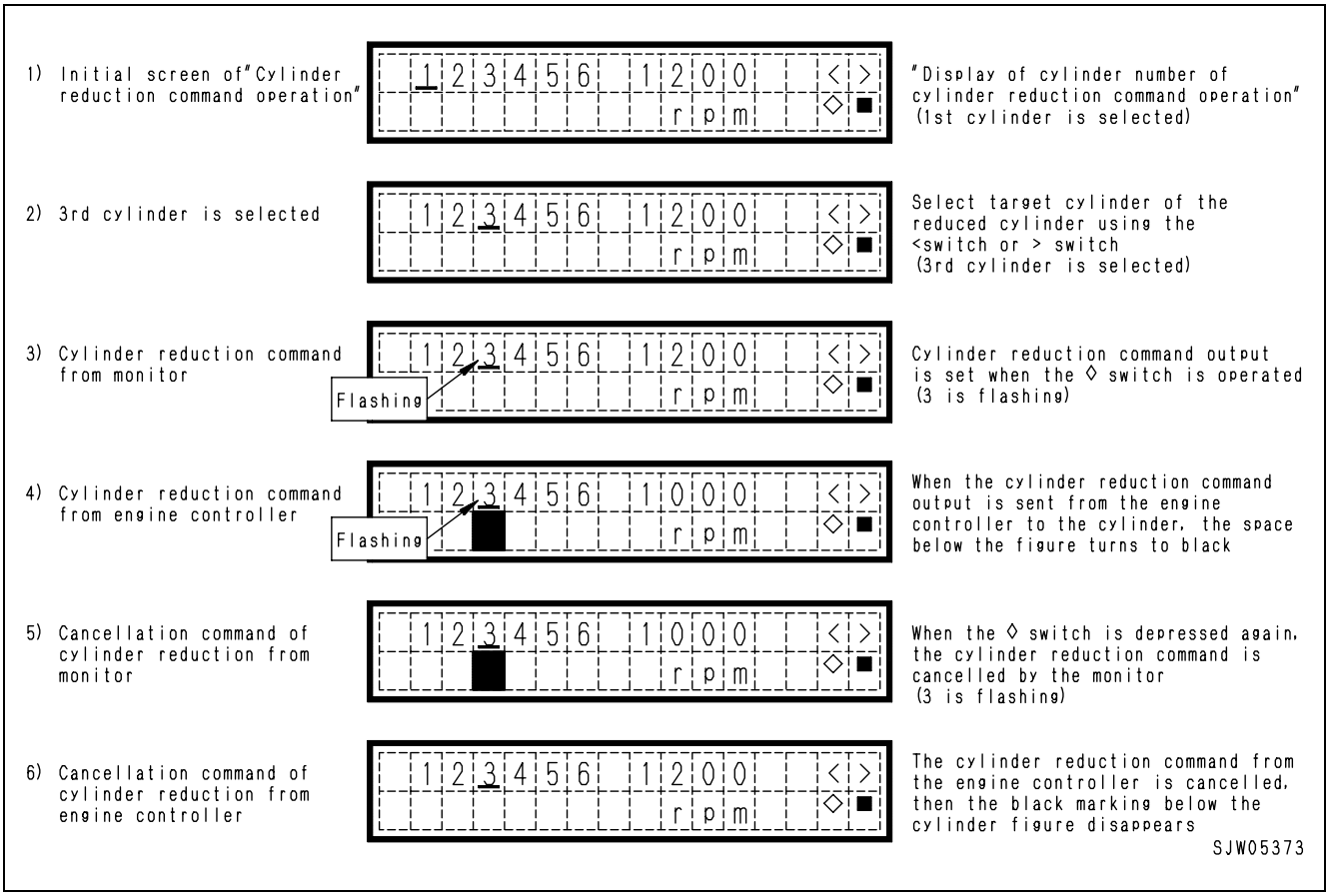
   Each time the > SW is pressed (to select the cylinder to be cut-out with a command), the cursor moves one step to the right.

   Each time the < SW is pressed (to select the cylinder to be cut-out with a command), the cursor moves one step to the left.

   Pressing the ◇ SW issues the command to cut-out the cylinder selected. Each time it is pressed, the command toggles between cut-out and cancel.

   Pressing the ■ SW returns the screen to that of [Select the cylinder cut-out mode], and any cut-out command which has been issued from monitor is cancelled.

Example of operation:
The command is issued to stop the third cylinder.



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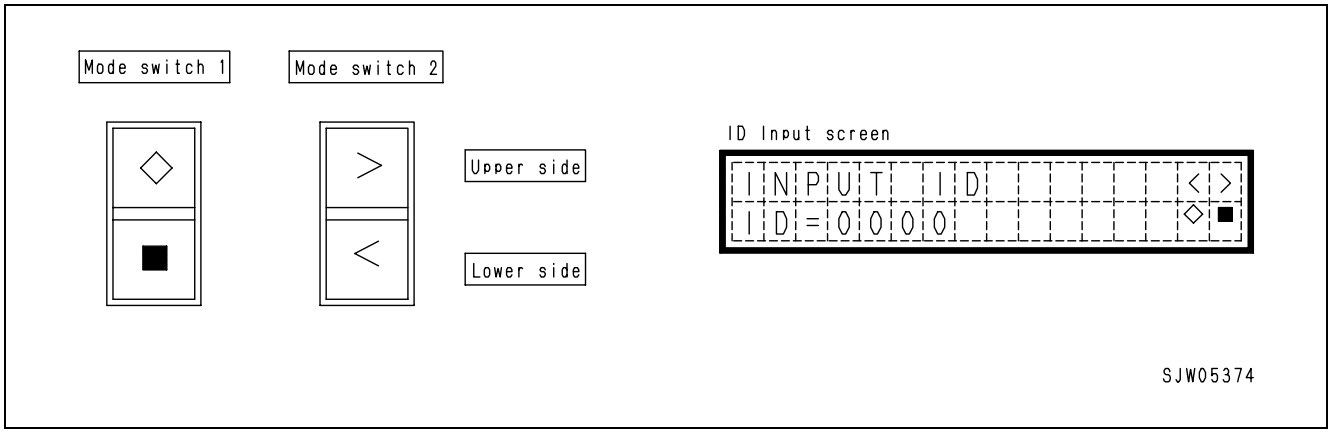
Real-time monitoring function

The real-time monitor shows real-time the information which the controller mounted on the vehicle has. This function is used for checking and adjustment, diagnosis of faults of the vehicle and other purposes.

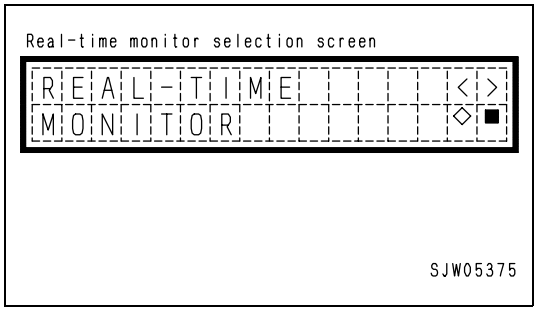
The real-time monitor shows the items and their data, classified by the controllers which have information. It shows them in two ways: the ordinary display, and the 2-item display where two data items are shown simultaneously.

Operation

1. Press the ■ SW and < SW for more than five seconds to go to the [ID Entry] screen.



2. Enter ID with the < and > SW, and press the ◇ SW to go to the screen for service persons.
3. Press the < and > SW to display the [Select the real-time monitor] screen, then press the ◇ SW to fix the screen.

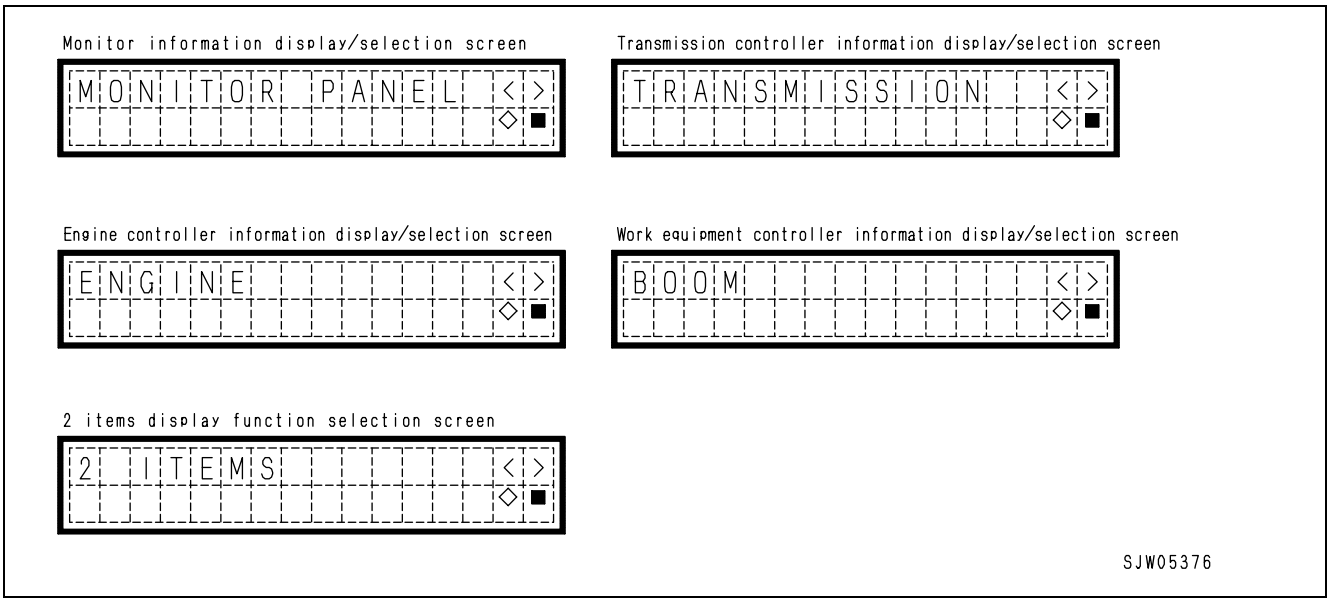


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4. Press the ◇ SW, and the [Select the information displayed on monitor panel] screen appears.

   Pressing the < or > SW display the screens

   [Select the information of the transmission controller],
   [Select the information of the engine controller],
   [Select the information of the working machine controller],
   [Select the 2-item display] in order.



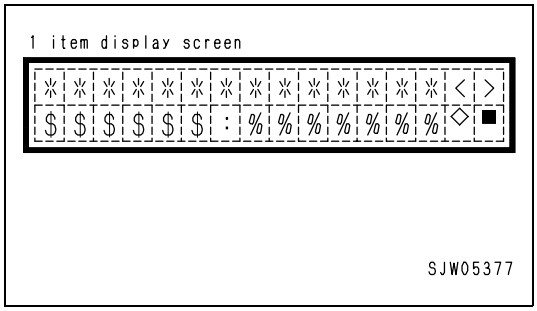
5. Pressing the ◇ SW, while each selection screen is shown, displays the [One-item display] screen or the [Select information on 2-item display] screen.

   ***: Shows items.

   %%%%%: Shows data and unit (SI system)

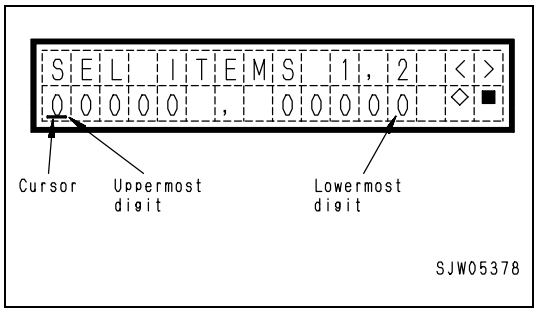
   $$$$: Shows ID.

   In the case of 1-item display, pressing the < and > SW changes the items shown in turn, displaying the information each controller has.



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How to enter an ID



- After the screen was changed from another, “00000” is shown.
- Enter a number 0-9 in the cursor position.
- The cursor is at the highest digit first. Each time the < or > SW was pressed, the number changes by 1 within a range 0-9.
- If the desired number was entered, press the ◇ SW.
- The cursor moves to the second highest digit. Repeat the procedures mentioned above until the last number is filled in the lowest digit.
- If the lowest digit was entered, press the ◇ SW, and the screen changes to that for displaying/selecting the second item. Alternately, pressing the ◇ SW returns the screen to that for displaying/selecting two items.
- In the case of 2-item display, enter the IDs of the information to be displayed, and the two items are shown simultaneously. The IDs shown are the same as those on the 1-item display screen.

6. In the case of 1-item display, pressing the < and > SW changes the items shown in turn, displaying the information each controller has.

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Real-time monitoring items

Item ID	Real-time monitoring item	Item displayed	Display unit	Displayed range	Component detected	Terminal No.	Remarks
	All the items are shown even if some of them are not equipped depending on models and options.	Abridged due to limitation of number of letters.	SI unit system so long as the values have units	A value out of the range displayed is shown as the lowest (highest) value in the range.			
Monitor panel controller							
20200	Part No. of monitor's ROM	MONITOR ROM	---	---	Monitor	---	Shows the part No. of monitor-panel's ROM
01001	Engine speed	ENG SPEED	1rpm	0~3000	T/M	L62-10	
40000	Vehicle speed	SPEED	km/h	0~50	T/M	L62-20	
04202	Fuel volume	FUEL SENSOR	1%	0~100	Monitor	L55-1	
04401	Hydraulic oil temperature	HYD TEMP	1°C	24~131	Monitor	L55-7	Any temperature lower than 24°C is displayed as 24°C
04103	Coolant temperature	COOLANT TEMP	1°C	24/131	Monitor	L55-8	Any temperature lower than 24°C is displayed as 24°C
04104	Coolant temperature (low)	COOLANT Lo	1°C	-31/91	Monitor	L55-3	Any temperature lower than -31°C is displayed as -31°C
40100	Torque converter oil temperature	TC OIL TEMP	1°C	24/131	Monitor	L55-2	Any temperature lower than 24°C is displayed as 24°C
04302	Charging rate of alternator	ALTERNATOR R	0.1V	0.0/30.0	Monitor	L52-18	
40200	Voltage of small lamps	SMALL LAMP	0.1V	0.0/30.0	Monitor	L53-12	
40300	Battery fluid volume A	BATTERY A2V	0.1V	0.0/30.0	Monitor	L55-5	
40301	Battery fluid volume B	BATTERY B2V	0.1V	0.0/30.0	Monitor	L55-12	
06001	Boom angle	BOOM ANG	1°	-41-/46	Monitor	L55-10	
40400	Boom bottom pressure	BTM PRESS	0.01MPa	0.00/50.00	Monitor	L55-9	
40500	Boom rod pressure	ROD PRESS	0.01MPa	0.00/50.00	Monitor	L55-4	
40600	Calibration pressure	CAL PRESS	0.01MPa	0.00/50.00	Monitor	Calculated value	
40700	Calculated pressure	MES PRESS	0.01MPa	0.00/50.00	Monitor	Calculated value	
40800	Calculated load weight	MES LOAD	0.01t	0.00/50.00	Monitor	Calculated value	
30802	Rotary switch position	SW1,SW2,SW3	---	F.F.F	Monitor	Switch on the rear	
30904	Dip switch position	SW5-1,SW5-2	---	OFF.ON	Monitor	Switch on the rear	
30905	Dip switch position	SW5-3,SW5-4		OFF.ON	Monitor	Switch on the rear	
30906	Dip switch position	SW6-1,SW6-2		OFF.ON	Monitor	Switch on the rear	
30907	Dip switch position	SW6-3,SW6-4		OFF.ON	Monitor	Switch on the rear	
40900	Input signal D_IN_0-7	D-IN---0-----7	---	10101010	Monitor	See separate sheet	
40901	Input signal D_IN_8-15	D-IN-8-----15	---	10101010	Monitor	See separate sheet	
40902	Input signal D_IN_16-23	D-IN-16-----23	---	10101010	Monitor	See separate sheet	
40903	Input signal D_IN_24-31	D-IN-24-----31	---	10101010	Monitor	See separate sheet	
40904	Input signal D_IN_32-39	D-IN-32--39	---	10101010	Monitor	See separate sheet	
T/M controller							
20201	Part No. of T/M controller's ROM	TRANSM ROM	---	---		---	Shows part No. of ROM
41000	Target speed of fan pump	FAN PUMP	1rpm	0/3000	T/M	Calculated value	
T/M controller							

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Item ID	Real-time monitoring item	Item displayed	Display unit	Displayed range	Component detected	Terminal No.	Remarks
	All the items are shown even if some of them are not equipped depending on models and options.	Abridged due to limitation of number of letters.	SI unit system so long as the values have units	A value out of the range displayed is shown as the lowest (highest) value in the range.			
41100	Pressure of left-hand brake	LH BRAKE	0.01MPa	0.00/50.00	T/M	L61-19	
41200	T/M cut-off pressure	CUT OFF	0.01MPa	0.00/50.00	TM	Calculated value	
41300	Number of times of kick-down	K/D TIMES	---		TM	Calculated value	
41400	Average cycle time	CYCLE TIME	SEC		TM	Calculated value	
31608	F ECMV current	ECMV F	1mA	0/1000	TM	L63-5	
31606	R ECMV current	ECMV R	1mA	0/1000	TM	L63-15	
31602	1st-gear ECMV current	ECMV 1	1mA	0/1000	TM	L63-25	
31603	2nd-gear ECMV current	ECMV 2	1mA	0/1000	TM	L63-6	
31604	3rd-gear ECMV current	ECMV 3	1mA	0/1000	TM	L63-16	
31605	4th-gear ECMV current	ECMV 4	1mA	0/1000	TM	L63-26	
31609	L/C ECMV current	ECMV LU	1mA	0/1000	TM	L63-35	
41400	Fan pump EPC current	FAN EPC	1mA	0/1000	TM	L63-36	
41500	T/C oil temperature	ECMV OIL TEMP	1°C	24/131	TM	L61-9	
41600	Selection of engine mode	ENGINE MODE	---	P/N	TM	L61-6	
41700	Selection of shift mode	SHIFT MODE	---	H/M/L	TM	Calculated value	
41808	F fill time	FILL TIME F	10msec	0/2550	TM	Calculated value	
41806	R fill time	FILL TIME R	10msec	0/2550	TM	Calculated value	
41802	1st-gear fill time	FILL TIME 1	10msec	0/2550	TM	Calculated value	
41803	2nd-gear fill time	FILL TIME 2	10msec	0/2550	TM	Calculated value	
41804	3rd-gear fill time	FILL TIME 3	10msec	0/2550	TM	Calculated value	
41805	4th-gear fill time	FILL TIME 4	10msec	0/2550	TM	Calculated value	
31508	F fill time	FILL SW(F)	---	0/1 (Normal/abnormal)	TM	Calculated value	
31506	R fill time	FILL SW(R)	---	0/1 (Normal/abnormal)	TM	Calculated value	
31502	1st-gear fill time	FILL SW(1)	---	0/1 (Normal/abnormal)	TM	Calculated value	
31503	2nd-gear fill time	FILL SW(2)	---	0/1 (Normal/abnormal)	TM	Calculated value	
31504	3rd-gear fill time	FILL SW(3)	---	0/1 (Normal/abnormal)	TM	Calculated value	
31505	4th-gear fill time	FILL SW(4)	---	0/1 (Normal/abnormal)	TM	Calculated value	
40905	Input signal D_IN_0-7	D-IN--0-----7	---	10101010	TM	See separate sheet	
40906	Input signal D_IN_8-15	D-IN--8----15	---	10101010	TM	See separate sheet	
40907	Input signal D_IN_16-23	D-IN-16-----23	---	10101010	TM	See separate sheet	
40908	Input signal D_IN_24-31	D-IN-24-----31	---	10101010	TM	See separate sheet	
30202	Rear brake fluid temperature	R BRAKE OIL	1°C	24/131	TM	L61-20	
40915	Output signal D_OUT_0-6	D-OUT-0-----6	---	101010	TM	See separate sheet	
40914	Output signal D_OUT_0-5	D-OUT-0---5	---	101010	TM	See separate sheet	
Working machine controller							

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Item ID	Real-time monitoring item	Item displayed	Display unit	Displayed range	Component detected	Terminal No.	Remarks
	All the items are shown even if some of them are not equipped depending on models and options.	Abridged due to limitation of number of letters.	SI unit system so long as the values have units	A value out of the range displayed is shown as the lowest (highest) value in the range.			
20202	Part No. of working machine controller's ROM	BOOM ROM	---	---	Working machine	---	Shows part No. of ROM
41900	Boom-raising EPC current	RAISE EPC	1mA	0/1000	Working machine	L73-6	
41901	Boom-lowering EPC current	LOWER EPC	1mA	0/1000	Working machine	L73-16	
41902	Bucket tilt EPC current	TILT EPC	1mA	0/1000	Working machine	L73-5	
41903	Bucket dump EPC current	DUMP EPC	1mA	0/1000	Working machine	L73-15	
41904	J/S right EPC current	RH J/S EPC	1mA	0/1000	Working machine	L73-26	
41905	J/S left EPC current	LH J/S EPC	1mA	0/1000	Working machine	L73-36	
41906	3-fork valve 1 ECMV current	3RD EPC1	1mA	0/1000	Working machine	L73-25	
41907	3-fork valve 2 ECMV current	3RD EPC2	1mA	0/1000	Working machine	L73-35	
42000	Lever potentiometer-voltage boom 1	BOOM POT1	0.01V	0.00/5.00	Working machine	L71-19	
42001	Lever potentiometer-voltage boom 2	BOOM POT2	0.01V	0.00/5.00	Working machine	L71-13	
42002	Lever potentiometer-voltage bucket 1	BUCKET POT1	0.01V	0.00/5.00	Working machine	L71-7	
42003	Lever potentiometer-voltage bucket 2	BUCKET POT2	0.01V	0.00/5.00	Working machine	L71-1	
42004	Lever potentiometer-voltage J/S 1	J/S POT1	0.01V	0.00/5.00	Working machine	L71-9	
42005	Lever potentiometer-voltage J/S 2	J/S POT2	0.01V	0.00/5.00	Working machine	L71-3	
42006	Lever potentiometer-voltage 3-fork valve 1	3RD POT1	0.01V	0.00/5.00	Working machine	L71-20	
42007	Lever potentiometer-voltage 3-fork valve 2	3RD POT2	0.01V	0.00/5.00	Working machine	L71-14	
06002	Boom angle	BOOM ANG	1°	-41/46	Working machine	L71-8	
40401	Boom bottom pressure	BTM PRESS	0.01MPa	0.00/5.00	Working machine	---	No function
42100	Number of times of boom lever operation	BOOM LVR	1000	1/256000 (incremental step=1000)	Working machine	Calculated value	
42101	Number of times of bucket lever operation	BUCKET LVR	1000	1/256000 (incremental step=1000)	Working machine	Calculated value	
42102	Number of times of 3rd lever operation	3RD LVR	1000	1/256000 (incremental step=1000)	Working machine	Calculated value	
01003	Engine speed	ENG SPEED	1rpm	0/3000	Working machine	L72-10	
40001	Vehicle speed	SPEED	1km/h	0/50	Working machine	L72-20	
40910	Input signal D_IN_0-7	D-IN--0-----7	---	10101010	Working machine	See separate sheet	
40911	Input signal D_IN_8-15	D-IN--8-----15	---	10101010	Working machine	See separate sheet	
40912	Input signal D_IN_16-23	D-IN-16-----23	---	10101010	Working machine	See separate sheet	
40913	Input signal D_IN_24-31	D-IN-24-----31	---	10101010	Working machine	See separate sheet	
40917	Output signal D_OUT_0-6	D-OUT-0-----6	---	1010101	Working machine	See separate sheet	
40916	Output signal SOL/0-0-5	SOL/0-0----5	---	101010	Working machine	See separate sheet	
Engine controller							
20203	Part No. of engine controller	ENGINE ROM	---	---	Engine		

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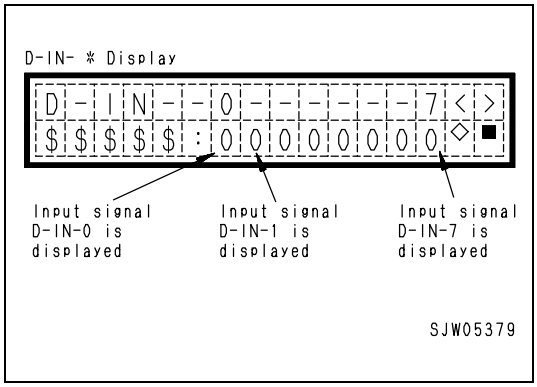
Item ID	Real-time monitoring item	Item displayed	Display unit	Displayed range	Component detected	Terminal No.	Remarks
	All the items are shown even if some of them are not equipped depending on models and options.	Abridged due to limitation of number of letters.	SI unit system so long as the values have units	A value out of the range displayed is shown as the lowest (highest) value in the range.			
31702	Throttle voltage	THROTTLE POS	0.01V	0.00/5.00	Engine	L82-10	
31701	Throttle opening	THROTTLE POS	1%	0/100	Engine	Calculated value	
36600	Engine status	ENG STATUS	---	---	Engine	Calculated value	
01004	Engine speed	ENG SPEED	1rpm	0/3000	Engine	L82-35	
36200	Targeted common rail pressure	RAIL PRESS (C)	1MPa	0/150	Engine	L82-40	
36400	Common rail pressure	RAIL PRESS (A)	1MPa	0/150	Engine	Calculated value	
36500	Boost pressure	BOOST PRESS	1kPa	0/300	Engine	L82-20	
31600	Targeted fuel delivery	FUEL DELIVERY	11/h	0/500	Engine	Calculated value	
36300	Targeted injection timing	INJECT TIMING	1°CA	-30/31	Engine	Calculated value	
36700	Torque ratio	TORQUE RATIO	1%	0/100	Engine	Calculated value	
36800	Q adjust switch	Q ADJUST SW	---	1=F 2=F	Engine	Calculated value	
04101	Coolant temperature (high)	COOLANT TEMP H	1°	0/150	Engine	---	No function
04103	Coolant temperature (low)	COOLANT TEMP L	1°	-30/100	Engine	L82-37	
04203	Fuel temperature	FUEL TEMP	1°	-30/100	Engine		

How to read input signals (D-IN-0-----7)

The signal input into controller by ON/OFF switch is shown as [D-IN-*] (* represents input No.).

The display shows it as follows:
***: Shows items.
%%%%%: Shows data and unit (SI system)
$$$$: Shows ID No.

If input status [0] or [1] is shown, Output OFF or ON is displayed, respectively.

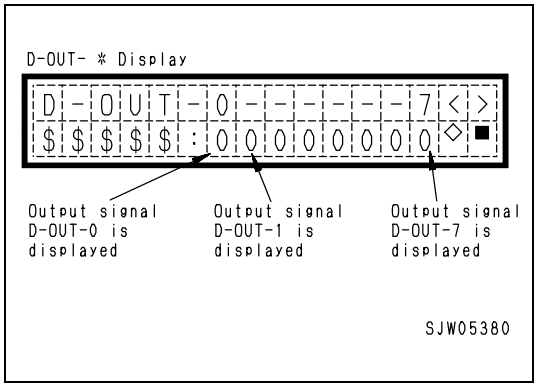


How to read output signals (D-OUT-0-----7)

The signal output from controller by ON/OFF switch is shown as [D-OUT-*] (* represents output No.).

The display shows it as follows:
***: Shows items.
%%%%%: Shows data and unit (SI system)
$$$$: Shows ID No.

If input status [0] or [1] is shown, Output OFF or ON is displayed, respectively.



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I/O signal	Displayed item	Connector No.	Pin No.	ON/OFF logic
Machine Monitor				
D-IN-0	Head lamp	L52	1	Head lamp turned ON=(24V)/OFF (OPEN)
D-IN-1	No item	L52	10	ON (24V)/OFF (OPEN)
D-IN-2	IGN_C	L52	2	Starter activated=(24V)/OFF (OPEN)
D-IN-3	No item	L52	11	ON (24V)/OFF (OPEN)
D-IN-4	Auto-grease A (op)	L52	3	Tank empty or abnormal=(24V)/OFF (OPEN)
D-IN-5	Auto-grease B (op)	L52	12	Operating or abnormal=(24V)/OFF (OPEN)
D-IN-6	No item	L52	4	ON (24V)/OFF (OPEN)
D-IN-7	No item	L52	13	ON (24V)/OFF (OPEN)
D-IN-8	No item	L52	5	ON (24V)/OFF (OPEN)
D-IN-9	No item	L52	14	ON (24V)/OFF (OPEN)
D-IN-10	No item	L52	6	ON (24V)/OFF (OPEN)
D-IN-11	No item	L52	15	ON (24V)/OFF (OPEN)
D-IN-12	Blinker R	L52	7	Right blinker=ON (24V)/OFF (OPEN)
D-IN-13	Blinker L	L52	16	Left blinker=ON (24V)/OFF (OPEN)
D-IN-14	Input from the ◇ SW	L52	8	Switch pressed=ON (24V)/OFF (OPEN)
D-IN-15	Input from the ■ SW	L52	17	Switch pressed=ON (24V)/OFF (OPEN)
D-IN-16	Brake fluid pressure (front)	L53	1	Pressure normal=ON (GND)/OFF (OPEN)
D-IN-17	Brake fluid pressure (rear)	L53	7	Pressure normal=ON (GND)/OFF (OPEN)
D-IN-18	No item	L53	2	ON (GND)/OFF (OPEN)
D-IN-19	No item	L53	8	ON (GND)/OFF (OPEN)
D-IN-20	Clogged air cleaner	L53	3	No clogging=ON (GND)/OFF (OPEN)
D-IN-21	No item	L53	9	ON (GND)/OFF (OPEN)
D-IN-22	No item	L53	4	ON (GND)/OFF (OPEN)
D-IN-23	No item	L53	10	ON (GND)/OFF (OPEN)
D-IN-24	No item	L53	5	ON (GND)/OFF (OPEN)
D-IN-25	No item	L53	11	ON (GND)/OFF (OPEN)
D-IN-26	Parking brake	L54	1	P/B in operation=ON (GND)/OFF (OPEN)
D-IN-27	Coolant volume	L54	10	Coolant volume normal=ON (GND)/OFF (OPEN)
D-IN-28	Engine oil pressure	L54	2	Dropped pressure=ON (GND)/OFF (OPEN)
D-IN-29	Engine oil volume	L54	11	Oil volume normal=ON (GND)/OFF (OPEN)
D-IN-30	(Emergency steering) motor normal (op)	L54	3	(Emergency state) motor activated=ON (GND)/OFF (OPEN)
D-IN-31	No item	---	---	---
D-IN-32	Load meter subtotal switch (op)	L54	4	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-33	Load meter cancel switch (op)	L54	13	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-34	High-beam switch	L54	5	High-beam=ON (GND)/OFF (OPEN)
D-IN-35	No item	L54	14	ON (GND)/OFF (OPEN)
D-IN-36	Service function 2	L54	6	ON (GND)/OFF (OPEN)
D-IN-37	Input from the > SW	L54	15	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-38	Input from the < SW	L54	7	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-39	Dropped steering pressure	L54	6	Fluid pressure normal=ON (GND)/OFF (OPEN)

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I/O signal	Displayed item	Connector No.	Pin No.	ON/OFF logic
T/M Controller				
D-IN-0	S/T pressure switch (N.O.)	L61	23	Pressure normal=ON (OPEN)/OFF (GND)
D-IN-1	S/T pressure switch (N.O.)	L61	17	Pressure normal=ON (OPEN)/OFF (GND)
D-IN-2	T/M cut-off switch	L61	11	Switched pressed=ON (GND)/OFF (OPEN)
D-IN-3	T/M cut-off set switch	L61	5	Switched pressed=ON (GND)/OFF (OPEN)
D-IN-4	Running damper change-over switch (op)	L61	24	Switched pressed=ON (GND)/OFF (OPEN)
D-IN-5	Lock-up change-over switch (op)	L61	18	Switched pressed=ON (GND)/OFF (OPEN)
D-IN-6	Kick-down switch	L61	12	Switched pressed=ON (GND)/OFF (OPEN)
D-IN-7	Engine power mode switch	L61	6	P mode=ON (24V)/OFF (OPEN)
D-IN-8	Shift range 1st	L63	10	1st gear=ON (24V)/OFF (OPEN)
D-IN-9	Shift range 2nd	L63	20	2nd gear=ON (24V)/OFF (OPEN)
D-IN-10	Shift range 3rd	L63	30	3rd gear=ON (24V)/OFF (OPEN)
D-IN-11	Shift range 4th	L63	40	4th gear=ON (24V)/OFF (OPEN)
D-IN-12	J/S shift up (op)	L63	9	Switch pressed=ON (24V)/OFF (OPEN)
D-IN-13	J/S shift down (op)	L63	19	Switch pressed=ON (24V)/OFF (OPEN)
D-IN-14	Electric (emergency steering) manual switch (op)	L63	29	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-15	IGN_C (AFTER N SAFETY)	L63	39	Starter activated=ON (24V)/OFF (OPEN)
D-IN-16	Right FNR (J/S) change-over switch (op)	L62	35	Switch pressed=ON (24V)/OFF (OPEN)
D-IN-17	Right seesaw & J/S F (op)	L62	25	Forward=ON (24V)/OFF (OPEN)
D-IN-18	Right seesaw & J/S N (op)	L62	15	Neutral=ON (24V)/OFF (OPEN)
D-IN-19	Right seesaw & J/S R (op)	L62	5	Reverse=ON (24V)/OFF (OPEN)
D-IN-20	Direction lever F	L62	36	Forward=ON (24V)/OFF (OPEN)
D-IN-21	Direction lever N	L62	26	Neutral=ON (24V)/OFF (OPEN)
D-IN-22	Direction lever R	L62	16	Reverse=ON (24V)/OFF (OPEN)
D-IN-23	Neutralizer (P/B) signal	L62	6	Parking switch=ON (24V)/OFF (OPEN)
D-IN-24	E-POC FILL F	L62	37	Fill switch=ON (GND)/OFF (OPEN)
D-IN-25	E-POC FILL R	L62	27	Fill switch=ON (GND)/OFF (OPEN)
D-IN-26	E-POC FILL 1st	L62	17	Fill switch=ON (GND)/OFF (OPEN)
D-IN-27	E-POC FILL 2nd	L62	7	Fill switch=ON (GND)/OFF (OPEN)
D-IN-28	E-POC FILL 3rd	L62	13	Fill switch=ON (GND)/OFF (OPEN)
D-IN-29	E-POC FILL 4th	L62	3	Fill switch=ON (GND)/OFF (OPEN)
D-IN-30	E-POC FILL L/U	L62	2	Fill switch=ON (GND)/OFF (OPEN)
D-IN-31	Shift hold switch	L62	38	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-32	No item	L62	28	ON (GND)/OFF (OPEN)
SOL/0-0	Electric (emergency steering) relay (op)	L63	7	Output ON (24V)/OFF (OPEN)
SOL/0-1	E.C.S.S. relay	L63	17	Output ON (24V)/OFF (OPEN)
SOL/0-2	SW pump cut-off	L63	27	Output ON (24V)/OFF (OPEN)
SOL/0-3	Neutral output	L63	37	Output ON (24V)/OFF (OPEN)
SOL/0-4	Fan pump reverse turn SOL	L63	28	Output ON (24V)/OFF (OPEN)
SOL/0-5	Fan pump neutral SOL	L63	38	Output ON (24V)/OFF (OPEN)
D-OUT-0	Back lamp relay	L63	4	Output ON (24V)/OFF (OPEN)
D-OUT-1	T/M cut-off indicator	L63	8	Output ON (24V)/OFF (OPEN)

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I/O signal	Displayed item	Connector No.	Pin No.	ON/OFF logic
Working machine controller (op)				
D-IN-0	J/S ON/OFF change-over switch	L71	23	J/S (right FNR) selection=ON (24V)/OFF (OPEN)
D-IN-1	Machine safety-lock lever switch	L71	17	Operating position=ON(24V)/Obstructing position=OFF(OPEN)
D-IN-2	No item	L71	11	ON (24V)/OFF (OPEN)
D-IN-3	No item	L71	5	ON (24V)/OFF (OPEN)
D-IN-4	No item	L71	24	ON (24V)/OFF (OPEN)
D-IN-5	No item	L71	18	ON (24V)/OFF (OPEN)
D-IN-6	No item	L71	12	ON (24V)/OFF (OPEN)
D-IN-7	No item	L71	6	ON (24V)/OFF (OPEN)
D-IN-8	J/S speed Hi/Lo change-over switch	L73	10	J/H Hi speed selection=ON (GND)/OFF (OPEN)
D-IN-9	Bucket proximity switch (horizontal)	L73	20	Horizontal position=ON (GND)/OFF (OPEN)
D-IN-10	Bucket full-stroke switch	L73	30	Stroke end position=ON (GND)/OFF (OPEN)
D-IN-11	No item	L73	40	ON (GND)/OFF (OPEN)
D-IN-12	Semi-auto digging hard switch	L73	9	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-13	Semi-auto digging soft switch	L73	19	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-14	No item	L73	29	ON (GND)/OFF (OPEN)
D-IN-15	No item	L73	39	ON (GND)/OFF (OPEN)
D-IN-16	No item	L72	35	ON (GND)/OFF (OPEN)
D-IN-17	No item	L72	25	ON (GND)/OFF (OPEN)
D-IN-18	No item	L72	15	ON (GND)/OFF (OPEN)
D-IN-19	No item	L72	5	ON (GND)/OFF (OPEN)
D-IN-20	No item	L72	36	ON (GND)/OFF (OPEN)
D-IN-21	No item	L72	26	ON (GND)/OFF (OPEN)
D-IN-22	No item	L72	16	ON (GND)/OFF (OPEN)
D-IN-23	No item	L72	6	ON (GND)/OFF (OPEN)
D-IN-24	No item	L72	37	ON (GND)/OFF (OPEN)
D-IN-25	No item	L72	27	ON (GND)/OFF (OPEN)
D-IN-26	No item	L72	17	ON (GND)/OFF (OPEN)
D-IN-27	No item	L72	7	ON (GND)/OFF (OPEN)
D-IN-28	Remote positioner upper set switch	L72	13	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-29	Remote positioner lower set switch	L72	3	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-30	Remote positioner upper selection switch	L72	2	Switch pressed=ON (GND)/OFF (OPEN)

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I/O signal	Displayed item	Connector No.	Pin No.	ON/OFF logic
Working machine controller (op)				
D-IN-31	Remote positioner lower selection switch	L72	38	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-32	No item	L72	28	ON (GND)/OFF (OPEN)
SOL/0-0	J/S EPC cut relay	L73	7	Output ON (24V)/OFF (GND)
SOL/0-1	Detent boom up	L73	17	Output ON (24V)/OFF (GND)
SOL/0-2	Detent boom floating	L73	27	Output ON (24V)/OFF (GND)
SOL/0-3	Detent tilt	L73	37	Output ON (24V)/OFF (GND)
SOL/0-4	Machine lock SOL	L73	28	Output ON (24V)/OFF (GND)
SOL/0-5	No item	L73	38	Output ON (24V)/OFF (GND)
D-OUT-1	Remote positioner upper lamp	L73	8	Output ON (24V)/OFF (GND)
D-OUT-2	Remote positioner lower lamp	L73	18	Output ON (24V)/OFF (GND)

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(For Reference) Check Using the Real-Time Monitor

Example: Measurement of engine speed

Measure the engine speed under the following conditions:
Temperature of coolant: within operation range
Temperature of hydraulic oil: 45 ~ 55 C
Temperature of power train oil: 70 ~ 90°C

Use the real-time monitor first to check these conditions.

Conditions	Real-time monitor item	Component	ID
Temperature of coolant	COOLANT TEMP	Machine monitor	04103
Temperature of hydraulic oil	HYD TEMP	Machine monitor	04401
Temperature of power train oil	TC OIL TEMP	Machine monitor	40100

After checking those conditions on the real-time monitor, check the engine speed

Conditions	Real-time monitor item	Component	ID
Engine speed	ENG SPEED	Machine monitor	01001

(For Reference) Fault Diagnosis Using the Real-Time Monitor

Example: Cannot succeed in re-setting the T/M cut-off position.

Possible causes of disabled cut-off of T/M include the following:
Abnormal cut-off selection switch
Abnormal cut-off position set switch
Abnormal left brake pressure sensor
Abnormal T/M controller

Check the T/M controller first to see if any abnormality was found and to see if an error was issued.

If no error was detected, check the status of input signals on the real-time monitor.

1. Check the cut-off selection switch

Item	Real-time monitor item	Pin position	ID
D-IN-2	D-IN--0------7 40905:**0****	L61-11	40905

The third digit is [0] if the T/M cut-off selection switch has recognized itself as not ON.

Item	Real-time monitor item	Pin position	ID
D-IN-2	D-IN--0------7 40905:**1****	L61-11	40905

On the contrary, the digit is [1] if the switch has recognized itself as ON.

If [0] continues after you operated the switch, you can consider that the cut-off selection switch system is abnormal.

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2. Check the cut-off set switch

Item	Real-time monitor item	Pin position	ID
D-IN-3	D-IN--0------7 40905:***0***	L61-11	40905

The fourth digit is [0] if the T/M cut-off set switch has recognized itself as not ON.

Item	Real-time monitor item	Pin position	ID
D-IN-3	D-IN--0------7 40905:***1***	L61-11	40905

Onthe contrary, the digit is [1] if the switch has recognized itself as ON. If [0] continues after you operated the switch, you can consider that the cut-off set switch is abnormal.

3. Check the left-hand brake pressure sensor

Check the left-hand brake pressure sensor with the engine kept operating.

Item	Real-time monitor item	Pin position	ID
Left brake pressure	LH BRAKE 41100:*.**MPa	L61-19	41100

If the pressure does not change after you stepped on/released the cut-off brake, you can consider that the sensor system is abnormal. If you stepped on the left-hand brake fully, about 5.00Mpa {51kg/cm²} of pressure should be shown.If you released the brake, a value less than 0.5Mpa {5kg/cm²} should be shown. The pressure may change when you stepped on the brake even when the engine is stopped if some pressure remains in accumulator; if no pressure remains in it, a value less than 0.5Mpa {5kg/cm²} should be shown.

4. Check the cut-off pressure set value

Check the set value of the pressure at which T/M is cut off.

Set the cut-off position at a desired pressure by stepping on the cut-off brake, with the left-hand brake pressure sensor kept displaying. Here, it is set at a pressure 1.5Mpa{15kg/cm²}.

Item	Real-time monitor item	Pin position	ID
Left brake pressure	LH BRAKE 41100: 1.50MPa	L61-19	41100

Set the cut-off position ([1.50] was selected arbitrarily).
Setting cut-off causes the pressure taken into memory when the set switch being pressed was released.

Check the cut-off pressure just set on the real-time monitor.

Item	Real-time monitor item	Pin position	ID
T/M cut-off pressure	CUT OFF 41200: 1.50MPa	Calculated value	41200

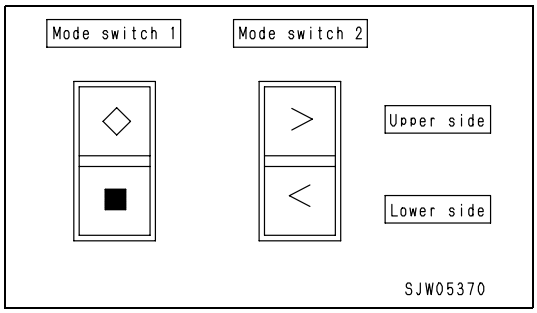
The result is accepted if the value is substantially the same with the value previously set. Although, if the cut-off pressure has been set to less than 0.49Mpa {5kg/cm²}, 9.49Mpa {5kg/cm²} shall be adopted as the set value; if the cut-off pressure has been set to more than 4.5Mpa {45kg/cm²}, 4.5Mpa {45kg/cm²} shall be adopted as the set value.

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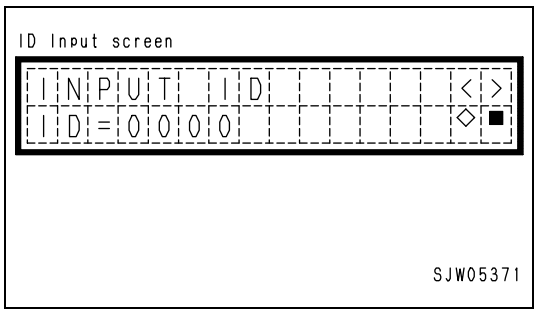
Machine setting

Setting of machine serial number

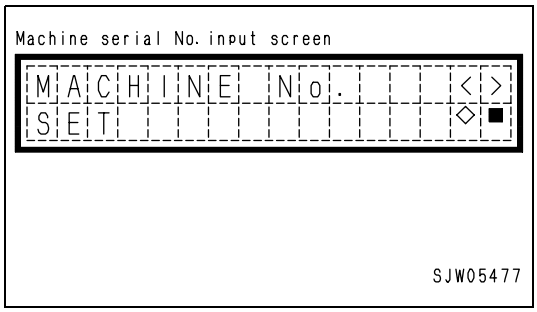
1. Hold down the ■ SW and < SW for 5 seconds or more, and change to the [ID entry screen].



2. Use the < and > SW to enter ID, and press the ◇ SW to enter the service person screen.



3. Use the < and > SW to display the [machine serial No. entry] screen, and press the ◇ SW to decide the machine serial number.



4. Enter the machine serial number.

   Entering ID
   At transition to the screen, “50000” or “set numeric value” is displayed on the screen.

   Enter a numeric value 0 to 9 at the cursor position.

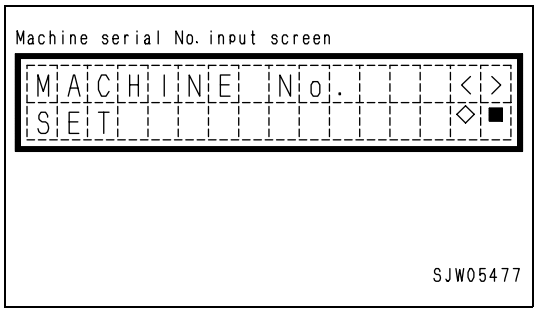
   The cursor appears on the highest-order position, and 0 to 9 is displayed one by one each time the >, /, or < SW is pressed.

   When a target numeric value is displayed, press the ◇ SW.

   The cursor moves to the second digit. Follow the same procedure to enter up to the lowest-order digit, and press the ◇ SW.

   If a numeric value is changed, the operation acceptance completion sound is output.

   If an incorrect numeric value is entered, use the ■ SW to return to the [Select Setting] screen once, and repeat the procedure from the beginning.

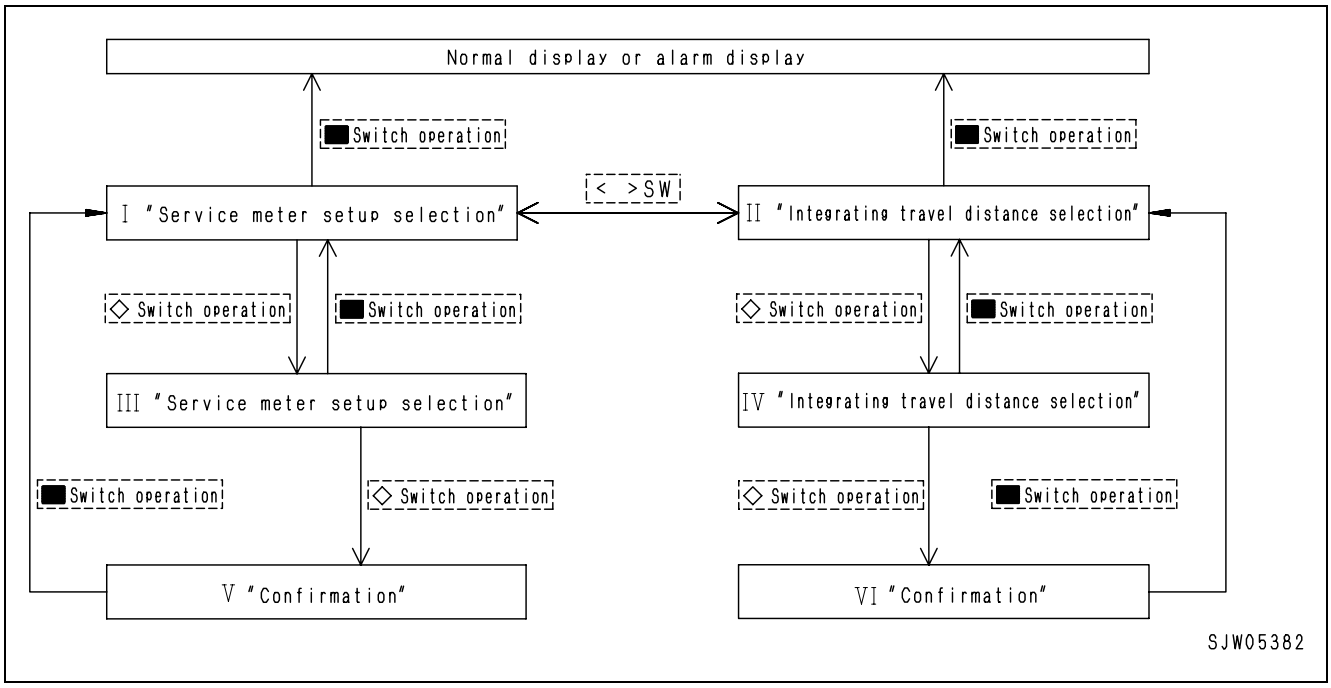


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Setting of service meter and travel distance integration value

In layer 1 of service person function 1, select [CN L54-6 pin OPEN-GND (insert the T branch circuit, then connect the L54-6 and -9 pins), then change to [Set Service Meter].

In addition to the operation of the ■ SW, the screen returns to the normal screen 3 seconds after the short by the T branch circuit is released.



1. Select the service meter setting. (Layer 1)

   Use the < and > SW to change to the [Select Travel Distance Integration Value Setting].

   Press the ■ SW to change to the normal or warning screen.

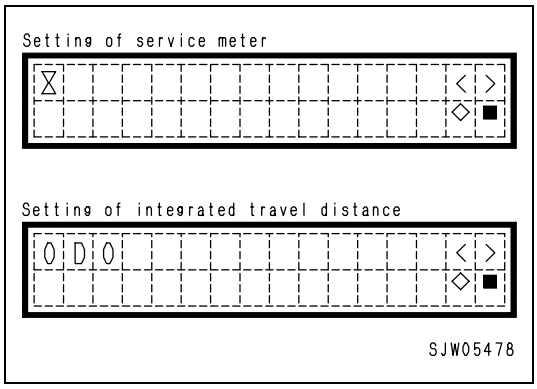
   Use the ◇ SW to change to the [Set Service Meter].

   Select the travel distance integration value setting. (Layer 0)

   Use the < and > SW to change to the [Select Service Meter Setting].

   Press the ■ SW to change to the normal or warning screen.

   Use the ◇ SW to change to the [Set Travel Distance Integration Value].

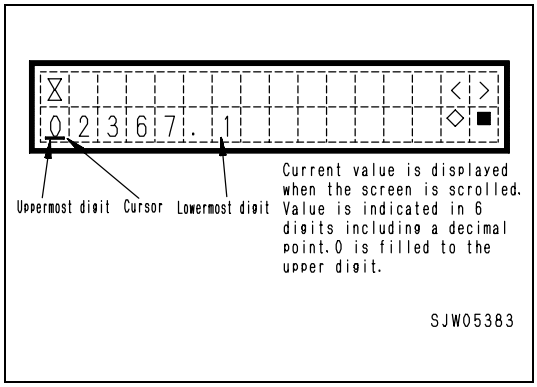


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2. Display at service meter setting (Layer 2)

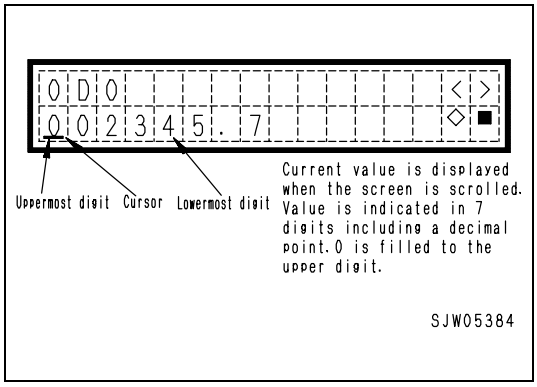
When the service meter is changed, the time control information based on the service meter, for example, abnormal history, maintenance monitor, and load meter, becomes confused; so, do not change the service meter unless especially required.
If the service meter is changed, confirm whether the information is abnormal.

Setting
Enter a numeric value 0 to 9 at the cursor position.
The cursor first is on the highest-order digit. 0 to 9 is displayed one by one each time the <. /, or > SW is pressed. The highest-order digit of the service meter is on the place of ten thousand. For example, if the current service meter value is “2367.1,” 0 is displayed on the highest-order digit.
After a target numeric value is entered, press the ◇ SW to decide the value. The cursor moves down one digit. Follow the same procedure to enter up to the lowest-order digit, and press the ◇ SW. (Change to the confirmation screen.)
In this case, the operation acceptance completion sound is output.
If an incorrect numeric value is entered, use the ■ SW to return to the [Select Service Meter Setting] once, and repeat the procedure from the beginning.



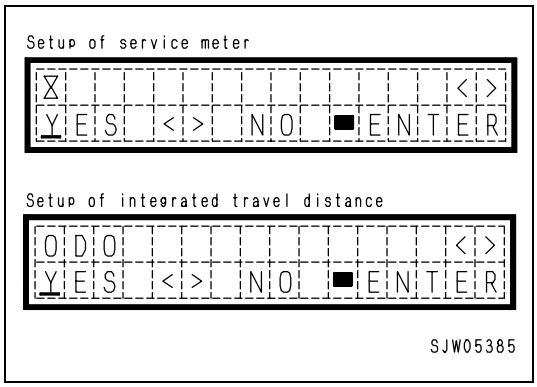
Display at travel distance integration value setting (Layer 2)

Setting
Enter a numeric value 0 to 9 at the cursor position.
The cursor first is on the highest-order digit. 0 to 9 is displayed one by one each time the <. /, or > SW is pressed. The highest-order digit of the travel distance integration value is on the place of ten thousand. For example, if the current travel distance integration value is “2345.7,” 0 is displayed on the highest-order digit and next digit.
After a target numeric value is entered, press the ◇ SW to decide the value. The cursor moves down one digit. Follow the same procedure to enter up to the lowest-order digit, and press the ◇ SW. (Change to the confirmation screen.)
In this case, the operation acceptance completion sound is output.
If an incorrect numeric value is entered, use the ■ SW to return to the [Select Travel Distance Integration Value Setting] once, and repeat the procedure from the beginning.



3. Display of the confirmation screen.

When the changed value is accepted, the operation acceptance completion sound is output; otherwise, the operation cancellation sound (one long tone) is output for one second, and the screen returns to the normal menu.



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Setting necessary for option mounting

When one of the options below is added or replaced, initialize the sensors and solenoids using the machine monitor.

Additional or changeable options	Initial adjustment items
T/M mainframe, T/M controller, and ECMV	Transmission initial learning
Boom angle sensor and work equipment controller	Adjustment of work equipment boom angle
EPC lever, work equipment controller, and work equipment EPC valve	Adjustment of work equipment EPC
3 EPC levers, work equipment controller, and work equipment EPC valve	Adjustment of work machine EPC
J/S lever, work equipment controller, J/S EPC valve	Adjustment of J/S steering
Boom angle sensor and machine monitor	Adjustment of load meter boom angle

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Optional device setting for machine monitor

When one of the options below is added or removed, change the machine monitor setting. If the machine monitor is replaced, set the option mounting state of the machine.

Option set items

Item No.	Option item	English	Remarks
Monitor panel controller			
1	Auto grease	AUTO GREASE	
2	Battery electrolyte reduction sensor	BAT LIQUID	
3	T/M clogging sensor	TRANSM CLOG	
4	Printer	PRINTER	
5	Boom high lift specifications	HI LIFT	
6	Speed/engine tachometer switch	ENGINE RPM	※ 1
7	Short ton switch	SHORT TON	※ 2
T/M controller			
1	Travel dumper	E.C.S.S	
2	T/C lock-up	LOCK UP	
3	Emergency steering	EMER STRG	
4	Tire size	TIRE SIZE	※ 3
5	Automatic opposite rotation fan	AUTO RE FAN	
6	Right FNR switch	RH FNR SW	
Work equipment controller			
1	EPC lever	EPC LEVER	
2	J/S lever	JOY STICK	
3	3 EPC levers	EPC 3RD	
Engine controller			
1	Not set currently	---	

※ 1. Setting of speed/engine tachometer indicator switch
When the rotary switch on the rear is km/h: the engine rotation is displayed at engine rotation OPT = ADD.
When the rotary switch on the rear is MPH: the engine rotation is displayed at engine rotation OPT = ADD.
When the rotary switch on the rear is rpm: the machine speed (km/h) is displayed engine rotation OPT = NO ADD.

※ 2. Setting of load meter short ton (US ton) indicator switch
When the DIP switches on the rear is MPH, the indicator is switched to short ton.
The MPH indicator is the domestic type using the non-SI unit (mile); so, do not change for SI unit countries.

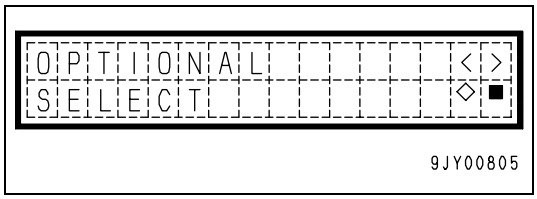
※ 3. Adjustment of tire size
When the speed indicator does not match the actual value because an unspecified tire is used or a tire is abraded, correct the tires so that the speed indicator matches the actual value.
When the normal tire size is changed, use the rotary switch 3 on the rear, not the adjustment function.

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Operation method

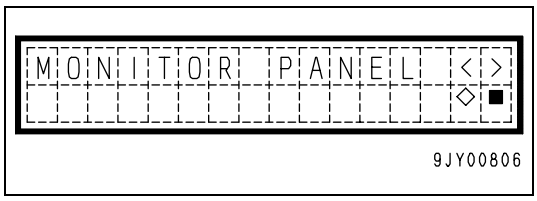
1. Operate the monitor mode switch to select a service mode option.

   Pressing the monitor mode switch changes the option setting as follows.

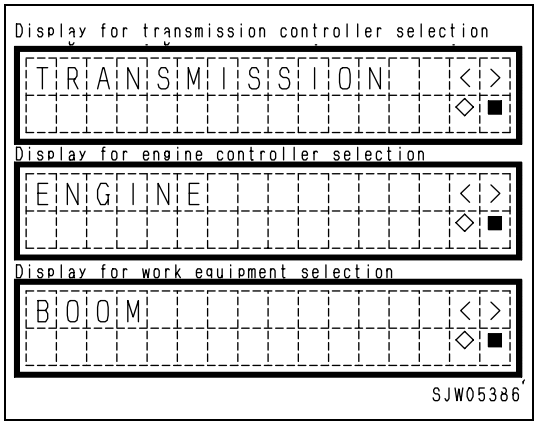


2. Press and release the monitor panel mode switch (◇).

   The screen changes to the monitor panel option setting selectable display.



3. When the option setting controller is not the monitor, use the monitor panel mode switch (< or >) to switch to each controller.



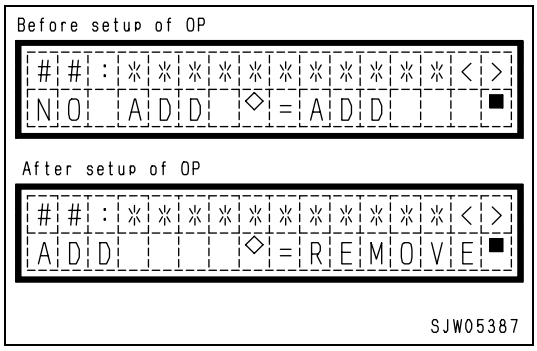
4. After a target controller is selected, press and release the monitor mode switch (◇). The setting state for each option appears as follows.

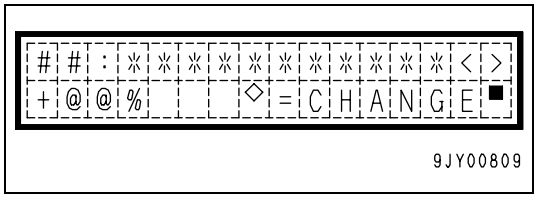
   ##: Displays an item number.
   ***: Displays an item name.

   Upper row: Displayed when no OPT is set currently.
   Lower row: Displayed when OPT is set currently.
   Pressing the ◇ SW changes ADD (set) or NO ADD (not set), and the display is switched.
   If the setting is changed, the operation acceptance completion sound (two short tones (0.1 sec. ON ➔ 0.1 sec. OFF ➔ 0.1 sec. ON)) is output.
   To adjust the tire size, the operation and display sizes are as follows:
   Using the ◇ SW switches the 00% and @@%.
   @@: Can be switched every 2% up to deflection -12 to +12% for the setting of the DIP switches on the rear.

   +00➔+02➔+04➔+06➔+08➔+10➔+12➔-02➔-04➔ -06➔-08➔-10➔-12➔+00··· .

   When the value is changed, the operation acceptance completion sound (two short tones (0.1 sec. ON ➔ 0.1 sec. OFF ➔ 0.1 sec. ON)) is output.
   Adjust the tire size only when an unspecified tire is mounted.





5. Press and release the monitor panel mode switch (■); the menu returns to the preceding screen.

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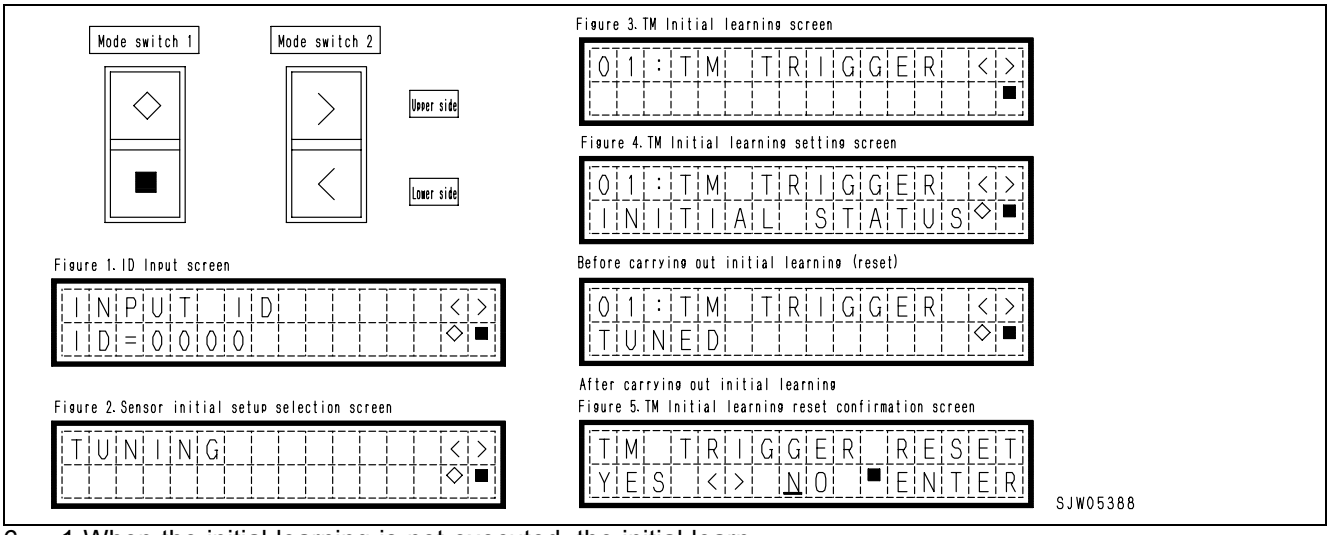
T/M initial learning setting

Learning for correcting the solid difference of transmission

Learning data reset
Issue the learning data reset command to reset all learning data stored in the non-volatile memory.

Display of T/M initial learning and procedure for resetting data

1. Hold down the ■ SW and < SW for 5 seconds or more at the same time, and change to the ID entry screen. (Figure 1)
2. Use the < and > SW to enter ID, and press the ◇ SW to enter the service person screen.
3. Use the < and > SW to display the sensor initialization selection screen (Figure 2), and press the ◇ SW to decide the value.
4. Use the < and > SW to display the T/M initial learning screen (Figure 3) of set item 1.
5. Press the ◇ SW; the T/M initial learning set screen (Figure 4) appears.



6. -1 When the initial learning is not executed, the initial learning reset screen (Figure 4) appears.
   -2 When the initial learning is executed, the initial learning set screen (Figure 4) appears.
7. If the ■ SW is pressed here, the initial learning reset confirmation screen (Figure 5) appears.
8. -1 When resetting, use the < switch to select [YES], then press the ■ SW.
   -2 When not resetting, select NO, then press the ■ SW.
9. Press the ■ SW: the learning state set or reset screen (Figure 4) appears.

Press the ■ SW, and confirm that the monitor indicator is in the initial learning reset state (Figure 4). Resetting is then completed. If the initial learning is required, reset once even when the monitor indicator first displays the learning reset state.

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Initial learning procedure

Preparation for machine

1. Start the engine.
2. Display the T/M oil temperature on the real-time monitor.
3. Operate the gear shift lever and forward-reverse lever to oil the inside of the transmission sufficiently.

   N2 ➔ F2 ➔ F1 ➔ F2 ➔ F3 ➔ F4 ➔ F3 ➔ F2 ➔ N2 ➔ R2 ➔ N2

   Each speed level must be held for 2 sec. or more.
4. Lift the T/M oil temperature to 55 to 70°C.

The learning operation must be performed at the specified oil temperature; so, exactly adjust the oil temperature.

Confirm that the machine is normal (no fault is detected).

Initial learning procedure

1. Execute the initial learning from the machine standby state above. (Do not stop the engine.)
2. Use the real-time monitor to confirm that the T/M oil temperature is in the range from 55 to 70°C.

   The T/M controller [ECMV OIL TEMP] is displayed on the real-time monitor. If the T/M oil temperature is illegal, adjust it to 55 to 70°C.
3. Operate the gear shift lever and forward-reverse lever to change the transmission.

   N2 ➔ F2 ➔ F1 ➔ F2 ➔ F3 ➔ F4 ➔ F3 ➔ F2 ➔ N2 ➔ R2 ➔ N2

   For the first N2, hold for 5 sec. or more, and hold for 3 sec. or more at each speed level.

   Operate the machine in the engine low idling, manual switch ON, T/M cut-off switch OFF, and (lock-up switch OFF) states.

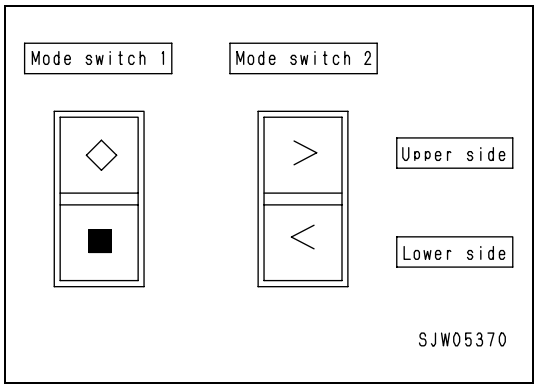
   The gear shift must be operated at actual travel or on-base travel.
4. After all the initial learning is completed, the initial learning set screen (TUNED) appears.

   Ordinarily, the initial learning is completed by performing the gear shift operation until this initial learning set screen (TUNED) appears.

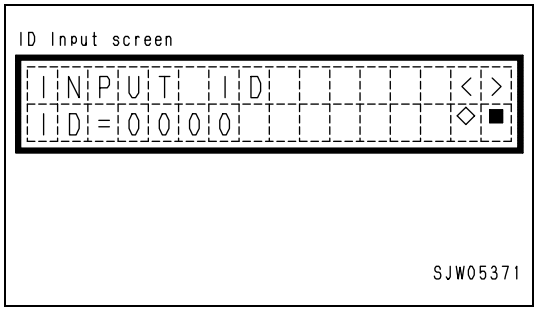
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Adjustment of work equipment boom angle (For electric work equipment lever) (op)

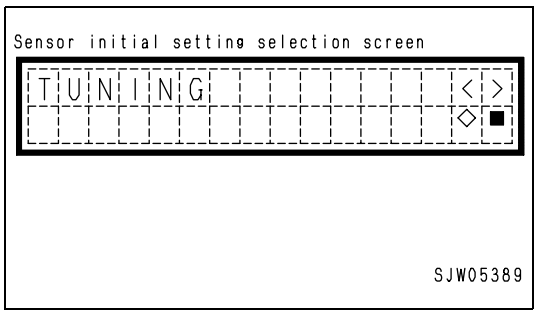
1. Hold down the ■ SW < SW for 5 seconds or more at the same time, and change to the [ID Entry] screen.



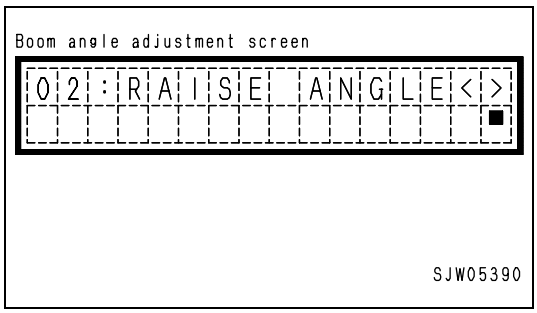
2. After the ID is entered using the < and > SW, press the ◇SW to enter the service person screen.



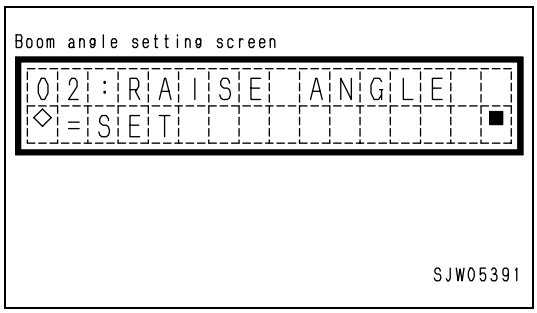
3. Press the < and > SW to display the [Sensor Initial Setting Selection] screen, and press the ◇ SW to decide the value.



4. Press the < and > SW to display the [Work Equipment Boom Angle Adjustment] screen of set item 2.



5. Press the ◇ SW here; the [Work Equipment Book Angle Set] screen appears.



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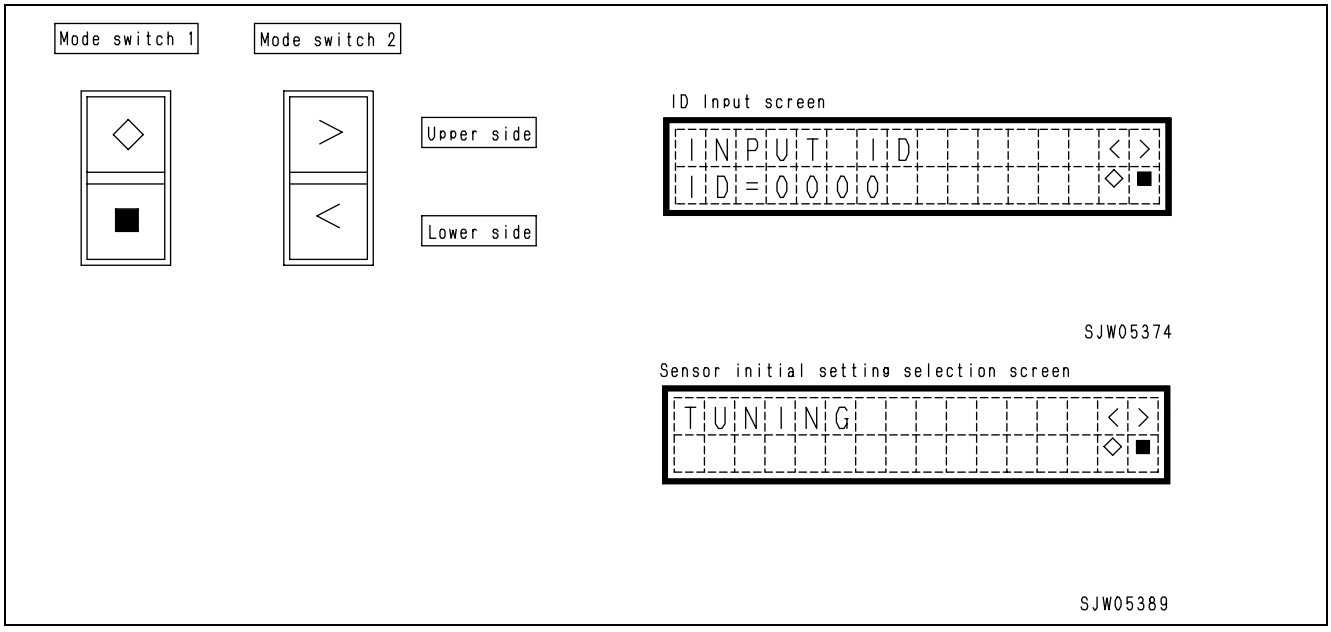
Adjustment of boom angle

6. Adjust the boom to the highest position without load.
7. Press the ◇ SW here: the boom angle sensor value is read, and a difference between the read result and reference value is stored as an offset value.
8. Confirm that the buzzer sounds (two short tones) twice and the menu returns to the [Boom Angle Adjustment] screen. The setting is then completed.
9. Pressing the ■ SW ends the boom angle correction even if it is performed currently.

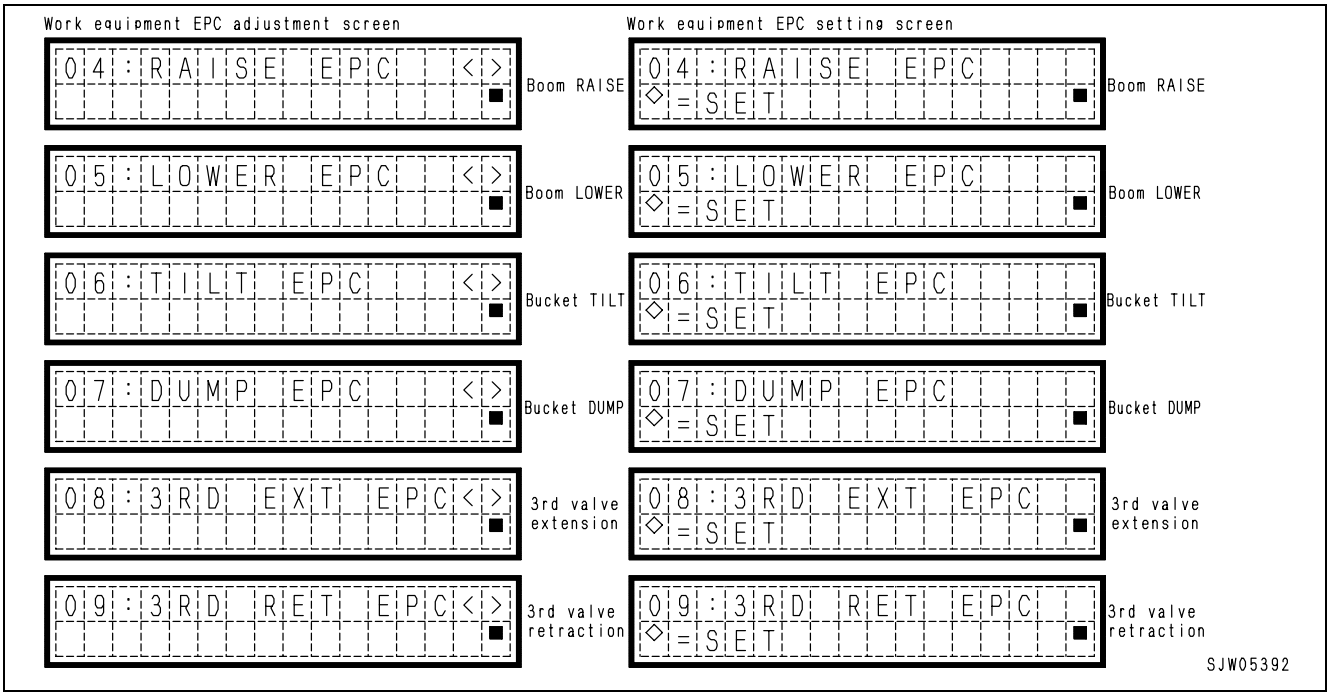
Adjustment of work equipment EPC (op)

Item setting

1. Hold down the < and > SW for 5 seconds or more at he same time, and change to the [ID Entry] screen.
2. Use the < and > SW to enter ID, and press the ■ SW to enter the service person screen.
3. Use the < and > SW to display the [Sensor Initial Setting Selection] screen, and press the ◇ SW to decide the value.
4. Use the < and > SW to display the [Work Equipment EPC Adjustment] screen on set items 4 to 7.
   Boom up: No.4
   Boom down: No.5
   Bucket tilt: No.6
   Bucket dump: No.7
   3-valve extension: No.8
   3-valve reduction: No.9
   Set the value individually.
5. Press the ◇ SW here; the [Work Equipment EPC Setting] screen appears.



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Adjustment for each EPC

Boom-up

1. Dump the bucket to lower the boom, and lift the front tires. Lift the boom (lower the machine) by degrees in the engine high idling state.
2. Return the lever by fine operation to stop the boom (tire floating). Then hold the lever at that position.
3. Press the ◇ SW here; the EPC command value is read, and a difference between the read value and reference value is stored as an offset value.
4. The buzzer sounds twice (two short tones), and the menu returns to the [Work Equipment EPC Adjustment] screen. The setting is then completed.
5. When the ◇ SW is pressed as the lever stroke is in the down direction, the buzzer sounds for 1 second, and the adjustment is canceled as the [Work Equipment EPC Setting] screen remains displayed.
6. When the ◇ SW is pressed as the lever is at the neutral position, the adjustment value is cleared, and the buzzer sounds twice (two short tones). The menu then returns to the [Work Equipment EPC Adjustment] screen.
7. Press the ■ SW; the work equipment EPC dispersion correction is ended even if it is in progress of processing.

Boom-down

1. Adjust the boom to the horizontal level without load, and lower the boom by degrees in the engine high idling state.
2. Return the lever by fine operation to stop the boom, then hold the lever at that position.
3. Press the ◇ SW here; the EPC command value is read, and a difference between the read value and reference value is stored as an offset value.
4. The buzzer sounds twice (two short tones), and the menu returns to the [Work Equipment EPC Adjustment] screen. The setting is then completed.
5. When the ◇ SW is pressed as the lever stroke is 40% or more in the down direction, the buzzer sounds for 1 second, and the adjustment is canceled as the [Work Equipment EPC Setting] screen remains displayed.
6. When the ◇ SW is pressed as the lever is at the neutral position, the adjustment value is cleared, and the buzzer sounds twice (two short tones). The menu then returns to the [Work Equipment EPC Adjustment] screen.

Bucket tilt

1. Dump the bucket to lower the boom, and lift the front tires. Tilt the bucket by degrees in the engine high idling state. (Lower the machine.)
2. Return the lever by fine operation to stop the bucket (tire floating), then hold the lever at that position.

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3. Press the ◇ SW here; the EPC command value is read, and a difference between the read value and reference value is stored as an offset value.
4. The buzzer sounds twice (two short tones), and the menu returns to the [Work Equipment EPC Adjustment] screen. The setting is then completed.
5. When the ◇ SW is pressed as the lever stroke is in the dump direction, the buzzer sounds for 1 second, and the adjustment is canceled as the [Work Equipment EPC Setting] screen remains displayed.
6. When the ◇ SW is pressed as the lever is at the neutral position, the adjustment value is cleared, and the buzzer sounds twice (two short tones). The menu then returns to the [Work Equipment EPC Adjustment] screen.
7. When the ■ SW is pressed, the work equipment EPC dispersion correction is ended even if it is in progress of processing.

Bucket dump

1. Adjust the bucket to the horizontal level without load, and lower the bucket by degrees in the engine high idling state.
2. Return the lever by fine operation to stop the boom, then hold the lever at that position.
3. Press the ◇ SW here; the EPC command value is read, and a difference between the read value and reference value is stored as an offset value.
4. The buzzer sounds twice (two short tones), and the menu returns to the [Work Equipment EPC Adjustment] screen. The setting is then completed.
5. When the ◇ SW is pressed as the lever stroke is in the tilt direction, the buzzer sounds for 1 second, and the adjustment is canceled as the [Work Equipment EPC Setting] screen remains displayed.
6. When the ■ SW is pressed as the lever is at the neutral position, the adjustment value is cleared, and the buzzer sounds twice (two short tones). The menu then returns to the [Work Equipment EPC Adjustment] screen.

3-valve extension

1. Extend three valves by degrees in the engine high idling state.
2. Return the lever by fine operation. After the cylinder of three valves stops, hold the lever at that position.
3. Press the ◇ SW here; the EPC command value is read, and a difference between the read value and reference value is stored as an offset value.
4. The buzzer sounds twice, (two short tones), and the menu returns to the [Work Equipment EPC Adjustment] screen. The setting is then completed.
5. When the ◇ SW is pressed as the lever stroke is in the fastening direction, the buzzer sounds for 1 second, and the adjustment is canceled as the [Work Equipment EPC Setting] screen remains displayed.
6. When the ◇ SW is pressed as the lever is at the neutral position, the adjustment value is cleared, and the buzzer sounds twice (two short tones). The menu then returns to the [Work Equipment EPC Adjustment] screen.
7. When the ■ SW is pressed, the work equipment EPC dispersion correction is ended even if it is in progress of processing.

3-valve reduction

1. Reduce three valves by degrees in the engine high idling state.
2. Return the lever by fine operation. After the cylinder of three valves stops, hold the lever at that position.
3. Press the ◇ SW here; the EPC command value is read, and a difference between the read value and reference value is stored as an offset value.
4. The buzzer sounds twice, (two short tones), and the menu returns to the [Work Equipment EPC Adjustment] screen. The setting is then completed.
5. When the ◇ SW is pressed as the lever stroke is in the extension direction, the buzzer sounds for 1 second, and the adjustment is canceled as the [Work Equipment EPC Setting] screen remains displayed.
6. When the ◇ SW is pressed as the lever is at the neutral position, the adjustment value is cleared, and the buzzer sounds twice (two short tones). The menu then returns to the [Work Equipment EPC Adjustment] screen.
7. When the ■ SW is pressed, the work equipment EPC dispersion correction is ended even if it is in progress of processing.

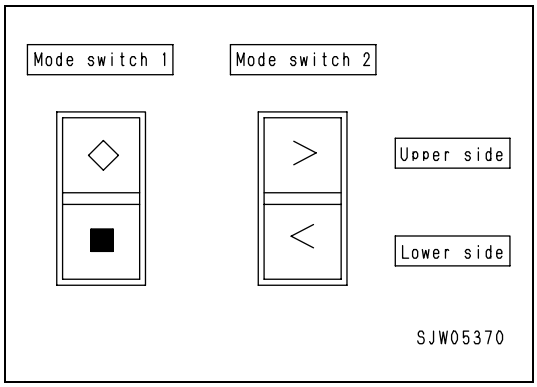
Correction of position of work equipment EPC lever detent

Procedure for correcting position of work equipment EPC lever

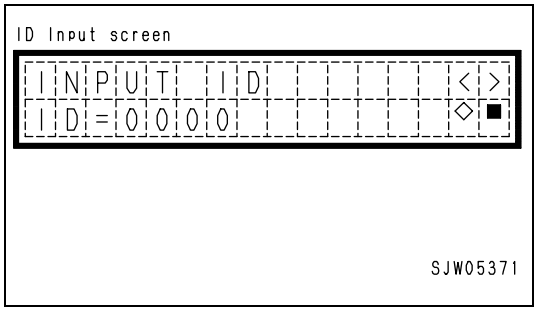
Perform the following procedure with the engine stopped

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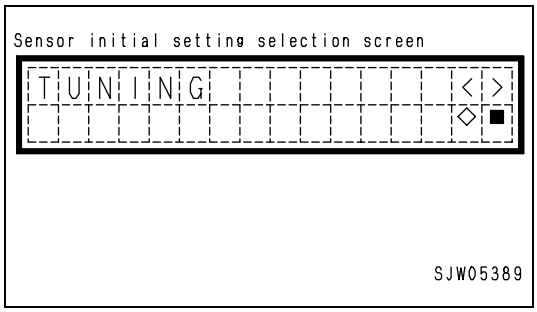
1. Push and hold the ■ SW and > switch simultaneously for 5 seconds to go to the "Input ID" screen.



2. Input the ID with the < switch and > switch, then push the ◇ SW to go to the screen for the service person.



3. Display the "Select initial setting of sensors" screen with the < switch and > switch and enter the setting.

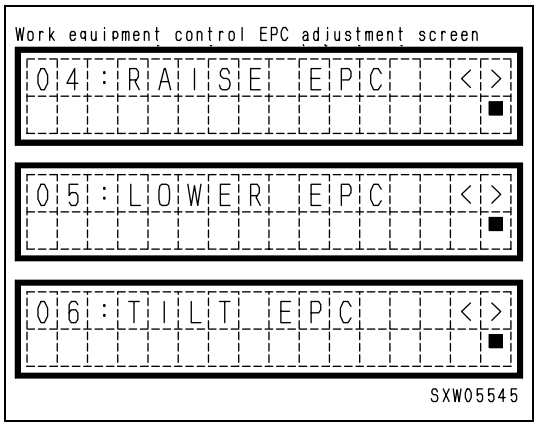


4. Display the screen for adjusting items No. 4 — 6 of the work equipment EPC with the < switch and > switch.

   Screen for adjusting work equipment EPC
   Raise boom: No. 4
   Lower boom: No. 5
   Tilt bucket: No. 6
   Set these items respectively.

   Perform this correction procedure when the electric work equipment control lever or work equipment controller is replaced.

   This correction procedure cannot be performed if the ROM No. of the work equipment controller in the real-time monitor is ****R200.



5. Push the ◇ SW and the screen for setting the work equipment EPC appears.

   Screen for setting work equipment EPC.

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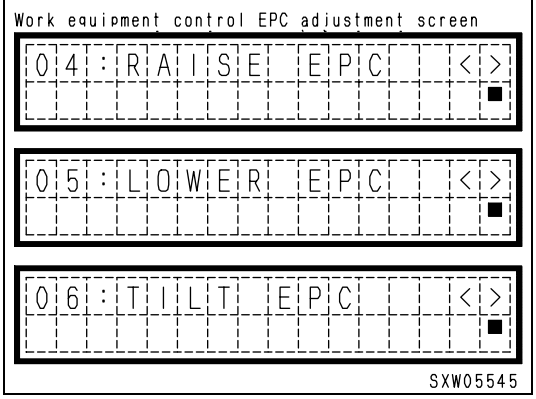
Adjustment of each EPC lever

[Adjustment of position of boom LOWER (FLOAT) detent]

1. -1. Lower the boom to the ground.
2. -1. Stop and hold the boom lever before the FLOAT detent position.
3. -1. Push the ◇ SW at this time. The lever voltage is read and the standard value is changed and saved.
4. -1. The buzzer sounds twice. The screen for adjusting the work equipment EPC appears and the adjustment is completed.
5. -1. At this time, if the ◇ SW is pushed while the lever output voltage is below the standard value (out of the design range), the buzzer sounds for 1 second and the screen for setting work equipment EPC does not change. The adjustment is cancelled in this case.

   The buzzer sounds twice and the screen for adjusting work equipment EPC appears again.
6. Correction of the position of the work equipment EPC lever detent can be stopped at any time by pushing the ■ SW.

Screen for adjusting work equipment EPC



[Adjustment of position of boom RAISE detent]

Perform the following procedure with the engine stopped.

1. -2. Lower the boom to the ground.
2. -2. Stop and hold the boom lever before the RAISE detent position.
3. -2. Push the ◇ SW at this time. The lever voltage is read and the standard value is changed and saved.
4. -2. The buzzer sounds twice. The screen for adjusting the work equipment EPC appears and the adjustment is completed.
5. -2. At this time, if the ◇ SW is pushed while the lever output voltage is below the standard value (out of design range), the buzzer sounds for 1 second and the screen for setting work equipment EPC does not change.

   The adjustment is cancelled in this case.

   The buzzer sounds twice and the screen for adjusting work equipment EPC appears again.
6. Correction of the position of the work equipment EPC lever detent can be stopped at any time by pushing the ■ SW.

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[Adjustment of the position of the bucket TILT detent]

Perform the following procedure with the engine stopped.

1. -3. Lower the boom to the ground.
2. -3. Stop and hold the bucket lever before the TILT detent position.
3. -3. Push the ◇ SW at this time. The lever voltage is read and the standard value is changed and saved.
4. -3. The buzzer sounds twice. The screen for adjusting the work equipment EPC appears and the adjustment is completed.
5. -3. At this time, if the ◇ SW is pushed while the lever output voltage is below the standard value (out of the design range), the buzzer sounds for 1 second.

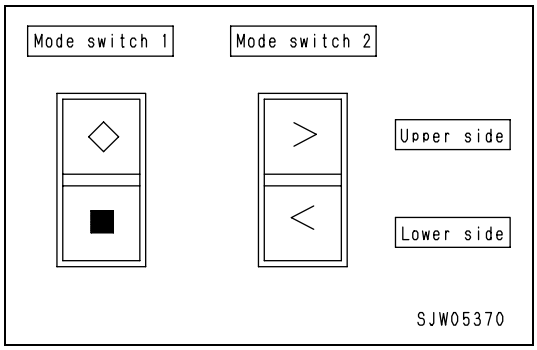
   The screen for setting the work equipment EPC does not change. The adjustment is cancelled in this case.

   The buzzer sounds twice and the screen for adjusting work equipment EPC appears again.
6. Correction of the position of the work equipment EPC lever detent can be stopped at an time by pushing the ■ SW.

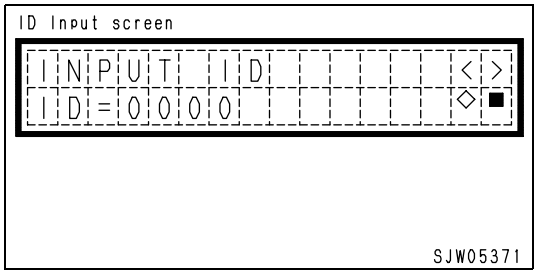
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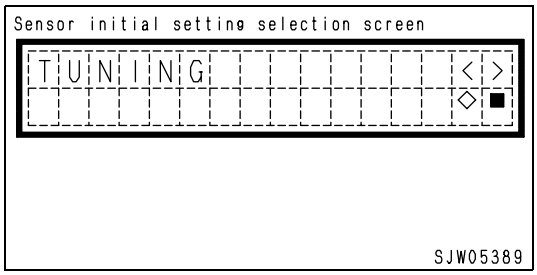
Adjustment of J/S steering (op)

1. Hold down the ■ SW < SW for 5 seconds or more at the same time, and change to the [ID Entry] screen.



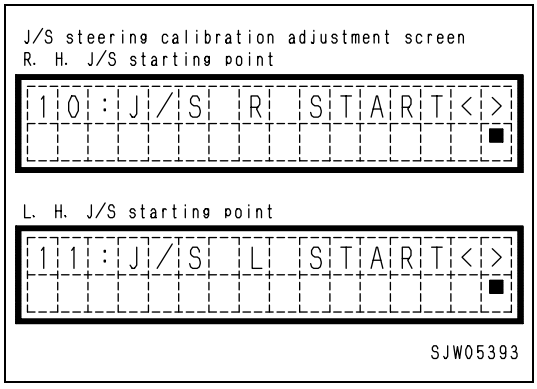
2. Use the < and > SW to enter ID, and press the ◇SW to enter the service person screen.
3. Use the < and > SW to display the [Sensor Initialization Setting] screen, and press the ◇SW to decide the value.
4. Use the < and > SW to display the [J/S Calibration Adjustment] screen of set item 11 or 12. (Right or left)
5. Press the ◇ SW here; the [J/S Calibration Adjustment] screen appears. (Right or left)

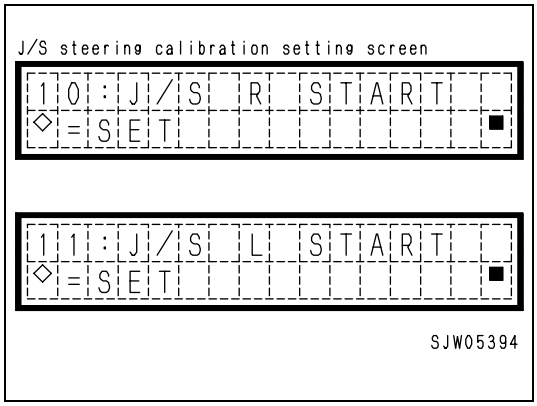




Setting of starting point (Right or left)

6. Set the engine high idling state, and set the S/T speed High/Low switch to High.
   (For this operation, use the stationary steering.)
7. Start the S/T by right or left steering fine-operation, and stop the S/T. Then hold the lever at that position.
8. Press the ◇ SW here; the EPC command value is read, and a difference between the read value and reference value is stored as an offset value.
9. The buzzer sounds twice (two short tones), and the [J/S Steering Calibration Adjustment] screen returns. The setting is then completed.
10. When the ◇ SW is pressed as the lever is in the reverse state, the buzzer sounds for 1 second, and the adjustment is canceled as the [J/S Calibration Setting] screen remains displayed.
11. When the ◇ SW is pressed as the lever is at the neutral position, the adjustment value is cleared to the initial value, and the buzzer sounds twice (two short tones). The menu then returns to the [J/S Steering Calibration Adjustment] screen.
12. When the ■ SW is pressed, the J/S calibration is ended even if it is in progress of processing.



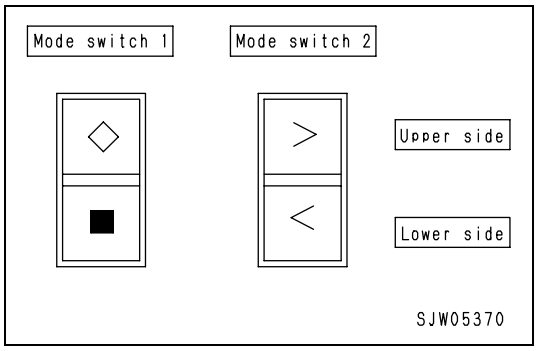


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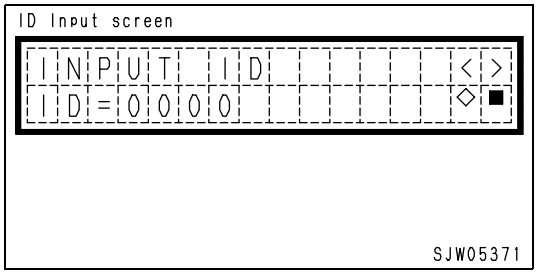
Adjustment of boom angle for load meter (op)

Adjustment of boom angle (upper position)

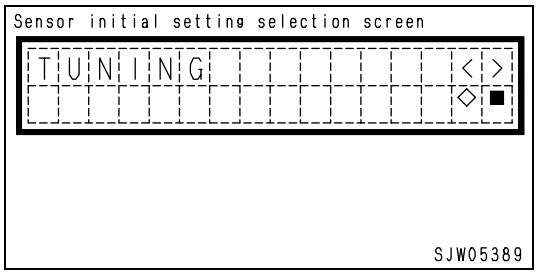
1. Hold down the ■ SW < SW for 5 seconds or more at the same time, and change to the [ID Entry] screen.



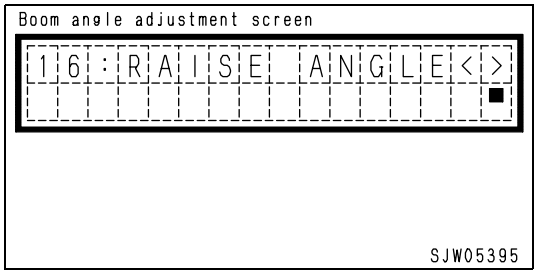
2. Use the < and > SW to enter ID, and press the ◇ SW to enter the service person screen.



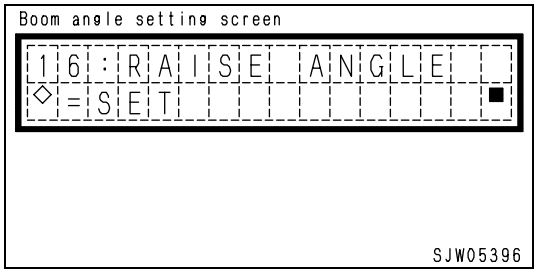
3. Use the < and > SW to display the [Sensor Initialization Setting] screen, and press the ◇ SW to decide the value.



4. Press the < and > SW to display the [Work Equipment Boom Angle Adjustment] screen on set item 16.



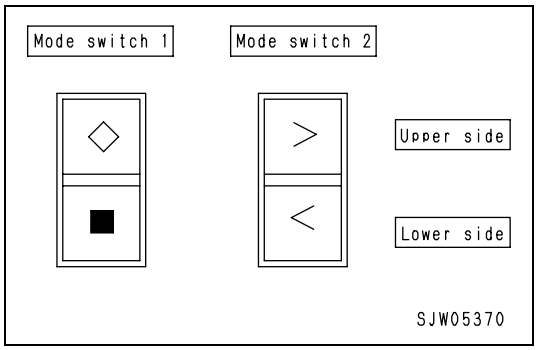
5. Press the ◇ SW here; the [Work Equipment Boom Angle Setting] screen appears.
6. Adjust the boom to the highest position without load.
7. Press the ◇ SW here; the boom angle sensor value is read, and a difference between the read result and reference value is stored as an offset value.
8. The buzzer sounds twice (two short tones), and the menu returns to the [Boom Angle Adjustment] screen. The setting is then completed.
9. Press the ■ SW; the boom angle correction is ended even if it is in progress of processing.



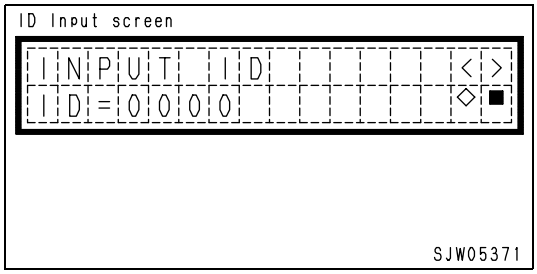
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Adjustment of boom angle (Lower position)

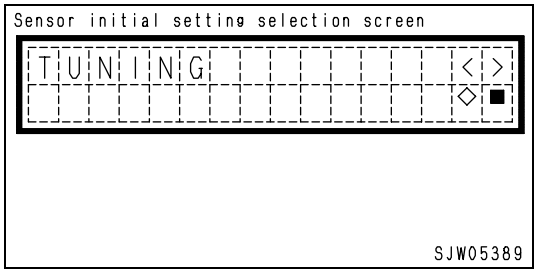
1. Hold down the ■ SW < SW for 5 seconds or more at the same time, and change to the [ID Entry] screen.



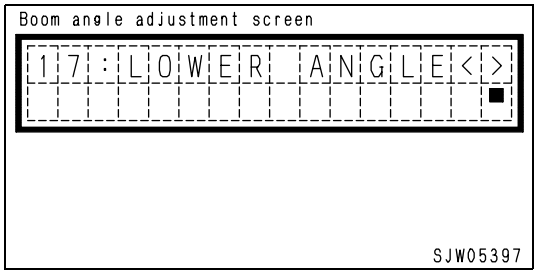
2. Use the < and > SW to enter ID, and press the ◇ SW to enter the service person screen.



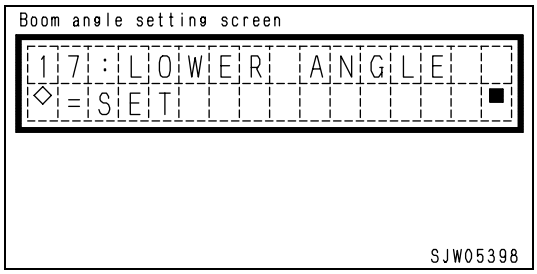
3. Use the < and > SW to display the [Sensor Initialization Setting] screen, and press the ◇ SW to decide the value.



4. Use the < and > SW to display the [Work Equipment Boom Angle Adjustment] screen of set item 17.



5. Press the ◇ SW here; the [Work Equipment Boom Angle Setting] screen appears.
6. Adjust the boom to the lowest position without load.
7. Press the ◇ SW here; the boom angle sensor value is read, and a difference between the read result and reference value is stored as an offset value.
8. The buzzer sounds twice (two short tones), and the menu returns to the [Boom Angle Adjustment] screen. The setting is then completed.
9. Press the ■ SW; the boom angle correction is ended even if it is in progress of processing.

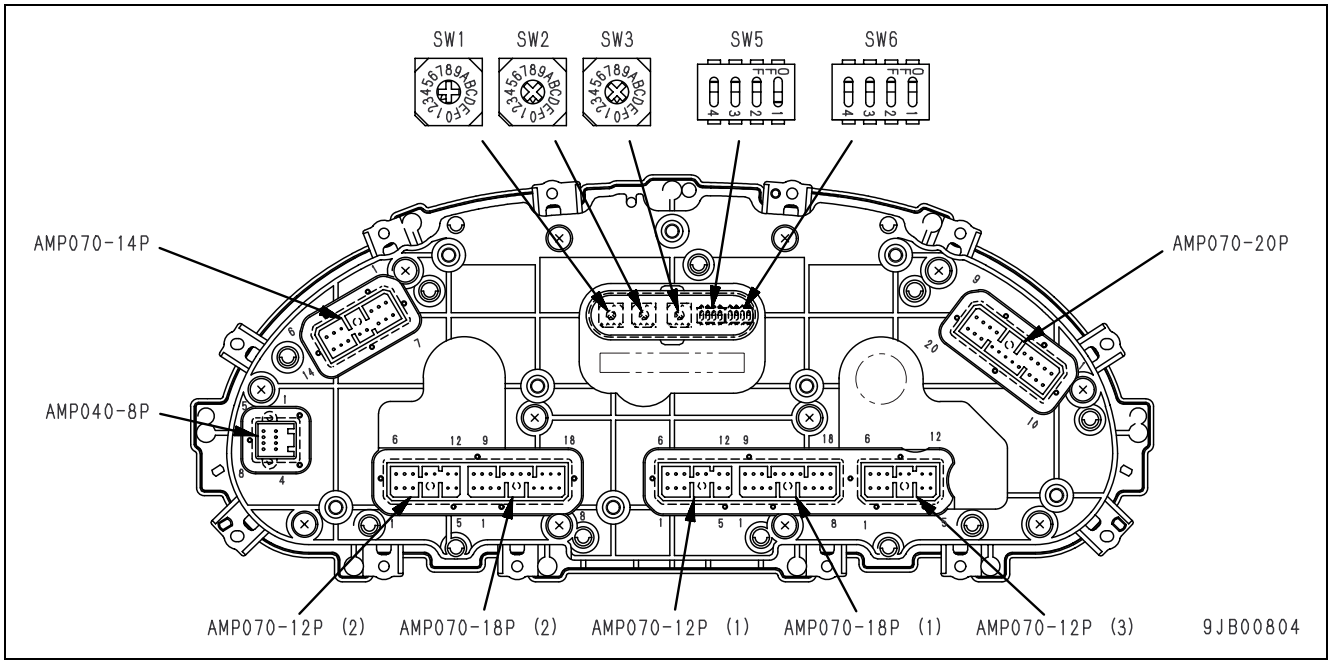


- After the boom angle is adjusted, be sure to perform calibration without load.

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AMP070-20 [CN-L51]

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA470/480-5	Remarks
1	---	—	—		---	---	
2	Small lamp power	I	—	Power +24V	---	---	
3	Small lamp power	I	—	Power +24V	---	---	
4	NSW power (+24V)	I	—	Power +24V	NSW power (+24V)	NSW power (+24V)	
5	NSW power (+24V)	I	—	Power +24V	NSW power (+24V)	NSW power (+24V)	
6	SW power (+24V)	I	—	Power +24V	SW power (+24V)	SW power (+24V)	
7	SW power (+24V)	I	—	Power +24V	SW power (+24V)	SW power (+24V)	
8	---	—	—		---	---	
9	GND	I	—	GND	GND	GND	
10	GND	I	—	GND	GND	GND	
11	D_OUT_3 (+24V, sink 200mA)	O	A	D/0 sink	(HST overrun prevention relay)	---	
12	D_OUT_2 (+24V, sink 200mA)	O	A	D/0 sink	(Auto preheating relay)	---	Performed by common rail E/G controller
13	D_OUT_1 (+24V, sink 200mA)	O	A	D/0 sink	Buzzer 2 (Error alarm)	---	
14	D_OUT_0 (+24V, sink 200mA)	O	A	D/0 sink	Buzzer 1 (Machine monitor)	Buzzer 1 (Machine monitor)	
15	Sensor power output (+24V)	O	—	Sensor power	Boom pressure sensor power	Boom pressure sensor power	
16	Sensor power output (+5V)	O	—	Sensor power	Boom angle sensor power	Boom angle sensor power	
17	GND	I	—	GND	GND	GND	
18	GND	I	—	GND	GND	GND	
19	GND	I	—	GND	GND	GND	
20	GND	I	—	GND	GND	GND	

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AMP070-18P(1) [CN-L52], AMP070-12P(1) [CN-L53]

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA470/480-5	Remarks
1	D_IN_0 (24V,5mA)	I	B	D/I+24V	High beam	Head lamp	
2	D_IN_2 (24V,5mA)	I	B	D/I+24V	IGN C	IGN C	
3	D_IN_4 (24V,5mA)	I	B	D/I+24V	Auto grease A	Auto grease A (OPT)	OPT
4	D_IN_6 (24V,5mA)	I	B	D/I+24V	(Direction F)	---	For compact type
5	D_IN_8 (24V,5mA)	I	B	D/I+24V	(Direction R)	---	For compact type
6	D_IN_10(24V,5mA)	I	B	D/I+24V	(Diagnosis IN A)	---	Spare
7	D_IN_12 (NSW24V,5mA)	I	C	D/I+24V	Blinker right	Blinker right	
8	D_IN_14 (NSW24V,5mA)	I	C	D/I+24V	Service SW input	◇SW input	Machine monitor operation SW
9	GND	O	—		SIGNAL GND	SIGNAL GND	
10	D_IN_1 (24V,5mA)	I	B	D/I+24V	IGN BR	---	
11	D_IN_3 (24V,5mA)	I	B	D/I+24V	IGN R1	---	
12	D_IN_5 (24V,5mA)	I	B	D/I+24V	Auto grease B	Auto grease B (OPT)	OPT
13	D_IN_7 (24V,5mA)	I	B	D/I+24V	(Direction N)	---	For compact type
14	D_IN_9 (24V,5mA)	I	B	D/I+24V	(HST: Hi/Lo switch)	---	For compact type
15	D_IN_11 (24V,5mA)	I	B	D/I+24V	(Diagnosis IN B)	---	Spare
16	D_IN_13 (NSW24V,5mA)	I	C	D/I+24V	Blinker left	Blinker left	
17	D_IN_15 (NSW24V,5mA)	I	C	D/I+24V	(P break forgetting alarm)	■ SW input	Machine monitor operation SW
18	A_IN_0(0~30V)	I	H	A/I	Small lamp SW	Alternator R	
19	D_IN_16 (24V/GND,5mA)	I	D	D/IGND	Break oil pressure (Front)	Break oil pressure (Front)	
20	D_IN_18 (24V/GND,5mA)	I	D	D/IGND	Break oil level (Front)	---	Spare
21	D_IN_20 (24V/GND,5mA)	I	D	D/IGND	Air cleaner clogging 1	Air cleaner clogging	
22	D_IN_22 (24V/GND,5mA)	I	D	D/IGND	(Spare)	---	
23	D_IN_24 (24V/GND,5mA)	I	E	D/IGND	T/M filter clogging	---	
24	GND	O	—	GND	Sensor GND	Sensor GND	
25	D_IN_17 (24V/GND,5mA)	I	D	D/IGND	Break oil pressure (Rear)	---	
26	D_IN_19 (24V/GND,5mA)	I	D	D/IGND	Break oil level (Rear)	---	Spare
27	D_IN_21 (24V/GND,5mA)	I	D	D/IGND	Air cleaner clogging 2	---	Spare
28	D_IN_23 (24V/GND,5mA)	I	D	D/IGND	(Spare)	---	
29	D_IN_25 (24V/GND,5mA)	I	E	D/IGND	Seat belt mounting alarm	---	OPT
30	A_IN_0 (0~30V)	I	H	A/I	Alternator R	Small lamp SW	

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AMP070-18P(2) [CN-L54], AMP070-12P(2) [CN-L55]

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA470/480-5	Remarks
1	D_IN_26 (24V/GND,5mA)	I	E	D/IGND	Parking brake	Parking brake	
2	D_IN_28 (24V/GND,5mA)	I	E	D/IGND	Engine oil pressure	Engine oil pressure	Spare
3	D_IN_30 (24V/GND,5mA)	I	E	D/IGND	E/G steering normal	E/G steering normal	
4	D_IN_32 (24V/GND,5mA)	I	F	D/IGND	Subtotal SW	Subtotal SW (op)	For load meter (Spare for std)
5	D_IN_34 (24V/GND,5mA)	I	F	D/IGND	Printer output SW	High-beam SW	
6	D_IN_36 (24V/GND,5mA)	I	G	D/IGND	Machine monitor indicator SW	Service function 2	
7	D_IN_38 (24V/GND,5mA)	I	G	D/IGND	Increment SW	< SW input	Machine monitor operation SW
8	P_IN_0 (0.5Vp-p)	I	M	P/I	(Machine speed sensor)	---	For compact type
9	GND	O	—	GND	GND	GND	
10	D_IN_27 (24V/GND,5mA)	I	E	D/IGND	Engine coolant level	Engine coolant level	
11	D_IN_29 (24V/GND,5mA)	I	E	D/IGND	Engine oil level	Engine oil level	Spare
12	N.C.	I	E	D/IGND	N.C.	---	(op)
13	D_IN_33 (24V/GND,5mA)	I	F	D/IGND	Cancel SW	Cancel SW (op)	For load meter (Spare for std)
14	D_IN_35 (24V/GND,5mA)	I	F	D/IGND	Boom approach SW	---	
15	D_IN_37 (24V/GND,5mA)	I	G	D/IGND	Decrement SW	> SW input	
16	D_IN_39 (24V/GND,5mA)	I	G	D/IGND	E/G steering operation	E/G steering operation	
17	P_IN_1 (0.5Vp-p)	I	M	P/I	(Spare)	---	Pulse input
18	(NC)	—	—		(NC)	---	
19	A_IM_2 (High resistance input)	I	J	A/I	Fuel level sensor	Fuel level sensor	
20	A_IM_4 (High resistance input)	I	J	A/I	Torque converter oil temperature sensor	Torque converter oil temperature sensor	
21	A_IM_6 (High resistance input)	I	K	A/I	Engine coolant temperature sensor (for auto pre-heating)	---	
22	A_IM_8(0~5V)	I	L	A/I	Boom pressure sensor rod	Boom pressure sensor rod	For load meter (Spare for std)
23	A_IM_10(0~14V)	—	—		Battery fluid level A	Battery fluid level (op)	(op)
24	GND	O	—	GND	SIGNAL GND	GND	
25	A_IM_3 (High resistance input)	I	J	A/I	Operating oil temperature sensor	Operating oil temperature sensor	
26	A_IM_5 (High resistance input)	I	J	A/I	Engine coolant temperature sensor	Engine coolant temperature sensor Hi	
27	A_IM_7 (0~5V)	I	L	A/I	Boom pressure sensor (bottom)	Boom pressure sensor (bottom)	For load meter (Spare for std)
28	A_IM_9 (0~5V)	I	L	A/I	Boom angle sensor	Boom angle sensor	For load meter (Spare for std)
29	GND	O	—	GND	SIGNAL GND	GND	
30	A_IM_11 (0~14V)	—	—		Battery fluid level B	---	Spare

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AMP070-12P(3) [CN-L56]

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA470/480-5	Remarks
1	S_NET (+)	I/O	N	S-NET	Machine monitor, T/M, and work equipment controller	S_NET+	
2	S_NET (+)	I/O	N	S-NET	Machine monitor, T/M, and work equipment controller	S_NET+	
3	CAN+	I/O	P	CAN	Machine monitor, T/M, and work equipment controller, KOMTRAX	CAN+	
4	S_NET (-)	O	N	S-NET	S_NET GND	S_NET-	
5	S_NET (-)	O	N	S-NET	S_NET GND	S_NET-	
6	GND	O	—	GND	S_NET	GND	
7	GND	O	—	GND	CAN	GND	
8	CAN-	I/O	P	CAN	Machine monitor, T/M, and work equipment controller, KOMTRAX	CAN-	
9	(NC)						
10	(NC)						
11	(NC)						
12	(NC)						

AMP070-14P(2) [CN-L57]

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA470/480-5	Remarks
1	(NC)	—	—			---	
2	R232C_1_RTS	I/O	Q		RS232_C serial communication	---	
3	R232C_1_RD	I	Q	RD	↑	PC RX	For monitoring PC
4	R232C_2_RD	I	R	RD	NC	---	
5	R232C_2_RTS	I/O	R		NC	---	
6		—	—		Load meter printer busy input	Printer BUSY	For load meter (Spare for std)
7	(NC)	—	—			---	
8	R232C_1_CTS	I/O	Q		RS232_C serial communication	---	
9	R232C_1_TX	O	Q	TX	↑	Printer & PC TX	
10	R232C_1_SG	O	Q		↑	---	
11	R232C_2_SG	O	R		NC	---	
12	R232C_2_TX	O	R	TX	NC	---	
13	R232C_2_CTS	I/O	R		NC	---	
14	(NC)	—	—				

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AMP040-8P [CN-L58]

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA470/480-5	Remarks
1	R232C_0_TXD	O	S		Flash writing data (sending)	---	Harness not connected in machine
2	FLASH_SW	I	S		Flash writing switch	---	Harness not connected in machine
3	R232C_0_TXD	O	S		Flash writing data (sending)	---	Harness not connected in machine
4	(NC)	—	—		(NC)	---	Harness not connected in machine
5	R232C_0_RXD	I	S		Flash writing data (receiving)	---	Harness not connected in machine
6	(NC)	—	—		(NC)	---	Harness not connected in machine
7	R232C_0_RXD	I	S		Flash writing data (receiving)	---	Harness not connected in machine
8	GND	O	—		GND	---	Harness not connected in machine

Setting switches (on board)

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA470/480-5	Remarks
1	16 Posi rotary SW1	I	—		Model selection	Model selection	
2	16 Posi rotary SW2	I	—		Specifications selection	---	
3	16 Posi rotary SW3	I	—		Speed indicator switch and OPT tire selection	Speed indicator switch	
4	26 Posi rotary SW1	I	—		Common rail engine controller selection	Common rail engine controller selection	
5	26 Posi rotary SW2	I	—		Work equipment controller selection	Work equipment controller selection	
6	26 Posi rotary SW3	I	—		(Spare)	---	
7	26 Posi rotary SW4	I	—		(Spare)	---	
8	26 Posi rotary SW5	I	—		(Spare)	---	
9	26 Posi rotary SW6	I	—		(Spare)	---	
10	26 Posi rotary SW7	I	—		(Spare)	---	
11	26 Posi rotary SW8	I	—		(Spare)	---	

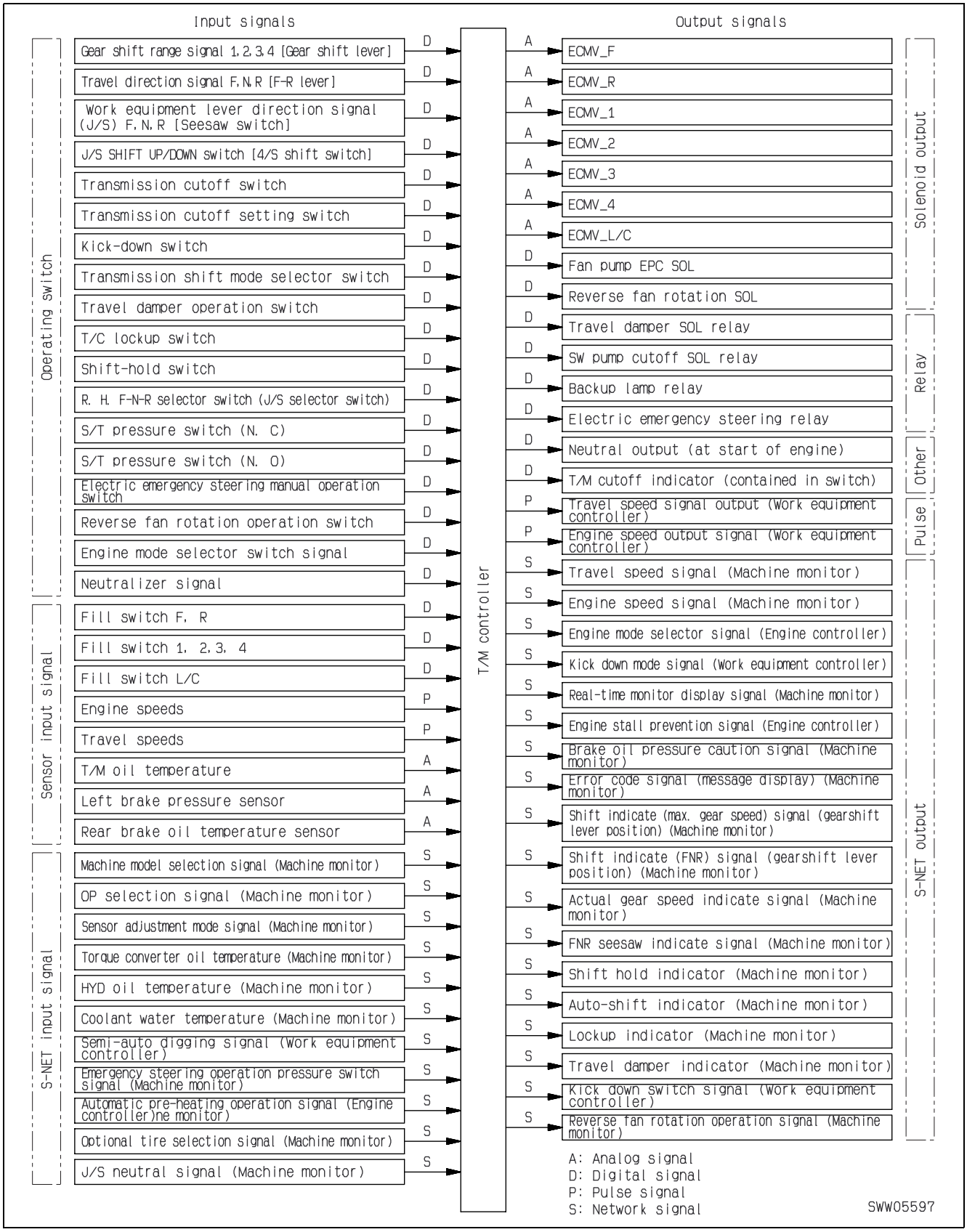
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Transmission control system

System diagram



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Control Function

1. Gear Speed Change Function

1-1. Electronic Modulation Function

In order to reduce shocks at gear speed changes (at engagement of the clutch), this function controls the clutch oil pressure to the level suitable to the oil-pressure circuit depending on the engine speed, oil temperature of the transmission, travel speed and gear speed change pattern.

This control is performed through the whole range of gear speeds (including the lock-up clutch) according to the data in the transmission modulation data table stored in the transmission controller memory.

The clutch to be turned off is also included in the target of the modulation control in order to reduce running out of the torque. A learning function is also provided so that an abnormal time lag in the gear speed change may be automatically modulation controlled.

1-2. Automatic Gear Speed Change

This function is consisted of the auto-shift and manual shift. The former decides the gear speed automatically according the travel speed and the latter selects the gear speed according to the gear speed specified by the gear shift lever.

In the auto-shift, the travel speed mode is switched between the auto-shift up and down depending on the state of the engine-power mode and torque converter lockup control.

Overseas specification for switching of the shift mode between the auto-shift up and down. With the overseas specification, the shift mode is switched between the auto-shift up and down as shown below according to state of the shift mode selector switch (switching between manual, H/M/L shift) and the power mode selector switch (switching between the power and normal and torque converter lockup)

Power mode switch position	**Lockup switch position**	**Shift mode switch position**			
		Manual	H	M	L
POWER	OFF	Manual	H-mode	M-mode	L-mode
NORMAL		Manual	M-mode	M-mode	L-mode
POWER	ON	Manual	H-mode	M-mode	L-mode
NORMAL		Manual	L-mode	L-mode	L-mode

When the engine speed is 1000 rpm or above, switching between the auto-shift up and down in the auto-shift mode is implemented according to a travel speed mode selected from the “Table - Auto Shift Point List” stored in the transmission controller’s memory. Here, selection of a shift mode is done by referencing the signals from the forward-reverse lever, shift lever and travel speed sensor.

1) Shift lever at 1st to 4th speeds

This function limits the maximum gear speed (range of speed change) available for the automatic gear speed change. Start at the 2nd speed is usually employed in the auto-shift mode.

Thus, when the shift lever is at the 4th speed, the shift up/down is performed in the range of the 2nd and 4th speeds. It is, however, done at the 1st speed when the kick down function is used.

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2) Forward-reverse lever at “N” position
When the forward-reverse lever is at the neutral position, the number of speed of the transmission is fixed to the gear speed being set before the lever was shifted to “N”.
As long as the forward-reverse lever is at “N” position, operating the gearshift lever does not change the gear speed.

3) Forward-reverse lever at “F” position
As the forward-reverse lever is shifted from N ➔ F, the transmission sends the modulation instruction to the F-clutch and 2nd speed clutch’s ECMV (auto 2nd speed start).

a. Shift up (Gearshift lever at 4th speed and the auto-shift mode “H” is on)
If you increase travel speed up to 10.2km/h by increasing the engine speed from the accelerator pedal, the gear speed will be shifted to the 3rd speed. If the travel speed is increased to 18.0km/h, the gear speed is shifted to the 4th speed.

b. Shift down (Gearshift lever at 4th speed and auto-shift mode “H” is on)
If you reduce the travel speed to 16.0km/h or less when 1,000 rpm or above engine speed is turned on (when travelling up hills, for instance), the gear speed is shifted is to the 3rd speed. If the travel speed is further reduced to 10.7km/h or less, it will be shifted to the 2nd speed.

c. Skip shift down (Gearshift lever at 3rd or 4th speed)
If you reduce the engine speed to less than 1,000 rpm by releasing the accelerator pedal while the machine is traveling, the 3rd or 4th speed will be maintained until the travel speed reaches 1km/h. As the travel speed reaches 1km/h, the gear speed will be shifted to the 2nd speed.
If you run the accelerator pedal again when the travel speed is reduced to 5km/h or less and the gearshift lever is positioned at 3rd or 4th speed, the gear speed will be shifted to the 2nd speed as the engine speed reaches 1,000 rpm or above.

4) Forward-reverse lever at “R” position
In this case, just like when the forward-reverse lever is at “F” position, travel speed is changed according to the position of the gearshift lever, auto-shift mode selected and given travel speed as specified in the “Auto-Shift Point List”.

5) Gear speed change disabling time
It is a specified duration of time in which a selected gear speed is maintained in order to prevent hunting after changing the speed. Duration of this time depends on the gear change pattern (see the Auto-Shift Point List).

1-3. Shift Hold Function
This function is used to hold the gear speed being selected at when the hold switch is depressed. Increasing a traveling speed does not cause the shift up as long as this function is turned on. Likewise, slowing down the traveling speed does not result in the shift down.
You can cancel the shift hold function by hitting the hold switch again.
This function is automatically cancelled if you operate the forward-reverse lever, gearshift lever or kick down switch. This function does not hold ON status of the lockup.

1-4. Kick-Down Function

1) Kick down in the manual shift mode
The kick-down switch is operable only when the forward 2nd speed (F2) is selected. It is inoperable at any other speeds.
You can cancel the kick-down by shifting the forward-reverse lever to any position other than F or by shifting the gearshift lever to any position other than F2.
You can select the 2nd speed by shifting the forward-reverse lever to R after selecting F1 from the kick-down switch. If you move the gearshift lever to any speed other than the 2nd speed, the speed will be changed to the one where the lever is positioned.

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2) Kick-down in the auto-shift mode
The kick-down switch is enabled irrespective of the position of the forward-reverse lever and gearshift lever.
Following gear speed changes are available from the kick-down switch at respective travel speeds.
Gear speed change from the kick-down switch is implemented after the predetermined gear speed change disabling time is expired. When it is done from the forward-reverse lever, the gear speed change is executed according to the Auto-Shift Point List.

Gear speed before change	Travel speed	Gear speed after change	Gear speed change disabling time
2nd speed	Throughout whole speed ranges	1st speed	5 seconds
3rd speed	Less than 12.5 km/h	1st speed	5 seconds
3rd speed	12.5 km/h to less than 25 km/h	2nd speed	4 seconds
3rd speed	More than 25 km/h	Gear speed change is not available (remains at 3rd speed)	
4th speed	Less than 12.5 km/h	1st speed	5 seconds
4th speed	12.5 to less than 35 km/h	3rd speed	4 seconds
4th speed	More than 35 km/h	Gear speed change is not available (remains at 4th speed)	
3rd speed (when lockup is turned ON)	Less than 12.5 km/h	1st speed	5 seconds
3rd speed (when lockup is turned ON)	More than 12.5 km/h	3rd speed (after lockup is canceled)	※ 1
4th speed (when lockup is turned ON)	Less than 12.5 km/h	1st speed	5 seconds
4th speed (when lockup is turned ON)	More than 12.5 km/h	4th speed (after lockup is canceled)	※ 1

※ 1: When the lockup is canceled from 1 kick-down switch, it can be turned on only when:
- The torque converter lockup switch is turned on once and then turned off again,
- Travel speed is increased from less than the lockup ON speed to above the ON speed (both indicated in the Auto-Shift Point List).

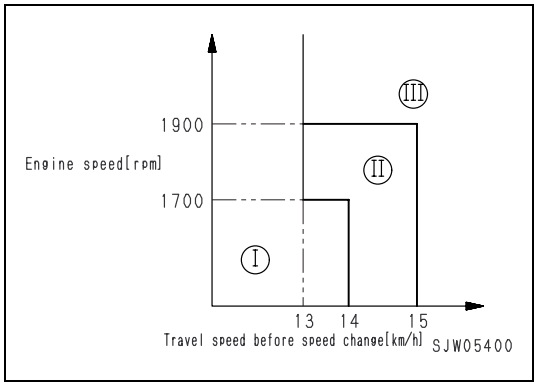
1-5. Transmission Protection Function
In order to protect the transmission, several restrictions are laid down in F-R shift of the forward-reverse lever during high-speed travel.

1) When the auto-shift is turned on
Zone I: F-R shift is enabled and the 2nd speed is selected (normal zone).
Zone II: F-R shift is enabled and the 2nd speed is selected, but alarm is warned.
Zone III: F-R shift is enabled though accompanied by alarm.

Gear speed of the speed clutch is selected from the Auto-Shift Point List and then the shift down to the 2nd speed maximum results depending on the travel speed.

2) When the manual shift mode (3rd/4th speed) is turned on (speed of the speed clutch is not changed because of the manual shift)

Zone I: F-R shift alone is enabled (normal alarm).
Zone II: F-R shift is enabled but accompanied by alarm.
Zone III: F-R shift is enabled but accompanied by alarm.



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1-6. Travel Speed Alarm Function

Alarm buzzer is sounded for travel speeds beyond 38km/h as over speeds. The alarm is turned off as the travel speed is reduced to 36km/h or below.

Auto-Shift Point List

	Shift lever position	Solenoid signal	Forward (F)	Reverse (R)	Gear speed change disabling time after the preceding change (sec)
			Speed (km/h)	Speed (km/h)	
Engine speed (1,000 rpm or above)	2, 3 or 4	1T/C➔2T/C(L&M)	4.7	4.7	2
		1T/C➔2T/C(H)	5.3	5.3	2
	3 or 4	2T/C➔3T/C(H)	10.2	10.2	2
		2T/C➔3T/C(M)	9.0	9.0	2
		2T/C➔3T/C(L)	7.0	7.0	2
	3	3T/C➔3L/U(M&H)	13.9	16.0	0
		3T/C➔3L/U(L)	11.0	16.0	0
	4	3T/C➔4T/C(H)	18.0	18.0	1
		3T/C➔4T/C(M)	16.5	16.5	1
		3T/C➔4T/C(L)	15.0	15.0	1
		3T/C➔4L/U(H)	23.7	25.2	0
		3T/C➔4L/U(M)	22.2	23.6	0
		3T/C➔4L/U(L)	20.7	22.0	0
	4	4L/U➔4T/C(L&M&H)	40.0	40.0	5
		4L/U➔4T/C(L&M&H)	19.1	20.3	1
		4T/C➔3T/C(H)	16.0	16.0	1
		4T/C➔3T/C(M)	14.5	14.5	1
		4T/C➔3T/C(L)	13.0	13.0	1
	3 or 4	3T/C➔2T/C(H)	10.7	10.7	2
		3T/C➔2T/C(M)	9.5	9.5	2
		3T/C➔2T/C(L)	6.5	6.5	2
Engine speed (less than 1,000 rpm)	4	4T/C➔2T/C(L&M&H)	1.0	1.0	0
	3 or 4	3T/C➔2T/C(L&M&H)	1.0	1.0	0
Engine speed (Less than 1,000 rpm ➔ Above 1,000 rpm)		4T/C➔2T/C(L&M&H)	5.0	5.0	2
		3T/C➔2T/C(L&M&H)	5.0	5.0	2
Kick-down mode (When kick-down switch OFF ➔ ON)		2T/C➔1T/C(L&M&H)	Through all speed ranges	Through all speed ranges	5
		3T/C➔1T/C(L&M&H)	Less than 12.5	Less than 12.5	5
		3L/U➔3T/C(L&M&H)	Through all speed ranges	Through all speed ranges	0
		4T/C➔1T/C(L&M&H)	Less than 12.5	Less than 12.5	5
		4L/U➔4T/C(L&M&H)	Through all speed ranges	Through all speed ranges	0
		4T/C➔3T/C(L&M&H)	12.5 ~ 35.0	12.5 ~ 35.0	4
		3T/C➔2T/C(L&M&H)	12.5 ~ 35.0	12.5 ~ 35.0	4

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	Shift lever position	Solenoid signal	Forward (F)	Reverse (R)	Gear speed change disabling time after the preceding change (sec)
			Speed (km/h)	Speed (km/h)	
When direction switch is shifted (1) (F➔) N➔R (R➔) N➔F	2, 3 or 4	4L/U➔4T/C(L&M&H)	Zone I & II	Zone I & II	2
		4T/C➔2T/C(L&M&H)	Zone I & II	Zone I & II	2
		3L/U➔2T/C(L&M&H)	Zone I & II	Zone I & II	2
		3T/C➔2T/C(L&M&H)	Zone I & II	Zone I & II	2
		1T/C➔2T/C(L&M&H)	Through all speed ranges	Through all speed ranges	2
	4	4L/U➔4T/C(H)	Zone III & 18.0 and up	Zone III & 18.0 and up	2
		4L/U➔4T/C(M)	Zone III & 16.5 and up	Zone III & 16.5 and up	2
		4L/U➔4T/C(L)	Zone III & 15.0 and up	Zone III & 15.0 and up	2
		4L/U➔3T/C(H)	Zone III & 13.0~18.0	Zone III & 13.0~18.0	2
		4L/U➔3T/C(M)	Zone III & 13.0~16.5	Zone III & 13.0~16.5	2
		4L/U➔3T/C(L)	Zone III & 13.0~15.0	Zone III & 13.0~15.0	2
		4T/C➔3T/C(H)	Zone III & 13.0~18.0	Zone III & 13.0~18.0	2
		4T/C➔3T/C(M)	Zone III & 13.0~16.5	Zone III & 13.0~16.5	2
		4T/C➔3T/C(L)	Zone III & 13.0~15.0	Zone III & 13.0~15.0	2
		3T/C➔3T/C(H)No gear speed change	Zone III & 13.0~18.0	Zone III & 13.0~18.0	2
		3T/C➔3T/C(M) No gear speed change	Zone III & 13.0~16.5	Zone III & 13.0~16.5	2
		3T/C➔3T/C(L) No gear speed change	Zone III & 13.0~15.0	Zone III & 13.0~15.0	2
	3	3L/U➔3T/C(L&M&H)	Zone III	Zone III	2
		3T/C➔3T/C(L&M&H) No gear speed change	Zone III	Zone III	2
When direction switch is shifted (2) F➔N➔R R➔N➔F	4	➔4L/U(H)	23.7 and up	25.2 and up	---
		➔4L/U(M)	22.2 and up	23.6 and up	---
		➔4L/U(L)	20.7 and up	22.0 and up	---
		➔4T/C(H)	18.0~23.7	18.0~25.4	0
		➔4T/C(M)	16.5~22.2	16.5~23.9	0
		➔4T/C(L)	15.0~20.7	15.0~22.4	0
		➔3T/C(H)	10.2~18.0	10.2~18.0	0
		➔3T/C(M)	9.0~16.5	9.0~16.5	0
		➔3T/C(L)	7.0~15.0	7.0~15.0	0
	3	➔3L/U(M&H)	13.9 and up	16.0 and up	---
		➔3L/U(L)	11.0 and up	16.0 and up	---
		➔3T/C(H)	10.2~13.9	10.2~16.0	0
		➔3T/C(M)	9.0~13.9	9.0~16.0	0
		➔3T/C(L)	7.0~11.0	7.0~16.0	0
	3 or 4	➔2T/C(H)	up to 10.2	up to 10.2	0
		➔2T/C(M)	up to 9.0	up to 9.0	0
		➔2T/C(L)	up to 7.0	up to 7.0	0
	2	➔2T/C(L&M&H)	Through all speed ranges	Through all speed ranges	---

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2. Torque Converter Lockup Control Function (Option)

1) The torque converter lockup switch operation (ON/OFF) enables to implement the lockup automatically. When the lockup switch is turned on, the torque converter lockup can be automatically turned on or off in the manual shift mode, too.
Following table shows the lockup specification-based gear speeds

	Lockup specification-based gear speeds Lockup: ○							
Travel mode	F1	F2	F3	F4	R1	R2	R3	R4
Manual shift			○	○			○	○
Auto-shift (L, M, H)			※	○			※	○
※ In the auto-shift mode, the lockup is not available only at the 3rd gear speed (gearshift lever position).								

2) Lockup travel speed
For the travel speed that turns ON/OFF the lockup, refer to the [Auto-Shift Point List].
In the manual shift mode, too, the lockup is turned on or off at the same travel as in the auto-shift mode.
The lockup is cancelled as the travel speed reaches 40km/h or above. his arrangement is prepared to ensure the driver safety. After the cancellation, if the travel speed is increased from below 36km/h to 36km/h or above, the lockup is applied again.

3) Lockup protection function
The lockup is turned on only when the machine traveling direction matches the lever position.
Judgement of machine travel direction

a. When the travel speed is ≥ 10 km/h, the lever position decides the machine travel direction.

b. As long as the travel speed ≥ 10 km/h is kept, judgement of "a" above is maintained.

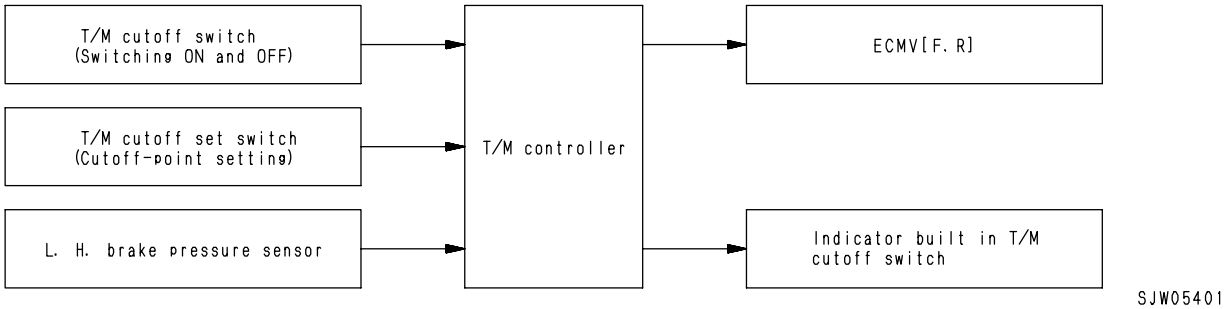
c. When the travel speed < 10 km/h is detected continuously for one second or more, the protection function judges that no speed data is available.

d. When data on FR travel direction is not stored in the memory or when the travel direction does not match the lever position, the lockup function is not turned on.

3. Transmission Cutoff Function

1) Function
If you step on the left brake pedal, this function causes the transmission to the neutral detecting oil pressure in the brake circuit by use of the pressure sensor.
This function enables the cutoff at any position by storing position of the stepped-on brake where the transmission is caused to the neutral as the brake circuit pressure.

2) Input and output



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3) Description of the control

(1)	T/M cutoff control		This function causes the T/M to neutral as a pressure greater than the predetermined level is signaled by the left brake pressure sensor (when T/M cutoff switch is ON).
(2)	Set up of cutoff point	Enable condition	T/M cutoff switch ON (T/M cutoff is enabled)
		Setup procedure	a Step on the left brake pedal until it comes to the position desired as the cutoff point. b Push and release the T/M cutoff set switch. c The pressure at the time when the switch is released is temporarily stored. The setup complete buzzer is sounded twice (beep). d At the same time, the indicator built in the T/M cutoff switch flashes for 2.5 seconds. e After the flashing, the brake position is stored on memory (your setting is held after the key is turned off).
		Reset procedure	a Push and release the T/M cutoff set switch. b The indicator built in the T/M cutoff switch will flash for 2.5 seconds. c While the flashing continued, push and release the T/M cutoff set switch again. d As the flashing is ended, the cutoff point is set as the default left brake pressure. The setup cancel buzzer is sounded. e The setup (default) value is stored on memory (the set value is held after the key is turned off).

4) Output conditions for the buzzer, indicator (main monitor) and indicator built in the T/M cutoff switch

Output condition	Indicator built in the T/M cutoff switch	Buzzer sound	Cutoff point
When T/M cutoff switch is ON	Comes on	Not available	Control is done based on the value stored in previous operation
While T/M cutoff point is being set	Flashes	Setup complete buzzer is sounded as the set switch is released	Pressure at your releasing the set switch is stored
When T/M cutoff switch is ON but error is present on sensor	Goes off	Not available	No control is provided. Stored value is not changed.
When T/M cutoff switch is ON but error is present on set switch	Goes off	Not available	Control is done based on the value stored in previous operation. Stored value is not changed.
When T/M is OFF	Goes off	Not available	No control is provided

5) T/M cutoff point settable range

Settable range
0.49~4.41MPa {5~45kg/cm²}

Note: If you specify a value less than 0.49MPa (5kg/cm²), it will be set as 0.49MPa (5kg/cm²).

Note: When a value larger than 4.41MPa (45kg/cm²), it will be set as 4.41MPa (45kg/cm²). The default value is 1.47MPa (15kg/cm²).

A separation of 0.20MPa (2kg/cm²) is provided between the cutoff IN pressure (causing T/M to neutral) and OUT (reset) pressure.

Example:
When 0.98MPa (10kg/cm²) is set on the pressure sensor

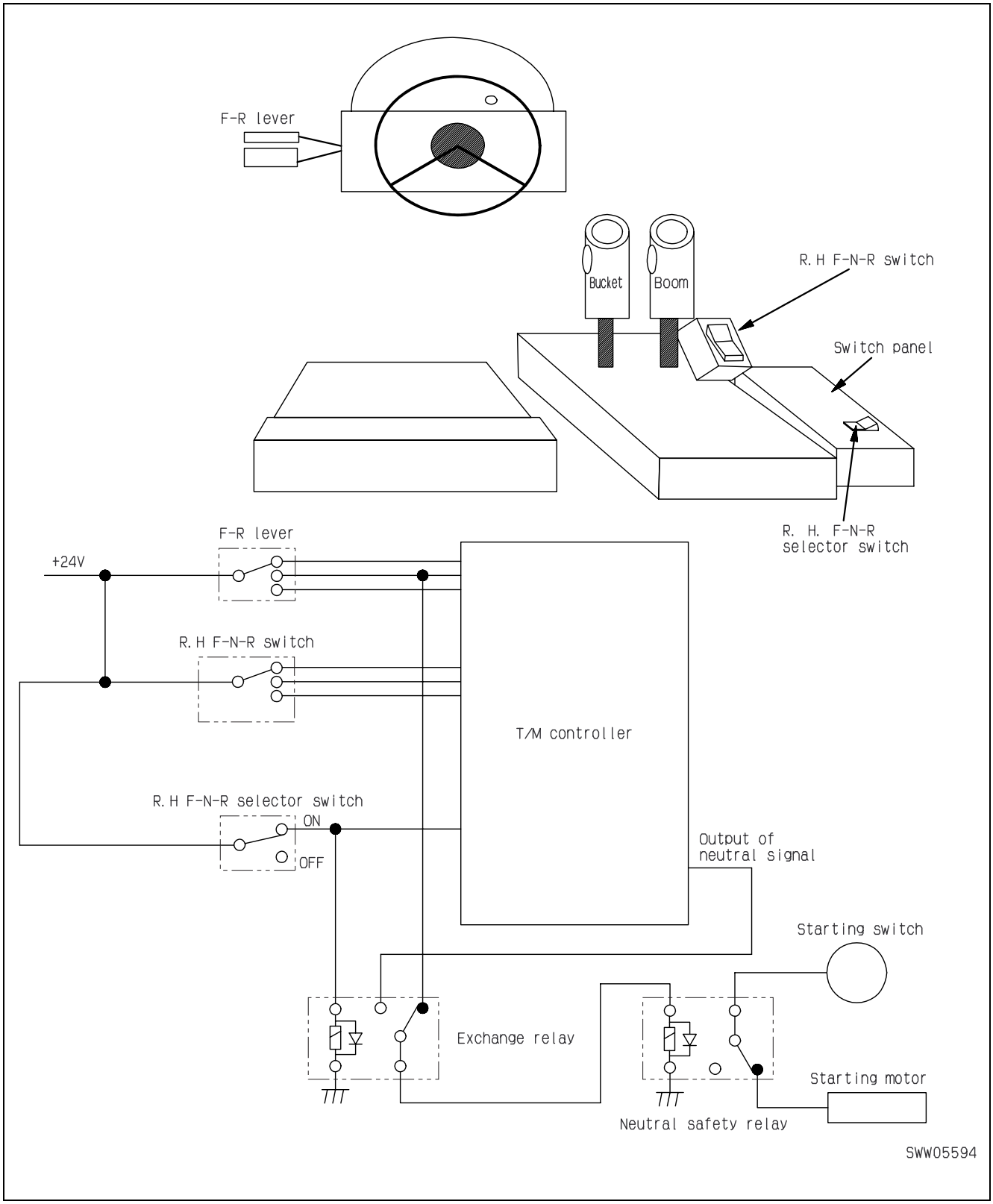
Cutoff IN pressure = 0.98MPa (10kg/cm²)

Cutoff OUT pressure = 0.78MPa (8kg/cm²)

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4. Right FNR Switch Selecting Function (Option)
   The right FNR switch on the side of the work equipment lever can select forward/reverse travel without operating forward-reverse lever on the steering column.

System Diagram



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1) Turning on the right FNR switch functions
If you set the right FNR switch to the ON position, the signal enabling the right FNR to cause forward-reverse travel is entered to the transmission controller.

When forward-reverse travel of the work equipment is handed over to the steering, both the steering column's forward-reverse lever and the right FNR switch must be positioned at the neutral (N) in order to ensure safety.

		Right FNR switch	**Forward-reverse lever**
When switched from steering to right FNR	Normal position	N	N
	Even resulting from abnormal position	Error is warned	Error is warned
	Correcting approach	Set to N	Set to N
When switched from right FNR to steering	Normal position	N	N
	Even resulting from abnormal position	Error is warned	Error is warned
	Correcting approach	Set to N	Set to N

2) Switching between forward and reverse from the right FNR
If the forward-reverse lever on the steering column is positioned at the neutral in the state of 1) above, switching between forward and reverse becomes available from the right FNR.

When the forward-reverse lever on the steering column is positioned at F or R, precedence is given to the lever operation irrespective of the right FNR switch position.

3) Gear speed change from the right FNR switch
The same gear speed change functions as those from the steering column become available.

Operable switches when the right FNR switch function is installed

		Operation on work equipment	**Operation on steering column**	
Switch selection	Switching between auto-shift and manual shift	Right FNR switch	Forward-reverse lever	Gearshift lever position
When right FNR is selected	Manual shift	Switching between forward and reverse is available from the switch	When the lever is positioned at N, operation from the work equipment is enabled. When the lever is at F or R, precedence is given to the lever though an error is warned.	Gear speed change becomes available by changing the lever position.
	Auto-shift (L,M,H)	↑	↑	Maximum gear speed (limiter)
When steering column is selected	Manual shift	Normal operation is available when fixed to N. Error is warned at any position other than N.	Switching between forward and reverse becomes available from the lever.	Gear speed change becomes available from the lever.
	Auto-shift (L,M,H)	↑	↑	Maximum gear speed (limiter)

4) Safety function to be turned on at startup of engine
If the right FNR switch on the work equipment is not positioned at N, output of the neutral signal from the transmission controller is disabled, and thus you can't start up the engine. In this case, too, the neutral caution is warned.

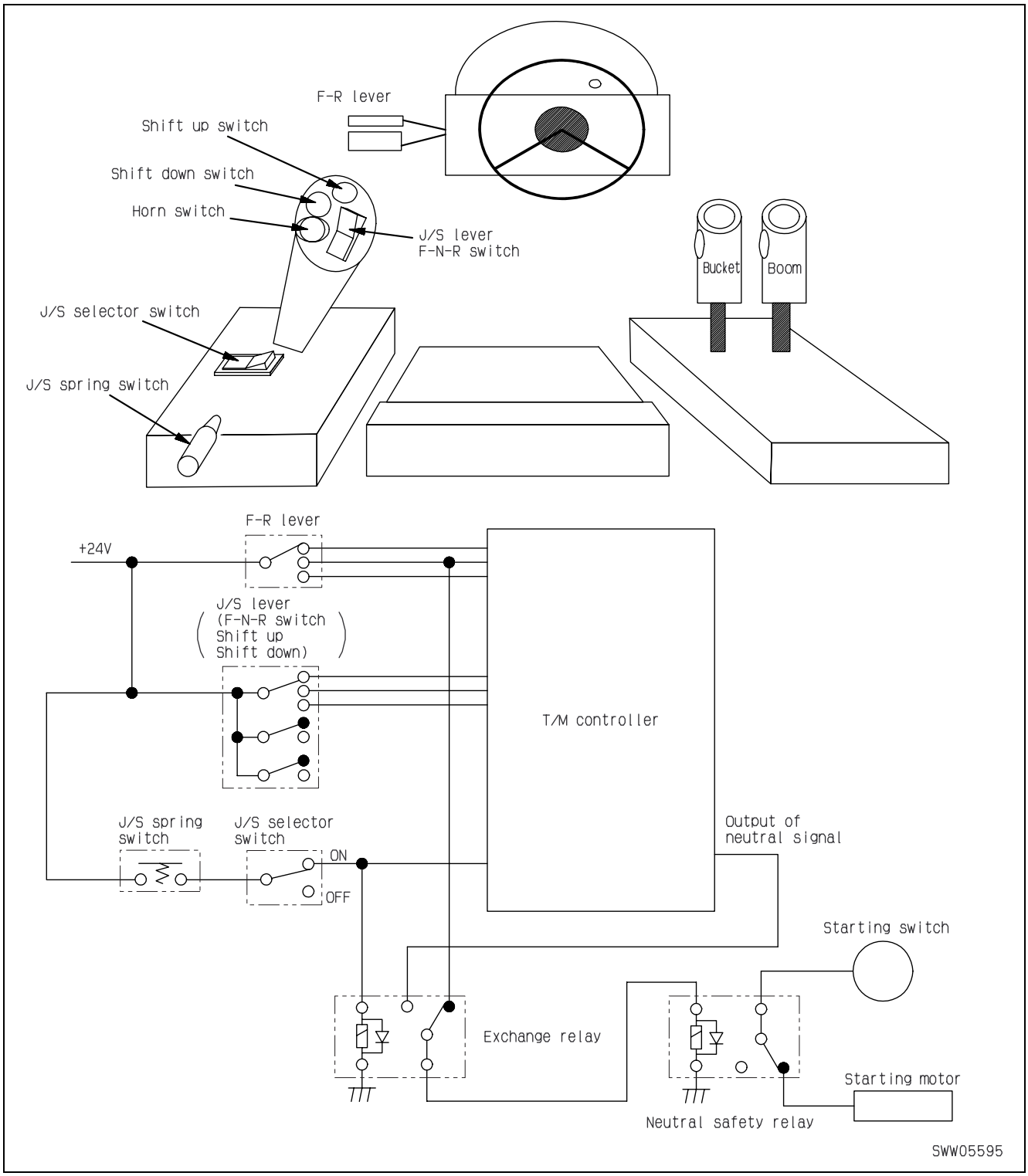
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5. Gear Speed Change Function available from Joystick Steering (Option)
   Forward-reverse travel of the travel system as well as gear speed change operation is available from the transmission controller-controlled joystick function.

   As long as the joystick function is turned on, travel at the 4th speed is prohibited in order to ensure driver safety.

   Steering on both sides is done from the joystick work equipment controller.

System Diagram



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1) Turning on the joystick function
If you turn on J/S FNR switch after turning on J/S sprung switch by shifting the armrest for the joystick to the lock position, the joystick function enable signal is entered to the transmission controller.

When you switch the function between the joystick and steering, both the forward-reverse lever on the steering column and J/S FNR switch on the joystick must be positioned at neutral (N). It is so required from the safety standpoint.

		J/S FNR switch	Forward-reverse lever	Gearshift lever
When switching is done from steering to joystick	Normal position	N	N	1st to 3rd speeds
	Even resulting from abnormal position	Error is warned	Error is warned	Error is warned
	Correcting approach	Position at N	Position at N	Position at one of 1st to 3rd speeds
When switching is done from joystick to steering	Normal position	N	N	Any position
	Even resulting from abnormal position	Error is warned	Error is warned	---
	Correcting approach	Position at N	Position at N	---

2) Switching between forward and reverse from joystick
If the forward-reverse level on the joystick is at the neutral position in the state of 1) above, switching between forward and reverse becomes available from J/S FNR switch.

When the forward-reverse level is positioned at F or R, precedence is given to the lever irrespective of the J/S FNR switch position.

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3) Switching of gear speed from joystick

- When the manual shift is selected
  You can switch the gear speed from the shift up/down switches provided at the head of the joystick. In this case, however, the gearshift lever on the steering column must be positioned at the maximum gear speed (in the gear speed change range).
  Example: When the gearshift lever is at the 3rd speed, switching from the shift up/down switches is available in the range of the 1st and 3rd speeds. Pushing the shift up/down switches from the 3rd speed does not turn on the 4th speed.

- When the auto-shift (L, M, H) is selected
  The gearshift lever on the steering column is positioned at the maximum gear speed (gear speed change range), thereby enabling the gear speed change. In this case, the shift up/down switches provided at the head of the joystick is disabled for the speed change.

- Gear speed change from the hold switch or the kick down switch
  The same function as that from the steering column becomes available.

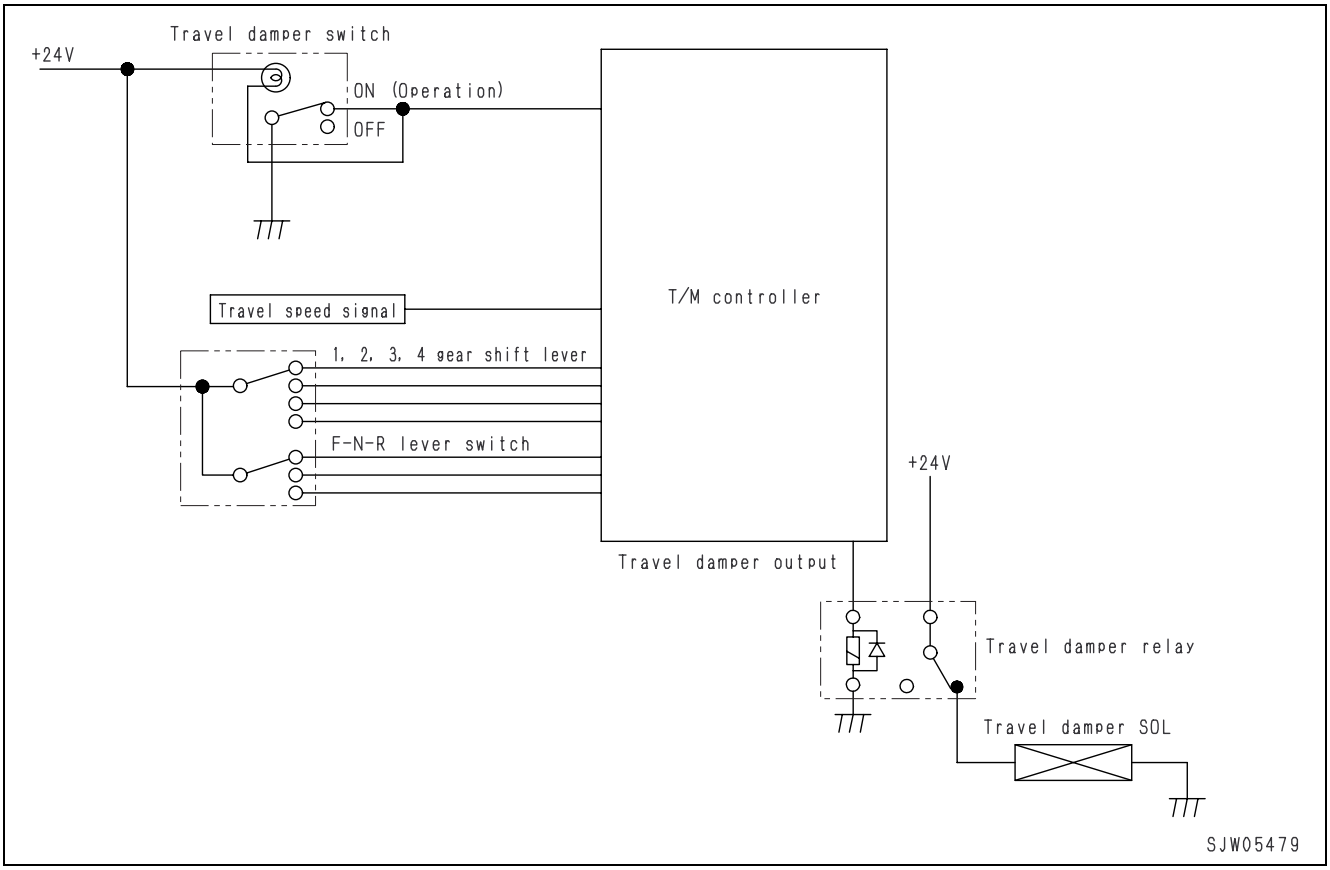
Operable Switches (Levers) when Joystick Function is Installed

Operations on joystick					**Operations on steering column**	
Switching of joystick function	Switching of auto-shift	J/S FNR switch	Shift up switch	Shift down switch	Forward-reverse lever	Gearshift lever position
When joystick is selected	Manual shift	Switching between forward and reverse is available from the switch	Shift up	Shift down	When it is fixed at N, switching becomes available from the joystick. At any other positions, precedence is given to the lever, though accompanied by an error warning.	When the lever is positioned at the maximum gear speed (limiter), selection is available only in the range of 1st to 3rd speeds.
	Auto-shift (L,M,H)	↑	Disabled	Disabled	↑	↑
When steering column is selected	Manual shift	Normal operation is available when fixed to N. An error will be warned at any position other than N.	↑	↑	Switching between forward and reverse is available from the lever.	Switching between forward and reverse is available from the lever.
	Auto-shift (L,M,H)	↑	↑	↑	↑	Maximum gear speed (limiter)

4) Safety function to be turned on at start of engine
If the joystick is selected and J/S FNR switch is not at N position at startup of the engine, output of the neutral signal from the transmission controller is disabled and thus the engine can’t be started.
When the joystick lever is operated (located at any position other than N), output of the neutral signal is disabled by the network signal from the work equipment controller. Thus, the engine can’t be started.
The neutral caution will be warned for both of above cases.

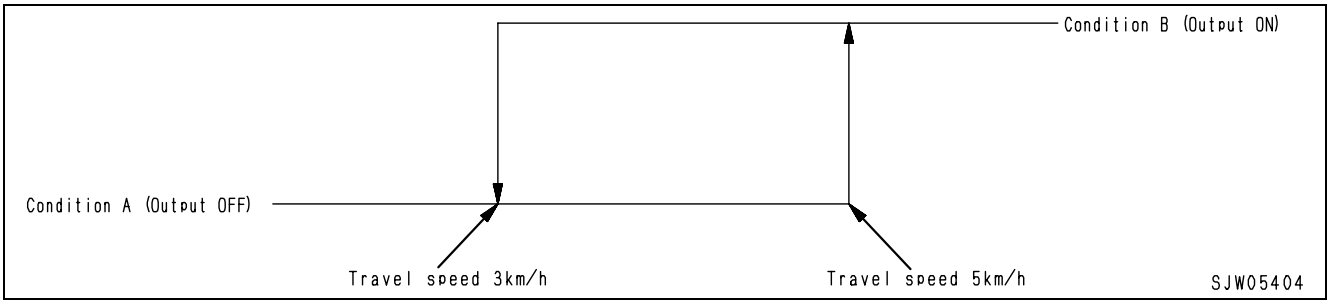
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6. Travel Damper Function (op)
   This function automatically controls ON or OFF of the accumulator sealed with high-pressure gas as well as relief of hydraulic oil of the work equipment taking into consideration of traveling state of the machine. This system is intended at providing enhanced operator comfort by reducing rocking of the machine body, preventing load shifts and improving work efficiency through the elasticity-based control of vertical motion of the work equipment



Following table shows the operating conditions of the travel damper.

Travel damper switch	Gear speed	Travel speed	Travel damper output	Operational status
OFF	Through all gear speeds	0 ~ MAX	OFF	Not activated (in the process of charging)
ON	1st speed	0 ~ MAX	OFF	Not activated (in the process of charging)
	2nd ~ 4th speeds	Condition A	OFF	Not activated (in the process of charging)
		Condition B	ON	Activated

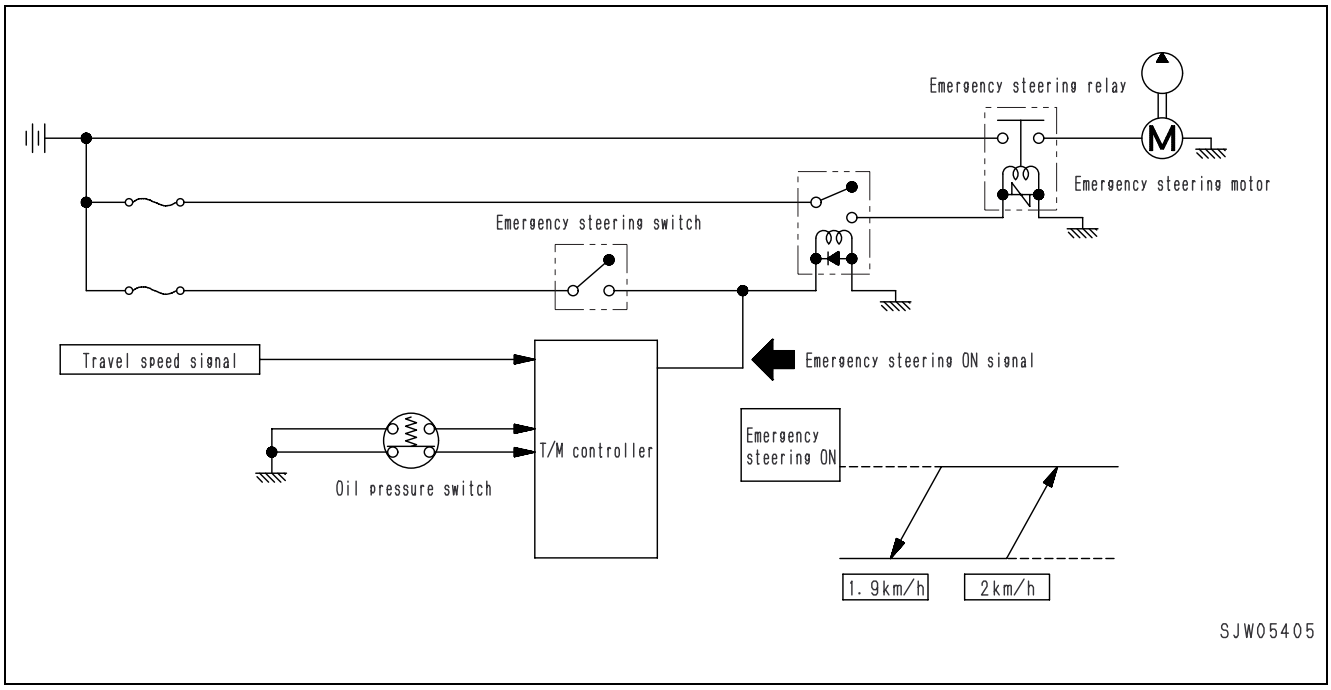


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7. Electric Emergency Steering Function (op)

1) Operation of electric emergency steering function
The transmission controller constantly monitors state of the steering oil pressure switch of the steering circuit. If oil pressure of the steering goes low, thereby increasing the travel speed above the emergency steering activation level, the transmission controller outputs the emergency steering ON signal to the relay to turn on the emergency steering.

This function can also be turned on from the emergency steering switch independent of the travel speed or steering oil pressure.



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2) Self-check operation of emergency steering
3 seconds after the starting switch is turned on (after the monitor check is completed), the transmission controller implements the self-check in which the controller checks operation of the emergency steering automatically.

In the following cases, however, the self-check is not implemented.

a. When the engine starter is turned on from the starting switch.

b. When the engine is already started (when engine speed of 500 rpm or above is detected).

c. When the steering pressure is already present.

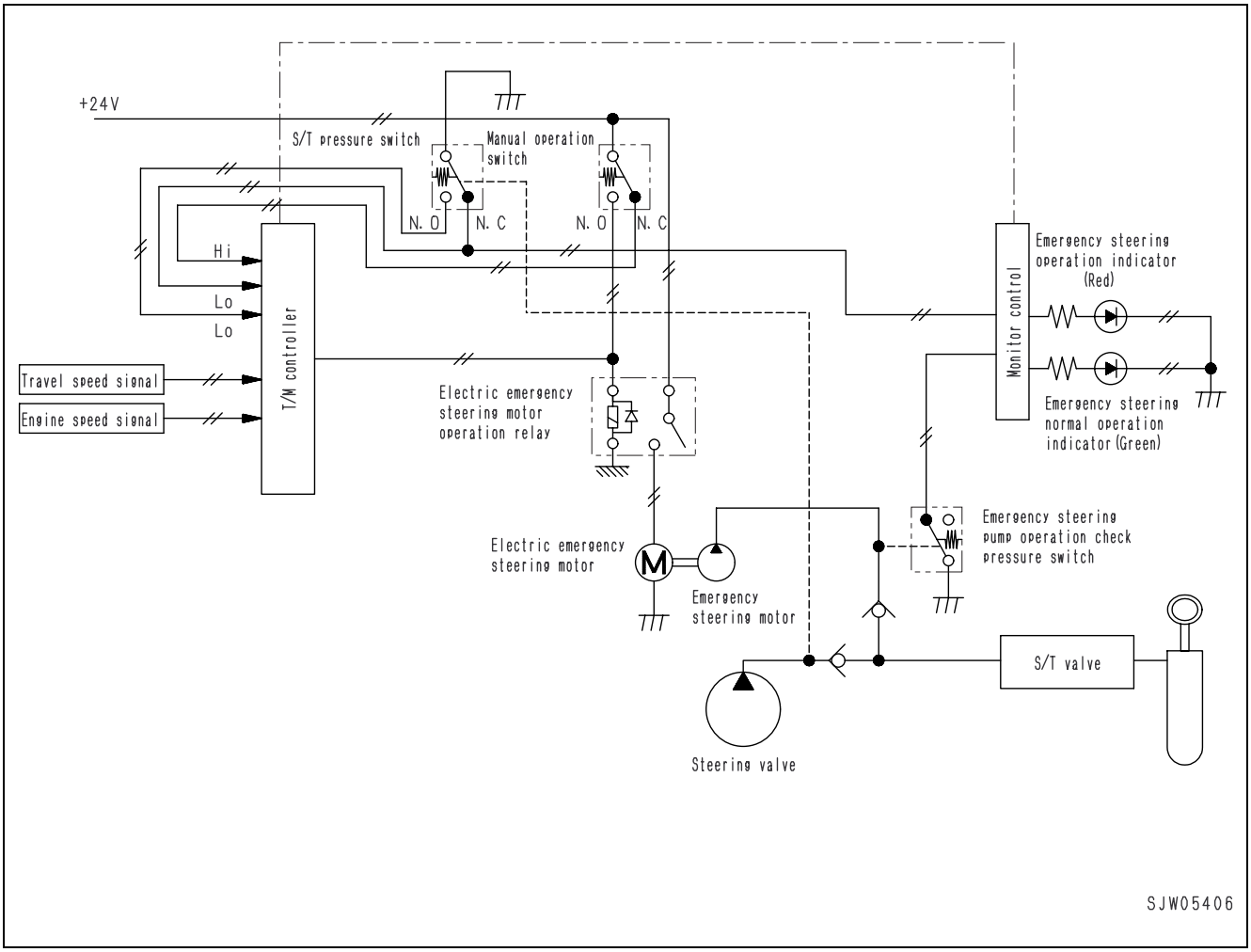
d. When the automatic engine pre-heating function is turned on.

e. When a emergency steering-related error is detected in the monitor check.

f. When the engine has not been operated more than 10 seconds from the last self-check (when the engine has not been operated at 500 rpm for 10 seconds or more).

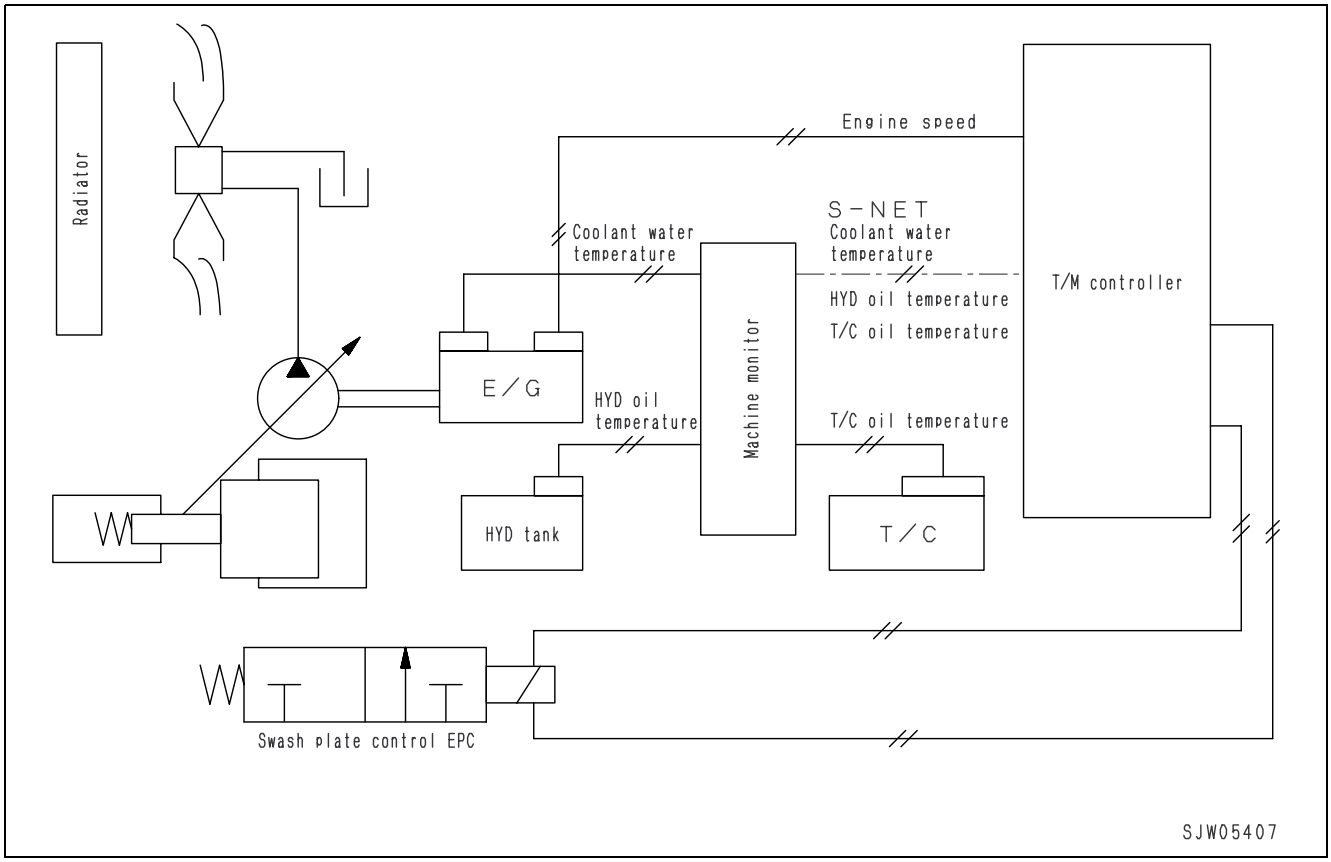
The emergency steering ON signal at the self-check is output for 3 seconds maximum. If the monitor detects presence of the emergency steering operating pressure within 3 seconds, the monitor sends the emergency steering operation detection signal to the network. Upon output of this signal, the transmission controller ends the self-check of the emergency steering.

If the above signal is not sent within 3 seconds, the controller warns an error.

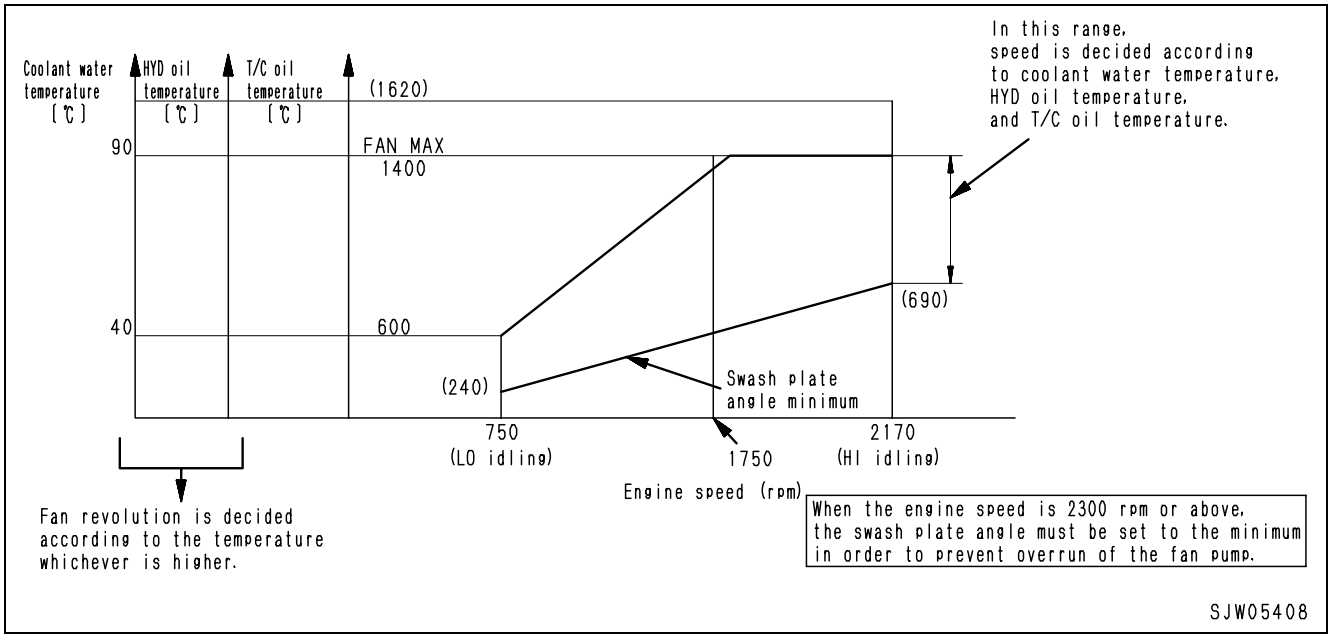


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8. Cooling Fan Control Function
   1) Fan control
      This system reduces loss of horsepower and noise at low temperature by employing the hydraulic drive for the cooling fan and controlling the swash plate of the hydraulic pump swash.



Engine water temperature, operating oil temperature and oil temperature of the torque converter detected by the machine monitor are sent to the transmission controller via the network. Upon receiving above information, the transmission controller turns on a fan revolution suitable to the temperature and engine speed by controlling the swash plate of the hydraulic pump by use of electric current.



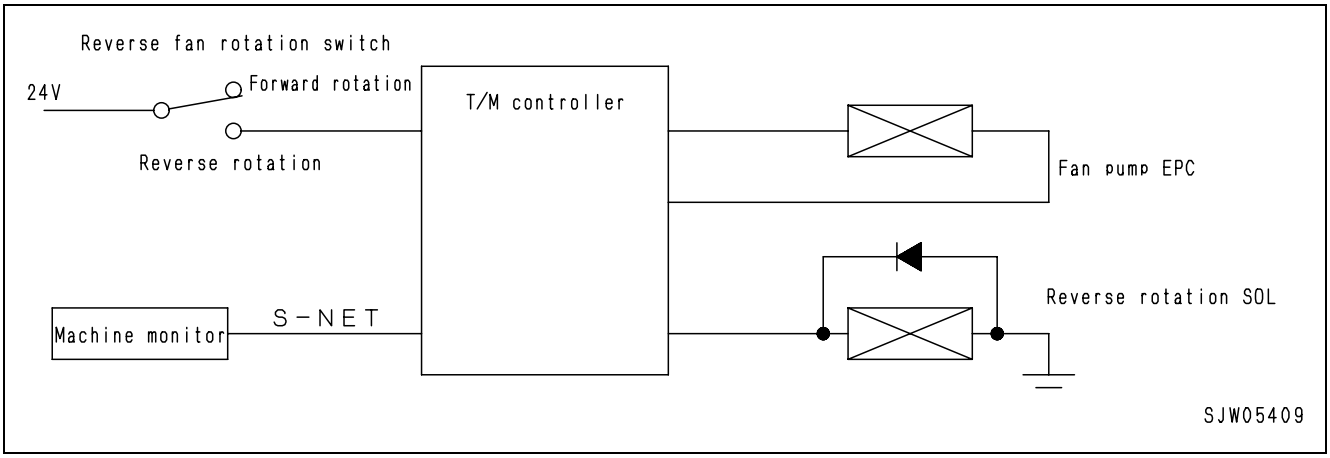
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2) Control of reverse fan rotation
You can reverse rotate the fan from the reverse fan rotation switch by activating the reverse rotation solenoid for the hydraulically driven fan.

When the engine speed is 1,500 rpm or greater, this system increases the radiator cleaning capability of the reverse rotated fan by setting both the fan pump swash plate and the fan revolution to the maximum. When the engine revolution is less than 1,500 rpm, the fan pump swash plate is set to the minimum in order to suppress generation of surge oil pressure due to reversing of the circuit at engine stop.

Note that switching between the forward and reverse rotation is available only when the engine is stopped.

Even if you may try to cause switching between the forward and reverse rotation while the engine is in operation (when the engine speed is 500 rpm or above), operation signal is not output from the reverse rotation solenoid

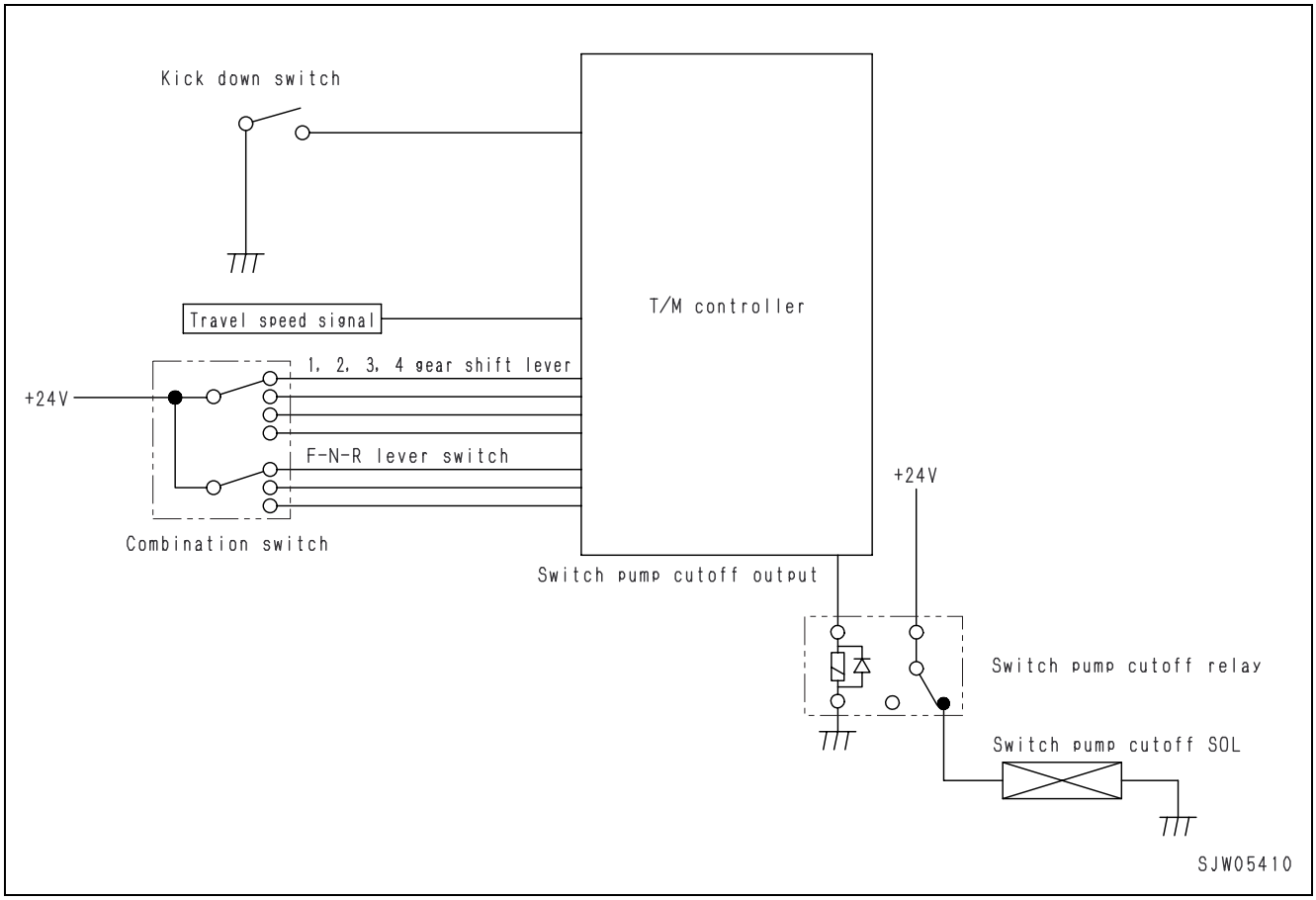


Output from reverse rotation SOL (before switch operation)	Reverse fan rotation switch	Engine speed	Output from reverse rotation SOL	Output from fan pump EPC	Monitor indicator
OFF	OFF➔ON	Stopped (less than 500 rpm)	ON	MIN rotation	OFF➔ON
OFF	ON➔OFF		OFF	Normal	Blinking➔OFF
ON	OFF➔ON		ON	MIN rotation	Blinking➔ON
ON	ON➔OFF		OFF	Normal	ON➔OFF
OFF	OFF➔ON	Started (500 rpm or above)	OFF	Normal	OFF➔Blinking
OFF	ON➔OFF		OFF	Normal	Blinking➔OFF
ON	OFF➔ON		ON	※	Blinking➔ON
ON	ON➔OFF		ON	※	ON➔Blinking
※: Output from the fan pump EPC while the fan is in reverse rotation					

Engine speed	Less than 1,500 rpm	1,500 rpm or above
EPC control	MIN rotation	MAX rotation

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9. Switch Pump Cutoff Function
   When digging operation at 1st speed is turned on from the kick down switch, this function is used to reduce loss of horsepower due to driving for the switch pump by cutting the switch pump off.



The switch pump cutoff signal is output when digging operation is turned on from the kick down switch.

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10. Engine Overrun Protection Function
If you try to shift down while travelling downhill at a high-speed with the accelerator being stepped on, engine overrun can result from driving force of the tires.

In order to prevent this engine overrun, the transmission controller restricts the shift down operation depending on the given engine speed and revolution of the transmission output shaft (travel speed).

Following lists the conditions for turning on or off the protection:

1) Protect condition: If shift down is tried when the protect condition = A or (B & C) is met, an alarm is output in stead of the shift down output.

2) (2) Protect cancel condition: When the protect-cancel condition = D & (E or F) is met, the shift down output is generated in stead of the alarm.

	Protection condition [A or (B and C)]			**Cancel condition [E and (E or F)]**		
Targeted shift down gear speed	Condition A	Condition B	Condition C	Condition D	Condition E	Condition F
	TM output speed	TM output speed	Engine speed	TM output speed	TM output speed	Engine speed
3rd speed	None	2658 rpm or above	2100 rpm or above	None	Less than 2436 rpm	Less than 1900 rpm
2nd speed	2658 rpm or above	846 rpm or above	2100 rpm or above	Less than 2436 rpm	Less than 1698 rpm	Less than 1900 rpm
1st speed	1846 rpm or above	1107 rpm or above	2100 rpm or above	Less than 1698 rpm	Less than 997 rpm	Less than 1900 rpm

3) Protect alarm cancel condition: In any of the following cases, output of the protect alarm is stopped and normal control is restored.

a. When matching is established between the input instruction and output instruction from the gearshift lever (shift switch).

b. When a shift above the one specified with the output instruction is selected from the gearshift lever (shift switch).

4) Operations restricted while the shift down protect is turned on: As long as the protect is turned on, hold and kick down operations are disabled.

T/M output shaft speed and travel speed

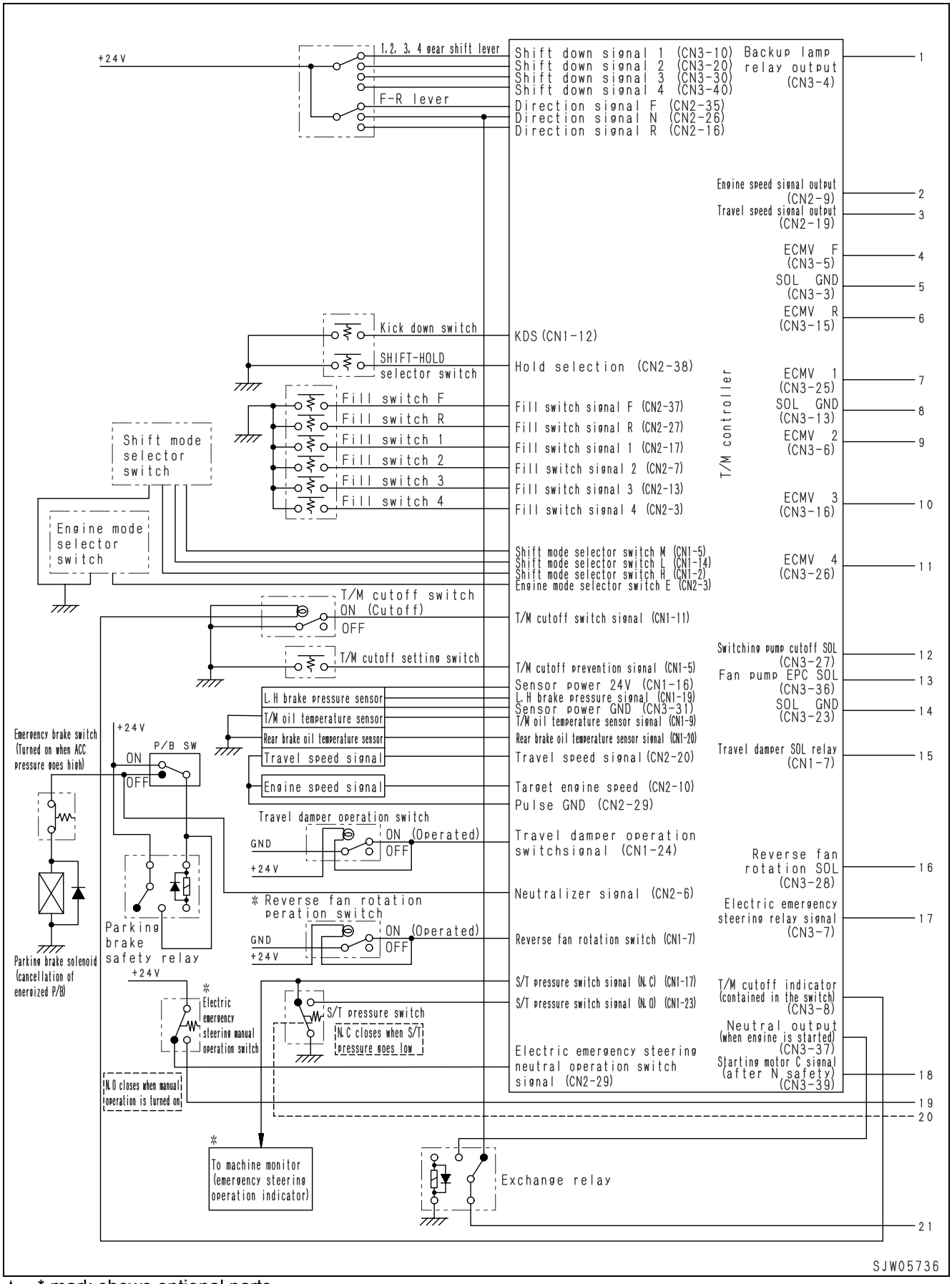
		WA470-5 (small diameter tire)	**WA470-5 (large diameter tire)/WA480-5**
T/M output shaft speed converted to travel speed (rpm)	2658	33.2	36.0
	1846	23.0	25.0
	1107	13.8	15.0

11. Troubleshooting
The transmission controller self diagnoses the system by monitoring the input/output signals constantly.

If any errors are found in the self-diagnosis, the controller sends the error information to the machine monitor via the network. The machine monitor allows you to check the errors.

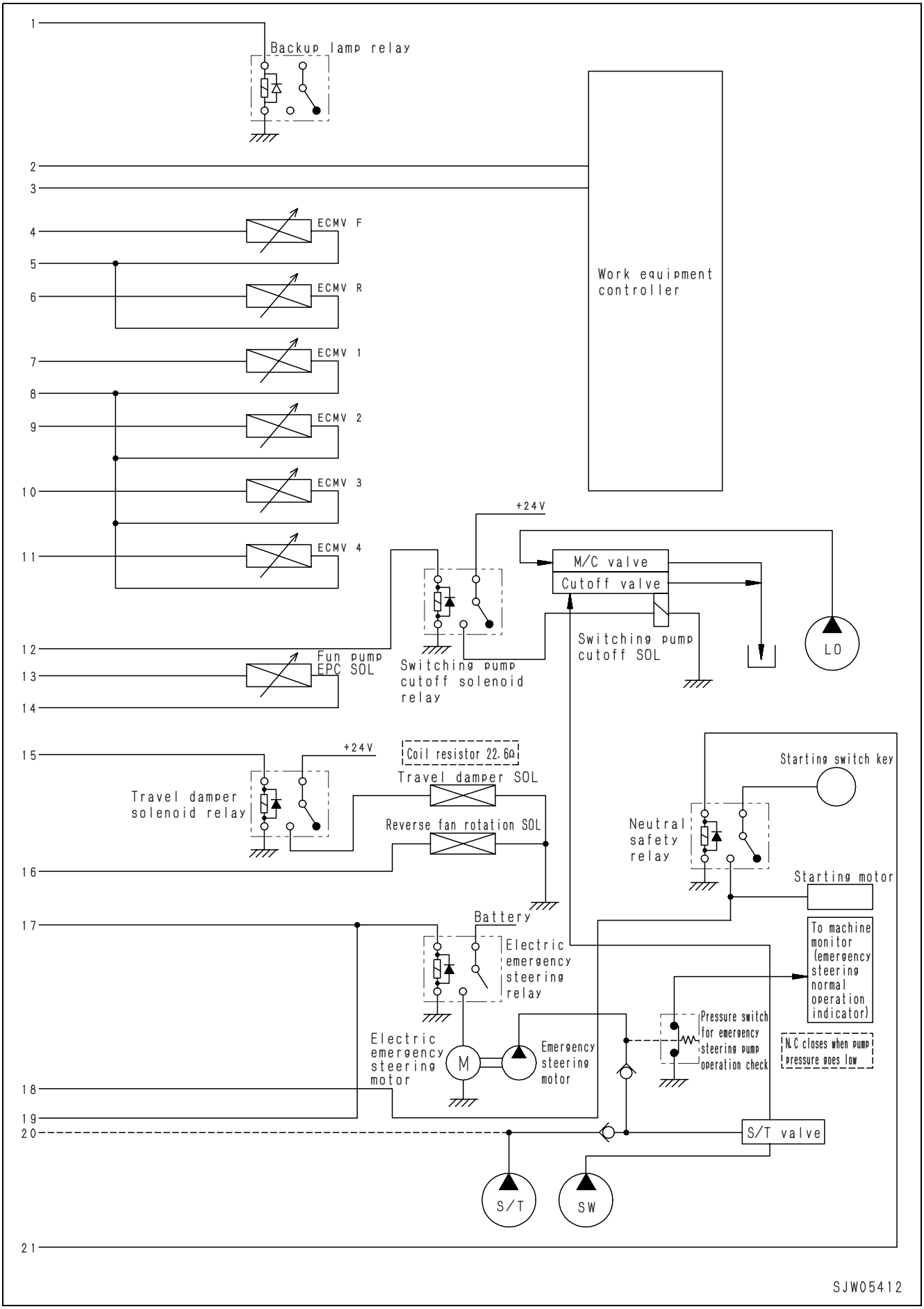
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Electric circuit diagram (std)



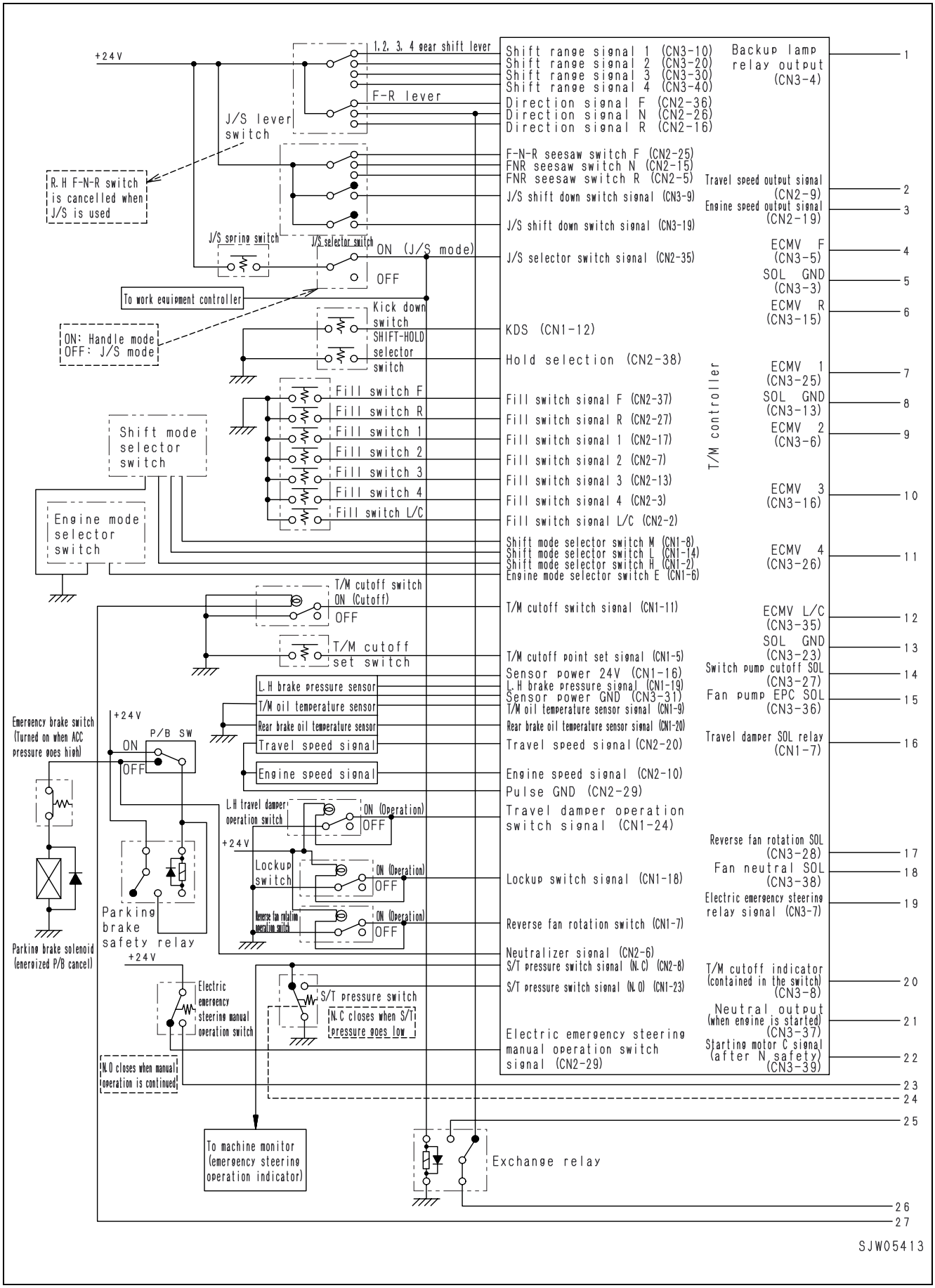
★ * mark shows optional parts.

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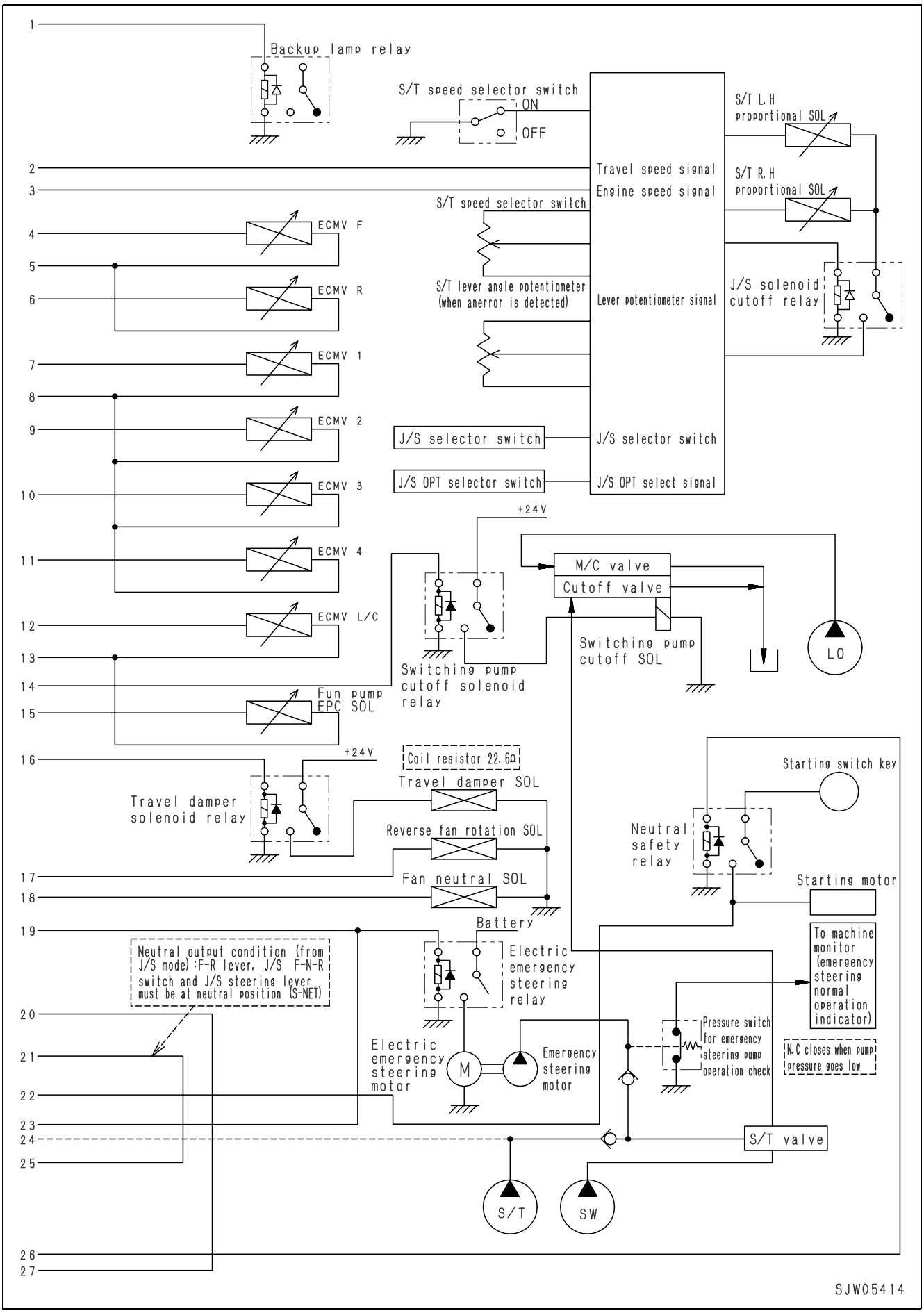


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Electric circuit diagram (op)

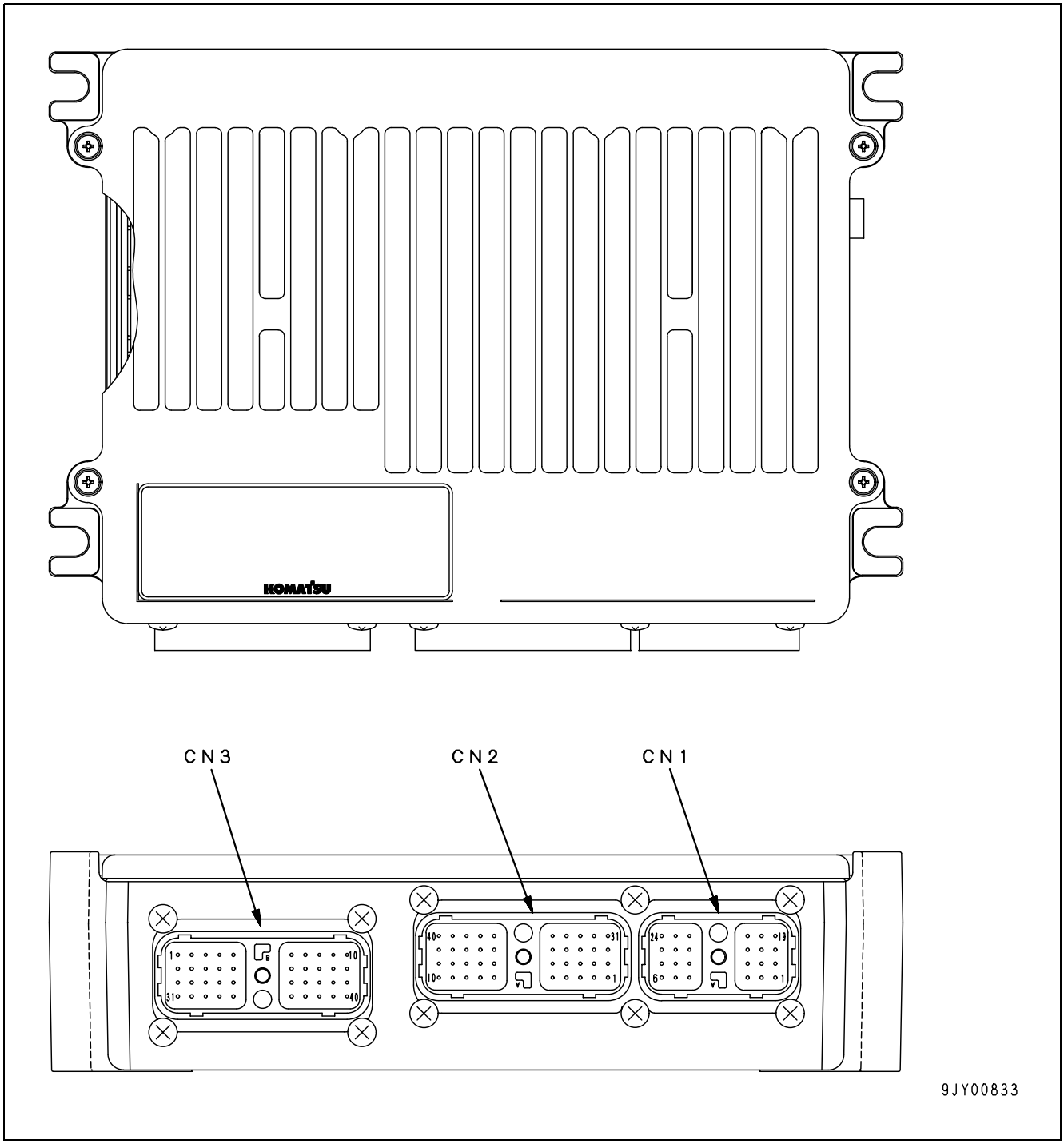


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Transmission controller



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DEUTSCH-24P [CN-L61]	
1	NC
2	Shift mode H
3	NC
4	Signal GND
5	T/M cutoff set switch
6	Engine power mode switch
7	Reverse fan rotation switch
8	Shift mode M
9	T/M oil temperature sensor
10	Signal GND
11	T/M cutoff switch
12	Kick down switch
13	NC
14	Shift mode L
15	NC
16	Sensor supply source output (+24V)
17	Steering pressure switch (NC)
18	Lockup selector switch
19	Left brake pressure sensor
20	Rear brake oil temperature sensor
21	Analog GND
22	Potentiometer power (+5V)
23	Steering pressure switch (NO)
24	Travel damper switch

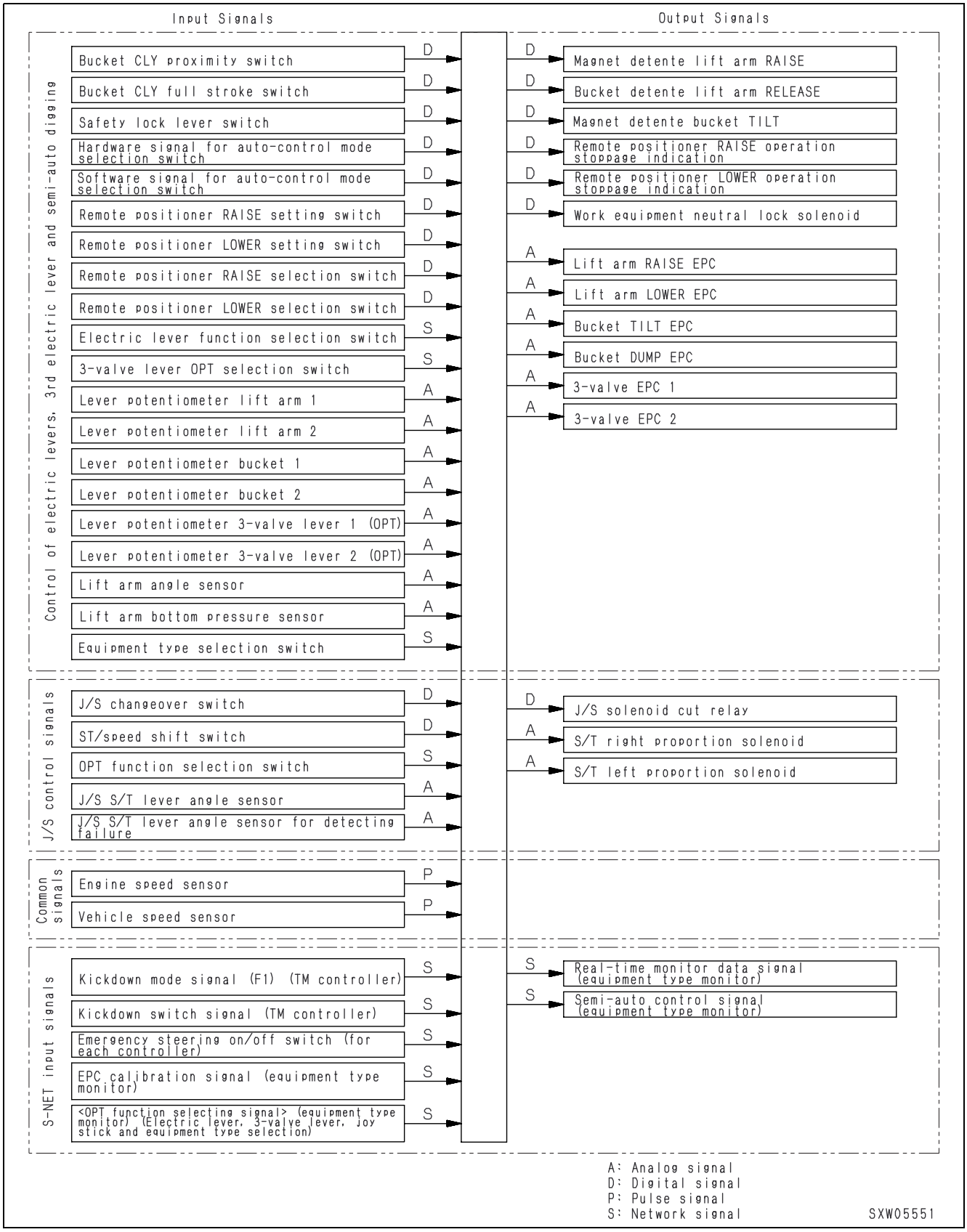
DEUTSCH-40P(1) [CN-L62]	
1	NC
2	ECMV fill switch L/U
3	ECMV fill switch 4th
4	232C_RxD
5	Right FNR (J/S) forward-reverse R
6	Neutralizer (P/B) signal
7	ECMV fill switch 2nd
8	NC
9	Engine speed pulse unlatched output
10	Engine speed signal (+)
11	NC
12	CAN shield
13	ECMV fill switch 3rd
14	232_TxD
15	Right FNR (J/S) forward-reverse N
16	Forward-reverse lever R
17	ECMV fill switch 1st
18	NC
19	Travel speed unlatched output
20	Travel signal (+)
21	S_NET
22	CAN0_L
23	CAN1_L
24	Write-to-flash-memory enable signal
25	Right FNR (J/S) forward-reverse F
26	Forward-reverse lever N
27	ECMV fill switch R
28	NC
29	Pulse GND
30	NC
31	S_NET GND
32	CAN0_H
33	CAN1_H
34	232C GND
35	Right FNR (J/S) switch
36	Forward-reverse lever F
37	ECMV fill switch F
38	Shift hold switch
39	Pulse GND
40	NC

DEUTSCH-40P(2) [CN-L63]	
1	VB (controller power)
2	VIS (solenoid power)
3	SOL_COM (common solenoid ground)
4	Back lamp relay
5	ECMV F
6	ECMV 2nd
7	Electric emergency steering relay
8	Indicator built in T/M cutoff switch
9	J/S shift up switch
10	Gearshift lever 1st speed
11	VB (controller power)
12	VIS (solenoid power)
13	SOL_COM (common solenoid ground)
14	KEY_SIG
15	ECMV R
16	ECMV 3rd
17	Travel damper
18	NC
19	J/S shift down switch
20	Gearshift lever 2nd speed
21	GND (controller ground)
22	VIS (solenoid power)
23	SOL_COM (common solenoid ground)
24	KEY_SIG
25	ECMV 1st
26	ECMV 4th
27	Switch pump cutoff relay
28	Reverse fan pump rotation SOL
29	Electric emergency steering operation switch
30	Gearshift lever 3rd speed
31	GND (controller ground)
32	GND (controller ground)
33	GND (controller ground)
34	NC
35	ECMV L/U
36	Fan pump EPC
37	Neutral output
38	Fan pump neutral SOL
39	Starter switch C-terminal
40	Gearshift lever 4th speed

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Work equipment control system (op)

System diagram



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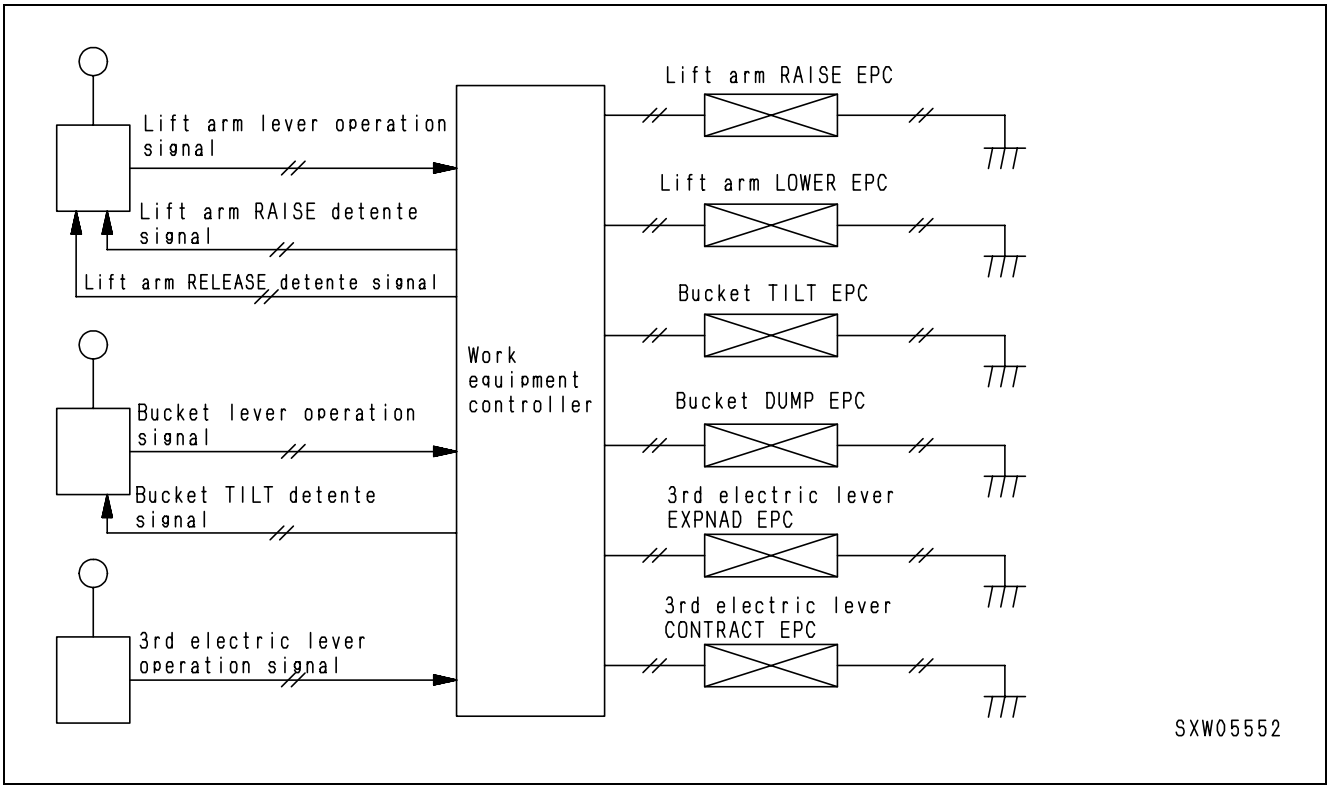
1. Work equipment control

1-1. Electric lever control

Lift arm controlling function
This function controls the EPC valve according to how much the lift arm lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the lift arm RAISE/LOWER function to be performed.

Bucket controlling function
This function controls the EPC valve according to how much the bucket lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the bucket TILT/DUMP function to be performed.

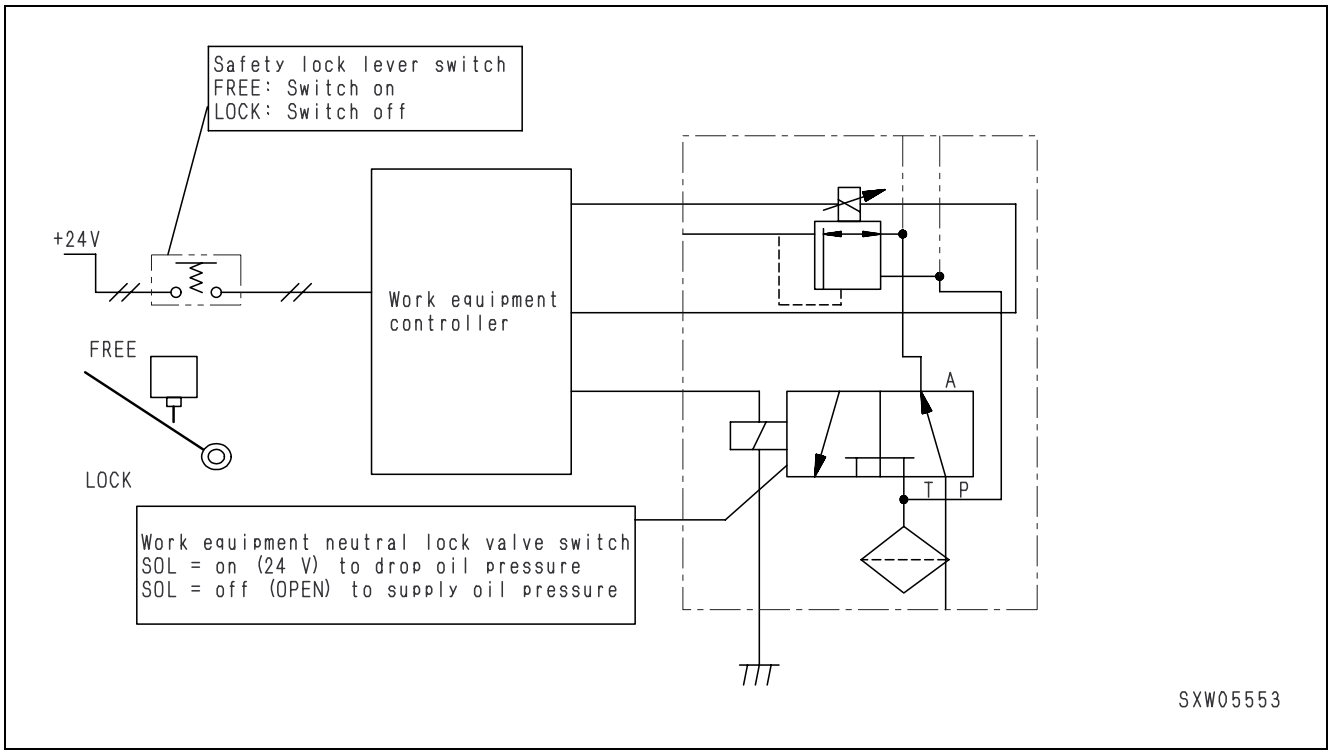
3rd Lever controlling function
This function controls the EPC valve according to how much the 3rd lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the 3rd valve cylinder EXTEND/RETRACT function to be performed.



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Work equipment neutral cut

When the safety lock lever for blocking the passage on the work equipment lever circuit is in the LOCK position, the work equipment neutral cut solenoid is excited to unload the pilot pressure on the work equipment valve. This mechanism prevents the work equipment from being accidently operated by operation of the work equipment lever.



Function table

Operator's action	Controller input	Controller output	Movement at machine
Safety lock lever	Safety lock lever switch	Work equipment Neutral lock valve	Hydraulic power
Raise (FREE)	ON (CLOSE)	OFF (OPEN)	Active
Lower (LOCK)	OFF (OPEN)	ON (24V)	Inactive

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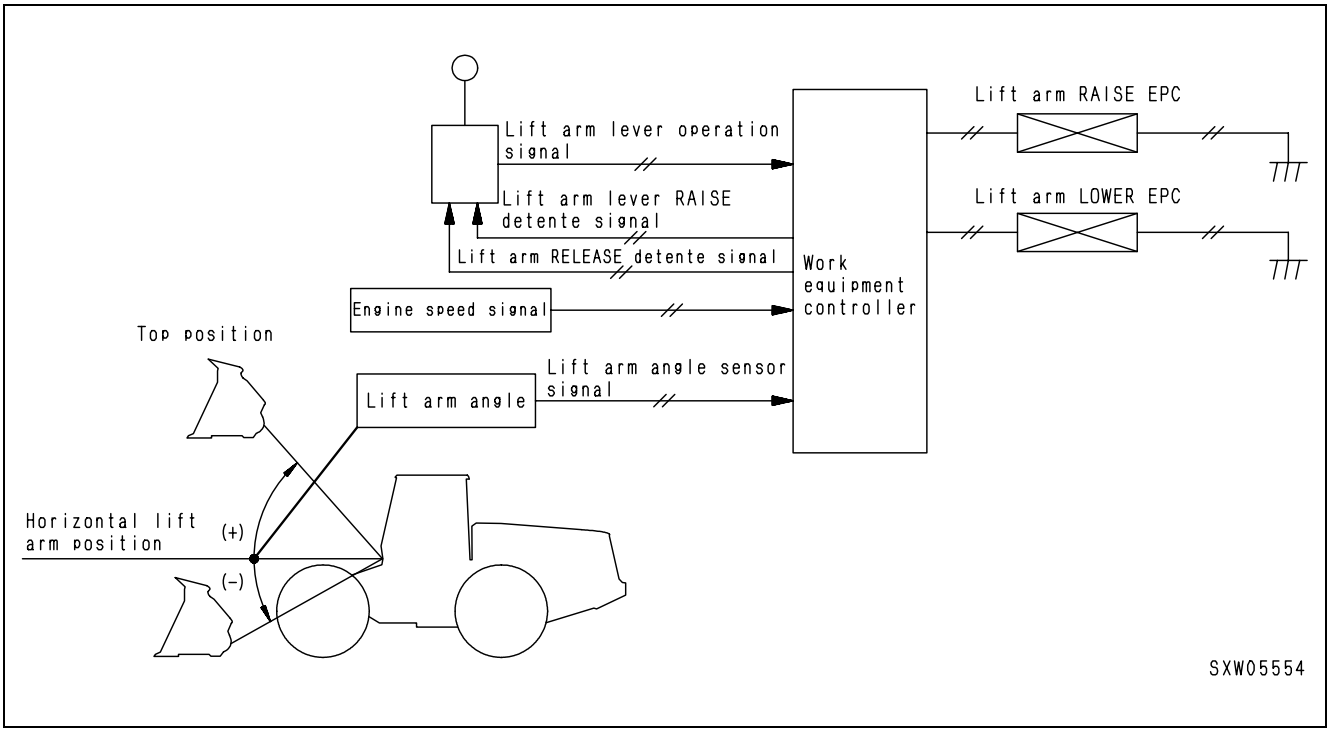
1-2. Detent control

Lift arm kick-out control
Operating the lift arm lever to reach the RAISE detent range allows a detent-on signal to be output from the work equipment controller.

This enables the lift arm lever to be maintained in the RAISE state even when the lever is released.

When the lift arm is raised and an input signal of the lift arm angle sensor approaches the top angle, detent is cancelled and the lift arm stops rising. At this same time, the work equipment controller gradually slows down the lift arm RAISE EPC (referred to as modulation control) to prevent excessive impact from arising upon stoppage of the lift arm motion.

Detent can be cancelled (manually) by operating the work equipment lever toward the neutral position side, in which case, EPC performs ordinary control according to how much the lever was moved.



Lift arm releasing function
Lowering the lift arm lever to allow it to reach the detent range, a detent-on signal is output from the work equipment controller to cause the lift arm lever to be maintained in the LOWER state. At this time, the lift arm cylinder is released to allow the lift arm to be raised or lowered by external force. Therefore, it this function starts when the lift arm is up in the air, it goes down due to its own weight.

Detent can be cancelled (manually) by operating the work equipment lever toward the neutral position side, in which case, EPC performs ordinary control according to how much the lever was moved.

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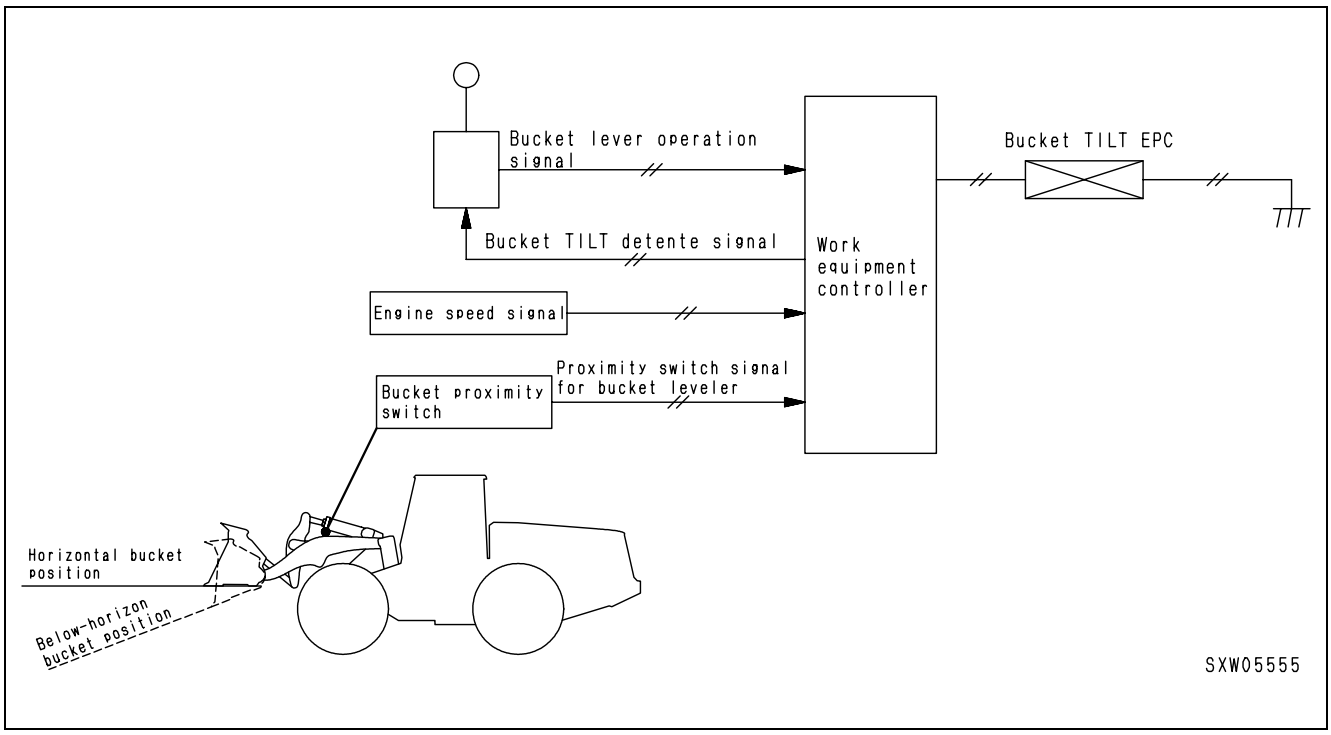
Bucket leveling function
If the bucket is below the horizontal position, operating the bucket lever to allow it to approach the TILT detent range causes a detent-on signal to be output from the work equipment controller, which, in turn allows the bucket lever to be maintained in the TILT state.

When the bucket is tilted and approaches the horizontal position, the bucket proximity switch detects it, cancelling detent to stop the TILT operation.

At this time, the work equipment controller gradually slows down the bucket TILT EPC (referred to as modulation control) to prevent excessive impact from arising upon stoppage of the bucket motion.

Detent can be cancelled (manually) by operating the work equipment lever toward the neutral position side, in which case, EPC performs ordinary control according to how much the lever was moved.

If the bucket is tilted above the horizontal position, detent does not work even when the lever is operated to approach the detent position.



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2. Remote positioner control
The remote positioner enables the operator to set the lift arm stop position as desired, smoothing lift arm starting and stopping motions.

This enables safety and operability of backward digging operations as well as machine body operations for approaching DUMP.

Functions
The remote positioner stops after slowing down at the lift arm RAISE/LOWER position.

The work equipment controller constantly detects the lift arm angle (position) based upon the direction in which the lever is operated and data from the arm angle potentiometer.

To stop the lift arm RAISE operation (when the RAISE selection switch is turned on)

Operating the lift arm lever to enter RAISE detent and allowing the lift arm to be raised before the set position cancels lift arm RAISE detent, which starts modulation control for stopping the lift arm.

The lift arm can be manually raised in all cases except for the RAISE detent position.

If RAISE is not selected (when the selection switch is turned off), only kick-out is enabled.

To stop lift arm LOWER operation (when the LOWER selection switch is turned on)

Place the lift arm lever at the "FLOAT detent" position. The lift arm starts slowing down at 10 degrees before the set position, and FLOAT detent is canceled 4 degrees before the set position to perform modulation control for stopping the lift arm.

Retain the lift arm lever at that position to restart lowering it.

If LOWER is not selected (when the LOWER selection switch is turned off), only FLOAT detent is enabled.

If the lift arm angle is above the horizontal position when the lever is placed in the detent position, only FLOAT detent is enabled.

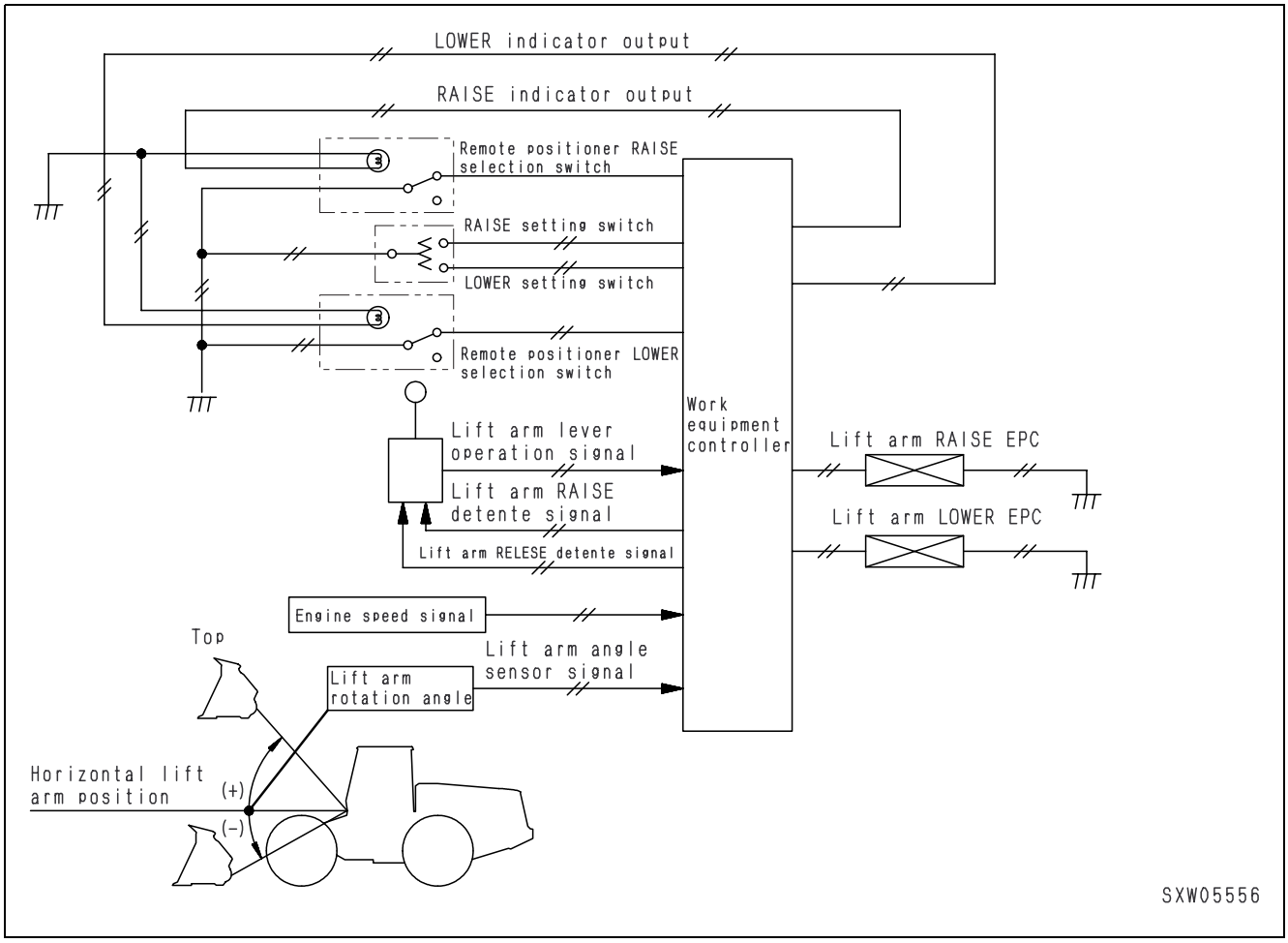
Remote positioner mode selection and stop angle setting
Remote positioner mode selecting function

Selection switch	**Selection mode**		
	RAISE stop	LOWER stop	RAISE and LOWER stop
RAISE selection switch	ON(●)	OFF(○)	ON(●)
LOWER selection switch	OFF(○)	ON(●)	ON(●)
Indicator output: Lamp on (SW ON) : ● Lamp off (SW OFF) : ○			

Applicable setting range for remote positioner stop position
Applicable setting range for RAISE/LOWER stop position

Equipment type	**Stop position**	
	For RAISE	**For LOWER**
WA470	0° ~ +45.7°	0° ~ -40.3°
WA480	0° ~ +45.9°	0° ~ -41.2°
0°: Horizontal boom position		

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Control items

RAISE position setting

1	Remote positioner RAISE stop control		RAISE boom stop (selection switch = on)
2	Setting of remote positioner RAISE stop angle point	Enabled if:	RAISE selection switch = On (remote positioner RAISE stop enabled) Work equipment lever (boom) stroke = Neutral (within ±10%)
		Setting procedure	1. Raise the boom to the position to be set. 2. Press the remote positioner RAISE position setting switch and release it. 3. If the setting position where the switch was released is within the applicable range, the angle attained when the switch was released is tentatively saved, and the setting completion buzzer beeps twice. Otherwise, the setting cancellation buzzer beeps. 4. The RAISE indicator blinks (for 2.5 seconds). 5. The setting is saved after the indicator blinks for 2.5 seconds (the setting mode completed). (The set status is maintained even after the equipment is keyed off.)
		Resetting procedure	1. During the 2.5-second interval in setting step 4 above (while the RAISE indicator is blinking), press the remote positioner RAISE position setting switch again, and release it. 2. As the indicator stops blinking, set the RAISE stop position point to "0°" (horizontal). The setting cancellation buzzer beeps. 3. The set value is saved (as the default value). (The set status is maintained even after the equipment is keyed off.)

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LOWER position setting

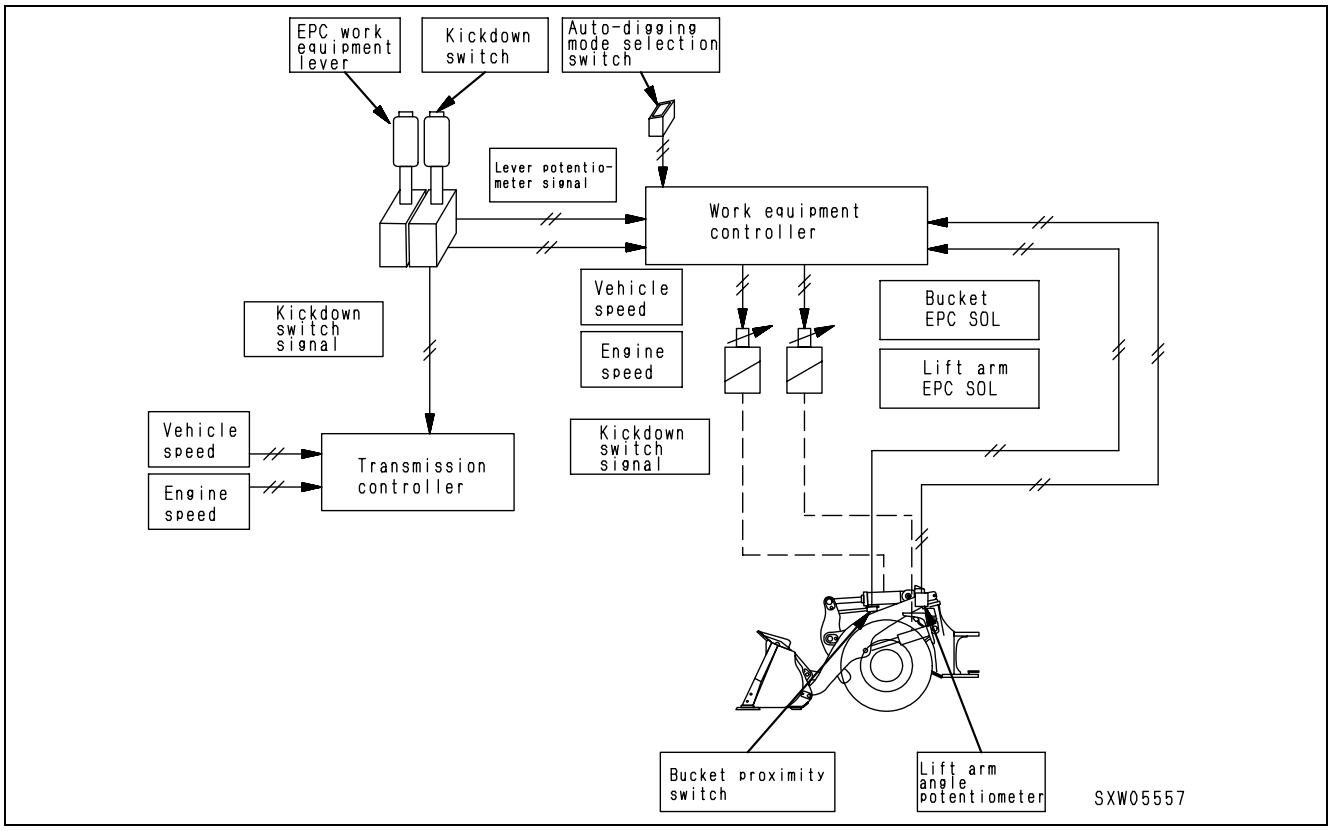
1	Remote positioner LOWER stop control		LOWER lift arm stop (selection switch = ON)
2	Setting of remote positioner LOWER stop angle point	Enabled if:	LOWER selection switch = ON (remote positioner LOWER stop enabled) Work equipment lever (lift arm) stroke = Neutral (within ±10%)
		Setting procedure	1. Lower the lift arm to the position to be set. 2. Press the remote positioner LOWER position setting switch and release it. 3. If the setting position where the switch was released is within the applicable range, the angle attained when the switch was released is tentatively saved, and the setting completion buzzer beeps twice. Otherwise, the setting cancellation buzzer beeps. 4. The LOWER indicator blinks (for 2.5 seconds). 5. The setting is saved after the indicator blink
		Resetting procedure	1. During the 2.5-second interval in setting step 4 above (while the LOWER indicator is blinking), press the remote positioner LOWER position setting switch again, and release it. 2. As the indicator stops blinking, set the LOWER stop position point to "0°" (horizontal). The setting cancellation buzzer beeps. 3. The set value is saved (as the default value). (The set status is maintained even after the equipment is keyed off.)

Output conditions for buzzers and indicator lamps
The same output conditions apply for both RAISE and LOWER operations.

Output condition	Indicator lamp	Buzzer output	Stop position
Remote positioner selection switch = On	Comes on	None	Controlled with the value saved previously
Remote positioner selection switch = On; Position setting switch = On. Output for 2.5 seconds or until reset (When the sensor is operating normally)	Blinks (for 2.5 seconds or until reset)	Setting completion buzzer beeps upon releasing setting switch	Controlled with the value saved previously. Value attained when setting switch was released is saved.
Remote positioner selection switch = On; Position setting switch = ON; Boom angle = Outside the setting range.	Comes on.	Setting cancellation buzzer beeps upon releasing setting switch.	Controlled with the value saved previously. The value stored is not altered.
Remote positioner selection switch = On; When the sensor is not operating normally.	Goes off.	None	Not controlled. The value stored is not altered.
Remote positioner selection switch = On; When the sensor is not operating normally.	Comes on.	None	Controlled with the value saved previously. The value stored is not altered.
Remote positioner selection switch = On; Position setting switch = On. Reset during 2.5-second blinking (Position setting switch = On again)	Comes on.	Setting cancellation buzzer beeps upon releasing setting switch.	Controlled with the value saved previously. The default value is saved.
Remote positioner selection switch = Off	Goes off.	None	Not controlled. RAISE/RELEASE détente is controlled.

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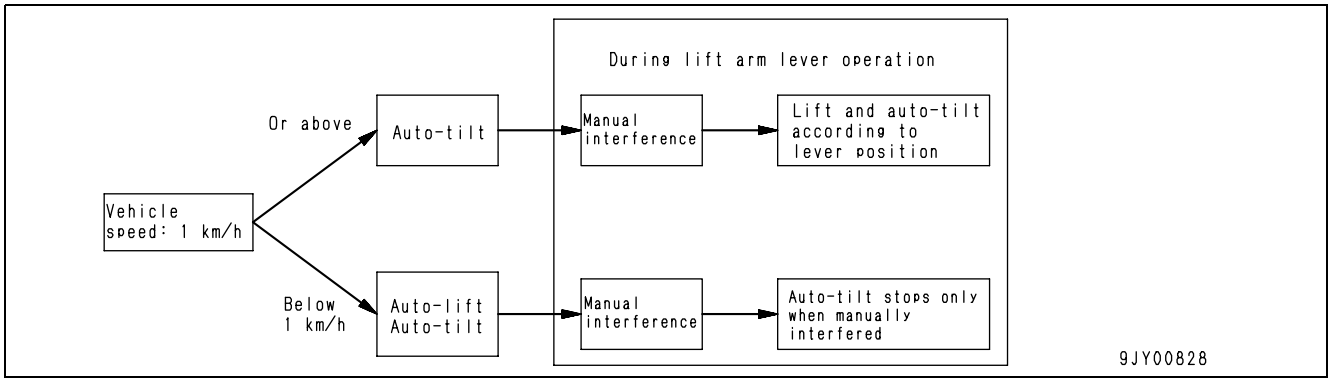
3. Semi-auto digging control
   Semi-auto digging control enables loads to be scooped in easily, simply by operating the lift arm lever and the kickdown. With this function, even an amateur can achieve performance comparable with that of a professional one.



1) Starting conditions for semi-auto digging
   Turn the auto-digging selection switch on (in the soft or hard mode).
   Set the lift arm angle of the work equipment to -35° or below (so that the bucket contacts the ground).
   Operate the kickdown switch to shift down to the 1st speed gear with the transmission kept in the forward mode. The engine speed increases and the machine speed drops (machine speed in km/h < 3.5 multiplied by engine speed in rpm divided by 2000). Semi-auto digging starts with lift arm LOWER operation.

2) Starting semi-auto digging

a. When the lift arm lever was replaced to the neutral position after semi-auto digging had started:
   Auto TILT starts on the bucket.
   The lift arm starts auto-lift after a machine speed of 1 km/h or below is maintained for 1 second.
   If lift arm RAISE is started at this time, AUTO-TILT stops during lift arm RAISE operation.

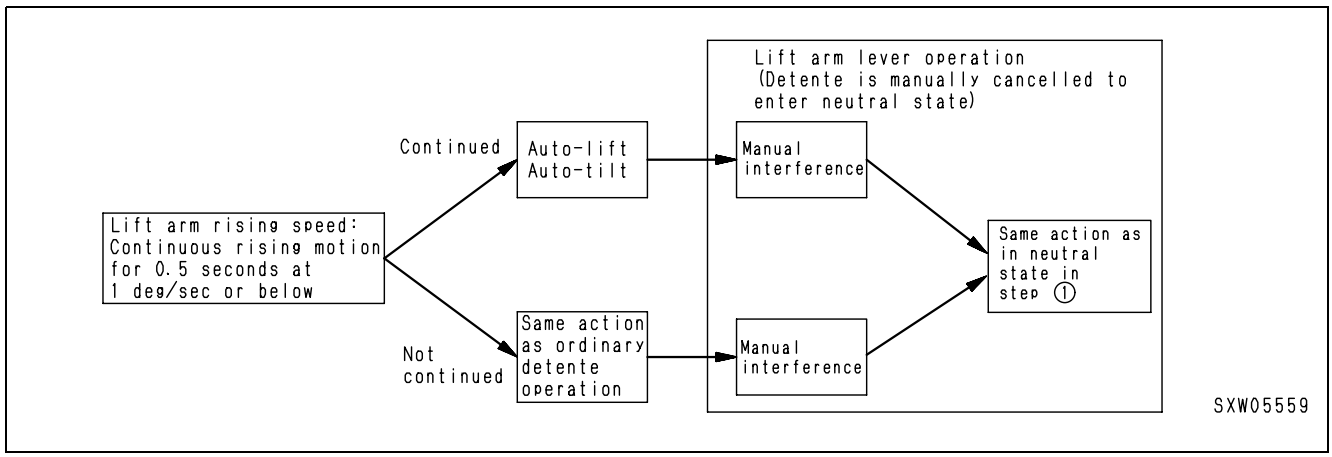


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b. When the lift arm lever was placed in the detent position after semi-auto digging had started:

AUTO-TILT does not start if the lift arm RAISE speed does not drop due to failure of loading into the bucket (after the lift arm continued to be raised at 1 deg/sec for 0.5 seconds).

AUTO-TILT starts when the bucket stops being raised (after being raised at 1 deg/sec for 0.5 seconds).



3) Termination of semi-auto digging
Semi-auto digging is terminated if one of the following conditions is satisfied:

- The shift lever is placed in a position other than forward.
- The lift arm is placed above the horizontal position.
- TILT operation reaches the stroke end.
- AUTO-TILT has been performed six times in the hard mode.

4) Semi-auto digging mode

- Soft mode
  AUTO-TILT is continuously performed.
  NOTE, however, TILT may temporarily stop due to manual interference
- Hard mode
  AUTO-TILT operates intermittently in a cycle of 1 or 2 seconds.
  The semi-auto digging mode is terminated when TILT has been performed six times in the hard mode.

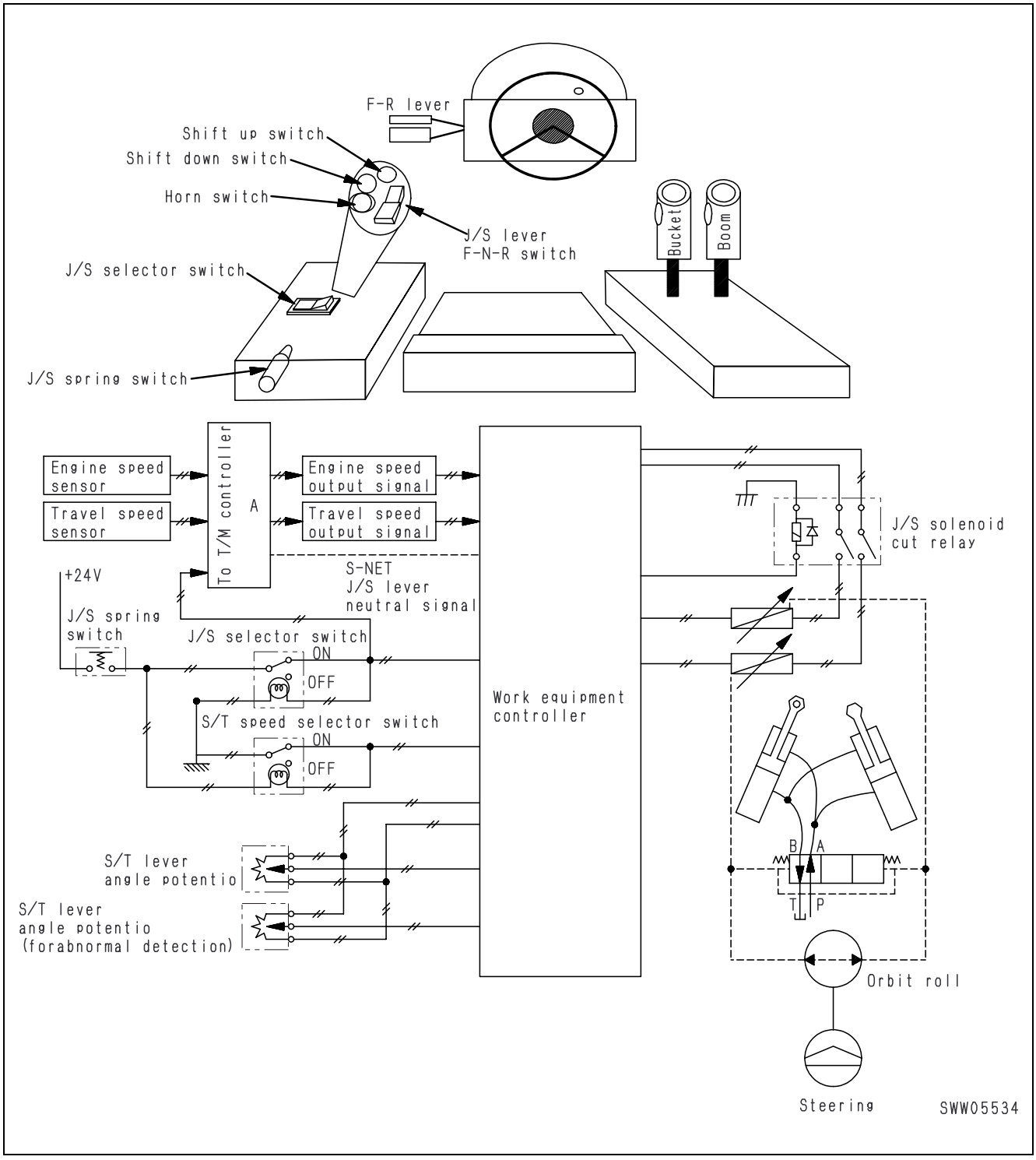
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4. Joystick steering control
Joystick steering control enables steering of the machine to be performed simply with the joystick, without operating the steering wheel.

The steering wheel can be operated even during operation of the joystick. However, operation is articulated by either the joystick or the steering wheel, depending upon which is more powerful (in terms of steering force) if the operating direction differs between the two.

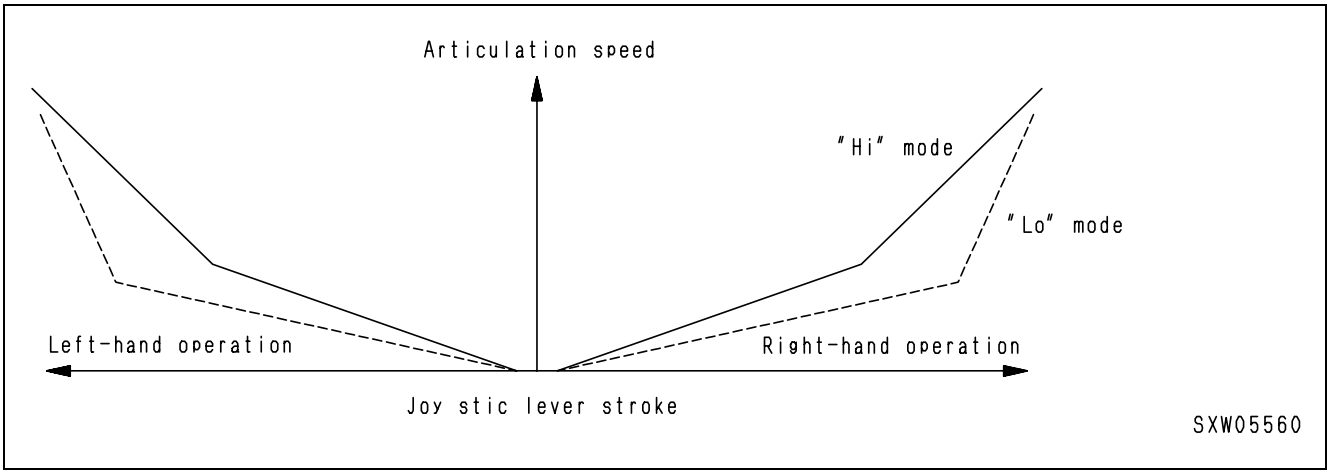
The work equipment controller controls the steering system of the joystick.

The traveling system (forward/backward travel and gear shift) is controlled by the transmission controller.



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1) Steering control
Steering control with the joystick provides an articulation speed according to how the joystick lever is moved.

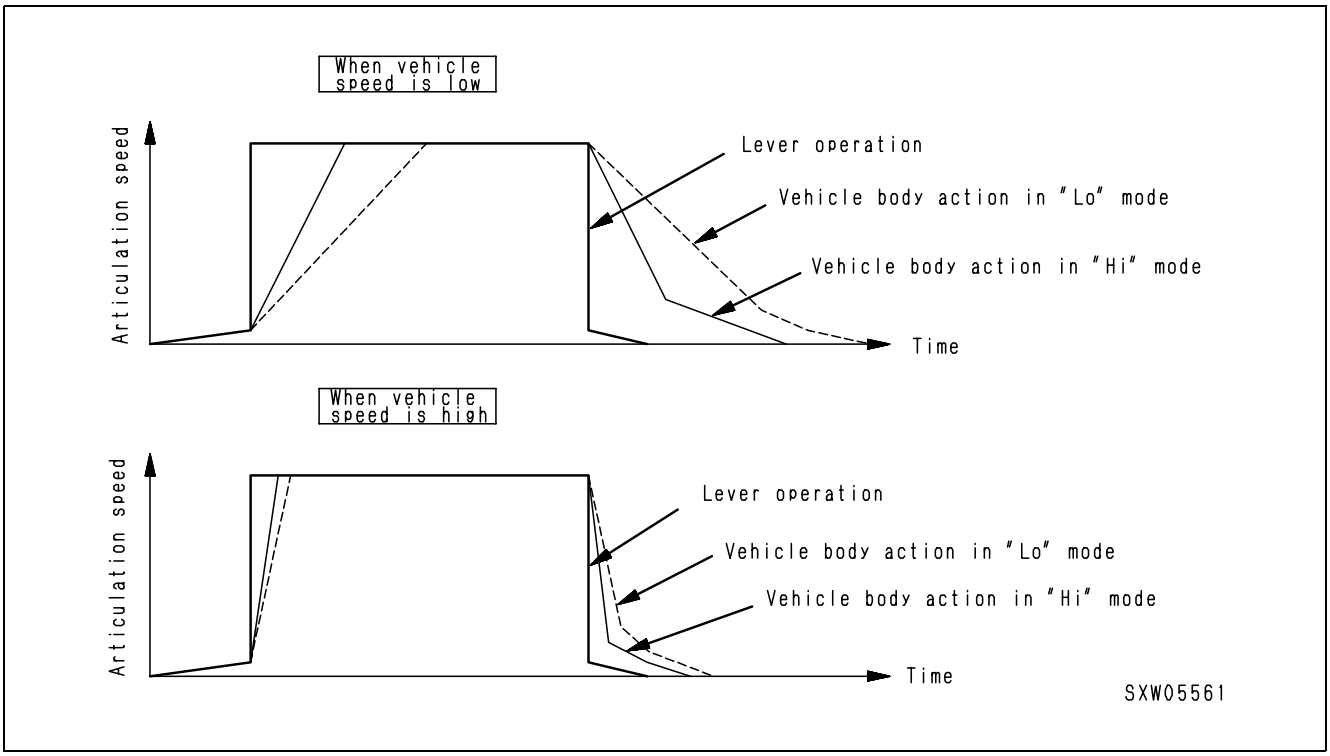


A more fine steering range is provided for the "Lo" mode then the "Hi" mode for the joystick.

2) Modulation control
Steering with the joystick applies modulation control in order to reduce impact that may be experienced when operation is started or finished.

A greater degree of modulation control is provided for the "Lo" for more impact reduction.

This modulation control enables steering of the machine even during traveling at a high speed, as it improves response of the machine toward lever operation according to the machine speed.



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5. Calibration function

   1) EPC calibration
      This is an adjusting function to reduce variances of the starting points of the lift arm, bucket and joystick due to cumulative errors with the electric lever, EPC valve and main valve.

   2) Sensor adjustment
      This function provides offset adjustment for errors due to installation of the lift arm angle potentiometer to enable the position data of the work equipment to be correctly detected.

   3) Calibrating method
      Calibration is performed in the service mode on the monitor panel. See the "Equipment Monitoring" section for details.

6. Troubleshooting
   The work equipment controller constantly monitors the I/O signal status and provides a self-diagnosis function for the system. If any abnormalities are detected through self-diagnosis, it outputs fault information via the equipment-monitoring network.

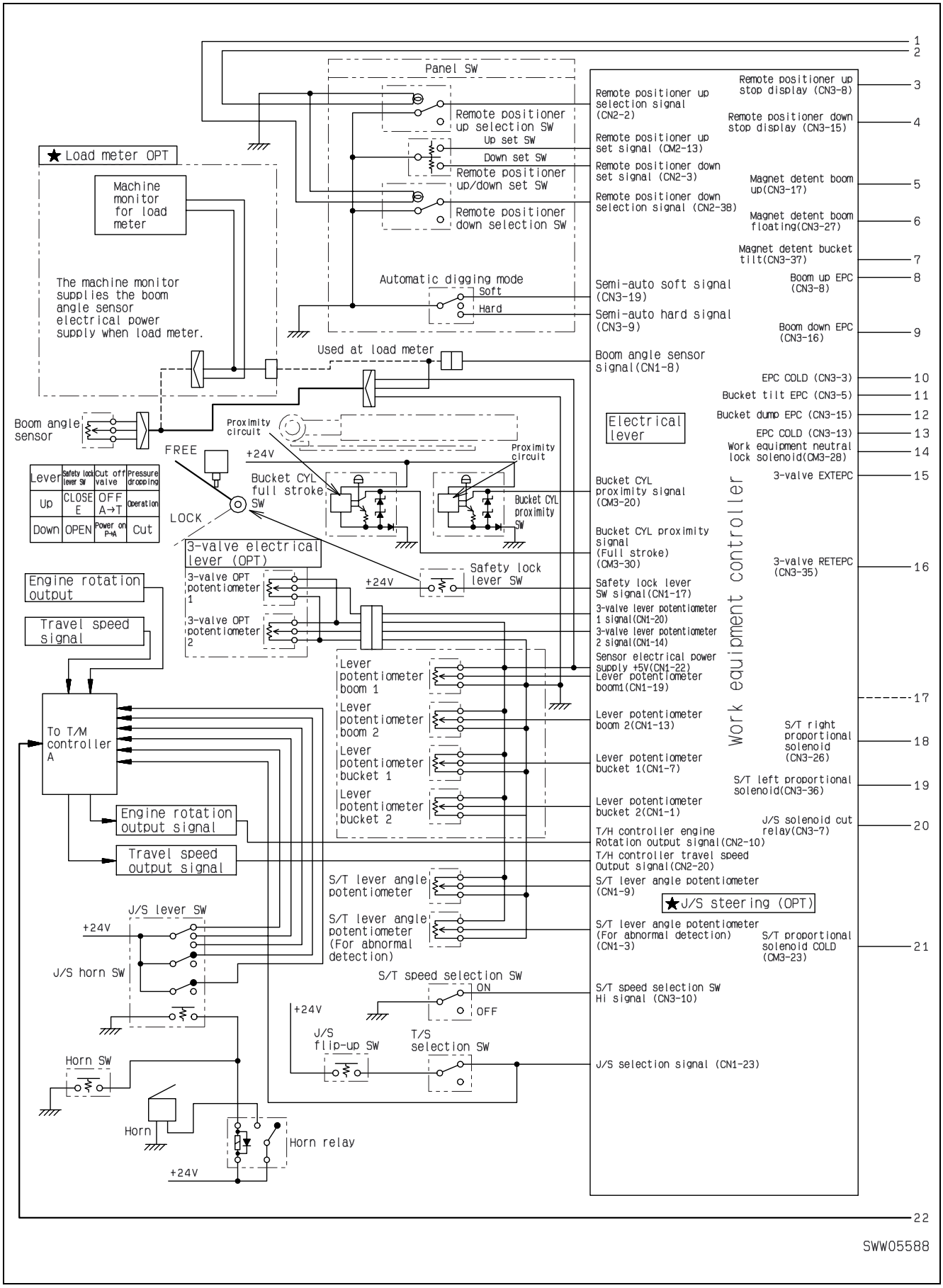
   In case of faulty occurrences, you can check the status with the equipment-monitoring function.

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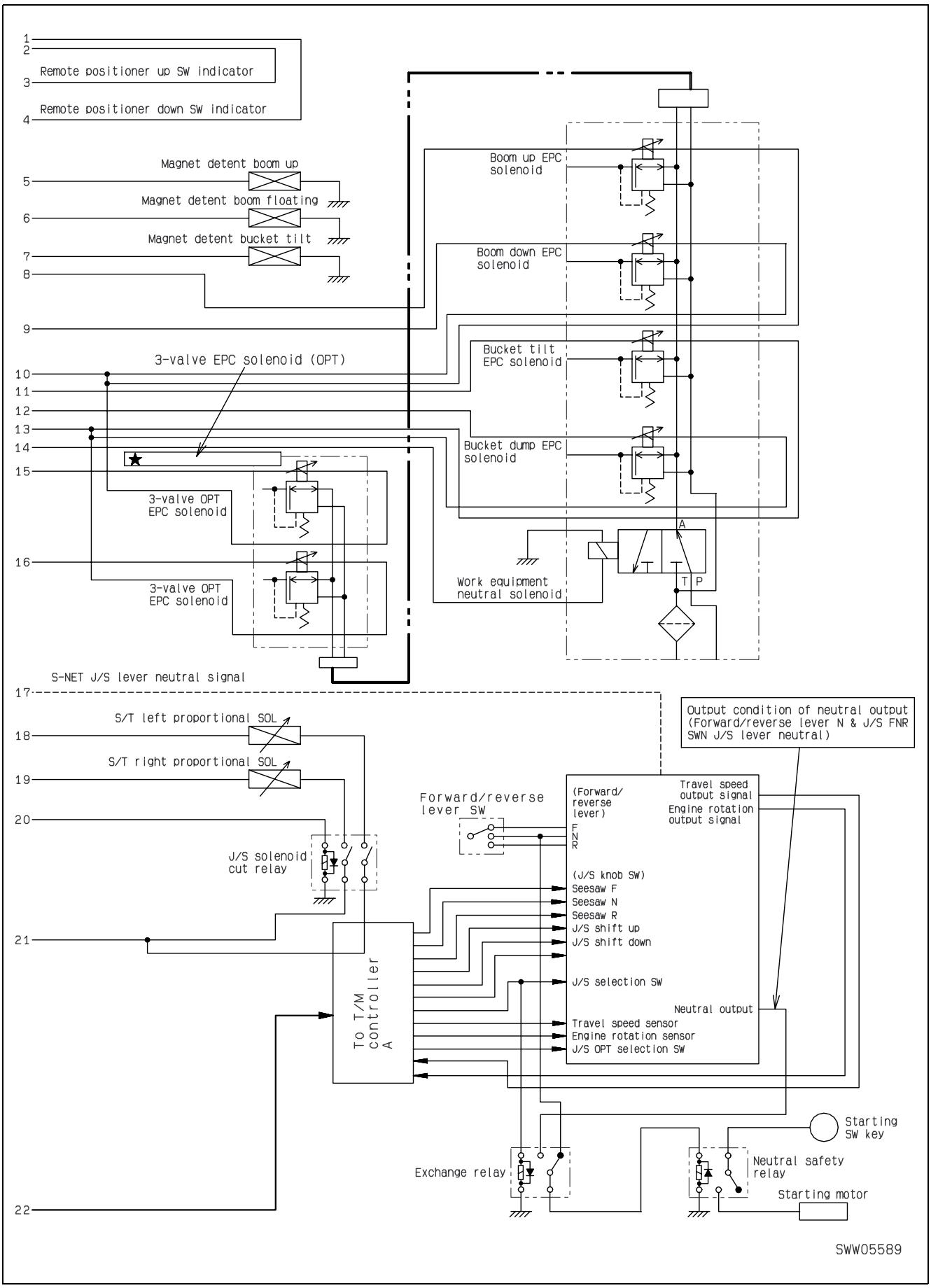
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Electric circuit diagram (op)

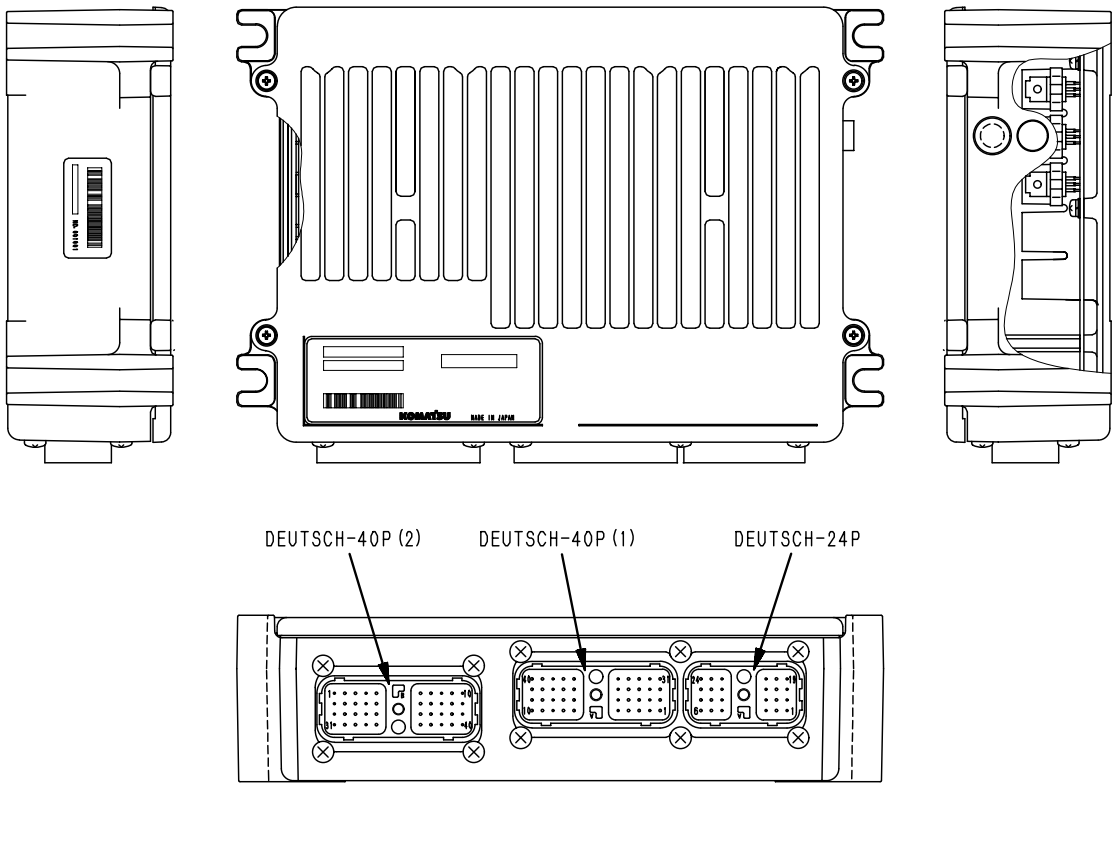


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Work equipment controller



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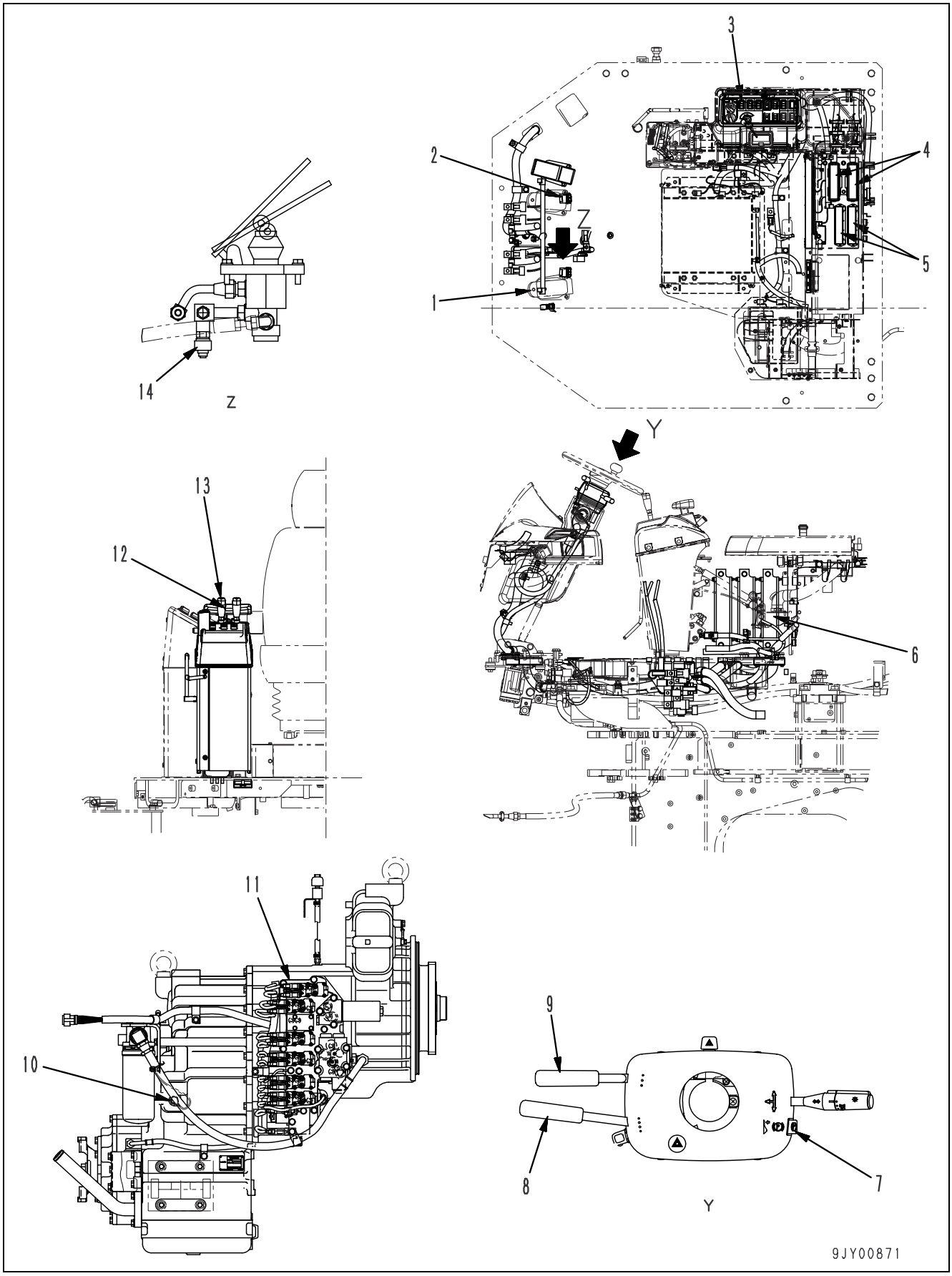
DEUTSCH-24P [CN-L71]	
1	Bucket lever potentiometer B
2	NC
3	J/S lever potentiometer B
4	Signal GND
5	NC
6	NC
7	Bucket lever potentiometer A
8	Boom angle sensor
9	J/S lever potentiometer A
10	Signal GND
11	NC
12	NC
13	Boom lever potentiometer B
14	Third EPC lever B
15	NC
16	Sensor power
17	
18	NC
19	Boom lever potentiometer A
20	Third EPC lever A
21	Analog GND
22	Potentiometer power
23	J/S ON/OFF SW
24	NC

DEUTSCH-40P(1) [CN-L72]	
1	NC
2	Remote posistioner lifting select SW
3	Remote positioner lowering select SW
4	232C_RxD
5	NC
6	NC
7	NC
8	NC
9	NC
10	Engine rev. signal
11	NC
12	CAN shield
13	Remote positioner lifting select SW
14	232_TxD
15	NC
16	NC
17	NC
18	NC
19	NC
20	Vehicle speed signal
21	S_NET
22	CAN0_L
23	CAN1_L
24	Flash memory write enabel signal
25	NC
26	NC
27	NC
28	NC
29	Pulse GND
30	NC
31	S_NET GND
32	CAN0_H
33	CAN1_H
34	232C GND
35	NC
36	NC
37	NC
38	Remote positioner lowering select SW
39	Pulse GND
40	NC

DEUTSCH-40P(2) [CN-L73]	
1	Controller power
2	Solenoid power
3	SOL_COM (common solenoid ground)
4	NC
5	Bucket tilting EPC
6	Boom lifting EPC
7	J/S EPC cut-off relay
8	Remote positioner tilting indicator
9	Semiautomatic loading mode SW
10	J/S speed select SW
11	Controller power
12	Solenoid power
13	SOL_COM (common solenoid ground)
14	KEY_SIG
15	Bucket dumping EPC
16	Boom lowering EPC
17	Boom lever automatic detection of lifting
18	Remote positioner lowering indicator
19	Semiautomatic loading_mode SW
20	Bucket cylinder_SW
21	GND (controller ground)
22	Solenoid power
23	SOL_COM (common solenoid ground)
24	KEY_SIG
25	Third EXT EPC
26	J/S right EPC
27	Boom lever manual detection of float
28	Bucket and boom neutral lock solenoid
29	NC
30	Bucket cylinder tilt_SW
31	GND (controller ground)
32	GND (controller ground)
33	GND (controller ground)
34	Reserve
35	Third RET EPC
36	J/S left EPC
37	
38	NC
39	NC
40	NC

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Electric transmission control



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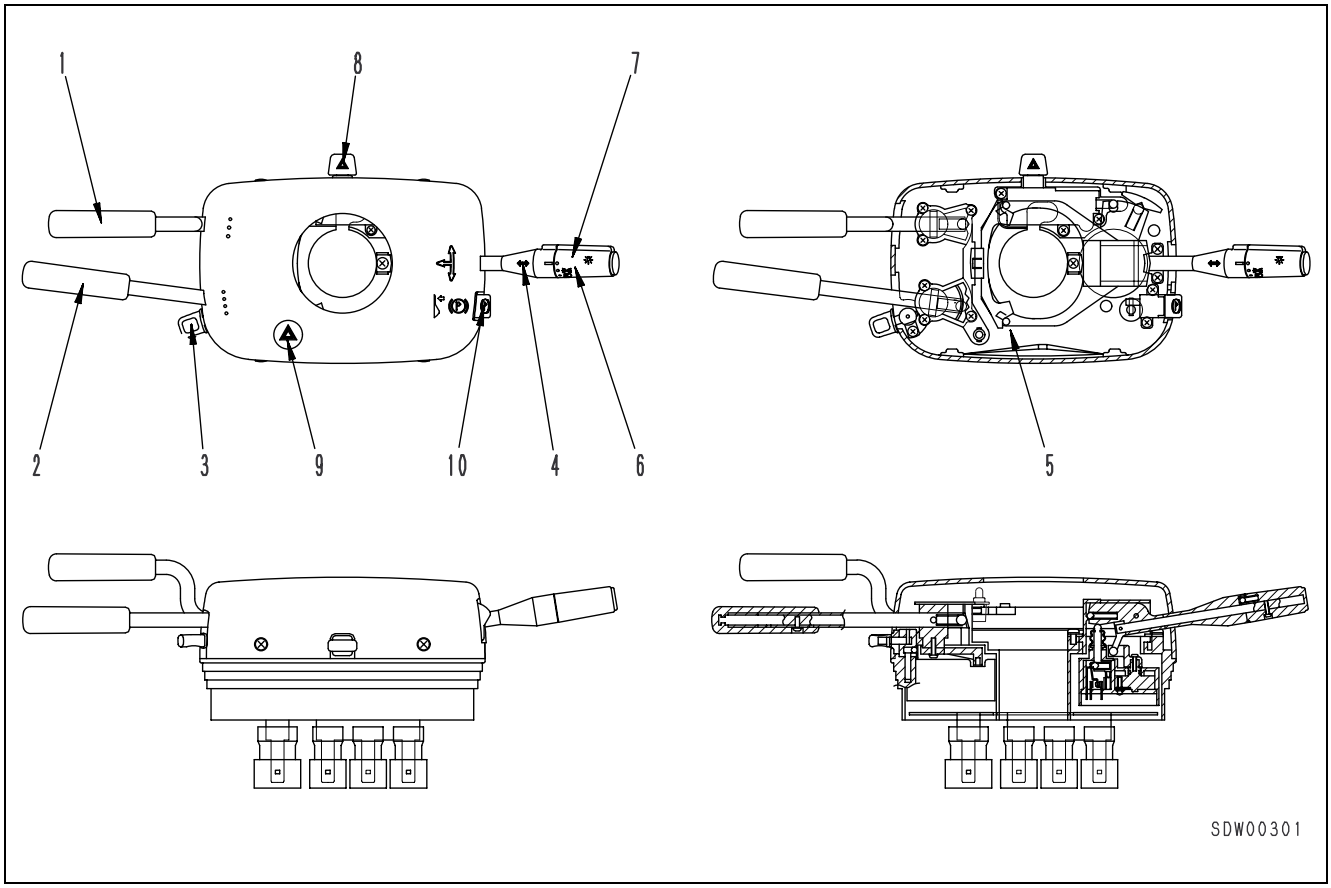
1. Brake valve (left)
2. Transmission cutoff switch
3. Transmission cutoff set switch
4. Relay box
5. Fuse box
6. Transmission controller
7. Parking brake switch
8. Gearshift lever
9. Forward-reverse lever
10. Speed sensor
11. Transmission control valve
12. Kick down switch
13. Hold switch
14. Left brake pressure sensor

Functions

1	Selection of forward, reverse or N (neutral)	It is performed from the forward-reverse lever
2	Selection of gear speed	It is done from the gearshift lever
3	Kick down switch	Shift down is available from this switch, too, without resorting to the gearshift lever. In the manual shift mode, forward move at the 2nd speed alone can be shifted down to the 1st speed. When the auto-shift mode is selected, shift down is carried out according to the gear speed and travel speed being selected prior to operation of this is operated.
4	Hold switch	When the auto-shift is selected, this switch maintains the gear speed of the time when the switch is depressed without allowing shift up accompanying increased travel speed.
5	Transmission cutoff function	You can cause the transmission to neutral by turning on the transmission cutoff switch and depressing the left brake pedal.
6	Transmission cutoff position adjusting function	You can specify any pedal depression depth for turning on the transmission cutoff function.
7	Transmission cutoff switching function	It allows you to enable or disable the transmission cutoff function. When the function is disabled, the left brake pedal offers the same braking function as that of the right brake pedal.
8	Neutralizer	It shifts the transmission to neutral as long as the parking brake is in operation. It prevents seizure of the parking brake that can result from travelling while the parking brake is in operation.
9	Neutral safety function	This function disables startup of the engine from the starter switch when the forward-reverse lever is not at N (neutral). This function is provided to prevent accidents due to unexpected starting of the machine.
10	Alarm function	As the reverse travel is started, this function turns on the back lamp and back horn buzzer to alert nearby people.

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Combination switch



Overview

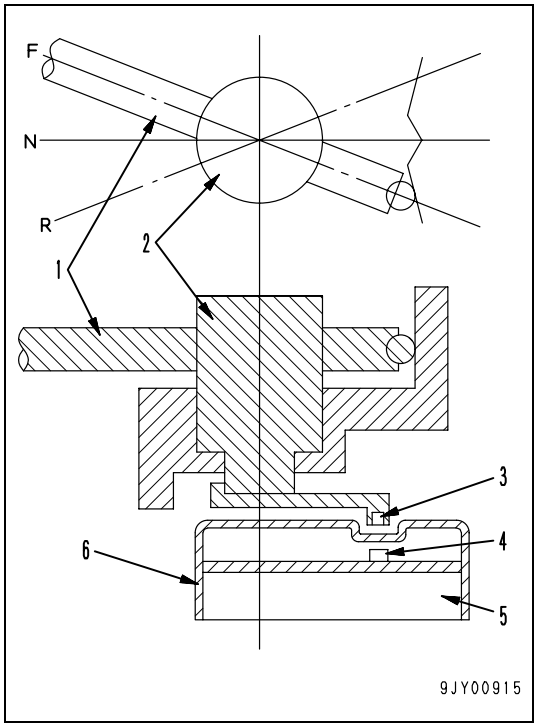
- The forward-reverse lever and the gearshift lever switch have 3 positions and 4 positions, respectively. Independent switches do not have the detent mechanism. This mechanism is provided on the combination switch body. Each switch is positioned with two pins and then fixed to the combination switch with three screws. Moving a lever to a desired position turns on the corresponding switch connected via the shaft to conduct current to the designated circuit.

Functions

1	Forward-reverse lever switch	Used for switching between for forward, reverse and neutral.
2	Gearshift lever switch	Used for switching gear speed.
3	Gearshift lever stopper	Used for preventing the gearshift lever get into the 3rd or 4th speed.
4	Turn signal	It is a signal to be turned ON at right or left turn.
5	Self-cancel	This function returns the turn signal lever to neutral position after right or left turn is complete.
6	Lamp switch	Used to turn ON the tail lamp, front lamp or parking lamp.
7	Dimmer switch	Used to turn ON the travel or low beam.
8	Hazard switch	Used to turn ON blinking of the right and left turn signals at the same time.
9	Hazard lamp pilot lamp	It start blinking accompanying blinking of the hazard lamp.
10	Parking brake switch	Used to turn ON (activation) or OFF (deactivation) the parking brake.

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Operation



- The forward-reverse lever (1) and the gearshift lever shaft (2) on the combination switch are united with the magnet (3).

  Thus, as the lever (1) is moved, the magnet (3) is moved, too.The control switch (5) with the built-in hall IC (4) is attached under the magnet (3).

  A hall IC (4) is provided on the board for respective positions.

- If you set the forward-reverse lever (1) at “F” position, the magnet comes right above the hall IC (4) of the control switch at “F” position.

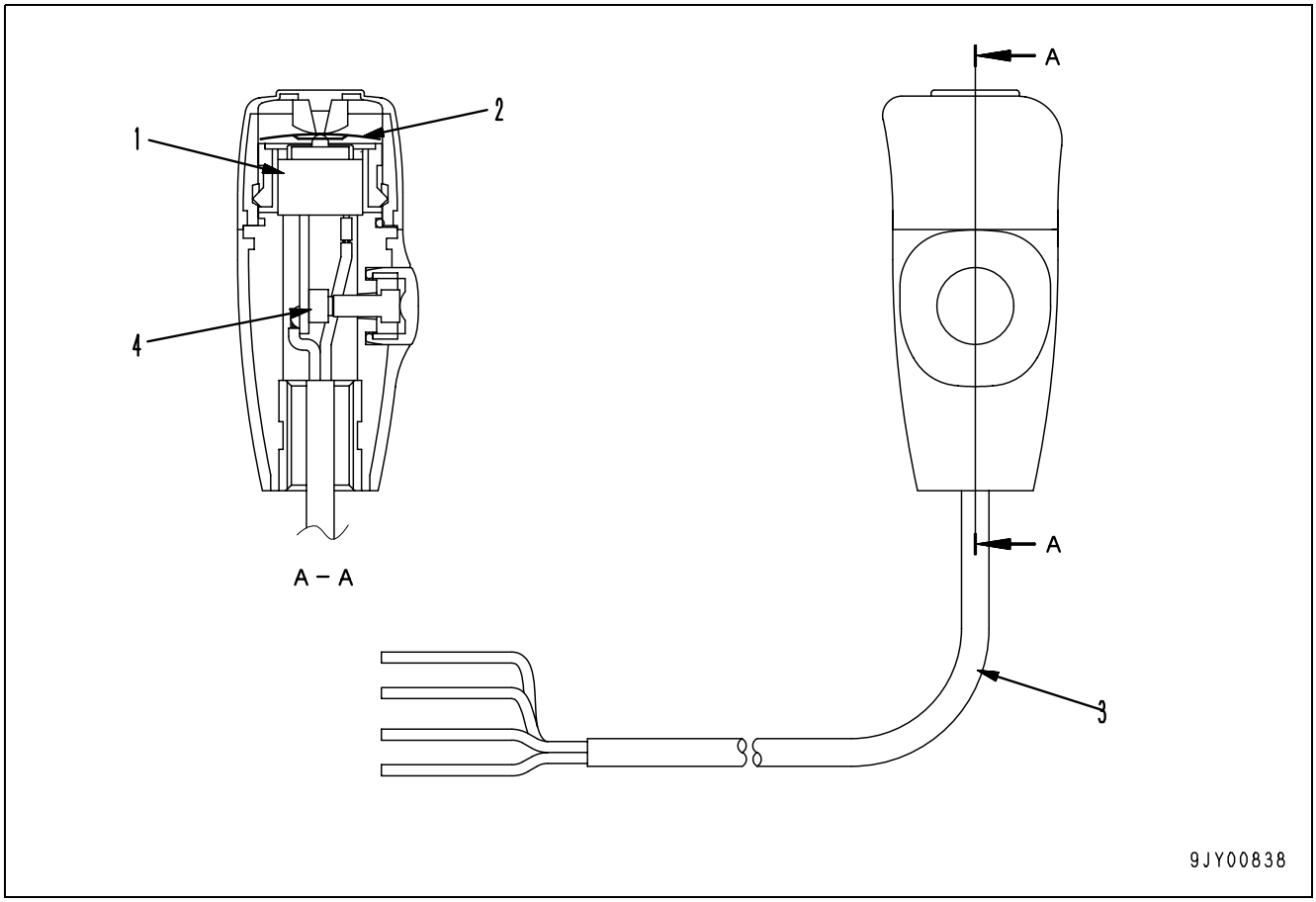
  Thus, magnetism of the magnet (3) is irradiated to the hall IC (4) through the clearance and case (6).

- Since the hall IC (4) is inside the magnetism detection circuit, the circuit detects magnetism from the magnet (3) and then sends the “F” position signal to the current amplifier circuit.

  Receiving this signal, the current amplifier circuit outputs the signal to operate the transmission.

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Kick down, hold switch



1. Switch A (white harness)
2. Spring
3. Harness
4. Switch B (yellow harness)

Functions

- Being installed on the boom-operating lever, switch **A** (1) and switch **B** (4) function as the kick down switch and hold switch, respectively.
- When the load meter (optional) is provided, switch **A** and switch **B** are installed on the bucket-operating lever.

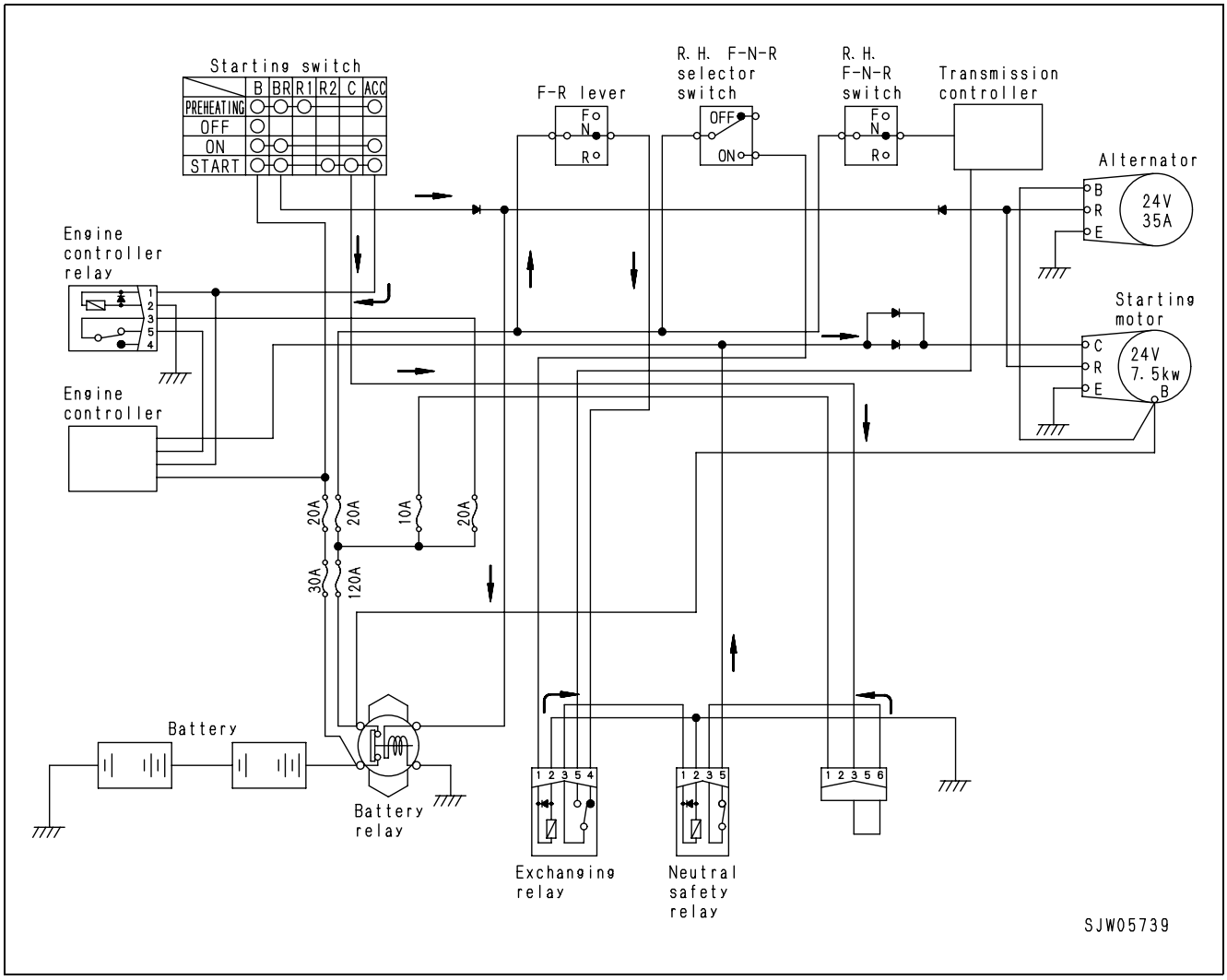
  In this case, switch **A** and **B** function as the cancel switch and sub-total switch, respectively.
- Contact of both switches **A** and **B** resets automatically, namely it is closed only when the switches are depressed.

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Engine starting circuit



Function

Adoption of the neutral safety circuit assured safety when starting the engine.

- The engine cannot start except when the forward-reverse lever is in the N (neutral) position.
- When the right FNR selector switch (op) is in the ON position, the engine cannot start except when the right FNR switch (op) is in the N (neutral) position.
- When the J/S (joystick steering) (op) is in the ON position, the engine cannot start except when the FNR switch of J/S lever is in the N (neutral) position and also the J/S lever is in the N (neutral) position.

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Operation

1. When the starting switch is in the [ON] position

   - If you place the starting switch in the [ON] position, the terminals **B** and **BR** of starting switch close. Current flows from the battery, and goes through the starting switch and battery relay coil to grounding, closing the battery relay contacts. By this operation, every circuit of the machine is powered.

     In addition, a current flows from the **ACC** terminal of the starting switch to the engine controller power relay, operating the relay to power the engine controller for operation. By this, the engine is completely ready for start.

2. Neutral safety circuit

   - If you place the forward-reverse lever at the N (neutral) position, and then, current flows from the **N** contact of forward-reverse lever and goes through the exchange relay to the neutral safety relay coil. As a result, the current is carried between the terminals 3 and 5 of neutral safety relay.

   - When the right FNR switch (OPT) is used (when the right FNR selector switch is in the ON position), current flows from the right FNR selector switch to the exchange relay coil to operate the relay.

     If the right FNR switch is in the N (neutral) position at that time, the T/M controller outputs current to the exchange relay. It flows from the T/M controller to the exchange relay and finally it reaches the neutral safety relay coil. As a result, the current is carried between the terminals 3 and 5 of neutral safety relay.

   - When the J/S steering (OPT) is used, lower the J/S arm rest and place the J/S selector switch in the ON position. Then, current flows from the J/S selector switch to the exchange relay coil to operate the relay.

     If the FNR switch of the J/S lever is in the N (neutral) position and the J/S lever is in the N (neutral) position, the T/M controller outputs current to the exchange relay.

     It goes through the exchanger relay to the neutral safety relay coil, consequently making the current flow between the terminals 3 and 5 of the neutral safety relay.

     (When the J/S steering is mounted, the J/S flip switch and J/S selector switch are mounted instead of the right FNR selector switch in the figure above, and the J/S lever FNR switch is mounted instead of right FNR switch.)

3. When the starting switch is in the [Start] position

   - If you place the starting switch in the [Start] position, and then, current goes from the terminal **B** of starting switch, terminal **C**, terminal **3** of neutral safety relay, and terminal **5** to the starter, starting the engine.

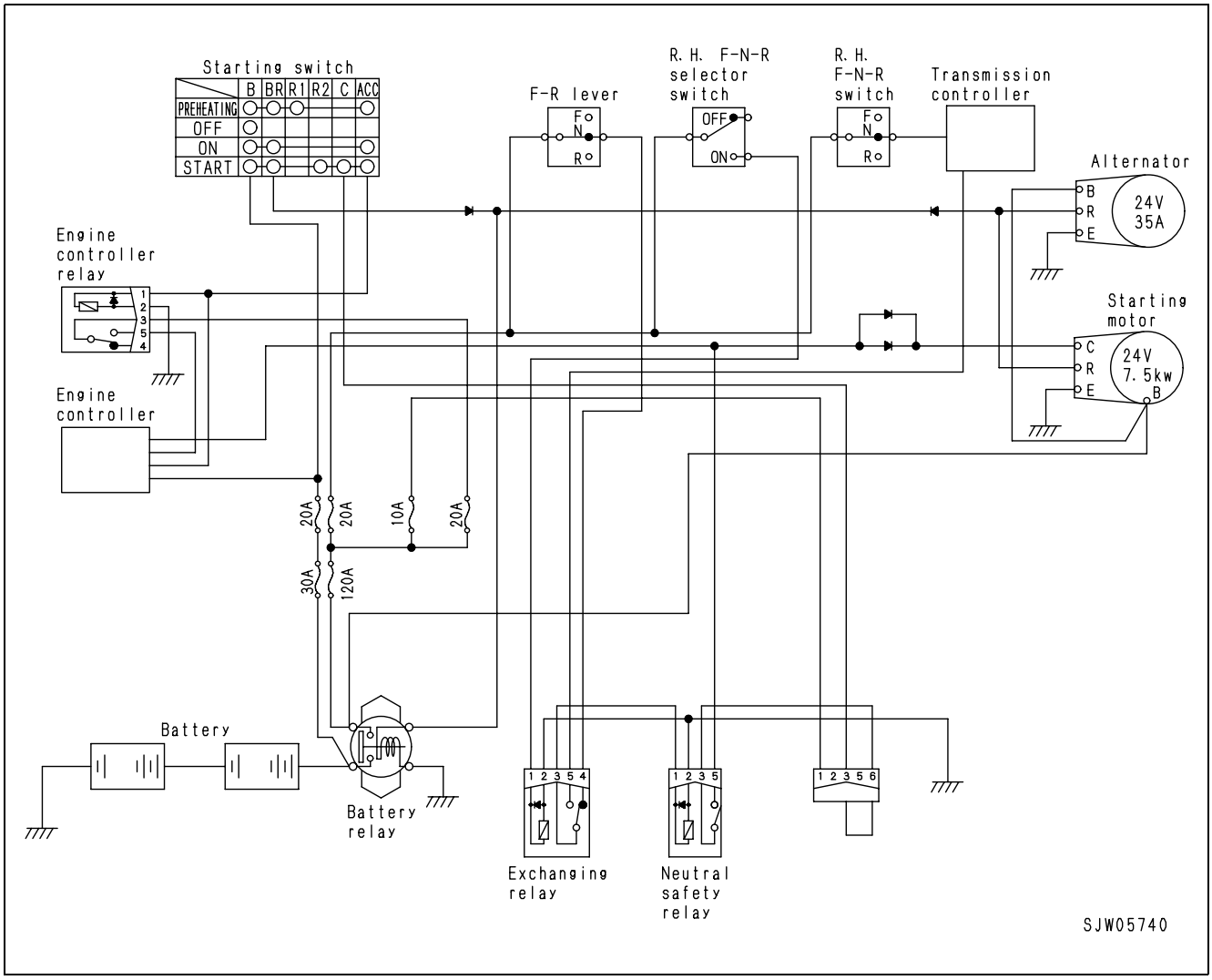
   - At the same time, the current from the terminal **C** of starting switch flows to the engine controller.

     Then, the engine controller calculates signals of the engine speed, water temperature, etc. to control injection volume optimally.

   - Except when the forward-reverse lever is in the N (neutral) position, the right FNR switch is the N (neutral) position (when the right FNR switch is used), or the J/S lever FNR switch is in the N (neutral) position and also the J/S lever is in the N (neutral) position, the neutral safety relay, not allowing the engine to start.

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Engine stop circuit



Operation

If you place the starting switch in the [OFF] position, and then, current at the **ACC** terminal of starting switch is shut off, cutting off the **ACC** signal to the engine controller. Then, the engine controller stops supplying fuel to the engine. At the same time, current to the engine controller power relay coil is shut off and the relay is turned off. As a result, the operating power of the engine controller is shut down, preventing malfunctions.

When the fuel supply is stopped, the engine reduces its speed and stops. Then, the power generation of the alternator stops to shut off voltage supply from the terminal **R** of the alternator. In addition, the current from the terminal **BR** of starting switch is shut off. Consequently, the battery relay contact opens to shut down the power supplied to every circuit of the machine.

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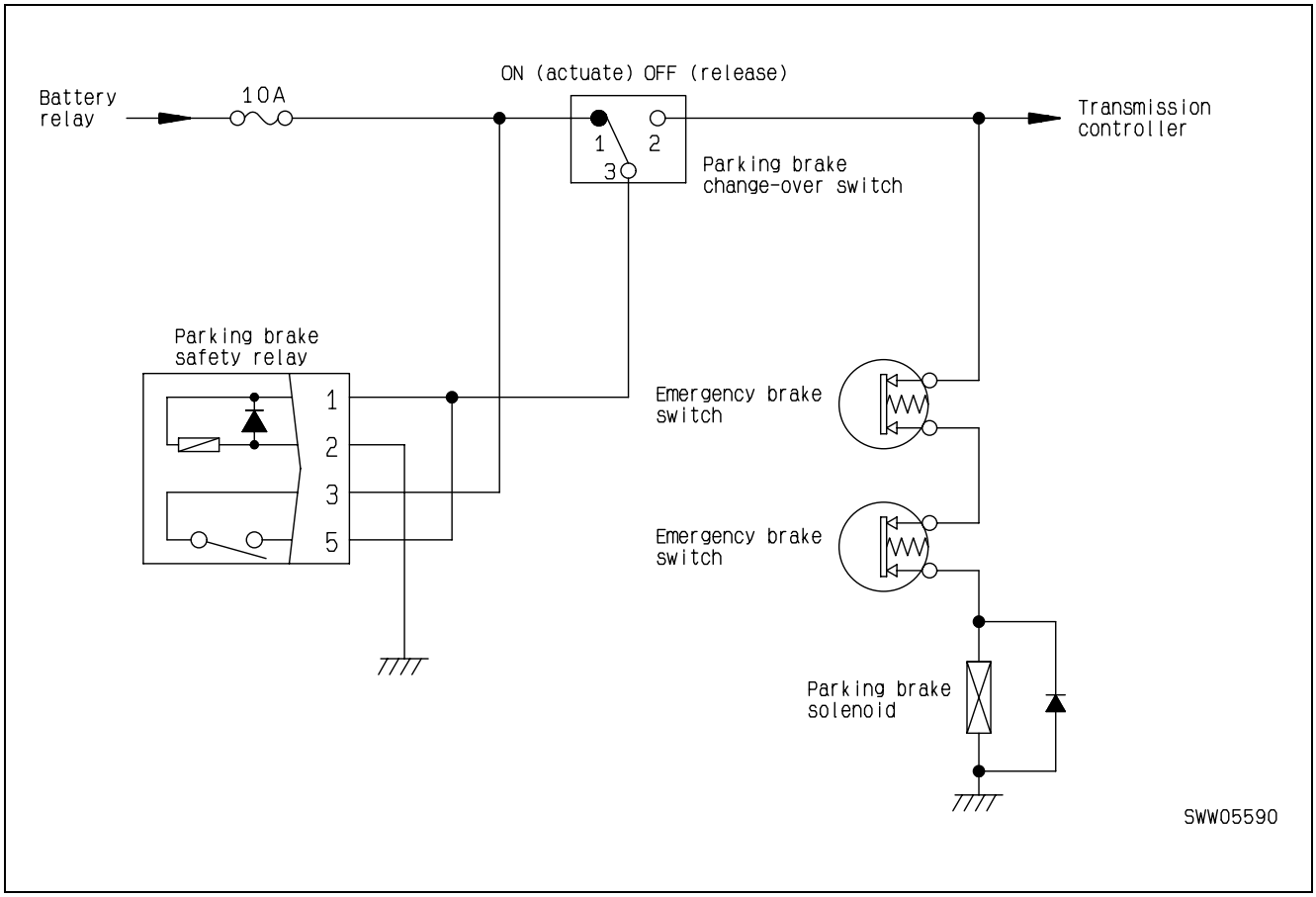
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Parking brake circuit

Operation

1. When the starting switch is in the OFF position.

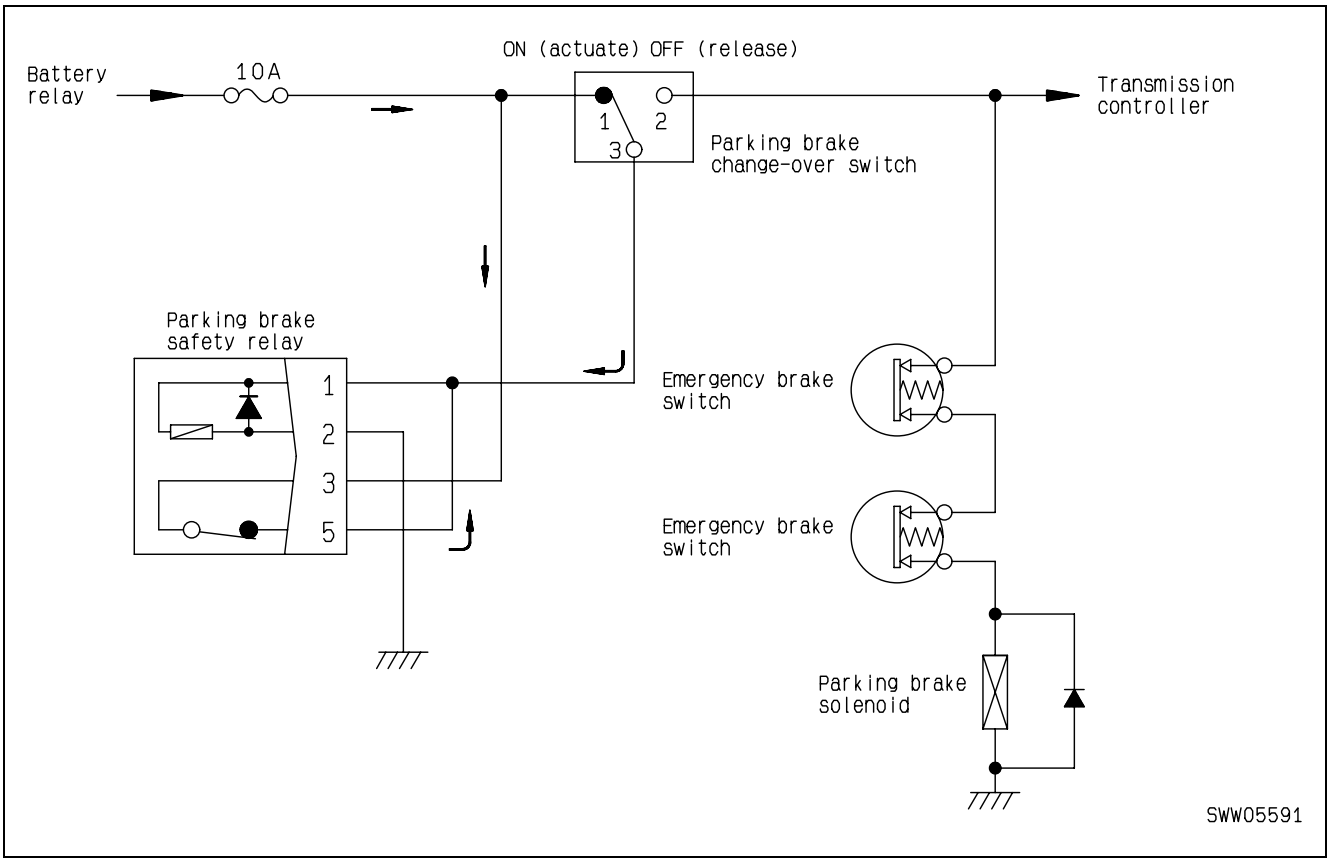


If you place the starting switch in the OFF position, and then, the battery relay contact opens, not allowing current to flow to the parking brake circuit. For this reason, if the starting switch is in the OFF position, the current does not flow to the parking brake solenoid regardless of whether the parking brake switch is in the ON or OFF position, operating the parking brake.

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2. When the starting switch is in the ON position

2-1. When the parking brake switch is in the ON (operation) position before placing the starting switch in the ON position



- Since the parking brake selector switch is in the ON (operate) position, current goes through the battery relay, contact 1 of parking brake selector switch, contact 3, and parking brake safety relay coil to the grounding.

  Consequently, the terminals 3 and 5 of the parking brake safety relay close. The current from the battery relay continues to flow to the parking brake safety relay coil and opens the battery relay contact which is held open until the current stops flowing to the parking brake circuit.

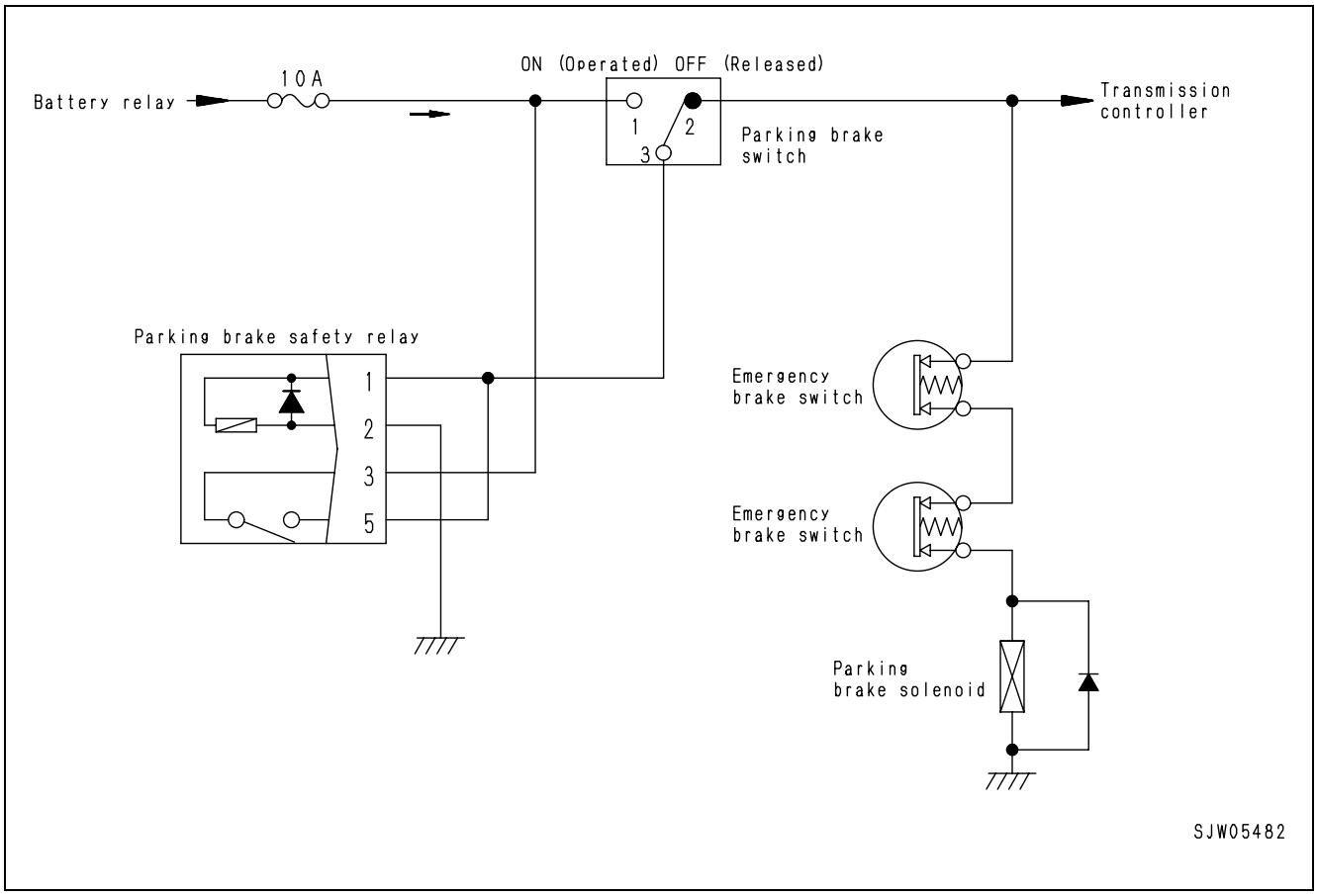
- At that time, the current does not flow to the parking brake solenoid and the parking brake remains in operation.

- In addition, this signal is input to the T/M controller to prevent dragging of the parking brake by placing the transmission in the neutral position during the operation of the parking brake.

- If you place the parking brake selector switch in the OFF (open) position after that, current goes through the battery relay, parking brake safety relay, contact 3 of parking brake selector switch, contact 2, emergency brake switch, and parking brake solenoid to the grounding, consequently releasing the parking brake.

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2-2. When the parking brake is in the OFF (release) position before placing the starting switch in the ON position

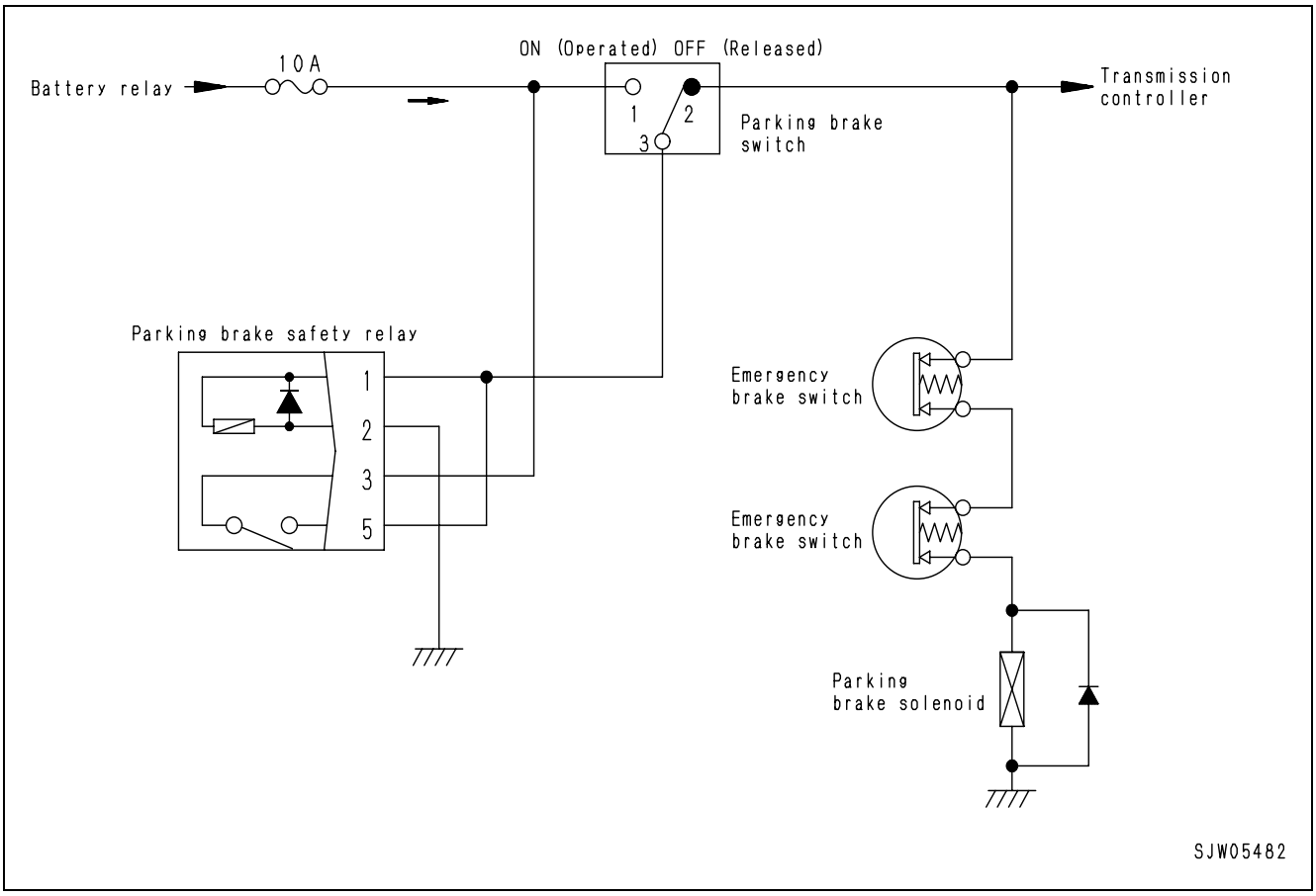


- Since current does not flow to the parking brake safety relay when the starting switch is in the OFF position, the relay contact is open.

  Even if you place the starting switch in the ON position, the current does not flow to the parking brake solenoid. Therefore, the parking brake will not be released automatically.

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3. When the main brake oil pressure lowers (emergency brake operates)



- When the main brake oil pressure lowers, the contact of the emergency brake switch mounted to the accumulator opens. This shuts off current to the parking brake solenoid, consequently draining the oil pressure out of the parking brake cylinder to operate the parking brake.

  In this case, however, the parking brake release signal is being issued to the T/M controller unlike when you place the parking brake switch in the ON position. Therefore, the transmission is not switched to the N position.

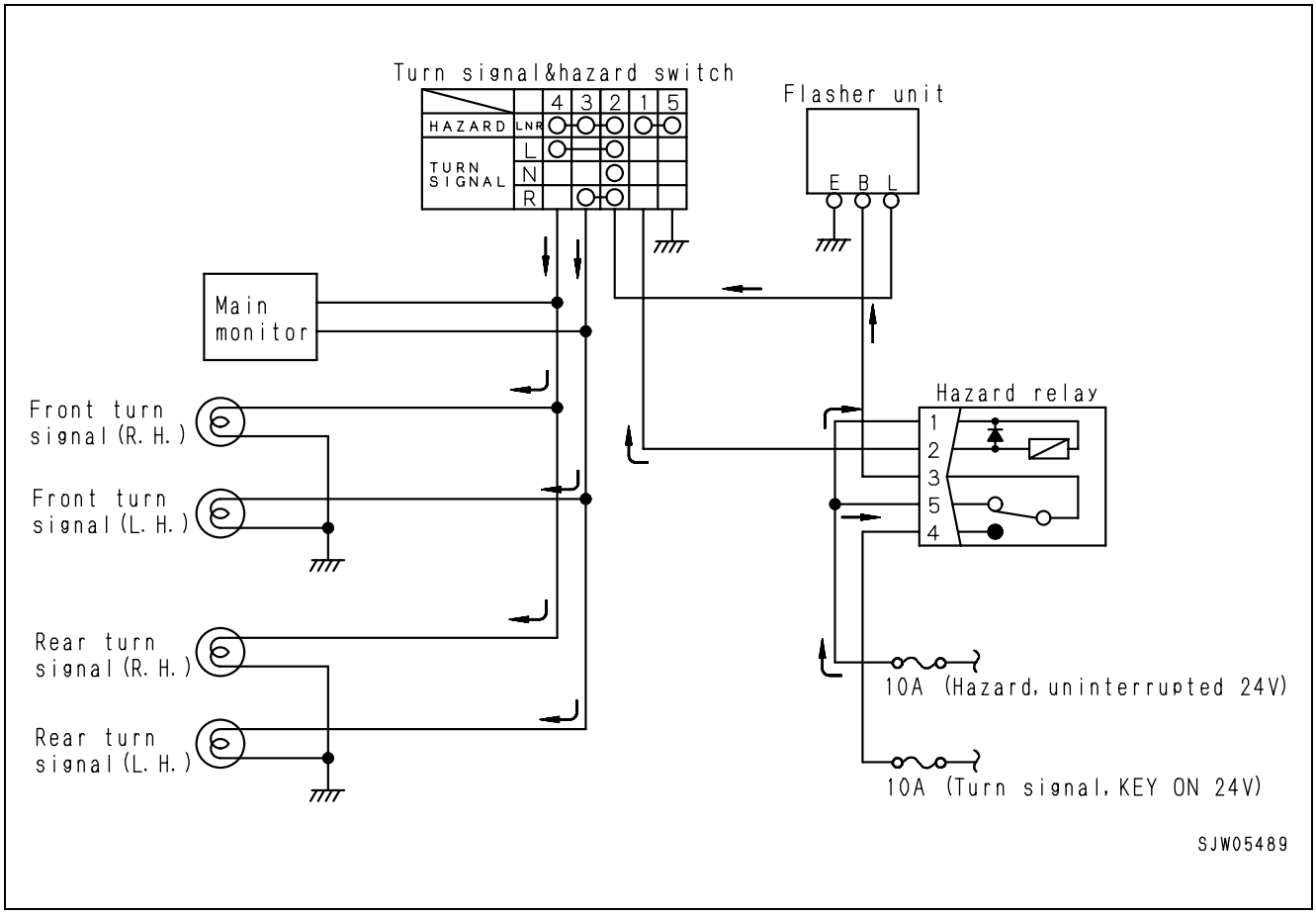
  By using this design and the engine brake when the emergency brake functions, you can shorten a braking distance. Even if the emergency brake should function, it is possible to move the machine.

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Turn signal, hazard lamp circuit

Operation

1. When the starting switch is in the OFF position



- If you place the hazard switch in the ON position when the starting switch is in the OFF position, current flows between the terminals 1 and 5 of the switch, creating a circuit through the fuse, hazard relay coil and hazard switch to the grounding. Then, the hazard relay operates to carry current to the terminal B of the flasher unit.

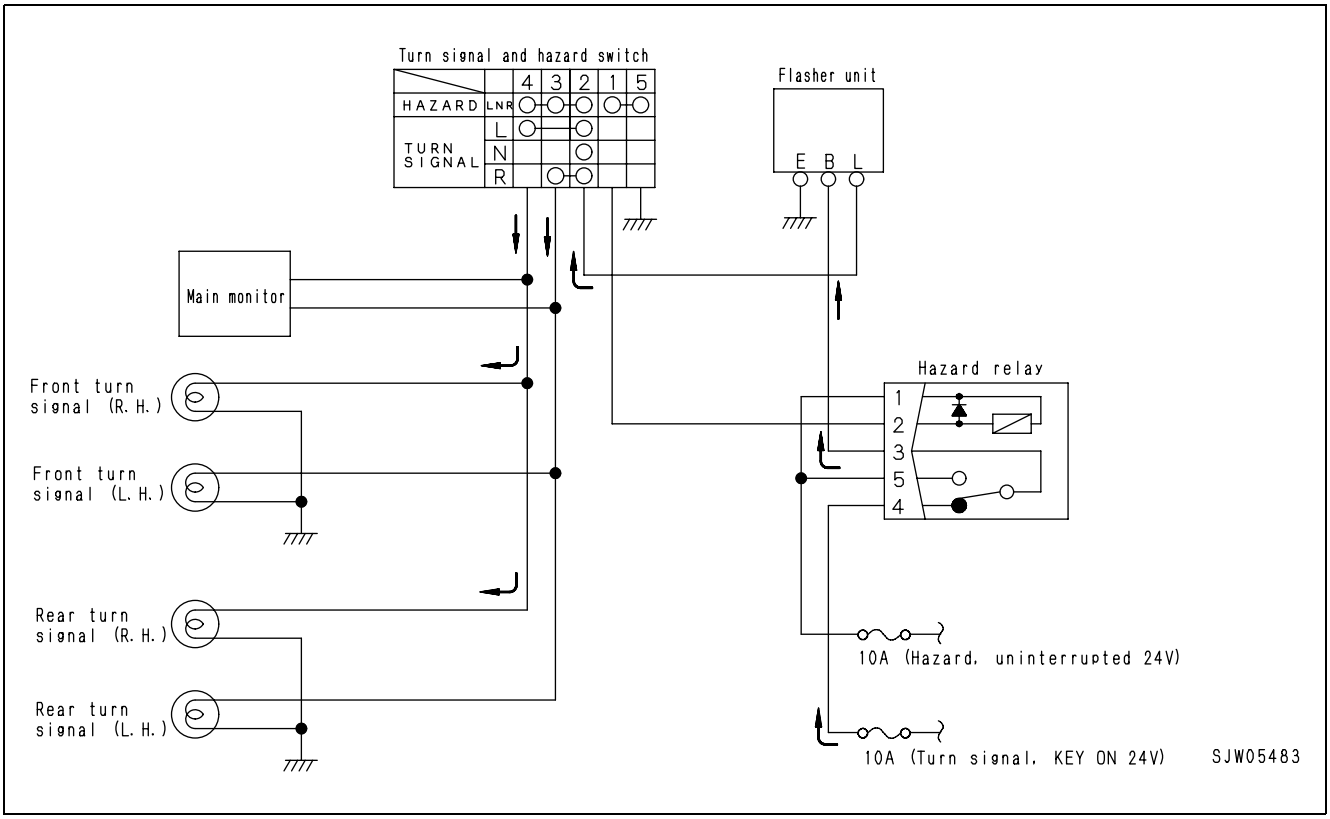
  The current which was changed to an intermittent signal by the flasher unit flows through the terminal L of flasher unit and terminal 2 of turn signal & hazard switch to the terminals 3 and 4, causing the front, rear, right, and left turn signals to flash.

  Even if you place the turn signal switch to L or R at that time, the front, rear, right and left turn signals flash since the circuits from the turn signal & hazard switch to the right and left turn signals are created.

  In addition, the flash signal is issued to the main monitor as well, making the right and left turn signal pilots flash.

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2. When the starting switch is in the ON position



- When the starting switch is in the ON position, the battery relay operates to power the machine. Therefore, without turning ON the hazard switch, the circuit to supply power from the fuse for the turn signal circuit is created.

  1) When the turn signal switch is in the L position

     If you place the turn signal switch in the L position, the terminals 2 and 4 of the turn signal & hazard switch close.

     Then, current flows through the battery relay, fuse, terminal 4 of hazard relay, terminal 3, flasher unit, terminal 2 of turn signal & hazard switch, terminal 4, and right turn signal to the grounding, making the right turn signal flash. At the same time, the flash signal is issued to the main monitor to cause the right turn signal pilot to flash.

     (The above figure illustrates the circuit with the turn signal switch in the L position.)

  2) When the turn signal switch is in the R position

     If you place the turn signal switch in the R position, the terminals 2 and 4 of the turn signal & hazard switch close. Then, current flows through the battery relay, fuse, terminal 4 of hazard relay, terminal 3, flasher unit, terminal 2 of turn signal & hazard switch, terminal 3, and left turn signal to the grounding, making the left turn signal flash. At the same time, the flash signal is issued to the main monitor to make the right turn signal pilot flash.

  3) When the hazard switch is in the ON position

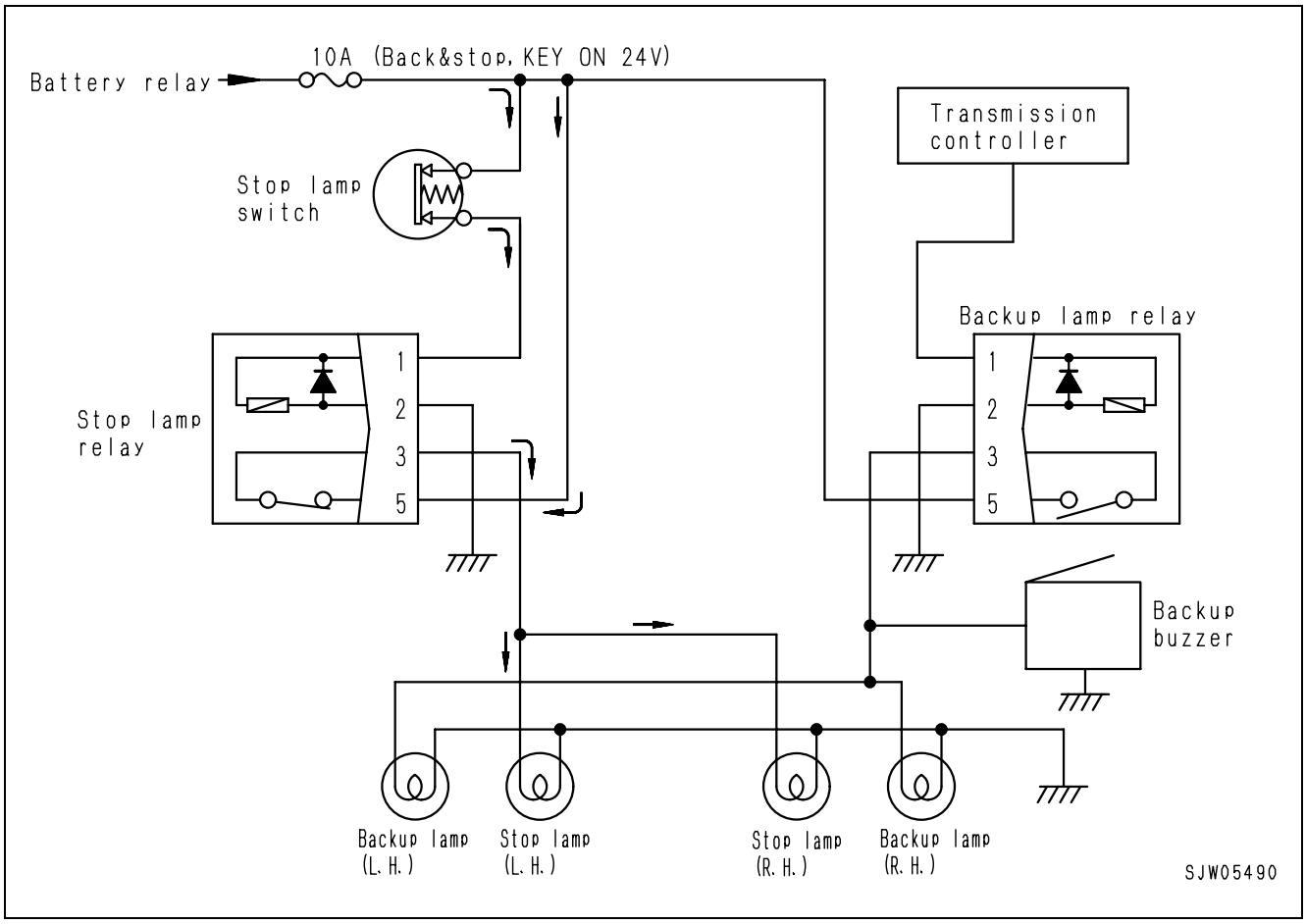
     If you place the hazard switch in the ON position, terminals 1 and 5 of the switch close to operate the hazard relay. Current flows through the fuse, hazard relay, flasher unit, the terminal 2 of turn signal & hazard switch, terminals 3 and 4, and right and left turn signals to the grounding, making the left turn signal flash. At the same time, the flash signal is issued to the main monitor to make the right turn signal pilot flash.

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Backup lamp, stop lamp circuit

Operation

Stop lamp circuit



- If you hold the brake pedal down, and then, the stop lamp switch contact closes to carry current through the stop lamp relay coil.

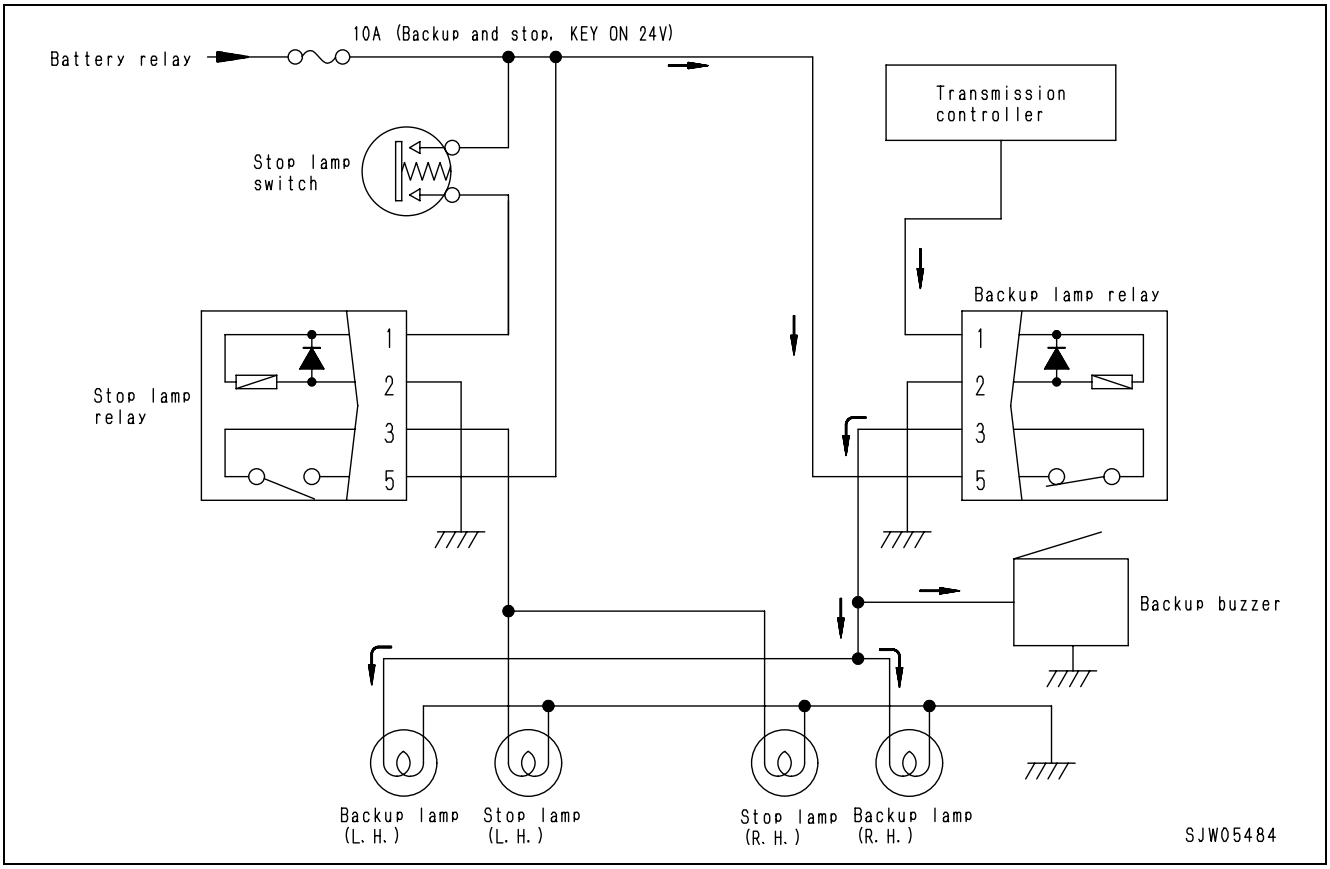
  Then, the relay contact closes and a circuit is created through the fuse, terminal 5 of stop lamp relay, terminal 3, and right and left stop lamps to the grounding. It causes the right and left stop lamps to flash.

- If you release the brake pedal, then, the stop lamp switch contact opens to open the stop lamp relay contact, making the stop lamp go off.

- The stop lamp circuit is designed so that current flows when the battery relay operates. Therefore, the stop lamp does not light when the starting switch is in the OFF position.

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Backup lamp circuit



The backup lamp circuit is designed so that current flows when the battery relay operates. Therefore, the backup lamp does not light and the backup buzzer does not sound either when the starting switch is in the OFF position.

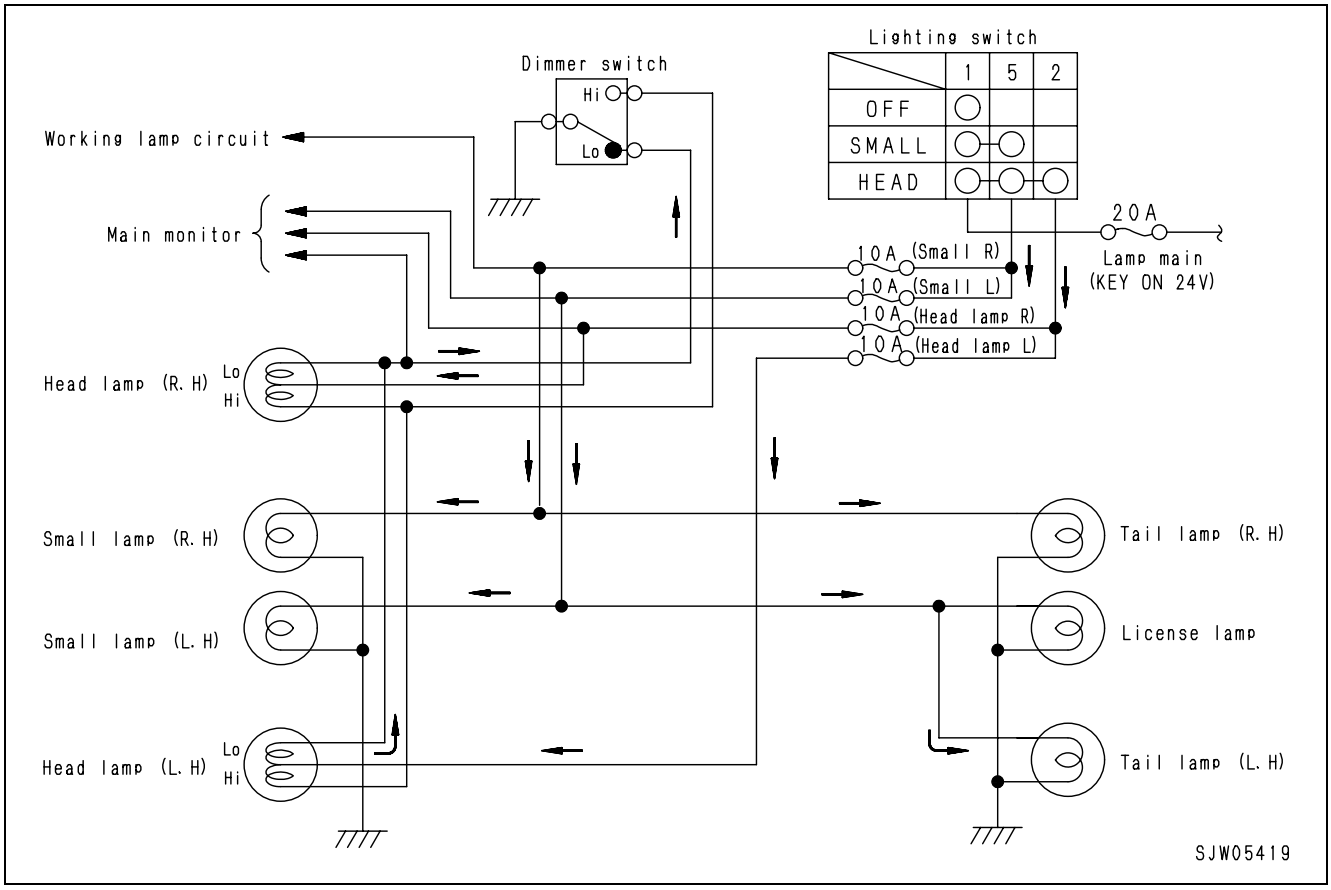
1. When the forward-reverse lever is in the R position
   If you place the forward-reverse lever in the R position, a output signal is output from the T/M controller to the backup lamp relay to close the backup lamp relay contact. Then, a circuit is created through the fuse, terminal 5 of backup lamp relay, terminal 3, and right and left backup lamps to the grounding to make the right and left backup lamp flash. At the same time, the backup buzzer sounds.

2. When the right FNR switch is used (op)
   Even if the forward-reverse lever is in the N (neutral) position, a signal is output from the T/M controller to operate the backup lamp relay by placing the switch in the R position when the right FNR switch is used, making the right and left backup lamps light. At the same time, the backup buzzer sounds.

3. When the J/S (joystick steering) is used (op)
   Even if the forward-reverse lever is in the N (neutral) position, a signal is output from the T/M controller to operate the backup lamp relay by placing the J/S lever FNR switch in the R position when the right FNR switch is used, making the right and left backup lamps light. At the same time, the backup buzzer sounds.

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Small lamp, head lamp circuit



Operation

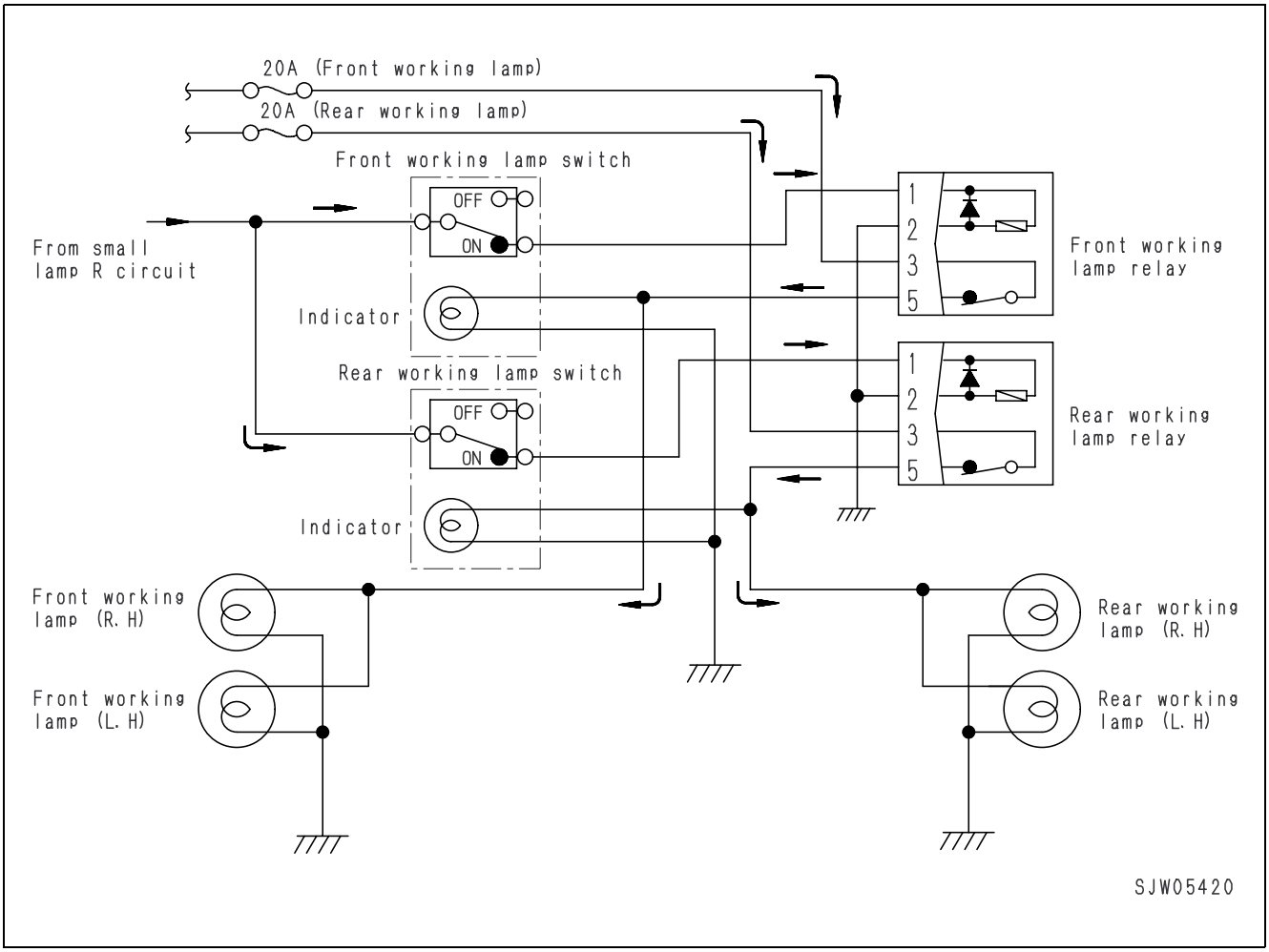
The small lamp and headlamp circuits are designed so that current flows when the battery relay operates. Therefore, the small lamps and headlamps do not light when the starting switch is in the OFF position.

1. When the lighting switch is in the small lamp position
   If you place the light switch in the small lamp position, then, current flows from the switch and goes through the fuse to the front, rear, right, and left small lamps to light them. The small lamp signal is input to the main monitor to light the night illumination. In addition, the current of the small lamp circuit is designed to also serve as a supply power circuit to the working lamp. Therefore, the working lamp does not light when the small lamps are off.

2. When the light switch is in the headlamp position
   If you place the lighting switch in the headlamp position, then, current flows from the switch and goes through the fuse to the headlamp circuit simultaneously with to the small lamp circuit. The current goes through the headlamp to the dimmer switch (Hi/Lo selector switch) to the grounding. Therefore, either the high beam or low beam you selected with the dimmer switch lights. The high beam lighting signal is input to the main monitor, lighting the high beam pilot of the main monitor.

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Working lamp circuit



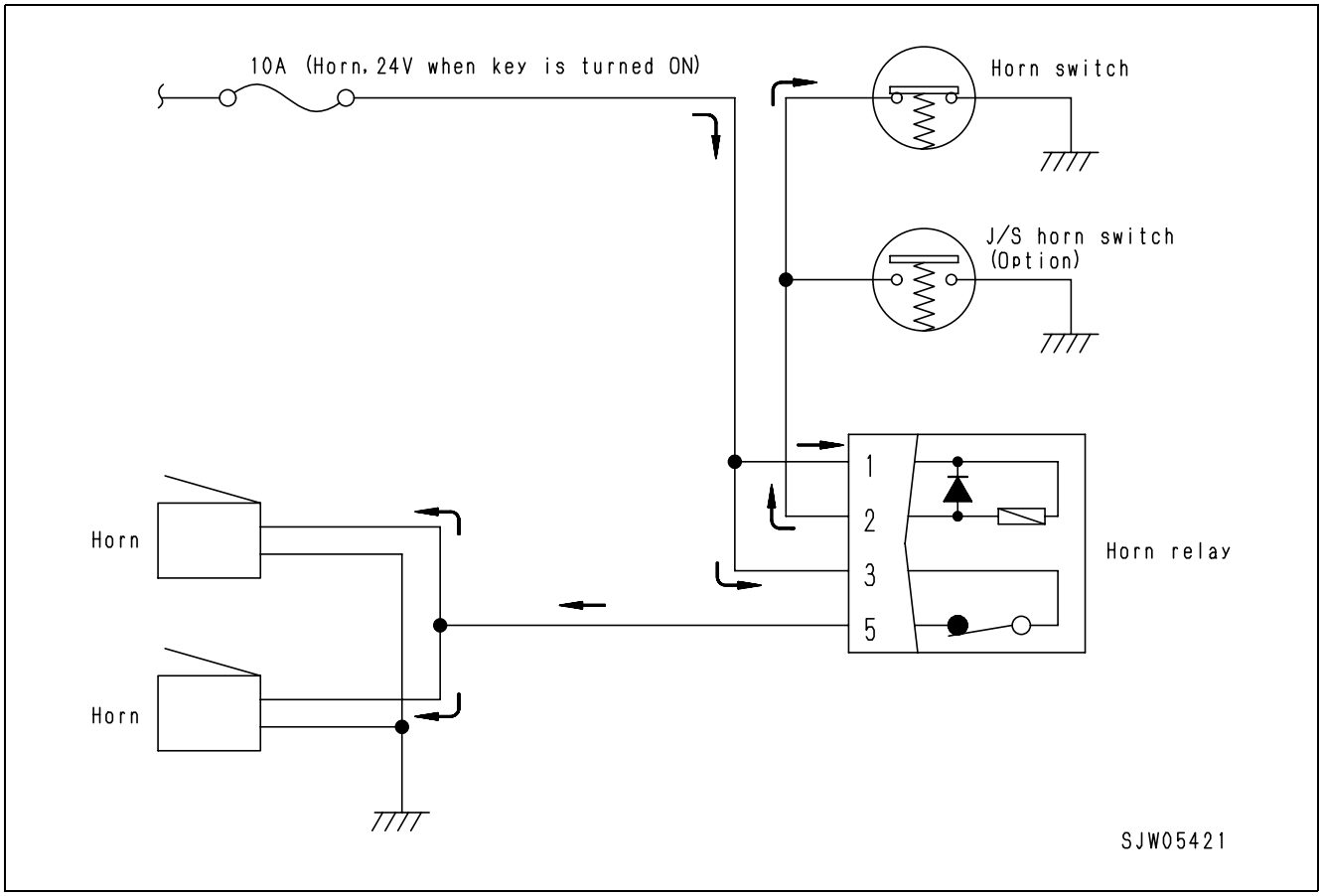
Operation

- To the front and rear working lamp switches, current is supplied from the small lamp circuit. If you turn on the working lamp switch, and then, the working lamp relays operate to close the contact. The current goes through the fuse, working lamp relays, and working lamps to the grounding, lighting the working lamps.

  At the same time, the indicator in the working lamp switch light.

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Horn circuit



Operation

- The horn circuit is designed so that current flows when the battery relay operates. Therefore, the horn does not sound when the starting switch is in the OFF position.

1. When you operate the steering wheel horn switch

   If you press the horn switch of steering wheel, and then, the horn relay operates to close the relay contact. Current goes through the fuse, horn relay, and horn to the grounding, making the horn sound.

2. When you operate the J/S steering horn switch (op)

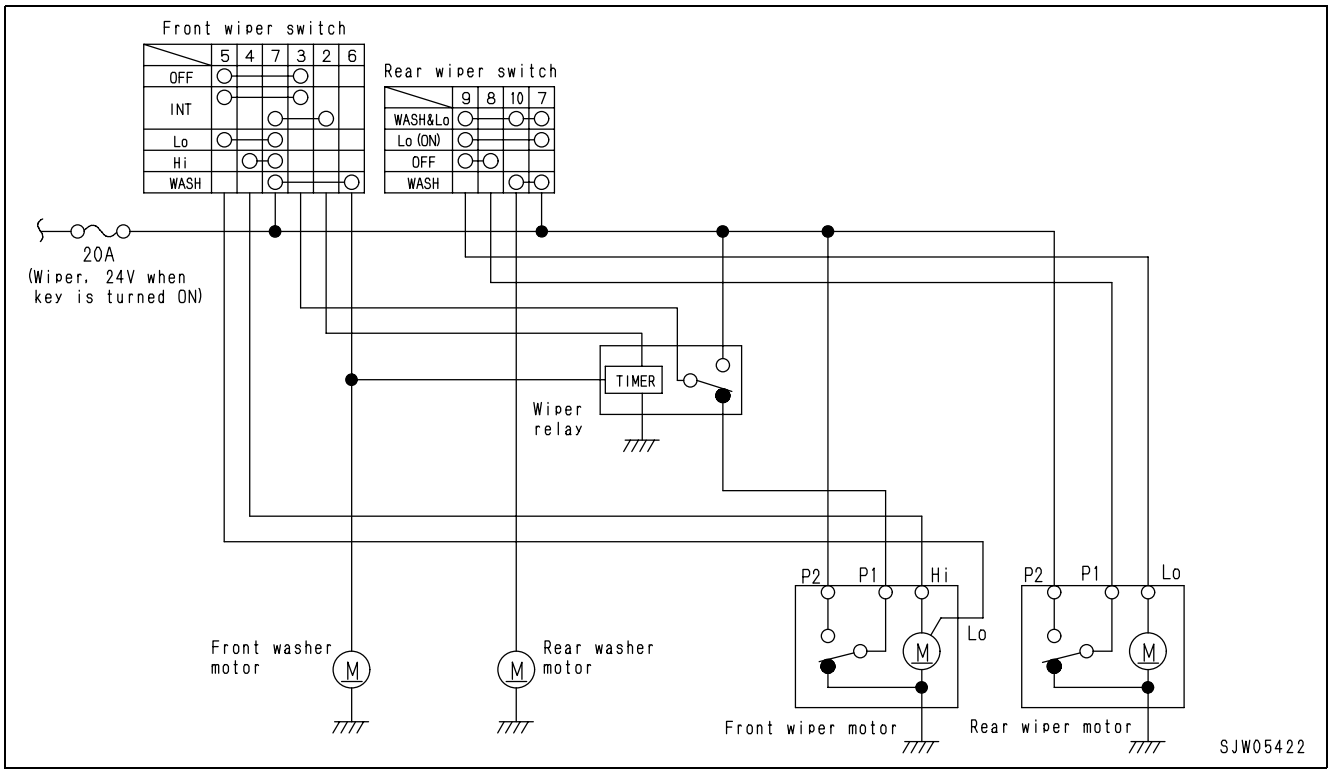
   If you press the horn switch of joystick lever, and then, the horn relay operates to close the relay contact. Current goes through the fuse, horn relay, and horn to the grounding, making the horn sound.

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Windshield wiper/window washer circuit (If equipped with cab)



Operation

The windshield wiper/window washer circuit is designed so that current flows when the battery relay operates. Therefore, the windshield wiper and window washer do not operate when the starting switch is in the OFF position. In addition, they stop when you switch the starting switch to the OFF position during the operation.

1. Front windshield wiper circuit

1-1. When the front windshield wiper switch is in the Lo position
Current goes through the fuse, terminal 7 of front windshield wiper switch, and terminal 5 to the front windshield wiper motor (Lo), operating the windshield wiper at a slow speed.

1-2. When the front windshield wiper switch is in the Hi position
Current goes through the fuse, terminal 7 of front windshield wiper switch, and terminal 4 to the front windshield wiper motor (Hi), operating the windshield wiper at a high speed.

1-3. When the front windshield wiper switch is in the INT position
Current goes through the fuse, terminal 7 of front windshield wiper switch, and terminal 2 to the wiper relay, closing the relay contact. Then, the current goes through the fuse, the windshield wiper relay, terminal 3 of front windshield wiper switch, and terminal 5 to the front windshield wiper motor (Lo), operating the windshield wiper at a low speed. After holding a 4- to 6-second quiescent time following one reciprocating operation of windshield wiper, the windshield wiper relay continues timer-operated reciprocating operation of the windshield wiper.

1-4. When the window washer switch is in the ON position
Current goes through the fuse and the front windshield wiper switch to the window washer motor, operating the window washer. At the same time, the current also flows to the windshield wiper relay, operating the windshield wiper in 0.2 to 0.8 second after the washer switch ON.
In addition, the operation of the windshield wiper relay operates the windshield wiper 2 to 4 times and stops after the washer switch OFF. Operation of windshield wiper after the washer switch OFF is activated only when you place the washer switch in the ON position at least one reciprocating period of the windshield wiper.

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1-5. When the front windshield wiper switch is in the OFF position
If you place the switch in the OFF position during the operation of the windshield wiper, the contacts P1 and P2 of the front windshield wiper motor close. Then, current goes through the fuse, contact P2 of windshield wiper motor, contact P1, windshield wiper relay, terminal 3 of front windshield wiper switch, and terminal 5 to the front windshield wiper motor (Lo), operating the windshield wiper. When the windshield wiper comes to the stop position, the contacts P1 and P2 of the windshield wiper motor open, stopping the windshield wiper.

2. Rear windshield wiper circuit

2-1. -When the rear windshield wiper switch is in the Lo position
Current goes through the fuse, terminal 7 of windshield wiper switch, and terminal 9 to the rear windshield wiper motor, operating the rear windshield wiper.

2-2. When the rear windshield wiper switch is in the window washer position
Current goes through the fuse, terminal 7 of rear windshield wiper switch, and terminal 10 to the window washer motor, operating the window washer.

2-3. When the rear windshield wiper switch is in the window washer and Lo positions
Current goes through the fuse, terminal 7 of rear windshield wiper switch, and terminal 9 to the rear windshield wiper motor, operating the rear windshield wiper. At the same time, it goes through the fuse, terminal 7 of rear windshield wiper switch, and terminal 10 to the window washer motor, operating the window washer.

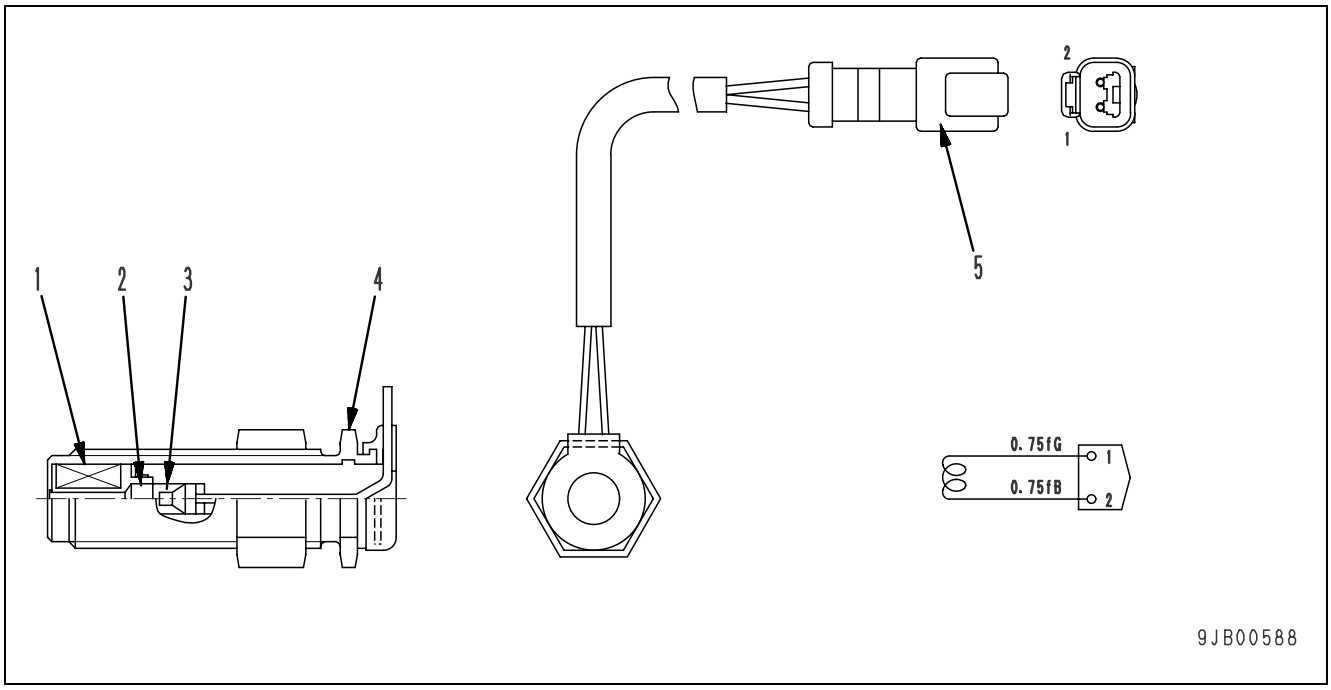
2-4. When the rear windshield wiper switch is in the OFF position
If you place the switch during the operation of the windshield wiper, then, the contacts P1 and P2 of rear windshield wiper motor close. Current goes through the fuse, the contact P2 of windshield wiper motor, contact P1, terminal 8 of rear windshield wiper switch, and terminal 9 to the windshield wiper motor, operating the windshield wiper. When the windshield wiper comes to the stop position, the contacts P1 and P2 of windshield wiper motor open, stopping the windshield wiper.

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Sensors

Engine speed sensor

Speed sensor



1. Coil
2. Magnet
3. Terminal
4. Housing
5. Connector

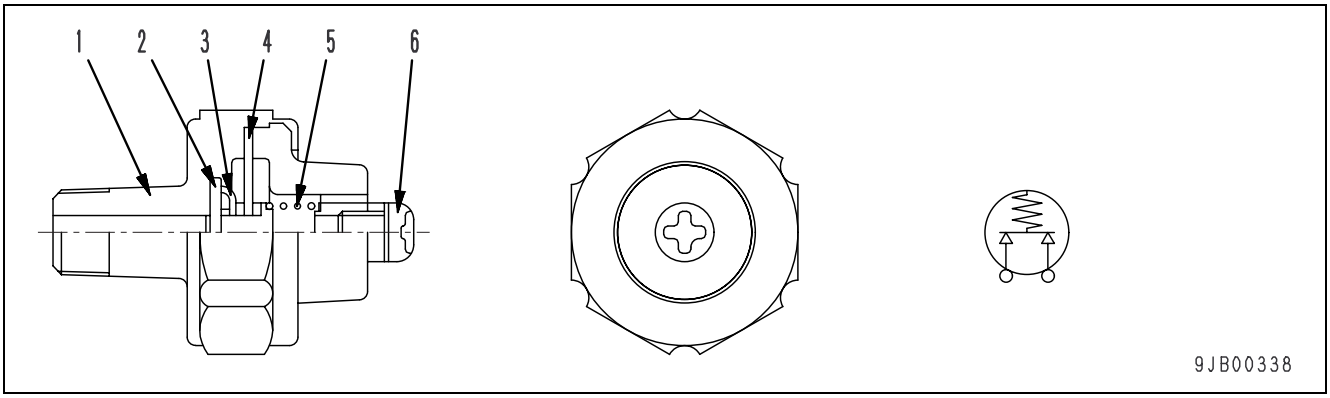
Function

- The engine speed sensor is mounted to the ring gear of the flywheel housing. It generates pulse voltage depending on the rotation of the gear teeth to send a signal to the T/M controller.
- The speed sensor is mounted to the transmission output gear. It generates pulse voltage depending on the rotation of the gear teeth to send a signal to the T/M controller.

  The signal converted from the pulse to machine speed in the T/M controller is sent to the machine monitor for display through the network.

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Engine oil pressure sensor

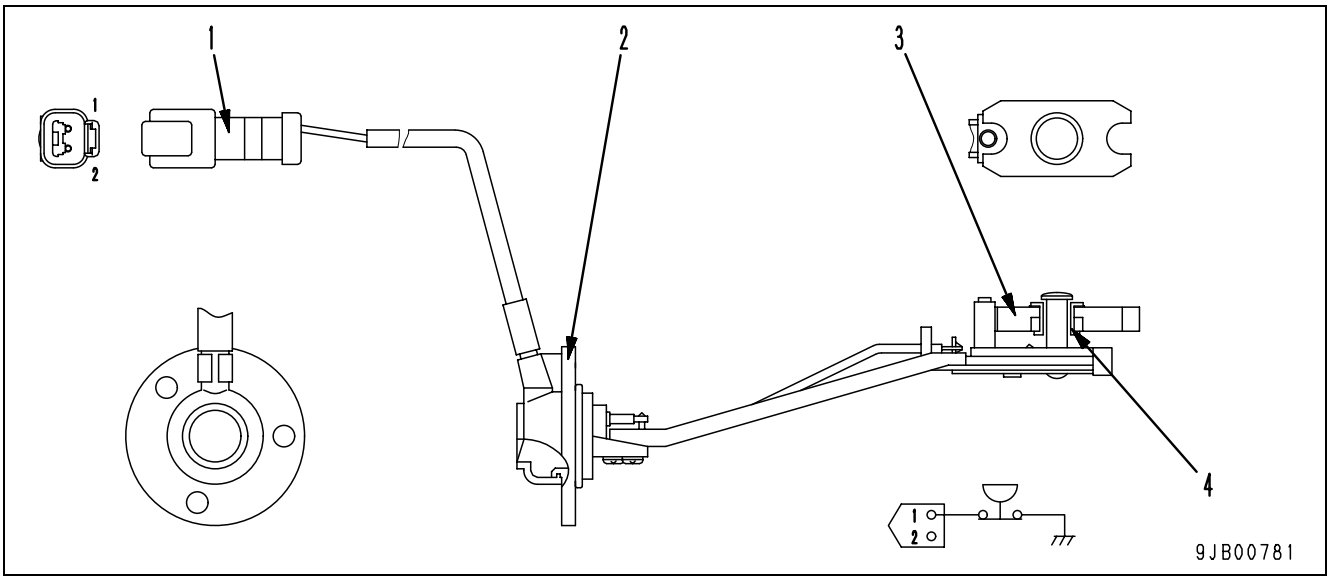


1. Plug
2. Contact link
3. Contact
4. Diaphragm
5. Spring
6. Terminal

Function

This sensor is mounted to the engine block. The diaphragm detects oil pressure, and when it reaches below the specified value, the switch is turned ON.

Engine oil level sensor



1. Connector
2. Bracket
3. Float
4. Switch

Function

This sensor is mounted to the side surface of the oil pan. The float lowers when the oil level reaches below the specified level, turning OFF the switch.

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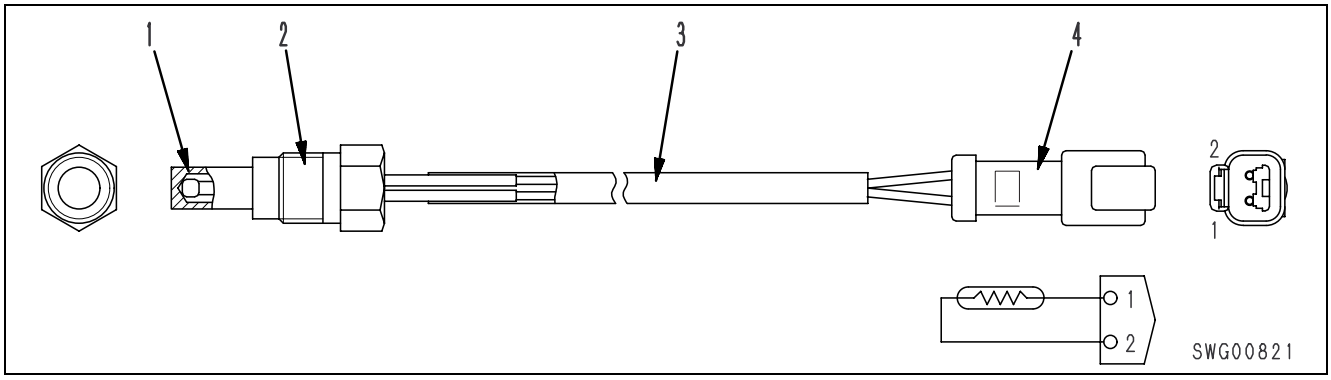
Engine water temperature sensor

Torque converter oil temperature sensor

Hydraulic oil temperature sensor

Transmission oil temperature sensor

Brake oil temperature sensor



1. Thermistor
2. Plug
3. Harness
4. Connector

Function

- The engine water temperature sensor is mounted to the engine cylinder block, the torque converter oil temperature sensor is mounted to the transmission case, and the hydraulic oil temperature sensor is mounted to the hydraulic piping. Each sensor handles a temperature change as a resistance change of the thermistor and sends it as a signal to the machine monitor to display the temperature.

  In addition, the temperature signal is sent to the T/M controller through the network and is used for cooling fan control.

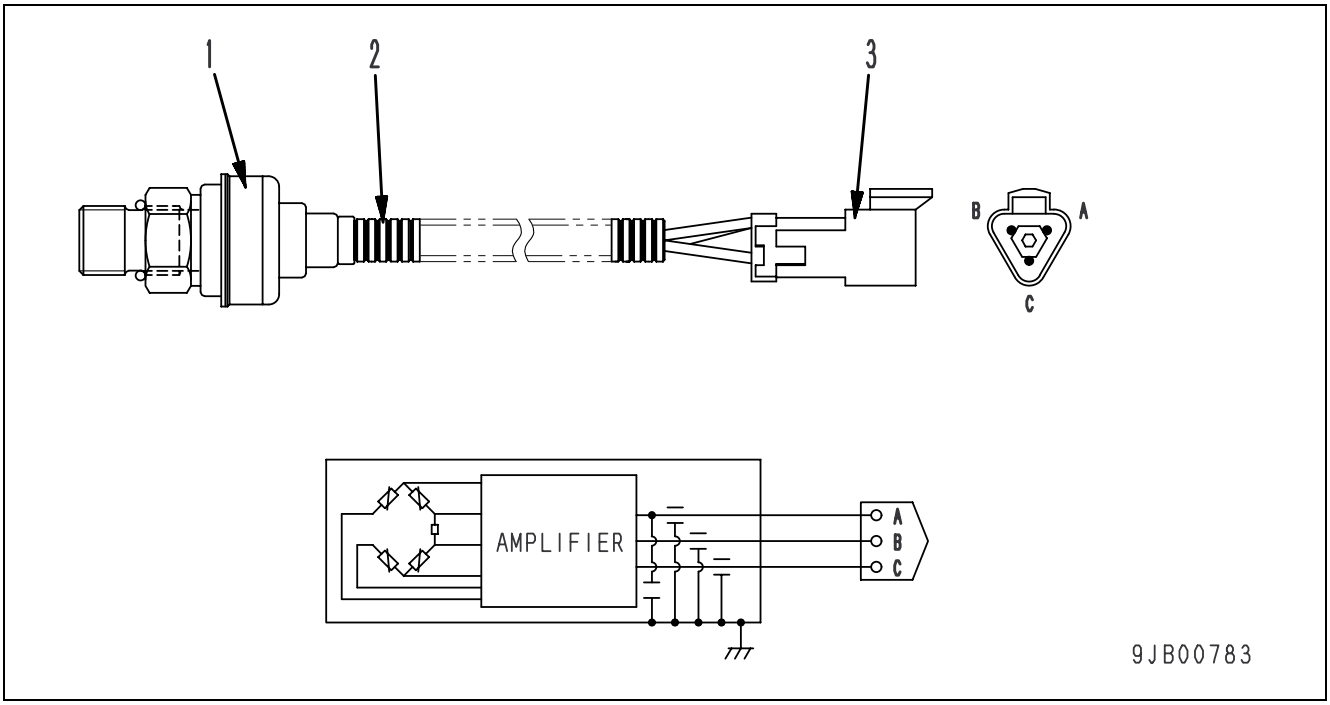
- The transmission oil temperature sensor is mounted to the transmission case. It handles a temperature change as a resistance change of the thermistor and sends it as a signal to the T/M controller.

  The T/M controller is used for changing over temperature tables for the electronic modulation to use a gear shift pattern appropriate to oil temperature.

- The brake oil temperature sensor is mounted to the rear axle. It handles a temperature change as a resistance change of the thermistor and sends a signal to the T/M controller. The T/M controller sends a signal to the machine monitor through the network. When it reaches the specified value, the lamp lights and buzzer sounds as a warning.

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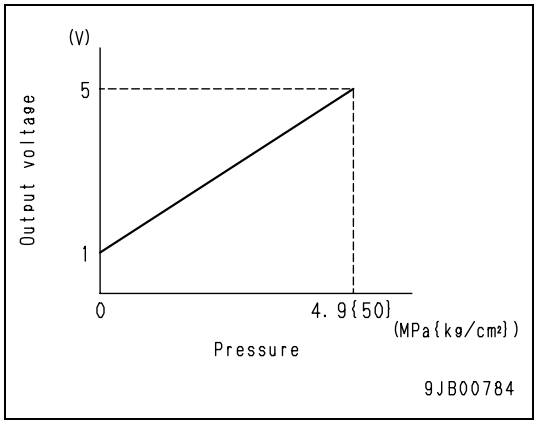
Transmission cut-off pressure sensor



1. Sensor
2. Lead
3. Connector

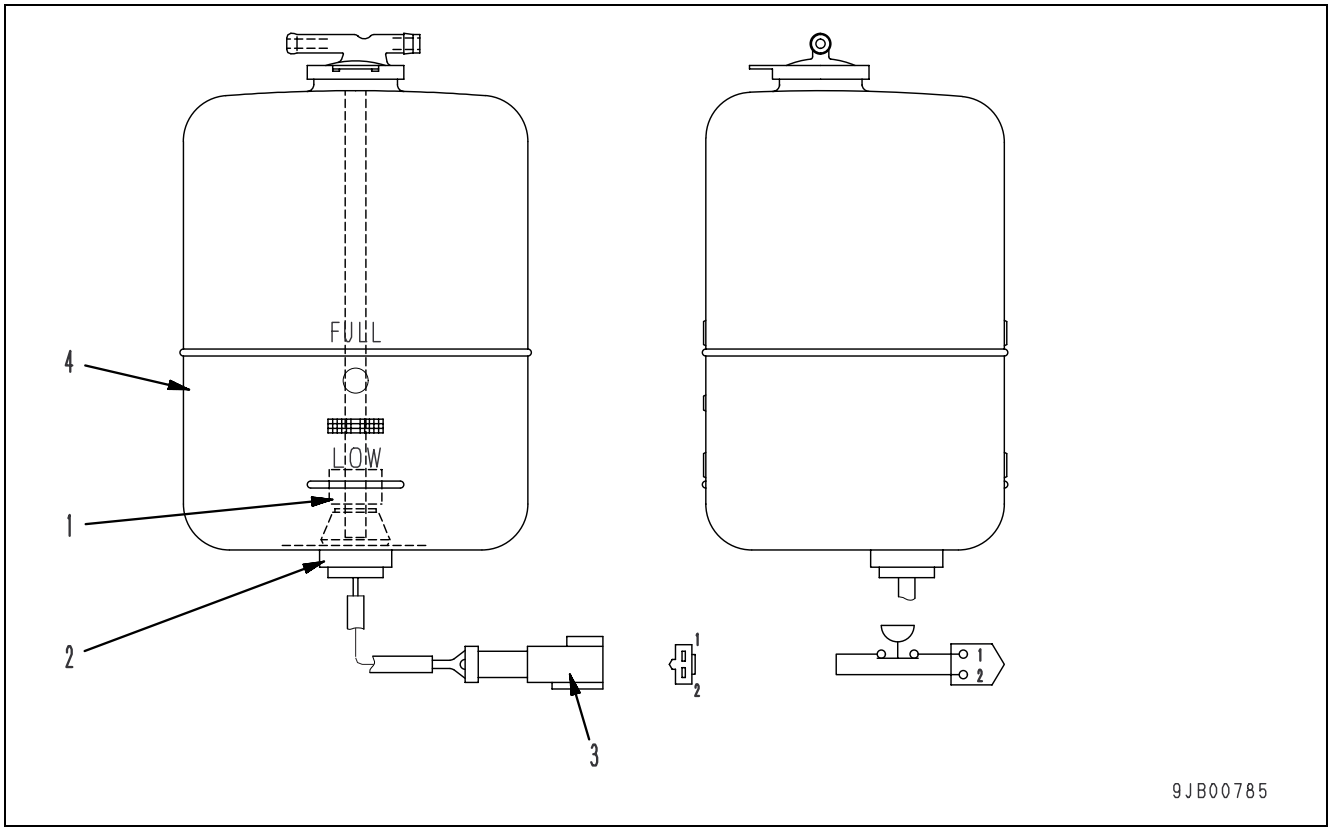
Function

This sensor is mounted to the brake line block under the floor. It detects brake operating pressure to use it for position setting and operation of the variable transmission cut-off function.



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Radiator water level sensor



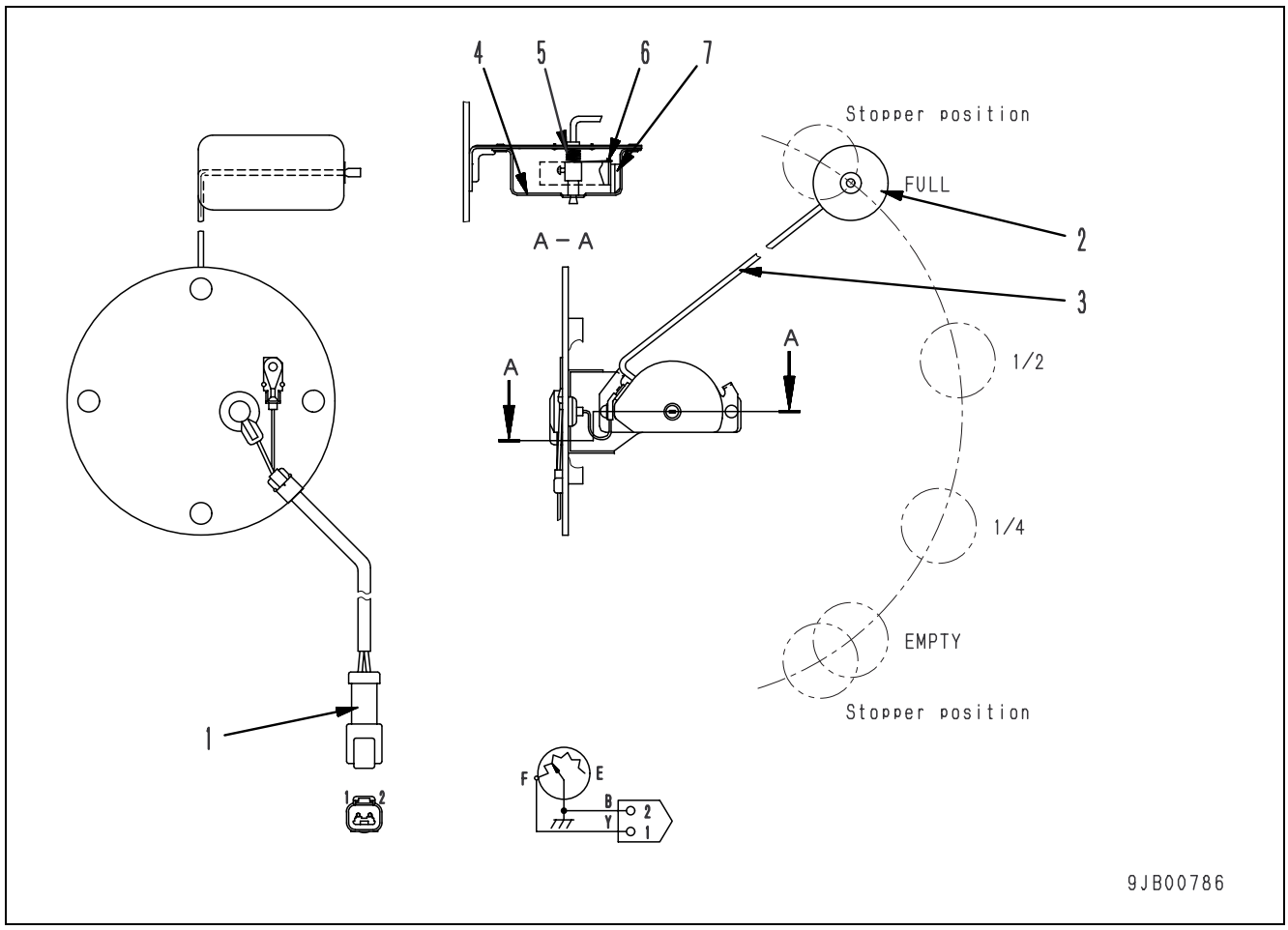
1. Float
2. Sensor
3. Connector
4. Sub-tank

Function

This sensor is mounted to the sub-tank in the bulkhead. The float lowers to turn off the switch when the coolant level reaches below the specified level.

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Fuel level sensor



1. Connector
2. Float
3. Arm
4. Body
5. Spring
6. Contact
7. Spacer

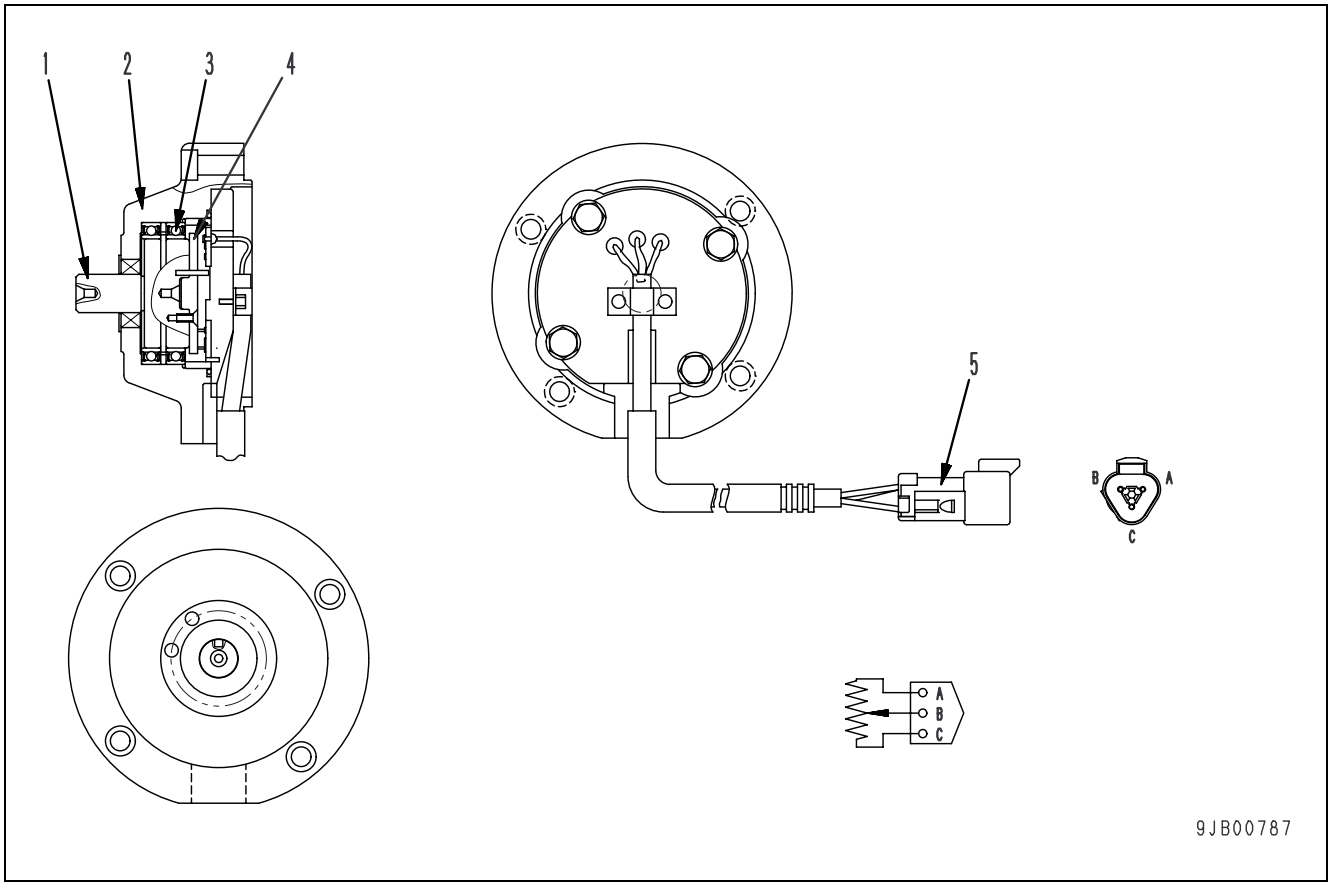
Function

This sensor is mounted to the side surface of the fuel tank. The float moves vertically depending on the remaining quantity of the fuel.

The movement of the float operates the variable resistor through the arm and sends a signal to the machine monitor to indicate the remaining quantity of the fuel.

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Lift arm angle sensor (op)



1. Shaft
2. Housing
3. Bearing
4. Rotor
5. Connector

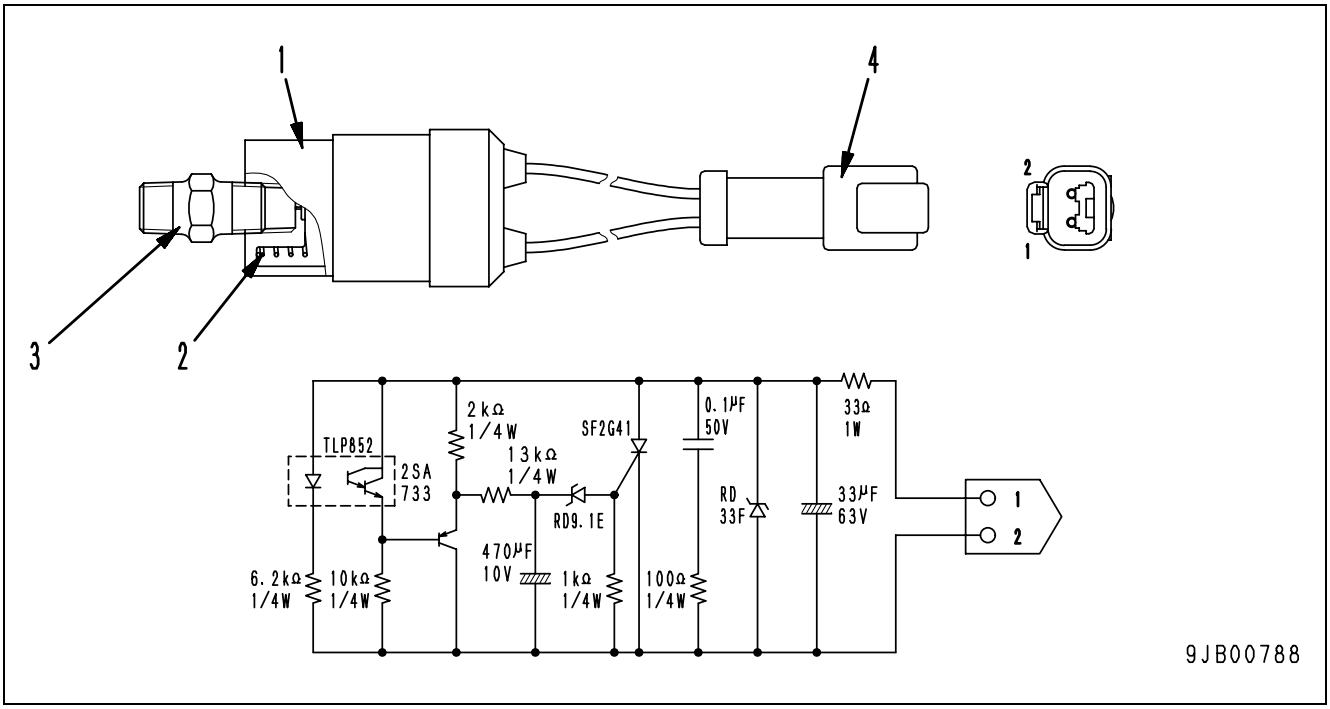
Function

This sensor is mounted to the front frame. When the lift arm angle changes, the shaft receives sliding resistance through the link on the lift arm side to detect the boom angle.

You can mount it when mounting a load meter or electric work equipment control lever.

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Air cleaner clogging sensor



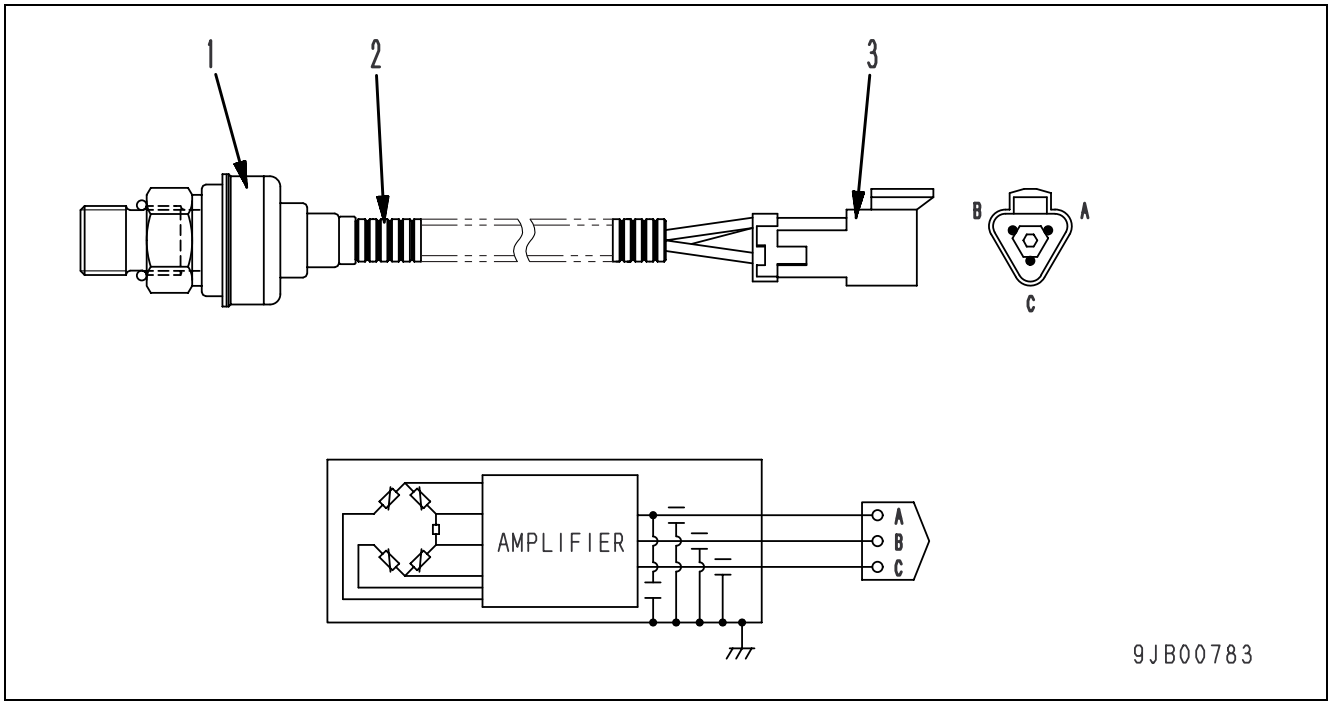
1. Indicator
2. Spring
3. Adapter
4. Connector

Function

This sensor is mounted to the air cleaner outlet. If the air cleaner is clogged to cause pressure to rise to the specified pressure (negative pressure), the warning lamp of the machine monitor lights to issue a warning.

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Pressure sensor for load meter (op)



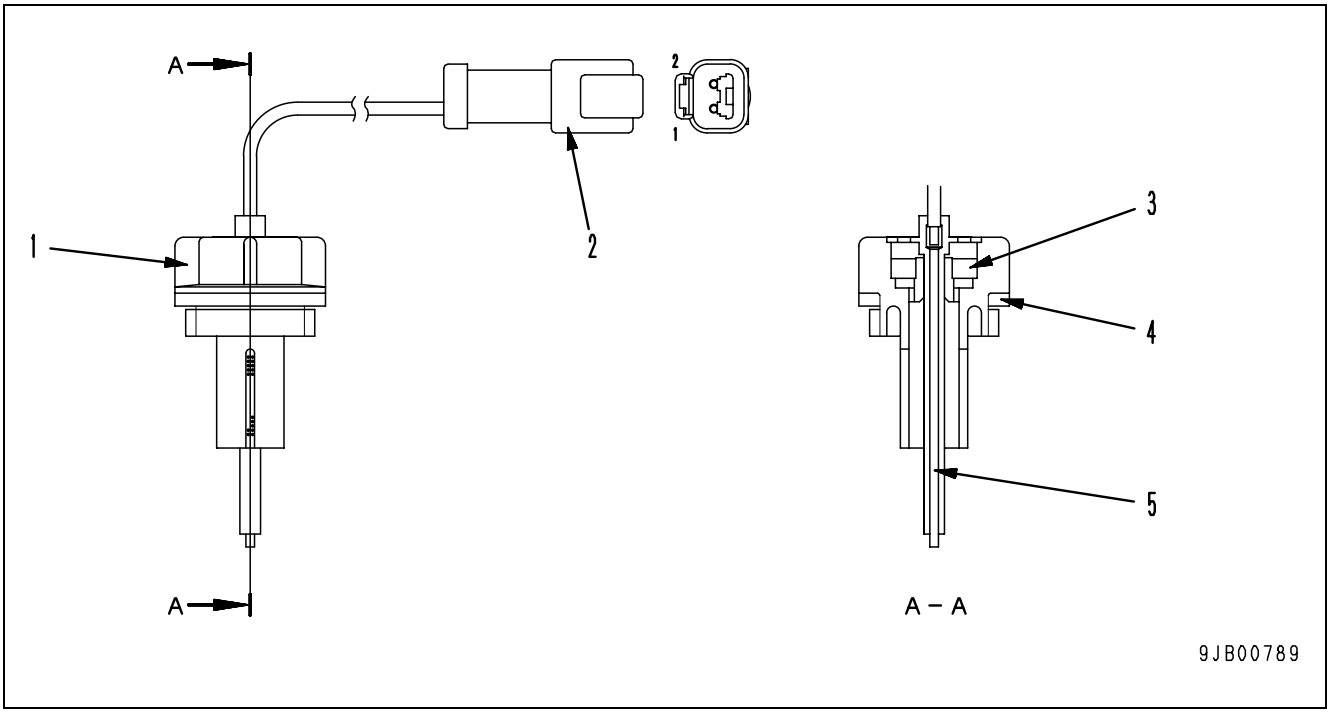
1. Sensor
2. Lead
3. Connector

Function

This sensor is mounted to the bottom of the boom cylinder and the both ends of the rod. It measures the pressure of the cylinder to use it for calculation of load weight.

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Battery liquid sensor (op)



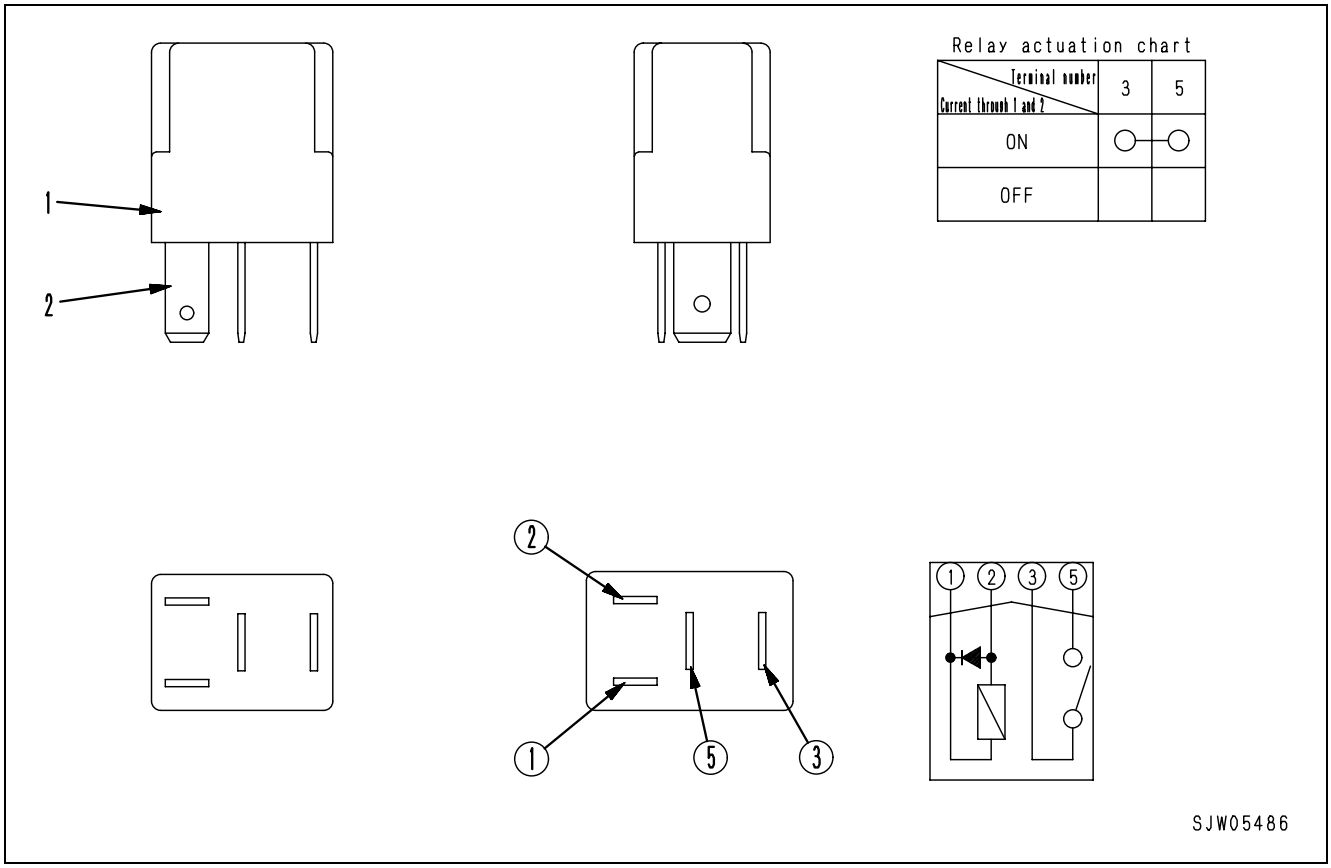
1. Body
2. Connector
3. Filter
4. Packing
5. Pin

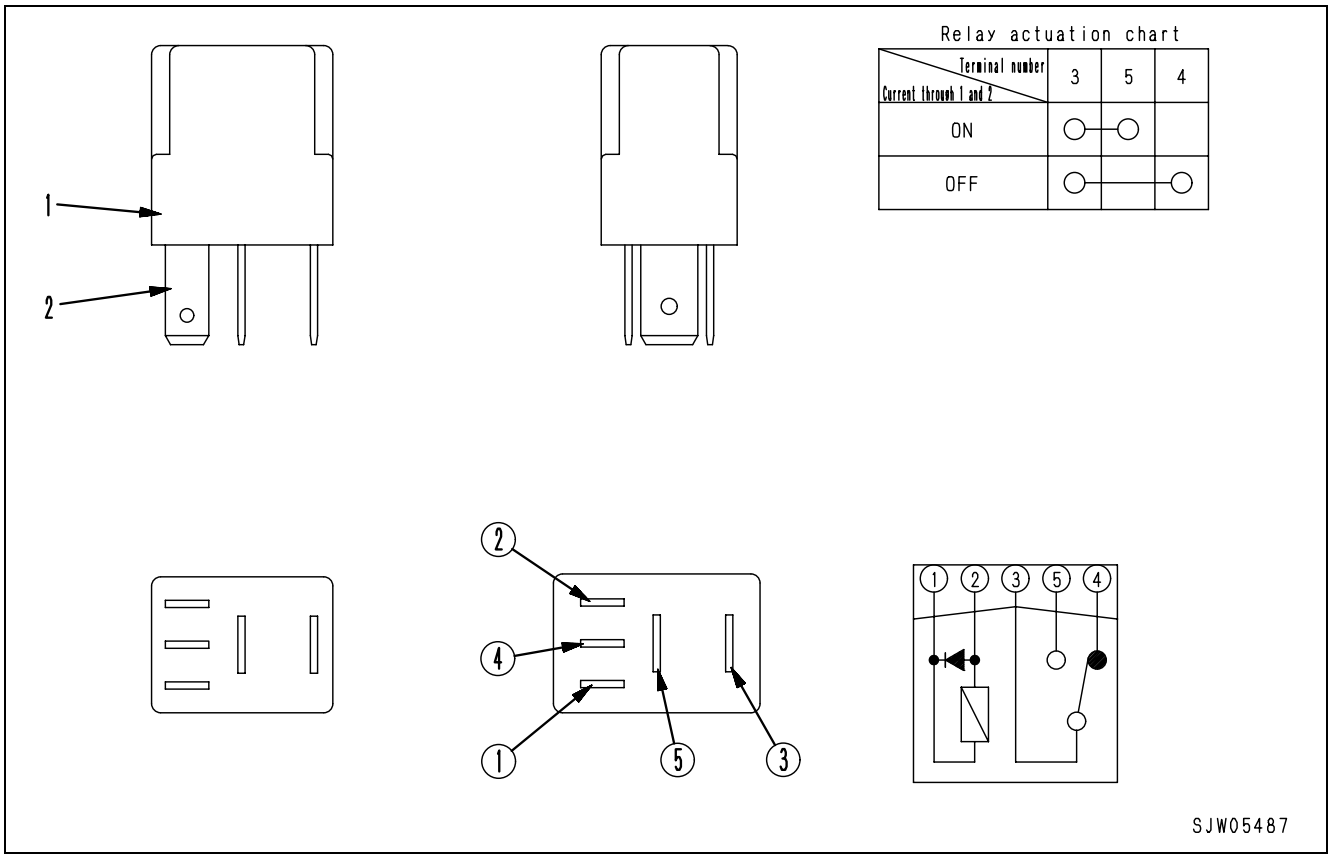
Function

This sensor is mounted to the battery. It sends a signal to the machine monitor to indicate voltage change that occurs when the sensor end comes out of the battery liquid into the air, giving a signal.

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Relay





1. Case
2. Plug

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20 TESTING AND ADJUSTING

Standard value table for engine 20-2
Standard value table for chassis 20-3
Testing and adjusting 20-201

Troubleshooting of engine control system (ENG mode) 20-301
Troubleshooting of transmission control system (TM mode) 20-401
Troubleshooting of work equipment control system (WRK mode) 20-601
Troubleshooting of monitor system (MON mode) 20-801
Troubleshooting of hydraulic, mechanical system (H mode) 20-901
Troubleshooting of electrical system (E mode) 20-1001

★ Note the following when making judgements using the standard value tables for testing, adjusting, or troubleshooting.

1. The standard value for a new machine given in the table is the value used when shipping the machine from the factory and is given for reference. It is used as a guideline for judging the progress of wear after the machine has been operated, and as a reference value when carrying out repairs.
2. The service limit value given in the tables is the estimated value for the shipped machine based on the results of various tests. It is used for reference together with the state of repair and the history of operation to judge if there is a failure.
3. These standard values are not the standards used in dealing with claims

WARNING! When carrying out testing, adjusting, or troubleshooting, park the machine on level ground, insert the safety pins, and use blocks to prevent the machine from moving.

WARNING! When carrying out work together with other workers, always use signals and do not let unauthorized people near the machine.

WARNING! When checking the water level, always wait for the water to cool down. If the radiator cap is removed when the water is still hot, the water will spurt out and cause burns.

WARNING! Be careful not to get caught in the fan, fan belt or other rotating parts.

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Standard value table for engine

Machine model				WA470-5, WA480-5	
Engine				SAA6D125E-3	
Item	Measurement conditions		Unit	Standard value for new machine	Service limit value
Engine speed	High idling		rpm	2,170 $^{+20}_{-80}$	2,170 $^{+20}_{-80}$
	Low idling			750 $^{+50}_{0}$	750 $^{+50}_{0}$
	Rated speed			2,000	—
Air supply	At rated output		kPa {mmHg}	Min. 79.8 {Min. 600}	60 {450}
Exhaust gas color	At sudden acceleration At high idling		Bosch index	Max. 4.5 Max. 1.0	6.5
Exhaust temperature (Turbocharger inlet temperature)	Whole speed range (Ambient temperature 20°C)		°C	Max. 650	700
Valve clearance	Intake valve Exhaust valve		mm	0.33 0.71	— —
Compression pressure (SAE oil)	Oil temperature: 40 ~ 60°C (Engine speed)		MPa {kg/cm²} (rpm)	Min. 2.9 {Min. 30} (150 ~ 200)	—
Blow-by pressure (SAE oil)	(Water temperature: Operating range) At rated output		kPa {mmH_2O}	Max. 0.98 {Max. 100}	1.96 {200}
Oil pressure	(Water temperature: Operating range) At high idling (SAE30) At high idling (SAE10W) At low idling (SAE30) At low idling (SAE10W)		kPa {kg/cm²}	 392 ~ 588 {4.0 ~ 6.0} 343 ~ 539 {3.5 ~ 5.5} Min. 147 {Min. 1.5} Min. 98 {Min. 1.0}	 206 {2.1} 176 {1.8} 69 {0.7} 69 {0.7}
Oil temperature	Whole speed range (Inside oil pan)		°C	90 ~ 120	Min. 120
Belt tension	Deflection when pressed with a finger force of approx. 58.8 N {approx. 6 kg}.	Alternator - crankshaft pulley	mm	13	—
	Deflection when pressed with a finger force of approx. 98 N {approx. 10 kg}.	Air conditioner - crankshaft pulley		16 ~ 20	—

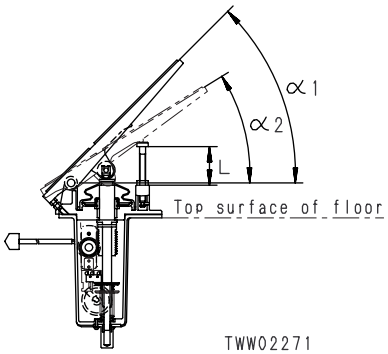
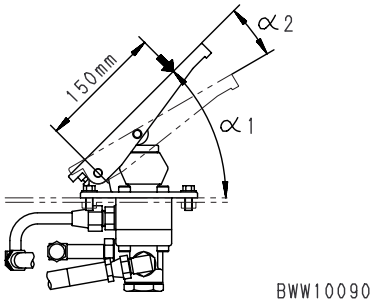
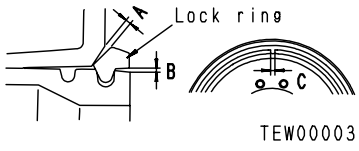
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Standard value table for chassis

The * mark shows the value before the detent.

Machine model						WA470-5, WA480-5		
Category	Item			Measurement conditions	Unit	Standard value for new machine		Service limit value
Directional lever	Operating effort		N - FORWARD, REVERSE	• Engine Stopped • Measure at center of lever knob	N {kg}	$5.9^{+4.9}_{-3.0}$	{$0.6^{+0.5}_{-0.3}$}	Max. 16.7 {1.7}
	Travel		N - FORWARD, REVERSE		mm	35 ± 10		35 ± 20
Speed lever	Operating effort		1st ~ 2nd	• Engine stopped • Measure at center of lever knob	N {kg}	$5.9^{+4.9}_{-3.0}$	{$0.6^{+0.5}_{-0.3}$}	Max. 16.7 {1.7}
			2nd ~ 3rd			$5.9^{+4.9}_{-3.0}$	{$0.6^{+0.5}_{-0.3}$}	Max. 16.7 {1.7}
			3rd ~ 4th			$5.9^{+4.9}_{-3.0}$	{$0.6^{+0.5}_{-0.3}$}	Max. 16.7 {1.7}
	Travel		1st ~ 2nd		mm	35 ± 10		35 ± 20
			2nd ~ 3rd			35 ± 10		35 ± 20
			3rd ~ 4th			35 ± 10		35 ± 20
Working equipment control lever	Operating effort	Boom	HOLD➔RAISE	• Engine speed: Low idling • Hydraulic oil temperature: 45 ~ 55°C	N {kg}	Max. 12.8 {1.3} *		Max. 19.6 {2.0} *
			RAISE➔HOLD			Max. 14.7 {1.5}		Max. 22.6 {2.3}
			HOLD➔LOWER			Max. 12.8 {1.3} *		Max. 19.6 {2.0} *
			LOWER➔HOLD			—		—
			LOWER➔FLOAT			Max. 15.7 {1.6}		Max. 23.5 {2.4}
			FLOAT➔HOLD			Max. 14.7 {1.5}		Max. 22.6 {2.3}
		Bucket	HOLD➔DUMP			Max. 17.7 {1.8}		Max. 26.5 {2.7}
			HOLD➔TILT			Max. 12.8 {1.3} *		Max. 19.6 {2.0} *
			TILT➔HOLD			Max. 14.7 {1.5}		Max. 22.6 {2.3}
	Travel	Boom	HOLD➔RAISE	• Engine speed: Low idling • Hydraulic oil temperature: 45 ~ 55°C	mm	43 ± 9 *		43 ± 18 *
			HOLD➔RAISE			43 ± 9 *		43 ± 18 *
			HOLD➔RAISE			50 ± 9		50 ± 18
		Bucket	HOLD➔RAISE			50 ± 9		50 ± 18
			HOLD➔RAISE			43 ± 9 *		43 ± 18 *
Steering wheel	Play			• Engine stopped • Machine facing straight to front	mm	Max. 20		Max. 50
	Operating effort			• Flat, horizontal, straight, dry paved road surface • Engine speed: Low idling (Bucket empty)	N {kg}	6.9 ~ 12.6 {0.7 ~ 1.3}		Max. 19.6 {2.0}
	Turning speed (Not including play)			• Engine speed: High idling • Left lock - right lock	Turns	3.6 ± 0.4		3.6 ± 0.4
	Operating time	Low idling		• Engine speed: Low idling • Hydraulic oil temperature: 45 ~ 55°C	Sec.	3.6 ~ 4.4		Max. 6.0
		High idling				3.2 ~ 3.8	P mode	Max. 5.2
						3.4 ~ 4.0	N mode	Max. 5.6

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Machine model					WA470-5, WA480-5	
Category	**Item**		**Measurement condition**	**Unit**	**Standard value for new machine**	**Service limit value**
Accelerator pedal	Operating effort		• Engine started 	N {kg}	53.9 ~ 73.6 {5.5 ~ 7.5}	Max. 107.9 {11.0}
	Operating angle	Neutral (α1)		deg.	48	—
		Neutral (α2)			35 ± 1	—
	Stopper height (L)			mm	56 ± 5	—
Brake pedal	Operating effort		• Engine speed: Low idling • Hydraulic oil temperature: 45 ~ 55°C 	N {kg}	294 ± 29.4 {30 ± 3}	Max. 421.4 {43}
	Operating angle	Neutral (α1)		deg.	45	—
		Neutral (α2)			$15\ ^{+1}_{0}$	—
	Play			mm	5 ± 0.5	—
Tire	Fitting of wheel lock ring	A	• Tire inflation pressure: Specified pressure 	mm	Max. 2.5	—
		B			Max. 4.0	—
	Clearance of wheel lock ring	C			2 ~ 10	—

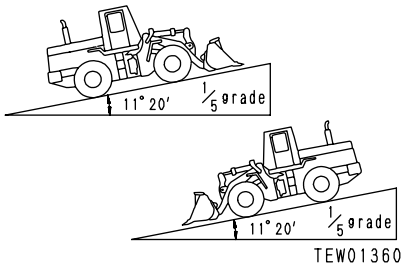
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Machine model						WA470-5, WA480-5			
Category	Item		Measurement conditions		Unit	Standard value for new machine		Service limit value	
Engine speed	Torque converter stall		• Engine water temperature: Operating range • Torque converter oil temperature: 60 ~ 80°C • Hydraulic oil temperature: 45 ~ 55°C		rpm	WA470-5	WA480-5	WA470-5	WA480-5
				N mode		1,770 ± 100	1,900 ± 100	1,770 ± 200	1,900 ± 200
				P mode		2,020 ± 100	2,020 ± 100	2,020 ± 200	2,020 ± 200
	Hydraulic stall			N mode		1,800 ± 100	1,950 ± 100	1,800 ± 200	1,950 ± 200
				P mode		2,050 ± 100	2,070 ± 100	2,050 ± 200	2,070 ± 200
	Torque converter stall + hydraulic stall			N mode		1,530 ± 100	1,610 ± 100	1,530 ± 200	1,610 ± 200
				P mode		1,665 ± 100	1,670 ± 100	1,665 ± 200	1,670 ± 200
Transmission, torque converter	Main relief valve	Low idling	• Torque converter oil temperature: 60 ~ 80°C • Engine: Rated speed		MPa {kg/cm²}	2.78 ± 0.2 {28.3 ± 2}		←	
		Rated speed				2.93 ± 0.2 {29.9 ± 2}		←	
	Torque converter relief (Inlet port) pressure					Max. 0.93 {Max. 9.5}		←	
	Torque converter outlet port oil pressure					0.59 ± 0.05 {6.0 ± 0.5}		←	
	ECMV output (Clutch) oil pressure	1st, 2nd, 3rd, 4th	• Torque converter oil temperature: 60 ~ 80°C • Engine: Rated speed • Manual switch ON			2.31 ± 0.15 {23.5 ± 1.5}		←	
		F - R				2.06 ± 0.15 {21.0 ± 1.5}		←	
		Lock-up				2.31 ± 0.15 {23.5 ± 1.5}		←	
Steering	Steering relief pressure		• Hydraulic oil temperature: 45 ~ 55°C • Engine speed: High idling		MPa {kg/cm²}	20.6 ± 0.49 {210 ± 5}		$20.6\ ^{+0.4}_{-1.27}$ {$210\ ^{+5}_{-13}$}	
Accumulator	Charge cut-in pressure		• Engine speed: Low idling • Hydraulic oil temperature: 45 ~ 55°C	• Point where brake oil pressure warning lamp goes out	MPa {kg/cm²}	$5.9\ ^{+0.5}_{0}$ {$60\ ^{+5}_{0}$}		$5.9\ ^{+0.98}_{-0.5}$ {$60\ ^{+10}_{-5}$}	
	Charge cut-out pressure			• Point where oil pressure is going up and then starts to go down		$9.8\ ^{+0.98}_{0}$ {$100\ ^{+10}_{0}$}		$9.8\ ^{+1.5}_{-0.5}$ {$100\ ^{+15.}_{-5}$}	

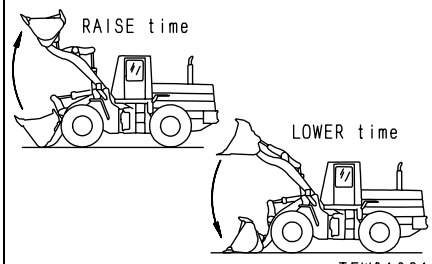
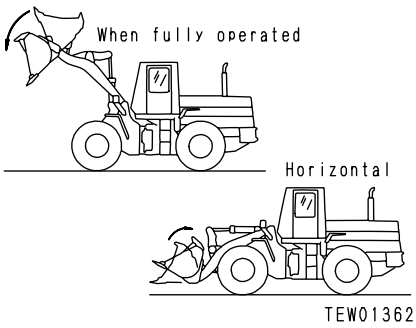
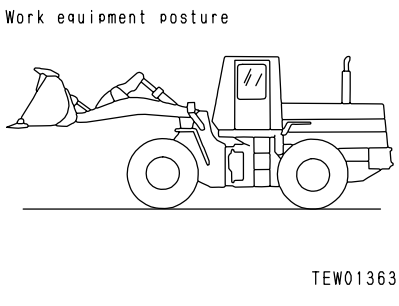
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Machine model						WA470-5, WA480-5			
Category	Item	Measurement conditions			Unit	Standard value for new machine		Service limit value	
Power train	Travel speed (Bucket empty)				km/h	WA470-5	WA480-5	WA470-5	WA480-5
		FORWARD	P mode	1st		6.3 ± 0.3	6.3 ± 0.3	6.3 ± 0.45	6.3 ± 0.45
				2nd		12.1 ± 0.6	12.1 ± 0.6	12.1 ± 0.9	12.1 ± 0.9
				3rd		21.7 ± 1.1	21.6 ± 1.1	21.7 ± 1.7	21.6 ± 1.7
				4th		34.9 ± 1.7	34.3 ± 1.7	34.9 ± 2.6	34.3 ± 2.6
			N mode	1st		5.4 ± 0.3	5.7 ± 0.3	5.4 ± 0.45	5.7 ± 0.45
				2nd		10.2 ± 0.5	11.0 ± 0.6	10.2 ± 0.75	11.0 ± 0.9
				3rd		18.5 ± 0.9	20.0 ± 1.0	18.5 ± 1.4	20.0 ± 1.5
				4th		29.2 ± 1.5	32.0 ± 1.6	29.2 ± 2.3	32.0 ± 2.4
		REVERSE	P mode	1st		6.7 ± 0.3	6.6 ± 0.3	6.7 ± 0.45	6.6 ± 0.45
				2nd		12.8 ± 0.6	12.8 ± 0.6	12.8 ± 0.9	12.8 ± 0.9
				3rd		23.0 ± 1.2	22.8 ± 1.1	23.0 ± 1.8	22.8 ± 1.7
				4th		36.0 ± 1.8	35.8 ± 1.8	36.0 ± 2.7	35.8 ± 2.7
			N mode	1st		5.6 ± 0.3	6.1 ± 0.3	5.6 ± 0.45	6.1 ± 0.45
				2nd		10.9 ± 0.5	11.7 ± 0.6	10.9 ± 0.75	11.7 ± 0.9
				3rd		19.7 ± 1.0	21.3 ± 1.1	19.7 ± 1.5	21.3 ± 1.7
				4th		30.1 ± 1.5	34.1 ± 1.7	30.1 ± 2.3	34.1 ± 2.6
Wheel brake	Brake oil pressure	• Hydraulic oil temperature: 45 ~ 55°C			MPa {kg/cm²}	5.1 ± 0.49 {52 ± 5}		5.1 ± 0.98 {52 ± 10}	
	Drop in brake pressure	• Engine stopped • Keep brake pedal depressed at 4.9 MPa {50 kg/cm^2} and measure drop in oil pressure after 5 min.				Max. 0.49 {5.0}		Max. 0.49 {5.0}	
	Performance	• Tire inflation pressure: Specified pressure • Flat, horizontal, straight, dry paved road surface • Speed when applying brake: 20 km/h, braking delay: Within 0.1 sec. • Brake pedal operating effort: Specified operating effort (294 ± 29.4 N {30 ± 3 kg}) • Measure braking distance			m	Max. 5		Max. 5	
	Disc wear	• Oil pressure: 4.9 MPa {50 kg/cm^2} • Pedal depressed fully			mm	Shaft protrusion 0		Shaft protrusion reaches wear limit position (2.4 mm)	

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Machine model					WA470-5, WA480-5	
Category	**Item**		**Measurement conditions**	**Unit**	**Standard value for new machine**	**Service limit value**
Parking brake	Parking brake inlet pressure		• Torque converter oil temperature: 60 ~ 80°C • Engine speed: Low idling	MPa {kg/cm²}	Min. 2.27 {Min. 23.1}	Min. 2.27 {Min. 23.1}
	Performance		• Tire inflation pressure: Specified pressure • Flat paved road with 1/5 (11° 20') grade • Dry, paved road surface • Machine at operating condition 	—	Holds in position	Holds in position
	Disc thickness			mm	3.2 ± 0.08	2.97
PPC	PPC valve basic pressure		Hydraulic oil temperature: 45 ~ 55°C Engine speed: High idling	MPa {kg/cm²}	$3.72\ ^{+0.2}_{0}$ {$38\ ^{+2}_{0}$}	$3.72\ ^{+0.2}_{-0.2}$ {$38\ ^{+2}_{-2}$}
	PPC valve output pressure	Boom RAISE, FLOAT; Bucket DUMP, TILT	Hydraulic oil temperature: 45 ~ 55°C Engine speed: High idling Control lever operated fully		$3.72\ ^{+0.1}_{-0.1}$ {$38\ ^{+1}_{-1}$}	$3.72\ ^{+0.1}_{-0.2}$ {$38\ ^{+1}_{-2}$}
		Boom LOWER			2.2 ± 0.25 {22.5 ± 2.5}	2.2 ± 0.39 {22.5 ± 4}

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Machine model						WA470-5, WA480-5			
Category	Item			Measurement conditions	Unit	Standard value for new machine		Service limit value	
Work equipment	Work equipment relief pressure			• Hydraulic oil temperature: 45 ~ 55°C • Engine speed: High idling	MPa {kg/cm²}	20.6 ± 0.49 {210 ± 5}		20.6 $^{+0.49}_{-1.27}$ {210 $^{+5}_{-13}$}	
	Work equipment speed	Boom RAISE		• Hydraulic oil temperature: 45 ~ 55°C • Engine speed: High idling • No load	N mode	WA470-5	WA480-5	WA470-5	WA480-5
						6.7 ± 0.5	6.8 ± 0.5	Max. 8.6	Max. 8.8
					P mode	5.8 ± 0.5	6.3 ± 0.5	Max. 7.6	Max. 8.2
		Boom LOWER			N mode	4.3 ± 0.5	4.1 ± 0.5	Max. 5.8	Max. 5.5
					P mode	3.7 ± 0.5	3.8 ± 0.5	Max. 5.0	Max. 5.2
		Bucket tiltback	When fully operated	• Hydraulic oil temperature: 45 ~ 55°C • Engine speed: High idling • No load	N mode	1.6 ± 0.3	1.7 ± 0.3	Max. 2.3	Max. 2.4
					P mode	1.4 ± 0.3	1.6 ± 0.3	Max. 2.0	Max. 2.3
			Bucket horizontal (Above ground)		N mode	1.4 ± 0.3	1.6 ± 0.3	Max. 2.0	Max. 2.3
					P mode	1.2 ± 0.3	1.5 ± 0.3	Max. 1.8	Max. 2.2
	Hydraulic drift	Retraction of boom cylinder rod		• Hydraulic oil temperature: 45 ~ 55°C • Leave for 5 minutes after stopping engine then measure for next 15 minutes • Bucket empty, boom, bucket horizontal	mm	Max. 30		Max. 36	
		Retraction of bucket cylinder rod				Max. 20		Max. 24	

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Machine model				WA470-5, WA480-5	
Category	**Item**	**Measurement conditions**	**Unit**	**Standard value For new machine**	**Service limit value**
Oil pressure drive fan	Max. fan speed	• Engine speed: High idling • Engine water temperature: Min. 95°C • Hydraulic oil temperature: Min. 95°C • Torque converter oil temperature: Min. 105°C	rpm	1,400 ± 100	1,400 ± 200
	Min. fan speed	• Engine speed: Low idling • Engine water temperature: Max. 40°C • Hydraulic oil temperature: Max. 40°C • Torque converter oil temperature: Max. 40°C		240 ± 50	240 ± 100

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20 TESTING AND ADJUSTING

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When carrying out testing, adjusting, or troubleshooting, park the machine on level ground, inset the safety pins, and use blocks to prevent the machine from moving.

When carrying out work together with other workers, always use signals and do not let unauthorized people near the machine.

When checking the water level, always wait for the water to cool down. If the radiator cap is removed when the water is still hot, the water will spurt out and cause burns.

Be careful not to get caught in the fan, fan belt or other rotating parts.

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Measuring engine speed

- **Put blocks under the tires.**
- **Before starting measurement, check that there is no one in the surrounding area.**

★ Measure the engine speed under the following conditions.

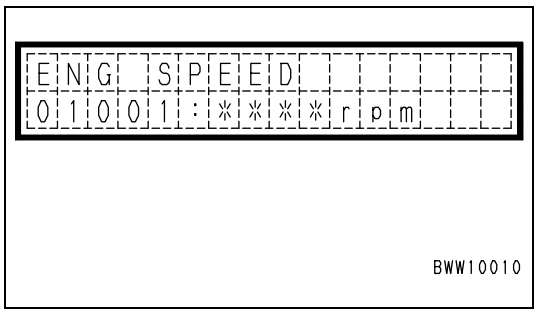
- Coolant temperature: Within operating range
- Hydraulic temperature: 45 ~ 55°C
- Torque converter oil temperature: 60 ~ 80°C

1. Measuring engine speed (low idling and high idling)

   1) Switch to the monitoring function of Service Mode 1 and display the engine speed. For details, see SPECIAL FUNCTIONS OF MACHINE MONITOR in the TROUBLESHOOTING section.

      ★ Monitoring item: ENG SPEED

   2) Start the engine, set to the measurement conditions, and measure the engine speed.



2. Measuring torque converter stall speed.

   1) Switch to the monitoring function of Service Mode 1 and use the 2-item simultaneous monitoring function to display the following 2 items. For details, see SPECIAL FUNCTIONS OF MACHINE MONITOR in the TROUBLESHOOTING section.

      ★ Monitoring items
      a. Code No.01001: Engine speed
      b. Code No.40100: Torque converter oil temperature

   2) Start the engine.

   3) Turn the transmission cut-off selector switch OFF and depress the left brake securely.

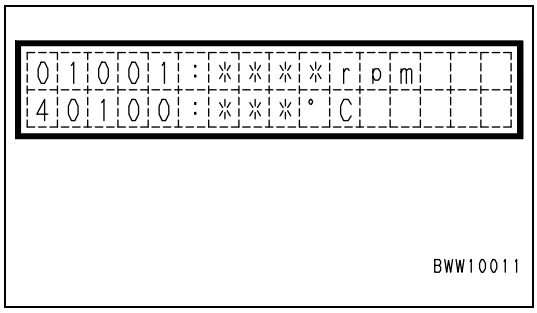
   4) Place the directional lever at F4 or R4.
      Operate the shift mode switch to MANUAL and place the speed lever at F4 or R4.

   5) Release the parking brake.

   6) Depress the accelerator pedal gradually to raise the engine speed to full throttle, and measure the engine speed when the torque converter stalls.

      ★ Measure the stall speed 2 or 3 times.

      ★ Do not keep the stall condition for more than 20 seconds. Make sure that the torque converter oil temperature does not exceed 120°C.



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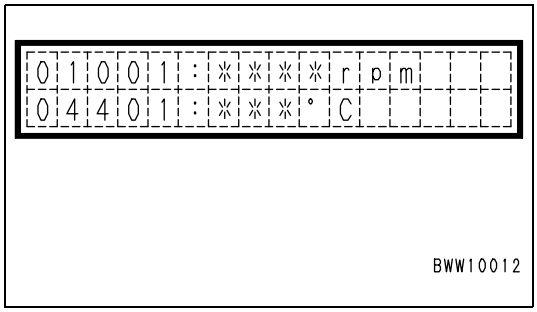
3. Measuring hydraulic stall speed:

   1) Switch to the monitoring function of Service Mode 1 and use the 2-item simultaneous monitoring function to display the following 2 items. For details, see SPECIAL FUNCTIONS OF MACHINE MONITOR in the TROUBLESHOOTING section.

      ★ Monitoring items
      a. Code No. 01001: Engine speed
      b. Code No. 04001: Hydraulik oil temperature

   2) Start the engine and run at high idling.

   3) Measure the engine speed when the boom cylinder or bucket cylinder is extended and the circuit is relieved.



4. Measuring torque converter stall + hydraulic stall (full stall) speed:

   1) The setting of the machine monitor is the same as 2-1) Measuring torque converter stall speed.

   2) Start the engine.

   3) Turn the transmission cut-off selector switch (2) OFF and depress the left brake securely.

   4) Place the directional lever at F4 or R4.

   5) Release the parking brake.

   6) Run the engine at high idling, stall the torque converter, extend the boom cylinder or bucket cylinder at the same time to relieve the circuit, and measure the engine speed.

   ★ Do not keep the stall condition for more than 20 seconds. Make sure that the torque converter oil temperature does not exceed 120°C.

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Measuring exhaust color

Special tools required

Symbol		Part No.	Part name	Qty	Remarks
G	1	799-201-9000	Handy Smoke Checker	1	Discoloration 0 ~ 70% (with standard color) (Discoloration% x 1/10 = Bosch index)
	2	Commercially available	Smoke meter	1	

When installing or removing the measuring equipment, be careful not to touch any high-temperature parts.

★ When measuring in the field where there is no air or power supply, use Handy Smoke Checker **G1**; when recording official data, use Smoke meter **G2**.

1. Measuring with Handy Smoke Checker **G1**

   1) Fit filter paper in tool **G1**.

   2) Insert the exhaust gas intake port into the exhaust pipe.

   3) Start the engine and raise the engine water temperature to the operating range.

   4) Accelerate the engine suddenly run it at high idling, and at the same time operate the handle of Handy Smoke Checker **G1** to catch the exhaust gas on the filter paper.

   5) Remove the filter paper and compare it with the scale provided to judge the condition.

2. Measuring with Smoke Meter **G2**

   1) Insert probe B of smoke meter **G2** into the outlet port of the exhaust pipe, then secure it to the exhaust pipe with the clip.

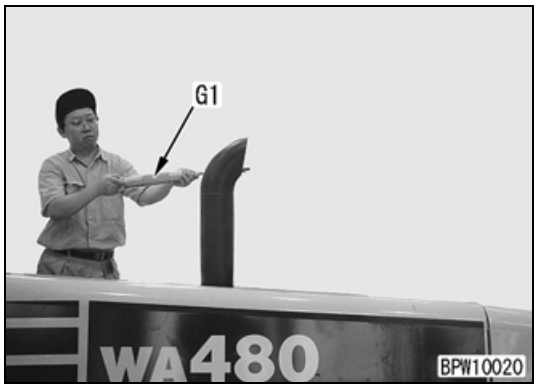
   2) Connect the probe hose, accelerator switch plug, and air hose to smoke meter **G2**. The pressure of the air supply should be less than 1.5 MPa {15 kg/cm²}.

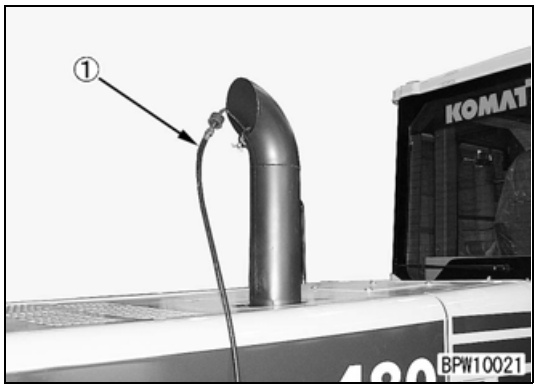
   3) Connect the power cord to the AC 100 V outlet.
   Before connecting the cord, check that the power switch of the smoke meter is OFF.

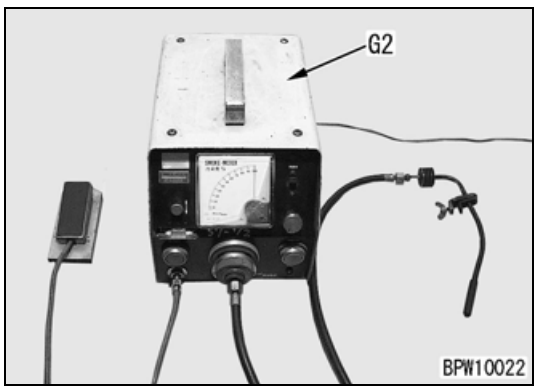
   4) Loosen the cap nut of the suction pump, then fit the filter paper. Fit the filter paper securely so that the exhaust gas does not leak.

   5) Turn the power switch of smoke meter **G2** ON.

   a. Accelerate the engine suddenly, and at the same time, depress the accelerator pedal and operate the relief valve to catch the exhaust gas color on the filter paper.







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b. Lay the filter paper used to catch the exhaust gas color on top of unused filter papers (10 sheets or more) inside the filter paper holder, and read the indicated value.

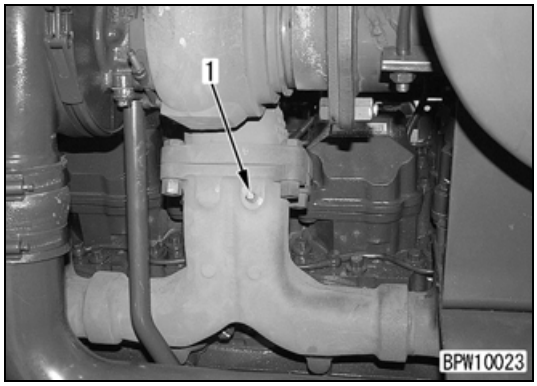
Measuring exhaust temperature

Special tool required

Symbol	Part No.	Part Name	Qty	Remarks
B	799-101-1502	Digital temperature gauge	1	-99.9 ~ 1,299°C

Wait for the temperature of the exhaust pipe to go down before installing or removing the measuring equipment.

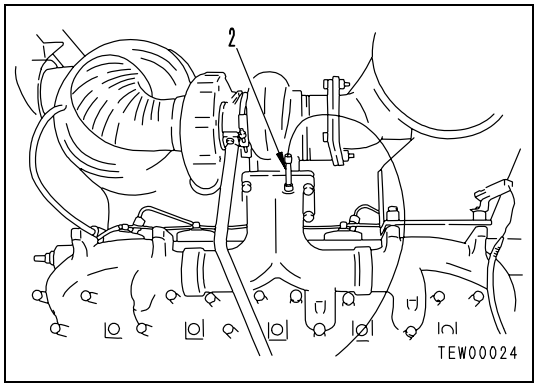
1. Remove the adiabatic cover, then remove exhaust temperature measurement plug (1).



2. Install sensor (2) and connect to digital temperature gauge **B.**

   ★ Be careful not to let the wiring harness of the temperature gauge touch the high-temperature portion.

3. When measuring the exhaust temperature at torque converter stall, do as follows.
   To prevent overheating of the torque converter, stabilize the exhaust temperature at full stall (torque converter stall + hydraulic stall), then stall the torque converter only and measure the temperature.



   1) Start the engine and raise the cooling water temperature to the operating range.

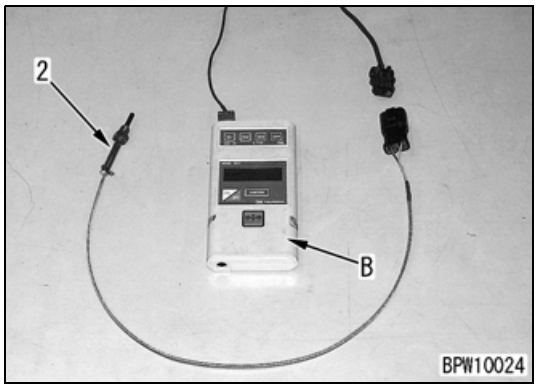
   2) Turn the transmission cut-off selector switch OFF and depress the left brake securely.

   3) Place the directional lever at F4 or R4.
   Turn the transmission manual switch ON and place the speed lever at F4 and R4.

   4) Release the parking brake.

   5) Depress the accelerator pedal gradually to raise the engine speed to full throttle, stall the torque converter, and extend boom cylinder or bucket cylinder at the same time to relieve the circuit.

      ★ Continue until the exhaust temperature is around the standard value of 650°C



Do not keep the stall condition for more than 20 seconds. Make sure that the torque converter oil temperature does not exceed 120°C.

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6) When the temperature becomes stable at around the target temperature, cancel the hydraulic relief, carry out only torque converter stall, and measure the exhaust temperature.

   ★ The exhaust temperature at full stall will start to go down, so measure the temperature when it becomes stable.

   ★ If the exhaust temperature does not go down and continues to go up, make the temperature setting at full stall higher.

7) When measuring maximum value for exhaust gas temperature, carry out actual work and measure the maximum value when operating.

   ★ Use the PEAK mode function (the maximum value can be recorded) of the temperature gauge.

   ★ The exhaust temperature differs greatly according to the ambient temperature (engine intake temperature), so if an abnormal value is recorded, compensate for the temperature.

   ★ Compensation temperature value = measured value + 2 × (converted ambient temperature – ambient temperature).

   The converted ambient temperature is taken as 20°C.

Adjusting valve clearance

Special tool required

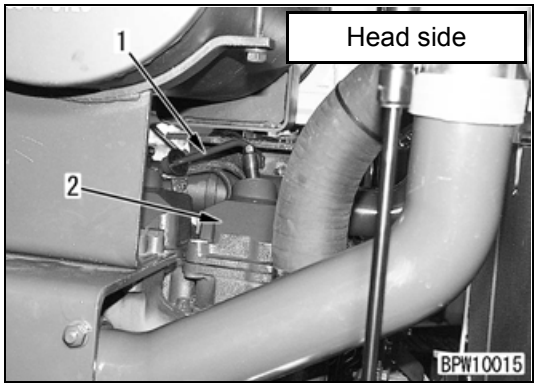
Symbol	Part No.	Part Name	Qty	Remarks
F	Commercially available	Feeler gauge	1	—

1. Open left and right engine side covers.
2. Disconnect 6 fuel high-pressure tubes (1). Remove the tube clamps also.
3. Remove cylinder head cover (2).

   kgm **Head cover mounting bolt:** 9.8 ± 1 Nm {1.0 ± 0.1 kgm}

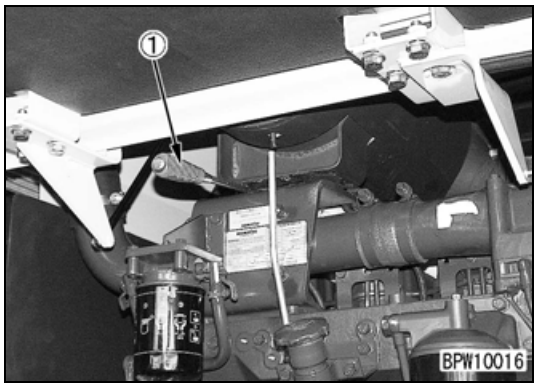
   ★ When removing the No. 1 and No. 2 head covers of the cylinder, use bar ① to raise the muffler mounting bracket, then remove tube (1) from head cover (2).





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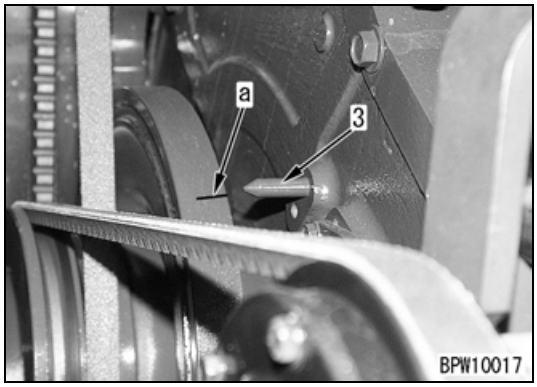
★ When removing the No. 5 and No. 6 head covers of the cylinder, remove the air cleaner assembly (including the bracket) first.



4. Rotate the crankshaft in the normal direction, and align 1.6 line **a** on the damper with pointer (3) to set the No. 1 cylinder to compression top dead center.

   Remove the wall between the engine and the radiator and move it towards the radiator.

   ★ At compression top dead center, the rocker arm can be moved by hand by the amount of the valve clearance. If the rocker arm does not move, the crankshaft is not at compression top dead center, so rotate it one more turn.



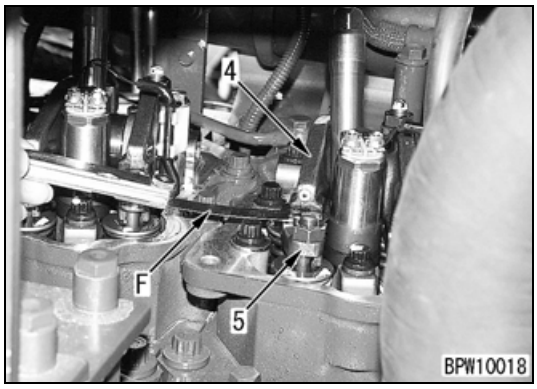
5. To adjust the valve clearance, insert feeler gauge **F** into clearance **b** between rocker arm (4) and crosshead (5), and adjust the valve clearance with adjustment screw (6).

   ★ Insert the feeler gauge and turn the adjustment screw until the clearance is a sliding fit.

6. Hold adjustment screw (6) in position and tighten locknut (7).

   kgm **Locknut:** 53.0 ~ 64.7 Nm {5.4 ~ 6.6 kgm}

   ★ After tightening the locknut, check the clearance again.

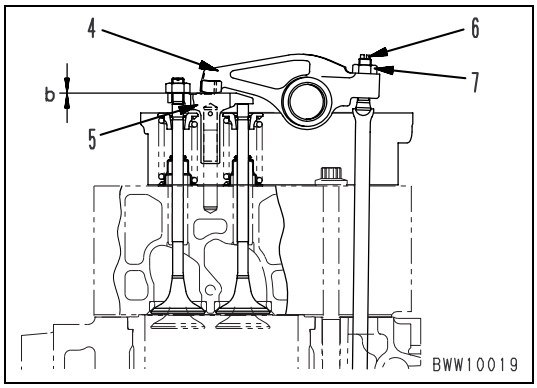


7. Rotate the crankshaft 120° each time in the normal direction and repeat the procedure in Steps 4 to 6 to adjust the clearance of the intake and exhaust valves of each cylinder according to the firing order.

   ★ Firing order: 1-5-3-6-2-4

8. After completing the measurement, return to the original condition.

   ★ For details of the assembly of the fuel high-pressure tube, see DISASSEMBLY AND ASSEMBLY.



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Measuring compression pressure

Special tools required

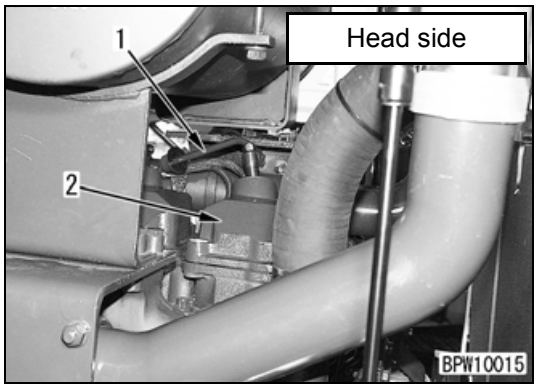
Symbol		Part No.	Part Name	Qty	Remarks
D	1	795-502-1590	Compression gauge	1	0 ~ 0.9 MPa {0 ~ 70 kg/cm²} Kit part No. 795-502-1205
	2	795-471-1410	Adapter	1	

When measuring the compression pressure, be careful not to touch the exhaust manifold or muffler and burn yourself, or to get caught in any rotating parts.

★ Measure the compression pressure with the engine warmed up (engine oil temperature: 40 ~ 60°C).

1. Open left and right engine side covers.
2. Disconnect 6 fuel high-pressure tubes (1). Remove the tube clamps also.



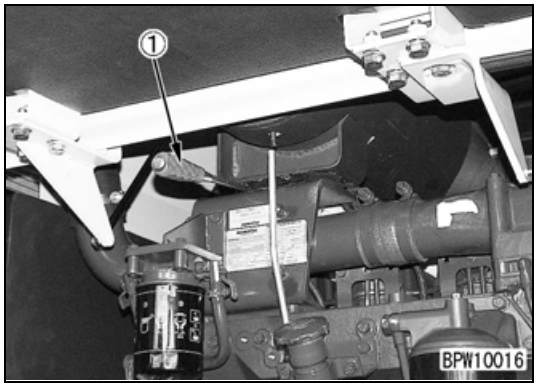


3. Remove cylinder head cover (2).

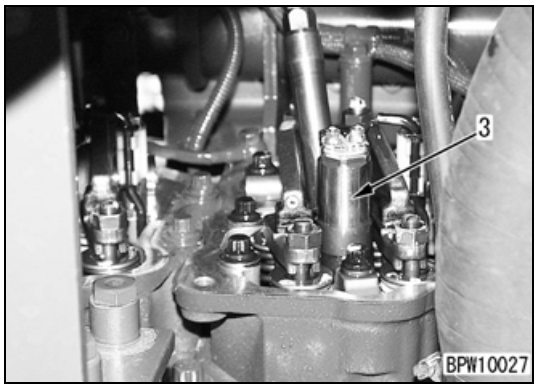
   kgm **Head cover mounting bolt:** 9.8 ± 1 Nm {1.0 ± 0.1 kgm}

   ★ When removing the No. 1 and No. 2 head covers of the cylinder, use bar ① to raise the muffler mounting bracket, then remove tube (1) from head cover (2).

   ★ When removing the No. 5 and No. 6 head covers of the cylinder, remove the air cleaner assembly (including the bracket) first.



4. Remove injector wiring harness and fuel injector (3).



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5. Fit adapter **D2** and connect to compression gauge **D1**.

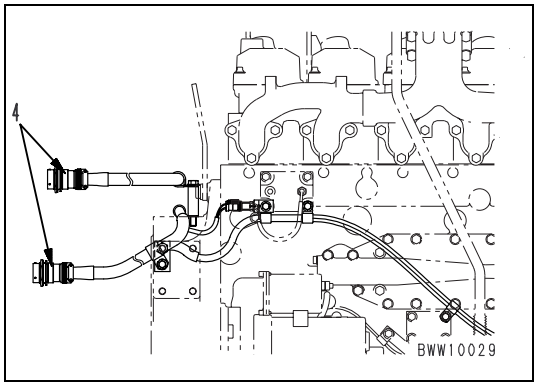
   ★ Coat the connection of the adapter and gauge with a small amount of engine oil to make leakage more difficult.

   ★ Secure the adapter with the injector holder.

   kgm **Mounting bolt:** 58.8 - 73.5 Nm {6.0 - 7.5 kgm}



6. Disconnect 2 engine centralized connectors (4) (CN EL2 and EL3).



- **If the connectors are not disconnected, there is a danger that the engine may start during the measurement, so disconnect them without fail.**
- **Cover the connector at the controller end with vinyl to prevent short circuits and leakages of electricity.**

7. Crank the engine with the starting motor and measure the compression pressure.

   ★ Measure the compression pressure at the point where the compression gauge indicator remains steady.

8. After completing the measurement, remove the measuring equipment and return to the original condition.

   ★ For details of the assembly of the fuel injector and fuel high-pressure tub, see DISASSEMBLY and ASSEMBLY.

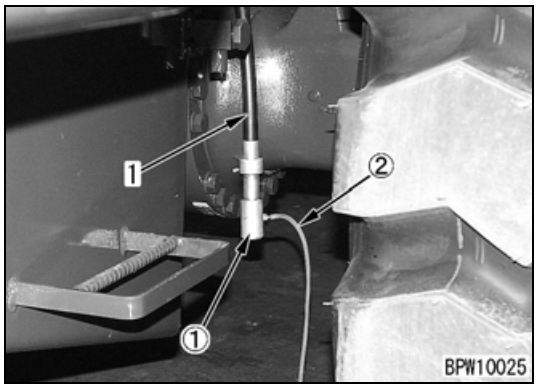
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Measuring blow-by pressure

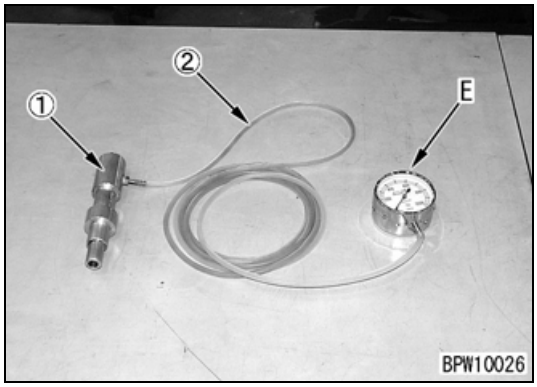
Special tool required

Symbol	Part No.	Part Name	Qty	Remarks
E	799-201-1504	Blow-by checker	1	0 ~ 4.9 kPa {0 ~ 500 mmH_2O}

1. Install nozzle ① and hose ② to blow-by hose (1), and connect to blow-by checker **E**.



2. Run the engine and raise the coolant temperature to the operating range.
3. Turn the transmission cut-off selector switch OFF and depress the left brake securely.
4. Place the speed lever at F4 and R4.
   - Turn the transmission manual switch ON and place the speed lever at F4 and R4.
5. Release the parking brake.
6. Depress the accelerator pedal gradually to raise the engine speed to full throttle, and measure the blow-by pressure when the torque converter stalls.



Do not keep the stall condition for more than 20 seconds. Make sure that the torque converter oil temperature does not exceed 120°C.

★ Precautions when measuring blow-by

Blow-by varies greatly according to the condition of the engine. Therefore, if the blow-by value is considered abnormal, check for problems connected with defective blow-by, such as excessive oil consumption, defective exhaust gas color, and prematurely dirty or deteriorated oil.

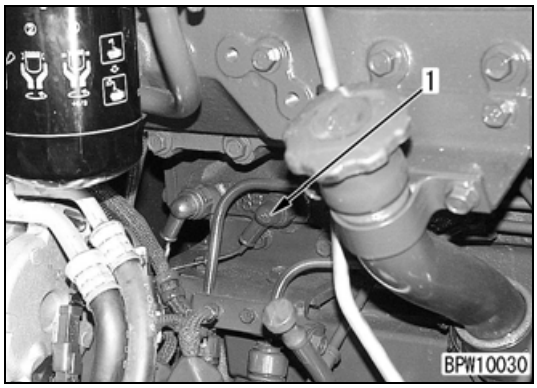
https://truckmanualshub.com/

Measuring engine oil pressure

Special tool required

Symbol	Part No.	Part Name	Qty	Remarks
C2	799-401-2320	Hydraulic gauge	1	Pressure gauge 1.0 MPa {10 kg/cm²} (Use hose in C1 tool kit)

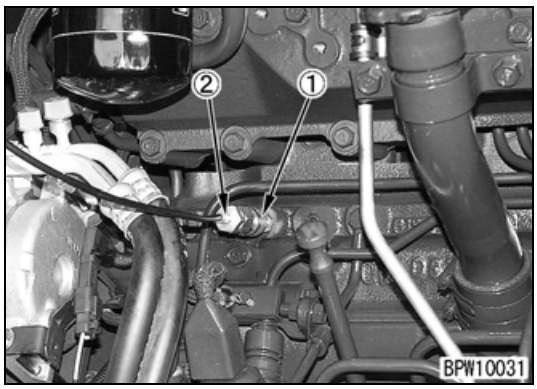
1. Open the engine right side cover.
2. Remove engine oil pressure switch (1).

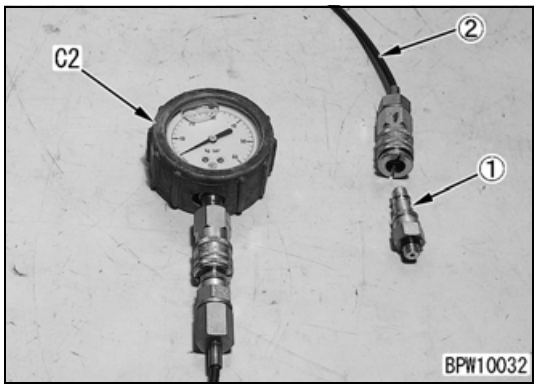


3. Install nipple ① and hose ②, and connect oil pressure gauge **C2**.

   ★ Use a 0.98 MPa {10 kg/cm²} oil pressure gauge.

4. Run the engine and raise the coolant temperature to the operating range.
5. Measure the oil pressure with the engine at low idling and high idling.
6. After completing the measurement, remove the measuring equipment and return to the original condition.





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Measuring air supply pressure (boost pressure)

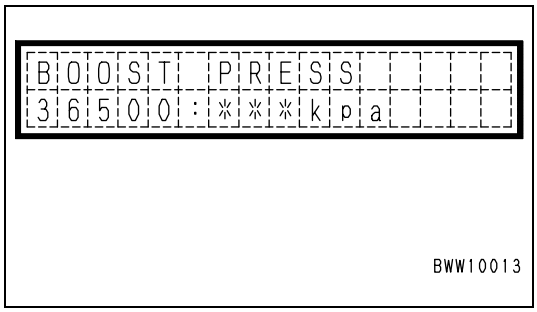
1. Switch to the monitoring function of Service Mode 1 and display the air supply pressure. For details, see SPECIAL FUNCTIONS OF MACHINE MONITOR in the TROUBLESHOOTING section.

   ★ Monitoring item: Boost pressure

2. Start the engine.
3. Turn the transmission cut-off selector switch (1) OFF and depress the left brake securely.
4. Place the speed lever at F4 or R4.

   • Turn the transmission manual switch ON and place the speed lever at F4 or R4.

5. Release the parking brake.
6. Depress the accelerator pedal gradually, and measure the air supply pressure at the rated speed when the torque converter stalls.



Measuring fuel pressure

Special tool required

Symbol	Part No.	Part Name	Qty	Remarks
C2	799-401-2320	Hydraulic gauge	1	Pressure gauge 1.0 MPa {10 kg/cm²} (Use hose in C1 tool kit)

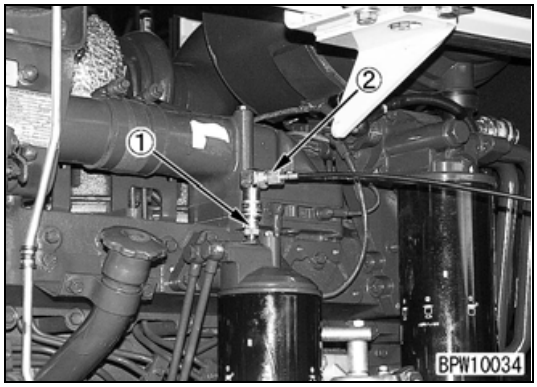
★ When measuring the fuel pressure, measure only the low pressure circuit between the feed pump - fuel filter - fuel supply pump.

Extremely high pressure is generated in the high-pressure circuit between the fuel supply pump - common rail - fuel injector, so it cannot be measured.

1. Open the engine right side cover.
2. Remove the fuel pressure measurement plug (1).
3. Install nipple ① and hose ②, and connect oil pressure gauge **C2**.

   ★ Use a 0.98 MPa {10 kg/cm²} oil pressure gauge.



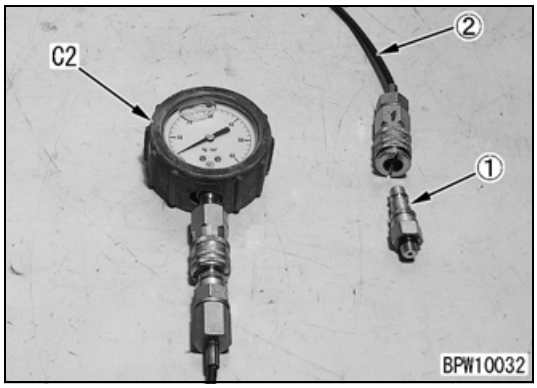


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4. Run the engine and measure the fuel pressure at high idling.

   ★ For details of the standard value, see Troubleshooting of Engine Controller System.

5. After completing the measurement, remove the measuring equipment and return to the original condition.



Adjusting engine speed sensor

★ G speed sensor (CN-G) and Ne speed sensor (CN-NE) for the engine controller cannot be adjusted.

★ Adjust the engine speed sensor (CN-EREV) as follows.

1. Open the engine right side cover.

2. Screw in until the tip of sensor (1) contacts the tip of the tooth of flywheel ring gear (2).

   ★ Check that there are no scratches or metal particles stuck to the tip of the sensor.

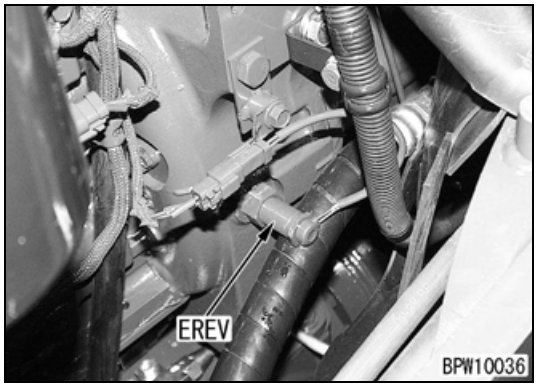
   Thread portion: Hydraulic sealant

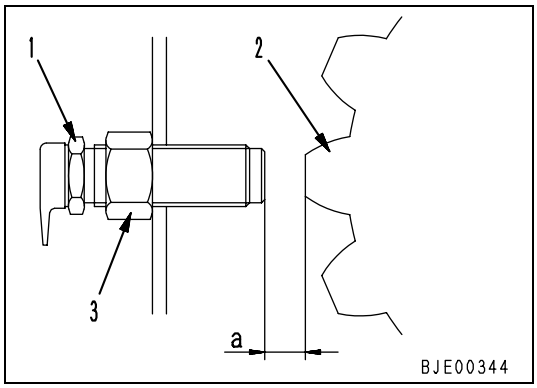
3. Turn sensor (1) back 1/2 - 2/3 turns from that position.

   ★ Adjust clearance a between so that the tip of the sensor and the tip of the gear tooth is 0.75 ~ 1.00 mm.

4. Secure sensor (1) with nut (3).

   Nut: 9 ~ 74 Nm {7.0 ~ 7.5 kgm}





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Handling equipment in fuel system

★ Precautions for inspection and maintenance of fuel system.

The common rail type fuel injection system is constructed of more precise components than the conventional fuel injection pump and nozzle, so problems may occur if dirt or dust get in.

When carrying out inspection and maintenance of the fuel system, pay more attention than usual to prevent dirt or dust from getting in. If there is any dirt stuck to any part, use clean fuel to wash it off completely

★ Precautions when replacing fuel filter cartridge.
Always use a genuine Komatsu part for the fuel filter cartridge.

The common rail type fuel injection system is constructed of more precise components than the conventional fuel injection pump and nozzle, so a special filter with high efficiency filtering ability is used to prevent dirt or dust from getting in.

For this reason, if any filter is used as a substitute for the genuine filter, there is danger that problems will occur with the fuel system. To prevent this, never use such filters.

Releasing remaining pressure in fuel system

★ When the engine is running, pressure is generated in both the low-pressure circuit and the high-pressure circuit of the fuel line.

Low-pressure circuit:
Feed pump - fuel filter - fuel supply pump
High-pressure circuit:
Fuel supply pump - common rail - fuel injector

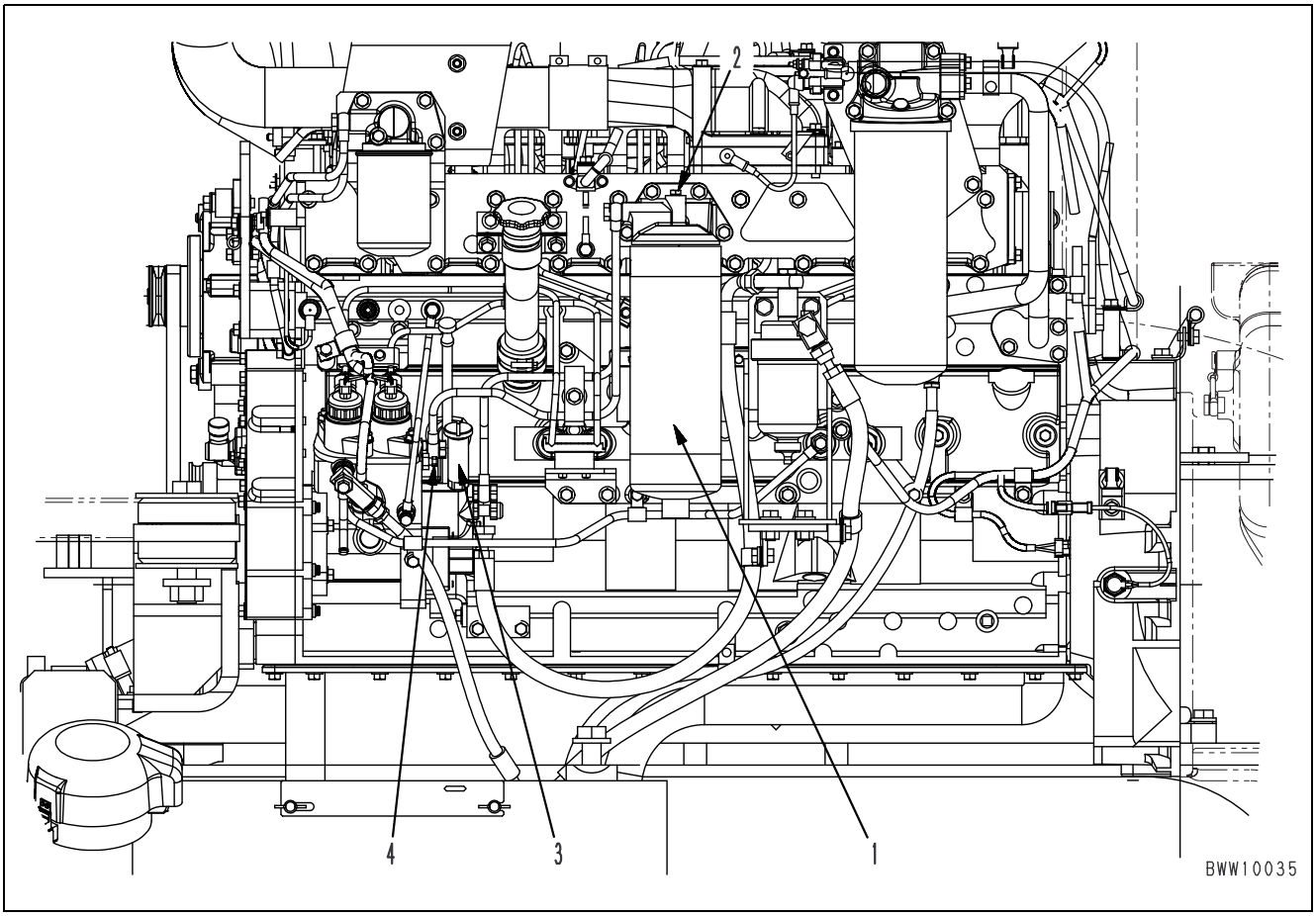
★ For both the low-pressure circuit and high-pressure circuit, the pressure automatically goes down to a safe level 30 seconds after the engine is stopped.

★ The remaining pressure in the fuel system must be completely released before carrying out inspection of the fuel system or removal or installation of the equipment. Always follow the following precautions when carrying out the operation.

When inspecting the fuel line or removing or installing equipment, wait for at least 30 seconds after the engine is stopped, and release the remaining pressure in the fuel system before starting the operation. (There is still pressure remaining in the circuit, so do not start the operation immediately after the engine is stopped.)

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Bleeding air from fuel circuit



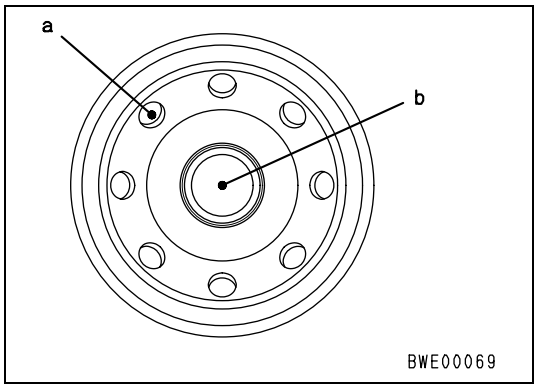
★ Bleeding the air as follows if the engine has run out of fuel or the fuel circuit equipment has been removed and installed.

1. Remove fuel filter (1), fill with fuel, then install again.

   ★ When filling, use clean fuel and be careful not to let dirt get in.

   ★ Add fuel through inlet port portion **a** (8 places) of the filter. Portion **b** is the outlet port (clean side) after the fuel has been filtered, so never add fuel from here.

   ★ If clean fuel is not available, do not remove the filter. Operate the priming pump to fill the filter with fuel.



2. Remove air bleed plug (2) of the fuel filter and operate priming pump (3).

   ★ Continue operating the priming pump until flow out from the plug hole. When fuel comes out, install the plug.

   kgm **Air bleed plug:** 7.8 ~ 9.8 Nm {0.8 ~ 1.0 kgm}

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3. Loosen air bleeder (4) of the fuel supply pump and operate priming pump (3) 90 to 100 times.

   ★ Continue operating the priming pump until fuel flows out from the bleeder. When fuel comes out, tighten the bleeder, then operate several times until the priming pump becomes stiff.

   kgm **Air bleeder:** 4.9 ~ 6.9 Nm {0.5 ~ 0.7 kgm}

4. Crank the engine with the starting motor and start the engine.

   ★ When the engine is cranked, the air in the high-pressure circuit is automatically bled.

   ★ If the engine does not start, the air has probably been not properly bled from the low-pressure circuit, so repeat the procedure from Step 2.

Reduced cylinder mode operation for engine

★ Reduced cylinder mode operation for the engine means setting the fuel injectors of a single cylinder or multiple cylinders electronically to the NO injection condition to run the engine on a reduced number of cylinders.

The reduced cylinder mode operation is used when it is thought that one of the engine cylinders is not giving normal output (combustion). It is a method to determine which cylinder is not operating normally.

★ The reduced cylinder mode operation is carried out by using the reduced cylinder mode operation setting function on the monitor panel.

★ For details of the method of operation, see the TROUBLESHOOTING, Monitor panel display and special functions.

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Checking for leakage in fuel system

With the fuel system, the high-pressure circuit is under extremely high pressure, so if fuel leaks when the engine is running, there is danger of fire.

Check for fuel leakage as follows when checking the fuel circuit or when equipment has been removed and installed.

★ To make it easier to check for fuel leakage, wipe the engine itself and the surrounding area clean and remove all oil and grease before starting the inspection.

1. Spray the fuel supply pump, common rail, fuel injector, and high-pressure piping connections with a color checker (developing solution).

2. Start the engine, run it at under 1000 rpm, and when the speed stabilizes, stop the engine.

   1) Check the fuel piping and equipment for fuel leakage.

   ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
   If there is fuel leakage, carry out repairs, then repeat the check from Step 2.

3. Start the engine and run it at low idling.

   1) Check the fuel piping and equipment for fuel leakage.

   ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
   If there is fuel leakage, carry out repairs, then repeat the check from Step 2.

4. Start the engine and run it at high idling.

   1) Check the fuel piping and equipment for fuel leakage.

   ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
   If there is fuel leakage, carry out repairs, then repeat the check from Step 2.

5. Start the engine, run it at high idling, then apply load to the engine.

   ★ Extend the boom cylinder and relieve the circuit.

   1) Check the fuel piping and equipment for fuel leakage.

   ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
   If there is fuel leakage, carry out repairs, then repeat the check from Step 2.
   If no fuel leakage is found, the check is complete.

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Adjusting accelerator pedal potentiometer

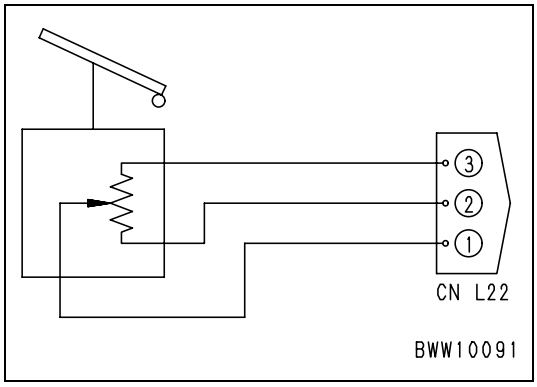
Special tool required

Symbol	Part No.	Part Name	Qty	Remarks
N	79A-264-0211	Tester	1	—

1. Measuring
   Output voltage of accelerator pedal potentiometer

   1) Measure the output voltage of the potentiometer when the engine is running at low idling and high idling.

   ★ Connect a T-adapter to CN L22 and measure the voltage between ① and the ground.



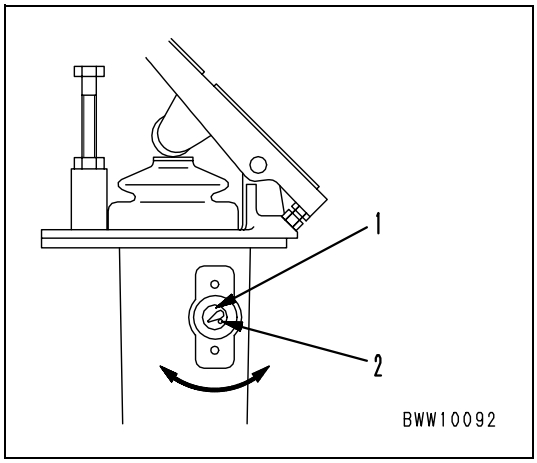
2. Adjusting
   Adjusting output voltage of potentiometer

   1) Check that punch mark (2) made on intermediate connector (1) between the case and potentiometer is on the side where it can be seen.

      Insert the protruding part of the potentiometer into the groove in the intermediate connector, then temporarily tighten the mounting screw.

      Potentiometer mounting surface
      Cemedyne POS seal

      Potentiometer mounting screw
      LT-2



   2) Set the pedal to the low idling position, impress a voltage of DC 5 V on the potentiometer, and turn the potentiometer to the left and right to set it within the range for the low idling output voltage.

      • Output voltage at low idling: 4.1 $^{+0.2}_{-0.1}$ V

      Operate the pedal 2 or 3 times and check that the voltage range at the low idling position. If the voltage is not within the specified range, carry out the adjustment again.

      ★ When adjusting the low idling output voltage, first operate the pedal 2 or 3 times at the lowest output voltage position, then turn the potentiometer to increase the voltage until it is within the specified voltage range. This will keep the play on one side and make it easier to adjust.

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3) Next, operate the pedal to the high idling position and check that the voltage is within the high idling output voltage range.

   • Output voltage at high idling: 0.7 ± 0.2 V

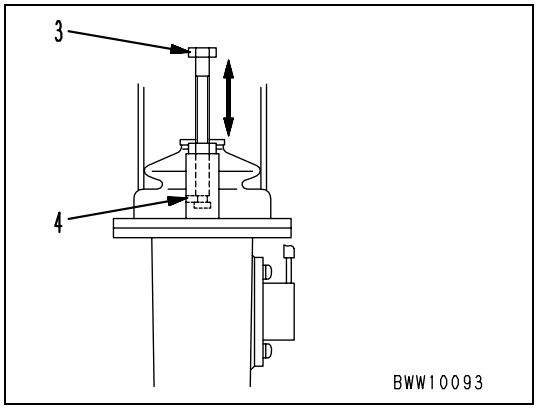
   If the voltage is not within the specified range, adjust the low idling voltage again within the specified range and adjust so that both the low idling and high idling voltages are the specified voltage.

4) If the high idling voltage does not enter the voltage range with the procedure up to Step 3), remove pin (4) from the bottom of stopper bolt (3), loosen the stopper bolt, and move it up or down to adjust so that the high idling voltage is within the voltage range.

   ★ Adjust the position of the hole so that pin (4) can enter the hole at the bottom of the bolt.

   ★ Stopper bolt (3) is already properly adjusted, so do not adjust it unless there is some special reason.

5) Tighten the potentiometer mounting screw.



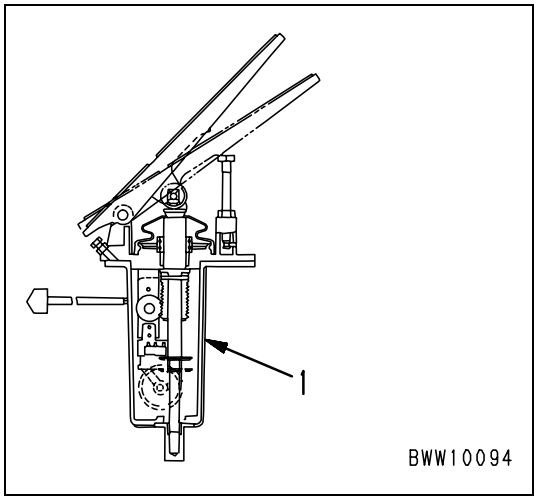
Adjusting accelerator pedal microswitch

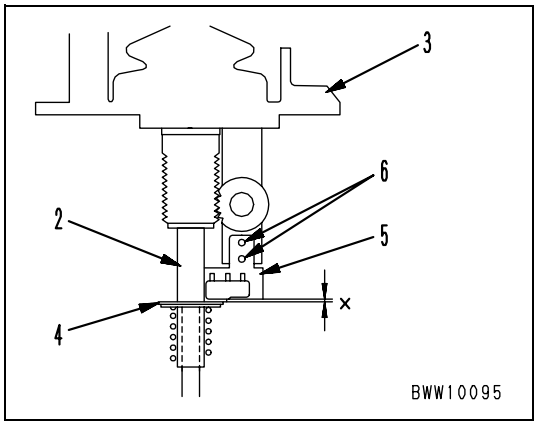
Special tool required

Symbol	Part No.	Part Name	Qty	Remarks
F	Commercially available	Feeler gauge	1	—

1. Remove the accelerator pedal assembly.
2. Remove case (1).
3. Set so that rod (2) pushes against body (3) and guide (4) pushes against the stepped portion of the rod. Then insert a clearance gauge between the guide and bracket, and tighten screw (6) so that clearance **x** between spring guide (4) and bracket (5) is within the standard value.

   • Clearance **x**: 0.1 ~ 0.2 mm





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4. Installation of case

   1) Install case (1) to body (3).

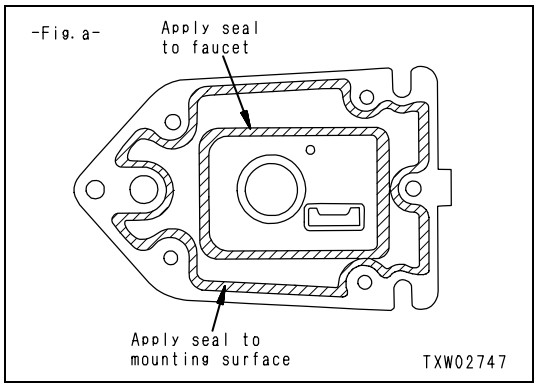
   Mounting surface of case
   Cemedyne POS seal

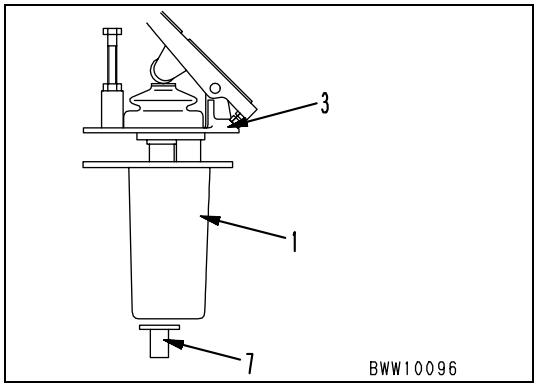
   ★ For details of coating with adhesive, see Diagram a.

   2) Install rod guide (7).

   Mounting surface of case
   Cemedyne POS seal

5. Install the accelerator pedal assembly to the machine.





Adjusting transmission speed sensor

- Adjust speed sensor (1) (CN-REV OUT) as follows.

1. Remove the cover at the left side of the rear frame.
2. Screw in until the tip of sensor (1) contacts the tip of the tooth of gear (2).

   ★ Check that there are no scratches or metal particles stuck to the tip of the sensor.

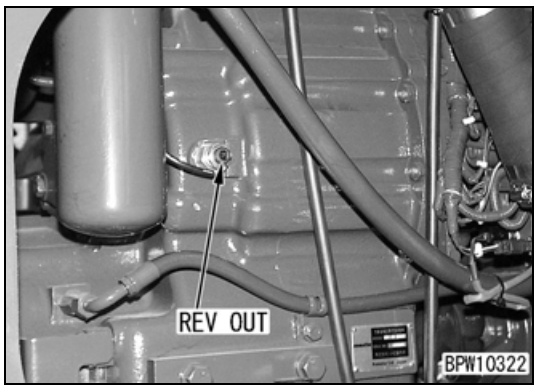
   Thread portion:
   Gasket sealant (LG-5)

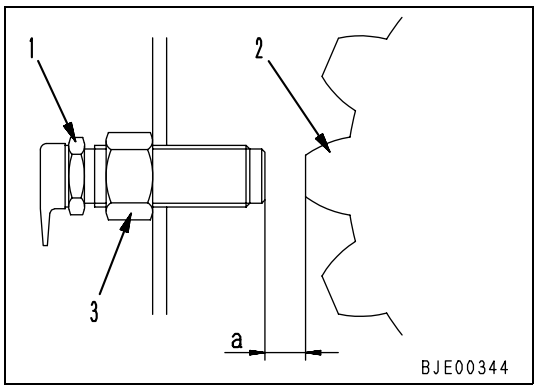
3. Turn sensor (1) back 1/2 - 1 turn from that position.

   ★ Adjust clearance **a** between the tip of the sensor and the tip of the gear tooth to approx. 1.5 mm.

4. Secure sensor (1) with nut (3).

   Nut
   69 ~ 74 Nm {7.0 ~ 7.5 kgm}





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Testing and adjusting power train oil pressure

Special tools required

Symbol	Part No.	Part Name	Qty	Remarks
C1	799-101-5002	Analog type hydraulic tester	1 Set	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm²}
	790-261-1203	Digital type hydraulic tester	1 Set	Pressure gauge: 58.8 MPa {600 kg/cm²}

- **Put block under the tires.**
- **Wait for the temperature of the oil to go down before installing or removing the measuring equipment.**

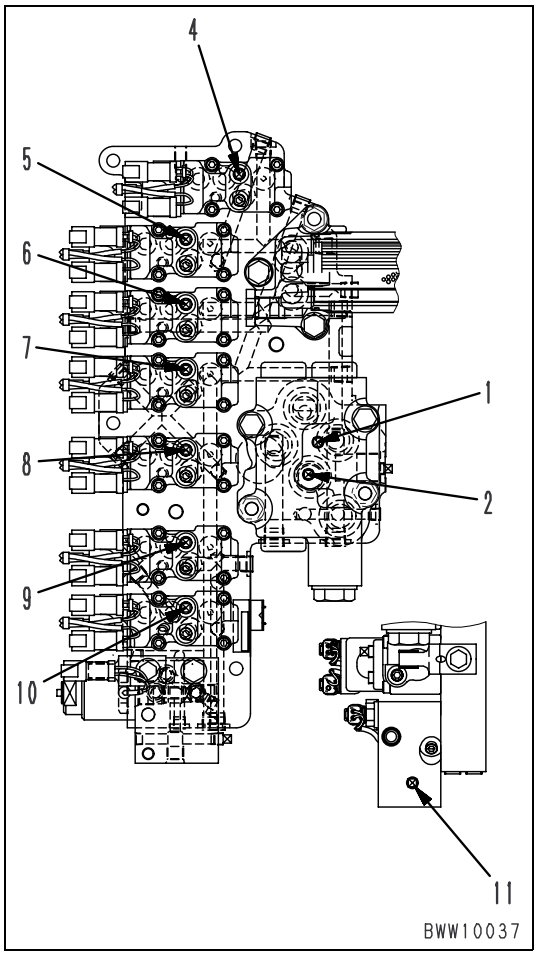
★ Measure the power train oil pressure under the following conditions.

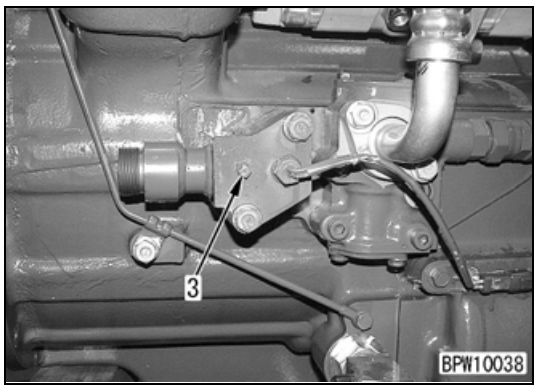
- Coolant temperature: Within operating range
- Power train oil temperature: 60 ~ 80°C
- Remove the cover at the left side of the rear frame.

★ Turn the transmission cut-off selector switch OFF and use the left brake.

Oil pressure measuring position and measuring gauges

No.	Measuring Oil Pressure	Gauge MPa {kg/cm²}
1	Main relief pressure	5.9 {60}
2	Torque converter relief pressure	5.9 {60}
3	Torque converter outlet pressure	0.98 {10}
4	Transmission F clutch pressure	5.9 {60}
5	Transmission R clutch pressure	5.9 {60}
6	Torque converter lock-up clutch pressure	5.9 {60}
7	Transmission 4th clutch pressure	5.9 {60}
8	Transmission 1st clutch pressure	5.9 {60}
9	Transmission 3rd clutch pressure	5.9 {60}
10	Transmission 2nd clutch pressure	5.9 {60}
11	Parking brake pressure	5.9 {60}

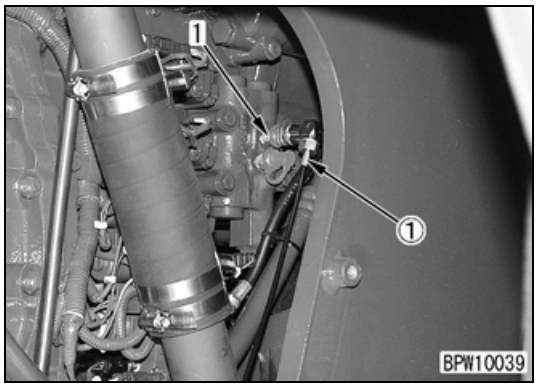




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1. Measuring main relief pressure

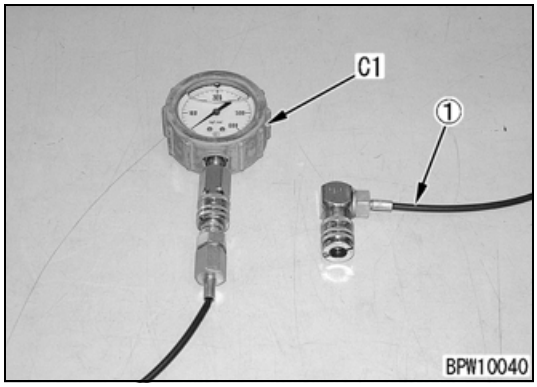
   1) Install hose ① to oil pressure measurement nipple (1).



   2) Connect oil pressure gauge **C1**.

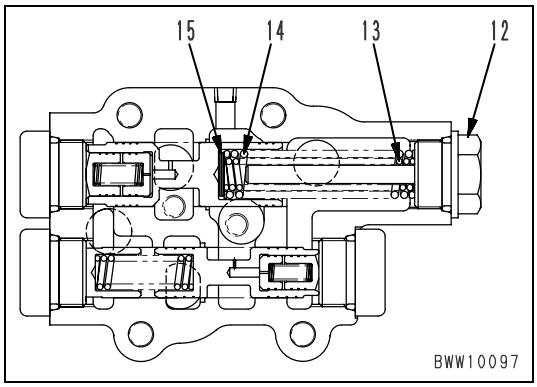
   3) Start the engine, keep the gearshift lever at the **N** position, and measure the oil pressure with the engine at low idling and rated speed.

   4) After completing the measurement, remove the measuring equipment and return to the original condition.



2. Adjusting the main relief valve

Adjust the main relief valve with the engine stopped.



   - If the main relief pressure is not within the standard value, adjust as follows.

   1) Remove plug (12).

   2) Remove inner spring (13) and outer spring (14).

   3) Adjust by changing the thickness of shim (15).

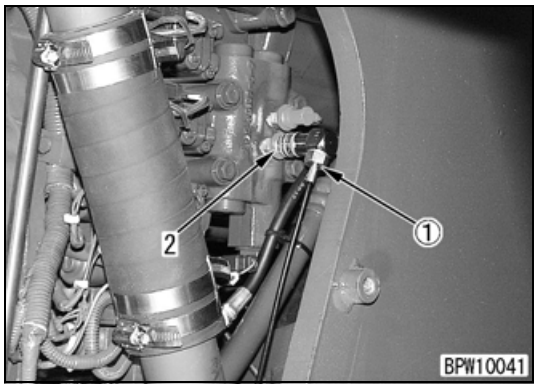
      ★ Standard shim thickness: 0.5 mm (0.5 × 1)

      ★ Amount of adjustment for one shim:
      0.04 MPa {0.4 kg/cm²}

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3. Measuring torque converter relief pressure (inlet)

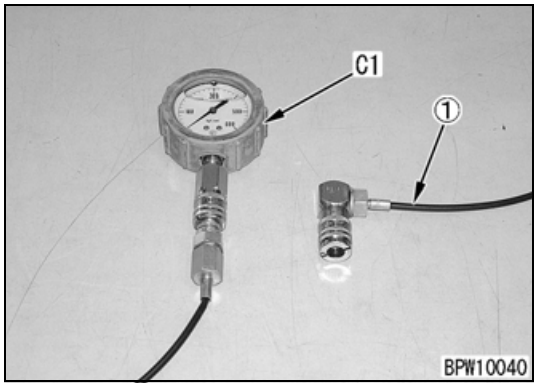
   1) Install hose ① to oil pressure measurement nipple (2).



   2) Connect oil pressure gauge **C1**.

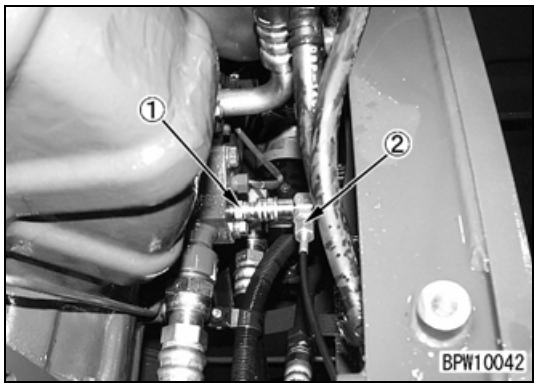
   3) Start the engine, keep the gearshift lever at the **N** position, and measure the oil pressure with the engine at rated speed.

   4) After completing the measurement, remove the measuring equipment and return to the original condition.



4. Measuring torque converter outlet pressure

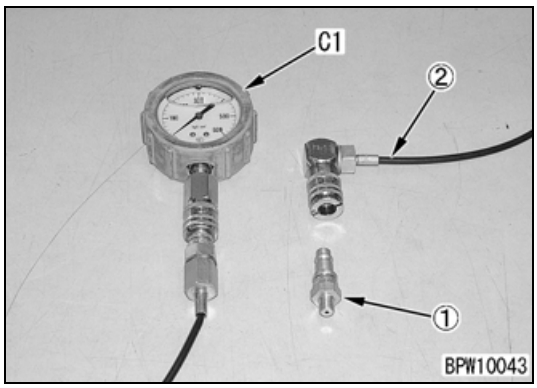
   1) Remove oil pressure measurement plug and install nipple ① and hose ②.



   2) Connect oil pressure gauge **C1**.

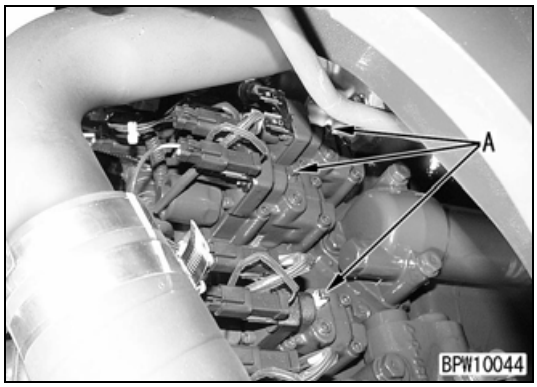
   3) Start the engine, keep the gearshift lever at the **N** position, and measure the oil pressure with the engine at rated speed.

   4) After completing the measurement, remove the measuring equipment and return to the original condition.



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5. Measuring transmission clutch pressure
Remove measurement plug **A** of the ECMV valve, install the nipple and the hose, then connect oil pressure gauge **C1**.



1) 1st, 2nd, 3rd, 4th clutch

- Plug 7: 4th clutch pressure
- Plug 8: 1st clutch pressure
- Plug 9: 3rd clutch pressure
- Plug 10: 2nd clutch pressure

a) Depress the brake.
b) Start the engine and turn the parking brake switch OFF.
c) Run the engine at low idling, set the directional lever at N, switch the shift mode selector switch to the MANUAL position, then place the speed lever in the speed range to be measured.
d) With the engine at low idling, keep the brake depressed, place the directional lever on F or R, then return the directional lever to N.

★ The above operation is carried out because when the directional lever is at N, even if the speed lever is operated, the speed range is not shifted.

⚠ **The machine will move, so check carefully that the surrounding area is safe.**

e) Measure the oil pressure of the measurement clutch oil with the engine at rated speed.
f) After completing the measurement, remove the measuring equipment and return to the original condition.

2) F, R clutch (measurement plug: 4, 5)

a) Depress the brake.
b) Start the engine and turn the parking brake switch OFF.
c) Place the gearshift mode selector switch at MANUAL.
d) With the engine at low idling, keep the directional lever at N, and operate the speed lever to 4th speed.
e) With the engine at low idling, keep the brake depressed, place the directional lever in F or R, then return the directional lever to N

⚠ **The machine will move, so check carefully that the surrounding area is safe.**

f) Run the engine at rated speed and measure the F and R clutch oil pressure.
g) After completing the measurement, remove the measuring equipment and return to the original condition.

3) Torque converter lock-up clutch (measurement plug: 6)

⚠ **The measurement is made with the machine travelling, so check carefully that the surrounding area is safe.**

a) Depress the brake.
b) Place the gearshift mode selector switch at AUTO.
c) Turn the parking brake switch OFF.
d) Place the speed lever at 3rd.
e) Place the directional lever at F and drive the machine.
f) Travel with the engine running at rated speed and measure the oil pressure at the point where the lock-up pilot lamp lights up in F3.
g) After completing the measurement, remove the measuring equipment and return to the original condition.

4) Measuring parking brake pressure (measurem. plug: 11)

a) Turn the parking brake switch OFF.
b) Start the engine and measure the pressure with the engine at low idling.

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Flushing torque converter, transmission hydraulic circuit

★ Metal particles and other dirt in the torque converter and transmission hydraulic circuit will reduce the life of the torque converter and transmission, and will cause internal damage. To prevent this, carry out flushing to remove the dirt in the hydraulic circuit.

1. Flush the circuit if the following conditions apply.

   1) If there has been any breakage of the torque converter, transmission, or hydraulic equipment, and metal particles are circulating in the hydraulic circuit.

   2) When the torque converter and transmission have been overhauled or repaired.

2. Install a new filter cartridge.

   1) Drain the oil from the filter piping.

   2) remove the transmission oil filter cartridge, then install the cartridge (714-07-28711).

3. Fill the transmission case with oil.

   Add fresh oil through the oil filter port to the specified level, and run the engine to circulate the oil through the system. Then check the level again.

   Transmission case: 65 l

4. Carry out flushing as follows.

   1) After starting the engine, run the engine for approx. 20 minutes at low idling without operating the speed lever or directional lever.

      ★ From time to time, raise the engine speed to approx. 1500 rpm. If the ambient temperature is low and the engine water temperature gauge does not enter the white range, continue the warming-up operation.

   2) Travel or carry out actual operations for 20 minutes.

      ★ Use all the speed ranges (FORWARD, REVERSE, and 1st - 4th).

   3) Repeat the procedure in step 4-1) and run the engine at low idling for approx. 20 minutes.

5. Replace the filter cartridge.

   1) Using the procedure in Step, 2 replace the cartridge used for flushing with the new cartridge (714-07-28711).

      If the cartridge used for flushing is used for a long time, there will be premature clogging, so always replace the flushing element with the standard element.

   2) Add oil and check the level again.

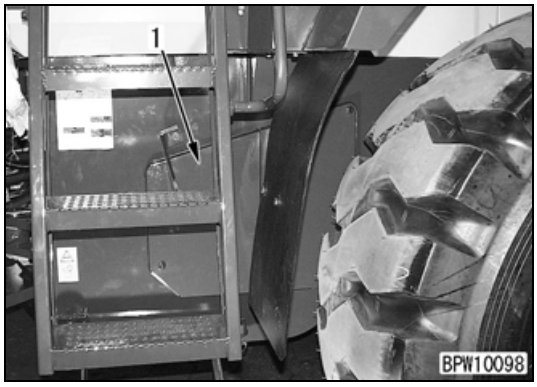
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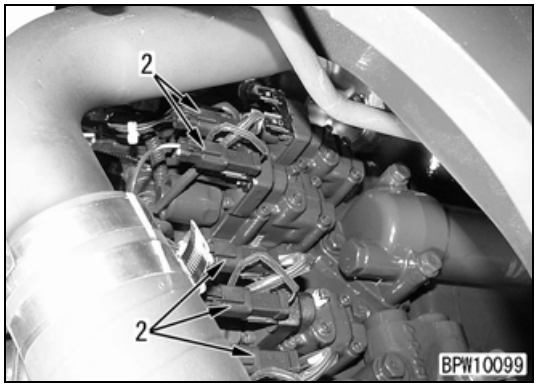
Moving machine when transmission valve fails

Special tool required

Symbol	Part No.	Part Name	Qty	Remarks
K	794-423-1190	Plug	1	M20 x 1.5

★ If the machine cannot be moved because of a failure in any parts of the transmission valve system (electrical system, solenoid valves, spools, etc.), it is possible to move the machine by installing plug **K**.





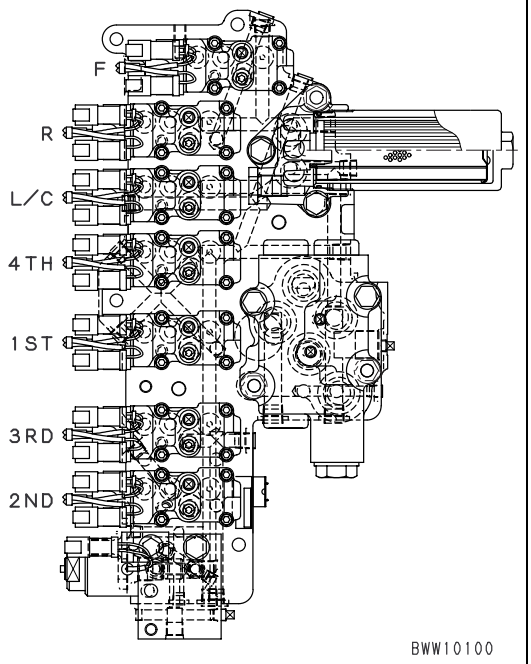
- **Plug K is only for emergency use when the machine cannot be moved in any speed range because of a failure in the transmission control valve. Install plug K to the ECMV only when there has been a failure and it is necessary to move the machine from a dangerous working area to a safe place for repairs.**
- **When carrying out this operation, keep strictly to the procedure and pay careful attention to safety when moving the machine.**
- **To prevent the machine from moving, lower the work equipment completely to the ground, apply the parking brake, and put blocks under the tires.**
- **Carry out the operation with the engine stopped.**
- **Be careful not to burn yourself if the oil is hot.**

1. Remove cover (1) at the left side of the rear frame.

   ★ Wash the area around the ECMV clean and remove all dirt and mud.

2. Disconnect wiring connector (2) of each ECMV. (12 places, L/C specification: 14 places)

ECMV allocation diagram



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3. Depending on the direction for moving the machine (forward or reverse), remove 2 ECMV solenoids (3) and install plug **K**.

   - FORWARD: F solenoid and 2nd solenoid
   - REVERSE: R solenoid and 2nd solenoid

   ★ If there is any mistake in the selection of the solenoid to remove, there is danger that the transmission may be damaged.

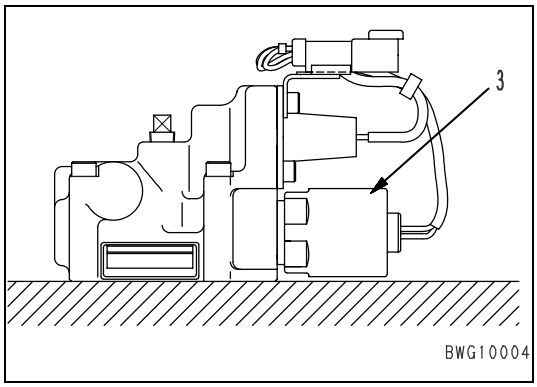
   ★ Install plus **K** with the protruding surface facing the ECMV. Check also that there is an O-ring installed to the mating surface.

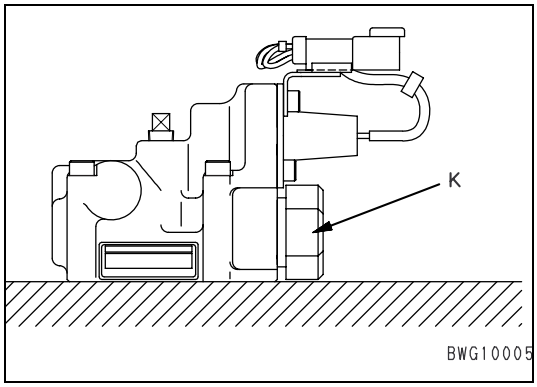
   ★ Be careful not to let any dirt or mud get inside the removed solenoid or valve.

4. Depress the brake pedal securely.

5. Start the engine, release the parking brake, then release the brake pedal gradually to allow the machine to start, and move the machine.

   ★ If a failure in the electrical system makes it impossible to release the parking brake, release the parking brake manually. For details, see MANUAL RELEASE METHOD FOR PARKING BRAKE.





- **Remove the blocks from under the tires.**
- **When the engine is started, the transmission is also engaged to start the machine. To ensure safety when starting the engine, check carefully that the direction of travel and area around the machine are safe, and always keep the brake pedal depressed.**
- **After moving the machine, stop the engine, apply the parking brake, and put blocks under the tires.**

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Testing and adjusting steering control

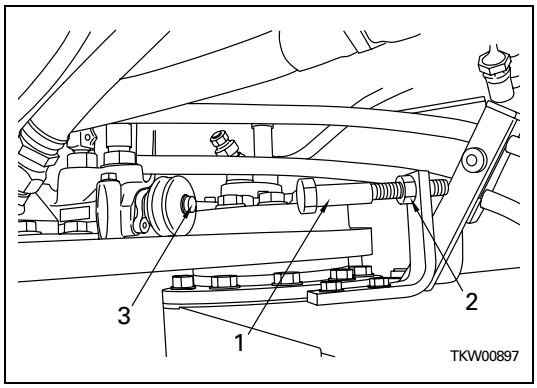
★ Measurement conditions

- Hydraulic oil temperature: 45 ~ 55°C
- Engine speed: 1,200 rpm
- Road surface: Flat, horizontal, dry paved surface
- Tire inflation pressure: Standard pressure

Testing

1. Start the engine, operate the steering wheel, and set the front and rear frames straight.
2. Check the looseness of locknut (2), or stopper bolt (1).
3. Start the engine and measure clearance between the front frame and rear frame stopper when the steering wheel is turned fully to the left and right.

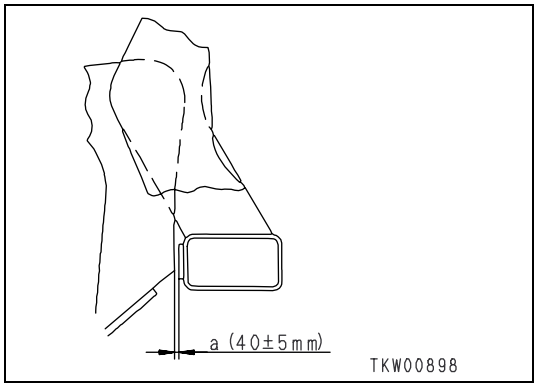
   ★ When measureing the clearance, check that the end face of the spool of stop valve (3) is in contact with the head of the stopper bolt.



Adjusting

1. Adjust the stopper bolt.
   1) Screw in stopper bolt (1) to make it the minimum length.
   2) Run the engine at low idling and operate the steering slowly to contact the frame stopper.
   3) Turn the stopper bolt until the head of stopper bolt (1) contacts the end face of the spool of the stop valve (3).
   4) Set the machine facing straight, and stop the engine.
   5) Loosen stopper bolt (1) 8.5 turns, then lock it in position with locknut (2).
   6) Carry out steps 1) thru 5) for both the left and right sides.
2. Start the engine and measure clearance **a** between the front frame and rear frame stopper when the steering wheel is turned fully to the left and right.

   ★ When measuring the clearance, check that the end face of the spool of stop valve (3) is in contact with the head of the stopper bolt.



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Testing and adjusting steering oil pressure

Special tools required

Symbol	Part No.	Part Name	Qty	Remarks
C1	799-101-5002	Analog type hydraulic tester	1 Set	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm²}
	790-261-1203	Digital type hydraulic tester	1 Set	Pressure gauge: 58.8 MPa {600 kg/cm²}

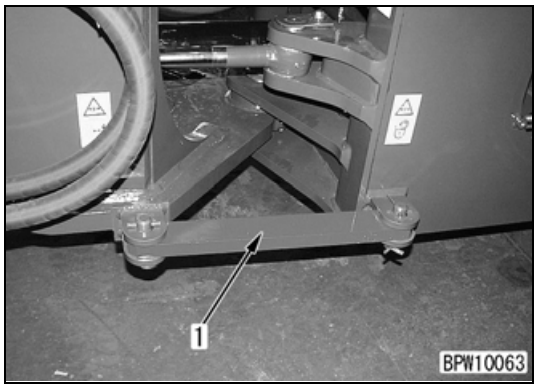
- Hydraulic oil temperature: 45 ~ 55°C

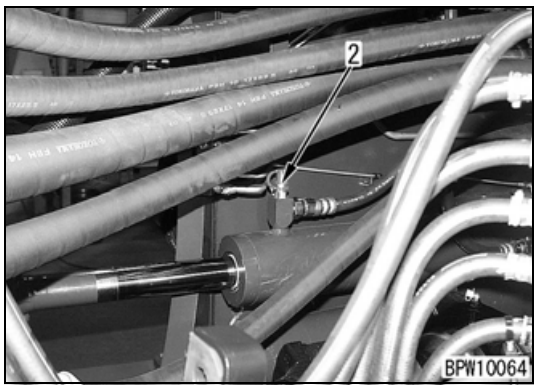
Measuring

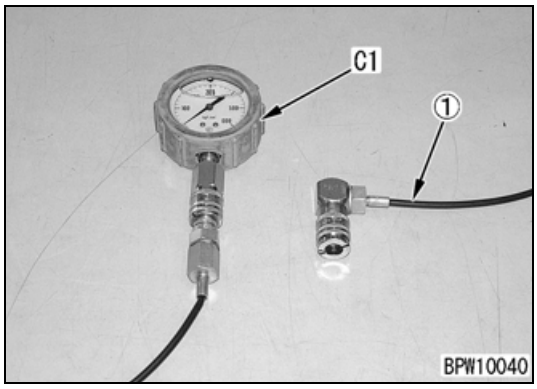
Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank, and operate the steering wheel 2 or 3 times to release the remaining pressure in the hydraulic piping.

1. Fit safety bar (1) to the frame.
2. Install oil pressure gauge **C1** (39.2 MPa {400 kg/cm²}) to nipple (2) for measuring the left turn steering circuit.
3. Run the engine at high idling, then turn the steering wheel to the left and measure the pressure when the relief valve is actuated.

   ★ If the plug for the right turn steering circuit was removed, turn the steering wheel to the right and measure the pressure.





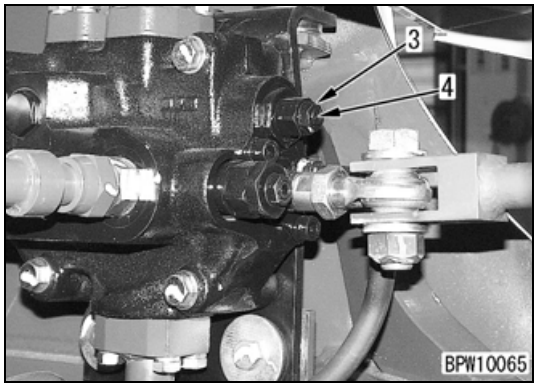


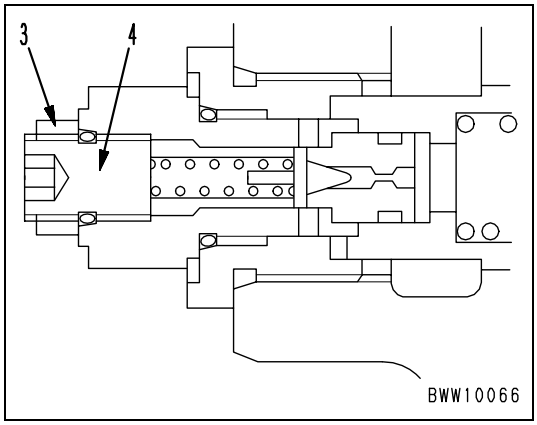
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Adjusting

Always stop the engine before adjusting the pressure.

1. Stop the engine.
2. Loosen locknut (3), then turn adjustment screw (4) to adjust.
   - ★ Turn the adjustment screw to adjust the pressure as follows.
     - To INCREASE pressure, turn CLOCKWISE
     - To DECREASE pressure, turn COUNTERCLOCKWISE
   - ★ Pressure adjustment for one turn of adjustment screw: 14.8 MPa {151 kg/cm²}
   - ★ If the relief pressure cannot be measured correctly, do not try to adjust it.





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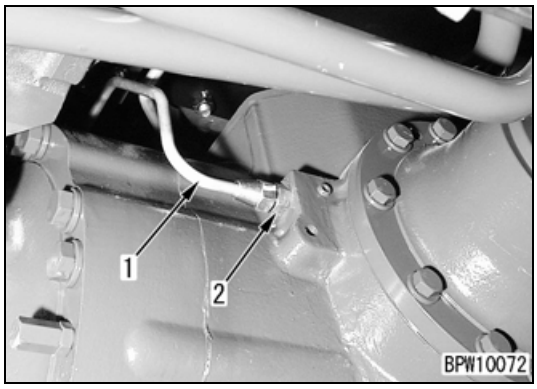
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Measuring brake oil pressure

Special tools required

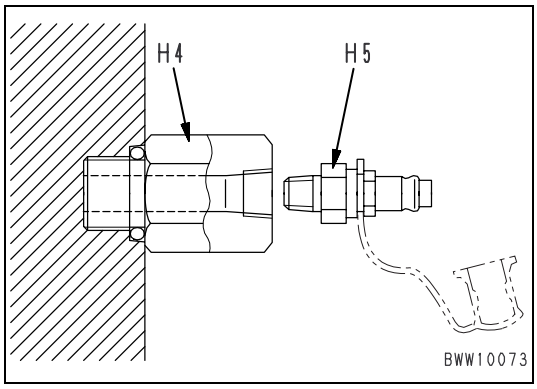
Symbol		Part No.	Part Name	Qty	Remarks
H	1	793-605-1001	Brake test kit	1	---
	2	790-101-1430	Coupler	1	---
	3	790-101-1102	Pump	1	---
	4	799-301-1720	Adapter	1	M20 x 1.5 (Rc1/8)
	5	799-101-5160	Nipple	1	---
	6	799-401-2220	Hose	1	L: 5 m
	7	790-261-1130	Coupling	1	---

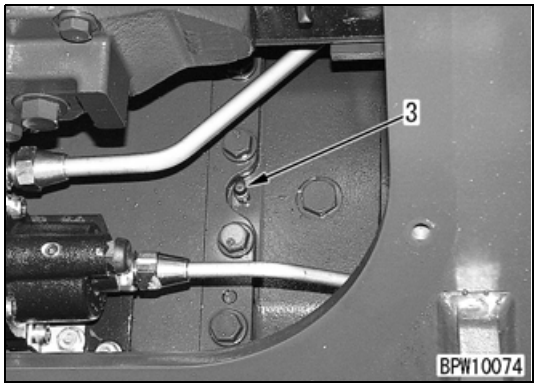


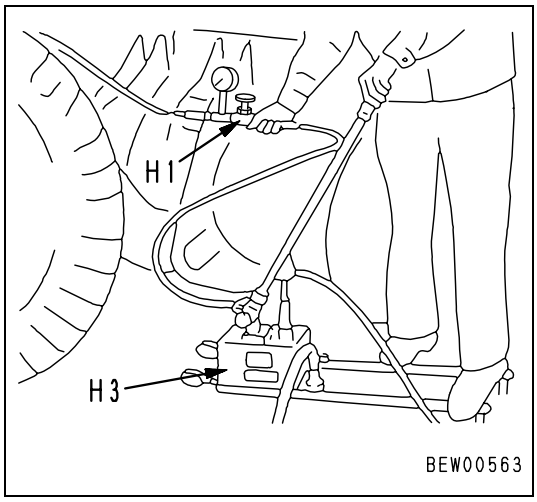
Apply the parking brake and put blocks under the tires.

★ Use the same procedure to measure the front brakes (left and right) and rear brakes (left and right).

1. Stop the engine.
2. Remove brake tube (1) on the side to be measured.
3. Remove union (2), install adapter **H4** and nipple **H5**, then assemble brake test kit **H1**.
   ★ Use the O-ring assembled to the union.
4. Loosen bleeder screw (3) and bleed the air.
   ★ Operate pump **H3** to bleed the air.
5. Tighten bleeder screw (3), operate pump **H3**, raise the pressure to 4.9 MPa {50 kg/cm²}, then tighten stop valve (1).
6. After applying the pressure, leave for 5 minutes and measure the drop in the pressure.
   ★ If the hose is moved while measuring the pressure, the pressure will change, so do not move the hose.





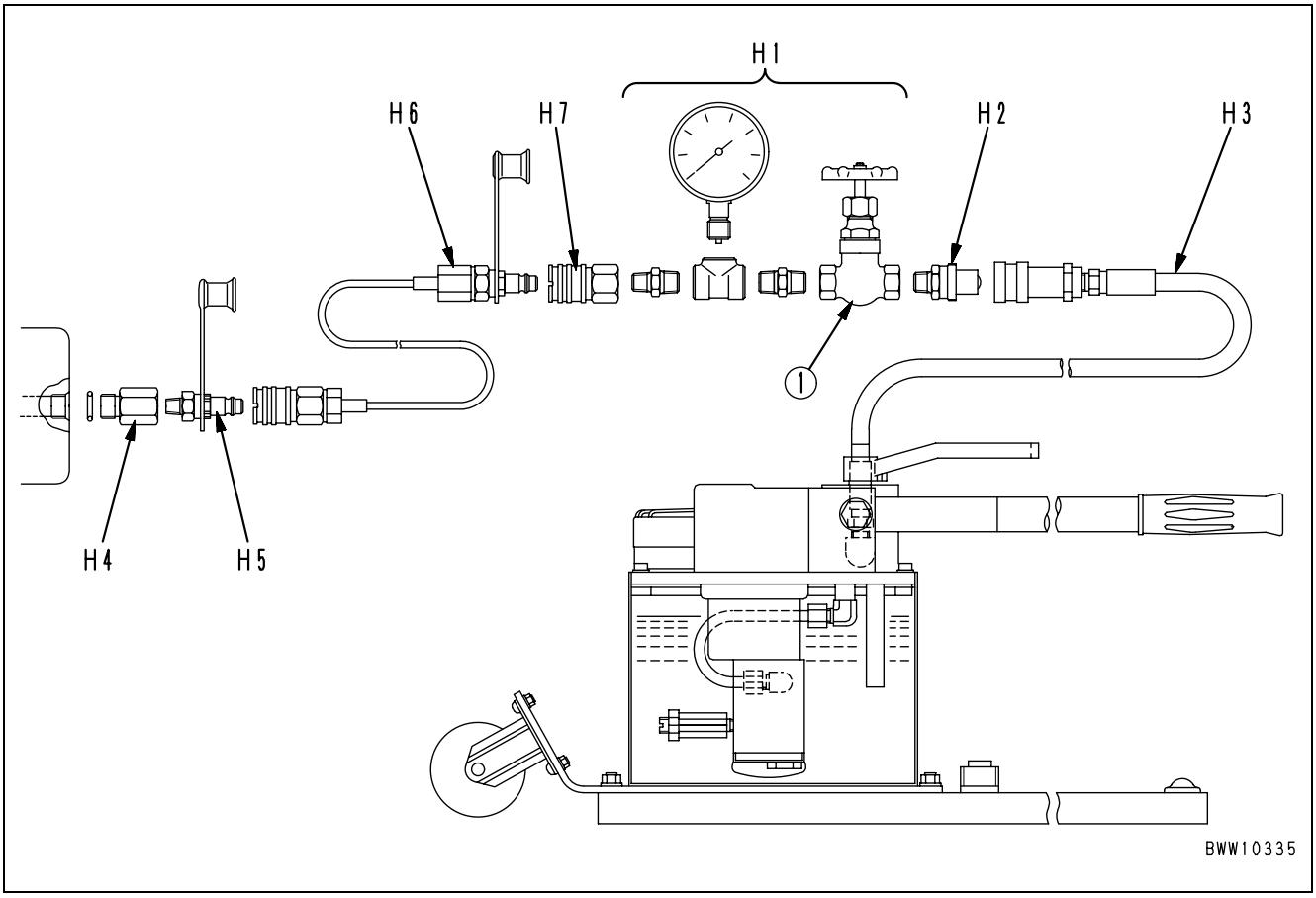


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★ When removing brake test kit **H1** after testing, operate pump **H3** to lower the pressure of brake test kit **H1**, then remove it.

★ After completing the operation, install the brake tube, then bleed the air from the brake circuit.

• Brake test tool



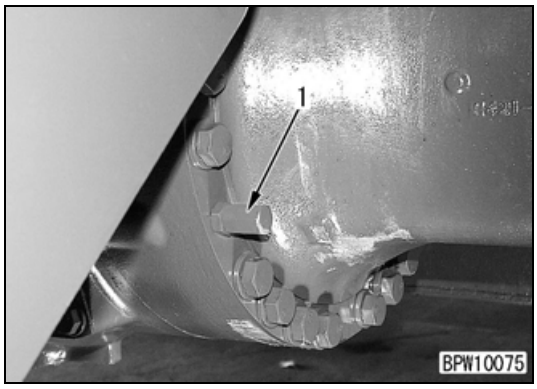
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Testing wear of wheel brake disc

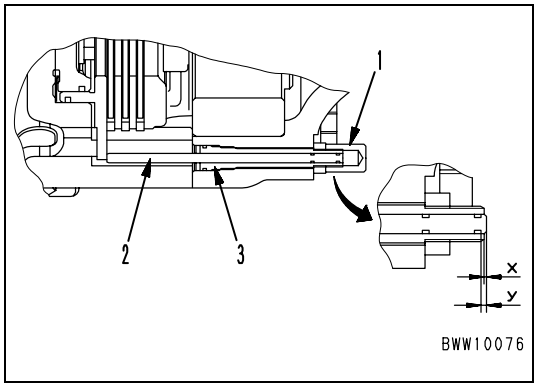
Stop the machine on horizontal ground and put blocks under the tires.

★ Brake oil pressure: 4.9 MPa ± 0.49 {50 ± 5 kg/cm²}

1. Remove cap (1).



2. Depress the brake pedal fully.
3. Push in shaft (2), then check protrusion **x** (amount of wear) from guide (3).
   - ★ Keep the pedal depressed while measuring.
   - ★ If the groove of shaft (2) is protruding from the end face of guide (3), replace the disc.
   - • Amount of wear: **x**
   - • Wear limit: **y** (2.4 mm)
4. After completing the measurement, return to the original condition.



kgm **Cap (1):**
29.4 ~ 39.2 Nm {3.0 ~ 4.0 kgm}

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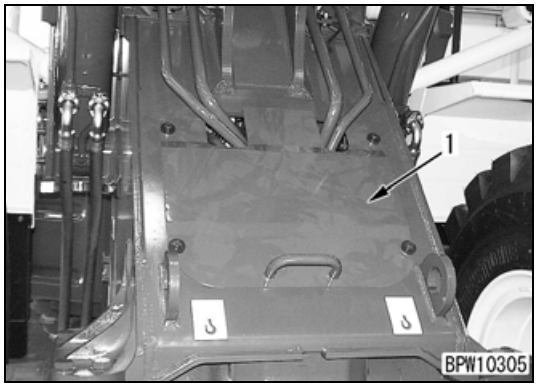
Bleeding air from brake circuit

Stop the machine on horizontal ground and put block under the tires.

★ If equipment in the brake circuit has been removed and installed, bleed the air from the brake circuit as follows.

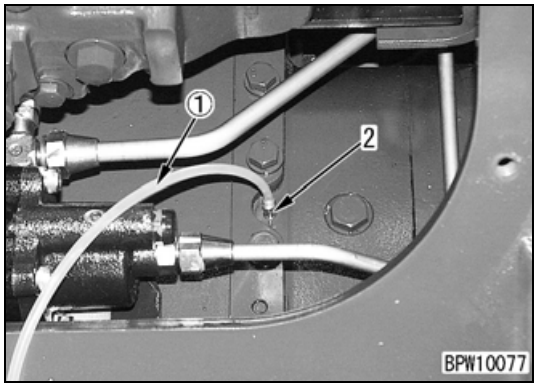
★ Use the same procedure for both the front brake circuit and rear brake circuit (2 places each).

• Remove front frame cover (1).



1. Connect air bleed hose ① to bleeder screw (2), then insert the other end in a container.
2. Start the engine and run at low idling.
3. Depress the brake pedal, and keep the brake pedal depressed.
4. Loosen bleeder screw (2) approx. 1/2 turn, and drain the air and oil.
5. When no more bubbles come out with the oil from the hose, tighten bleeder screw (2).

   kgm **Bleeder screw:** 10 ~ 20 Nm {1 ~ 2 kgm}
6. After completing the air bleeding, run the engine at low idling, check the oil level in the hydraulic tank, and more oil if necessary.



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Testing wear of parking brake disc

Special tools required

Symbol	Part No.	Part Name	Qty	Remarks
M	Commercially available	Calipers	1	(Mitsutoyo N10 or equivalent)

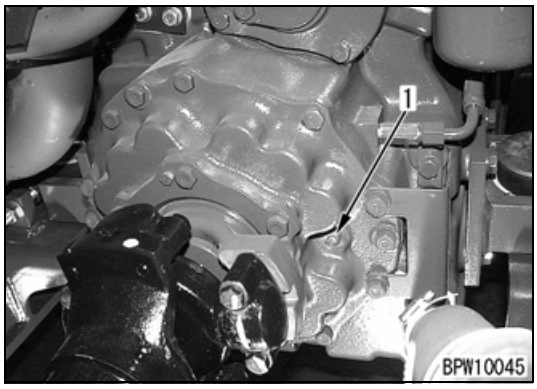
★ If the parking brake effect becomes weak, measure the piston stroke as follows.

- **To prevent the machine from moving, lower the bucket to the ground and put blocks under the tires.**
- **Always stop the engine before carrying out this procedure.**

1. Drain the oil from the transmission case.

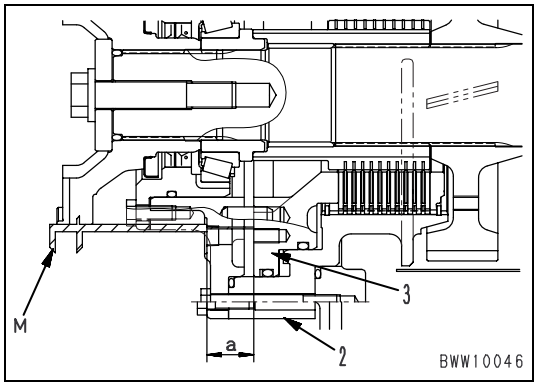
   Transmission case: 65 l

2. Remove 1 plug (1)
   (remove 1 of the 2 plugs).



3. Measure depth a with calipers **M** from the end face of cage (2) to piston (3).

   - Standard depth **a**: Max. 41.3 mm

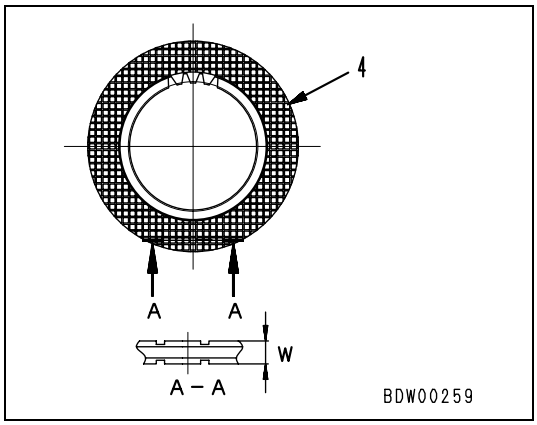


4. When the depth **a** is more than the standard value, remove parking brake disc (4), and measure disc width **W**.

   For details, see DISASSEMBLY AND ASSEMBLY, Removal of parking brake disc.

   - Judgement standard width **W**: 2.97 mm

   ★ When the depth of the parking brake disc is less than the standard value replace the disc.



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Manual release method for parking brake

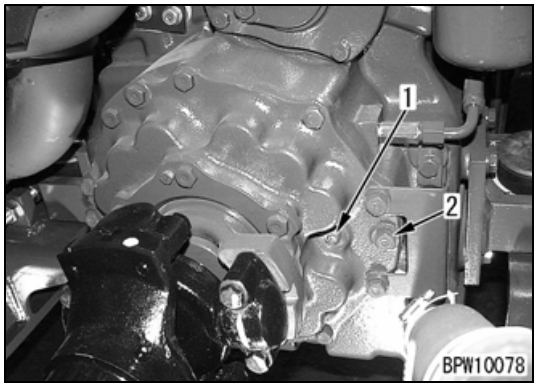
★ The parking brake is controlled by hydraulic pressure, so if there should be any failure in the transmission or the emergency release solenoid and it becomes impossible to release the parking brake, it is possible to release it manually to move the machine.

- **The manual release of the parking brake is designed only to move the machine from a dangerous working area to a safe place where repairs can be carried out. This method must not be used except in an emergency.**
- **To prevent the machine from moving, lower the bucket to the ground and put blocks under the tires.**
- **Always stop the engine before carrying out this procedure.**

1. Remove 2 plugs (1). (left and right)

   ★ Approx. 20 l of oil will come out from the plug mount, so prepare a container to catch it.

   ★ After releasing the parking brake, coat the plug with gasket sealant (LG-5) and tighten it.

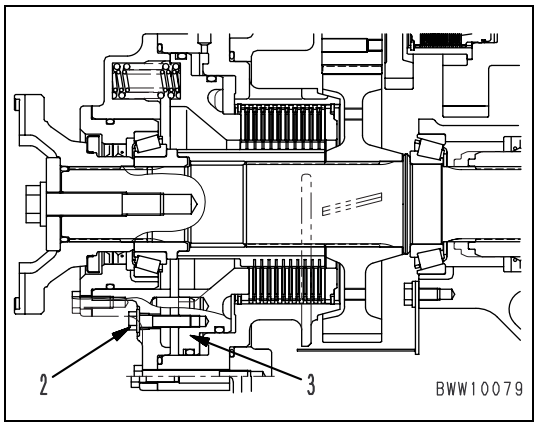


2. Remove 2 gauge mounting bolts (2), and tighten to plug mounting portion in turn.

   ★ Remove 2 bolts on opposite sides.

   ★ When bolts (2) are screwed in, piston (3) is pulled and the parking brake is released.

   ★ Tighten the 2 bolts uniformly a little at a time. (Tighten approx. 4.5 turns after the bolts contacts the seat.)



- Refilling with oil (transmission case)

  After carrying out the manual release method for the parking brake, add oil through the oil filler to the specified level. Run the engine to circulate the oil through the system, then check the oil again.

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Testing and adjusting accumulator charge pressure

Special tools required

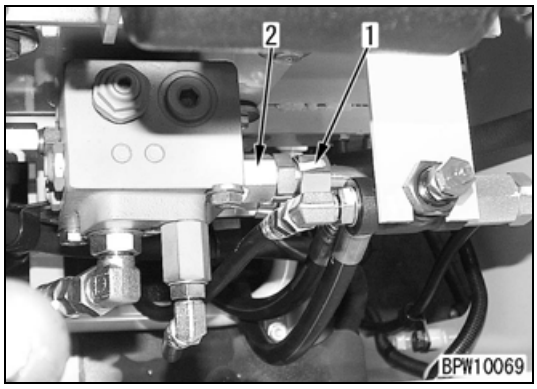
Symbol		Part No.	Part Name	Qty	Remarks
C	1	799-101-5002	Analog type hydraulic tester	1 Set	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm²}
		790-261-1203	Digital type hydraulic tester	1 Set	Pressure gauge: 58.8 MPa {600 kg/cm²}
	3	799-401-2930	Nipple	—	Both male and female: 11/16-16UN (Rc1/8)
		02896-11009	O-ring	—	

Measuring

- Hydraulic oil temperature: 45 ~ 50°C

• Put blocks under the tires.
• Stop the engine, then depress the brake pedal at least 100 times to release the pressure inside the accumulator circuit.

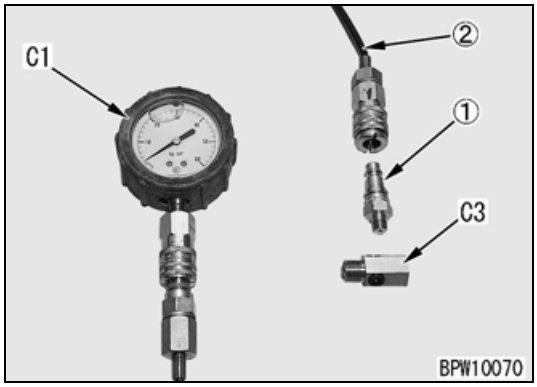
1. Open the main control valve cover and disconnect accumulator inlet port hose (1).
2. Install tool **C3** to nipple ② at charge valve end, then assemble hose B again.



3. Fit nipple ① and hose ② for measuring oil pressure to tool **C3**, then install oil pressure gauge **C1** (39.2 MPa {400 kg/cm²}).
4. Measure the accumulator charge cut-in pressure.

   Start the engine, run at low idling, and measure the oil pressure when the brake oil pressure warning pilot lamp on the maintenance monitor goes out.
5. Measure the accumulator charge cut-out pressure.

   After the accumulator charge cut-in, the pressure rises. Measure the oil pressure at the point where the oil pressure gauge indicator suddenly drops after rising.



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Adjusting

★ When the accumulator charge cut-out pressure is adjusted, the cut-in pressure also changes because of the valve area ratio.

1. Loosen locknut (4) of accumulator charge cut-out valve (3), then turn adjustment screw (5) to adjust.

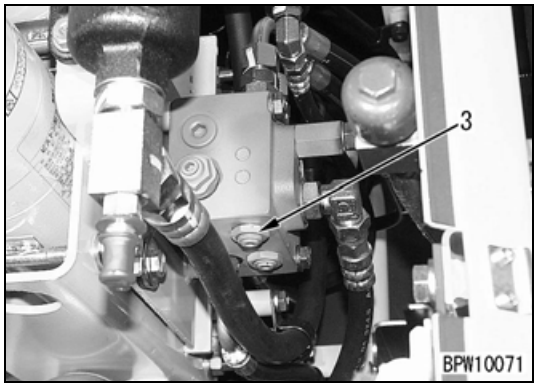
   ★ Turn the adjustment screw to adjust as follows.

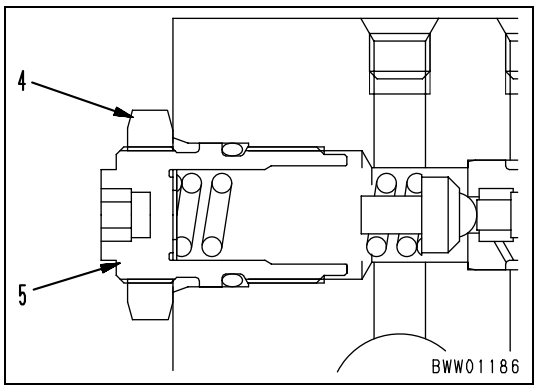
   • To INCREASE the pressure, turn CLOCKWISE.

   • To DECREASE the pressure, turn COUNTERCLOCKWISE.

   ★ Amount of adjustment for on turn of adjustment screw: 5.59 MPa {57 kg/cm²}

   kgm **Locknut:** 9.8 ~ 11.8 Nm {1.0 ~ 1.2 kgm}





★ After completion of the adjustment, repeat the above procedure for testing to check the accumulator charge cut-in pressure and cut-out pressure again.

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Testing and adjusting PPC oil pressure

Special tools required

Symbol	Part No.	Part Name	Qty	Remarks
C1	799-101-5002	Analog type hydraulic tester	1 Set	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm²}
	790-261-1203	Digital type hydraulic tester	1 Set	Pressure gauge: 58.8 MPa {600 kg/cm²}

- Hydraulic oil temperature: 45 ~ 55°C

• Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.
• Operate the control levers several times to release the pressure in the PPC accumulator circuit.

Measuring

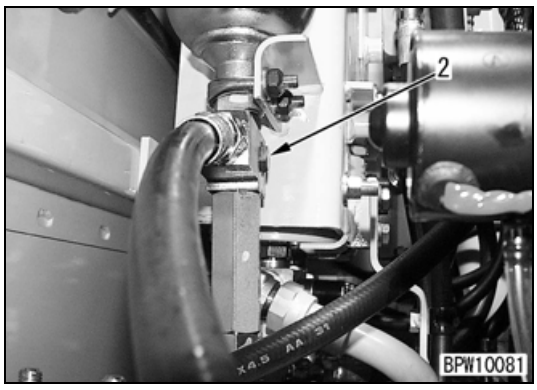
1. PPC pump basic pressure

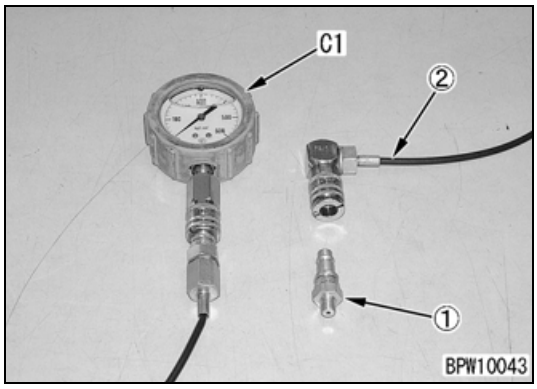
   1) Remove cover (1).

   2) Remove oil pressure measurement plug (2) (M10 × 1.25), then fit nipple ① and hose ② and install oil pressure gauge **C1** (5.9 MPa {60 kg/cm²}).

   3) Start the engine, operate the work equipment control lever at high idling and measure the oil pressure.







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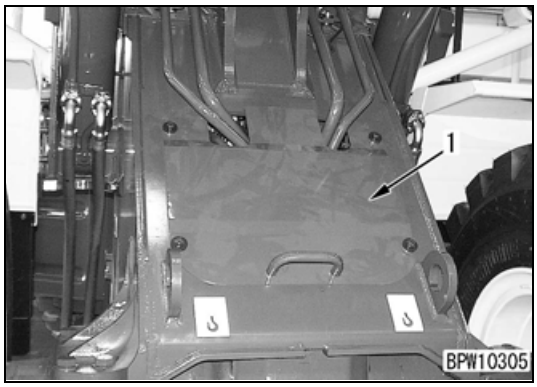
2. Measuring PPC valve output pressure

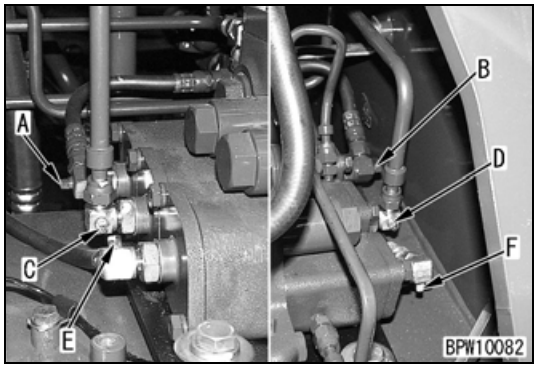
   1) Remove main control valve cover (1).

   2) Remove oil pressure measurement plug (PT 1/8) of the circuit to be measured, then fit nipple ① and hose ② and install oil pressure gauge **C1** (5.9 MPa {60 kg/cm²}).

      ★ Plug **A**: Boom RAISE
      Plug **B**: Boom RAISE
      Plug **C**: Bucket DUMP
      Plug **D**: Bucket TILT
      Plug **E**: Option
      Plug **F**: Option

   3) Start the engine, run the engine at high idling, then operate the work equipment control lever and measure the oil pressure.





Adjusting

1. Adjusting PPC relief valve

   Loosen locknut (3) of PPC valve (5), then turn adjustment screw (4) to adjust.

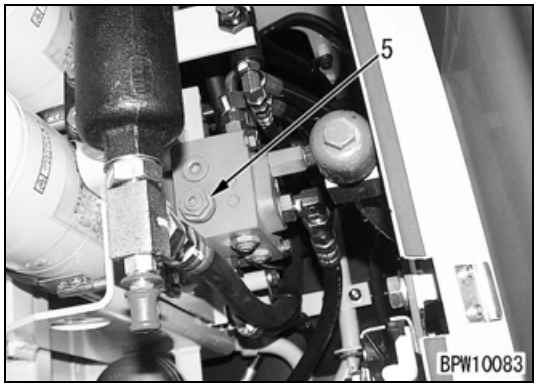
   ★ Turn the adjustment screw to adjust as follows.

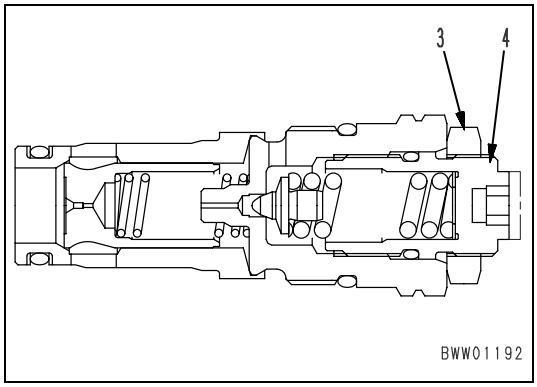
      • To INCREASE the pressure, turn CLOCKWISE.

      • To DECREASE the pressure, turn COUNTER-CLOCKWISE.

   ★ Amount of adjustment for one turn of adjustment screw: 1.79 MPa {18.3 kg/cm²}.

   ★ After completion of the adjustment, check the accumulator charge cut-in pressure and cut-out pressure again. For details, see TESTING AND ADJUSTING ACCUMULATOR CHARGE PRESSURE.





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Testing and adjusting work equipment hydraulic pressure

Special tools required

Symbol	Part No.	Part Name	Qty	Remarks
C1	799-101-5002	Analog type hydraulic tester	1 Set	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm²}
	790-261-1230	Digital type hydraulic tester	1 Set	Pressure gauge: 58.8 MPa {600 kg/cm²}

★ Hydraulic oil temperature: 45 ~ 55°C

1. Measuring work equipment relief pressure

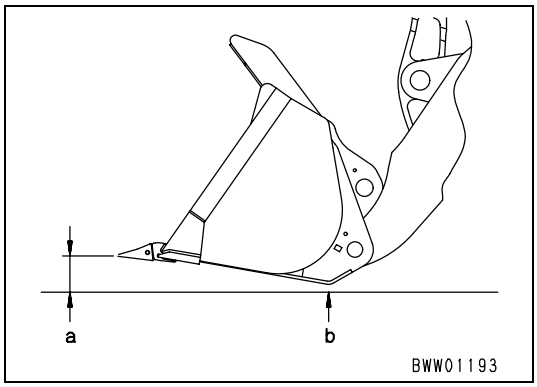
   1) Raise bucket portion **a** approx. 30 ~ 50 mm and set portion **b** in contact with the ground.

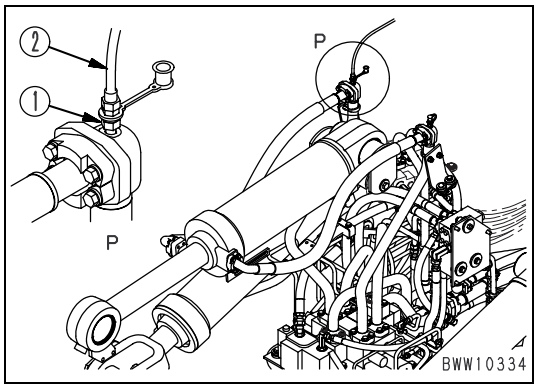
   2) Stop the engine, then operate the work equipment control lever and check that the bottom surface of the bucket (both portion **a** and portion **b** is in contact with the ground.

      ★ After lowering the bucket to the ground, operate the work equipment control lever several times to release the remaining pressure in the piping.

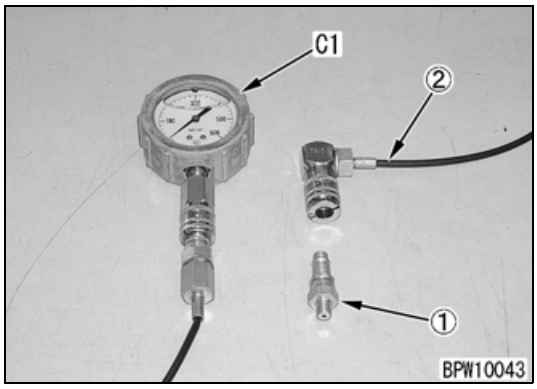
   3) Remove the oil pressure measurement plug, then fit nipple ① and hose ② and install oil pressure gauge **C1** (39.2 MPa {400 kg/cm²}).

   4) Start the engine, raise the lift arm approx. 400 mm, run the engine at high idling, tilt the bucket back, then measure the oil pressure when the relief valve is actuated.





After measuring, repeat the procedure used when installing the oil pressure gauge to release the pressure inside the circuit, then remove the oil pressure gauge.



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Adjusting

1. Adjusting work equipment relief valve

   Loosen locknut (3) of work equipment relief valve (2), then turn adjustment screw (4) to adjust.

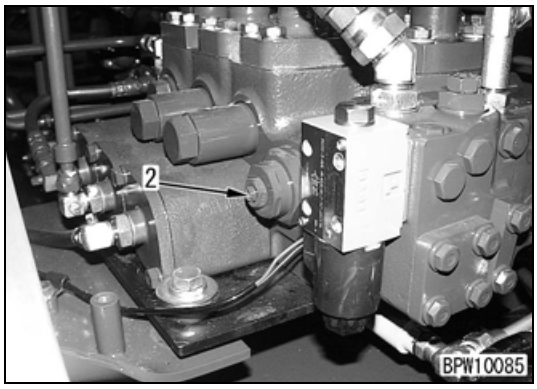
   ★ Turn the adjustment screw to adjust as follows.

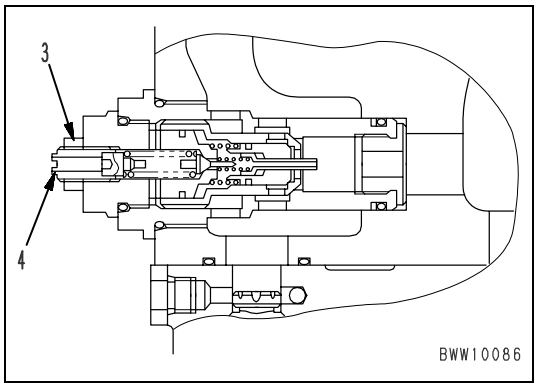
   - To INCREASE the pressure, turn CLOCKWISE.
   - To DECREASE the pressure, turn COUTNER-CLOCKWISE.

   ★ Amount of adjustment for one turn of adjustment screw: 19.6 MPa {200 kg/cm²}

   Locknut: 29 ~ 39 Nm {3 ~ 4 kgm}

   ★ After completion of the adjustment, repeat the above procedure to measure the work equipment relief pressure again.





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Testing and adjusting bucket positioner

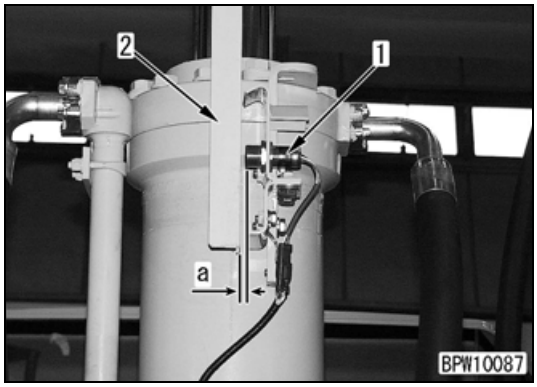
★ Engine water temperature: Within white range on engine water temperature gauge

★ Hydraulic oil temperature: 45 ~ 55°C

Testing

1. With the engine stopped, check that the clearance **a** between proximity switch (1) and detector bar (2) is the standard value.

2. Start the engine, run at a midrange speed (1500 rpm), and check the actuation point.
(Check three times and take the average.)



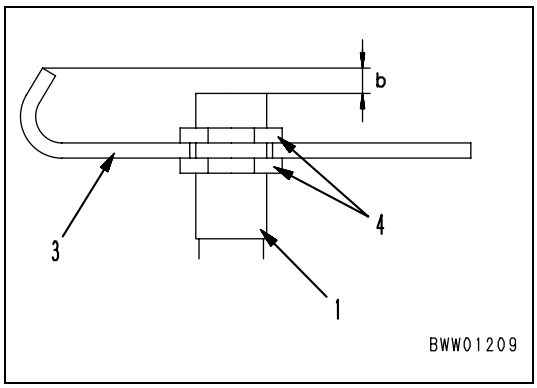
Adjusting

1. Lower the bucket to the ground, set the bucket to the desired digging angle, return the lever to the HOLD position, and stop the engine.

2. Adjust nut (4) of the switch so that clearance b between the tip of switch protector (3) and the sensing surface of the switch is in the standard value, then secure in position.

   ★ Standard clearance **b**: 0.5 ~ 1.0 mm

   kgm **Mounting nut:** 14.7 ~ 19.6 Nm {1.5 ~ 2.0 kgm}



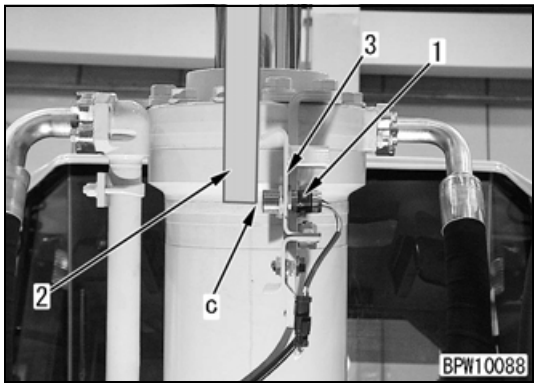
3. Adjust with shims and the proximity switch bracket mounting bolts, and secure in position so that the clearance a between the sensing surface of proximity switch (1) and detector bar (2) is the standard value.

   ★ Clearance **a**: 3 ~ 5 mm

   ★ Adjust so that the clearance a is within the standard value for the whole stroke of detector bar (2).

4. Secure switch protector (3) to the bucket cylinder so that the tip **c** of detector bar (2) is aligned with the center of proximity switch (1).

   ★ After adjusting, operate the bucket lever and check that the bucket positioner is actuated at the desired position.



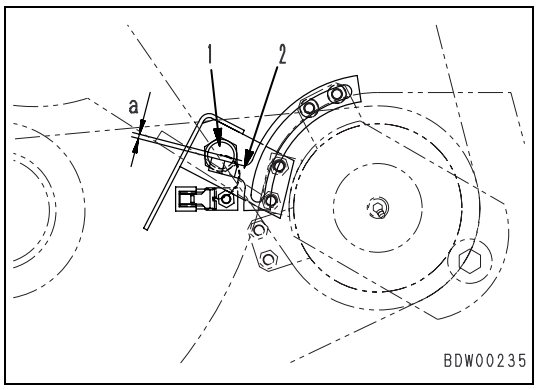
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Testing and adjusting lift arm kick-out

★ Hydraulic oil temperature: 45 ~ 55°C

Testing

1. Start the engine, operate the lift arm lever to actuate proximity switch (1), then stop the engine.



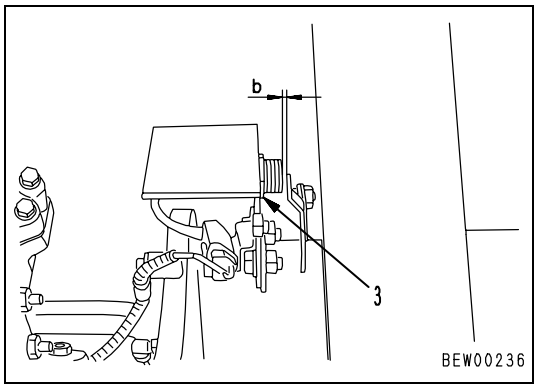
Always be sure to apply the safety lock to the work equipment control lever.

2. After stopping the engine, measure dimension **a** between the center of proximity switch (1) and the top of plate (2).

   ★ Standard dimension **a**: 0 ~ 5 mm

3. Measure clearance **b** between the proximity switch sensing surface and the plate.

   ★ Standard dimension **b**: 3 ~ 5 mm



Adjusting

1. If dimension **a** is not within the standard value, move the plate to adjust.

2. If dimension **b** is not within the standard value, adjust proximity switch mounting nut (3).

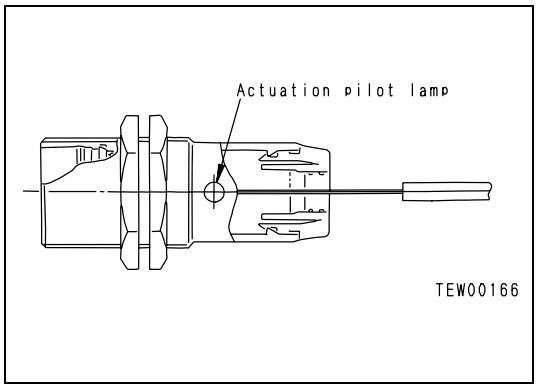
   kgm **Mounting nut:** 14.7 ~ 19.6 Nm {1.5 ~ 2.0 kgm}

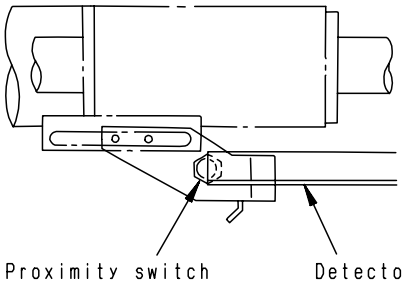
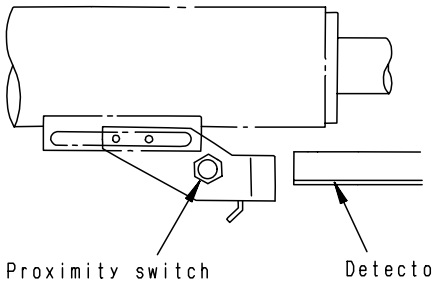
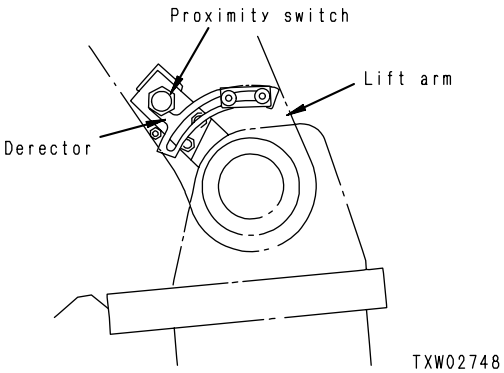
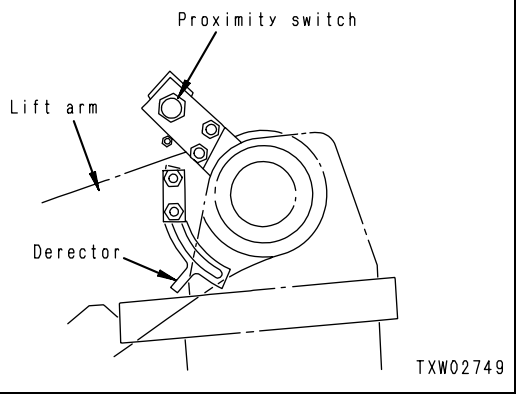
   ★ After adjusting, operate the lift arm lever and check that the proximity switch is actuated normally.

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Checking proximity switch actuation pilot lamp

The proximity switch is equipped with a pilot lamp which shows when it is being actuated, so use this when adjusting.

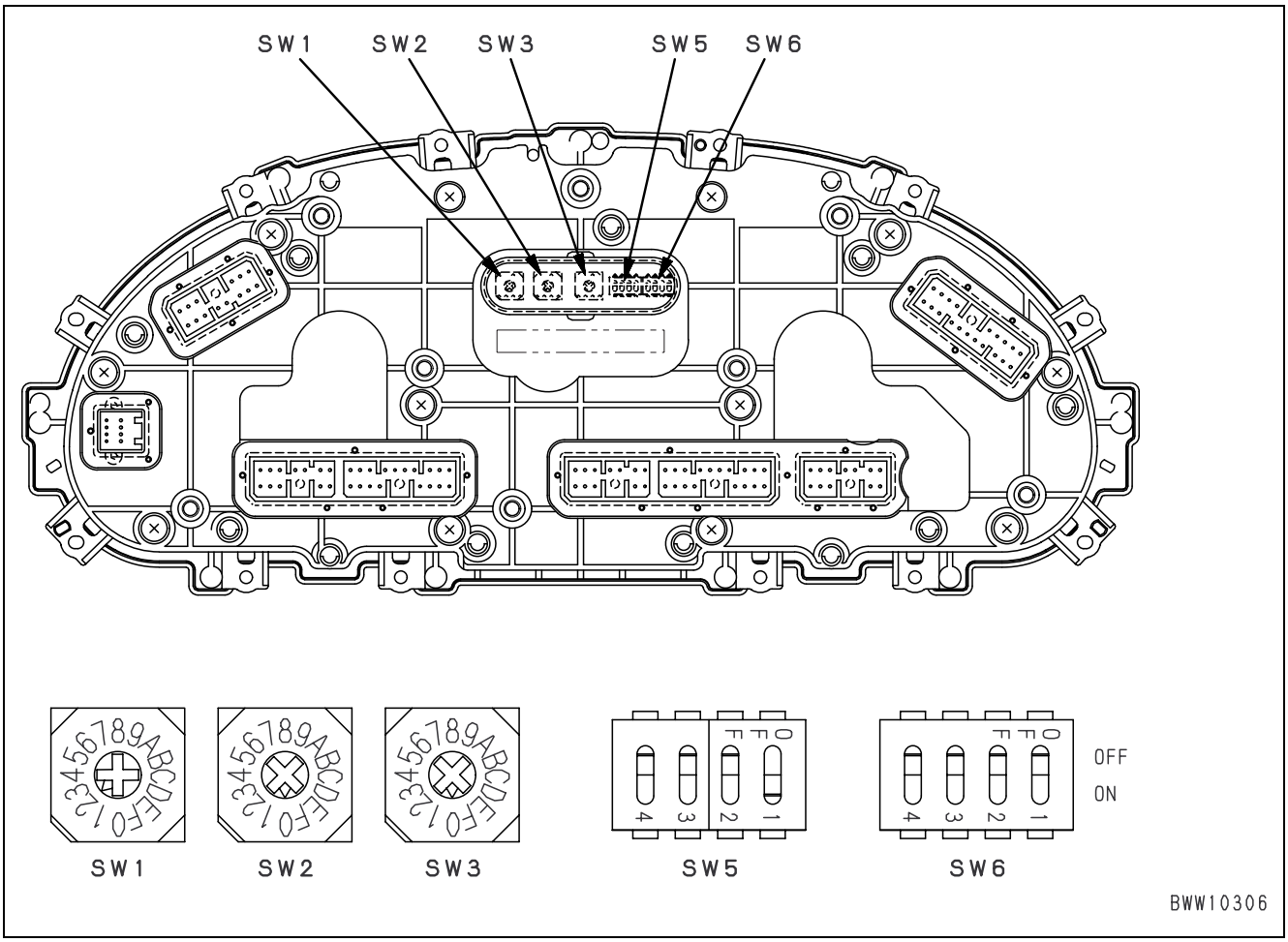


Proximity switch actuation pilot lamp	lights up	Goes out
Detector positon	When detector is positioned at detection surface of proximity switch	When detector has moved from detection surface of proximity switch
Bucket positioner		
Lift arm kick-out		

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Adjusting machine monitor

Machine monitor rotary switches (SW1, SW2, SW3) and dipswitches (SW5, SW6)



- In the following cases, check the settings of the rotary switches and dipswitches at the rear face of the machine monitor, and change the settings as necessary.
  - When the machine monitor has been removed and installed again.
  - When the tire size has been changed (travel speed compensation setting).
  - When the parts of the machine monitor have been replaced with new parts (service meter, odometer).
    - ★ When carrying out these settings, it is necessary to use the special operation of the character display and mode switch. For details, see STRUCTURE AND FUNCTION, SPECIAL FUNCTIONS OF MACHINE MONITOR.
  - The status of each switch can be checked with the special function of the machine monitor (monitoring function).
  - ★ All setting operations are carried out with the starting switch OFF and the monitor panel removed.
  - ★ Always set each switch as instructed.
  - ★ Be careful not to touch anything inside the grommet except for the switch.
  - ★ When turning the rotary switch, use a precision cross-head screwdriver and turn slowly.
  - ★ The protruding triangular part of the rotary switch is the setting arrow.
  - ★ When changing the dipswitch, use a precision flat-headed screwdriver and turn slowly.

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- Setting function of switches

Switch		Position	Content Of Setting	Position When Monitor Is Shipped
SW1		0 ~ F	Model selection	2
SW2		0 ~ F	Not used (Always set to 0)	0
SW3		0 ~ F	Speed/tachometer & tire size selection	0
SW5	1	OFF	Common rail engine controller: Not installed	ON
		ON	Common rail engine controller: Installed	
	2	OFF	Work equipment controller: Not installed	OFF
		ON	Work equipment controller: Installed	
	3	OFF	Not used (Always set to OFF)	OFF
		ON		
	4	OFF	Not used (Always set to OFF)	OFF
		ON		
SW6	1	OFF	Not used (Always set to OFF)	OFF
		ON		
	2	OFF	Not used (Always set to OFF)	OFF
		ON		
	3	OFF	Not used (Always set to OFF)	OFF
		ON		
	4	OFF	Not used (Always set to OFF)	OFF
		ON		

1. Setting rotary switch SW1

   The machine monitor is designed to handle many models, so it must be set for the model on which it is actually installed.

   When the machine monitor is replaced, use rotary switch SW1 to select the correct model.

Model	SW1	Remarks
WA470-5	2	—
WA480-5	3	—

2. Setting rotary switch SW2

   Rotary switch SW2 is set as follows. The setting must not be changed.
   • Set position of SW2: 0

3. Setting the rotary switch SW3
   The machine monitor is set to calculate the travel speed for machines using standard tires. If the tire size has been changed, adjust with rotary switch SW3 to compensate the speed display.

   The settings for the tire sizes are as follows.

Meter Display	SW3	Tire Size	Remarks
km/h display	0	Standard tire	—
MPH display	1	Standard tire	Used only in countries using non-SI units
rpm display	2	Standard tire	—
km/h display	3	Large diameter tire	—
MPH display	4	Large diameter tire	Used only in countries using non-SI units
rpm display	5	Large diameter tire	—

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Tire Size	WA470-5	WA480-5
23.5-25	std	No setting
26.5-25	Large diameter	std

When the meter display is changed, the content of the speedometer display in the center of the monitor changes.

- As an optional setting, it is possible to change from the speedometer display to the tachometer display.
- The units for the odometer on the character displayed as set above.

★ If the tire size has been changed, adjust with rotary switch SW1 to compensate the speed display.

- If unlisted tires are used or if the tires become worn and the speed display does not match the actual speed, use and optional setting to compensate for the tires.

4. Setting dipswitch SW5-1
   The setting when the common rail engine controller is installed is as follows. The setting must not be changed.
   • Set position of dipswitch SW5-1: OFF

5. Setting dipswitch SW5-2
   When the joystick controller has been installed or removed, set as follows.
   • Controller removed: Set position of dipswitch SW5-2: OFF
   • Controller installed: Set position of dipswitch SW5-2: ON

6. Setting dipswitch SW5-3
   Dipswitch SW5-3 is set as follows. The setting must not be changed.
   • Set position of dipswitch SW5-3: OFF

7. Setting dipswitch SW5-4
   Dipswitch SW5-4 is set as follows. The setting must not be changed.
   • Set position of dipswitch SW5-4: OFF

8. Setting dipswitch SW6-1
   Dipswitch SW6-1 is set as follows. The setting must not be changed.
   • Set position of dipswitch SW6-1: OFF

9. Setting dipswitch SW6-2
   Dipswitch SW6-2 is set as follows. The setting must not be changed.
   • Set position of dipswitch SW6-2: OFF

10. Setting dipswitch SW6-3
    Dipswitch SW6-3 is set as follows. The setting must not be changed.
    • Set position of dipswitch SW6-3: OFF

11. Setting dipswitch SW6-4
    Dipswitch SW6-4 is set as follows. The setting must not be changed.
    • Set position of dipswitch SW6-4: OFF

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Testing and adjusting load meter

The load meter is a simple measuring device, so check it periodically (decide the period yourself) as follows. Carry out this inspection even if a non-standard bucket is installed.

Testing
Measure a load with the load meter and check that the measurement is within the standard value.

Measure the load under the following conditions:
Near normal load
Near normal load × 1/2

Standard value:
Measured value precision ≤ ± 1.5%

Method of calculating precision:
Precision = (displayed load - actual load) ÷ normal load × 100%

Model	Normal load	Tolerance for 1.5% precision	Limit for displayed Llad
WA470-5	6.4 t	± 0.096 t	± 0.1 t
WA480-5	7.36 t	± 0.11 t	± 0.1 t

The load display is rounded to 2 places of decimal (units of 10 kg), so remember this when calculating the precision.

Adjusting

If the value measured by the load meter is not within the standard value, adjust as follows.

1. Using the monitor service mode, adjust the lift arm angle (both the top limit and the bottom limit) for the load meter.

   ★ For details, see TESTING AND ADJUSTING, Machine monitor.

2. Using the operator mode, carry out calibration for no load.

   ★ For details, see Operation and Maintenance Manual, Handling load meter.

   • When carrying out calibration for no load, warm up the hydraulic oil, and carry out the calibration at the engine speed and lift arm lever operation for actual normal operations.

3. Measure the load again with the load meter and check that the measured load is within the standard value.
   (Normally, only calibration for no load can be performed.)

4. If the measurement is still not within the standard value, use the operator mode again to repeat the calibration for no load.

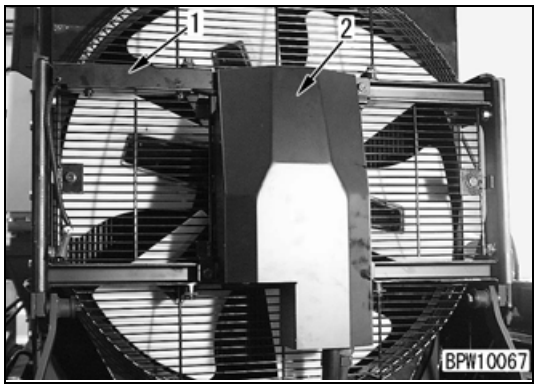
   For the set mode when measuring the load calibration, use the normal load ± 0.2 t and the normal load × (1/2) ± 0.2 t. Use the load in units of 0.1 t.

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Bleeding air

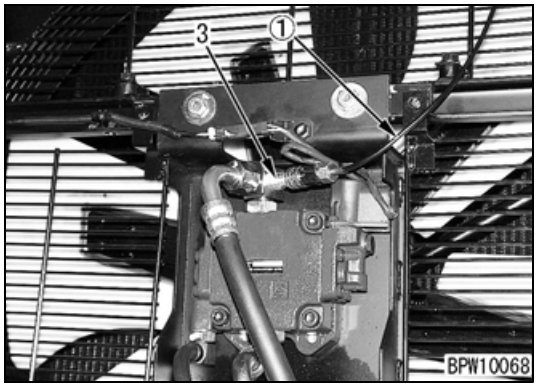
1. Bleeding air from fan motor circuit

   1) Open the radiator grill, then remove covers (1) and (2).



   2) Connect air bleed hose ① to nipple (3) at the inlet port of the motor.

   3) Start the engine, and when oil comes out from the air bleed hose, stop the engine and remove the air bleed hose.



2. Bleeding air from work equipment PPC circuit

   1) Operate each work equipment lever fully and hold it in position to relieve the circuit for approx. 1 minute. Carry out this operation once for each work equipment lever.

3. Bleeding air from cylinders

   1) Start the engine and run at idling for approx. 5 minutes.

   2) Run the engine at low idling, then raise and lower the lift arm 4 ~ 5 times in succession.

      ★ Operate the piston rod to a point approx. 100 mm before the end of its stroke. Do not relieve the circuit under any circumstances.

   3) Run the engine at full throttle and repeat Step 2). After that, run the engine at low idling, and operate the piston rod to the end of its stroke to relieve the circuit.

   4) Repeat Steps 2) and 3) to bleed the air from the bucket and steering cylinders.

      ★ When the cylinder has been replaced, bleed the air before connecting the piston rod.

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Releasing remaining pressure in hydraulic circuit

1. Releasing remaining pressure between each hydraulic cylinder and control valve
   - ★ If the piping between the hydraulic cylinder and the control valve is to be disconnected, release the remaining pressure from the circuit as follows.
   1) Stop the engine.
   2) Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.
   3) Operate the control levers.
   - ★ When the levers are operated 2 ~ 3 times, the pressure stored in the PPC accumulator is removed. Start the engine again, run at low idling for approx. 5 minutes to charge the accumulator, the stop the engine and operate the control levers.
   - ★ Repeat the above operation 2 ~ 3 times to release all the remaining pressure.

2. Releasing remaining pressure in brake accumulator circuit.
   - ★ If the piping between the brake accumulator and parking brake manual valve, between the accumulator and the accumulator check valve, or between the accumulator and brake valve is to be disconnected, release the remaining pressure from the circuit as follows.
   1) Stop the engine.
   2) Depress the brake pedal at least 100 times to release the pressure inside the brake accumulator circuit.

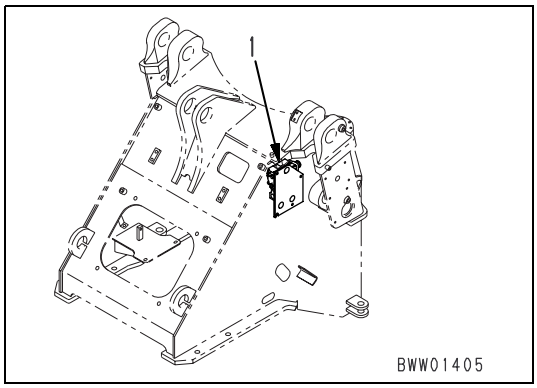
1. Releasing remaining pressure in PPC accumulator circuit.
   - ★ If the piping between the PPC accumulator and PPC valve is to be disconnected, release the remaining pressure from the circuit as follows.
   - Operate the control lever 2 ~ 3 times to release the remaining pressure in the circuit.

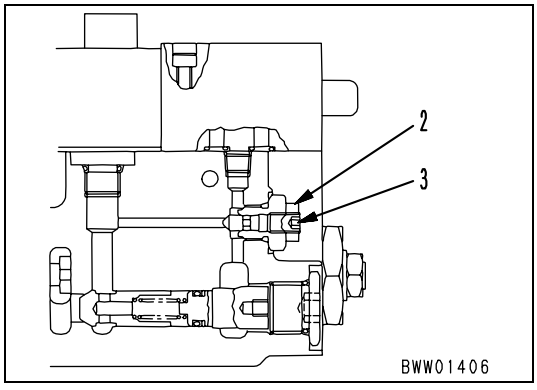
Releasing remaining pressure in travel damper circuit

★ When removing the piping of the travel damper circuit and travel damper valve, release the pressure in the accumulator as follows.

1. Loosen locknut (2) of travel damper valve (1).
2. Loosen adjustment screw (3) 1/2 ~ 1 turn and release the pressure from the accumulator.
   - Locknut (2) and adjustment screw (3) are painted red.
3. After releasing the remaining pressure, return adjustment screw (3) to its original position and tighten locknut (2) securely.

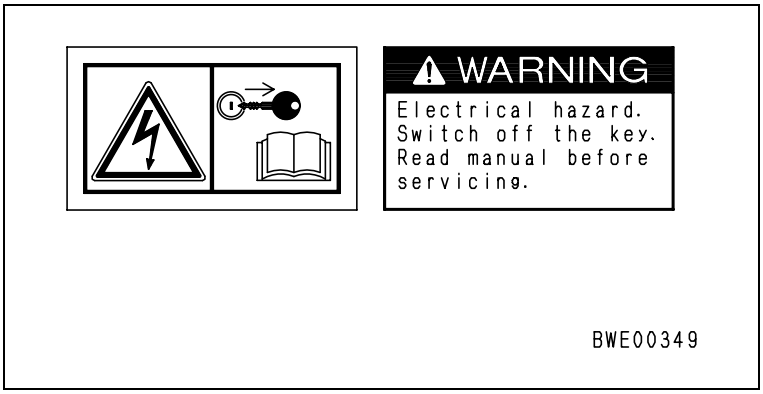
   kgm **Locknut**: 12.7 ± 0.6 Nm {1.3 ± 0.06 kgm}





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Handling controller high-voltage circuit



With the engine controller, a high-voltage circuit (110 ~ 130 V) is used for the fuel injector drive.
As a result, a high-voltage circuit is connected to the wiring harness and connector from the engine controller to the fuel injector.

★ Normally, high voltage is output from the engine controller to the fuel injector only when the engine is running. When the engine is stopped, the output stops.

If the high-voltage circuit is touched directly, there is danger of electrocution, so observe the following precautions when carrying out inspection.

1. The connectors, including those for the high voltage circuit, are as follows.
   - Engine controller connector: L83
   - Intermediate connector: EL3
   - Injector connector: CN1, CN2, CN3, CN4, CN5, CN6
   - Terminal at head of injector (inside head cover)
2. Always turn the starting switch OFF before disconnecting or connecting the applicable connector.
3. Never start the engine when a T-adapter has been inserted or connected to the applicable connector to carry out troubleshooting.
   ★ If the starting switch is operated, operate it only to OFF or ON. Never turn it to the START position1

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TROUBLESHOOTING

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Points to remember when troubleshooting

WARNING! Stop the machine in a level place, and check that the safety pin, blocks, and parking brake are securely fitted.

WARNING! When carrying out the operation with two or more workers, keep strictly to the agreed signals, and do not allow any unauthorized person to come near.

WARNING! If the radiator cap is removed when the engine is hot, hot coolant may spurt out and cause burns, so wait for the engine to cool down before starting troubleshooting.

WARNING! Be extremely careful not to touch any hot parts or to get caught in any rotating parts.

WARNING! When disconnecting wiring, always disconnect the negative (-) terminal of the battery first.

WARNING! When removing the plug or cap from a location which is under pressure from oil, water or air, always release the internal pressure first. When installing measuring equipment, be sure to connect it properly.

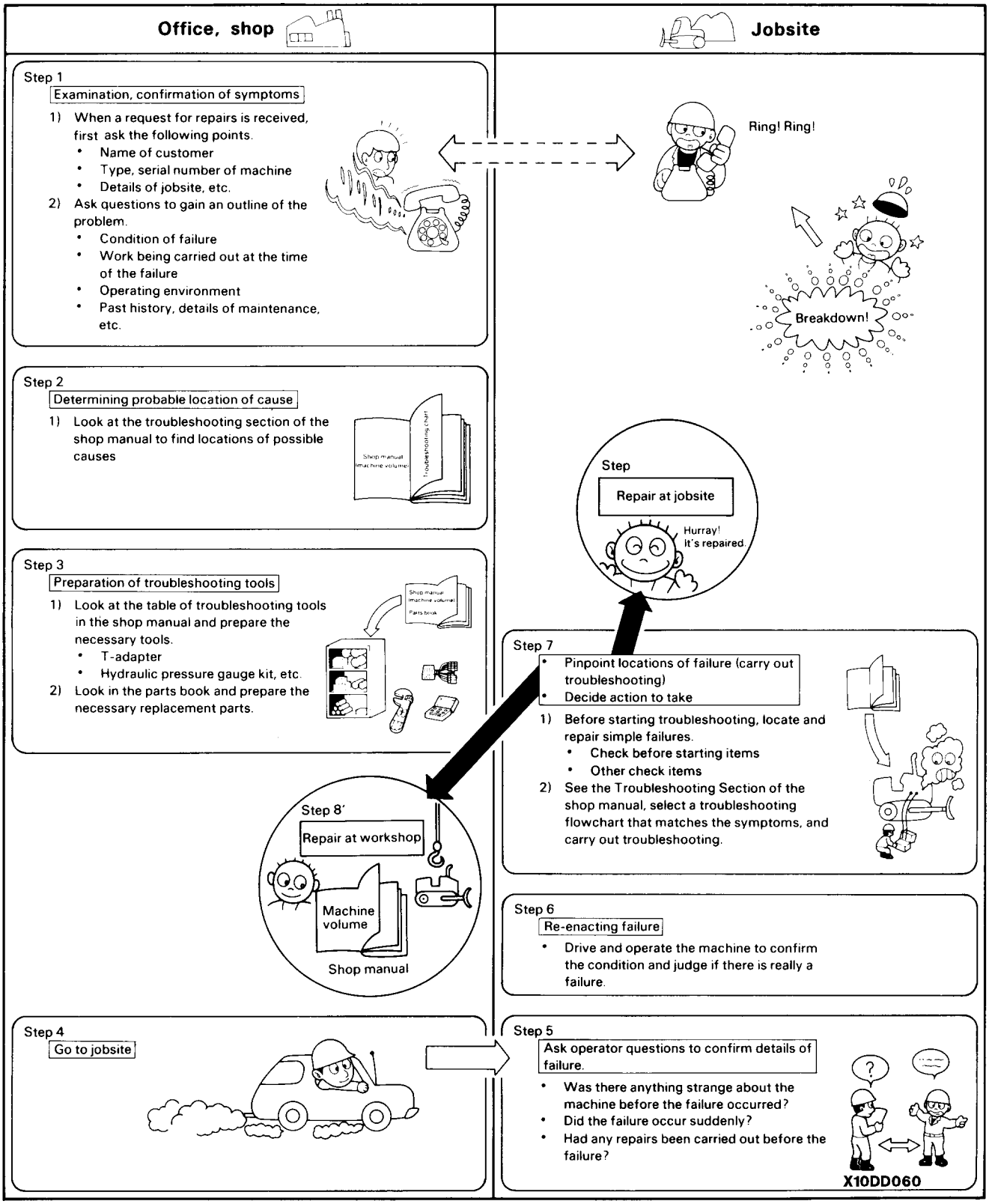
The aim of troubleshooting is to pinpoint the basic cause of the failure, to carry out repairs swiftly, and to prevent reoccurrence of the failure. When carrying out troubleshooting, an important point is to understand the structure and function of the machine. However, a short cut to effective troubleshooting is to ask the operator various questions to form some idea of possible causes of the failure that would produce the reported symptoms.

1. When carrying out troubleshooting, do not hurry to disassemble the components. If components are disassembled immediately after a failure occurs:
   - Parts that have no connection with the failure or other unnecessary parts will be disassembled.
   - It will become impossible to find the cause of the failure.

   It will also cause a waste of man hours, parts, or oil and grease. At the same time, it will also lose the confidence of the user or operator. For this reason, when carrying out troubleshooting, it is necessary to carry out thorough prior investigation and to carry out troubleshooting in accordance with the fixed procedure.
2. Points to ask the user or operator.
   1) Have any other problems occurred apart from the problem that has been reported?
   2) Was there anything strange about the machine before the failure occurred?
   3) Did the failure occur suddenly, or were there problems with the machine condition before this?
   4) Under what conditions did the failure occur?
   5) Had any repairs been carried out before the failure? When were these repairs carried out?
   6) Has the same kind of failure occurred before?
3. Check before troubleshooting.
   1) Check the oil level.
   2) Check for any external leakage of oil from the piping or hydraulic equipment.
   3) Check the travel of the control levers.
   4) Check the stroke of the control valve spool.
   5) Other maintenance items can be checked externally, so check any item that is considered to be necessary.
4. Confirming the failure.
   Confirm the extent of the failure yourself, and judge whether to handle it as a real failure or as a problem with the method of operation, etc.
   ★ When operating the machine to re-enact the troubleshooting symptoms, do not carry out any investigation or measurement that may make the problem worse.
5. Troubleshooting
   Use the results of the investigation and inspection in Steps 2 - 4 to narrow down the causes of the failure, then use the troubleshooting flowchart to locate the position of the failure exactly.
   ★ The basic procedure for troubleshooting is as follows.
      1) Start from the simple points.
      2) Start from the most likely points.
      3) Investigate other related parts or information.
6. Measures to remove root cause of failure.
   Even if the failure is repaired, if the root cause of the failure is not repaired, the same failure will occur again. To prevent this, always investigate why the problem occurred. Then, remove the root cause.

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Sequence of events in troubleshooting



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Precautions when carrying out maintenance

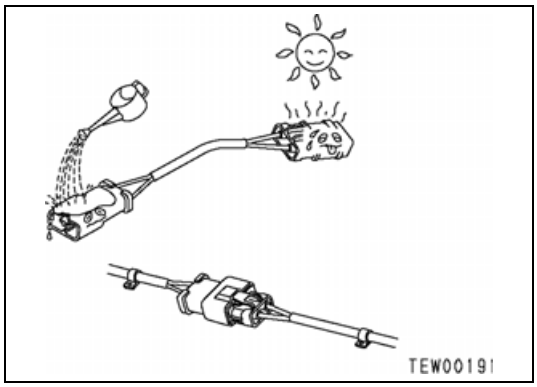
To maintain the performance of the machine over a long period, and to prevent failures or other troubles before they occur, correct operation, maintenance and inspection, troubleshooting, and repairs must be carried out. This section deals particularly with correct repair procedures for mechatronics and is aimed at improving the quality of repairs. For this purpose, it gives sections on 'Handling electric equipment' and 'Handling hydraulic equipment' (particularly hydraulic oil).

1. Precautions when handling electric equipment

1. Handling wiring harnesses and connectors

Wiring harnesses consist of wiring connecting one component to another component, connectors used for connecting and disconnecting one wire from another wire, and protector or tubes used for protecting the wiring.

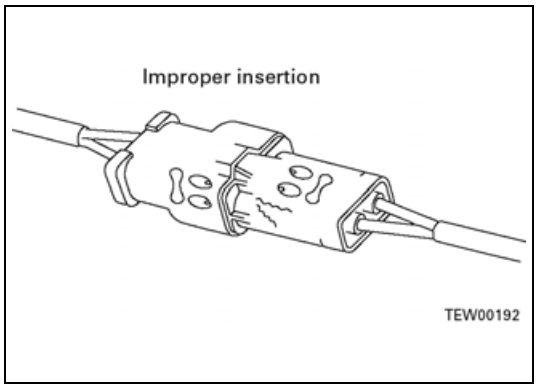
Compared with other electrical components fitted in boxes or cases, wiring harnesses are more likely to be affected by the direct effects of rain, water, heat, or vibration. Furthermore, during inspection and repair operations they are frequently removed and installed again, so they are likely to suffer deformation or damage. For this reason, it is necessary to be extremely careful when handling wiring harnesses.



Main failures occurring in wiring harness

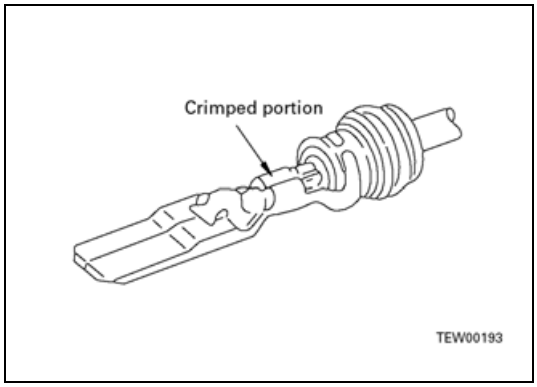
1) Faulty contact of connectors
(faulty contact between male and female).

Problems with faulty contact are likely to occur because the male connector is not properly inserted into the female connector, or because one or both of the connectors is deformed or the position is not correctly aligned, or because there is corrosion or oxidation of the contact surfaces.



2) Defective compression or soldering of connectors

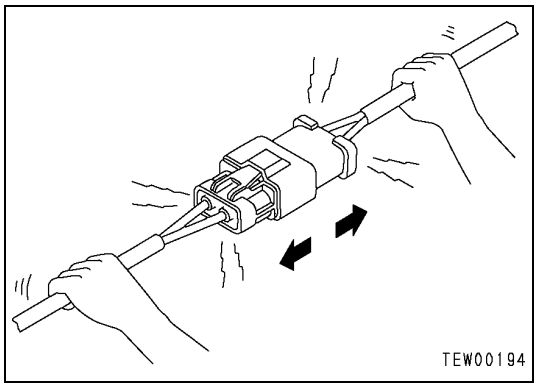
The pins of the male and female connectors are in contact at the compressed terminal or soldered portion, but there is excessive force on the wiring, and the plating peels to cause improper connection or breakage.



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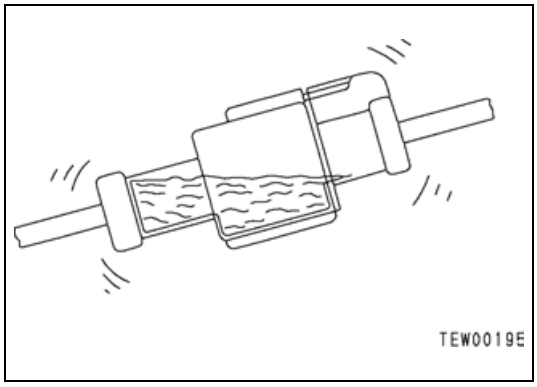
3) Disconnections in wiring

If the wiring is held and tugged and the connectors are pulled apart, or components are lifted with a crane with the wiring still connected, or a heavy object hits the wiring, the crimping compression of the connectors to the wire may be loosened, or the soldering may be damaged, or the wiring may be broken.



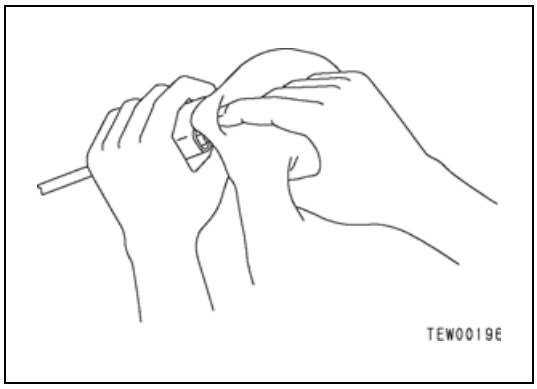
4) High pressure water entering a connector

The connector is designed to make it difficult for water to enter (drip-proof structure), but if high-pressure water is sprayed directly on the connector, water may enter the connector depending on the direction of the water jet. The connector is designed to prevent water from entering, but if water does enter, it is difficult for it to be drained. Therefore, if water should get into the connector, the pins will be short-circuited by the water, so if any water gets in, immediately dry the connector or take other appropriate action before passing electricity through it.



5) Oil, grease or dirt stuck to connector

If oil or grease are stuck to the connector and an oil film is formed on the mating surface between the male and female pins, the oil will not let the electricity pass, and this will cause a defective contact. If there is oil or grease or dirt stuck to the connector, wipe it off with a dry cloth or blow dry with air, and spray it with a contact restorer.



★ When wiping the mating portion of the connector, be careful not to use excessive force or deform the pins.

★ If there is water or oil present, it will increase the contamination of the points, so clean with air until all water and oil has been removed.

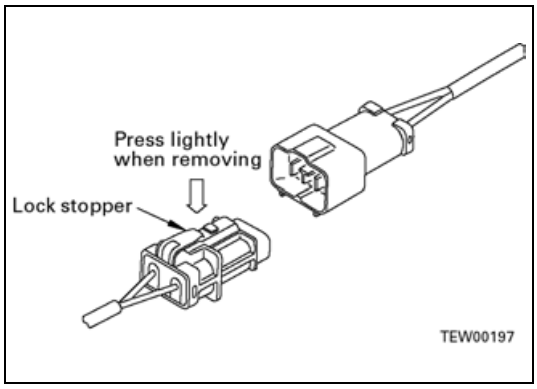
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2. Removing, installing, and drying connectors and wiring harnesses

Disconnecting connectors

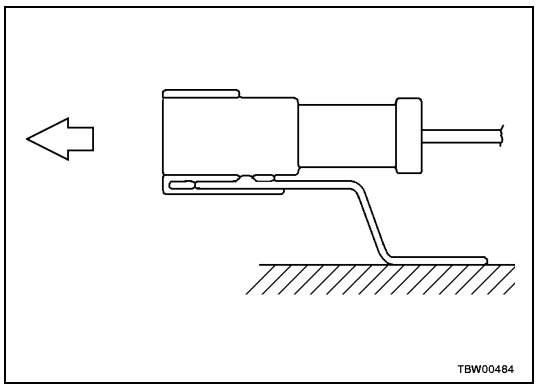
1) Hold the connectors when disconnecting. When disconnecting the connectors, hold the connectors and not the wires. For connectors held by a screw, loosen the screw fully, then hold the male and female connectors in each hand and pull apart. For connectors which have a lock stopper, press down the stopper with your thumb and pull the connectors apart.

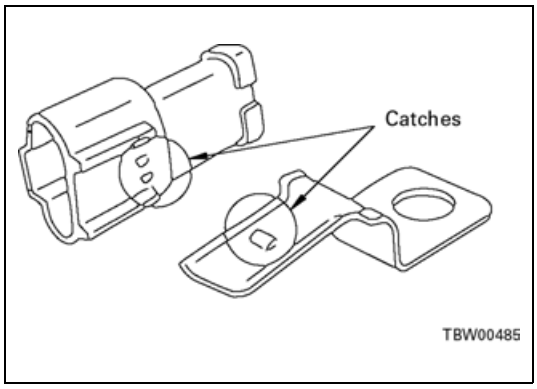
★ Never try to pull apart with one hand.



2) When removing the connectors from the clips, pull the connector in a parallel direction to the clip.

★ If the connector is twisted to the left and right or up and down, the housing may break.

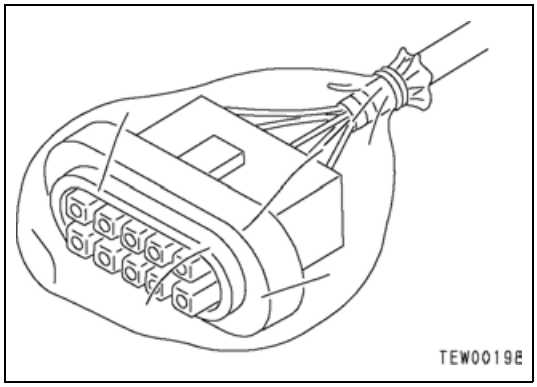




3) Action to take after removing connectors.

After removing any connector, cover it with a vinyl bag to prevent any dust, dirt, oil, or water from getting in the connector portion.

★ If the machine is left for a long time, it is particularly easy for improper contact to occur, so always cover the connector.



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Connecting connectors

1) Check the connector visually.

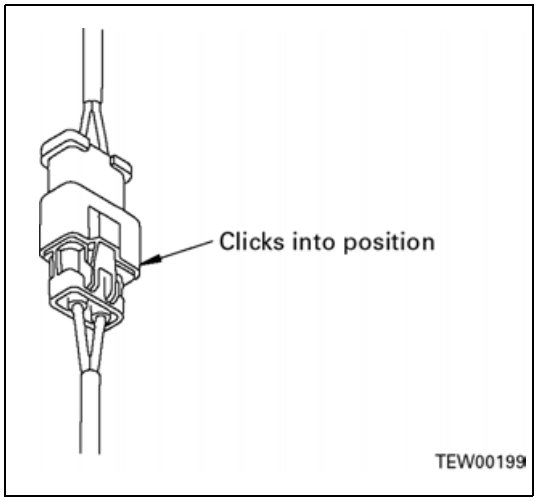
   I. Check that there is no oil, dirt, or water stuck to the connector pins (mating portion).

   II. Check that there is no deformation, faulty contact, corrosion, or damage to the connector pins.

   III. Check that there is no damage or breakage to the outside of the connector.

   ★ If there is any oil, water, or dirt stuck to the connector, wipe it off with a dry cloth. If any water has gotten inside the connector, warm the inside of the wiring with a dryer, but be careful not to make it too hot as this will cause short circuits.

   ★ If there is any damage or breakage, replace the connector.



2) Assemble the connector securely.

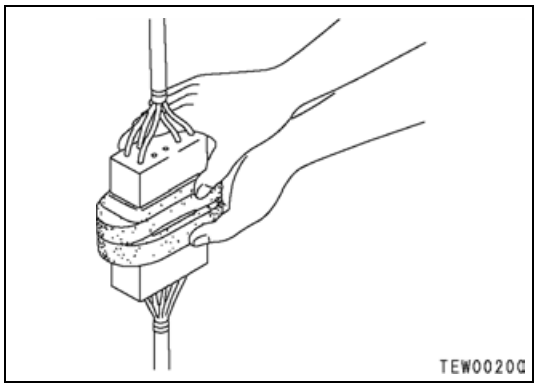
   Align the position of the connector correctly, then insert it securely.

   For connectors with a lock stopper:
   Push in the connector until the stopper clicks into position.

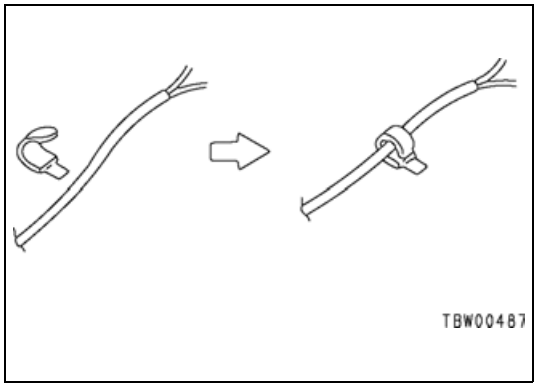
3) Correct any protrusion of the boot and any misalignment of the wiring harness.

   For connectors fitted with boots, correct any protrusion or the boot. In addition, if the wiring harness is misaligned, or the clamp is out of position, adjust it to its correct position.

   ★ When blowing with dry air, there is danger that the oil in the air may cause improper contact, so clean with properly filtered air.



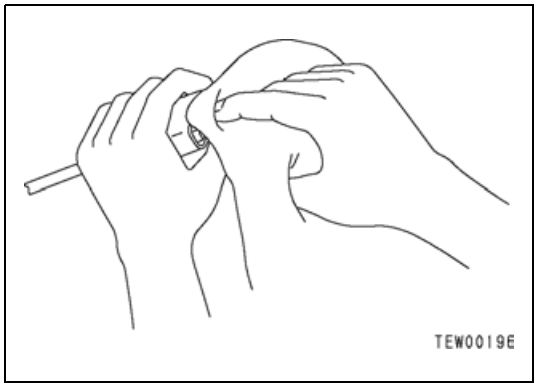
4) When the wiring harness clamp of the connector has been removed, always return it to its original condition and check that there is no looseness of the clamp.



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Drying wiring harness

If there is any oil or dirt on the wiring harness, wipe it off with a dry cloth. Avoid washing it in water or using steam. If the connector must be washed in water, do not use high pressure water or steam directly on the wiring harness.



If water gets directly on the connector, do as follows:

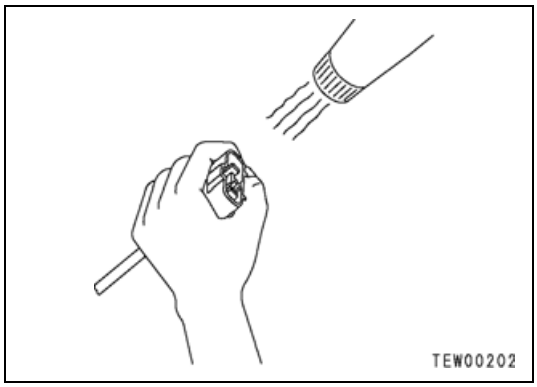
1) Disconnect the connector and wipe off the water with a dry cloth.

   ★ If the connector is blown dry with air, there is the risk that oil in the air may cause a faulty contact, so avoid blowing with air.

2) Dry the inside of the connector with a dryer.

   If water gets inside the connector, use a dryer to dry the connector.

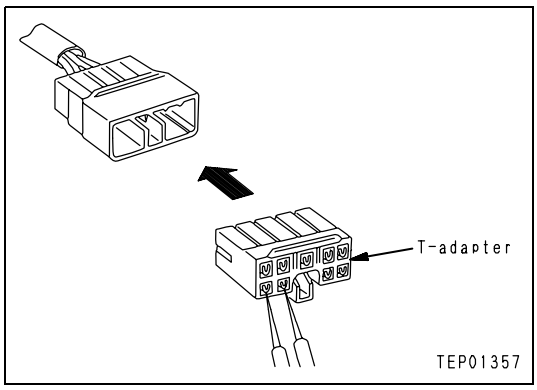
   ★ Hot air from the dryer can be used, but be careful not to make the connector or related parts too hot, as this will cause deformation or damage to the connector.



3) Carry out a continuity test on the connector.

   After drying, leave the wiring harness disconnected and carry out a continuity test to check for any short circuits between pins caused by water.

   ★ After completely drying the connector, spray it with contact restorer and reassemble.



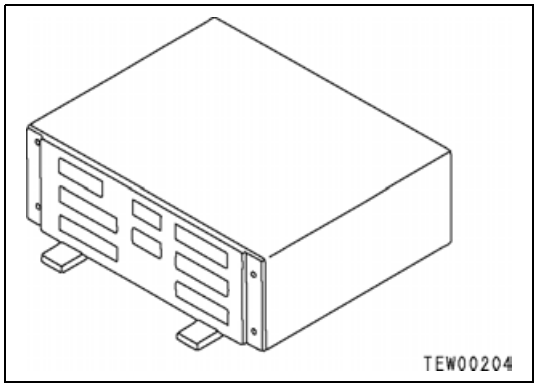
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3. Handling control box

1) The control box contains a microcomputer and electronic control circuits.

   This controls all of the electronic circuits on the machine, so be extremely careful when handling the control box.

2) Do not open the cover of the control box unless necessary.

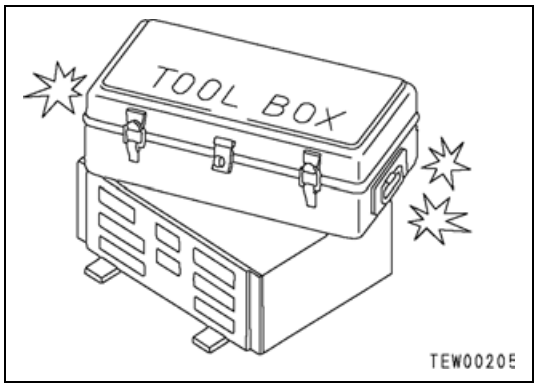


3) Do not place objects on top of the control box.

4) Cover the control connectors with tape or a vinyl bag.

   Never touch the connector contacts with your hand.

5) Do not leave the control box in a place where it is exposed to rain.

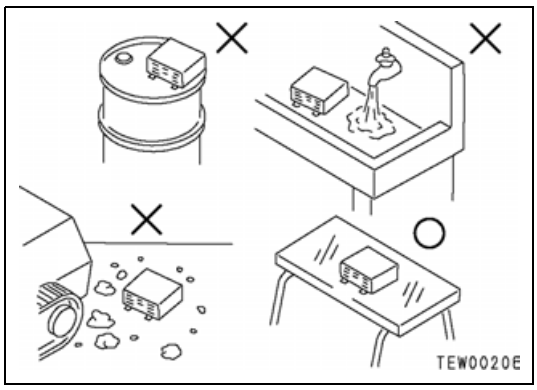


6) Do not place the control box on oil, water, or soil, or in any hot place, even for a short time.

   (Place it on a suitable dry stand)

7) Precautions when carrying out arc welding

   When carrying out arc welding on the body, disconnect all wiring harness connectors connected to the control box. Fit an arc welding ground close to the welding point.



2. Points to remember when troubleshooting electric circuits

1) Always turn the power OFF before disconnecting or connecting connectors.

2) Before carrying out troubleshooting, check that all the related connectors are properly inserted.

   ★ Disconnect and connect the related connectors several times to check.

3) Always connect any disconnected connectors before going on to the next step.

   ★ If the power is turned ON with the connectors still disconnected, unnecessary abnormality displays will be generated.

When carrying out troubleshooting of circuits (measuring the voltage, resistance, continuity, or current), move the related wiring and connectors several times and check that there is no change in the reading of the tester.

★ If there is any change, there is probably defective contact in the circuit.

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3. Points to remember when handling hydraulic equipment

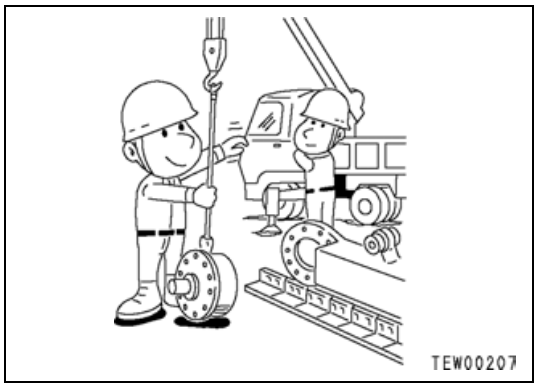
With the increase in pressure and precision of hydraulic equipment, the most common cause of failure is dirt (foreign material) in the hydraulic circuit. When adding hydraulic oil, or when disassembling or assembling hydraulic equipment, it is necessary to be particularly careful.

1. Be careful of the operating environment

   Avoid adding hydraulic oil, replacing filters, or repairing the machine in rain or high winds, or places where there is a lot of dust.

2. Disassembly and maintenance work in the field

   If disassembly or maintenance work is carried out on hydraulic equipment in the field, there is danger of dust entering the equipment. It is also difficult to confirm the performance after repairs, so it is desirable to use unit exchange. Disassembly and maintenance of hydraulic equipment should be carried out in a specially prepared dust proof workshop, and the performance should be confirmed with special test equipment.



3. Sealing openings

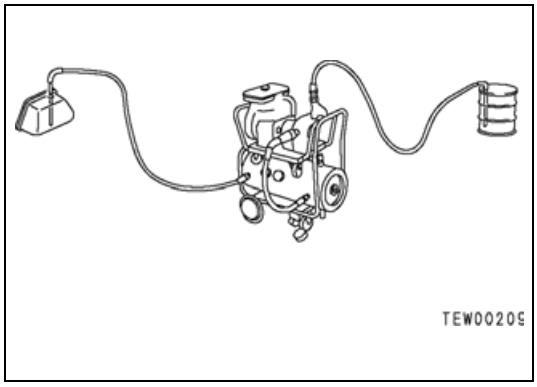
   After any piping or equipment is removed, the openings should be sealed with caps, tape, or vinyl bags to prevent any dirt or dust from entering. Never leave any openings opened or blocked with a rag, this could cause particles or dirt to get into the system.

   Drain all oil into a container and not unto the ground and be sure to follow the proper environmental regulation for any disposal of oil.



4. Do not let any dirt, or dust get in during refilling operations.

   Be careful not to let any dirt or dust get in when refilling with hydraulic oil. Always keep the oil filler and the area around it clean, and also use clean pumps and oil containers. If an oil cleaning device is used, it is possible to filter out the dirt that has collected during storage, so this is an even more effective method.



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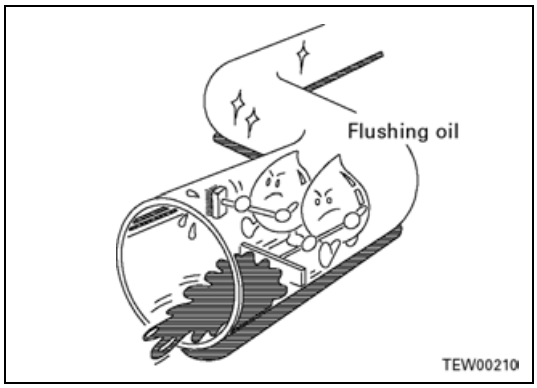
5. Change hydraulic oil when the temperature is high.

   When hydraulic oil or other oil is warm, it flows easily. In addition, the sludge can also be drained out easily from the circuit together with the oil, so it is best to change the oil when it is still warm. When changing the oil, as much as possible of the old hydraulic oil must be drained out. (Do not drain the oil from the hydraulic tank; but drain the oil from the filter and from the drain plug in the circuit.) If any old oil is left, the contaminants and sludge in it will mix with the new oil and will shorten the life of the hydraulic oil.

6. Flushing operations

   After disassembling and assembling the equipment, or changing the oil, use flushing oil to remove the contaminants, sludge, and old oil from the hydraulic circuit.

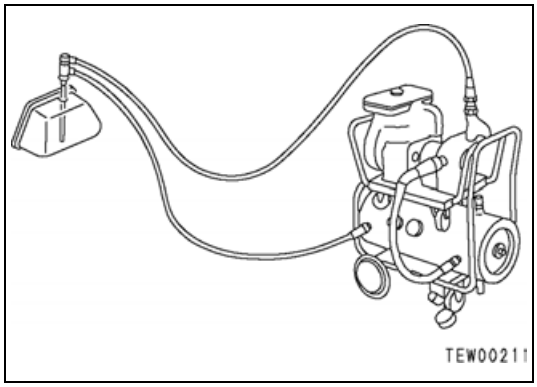
   Normally, flushing is carried out twice: primary flushing is carried out with flushing oil, and secondary flushing is carried out with the specified hydraulic oil.



7. Cleaning operations

   After repairing the hydraulic equipment (pump, control valve, etc.) or when running the machine, carry out oil cleaning to remove the sludge or contaminants in the hydraulic oil circuit.

   The oil cleaning equipment is used to remove the ultra fine (about 3μ) particles that the filter built into the hydraulic equipment cannot remove, so it is an extremely effective device.



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Checks before troubleshooting

Item		Judgement Value	Action
Lubricating oil, coolant	1. Check fuel level, type of fuel	—	Add fuel
	2. Check for impurities in fuel	—	Clean, drain
	3. Check hydraulic oil level	—	Add oil
	4. Check hydraulic strainer	—	Clean, drain
	5. Check swing machinery oil level	—	Add oil
	6. Check engine oil level	—	Add oil
	7. Check coolant level	—	Add coolant
	8. Check dust indicator for clogging	—	Clean or replace
	9. Check hydraulic filter	—	Replace
	10. Check final drive oil level	—	Add oil
Electrical equipment	11. Check for looseness, corrosion of battery terminal, wiring	—	Tighten or replace
	12. Check for looseness, corrosion of alternator terminal, wiring	—	Tighten or replace
	13. Check for looseness, corrosion of starting motor terminal, wiring	—	Tighten or replace
	14. Check operation of instruments	—	Repair or replace
Hydraulic, mechanical equipment	15. Check for abnormal noise, smell	—	Repair
	16. Check for oil leakage	—	Repair
	17. Carry out air bleeding	—	Bleed air
Electrical equipment	18. Check battery voltage (Engine stopped)	24 - 26 V	Replace
	19. Check battery electrolyte level	—	Add or replace
	20. Check for discolored, burnt, exposed wiring	—	Replace
	21. Check for missing wiring clamps, hanging wire	—	Repair
	22. Check for water leaking on wiring (Pay particular attention to water leaking on connectors or terminals)	—	Disconnect connector and dry
	23. Check for blown, corroded fuses	—	Replace
	24. Check alternator voltage (Engine running at 1/2 throttle or above)	After running for several minutes: 27.5 ~ 29.5 V	Replace
	25. Sound of actuation of battery relay (When starting switch is turned ON, OFF)	—	—

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Equipment for troubleshooting electrical system

Check or Maintenance	Part No.	Part Name	Remarks
Measurement of voltage, resistance value	79A-264-0211	Tester	—
Troubleshooting of wiring harness, sensor	799-601-7400	T-adapter assembly	—
	799-601-7500	T-adapter assembly (AMP070)	—
	799-601-9320	Box	—
	799-601-9310	Plate for T-adapter	—
	799-601-9200	T-adapter assembly (DT series)	—
Troubleshooting of NE sensor, G sensor	799-601-9410	Adapter (socket)	Common rail engine fuel pump specification
Troubleshooting of fuel pressure, boost pressure sensor	799-601-9420	Adapter (T-adapter)	
Troubleshooting of PVC solenoid	799-601-9430	Adapter (socket)	

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Special functions of machine monitor

Normal functions and special functions of machine monitor

The machine monitor is equipped with normal functions and special functions.

Various items of data are displayed on the character display in the middle of the machine monitor. Depending on the internal setting of the machine monitor, the display items are divided into automatic display items and items displayed when the machine monitor switches are operated.

1. Normal functions: Operator mode

   Functions for which the content is normally displayed or which can be used displayed and operated by the operator operating the switches.

2. Special functions 1: Service Mode 1

   Functions which the serviceman can display and operate with the special switches to carry out inspection, maintenance, and troubleshooting.

3. Special functions 2: Service Mode 2

   Special operations performed by the serviceman or at the factory.

Operator mode	
1	Service meter, time display (Load meter specification)
2	Load meter function
3	Odometer display function
4	Filter, oil replacement interval display function
5	Telephone number input function
6	Language selection function
7	Monitor brightness adjustment function
8	Time adjustment function
9	Action code display function
10	Failure code display function

⇔

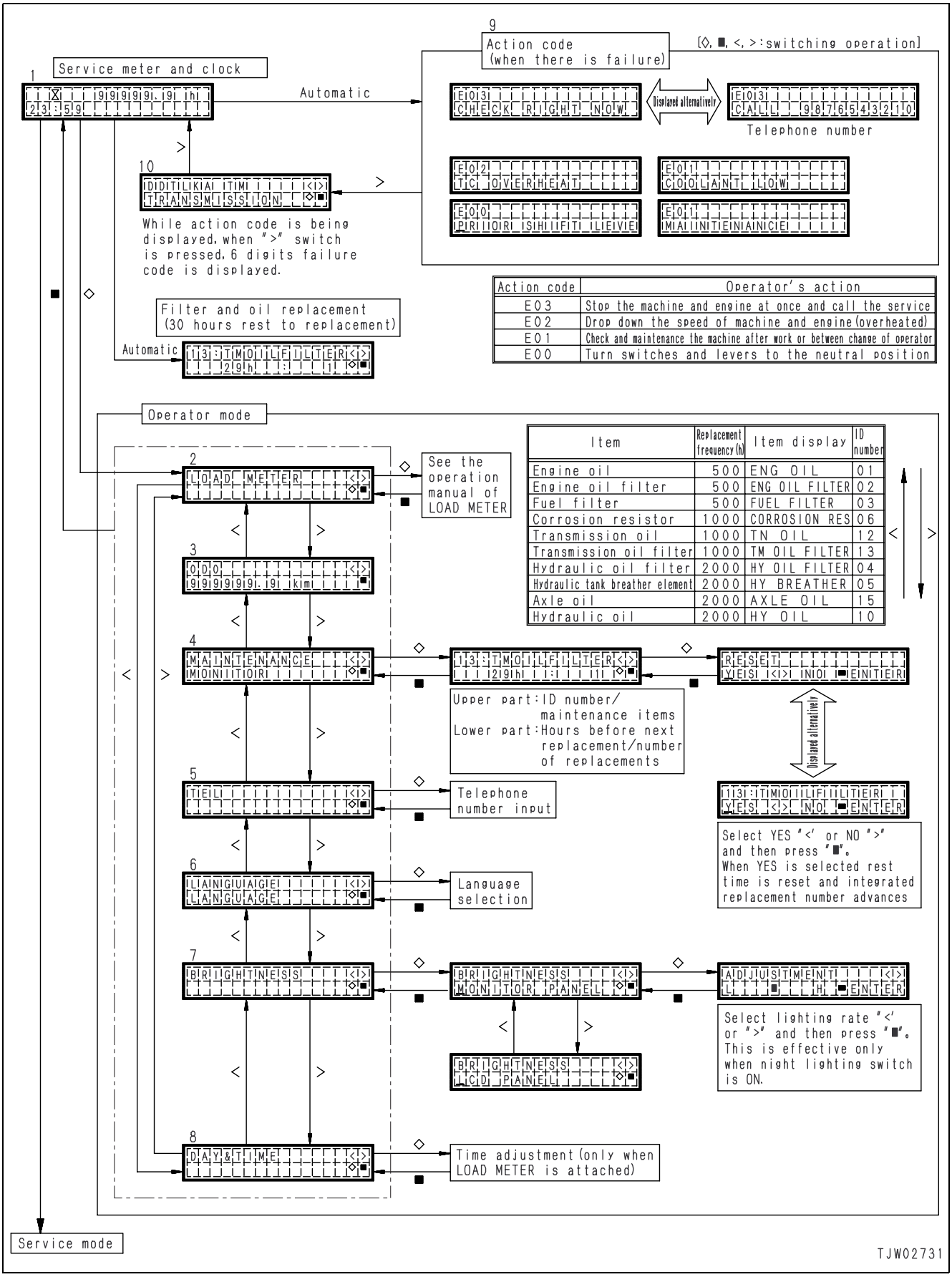
Service mode 1	
11	Electrical system trouble data display function
12	Mechanical system trouble data display function
13	Machine data monitoring function
14	Reduced cylinder mode
15	Adjustment function
16	Filter, oil replacement time setting function
17	Option selection function
18	Serial No. setting function
19	Initialize function

⇔

Service mode 2	
20	Service meter setting function
21	Odometer setting function

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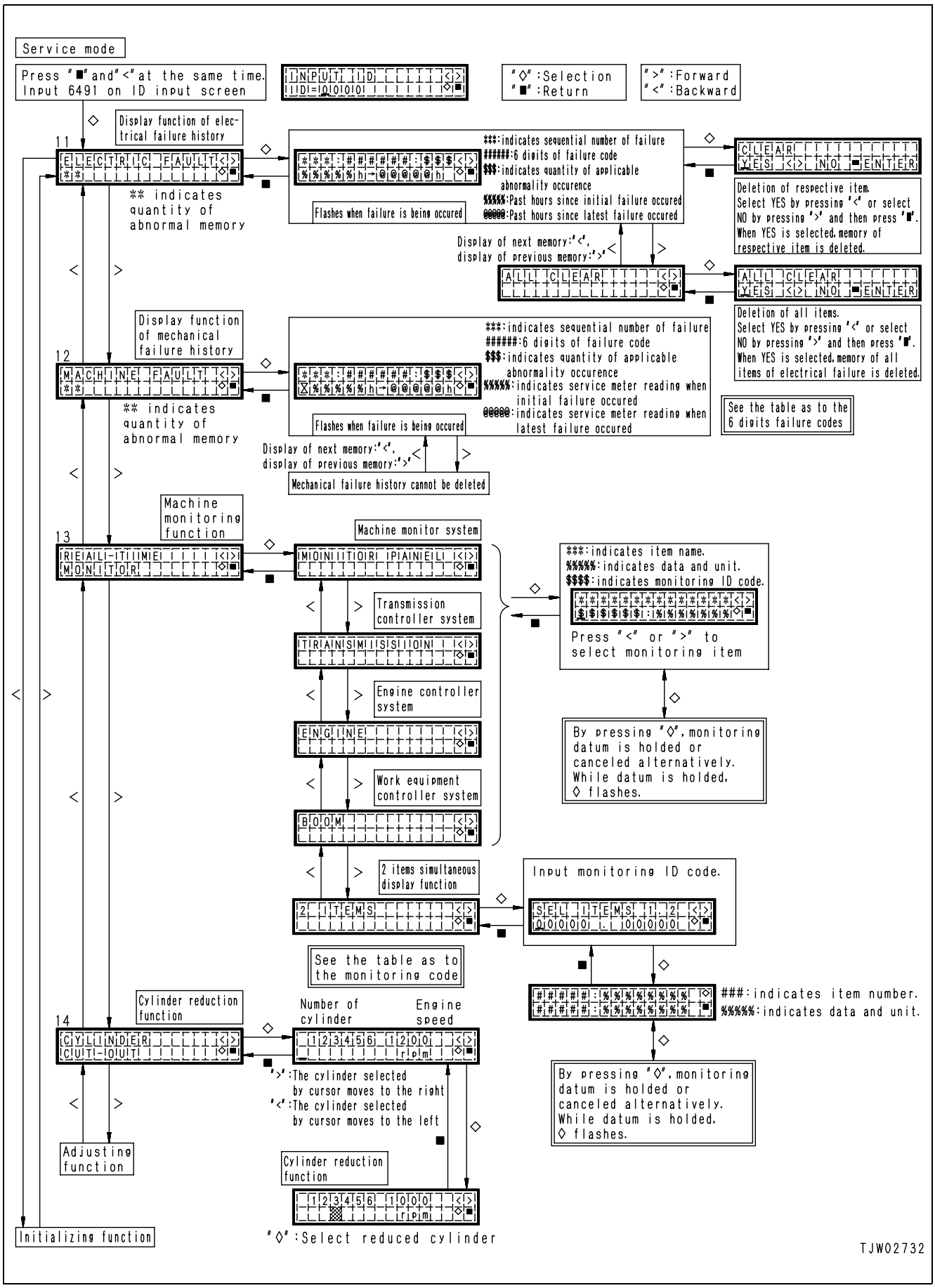
Flow of modes and functions



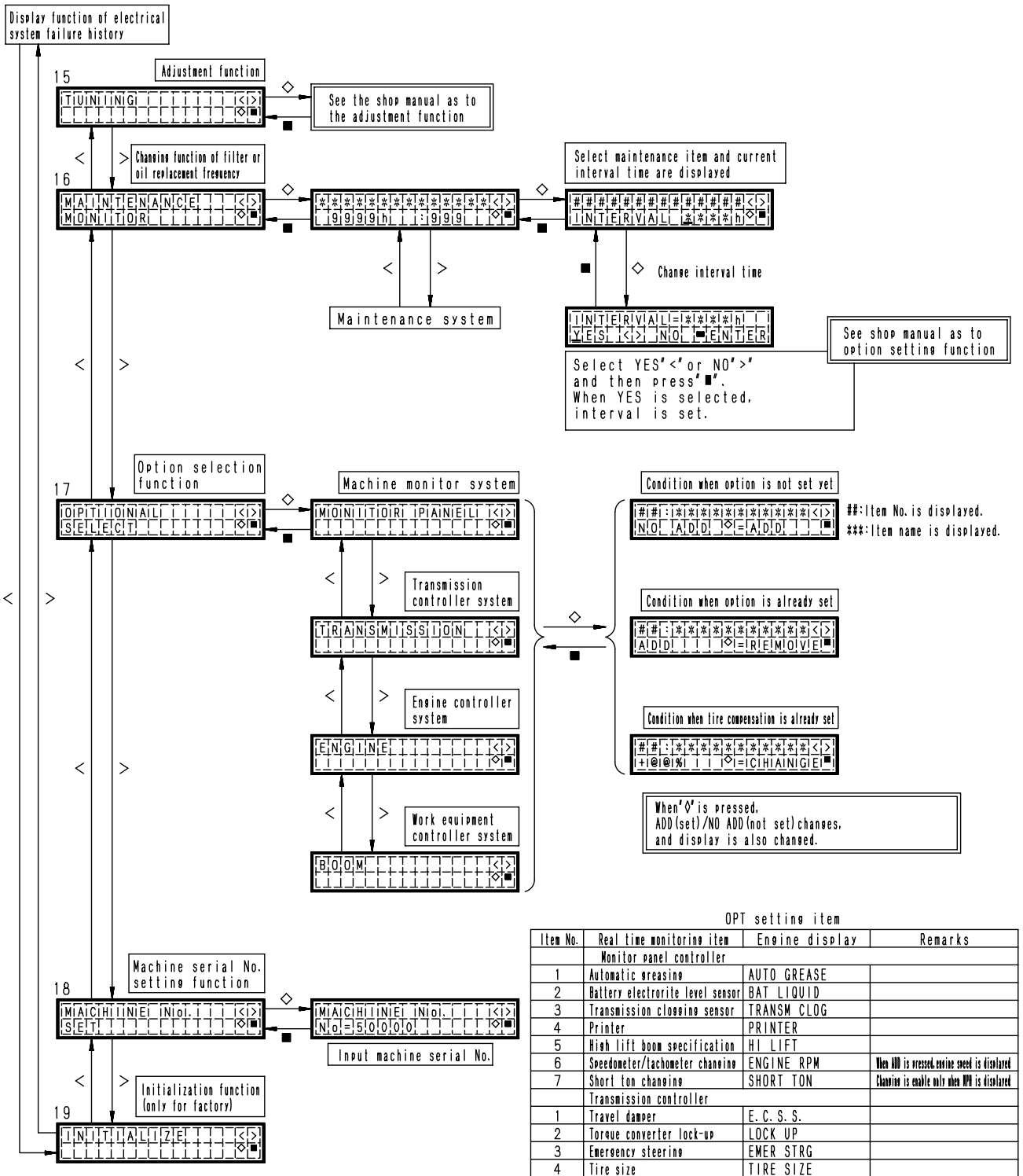
Action code	Operator's action
E03	Stop the machine and engine at once and call the service
E02	Drop down the speed of machine and engine (overheated)
E01	Check and maintenance the machine after work or between change of operator
E00	Turn switches and levers to the neutral position

Item	Replacement frequency (h)	Item display	ID number
Engine oil	500	ENG OIL	01
Engine oil filter	500	ENG OIL FILTER	02
Fuel filter	500	FUEL FILTER	03
Corrosion resistor	1000	CORROSION RES	06
Transmission oil	1000	TN OIL	12
Transmission oil filter	1000	TM OIL FILTER	13
Hydraulic oil filter	2000	HY OIL FILTER	04
Hydraulic tank breather element	2000	HY BREATHER	05
Axle oil	2000	AXLE OIL	15
Hydraulic oil	2000	HY OIL	10

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OPT setting item

Item No.	Real time monitoring item	Engine display	Remarks
	Monitor panel controller		
1	Automatic greasing	AUTO GREASE	
2	Battery electrorite level sensor	BAT LIQUID	
3	Transmission clogging sensor	TRANSM CLOG	
4	Printer	PRINTER	
5	High lift boom specification	HI LIFT	
6	Speedometer/tachometer changing	ENGINE RPM	When ADD is pressed, engine speed is displayed
7	Short ton changing	SHORT TON	Changing is enable only when RPM is displayed
	Transmission controller		
1	Travel damper	E.C.S.S.	
2	Torque converter lock-up	LOCK UP	
3	Emergency steering	EMER STRG	
4	Tire size	TIRE SIZE	
5	Automatic reverse rotation fan	AUTO RE FAN	
6	R.H. F-N-R switch	RH FNR SW	
	Work equipment controller		
1	EPC lever	EPC LEVER	
2	Joy stick	JOY STICK	
3	EPC 3rd lever	EPC 3RD	
	Engine controller		
1	Not used	---	

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Operator Mode

★ No. 2 ~ No. 8 give an endless display according to the operation of the switch.

★ When a failure occurs, the screen changes automatically to No. 9, regardless of the display screen.

★ Regardless of the display screen, if no switch is operated for more than 30 seconds, the screen automatically changes as follows.

- Goes to No. 1: If there is no failure
- Goes to No. 9: If there is no failure

★ From No. 10 the screen changes to No. 1 with the switch operation, and if no switch is operated for more than 10 seconds, the screen automatically changes to No. 9.

Service Mode 1

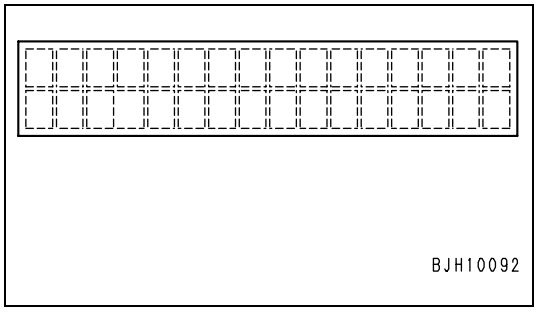
★ No. 11 ~ No. 19 give an endless display according to the operation of the switch.

★ Once the ID is input and confirmed, it remains effective until the starting switch is turned OFF.

Service Mode 2

★ No. 20 and 21 switch according to the operation of the switch.

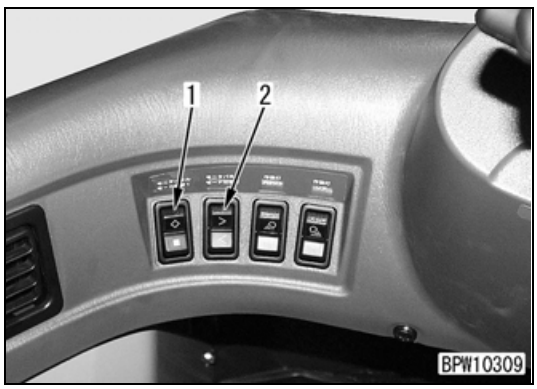
The character display consists of a top line and bottom line with 16 characters each. A combination of the following characters (alphabet and numerals) and symbols is displayed according to the content.



1) Numerals: 1 2 3 . . .
2) Small letters: a b c . . .
3) Capital letters: A B C . . .
4) Katakana: Japanese display only
5) Symbols: @ Y= $ . . .
6) Special characters

Control switches

Control of the machine monitor display is all carried out with machine monitor mode selector switches (1) and (2).



The following functions are provided for the buttons of each switch.

1. ◇: Select, Run
2. ■: Cancel, Release, Select (YES/NO screen only)
3. >: Right, Next, Continue
4. <: Left, Previous, Return

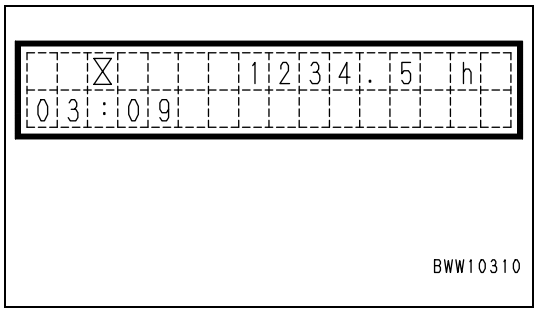
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Operation and displays for operator mode

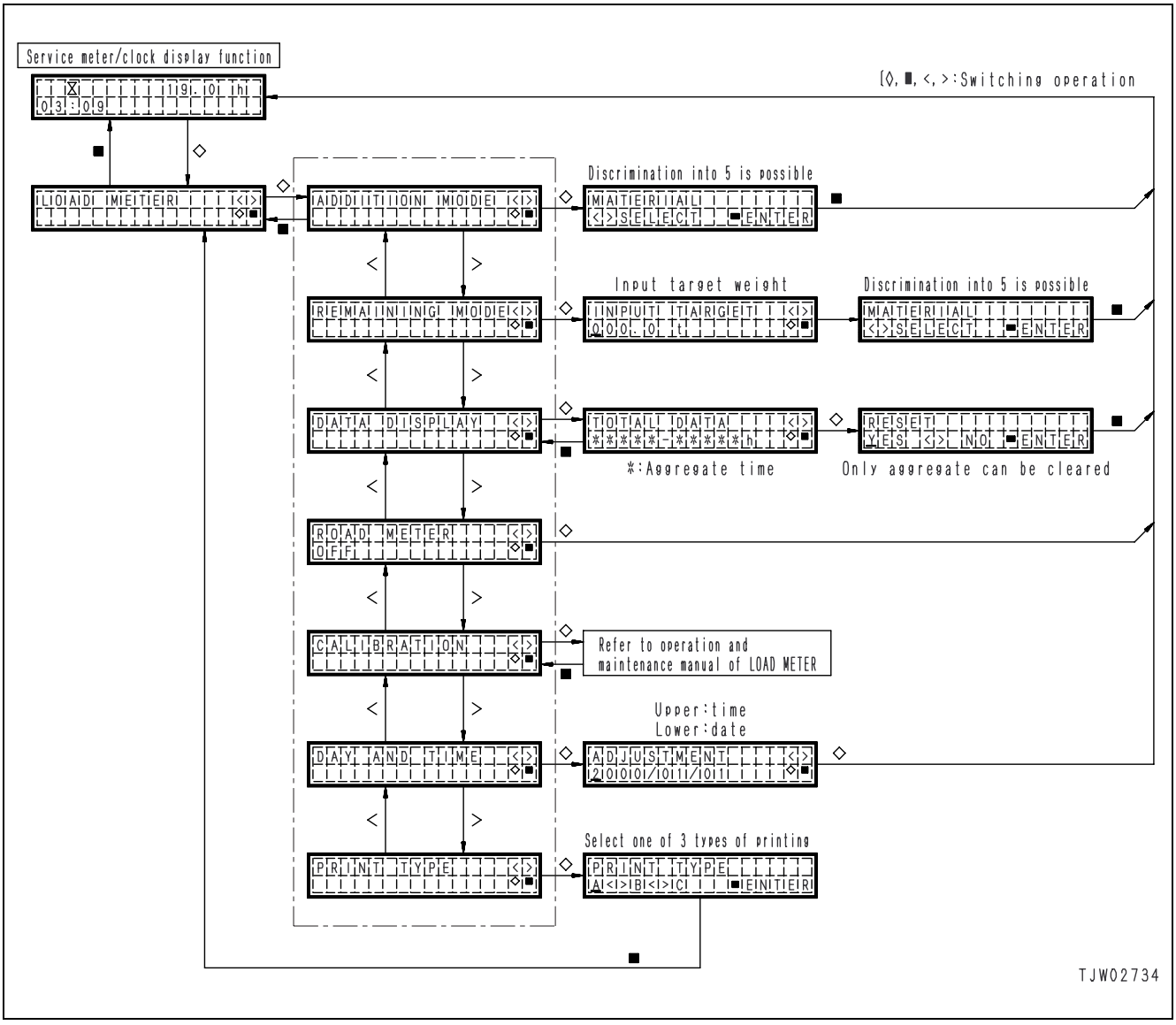
1. Service meter, time display function

   When the starting switch is turned ON, the top line shows the service meter and the bottom line shows the time.

   - The time display function is only on the load meter specification machine



2. Load meter function



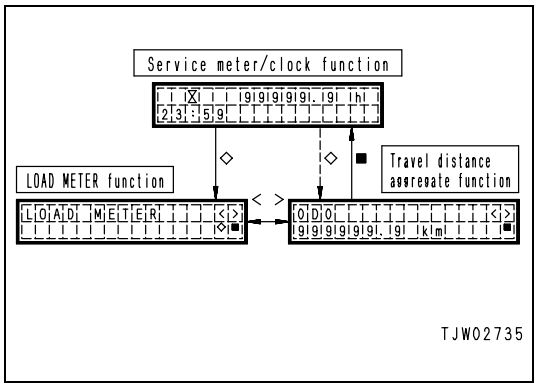
★ For details, see the OPERATION AND MAINTENANCE MANUAL, Machine Monitor and Other Functions.

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3. Distance traveled in reverse display function
From the normal service meter display, press the [◇] switch to display the odometer.

   • On machines without a load meter, this display is shown first.

   ★ For details, see the OPERATION AND MAINTENANCE MANUAL, Machine Monitor and Other Functions.



4. Filter, oil replacement interval display function

   1) Filter, oil replacement time display (automatic display)

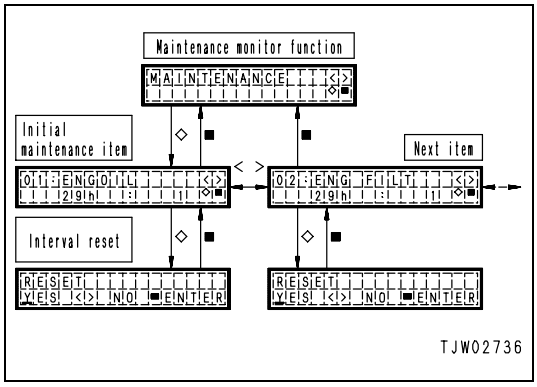
      When the replacement interval for the filters or oil approaches, this information is automatically displayed on the machine monitor to recommend the operator to carry out maintenance.

   2) Resetting replacement time (selection menu)

      When the maintenance operation for the filters and oil replacement has completed, the switches on the machine monitor can be used to reset the interval.

   ★ For details, see the OPERATION AND MAINTENANCE MANUAL, Machine Monitor and Other Functions.

   ★ The replacement interval can be set using Service Mode 1.

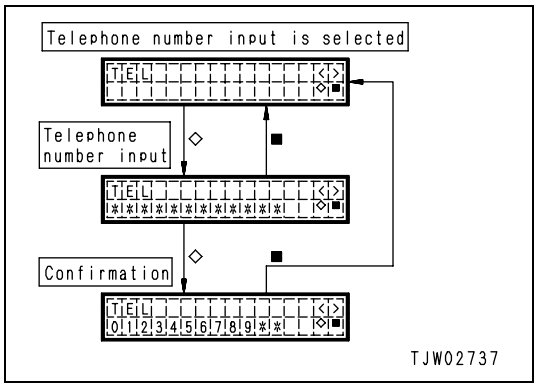


5. Telephone number input function

   The telephone number set inside the machine monitor can be input, corrected, or cancelled by operating the switches.

   ★ When action code [E03] is displayed, the telephone number is displayed at the same time as [CALL].

   ★ For details, see the OPERATION AND MAINTENANCE MANUAL, Machine Monitor and Other Functions.

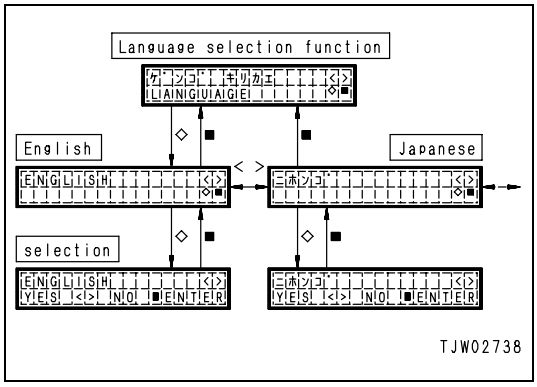


6. Language selection function

   The language used for the machine monitor display can be selected by operating the switches.

   ★ The functions of Service Mode 1 and Service Mode 2 are not included in the functions for display selection, so they are always displayed in English.

   ★ For details, see the OPERATION AND MAINTENANCE MANUAL, Machine Monitor and Other Functions.

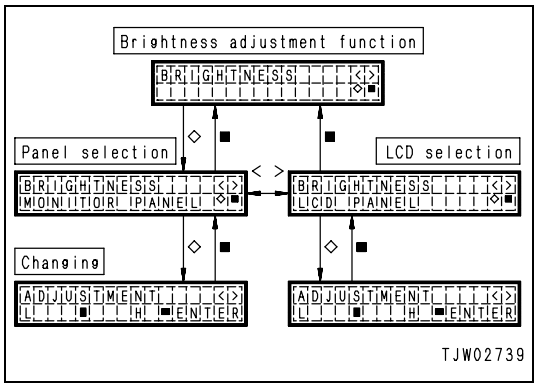


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7. Monitor brightness adjustment function

   The brightness of the machine monitor can be adjusted by the switch to 7 levels.

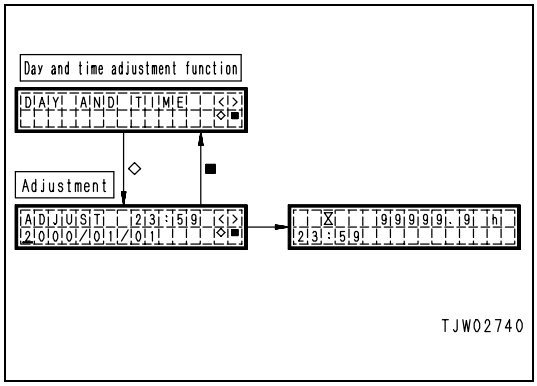
   ★ For details, see the OPERATION AND MAINTENANCE MANUAL, Machine Monitor and Other Functions.



8. Time adjustment function (load meter specification)

   The setting of the date and time on the machine monitor can be selected by the switch.

   ★ For details, see the OPERATION AND MAINTENANCE MANUAL, Handling Load Meter.

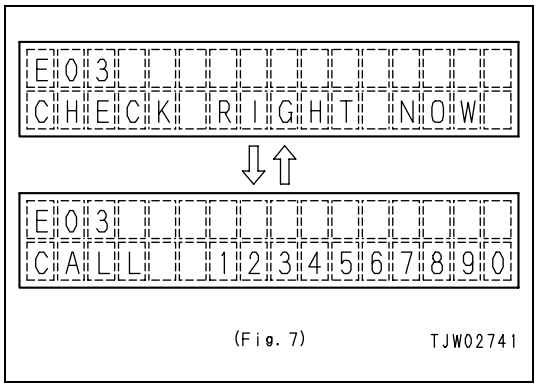


9. Action code display function

   If any abnormality occurs on the machine, the degree of the abnormality is automatically displayed as a user code on the machine monitor to recommend appropriate action to the operator.

   ★ The diagram on the right shows an example of action code [E03] and [CALL + Telephone number] being displayed in turn.

   ★ When action codes [E00], [E01], and [E02] are displayed, [CALL + Telephone number] is not displayed.

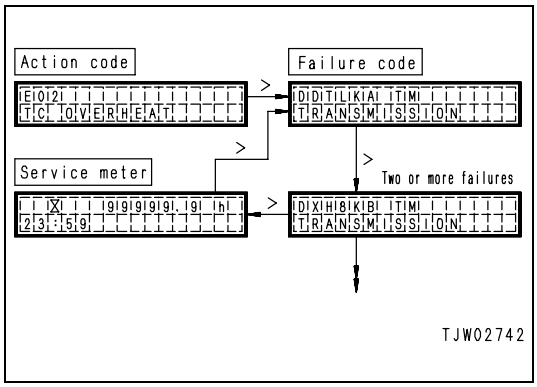


★ Correspondence between user code and recommendation to operator

Action code	Call + telephone number	Action recommended to operator
E00	Not displayed	• Return mis-operated switch or lever to normal condition
E01	Not displayed	• Carry out inspection and maintenance after completion of poerations or when changing shifts between operators
E02	Not displayed	• When overrun related display is shown: Reduce when engine speed and machine speed while continuing operations • When overheat related display is shown: Stop machine and keep engine running at mid-range speed under no load.
E03	Displayed	• Stop engine and machine immediately and contact serviceman

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10. Failure code display function



While the action code is being displayed on the machine monitor, press the [>] button once to display the failure codes for the existing failures.

★ The failure codes detected in the past are divided into failures of the electrical system and the mechanical system and are recorded as trouble data.
(For details, see Service Mode 1.)

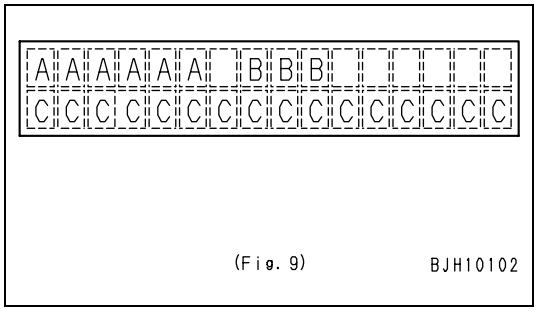
★ If more than one failure is occurring, press the [>] button once more to display the other failure codes.

★ After pressing the [>] button to display all the existing failures, press the [>] button once more to return to the service meter display screen.

If the [>] button is pressed once more, the failure codes will be displayed again from the beginning.

If the switch is not operated for 3 seconds, the display will switch automatically to the action code screen.

★ With the service code display function, the following data are displayed.



A. Failure code (location code + problem code)
B. Controller codes
   MON: Machine monitor
   ENG: Engine controller
   TM: Transmission controller
   WRK: Work equipment controller
C. System with problem

★ For details of the displayed failure codes, see FAILURE CODE TABLE.

★ If no switch is operated on the failure code display screen for more than 30 seconds, the display automatically returns to the action code display screen.

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Failure code table

Failure Code	Location of Failure (Location, component with failure)	Nature of Failure (Problem, nature of failure)	Controller	Action Code
1500L0	Transmission clutch	※ See separate table (L0)	TM	E03
15B0NX	Transmission filter	Clogged (NX)	MON	E01
15SAL1	Fill switch for F clutch	※ See separate table (L1)	TM	E03
15SALH	Fill switch for F clutch	※ See separate table (LH)	TM	E01
15SBL1	Fill switch for R clutch	※ See separate table (L1)	TM	E03
15SBLH	Fill switch for R clutch	※ See separate table (LH)	TM	E01
15SEL1	Fill switch for 1st clutch	※ See separate table (L1)	TM	E03
15SELH	Fill switch for 1st clutch	※ See separate table (LH)	TM	E01
15SFL1	Fill switch for 2nd clutch	※ See separate table (L1)	TM	E03
15SFLH	Fill switch for 2nd clutch	※ See separate table (LH)	TM	E01
15SGL1	Fill switch for 3rd clutch	※ See separate table (L1)	TM	E03
15SGLH	Fill switch for 3rd clutch	※ See separate table (LH)	TM	E01
15SHL1	Fill switch for 4th clutch	※ See separate table (L1)	TM	E03
15SHLH	Fill switch for 4th clutch	※ See separate table (LH)	TM	E01
15SJL1	Fill switch for lock-up clutch	※ See separate table (L1)	TM	E03
15SJLH	Fill switch for lock-up clutch	※ See separate table (LH)	TM	E01
(2F00KM)	Parking Brake	Mistaken operation or mistaken setting (KM)	MON	E00
(2F00MR)	Parking Brake	Brake failure (MR)	MON	E00
2G42ZG	Accumulator (Front)	Drop in oil pressure (ZG)	MON	E03
2G43ZG	Accumulator (Rear)	Drop in oil pressure (ZG)	MON	E03
(989F00)	Transmission overrun prevention command signal	Actuated (00)	TM	E00
(989G00)	Neutral position confirmation signal	Actuated (00)	TM	E00
A000N1	Engine	Overrun (N1)	ENG	E02
AA1ANX	Engine air cleaner 1	Clogged (NX)	MON	E01
AA1BNX	Engine air cleaner 2	Clogged (NX)	MON	E01
AB00L6	Alternator	※ See separate table (L6)	MON	E03
AB00MA	Alternator	Function impossible (MA)	MON	E03
AD00L2	Common rail	※ See separate table (L2)	ENG	E03
AD00MA	Common rail	Function impossible (MA)	ENG	E03
AD10L3	Fuel supply pump	※ See separate table (L3)	ENG	E03
AD10MA	Common rail	Function impossible (MA)	ENG	E03
AD10MB	Fuel supply pump	Drop in function (MB)	ENG	E03
AD11KA	Fuel supply pump solenoid valve 1	Disconnection (KA)	ENG	E03
AD11KB	Fuel supply pump solenoid valve 1	Short circuit (KB)	ENG	E03
AD51KA	Fuel supply pump solenoid valve 2	Disconnection (KA)	ENG	E03
AD51KB	Fuel supply pump solenoid valve 2	Short circuit (KB)	ENG	E03
ADA1KA	No. 1 injector solenoid valve	Disconnection (KA)	ENG	E03
ADAZKB	No. 1, 2, 3 injector solenoid valve	Short circuit (KB)	ENG	E03
ADB1KA	No. 2 injector solenoid valve	Disconnection (KA)	ENG	E03
ADC1KA	No. 3 injector solenoid valve	Disconnection (KA)	ENG	E03
ADD1KA	No. 4 injector solenoid valve	Disconnection (KA)	ENG	E03
ADDZKB	No. 4, 5, 6 injector solenoid valve	Short circuit (KB)	ENG	E03
ADE1KA	No. 5 injector solenoid valve	Disconnection (KA)	ENG	E03
ADF1KA	No. 6 injector solenoid valve	Disconnection (KA)	ENG	E03

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Failure Code	Location of Failure (Location, component with failure)	Nature of Failure (Problem, nature of failure)	Controller	Action Code
B@BAZG	Engine oil pressure	Drop in oil pressure (ZG)	MON	E03
B@BAZK	Engine oil	Drop in level (ZK)	MON	E01
B@BCNS	Engine	Overheat (NS)	MON	E02
B@BCZK	Radiator water level	Drop in level (ZK)	MON	E01
B@C6ZK	Brake oil (Front)	Drop in level (ZK)	MON	E01
B@C7NS	Brake oil temperature sensor	Overheat (NS)	TM	E02
B@C7ZK	Brake oil (Rear)	Drop in level (ZK)	MON	E01
B@CENS	Torque converter	Overheat (NS)	MON	E02
B@GAZK	Battery 1	Drop in level (ZK)	MON	E01
B@GBZK	Battery 2	Drop in level (ZK)	MON	E01
B@HANS	Hydraulic tank	Overheat (NS)	MON	E02
D150KA	Emergency steering relay	Disconnection (KA)	TM	E03
D150KB	Emergency steering relay	Short Circuit (KB)	TM	E03
D160KA	Back-up lamp relay	Disconnection (KA)	TM	E01
D160KB	Back-up lamp relay	Short Circuit (KB)	TM	E01
D182KZ	Preheating relay	Disconnection or short circuit (KZ)	ENG	E03
D191KA	Neutral output relay	Disconnection (KA)	TM	E03
D191KB	Neutral output relay	Short circuit (KB)	TM	E01
D192KA	Travel damper relay	Disconnection (KA)	TM	E01
D192KB	Travel damper relay	Short circuit (KB)	TM	E01
D193KA	Joystick lever solenoid relay	Disconnection (KA)	WRK	E03
D193KB	Joystick lever solenoid relay	Short circuit (KB)	WRK	E03
D1D0KB	Engine controller load power source relay	Short circuit (KB)	ENG	E01
D5ZHL6	Monitor panel	※ See separate table (L6)	MON	E01
DAF0KK	Monitor panel	Drop in power source voltage, input (KK)	MON	E03
DAF0KT	Monitor panel	Abnormality inside controller (KT)	MON	E03
DAF3KK	Monitor panel	Drop in power source voltage, input (KK)	MON	E03
DAF5KP	Load meter	Drop in output voltage (KP)	MON	E01
DAF6KP	Load meter	Drop in output voltage (KP)	MON	E01
DAFAKM	Monitor panel	Mistaken operation or mistaken setting (KM)	MON	E03
DAFBKM	Monitor panel	Mistaken operation or mistaken setting (KM)	MON	E03
DAFSKQ	Monitor panel	Non match in model selection signal (KQ)	MON	E01
DAQ0KK	Drop in power source voltage	Drop in power source voltage, input (KK)	TM	—
DAQ2KK	Solenoid power source circuit	Drop in power source voltage, input (KK)	TM	—
DAQ9KQ	Transmission	Non match in model selection signal (KQ)	TM	E03
DAQSKR	Monitor panel	Defective communication, abnormality in applicable component system (KR)	MON	E03
DB20KK	Engine controller	Drop in power source voltage, input (KK)	ENG	E03
DB20KT	Engine controller	Abnormality inside controller (KT)	ENG	E03
DB22KK	Engine controller load power source relay	Drop in power source voltage, input (KK)	ENG	E03
DB29KQ	Engine controller connecting wiring harness	Non match in model selection signal (KQ)	ENG	E03
DB2AMA	Engine controller fuel injection quantity control switch	Function impossible (MA)	ENG	E01
DB2SKR	Monitor panel	Defective communication, abnormality in applicable component system (KR)	MON	E03
DB90KK	Work equipment controller power source circuit	Drop in power source voltage, input (KK)	WRK	E03

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Failure Code	Location of Failure (Location, component with failure)	Nature of Failure (Problem, nature of failure)	Controller	Action Code
DB92KK	Solenoid power source circuit	Drop in power source voltage, input (KK)	WRK	E03
DB95KX	Sensor power source circuit	Input signal outside range (KX)	WRK	E03
DB9SKR	Monitor panel	Defective communication, abnormality in applicable component system (KR)	MON	E03
DD11KB	Starting switch	Short circuit (KB)	ENG	E03
DD15LD	Monitor panel	※ See separate table (LD)	MON	E01
DD16LD	Monitor panel	※ See separate table (LD)	MON	E01
DD17LD	Monitor panel	※ See separate table (LD)	MON	E01
DD18LD	Monitor panel	※ See separate table (LD)	MON	E01
DD1ALD	Remote positioner lamp	※ See separate table (LD)	WRK	E03
DD1BLD	Remote positioner lamp	※ See separate table (LD)	WRK	E03
DD1CLD	Load meter	※ See separate table (LD)	MON	E01
DDA1MA	Engine controller Lo idling switch	Function impossible (MA)	ENG	E01
DDA7LD	Throttle lock switch	※ See separate table (LD)	ENG	E01
DDE2L6	Engine oil pressure switch	※ See separate table (L6)	ENG	E03
DDK3KA	Shift switch	Disconnection (KA)	TM	E03
DDK3KB	Shift switch	Disconnection (KB)	TM	E03
(DDK3KM)	Shift switch neutral position confirmation	Mistaken operation or mistaken setting (KM)	MON	E00
DDK4KA	Joystick	Disconnection (KA)	TM	E03
DDK4KB	Joystick	Short circuit (KB)	TM	E03
(DDK4KM)	Joystick lever neutral position confirmation	Mistaken operation or mistaken setting (KM)	MON	E00
DDK5LD	Joystick	※ See separate table (LD)	TM	E03
DDK6KA	Shift lever	Disconnection (KA)	TM	E03
DDK6KB	Shift lever	Short circuit (KB)	TM	E03
(DDK6KM)	Shift switch neutral position confirmation	Mistaken operation or mistaken setting (KM)	MON	E00
DDS5KA	Steering circuit oil pressure	Disconnection (KA)	TM	E03
DDS5KB	Steering circuit oil pressure	Short circuit (KB)	TM	E03
DDS5L6	Steering oil pressure	Drop in oil pressure (ZG)	MON	E03
DDT0L4	Shift mode switch	※ See separate table (L4)	TM	—
DDT4LD	Transmission cut-off switch	※ See separate table (LD)	TM	E01
DDW9LD	Kick-down switch	※ See separate table (LD)	TM	E01
DDWLLD	Hold switch	※ See separate table (LD)	TM	E01
DDY0LD	Load meter	※ See separate table (LD)	MON	E01
DF10KA	Shift lever	Disconnection (KA)	TM	E01
DF10KB	Shift lever	Short circuit (KB)	TM	E01
(DF10KM)	Joystick shift lever	Mistaken operation or mistaken setting (KM)	TM	E00
(DFA0KM)	Work equipment lever neutral position confirmation signal	Mistaken operation or mistaken setting (KM)	WRK	E00
DGE2KX	Water temperature sensor (High temperature)	Input signal outside range (KX)	MON	E01
DGE3L6	Water temperature sensor	※ See separate table (L6)	ENG	E01
DGE3L6	Water temperature sensor (Low temperature)	※ See separate table (L6)	MON	E01
DGE4KX	Fuel temperature sensor	Input signal outside range (KX)	ENG	E01
DGF1KX	Transmission oil temperature sensor	Input signal outside range (KX)	TM	—
DGH2KX	Hydraulic tank	Input signal outside range (KX)	MON	E01
DGR2KA	Rear brake oil temperature sensor	Disconnection (KA)	TM	E01
DGR2KB	Rear brake oil temperature sensor	Short circuit (KB)	TM	E01
DGT1KX	Torque converter	Input signal outside range (KX)	MON	E01
DH30KX	Boost pressure sensor	Input signal outside range (KX)	ENG	E01
DH40KX	Common rail pressure sensor	Input signal outside range (KX)	ENG	E01

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Failure Code	Location of Failure (Location, component with failure)	Nature of Failure (Problem, nature of failure)	Controller	Action Code
DHA4KA	Engine air cleaner 1	Disconnection (KA)	MON	E01
DHA5KA	Engine air cleaner 2	Disconnection (KA)	MON	E01
DHE4L6	Engine oil pressure sensor	※ See separate table (L6)	MON	E01
DHPCKX	Cylinder bottom pressure sensor	Input signal outside range (KX)	MON	E01
DHPDKX	Cylinder rod pressure sensor	Input signal outside range (KX)	MON	E01
DHT1KX	Brake pressure sensor	Input signal outside range (KX)	TM	E01
DHT2L6	Transmission filter	※ See separate table (L6)	MON	E01
DJB1KX	Battery electrolyte level 1	Input signal outside range (KX)	MON	E01
DJB3KX	Battery electrolyte level 2	Input signal outside range (KX)	MON	E01
DK10KX	Accelerator sensor	Input signal outside range (KX)	ENG	E03
DK59KA	Lift arm EPC potentiometer	Disconnection (KA)	WRK	E03
DK59KY	Lift arm EPC potentiometer	Short circuit in power supply line (KY)	WRK	E03
DK59L8	Lift arm EPC lever potentiometer 2 system	Abnormality in input signal	WRK	E03
DK5FKA	Joystick lever EPC potentiometer	Disconnection (KA)	WRK	E03
(DK5FKM)	Joystick lever neutral position confirmation signal	Mistaken operation or mistaken setting (KM)	WRK	E03
DK5FKY	Joystick lever EPC potentiometer	Short circuit in power supply line (KY)	WRK	E03
DK5FL8	Joystick lever EPC potentiometer	※ See separate table (L8)	WRK	E03
DK5GKA	Joystick lever EPC potentiometer	Disconnection (KA)	WRK	E03
DK5GKY	Joystick lever EPC potentiometer	Short circuit in power supply line (KY)	WRK	E03
DKA0KA	Lift arm angle sensor	Short circuit in power supply line (KY)	WRK	E01
DKA0KX	Lift arm angle sensor	Input signal outside range (KX)	MON	E01
DKA0KY	Lift arm angle sensor	Short circuit in power supply line (KY)	WRK	E01
DLE2KA	Engine speed sensor	Disconnection (KA)	TM	E03
DLE2LC	Engine speed sensor	※ See separate table (LC)	TM	E03
DLE2LC	Engine speed sensor	※ See separate table (LC)	WRK	E01
DLE3LC	Engine Ne speed sensor	※ See separate table (LC)	ENG	E03
DLH1LC	Engine G speed sensor	※ See separate table (LC)	ENG	E03
DLT3KA	Speed sensor	Disconnection (KA)	TM	E03
DLT3LC	Speed sensor	※ See separate table (LC)	WRK	E01
DT20KB	Transmission cut-off indicator	Short circuit (KB)	TM	—
DUM1KB	Remote positioner lamp	Short circuit (KB)	WRK	E03
DUM2KB	Remote positioner lamp	Short circuit (KB)	WRK	E03
DV00KB	Alarm buzzer	Short circuit (KB)	MON	E01
DW4PKA	Boom RAISE EPC potentiometer	Disconnection (KA)	WRK	E03
DW4PKB	Boom RAISE EPC potentiometer	Short circuit (KB)	WRK	E03
DW4QKA	Boom LOWER EPC potentiometer	Disconnection (KA)	WRK	E03
DW4QKB	Boom LOWER EPC potentiometer	Short circuit (KB)	WRK	E03
DW4RKA	Bucket TILT EPC potentiometer	Disconnection (KA)	WRK	E03
DW4RKB	Bucket TILT EPC potentiometer	Short circuit (KB)	WRK	E03
DW43KA	Bucket DUMP EPC potentiometer	Disconnection (KA)	WRK	E03
DW43KB	Bucket DUMP EPC potentiometer	Short circuit (KB)	WRK	E03
DW7BKA	Reverse rotation solenoid valve for fan pump	Disconnection (KA)	TM	E01
DW7BKB	Reverse rotation solenoid valve for fan pump	Short circuit (KB)	TM	E01
DW7CKA	Switch pump solenoid	Disconnection (KA)	TM	E01
DW7CKB	Switch pump solenoid	Short circuit (KB)	TM	E01
DW7DKA	EPC solenoid valve for fan pump	Disconnection (KA)	TM	E01
DW7DKB	EPC solenoid valve for fan pump	Short circuit (KB)	TM	E01

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Failure Code	Location of Failure (Location, component with failure)	Nature of Failure (Problem, nature of failure)	Controller	Action Code
DWM1KA	Work equipment solenoid	Disconnection (KA)	WRK	E01
DWM1KB	Work equipment solenoid	Short circuit (KB)	WRK	E01
DWN6KA	Boom RAISE magnet detent	Disconnection (KA)	WRK	E01
DWN6KB	Boom RAISE magnet detent	Short circuit (KB)	WRK	E01
DWN7KA	Lift arm FLOAT magnet detent	Disconnection (KA)	WRK	E01
DWN7KB	Lift arm FLOAT magnet detent	Short circuit (KB)	WRK	E01
DWN8KA	Bucket TILT magnet detent	Disconnection (KA)	WRK	E01
DWN8KB	Bucket TILT magnet detent	Short circuit (KB)	WRK	E01
DX16KA	EPC valve for fan pump	Disconnection (KA)	TM	E01
DX16KB	EPC valve for fan pump	Short circuit (KB)	TM	E01
DXH1KA	ECMV for lock-up clutch	Disconnection (KA)	TM	E01
DXH1KB	ECMV for lock-up clutch	Short circuit (KB)	TM	E01
DXH4KA	ECMV for 1st clutch	Disconnection (KA)	TM	E03
DXH4KB	ECMV for 1st clutch	Short circuit (KB)	TM	E03
DXH5KA	ECMV for 2nd clutch	Disconnection (KA)	TM	E03
DXH5KB	ECMV for 2nd clutch	Short circuit (KB)	TM	E03
DXH6KA	ECMV for 3rd clutch	Disconnection (KA)	TM	E03
DXH6KB	ECMV for 3rd clutch	Short circuit (KB)	TM	E03
DXH7KA	ECMV for R clutch	Disconnection (KA)	TM	E03
DXH7KB	ECMV for R clutch	Short circuit (KB)	TM	E03
DXH8KA	ECMV for F clutch	Disconnection (KA)	TM	E03
DXH8KB	ECMV for F clutch	Short circuit (KB)	TM	E03
DXHHKA	ECMV for 4th clutch	Disconnection (KA)	TM	E03
DXHHKB	ECMV for 4th clutch	Short circuit (KB)	TM	E03
DXHJKA	3rd lever EXTEND EPC solenoid	Disconnection (KA)	WRK	E03
DXHJKB	3rd lever EXTEND EPC solenoid	Short circuit (KB)	WRK	E03
DXHKKA	3rd lever RETRACT EPC solenoid	Disconnection (KA)	WRK	E03
DXHKKB	3rd lever RETRACT EPC solenoid	Short circuit (KB)	WRK	E03
DXHLKA	Joystick lever right EPC solenoid	Disconnection (KA)	WRK	E03
DXHLKB	Joystick lever right EPC solenoid	Short circuit (KB)	WRK	E03
DXHMKA	Joystick lever left EPC solenoid	Disconnection (KA)	WRK	E03
DXHMKB	Joystick lever left EPC solenoid	Short circuit (KB)	WRK	E03
DY30MA	Emergency steering pump	Function impossible (MA)	TM	E03
DY30MC	Emergency steering pump	Operation impossible (MC)	TM	E03
(DY30ME)	Emergency steering	Cancel impossible (ME)	MON	E02

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※ Separate table: Detailed phenomena of problem codes (L*)

Problem Code	Nature
L0	Fill signals on 2 or more channels for clutches not forming a set are input at same time
L1	Fill signal is ON when command current to ECMV is OFF
L2	Fuel pressure is higher than maximum set pressure
L3	Corresponding component cannot be controlled
L4	ON/OFF signals for 2 systems do not match
L5	Potentiometer signal and switch signal do not match
L6	Engine speed signal, terminal C signal, signals for oil pressure switch, water temperature switch, etc. do not match operating condition or stopped condition of machine
L8	Analog signals for 2 systems do not match
LC	Speed signals for 2 systems do not match
LD	Switch has been kept pressed for abnormally long time
LH	Fill signal is OFF when command current to ECMV is ON

★ Failure codes with ( )

These failure codes are not recorded as trouble data for either the electrical system or the mechanical system.

★ Controller codes and troubleshooting mode names

The controller code name shown in the Controller column and the troubleshooting mode name in the troubleshooting section are linked, so check the controller code for the failure code displayed, then go to the applicable troubleshooting mode.

ENG: Troubleshooting of engine control system (ENG MODE)
TM: Troubleshooting of transmission control system (TM MODE)
MON: Troubleshooting of machine monitor system (MON MODE)
WRK: Troubleshooting of work equipment control system (WRK MODE)

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Procedure for switching to Service Mode 1 and screen display

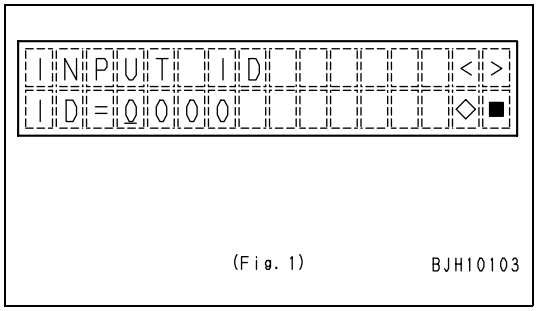
★ When using Service Mode 1, carry out the following special operation to switch the screen display.

1) Checking screen display
With the machine monitor in the operator mode, check that the screen is one of the following displays: Service meter, action code, or failure code.

2) Initial screen display for ID input
Press the following 2 buttons at the same time for at least 5 seconds to display the initial screen display for the ID input.

- [■] button and [<] button

★ If the buttons are held pressed for at least 5 seconds, the whole screen will give no display, so check that the screen gives no display, then release the buttons.

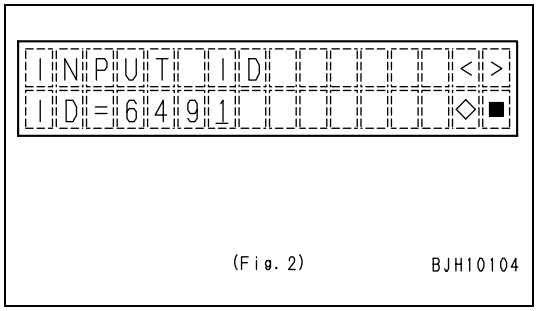


(Fig. 1) BJH10103

3) Inputting, confirming ID
Operate the buttons to input the ID.

★ ID: 6491

- [>] button: Number at cursor goes up.
- [<] button: Number at cursor goes down.
- [◇] button: Number at cursor is confirmed.
- [■] button: Returns to initial screen (see Note).



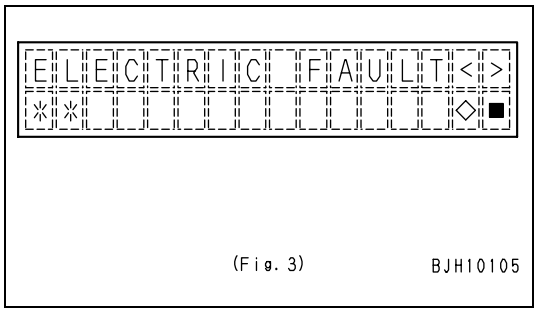
(Fig. 2) BJH10104

NOTE
When the cursor is at the left edge, the screen returns to the normal screen (operator mode). If the cursor is not at the left edge, the cursor returns to the left edge.

★ If more than 60 seconds passes before the switch on the ID input screen is operated, the screen returns automatically to the normal screen.

4) Displaying menu initial screen
After all four digits of the ID are confirmed, the menu initial screen of Service Mode 1 is displayed.

★ Once the ID has been input and confirmed, it remains effective until the starting switch is turned OFF.



(Fig. 3) BJH10105

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5) Menu selection in Service Mode 1
Press the [>] or [<] buttons on the menu screen and the menus of Service Mode 1 are displayed endlessly in the following order.

★ The menu is displayed in the places marked with [*].

- [>] button: Go on to the next menu
- [<] button: Go back to previous menu

I. ELECTRICAL FAULT:
Trouble data display function for electrical system

II. MACHINE FAULT:
Trouble data display function for mechanical system

III. REAL-TIME MONITOR:
Machine data monitoring function

IV. CYLINDER CUT-OUT:
Reduced cylinder mode

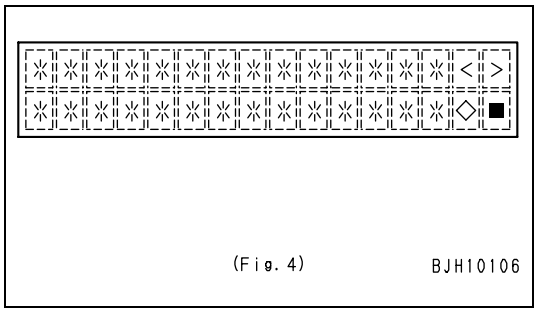
V. TUNING:
Adjustment function

VI. MAINTENANCE MONITOR:
Filter, oil replacement interval setting function

VII. OPTION SELECT:
Option installation selection function

VIII. MACHINE No. SET:
Serial No. setting function

IX. INITIALIZE:
Initialize function (exclusive function for factory)



(Fig. 4) BJH10106

6) Completion of mode, function
When operating at any point in any function, it is possible to finish the mode or function by using any of the following methods.

I. When continuing operations in another mode or function: Press the [■] button and return to the mode screen to be used or menu screen to be used.

★ Note that if the [■] button is pressed on the YES/NO screen, the function will be executed.

★ If you return to the normal screen (operator mode) by mistake, repeat the procedure from Step 1) above (there is no need to input the ID again).

II. When completing all operations:
Turn the starting switch OFF.

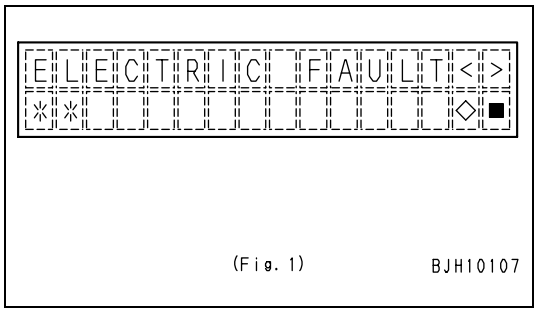
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11. Electrical system trouble data display function (ELECTRIC FAULT)

The monitor retains the data for problems that occurred in the electrical system in the past as failure codes. They can be displayed as follows.

1) Menu selection
Select the display function for ELECTRIC FAULT trouble data on the menu screen of Service Mode 1.

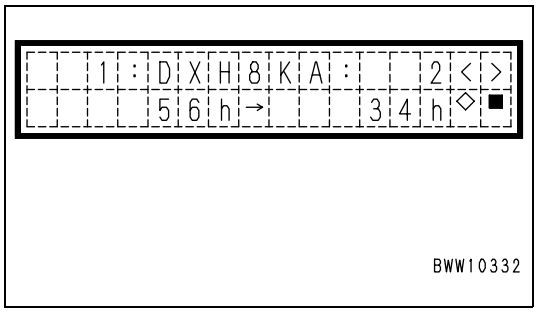
★ The total number of trouble data items recorded in memory is displayed in the [**] portion. (Recorded up to a maximum of 20 items)



(Fig. 1) BJH10107

2) Trouble data display
With the menu selected, press the [◊] button and display the trouble data recorded in memory.

• [◇] button: Run menu

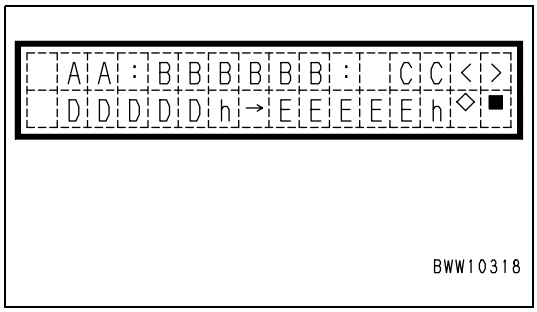


BWW10332

3) Displayed trouble data
With the display function for trouble data of the electrical system, the following data can be displayed.

A: Record number

B: Failure code
(4-digit location code + 2 digit problem code)
C: Number of occurrences
(number of occurrences of same code in past)
D: Elapsed time 1
(time elapsed on service meter since first occurrence)
E: Elapsed time 2
(time elapsed on service meter since last occurrence)



BWW10318

★ Failure codes for problems that are still existing are shown on a flashing display.

★ For details of the failure codes displayed, see FAILURE CODE TABLE in the explanation for the failure code display function.

★ Note that with the trouble data display function and failure code display function for the electrical system, the displayed data are partially different.

★ If no trouble data are recorded, [-] is displayed on the display portion.

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4) Switching trouble data display
If the [>] button or [<] button is pressed during the display of trouble data, the display switches to the other recorded trouble data.

- [>] button: Go on to data for next record number.
- [<] button: Go back to data for last record number.

5) Deleting individual trouble data

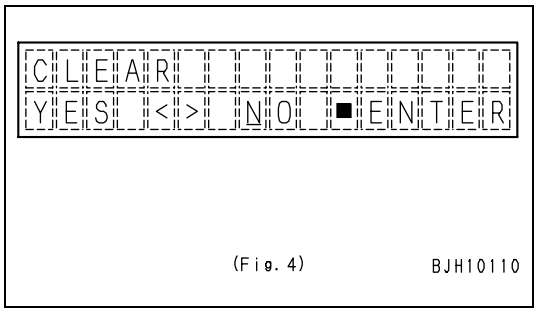
I. Display the trouble data to be deleted, then press the [◇] button once to display the individual item CLEAR screen (Fig. 4).

- [◇] button: Display CLEAR screen

II. Operate the buttons according to the explanation on the screen (Fig. 4).

- [<] button: Select YES
- [>] button: Select NO
- [■] button: Run

★ The data for an existing problem (flashing display) cannot be deleted.



(Fig. 4) BJH10110

6) Deleting all trouble data

I. Display the trouble data, then press the [>] button or [<] button to display the ALL CLEAR menu (Fig. 5).

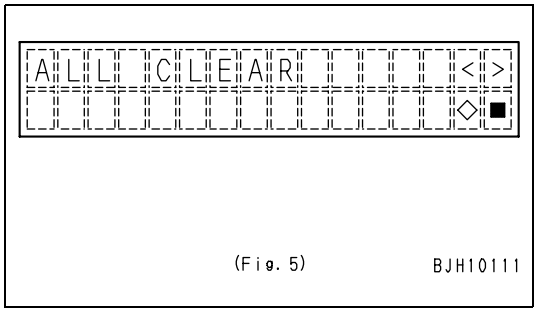
II. Press the [◇] button once to display the ALL CLEAR screen (Fig. 6).

- [◇] button: Run ALL CLEAR menu

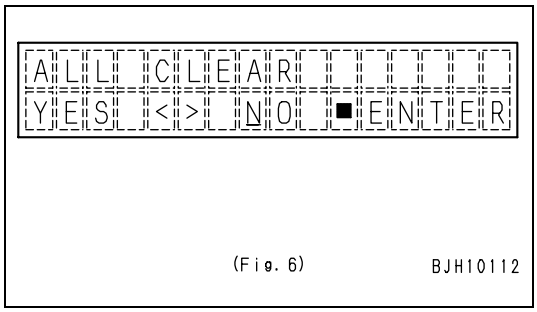
III. Operate the buttons according to the explanation on the screen (Fig. 6).

- [<] button: Select YES
- [>] button: Select NO
- [■] button: Run

★ The data for an existing problem (flashing display) cannot be deleted.



(Fig. 5) BJH10111



(Fig. 6) BJH10112

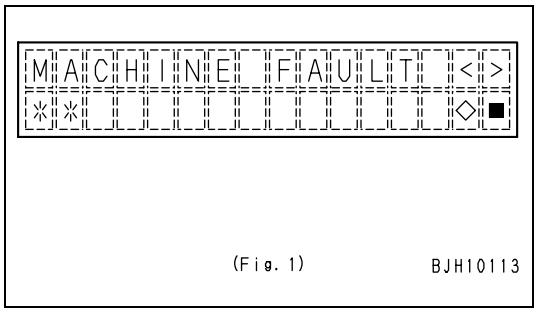
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12. Mechanical system trouble data display function (MACHINE FAULT)

The machine monitor retains the data for problems that occurred in the mechanical system in the past as failure codes. They can be displayed as follows.

1) Menu selection
Select the display function for MACHINE FAULT trouble data on the menu screen of Service Mode 1 (Fig. 1).

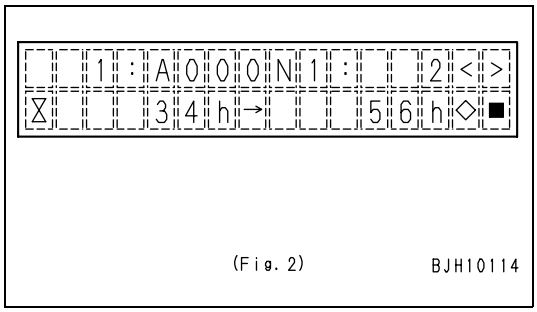
★ The total number of trouble data items recorded in memory is displayed in the [**] portion.



(Fig. 1) BJH10113

2) Trouble data display
With the menu selected, press the [◇] button and display the trouble data recorded in memory
(Fig. 2: example).

• [◇] button: Run menu



(Fig. 2) BJH10114

3) Display trouble data
With the display function for trouble data of the mechanical system, the following data can be displayed (Fig. 3).

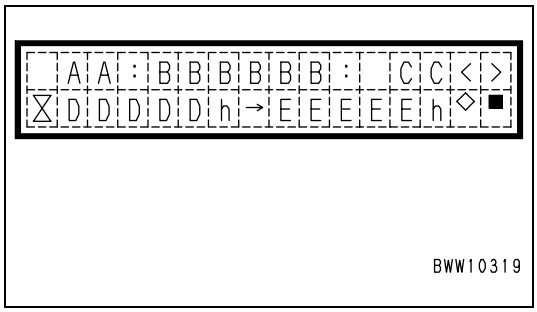
A: Record number

B: Failure code
(4-digit location code + 2 digit problem code)

C: Number of occurrences
(number of occurrences of same code in past)

D: Elapsed time 1
(time elapsed on service meter since first occurrence)

E: Elapsed time 2
(time elapsed on service meter since last occurrence)



BWW10319

★ Failure codes for problems that are still existing are shown on a flashing display.

★ For details of the failure code displayed, see FAILURE CODE TALBLE in the explanation for the failure code display function.

★ Note that with the trouble data display function and failure code display function for the mechanical system, the displayed data are partially different.

★ If no trouble data are recorded, [-] is displayed on the display portion.

4) Switching trouble data display

If the [>] button or [<] button is pressed during the display of trouble data, the display switches to the other recorded trouble data.

• [>] button: Go on to data for the next record number

• [<] button: Go back to data for last record number

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5) Deleting trouble data (not permitted)

★ The trouble data for the mechanical system cannot be deleted.

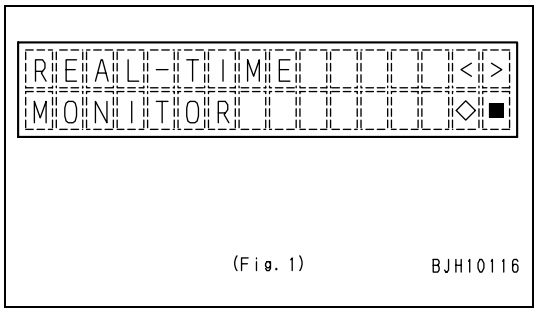
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13. Machine data monitoring function (REAL-TIME MONITOR)

The machine monitor can monitor the condition of the machine in real time through the signals from the sensors installed to various parts of the machine.

In the machine data monitoring function, the following 2 types of display can be shown.

- 1st item independent display (for each controller)
- 2nd item simultaneous display (code input)

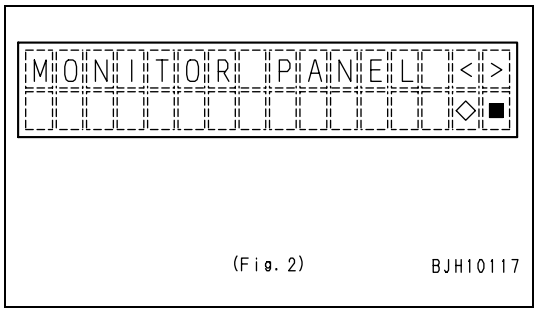


(Fig. 1) BJH10116

1) Menu selection
Select the machine data monitoring function on the menu screen of the Service Mode 1 (Fig. 1).

2) Display sub menu
With the sub menu selected, press the [◇] button and display the initial screen of the sub menu (Fig. 2).

- [◇] button: Run menu

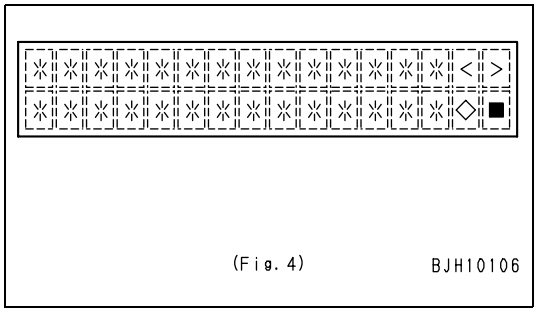


(Fig. 2) BJH10117

3) Select sub menu
If the [>] button or [<] button is pressed on the sub menu screen, the sub menu displays endlessly in the following order (Fig. 3).

★ The sub menu is displayed in the [*] position.

- [>] button: Go on to next menu
- [<] button: Go back to last menu



(Fig. 4) BJH10106

a) MONITOR PANEL:
Machine monitor system
b) TRANSMISSION:
Transmission controller system
c) ENGINE:
Engine controller system
d) BOOM:
Work equipment controller system
e) 2 ITEM:
2-item display

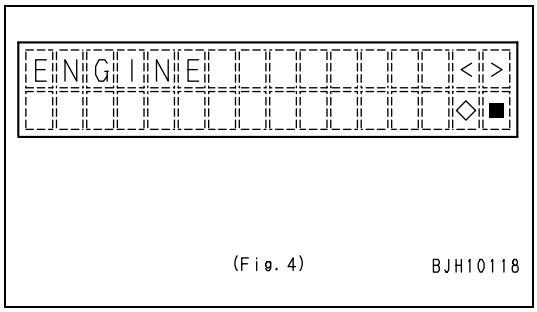
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4) Setting 1st item individual monitoring

I. Select the controller system for monitoring on the sub menu screen (Fig. 4: Example).

II. With the sub menu selected, press the [◇] button and siplay the monitoring data initial screen.

• [◇] button: Run sub menu



(Fig. 4) BJH10118

III. Press the [>] button or [<] button to select the item for monitoring (Fig. 5: Example).

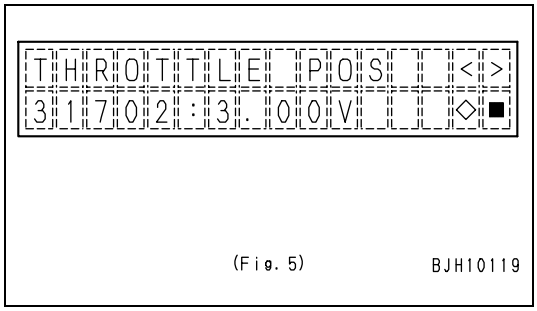
• [>] button: Go on to next item

• [<] button: Go back to last item

★ Scroll the monitoring items to display in the internally set order.

★ If the button is kept pressed, the items will scroll at high speed.

★ To hold or cancel monitoring data:
If the [◇] button is pressed during monitoring, the monitor data is held and the [◇] mark flashes. If the [◇] button is pressed again, it becomes active again.



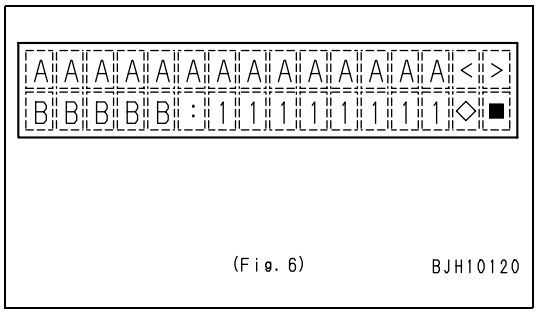
(Fig. 5) BJH10119

5) Display data for 1st item individual monitoring

On the 1st item individual monitoring screen, the following data are displayed (Fig. 6).

A: Item display
B: Monitoring data (5-digit)
1: Monitoring data (including unit)

★ For details, see MONITORING CODE TABLE.



(Fig. 6) BJH10120

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6) Setting 2nd item simultaneous monitoring

I. Select the 2nd item display on the sub menu screen.

II. With the sub menu selected, press the [◇] button and display the monitoring code input screen.

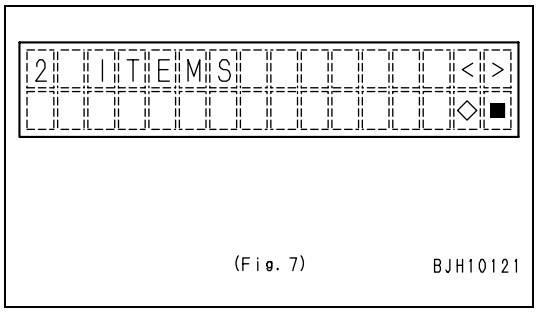
- [◇] button: Run sub menu

III. Operate each button and input the monitoring code for the 2nd monitoring item directly.

- [>] button: Number at cursor goes up
- [<] button: Number at cursor goes down
- [◇] button: Number at cursor is confirmed
- [■] button: Returns to code input screen

IV. When both of the monitoring codes have been confirmed, the screen switches to the 2nd item display screen.

★ To hold or cancel monitoring data:
If the [◇] button is pressed during monitoring, the monitor data are held and the [◇] mark flashes. If the [◇] button is pressed again, it becomes active again.



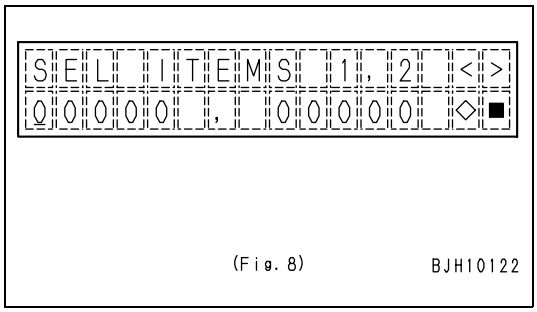
(Fig. 7) BJH10121

7) Display data for 2nd item simultaneous monitoring

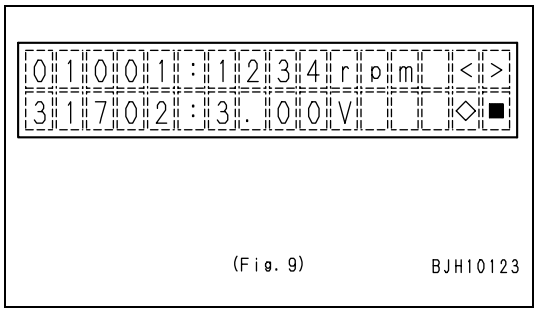
On the 2nd item simultaneous monitoring screen, the following data are displayed.

A: Monitoring code 1
1: Monitoring data 1 (including unit)
B: Monitoring code 2
1: Monitoring data 2 (including unit)

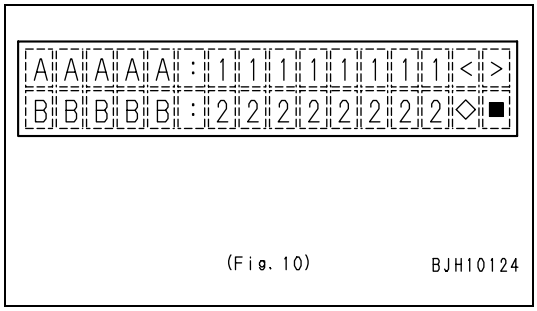
★ For details, see MONITORING CODE TABLE.



(Fig. 8) BJH10122



(Fig. 9) BJH10123



(Fig. 10) BJH10124

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Monitoring Code Table

MONITOR PANEL [Machine monitor system]					
No.	**Monitoring Item**	**Item Display**	**Monitoring Code**	**Data Display Range**	**Unit**
1	Monitor ROM part No.	MONTORING ROM	20200	Arabic Numerals	Status display
2	Engine speed	ENG SPEED	01001	0 ~ 3000	rpm
3	Travel speed	SPEED	40000	0 ~ 50	km/h
4	Fuel level	FUEL SENSOR	04202	0 ~ 100	%
5	Hydraulic oil temperature	HYD TEMP	04401	24 ~ 131	°C
6	Engine water temperature	COOLANT TEMP	04103	24 ~ 131	°C
7	Engine water temperature (Low temperature)	COOLANT Lo	04104	-31 ~ 91	°C
8	Torque converter oil temperature	TC OIL TEMP	40100	24 ~ 131	°C
9	Battery charge	ALTERNATOR R	04302	0.00 ~ 30.00	V
10	Side lamp voltage	SMALL LAMP	40200	0.00 ~ 30.00	V
11	Battery electrolyte A	BATTERY A2V	40300	0.00 ~ 30.00	V
12	Battery electrolyte B	BATTERY B2V	40301	0.00 ~ 30.00	V
13	Lift arm angle	BOOM ANG	06001	-41 ~ 46	deg.
14	Lift arm bottom pressure	BTM PRESS	40400	0.00 ~ 50.00	MPa
15	Lift arm rod pressure	ROD PRESS	40500	0.00 ~ 50.00	MPa
16	Load meter calibration pressure	CAL PRESS	40600	0.00 ~ 50.00	MPa
17	Load meter calculation pressure	MES PRESS	40700	0.00 ~ 50.00	MPa
18	Load meter calculation load	MES LOAD	40800	0.00 ~ 50.00	MPa
19	Setting status of rotary switch	SW1, SW2, SW3	30802	0 ~ F, 0 ~ F, 0 ~ F	Status display
20	Setting status of dipswitch	SW5-1, SW5-2	30904	ON/OFF, ON/OFF	Status display
21	Setting status of dipswitch	SW5-3, SW5-4	30905	ON/OFF, ON/OFF	Status display
22	Setting status of dipswitch	SW6-1, SW6-2	30906	ON/OFF, ON/OFF	Status display
23	Setting status of dipswitch	SW6-3, SW6-4	30907	ON/OFF, ON/OFF	Status display
24	Input signal D_IN_0-7	D-IN--0------7	40900	See separate table	Status display
25	Input signal D_IN_8-15	D-IN--8------15	40901	See separate table	Status display
26	Input signal D_IN_16-23	D-IN--16------23	40902	See separate table	Status display
27	Input signal D_IN_24-31	D-IN--24------31	40903	See separate table	Status display
28	Input signal D_IN_32-39	D-IN--32------39	40904	See separate table	Status display

★ Note:
The following monitoring items display data for 2 or 3 systems at the same time.

- No. 19: Setting status of rotary switch
(displays 3 items at same time)
- No. 20: Setting status of dipswitch
(displays 2 items at same time)
- No. 21: Setting status of dipswitch
(displays 2 items at same time)
- No. 22: Setting status of dipswitch
(displays 2 items at same time)
- No. 23: Setting status of dipswitch
(displays 2 items at same time)

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TRANSMISSION [Transmission controller system]					
No.	**Monitoring Item**	**Item Display**	**Monitoring Code**	**Data Display Range**	**Unit**
1	Transmission controller ROM part No.	TRANSM ROM	20201	Arabic Numerals	Status display
2	Fan pump speed	FAN PUMP	41000	0 ~ 3000	rpm
3	Transmission cut-off pressure	LH BRAKE	41200	0.00 ~ 50.00	MPa
4	Left brake pressure	CUT OFF	41100	0.00 ~ 50.00	MPa
5	No. of times of kick down	K/D TIMES	41300	—	—
6	Average cycle time	CYCLE TIME	41400	—	sec.
7	F clutch solenoid circuit	ECMV F	31608	0 ~ 1000	mA
8	R clutch solenoid circuit	ECMV R	31608	0 ~ 1000	mA
9	1st clutch solenoid circuit	ECMV 1	31602	0 ~ 1000	mA
10	2nd clutch solenoid circuit	ECMV 2	31603	0 ~ 1000	mA
11	3rd clutch solenoid circuit	ECMV 3	31604	0 ~ 1000	mA
12	4th clutch solenoid circuit	ECMV 4	31605	0 ~ 1000	mA
13	Lock-up clutch solenoid current	ECMV LU	31609	0 ~ 1000	mA
14	Fan pump solenoid valve current	FAN EPC	41400	0 ~ 1000	mA
15	Torque converter oil temperature	ECMV OIL TEMP	41500	24 ~ 131	°C
16	Engine mode selection	ENGINE MODE	41600	P/N	—
17	Shift mode selection	SHIFT MODE	41700	H/M/L	—
18	F clutch fill time	FILL TIME F	41808	0 ~ 2550	msec
19	R clutch fill time	FILL TIME R	41806	0 ~ 2550	msec
20	1st clutch fill time	FILL TIME 1	41802	0 ~ 2550	msec
21	2nd clutch fill time	FILL TIME 2	41803	0 ~ 2550	msec
22	3rd clutch fill time	FILL TIME 3	41804	0 ~ 2550	msec
23	4th clutch fill time	FILL TIME 4	41805	0 ~ 2550	msec
24	F clutch fill display	FILL SW(F)	31508	0 ~ 1	Status display
25	R clutch fill display	FILL SW(R)	31506	0 ~ 1	Status display
26	1st clutch fill display	FILL SW(1)	31502	0 ~ 1	Status display
27	2nd clutch fill display	FILL SW(2)	31503	0 ~ 1	Status display
28	3rd clutch fill display	FILL SW(3)	31504	0 ~ 1	Status display
29	4th clutch fill display	FILL SW(4)	31505	0 ~ 1	Status display
30	Input signal D_IN_0-7	D-IN--0------7	40905	See separate table	Status display
31	Input signal D_IN_8-15	D-IN--8------15	40906	See separate table	Status display
32	Input signal D_IN_16-23	D-IN--16------23	40907	See separate table	Status display
33	Input signal D_IN_24-31	D-IN--24------31	40908	See separate table	Status display
34	Output signal D_OUT_0-6	D-OUT-0------6	40915	See separate table	Status display
35	Output signal SOL/0_0-5	SOL/O-0------5	40914	See separate table	Status display
36	Rear brake oil temperature	R BRAKE OIL	30202	24 ~ 131	°C

★ Content of display for monitoring items No. 24 ~ 29

0: Normal
1: Delayed

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WORK [Work equipment controller system]					
No.	**Monitoring Item**	**Item Display**	**Monitoring Code**	**Data Display Range**	**Unit**
1	Work equipment controller ROM part No.	BOOM ROM	20202	—	—
2	Boom RAISE solenoid valve current	RAISE EPC	41900	0 ~ 1000	mA
3	Boom LOWER solenoid valve current	LOWER EPC	41901	0 ~ 1000	mA
4	Bucket TILT solenoid valve current	TILT EPC	41902	0 ~ 1000	mA
5	Bucket DUMP solenoid valve current	DUMP EPC	41903	0 ~ 1000	mA
6	Joystick steering right solenoid valve current	RH J/S EPC	41904	0 ~ 1000	mA
7	Joystick steering left solenoid current	LH J/S EPC	41905	0 ~ 1000	mA
8	3-tandem valve 1 solenoid valve current	3RD EPC1	41906	0 ~ 1000	mA
9	3-tandem valve 2 solenoid valve current	3RD EPC2	41907	0 ~ 1000	mA
10	Lever potentiometer voltage lift arm 1	BOOM POT1	42000	0.00 ~ 5.00	V
11	Lever potentiometer voltage lift arm 2	BOOM POT2	42001	0.00 ~ 5.00	V
12	Lever potentiometer voltage bucket 1	BUCKET POT1	42002	0.00 ~ 5.00	V
13	Lever potentiometer voltage bucket 2	BUCKET POT2	42003	0.00 ~ 5.00	V
14	Lever potentiometer voltage joystick steering 1	J/S POT1	42004	0.00 ~ 5.00	V
15	Lever potentiometer voltage joystick steering 2	J/S POT2	42005	0.00 ~ 5.00	V
16	Lever potentiometer voltage 3-tandem valve 1	3RD POT1	42006	0.00 ~ 5.00	V
17	Lever potentiometer voltage 3-tandem valve 1	3RD POT2	42007	0.00 ~ 5.00	V
18	Lift arm angle	BOOM ANG	06002	-41 ~ 46	deg.
19	Lift arm bottom pressure	BTM PRESS	40401	0.00 ~ 50.00	MPa
20	No. of times of lift arm lever operation	BOOM LVR	42100	0 ~ 25600	x 1000
21	No. of times of bucket lever operation	BUCKET LEVER	42101	0 ~ 25600	x 1000
22	No. of times of 3rd lever operation	3RD LVR	42102	0 ~ 25600	x 1000
23	Engine speed	ENG SPEED	01003	0 ~ 3000	rpm
24	Travel speed	SPEED	40001	0 ~ 50	km/h
25	Input signal D_IN_0-7	D-IN--0------7	40910	See separate table	Status display
26	Input signal D_IN_8-15	D-IN--8------15	40911	See separate table	Status display
27	Input signal D_IN_16-23	D-IN--16------23	40912	See separate table	Status display
28	Input signal D_IN_24-31	D-IN--24------31	40913	See separate table	Status display
29	Output signal D_OUT_0-6	D-OUT-0------6	40917	See separate table	Status display
30	Output signal SOL/0_0-5	SOL/O-0------5	40916	See separate table	Status display

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ENGINE [Engine controller system]					
No.	**Monitoring Item**	**Item Display**	**Monitoring Code**	**Data Display Range**	**Unit**
1	Engine controller part No.	ENGINE ROM	20203	Arabic numerals	Status display
2	Accelerator pedal voltage	THROTTLE POS	31702	0.00 ~ 5.00	V
3	Accelerator pedal angle	THROTTLE POS	31701	0 ~ 100	%
4	Operating mode	ENG STATUS	36600	0 ~ 3	—
5	Engine speed	ENG SPEED	01004	0 ~ 3000	rpm
6	Target common rail pressure	RAIL PRESS(C)	36200	0 ~ 150	MPa
7	Common rail pressure	RAIL PRESS(A)	36400	0 ~ 150	MPa
8	Boost pressure	BOOST PRESS	36500	0 ~ 300	kPa
9	Target fuel injection amount	FUEL DELIVERY	31600	0 ~ 500	mm
10	Target injection timing	INJECT TIMING	36300	-30 ~ 31	degree
11	Torque ratio	TORQUE RATIO	36700	0 ~ 100	%
12	Selection status of fuel injection quantity control switch	Q ADJUST SW	36800	0 ~ F, 0 ~ F	Status display
13	Engine water temperature (For high temperature)	COOLANT TEMP H	04102	0 ~ 150	°C
14	Engine water temperature (For low temperature)	COOLANT TEMP L	04101	-30 ~ 100	°C
15	Fuel temperature	FUEL TEMP	04203	-30 ~ 100	°C

★ Content of display for monitoring item No. 4

0: Control stopped
1: Split injection
2: Fixed injection
3: Normal injection

★ Content of setting for monitoring item No. 12

Switch 1: F; Switch 2: F

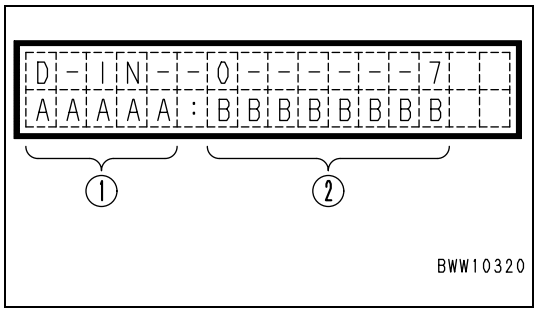
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★ ON/OFF switch signals input to controller

1) Method of reading input signal to controller

- Input status display 0: No input (OFF)
- Input status display 1: Input (ON)

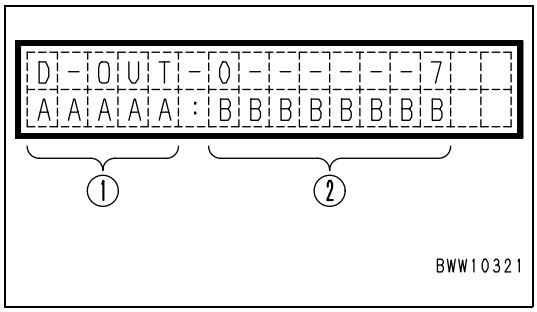
① Monitoring code
② Input status
Starting from the left, the status is displayed in turn from D-IN-0 to D-IN-7.



2) Method of reading output signal D-OUT-0.....7

- Output status display 0: No output (OFF)
- Output status display 1: Output (ON)

① Monitoring code
② Output status
Starting from the left, the status is displayed in turn from D-OUT-0 to D-OUT-7.



Monitor Panel				
No.	**Monitoring Code**	**Input/Output Signal**	**Display Item**	**Content of ON/OFF Switch**
1	40900	D-IN-0	Head lamp	Head lamp lights up = ON (24V) / OFF (OPEN)
		D-IN-2	Starting switch output	Starting motor started = ON (24V) / OFF (OPEN)
		D-IN-4	Auto grease A	Tank empty or abnormal = ON (24V) / OFF (OPEN)
		D-IN-5	Auto grease B	Operating or abnormal = ON (24V) / OFF (OPEN)
2	40901	D-IN-12	Turn signal right	Right turn signal lights up = ON (24V) / OFF (OPEN)
		D-IN-13	Turn signal left	Left turn signal lights up = ON (24V) / OFF (OPEN)
		D-IN-14	◇ Switch input	Switch pressed = ON (24V) / OFF (OPEN)
		D-IN-15	■ Switch input	Switch pressed = ON (24V) / OFF (OPEN)
3	40902	D-IN-16	Breakter oil pressure (Front)	Oil pressure normal = ON (GND) / (OPEN)
		D-IN-17	Breakter oil pressure (Rear)	Oil pressure normal = ON (GND) / (OPEN)
		D-IN-20	Air cleaner colgging	No clogging = ON (GND) / (OPEN)
4	40903	D-IN-26	Parking brake	Parking brake applied = ON (GND) / (OPEN)
		D-IN-27	Engine water level	Water level normal = ON (GND) / (OPEN)
		D-IN-28	Engine oil pressure	Drop in oil pressure = ON (GND) / (OPEN)
		D-IN-29	Engine oil level	Oil level normal = ON (GND) / (OPEN)
		D-IN-30	Emergency steering motor normal	Emergency steering motor actuated = ON (GND) / (OPEN)
5	40904	D-IN-32	Load meter sub-total switch	Switch pressed = ON (GND) / (OPEN)
		D-IN-33	Load meter candel switch	Switch pressed = ON (GND) / (OPEN)
		D-IN-34	High beam switch	High beam = ON (GND) / (OPEN)
		D-IN-36	Service function 2	Switch pressed = ON (GND) / (OPEN)
		D-IN-37	> Switch input	Switch pressed = ON (GND) / (OPEN)
		D-IN-38	< Switch input	Switch pressed = ON (GND) / (OPEN)
		D-IN-39	Drop in steering pressure	Oil pressure normal = ON (GND) / (OPEN)

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Monitor Panel				
No.	**Monitoring Code**	**Input/Output Signal**	**Display Item**	**Content of ON/OFF Switch**
1	40905	D-IN-0	Steering pressure switch (N.O.)	Pressure normal ON=(OPEN)/OFF(GND)
		D-IN-1	Steering pressure switch (N.C.)	Pressure normal ON=(OPEN)/OFF(GND)
		D-IN-2	Transmission cut-off switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-3	Transmission cut-off set switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-4	Travel damper selector switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-5	Lock-up selector switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-6	Kick-down switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-7	Engine power mode	Power mode = ON(GND) /Economy mode(OPEN)
2	40906	D-IN-8	Shift range 1st	1st = ON(24V)/OFF(OPEN)
		D-IN-9	Shift range 2nd	2nd = ON(24V)/OFF(OPEN)
		D-IN-10	Shift range 3rd	3rd = ON(24V)/OFF(OPEN)
		D-IN-11	Shift range 4th	4th = ON(24V)/OFF(OPEN)
		D-IN-12	Joystick shift up	Switch pressed = ON(24V)/OFF(OPEN)
		D-IN-13	Joystick shift down	Switch pressed = ON(24V)/OFF(OPEN)
		D-IN-14	Electric emergency steering manual switch	Switch pressed = ON(24V)/OFF(OPEN)
		D-IN-15	Starting switch output	Starting motor started = ON(GND)/OFF(OPEN)
3	40907	D-IN-16	Right FNR (Joystick) selector switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-17	Right seesaw switch & joystick FORWARD	FORWARD = ON(24V)/OFF(OPEN)
		D-IN-18	Right seesaw switch & joystick Neutral	NEUTRAL = ON(24V)/OFF(OPEN)
		D-IN-19	Right seesaw switch & joystick REVERSE	REVERSE = ON(24V)/OFF(OPEN)
		D-IN-20	Direction lever FORWARD	FORWARD = ON(24V)/OFF(OPEN)
		D-IN-21	Direction lever Neutral	NEUTRAL = ON(24V)/OFF(OPEN)
		D-IN-22	Direction lever REVERSE	REVERSE = ON(24V)/OFF(OPEN)
		D-IN-23	Neutralizer (Parking brake) signal	Parking switch ON = ON(24V)/OFF(OPEN)
4	40908	D-IN-24	F clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-25	R clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-26	1st clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-27	2nd clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-28	3rd clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-29	4th clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-30	Lock-up clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-31	Shift hold switch	Switch pressed = ON(GND)/OFF(OPEN)
5	40915	D-OUT-0	Backup lamp relay	Output ON (24V)/OFF(GND)
		D-OUT-1	Transmission cut-off indicator	Output ON (24V)/OFF(GND)
6	40914	SOL/O-0	Electric emergency steering relay	Output ON (24V)/OFF(GND)
		SOL/O-1	E.C.S.S. relay	Output ON (24V)/OFF(GND)
		SOL/O-2	Switch pump cut-off	Output ON (24V)/OFF(GND)
		SOL/O-3	Neutral output	Output ON (24V)/OFF(GND)
		SOL/O-4	Fan pump reverse rotation solenoid	Output ON (24V)/OFF(GND)
		SOL/O-5	Fan pump neutral solenoid	Output ON (24V)/OFF(GND)

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Monitor Panel				
No.	**Monitoring Code**	**Input/Output Signal**	**Display Item**	**Content of ON/OFF Switch**
1	40910	D-IN-0	Joystick ON/OFF selector switch	Joystick (right FNR) selected = ON(24V)/(OPEN)
		D-IN-1	Work equipment safety lock lever switch	Working position = ON(24V)/LOCK position = OFF(OPEN)
2	40911	D-IN-8	Joystick speed Hi/Lo selector switch	Joystick Hi speed selected = ON(GND)/ OFF(OPEN)
		D-IN-9	Bucket proximity switch (horizontal)	Horizontal position = ON(GND)/OFF(OPEN)
		D-IN-10	Bucket full stroke switch	Stroke end position = ON(GND)/OFF(OPEN)
		D-IN-12	Semi auto digging hard switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-13	Semi auto digging soft switch	Switch pressed = ON(GND)/OFF(OPEN)
3	40913	D-IN-28	Remote positioner TOP set switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-29	Remote positioner BOTTOM set switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-30	Remote positioner TOP selector switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-31	Remote positioner BOTTOM selector switch	Switch pressed = ON(GND)/OFF(OPEN)
4	40917	D-OUT-1	Remote positioner TOP switch	Output ON (24V)/OFF(GND)
		D-OUT-2	Remote positioner BOTTOM lamp	Output ON (24V)/OFF(GND)
5	40916	SOL/O-0	Joystick EPC cut relay	Output ON (24V)/OFF(GND)
		SOL/O-1	Detent lift arm RAISE	Output ON (24V)/OFF(GND)
		SOL/O-2	Detent lift arm FLOAT	Output ON (24V)/OFF(GND)
		SOL/O-3	Detent TILT	Output ON (24V)/OFF(GND)
		SOL/O-4	Work equipment neutral lock solenoid	Output ON (24V)/OFF(GND)

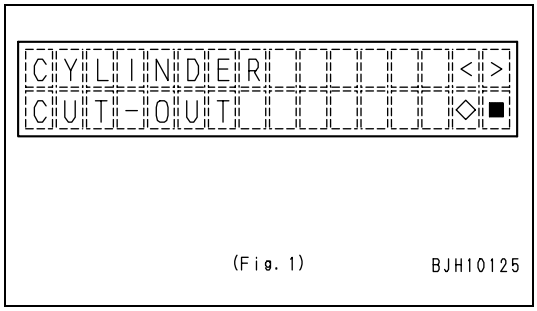
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14. Reduced cylinder mode (CYLINDER CUT-OUT)

As one method of troubleshooting for the engine, the machine monitor has a reduced cylinder function that can set the desired cylinder to the NO INJECTION condition.

1) Starting engine

★ With this function, it is possible to use the engine speed in the reduced cylinder mode to judge if there is a problem with any cylinder, so run the engine during the operation.



(Fig. 1) BJH10125

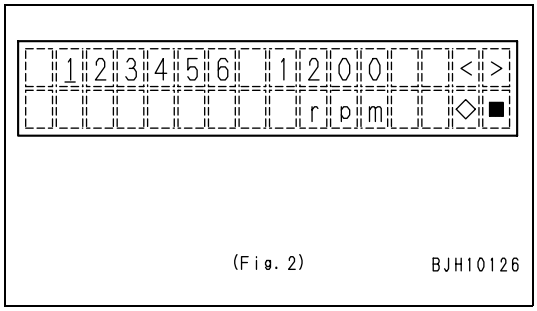
2) Menu selection

I. Select the reduced cylinder mode on the menu screen of Service Mode 1.

II. With the menu selected, press the [◇] button and display the cylinder selections screen.

• [◇] button: Run menu

★ The cylinder No. and engine speed are displayed at the same time.



(Fig. 2) BJH10126

3) Setting cut-out cylinder

Operate each button and select the cylinder to be cut out.

• [>] button: Selector cursor moves to right

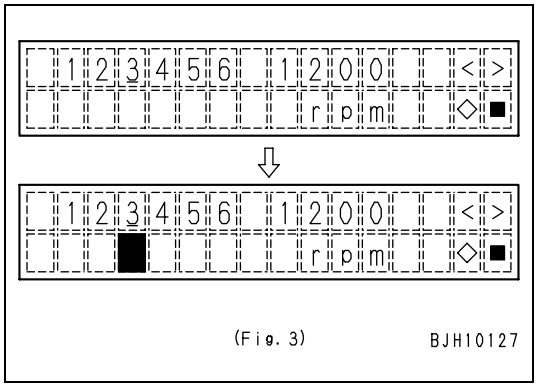
• [<] button: Selector cursor moves to left

• [◇] button: Cylinder is confirmed (canceled)

• [■] button: Returns to menu screen

★ When the [◇] button is used to confirm the cut-out cylinder, communications is carried out between the machine monitor and engine controller. During this time, the cylinder No. flashes. After completion of the communication, the segment under the cylinder No. becomes black to show that the cylinder has been cut out.

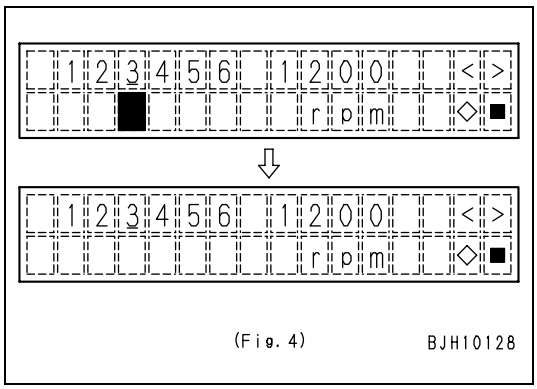
★ Single cylinders or multiple cylinders can be cut out.



(Fig. 3) BJH10127

4) Cancelling cylinder cut out

★ Cancel the cylinder cut out in the same way as when setting the cut out.



(Fig. 4) BJH10128

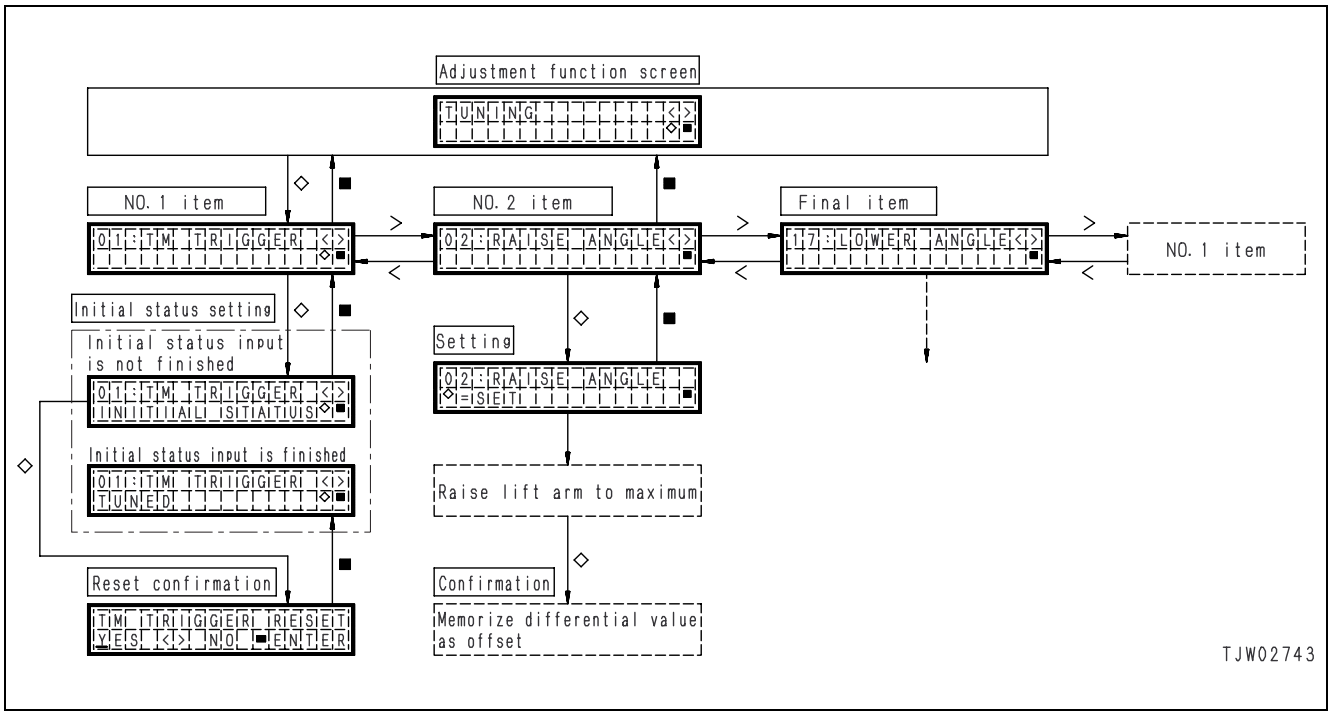
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15. Adjustment function (default setting)

★ The machine monitor is used to carry out the default setting when the transmission has been overhauled or replaced, or the sensors, EPC valve, controller have been replaces or added, or when adjusting or compensating for tolerance in installation or individual differences in manufacture.

Adjustment items

1) Setting initial training of transmission
2) Adjusting lift arm angle sensor (RAISE) (for EPC lever)
3) Adjusting lift arm RAISE EPC valve
4) Adjusting lift arm LOWER EPC valve
5) Adjusting bucket TILT EPC valve
6) Adjusting bucket DUMP EPC valve
7) Adjusting 3-tandem valve EPC valve (cylinder extension)
8) Adjusting 3-tandem valve EPC valve (cylinder retraction)
9) Adjusting joystick steering calibration (right)
10) Adjusting joystick steering calibration (left)
11) Adjusting lift arm angle sensor (RAISE) (for load meter)
12) Adjusting lift arm angle sensor (RAISE) (for load meter)

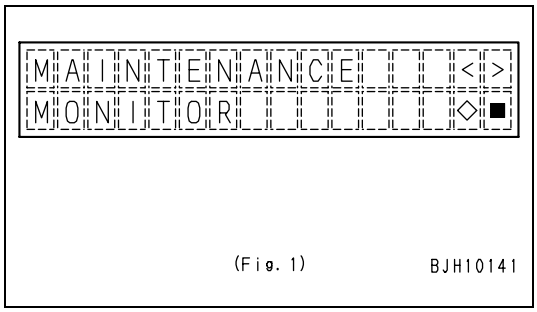


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16. Filter, oil replacement interval setting function

    The machine monitor can set the maintenance interval for filters and oil. This forms the base for the filter and oil replacement interval and display.

    ★ For details, see STRUCTURE AND FUNCTION, Maintenance monitor items.



(Fig. 1) BJH10141

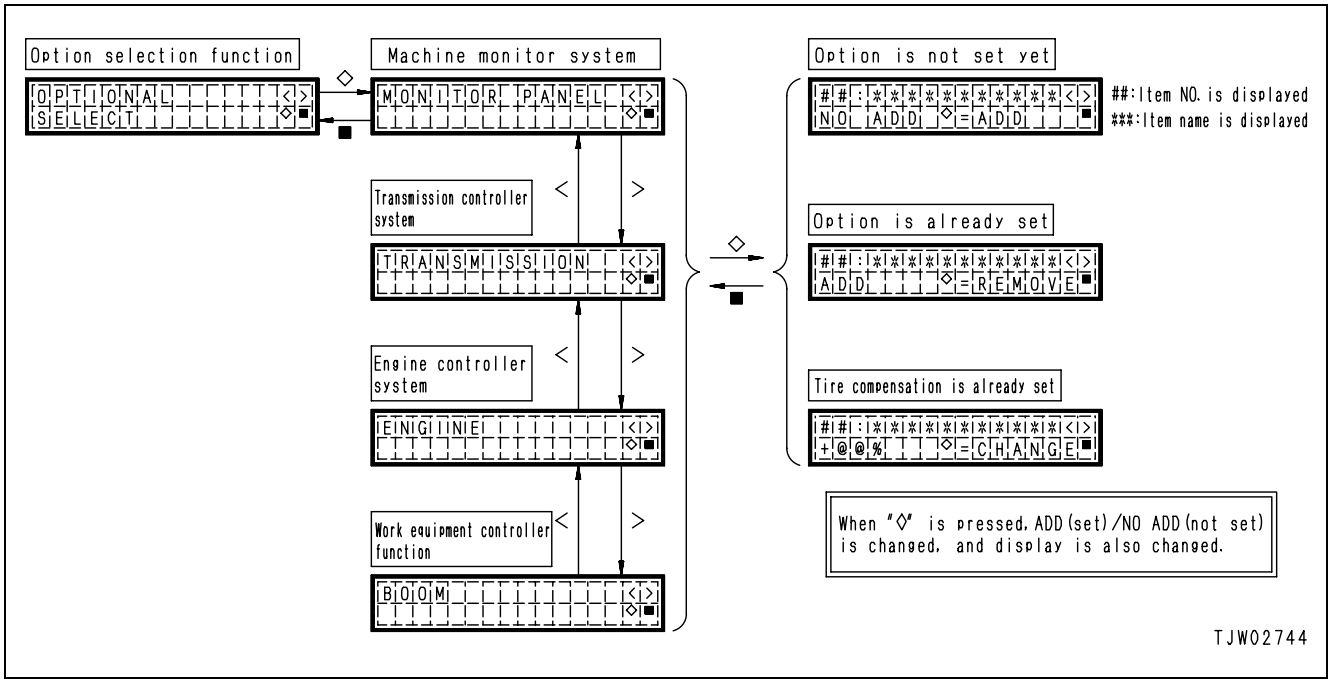
Table of filter and oil replacement interval set items
[when shipping]

No.	Item	Code	Display	Replacement interval
1	Engine oil	01	ENG OIL	500
2	Engine oil filter	02	ENG OIL FILTER	500
3	Fuel filter	03	FUEL FILTER	500
4	Corrosion resistor	06	CORR RESISTOR	1000
5	Transmission oil	12	TM OIL	1000
6	Transmission oil filter	13	TM OIL FILTER	1000
7	Hydraulic filter	04	HYD OIL FILTER	2000
8	Hydraulic tank breater element	05	BREATHER ELE	2000
9	Axle oil	15	AXLE OIL	2000
10	Hydraulic oil	10	HYD OIL	2000

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17. Option selection function

- When adding or removing optional equipment, change the setting on the machine monitor.
- When the machine monitor has been replaced, set the status of optional equipment installed on the machine.



Option set items

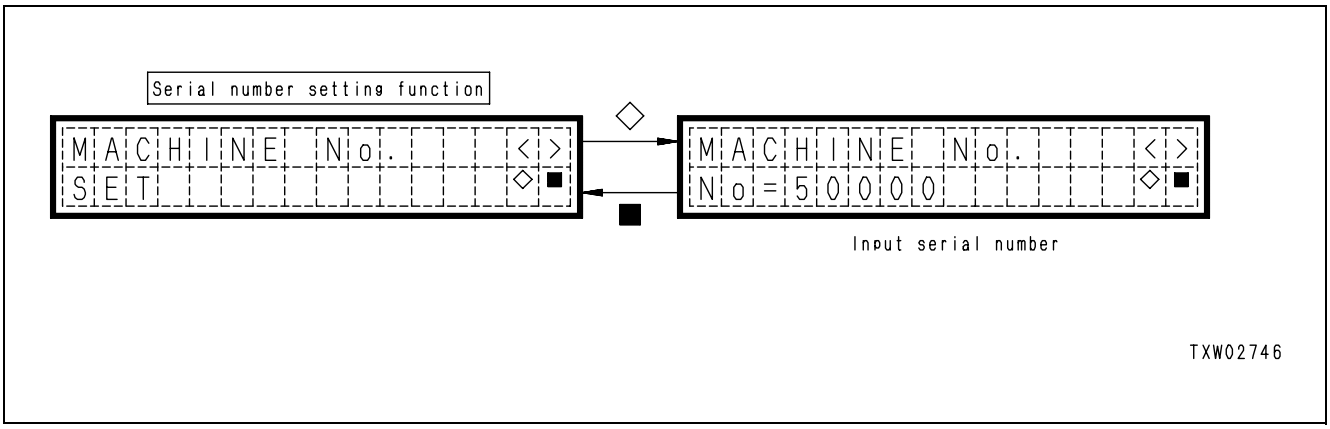
Item No.	Real-time monitor item	English display	Remarks
	Monitor panel controller		
1	Auto grease	AUTO GREASE	
2	Battery electrolyte level drop sensor	RAT LIQUID	
3	Transmission clogging sensor	TRANSM CLOG	
4	Printer	PRINTER	
5	Lift arm; Hi lift specification	HI LIFT	
6	Speedometer/tachometer display switch	ENGINE RPM	Use ADD screen to display engine speed
7	Short ton switch	SHORT TON	Can be switches only when MPH is displayed
	Transmission control		
1	Travel damper	ECSS	
2	Torque converter lock-up	LOCK UP	
3	Emergency steering	EMER STRG	
4	Tire size	TIRE SIZE	Tire compensation for non-specified tires
5	Automatic reverse fan	AUTO RE FAN	
6	Right FNR switch	RH FNR SW	
	Work equipment controller		
1	EPC lever	EPC LEVER	
2	Joystick	JOY STICK	
4	EPC 3rd lever	EPC §RD	

★ For details, see STRUCTURE AND FUNCTION, Settings needed when installing optional equipment.

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18. Serial No. setting function

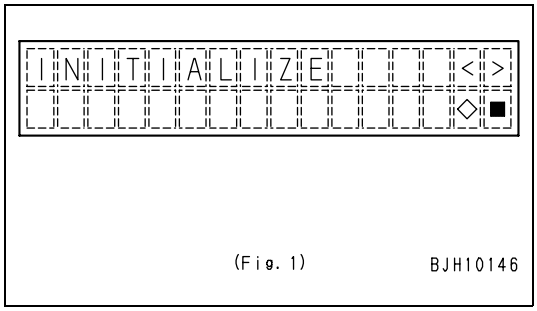
    This is used to set the serial number of the machine.



★ For details, see STRUCTURE AND FUNCTION, Settings needed when installing optional equipment.

19. Initialize function

    ★ This function is a special function used only at the factory, so it cannot be used when servicing the machine.



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Service Mode 2

The following functions are provided for use when replacing the machine monitor.

1. Setting service monitor

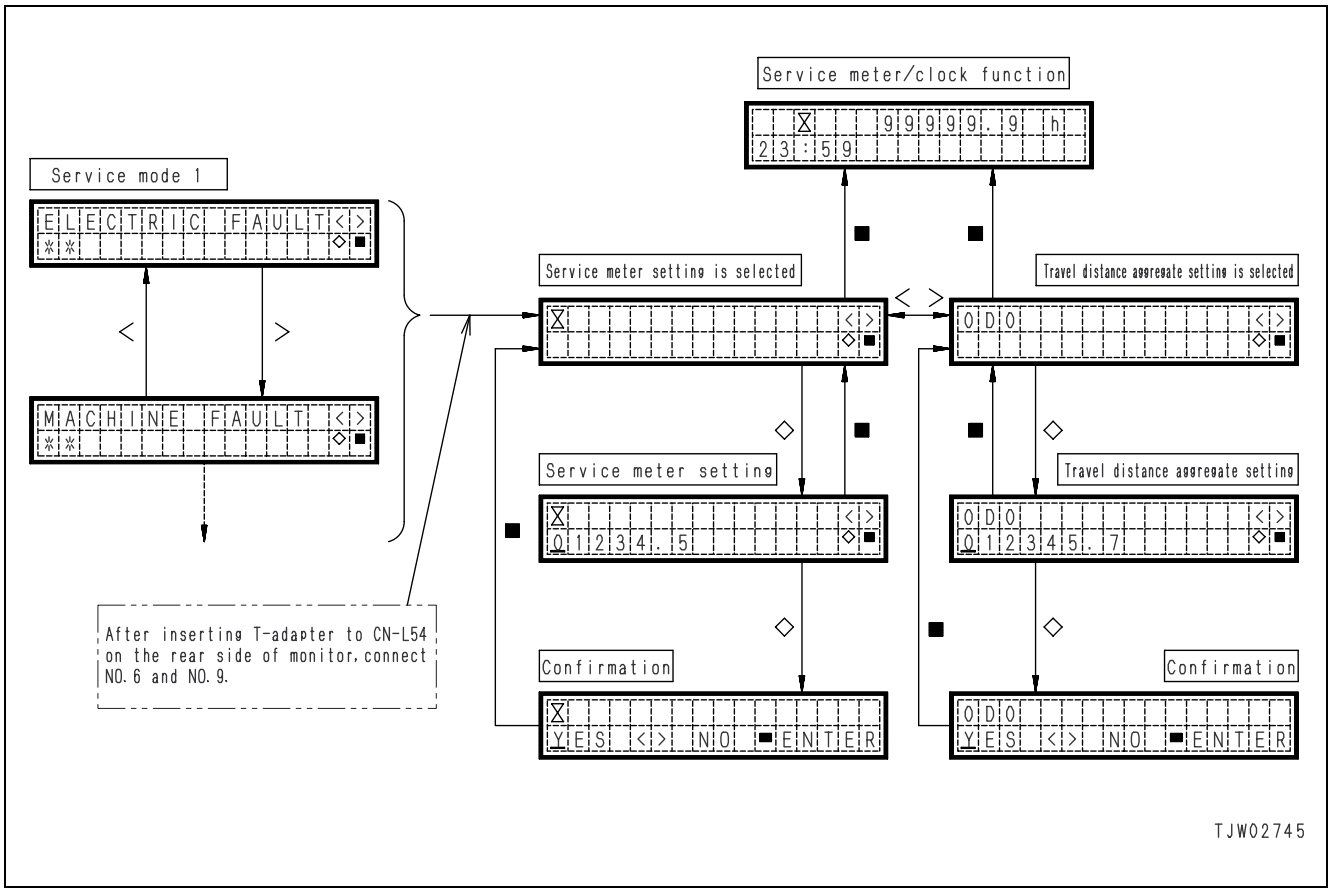
   This sets the service meter values recorded in the machine monitor

   ★ It is possible to set only a value that is higher than the present value.

2. Setting odometer

   This sets the odometer value recorded in the machine monitor.

   ★ It is possible to set only a value that is higher than the present value.



★ For details, see STRUCTURE AND FUNCTION, Settings needed when installing optional equipment.

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Categories, procedure, and method of using troubleshooting charts

1. Category of troubleshooting code

   ★ If the machine monitor displays a failure code, it also displays the controller name at the same time, so the troubleshooting codes are categorized to match each controller name. (This may also include the electrical system, where some failure codes are not displayed).

   ★ The hydraulic and mechanical system, for which the machine monitor cannot display a failure code, is categorized as H Mode.

Troubleshooting Code	Troubleshooting System
ENG	Troubleshooting of engine control system
TM	Troubleshooting of transmission control system
WRK	Troubleshooting of work equipment control system
MON	Troubleshooting of machine monitor system
H	Troubleshooting of hydraulic, mechanical system
E	Troubleshooting of electrical system

2. Troubleshooting procedure

   ★ If a problem occurs on the machine, or if it is felt that there is a problem, carry out troubleshooting as follows.

   1) When machine monitor displays failure code
      If a failure code is displayed on the machine monitor at the same time as the problem occurs, check the content of the display, then go to the applicable troubleshooting chart for the failure code.

   2) When machine monitor does not display failure code, but trouble data is recorded
      If a problem occurs but the failure code display cannot be checked on the machine monitor, use the trouble data display function in the machine monitor service mode to check for a failure code.
      If a failure code is recorded, there is a high probability that this is the cause, so go to the applicable troubleshooting chart.

   3) When machine monitor does not display failure code and trouble data is also not recorded
      If a problem occurs but the failure code display cannot be checked on the machine monitor, and the problem is also not recorded by the trouble data display function in the machine monitor service mode, there is a probability that it is a problem in the electrical system that cannot be detected by a controller or that a problem has occurred in the hydraulic and mechanical system.
      In this case, check the nature of the problem and go to the applicable troubleshooting chart.

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3. Method of using troubleshooting table
(ENG mode, TM mode, WRK mode, MON mode)

Action Code	Error Code	Controller Code	Trouble	Trouble displayed in trouble data
Panel display	Panel display	Panel display		
Description of Trouble	• Condition when monitor panel or controller detected trouble.			
Controller Reaction	• Action to take to protect system or equipment when monitor or controller detected trouble.			
Effect on Machine	• Condition that appeared as problem on machine when action (given above) was taken by monitor panel or controller.			
Related Information	• Information related to troubleshooting or error that occurred.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting
Possible Causes and Standard Values	1	Probable cause when trouble occurred (the numbers are index numbers and do not indicate the order of priority)	<Data to fill in> • Normal standard values used to judge probable cause • Remarks regarding decision-making <Condition when wiring harness is defective> • Disconnection There is defective connection of connector or disconnection in wiring harness • Short circuit with ground Wiring harness not wired to ground (GND) circuit is in contact with ground (GND) circuit • Short circuit with power source Wiring harness not wired to power supply (24 V) circuit is in contact with power supply (24 V) circuit <Points to remember when troubleshooting> a Method of displaying connector No. and handling T-adapter Unless there is special instruction, insert or connect the T-adapter as follows • If there is no indication for the male or female terminal of the connector No., disconnect the connector and insert the T-adapter in both the male and female terminals • If there is indication for the male or female terminal of the connector No., disconnect the connector and connect the T-adapter to only the terminal indicated (either the male terminal or female terminal) <Points to remember when troubleshooting> b Given order for pin numbers and handling tester lead Unless there is a special instruction, connect tester (+) lead and (-) lead as follows to carry out troubleshooting • Connect the (+) lead to the wiring harness for the pin No. given first • Connect the (-) lead to the wiring harness for the pin No. given last
	2		
	3		
	4		
	5		

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4. Method of reading matrix-type troubleshooting chart (H mode)

Step 1 – Ask operator questions
The questions to ask the operator are given under the problem. If the answer to the question matches the content given, the cause given after the arrow is the probable cause.
Keeping the content of the questions in mind, read the matrix and proceed with Step 2 and Step 3 to pinpoint the correct cause.

Step 2 – Checks before troubleshooting
Before measuring the oil pressure or starting the troubleshooting, confirm the checks before starting items, check for leakage of oil, or for loose bolts.
This will prevent wasting time when troubleshooting.
The items given under Checks before troubleshooting are checks that are particularly important to make about the condition of the machine before starting the actual troubleshooting.

Step 3 – Method of reading matrix

1) Operate the machine when carrying out troubleshooting of the items in the Troubleshooting column. If any problems occur as the result of the troubleshooting, put a check against the item.

   ★ When carrying out the troubleshooting, check the easier items first. It is not necessary to follow the number order.

2) Find the matching cause in the Causes column.
   If a problem is found, the ❍ marks on the same line as the troubleshooting are the causes.

   (In Troubleshooting item 2 in the same diagram on the right the cause is **c** or **e**.)

   When there is one ❍ mark
   Carry out troubleshooting for the other items marked with ❍ in the same Causes column to check if the problem occurs, then make repairs.

   When there are two ❍ marks
   Go to Step 3) to narrow down the cause.

Steering wheel does not turn ← Problem (example)

Ask the operator the following questions.
- Did the problem suddenly start?
  Yes = Equipment related to steering broken
- Was there previously any symptom, such as heaviness of the steering wheel?
  Yes = Wear of equipment related to steering, defective seal

Checks before troubleshooting (example)

- Is the oil level in the hydraulic tank correct?
  Is the type of oil correct?
- Is there any leakage of oil from the steering valve or Orbit-roll?
- Has the safety bar been removed from the frame?

<Example 1>

No.	Remedy / Problems
1	Steering wheel does not turn in either direction (left and right)
2	In Item 1, movement of work equipment is abnormal
3	Steering wheel turns only in one direction (left or right)
4	Steering wheel is heavy and does not turn

<Example 2>

	Cause				
	a	**b**	**c**	**d**	**e**
Remedy / Problems	X	C	Δ X	A	X
1	❍	❍	❍	❍	
2			●		●
3		❍		❍	
4	❍			❍	
5		❍			❍

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3) Operate the machine and carry out troubleshooting of the items not checked in Step 1).

   Operate the machine in the same way as in Step 1), and if any problem occurs, put a check against the item.

   (In Troubleshooting item 5 in the diagram on the right, the problem was re-enacted.)

4) Find the matching cause in the cause column.

   In the same way as in Step 2), if a problem is found, the ❍ marks on the same line for the troubleshooting item are the causes.

   (In Troubleshooting item 5 in the diagram on the right, the cause is **b** or **e**.)

5) Narrow down the causes.

   Of the causes found in Step 2) and Step 4), there are common items (❍ marks on the line for each troubleshooting item and in the same Cause column as each other) that have causes common with the problem items found in the troubleshooting in Step 1) and Step 3).

   ★ The items that are not common (items that do not have ❍ marks in the same cause common as each other) are probably not the cause, so they can be eliminated.

   (The causes for Troubleshooting item 2 in the diagram on the right are c or e, and the causes in Troubleshooting item 5 are **b** or **e**, so Cause **e** is the common cause.)

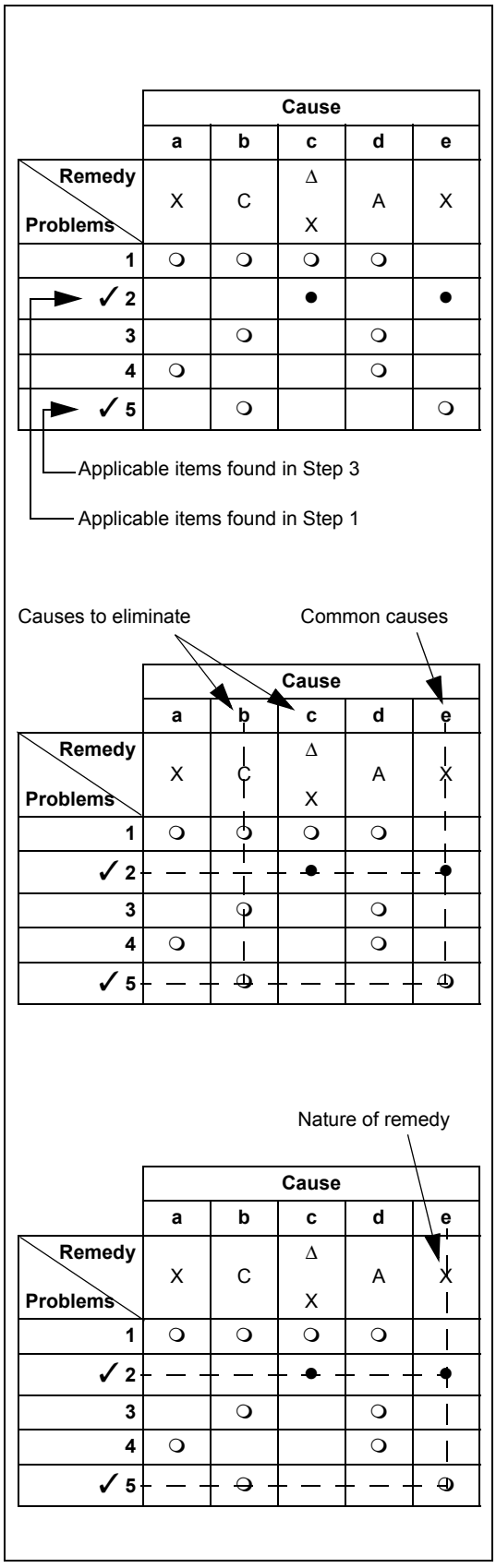
6) Repeat the operation in Steps 3), 4), and 5) until the cause is narrowed down to 1 item (1 common item).

   ★ If cause items are 2 or more, continue until number of items becomes minimum.

7) Remedy

   After narrowing down the common causes, taken the action given in the remedy line.

   X: Replace Δ: Repair A: Adjust C: Clean



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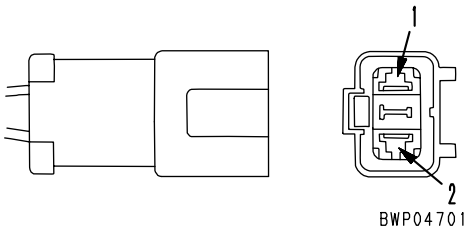
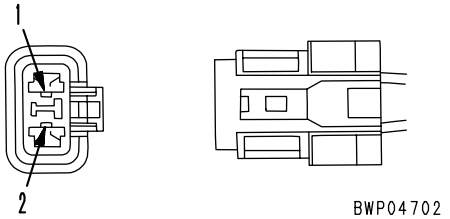
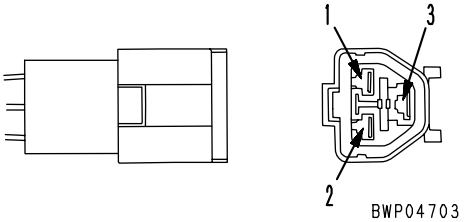
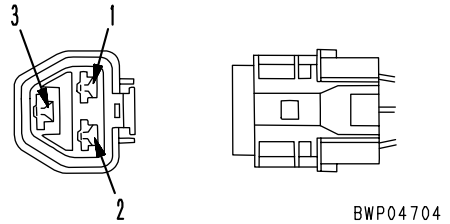
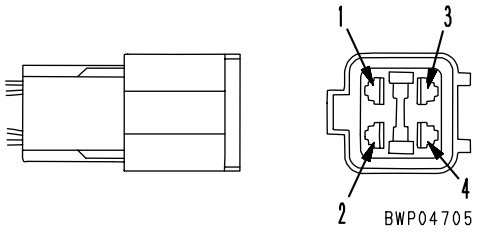
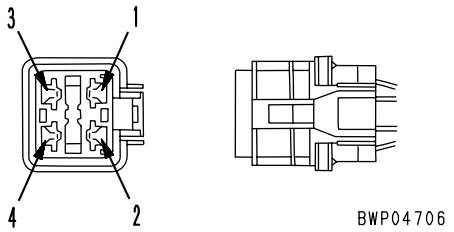
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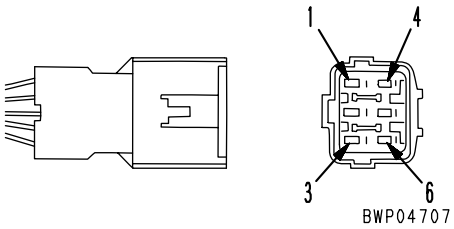
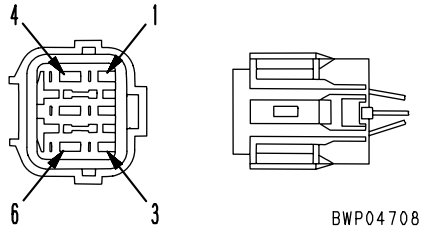
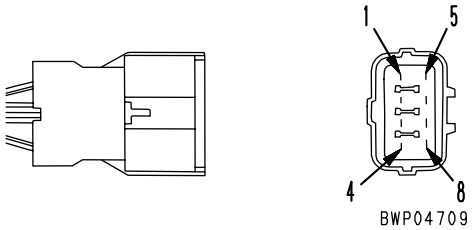
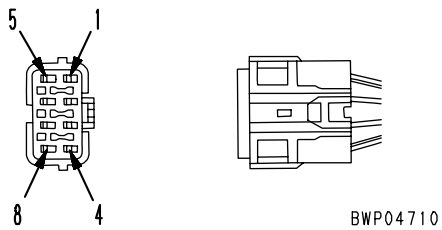
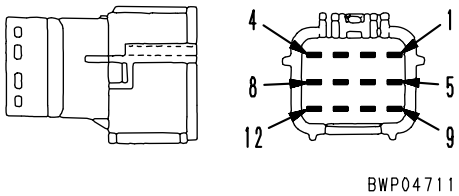
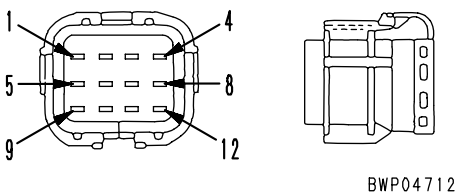
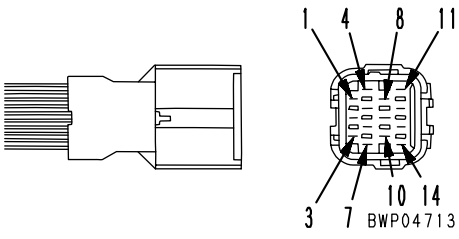
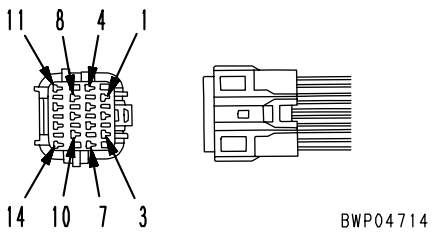
Connection table for connector pin numbers

★ The terms male and female refer to the pins, while the terms male housing and female housing refer to the mating portion of the housing.

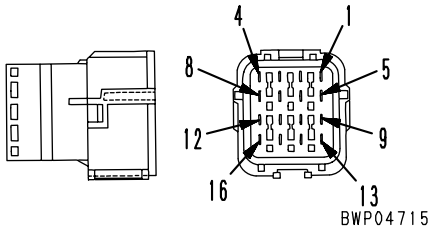
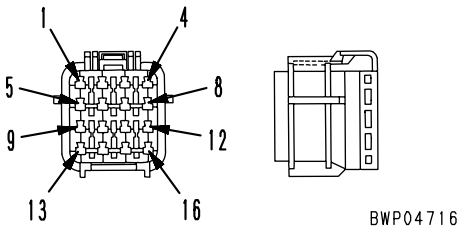
★ Deuscht connector has marks of pin numbers on the wiring harness side.

Number of Pins	X Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
1	Part number: 08055-00181	Part number: 08055-00191	799-601-7010
2			799-601-7020
	Part number: 08055-00282	Part number: 08055-00292	
3			799-601-7030
	Part number: 08055-00381	Part number: 08055-00391	
4			799-601-7040
	Part number: 08055-00481	Part number: 08055-00491	
—	Terminal part number: 79A-222-3370 • Wire size: 0.85 • Quantity: 20 pieces • Grommet: black	Terminal part number: 79A-222-3390 • Wire size: 0.85 • Quantity: 20 pieces • Grommet: black	—
—	Terminal part number: 79A-222-3380 • Wire size: 2.0 • Quantity: 20 pieces • Grommet: red	Terminal part number: 79A-222-3410 • Wire size: 2.0 • Quantity: 20 pieces • Grommet: red	—

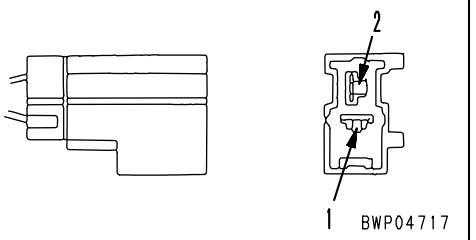
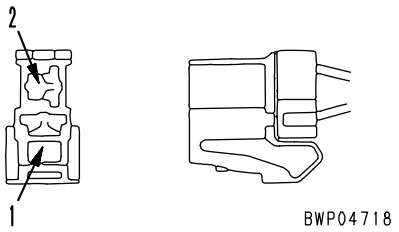
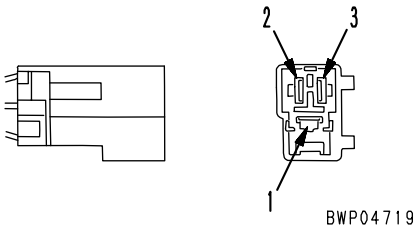
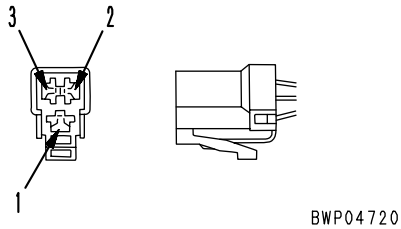
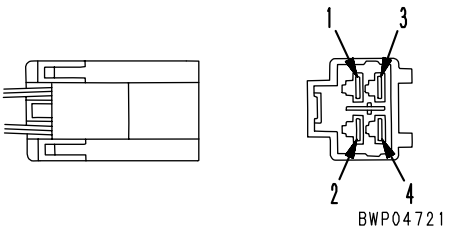
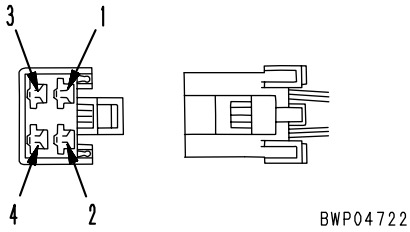
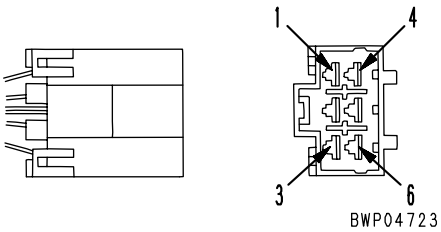
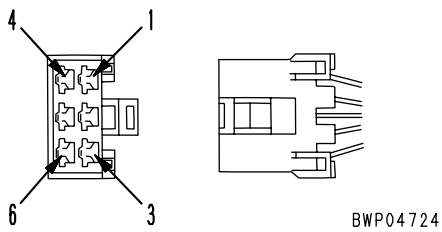
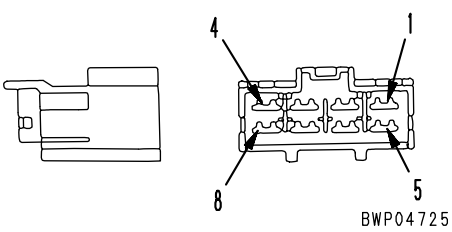
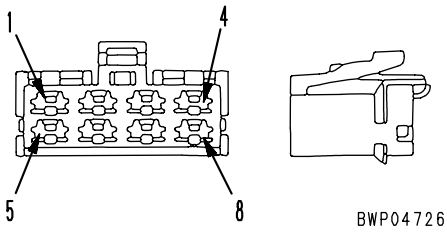
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Number of Pins	SWP Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
6			799-601-7050
	Part number: 08055-10681	Part number: 08055-10691	
8			799-601-7060
	Part number: 08055-10881	Part number: 08055-10891	
12			799-601-7310
	Part number: 08055-11281	Part number: 08055-11291	
14			799-601-7070
	Part number: 08055-11481	Part number: 08055-11491	

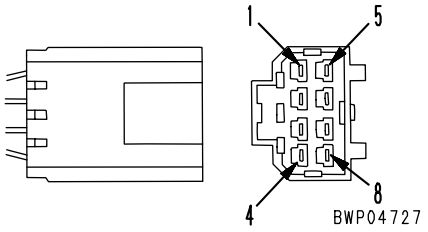
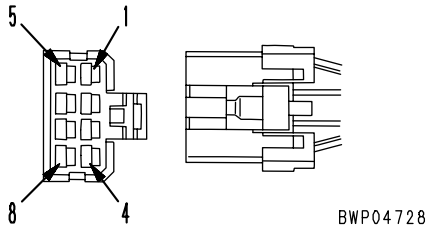
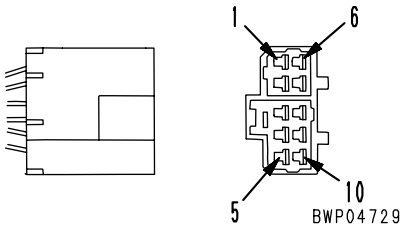
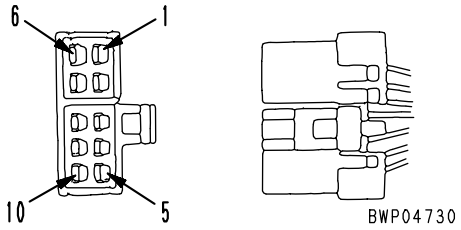
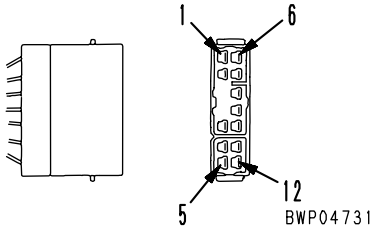
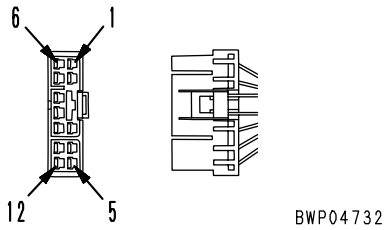
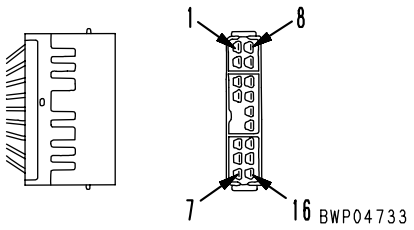
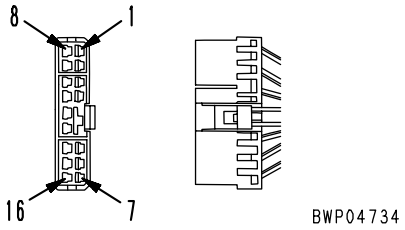
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Number of Pins	SWP Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
16			799-601-7320
	Part number: 08055-11681	Part number: 08055-11691	
—	Terminal part number: • Wire size: 0.85 • Quantity: 20 pieces • Grommet: black	• Terminal part number: • Wire size: 0.85 • Quantity: 20 pieces • Grommet: black	—
—	• Terminal part number: • Wire size: 1.25 • Quantity: 20 pieces • Grommet: red	• Terminal part number: • Wire size: 1.25 • Quantity: 20 pieces • Grommet: red	—

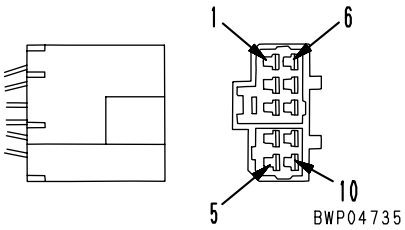
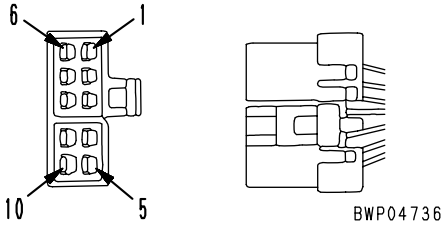
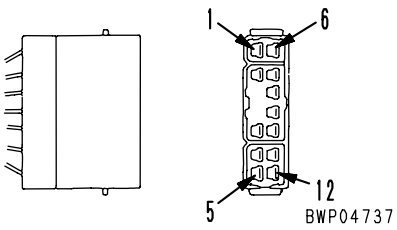
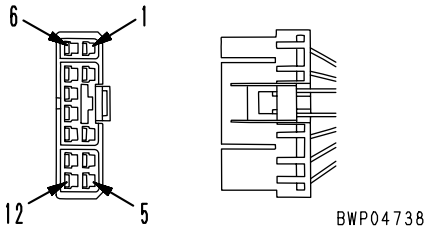
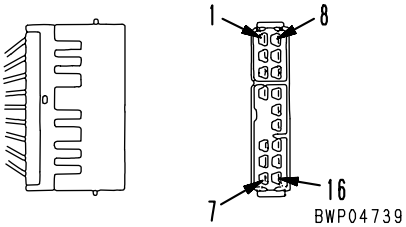
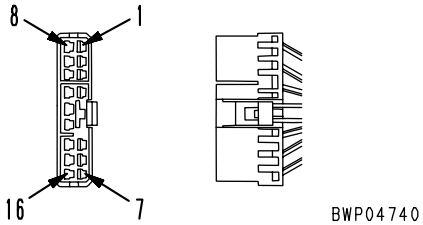
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Number of Pins	M Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
1	Part number: 08056-00171	Part number: 08056-00181	799-601-7080
2			799-601-7090
	Part number: 08056-00271	Part number: 08056-00281	
3			799-601-7110
	Part number: 08056-00371	Part number: 08056-00381	
4			799-601-7120
	Part number: 08056-00471	Part number: 08056-00481	
6			799-601-7130
	Part number: 08056-00671	Part number: 08056-00681	
8			799-601-7390
	Part number: 08056-00871	Part number: 08056-00881	

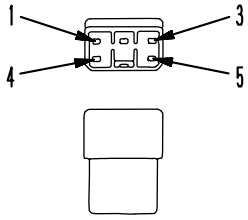
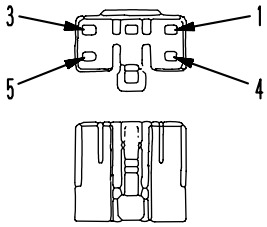
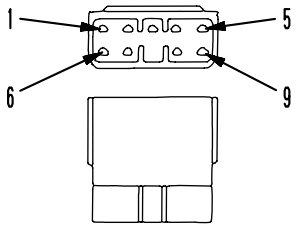
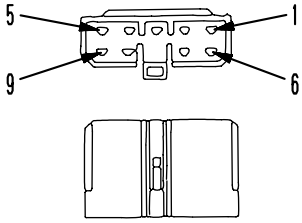
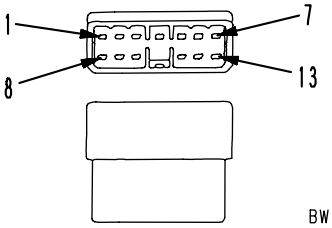
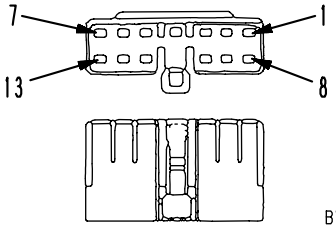
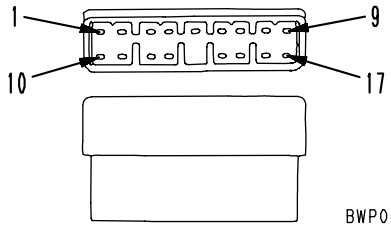
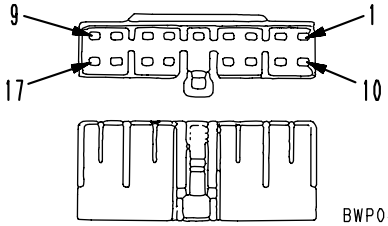
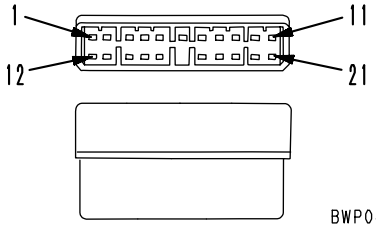
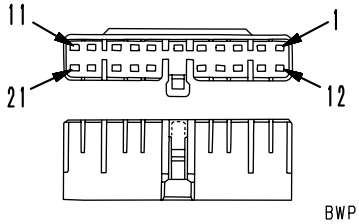
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Number of Pins	S Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
8			799-601-7140
	Part number: 08056-10871	Part number: 08056-10881	
10 (white)			799-601-7150
	Part number: 08056-11071	Part number: 08056-11081	
12 (white)			799-601-7350
	Part number: 08056-11271	Part number: 08056-11281	
16 (white)			799-601-7330
	Part number: 08056-11671	Part number: 08056-11681	

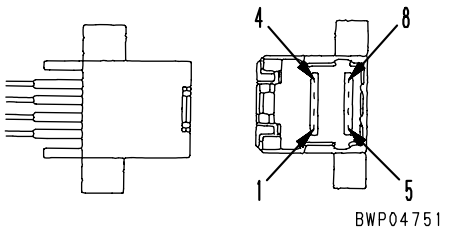
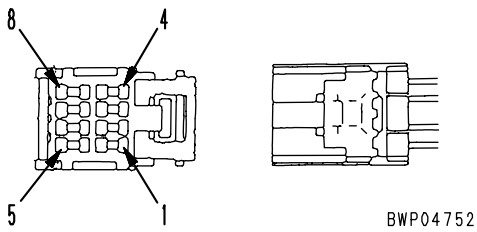
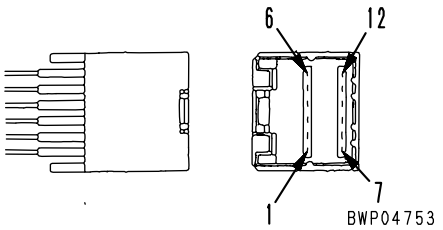
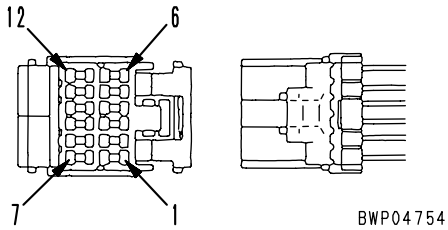
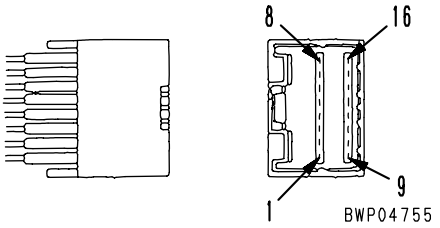
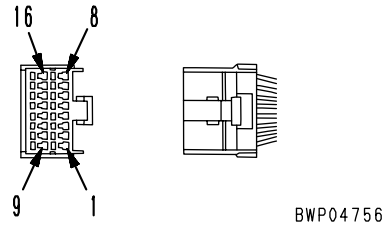
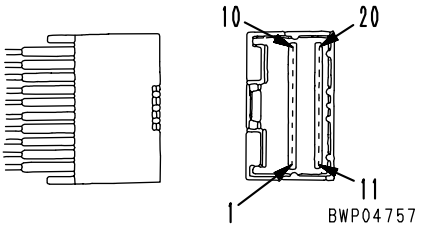
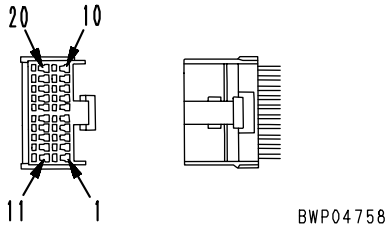
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Number of Pins	S Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
10 (blue)			—
	—	—	
12 (blue)			799-601-7160
	Part number: 08056-11272	Part number: 08056-11282	
16 (blue)			799-601-7170
	Part number: 08056-11672	Part number: 08056-11682	

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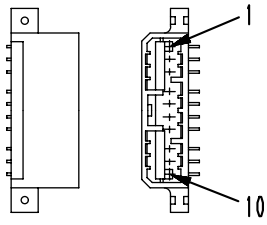
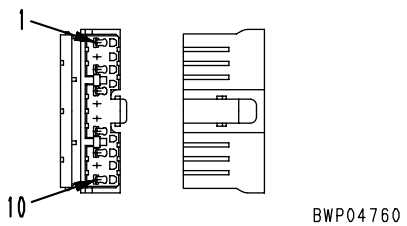
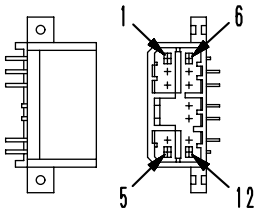
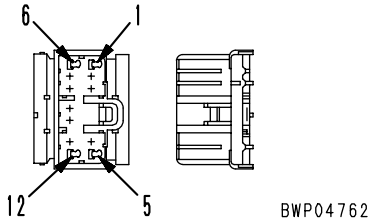
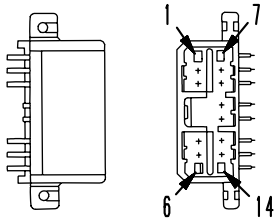
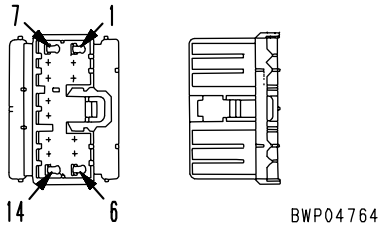
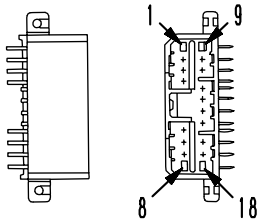
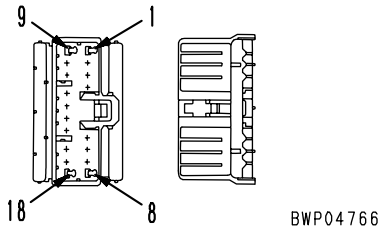
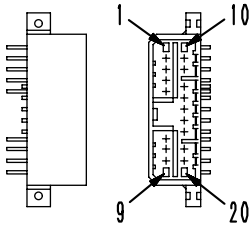
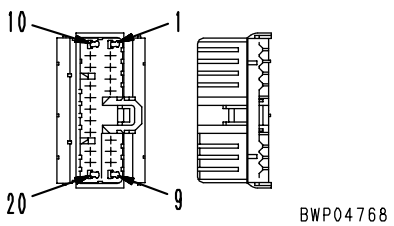
Number of Pins	MIC Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
7	Body part number: 79A-222-2640 (Quantity: 5 pieces)	Body part number: 79A-222-2630 (Quantity: 5 pieces)	—
11	Body part number: 79A-222-2680 (Quantity: 5 pieces)	Body part number: 79A-222-2670 (Quantity: 5 pieces)	—
5	 BWP04741	 BWP04742	799-601-2710
	Body part number: 79A-222-2620 (Quantity: 5 pieces)	Body part number: 79A-222-2610 (Quantity: 5 pieces)	
9	 BWP04743	 BWP04744	799-601-2950
	Body part number: 79A-222-2660 (Quantity: 5 pieces)	Body part number: 79A-222-2650 (Quantity: 5 pieces)	
13	 BWP04745	 BWP04746	799-601-2720
	Body part number: 79A-222-2710 (Quantity: 2 pieces)	Body part number: 79A-222-2690 (Quantity: 2 pieces)	
17	 BWP04747	 BWP04748	799-601-2730
	Body part number: 79A-222-2730 (Quantity: 2 pieces)	Body part number: 79A-222-2720 (Quantity: 2 pieces)	
21	 BWP04749	 BWP04750	799-601-2740
	Body part number: 79A-222-2750 (Quantity: 2 pieces)	Body part number: 79A-222-2740 (Quantity: 2 pieces)	
—	Body part number: 79A-222-2770 (Quantity: 50 pieces)	Body part number: 79A-222-2760 (Quantity: 50 pieces)	—

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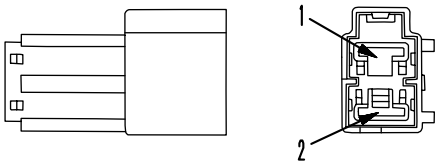
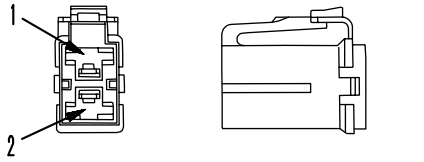
Number of Pins	AMP040 Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
8			799-601-7180
	—	Housing part number: 79A-222-3430 (Quantity: 5 pieces)	
12			799-601-7190
	—	Housing part number: 79A-222-3440 (Quantity: 5 pieces)	
16			799-601-7210
	—	Housing part number: 79A-222-3450 (Quantity: 5 pieces)	
20			799-601-7220
	—	Housing part number: 79A-222-3460 (Quantity: 5 pieces)	

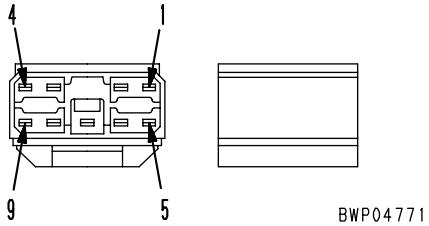
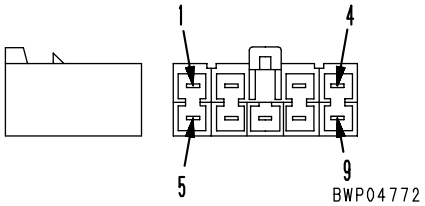
★ Terminal part number: 79A-222-3470
(for all numbers of pins).

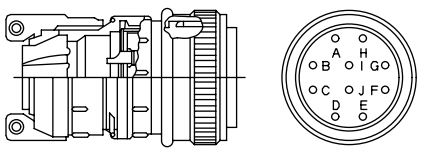
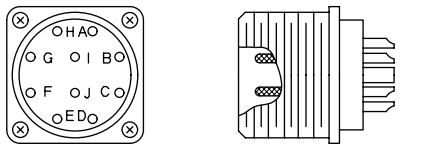
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Number of Pins	AMP070 Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
10			799-601-7510
	—	Part number: 08195-10210	
12			799-601-7520
	—	Part number: 08195-12210	
14			799-601-7530
	—	Part number: 08195-14210	
18			799-601-7540
	—	Part number: 08195-18210	
20			799-601-7550
	—	Part number: 08195-20210	

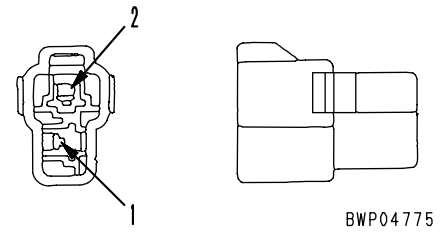
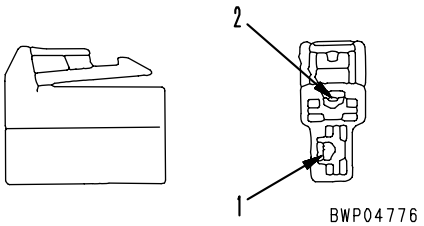
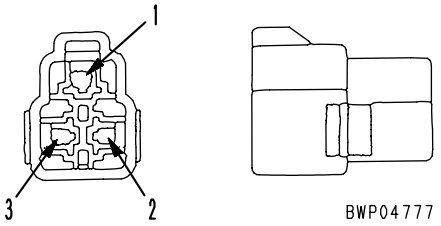
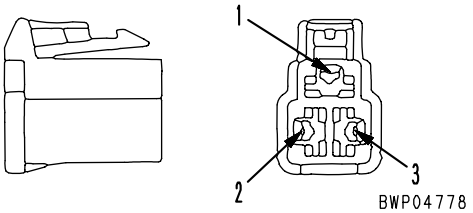
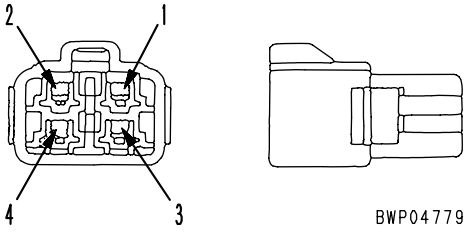
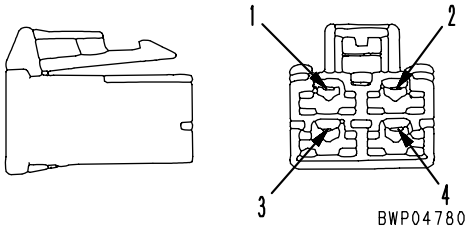
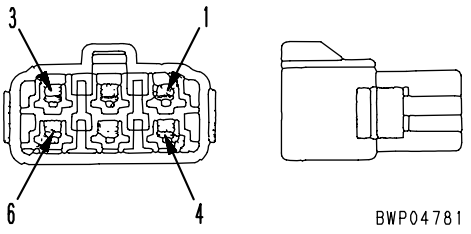
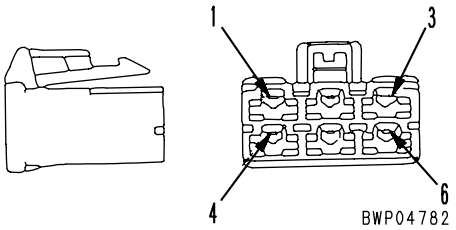
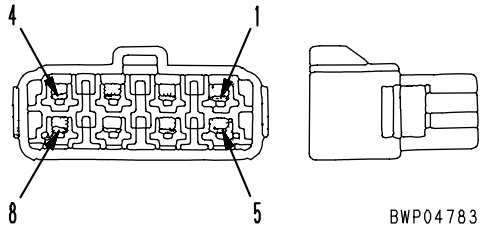
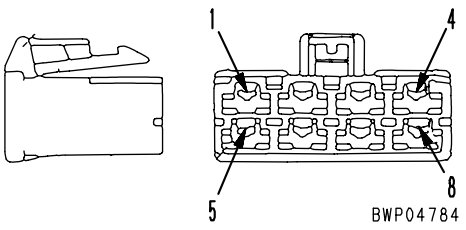
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Number of Pins	L Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
2	 BWP04769	 BWP04770	—
	—	—	

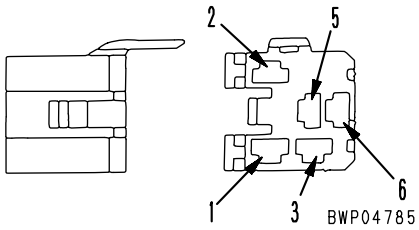
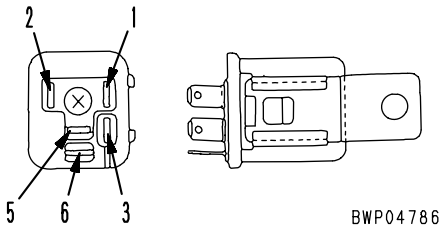
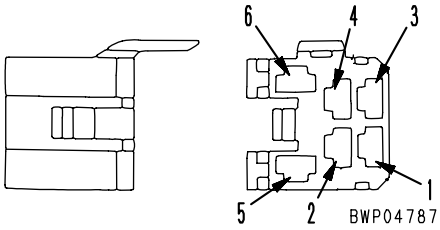
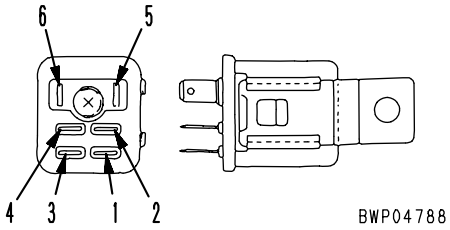
Number of Pins	PA Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
9	 BWP04771	 BWP04772	—
	—	—	

Number of Pins	BENDIX (MS) Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
10	 BWP04773	 BWP04774	799-601-3460
	—	—	

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Number of Pins	KES1 Automobile Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
2			—
	Part number: 08027-10210 (Natural color) 08027-10220 (Black)	Part number: 08027-10260 (Natural color) 08027-10270 (Black)	
3			—
	Part number: 08027-10310	Part number: 08027-10360	
4			—
	Part number: 08027-10410 (Natural color) 08027-10420 (Black)	Part number: 08027-10460 (Natural color) 08027-10470 (Black)	
6			—
	Part number: 08027-10610 (Natural color) 08027-10620 (Black)	Part number: 08027-10660 (Natural color) 08027-10670 (Black)	
8			—
	Part number: 08027-10810 (Natural color) 08027-10820 (Black)	Part number: 08027-10860 (Natural color) 08027-10870 (Black)	

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Number of Pins	Connector for relay (Socket)		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
5			799-601-7360
	—	—	
6			799-601-7370
	—	—	

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TROUBLESHOOTING OF ENGINE CONTROL SYSTEM (ENG MODE)

Connector types and installation positions 20-303
Connectors layout drawing 20-312
Engine control system diagram 20-318

Error code [A000N1] Engine overruns (N1) 20-320
Error code [AD00L2] Common rail is higher than maximum set value 20-321
Error code [AD00MA] Function of common rail is defective 20-322
Error code [AD10L3] Fuel supply pump cannot be controlled 20-323
Error code [AD10MA] Function of fuel supply pump is defective 20-325
Error code [AD10MB] Function of fuel supply pump is lowered 20-326
Error code [AD11KA] Disconnection in fuel supply pump PVC1 system 20-327
Error code [AD11KB] Short circuit in fuel supply pump PVC1 system 20-328
Error code [AD51KA] Disconnection in fuel supply pump PVC2 system 20-329
Error code [AD51KB] Short circuit in fuel supply pump PVC2 system 20-330
Error code [ADA1KA] Disconnection in No. 1 injector solenoid vavle system 20-331
Error code [ADAZKB] Short circuit in No. 1, 2, 3 injector solenoid valve system 20-332
Error code [ADB1KA] Disconnection in No. 2 injector solenoid valve system 20-334
Error code [ADC1KA] Disconnection in No. 3 injector solenoid valve system 20-335
Error code [ADD1KA] Disconnection in No. 4 injector solenoid valve system 20-336
Error code [ADDZKB] Short circuit in No. 4, 5, 6 injector solenoid valve system 20-338
Error code [ADE1KA] Disconnection in No. 5 injector solenoid valve system 20-340
Error code [ADF1KA] Disconnection in No. 6 injector solenoid valve system 20-341
Error code [D182KZ] Disconnection or short circuit in pre-heating relay coil 20-342
Error code [D1D0KB] Short circuit in voltage load power supply of engine controller power supply (SW) circuit 20-344
Error code [DB20KT] Controller power supply (NSW) voltage is low 20-346
Error code [AB20KT] Trouble in drive circuit in controller 20-348
Error code [DB22KK] Trouble in power supply of engine controller load power supply (SW) 1 circuit 20-350
Error code [DB29KQ] Nonconformance of model selection signals in engine controller connecting wiring harness 20-352
Error code [DB2AMA] Function of Q adjustment switches of engine controller is defective 20-354
Error code [DD11KB] Trouble in input of starting switch "C" (IGN "C") 20-355
Error code [DGE3L6] Trouble in water temperature (low temperature) sensor system 20-356
Error code [DGE4KX] Trouble in fuel temperature sensor system 20-357
Error code [DH30KX] Trouble in boost pressure sensor system 20-358
Error code [DH40KX] Trouble in common rail fuel pressure sensor system 20-359
Error code [DK10KX] Trouble in throttle (acceleration) sensor system 20-360
Error code [DLE3LC] Trouble in engine NE speed sensor system 20-361
Error code [DLH1LC] Trouble in engine G speed sensor system 20-362
Error code [ENG-1] Engine does not start 20-363

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Connector types and installation positions

★ The Address column in the following table indicates the addresses of the connector layout drawing (Cubic diagram) and the circuit diagram.

★ Codes indicated in the fields of the circuit diagram addresses:
ENG: Engine control system, **TM:** Transmission control system, **WRK:** working equipment control system, **MON:** Monitor system, **OTH:** Others

★ The characters in parenthesis in the Connector Type fields indicate the colors of the connector bodies.

Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
1.PS	DT-T	2	1st solenoid	AJ-4	TM
1.SW	DT	2	1st fill switch	AJ-4	TM
2.PS	DT-T	2	2nd solenoid	AJ-3	TM
2.SW	DT	2	2nd fill switch	AJ-3	TM
3.PS	DT-T	2	3rd solenoid	AJ-3	TM
3.SW	DT	2	3rd fill switch	AJ-4	TM
4.PS	DT-T	2	4th solenoid	AJ-5	TM
4.SW	DT	2	4th fill switch	AJ-5	TM
A1	M	6	Blower motor and resistor	U-2	—
A2	SWP	6	Air mix servo motor	U-2	—
A3	M	2	Thermistor	U-2	—
A4	X	2	Air servomotor	U-8	—
A5	X	2	Condenser switch	T-1	—
A6	YAZAKI	2	Hi, Lo switch	T-1	—
A7	YAZAKI	4	Blower relay (Main)	W-6	—
A8	YAZAKI	4	Blower relay (Hi)	W-6	—
A9	YAZAKI	4	Blower relay (M2)	W-6	—
A10	YAZAKI	4	Blower relay (M1)	W-5	—
A11	YAZAKI	4	Condenser relay	W-5	—
A12	YAZAKI	4	Condenser Hi (1) relay	W-5	—
A13	YAZAKI	4	Condenser Hi (2) relay	W-4	—
A14	YAZAKI	4	MAG clutch relay	W-4	—
A20	Terminal	1	Ground	T-1	—
A21	YAZAKI	2	Water temperature sensor (Automatic air conditioner model)	W-3	—
A22	YAZAKI	2	Room temperature sensor (Automatic air conditioner model)	U-2	—
A23	YAZAKI	2	Outside temperature sensor (Automatic air conditioner model)	A-7	—
A24	DT-T	2	Diode (Automatic air conditioner model)	W-3	—
A25	DT-T	2	Diode (Automatic air conditioner model)	V-3	—
A26	DT-T	2	Intermediate connector (Automatic air conditioner model)	W-4	—
AL1	M	6	Intermediate connector (Air conditioner relay)	U-2	—
AL2	S (W)	12	Intermediate connector (Air conditioner relay)	V-2	—
B01	DT	3	Condenser R	B-7	—
B02	DT	3	Condenser L	A-7	—
B03	DT-T	2	Emergency brake switch 1	G-9	TM
B04	DT-T	2	Emergency brake switch 2	G-9	TM
B05	DT-T	2	Front brake ACC low pressure switch	K-3	WRK

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Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
B06	DT-T	2	Rear brake ACC low pressure switch	J-2	WRK
BR1	DT-T (Gr)	12	Intermediate connector (Bulkhead)	I-2	WRK
C01	YAZAKI	9	AM/FM radio	L-9	—
C02	KES0	2	Speaker (Right)	E-9	—
C03	KES0	2	Speaker (Left)	G-9	—
C04	M	2	Front working lamp (Right)	B-8	—
C05	M	2	Front working lamp (Left)	B-8	—
C07	KES1	2	Rotary lamp	C-8	—
C08	M	1	Door switch (Right) (Room lamp)	C-8	—
C09	M	1	Door switch (Left) (Room lamp)	B-8	—
C10	—	2	Cigarette lighter	A-7	—
C12	M	6	Front wiper motor	A-7	OTH
C15	M	4	Rear wiper motor	F-9	OTH
C17	KYORITSU ES	4	Warning lamp switch	D-9	
C18	Plug	1	Warning lamp (Beacon)	F-9	
C19	DT-T	6	Glass heater switch	D-9	
C29	M	1	Glass heater ON	E-9	
C33	H	1	Rear glass heater	E-9	
C35	H	1	Rear glass heater	G-9	
C39	Terminal	1	Ground	C-8	
C40	Terminal	1	Ground	C-8	OTH
C41	M	1	Warning lamp	E-9	
C43	YAZAKI	6	Side wiper switch	B-8	OTH
C44	M	4	Right side wiper motor	A-7	OTH
C45	M	4	Left side wiper motor	F-1	OTH
C46	M	1	Intermediate connector (Power supply)	D-9	OTH
C47	Terminal	1	Ground	F-9	OTH
C47	AMP172021-2	16	A/C control AMP	P-1	—
C47	AMP040	20	A/C controL AMP (Automatic air conditioner model)	D-9	—
C48	AMP172245-2	12	A/C control AMP	P-1	—
C48	AMP040	16	A/C control AMP (Automatic air conditioner model)	D-9	—
C49	SWP	8	Left servomotor	R-1	—
C50	SWP	8	Right servomotor	M-3	—
C51	YAZAKI	2	Diode (Automatic air conditioner model)	Q-1	—
CAN1	DT-T	3	Resistor	O-1	E-9
CAN2	DT-T	3	Resistor	R-9	—
CHK0	X	1	Inspection connector 0	R-1	—
CHK1	X	1	Inspection connector 1	R-1	—
CL1	S	8	Intermediate connector	A-4	—
CL2	S (L)	12	Intermediate connector (Wiper motor)	A-4	OTH
CL5	S	16	Intermediate connector	M-2	—
CL6	DT-T (G)	12	Intermediate connector (Monitor panel controller)	M-2	WRK
CL6	M	6	Intermediate connector (Automatic air conditioner model)	W-3	—
CL7	DT-T (Gr)	12	Intermediate connector (Monitor panel controller)	M-2	WRK
CL8	DT-T	12	Intermediate connector (Monitor panel controller)	N-1	WRK
CL9	DT-T	8	Intermediate connector (Monitor panel controller)	O-1	WRK
CL10	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-1	J-6
CN1	DT-T	2	Injector	Y-5	A-3

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Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
CN2	DT-T	2	Injector	Y-5	A-2
CN3	DT-T	2	Injector	Y-9	A-2
CN4	DT-T	2	Injector	Z-9	A-1
CN5	DT-T	2	Injector	Z-9	A-2
CN6	DT-T	2	Injector	AC-8	A-2
COMB1	M	3	Front combination lamp (Right)	A-6	MON
COMB1	M	3	Front combination lamp (Left)	E-1	MON
D1	DT-T	2	Dust indicator	AB-9	MON
DIODE	DT-T	2	Diode (Parking brake solenoid)	AE-6	WRK
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	MON
E01	DT-T	2	Intermediate connector (Starting motor)	L-3	H-2
E02	Terminal	1	Alternator R	K-8	G-1
E03	Terminal	1	Alternator B	K-8	G-1
E04	Terminal	1	Alternator E	L-8	H-1
E06	Terminal	1	Heater relay	AC-8	F-9
E07	Terminal	1	Heater relay	AC-7	F-9
E10	DT-T	2	Compressor magnetic clutch	I-9	—
E11	DT-T	2	Diode	J-9	—
E14	Terminal	1	Ground	L-4	H-1
E28	DT	2	Diode (Engine heater relay)	Z-3	E-9
E29	Terminal	1	Engine oil pressure switch	Z-5	MON
E30	Terminal	1	Starting motor B	K-3	H-2
EL2	HD-24	31	Intermediate connector (Engine injector)	Z-1	C-4
EL3	HD-24	31	Intermediate connector (Engine)	Z-2	B-4
ER-1	DT-T	4	Intermediate connector (Starting motor)	L-4	I-2
EREV	DT-T	2	Engine speed sensor	AC-6	E-3
F01	M	6	Intermediate connector (Right front lamp)	A-5	MON
F02	M	6	Intermediate connector (Left front lamp)	D-1	MON
F03	Terminal	1	Horn	B-1	MON
F04	Terminal	1	Horn	A-1	MON
F05	Terminal	1	Horn	C-1	MON
F06	Terminal	1	Horn	C-1	MON
F07	DT-T	2	Switching pump cut-off	A-1	MON
F09	DT-T	3	Bucket positioner proximity switch	A-3	WRK
F10	DT-T	3	Lift arm positioner proximity switch (std)	A-3	WRK
F13	DT-T	2	Lift arm damper solenoid	D-1	WRK
F14	DT-T	2	Diode (Damper solenoid)	D-1	WRK
F15	DT-T	3	Lift arm angle signal (For load meter)	A-5	WRK
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1	WRK
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1	WRK
F18	DT-T	3	Lift arm angle sensor (For boom EPC)	A-5	WRK
F19	DT-T	3	Bucket positioner proximity switch (For boom EPC)	A-3	WRK
F20	DT-T	2	Lift arm RAISE EPC	A-2	WRK
F21	DT-T	2	Lift arm LOWER EPC	A-1	WRK
F22	DT-T	2	Bucket TILT EPC	A-1	WRK
F23	DT-T	2	Bucket DUMP EPC	A-1	WRK
F24	DT-T	2	ATT EXT EPC (op)	A-2	WRK
F25	DT-T	2	ATT RET EPC (op)	A-2	WRK

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Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
F26	DT-T	2	Lift arm EPC cut-off solenoid	C-1	WRK
F27	DT-T	2	Diode (Boom EPC cut-off solenoid)	A-4	WRK
F28	DT-T	2	Oil temperature sensor	B-1	WRK
FF1	S	10	Intermediate connector (Front lamp)	E-1	MON
FF2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	E-1	WRK
FL1	S	12	Intermediate connector (Front lamp)	V-1	MON
FL2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	V-2	WRK
FL3	DT-T	6	Intermediate connector (Load meter)	X-3	WRK
FS1	L	2	Intermediate connector (Fuse box)	W-7	K-8
FS2	L	2	Intermediate connector (Fuse box)	V-7	L-9
FS3	S (W)	16	Intermediate connector (Fuse box)	V-8	K-8
FS4	S (W)	12	Intermediate connector (Fuse box)	U-8	L-8
FS5	M	6	Intermediate connector (Fuse box)	V-7	MON
FS6	Plug	1	Intermediate connector (Fuse box)	V-7	—
FS7	Plug	1	Intermediate connector (Fuse box)	W-7	—
F.PS	DT-T	2	F clutch solenoid	AJ-6	WRK
F.SW	DT	2	F clutch fill switch	AJ-6	WRK
G	YAZAKI	2	Engine G speed sensor	AA-5	E-1
G01	Terminal	1	Backup buzzer	L-8	TM
G02	Terminal	1	Backup buzzer	L-7	TM
G04	M	2	Rear working lamp (Left)	K-9	MON
G05	M	2	Rear working lamp (Right)	I-9	MON
GR1	DT-T	4	Intermediate connector (Fan reverse solenoid, rear working lamp)	L-7	WRK
GR2	DT-T	2	Fan reverse solenoid	J-9	WRK
HEAD	M	3	Headlamp (Right)	A-6	MON
HEAD	M	3	Headlamp (Left)	E-1	MON
HT	Terminal	1	Engine heater relay	AC-9	E-9
L01	SWP	6	Parking brake switch	M-5	TM
L02	SWP	6	Dimmer switch, light switch	M-4	M0N
L03	SWP	6	Turn and hazard switch	M-5	MON
L04	SWP	14	Shift switch	M-3	G-8
L05	DT-T	2	Steering wheel horn switch	M-5	—
FL7	DT-T (B+)	12	Intermediate connector (Work equipment solenoid)	N-1	WRK
FL8	DT-T (G)	8	Intermediate connector (Work equipment solenoid)	N-2	WRK
FL9	DT-T	6	Intermediate connector (3rd solenoid)	N-2	WRK
L07	DT-T	6	Monitor mode/Cancel switch	P-1	MON
L08	DT-T	6	Monitor INC/DEC switch	P-1	MON
L09	DT-T	2	Stop lamp switch	P-1	MON
L10	DT-T	3	Left brake pressure sensor	R-1	TM
L11	DT-T	2	Air suspension seat	S-1	—
L12	DT-T	4	Right direction switch, intermediate connector	O-7	TM
L13	DT-T	2	Lift arm N lock switch	O-7	WRK
L14	DT-T	4	Boom lever KDS & HOLD	M-6	TM
L15	DT-T	4	Bucket lever LDM cancel	M-6	WRK
L16	M	2	Intermediate connector	V-2	—
L17	M	4	DC24V/DC12V converter	W-5	—
L18	YAZAKI	2	DC12V socket	W-3	—
L19	M	4	Flasher unit	U-8	MON

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Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
L20	M	2	Alarm buzzer	U-8	MON
L21	S	10	Front, rear wiper switch	N-2	OTH
L22	DT-T	3	Throttle pedal	O-1	H-8
L23	DT-T	3	Low idling switch	O-1	H-8
L25E	DT-T	2	Lift arm & bucket EPC lever	M-6	WRK
L25S	DT-T	2	PPC valve and electrical detent	N-6	WRK
L26E	DT-T	2	Lift arm & bucket EPC lever	O-7	WRK
L26S	DT-T	2	PPC valve and electrical detent	N-6	WRK
L27S	DT-T	2	PPC valve and electrical detent	N-7	WRK
L28	DT-T	4	Lift arm & bucket EPC lever	M-7	WRK
L29	DT-T	4	Lift arm & bucket EPC lever	N-6	WRK
L30	DT-T	4	3rd EPC lever	O-8	WRK
L31	M	6	Intermittent wiper timer	W-7	OTH
L34	DT-T	4	Joystick lever positioner	W-6	WRK
L35	DT-T	2	Joystick EPC solenoid	P-1	WRK
L36	DT-T	2	Joystick EPC solenoid	P-1	WRK
L37	DTM	12	Joystick lever switch	Q-1	TM
L38	DT-T	3	Joystick N lock switch	W-7	TM
L39	DT-T	6	Joystick ON/OFF switch	T-1	TM
L40	DT-T	6	Steering speed mode switch	S-1	TM
L41	Relay	6	Joystick cut-off relay	M-5	WRK
L42	Plug	1	Connector (Auxiliary power supply)	A-5	—
L43	Plug	1	Connector (Auxiliary power supply)	A-5	—
L44	M	6	Intermediate connector (Printer)	V-3	MON
L45	D-sub	25	Printer	—	MON
L46	G	4	Printer	—	MON
L51	AMP070	20	Monitor panel controller	M-2	MON
L52	AMP070	18	Monitor panel controller	M-3	MON
L53	AMP070	12	Monitor panel controller	M-3	MON
L54	AMP070	18	Monitor panel controller	M-3	MON
L55	AMP070	12	Monitor panel controller	M-4	MON
L56	AMP070	12	Monitor panel controller	M-3	L-8, MON
L57	AMP070	14	Monitor panel controller	M-4	MON
L58	AMP040	8	Monitor panel controller	M-4	—
L61	DRC23	24	Transmission and fan pump motor controller	P-8	I-8, TM
L62	DRC23	40	Transmission and fan pump motor controller	P-8	I-8, TM
L63	DRC23	40	Transmission and fan pump motor controller	Q-8	J-8, TM
L71	DRC23	24	Lift arm bucket & joystick controller	Q-9	WRK
L72	DRC23	40	Lift arm bucket & joystick controller	Q-9	TM
L73	DRC23	40	Lift arm bucket & joystick controller	R-9	TM
L81	DRC23	24	Engine controller	Q-8	A-8
L82	DRC23	40	Engine controller	Q-8	B-8
L83	DRC23	40	Engine controller	Q-8	C-8
L90	DT-T	4	Model selection connector	P-8	A-6
L100	Terminal	1	Ground	R-1	J-1
L101	S (W)	16	Intermediate connector (Relay sub unit)	T-9	J-6
L102	S (L)	16	Intermediate connector (Relay sub unit)	T-9	J-5
L103	S (W)	16	Intermediate connector (Relay sub unit)	S-9	MON

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Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
L104	S (W)	16	Intermediate connector (Relay sub unit)	T-9	WRK
L105	S (W)	12	Intermediate connector (Relay sub unit)	T-9	—
L106	S (W)	16	Intermediate connector (Relay sub unit)	S-9	MON
L111	—	5	Winker & hazard relay	X-7	MON
L112	—	5	Air cleaner clogging relay	W-7	MON
L113	—	5	Steering changeover relay	W-8	L-6
L114	—	5	Automatic preheating relay	V-8	L-5
L115	—	5	Engine controller power supply relay	V-9	—
L116	—	4	Neutral safety relay	W-7	TM
L117	—	4	Backup lamp relay	W-7	TM
L118	—	4	Stop lamp relay	V-8	MON
L119	—	4	Horn relay	V-8	MON
L120	—	4	Parking brake relay	V-8	TM
L123	—	5	Lift arm detent relay	X-9	—
L124	—	5	Bucket detent relay	W-9	—
L125	—	5	Lift arm damper relay	V-9	TM
L126	—	4	Emergency steering relay	X-8	TM
L127	—	4	Front working lamp relay	X-7	—
L128	—	4	Rear working lamp relay	X-9	MON
L129	—	4	Rear glass heater relay	V-9	—
L130	—	4	Transmission pump cut-off relay	V-9	TM
LC.PS	DT-T	2	Torque converter lockup solenoid (OPT)	AJ-5	TM
LC.SW	DT	2	Torque converter lockup fill switch (OPT)	AJ-5	TM
LL1	DT-T	6	Intermediate connector (Relay)	O-7	E-5
LL2	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-7	E-6
LL3	DTHD#12	1	Intermediate connector (Ground)	N-7	E-5
LL4	DT-T (Br)	12	Intermediate connector (Throttle pedal)	N-6	E-6
LL5	DT	3	Intermediate connector (Joystick model)	M-5	WRK
LL6	DT-T (Gr)	12	Intermediate connector (Joystick model)	Q-1	WRK
LL7	DT-T (G)	12	Intermediate connector (Joystick model)	Q-1	WRK
LL8	DT-T (Gr)	8	Intermediate connector (Joystick switch)	Q-1	WRK
LR1	DTHD#12	1	Intermediate connector (Slow blow fuse)	X-2	J-2
LR4	L	2	Intermediate connector (Slow blow fuse)	X-1	J-3
LR5	DT-T	6	Intermediate connector (Auto grease controller)	X-3	MON
LR6	L	2	Intermediate connector (Ground)	X-2	J-3
LR8	DTHD#8	1	Intermediate connector (Ground)	X-2	J-2
LR9	DT-T	12	Intermediate connector (Steering, brake oil pressure switch)	X-1	TM
LR10	DT-T	12	Intermediate connector	X-1	J-3
LT1	HD-24	31	Intermediate connector (Transmission)	W-3	TM
NE	YAZAKI	2	Engine NE speed sensor	AB-6	E-1
OL	DT-T	2	Engine oil level sensor	AC-1	MON
PB.PS	DT-T	2	Parking brake solenoid	AI-2	TM
PB.SW	DT-T	2	Parking brake indicator switch	AI-2	TM
PCV1	SUMITOMO	2	Supply pump (No. 1)	Z-4	A-1
PCV2	SUMITOMO	2	Supply pump (No. 2)	AA-5	A-1
PFUEL	AMP174357-2	3	Common rail pressure signal	AB-5	E-2
PIM	SUMITOMO	3	Boost pressure signal	AC-7	E-2
R01	Terminal	1	Battery relay	J-2	L-1

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Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
R02	Terminal	1	Slow blow fuse	L-2	L-2
R03	Terminal	1	Slow blow fuse	L-2	L-2
R04	Terminal	1	Battery relay	K-2	L-1
R05	Terminal	1	Slow blow fuse	K-2	L-3
R06	Terminal	1	Slow blow fuse	K-2	L-2
R11	Terminal	1	Slow blow fuse	K-2	L-2
R13	Terminal	1	Battery relay	L-1	L-2
R14	Terminal	1	Battery relay	L-1	L-2
R15	Terminal	1	Emergency steering relay	J-1	TM
R16	Terminal	1	Emergency steering relay	J-1	TM
R22	Terminal	1	Battery	H-9	K-1
R23	Terminal	1	Battery	H-9	K-1
R24	DT-T	2	Diode (Battery relay)	I-1	L-4
R25	DT-T	2	Diode (Battery relay)	J-2	L-3
R26	DT-T	2	Diode (Starting motor)	H-1	L-3
R27	DT-T	2	Diode (Starting motor)	I-2	L-3
R29	DT-T	2	Oil fan EPC	A-6	TM
R30	M	6	Rear combination lamp (Left)	L-7	TM
R31	M	6	Rear combination lamp (Right)	I-9	TM
R32	DT-T	2	Coolant level sensor	B-8	MON
R33	DT-T	2	Fuel level gauge sensor	K-3	MON
R34	M	2	License lamp	L-6	MON
R36	DT-T	3	Steering pump pressure switch	D-1	TM
R37	DT-T	3	Emergency steering pressure switch	F-1	TM
R38	DT-T	6	Auto grease controller	F-1	MON
R39	DT-T	2	Battery level sensor	L-6	MON
R43	KES1	2	Front windshield washer	G-1	OTH
R44	DT-T	2	Diode (Washer)	G-1	OTH
R45	KESI	2	Rear windshield washer	H-1	OTH
R46	DT-T	2	Diode (Washer)	G-1	OTH
R50	Terminal	1	Ground	H-9	K-1
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	TM
R56	DT-T	2	Rear brake oil temperature sensor	H-1	TM
R63	Terminal	1	Slow blow fuse	L-2	—
R64	Terminal	1	Ground	L-5	—
R65	DT-T	6	Auto tilt motor switch (OPT)	L-5	—
R66	DT-T	2	Auto tilt motor	H-9	—
REV OUT	DT-T	2	Speed sensor	AH-2	TM
R.PS	DT-T	2	R clutch solenoid	AJ-6	TM
R.SW	DT	2	R clutch fill switch	AJ-6	TM
S01	DT-T	6	Front working lamp switch	P-1	MON
S02	DT-T	6	Rear working lamp switch	P-1	MON
S03	DT-T	6	Transmission cut-off ON/OFF switch	M-4	TM
S04	DT-T	6	Right direction ON/OFF switch	N-9	G-8
S05	DT-T	6	Transmission cut-off set switch	M-9	TM
S06	DT-T	6	Torque converter lockup ON/OFF switch	O-8	TM
S07	DT-T	6	Boom damper ON/OFF switch	O-1	TM
S12	DT-T	6	Remote positioner set switch (Joystick model)	N-7	WRK

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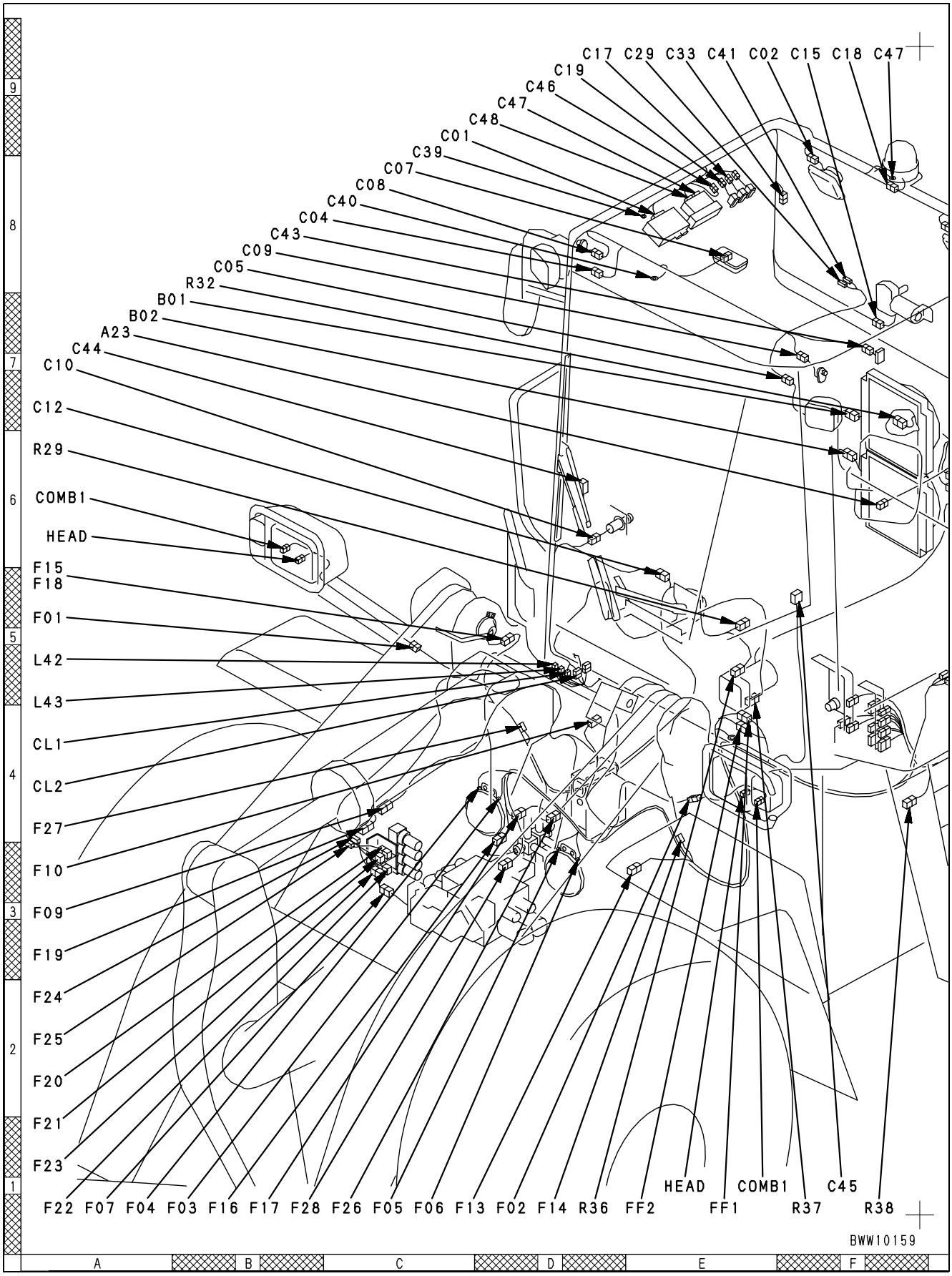
Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
S13	DT-T	6	Upper remote position ON/OFF switch (Joystick model)	N-9	WRK
S14	DT-T	6	Lower remote position ON/OFF switch (Joystick model)	N-8	WRK
S15	DT-T	6	Automatic digging switch (Joystick model)	N-9	WRK
S16	DT-T	6	Emergency steering check switch	M-9	TM
S17	DT-T	6	Auto grease switch	O-8	—
S19	DT-T	6	Hydraulic fan reverse switch	M-9	TM
S21	DT-T	4	Engine power mode switch	M-8	J-8
S22	DT-T	4	Auto shift mode switch	N-7	TM
S31	DT	4	Starting switch	N-7	K-8
TEL	DT-T (Gr)	12	Connector	Q-1	J-4
THL	DT-T	3	Fuel temperature sensor	AB-5	E-1
TC.C	DT-T	2	Torque converter oil temperature sensor (Monitor)	—	TM
TM.T	DT-T	2	Transmission oil temperature sensor	AJ-4	—
TWH	DT-T	2	Engine water temperature sensor (Monitor)	AD-2	MON
TWL	DT-T	3	Engine water temperature sensor (Preheater)	AB-1	E-2

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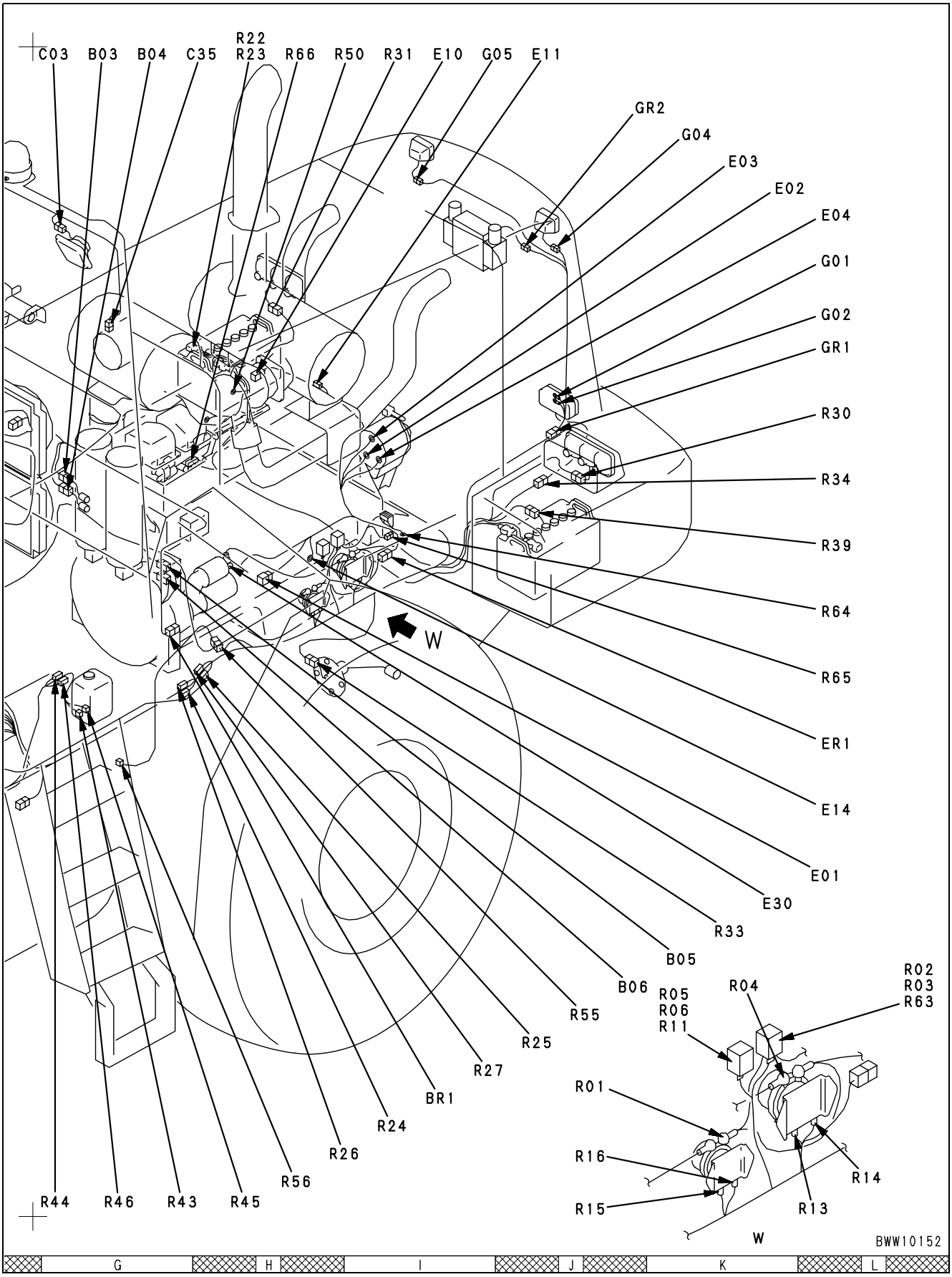
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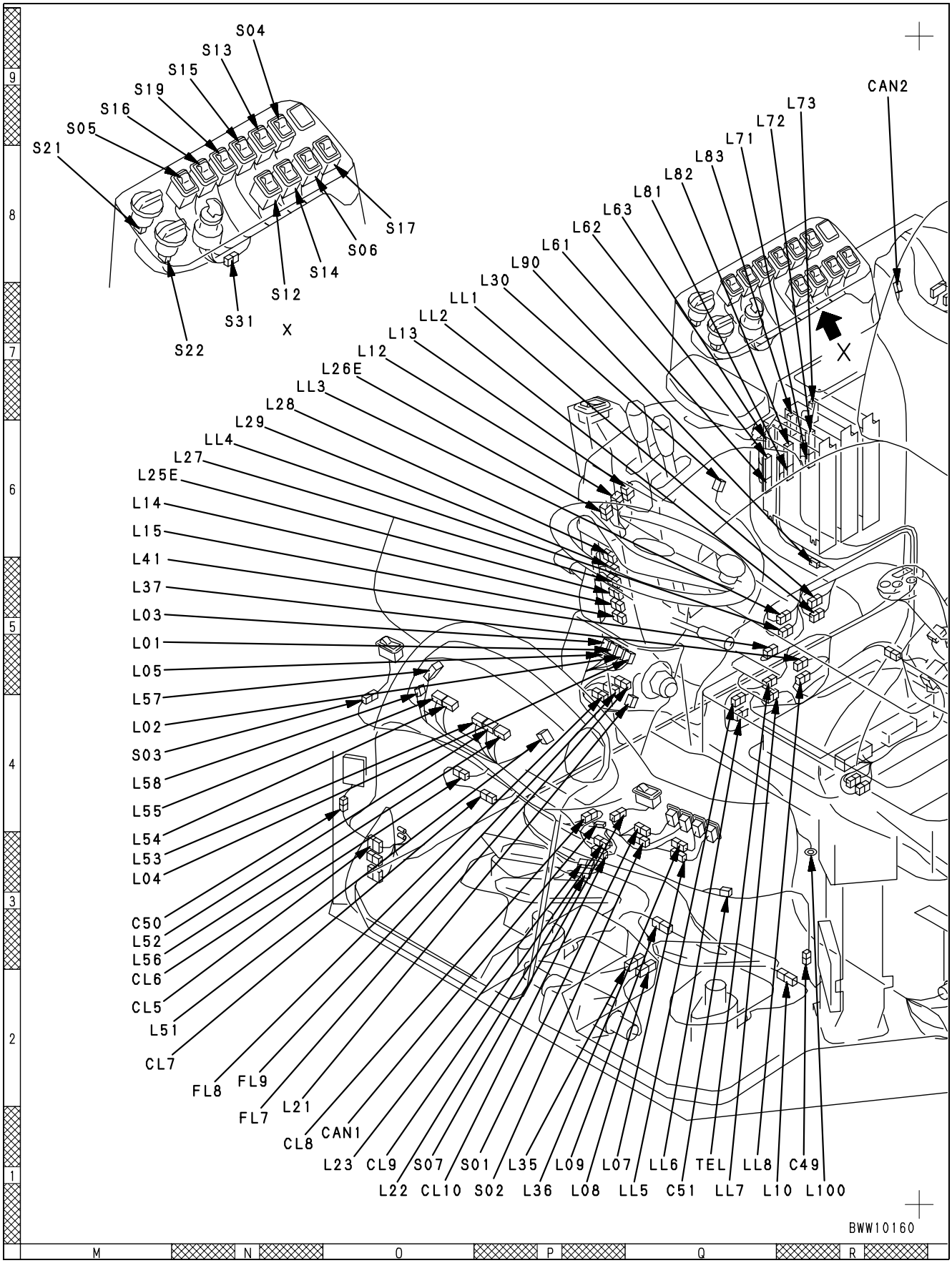
Connectors layout drawing



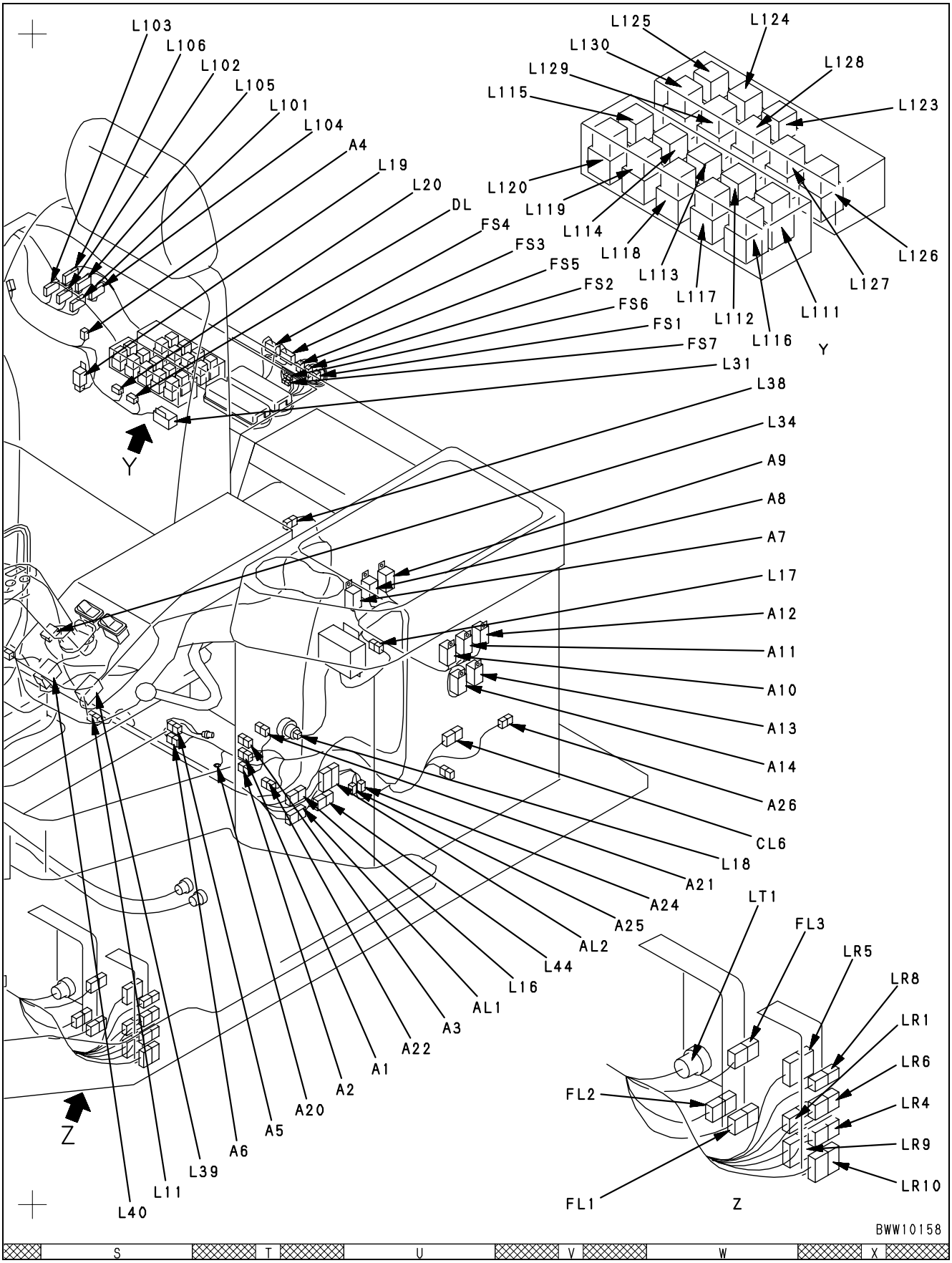
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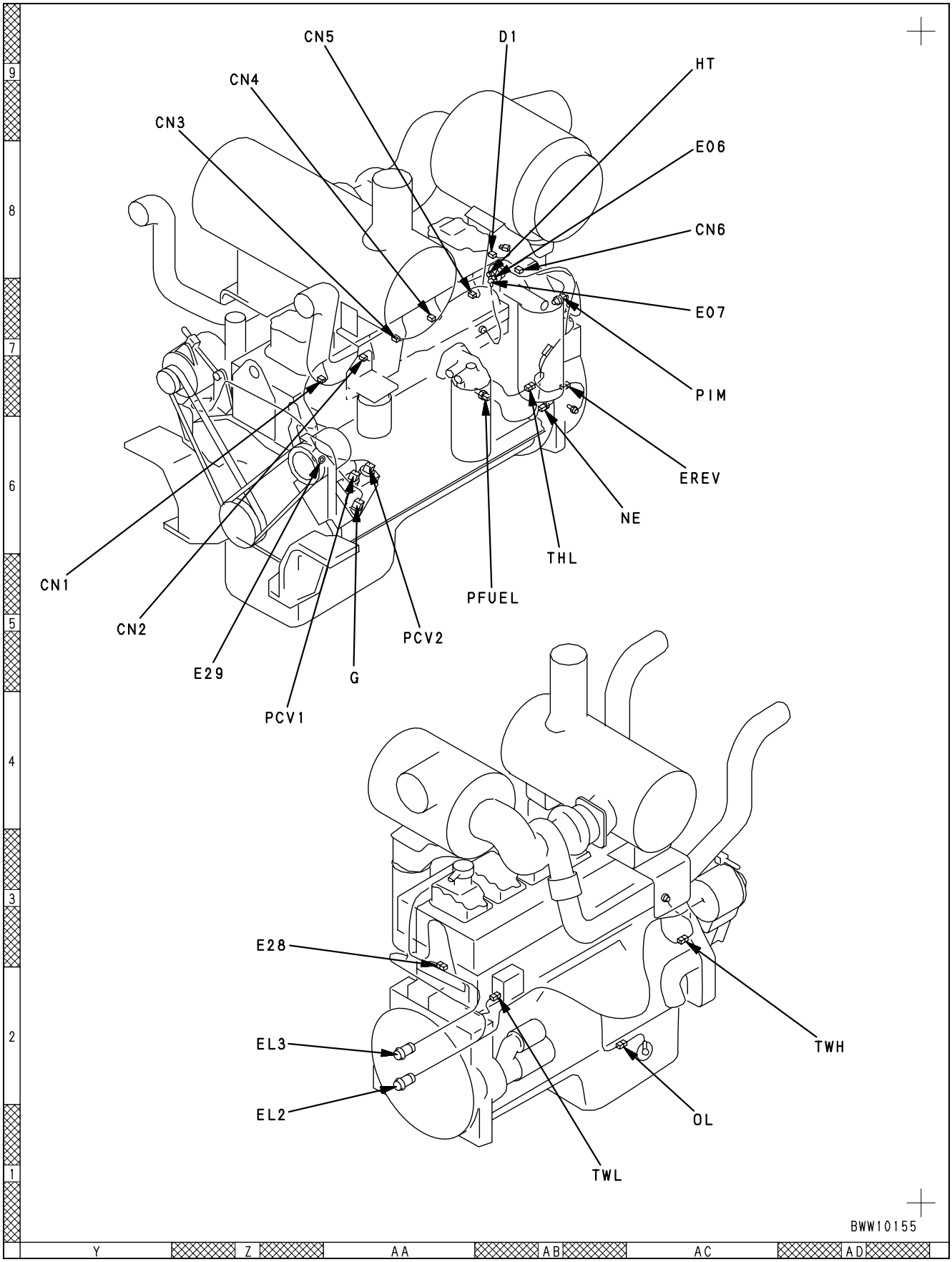
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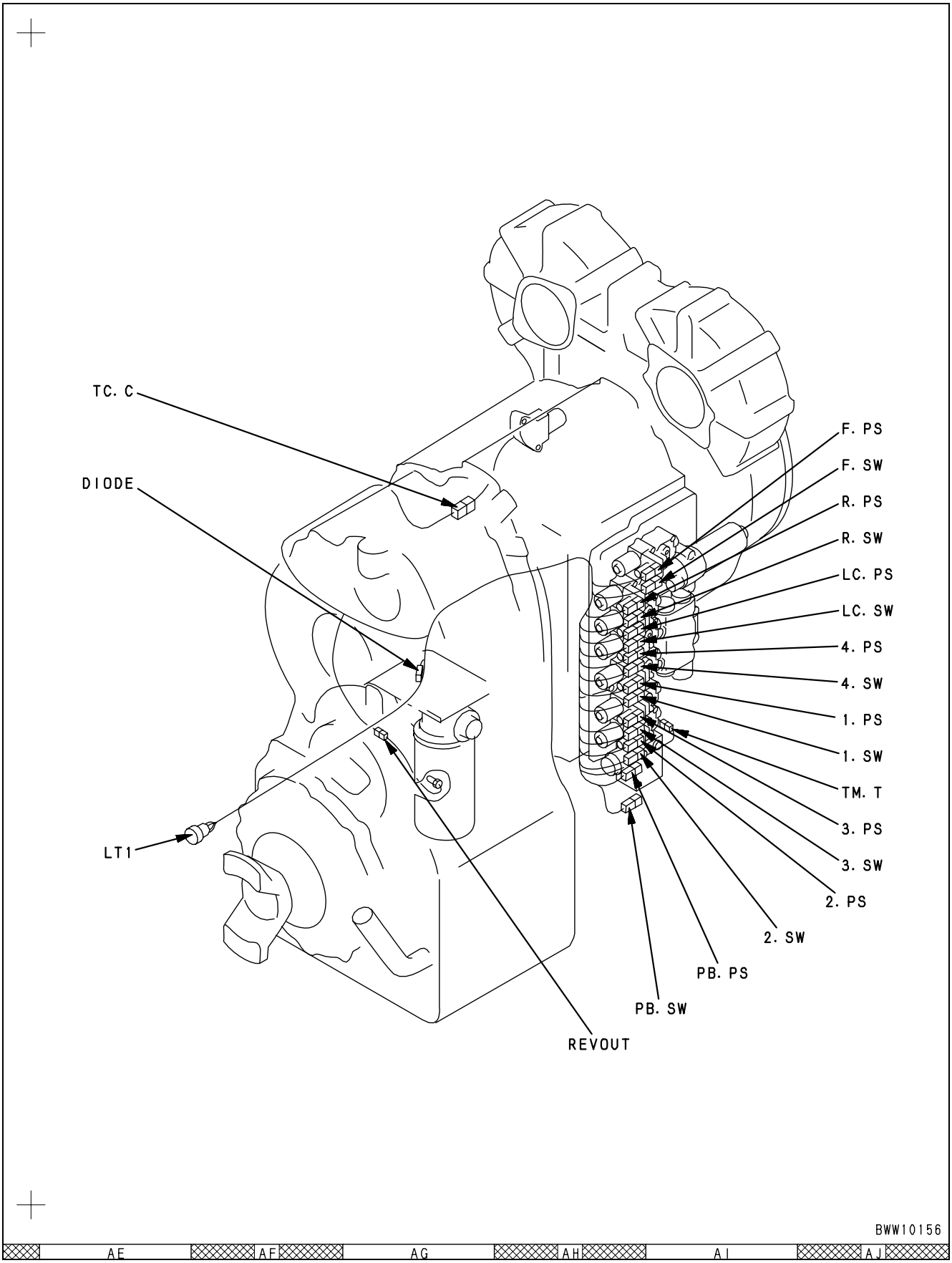
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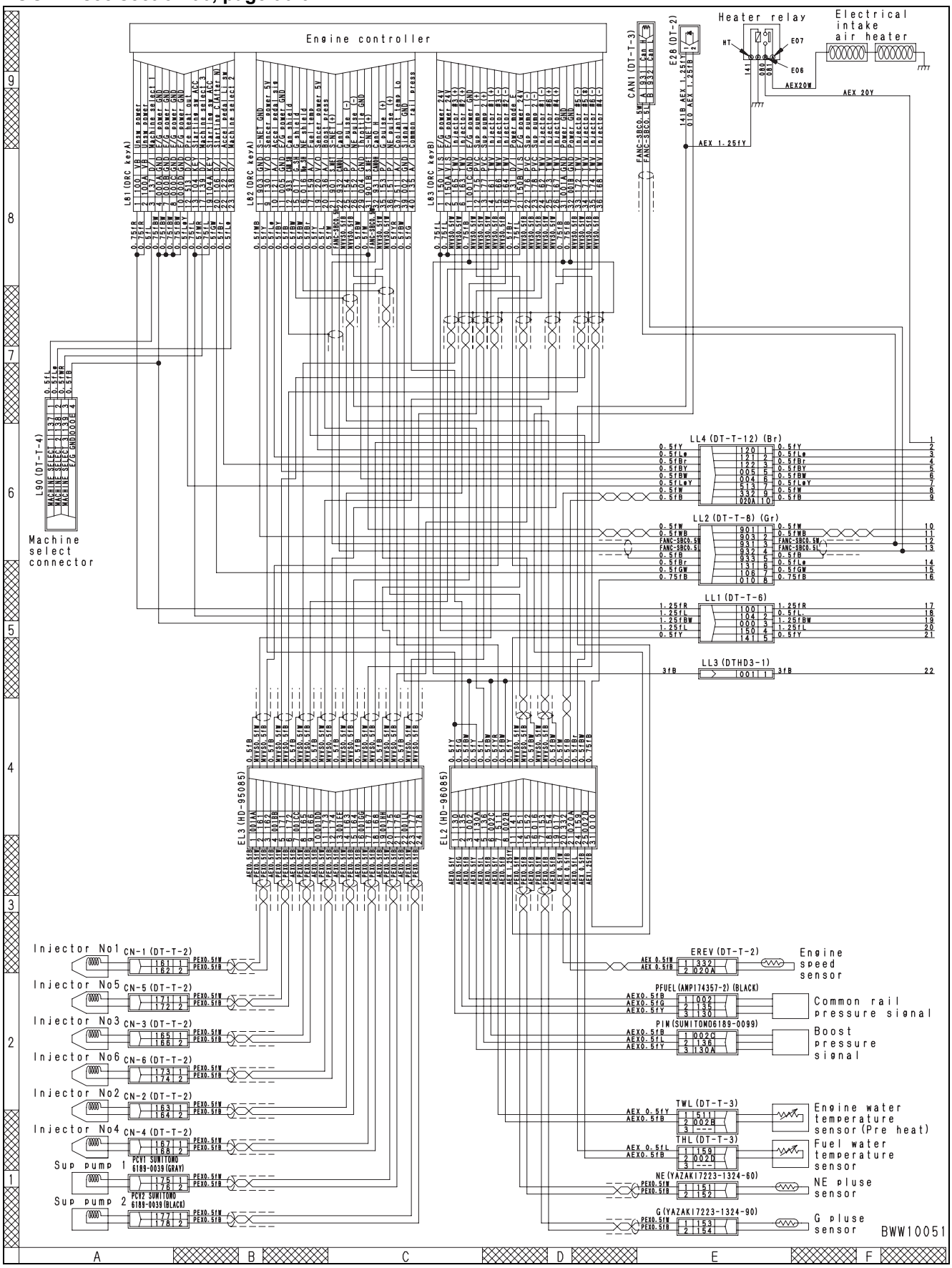
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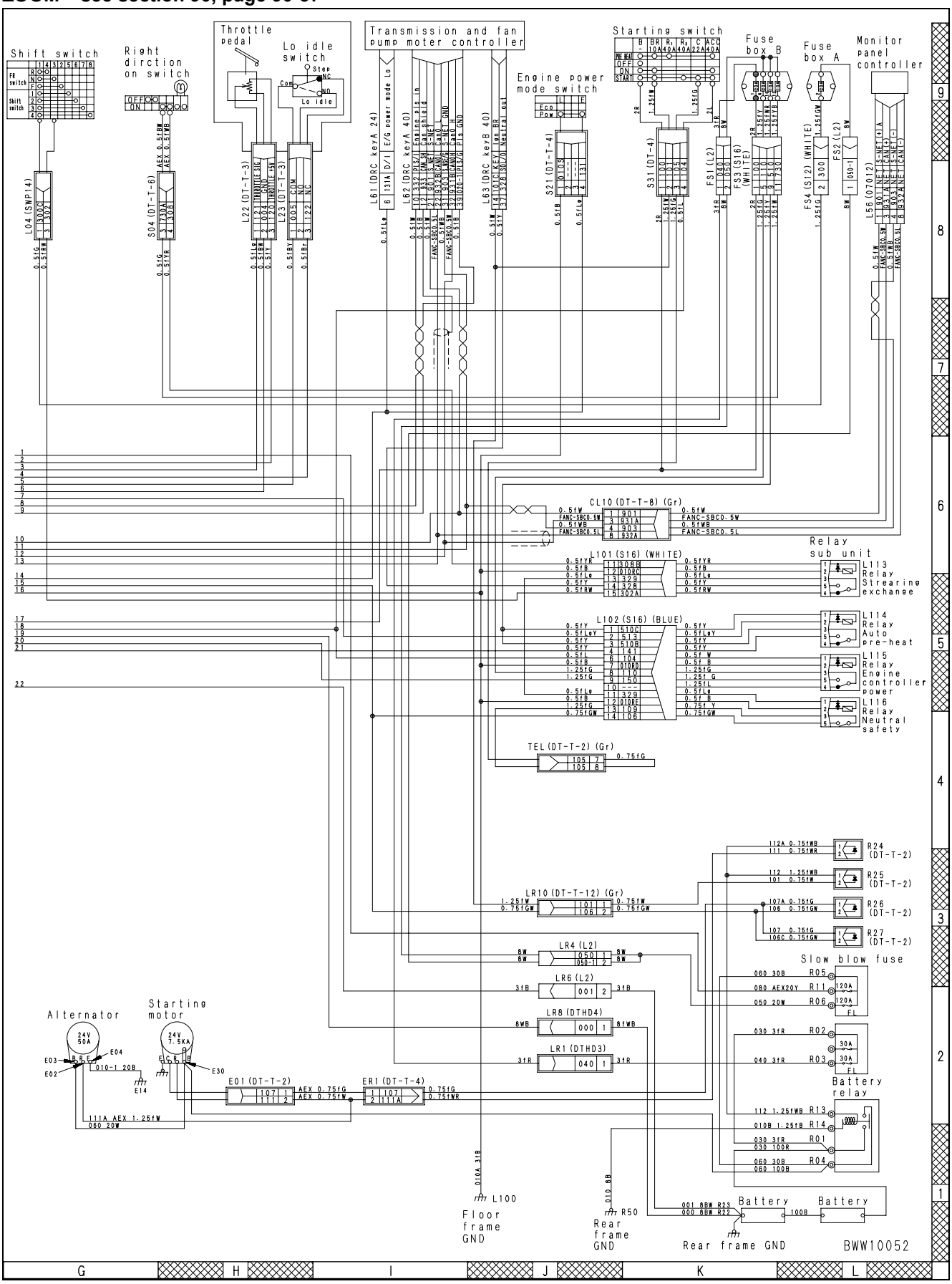
Engine control system diagram

ZOOM – see section 90, page 90-37



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ZOOM – see section 90, page 90-37



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Error code [A000N1]

Action Code	Error Code	Controller Code	Trouble	Engine overruns (N1)
E02	A000N1	ENG		
Description of Trouble	• Engine speed exceeded operating range.			
Controller Reaction	• Stops fuel injection until engine speed lowers to operating range.			
Effect on Machine	• Engine speed fluctuates abnormally.			
Related Information	• Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting	
Possible Causes and Standard Values	1	—	1) Turn starting switch ON. 2) Operate machine monitor.	
			Another code is displayed, too.	Perform troubleshooting for displayed code.
	2	Overrun of engine	When machine is so used that engine will overrun.	Remove cause and repair damaged parts of engine.
	3	Defective engine controller	1) Start engine. 2) Operate machine monitor.	
			Engine speed can be read normally.	Defective engine controller.
			Engine speed cannot be read normally.	Perform troubleshooting for error codes [DEL3LG] and [DEH1LC].

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Error code [AD00L2]

Action Code	Error Code	Controller Code	Trouble	Common rail is higher than maximum set value
E03	AD00L2	ENG		
Description of Trouble	• Common rail fuel pressure rose (Level 1).			
Controller Reaction	• Operates with limited output.			
Effect on Machine	• Engine output lowers.			
Related Information	• The common rail pressure can be checked with monitoring function (Code: 36400). • The converted torque can be checked with monitoring function (Code: 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting	
Possible Causes and Standard Values	1	Defect concerned to another error code	1) Turn starting switch ON. 2) Operate machine monitor.	
			Another code is displayed, too.	Perform troubleshooting for displayed code.
	2	Use of improper fuel	Proper fuel for atmospheric temperature is used.	Fuel use is proper.
			Proper fuel for atmospheric temperature is not used.	Fuel used is improper (replace).
	3	Defective mechanical system of common rail fuel pressure sensor, clogging of overflow piping, defective overflow valve, defective pressure limiter, defective electrical system of common rail fuel pressure sensor	1) Loosen overflow valve joint of fuel supply pump. 2) Operate priming pump.	
			Fuel leaks out.	Go to 5.
			Fuel does not leak out.	Go to 4.
	4	Defective overflow valve	1) Disassemble overflow valve of fuel supply pump. 2) Check inside of overflow valve.	
			Spring or seat is broken or ball is stuck.	Defective overflow valve.
			Spring and seat are normal and ball is not stuck.	Overflow valve is normal.
	5	Defective mechanical system of common rail fuel pressure sensor, clogging of overflow piping, defective pressure limiter, defective electrical system of common rail fuel pressure sensor	1) Perform this after performing 3. 2) Loosen joint of common rail pressure limiter. 3) Start engine.	
			Fuel leaks out.	Go to 6.
			Fuel does not leak out.	Go to 7.
	6	Defective pressure limiter, defective electrical system of common rail fuel pressure sensor	1) Perform this after performing 5. 2) Perform troubleshooting for error code [DH40KX].	
			There is trouble in electrical system.	Trouble in electrical system of common rail fuel pressure sensor.
			There is not trouble in electrical system.	Trouble in pressure limiter.
	7	Clogging of overflow piping	Overflow piping is clogged.	Clogging in overflow piping.
			Overflow piping is not clogged.	Trouble in mechanical system of common rail fuel pressure sensor.

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Error code [AD00MA]

Action Code	Error Code	Controller Code	Trouble	Function of common rail is defective
E03	AD00MA	ENG		
Description of Trouble	• Common rail fuel pressure rose (Level 2).			
Controller Reaction	• Operates with limited output and speed.			
Effect on Machine	• Engine output and speed lower.			
Related Information	• The common rail pressure can be checked with monitoring function (Code: 36400). • The converted torque can be checked with monitoring function (Code: 36400). • Engine speed can be checked with monitoring function (Code: 01004).			

Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting
	• Perform troubleshooting for error code [AD00L2].	

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Error code [AD10L3]

Action Code	Error Code	Controller Code	Trouble	Fuel supply pump cannot be controlled
E03	AD10L3	ENG		
Description of Trouble	• Fuel supply pump does not supply fuel (Level 1).			
Controller Reaction	• Operates with limited output.			
Effect on Machine	• Engine output and speed lower.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code: 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

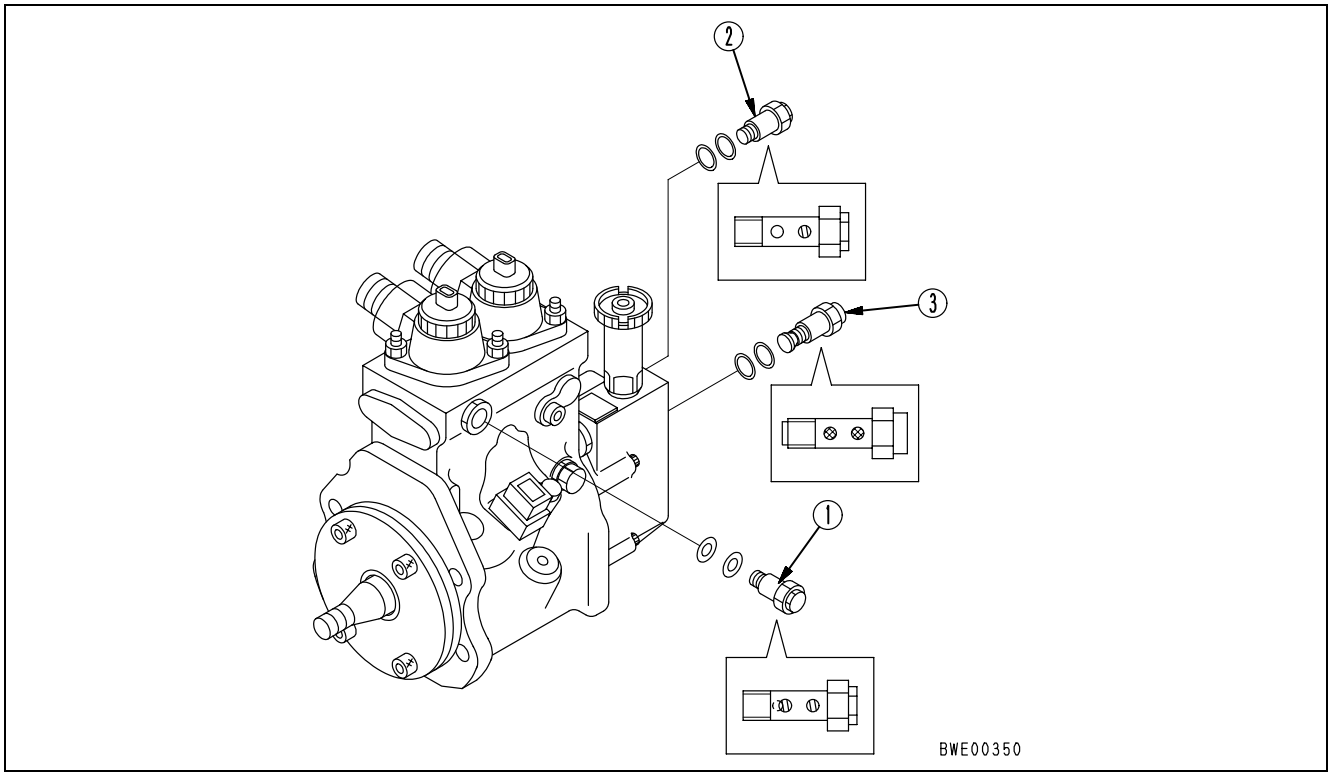
	Causes		Standard Value in Normal State and Remarks on Troubleshooting	
Possible Causes and Standard Values	1	—	1) Turn starting switch ON. 2) Operate machine monitor.	
			Another code is displayed, too	Perform troubleshooting for displayed code
	2	Use of improper fuel	Proper fuel for atmospheric temperature is used	Fuel use is proper
			Proper fuel for atmospheric temperature is not used	Fuel use is improper (replace)
	3	Fuel leakage from high-pressure circuit	Fuel does not leak from fuel injection pump, high-pressure primary piping, common, and high-pressure secondary piping	Normal (fuel does not leak)
			Fuel leaks from fuel injection pump, high-pressure primary piping, common, and high-pressure secondary piping	Abnormal (fuel leaks)
	4	Clogging of filter/strainer	Filter/Strainer is not clogged	Normal
			Filter/Strainer is clogged	Abnormal
			★ See Note 1.	
	5	Defective low-pressure circuit parts ★ See Note 2.	Pressure in low-pressure fuel circuit	0.15 ~ 0.3 MPa (1.5 ~ 3.0 kg/cm^2)
			★ See TESTING AND ADJUSTING (Measurement of fuel pressure).	
	6	Defective pressure limiter	1) Disconnect outlet piping of common rail pressure limiter. 2) Start engine.	
			Drainage of fuel	Max. 10 cc/min
	7	Defective fuel injector	1) Disconnect spill collector hose from injector. 2) Start engine.	
			When spill rate from injector is normal	★ See Note 3.
	8	Defective common rail fuel pressure sensor	1) Disconnect spill collector hose from injector. 2) Start engine.	
			When spill rate from injector is not normal	★ See Note 3.
	9	★ Defective fuel supply pump ★ Defective PCV electrical system of supply pump	Perform troubleshooting for error codes [AD11KA], [AD11KB], [AD15KA], [AD15KB].	
			There is trouble in electrical system	Defective PCV electrical system of supply pump
			There is not trouble in electrical system	Defective fuel supply pump

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Note 1: Check, clean, and replace the filters and strainers according to the following procedure.
1) Gauze filter
   Disassemble and check the filter.
   If it is clogged, clean.
2) Upstream strainer of gauze filter
   If the gauze filter is clogged, clean the upstream strainer, too.
3) Fuel filter
   If the trouble is not solved by performing 1) and 2) above, replace the fuel filter.

Note 2: Check the low-pressure circuit parts for the following items.
1) Remaining fuel
2) Sticking and wear of feed pump
2) Sticking and wear of feed pump
3) Leakage and clogging of low-pressure fuel piping
4) Defective operation of bypass valve or installation of wrong parts to bypass valve (See Fig. 1)
5) Oil pan oil mixed with fuel
   (fuel leakage in head cover)

Fig. 1 Locations of overflow valve **1** bypass valve **2**, and fuel inlet joint (gauze filter) **3**
- Overfolw valve **1** : Spring is seen through one hole (on nut side).
- Bypass valve **2** : Spring is seen through both holes.
- Fuel inlet joint **3** : Gauze filter is seen through both holes.



Note 3: Method of measuring fuel spill rate

WARNING! Since the spilling fuel is hot (max. 90°C), take care.

1) Disconnect the hose from the collection part of the return spill tube (at the rear of the engine.
2) Connect a hose to the spill tube end to receive the spilling fuel.
3) Start the engine and stall at each speed and measure the quantity of the fuel spilling in 1 minute.

Limit of fuel spill rate
(Total of quantity spilling from 6 cylinders)

Stall Speed (rpm)	Limit of Spill Rate (cc/min)
1,600	960
1,700	1,020
1,800	1,080
1,900	1,140
2,000	1,200

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Error code [AD10MA]

Action Code	Error Code	Controller Code	Trouble	Function of fuel supply pump is defective
E03	AD10MA	ENG		
Description of Trouble	• Common rail fuel pressure is abnormal.			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Engine output lowers.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The common rail pressure can be checked with monitoring function (Code: 36400). • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting
	• Perform troubleshooting for error code [AD00L3].	

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Error code [AD10MB]

Action Code	Error Code	Controller Code	Trouble	Function of fuel supply pump is lowered
E03	AD10MB	ENG		
Description of Trouble	• Fuel supply pump does not supply fuel (Level 2).			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Engine output and speed lower.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting
	• Perform troubleshooting for error code [AD10L3].	

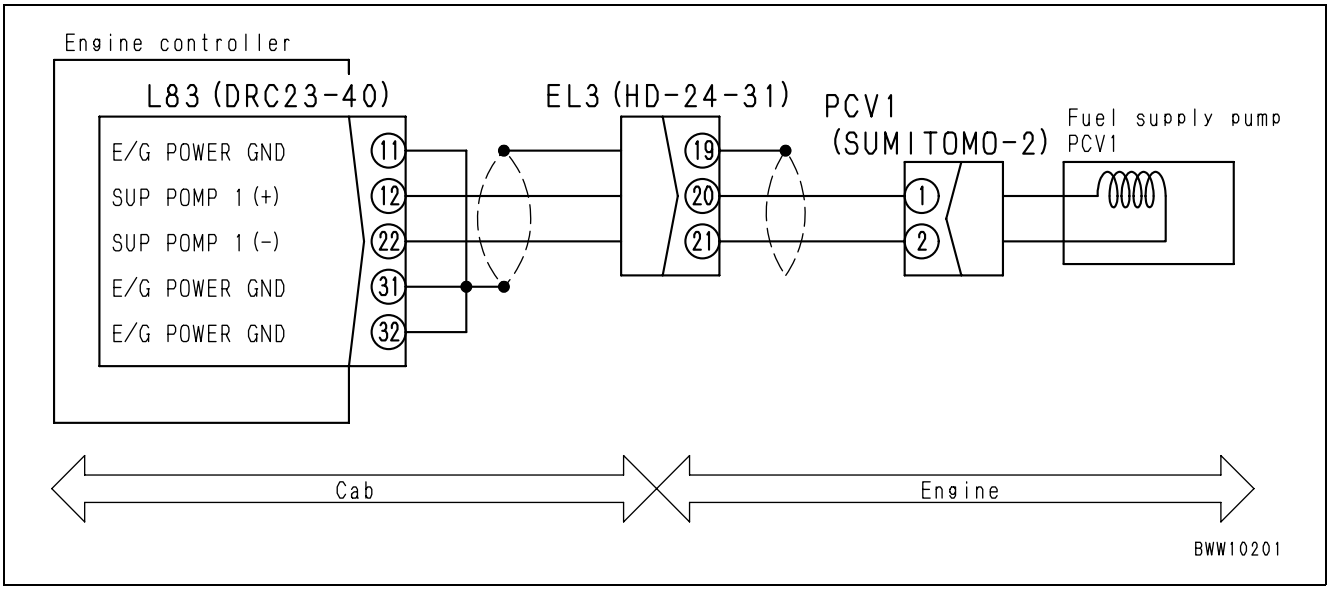
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Error code [AD11KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in fuel supply pump PVC1 system
E03	AD11KA	ENG		
Description of Trouble	• Fuel supply pump PCV1 system is disconnected.			
Controller Reaction	• Turns OFF output to fuel supply pump PCV1.			
Effect on Machine	• Machine is not affected particularly. (If error code [AD51KA] is displayed simultaneously, however, engine stops.)			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fuel supply pump PCV1	1) Turn starting switch OFF. 2) Disconnect connector PCV1. 3) Connect T-adapter.		
			Between PCV1 (male) (1) ~ (2)	Resistance	2.3 ~ 5.3 Ω
	2	Disconnection in wiring harness (disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV1. 3) Connect T-adapter.		
			Between L83 (female) (12) ~ PCV1 (female) (1)	Resistance	Max. 1 Ω
			Between L83 (female) (22) ~ PCV1 (female) (2)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV1. 3) Connect T-adapter.		
			Between L83 (female) (22) ~ PCV1 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV1. 3) Connect T-adapter.		
			Between L83 (female) (12) ~ (22)	Resistance	2.3 ~ 5.3 Ω

Related circuit diagram



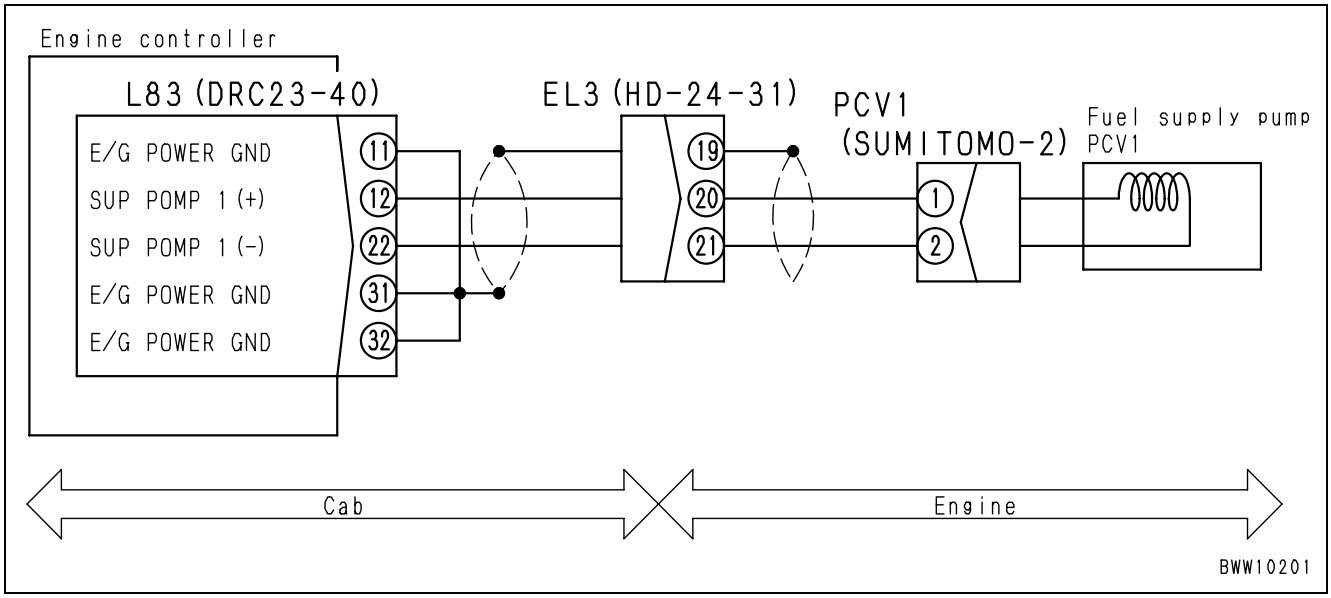
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Error code [AD11KB]

Action Code	Error Code	Controller Code	Trouble	Short circuit in fuel supply pump PCV1 system.
E03	AD11KB	ENG		
Description of Trouble	• Overcurrent flowed in fuel supply pump PCV1 system.			
Controller Reaction	• Turns OFF output to fuel supply pump PCV1.			
Effect on Machine	• Machine is not affected particularly. (If error code [AD51KB] is displayed simultaneously, however, engine stops.)			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fuel supply pump PCV1	1) Turn starting switch OFF. 2) Disconnect connector PCV1. 3) Connect T-adapter.		
			Between PCV1 (male) (1) ~ (2)	Resistance	2.3 ~ 5.3 Ω
	2	Short circuit with chassis ground or short circuit in wiring harness	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV1. 3) Connect T-adapter.		
			Between L83 (female) (12), PCV1 (female) (1) ~ chassis ground	Resistance	Min. 1 MΩ
			Between L83 (female) (12) ~ (22)	Resistance	Min. 1 MΩ
	3	Short circuit with power source in wiring harness	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV1. 3) Connect T-adapter.		
			Between L83 (female) (12), PCV1 (female) (1) ~ chassis ground	Voltage	Max. 1 V
			Between L83 (female) (22), PCV1 (female) (2) ~ chassis ground	Voltage	Max. 1 V
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector PCV1. 3) Connect T-adapter.		
			Between L83 (female) (12) ~ (22)	Resistance	2.3 ~ 5.3 Ω

Related circuit diagram



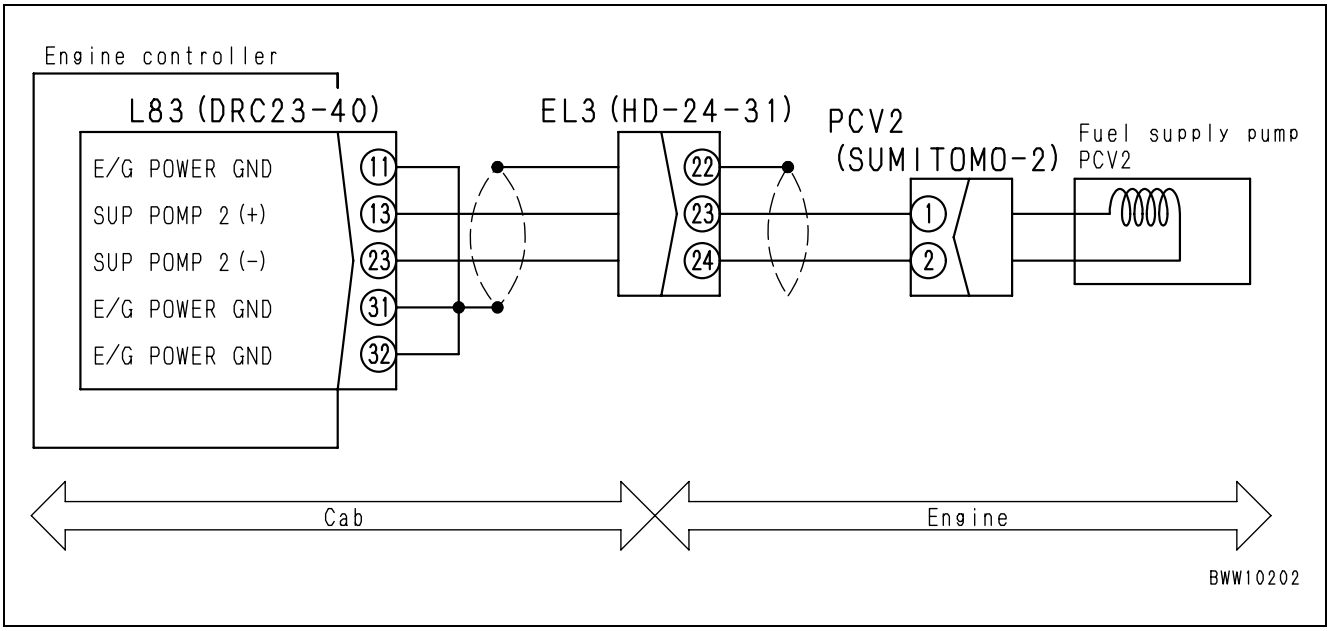
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Error code [AD51KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in fuel supply pump PCV2 system
E03	AD51KA	ENG		
Description of Trouble	• Fuel supply pump PCV2 system is disconnected.			
Controller Reaction	• Turns OFF output to fuel supply pump PCV2.			
Effect on Machine	• Machine is not affected particularly. (If error code [AD11KA] is displayed simultaneously, however, engine stops.)			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fuel supply pump PCV2	1) Turn starting switch OFF. 2) Disconnect connector PCV2. 3) Connect T-adapter.		
			Between PCV2 (male) (1) ~ (2)	Resistance	2.3 ~ 5.3 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV2. 3) Connect T-adapter.		
			Between L83 (female) (13) ~ PCV2 (female) (1)	Resistance	Max. 1 Ω
			Between L83 (female) (23) ~ PCV2 (female) (2)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV2. 3) Connect T-adapter.		
			Between L83 (female) (23), PCV2 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector PCV2. 3) Connect T-adapter.		
			Between L83 (female) (13) ~ (23)	Resistance	2.3 ~ 5.3 Ω

Related circuit diagram



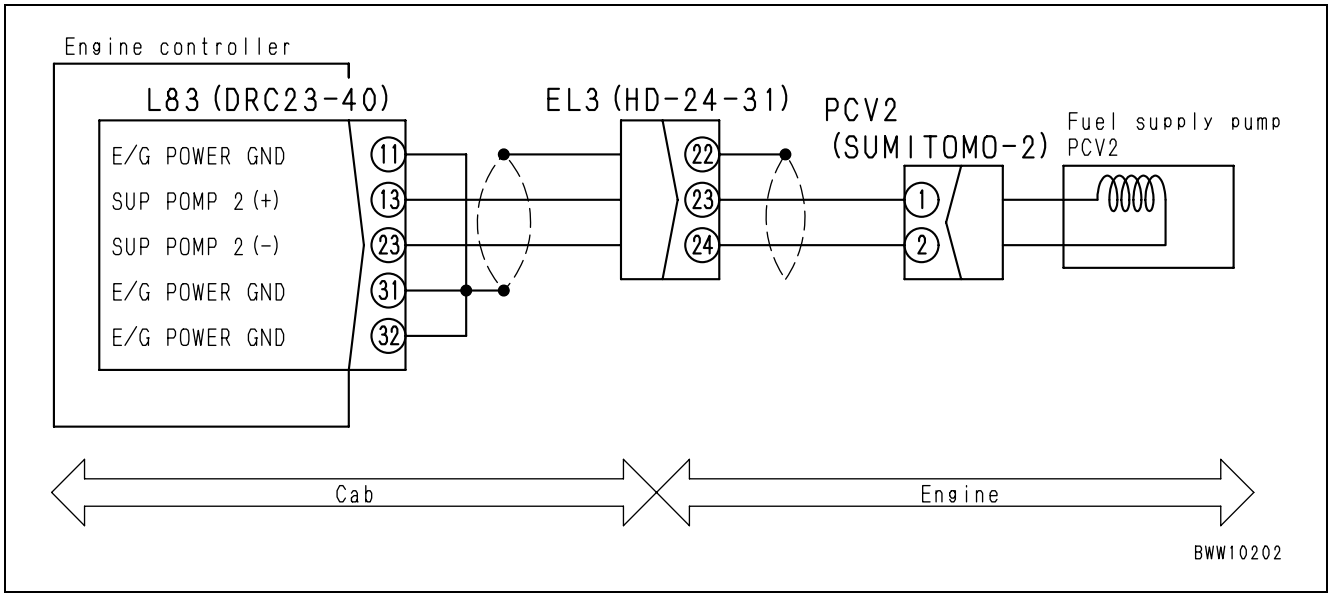
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Error code [AD51KB]

Action Code	Error Code	Controller Code	Trouble	Short circuit in fuel supply pump PVC2 system
E03	AD51KB	ENG		
Description of Trouble	• Overcurrent flowed in fuel supply pump PCV2 system.			
Controller Reaction	• Turns OFF output to fuel supply pump PCV2.			
Effect on Machine	• Machine is not affected particularly. (If error code [AD11KB] is displayed simultaneously, however, engine stops.)			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fuel supply pump PCV2	1) Turn starting switch OFF. 2) Disconnect connector PCV2. 3) Connect T-adapter.		
			Between PCV2 (male) (1) ~ (2)	Resistance	2.3 ~ 5.3 Ω
	2	Short circuit with chassis ground or short circuit in wiring harness	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV2. 3) Connect T-adapter.		
			Between L83 (female) (13), PCV2 (female) (1) ~ chassis ground	Resistance	Min. 1 MΩ
			Between L83 (female) (13) ~ (22)	Resistance	Min. 1 MΩ
	3	Short circuit with power source in wiring harness	1) Turn starting switch OFF. 2) Disconnect connector L83 and PCV2. 3) Connect T-adapter.		
			Between L83 (female) (13), PCV2 (female) (1) ~ chassis ground	Voltage	Max. 1 V
			Between L83 (female) (22), PCV2 (female) (2) ~ chassis ground	Voltage	Max. 1 V
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector PCV2. 3) Connect T-adapter.		
			Between L83 (female) (13) ~ (23)	Resistance	2.3 ~ 5.3 Ω

Related circuit diagram



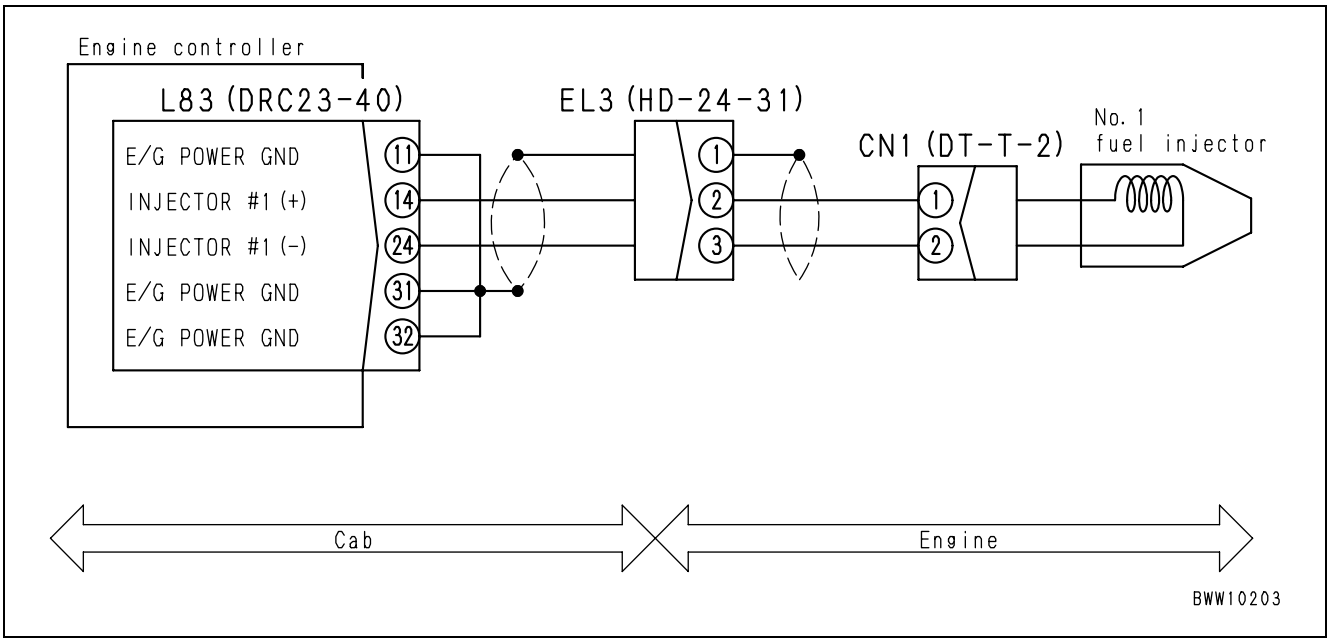
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Error code [ADA1KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in No. 1 injector solenoid valve system
E03	ADA1KA	ENG		
Description of Trouble	• No. 1 injector solenoid valve system is disconnected.			
Controller Reaction	• Turns OFF output to No. 1 injector solenoid valve.			
Effect on Machine	• Engine output lowers.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective No. 1 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN1. 3) Connect T-adapter.		
			Between CN1 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L83 and CN1. 3) Connect T-adapter.		
			Between L83 (female) (14) ~ CN1 (female) (2)	Resistance	Max. 1 MΩ
			Between L83 (female) (24) ~ CN1 (female) (2)	Resistance	Max. 1 MΩ
	3	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.		
			Between L83 (female) (14) ~ (24)	Resistance	0.4 ~ 1.1 Ω

Related circuit diagram



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Error code [ADAZKB]

Action Code	Error Code	Controller Code	Trouble	Short circuit in No. 1, 2, 3 injector solenoid valve system
E03	ADAZKB	ENG		
Description of Trouble	• Overcurrent flowed in No. 1, 2, or 3 injector solenoid valve.			
Controller Reaction	• Turns OFF output to No. 1, 2, or 3 injector solenoid valve.			
Effect on Machine	• Engine output lowers largely.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

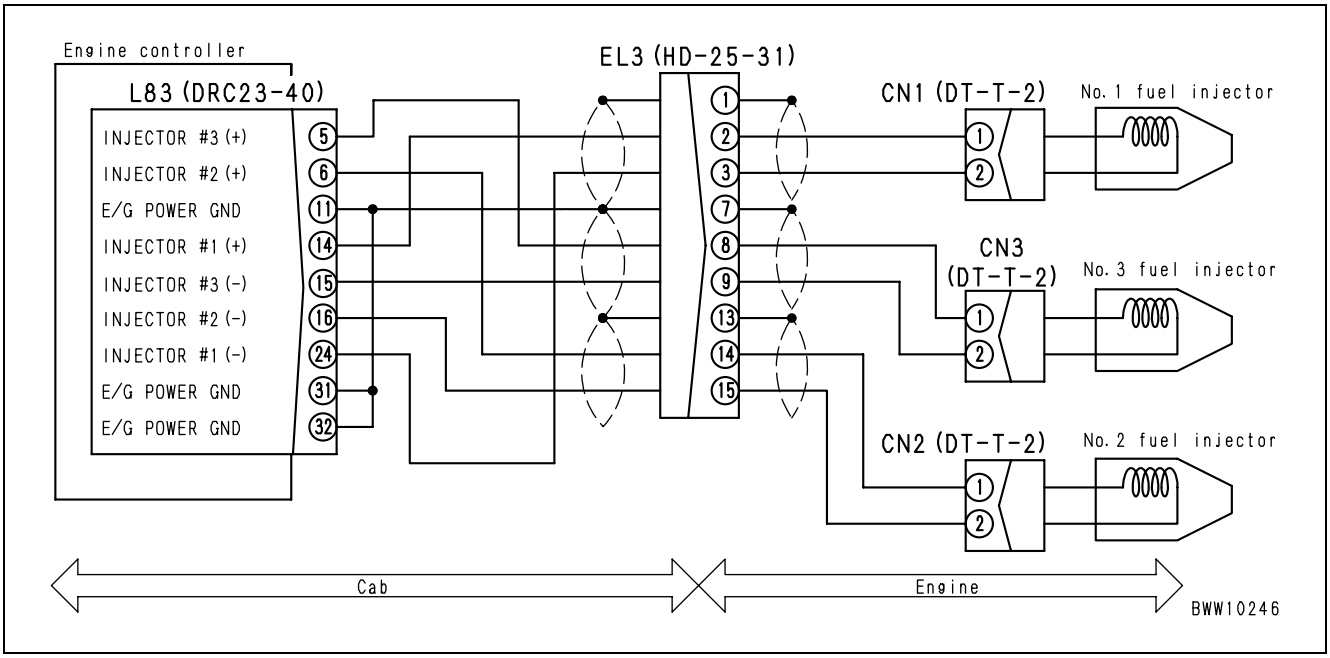
	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective No. 1, 2, or 3 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN1, CN2, or CN3. 3) Connect T-adapter.			
			No. 1	Between CN1 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
			No. 2	Between CN2 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
			No. 3	Between CN3 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Short circuit with chassis ground or short circuit in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN1, CN2, or CN3. 3) Connect T-adapter.			
			No. 1	Between L83 (female) (14), CN1 (female) (1) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (24), CN1 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (14) ~ (24)	Resistance	Min. 1 MΩ
			No. 2	Between L83 (female) (6), CN2 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (16), CN2 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (6) ~ (16)	Resistance	Min. 1 MΩ
			No. 3	Between L83 (female) (5), CN3 (female) (1) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (15), CN3 (female) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (5) ~ (15)	Resistance	Min. 1 MΩ
	3	Short circuit with power source in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN1, CN2, or CN3. **WARNING!** Since high voltage (110 - 150 V) is applied to the electrical circuit of the fuel injector, disconnect L83 on the controller side first. 3) Connect T-adapter. 4) Turn starting switch ON.			
			No.1	Between L83 (female) (14), CN1 (female) (1) ~ chassis ground	Voltage	Max. 1 V
				Between L83 (female) (24), CN1 (female) (2) ~ chassis ground	Voltage	Max. 1 V
			No. 2	Between L83 (female) (6), CN2 (female) (1) ~ chassis ground	Voltage	Max. 1 V
				Between L83 (female) (16), CN2 (female) (2) ~ chassis ground	Voltage	Max. 1 V
			No. 3	Between L83 (female) (5), CN3 (female) (1) ~ chassis ground	Voltage	Max. 1 V
				Between L83 (female) (15), CN3 (female) (2) ~ chassis ground	Voltage	Max. 1 V
⚠	**WARNING!** Since high voltage (110 ~ 150 V) is applied to the electrical circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, handling of high-voltage circuit of engine controller.					

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Action Code	Error Code	Controller Code	Trouble	Short circuit in No. 1, 2, 3 injector solenoid valve system
E03	ADAZKB	ENG		

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.			
			No. 1	Between L83 (female) (14) ~ (24)	Resistance	0.4 ~ 1.1 Ω
			No. 2	Between L83 (female) (6) ~ (16)	Resistance	0.4 ~ 1.1 Ω
			No. 3	Between L83 (female) (5) ~ (16)	Resistance	0.4 ~ 1.1 Ω
⚠	**WARNING!** Since high voltage (110 ~ 150 V) is applied to the electrical circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, handling of high-voltage circuit of engine controller.					

Related circuit diagram



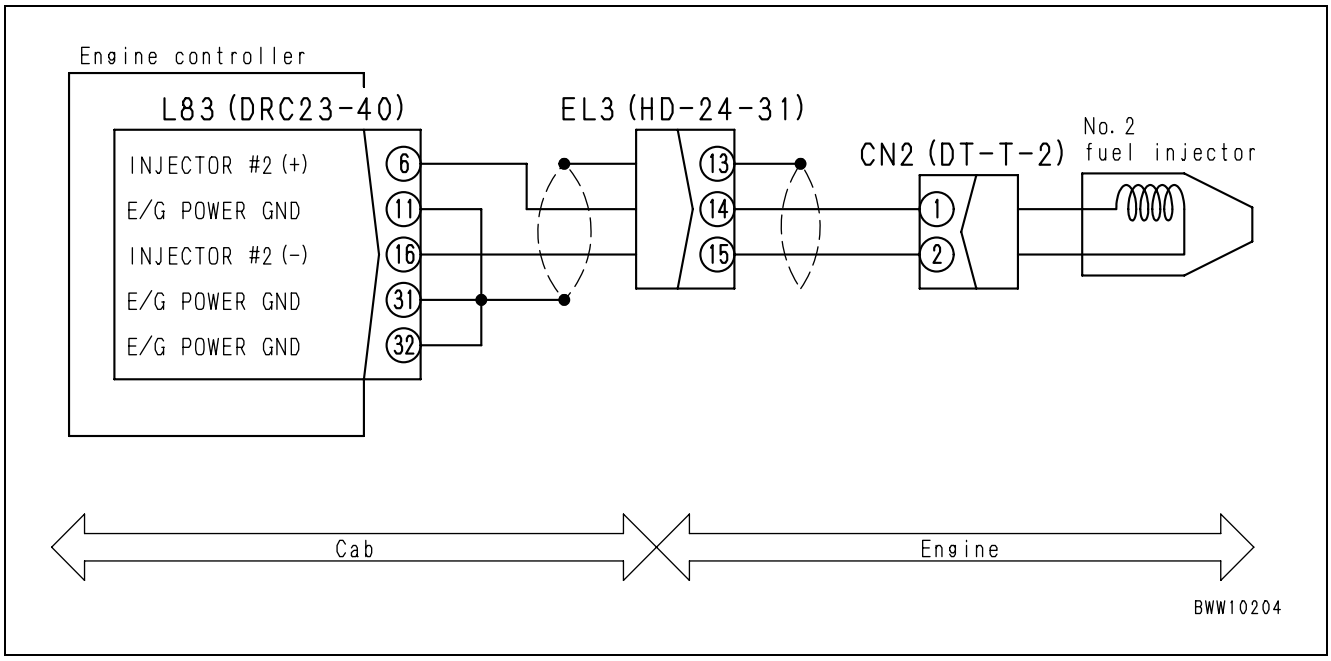
https://truckmanualshub.com/

Error code [ADB1KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in No. 2 injector solenoid valve system
E03	ADB1KA	ENG		
Description of Trouble	• No. 2 injector solenoid valve system is disconnected.			
Controller Reaction	• Turns OFF output to No. 2 injector solenoid valve.			
Effect on Machine	• Engine output lowers.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective No. 2 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN2. 3) Connect T-adapter.		
			Between CN2 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN2. 3) Connect T-adapter.		
			Between L83 (female) (6) ~ CN2 (female) (1)	Resistance	Max. 1 Ω
			Between L83 (female) (16) ~ CN2 (female) (2)	Resistance	Max. 1 Ω
	3	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.		
			Between L83 (female) (6) ~ (16)	Resistance	0.4 ~ 1.1 Ω

Related circuit diagram



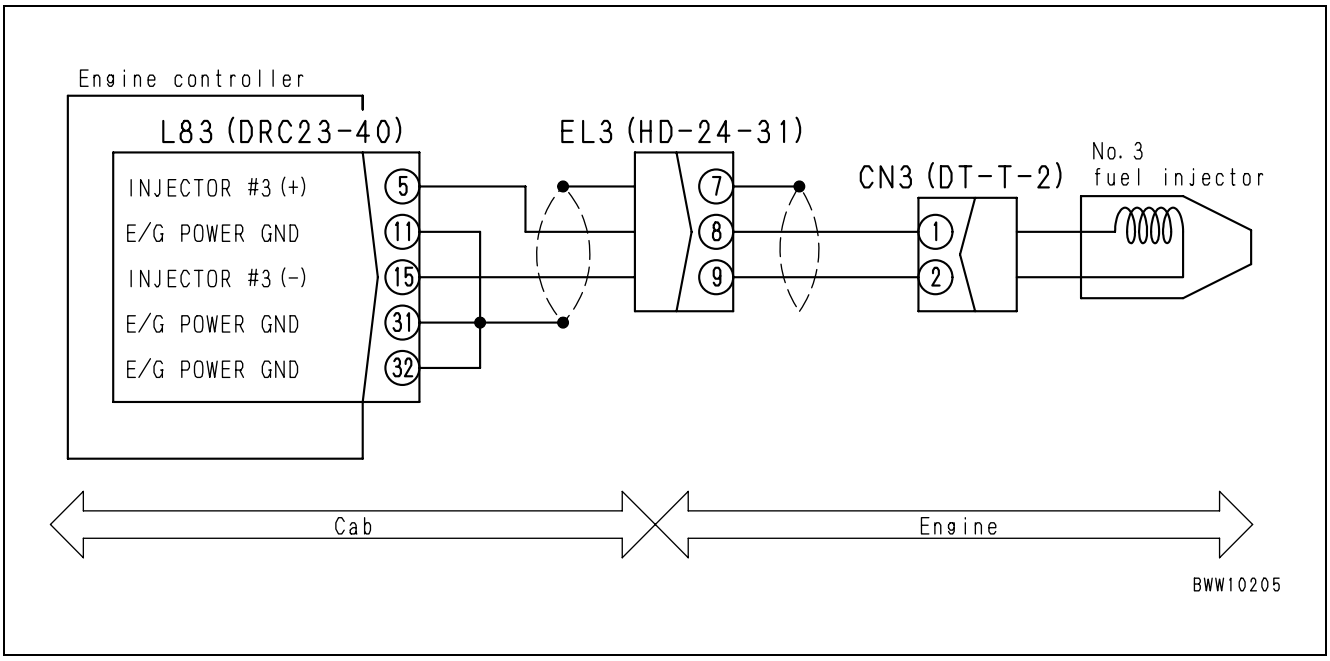
https://truckmanualshub.com/

Error code [ADC1KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in No. 3 injector solenoid valve system
E03	ADC1KA	ENG		
Description of Trouble	• No. 3 injector solenoid valve system is disconnected.			
Controller Reaction	• Turns OFF output to No. 3 injector solenoid valve.			
Effect on Machine	• Engine output lowers.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective No. 3 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN3. 3) Connect T-adapter.		
			Between CN3 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN3. 3) Connect T-adapter.		
			Between L83 (female) (5) ~ CN3 (female) (1)	Resistance	Max. 1 Ω
			Between L83 (female) (15) ~ CN3 (female) (2)	Resistance	Max. 1 Ω
	3	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.		
			Between L83 (female) (5) ~ (15)	Resistance	0.4 ~ 1.1 Ω

Related circuit diagram



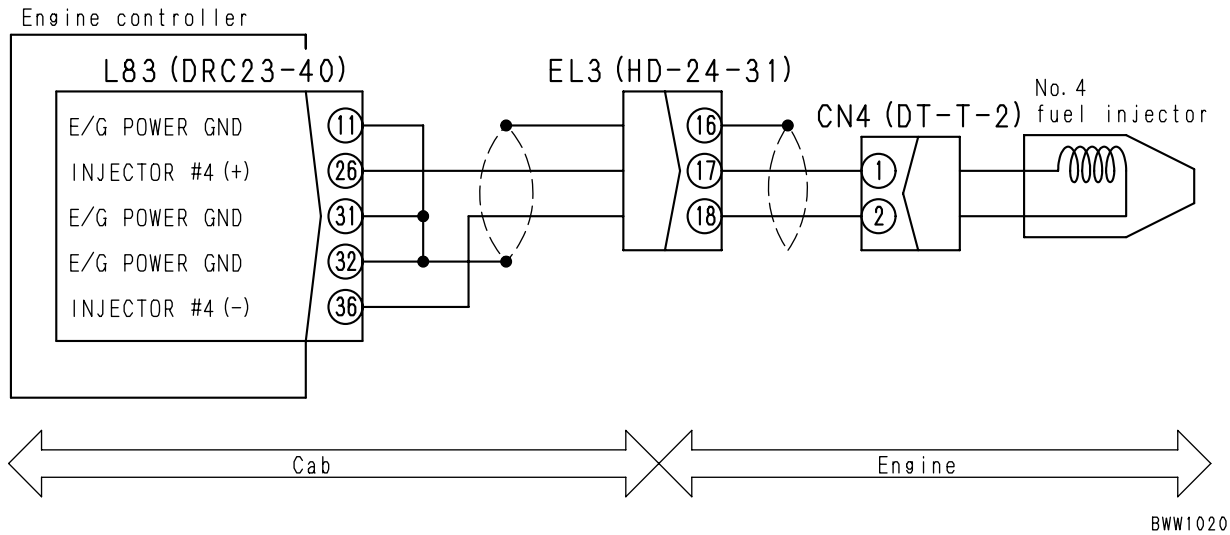
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Error code [ADD1KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in No. 4 injector solenoid valve system
E03	ADD1KA	ENG		
Description of Trouble	• No. 4 injector solenoid valve system is disconnected.			
Controller Reaction	• Turns OFF output to No. 4 injector solenoid valve.			
Effect on Machine	• Engine output lowers.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective No. 4 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN4. 3) Connect T-adapter.		
			Between CN4 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN4. 3) Connect T-adapter.		
			Between L83 (female) (26) ~ CN4 (female) (1)	Resistance	Max. 1 Ω
			Between L83 (female) (36) ~ CN4 (female) (2)	Resistance	Max. 1 Ω
	3	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.		
			Between L83 (female) (26) ~ (36)	Resistance	0.4 ~ 1.1 Ω

Related circuit diagram



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Error code [ADDZKB]

Action Code	Error Code	Controller Code	Trouble	Short circuit in No. 4, 5, 6 injector solenoid valve system
E03	ADDZKB	ENG		
Description of Trouble	• Overcurrent flowed in No. 4, 5, or 6 injector solenoid valve.			
Controller Reaction	• Turns OFF output to No. 4, 5, or 6 injector solenoid valve.			
Effect on Machine	• Engine output lowers largely.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

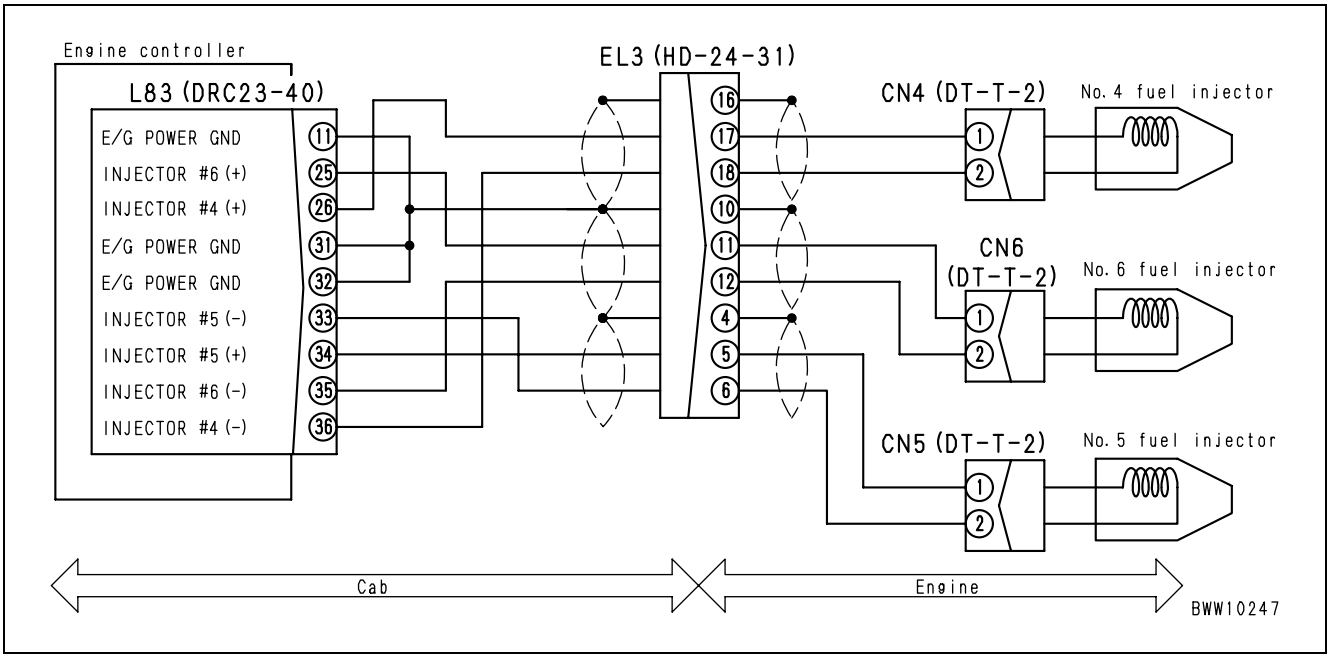
	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective No. 4, 5, or 6 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN4, CN5, or CN6. 3) Connect T-adapter.			
			No. 4	Between CN4 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
			No. 5	Between CN5 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
			No. 6	Between CN6 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Short circuit with chassis ground or short circuit in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN4, CN5, or CN6. 3) Connect T-adapter.			
			No. 4	Between L83 (female) (26), CN4 (female) (1) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (36), CN4 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (26) ~ (36)	Resistance	Min. 1 MΩ
			No. 5	Between L83 (female) (34), CN5 (female) (1) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (33), CN5 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (34), (33)	Resistance	Min. 1 MΩ
			No. 6	Between L83 (female) (25), CN6 (female) (1) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (35), CN6 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L83 (female) (25) ~ (35)	Resistance	Min. 1 MΩ
	3	Short circuit with power source in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN4, CN5, or CN6. **WARNING!** Since high voltage (110 - 150 V) is applied to the electrical circuit of the fuel injector, disconnect L83 on the controller side first. 3) Connect T-adapter. 4) Turn starting switch ON.			
			No.4	Between L83 (female) (26), CN4 (female) (1) ~ chassis ground	Voltage	Max. 1 V
				Between L83 (female) (36), CN4 (female) (2) ~ chassis ground	Voltage	Max. 1 V
			No. 5	Between L83 (female) (34), CN5 (female) (1) ~ chassis ground	Voltage	Max. 1 V
				Between L83 (female) (33), CN5 (female) (2) ~ chassis ground	Voltage	Max. 1 V
			No. 6	Between L83 (female) (25), CN6 (female) (2) ~ chassis ground	Voltage	Max. 1 V
				Between L83 (female) (35), CN6 (female) (2) ~ chassis ground	Voltage	Max. 1 V
⚠	**WARNING!** Since high voltage (110 - 150 V) is applied to the electrical circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, handling of high-voltage circuit of engine controller.					

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Action Code	Error Code	Controller Code	Trouble	Short circuit in No. 4, 5, 6 injector solenoid valve system
E03	ADDZKB	ENG		

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.			
			No. 4	Between L83 (female) (26) ~ (36)	Resistance	0.4 ~ 1.1 Ω
			No. 5	Between L83 (female) (34) ~ (33)	Resistance	0.4 ~ 1.1 Ω
			No. 6	Between L83 (female) (25) ~ (35)	Resistance	0.4 ~ 1.1 Ω
	WARNING! Since high voltage (110 - 150 V) is applied to the electrical circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, handling of high-voltage circuit of engine controller.					

Related circuit diagram



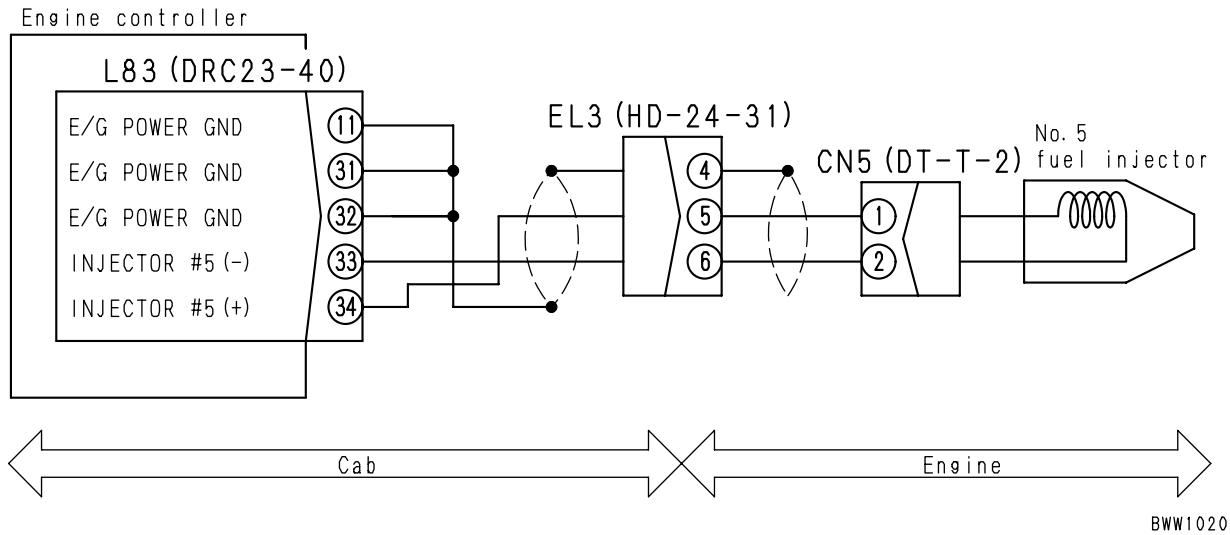
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Error code [ADE1KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in No. 5 injector solenoid valve system
E03	ADE1KA	ENG		
Description of Trouble	• No. 5 injector solenoid valve system is disconnected.			
Controller Reaction	• Turns OFF output to No. 5 injector solenoid valve.			
Effect on Machine	• Engine output lowers.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective No. 5 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN5. 3) Connect T-adapter.		
			Between CN5 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN4. 3) Connect T-adapter.		
			Between L83 (female) (34) ~ CN5 (female) (1)	Resistance	Max. 1 Ω
			Between L83 (female) (33) ~ CN5 (female) (2)	Resistance	Max. 1 Ω
	3	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.		
			Between L83 (female) (34) ~ (33)	Resistance	0.4 ~ 1.1 Ω

Related circuit diagram



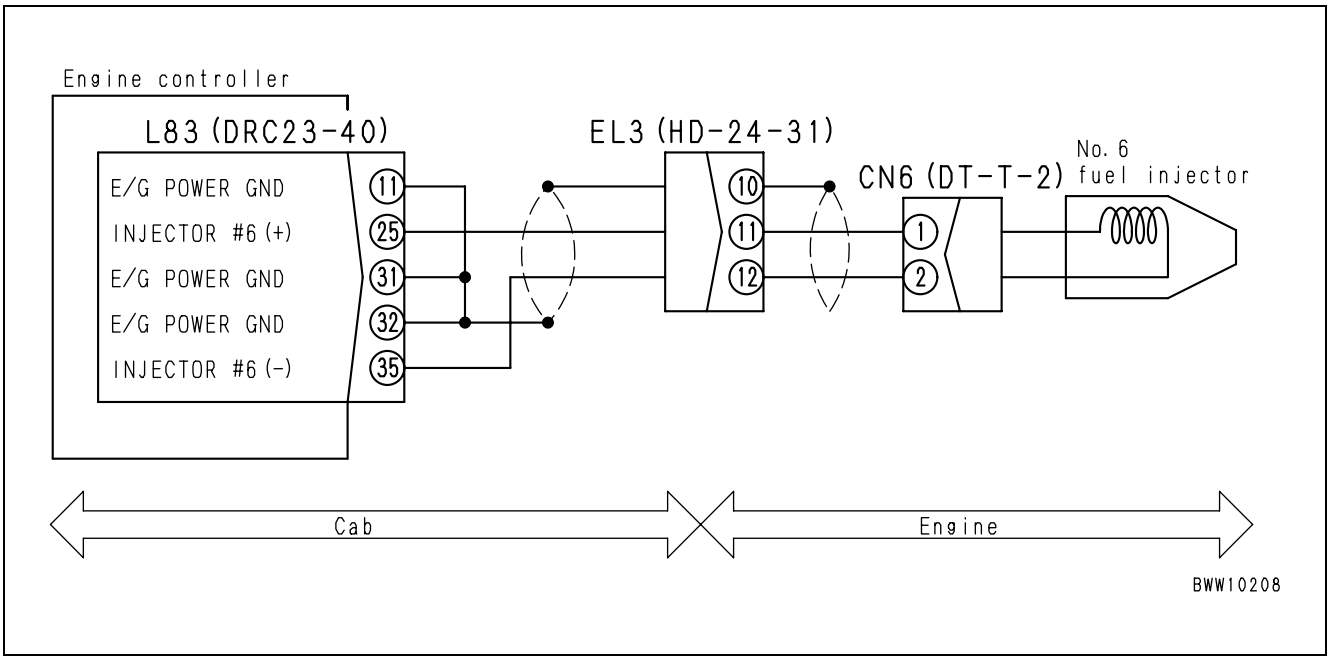
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Error code [ADF1KA]

Action Code	Error Code	Controller Code	Trouble	Disconnection in No. 6 injector solenoid valve system
E03	ADF1KA	ENG		
Description of Trouble	• No. 6 injector solenoid valve system is disconnected.			
Controller Reaction	• Turns OFF output to No. 6 injector solenoid valve.			
Effect on Machine	• Engine output lowers.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING. • The converted torque can be checked with monitoring function (Code 36700). • Engine speed can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective No. 6 injector solenoid valve	1) Turn starting switch OFF. 2) Disconnect connector CN6. 3) Connect T-adapter.		
			Between CN6 (male) (1) ~ (2)	Resistance	0.4 ~ 1.1 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L83 and CN6. 3) Connect T-adapter.		
			Between L83 (female) (25) ~ CN6 (female) (1)	Resistance	Max. 1 Ω
			Between L83 (female) (35) ~ CN6 (female) (2)	Resistance	Max. 1 Ω
	3	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L83. 3) Connect T-adapter.		
			Between L83 (female) (25) ~ (35)	Resistance	0.4 ~ 1.1 Ω

Related circuit diagram



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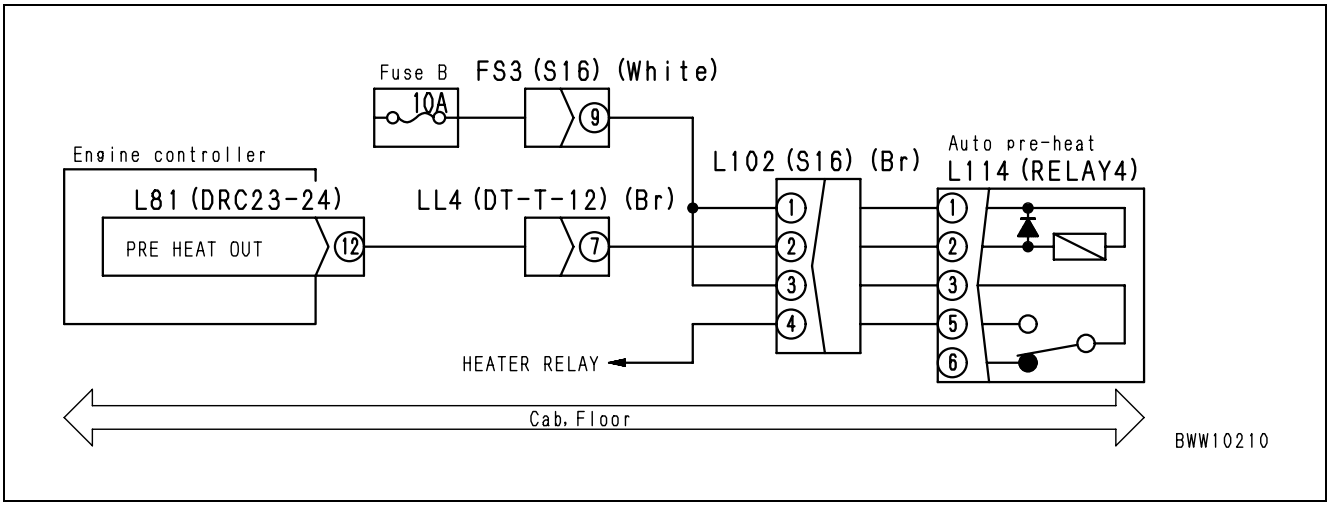
Error code [D182KZ]

Action Code	Error Code	Controller Code	Trouble	Disconnection or short circuit in pre-heating relay coil
E03	D182KZ	ENG		
Description of Trouble	• Pre-heating relay drive circuit is disconnected or shorted with chassis ground.			
Controller Reaction	• Cannot turn ON pre-heating relay.			
Effect on Machine	• Engine does not start easily at low temperature.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective pre-heating relay (L114)	1) Turn starting switch OFF. 2) Replace relay with another one of the same type. 3) Turn starting switch ON. 4) Shift forward-reverse lever to R.		
			This error code [D182KZ] is displayed.		Relay L114 is normal
			This error code [D182KZ] is not displayed.		Relay L114 is defective
			1) Turn starting switch OFF. 2) Disconnect connectors L81 and L114. 3) Connect T-adapter.		
			Between L114 (male) (1) ~ (2)	Resistance	100 ~ 500 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L81 and L102. 3) Connect T-adapter.		
			Between fuse B (10) ~ L102 (female) (2)	Resistance	Max. 1 Ω
			Between L81 (female) (12) ~ L102 (female) (2)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L81 and L102. 3) Connect T-adapter.		
			Between L81 (female) (12) ~ L102 (female) (2)	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L81. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L81 (12) ~ chassis ground	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connectors L81 and L114. 3) Connect T-adapter.		
			Between L81 (female) (12) ~ chassis ground	Resistance	100 ~ 500 Ω

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Related circuit diagram



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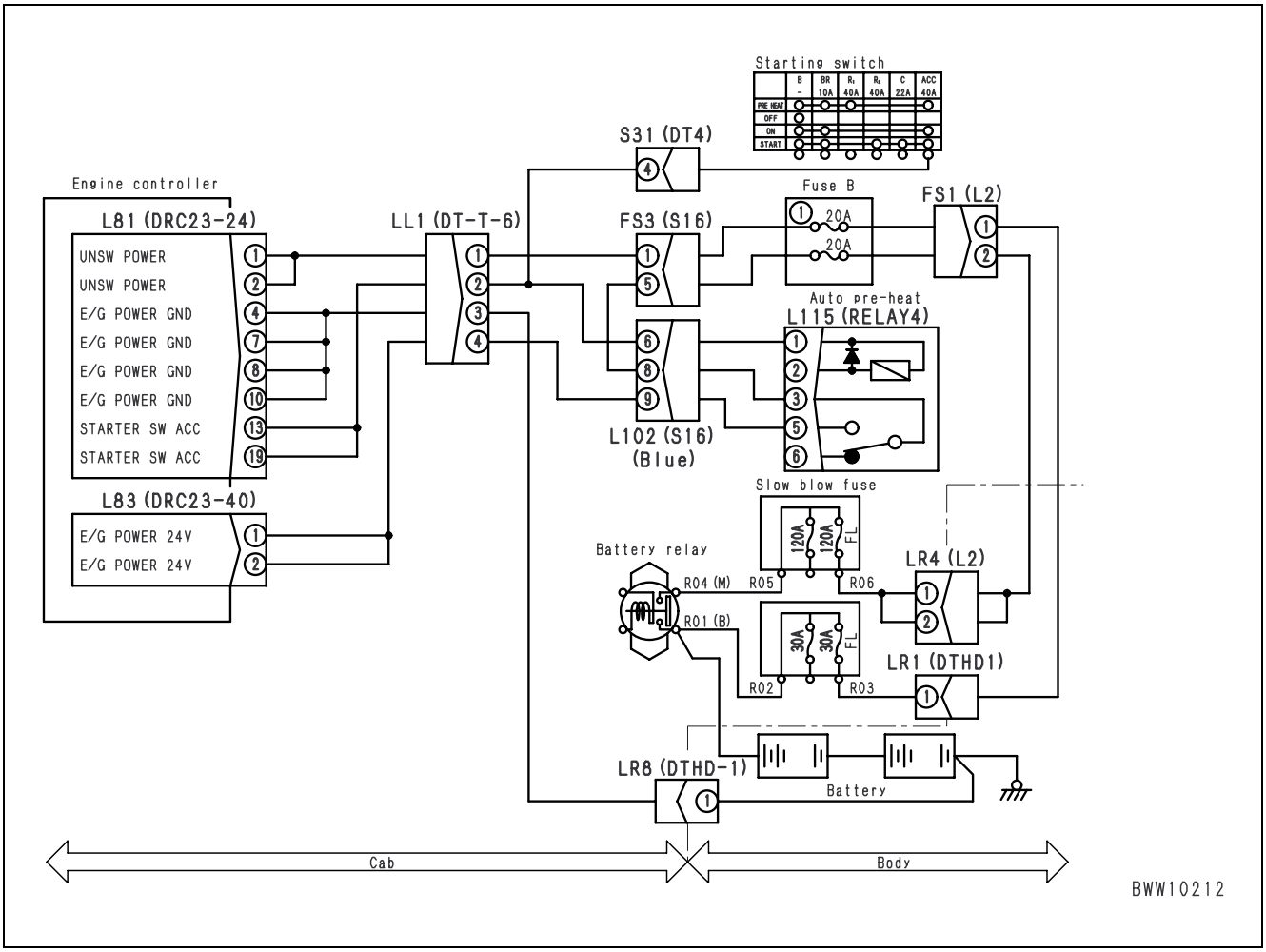
Error code [D1D0KB]

Action Code	Error Code	Controller Code	Trouble	Short circuit in voltage load power supply of engine controller power supply (SW) circuit
E01	D1D0KB	ENG		
Description of Trouble	• When starting switch was turned OFF, voltage was generated in engine controller power supply (SW) circuit.			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Machine is not affected particularly.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective engine load power supply relay (Short circuit in internal signal circuit)	1) Turn starting switch OFF. 2) Replace relay with another one of the same type. 3) Turn starting switch ON.			
			This error code [D1D0KB] is displayed.			Relay L126 is normal
			This error code [D1D0KB] is not displayed.			Relay L126 is defective
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L83 and L115. 3) Connect T-adapter.			
			Between starting switch ACC ~ L81 (13), (19)		Resistance	Max. 1 Ω
	3	Short circuit with power source in wiring	1) Turn starting switch OFF. 2) Disconnect connectors L83 and L115 and starting switch ACC. 3) Connect T-adapter.			
			Between starting switch ACC, L115 (female) (2) ~ chassis ground		Voltage	Max. 1 V
			Between L115 (female) (5), L83 (female) (1), (2) ~ chassis ground		Voltage	Max. 1 V
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connectors L83 and L81. 3) Connect T-adapter.			
			Between L83 (1), (2) ~ chassis ground	Turn starting switch ON.	Voltage	20 ~ 30 V
				Turn starting switch OFF.	Voltage	Max. 1 V
			Between L81 (13), (19) ~ chassis ground	Turn starting switch ON.	Voltage	20 ~ 30 V
				Turn starting switch OFF.	Voltage	Max. 1 V

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Related circuit diagram



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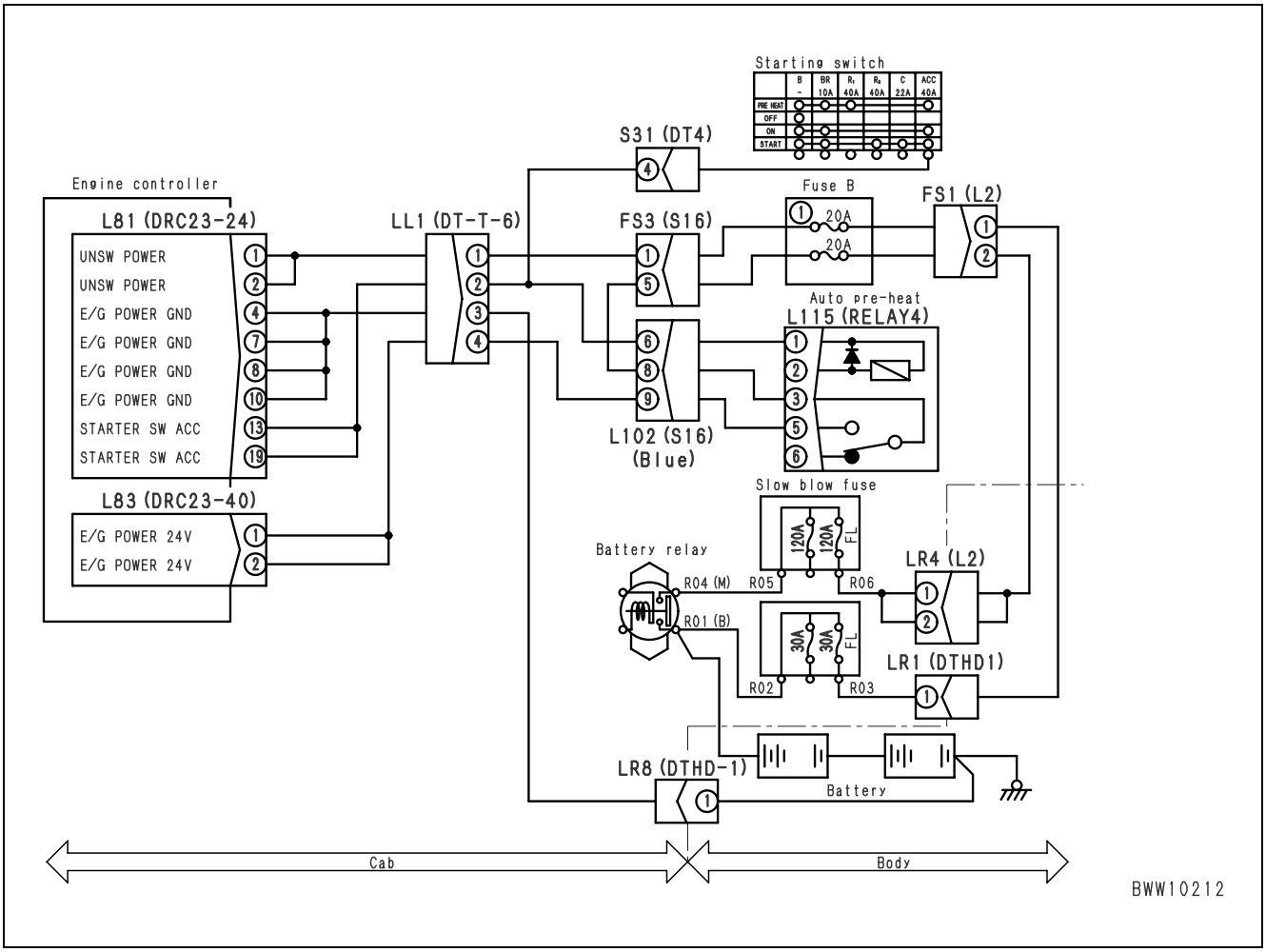
Error code [DB20KT]

Action Code	Error Code	Controller Code	Trouble	Controller power supply (NSW) voltage is low
E03	DB20KT	ENG		
Description of Trouble	• Controller has trouble in it.			
Controller Reaction	• Cannot drive injector sufficiently. • Stops driving injector.			
Effect on Machine	• High idling speed is not obtained under no load. • Engine stops. • Engine cannot be started.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L81. 3) Connect T-adapter.		
			Between battery (+) ~ slow blow fuse	Resistance	Max. 1 Ω
			Between slow blow fuse ~ LR1 (1) ~ FS1 (1) ~ fuse B (1)	Resistance	Max. 1 W
			Between fuse B (1) ~ L81 (1), (2)	Resistance	Max. 1 Ω
			★ If fuse B (1) is broken, above wiring harness is shorted with chassis ground.		
			Between L81 (4), (7), (8), (10) ~ chassis ground	Resistance	Max. 1 Ω
	2	Defective engine controller (Internal trouble)	1) Turn starting switch OFF. 2) Disconnect connector L81. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L81 (1), (2) ~ chassis ground	Voltage	20 ~ 30 V
			Between L83 (1), (2) ~ chassis ground	Voltage	20 ~ 30 V

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Related circuit diagram



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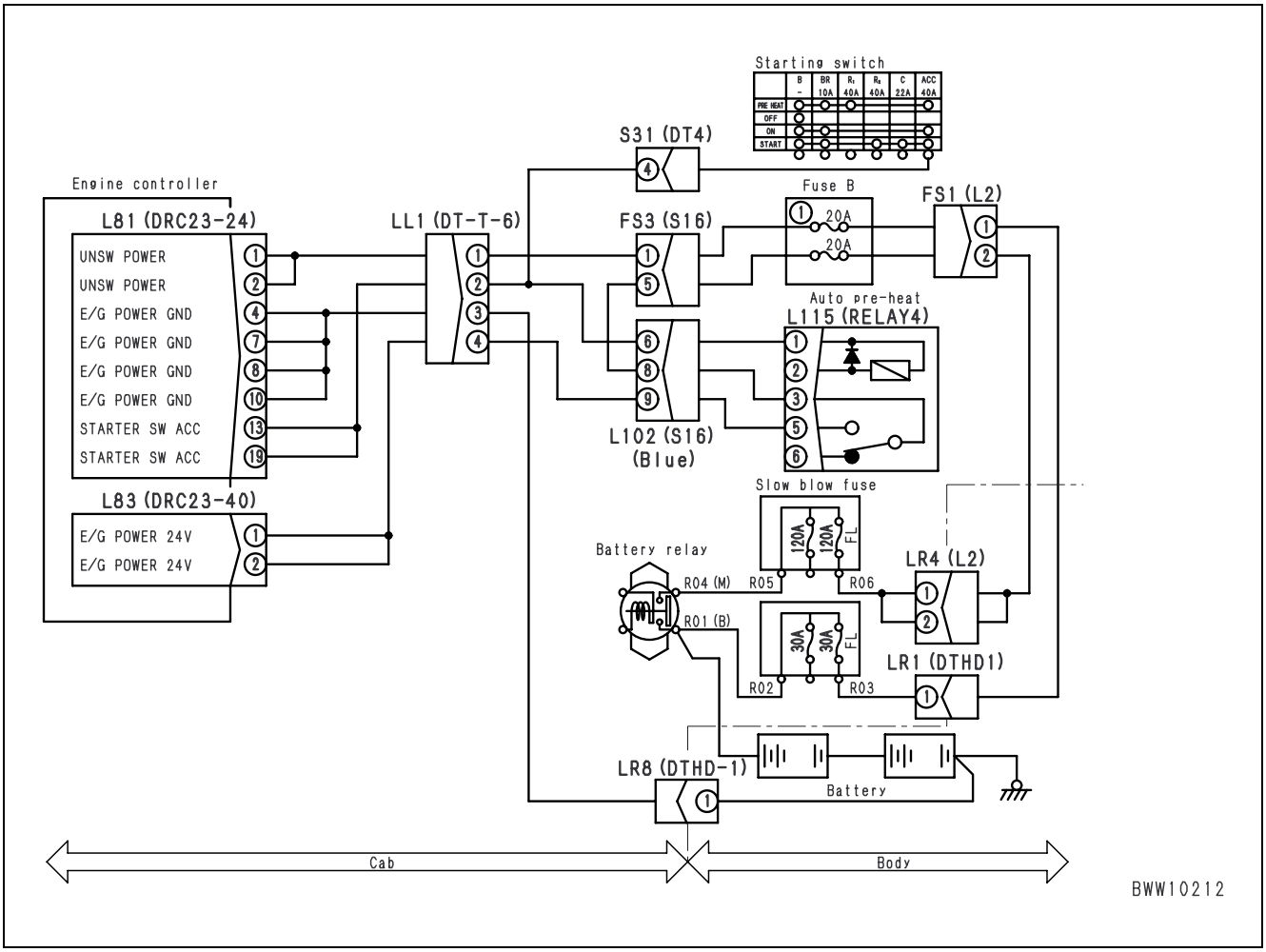
Error code [AB20KT]

Action Code	Error Code	Controller Code	Trouble	Trouble in drive circuit in controller
E03	DB20KT	ENG		
Description of Trouble	• Controller has trouble in it.			
Controller Reaction	• Cannot drive injector sufficiently. • Stops driving injector.			
Effect on Machine	• High idling speed is not obtained under no load. • Engine stops. • Engine cannot be started.			
Related Information	• For reduced cylinder mode operation, see TESTING AND ADJUSTING.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L81. 3) Connect T-adapter.			
			Between battery (+) ~ slow blow fuse		Resistance	Max. 1 Ω
			Between slow blow fuse ~ LR1 (1) ~ FS1 (1) ~ fuse B (1)		Resistance	Max. 1 W
			Between fuse B (1) ~ L81 (1), (2)		Resistance	Max. 1 Ω
			★ If fuse B (1) is broken, above wiring harness is shorted with chassis ground.			
			Between L81 (4), (7), (8), (10) ~ chassis ground		Resistance	Max. 1 Ω
	2	Defective engine controller (Internal trouble)	1) Turn starting switch OFF. 2) Disconnect connector L81. 3) Insert T-adapter.			
			Between L81 (1), (2) ~ (4), (7), (8), (10)	When starting switch is turned ON	Voltage	20 ~ 30 V

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Related circuit diagram



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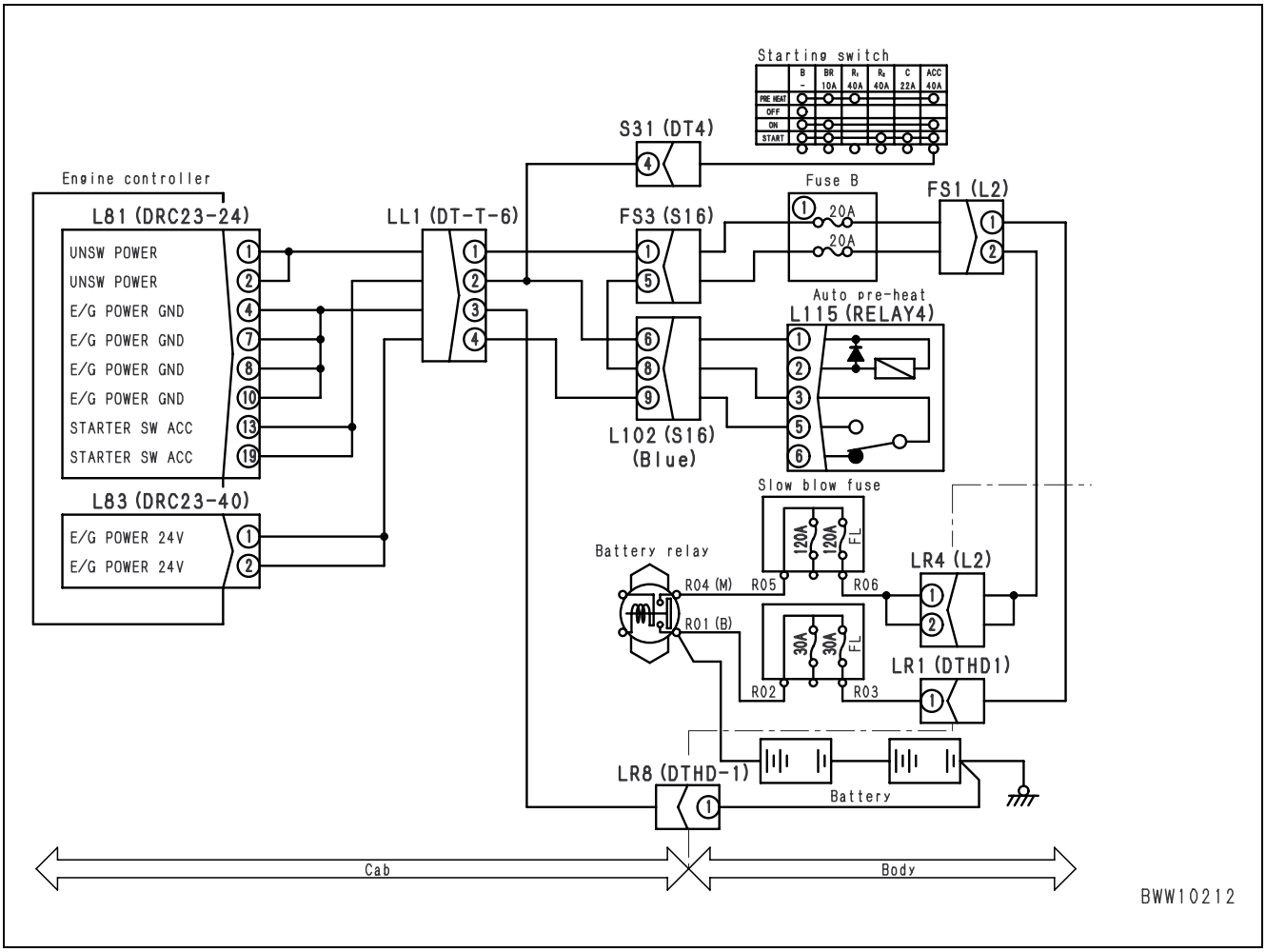
Error code [DB22KK]

Action Code	Error Code	Controller Code	Trouble	Trouble in power supply of engine controller load power supply (SW) 1
E03	DB22KK	ENG		
Description of Trouble	• When starting switch was turned OFF, voltage in engine controller power supply (SW) circuit lowered.			
Controller Reaction	• Does not take any action against this trouble.			
Effect on Machine	• Engine stops. • Engine cannot be started.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective engine load power supply relay (Internal disconnection, short circuit in internal drive circuit)	1) Turn starting switch OFF. 2) Replace relay with another one of the same type. 3) Turn starting switch ON.			
			This error code [DB22KK] is displayed.			Relay L126 is normal
			This error code [DB22KK] is not displayed.			Relay L126 is defective
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L83 and L115 and starting switch ACC. 3) Connect T-adapter.			
			Between starting switch ACC ~ L115 (female) (1)		Resistance	Max. 1 Ω
			Between L115 (female) (2) ~ chassis ground		Resistance	Max. 1 Ω
			Between fuse B (5) ~ L115 (female) (3)		Resistance	Max. 1 Ω
			★ If fuse B (1) is broken, above wiring harness is shorted with chassis ground.			
			Between L115 (female) (5) ~ L83 (female) (1), (2)		Resistance	Max. 1 Ω
	3	Short circuit with power source in wiring	1) Turn starting switch OFF. 2) Disconnect connectors L81 and starting switch ACC. 3) Connect T-adapter.			
			Between starting switch ACC, L83 (female) (1), (2) ~ chassis ground		Voltage	Max. 1 V
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connectors L83 and L81. 3) Connect T-adapter.			
			Between L83 (1), (2) ~ chassis ground	Turn starting switch ON.	Voltage	20 ~ 30 V
				Turn starting switch OFF.	Voltage	Max. 1 V
			Between L81 (13), (19) ~ chassis ground	Turn starting switch ON.	Voltage	20 ~ 30 V
				Turn starting switch OFF.	Voltage	Max. 1 V

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Related circuit diagram



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Error code [DB29KQ]

Action Code	Error Code	Controller Code	Trouble	Nonconformance of model selection signals in engine controller connecting wiring harness.
E03	DB29KQ	ENG		
Description of Trouble	• Model selection signals are not conformed to internal setting of engine controller.			
Controller Reaction	• Controls machine under default condition.			
Effect on Machine	• Normal engine output is not obtained.			
Related Information	• Check model setting of rotary switch.			

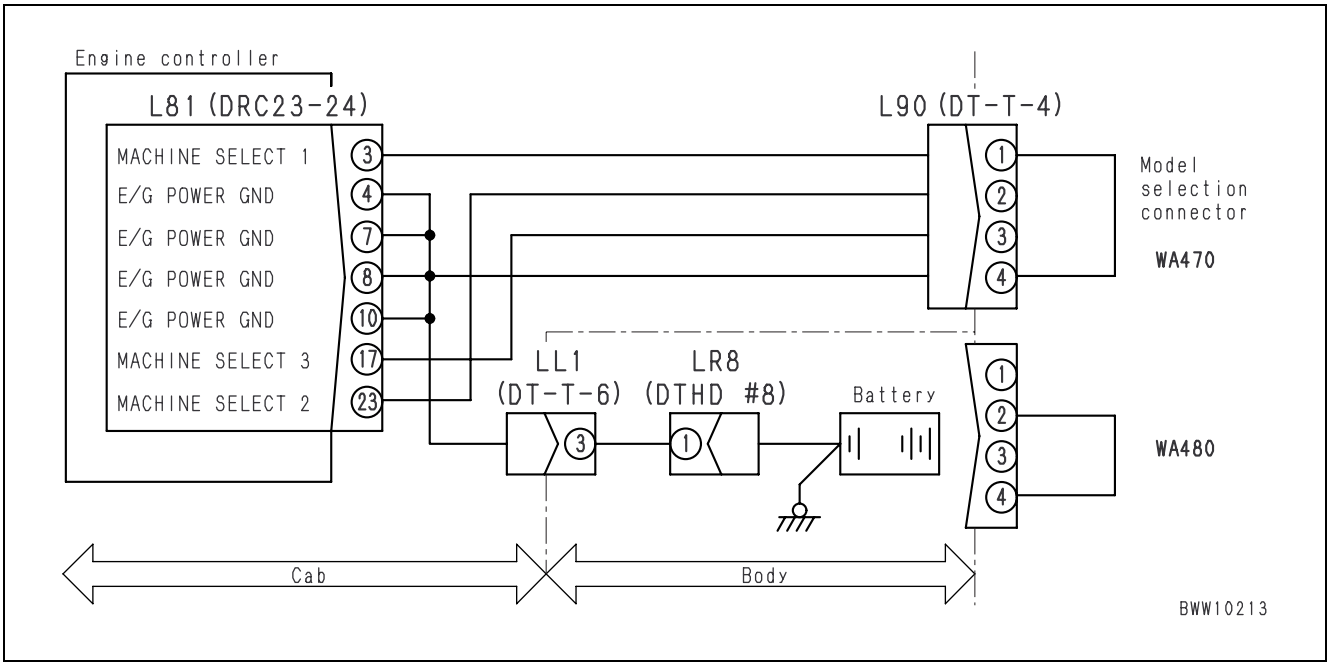
	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective model selection wiring harness	1) Turn starting switch OFF. 2) Disconnect connector L90. 3) Connect T-adapter.			
			WA470	Between L90 (male) (1) ~ (4)	Resistance	Max. 1 Ω
				Between L90 (male) (2) ~ (4)	Resistance	Min. 1 MΩ
				Between L90 (male) (3) ~ (4)	Resistance	Min. 1 MΩ
			WA480	Between L90 (male) (1) ~ (4)	Resistance	Min. 1 MΩ
				Between L90 (male) (2) ~ (4)	Resistance	Max. 1 Ω
				Between L90 (male) (3) ~ (4)	Resistance	Min. 1 MΩ
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L81 and L90. 3) Connect T-adapter.			
			WA470	Between L81 (female) (3) ~ L90 (female) (1)	Resistance	Max. 1 Ω
				Between L81 (female) (7), (8), (10) ~ L90 (female) (4)	Resistance	Max. 1 Ω
			WA480	Between L81 (female) (23) ~ L90 (female) (2)	Resistance	Max. 1 Ω
				Between L81 (female) (7), (8), (10) ~ L90 (female) (4)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring	1) Turn starting switch OFF. 2) Disconnect connectors L81 and L90. 3) Connect T-adapter.			
			WA470	Between L81 (female) (23), L90 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L81 (female) (17), L90 (female) (3) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L81 (female) (7), (8), (10), L90 (female) (4) ~ chassis ground	Resistance	Min. 1 MΩ
			WA480	Between L81 (female) (3), L90 (female) (2) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L81 (female) (17), L90 (female) (3) ~ chassis ground	Resistance	Min. 1 MΩ
				Between L81 (female) (7), (8), (10), L90 (female) (4) ~ chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L81. 3) Insert T-adapter. 4) Turn starting switch ON.			
			WA470	Between L81 (3) ~ chassis ground	Voltage	Max. 1 V
				Between L81 (23) ~ chassis ground	Voltage	20 ~ 30 V
				Between L81 (17) ~ chassis ground	Voltage	20 ~ 30 V

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Action Code	Error Code	Controller Code	Trouble	Nonconformance of model selection signals in engine controller connecting wiring harness
E03	DB29KQ	ENG		

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L81. 3) Insert T-adapter. 4) Turn starting switch ON.			
			WA480	Between L81 (3) ~ chassis ground	Voltage	20 ~ 30 V
				Between L81 (23) ~ chassis ground	Voltage	Max. 1 V
				Between L81 (17) ~ chassis ground	Voltage	20 ~ 30 V

Related circuit diagram



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Error code [DB2AMA]

Action Code	Error Code	Controller Code	Trouble	Function of Q adjustment switch of engine controller is defective
E01	DB2AMA	ENG		
Description of Trouble	• Q adjustment switches of engine controller are not set to proper positions.			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Setting of Q adjustment switches cannot be changed.			
Related Information	• Setting of Q adjustment switches (SW1, SW2) can be checked with monitoring function (Code: 36800).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective setting of Q adjustment switches	Setting of SW1 (On back side of controller)	When normal	F position
				When abnormal	Other position than F
			Setting of SW2 (On back side of controller	When normal	F position
				When abnormal	Other position than F
	2	Defective engine controller	—		

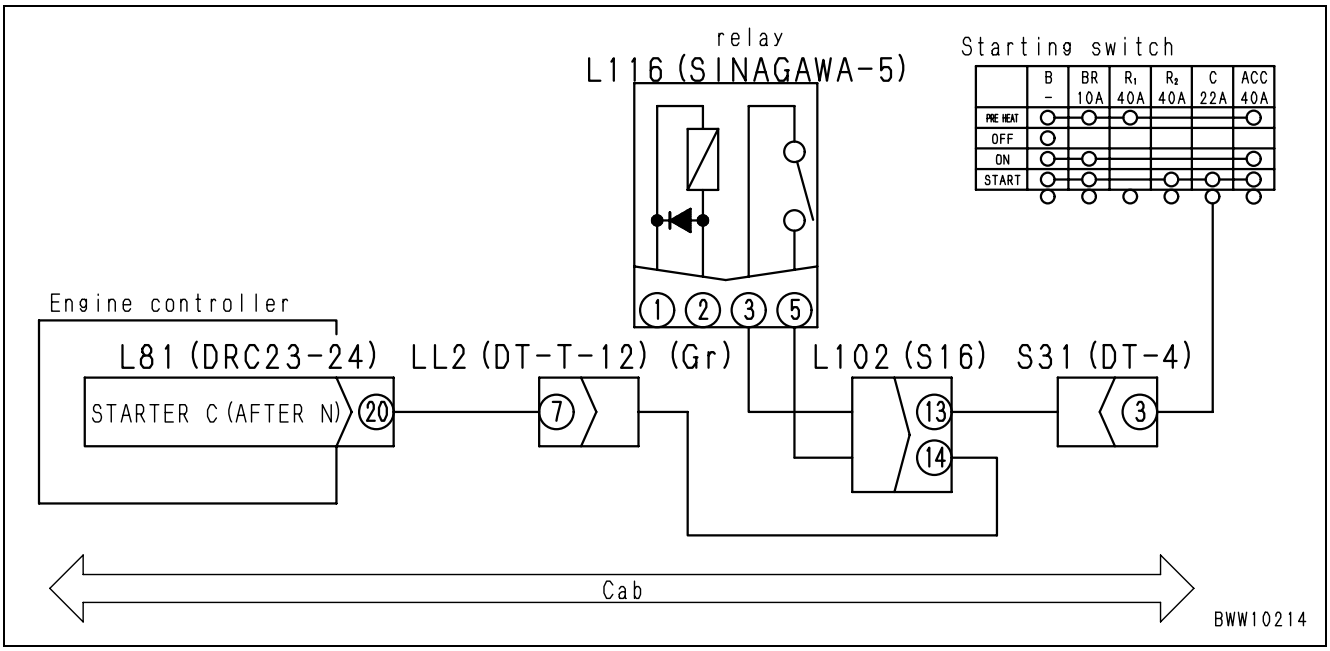
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Error code [DD11KB]

Action Code	Error Code	Controller Code	Trouble	Trouble in input of starting switch C (IGN C)
E03	DD11KB	ENG		
Description of Trouble	• Terminal signal of starting switch C (IGN C) was turned ON while engine was running.			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Engine operates normally 10 seconds after it is started.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective starting switch	1) Turn starting switch OFF. 2) Disconnect starting switch terminals. 3) Connect T-adapter.			
			Between starting switch terminals B ~ C	When starting switch is at START	Resistance	Max. 1 Ω
				When starting switch is not at START	Resistance	Min. 1 MΩ
	2	Disconnection in wiring harness	1) Turn starting switch OFF. 2) Disconnect starting switch terminal C and connector L116. 3) Connect T-adapter			
			Between starting switch terminal C (Wiring harness) ~ L116 (female) (3)		Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness ★ If this trouble occurs, fuse B-1 is broken.	1) Turn starting switch OFF. 2) Disconnect starting switch terminal C and connector L116. 3) Connect T-adapter.			
			Between starting switch terminal C (Wiring harness), L116 (female) (3) ~ chassis ground		Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L52 (2) ~ chassis ground	When starting switch is at START	Voltage	20 ~ 30 V
				When starting switch is at ON	Voltage	Max. 1 V

Related circuit diagram



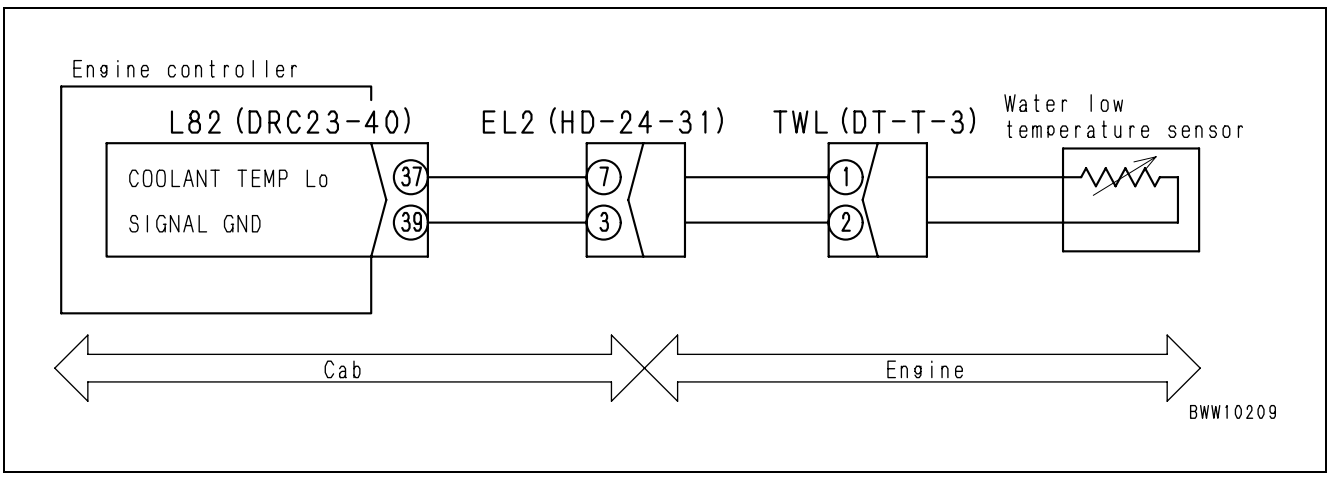
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Error code [DGE3L6]

Action Code	Error Code	Controller Code	Trouble	Trouble in water temperature (low temperature) sensor system
E01	DGE3L6	ENG		
Description of Trouble	• Signals of engine water temperature (Low temperature) sensor are not input.			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Exhaust gas color is bad and engine does not start easily at low temperature.			
Related Information	• This trouble can be checked with monitoring function (Code: 04103).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective engine water temperature (Low temperature) sensor	1) Turn starting switch OFF. 2) Disconnect connector TWL. 3) Connect T-adapter.			
			Between TWL (male) (1) ~ (2)	10°C	Resistance	Approx. 9 kΩ
				100°C	Resistance	Approx. 0.3 kΩ
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L82 and TWL. 3) Connect T-adapter.			
			Between L82 (female) (32) ~ TWL (female) (1)		Resistance	Max. 1Ω
			Between L82 (female) (39) ~ TWL (female) (2)		Resistance	Max. 1Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L82 and TWL. 3) Connect T-adapter.			
			Between L82 (female) (32), TWL (female) (1) ~ chassis ground		Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L82. 3) Connect T-adapter.			
			Between L82 (female) (32) ~ (39)	10°C	Resistance	Approx. 9 kΩ
				100°C	Resistance	Approx. 0.3 kΩ

Related circuit diagram



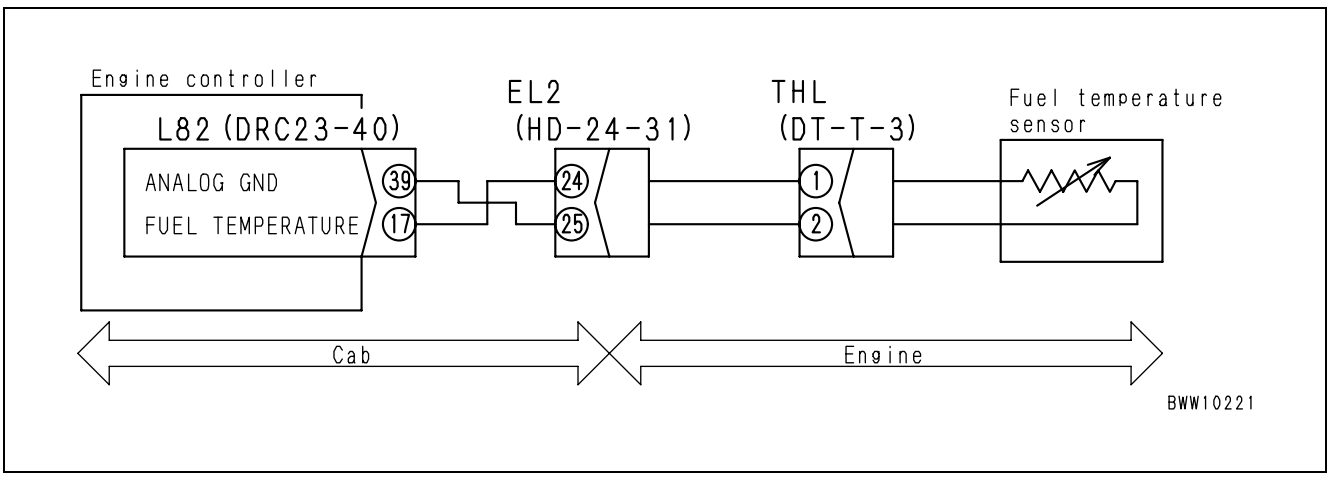
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Error code [DGE4KX]

Action Code	Error Code	Controller Code	Trouble	Trouble in fuel temperature sensor system
E01	DGE4KX	ENG		
Description of Trouble	• Signals of fuel temperature sensor are out of normal range.			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Output lowers a little at low temperature.			
Related Information	• This trouble can be checked with monitoring function (Code: 04203).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective fuel temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector THL. 3) Connect T-adapter.			
			Between THL (male) (1) ~ (2)	10°C	Resistance	Approx. 9 kΩ
				100°C	Resistance	Approx. 0.3 kΩ
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L82 and THL. 3) Connect T-adapter.			
			Between L82 (female) (17) ~ THL (female) (2)		Resistance	Max. 1Ω
			Between L82 (female) (39) ~ THL (female) (2)		Resistance	Max. 1Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L55 and THL. 3) Connect T-adapter.			
			Between L82 (female) (17), TWL (female) (1) ~ chassis ground		Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L82. 3) Connect T-adapter.			
			Between L82 (female) (17) ~ (39)	10°C	Resistance	Approx. 9 kΩ
				100°C	Resistance	Approx. 0.3 kΩ

Related circuit diagram



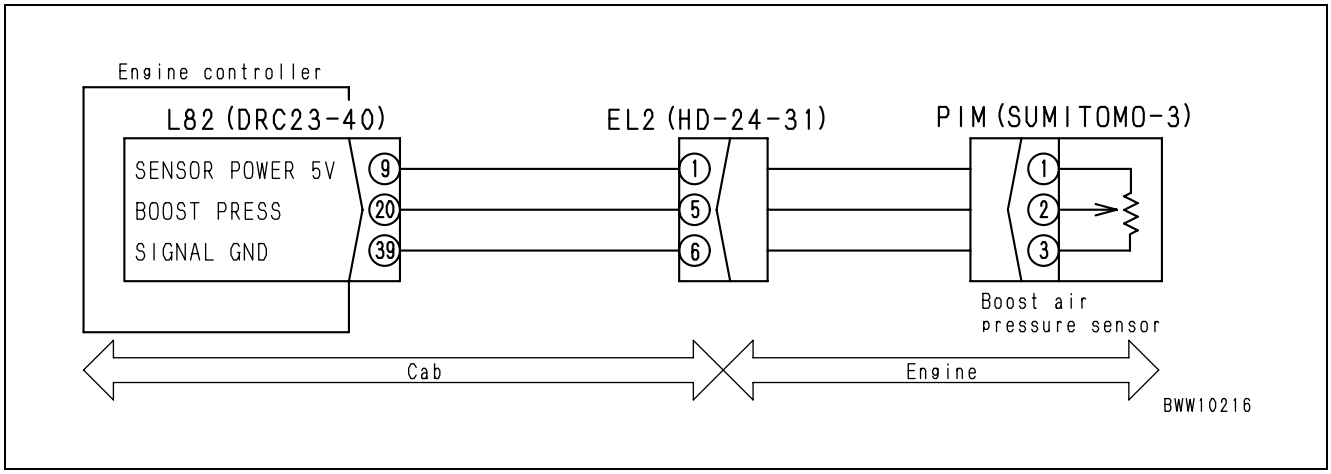
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Error code [DH30KX]

Action Code	Error Code	Controller Code	Trouble	Trouble in boost pressure sensor system
E01	DH30KX	ENG		
Description of Trouble	• Signals of boost pressure sensor are out of normal range.			
Controller Reaction	• Operates by normal control method.			
Effect on Machine	• Machine is not affected particularly.			
Related Information	• This trouble can be checked with monitoring function (Code: 36500).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective boost pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector PIM. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between PIM (3) ~ (1) (Sensor power source)	Voltage	4.6 ~ 5.4 V
			Between PIM (2) ~ (1) (Sensor signal)	Voltage	0.3 ~ 4.7 V
			★ When wiring harness in 2 and 3 below are normal.		
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L82 and PIM. 3) Connect T-adapter.		
			Between PIM (female) (3) ~ L82 (female) (9)	Resistance	Max. 1 Ω
			Between PIM (female) (2) ~ L82 (female) (20)	Resistance	Max. 1 Ω
			Between PIM (female) (1) ~ L82 (female) (39)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L82 and PIM. 3) Connect T-adapter.		
			Between PIM (female) (3), L82 (female) (9) ~ chassis ground	Resistance	Min. 1 MΩ
			Between PIM (female) (2), L82 (female) (20) ~ chassis ground	Resistance	Min. 1 MΩ
			Between PIM (female) (1), L82 (female) (39) ~ chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L82. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L82 (9) ~ (39) (Sensor power source)	Voltage	4.6 ~ 5.4 V
			Between L82 (20) ~ (39) (Sensor signal)	Voltage	0.3 ~ 4.7 V

Related circuit diagram



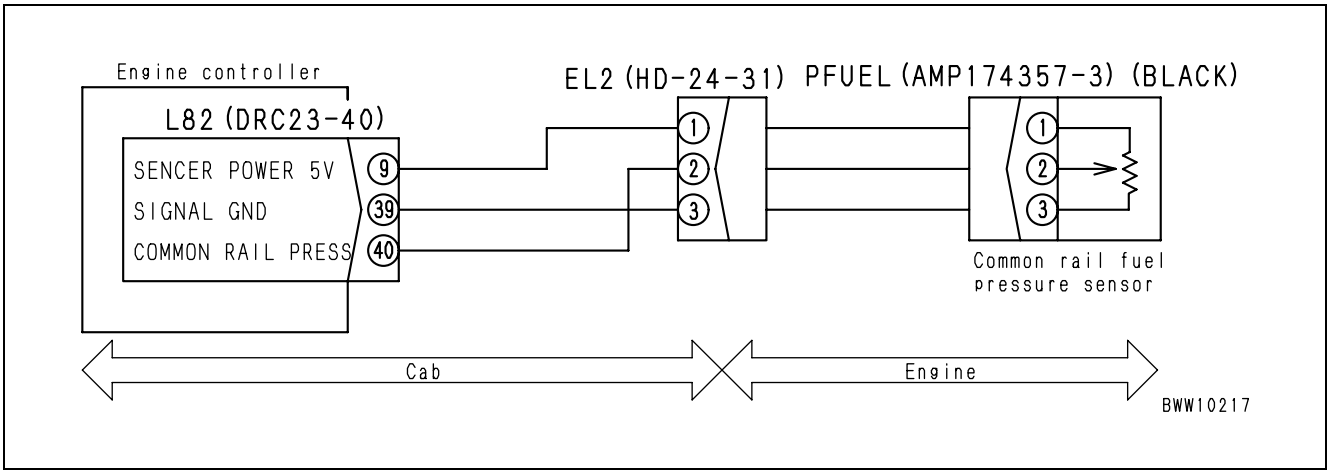
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Error code [DH40KX]

Action Code	Error Code	Controller Code	Trouble	Trouble in common rail fuel pressure sensor system
E03	DH40KX	ENG		
Description of Trouble	• Signals of common rail fuel pressure sensor are out of normal range.			
Controller Reaction	• Operates by open control method.			
Effect on Machine	• Engine output lowers.			
Related Information	• This trouble can be checked with monitoring function (Code: 36400).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective common rail fuel pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector PFUEL. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between PFUEL (3) ~ (1) (Sensor power source)	Voltage	4.6 ~ 5.4 V
			Between PFUEL (2) ~ (1) (Sensor signal)	Voltage	0.3 ~ 4.7 V
			★ When wiring harness in 2 and 3 below are normal.		
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L82 and PFUEL. 3) Connect T-adapter.		
			Between PFUEL (female) (3) ~ L82 (female) (9)	Resistance	Max. 1 Ω
			Between PFUEL (female) (2) ~ L82 (female) (40)	Resistance	Max. 1 Ω
			Between PFUEL (female) (1) ~ L82 (female) (39)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L82 and PFUEL. 3) Connect T-adapter.		
			Between PFUEL (female) (3), L82 (female) (9) ~ chassis ground	Resistance	Min. 1 MΩ
			Between PFUEL (female) (2), L82 (female) (40) ~ chassis ground	Resistance	Min. 1 MΩ
			Between PFUEL (female) (1), L82 (female) (39) ~ chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L82. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L82 (9) ~ (39) (Sensor power source)	Voltage	4.6 ~ 5.4 V
			Between L82 (40) ~ (39) (Sensor signal)	Voltage	0.3 ~ 4.7 V

Related circuit diagram



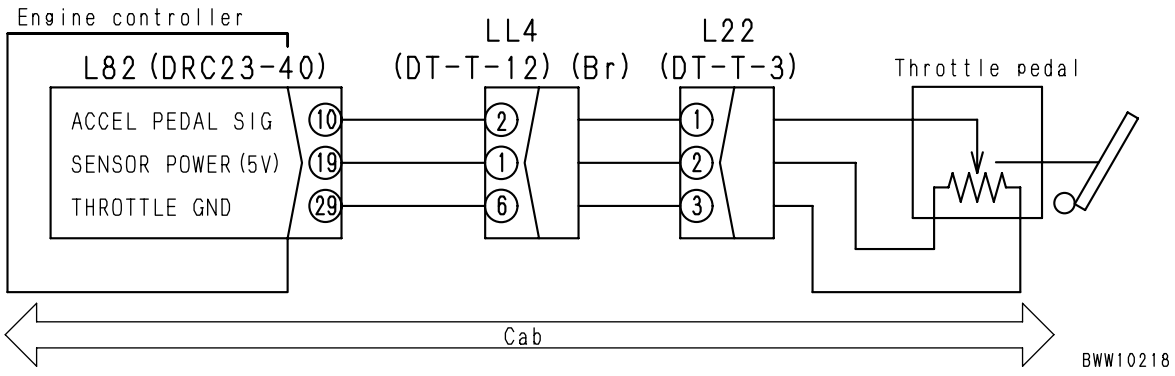
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Error code [DK10KX]

Action Code	Error Code	Controller Code	Trouble	Trouble in throttle (Acceleration) sensor system
E03	DK10KX	ENG		
Description of Trouble	• Throttle angle signals of accelerator pedal are out of normal range.			
Controller Reaction	• Controls according to idling validation signal at low idling or high idling.			
Effect on Machine	• Engine speed is fixed to low idling or high idling and cannot be adjusted between them.			
Related Information	• This trouble can be checked with monitoring function (Code: 31701).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective throttle (Acceleration) sensor	1) Turn starting switch OFF. 2) Disconnect connector L22. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L22 (3) ~ (1) (Sensor power source)	Voltage	4.6 ~ 5.4 V
			Between L22 (2) ~ (1) (Sensor signal)	Voltage	0.3 ~ 4.7 V
			★ When wiring harness in 2 and 3 below are normal.		
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L82 and L22. 3) Connect T-adapter.		
			Between L22 (female) (3) ~ L82 (female) (19)	Resistance	Max. 1 Ω
			Between L22 (female) (2) ~ L82 (female) (10)	Resistance	Max. 1 Ω
			Between L22 (female) (1) ~ L82 (female) (29)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L82 and L22. 3) Connect T-adapter.		
			Between L22 (female) (3), L82 (female) (19) ~ chassis ground	Resistance	Min. 1 MΩ
			Between L22 (female) (2), L82 (female) (10) ~ chassis ground	Resistance	Min. 1 MΩ
			Between L22 (female) (1), L82 (female) (29) ~ chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L82. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L82 (9) ~ (29) (Sensor power source)	Voltage	4.6 ~ 5.4 V
			Between L82 (19) ~ (29) (Sensor signal)	Voltage	0.3 ~ 4.7 V

Related circuit diagram



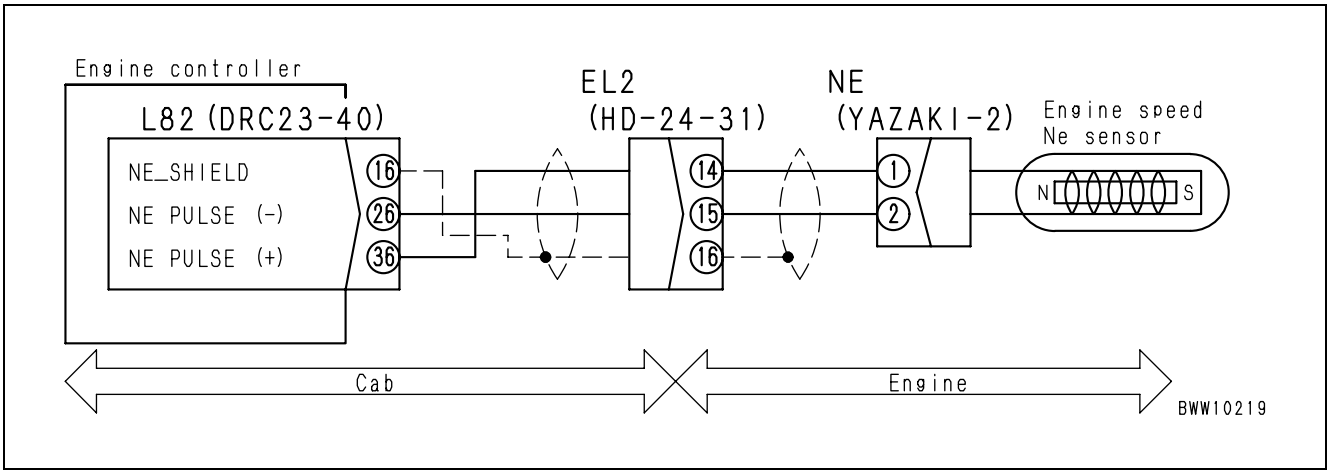
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Error code [DLE3LC]

Action Code	Error Code	Controller Code	Trouble	Trouble in engine NE speed sensor system
E03	DLE3LC	ENG		
Description of Trouble	• Signals of engine NE speed sensor are not conformed to those of engine G speed sensor.			
Controller Reaction	• Operates with limited output.			
Effect on Machine	• Engine output lowers.			
Related Information	• This trouble can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective engine NE speed sensor	1) Turn starting switch OFF. 2) Disconnect connector NE. 3) Connect T-adapter.		
			Between NE (male) (1) ~ (2)	Resistance	85 ~ 210 Ω
	2	Disconnection in wiring harness (Disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L82 and NE. 3) Connect T-adapter.		
			Between NE (female) (1) ~ L82 (female) (36)	Resistance	Max. 1 Ω
			Between NE (female) (2) ~ L82 (female) (26)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L82 and NE. 3) Connect T-adapter.		
			Between NE (female) (1) ~ L82 (female) (36)	Resistance	Min. 1 MΩ
			Between NE (female) (2) ~ L82 (female) (26)	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L82. 3) Connect T-adapter.		
			Between L82 (female) (36) ~ (26)	Resistance	85 ~ 210 Ω

Related circuit diagram



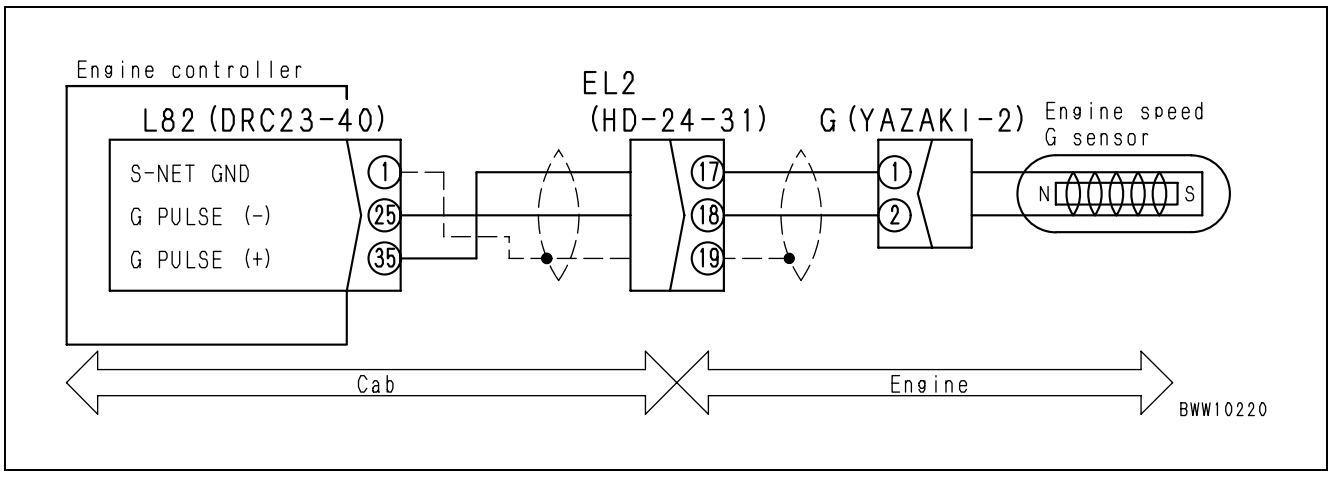
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Error code [DLH1LC]

Action Code	Error Code	Controller Code	Trouble	Trouble in engine G speed sensor system
E03	DLH1LC	ENG		
Description of Trouble	• Signals of engine G speed sensor are not conformed to those of engine NE speed sensor.			
Controller Reaction	• Operates with limited output.			
Effect on Machine	• Engine output lowers.			
Related Information	• This trouble can be checked with monitoring function (Code: 01004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective engine G speed sensor	1) Turn starting switch OFF. 2) Disconnect connector G. 3) Connect T-adapter.		
			Between G (male) (1) ~ (2)	Resistance	1.4 ~ 3.5 kΩ
	2	Disconnection in wiring harness (disconnection, defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L82 and G. 3) Connect T-adapter.		
			Between G (female) (1) ~ L82 (female) (35)	Resistance	Max. 1 Ω
			Between G (female) (2) ~ L82 (female) (25)	Resistance	Max. 1 Ω
	3	Short circuit with chassis ground in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L82 and G. 3) Connect T-adapter.		
			Between G (female) (1) ~ L82 (female) (35)	Resistance	Min. 1 MΩ
			Between G (female) (2) ~ L82 (female) (25)	Resistance	Min. 1 MΩ
	4	Defective engine controller	1) Turn starting switch OFF. 2) Disconnect connector L82. 3) Connect T-adapter.		
			Between L82 (female) (35) ~ (25)	Resistance	1.4 ~ 3.5 kΩ

Related circuit diagram



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Error code [ENG-1]

Action Code	Error Code	Controller Code	Trouble	Engine does not start
ENG-1	—	ENG		
Description of Trouble	• Engine does not start because of trouble in starting motor system.			
Controller Reaction				
Effect on Machine	• Engine does not start because of trouble in starting motor system.			
Related Information	• Check that fuses A-2 and B-2 are not broken. (If they are broken, check related wiring harnesses for short circuit with chassis ground.)			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective battery		Specific gravity	Min. 1.26
				Voltage	Min. 25 V
	2	Disconnection of wiring harness related to battery relay	1) Turn starting switch ON.		
			Between battery relay terminal R13, R01, R04 ~ chassis ground	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector S31 and terminal R13. 3) Insert T-adapter.		
			Between S31 (female) (2) ~ battery relay terminal R13 ★ Measure on S31 (female) (2) side in diode range.	Continuity	Made
			1) Turn starting switch ON.		
			Between battery relay terminals (+) ~ (-)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect battery relay terminal (-).		
			Between battery relay terminal (-) ~ chassis ground	Resistance	Max. 1 Ω
	3	Disconnection wiring harness related to starting motor	1) Turn starting switch OFF. 2) Disconnect connector E01. 3) Insert T-adapter. 4) Turn starting switch to START.		
			Between E01 (1) ~ chassis ground	Voltage	20 ~ 30 V
			1) Turn starting switch ON.		
			Between starting motor terminal B ~ chassis ground	Voltage	20 ~ 30 V
	4	Defective alternator (Regulator)	1) Turn starting switch OFF. 2) Disconnect connector E01. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between E01 (2) ~ chassis ground	Voltage	Max. 12 V
	5	Disconnection of wiring harness related to starting switch	1) Turn starting switch OFF. 2) Disconnect connector E01. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between S31 (1), (2), (3) ~ chassis ground (When checking between (3) ~ chassis ground, turn starting switch to START)	Voltage	20 ~ 30 V

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Action Code	Error Code	Controller Code	Trouble	Engine does not start
ENG-1	—	ENG		

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	5	Disconnection of wiring harness related to starting switch	1) Turn starting switch OFF. 2) Disconnect starting switch terminals B, BR, and C.		
			Between starting switch B ~ BR	Resistance	Max. 1 Ω
			Between starting switch B ~ C	Resistance	Max. 1 Ω
			1) Turn starting switch OFF. 2) Disconnect connectors S31, FS3, and L116.		
			Between S31 (female) (1) ~ FS3 (female) (1)	Resistance	Max. 1 Ω
			Between S31 (female) (3) ~ L116 (female) (3)	Resistance	Max. 1 Ω
	6	Disconnection of wiring harness related to short connector (TEL)	1) Turn starting switch OFF. 2) Disconnect connector TEL. 3) Connect T-adapter.		
			Between TEL (female) (7) ~ TEL (female) (8)	Resistance	Max. 1 Ω
			1) Turn starting switch OFF. 2) Disconnect connectors TEL and L116. 3) Connect T-adapter.		
			Between TEL (male) (8) ~ L116 (female) (3)	Resistance	Max. 1 Ω
	7	Disconnection of wiring harness related to relay (L113)	1) Turn starting switch OFF. 2) Disconnect connectors L79 and L116. 3) Insert T-adapter. 4) Turn shift switch to NEUTRAL. 5) Turn starting switch to START.		
			Between L113 (4) ~ chassis ground	Voltage	20 ~ 30 V
			Between L113 (3) ~ chassis ground	Voltage	20 ~ 30 V
			Between L113 (1) ~ chassis ground	Voltage	Max. 1 V
			1) Turn starting switch OFF. 2) Disconnect relays L113 and L116. 3) Connect T-adapter.		
			Between L113 (female) (3) ~ L116 (female) (1)	Resistance	Max. 1 Ω
			Between L113 (male) (1) ~ (2)	Resistance	200 ~ 400 Ω
			1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Connect T-adapter.		
			Between L113 (female) (4) ~ L04 (female) (1)	Resistance	Max. 1 Ω
			1) Turn starting switch OFF. 2) Disconnect connectors L101 and L102. 3) Connect T-adapter.		
			Between L101 (female) (12) , L102 (female) (12) ~ chassis ground	Resistance	Max. 1 Ω
	8	Disconnection of wiring harness related to relay (L116)	1) Turn starting switch OFF. 2) Disconnect connectors L102 and E01. 3) Connect T-adapter.		
			Between L102 (female) (14) ~ E01 (female) (1) ★ Measure on L102 (female) (14) side in diode range.	Continuity	Made

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Action Code	Error Code	Controller Code	Trouble	Engine does not start
ENG-1	—	ENG		

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	8	Disconnection of wiring harness related to relay (L116)	1) Turn starting switch OFF. 2) Disconnect relay L116. 3) Connect T-adapter.		
			Between relay L116 (male) (1) ~ (2)	Resistance	200 ~ 400 Ω
	9	Disconnection of wiring harness related to shift switch	1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L04 (1), (3) ~ chassis ground	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connectors L04 and FS4. 3) Connect T-adapter.		
			Between L04 (female) (1) ~ FS4 (female) (2)	Resistance	Max. 1 Ω
	10	Disconnection of wiring harness related to diodes R26 and R27	1) Turn starting switch OFF. 2) Disconnect connector R26. 3) Connect T-adapter.		
			Between R26 (male) (2) ~ (1)		
			★ Measure on (2) side in diode range.	Continuity	Made
			★ Measure on (1) side in diode range.	Continuity	Not made
			★ Diode R26 may be replaced.		
			1) Turn starting switch OFF. 2) Disconnect connector R26. 3) Connect T-adapter.		
			Between R27 (male) (2) ~ (1)		
			★ Measure on (2) side in diode range.	Continuity	Made
			★ Measure on (1) side in diode range.	Continuity	Not made
			★ Diode R27 may be replaced.		
			1) Turn starting switch OFF. 2) Disconnect connectors L102, R26, and R27. 3) Connect T-adapter.		
			Between L102 (female) (14) ~ R26 (female) (2)	Resistance	Max. 1 Ω
			Between L102 (female) (14) ~ R27 (female) (2)	Resistance	Max. 1 Ω
			1) Turn starting switch OFF. 2) Disconnect connectors E01, R26, and R27. 3) Connect T-adapter.		
			Between E01 (female) (1) ~ R26 (female) (1)	Resistance	Max. 1 Ω
			Between E01 (female) (1) ~ R27 (female) (1)	Resistance	Max. 1 Ω

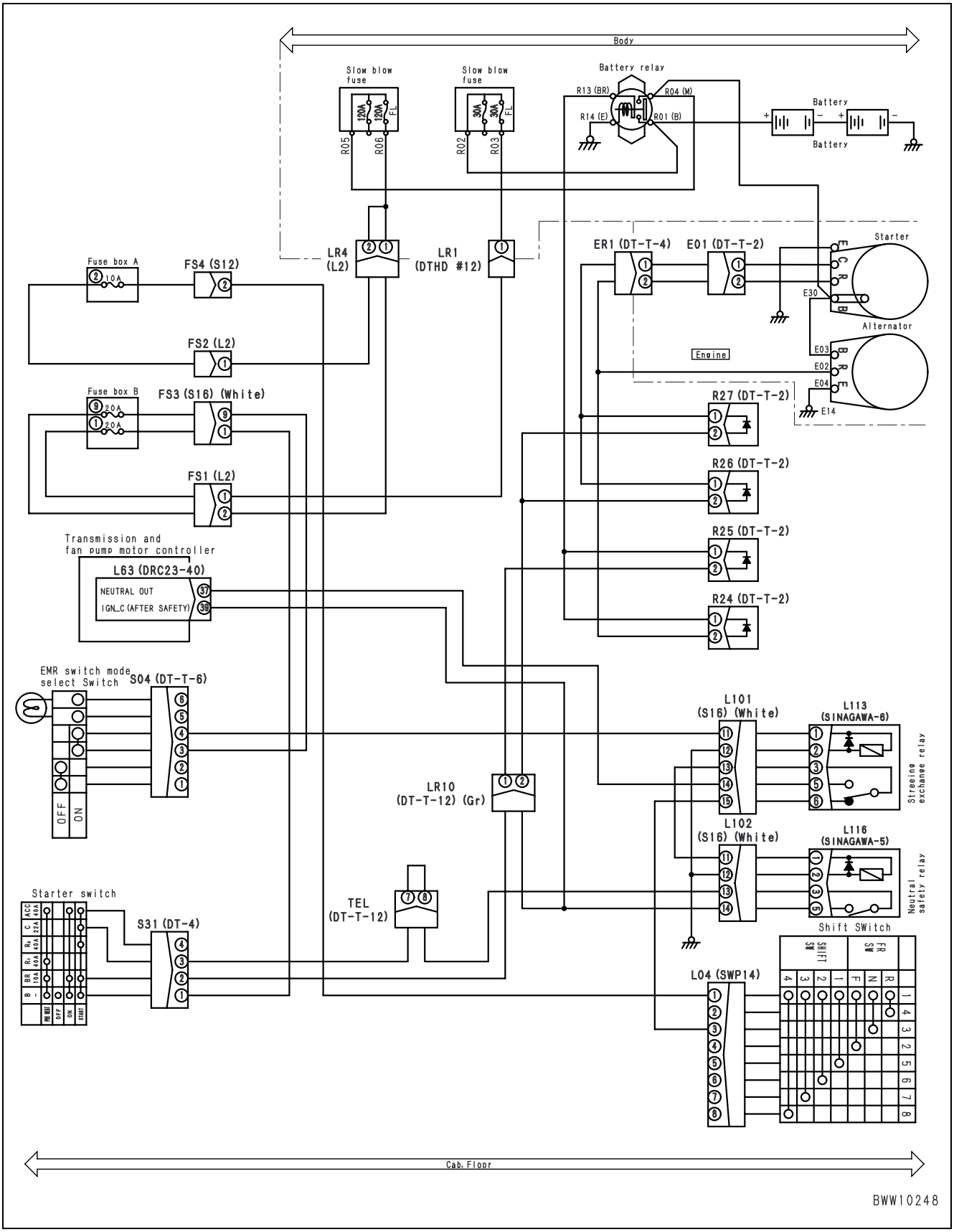
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Action Code	Error Code	Controller Code	Trouble	Engine does not start.
ENG-1	—	ENG		

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	11	Disconnection of wiring harness related to fuse	1) Turn starting switch OFF. 2) Disconnect connectors FS2 and FS4. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between FS3 (1) ~ chassis ground	Voltage	20 ~ 30 V
			Between FS4 (2) ~ chassis ground	Voltage	20 ~ 30 V
			Between FS2 (1) ~ chassis ground	Voltage	20 ~ 30 V
			Between FS1 (1), (2) ~ chassis ground	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connectors LR1 and LR4. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between LR1 (1) ~ chassis ground	Voltage	20 ~ 30 V
			Between LR4 (1), (2) ~ chassis ground	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connectors FS1, FS2, LR1, and LR4. 3) Connect T-adapter.		
			Between FS1 (female) (1) ~ LR1 (male) (1)	Resistance	Max. 1 Ω
			Between FS1 (female) (2) ~ LR4 (male) (1)	Resistance	Max. 1 Ω
			1) Turn starting switch ON. 2) Slow blow fuse (Service power supply)		
			Between terminals R02, R03 ~ chassis ground	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect slow blow fuse (Service power supply) terminal R02, and battery relay terminal R01.		
			Between slow blow fuse (Service power supply) terminal R02 ~ battery relay terminal R01	Resistance	Max. 1 Ω
			1) Turn starting switch OFF. 2) Disconnect slow blow fuse terminal R05 and battery relay terminal R04.		
			Between slow blow fuse terminal R05 ~ battery relay terminal R04	Resistance	Max. 1 Ω
	12	Defective selector switch for FNR switch mode	1) Turn starting switch OFF. 2) Disconnect connector S04. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between S04 (4) ~ chassis ground	Voltage	Max. 1 V

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Related circuit diagram



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TROUBLESHOOTING OF TRANSMISSION CONTROL SYSTEM (TM MODE)

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Connector types and installation positions

★ The Address column in the following table indicates the addresses of the connector layout drawing (Cubic diagram) and the circuit diagram.

★ Codes indicated in the fields of the circuit diagram addresses: **ENG:** Engine control system, **TM:** Transmission control system, **WRK:** working equipment control system, **MON:** Monitor system, **OTH:** Others

★ The characters in parenthesis in the Connector Type fields indicate the colors of the connector bodies.

Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
1.PS	DT-T	2	1st solenoid	AJ-4	M-8
1.SW	DT	2	1st fill switch	AJ-4	O-8
2.PS	DT-T	2	2nd solenoid	AJ-3	M-8
2.SW	DT	2	2nd fill switch	AI-3	O-8
3.PS	DT-T	2	3rd solenoid	AJ-3	M-8
3.SW	DT	2	3rd fill switch	AJ-4	O-8
4.PS	DT-T	2	4th solenoid	AJ-5	M-8
4.SW	DT	2	4th fill switch	AJ-5	O-8
A1	M	6	Blower motor & resistor	U-2	—
A2	SWP	6	Air mix servo motor	U-2	—
A3	M	2	Thermistor	U-2	—
A4	X	2	Air servomotor	U-8	—
A5	X	2	Capacitor switch	T-1	—
A6	Yazaki	2	Hi and Lo switch	T-1	—
A7	Yazaki	4	Blower relay (Hi)	W-6	—
A8	Yazaki	4	Blower relay (M2)	W-6	—
A9	Yazaki	4	Blower relay (M1)	W-6	—
A10	Yazaki	4	Capacitor relay	W-5	—
A11	Yazaki	4	Capacitor Hi (1) relay	W-5	—
A12	Yazaki	4	Capacitor Hi (2) relay	W-5	—
A13	Yazaki	4	MAG clutch relay	W-4	—
A14	Yazaki	4	Ground	W-4	—
A20	Terminal	1	Water temperature sensor (Auto-air conditioner vehicle)	T-1	—
A21	Yazaki	2	Indoor air temperature sensor (Auto-air conditioner vehicle)	W-3	—
A22	Yazaki	2	Outdoor air temperature sensor (Auto-air conditioner vehicle)	U-2	—
A23	Yazaki	2	Diode (Auto-air conditioner vehicle)	A-7	—
A24	DT-T	2	Diode (Auto-air conditioner vehicle)	W-3	—
A25	DT-T	2	Intermediate connector (Auto-air conditioner vehicle)	V-3	—
A26	DT-T	2	Intermediate connector (Air conditioner relay)	W-4	—
AL1	M	6	Intermediate connector (Air conditioner relay)	U-2	—
AL2	S (W)	12	Intermediate connector (Air conditioner relay)	V-2	—
B01	DT	3	Capacitor R	B-7	—
B02	DT	3	Capacitor L	A-7	—
B03	DT-T	2	Emergency brake switch 1	G-9	I-1
B04	DT-T	2	Emergency brake switch 2	G-9	I-1
B05	DT-T	2	Front brake ACC low pressure switch	K-3	I-1
B06	DT-T	2	Rear brake ACC low pressure switch	J-2	I-2
BR1	DT-T (Gr)	12	Intermediate connector (Bulk head)	I-2	I-2
C01	Yazaki	9	AM/FM radio	L-9	—
C02	KES0	2	Speaker (Right)	E-9	—

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
C03	KES0	2	Speaker (Left)	G-9	—
C04	M	2	Front working lamp (Right)	B-9	—
C05	M	2	Front working lamp (Left)	B-8	—
C07	KES1	2	Room lamp	C-8	—
C08	M	1	Door switch (Right) (Room Lamp)	C-8	—
C09	M	1	Door switch (Left) (Room lamp)	B-8	—
C10	-	2	Cigarette lighter	A-7	—
C12	M	6	Front wiper motor	A-7	E
C15	M	4	Rear wiper motor	F-9	E
C17	Kyoritsu ES	4	Warning lamp switch	D-9	—
C18	Plug	1	Warning lamp (Beacon)	F-9	—
C19	DT-T	6	Glass heater switch	D-9	—
C29	M	1	Glass heater ON	E-9	—
C33	H	1	Rear glass heater	E-9	—
C35	H	1	Rear glass heater	G-9	—
C39	Terminal	1	Ground	C-8	—
C40	Terminal	1	Ground	C-8	E
C41	M	1	Warning lamp	E-9	—
C43	Yazaki	6	Rear wiper switch	B-8	E
C44	M	4	Right-side wiper switch	A-7	E
C45	M	4	Left-side wiper switch	F-1	E
C46	M	1	Intermediate connector (Power supply)	D-9	E
C47	Terminal	1	Ground	F-9	E
C47	AMP172021-2	16	A/C control AMP	P-1	—
C47	AMP040	20	A/C control AMP (Auto-air conditioner vehicle)	D-9	—
C48	AMP172245-2	12	A/C control AMP	P-1	—
C48	AMP040	16	A/C control AMP (Auto-air conditioner vehicle)	D-9	—
C49	SWP	8	Left Servomotor	R-1	—
C50	SWP	8	Right Servomotor	M-3	—
C51	Yazaki	2	Diode (Auto-air conditioner vehicle)	Q-1	—
CAN1	DT-T	3	Resister	O-1	ENG
CAN2	DT-T	3	Resister	R-9	—
CHK0	X	1	Connector for inspection 0	R-1	—
CHK1	X	1	Connector for inspection 1	R-1	—
CL1	S	8	Intermediate connector	A-4	—
CL2	S (L)	12	Intermediate connector (Wiper motor)	A-4	E
CL5	S	16	Intermediate connector	M-2	—
CL6	DT-T (G)	12	Intermediate connector (Monitor panel controller)	M-2	B-3
CL6	M	6	Intermediate connector (Auto-air conditioner vehicle)	W-3	—
CL7	DT-T (Gr)	12	Intermediate connector (Monitor panel controller)	M-2	B-4
CL8	DT-T	12	Intermediate connector (Monitor panel controller)	N-1	B-4
CL9	DT-T	8	Intermediate connector (Monitor panel controller)	O-1	B-4
CL10	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	0-1	B-3
CN1	DT-T	2	Injector	Y-5	ENG
CN2	DT-T	2	Injector	Y-5	ENG
CN3	DT-T	2	Injector	Y-9	ENG
CN4	DT-T	2	Injector	Z-9	ENG
CN5	DT-T	2	Injector	Z-9	ENG
CN6	DT-T	2	Injector	AC-8	ENG

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
COMBI	M	3	Front combination lamp (Right)	A-6	MON
COMBI	M	3	Front combination lamp (Reft)	E-1	MON
DI	DT-T	2	Dust indicator	AB-9	MON
DIODE	DT-T	2	Diode (Parking brake solenoid)	AE-6	P-8
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	MON
E01	DT-T	2	Intermediate connector (Starting motor)	L-3	ENG
E02	Terminal	1	Alternator R	K-8	ENG
E03	Terminal	1	Alternator B	K-8	ENG
E04	Terminal	1	Alternator E	L-8	ENG
E06	Terminal	1	Heater relay	AC-8	ENG
E07	Terminal	1	Heater relay	AC-7	ENG
E10	DT-T	2	Compressor magnetic clutch	I-9	—
E11	DT-T	2	Diode	J-9	—
E14	Terminal	1	Ground	L-4	ENG
E28	DT	2	Diode (Engine heater relay)	Z-3	ENG
E29	Terminal	1	Engine oil pressure switch	Z-5	MON
E30	Terminal	1	Starting motor B	K-3	ENG
EL2	HD-24	31	Intermediate connector (Engine injector)	Z-1	K-6
EL3	HD-24	31	Intermediate connector (Engine)	Z-2	ENG
ER-1	DT-T	4	Intermediate connector (Starting motor)	L-4	ENG
EREV	DT-T	2	Engine speed sensor	AC-6	L-8
F01	M	6	Intermediate connector (Right head lamp)	A-5	MON
F02	M	6	Intermediate connector (Left head lamp)	D-1	MON
F03	Terminal	1	Horn	B-1	MON
F04	Terminal	1	Horn	A-1	MON
F05	Terminal	1	Horn	C-1	MON
F06	Terminal	1	Horn	C-1	MON
F07	DT-T	2	Switch pump cutoff solenoid	A-1	R-8
F09	DT-T	3	Bucket positioner proximity switch	A-3	WRK
F10	DT-T	3	Lift arm positioner proximity switch (std)	A-3	WRK
F13	DT-T	2	Lift arm damper solenoid	D-1	R-8
F14	DT-T	2	Diode (Damper solenoid)	D-1	R-8
F15	DT-T	3	Lift arm angle signal (For load meter)	A-5	WRK
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1	WRK
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1	WRK
F18	DT-T	3	Lift arm angle sensor (For boom EPC)	A-5	WRK
F19	DT-T	3	Bucket positioner proximity switch (for boom EPC)	A-3	WRK
F20	DT-T	2	Lift arm raising EPC	A-2	WRK
F21	DT-T	2	Lift arm lowering EPC	A-1	WRK
F22	DT-T	2	Bucket tilt EPC	A-1	WRK
F23	DT-T	2	Bucket damp EPC	A-1	WRK
F24	DT-T	2	ATT EXT EPC (op)	A-2	WRK
F25	DT-T	2	ATT RET EPC (op)	A-2	WRK
F26		2	Lift arm EPC cutoff solenoid	C-1	WRK
F27	DT-T	2	Diode (Boom RPC cutoff solenoid)	A-4	WRK
F28	DT-T	2	Oil temperature sensor	B-1	WRK
FF1	S	10	Intermediate connector (Head lamp)	E-1	MON
FF2	DT-T (Gr)	8	Intermediate connector (Working equipment sensor)	E-1	K-4

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
FL1	S	12	Intermediate connector (Head lamp)	V-1	J-3
FL2	DT-T (Gr)	8	Intermediate connector (Working equipment sensor)	V-2	J-4
FL3	DT-T	6	Intermediate connector (Load meter)	X-3	WRK
FS1	L	2	Intermediate connector (Fuse box)	W-7	ENG
FS2	L	2	Intermediate connector (Fuse box)	V-7	ENG
FS3	S (W)	16	Intermediate connector (Fuse box)	V-8	C-1
FS4	S (W)	12	Intermediate connector (Fuse box)	U-8	B-1
FS5	M	6	Intermediate connector (Fuse box)	V-7	MON
FS6	Plug	1	Intermediate connector (Fuse box)	V-7	—
FS7	Plug	1	Intermediate connector (Fuse box)	W-7	—
F.PS	DT-T	2	F clutch solenoid	AJ-6	N-8
F.SW	DT	2	F clutch fill switch	AJ-6	P-8
G	Yazaki	2	Engine G speed sensor	AA-5	ENG
G01	Terminal	1	Backup buzzer	L-8	Q-1
G02	Terminal	1	Backup buzzer	L-7	Q-1
G04	M	2	Rear working lamp (Left)	K-9	MON
G05	M	2	Rear working lamp (Right)	I-9	MON
GR1	DT-T	4	Intermediate connector (Fan reverse solenoid, rear working lamp)	L-7	O-4
GR2	DT-T	2	Fan reverse solenoid	J-9	Q-4
HEAD	M	3	Head lamp (Right)	A-6	MON
HEAD	M	3	Head lamp (Left)	E-1	MON
HT	Terminal	1	Engine heater relay	AC-9	ENG
L01	SWP	6	Parking brake switch	M-5	B-7
LO2	SWP	6	Dipping switch, light switch	M-4	MON
L03	SWP	6	Turn and hazard switch	M-5	MON
L04	SWP	14	Shift switch	M-3	B-7
L05	DT-T	2	S/T wheel horn switch	M-5	—
FL7	DT-T (Br)	12	Intermediate connector (Working equipment solenoid)	N-1	WRK
FL8	DT-T (G)	8	Intermediate connector (Working equipment solenoid)	N-2	WRK
FL9	DT-T	6	Intermediate connector (3rd solenoid)	N-2	WRK
L07	DT-T	6	Monitor mode/cancel switch	P-1	MON
L08	DT-T	6	Monitor INC/DEC switch	P-1	MON
L09	DT-T	2	Stop lamp switch	P-1	MON
L10	DT-T	3	Left brake pressure sensor	R-1	B-6
L11	DT-T	2	Air suspension seat	S-1	—
L12	DT-T	4	Right-hand direction switch, intermediate connector	O-7	I-7
L13	DT-T	2	Lift arm N lock switch	O-7	WRK
L14	DT-T	4	Lift arm lever KDS&HOLD	M-6	B-8
L15	DT-T	4	Bucket lever LDM cancel	M-6	WRK
L16	M	2	Intermediate connector	V-2	—
L17	M	4	24 VDC/12 VDC converter	W-5	—
L18	Yazaki	2	12 VDC socket	W-3	—
L19	M	4	Flasher unit	U-8	MON
L20	M	2	Alarm buzzer	U-8	MON
L21	S	10	Front and rear wiper switches	N-2	OTH
L22	DT-T	3	Throttle pedal	O-1	ENG
L23	DT-T	3	Low idle switch	O-1	ENG

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L25E	DT-T	2	Lift arm and bucket EPC lever	M-6	WRK
L25S	DT-T	2	PPC valve and electrical detent	N-6	WRK
L26E	DT-T	2	Lift arm and bucket EPC lever	O-7	WRK
L26S	DT-T	2	PPC valve and electrical detent	N-6	WRK
L27S	DT-T	2	PPC valve and electrical detent	N-7	WRK
L28	DT-T	4	Lift arm and bucket EPC lever	M-7	WRK
L29	DT-T	4	Lift arm and bucket EPC lever	N-6	WRK
L30	DT-T	4	3rd EPC lever	O-8	WRK
L31	M	6	Intermittent wiper timer	W-7	WIP
L34	DT-T	4	Joystick level positioner	W-6	WRK
L35	DT-T	2	Joystick EPC solenoid	P-1	WRK
L36	DT-T	2	Joystick EPC solenoid	P-1	WRK
L37	DTM	12	Joystick lever switch	Q-1	TM
L38	DT-T	3	Joystick N lock switch	W-7	TM
L39	DT-T	6	Joystick ON/OFF switch	T-1	TM
L40	DT-T	6	Steering speed mode switch	S-1	TM
L41	Relay	6	Joystick cutoff relay	M-5	WRK
L42	Plug	1	Connector (Emergency power)	A-5	—
L43	Plug	1	Connector (Emergency power)	A-5	—
L44	M	6	Intermediate connector (Printer)	V-3	MON
L45	D-sub	25	Printer	—	MON
L46	G	4	Printer	—	MON
L51	AMP070	20	Monitor panel controller	M-2	A-2
L52	AMP070	18	Monitor panel controller	M-3	MON
L53	AMP070	12	Monitor panel controller	M-3	A-2
L54	AMP070	18	Monitor panel controller	M-3	A-2
L55	AMP070	12	Monitor panel controller	M-4	A-2
L56	AMP070	12	Monitor panel controller	M-3	A-2
L57	AMP070	14	Monitor panel controller	M-4	MON
L58	AMP040	24	Monitor panel controller	M-4	—
L61	DRC23	40	Transmission and fan pump motor controller	P-8	B-8
L62	DRC23	40	Transmission and fan pump motor controller	P-8	C-8
L63	DRC23	40	Transmission and fan pump motor controller	Q-8	E-8
L71	DRC23	24	Lift arm bucket and joystick controller	Q-9	WRK
L72	DRC23	40	Lift arm bucket and joystick controller	Q-9	TM
L73	DRC23	40	Lift arm bucket and joystick controller	R-9	TM
L81	DRC23	24	Engine controller	Q-8	ENG
L82	DRC23	40	Engine controller	Q-8	L-8
L83	DRC23	40	Engine controller	Q-8	ENG
L90	DT-T	4	Modal selection connector	P-8	ENG
L100	Terminal	1	Ground	R-1	I-1
L101	S (W)	16	Intermediate connector (Relay sub-unit)	T-9	ENG
L102	S (L)	16	Intermediate connector (Relay sub-unit)	T-9	ENG
L103	S (W)	16	Intermediate connector (Relay sub-unit)	S-9	MON
L104	S (W)	16	Intermediate connector (Relay sub-unit)	T-9	WRK
L105	S (W)	12	Intermediate connector (Relay sub-unit)	T-9	—
L106	S (W)	16	Intermediate connector (Relay sub-unit)	S-9	MON
L111	-	5	Turn signal lamp and hazard relay	X-7	MON

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L112	-	5	Air cleaner clogging relay	W-7	MON
L113	—	5	Steering switching relay	W-8	D-1
L114	—	5	Automatic preheating relay	V-8	ENG
L115	—	5	Engine controller power supply relay	V-9	—
L116	—	4	Neutral safety relay	W-7	D-1
L117	—	4	Backup lamp relay	W-7	E-1
L118	—	4	Stop lamp relay	V-8	MON
L119	—	4	Horn relay	V-8	MON
L120	—	4	Parking brake relay	V-8	E-1
L123	—	5	Lift arm detent relay	X-9	—
L124	—	5	Bucket detent relay	W-9	—
L125	—	5	Lift arm damper relay	V-9	E-1
L126	—	4	Emergency steering relay	X-8	F-1
L127	—	4	Front working lamp relay	X-7	—
L128	—	4	Rear working lamp relay	X-9	MON
L129	—	4	Rear glass heater relay	V-9	—
L130	—	4	Transmission pump cutoff relay	V-9	F-1
LC.PS	DT-T	2	Torque converter lockup solenoid (op)	AJ-5	N-8
LC.SW	DT	2	Torque converter lockup fill switch (op)	AJ-5	P-8
LL1	DT-T	6	Intermediate connector (Relay)	O-7	ENG
LL2	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-7	I-6
LL3	DTHD#12	1	Intermediate connector (Ground)	N-7	ENG
LL4	DT-T (Br)	12	Intermediate connector (Throttle panel)	N-6	I-6
LL5	DT	3	Intermediate connector (Joystick vehicle)	M-5	WRK
LL6	DT-T (Gr)	12	Intermediate connector (Joystick vehicle)	Q-1	WRK
LL7	DT-T (G)	12	Intermediate connector (Joystick vehicle)	Q-1	I-7
LL8	DT-T (Gr)	8	Intermediate connector (Joystick switch)	Q-1	K-2
LR1	DTHD#12	1	Intermediate connector (Slow-blow fuse)	X-2	ENG
LR4	L	2	Intermediate connector (Slow-blow fuse)	X-1	ENG
LR5	DT-T	6	Intermediate connector (Auto-greasing controller)	X-3	MON
LR6	L	2	Intermediate connector (Ground)	X-2	ENG
LR8	DTHD#8	1	Intermediate connector (Ground)	X-2	I-2
LR9	DT-T	12	Intermediate connector (Steering, brake oil pressure switch)	X-1	I-3
LR10	DT-T	12	Intermediate connector	X-1	I-3
LT1	HD-24	31	Intermediate connector (Transmission)	W-3	I-6
NE	Yazaki	2	Engine NE speed sensor	AB-6	ENG
OL	DT-T	2	Engine oil level sensor	AC-1	MON
PB.PS	DT-T	2	Parking brake solenoid	AI-2	P-8
PB.SW	DT-T	2	Parking brake indicate switch	AI-2	Q-8
PCV1	Sumitomo	2	Supply pump (No.1)	Z-4	ENG
PCV2	Sumitomo	2	Supply pump (No.2)	AA-5	ENG
PFUEL	AMP174357-2	3	Common rail pressure signal	AB-5	ENG
PIM	Sumitomo	3	Boost pressure signal	AC-7	ENG
R01	Terminal	1	Battery relay	J-2	ENG
R02	Terminal	1	Slow-blow fuse	L-2	ENG
R03	Terminal	1	Slow-blow fuse	L-2	ENG

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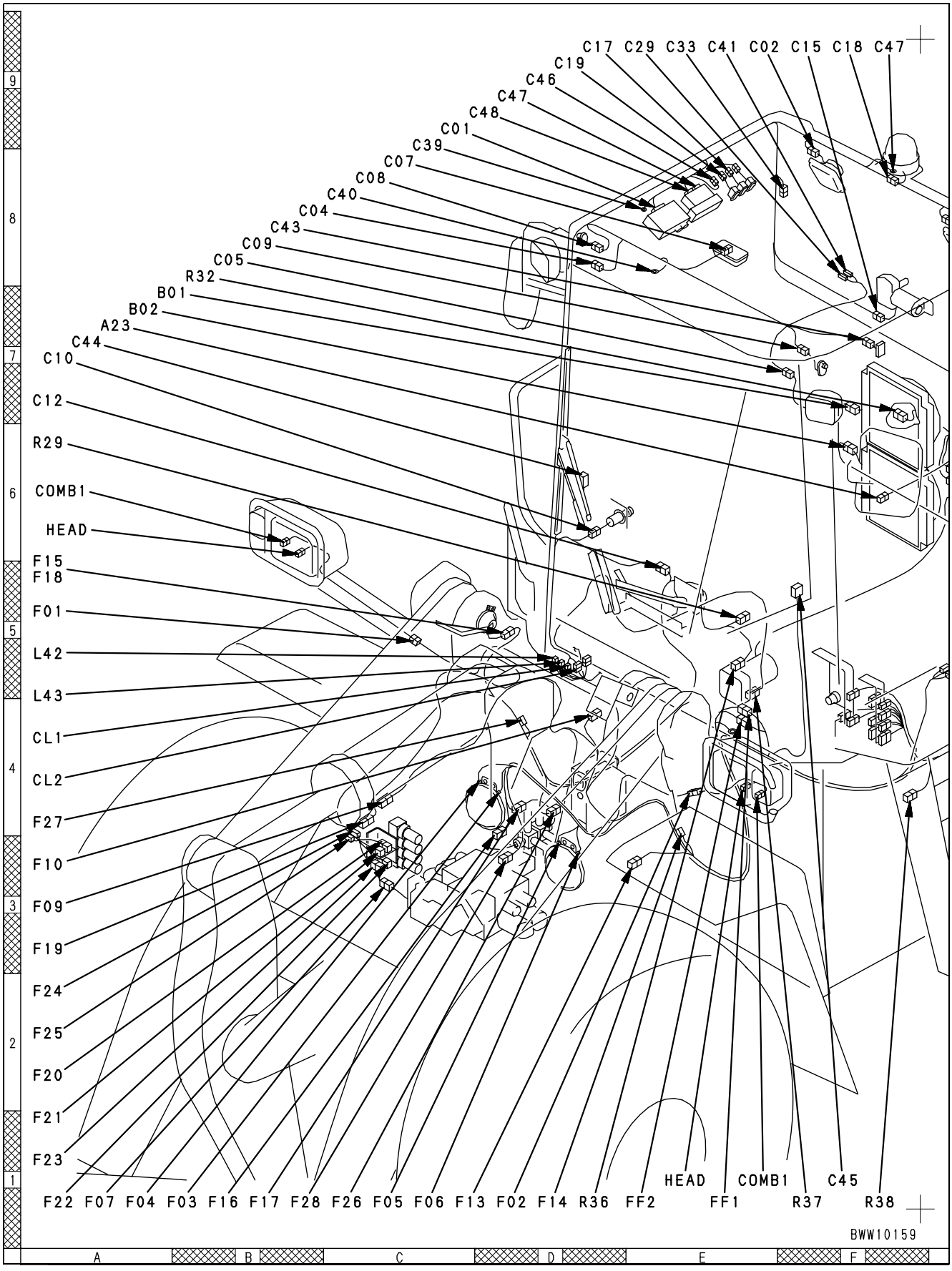
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
R04	Terminal	1	Battery relay	K-2	ENG
R05	Terminal	1	Slow-blow fuse	K-2	ENG
R06	Terminal	1	Slow-blow fuse	K-2	ENG
R11	Terminal	1	Slow-blow fuse	K-2	ENG
R13	Terminal	1	Battery relay	L-1	ENG
R14	Terminal	1	Battery relay	L-1	ENG
R15	Terminal	1	Emergency steering relay	J-1	O-1
R16	Terminal	1	Emergency steering relay	J-1	O-1
R22	Terminal	1	Battery	H-9	ENG
R23	Terminal	1	Battery	H-9	ENG
R24	DT-T	2	Diode (Battery relay)	I-1	ENG
R25	DT-T	2	Diode (Battery relay)	J-2	ENG
R26	DT-T	2	Diode (Starting motor)	H-1	ENG
R27	DT-T	2	Diode (Starting motor)	I-2	ENG
R29	DT-T	2	Oil fan EPC	A-6	Q-3
R30	M	6	Rear combination lamp (Left)	L-7	Q-2
R31	M	6	Rear combination lamp (Right)	I-9	Q-2
R32	DT-T	2	Coolant level sensor	B-8	MON
R33	DT-T	2	Fuel gauge sensor	K-3	MON
R34	M	2	License lamp	L-6	MON
R36	DT-T	3	Steering pump pressure switch	D-1	Q-3
R37	DT-T	3	Emergency steering pressure switch	F-1	Q-2
R38	DT-T	6	Auto-greasing controller	F-1	MON
R39	DT-T	2	Battery level sensor	L-6	MON
R43	KES1	2	Front windshield washer	G-1	OTH
R44	DT-T	2	Diode (Washer)	G-1	OTH
R45	KES1	2	Rear windshield washer	H-1	OTH
R46	DT-T	2	Diode (Washer)	G-1	OTH
R50	Terminal	1	Ground	H-9	M-1
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	P-3
R56	DT-T	2	Rear brake oil temperature sensor	H-1	Q-3
R63	Terminal	1	Slow-blow fuse	L-2	—
R64	Terminal	1	Ground	L-5	—
R65	DT-T	6	Auto-tilt motor switch (op)	L-5	—
R66	DT-T	2	Auto-tilt motor	H-9	—
REV OUT	DT-T	2	Speed sensor	AH-2	N-8
R.PS	DT-T	2	R clutch solenoid	AJ-6	N-8
R.SW	DT	2	R clutch fill switch	AJ-6	O-8
S01	DT-T	6	Front working lamp switch	P-1	MON
S02	DT-T	6	Rear working lamp switch	P-1	MON
S03	DT-T	6	Transmission cutoff ON/OFF switch	M-4	B-5
S04	DT-T	6	Right-hand direction ON/OFF switch	N-9	H-8
S05	DT-T	6	Transmission cutoff set switch	M-9	I-8
S06	DT-T	6	Torque converter lock-up ON/OFF switch	O-8	I-8
S07	DT-T	6	Lift arm damper ON/OFF switch	0-1	B-5
S12	DT-T	6	Remote positioner set switch (Joystick vehicle)	N-7	WRK
S13	DT-T	6	Upper remote positioner ON/OFF switch (Joystick vehicle)	N-9	WRK

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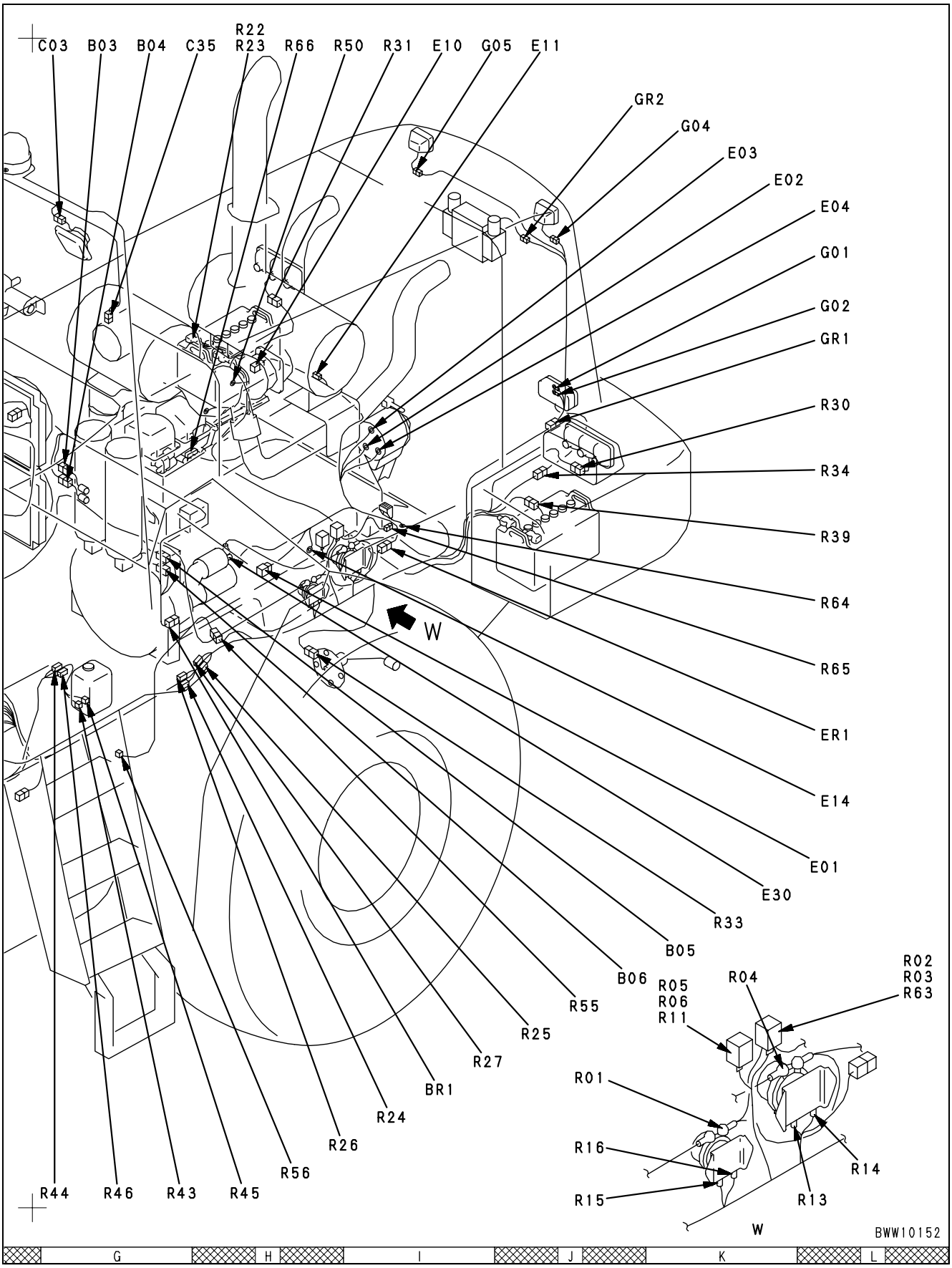
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
S14	DT-T	6	Lower remote positioner ON/OFF switch (Joystick vehicle)	N-8	WRK
S15	DT-T	6	Auto-excavation switch (Joystick vehicle	N-9	WRK
S16	DT-T	6	Emergency steering check switch	M-9	G-2
S17	DT-T	6	Auto-greasing switch	O-8	—
S19	DT-T	6	Hydraulic fan reverse switch	M-9	H-2
S21	DT-T	4	Engine power mode switch	M-8	G-8
S22	DT-T	4	Auto-shifting mode switch	N-7	H-8
S31	DT	4	Starting switch	N-7	G-2
G-2	DT	4	Starting switch	N-7	G-2
TC.C	DT-T	2	Torque converter oil temperature sensor (Monitor)	—	Q-8
TEL	DT-T (Gr)	12	Connector	Q-1	ENG
THL	DT-T	3	Fuel temperature sensor	AB-5	Q-8
TM.T	DT-T	2	Transmission oil temperature sensor	AJ-4	—
TWH	DT-T	2	Engine water temperature sensor (Monitor)	AD-2	MON
TWL	DT-T	3	Engine water temperature sensor (Preheating)	AB-1	ENG

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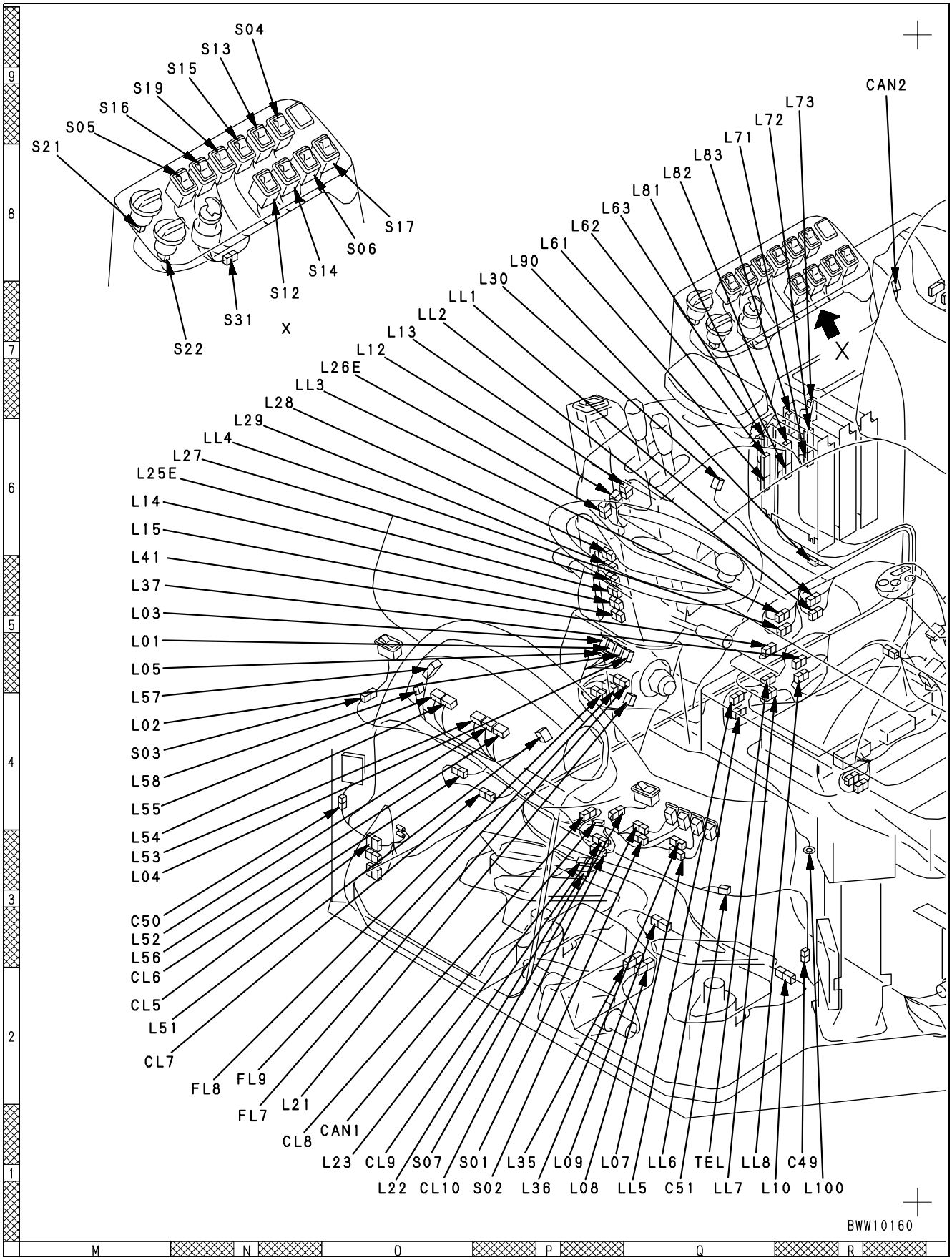
Connector layout drawing



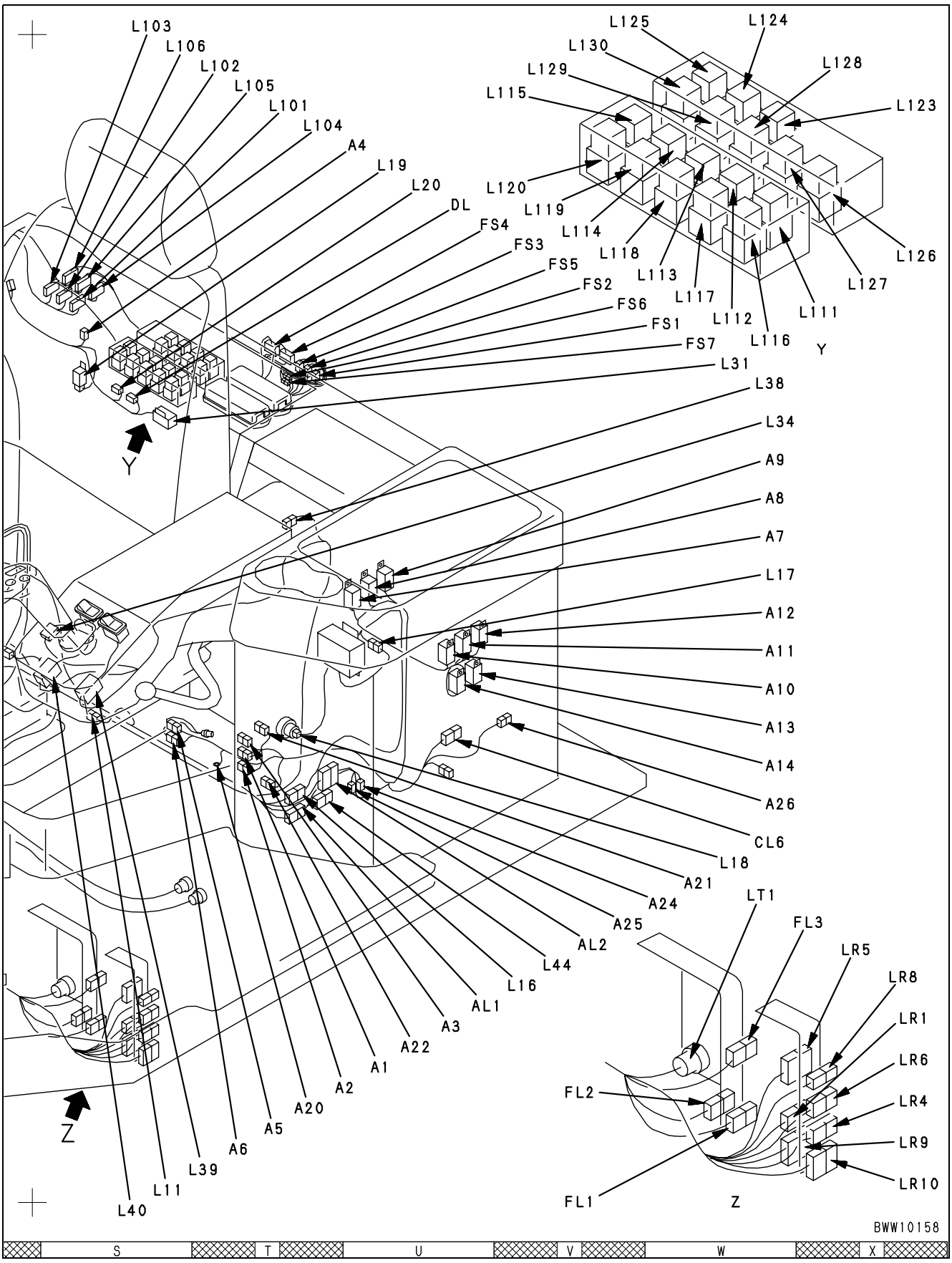
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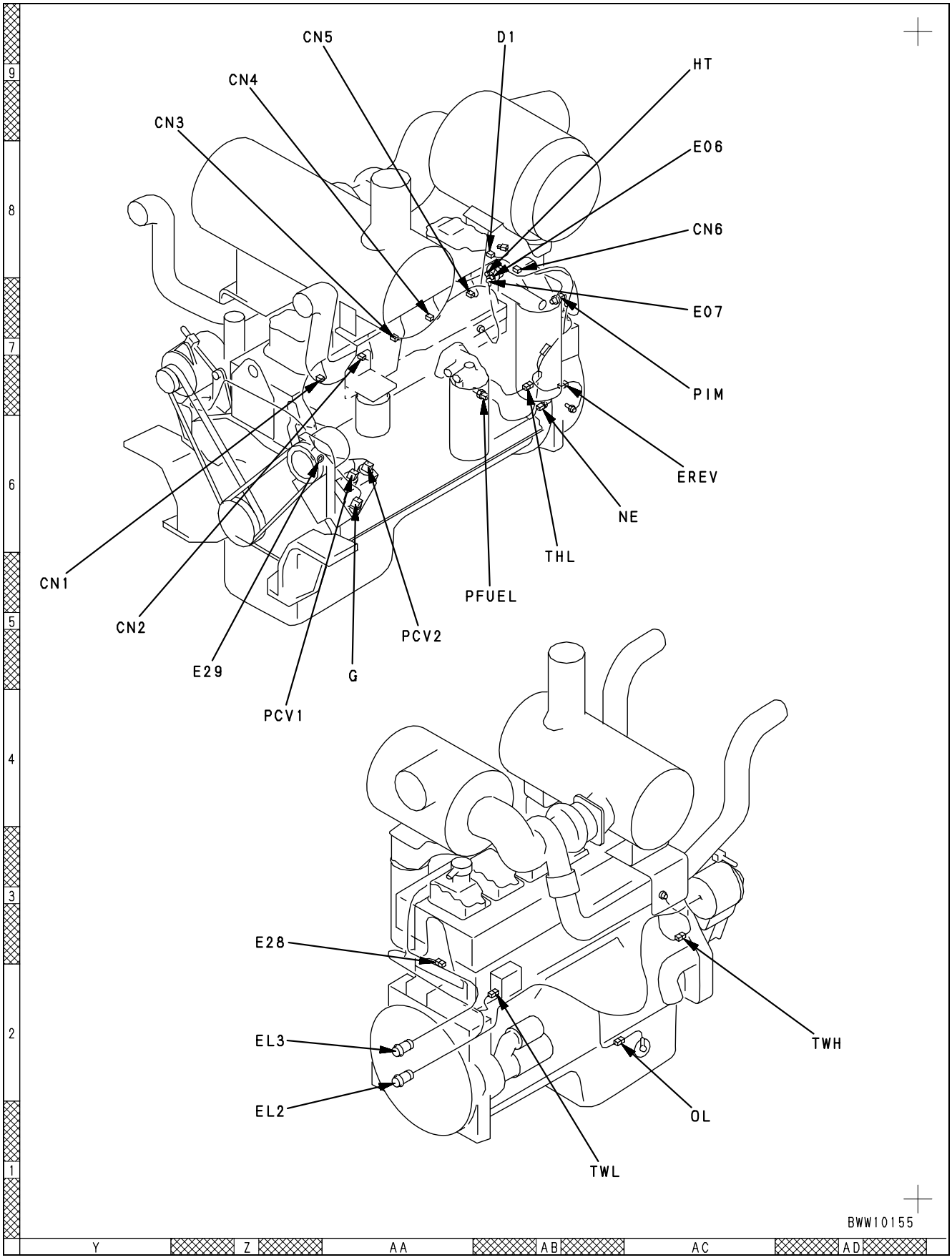
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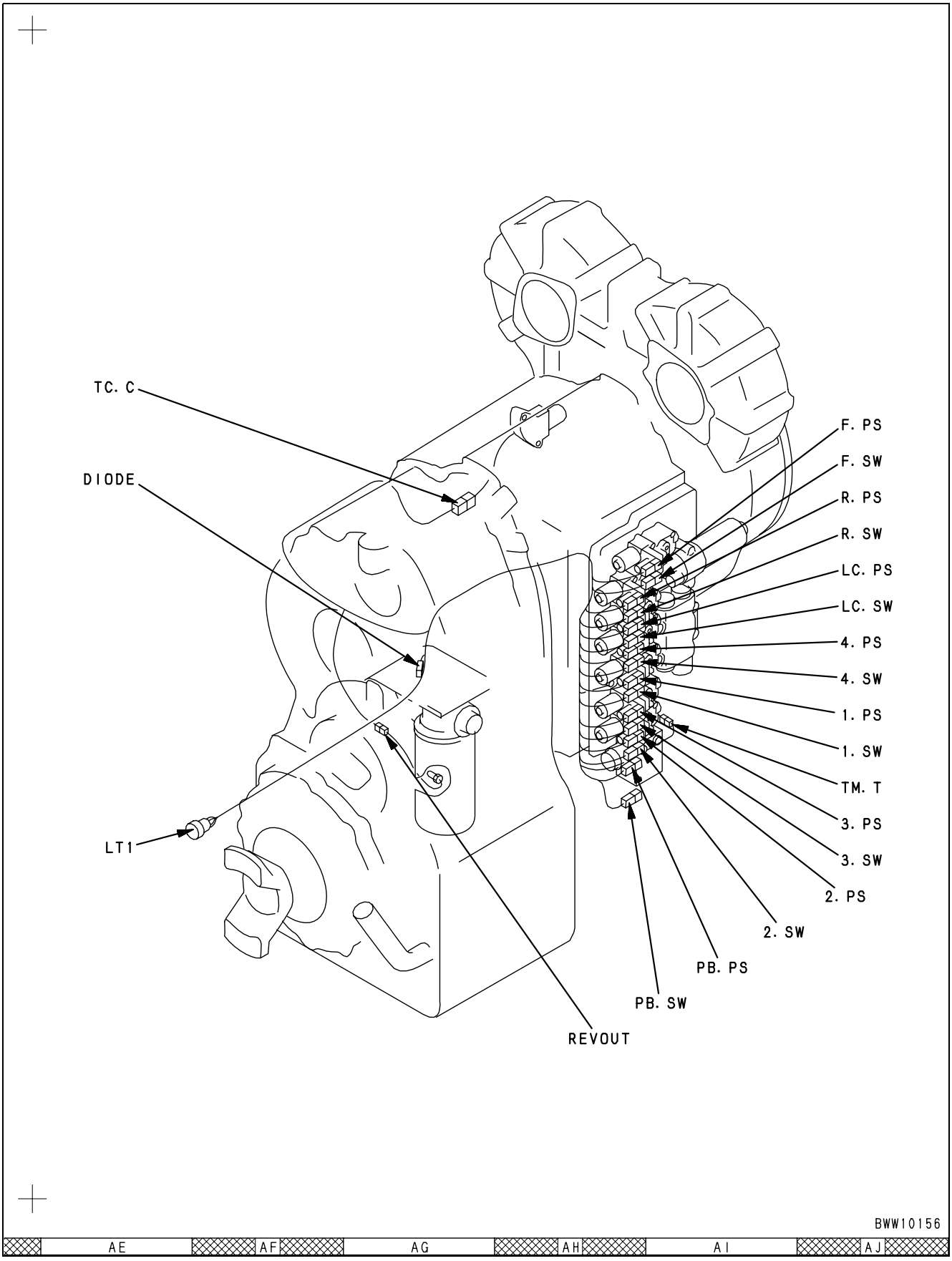
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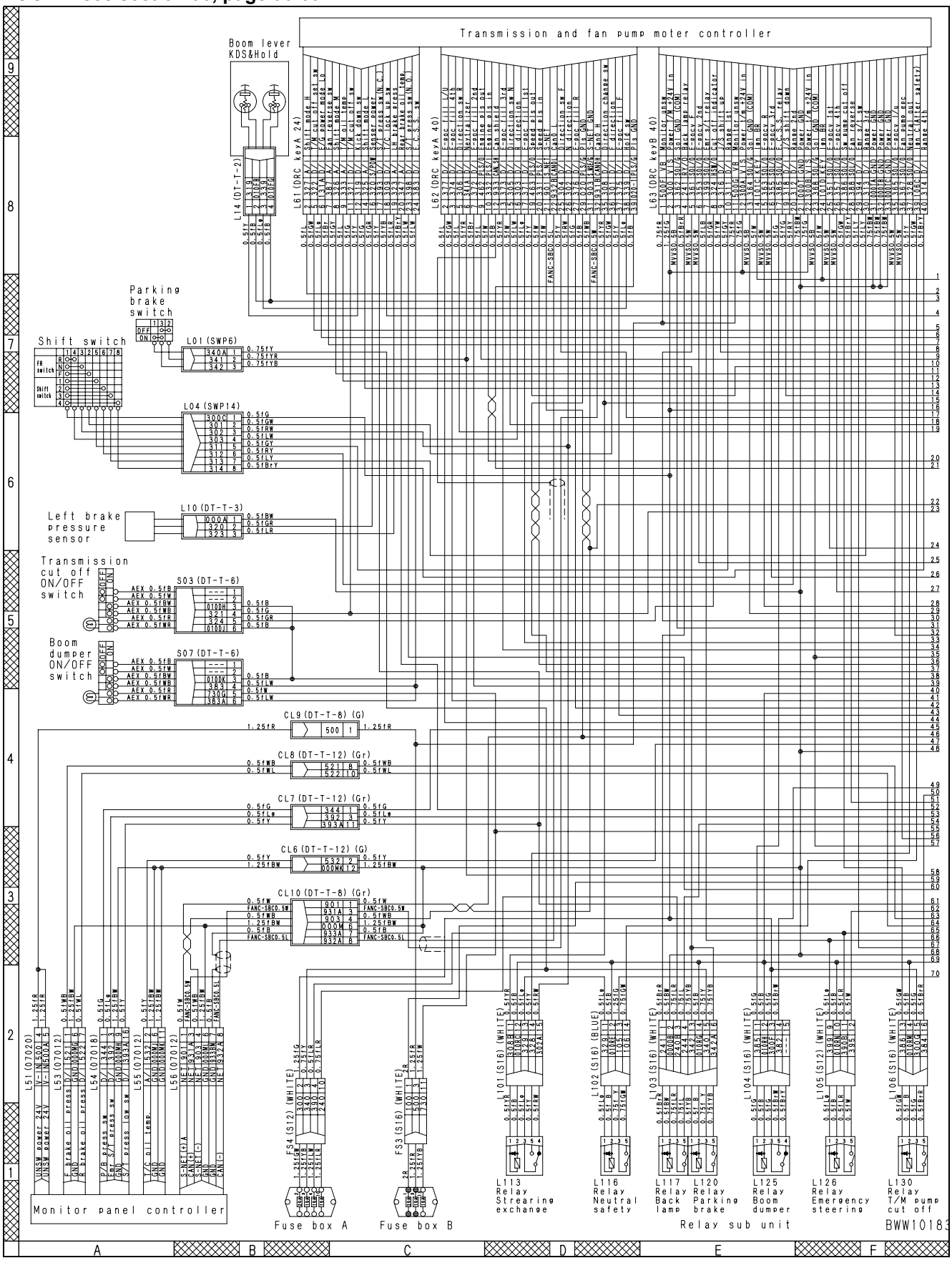
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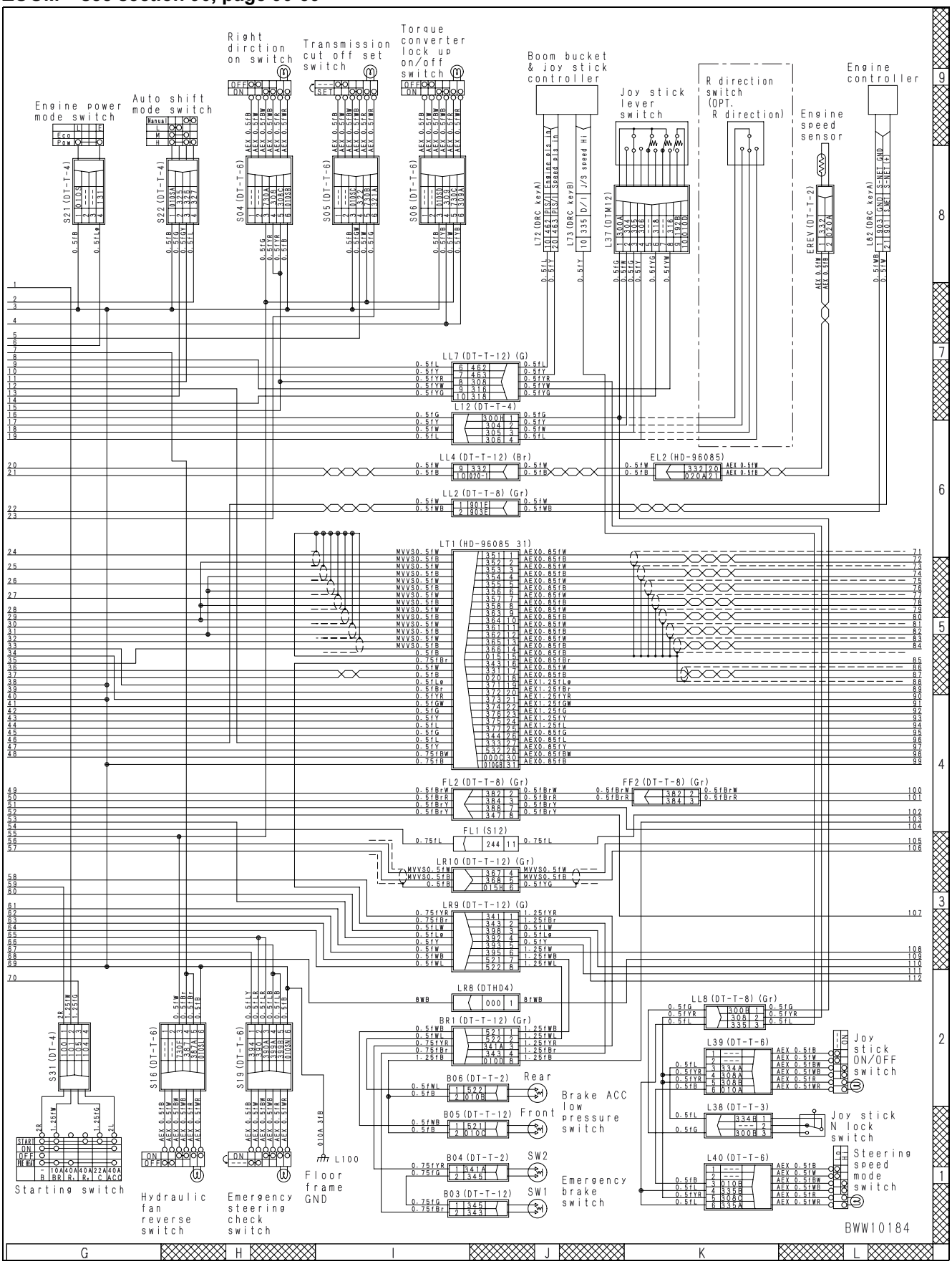
Transmission control system diagram

ZOOM – see section 90, page 90-39



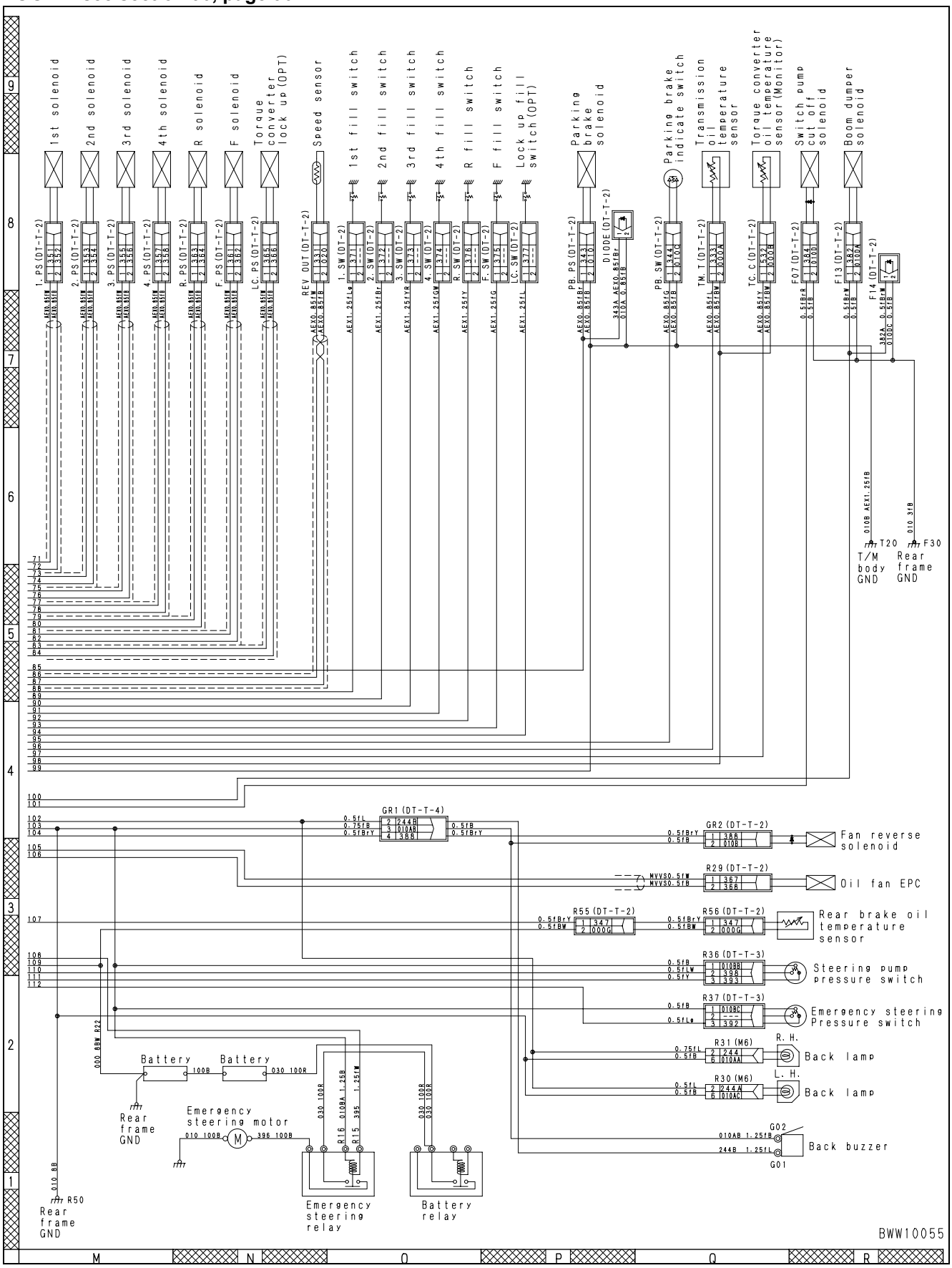
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ZOOM – see section 90, page 90-39



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ZOOM – see section 90, page 90-41



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Error code [1500L1]

Action Code	Error Code	Controller Code	Trouble	Double engagement detected
E03	1500L1	TM		
Description of Trouble	• A fill signal is input when double engagement is detected.			
Controller Reaction	• No reaction.			
Effect on Machine	—			
Related Information	—			

Possible Causes and Standard Values	Causes	Standard Values in Normal State and Remarks on Troubleshooting
	★ Refer to Error Codes 15SAL1, 15 SBL1, 15SEL1, 15SFL1, 15SGL1 and 15SHL1.	

Related Circuit Diagram

★ Refer to Error codes 15SAL1, 15 SBL1, 15SEL1, 15SFL1, 15SGL1 and 15SHL1.

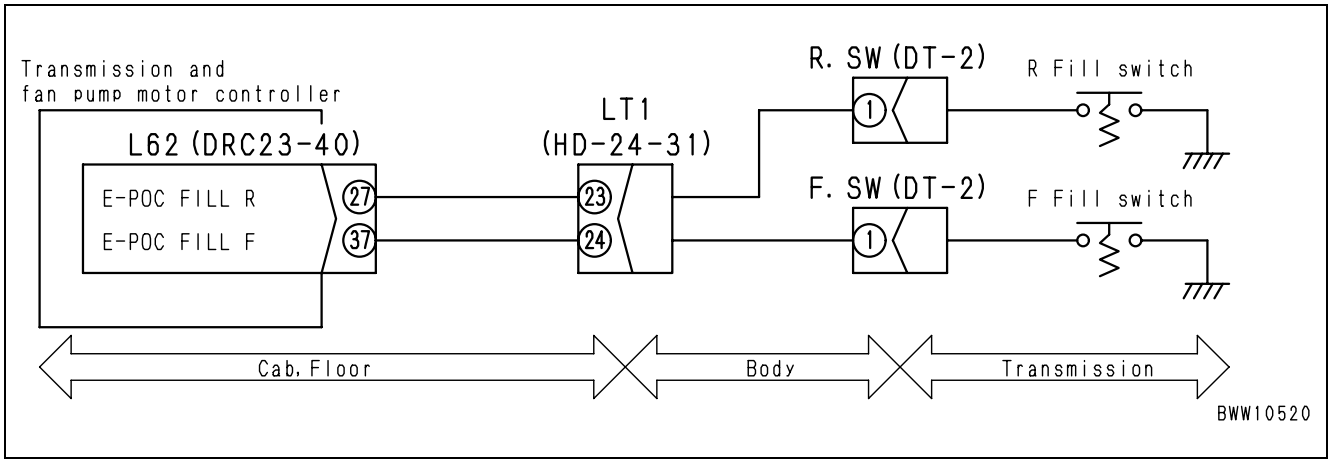
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Error code [15SAL1]

Action Code	Error Code	Controller Code	Trouble	F_ECMV fill switch system short-circuited
E03	15SAL1	TM		
Description of Trouble	• An F_ECMV fill switch signal is input when F_ECMV is OFF.			
Controller Reaction	• Assumes that the F_ECMV fill switch signal is on and turns output to “N”.			
Effect on Machine	• No travel.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-24).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective F_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector F.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between F.SW (male) (1) and body	Forward-reverse lever (Or switch) = F	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and F.SW. 3) Connect T-adapter.			
			Between L62 (female) (27)/F.SW (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Connect connector. 5) Start engine. 6) Turn transmission cut-off switch OFF. 7) Turn parking brake switch OFF. 8) Do not apply parking brake while traveling.			
			Between L62 (27) ~ body	Forward-reverse lever (Or switch) = F	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



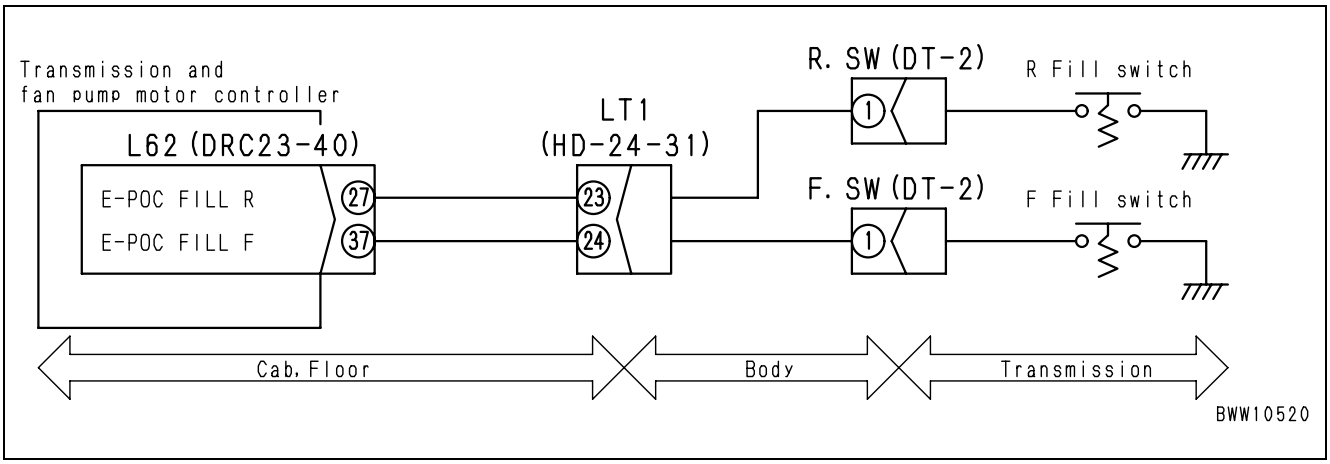
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Error code [15SALH]

Action Code	Error Code	Controller Code	Trouble	F_ECMV fill switch system disconnected
E01	15SALH	TM		
Description of Trouble	• An F_ECMV fill switch signal is input when F_ECMV is on.			
Controller Reaction	• Assumes that the F_ECMV fill switch signal is OFF and uses fill-less modulation data.			
Effect on Machine	• May not travel. • Gear shifting shock or time lag may occur on forward-travel switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-24).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective F_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector F.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between F.SW (male) (1) ~ body	Forward-reverse lever (Or switch) = F	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and F.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (27) ~ F.SW (female) (1)		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Connect connector. 5) Start engine. 6) Turn transmission cut-off switch OFF. 7) Turn parking brake switch OFF. 8) Do not apply parking brake while traveling.			
			Between L62 (27) ~ body	Forward-reverse lever (Or switch) = F	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



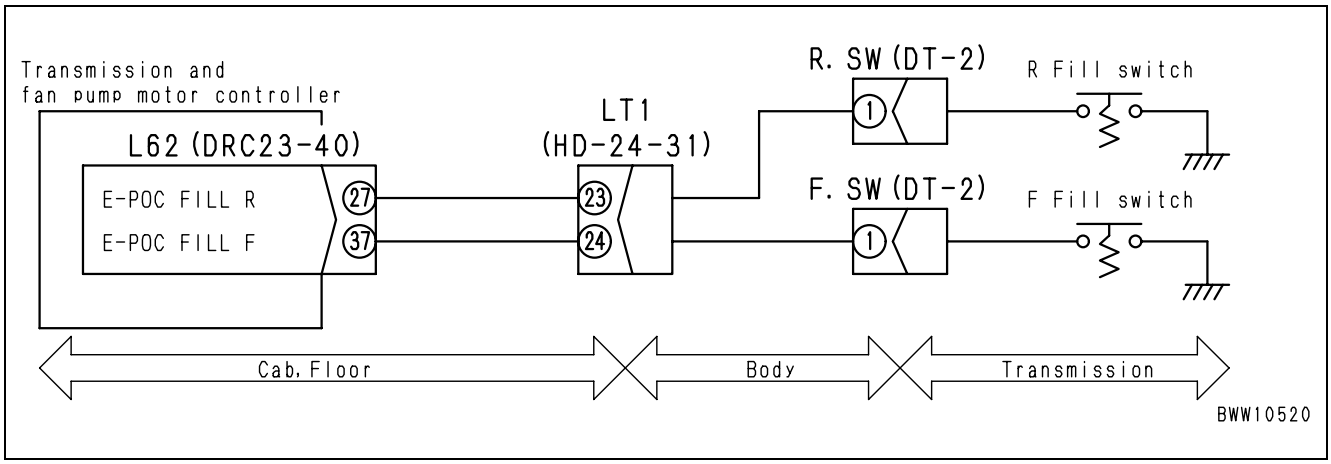
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Error code [15SBL1]

Action Code	Error Code	Controller Code	Trouble	R_ECMV fill switch system short-circuited
E03	15SBL1	TM		
Description of Trouble	• An R_ECMV fill switch signal is input when R_ECMV is OFF.			
Controller Reaction	• Assumes that the R_ECMV fill switch signal is on and turns output to “N”.			
Effect on Machine	• No travel.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-25).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective R_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector R.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between R.SW (male) (1) ~ body	Forward-reverse lever (Or switch) = R	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and R.SW. 3) Connect T-adapter.			
			Between L62 (female) (37)/R.SW (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between L62 (37) ~ body	Forward-reverse lever (Or switch) = R	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



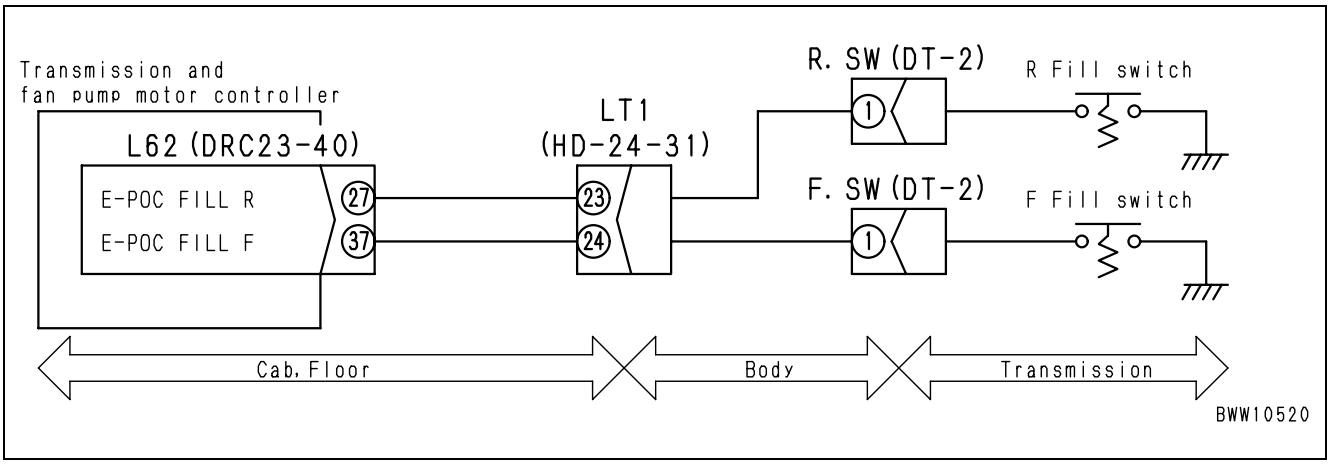
https://truckmanualshub.com/

Error code [15SBLH]

Action Code	Error Code	Controller Code	Trouble	R_ECMV fill switch system disconnected
E01	15SBLH	TM		
Description of Trouble	• An R_ECMV fill switch signal is input when R_ECMV is on.			
Controller Reaction	• Assumes that the R_ECMV fill switch signal is OFF and uses fill-less modulation data.			
Effect on Machine	• May not travel. • Gear shifting shock or time lag may occur on reverse-travel switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-25).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective R_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector R.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between R.SW (male) (1) ~ body	Forward-reverse lever (Or switch) = R	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and R.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (37) ~ R.SW (female) (1)		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between L62 (37) ~ body	Forward-reverse lever (Or switch) = R	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



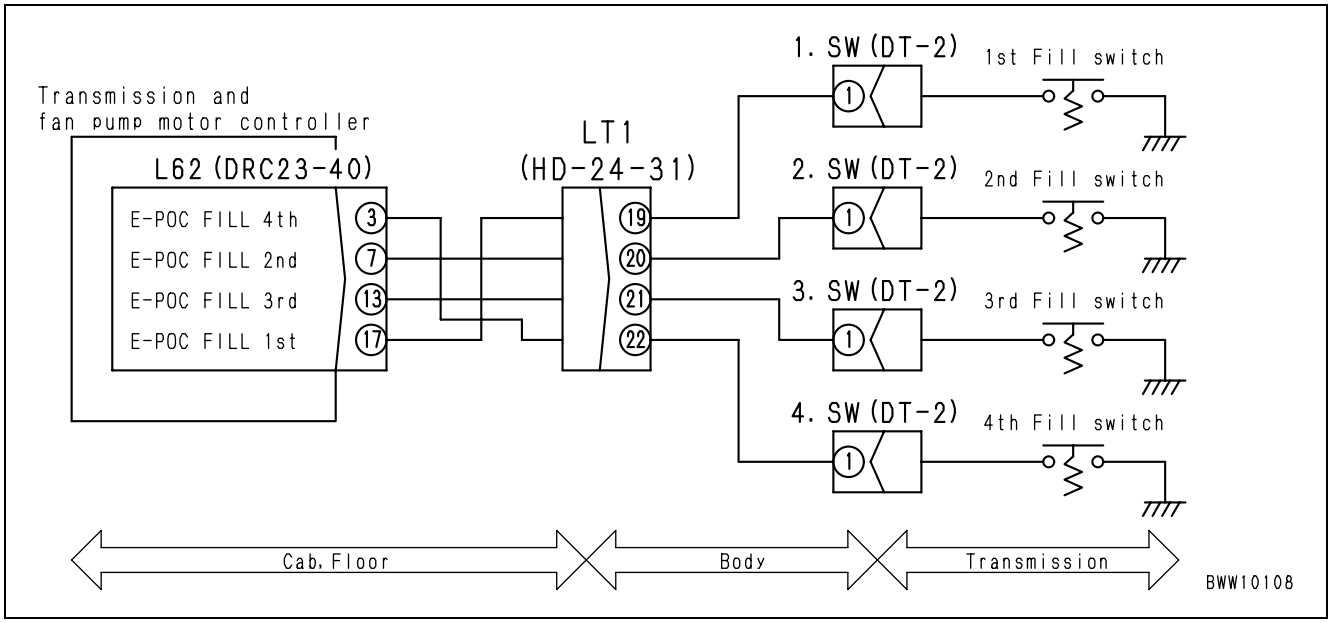
https://truckmanualshub.com/

Error code [15SEL1]

Action Code	Error Code	Controller Code	Trouble	1st_ECMV fill switch system short-circuited
E03	15SEL1	TM		
Description of Trouble	• A 1st_ECMV fill switch signal is input when 1st_ECMV is OFF.			
Controller Reaction	• Assumes that the 1st_ECMV fill switch signal is on and turns speed clutch output OFF.			
Effect on Machine	• No travel.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-26).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 1st_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 1.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 1.SW (male) (1) ~ body	Gear shift lever = 1st speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 1.SW. 3) Connect T-adapter.			
			Between L62 (female) (17)/1.SW (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Connect connector. 5) Start engine. 6) Turn transmission cut-off switch OFF. 7) Turn parking brake switch OFF. 8) Do not apply parking brake while traveling. 9) Turn manual/auto shift selector switch to “Manual”. 10) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 (17) ~ body	Gear shift lever = 1st speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



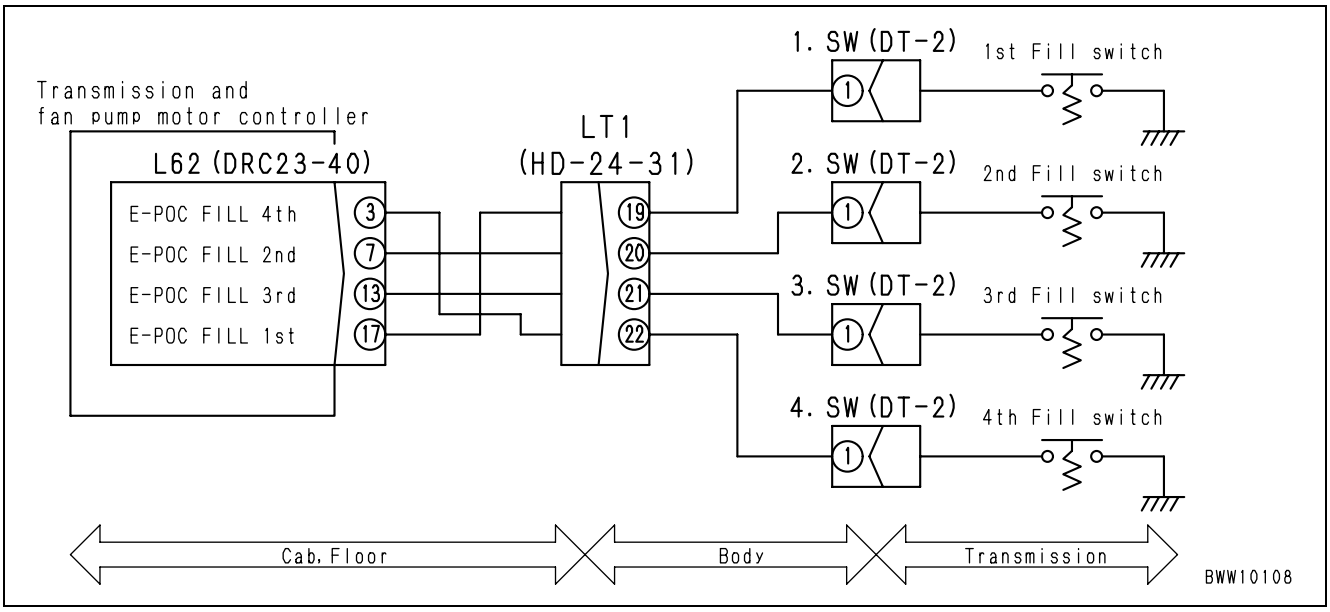
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Error code [15SELH]

Action Code	Error code	Controller code	Trouble	1st_ECMV fill switch system disconnected
E01	15SELH	TM		
Description of Trouble	• No 1st_ECMV fill switch signal is input when 1st_ECMV is on.			
Controller Reaction	• Assumes that the 1st_ECMV fill switch signal is OFF and turns speed clutch output OFF.			
Effect on Machine	• May not travel at 1st speed. • Gear shifting shock or time lag may occur on 1st-speed-travel switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-26).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 1st_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 1.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 1.SW (male) (1) ~ body	Gear shift lever = 1st speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 1.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (17) ~ 1.SW (female) (1)		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to “Manual”. 9) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 (17) ~ body	Gear shift lever = 1st speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related Circuit Diagram



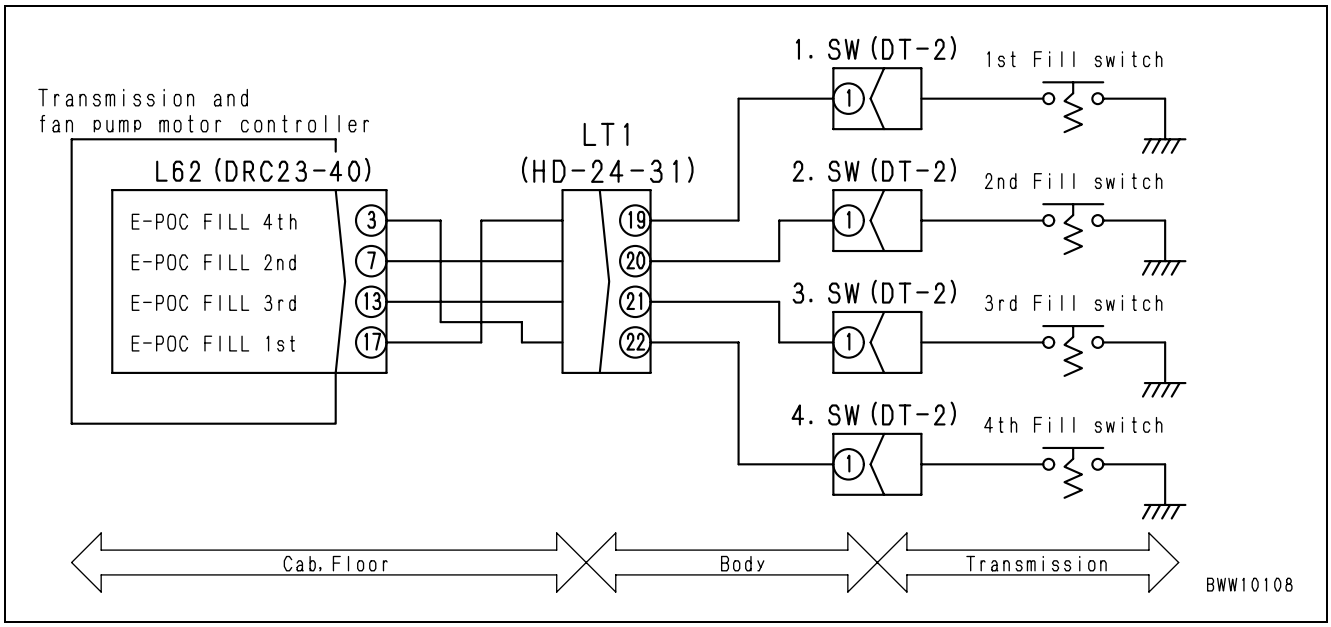
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Error code [15SFL1]

Action Code	Error Code	Controller Code	Trouble	2nd_ECMV fill switch system short-circuited
E03	15SFL1	TM		
Description of Trouble	• A 2nd_ECMV fill switch signal is input when 2nd_ECMV is OFF.			
Controller Reaction	• Assumes that the 2nd_ECMV fill switch signal is on and turns speed clutch output OFF.			
Effect on Machine	• No travel.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-27).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 2nd_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 2.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 2.SW (male) (1) ~ body	Gear shift lever = 2nd speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 2.SW. 3) Connect T-adapter.			
			Between L62 (female) (7)/2.SW (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to “Manual”. 9) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 (7) ~ body	Gear shift lever = 2nd speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



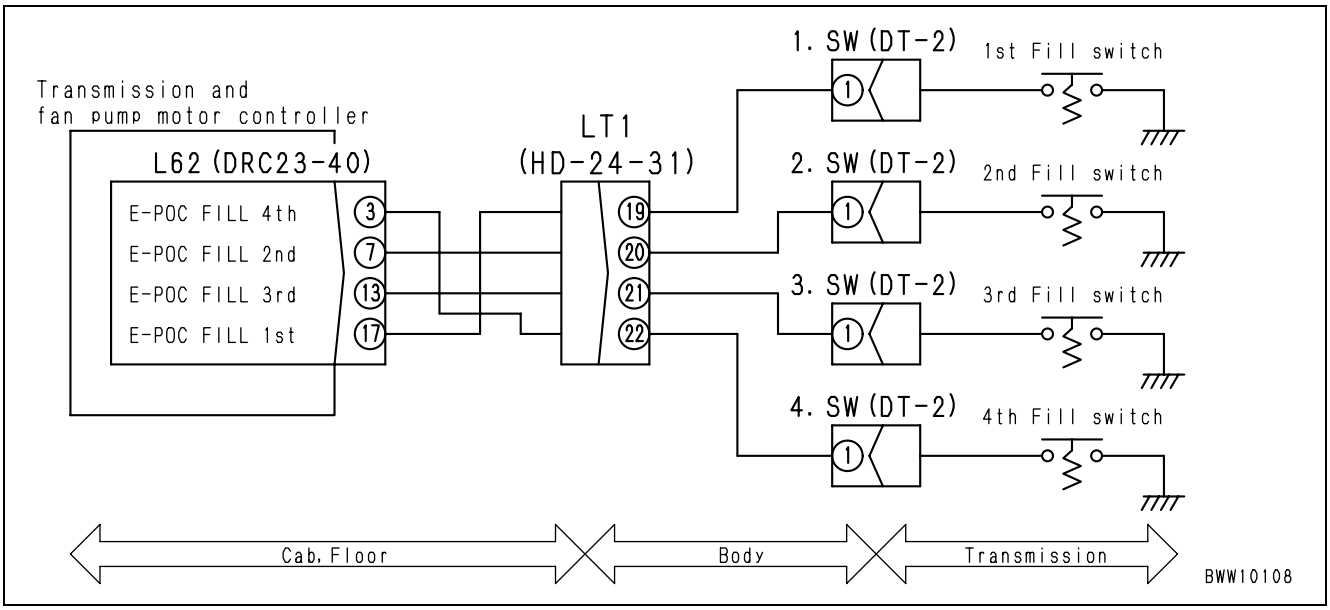
https://truckmanualshub.com/

Error code [15SFLH]

Action Code	Error Code	Controller Code	Trouble	2nd_ECMV fill switch system disconnected
E01	15SFLH	TM		
Description of Trouble	• No 2nd_ECMV fill switch signal is input when 2nd_ECMV is ON.			
Controller Reaction	• Assumes that the 2nd_ECMV fill switch signal is OFF and uses fill-less modulation data.			
Effect on Machine	• May not travel at 2nd speed. • Gear shifting shock or time lag may occur on 2nd-speed-travel switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-27).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 2nd_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 2.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 2.SW (male) (1) ~ body	Gear shift lever = 2nd speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 2.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (7) ~ 2.SW (female) (1)		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to “Manual”. 9) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 (7) ~ body	Gear shift lever = 2nd speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



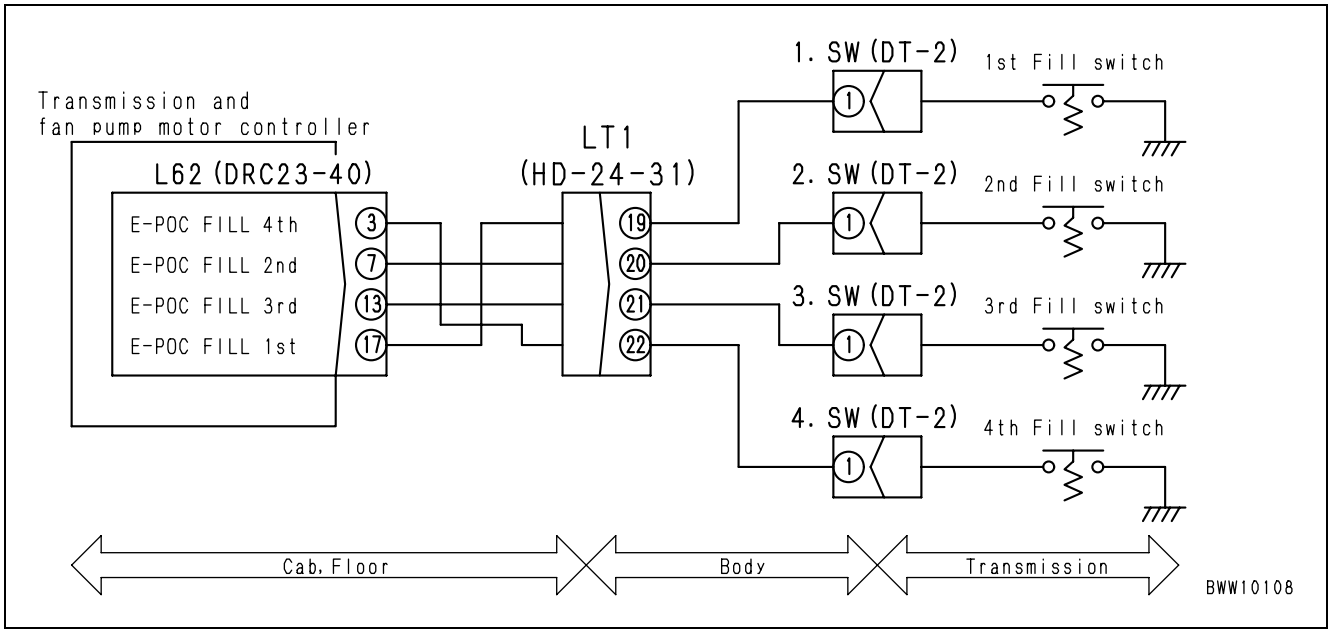
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Error code [15SGL1]

Action Code	Error Code	Controller Code	Trouble	3rd_ECMV fill switch system short-circuited
E03	15SGL1	TM		
Description of Trouble	• A 3rd_ECMV fill switch signal is input when 3rd_ECMV is OFF.			
Controller Reaction	• Assumes that the 3rd_ECMV fill switch signal is on and turns speed clutch output OFF.			
Effect on Machine	• No travel.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-28).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 3rd_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 3.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 3.SW (male) (1) ~ body	Gear shift lever = 3rd speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 3.SW. 3) Connect T-adapter.			
			Between L62 (female) (17)/3.SW (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to “Manual”. 9) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 (17) ~ body	Gear shift lever = 3rd speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



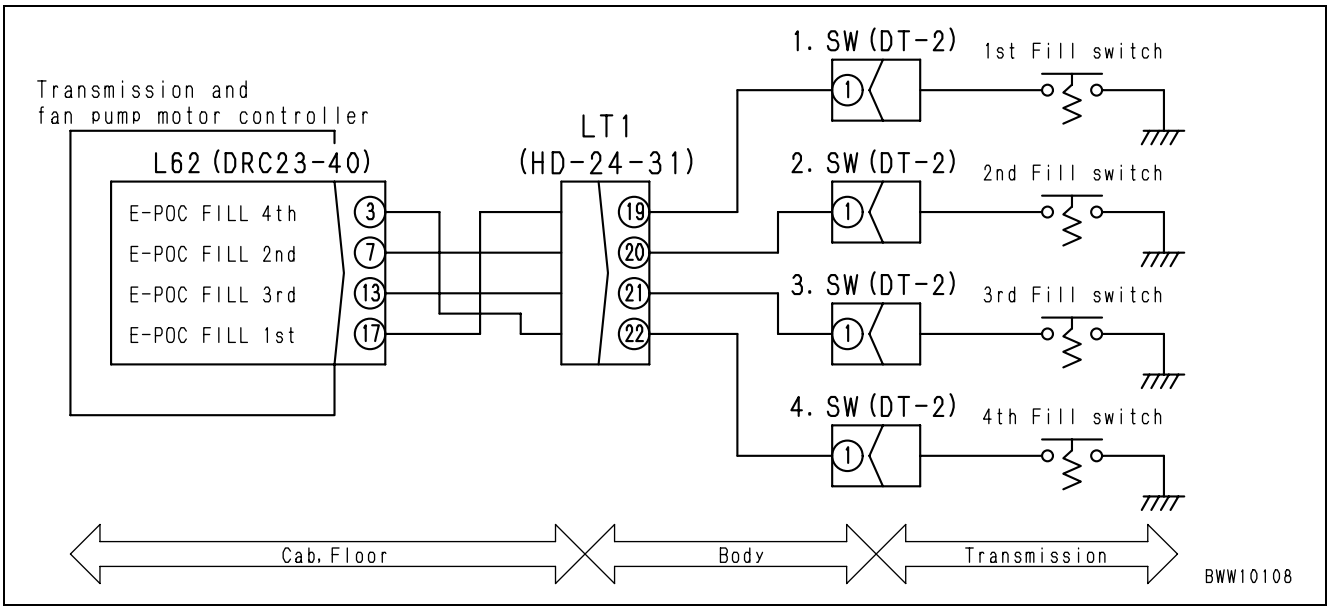
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Error code [15SGLH]

Action Code	Error Code	Controller Code	Trouble	3rd_ECMV fill switch system disconnected
E01	15SGLH	TM		
Description of Trouble	• No 3rd_ECMV fill switch signal is input when 3rd_ECMV is ON.			
Controller Reaction	• Assumes that the 3rd_ECMV fill switch signal is OFF and uses fill-less modulation data.			
Effect on Machine	• May not travel at 3rd speed. • Gear shifting shock or time lag may occur on 3rd-speed-travel switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-28).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 3rd_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 3.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 3.SW (male) (1) ~ body	Gear shift lever = 3rd speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 3.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (13) ~ 3.SW (female) (1)		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to “Manual”. 9) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 (13) ~ body	Gear shift lever = 3rd speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



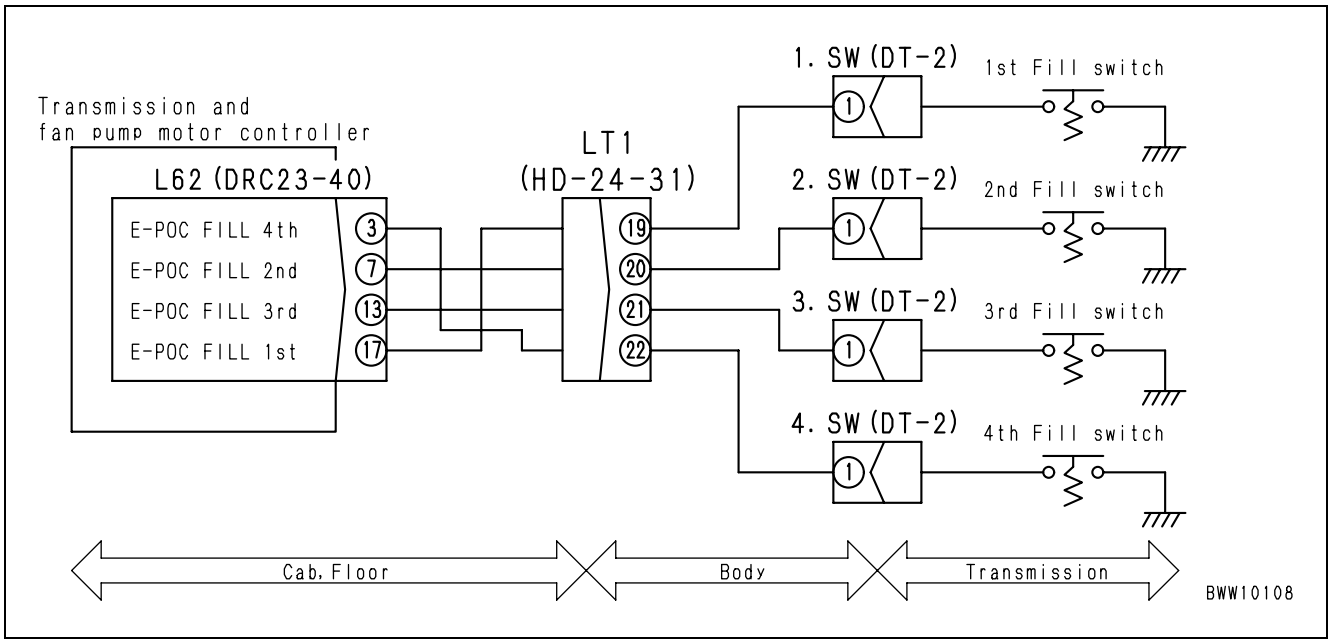
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Error code [15SHL1]

Action Code	Error Code	Controller Code	Trouble	4th_ECMV fill switch system short-circuited
E03	15SHL1	TM		
Description of Trouble	• A 4th_ECMV fill switch signal is input when 4th_ECMV is OFF.			
Controller Reaction	• Assumes that the 4th_ECMV fill switch signal is on and turns speed clutch output OFF.			
Effect on Machine	• No travel.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-29).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 4th_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 3.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 4.SW (male) (1) ~ body	Gear shift lever = 4th speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 4.SW. 3) Connect T-adapter.			
			Between L62 (female) (3)/4.SW (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to “Manual”. 9) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 (3) ~ body	Gear shift lever = 4th speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



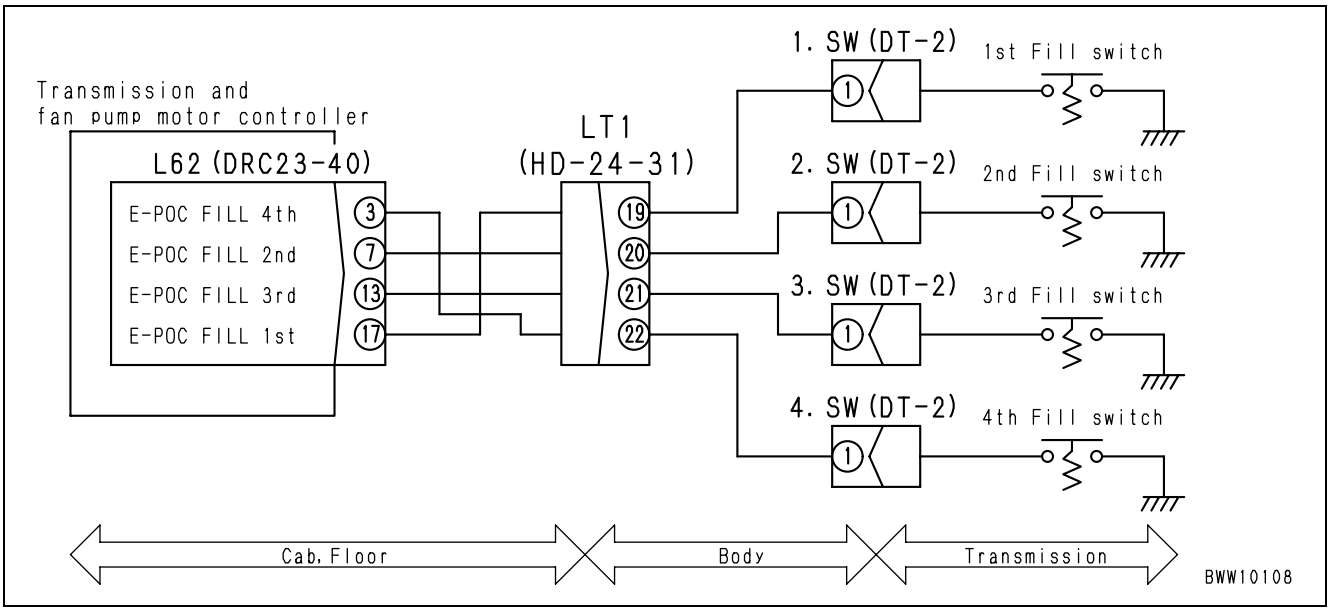
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Error code [15SHLH]

Action Code	Error Code	Controller Code	Trouble	4th_ECMV fill switch system disconnected
E01	15SHLH	TM		
Description of Trouble	• No 4th_ECMV fill switch signal is input when 4th_ECMV is on.			
Controller Reaction	• Assumes that the 4th_ECMV fill switch signal is OFF and uses fill-less modulation data.			
Effect on Machine	• May not travel at 4th speed. • Gear shifting shock or time lag may occur on 4th-speed-travel switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-29).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 4th_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 4.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 4.SW (male) (1) ~ body	Gear shift lever = 4th speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 4.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (3) ~ 4.SW (female) (1)		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to "Manual". 9) Turn forward-reverse lever (Or switch) to "F" or "R".			
			Between L62 (3) ~ body	Gear shift lever = 4th speed	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



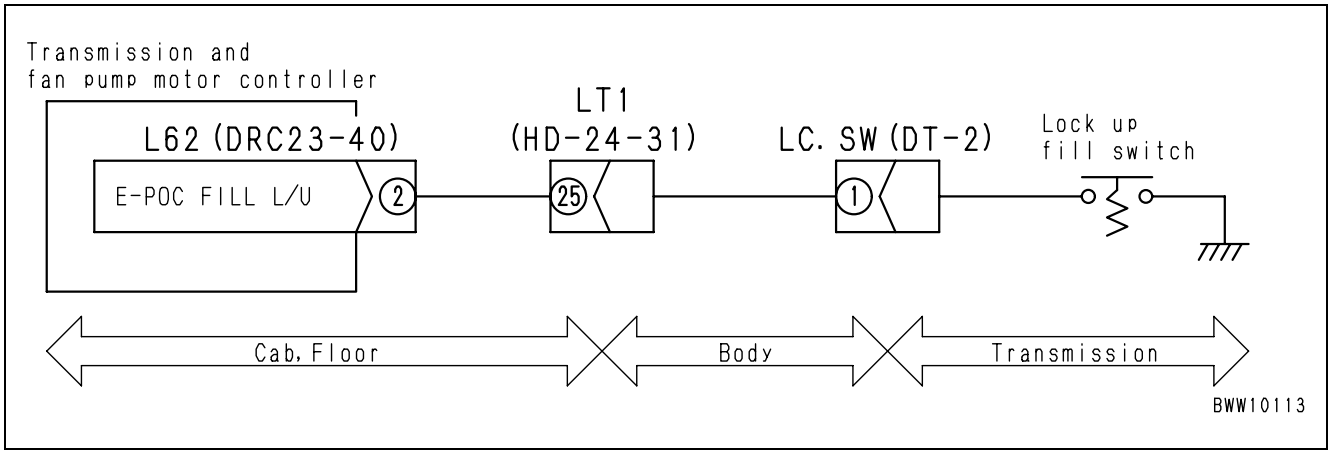
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Error code [15SJL1]

Action Code	Error Code	Controller Code	Trouble	Lockup_ECMV fill switch system short-circuited
E03	15SJL1	TM		
Description of Trouble	• A Lockup_ECMV fill switch signal is input when Lockup_ECMV is OFF			
Controller Reaction	• Assumes that the Lockup_ECMV fill switch signal is on and turns output OFF.			
Effect on Machine	• No travel.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-30).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and LC.SW. 3) Connect T-adapter.			
			Between L62 (female) (2)/LC.SW (female) (1) ~ body		Resistance	1 MΩ and above
	2	Defective transmission and fan pump motor controller or lockup_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine.			
			Betwen L62 (2) ~ body	Lockup = ON	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



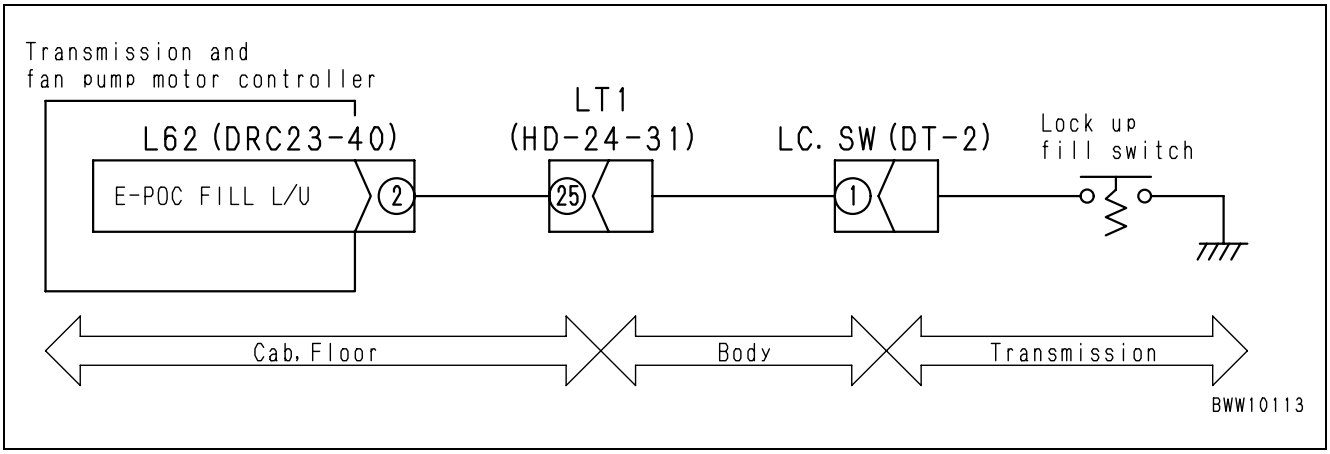
https://truckmanualshub.com/

Error code [15SJLH]

Action Code	Error Code	Controller Code	Trouble	Lockup_ECMV fill switch system disconnected
E03	15SJLH	TM		
Description of Trouble	• No Lockup_ECMV fill switch signal is input when Lockup_ECMV is ON.			
Controller Reaction	• Assumes that the Lockup_ECMV fill switch signal is OFF and uses fill-less modulation data.			
Effect on Machine	• May not be locked up. • Gear shifting shock or time lag may occur on lockup switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-30).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and LC.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (2) ~ LC.SW (female) (1)		Resistance	1 Ω and below
	2	Defective transmission and fan pump motor controller or lockup_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine.			
			Between L62 (2) ~ body	Lockup = ON	Voltage	1 V and below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



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Error code [989F00]

Action Code	Error Code	Controller Code	Trouble	Transmission protection caution
E00	989F00	TM		
Description of Trouble	• Not considered to be a failure. • The travel speed exceeds the allowable speed of the transmission on down shifting. • The allowable speed of the transmission is exceeded on FR gear shifting. • The travel speed exceeds 38km/h.			
Controller Reaction	• Issues a warning to attract operator's attention on FR gear shifting in auto shift mode.			
Effect on Machine	• May be started at 2nd speed during FR gear shifting in auto shift mode. • Down shifting may not be possible when the accelerator is fully pushed down.			
Related Information	• Refer to "Structure and Operation" (Transmission protection, travel speed warning, and engine overrun functions).			

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Error code [989G00]

Action Code	Error Code	Controller Code	Trouble	FNR lever priority caution
E00	989G00	TM		
Description of Trouble	• Not considered to be a failure. • The positions of the gear shift lever and each FNR selector switch are not normal when the joystick or right FNR switch is used.			
Controller Reaction	• Gives priority to gear shift lever FNS signals to control gear shifting.			
Effect on Machine	• Gear shifting cannot be controlled using the joystick or right FNR switch.			
Related Information	• Refer to "Structure and Operation" (Right FNR switch selection and joystick steering gear shift functions).			

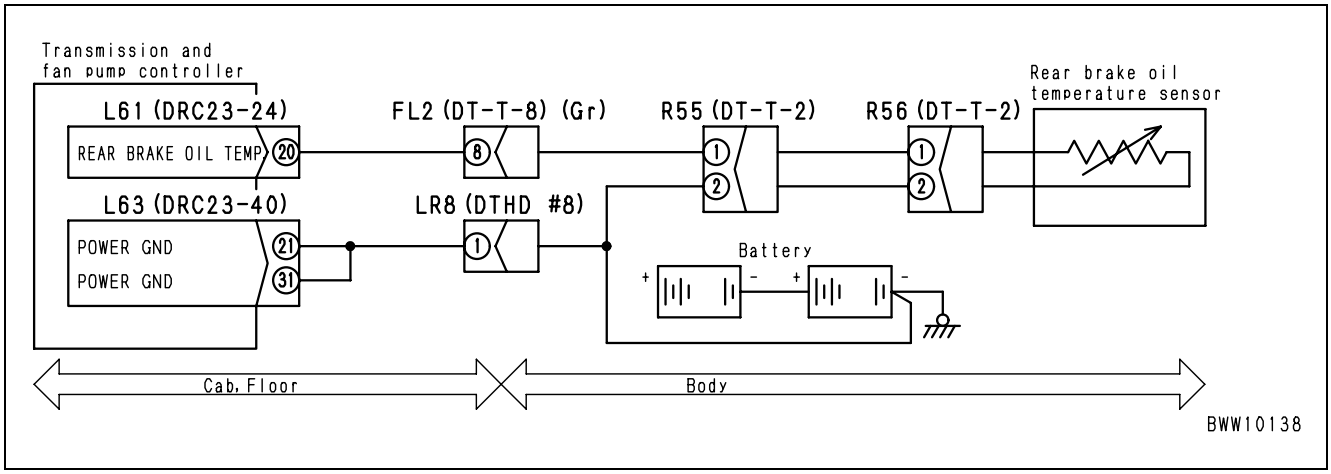
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Error code [B@C7NS]

Action Code	Error Code	Controller Code	Trouble	Rear brake cooling oil overheat
E02	B@C7NS	TM		
Description of Trouble	• Rear brake overheat.			
Controller Reaction	• No reaction.			
Effect on Machine	• Brake may be broken. • A rear brake overheat warning is displayed.			
Related Information	• Can be checked with the monitoring function (Code: 30202 R BRAKE OIL).			

Possible Causes and Standard Values		Causes	Standard Values in Normal State and Remarks on Troubleshooting			
	1	Defective rear brake oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector R56. 3) Connect T-adapter.			
			Between R56 (male) (1) ~ (2)	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter.			
			Between L61 (female) (20) ~ (31)	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



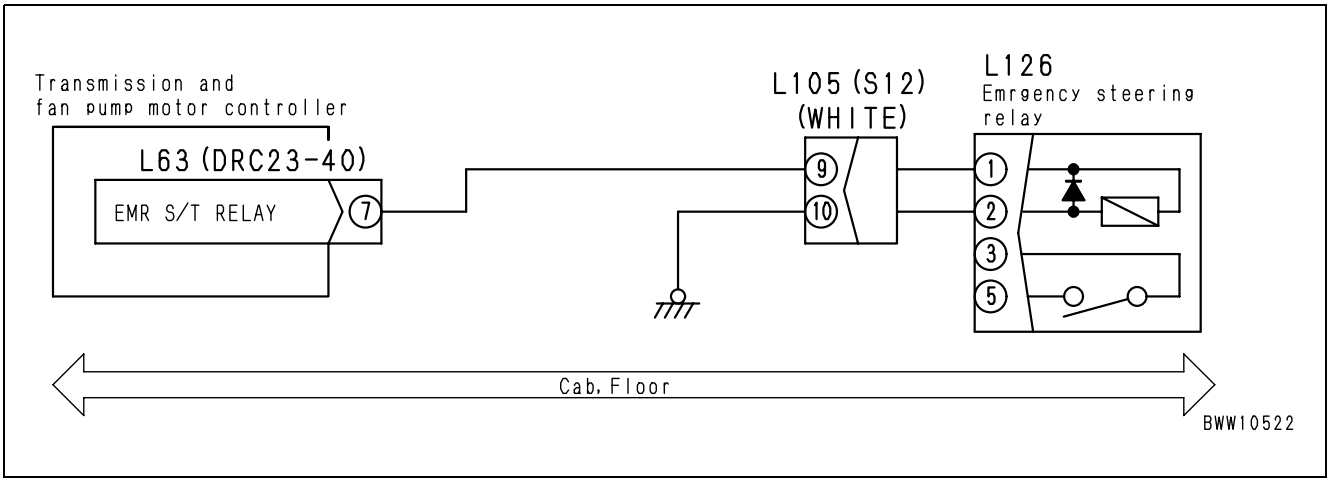
https://truckmanualshub.com/

Error code [D150KA]

Action Code	Error Code	Controller Code	Trouble	Emergency steering relay output system disconnected
E03	D150KA	TM		
Description of Trouble	• No signal is output to the emergency steering relay due to disconnection.			
Controller Reaction	• No reaction.			
Effect on Machine	• The electric emergency steering motor does not rotate.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective emergency _steering realy (L126)	1) Turn starting switch OFF 10 or more seconds after starting engine. 2) Replace relay. 3) Turn starting switch ON (at self-check).		
			This Error code (D150KA) issued	Relay L126 is not defective	
			This Error code (D150KA) not issued	Relay L126 is defective	
			1) Turn starting switch OFF. 2) Disconnect connector L105. 3) Connect T-adapter.		
			Between L105 (male) (9) ~ (10)	Resistance	200 ~ 400 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L105. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (7) ~ L105 (female) (9)	Resistance	1 Ω and below
			Wiring harness between L105 (female) (10) ~ body	Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (7) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



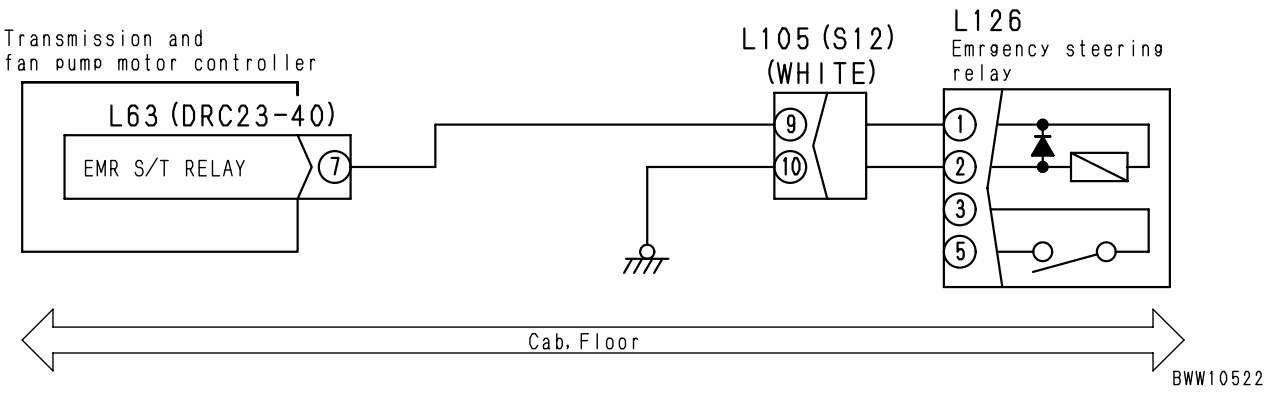
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Error code [D150KB]

Action Code	Error Code	Controller Code	Trouble	Emergency steering relay output system grounded
E03	D150KB	TM		
Description of Trouble	• No signal is output to the emergency steering relay due to disconnection.			
Controller Reaction	• No reaction.			
Effect on Machine	• The electric emergency steering motor does not rotate.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective emergency steering realy (L126)	1) Turn starting switch OFF 10 or more seconds after starting engine. 2) Replace relay. 3) Turn starting switch ON (at self-check).		
			This Error code (D150KA) issued	Relay L126 is not defective	
			This Error code (D150KA) not issued	Relay L126 is defective	
			1) Turn starting switch OFF. 2) Disconnect connector L105. 3) Connect T-adapter.		
			Between L105 (male) (9) ~ (10)	Resistance	200 ~ 400 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L105. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (7) ~ L105 (female) (9)	Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (7) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



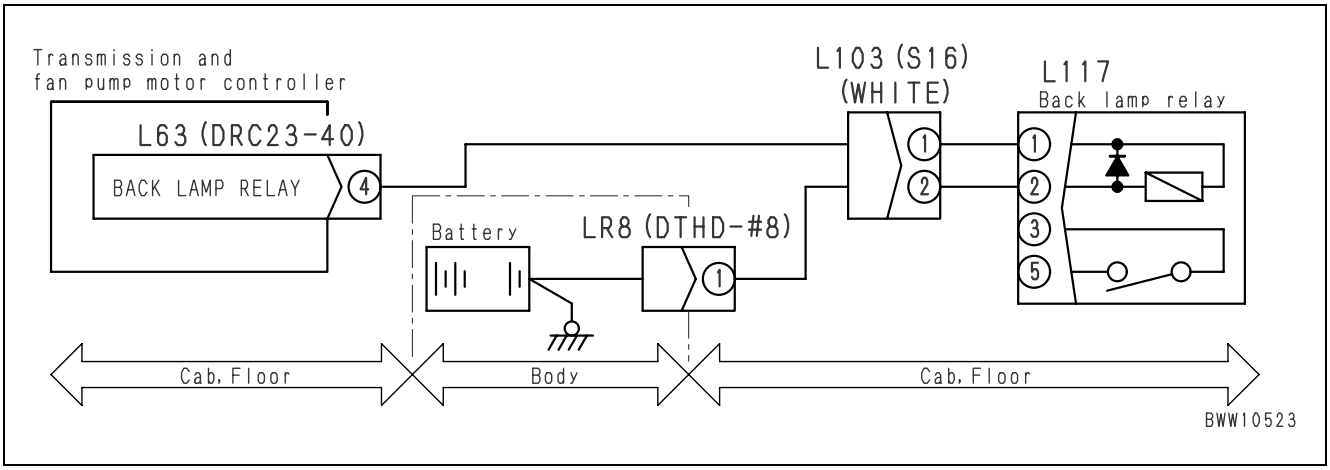
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Error code [D160KA]

Action Code	Error Code	Controller Code	Trouble	Emergency steering relay output system grounded
E01	D160KA	TM		
Description of Trouble	• Backup lamp relay output system disconnected.			
Controller Reaction	• No reaction.			
Effect on Machine	• The electric emergency steering motor does not rotate.			
Related Information	• No backup buzzer sounds or the backup lamp does not come on (Traveling is possible).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective backup lamp relay (L117)	1) Turn starting switch OFF. 2) Replace relay. 3) Turn starting switch ON. 4) Turn forward-reverse lever to “R”.		
			This Error code (D160KA) issued	Relay L117 is not defective	
			This Error code (D160KA) not issued	Relay L117 is defective	
			1) Turn starting switch OFF. 2) Disconnect connector L103. 3) Connect T-adapter.		
			Between L103 (female) (1) ~ (2)	Resistance	200 ~ 400 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L103. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (4) ~ L103 (male) (1)	Resistance	1 Ω and below
			Wiring harness between L103 (male) (2) ~ body	Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (4) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



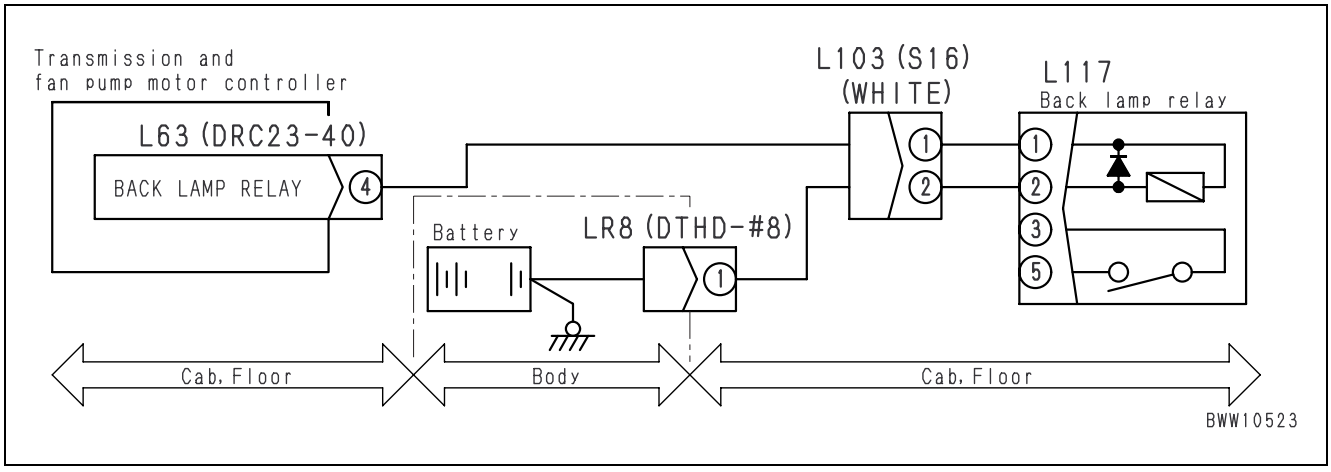
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Error code [D160KB]

Action Code	Error Code	Controller Code	Trouble	Backup lamp relay output system grounded
E03	D160KB	TM		
Description of Trouble	• No signal is output to the backup lamp relay due to grounding.			
Controller Reaction	• Turns output to the backup lamp relay OFF.			
Effect on Machine	• No backup buzzer sounds or the backup lamp does not come on (Traveling is possible).			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective backup lamp relay (L117)	1) Turn starting switch OFF. 2) Replace relay. 3) Turn starting switch ON. 4) Turn forward-reverse lever to “R”.		
			This Error code (D160KB) issued	Relay L117 is not defective	
			This Error code (D160KB) not issued	Relay L117 is defective	
			1) Turn starting switch OFF. 2) Disconnect connector L103. 3) Connect T-adapter.		
			Between L103 (female) (1) ~ (2)	Resistance	200 ~ 400 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L103. 3) Connect T-adapter.		
			Between L63 (female) (4)/L103 (male) (1) ~ body	Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (4) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



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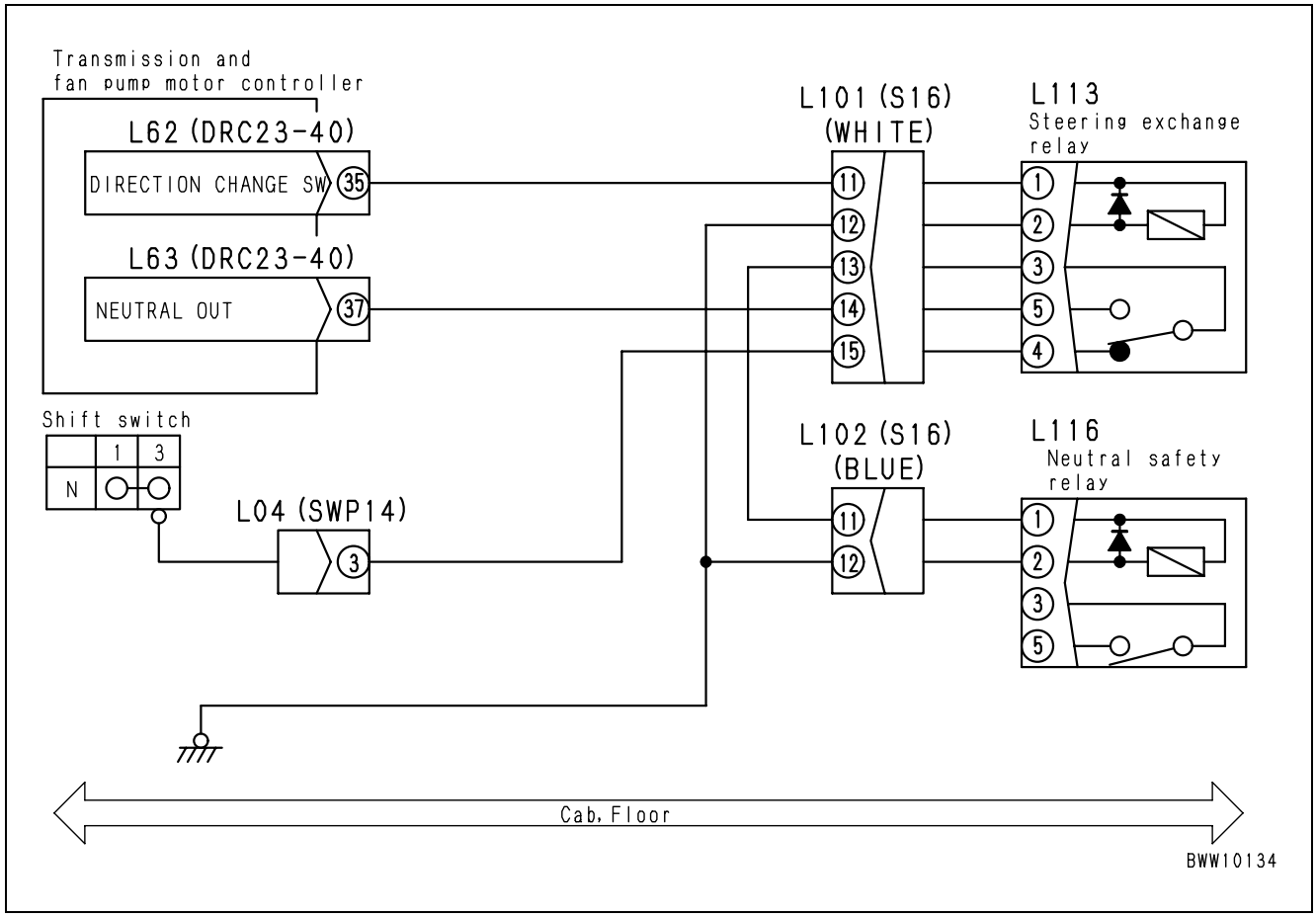
Error code [D191KA]

Action Code	Error Code	Controller Code	Trouble	Neutral safety relay output system disconnected
E03	D191KA	TM		
Description of Trouble	• No signal is output to the neutral safety relay due to disconnection.			
Controller Reaction	• Turns neutral output OFF.			
Effect on Machine	• The engine cannot be started when the right FNR switch or joystick mode is on (Can be started in steering wheel mode).			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective exchange relay (L115)	1) Turn starting switch OFF. 2) Replace relay. 3) Turn starting switch ON. 4) Turn right or joystick F 5) Turn FNR selector switch ON.			
			This Error code (D191KA) issued		Relay L115 is not defective	
			This Error code (D191KA) not issued		Relay L115 is defective	
	2	Defective neutral safety relay (L116)	1) Turn starting switch OFF. 2) Replace relay. 3) Turn starting switch ON. 4) Turn right or joystick FNR s 5) Turn FNR selector switch ON.			
			This Error code (D191KA) issued		Relay L116 is not defective	
			This Error code (D191KA) not issued		Relay L116 is defective	
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62, L63, L101 and L102. 3) Connect T-adapter.			
			Wiring harness between L63 (female) (37) ~ L101 (female) (14)		Resistance	1 Ω and below
			Wiring harness between L101 (female) (14) ~ L102 (female) (11)		Resistance	1 Ω and below
			Wiring harness between L62 (female) (35) ~ L101 (female) (11)		Resistance	1 Ω and below
			Wiring harness between L102 (female) (12) ~ body		Resistance	1 Ω and below
			Wiring harness between L101 (female) (12) ~ body		Resistance	1 Ω and below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON. 5)urn forward-reverse lever to “N”.			
			When right FNR switch mounted (Right FNR switch = ON)			
			Between L63 (37) ~ body	Right FNR switch = N	Voltage	17 ~ 30 V
				Other than above	Voltage	1 V and below
			When joystick mounted (arm rest lock and joystick switch = ON)			
			Between L63 (37) ~ body	Joystick FNR switch = “N” and joystick lever = Neutral	Voltage	17 ~ 30 V
				Joystick FNR switch? N	Voltage	1 V and below
				Joystick lever being operated	Voltage	1 V and below

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Related circuit diagram



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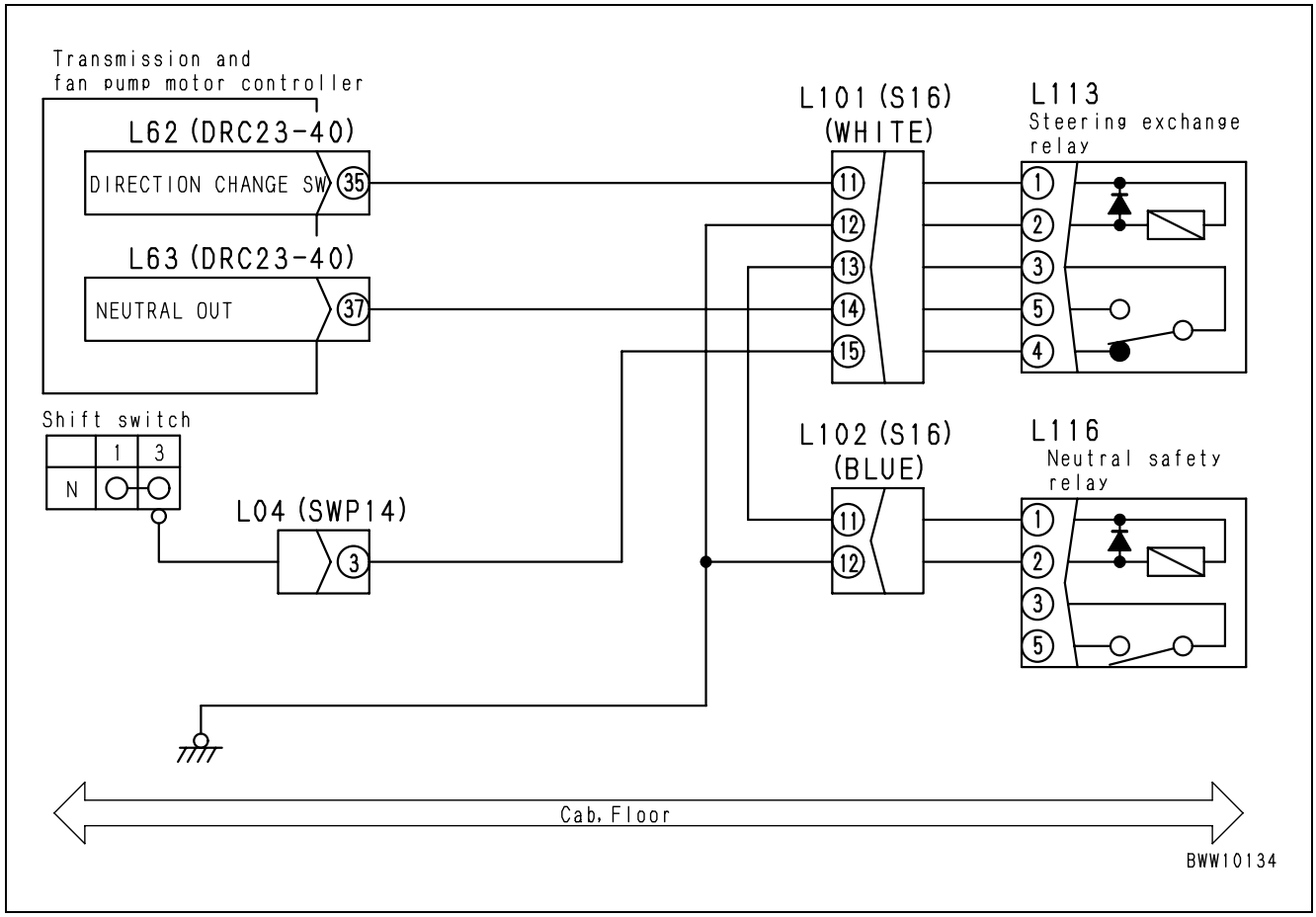
Error code [D191KB]

Action Code	Error Code	Controller Code	Trouble	Neutral safety relay output system grounded
E01	D191KB	TM		
Description of Trouble	• No signal is output to the neutral safety relay due to grounding.			
Controller Reaction	• Turns output to the neutral safety relay OFF when it is grounded.			
Effect on Machine	• The engine cannot be started when the right FNR switch or joystick mode is on (Can be started in steering wheel mode).			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective exchange relay (L115)	1) Turn starting switch OFF. 2) Replace relay. 3) Turn starting switch ON. 4) Turn right or joystick FN 5) Turn FNR selector switch ON.			
			This Error code (D191KB) issued		Relay L115 is not defective.	
			This Error code (D191KB) not issued		Relay L115 is defective.	
	2	Defective neutral safety relay (L116)	1) Turn starting switch OFF. 2) Replace relay. 3) Turn starting switch ON. 4) Turn right or joystick FNR switch 5) Turn FNR selector switch ON.			
			This Error code (D191KB) issued		Relay L116 is not defective.	
			This Error code (D191KB) not issued		Relay L116 is defective.	
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63, L101 and L102. 3) Connect T-adapter.			
			Between L63 (female) (37)/L101 (female) (14) ~ body		Resistance	1 Ω and above
			Between L101 (female) (13)/L102 (female) (11) ~ body		Resistance	1 Ω and below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Turn forward-reverse lever to “N”.			
			When right FNR switch mounted (Right FNR switch = ON)			
			Between L63 (37) ~ body	Right FNR switch = N	Voltage	17 ~ 30 V
				Other than above	Voltage	1 V and below
			When joystick mounted (Arm rest lock and joystick switch = ON)			
			Between L63 (37) ~ body	Joystick FNR switch = “N” and joystick lever = Neutral	Voltage	17 ~ 30 V
				Joystick FNR switch ≠ N	Voltage	1 V and below
				Joystick lever being operated	Voltage	1 V and below

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Related circuit diagram



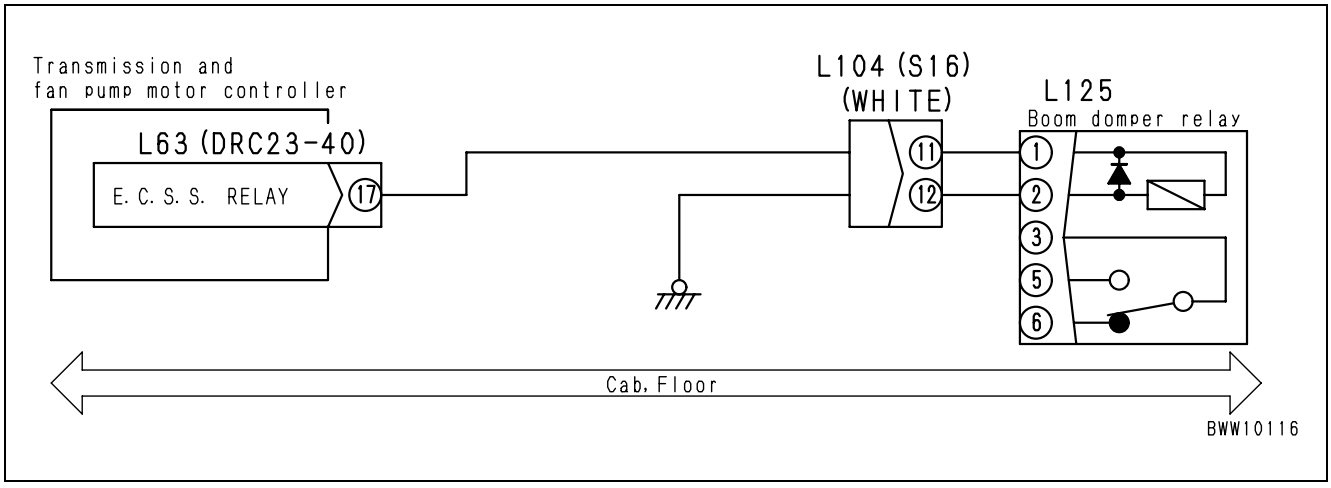
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Error code [D192KA]

Action Code	Error Code	Controller Code	Trouble	Boom damper relay output system disconnected
E01	D192KA	TM		
Description of Trouble	• No signal is output to the boom damper relay due to disconnection.			
Controller Reaction	• Turns output OFF.			
Effect on Machine	• The boom damper does not operate.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective boom damper relay (L125)	1) Turn starting switch OFF. 2) Disconnect connector L104. 3) Connect T-adapter.		
			Between L104 (female) (11) ~ (12)	Resistance	200 ~ 400 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L104. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (17) ~ L104 (female) (11)	Resistance	1 Ω and below
			Wiring harness between L104 (female) (12) ~ body	Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (17) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



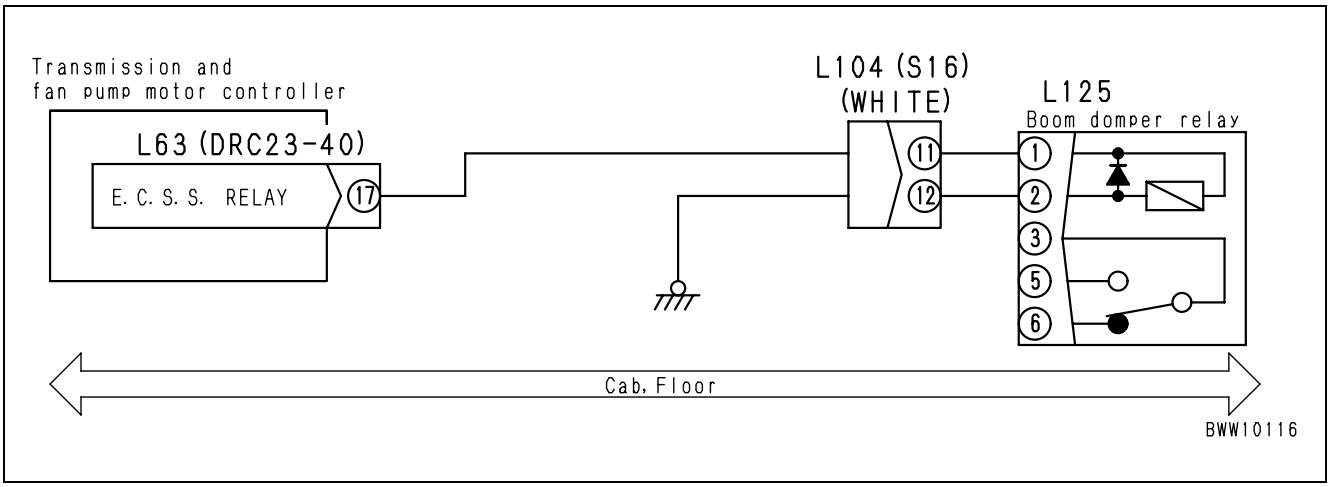
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Error code [D192KB]

Action Code	Error Code	Controller Code	Trouble	Lift arm damper relay output system grounded
E01	D192KB	TM		
Description of Trouble	• No signal is output to the boom damper relay due to grounding.			
Controller Reaction	• Turns output to the boom damper relay OFF.			
Effect on Machine	• The lift arm damper does not operate.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm damper relay (L125)	1) Turn starting switch OFF. 2) Disconnect connector L104. 3) Connect T-adapter.		
			Between L104 (female) (11) ~ (12)	Resistance	200 ~ 400 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L104. 3) Connect T-adapter.		
			Between L63 (female) (17),L104 (female) (11) ~ body	Resistance	1 M Ω and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (17) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



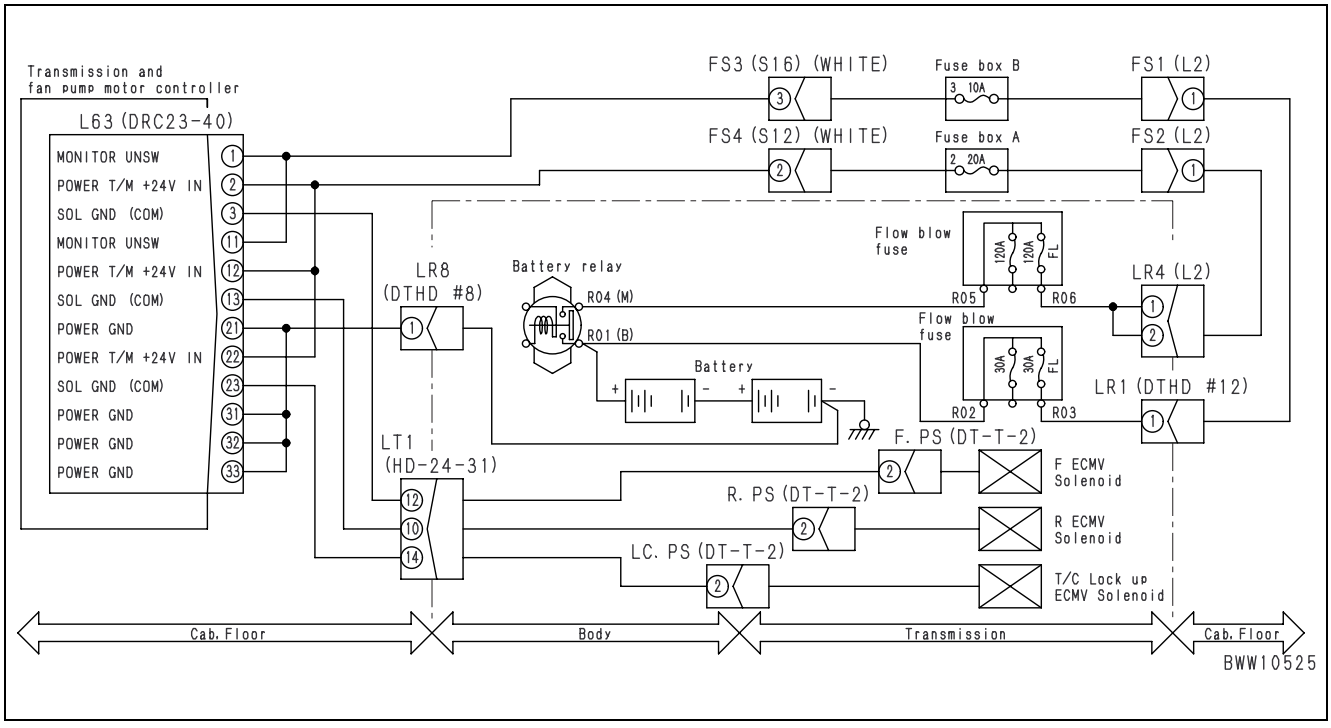
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Error code [DAQ0KK]

Action Code	Error Code	Controller Code	Trouble	Controller power supply voltage lowered
—	DAQ0KK	TM		
Description of Trouble	• The controller power supply voltage is lowered.			
Controller Reaction	• Cannot detect input signals properly.			
Effect on Machine	• Normal operation is disabled.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	Turn starting switch OFF. 2) Disconnect connectors L63 and FS3. 3) Connect T-adapter.			
			Wiring harness between L63 (female) (1), (11) ~ FS3 (female) (3)		Resistance	1 Ω and below
			Between L63 (female) (27), (31), (32), (33) ~ body.		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (female) (1), (11), FS3 (female) (3) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.			
			Between L63 (1), (11) ~ body	Constant (NSW) power supply	Voltage	20 ~ 30 V

Related circuit diagram



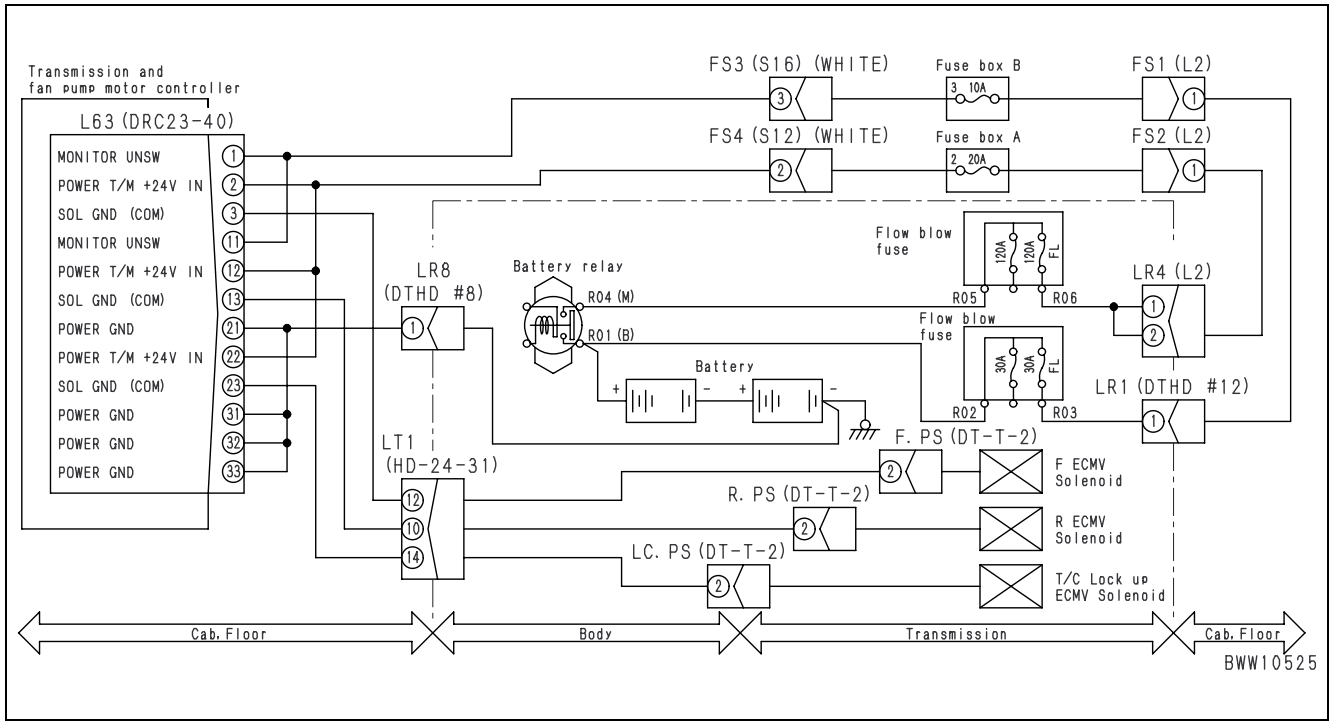
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Error code [DAQ2KK]

Action Code	Error Code	Controller Code	Trouble	Defective solenoid power supply system
—	DAQ2KK	TM		
Description of Trouble	• The solenoid power supply system voltage is lowered.			
Controller Reaction	• Disables solenoid output.			
Effect on Machine	• Normal operation is disabled.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and FS3. 3) Connect T-adapter.			
			Wiring harness between L63 (female) (2), (12), (22) ~ FS4 (female) (2)		Resistance	1 Ω and below
			Between L63 (female) (12), (21), (31), (31), (33) ~ body		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and FS4. 3) Connect T-adapter.			
			Between L63 (female) (2), (12), (22) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (2), (12), (22) ~ body	Constant (NSW) power supply	Voltage	20 ~ 30 V

Related circuit diagram



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Error code [DAQ9KQ]

Action Code	Error Code	Controller Code	Trouble	Model selection signal mismatch
E03	DAQ9KQ	TM		
Description of Trouble	• The controller is recognized as another model.			
Controller Reaction	• Operates assuming the model operated before the Error code was issued (Basically WA480) or default model (WA470).			
Effect on Machine	• Gear shifting shock may occur.			
Related Information	• Set the model using the rotary switch (Refer to "Testing and Adjusting").			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting
	1	Controller model selection error	—

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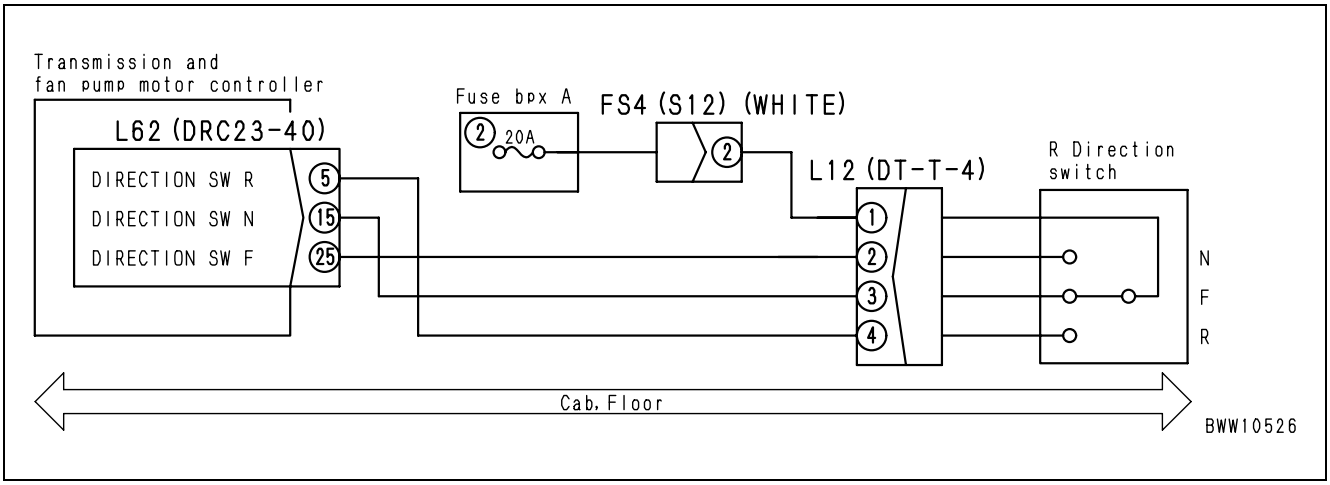
Error code [DDK3KA]

Action Code	Error Code	Controller Code	Trouble	Right FNR switch signal not input
E03	DDK3KA	TM		
Description of Trouble	• No signal is input due to disconnected or grounded right FNR switch input signal system.			
Controller Reaction	• Cannot judge the faulty line input signal.			
Effect on Machine	• Traveling is possible in steering wheel mode after the machine is stopped.			
Related Information	• Can be checked with the monitoring function (Code: 40907, D-IN-17, D-IN-18 or D-IN-19).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors FS4 and L12. 3) Connect T-adapter.			
			Wiring harness between FS4 (female) (2) ~ L12 (female) (1)		Resistance	1 Ω and below
			1) Turn starting switch OFF. 2) Disconnect connectors FS4 and L12. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (25) ~ L12 (female) (2)		Resistance	1 Ω and below
			Wiring harness between L62 (female) (15) ~ L12 (female) (3)		Resistance	1 Ω and below
			Wiring harness between L62 (female) (5) ~ L12 (female) (4)		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L12. 3) Connect T-adapter.			
			Between L62 (female) (25), L12 (female) (2) ~ body		Resistance	1 MΩ and above
			Between L62 (female) (15), L12 (female) (3) ~ body		Resistance	1 MΩ and above
			Between L62 (female) (5), L12 (female) (4) ~ body		Resistance	1 MΩ and above
	3	Defective right FNR switch	1) Turn starting switch OFF. 2) Disconnect connector L12. 3) Connect T-adapter.			
			Between L12 (male) (2) ~ (1)	Right FNR switch = F	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
			Between L12 (male) (3) ~ (1)	Right FNR switch = N	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
			Between L12 (male) (4) ~ (1)	Right FNR switch = R	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON.			
			When right FNR switch mounted (Right FNR switch = On)			
			Between L62 (25) and body	Right FNR switch = F	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (15) and body	Right FNR switch = N	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (5) and body	Right FNR switch = R	Voltage	20 ~ 30 V
					Voltage	1 V and below

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Related circuit diagram



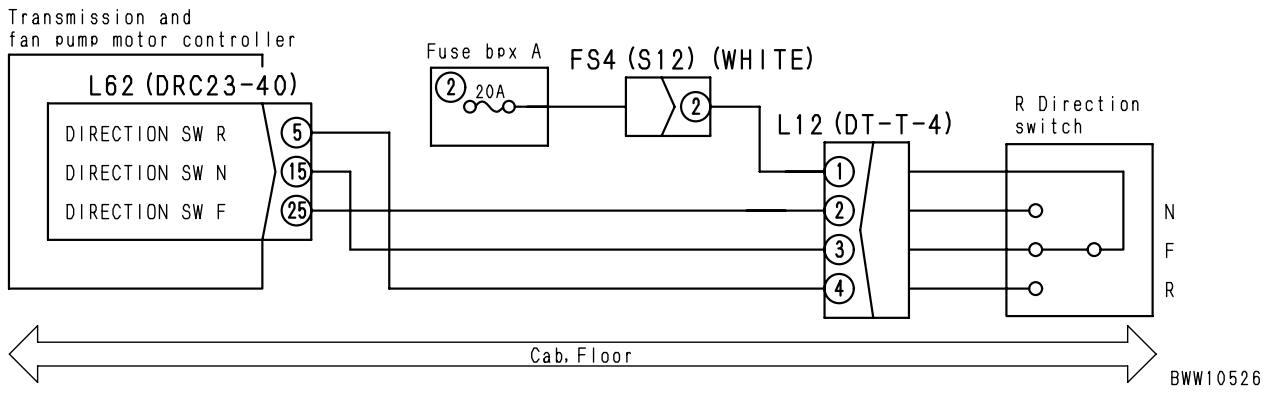
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Error code [DDK3KB]

Action Code	Error Code	Controller Code	Trouble	Multiple right FNR switch signal input
E03	DDK3KB	TM		
Description of Trouble	• Multiple signals are input due to short-circuited right FNR switch input signal system.			
Controller Reaction	• Cannot judge the FNR switch input signal.			
Effect on Machine	• Traveling is possible in steering wheel mode after the machine is stopped.			
Related Information	• Can be checked with the monitoring function (Code: 40907, D-IN-17, D-IN-18 or D-IN-19).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness hot-shorted incorrectly (Coming in contact with 24 V wiring harness)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L12. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (female) (25), L12 (female) (2) ~ body		Voltage	1 V and below
			Between L62 (female) (15), L12 (female) (3) ~ body		Voltage	1 V and below
			Between L62 (female) (5), L12 (female) (4) ~ body		Voltage	1 V and below
	2	Defective right FNR switch	1) Turn starting switch OFF. 2) Disconnect connector L12. 3) Connect T-adapter.			
			Between L12 (male) (2) ~ (1)	Right FNR switch = F	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
			Between L12 (male) (3) ~ (1)	Right FNR switch = N	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
			Between L12 (male) (4) ~ (1)	Right FNR switch = R	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON.			
			When right FNR switch mounted (Right FNR switch = On)			
			Between L62 (25) ~ body	Right FNR switch = F	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (15) ~ body	Right FNR switch = N	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (5) ~ body	Right FNR switch = R	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

Related circuit diagram



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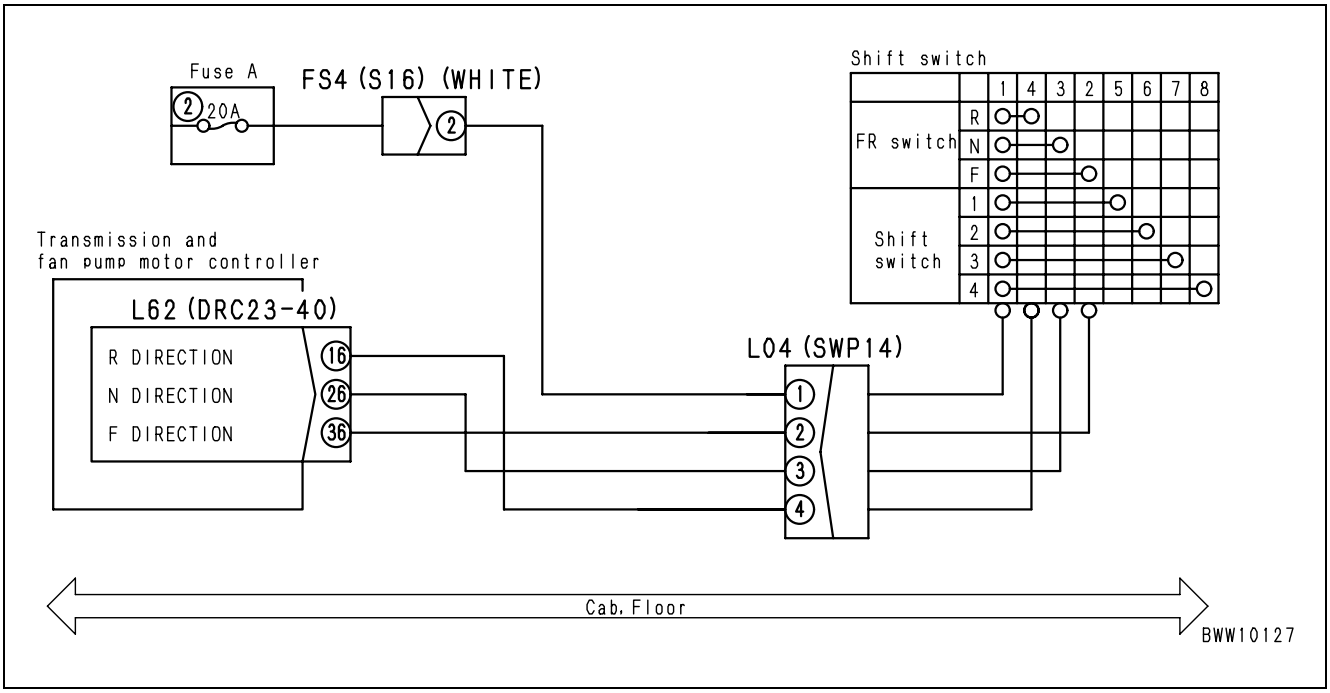
Error code [DDK6KA]

Action Code	Error Code	Controller Code	Trouble	Forward-reverse lever signal not input
E03	DDK6KA	TM		
Description of Trouble	• No signal is input due to disconnected or grounded forward-reverse input signal system.			
Controller Reaction	• Cannot judge the faulty line (F, N or R) input signal.			
Effect on Machine	• Traveling is impossible with the lever positioned where an Error alarm is caused (Forward or reverse). • Traveling is possible in right FNRSW mode when right FNRSW is mounted.			
Related Information	• Can be checked with the monitoring function (Code: 40907, D-IN-20, D-IN-21 or D-IN-22).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Forward-reverse lever positioned incorrectly	Make sure that the lever is not positioned neutral.			
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L04. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (36) ~ L04 (female) (2)		Resistance	1 Ω and below
			Wiring harness between L62 (female) (26) ~ L04 (female) (3)		Resistance	1 Ω and below
			Wiring harness between L62 (female) (16) ~ L04 (female) (4)		1 Ω and below	Resistance
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L04. 3) Connect T-adapter.			
			Between L62 (female) (36), L04 (female) (2) ~ body		Resistance	1 MΩ and above
			Between L62 (female) (26), L04 (female) (3) ~ body		Resistance	1 MΩ and above
			Between L62 (female) (16), L04 (female) (4) ~ body		Resistance	1 MΩ and above
	4	Defective forward-reverse lever	1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Connect T-adapter.			
			Between L04 (male) (2) ~ body	Right FNR switch = F	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L04 (male) (3) ~ body	Right FNR switch = N	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L04 (male) (4) ~ body	Right FNR switch = R	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
	5	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON. When forward-reverse lever mounted (Forward-reverse lever = On)			
			Between L62 (36) ~ body	Right FNR switch = F	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (26) ~ body	Right FNR switch = N	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (16) ~ body	Right FNR switch = R	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

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Related circuit diagram



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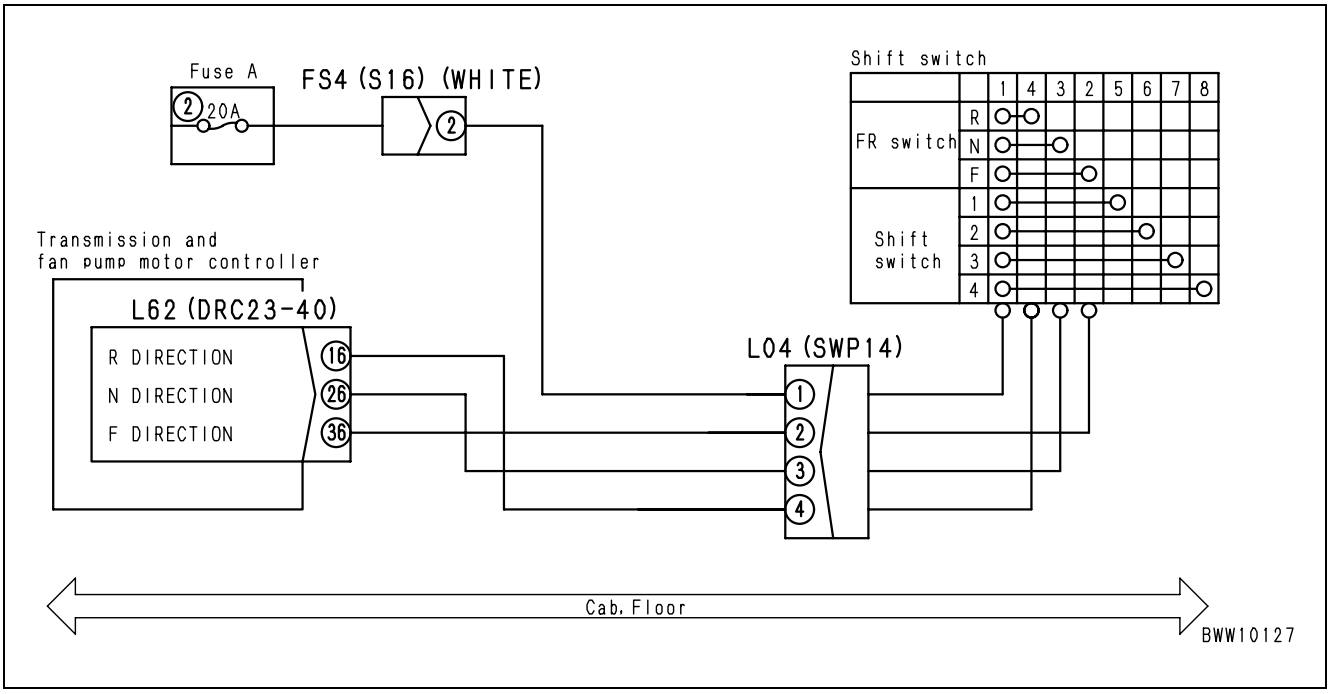
Error code [DDK6KB]

Action Code	Error Code	Controller Code	Trouble	Multiple forward-reverse lever signal input
E03	DDK6KB	TM		
Description of Trouble	• Multiple signals are input due to short-circuited forward-reverse lever input signal system.			
Controller Reaction	• Stops traveling (Neutral state).			
Effect on Machine	• Traveling is impossible with the lever positioned where an error alarm is caused (Forward or reverse). • Traveling is possible in right FNRSW mode when right FNRSW is mounted.			
Related Information	• Can be checked with the monitoring function (Code: 40907, D-IN-20, D-IN-21 or D-IN-22).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness hot-shorted incorrectly (Coming in contact with 24 V wiring harness)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (female) (36), L04 (female) (2) ~ body		Voltage	1 V and below
			Between L62 (female) (26), L04 (female) (3) ~ body		Voltage	1 V and below
			Between L62 (female) (16), L04 (female) (4) ~ body		Voltage	1 V and below
	2	Defective forward-reverse lever	1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			When right FNR switch mounted (Right FNR switch = On)			
			Between L04 (male) (2) ~ body	Forward-reverse lever = F	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L04 (male) (3) ~ body	Forward-reverse lever = N	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L04 (male) (4) ~ body	Forward-reverse lever = R	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (36) ~ body	Forward-reverse lever = F	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (26) ~ body	Forward-reverse lever = N	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below
			Between L62 (16) ~ body	Forward-reverse lever = R	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

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Related circuit diagram



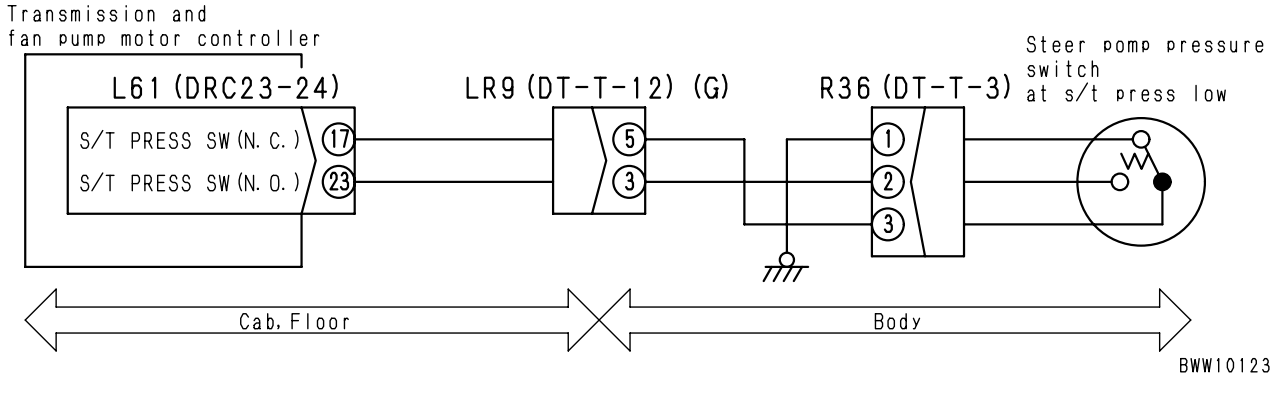
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Error code [DDS5KA]

Action Code	Error Code	Controller Code	Trouble	Steering pressure switch disconnected
E03	DDS5KA	TM		
Description of Trouble	• Both N.C and N.O signals of the steering pressure switch are open simultaneously.			
Controller Reaction	• Turns electric emergency motor relay output OFF.			
Effect on Machine	• The auto emergency steering does not operate (However, the emergency steering can be operated manually). • Self-check of the emergency steering does not work.			
Related Information	• Operate the emergency steering manually if the steering pressure is zero. • Can be checked with the monitoring function (Code: 40905, D-IN-0 or D-IN-1).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective steering pressure switch	1) Turn starting switch OFF. 2) Disconnect connector R36. 3) Connect T-adapter.			
			Between R36 (male) (3) ~ (1)	Engine stopped	Resistance	1 Ω and below
				Open to atmosphere (Reference)	Resistance	1 Ω and below
				Engine started	Resistance	1 MΩ and above
			Between R36 (male) (2) ~ (1)	Engine stopped	Resistance	1 MΩ and above
				Open to atmosphere (Reference)	Resistance	1 MΩ and above
				Engine started	Resistance	1 Ω and below
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and R36. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (17) ~ R36 (female) (3)		Resistance	1 Ω and below
			Wiring harness between L61 (female) (23) ~ R36 (female) (2)		Resistance	1 Ω and below
			Wiring harness between L36 (female) (1) ~ body		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (17) ~ body	Engine stopped	Voltage	1 V and below
				Engine started	Voltage	20 ~ 30 V
			Between L61 (23) ~ body	Engine stopped	Voltage	20 ~ 30 V
				Engine started	Voltage	1 V and below

Related circuit diagram



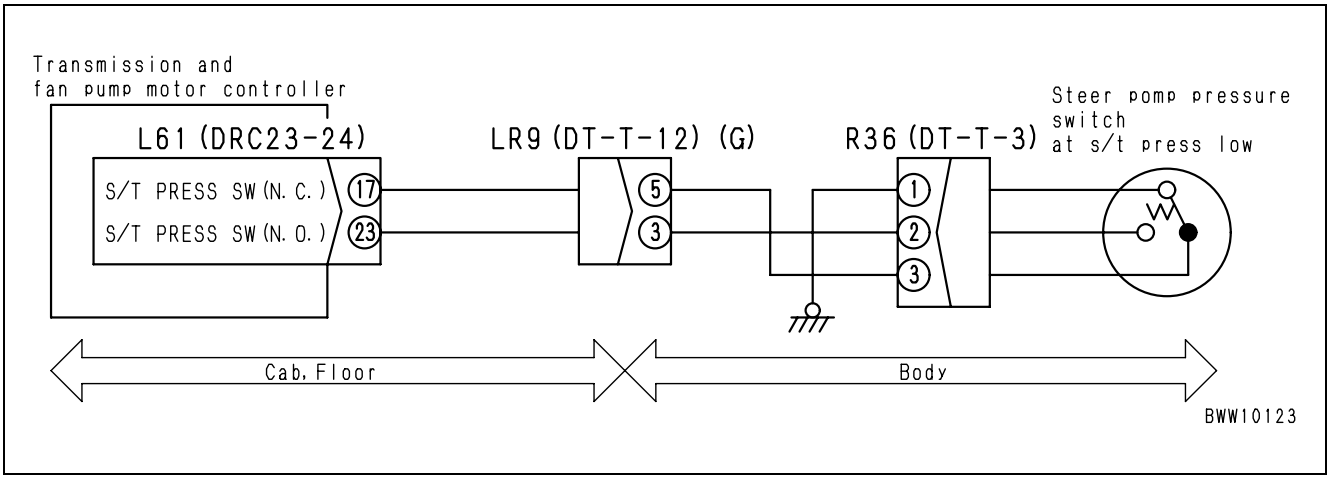
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Error code [DDS5KB]

Action Code	Error Code	Controller Code	Trouble	Steering pressure switch grounded
E03	DDS5KB	TM		
Description of Trouble	• Both N.C and N.O signals of the steering pressure switch is closed simultaneously.			
Controller Reaction	• Turns electric emergency motor relay output OFF.			
Effect on Machine	• The auto emergency steering does not operate (However, the emergency steering can be operated manually). • Self-check of the emergency steering does not work.			
Related Information	• Operate the emergency steering manually if the steering pressure is zero. • Can be checked with the monitoring function (Code: 40905, D-IN-0 or D-IN-1).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective steering pressure switch	1) Turn starting switch OFF. 2) Disconnect connector R36. 3) Connect T-adapter.			
			Between R36 (male) (3) ~ (1)	Engine stopped	Resistance	1 Ω and below
				Open to atmosphere (Reference)	Resistance	1 Ω and below
				Engine started	Resistance	1 MΩ and above
			Between R36 (male) (2) ~ (1)	Engine stopped	Resistance	1 MΩ and above
				Open to atmosphere (Reference)	Resistance	1 MΩ and above
				Engine started	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (17), R36 (female) (3) ~ body		Resistance	1 MΩ and above
			Between L61 (female) (23), R36 (female) (2) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (17) ~ body	Engine stopped	Voltage	1 V and below
				Engine started	Voltage	20 ~ 30 V
			Between L61 (23) ~ body	Engine stopped	Voltage	20 ~ 30 V
				Engine started	Voltage	1 V and below

Related circuit diagram



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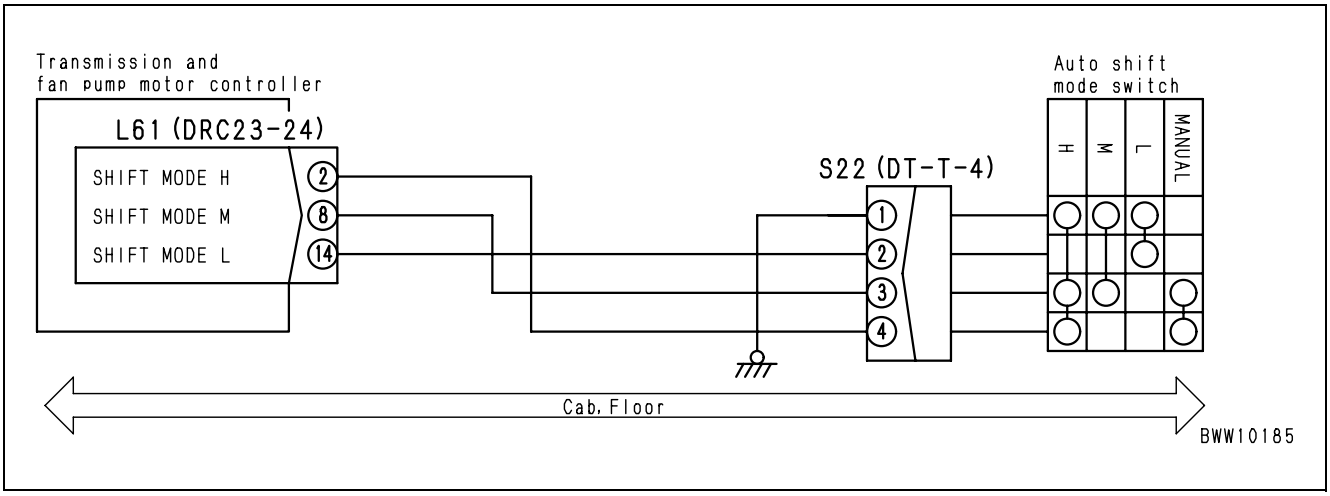
Error code [DDT0L4]

Action Code	Error Code	Controller Code	Trouble	Manual/auto-shift selector switch selection failure
—	DDT0L4	TM		
Description of Trouble	• Signals of an incorrect combination were input from the manual/auto-shift selector switch.			
Controller Reaction	• Switches to the manual shift mode.			
Effect on Machine	• The position of the manual/auto-shift selector switch does not match the shift mode.			
Related Information	• The current shift mode selection can be checked with the monitoring function (Code: 41700) and the auto-shift indicator.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S22. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (14) ~ S22 (female) (2)		Resistance	1 Ω and below
			Wiring harness between L61 (female) (8) ~ S22 (female) (3)		Resistance	1 Ω and below
			Wiring harness between L61 (female) (2) ~ S22 (female) (4)		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S22. 3) Connect T-adapter.			
			Between connector L61 (female) (14), S22 (female) (2) ~ body		Resistance	1 MΩ and above
			Between connector L61 (female) (8), S22 (female) (3) ~ body		Resistance	1 MΩ and above
	3	Defective manual/auto-shift selector switch (Overseas)	1) Turn starting switch OFF. 2) Disconnect connector S22. 3) Connect T-adapter.			
			Between S22 (male) (1) ~ (2)	Manual shift	Resistance	1 MΩ and above
				Auto-shift L	Resistance	1 Ω and below
				Auto-shift M	Resistance	1 MΩ and above
				Auto-shift H	Resistance	1 MΩ and above
			Between S22 (male) (1) ~ (3)	Manual shift	Resistance	1 MΩ and above
				Auto-shift L	Resistance	1 MΩ and above
				Auto-shift M	Resistance	1 Ω and below
				Auto-shift H	Resistance	1 MΩ and above
			Between S22 (male) (1) ~ (4)	Manual shift	Resistance	1 MΩ and above
				Auto-shift L	Resistance	1 MΩ and above
				Auto-shift M	Resistance	1 MΩ and above
				Auto-shift H	Resistance	1 Ω and below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (14) ~ body	Manual shift	Voltage	1 V or above
				Auto-shift L	Voltage	1 V or below
				Auto-shift M	Voltage	1 V or above
				Auto-shift H	Voltage	1 V or above
			Between L61 (8) ~ body	Manual shift	Voltage	1 V or above
				Auto-shift L	Voltage	1 V or above
				Auto-shift M	Voltage	1 V or below
				Auto-shift H	Voltage	1 V or above
			Between L61 (female) (2) ~ body	Manual shift	Voltage	1 V or above
				Auto-shift L	Voltage	1 V or above
				Auto-shift M	Voltage	1 V or above
				Auto-shift H	Voltage	1 V or below

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Related circuit diagram



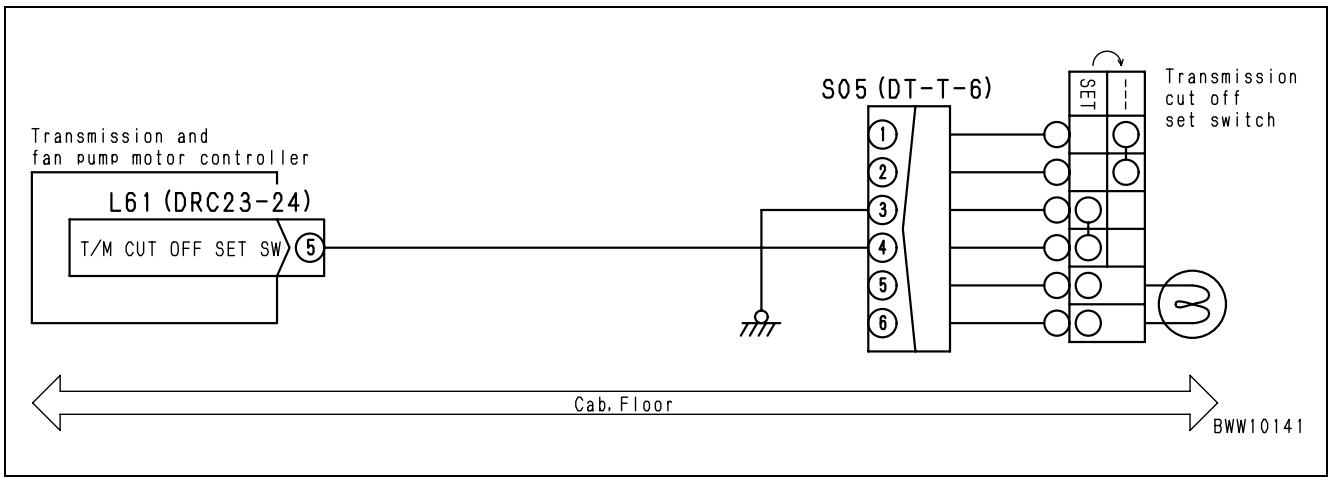
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Error code [DDT4LD]

Action Code	Error Code	Controller Code	Trouble	Ground fault of transmission cut-off setting switch
E01	DDT4LD	TM		
Description of Trouble	• Due to ground fault of the transmission cut-off setting switch system, a cut-off setting signal remains as input.			
Controller Reaction	• The transmission cut-off point cannot be reset.			
Effect on Machine	—			
Related Information	• Can be checked with the monitoring function (Code: 40905, D-IN-3).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector S05. 3) Connect T-adapter.			
			Between S05 (male) (4) ~ (3)	Cutoff setting switch = ON	Resistance	1 Ω and below
				Cutoff setting switch = OFF	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L61 and S05. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (5), S05 (female) (4) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61 and S05. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (5) ~ body	Cutoff setting switch = ON	Voltage	1 V and below
				Cutoff setting switch = OFF	Voltage	20 ~ 30 V

Related circuit diagram



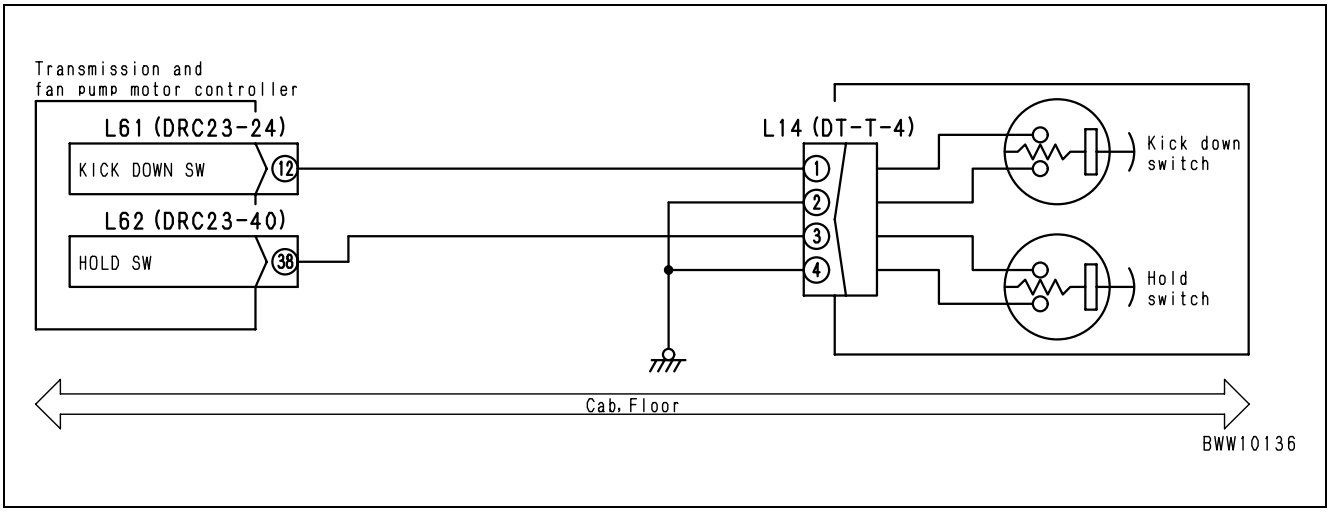
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Error code [DDW9LD]

Action Code	Error Code	Controller Code	Trouble	Ground fault of kickdown switch system
E01	DDW9LD	TM		
Description of Trouble	• Due to ground fault of the kickdown switch system, kickdown cannot be turned OFF.			
Controller Reaction	• Cannot perform kickdown control after performing it once at ground fault.			
Effect on Machine	• Cannot perform kickdown control after performing it once at ground fault.			
Related Information	• Can be checked with the monitoring function (Code: 40905, D-IN-6).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective kickdown switch	1) Turn starting switch OFF. 2) Disconnect connector L14. 3) Connect T-adapter.			
			Between L14 (male) (1) ~ (2)	Kickdown switch = ON	Resistance	1 Ω and below
				Kickdown switch = OFF	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L14. 3) Connect T-adapter.			
			Between L61 (female) (12), L14 (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L14. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (12) ~ body	Kickdown switch = ON	Voltage	1 V and below
				Kickdown switch = OFF	Voltage	20 ~ 30 V

Related circuit diagram



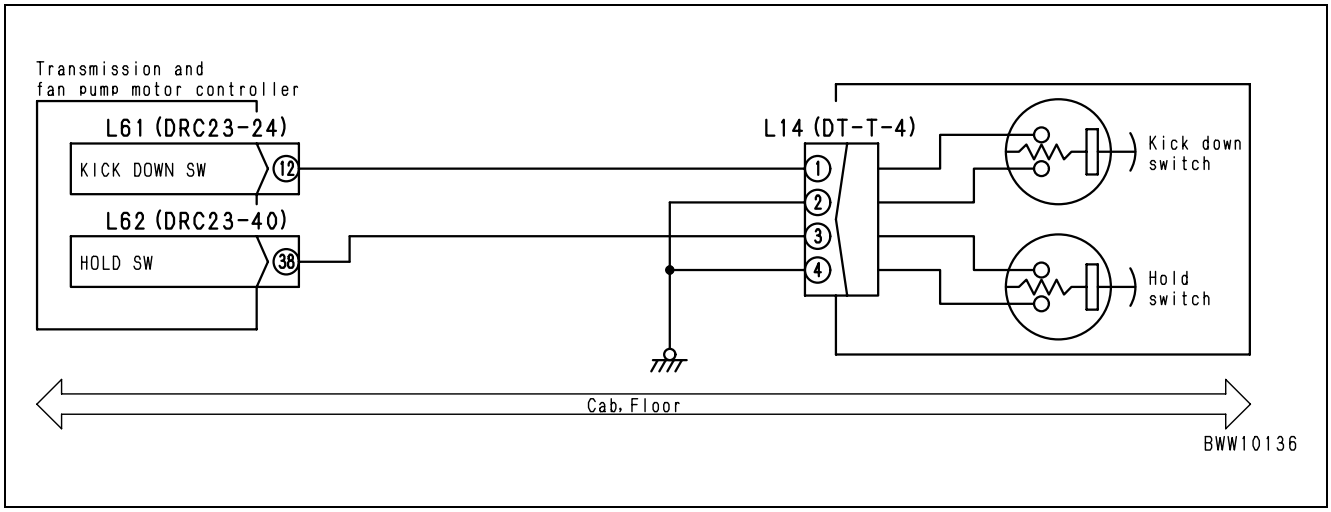
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Error code [DDWLLD]

Action Code	Error Code	Controller Code	Trouble	Ground fault of hold switch system
E01	DDWLLD	TM		
Description of Trouble	• Due to ground fault of the hold switch system, the hold switch cannot be changed over.			
Controller Reaction	• Cannot perform hold control after performing it once at ground fault.			
Effect on Machine	• Cannot perform hold control after performing it once at ground fault.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-31).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective hold switch	1) Turn starting switch OFF. 2) Disconnect connector L14. 3) Connect T-adapter.			
			Between L14 (male) (3) ~ (4)	Hold switch = ON	Resistance	1 Ω and below
				Hold switch = OFF	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L14. 3) Connect T-adapter.			
			Between L61 (female) (38), L14 (female) (3) ~ body		Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L14. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (38) ~ body	Hold switch = ON	Voltage	1 V and below
				Hold switch = OFF	Voltage	20 - 30 V

Related circuit diagram



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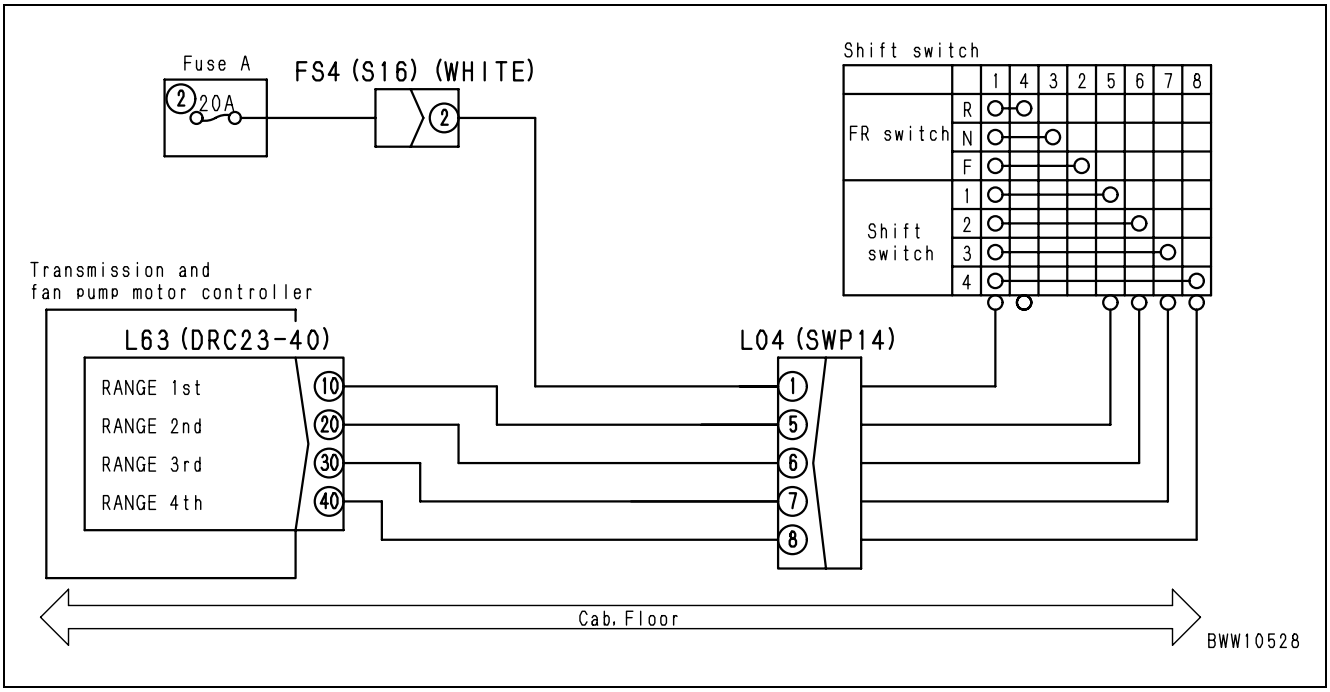
Error code [DF10KA]

Action Code	Error Code	Controller Code	Trouble	No input of gear shift lever signal
E01	DF10KA	TM		
Description of Trouble	• Due to disconnection of or ground fault of the gear shift lever system, no signal is input.			
Controller Reaction	• Cannot determine the input signal in the relevant shift range. The shift range is fixed to that before disconnection occurred.			
Effect on Machine	• The relevant gear speed cannot be achieved.			
Related Information	• Can be checked with the monitoring function (Code: 40906, D-IN-8, D-IN-9, D-IN-10, D-IN-11).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Connect T-adapter.			
			Wiring harness between FS4 (female) (2) ~ L04 (female) (1)		Resistance	1 Ω and below
			1) Turn starting switch OFF. 2) Disconnect connectors L63 and L04. 3) Connect T-adapter.			
			Wiring harness between L63 (female) (10) ~ L04 (female) (5)		Resistance	1 Ω and below
			Wiring harness between L63 (female) (20) ~ L04 (female) (6)		Resistance	1 Ω and below
			Wiring harness between L63 (female) (30) ~ L04 (female) (7)		Resistance	1 Ω and below
			Wiring harness between L63 (female) (40) ~ L04 (female) (8)		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L04. 3) Connect T-adapter.			
			Between L63 (female) (10), L04 (female) (5) ~ body		Resistance	1 Ω and below
			Between L63 (female) (20), L04 (female) (6) ~ body		Resistance	1 Ω and below
			Between L63 (female) (30), L04 (female) (7) ~ body		Resistance	1 Ω and below
			Between L63 (female) (40), L04 (female) (8) ~ body		Resistance	1 Ω and below
	3	Defective gear shift switch	1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L04 (5) ~ body	Shift range = 1	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L04 (6) ~ body	Shift range = 2	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L04 (7) ~ body	Shift range = 3	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L04 (8) ~ body	Shift range = 4	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (10) ~ body	Shift range = 1	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L63 (20) ~ body	Shift range = 2	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L 63 (30) ~ body	Shift range = 3	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L63 (40) ~ body	Shift range = 4	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below

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Related circuit diagram



https://truckmanualshub.com/

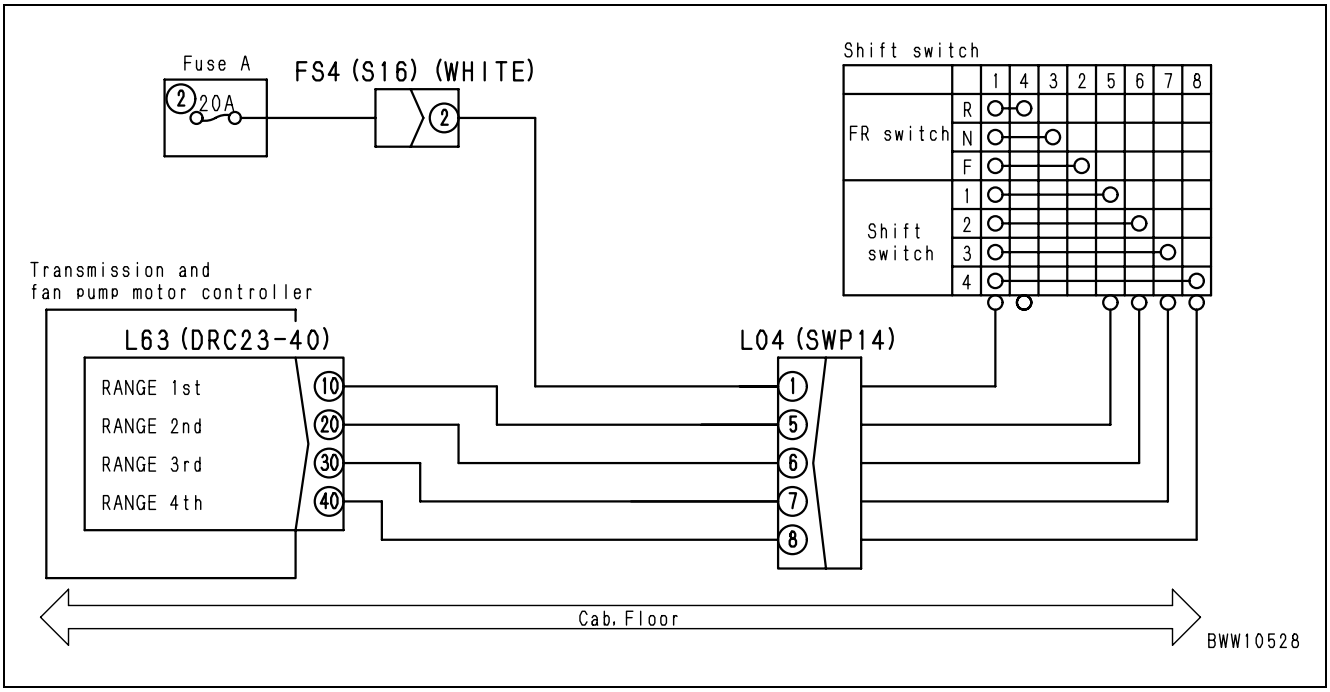
Error code [DF10KB]

Action Code	Error Code	Controller Code	Trouble	Input of multiple gear shift lever signals No input of gear shift lever signal
E01	DF10KB	TM		
Description of Trouble	• Due to disconnection of or ground fault of the gear shift lever system, no signal is input.			
Controller Reaction	• Cannot determine the input signal in the relevant shift range. The shift range is fixed to that before disconnection occurred.			
Effect on Machine	• The relevant gear speed cannot be achieved.			
Related Information	• Can be checked with the monitoring function (Code: 40906, D-IN-8, D-IN-9, D-In-10, D-IN-11).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting (Contacting 24-V wiring harness)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (female) (10), L04 (female) (5) ~ body		Voltage	1 V or below
			Between L63 (female) (20), L04 (female) (6) ~ body		Voltage	1 V or below
			Between L63 (female) (30), L04 (female) (7) ~ body		Voltage	1 V or below
			Between L63 (female) (40), L04 (female) (8) ~ body		Voltage	1 V or below
	2	Defective gear shift switch	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L04 (5) ~ body	Shift range = 1	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L04 (6) ~ body	Shift range = 2	Voltage	20 ~ 30 V
				Other than above		
			Between L04 (7) ~ body	Shift range = 3	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L04 (8) ~ body	Shift range = 4	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (10) ~ body	Shift range = 1	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L63 (20) ~ body	Shift range = 2	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L63 (30) ~ body	Shift range = 3	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L63 (40) ~ body	Shift range = 4	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below

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Related circuit diagram



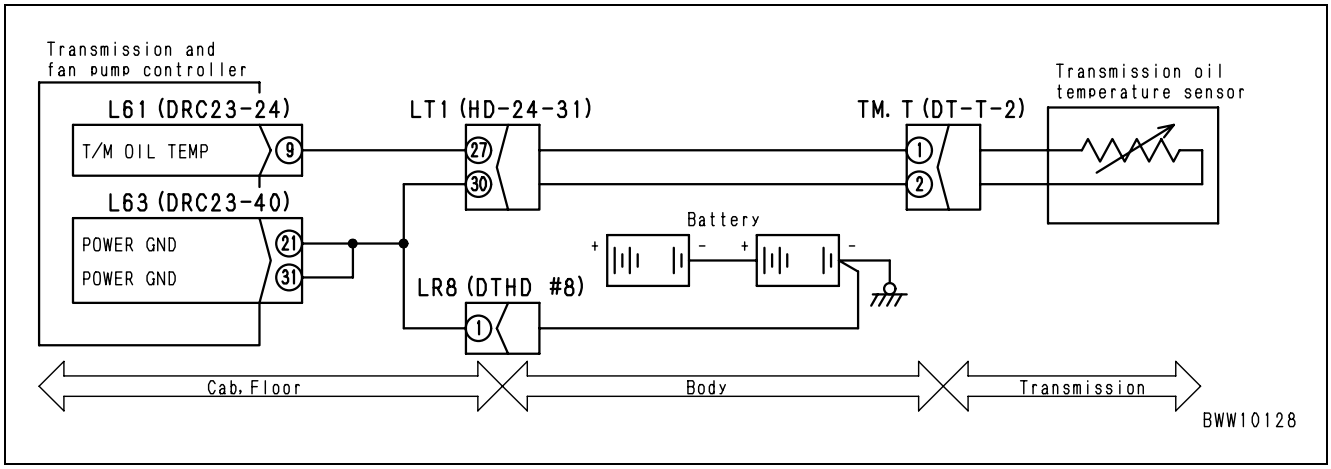
https://truckmanualshub.com/

Error code [DGF1KX]

Action Code	Error Code	Controller Code	Trouble	Transmission oil temperature sensor system failure
E01	DGF1KX	TM		
Description of Trouble	• Due to Error of the transmission oil temperature sensor system, no transmission oil temperature signal can be input.			
Controller Reaction	• Cannot determine the transmission oil temperature correctly.			
Effect on Machine	• Gear shift shock occurs.			
Related Information	• Can be checked with the monitoring function (Code: 41500, ECMV OIL TEMP).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective transmission oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connectors L61 and TM.T. 3) Connect T-adapter.			
			Between L61 (female) (9), TM.T (female) (1) ~ body	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L61 and S05. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (9), TM.T (female) (1) ~ body		Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and TM.T. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (9) ~ TM.T (female) (1)		Resistance	1 Ω or below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter.			
			Between L61 (female) (9) ~ body	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



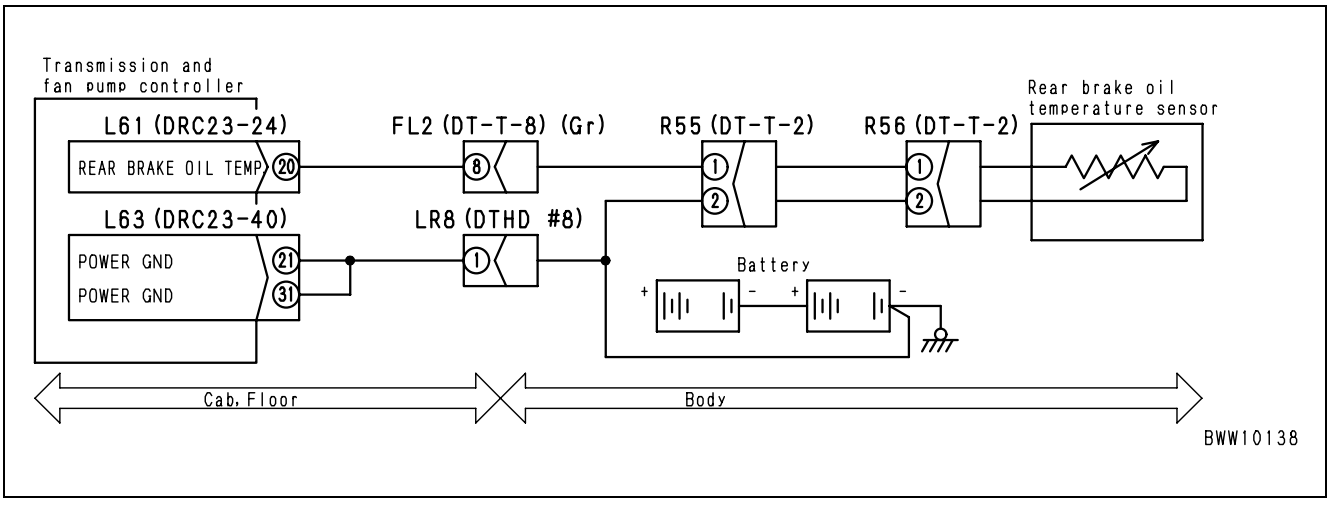
https://truckmanualshub.com/

Error code [DGR2KA]

Action Code	Error Code	Controller Code	Trouble	Rear brake oil temperature sensor system disconnection
E01	DGR2KA	TM		
Description of Trouble	• Due to B disconnection of the rear brake oil temperature sensor system, no rear brake oil temperature signal can be input.			
Controller Reaction	• Assumes that the rear brake oil temperature is low.			
Effect on Machine	• Does not issue a brake oil temperature alarm.			
Related Information	• Can be checked with the monitoring function (Code: 30202, R BRAKE OIL).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective rear brake oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector R56. 3) Connect T-adapter.			
			Between R56 (male) (1) ~ (2)	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61, L63 and R56. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (20) ~ R56 (female) (1)		Resistance	1 Ω or below
			Wiring harness between R56 (female) (2) ~ L63 (female) (21), (31)		Resistance	1 Ω or below
			Wiring harness between R56 (female) (2) ~ body		Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter.			
			Between L61 (female) (20) ~ body	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



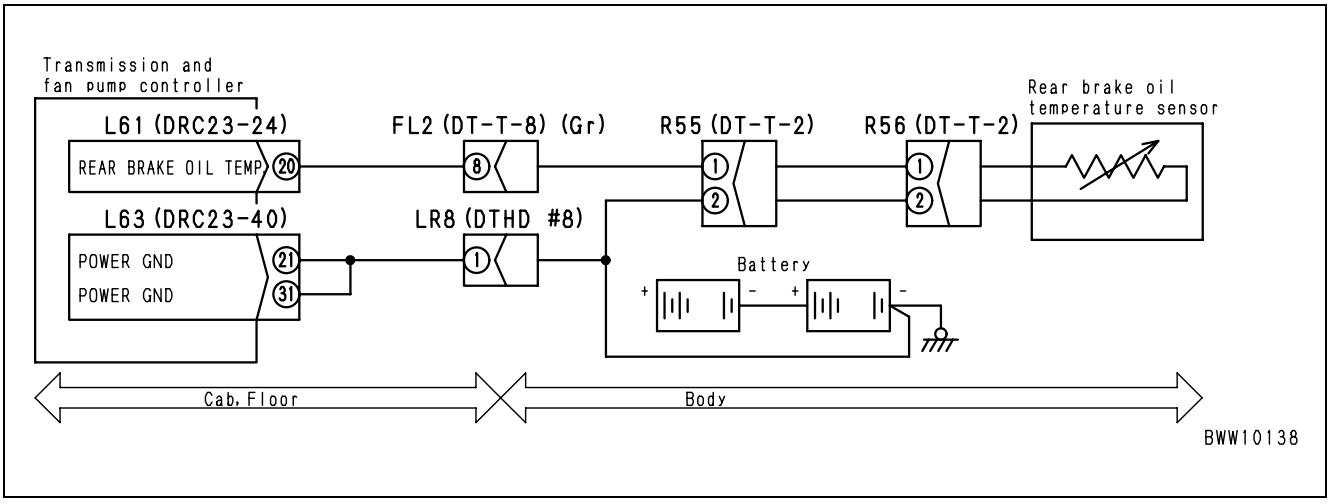
https://truckmanualshub.com/

Error code [DGR2KB]

Action Code	Error Code	Controller Code	Trouble	Ground fault of rear brake oil temperature sensor system disconnection
E01	DGR2KB	TM		
Description of Trouble	• Due to ground fault of the rear brake oil temperature sensor system, no rear brake oil temperature signal can be input.			
Controller Reaction	• Assumes that the rear brake oil temperature is high.			
Effect on Machine	• Continues to issue a brake oil temperature alarm.			
Related Information	• Can be checked with the monitoring function (Code: 30202, R BRAKE OIL).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective rear brake oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector R56. 3) Connect T-adapter.			
			Between R56 (male) (1) ~ (2)	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and R56. 3) Connect T-adapter.			
			Between L61 (female) (20), R56 (female) (1) ~ body		Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter			
			Between L61 (female) (20) ~ body	At normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				At 100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



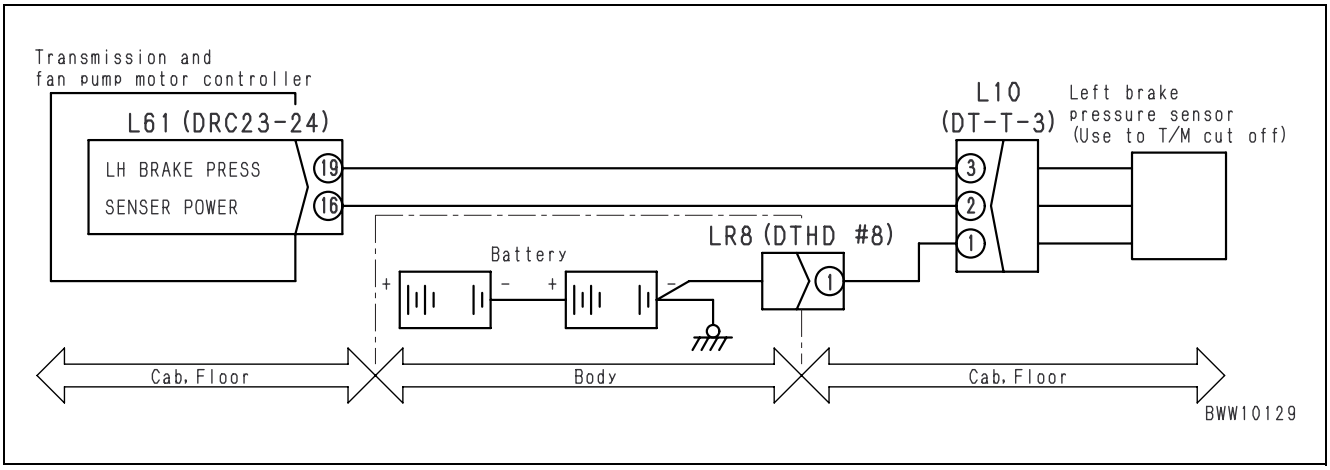
https://truckmanualshub.com/

Error code [DHT1KX]

Action Code	Error Code	Controller Code	Trouble	Transmission cut-off (Left brake pressure sensor) signal discontinuity
E01	DHT1KX	TM		
Description of Trouble	• Due to discontinuity of the left brake pressure sensor signal system, no oil pressure sensor signal for the left brake oil pressure can be input.			
Controller Reaction	• Cancels the transmission cut-off function.			
Effect on Machine	• Does not perform transmission cut-off when the left brake is stepped on while the transmission cut-off function is on.			
Related Information	• Left brake oil pressure can be checked with the monitoring function (Code: 41100, LH BRAKE). • Can be checked by stepping on the left brake while the transmission cut-off function is on.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective left brake pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector L10. 3) Connect T-adapter. 4) Start engine. 5) Step on the left brake.			
			L10	Between (2) ~ (1) (Power supply)	Voltage	20 ~ 30 V
				Between (3) ~ (1) (Signal)	Voltage	0.7 ~ 5.3 V
				Between (3) ~ (1) (Note: when open to atmosphere)	Voltage	0.5 ~ 1.5 V
	2	Wiring harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L10. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (19) ~ L10 (female) (3)		Resistance	1 Ω or below
			Wiring harness between L61 (female) (16) ~ L10 (female) (2)		Resistance	1 Ω or below
			Wiring harness between L10 (female) (1) ~ body		Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Step on the left brake.			
			L61	Between (16) ~ body (Power supply)	Voltage	20 ~ 30 V
				Between (19) ~ body (Signal)	Voltage	0.7 ~ 5.3 V

Related circuit diagram



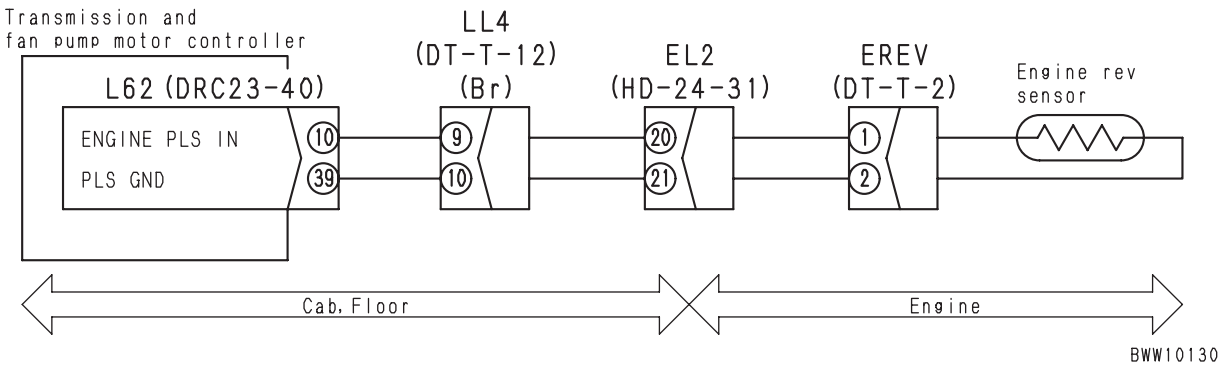
https://truckmanualshub.com/

Error code [DLE2KA]

Action Code	Error Code	Controller Code	Trouble	Engine revolution sensor system discontinuity
E03	DLE2KA	TM		
Description of Trouble	• Due to discontinuity of the engine revolution sensor system, no engine speed signal can be input.			
Controller Reaction	• Cannot detect engine speed. (Assumes that engine speed is 2,100 rpm.)			
Effect on Machine	• Gear shift shock may occur.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective connector contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and EREV. 3) Connect T-adapter.		
			Wiring harness between L62 (female) (10) ~ EREV (female) (1)	Resistance	1 Ω or below
			Wiring harness between L61 (female) (39) ~ EREV (female) (2)	Resistance	1 Ω or below
	2	Defective engine revolution sensor	1) Turn starting switch OFF. 2) Disconnect connector EREV. 3) Connect T-adapter.		
			Between EREV (male) (1) ~ (2)	Resistance	500 ~ 1,000 Ω
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L62 (10) ~ (39)	Voltage (Measured in AC range)	0.5 Ω or above

Related circuit diagram



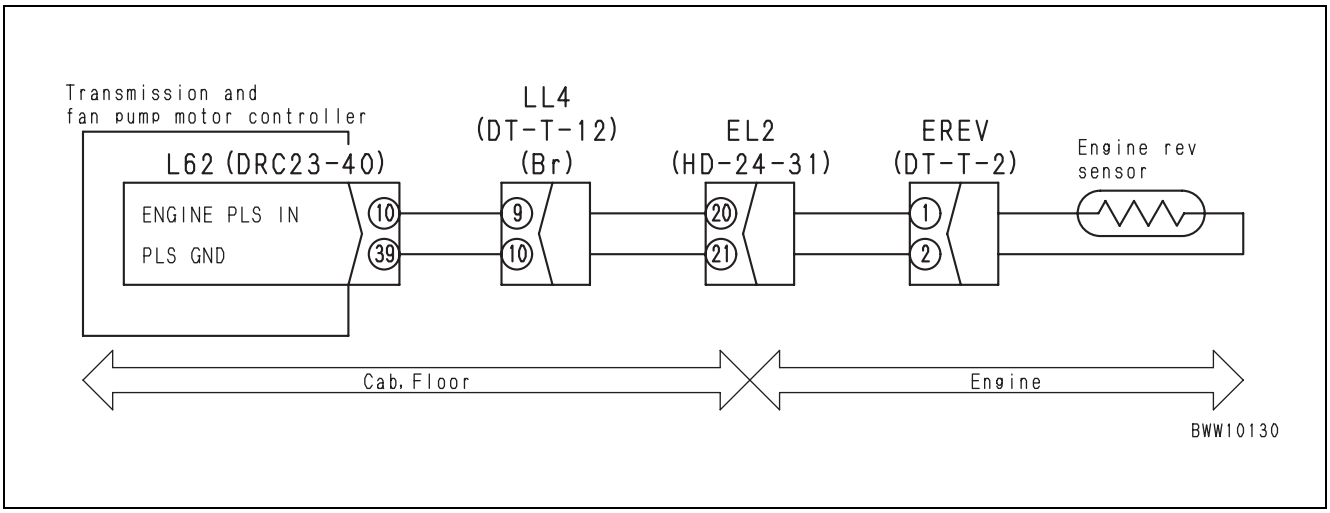
https://truckmanualshub.com/

Error code [DLE2LC]

Action Code	Error Code	Controller Code	Trouble	Engine revolution sensor failure
E03	DLE2LC	TM		
Description of Trouble	• Due to ground fault of the engine revolution sensor system, no engine speed signal can be input.			
Controller Reaction	• Cannot detect engine speed. (Assumes that engine speed is 2,100 rpm.)			
Effect on Machine	• Gear shift shock may occur.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness ground fault or short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L62 and EREV. 3) Connect T-adapter.		
			Between L62 (female) (10), EREV (female) (1) ~ body	Resistance	1 MΩ or above
	2	Defective engine revolution sensor	1) Turn starting switch OFF. 2) Disconnect connector EREV. 3) Connect T-adapter.		
			Between EREV (male) (1) ~ (2)	Resistance	500 ~ 1,000 Ω
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L62 (10) ~ (39)	Voltage (Measured in AS range)	0.5 Ω or above

Related circuit diagram



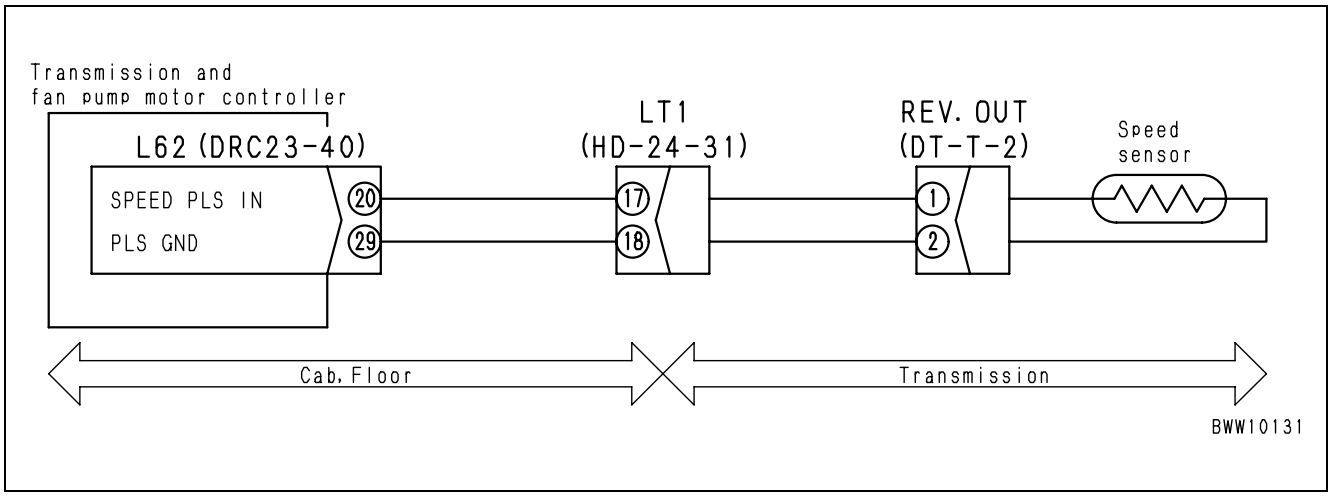
https://truckmanualshub.com/

Error code [DLT3KA]

Action Code	Error Code	Controller Code	Trouble	Speed sensor system discontinuity
E03	DLT3KA	TM		
Description of Trouble	• Due to discontinuity of the speed sensor system, no speed sensor signal is input.			
Controller Reaction	• Cannot recognize the travelling speed.			
Effect on Machine	• Indication of the vehicle speed stays at 0 km/h. • Shift up cannot be performed in the auto-shift mode.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and REV.OUT. 3) Connect T-adapter.		
			Between wiring harnesses between L62 (female) (20) ~ REV.OUT (female) (1)	Resistance	1 Ω or below
			Between wiring harnesses between L62 (female) (29) ~ REV.OUT (female) (2)	Resistance	1 Ω or below
	2	Defective speed sensor	1) Turn starting switch OFF. 2) Disconnect connector REV.OUT. 3) Connect T-adapter.		
			Between REV.OUT (male) (1) ~ (2)	Resistance	500 ~ 1,000 Ω
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter.		
			Between L62 female (20) ~ (29)	Resistance	500 ~ 1,000 Ω

Related circuit diagram



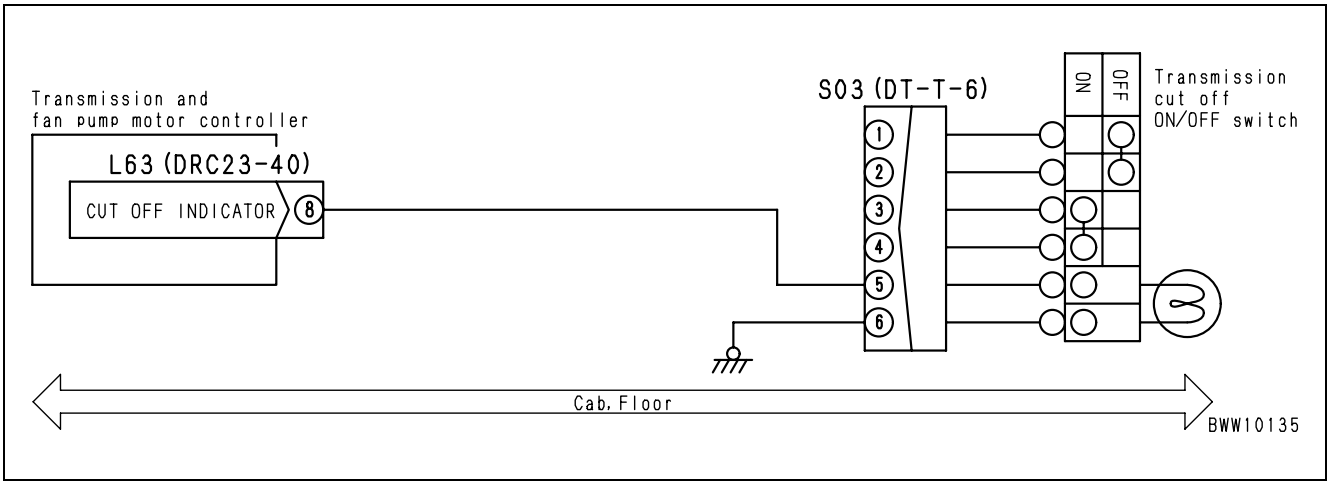
https://truckmanualshub.com/

Error code [DT20KB]

Action Code	Error Code	Controller Code	Trouble	Ground fault of built-in indicator lamp system of transmission cut-off switch
—	DT20KB	TM		
Description of Trouble	• Due to ground fault of the built-in indicator lamp system of transmission cut-off switch, no output goes to the indicator lamp.			
Controller Reaction	• No action.			
Effect on Machine	• The indicator lamp built in the transmission cut-off switch does not come on.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S03. 3) Connect T-adapter.			
			Between L63 (female) (8), S03 (female) (5) ~ body		Resistance	1 Ω or above
	2	Defective built in indicator lamp of transmission cut-off switch	1) Turn starting switch OFF. 2) Disconnect connector S03. 3) Connect T-adapter. 4.) Turn on starting switch.			
			Between S03 (5) ~ (6)	Cutoff switch = ON	Voltage	17 ~ 30 V
				Cutoff switch = OFF	Voltage	1 V or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (8) ~ body	Cutoff switch = ON	Voltage	17 ~ 30 V
				Cutoff switch = OFF	Voltage	1 V or below

Related circuit diagram



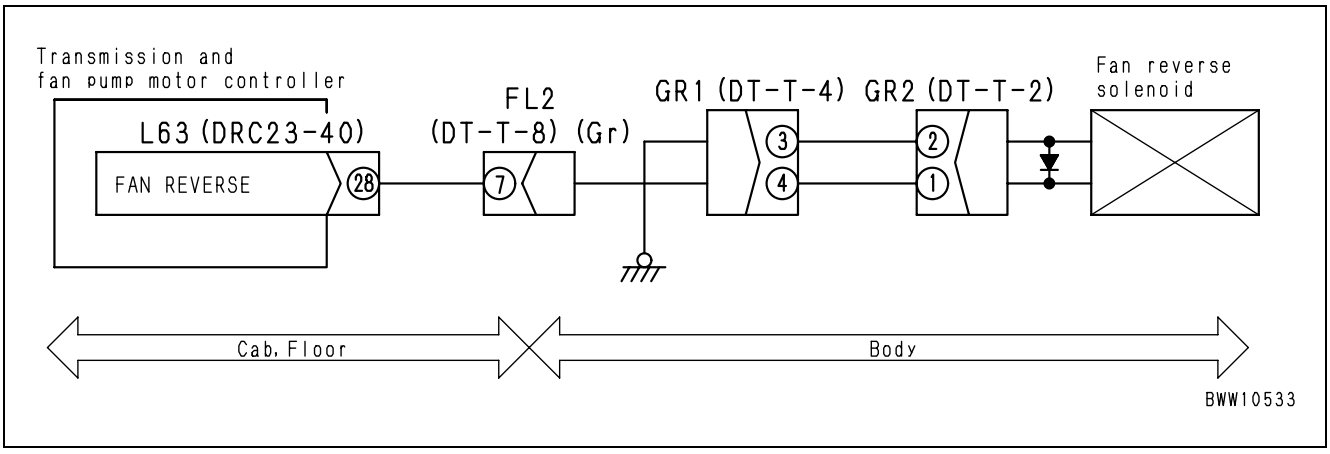
https://truckmanualshub.com/

Error code [DW7BKA]

Action Code	Error Code	Controller Code	Trouble	Fan reverse solenoid system discontinuity
E01	DW7BKA	TM		
Description of Trouble	• Due to disconnection or hot short-circuiting of the fan reverse solenoid system, no output goes to the fan reverse solenoid.			
Controller Reaction	• Turns OFF output to the fan reverse solenoid.			
Effect on Machine	• Cannot reverse rotation of the fan.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fan reverse solenoid	1) Turn starting switch OFF. 2) Disconnect connector GR2. 3) Connect T-adapter		
			Between GR2 (male) (1) ~ (2)	Resistance	35 ~ 45 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and GR2. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (28) ~ GR2 (female) (1)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (28) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



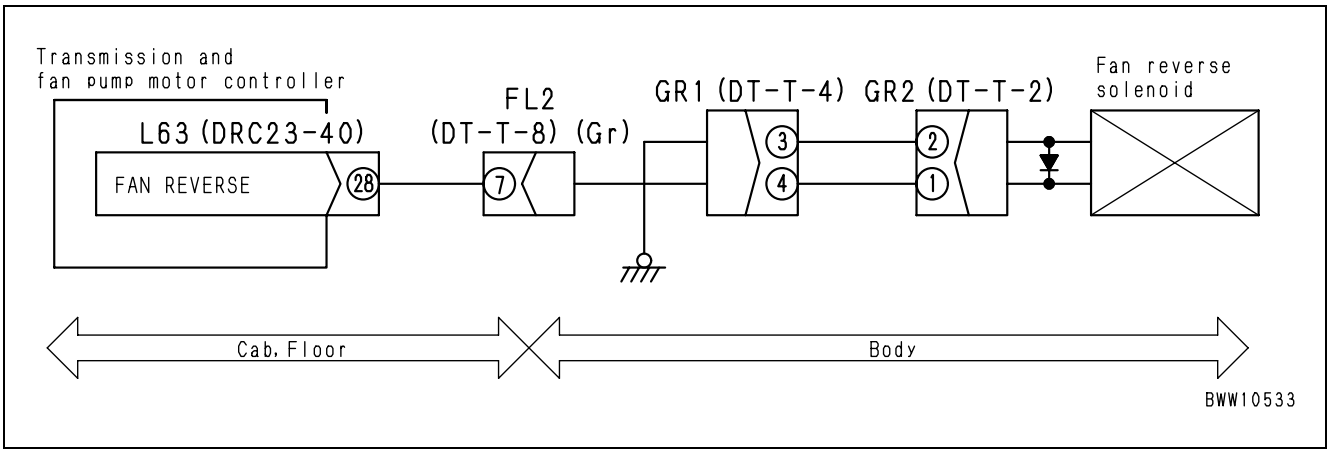
https://truckmanualshub.com/

Error code [DW7BKB]

Action Code	Error Code	Controller Code	Trouble	Fan reverse solenoid system short-circuiting
E01	DW7BKB	TM		
Description of Trouble	• Due to short-circuiting of the fan reverse solenoid system, no output goes to the fan reverse solenoid.			
Controller Reaction	• Turns OFF output to the fan reverse solenoid.			
Effect on Machine	• Cannot reverse rotation of the fan.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fan reverse solenoid	1) Turn starting switch OFF. 2) Disconnect connector GR2. 3) Connect T-adapter.		
			Between GR2 (male) (1) ~ (2)	Resistance	35 ~ 45 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and GR2. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (28) ~ GR2 (female) (1)	Resistance	1 Ω or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (28) ~ body.	Resistance	35 ~ 45 Ω

Related circuit diagram



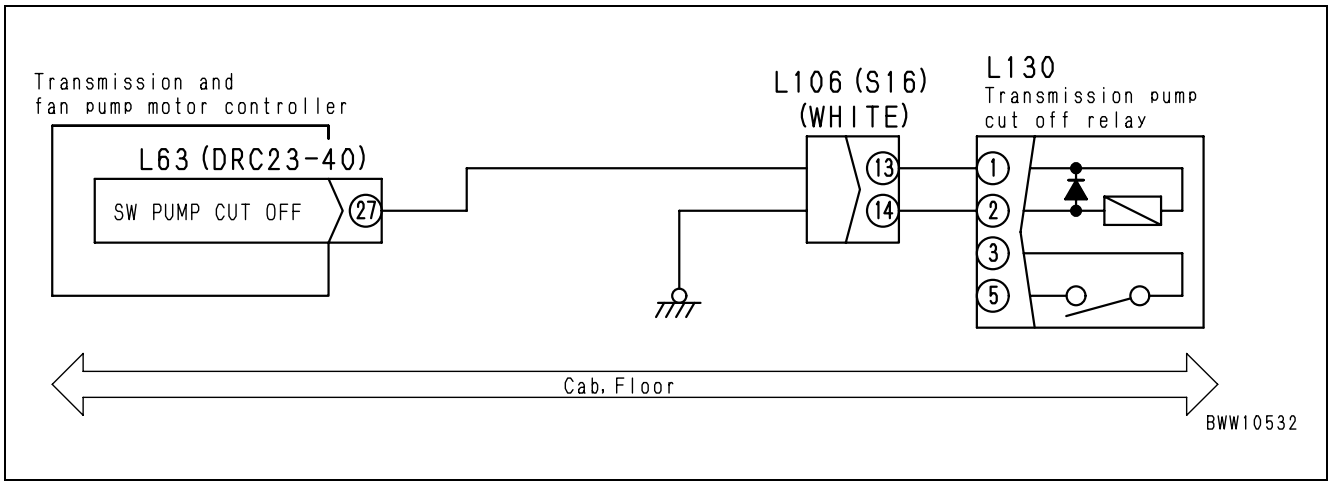
https://truckmanualshub.com/

Error code [DW7CKA]

Action Code	Error Code	Controller Code	Trouble	Switch pump cut-off relay discontinuity
E01	DW7CKA	TM		
Description of Trouble	• Due to discontinuity of the transmission pump cut-off relay system, no output goes to the transmission pump cut-off relay.			
Controller Reaction	• Does not output to the transmission pump cut-off relay.			
Effect on Machine	• Cannot turn transmission pump cut-off relay on.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective transmission pump cut-off relay (L130)	1) Turn starting switch OFF. 2) Disconnect connector L106. 3) Connect T-adapter.		
			Between L106 (female) (13) ~ (14)	Resistance	200 ~ 400 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L106. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (27) ~ L106 (male) (13)	Resistance	1 Ω or below
			Wiring harness between L130 (male) (14) ~ body	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (27) ~ body.	Resistance	200 ~ 400 Ω

Related circuit diagram



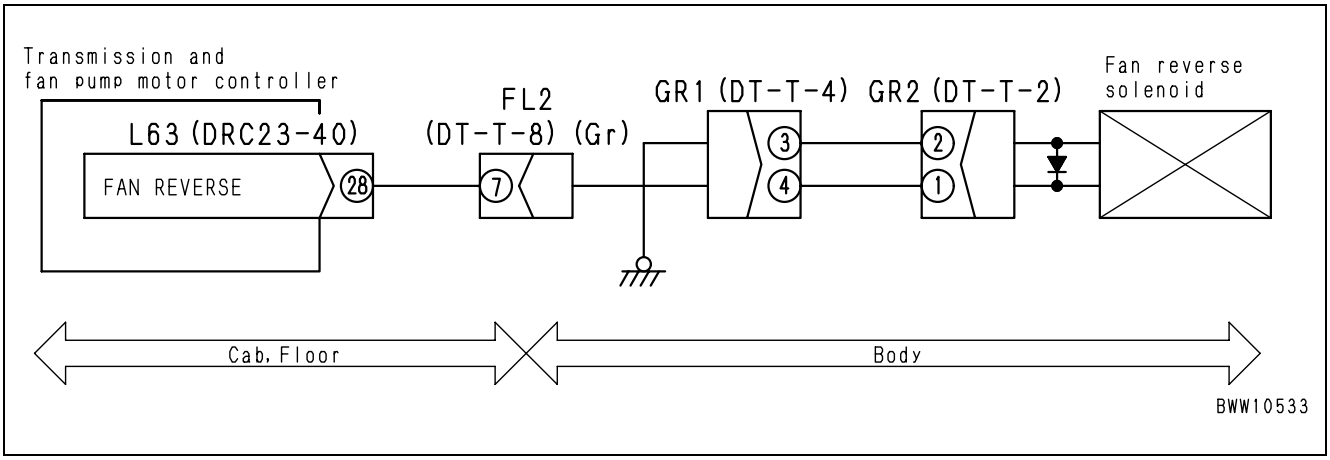
https://truckmanualshub.com/

Error code [DW7CKB]

Action Code	Error Code	Controller Code	Trouble	Switch pump cut-off relay ground fault
E01	DW7CKB	TM		
Description of Trouble	• Due to ground fault of the transmission pump cut-off relay system, no output goes to the transmission pump cut-off relay.			
Controller Reaction	• Turns output to the transmission pump cut-off relay OFF.			
Effect on Machine	• Cannot turn transmission pump cut-off relay on.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective transmission pump cut-off relay (L106)	1) Turn starting switch OFF. 2) Disconnect connector L106. 3) Connect T-adapter.		
			Between L106 (female) (13) ~ (14)	Resistance	200 ~ 400 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L106. 3) Connect T-adapter.		
			Between L63 (female) (27), L106 (male) (1) ~ body.	Resistance	1 MΩ and above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (27) ~ body.	Resistance	200 ~ 400 Ω

Related circuit diagram



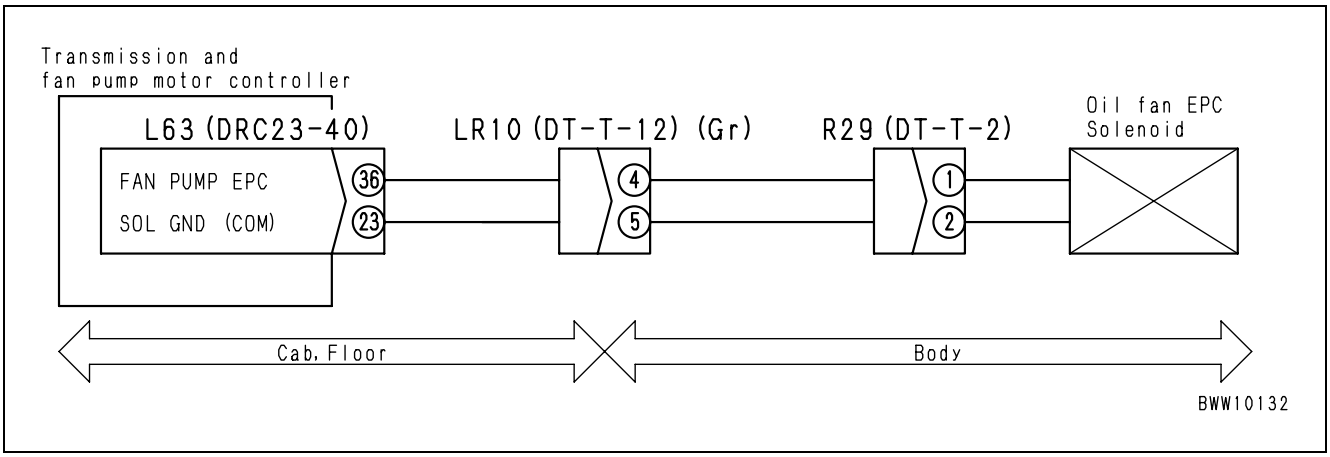
https://truckmanualshub.com/

Error code [DX16KA]

Action Code	Error Code	Controller Code	Trouble	Fan pump EPC solenoid system discontinuity
E01	DX16KA	TM		
Description of Trouble	• Due to mdiscontinuity of the fan pump EPC solenoid system, no output goes to the fan pump EPC solenoid.			
Controller Reaction	• No action.			
Effect on Machine	• Fan revolution reaches the limit.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fan pump EPC solenoid system	1) Turn starting switch OFF. 2) Disconnect connector R29. 3) Connect T-adapter.		
			Between R29 (male) (1) ~ (2)	Resistance	5 ~ 10 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and R29. 3) Connect T-adapter		
			Wiring harness between L63 (female) (36) ~ R29 (female) (1)	Resistance	1 Ω or below
			Wiring harness between L63 (female) (23) ~ R29 (female) (2)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (36) ~ (23)	Resistance	5 ~ 10 Ω

Related circuit diagram



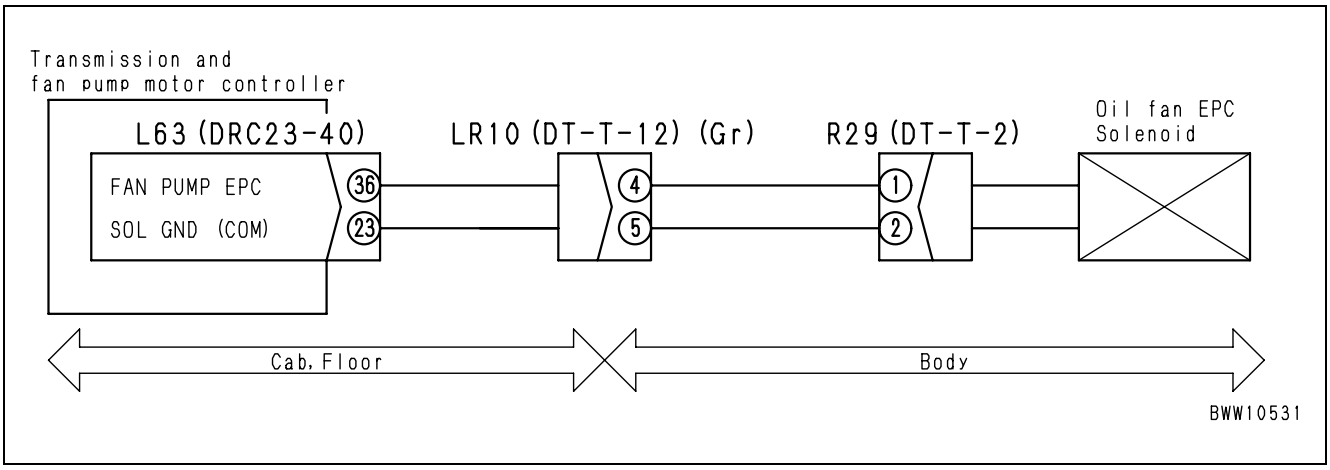
https://truckmanualshub.com/

Error code [DX16KB]

Action Code	Error Code	Controller Code	Trouble	Fan pump EPC solenoid system ground fault
E01	DX16KB	TM		
Description of Trouble	• Due to ground fault of the fan pump EPC solenoid system, no output goes to the fan pump EPC solenoid.			
Controller Reaction	• Turns output to the fan pump EPC solenoid OFF.			
Effect on Machine	• Fan revolution reaches the limit.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fan pump EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector R29. 3) Connect T-adapter.		
			Between R29 (male) (1) ~ (2)	Resistance	5 ~ 10 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and R29. 3) Connect T-adapter		
			Wiring harness between L63 (female) (36), R29 (female) (1) ~ body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (36) ~ (23)	Resistance	5 ~ 10 Ω

Related circuit diagram



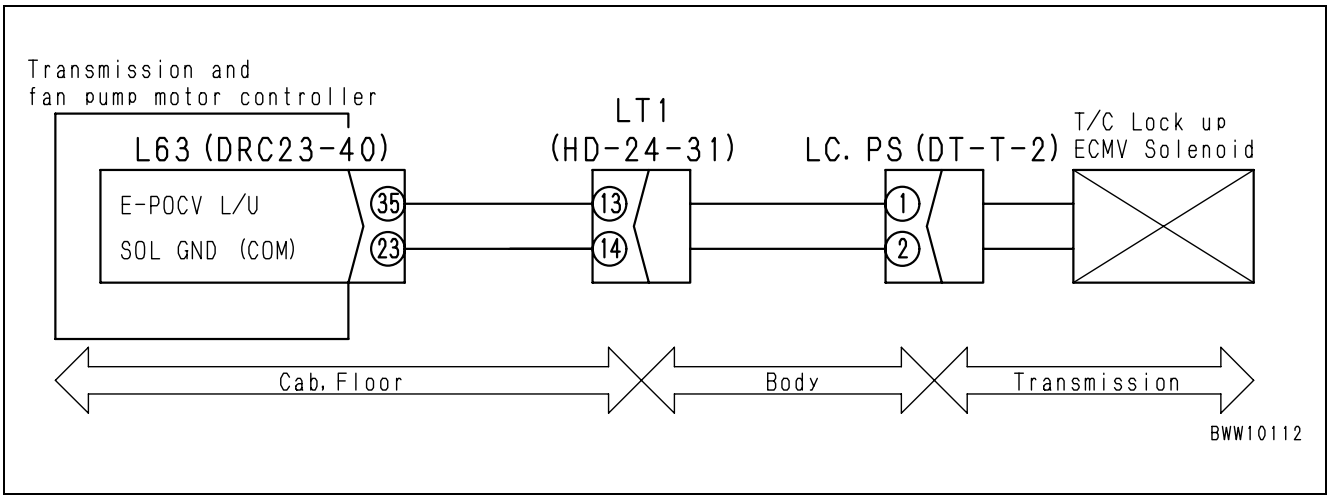
https://truckmanualshub.com/

Error code [DXH1KA]

Action Code	Error Code	Controller Code	Trouble	Lock-up clutch _ECMV solenoid system discontinuity
E01	DXH1KA	TM		
Description of Trouble	• Due to discontinuity of the lock-up clutch ECMV solenoid system, no output goes to the lock-up clutch _ECMV.			
Controller Reaction	• No action			
Effect on Machine	• The lock-up clutch cannot be engaged.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lock-up clutch _ECMV	1) Turn starting switch OFF. 2) Disconnect connector LC.PS. 3) Connect T-adapter.		
			Between LC.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and LC.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (35) ~ LC.RS (female) (1)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (35) ~ (23)	Resistance	15 ~ 25 Ω

Related circuit diagram



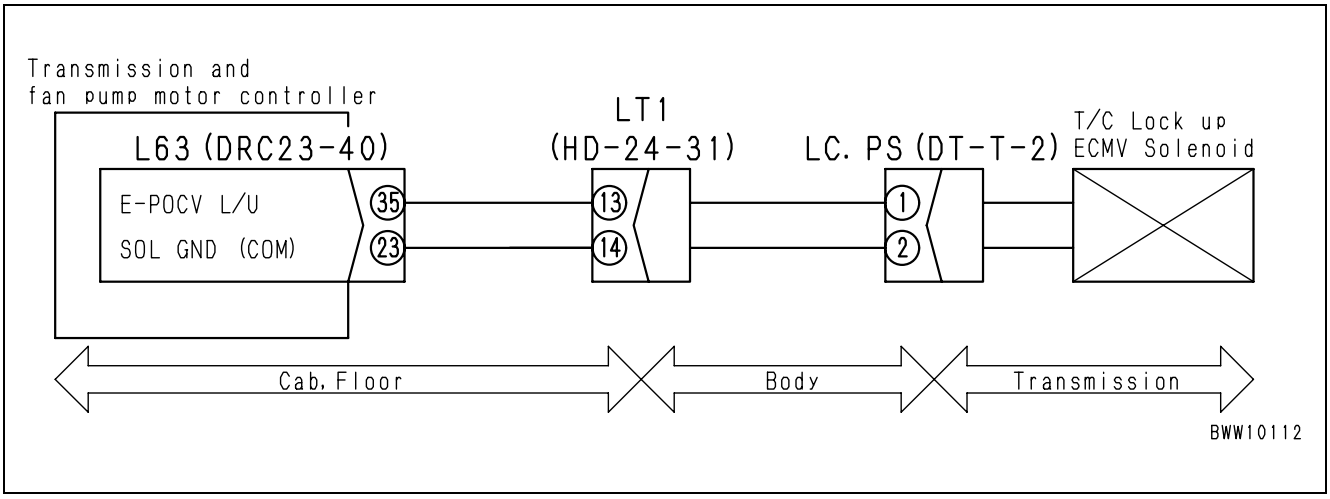
https://truckmanualshub.com/

Error code [DXH1KB]

Action Code	Error Code	Controller Code	Trouble	Lock-up clutch _ECMV solenoid system short-circuiting
E01	DXH1KB	TM		
Description of Trouble	• Due to short-circuiting of the lock-up clutch ECMV solenoid system, no output goes to the lock-up clutch _ECMV.			
Controller Reaction	• Turns output to the lock-up clutch ECMV solenoid OFF.			
Effect on Machine	• The lock-up clutch cannot be engaged.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lock-up clutch _ECMV	1) Turn starting switch OFF. 2) Disconnect connector LC.PS. 3) Connect T-adapter.		
			Between LC.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and LC.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (35), LC.PS (female) (1) ~ body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (35) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



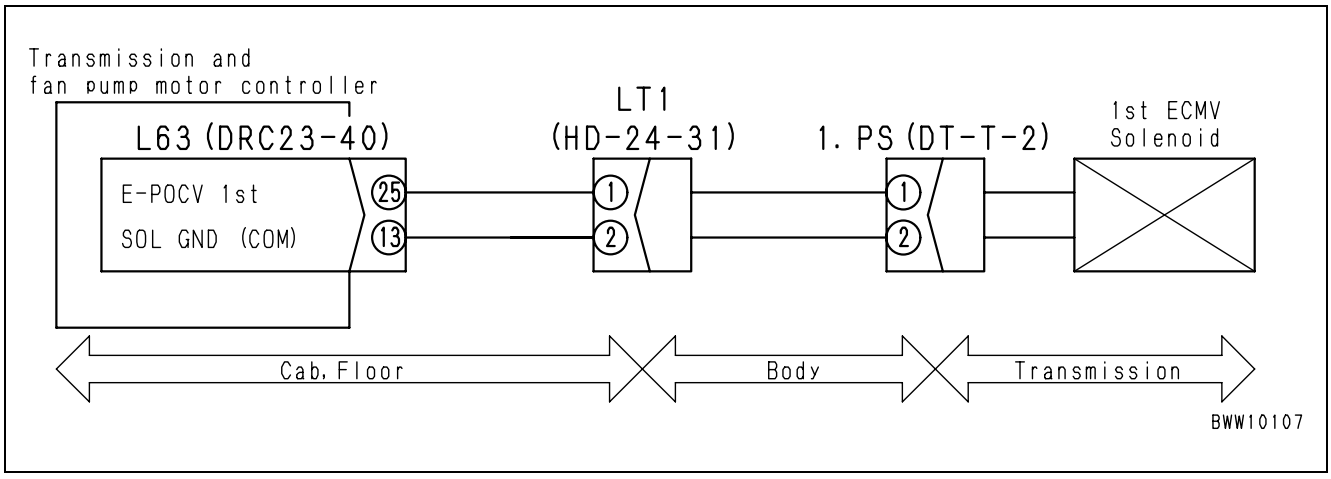
https://truckmanualshub.com/

Error code [DXH4KA]

Action Code	Error code	Controller code	Trouble	1st_ECMV solenoid system discontinuity
E03	DXH4KA	TM		
Description of Trouble	• Due to discontinuity of the 1st_ECMV solenoid system, no output goes to the 1st_ECMV.			
Controller Reaction	• No action.			
Effect on Machine	• The first pass cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 1st_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 1.PS. 3) Connect T-adapter.		
			Between 1.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 1.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (25) ~ 1.PS (female) (1)	Resistance	1 Ω or below
			Wiring harness between L63 (female) (13) ~ 1.PS (female) (1)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (25) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



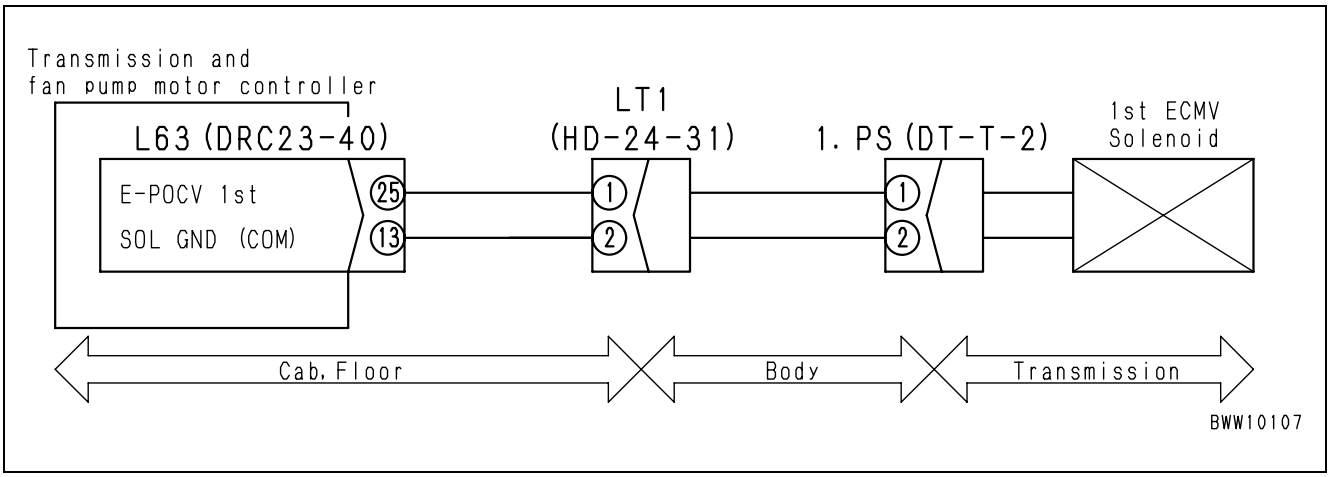
https://truckmanualshub.com/

Error code [DXH4KB]

Action Code	Error Code	Controller Code	Trouble	1st_ECMV solenoid system short-circuiting
E03	DXH4KB	TM		
Description of Trouble	• Due to ground fault of the 1st_ECMV solenoid system, no output goes to the 1st_ECMV.			
Controller Reaction	• Turns output to the 1st_ECMV solenoid OFF.			
Effect on Machine	• The first pass cannot be engaged. (Traveling in other passes is possible.)			
RelatedInformation	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 1st_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 1.PS. 3) Connect T-adapter.		
			Between 1.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 1.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (25), 1.PS (female) (1) ~ body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (25) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



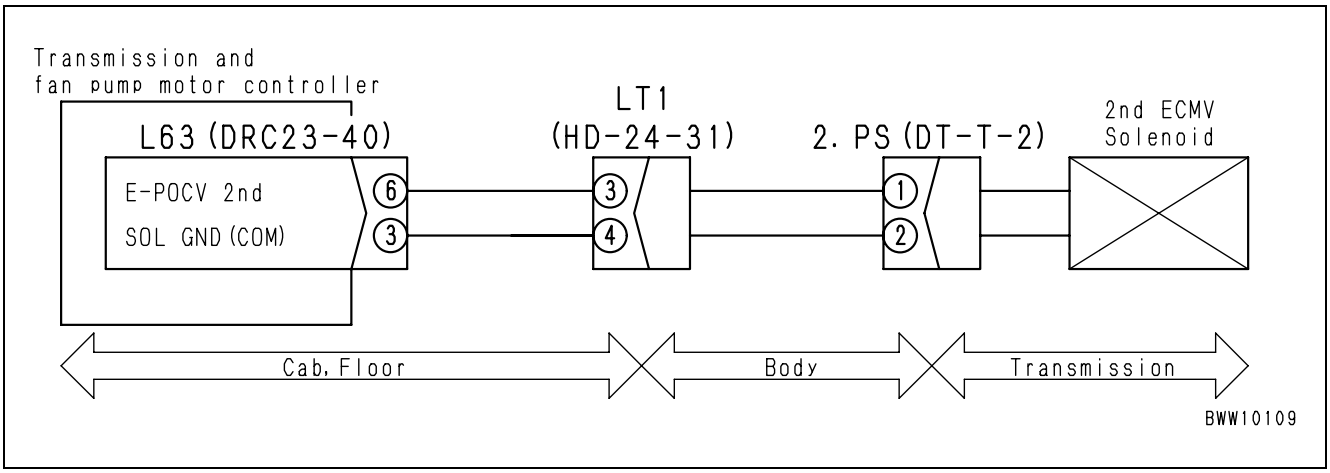
https://truckmanualshub.com/

Error code [DXH5KA]

Action Code	Error Code	Controller Code	Trouble	2nd_ECMV solenoid system discontinuity
E03	DXH5KA	TM		
Description of Trouble	• Due to discontinuity of the 2nd_ECMV solenoid system, no output goes to the 2nd_ECMV.			
Controller Reaction	• No action.			
Effect on Machine	• The first pass cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 2nd_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 2.PS. 3) Connect T-adapter.		
			Between 2.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 2.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (6) ~ 2.PS (female) (1)	Resistance	1 Ω or below
			Wiring harness between L63 (female) (3) ~ 2.PS (female) (2)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (6) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



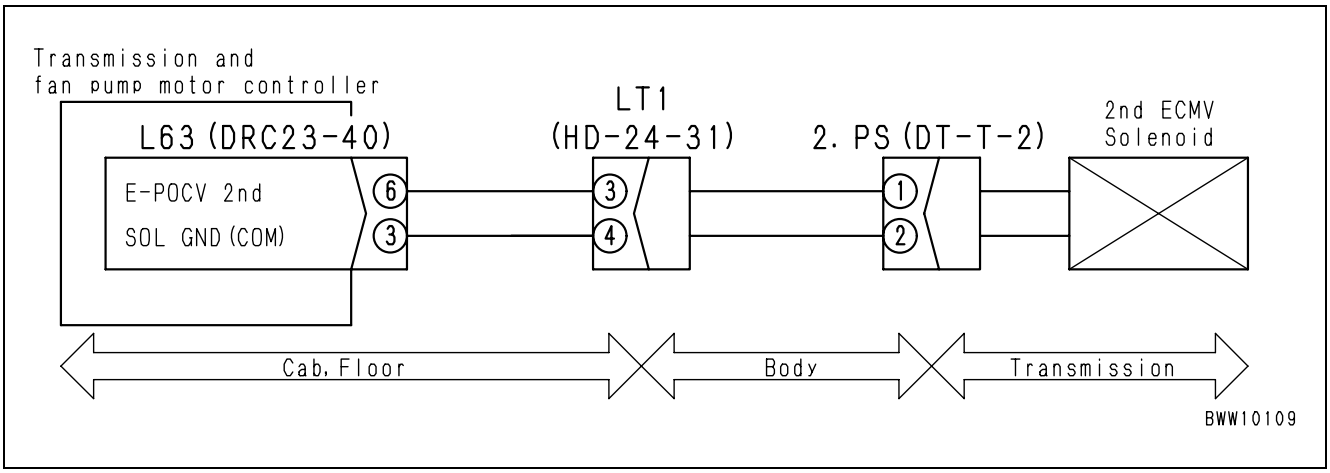
https://truckmanualshub.com/

Error code [DXH5KB]

Action Code	Error Code	Controller Code	Trouble	2nd_ECMV solenoid system short-circuiting
E03	DXH5KB	TM		
Description of Trouble	• Due to ground fault of the 2nd_ECMV solenoid system, no output goes to the 2nd_ECMV.			
Controller Reaction	• Turns output to the 2nd_ECMV solenoid OFF.			
Effect on Machine	• The first pass cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 2nd_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 2.PS. 3) Connect T-adapter.		
			Between 2.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 2.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (6), 2.PS (female) (1) ~ body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (6) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



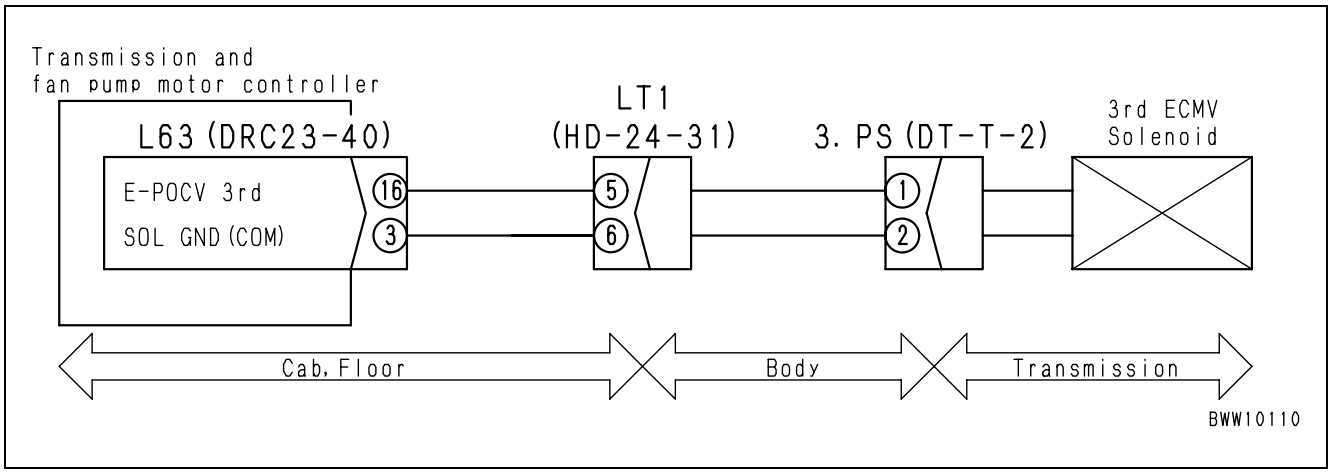
https://truckmanualshub.com/

Error code [DXH6KA]

Action Code	Error Code	Controller Code	Trouble	3rd_ECMV solenoid system discontinuity
E03	DXH6KA	TM		
Description of Trouble	• Due to discontinuity of the 3rd_ECMV solenoid system, no output goes to the 3rd_ECMV.			
Controller Reaction	• No action.			
Effect on Machine	• The first pass cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 3rd_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 3.PS. 3) Connect T-adapter.		
			Between 3.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 3.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (16) ~ 3.PS (female) (1)	Resistance	1 Ω or below
			Wiring harness between L63 (female) (3) ~ 3.PS (female) (2)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (16) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



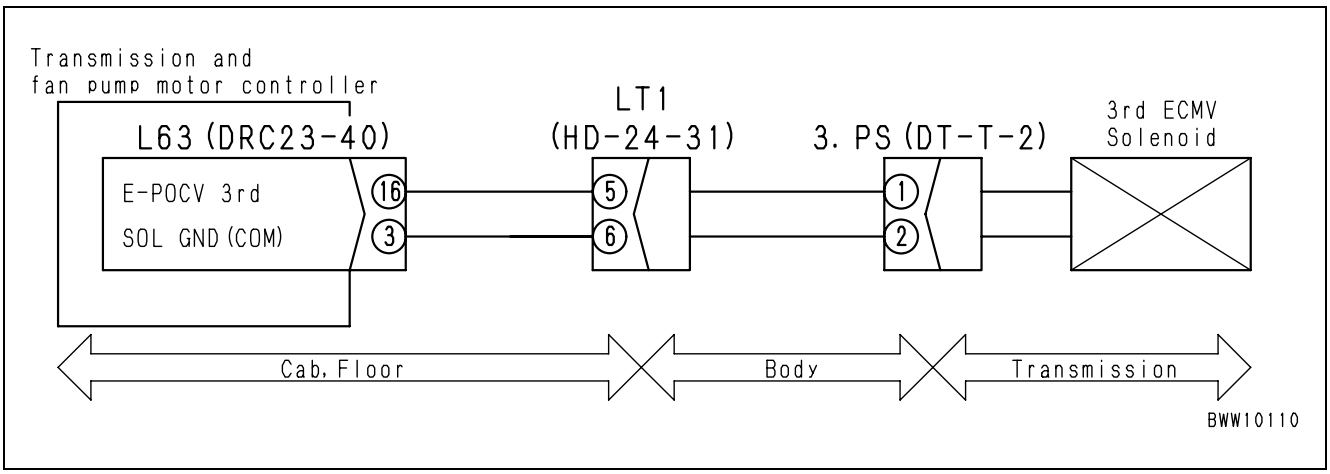
https://truckmanualshub.com/

Error code [DXH6KB]

Action Code	Error Code	Controller Code	Trouble	3rd_ECMV solenoid system short-circuiting
E03	DXH6KB	TM		
Description of Trouble	• Due to ground fault of the 3rd_ECMV solenoid system, no output goes to the 3rd_ECMV.			
Controller Reaction	• Turns output to the 3rd_ECMV solenoid OFF.			
Effect on Machine	• The first pass cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 3rd_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 3.PS. 3) Connect T-adapter.		
			Between 3.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 3.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (16) 3.PS (female) (1) ~ body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (16) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



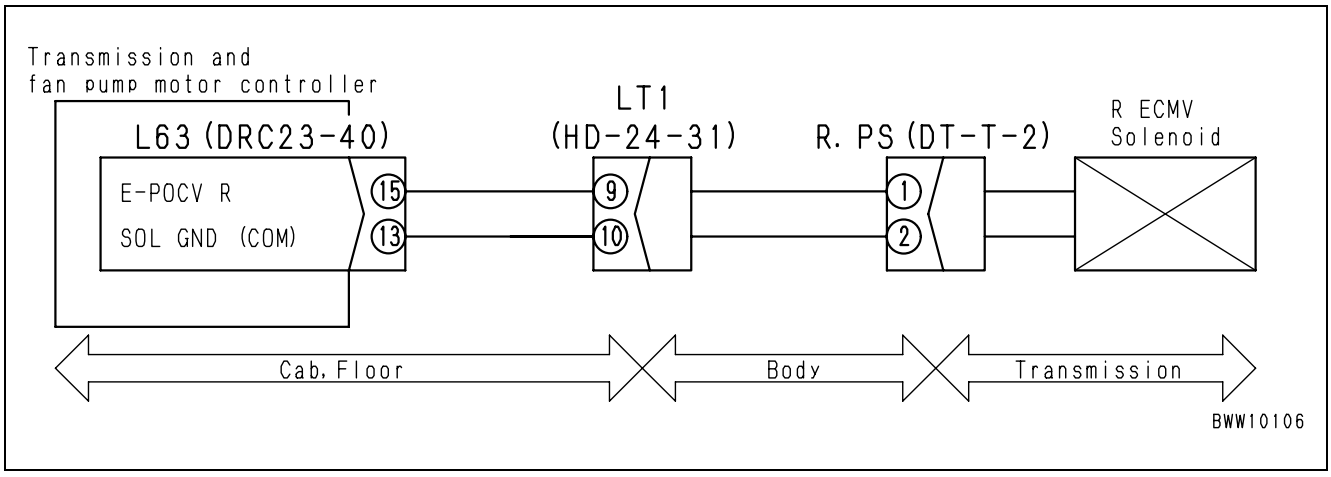
https://truckmanualshub.com/

Error code [DXH7KA]

Action Code	Error Code	Controller Code	Trouble	R_ECMV solenoid system discontinuity
E03	DXH7KA	TM		
Description of Trouble	• Due to discontinuity of the R_ECMV solenoid system, no output goes to the R_ECMV.			
Controller Reaction	• No action.			
Effect on Machine	• “R” cannot be engaged. (Traveling in “F” is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective R_ECMV	1) Turn starting switch OFF. 2) Disconnect connector R.PS. 3) Connect T-adapter.		
			Between R.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and R.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (15) ~ R.PS (female) (1)	Resistance	1 Ω or below
			Wiring harness between L63 (female) (13) ~ R.PS (female) (2)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (15) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



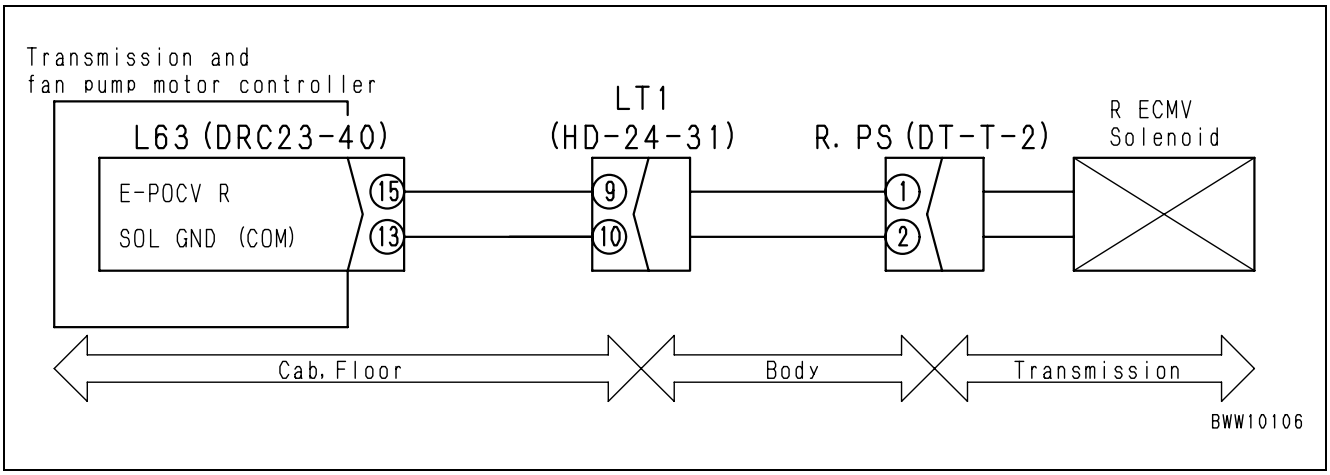
https://truckmanualshub.com/

Error code [DXH7KB]

Action Code	Error Code	Controller Code	Trouble	3rd_ECMV solenoid system ground fault
E03	DXH7KB	TM		
Description of Trouble	• Due to ground fault of the R_ECMV solenoid system, no output goes to the R_ECMV.			
Controller Reaction	• Turns output to the R_ECMV solenoid OFF.			
Effect on Machine	• “R” cannot be engaged. (Traveling in “F” is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective R_ECMV	1) Turn starting switch OFF. 2) Disconnect connector R.PS. 3) Connect T-adapter.		
			Between R.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and R.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (15), R.PS (female) (1) ~ body	Resistance	1 Ω or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (15) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



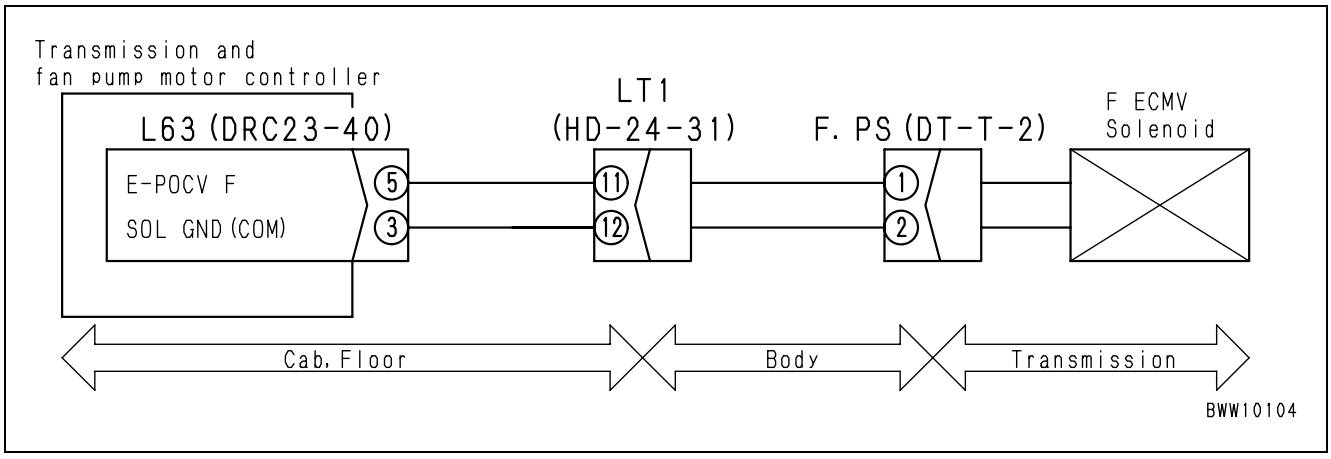
https://truckmanualshub.com/

Error code [DXH8KA]

Action Code	Error Code	Controller Code	Trouble	F_ECMV solenoid system discontinuity
E03	DXH8KA	TM		
Description of Trouble	• Due to discontinuity of the F_ECMV solenoid system, no output goes to the F_ECMV.			
Controller Reaction	• No action.			
Effect on Machine	• “F” cannot be engaged. (Traveling in “R” is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective R_ECMV	1) Turn starting switch OFF. 2) Disconnect connector F.PS. 3) Connect T-adapter.		
			Between F.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and F.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (5) ~ R.PS (female) (1)	Resistance	1 Ω or below
			Wiring harness between L63 (female) (3) ~ R.PS (female) (2)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (5) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



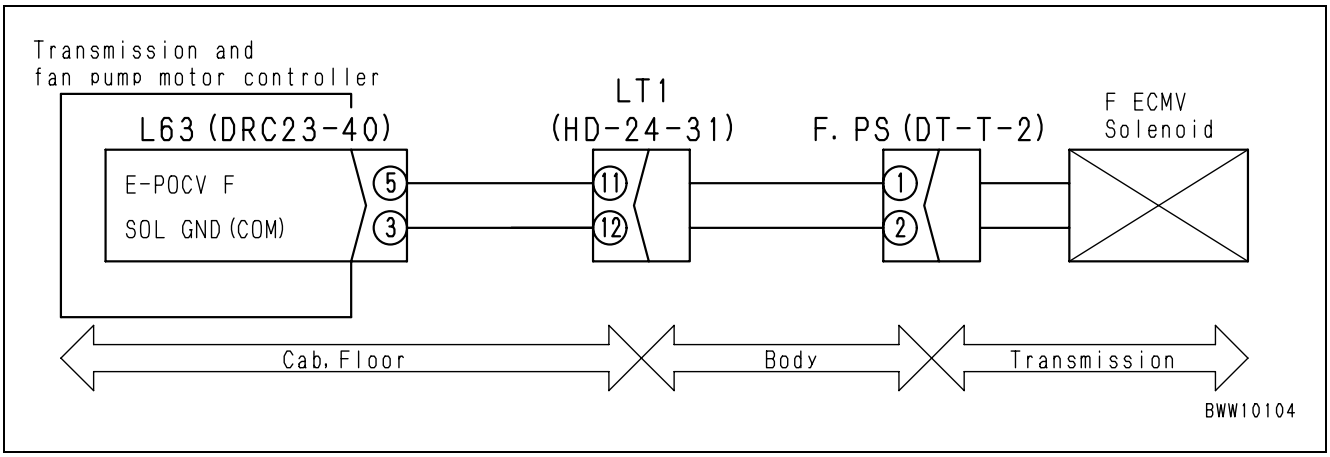
https://truckmanualshub.com/

Error code [DXH8KB]

Action Code	Error Code	Controller Code	Trouble	F_ECMV solenoid system ground fault
E03	DXH8KB	TM		
Description of Trouble	• Due to ground fault of the F_ECMV solenoid system, no output goes to the F_ECMV.			
Controller Reaction	• Turns output to the F_ECMV solenoid OFF.			
Effect on Machine	• “F” cannot be engaged. (Traveling in “R” is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective F_ECMV	1) Turn starting switch OFF. 2) Disconnect connector F.PS. 3) Connect T-adapter.		
			Between F.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and F.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (5), F.PS (female) (1) ~ body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (5) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



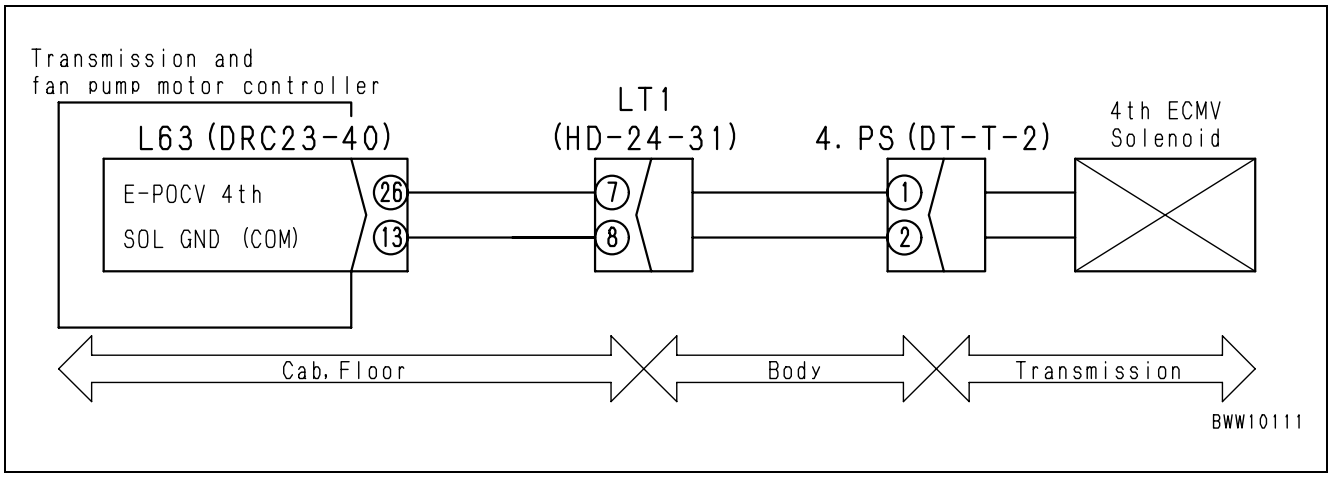
https://truckmanualshub.com/

Error code [DXHHKA]

Action Code	Error Code	Controller Code	Trouble	4th_ECMV solenoid system discontinuity
E03	DXHHKA	TM		
Description of Trouble	• Due to discontinuity of the 4th_ECMV solenoid system, no output goes to the 4th_ECMV.			
Controller Reaction	• No action.			
Effect on Machine	• The fourth pass cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective R_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 4th.PS. 3) Connect T-adapter.		
			Between 4th.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and F.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (26) ~ F.PS (female) (1)	Resistance	1 Ω or below
			Wiring harness between L63 (female) (13) ~ 4th.PS (female) (2)	Resistance	1 Ω or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (26) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



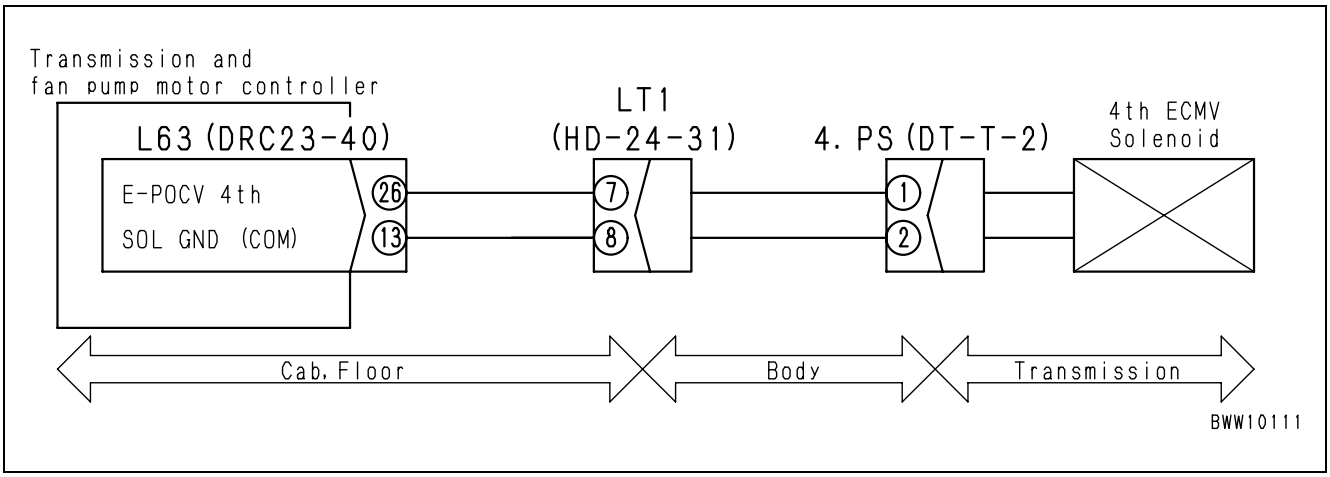
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Error code [DXHHKB]

Action Code	Error Code	Controller Code	Trouble	4th ECMV solenoid system short-circuiting
E03	DXHHKB	TM		
Description of Trouble	• Due to ground fault of the 4th_ECMV solenoid system, no output goes to the 4th_ECMV			
Controller Reaction	• Turns output to the 4th_ECMV solenoid OFF.			
Effect on Machine	• The fourth pass cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective F_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 4.PS. 3) Connect T-adapter.		
			Between 4.PS (male) (1) ~ (2)	Resistance	15 ~ 25 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 4th.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (female) (26), 4.PS (female) (1) ~ body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (female) (26) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



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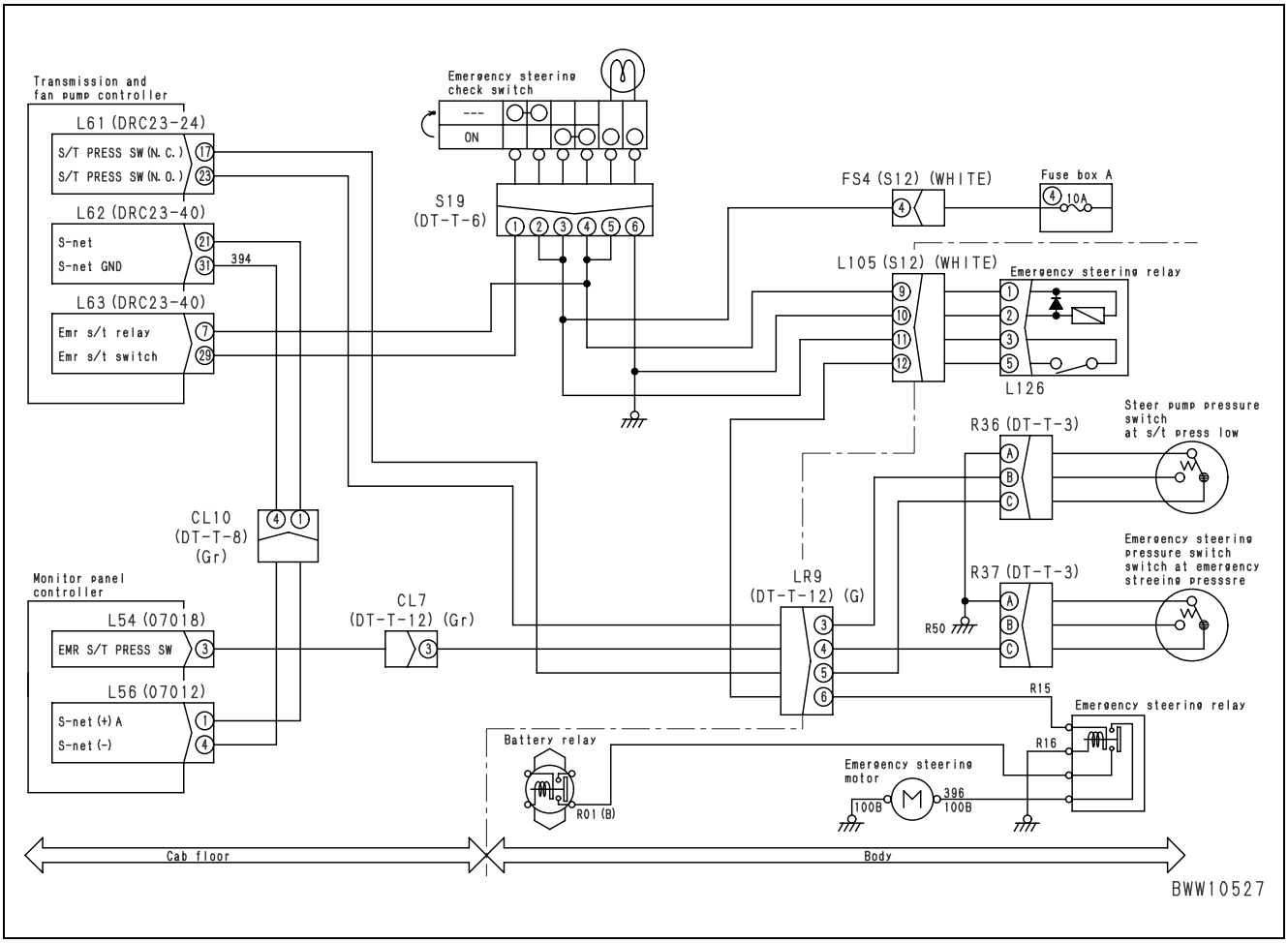
Error code [DY30MA]

Action Code	Error Code	Controller Code	Trouble	Motor-driven emergency steering pump Error (malfunction in manual mode)
E03	DY30MA	TM		
Description of Trouble	• An activation signal for the motor-driven emergency steering motor (pump) (S-NET) is issued although motor-driven emergency steering output is turned OFF.			
Controller Reaction	• Turns motor-driven emergency steering output OFF.			
Effect on Machine	• The motor-driven emergency steering motor (pump) operates although the motor-driven emergency steering switch is not operated. • The emergency steering operation indicator comes on.			
Related Information	• Check operation of the emergency steering motor with the monitoring function (Code: 40903 D-IN-30). • Check steering pressure drop with the monitoring function (Code: 40905 D-IN-0, D-IN-1). • error code documentation “DY30ME” related to monitoring.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective emergency steering relay (L126) (Power and signal lines short-circuited)	1) Turn starting switch OFF. 2) Disconnect connector L105. 3) Connect T-adapter (Single-unit check).			
			Between L105 (male) (11) ~ (12)	Relay =OFF	Resistance	1 MΩ or above
			1) Turn starting switch OFF. 2) Disconnect connector L105. 3) Connect T-adapter (Single-unit check).			
			Between L105 (male) (9) ~ (10)		Resistance	200 ~ 400 Ω
	2	Defective emergency steering relay (For driving emergency steering motor) (Power and signal lines short-circuited)	1) Turn starting switch OFF. 2) Disconnect two harnesses at 100B at both ends of emergency steering motor. 3) Connect T-adapter.			
			Between disconnected relay terminals		Resistance	1 MΩ or above
	3	Hot short-circuiting between harnesses	1) Turn starting switch OFF. 2) Disconnect connectors L63, L105 and R15, and line 396 (between emergency steering relay and emergency steering motor). 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (female) (7), L105 (female) (9) ~ body		Voltage	1 V or below
			Between L105 (female) (12), R15 terminal, ~ body		Voltage	1 V or below
			Between line 396 (Emergency steering relay, emergency steering motor, and body)		Voltage	1 V or below
	4	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and R37. 3) Connect T-adapter.			
			Wiring harness between L54 (female) (3) ~ R37 (female) (3)		Resistance	1 Ω or below
	5	Defective emergency steering pressure switch	1) Turn starting switch OFF. 2) Disconnect connector R37. 3) Connect T-adapter.			
			Between R37 (male) (3) ~ (1)	Emergency steering = Stopped	Resistance	1 Ω or below
				At open to atmosphere (for reference)	Resistance	1 Ω or below
				Emergency steering = Operating (High pressure) (Operate in manual mode.)	Resistance	1 Ω or below
	6	Defective transmission and fan pump motor controller	1.) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.			
			Between L63 (female) (7) ~ body		Resistance	200 ~ 400 Ω

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Related circuit diagram



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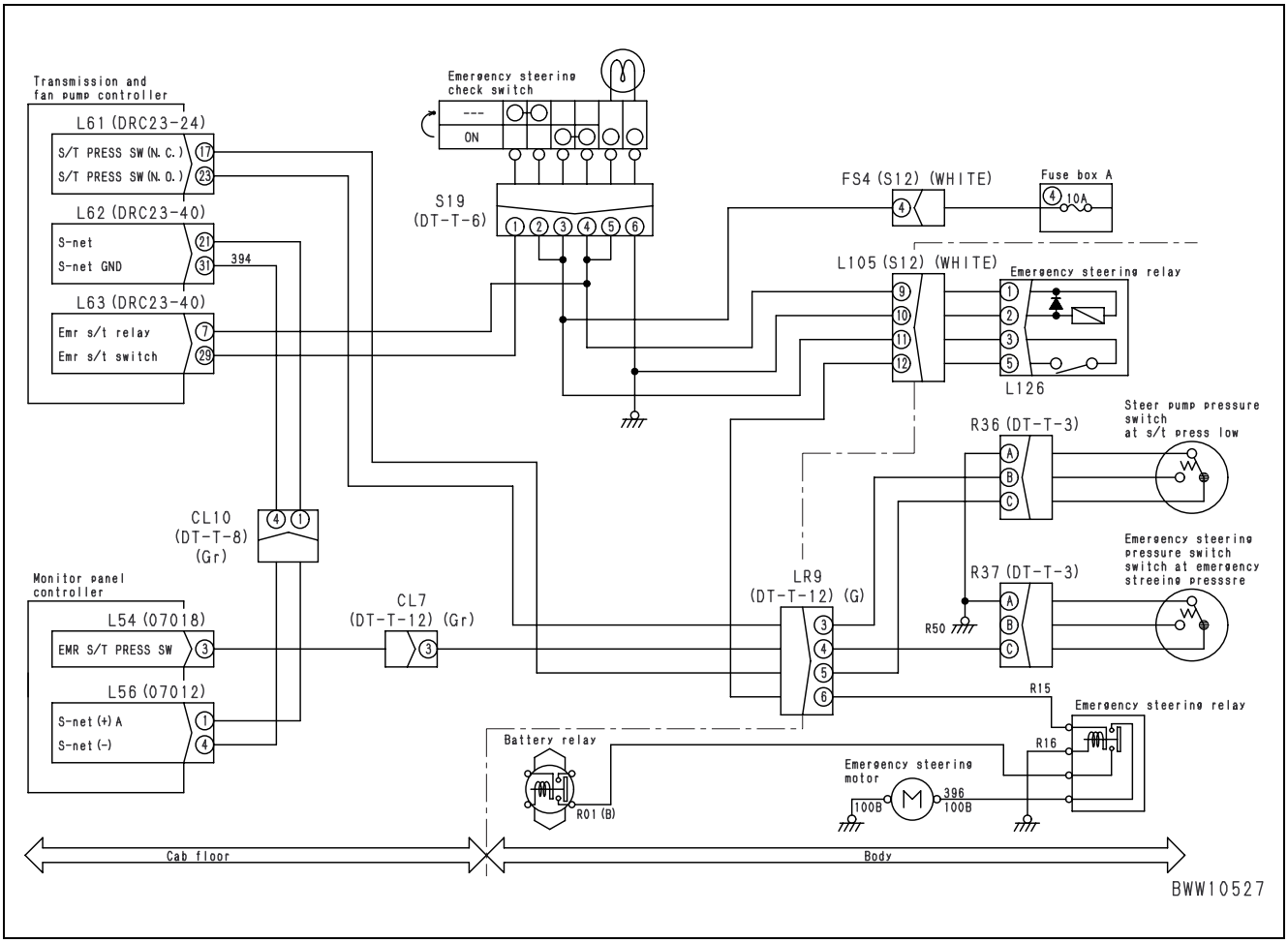
Error code [DY30MC]

Action Code	Error Code	Controller Code	Trouble	Motor-driven emergency steering pump Error (Malfunction in manual mode)
E03	DY30MC	TM		
Description of Trouble	• An activation signal for the motor-driven emergency steering motor (Pump) (S-NET) is not issued although motor-driven emergency steering output is turned on.			
Controller Reaction	• Turns motor-driven emergency steering output OFF.			
Effect on Machine	• The motor-driven emergency steering motor (pump) does not operate although the motor-driven emergency steering switch is operated.			
Related Information	• Check operation of the emergency steering motor with the monitoring function (Code: 40903 D-IN-30). • Check steering pressure drop with the monitoring function (Code: 40905 D-IN-0, D-IN-1). • See Error code descriptions of “DY30ME” related to monitoring.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective emergency steering relay (L126) (Internal discontinuity or defective contact)	1) Keep engine on for 10 seconds or longer and turn starting switch OFF. 2) Replace L126 relay with another relay of the same type. 3) Turn starting switch ON (for self-check).			
			Issues this Error code (DY30MC).		Relay (L126) = Normal	
			Does not issue this Error code (DY30MC).		Relay (L126) = Defective	
			1) Turn starting switch OFF. 2) Disconnect connector L105. 3) Connect T-adapter.			
			Between L105 (male) (9) ~ (19)		Resistance	200 ~ 400 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L105, R15, R16, line 396 (between emergency steering relay and terminals at both ends of emergency steering motor), and line 030 (battery relay and emergency steering relay). 3) Connect T-adapter.			
			Wiring harness between L105 (female) (12) ~ R15 terminal		Resistance	1 Ω or below
			Wiring harness between R16 terminal ~ body		Resistance	1 Ω or below
			Line 030 (Battery relay and emergency steering relay)		Resistance	1 Ω or below
			Line 396 (Emergency steering relay and emergency steering motor)		Resistance	1 Ω or below
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and R37. 3) Connect T-adapter.			
			Between L54 (female) (3), R37 (female) (3) ~ body		Resistance	1 MΩ or above
	4	Defective emergency steering pressure switch	1) Turn starting switch OFF. 2) Disconnect connector R37. 3) Connect T-adapter.			
			Between R37 (male) (3) ~ (1)	Emergency steering = Stopped	Resistance	1 Ω or below
				At open to atmosphere (For reference)	Resistance	1 Ω or below
				Emergency steering = Operating (High pressure) (Operate in manual mode.)	Resistance	1 MΩ or above
	5	Defective emergency steering motor	1) Turn starting switch ON.			
			Between emergency motor (+) terminal and body	Emergency steering = Stopped	Voltage	1 V or below
				Emergency steering = Operating (Operate in manual mode.)	Resistance	20 ~ 30 V
	6	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connectors L63. 3) Connect T-adapter.			
			Between L63 (female) (7) and body		Resistance	200 ~ 400 Ω

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Related circuit diagram



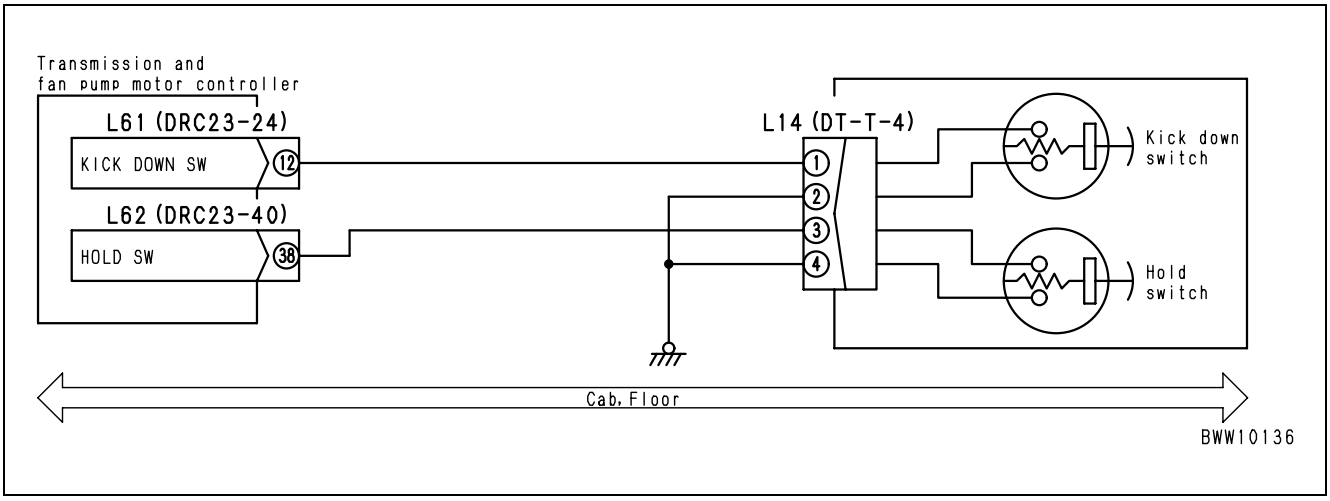
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Action code [TM-1]

Action Code	Error Code	Controller Code	Trouble	Discontinuity or hot short-circuiting of kickdown switch system
TM-1	—	(TM)		
Description of Trouble	• Due to discontinuity or hot short-circuiting of the kickdown switch system, kickdown cannot be performed.			
Controller Reaction	• No action.			
Effect on Machine	• Cannot perform kickdown control by turning the kickdown switch ON.			
Related Information	• Can be checked with the monitoring function (Code: 40905, D-IN-6).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective kickdown switch	1) Turn starting switch OFF. 2) Disconnect connector L14. 3) Connect T-adapter.			
			Between L14 (male) (1) ~ (2)	Kickdown switch = ON	Resistance	1 Ω or below
				Kickdown switch = OFF	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L14. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (12) ~ L14 (female) (1)		Resistance	1 Ω or below
			Between L14 (female) (2) ~ body		Resistance	1 Ω or below
	3	Wiring harness hot short-circuiting ★ In this case, fuse A-2 burns out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L14. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (12), L14 (female) (1) ~ body		Voltage	1 V or below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connectors L61. 3) Connect T-adapter.			
			Between L61 (12) ~ body	Kickdown switch = ON	Voltage	1 V or below
				Kickdown switch = OFF	Voltage	20 ~ 30 V

Related circuit diagram



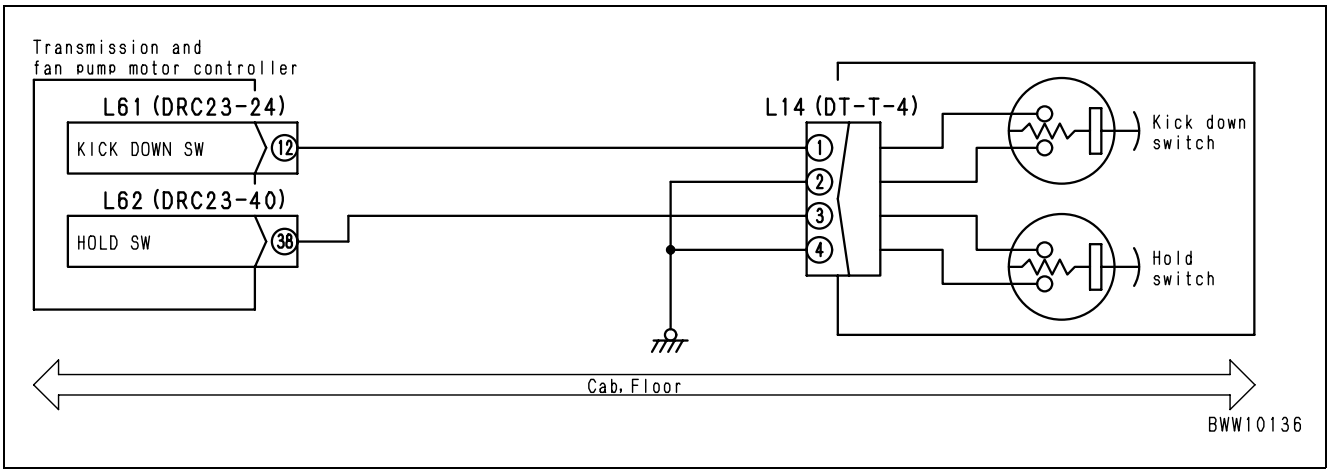
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Action code [TM-2]

Action Code	Error Code	Controller Code	Trouble	Hold switch system discontinuity or hot short-circuiting (No hold control performed by pressing hold switch)
TM-2	—	(TM)		
Description of Trouble	• Due to discontinuity or hot short-circuiting of the hold switch system, the hold switch cannot be changed over.			
Controller Reaction	• No reaction.			
Effect on Machine	• Hold control cannot be performed by pressing the hold switch.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-31)			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective hold switch	1) Turn starting switch OFF. 2) Disconnect connector L14. 3) Connect T-adapter.			
			Between L14 (male) (3) ~ (4)	Hold switch = ON	Resistance	1 Ω or below
				Hold switch = OFF	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L14. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (38) ~ L14 (female) (4)		Resistance	1 Ω or below
			Between L14 (female) (4) and body		Resistance	1 Ω or below
	3	Wiring harness hot short-circuiting ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L14. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (female) (38), L14 (female) (3) ~ body		Voltage	1 V or below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (38) ~ body	Hold switch = ON	Voltage	1 V or below
				Hold switch = OFF	Voltage	20 ~ 30 V

Related circuit diagram



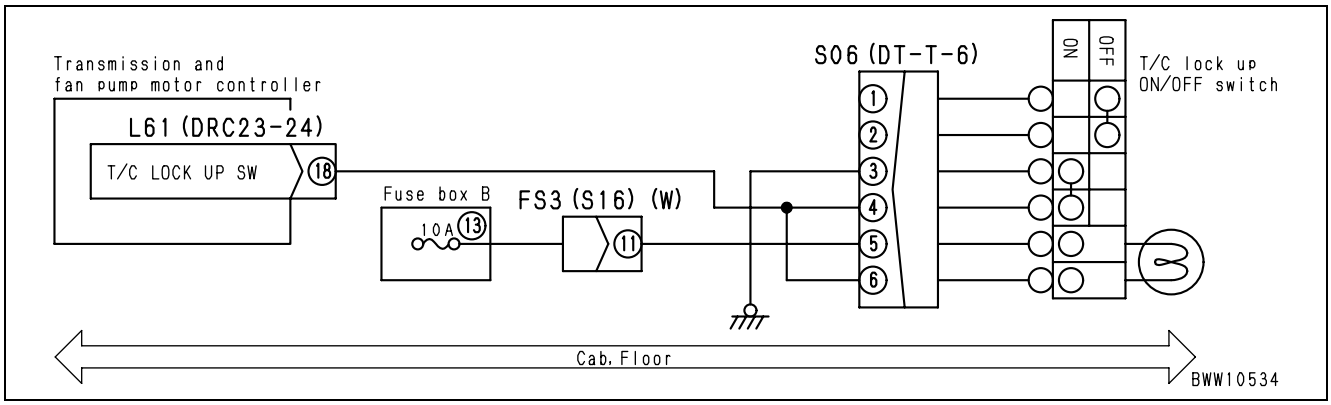
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Action code [TM-3]

Action Code	Error Code	Controller Code	Trouble	Torque converter lock-up switch system failure (No lock-up performed or no lock-up cancellation performed)
TM-3	—	(TM)		
Description of Trouble	• Due to failure of the torque converter lock-up switch system, lock-up cannot be performed (Failure associated with discontinuity) or lock-up cannot be cancelled normally (Failure associated with ground fault).			
Controller Reaction	• No reaction.			
Effect on Machine	• Lock-up or lock-up cancellation cannot be performed.			
Related Information	• Torque converter lock-up switch input signal can be checked with the monitoring function (Code: 40905, D-IN-5). • The service mode of the monitor can be used to check if the lock-up option is implemented or not.			

		Causes	Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective torque converter lock-up switch	1) Turn starting switch OFF. 2) Disconnect connector S06. 3) Connect T-adapter.			
			Between S06 (male) (84) ~ (4)	Torque converter lock-up switch = ON	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or more
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S06. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (18) ~ S06 (female) (4)		Resistance	1 Ω or below
			Between S06 (female) (3) ~ body		Resistance	1 Ω or below
	3	Wiring harness hot short-circuiting (Contacting 24-V harness) ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S06. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (18), S06 (female) (4) ~ body		Voltage	1 V or below
	4	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S06. 3) Connect T-adapter.			
			Between L61 (female) (18) S06 (female) (4) ~ body		Resistance	1 MΩ or above
	5	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (18) ~ body	Torque converter lock-up switch = ON	Voltage	1 V or below
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



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Action code [TM-4]

Action Code	Error Code	Controller Code	Trouble	Neutralizer signal (Parking brake switch signal) system failure
TM-4	—	(TM)		
Description of Trouble	• Due to failure of the neutralizer signal (Parking brake switch signal) system, always the neutral state is on (Failure associated with hot short-circuiting) or FR operation is performed while the parking brake is operated and traveling occurs with the brake engaged (Failure associated with discontinuity).			
Controller Reaction	• No reaction.			
Effect on Machine	• The neutralizer cannot be controlled, or it is always operating.			
Related Information	• Parking brake input switch signal can be checked with the monitoring function (Code: 40907, D-IN-23).			

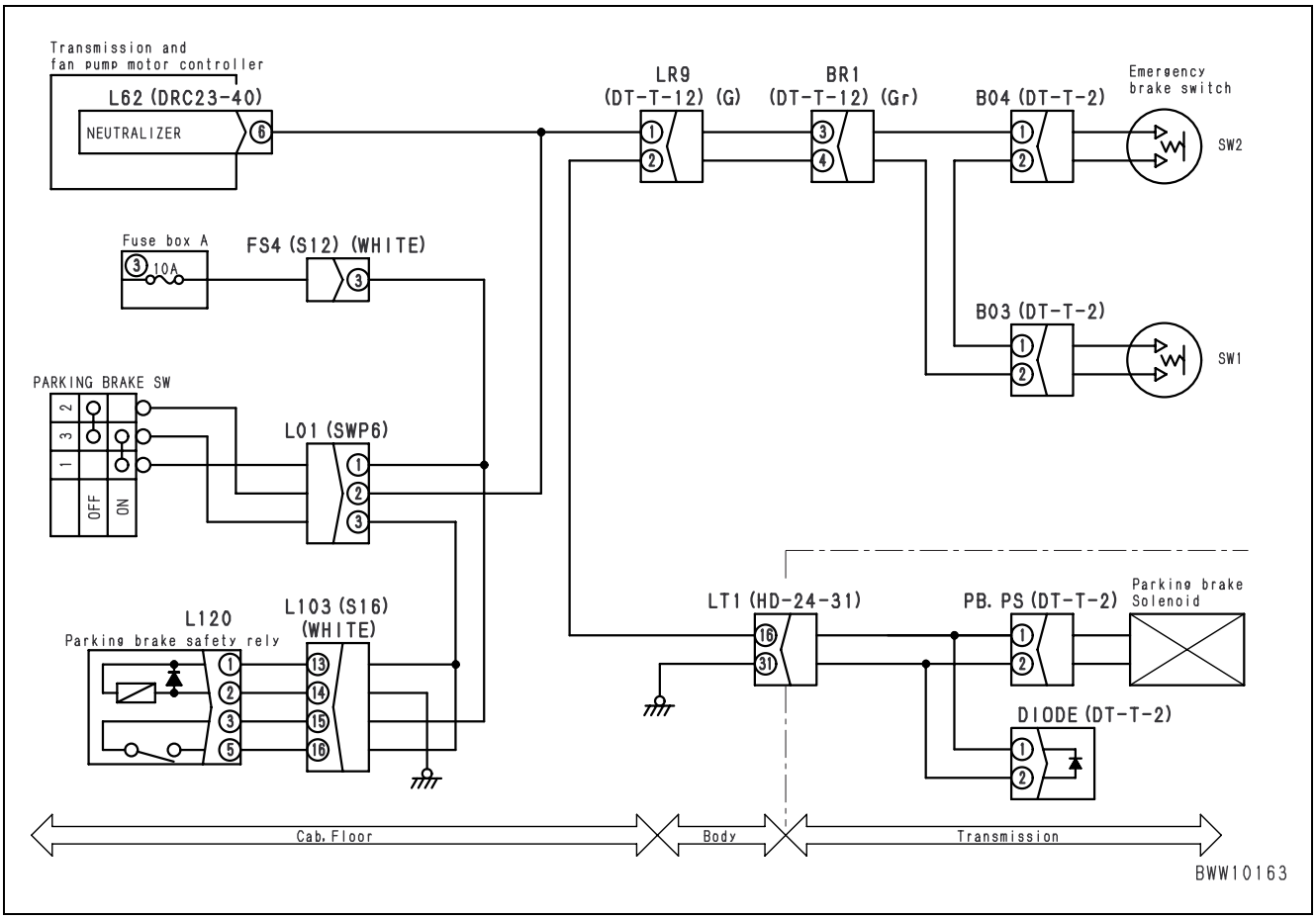
	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective parking brake switch	1) Turn starting switch OFF. 2) Disconnect connector L01. 3) Connect T-adapter.			
			Between L10 (male) (1) ~ (3)	Parking brake switch = ON	Resistance	1 Ω or below
				Parking brake switch = OFF	Resistance	1 MΩ or above
			Between L10 (male) (2) ~ (3)	Parking brake switch = ON	Resistance	1 MΩ or above
				Parking brake switch = OFF	Resistance	1 Ω or below
			Between L10 (male) (1) ~ (2)	Always	Resistance	1 MΩ or above
	2	Defective parking brake solenoid	1) Turn starting switch OFF. 2) Disconnect connectors PB and PS. 3) Connect T-adapter.			
			Between PB.PS (male) (1) ~ (3)		Resistance	10 ~ 40 Ω
			Between PB.PS (female) (2) ~ body		Resistance	1 Ω or below
			Between PB.PS (male) (1), (2) ~ body		Resistance	1 Ω or below
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S06. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (18) ~ S06 (female) (4)		Resistance	1 Ω or below
	4	Wiring harness hot short-circuiting (Contacting 24-V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L62, S01, and PB.PS. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (female) 6/L01 (female) (2) {PB.PS (female) (1)} ~ body		Voltage	1 V or below
	5	Defective diode (DIODE)	1) Turn starting switch OFF. 2) Disconnect connector DIODE. 3) Connect T-adapter.			
			Between DIODE (male) (2) ~ (1)	To be measured from (2) side in diode range.	Continuity	Positive
				To be measured from (1) side in diode range.	Continuity	None
			★ Replacing DIODE can also correct this failure.			
	6	Wiring harness ground fault • In this case, the fuse blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L62, L01 and PB.PS. 3) Connect T-adapter.			
			Between L62 (female) (6)/L01 (female) (2) {PB.PS (female) (1)} ~ body		Resistance	1 MΩ or above

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Action Code	Error Code	Controller Code	Trouble	Neutralizer signal (parking brake switch signal) system failure
TM-4	—	(TM)		

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	6	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connectors L62. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (2) ~ body	When parking brake switch is switched from OFF to ON (Not released)	Voltage	1 V or below
				Parking brake switch = OFF (Retained OFF) (Not released)	Voltage	1 V or below
				When parking brake switch is switched from ON to OFF (Released)	Voltage	20 ~ 30 V
				Parking brake switch = ON (Retained on) (Not released)	Voltage	1 V or below

Related circuit diagram



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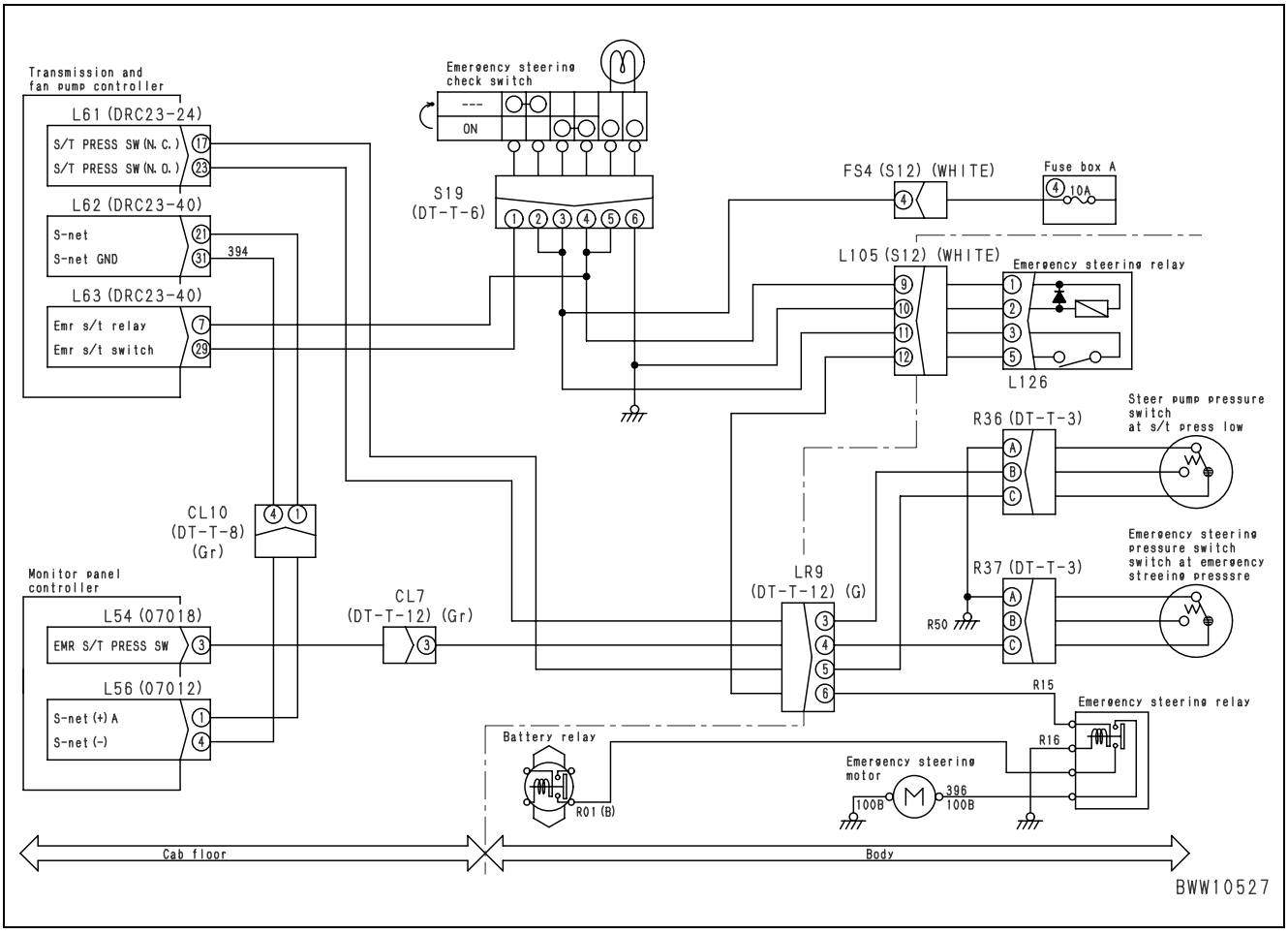
Action code [TM-5]

Action Code	Error Code	Controller Code	Trouble	Emergency steering switch (Motor-driven emergency steering operation switch) signal system failure
TM-5	—	(TM)		
Description of Trouble	• Due to failure of the emergency steering switch (Motor-driven emergency steering operation switch) signal system, emergency steering does not function. Or, emergency steering always functions.			
Controller Reaction	• No reaction.			
Effect on Machine	• Emergency steering does not function. Or, emergency steering always functions.			
Related Information	• Emergency steering switch input signal can be checked with the monitoring function (Code: 40906, DN-IN-14).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective emergency steering manual switch	1) Turn starting switch OFF. 2) Disconnect connector S19. 3) Connect T-adapter.			
			Between S19 (male) (4) ~ (3)	Emergency steering switch = ON	Resistance	1 Ω or below
				Emergency steering switch = OFF	Resistance	1 MΩ or above
	2	Defective emergency steering relay (L126)	1) Turn starting switch OFF. 2) Disconnect connector L126. 3) Connect T-adapter.			
			Between L126 (female) (3), L126 (female) (5) ~ body		Resistance	1 MΩ or above
	3	Defective emergency steering operation relay	1) Turn starting switch OFF. 2) Disconnect connectors R15, R16 and both power lines (100sq).			
			Between relay contacts.		Resistance	1 MΩ or above
	4	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S19. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Wiring harness between L63 (female) (29) ~ S19 (female) (1)		Resistance	1 Ω or below
	5	Hot short-circuiting between harnesses (Contacting 24-V _harness)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S19. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (female) (29), S19 (female) (1) ~ body		Voltage	1 V or below
	6	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63, L105, L126 and S19. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (female) (29), S19 (female) (1) ~ body		Resistance	1 MΩ or above
	7	Wiring harness short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63, L126 and S19. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (female) (29) L126 (female) (1), S19 (female) (4) ~ body		Resistance	1 MΩ or above
			1) Turn starting switch OFF. 2) Disconnect connectors L126 and R15. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L126 (5), R15 ~ body		Resistance	1 MΩ or above
	8	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (29) ~ body	Emergency steering switch = ON	Voltage	20 - 30 V
				Other than above	Voltage	1 V or below

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Related circuit diagram



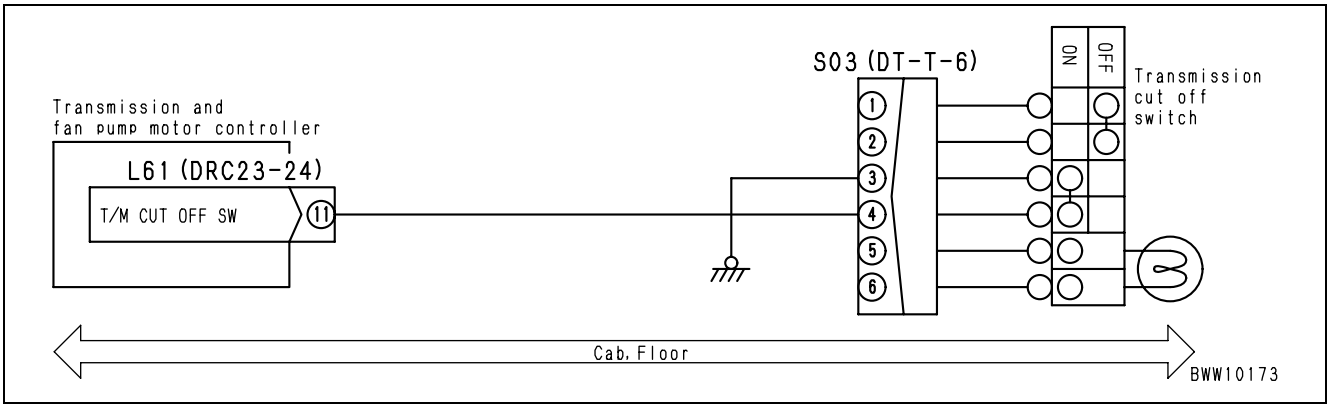
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Action code [TM-6]

Action Code	Error Code	Controller Code	Trouble	Transmission cut-off switch system discontinuity or ground fault
TM-6	—	(TM)		
Description of Trouble	• Due to discontinuity or ground fault of the transmission cut-off switch system, the transmission cut-off mode cannot be enabled (Failure associated with discontinuity). • Or the transmission cut-off mode cannot be cancelled (Failure associated with ground fault).			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission cut-off mode cannot be enabled or cancelled.			
Related Information	• Can be checked with the monitoring function (Code: 40905, D-IN-2).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective transmission cut-off switch	1) Turn starting switch OFF. 2) Disconnect connector S03. 3) Connect T-adapter.			
			Between S03 (male) (4) ~ (3)	Transmission cut-off switch = ON	Resistance	1 Ω or below
				Transmission cut-off switch = OFF	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S03. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Wiring harness between L61 (female) (11) ~ S03 (female) (4)		Resistance	1 Ω or below
			Between S03 (female) (3) ~ body		Resistance	1 Ω or below
	3	Hot short-circuiting between harnesses (Contacting 24-V harness) ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S03. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (11), S03 (female) (4) ~ body		Voltage	1 V or below
	4	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S03. 3) Connect T-adapter.			
			Between L61 (female) (11), S03 (female) (4) ~ body		Resistance	1 MΩ or above
	5	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (11) ~ body	Transmission cut-off switch = ON	Voltage	1 V or below
				Transmission cut-off switch = OFF	Voltage	20 - 30 V

Related circuit diagram



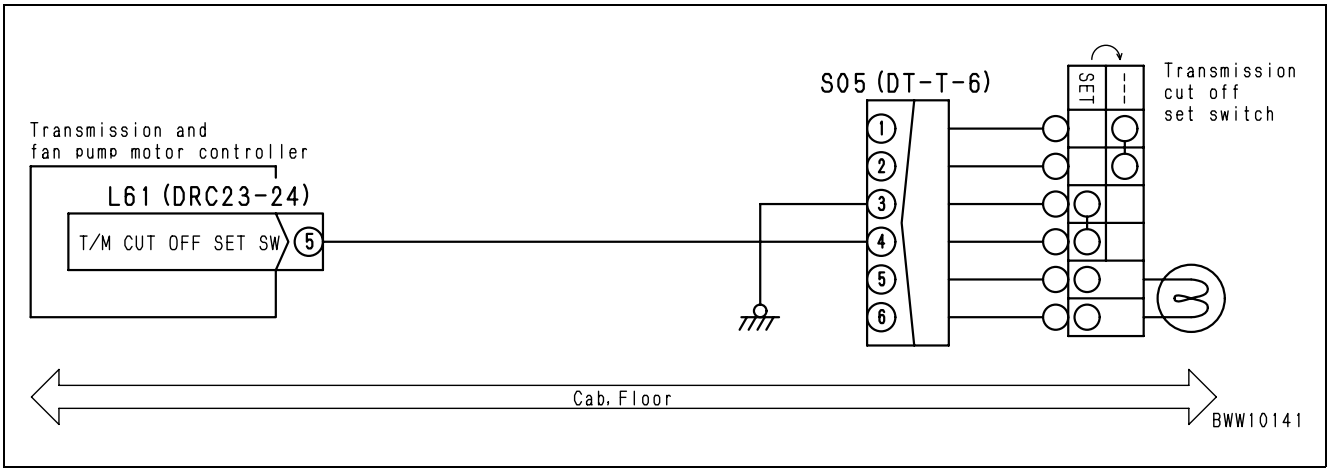
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Action code [TM-7]

Action Code	Error Code	Controller Code	Trouble	Transmission cut-off setting switch system discontinuity or hot short-circuiting
TM-7	—	(TM)		
Description of Trouble	• Due to discontinuity or hot short-circuiting of the transmission cut-off setting switch system, the cut-off setting signal is left as input.			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission cut-off point cannot be reset.			
Related Information	• Can be checked with the monitoring function (Code: 40905, D-IN-3).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective transmission cut-off setting switch	1) Turn starting switch OFF. 2) Disconnect connector S05. 3) Connect T-adapter.			
			Between S05 (male) (4) ~ (3)	Cut-off setting switch = ON	Resistance	1 Ω or below
				Cut-off setting switch = OFF	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S05. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Wiring harness between L61 (female) (5) ~ S05 (female) (4)		Resistance	1 MΩ or above
	3	Hot short-circuiting between harnesses	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S03. 3) Connect T-adapter.			
			Between L61 (female) (5), S05 (female) (4) ~ body		Voltage	1 V or below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61 and S05. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (5) ~ body	Cut-off setting switch = ON	Voltage	1 V or below
				Cut-off setting switch = OFF	Voltage	20 ~ 30 V

Related circuit diagram



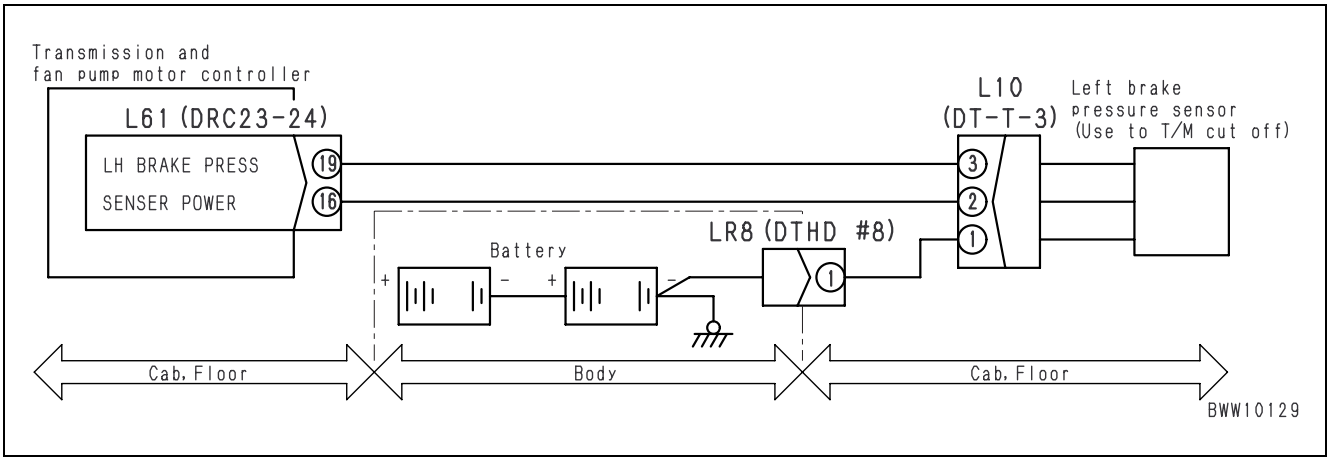
https://truckmanualshub.com/

Action code [TM-8]

Action Code	Error Code	Controller Code	Trouble	Transmission cut-off (Left brake sensor) signal short-circuiting
TM-8	—	(TM)		
Description of Trouble	• Due to short-circuiting of the left brake pressure sensor signal system, no signal for the left brake oil pressure sensor can be input.			
Controller Reaction	• No reaction.			
Effect on Machine	• Even when the left brake is not stepped ON, traveling in the neutral mode is not possible when transmission cut-off is ON (When the transmission cut-off function is used).			
Related Information	• Left brake oil pressure can be checked with the monitoring function (Code: 41100, LH BRAKE). • Can be checked by stepping ON the left brake while the transmission cut-off function is ON.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective left brake pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector L10. 3) Connect T-adapter. 4) Start engine. 5) Step ON the left brake.		
			Between L10 (2) ~ (1) (Power supply)	Voltage	20 ~ 30 V
			Between L10 (3) ~ (1) (Signal)	Voltage	0.7 ~ 5.3 V
			Between L10 (3) ~ (3) (Note: when open to atmosphere)	Voltage	0.5 ~ 1.5 V
	2	Wiring harness short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L10. 3) Connect T-adapter.		
			Between L61 (female) (19), L10 (female) (3) ~ body	Voltage	1 V or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Start engine. 5) Step ON the left brake.		
			Between L61 (16) ~ body (Power supply)	Voltage	20 ~ 30 V
			Between L61 (19) ~ body (Signal)	Voltage	0.7 ~ 5.3 V

Related circuit diagram



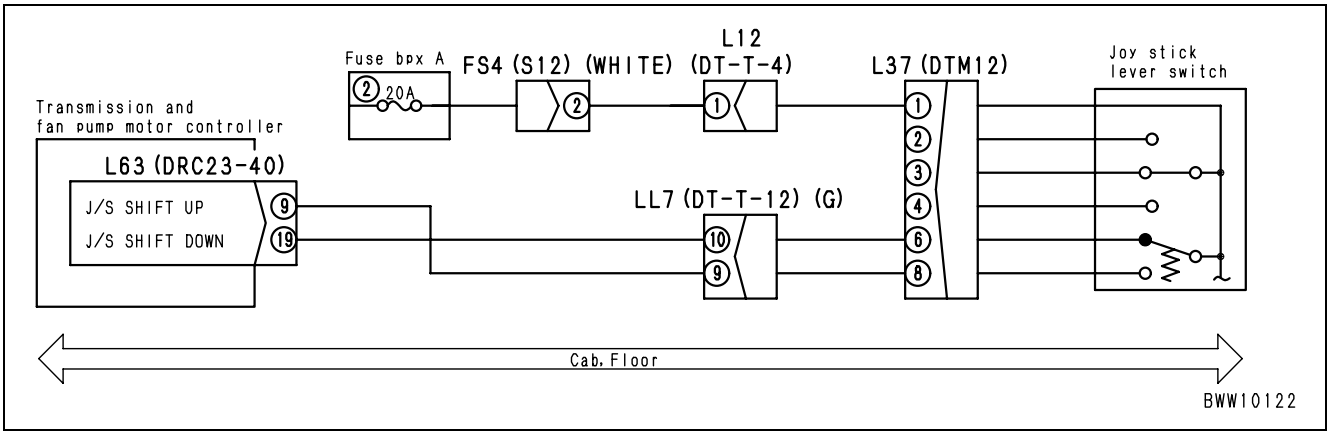
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Action code [TM-9]

Action Code	Error Code	Controller Code	Trouble	Joystick SHIFT_UP/SHIFT_DOWN siwtch system failure (discontinuity or ground fault)
TM-9	—	(TM)		
Description of Trouble	• When operating the joystick, SHIFT_UP or SHIFT_DOWN action cannot be enabled (due to discontinuity or ground fault).			
Controller Reaction	• No reaction.			
Effect on Machine	• When operating the joystick, SHIFT_UP or SHIFT_DOWN action cannot be enabled (due to discontinuity or ground fault). • The gear can be shifted in the auto-shift or handle mode.			
Related Information	• Can be check with the monitoring function (Code: 40906, D-IN-12, D-IN-13). Note: The up/down switch (SHIFT_UP/SHIFT_DOWN) cannot be used in the auto-shift mode.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnetion or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L37. 3) Connect T-adapter.			
			Wiring harness between L63 (female) (9) ~ L37 (female) (8)		Resistance	1 Ω or below
			Wiring harness between L63 (female) (19) ~ L37 (female) (6)		Resistance	1 Ω or below
			Wiring harness between fuse A-c ~ L37 (female) (1) (In this case, FNR does not work either.)		Resistance	1 Ω or below
	2	Wiring harness ground fault ★ In this case, fuse A-2 blows out when the switch is operated	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L37. 3) Connect T-adapter.			
			Between L63 (female) (9), L37 (female) (8) ~ body		Resistance	1 MΩ or above
			Between L63 (female) (19), L37 (female) (6) ~ body		Resistance	1 MΩ or above
	3	Defective joystick SHIFT_UP/SHIFT_DOWN switch	1) Turn starting switch OFF. 2) Disconnect connectors L37. 3) Connect T-adapter.			
			Between L37 (male) (1) ~ (2)	SHIFT_UP	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or above
			Between L37 (male) (6) ~ (1)	SHIFT_DOWN	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or above
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connectors L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (1) ~ body	SHIFT_UP	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below
			Between L63 (6) ~ body	SHIFT_DOWN	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below

Related circuit diagram



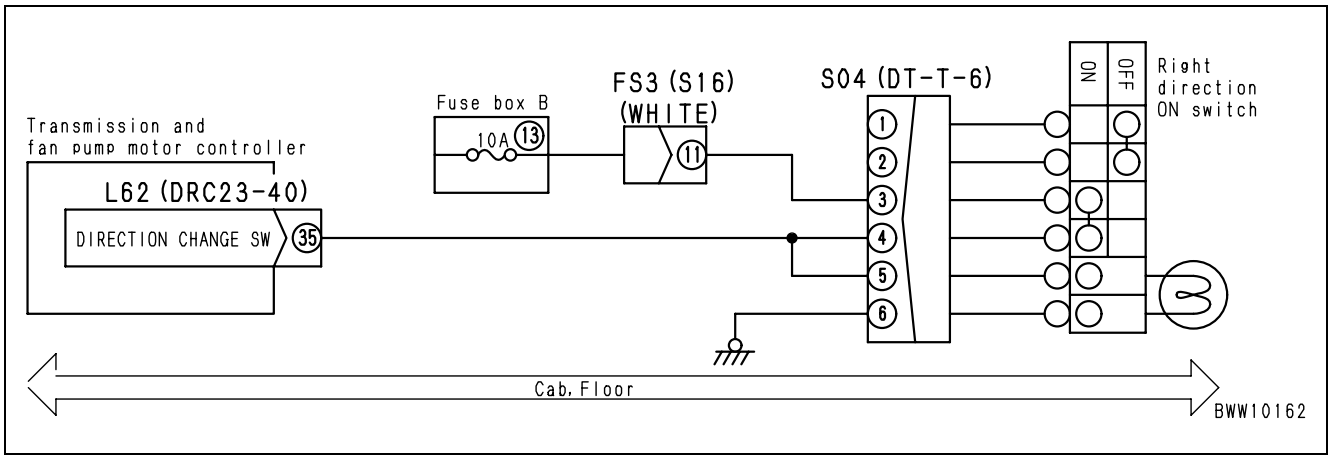
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Action code [TM-10-A]

Action Code	Error Code	Controller Code	Trouble	FNR switch mode change over switch system failure
TM-10-A	—	(TM)		
Description of Trouble	• Due to failure of the FNR switch mode change over switch system, the FNR switch mode cannot be changed over. • The FNR switch mode cannot be enabled (Due to ground fault). Or the handle mode cannot be enabled (Due to discontinuity).			
Controller Reaction	• No reaction.			
Effect on Machine	• The FNR switch mode cannot be enabled or cancelled.			
Related Information	• The FNR switch mode change over signal can be checked with the monitoring function (Code: 40907, D-IN-16). • The service mode of the monitor can be used to check if the right FNR switch is installed or not.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective FNR switch mode change over switch	1) Turn starting switch OFF. 2) Disconnect connector S04. 3) Connect T-adapter.			
			Between S04 (male) (4) ~ (3)	FNR switch mode change over switch = ON	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and S04. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (35) ~ S04 (female) (4)		Resistance	1 Ω or below
			1) Turn starting switch OFF. 2) Disconnect connectors L62 and S04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between S04 (female) (3) ~ body		Voltage	20 ~ 30 V
	3	Wiring harness hot short-circuiting (Contacting 24-V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and S04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (female) (35), S04 (female) (4) ~ body		Voltage	1 V or below
	4	Wiring harness ground fault ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L62, S04 and L101. 3) Connect T-adapter.			
			Between L62 (female) (35) S04 (female) (4) ~ body		Resistance	1 MΩ or above
	5	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (35) ~ body	FNR switch mode change over switch = ON	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below

Related circuit diagram



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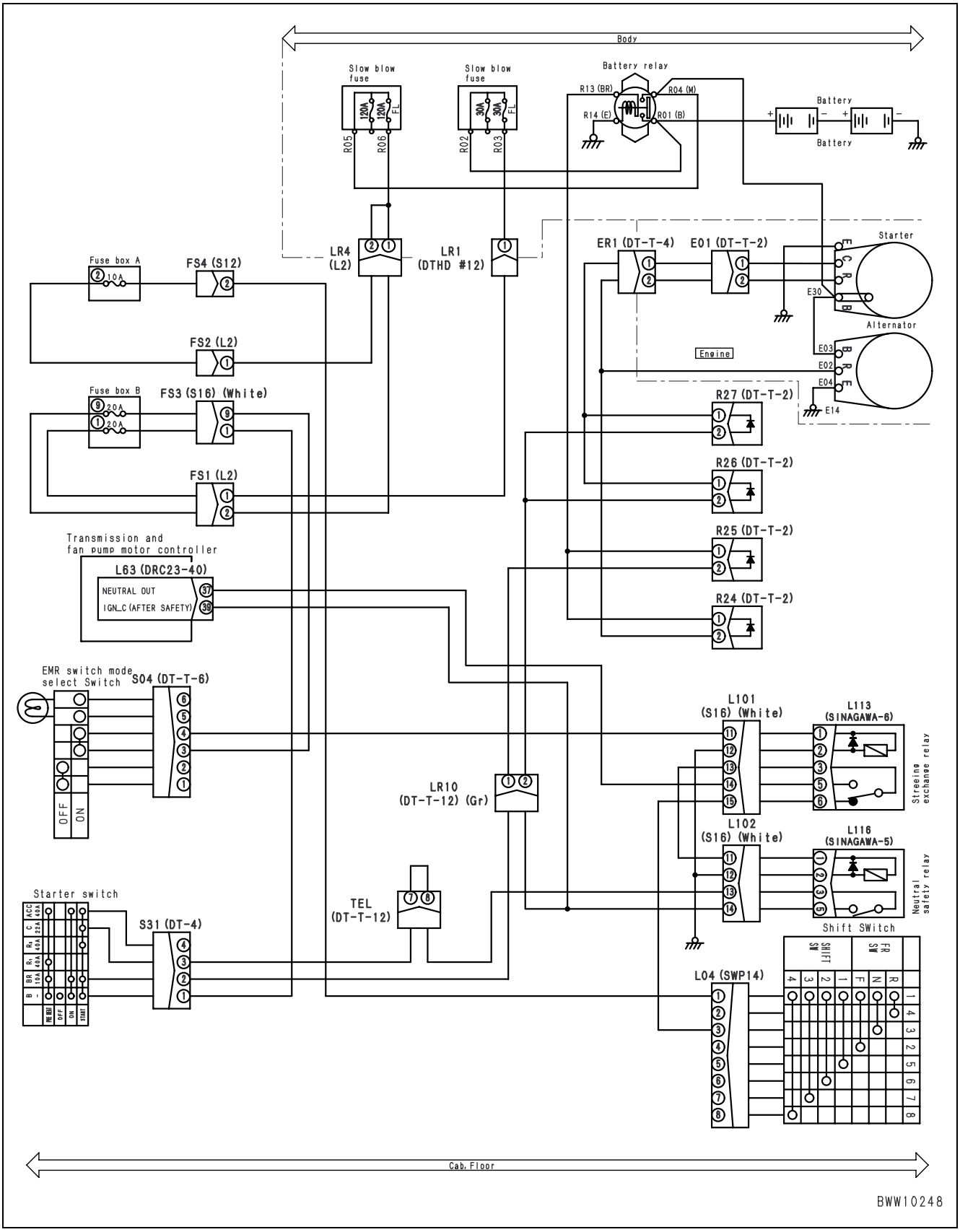
Action code [TM-10-B]

Action Code	Error Code	Controller Code	Trouble	Starting switch "C" (IGN_C) signal system failure
TM-10-B	—	(TM)		
Description of Trouble	• After the engine started, discontinuity or ground fault occurred in the "C" terminal signal input circuit of the starting switch.			
Controller Reaction	• No reaction.			
Effect on Machine	• The engine cannot be started. (Ground fault causes fuse B-1 to blow out, resulting in disabling the starting switch.)			
Related Information	• Terminal input signal (0/1) of the starting switch "C" (IGN "C") can be checked with the monitoring function (Code: 40906,D-IN-15).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective starting (Ignition key) switch	1) Turn starting switch OFF. 2) Disconnect connector S31. 3) Connect T-adapter.			
			Between S31 (male) (1) ~ (3)	Starting switch = "C" (at starting)	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or above
	2	Defective diode R26	1) Turn starting switch OFF. 2) Disconnect connector R26. 3) Connect T-adapter.			
			Between R26 (male) (1) ~ (2) ★ To be measured from c side in diode range.		Resistance	1 Ω or below
	3	Defective diode R27	1) Turn starting switch OFF. 2) Disconnect connector R27. 3) Connect T-adapter.			
			Between R27 (male) (1) ~ (2) ★ To be measured from c side in diode range.		Continuity	Positive
			★ Replacing R27 can also correct this failure.			
	4	Defective neutral safety relay (L116)	1) Turn starting switch OFF. 2) Disconnect connector L116. 3) Connect T-adapter.			
			Between L116 (male) (2) ~ (5)	Relay = ON	Resistance	1 Ω or below
				Relay = OFF	Resistance	1 MΩ or above
	5	Defective starting motor	★ Perform separate inspection.			
	6	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S31. 3) Connect T-adapter.			
			Wiring harness between L63 (female) (39) ~ L102 (female) (14)		Resistance	1 Ω or below
			Between L102 (female) (13) ~ S31 (female) (14)		Resistance	1 Ω or below
	7	Wiring harness hot short-circuiting (Contacting 24-V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S31. 3) Connect T-adapter.			
			Between L63 (female) (39), L102 (female) (14) ~ body		Voltage	1 V or below
			Between L102 (female) (13), S31 (female) (3) ~ body		Voltage	1 V or below
	8	Wiring harness ground fault *In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L63, S31, E01, L81 and L52. 3) Connect T-adapter.			
			Between L63 (female) (39), L102 (female) (14) ~ body		Resistance	1 MΩ or above
			Between L102 (female) (13) S31 (female) (3) ~ body		Resistance	1 MΩ or above
	9	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 (39) and body	Starting switch = "C" (at starting)	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below

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Related diagram circuit



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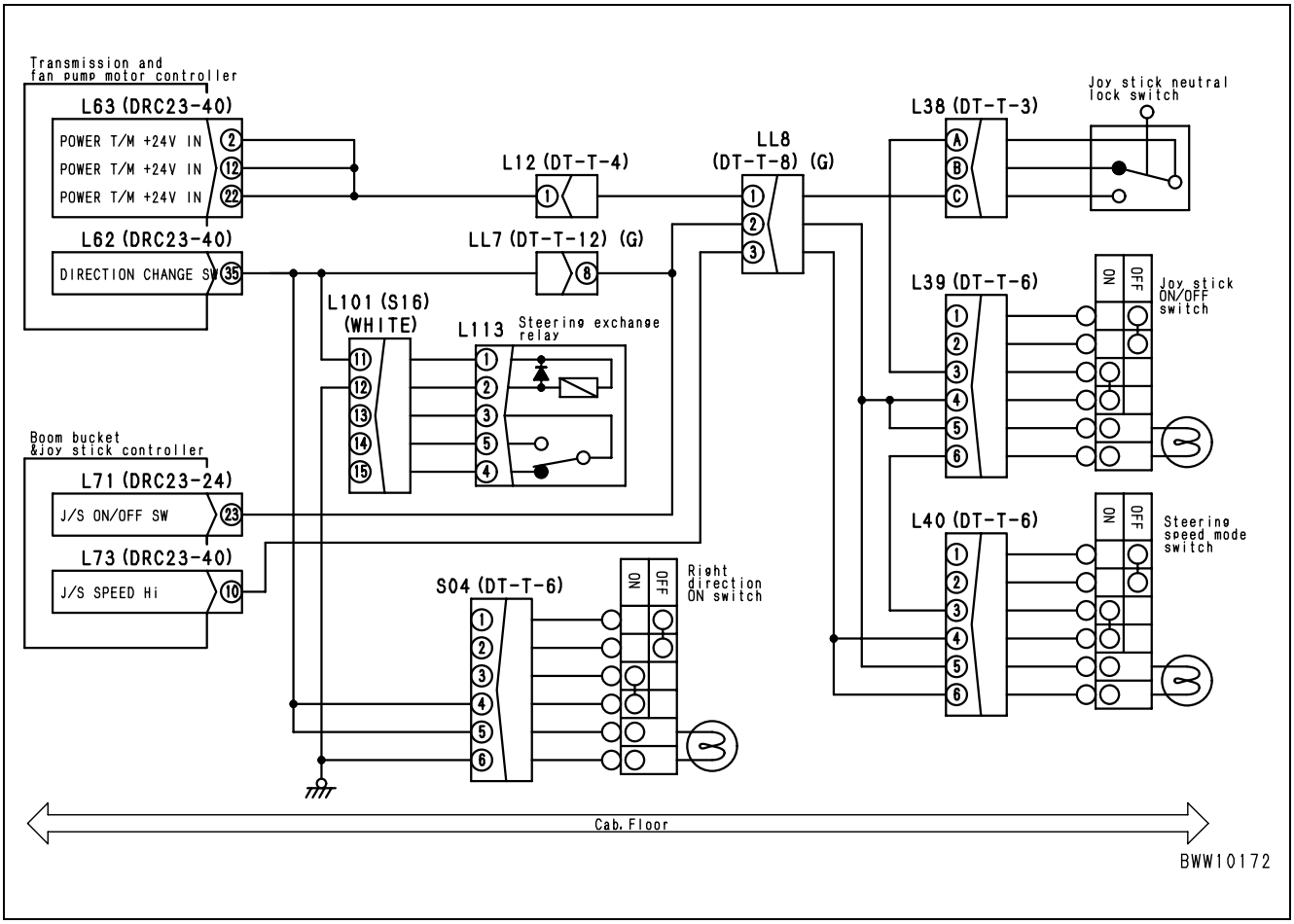
Action code [TM-11]

Action Code	Error Code	Controller Code	Trouble	Joystick ON/OFF change over switch system failure
TM-11	—	(TM)		
Description of Trouble	• Due to failure of the joystick ON/OFF change over switch system, the joystick cannot be switched ON/OFF. • The FNR mode cannot be enabled (Due to ground fault), or in the handle mode (Due to discontinuity).			
Controller Reaction	• No reaction.			
Effect on Machine	• The joystick mode cannot be enabled or cancelled. • The FNR switch mode cannot be enabled. • The handle mode cannot be enabled.			
Related Information	• The joystick ON/OFF switch input signal can be checked with the monitoring funtion (Code: 40907, D-IN-16). • The service mode of the monitor can be used to check if the joystick (op) is implemented or not.			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective joystick ON/OFF switch	1) Turn starting switch OFF. 2) Disconnect connector L39. 3) Connect T-adapter.			
			Between L39 (female) (4) ~ (3)	Joystick ON/OFF switch = ON	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or above
	2	Defective joystick N lock switch	1) Turn starting switch OFF. 2) Disconnect connector L38. 3) Connect T-adapter.			
			Between L38 (female) (1) ~ (2)	Left arm rest = Locked	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L39. 3) Connect T-adapter.			
			Wiring harness between L62 (female) (35) ~ L39 (female) (3)		Resistance	1 Ω or below
			1) Turn starting switch OFF. 2) Disconnect connectors L38 and L39. 3) Connect T-adapter.			
			Wiring harness between L38 (female) (1) ~ L39 (female) (4)		Resistance	1 Ω or below
			1) Turn starting switch OFF. 2) Disconnect connectors L62 and L38. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between S38 (female) (3) ~ body		Voltage	20 ~ 30 V
	4	Wiring harness hot short-circuiting (Contacting 24 V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and S04. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (female) (35), S04 (female) (4) ~ body		Voltage	1 V or below
	5	Wiring harness ground fault ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L62,S04, L71, L39, and L40. 3) Connect T-adapter.			
			Between L62 (female) (35), S04 (female) (4) ~ body		Resistance	1 MΩ or above
	6	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connectors L62. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (35) ~ body	Joystick ON/OFF switch = ON	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V or below

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Related diagram circuit



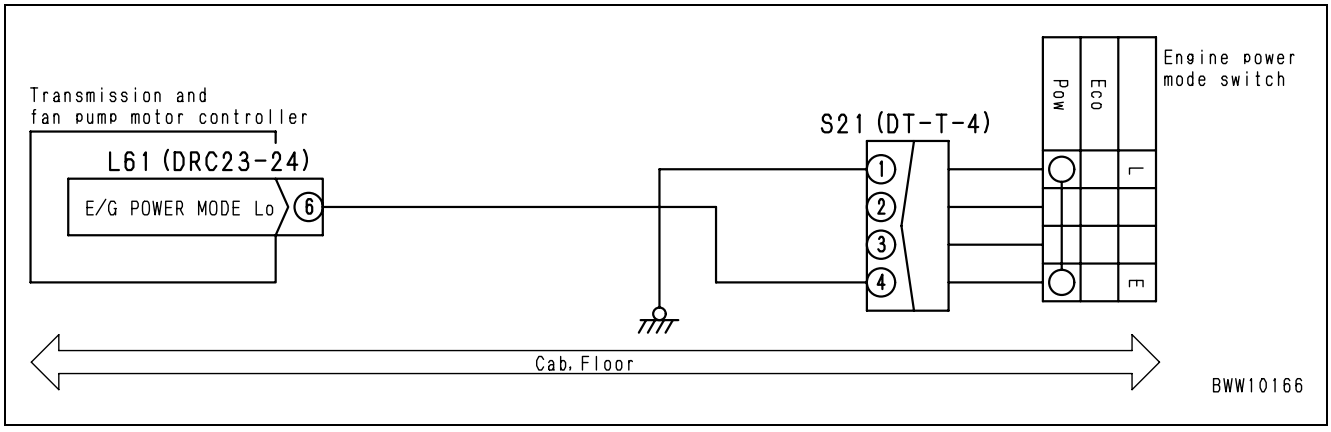
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Action code [TM-12]

Action Code	Error Code	Controller Code	Trouble	Engine power mode switch discontinuity or ground fault
TM-12	—	—		
Description of Trouble	• Due to discontinuity or ground fault of the engine power mode switch, the engine power mode cannot be changed over. • Power mode selection is disabled (Due to discontinuity), or the economy mode cannot be selected (Due to ground fault).			
Controller Reaction	• No reaction.			
Effect on Machine	• As the engine mode cannot be changed over, the engine is fixed either to the power or economy mode.			
Related Information	• Can be checked with the monitoring function (Code: 41600 ENGINE MODE).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective engine mode selection switch	1) Turn starting switch OFF. 2) Disconnect connector S21. 3) Connect T-adapter.			
			Between S04 (male) (4) ~ (1)	Engine = Power mode	Resistance	1 Ω or below
				Engine = Economy mode	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L21. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (6) ~ L21 (female) (4)		Resistance	1 Ω or below
			Between S21 (female) (3) ~ body		Resistance	1 Ω or below
	3	Wiring harness hot short-circuiting (Contacting 24-V harness) ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S21. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (6), S21 (female) (4) ~ body		Voltage	1 V or below
	4	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S21. 3) Connect T-adapter.			
			Between L61 (female) (6), S21 (female) (4) ~ body		Resistance	1 MΩ or above
	5	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (6) ~ body	Engine = Power mode	Voltage	1 V or below
				Engine = Economy mode	Voltage	20 ~ 30 V

Related circuit diagram



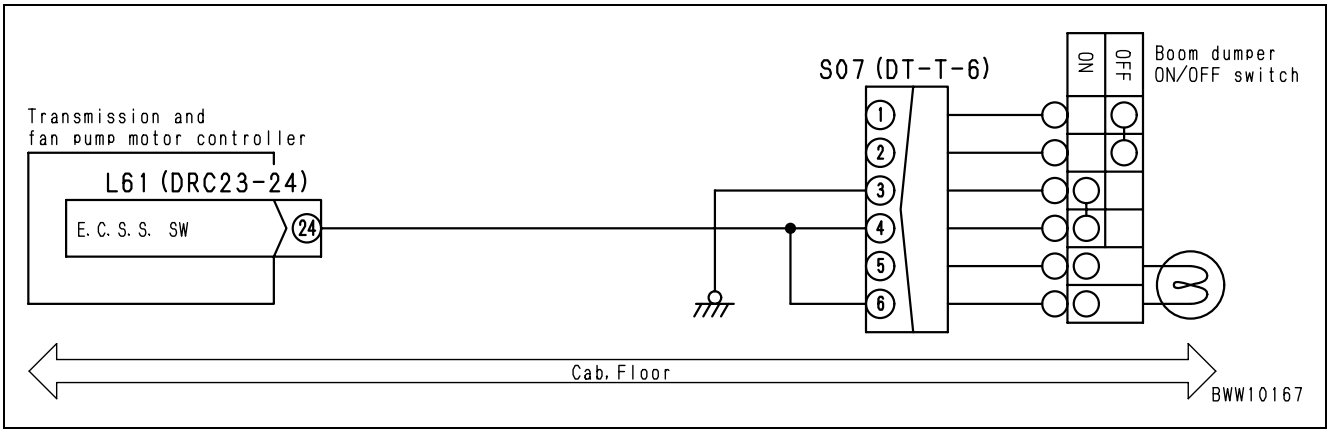
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Action code [TM-13]

Action Code	Error Code	Controller Code	Trouble	Travel damper ON/OFF switch discontinuity or ground fault
TM-13	—	—		
Description of Trouble	• Due to discontinuity or ground fault of the travel damper ON/OFF switch, the travel damper function cannot be enabled (Due to discontinuity) or cancelled (Due to ground fault).			
Controller Reaction	• No reaction.			
Effect on Machine	• The travel damper function cannot be enabled. • The travel damper function cannot be cancelled.			
Related Information	• Can be checked with the monitoring function (Code: 40905, D-IN-4).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective travel damper ON/OFF switch	1) Turn starting switch OFF. 2) Disconnect connector S07. 3) Connect T-adapter.			
			Between S07 (male) (4) ~ (3)	Boom damper ON/OFF switch = ON	Resistance	1 Ω or below
				Boom damper ON/OFF switch = OFF	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L07. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (24) ~ S07 (female) (4)		Resistance	1 Ω or below
			Between S07 (female) (3) and body		Resistance	1 Ω or below
	3	Wiring harness hot short-circuiting (Contacting 24-V harness) ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S07. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (24), S07 (female) (4) ~ body		Voltage	1 V or below
	4	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S07. 3) Connect T-adapter.			
			Between L61 (female) (24), S07 (female) (4) ~ body		Resistance	1 MΩ or above
	5	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (24) ~ body	Boom damper ON/OFF switch = ON	Voltage	1 V or below
				Boom damper ON/OFF switch = OFF	Voltage	20 ~ 30 V

Related circuit diagram



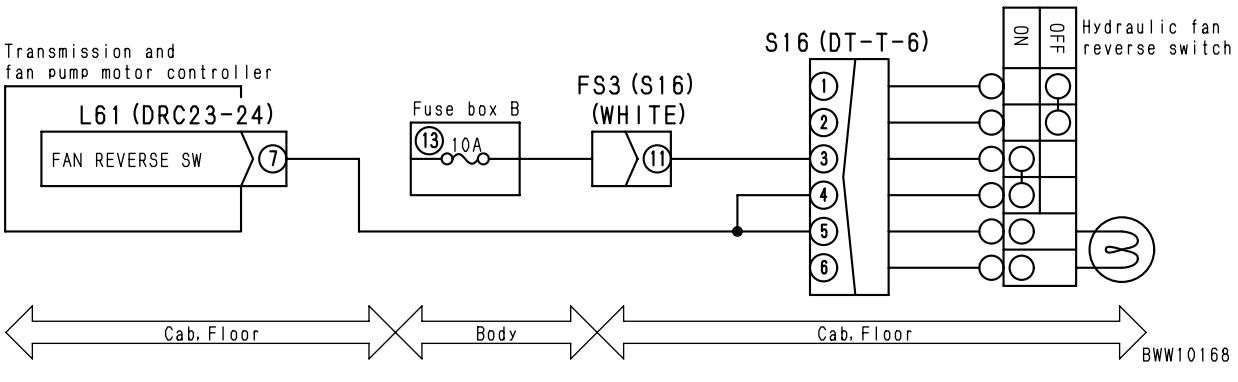
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Action code [TM-14]

Action Code	Error Code	Controller Code	Trouble	Hydraulic fan reverse switch signal system hot short-circuiting or discontinuity
TM-14	—	—		
Description of Trouble	• Due to ground fault or discontinuity of the fan reverse ON/OFF switch signal system, the fan reverse switch cannot be turned OFF (Due to hot short circuiting) or ON (Due to discontinuity).			
Controller Reaction	• No reaction.			
Effect on Machine	• The fan reverse switch cannot be turned ON or OFF.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective fan reverse switch	1) Turn starting switch OFF. 2) Disconnect connector S16. 3) Connect T-adapter.			
			Between S16 (male) (4) ~ (3)	Fan reverse switch = ON	Resistance	1 Ω or below
				Fan reverse switch = OFF	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and L16. 3) Connect T-adapter.			
			Wiring harness between L61 (female) (7) ~ S16 (female) (4)		Resistance	1 Ω or below
			1) Turn starting switch OFF. 2) Disconnect connectors L61 and S16. 3) Connect T-adapter.			
			Between S16 (female) (3) and body		Voltage	20 ~ 30 V
	3	Wiring harness hot short-circuiting (Contacting 24-V harness) ★ In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S16. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (female) (7), S16 (female) (4) ~ body		Voltage	1 V or below
	4	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S16. 3) Connect T-adapter.			
			Between L61 (female) (7), S16 (female) (4) ~ body		Resistance	1 MΩ or above
	5	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 (7) ~ body	Fan reverse switch = ON	Voltage	20 ~ 30 V
				Fan reverse switch = OFF	Voltage	1 V or below

Related circuit diagram



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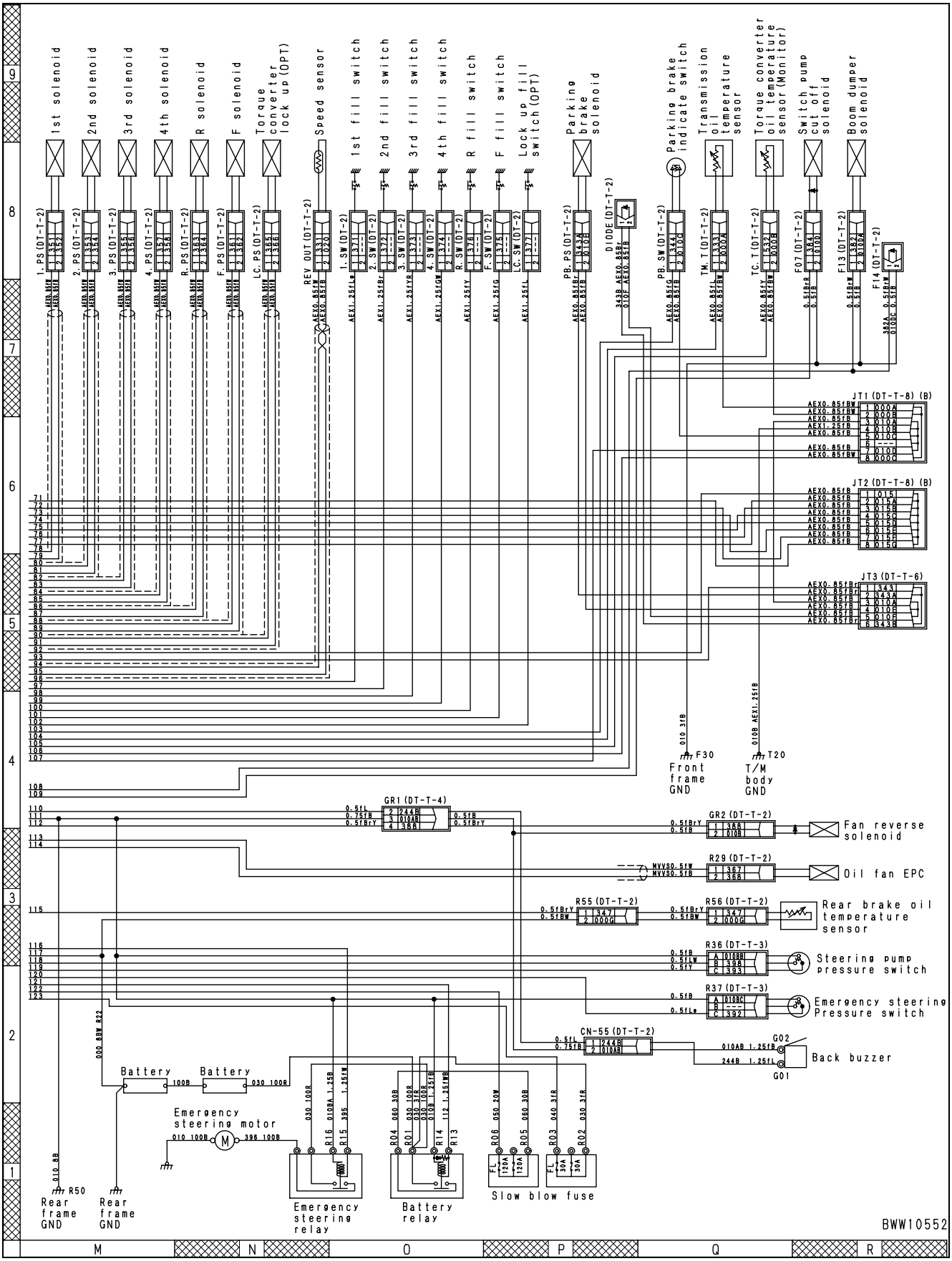
Action code [TM-15]

Action Code	Error Code	Controller Code	Trouble	Motor-driven emergency steering relay output system hot short-circuiting
TM-15	—	—		
Description of Trouble	• Due to hot short-circuiting of the motor-driven emergency steering relay output system, the emergency steering motor keeps operating.			
Controller Reaction	• No reaction.			
Effect on Machine	• The emergency steering motor keeps operating.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L105. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (7), S105 (female) (9) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (7) ~ body	Resistance	200 ~ 400 Ω

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Related circuit diagram



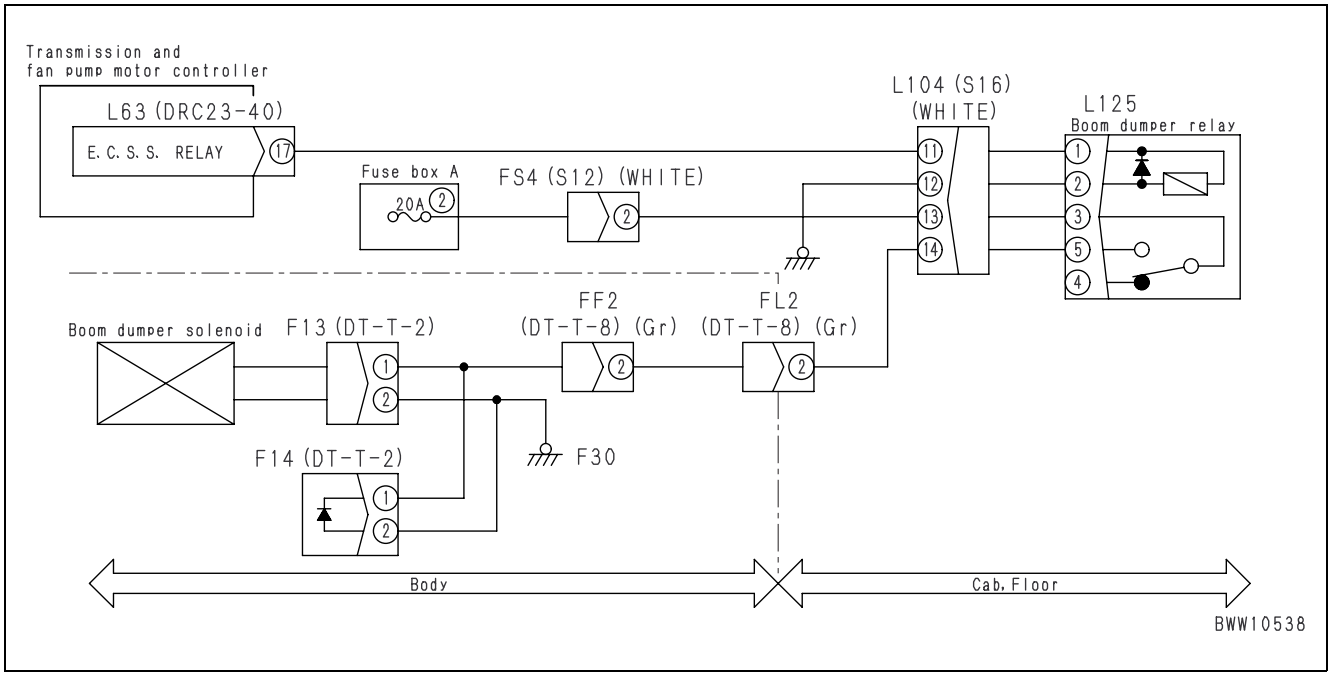
https://truckmanualshub.com/

Action code [TM-16]

Action Code	Error Code	Controller Code	Trouble	Travel damper relay output system hot short-circuiting
TM-16	—	—		
Description of Trouble	• Due to hot short-circuiting of the travel damper relay output system, the travel damper keeps operating.			
Controller Reaction	• No reaction.			
Effect on Machine	• The travel damper keeps operating.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L104. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (17), S105 (female) (11) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (17) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



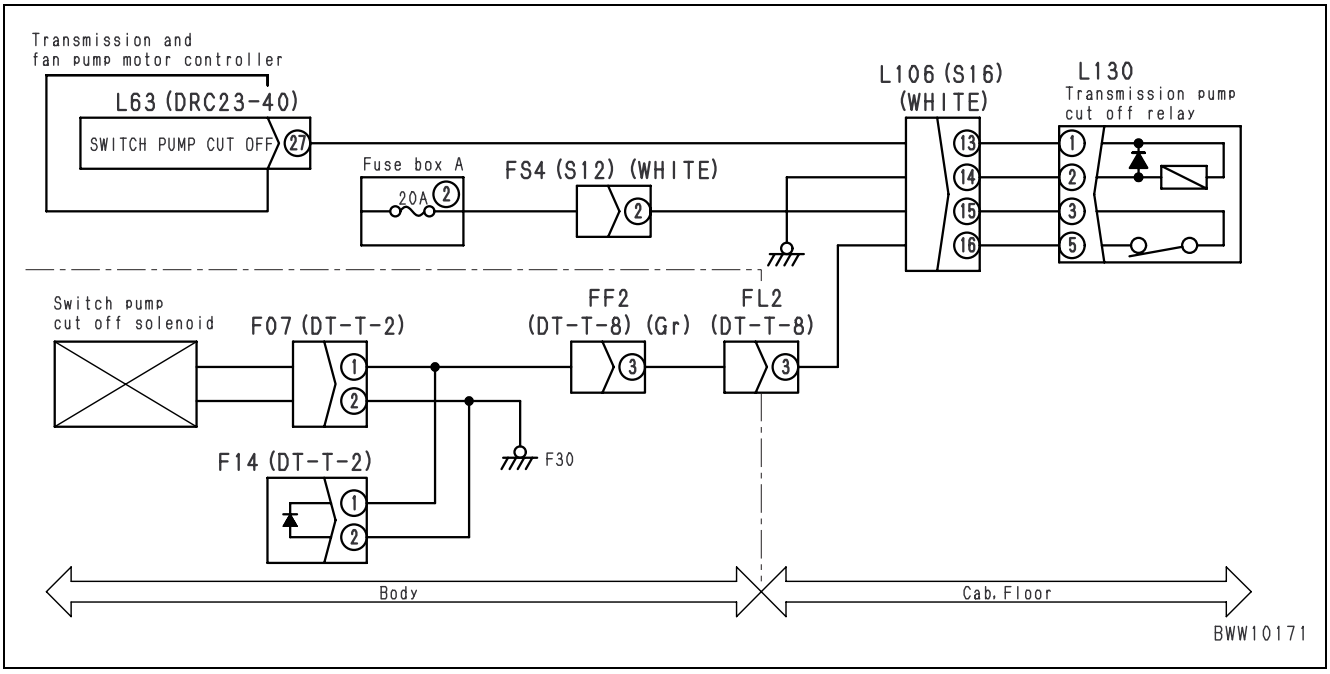
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Action code [TM-17]

Action Code	Error Code	Controller Code	Trouble	Switch pump cut-off relay output system hot short-circuiting
TM-17	—	—		
Description of Trouble	• Due to hot short-circuiting of the switch pump cut-off relay output system, the switch pump cut-off relay is always ON.			
Controller Reaction	• No reaction.			
Effect on Machine	• The switch pump cut-off relay is always ON.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L106. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (27), S105 (female) (13) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (27) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



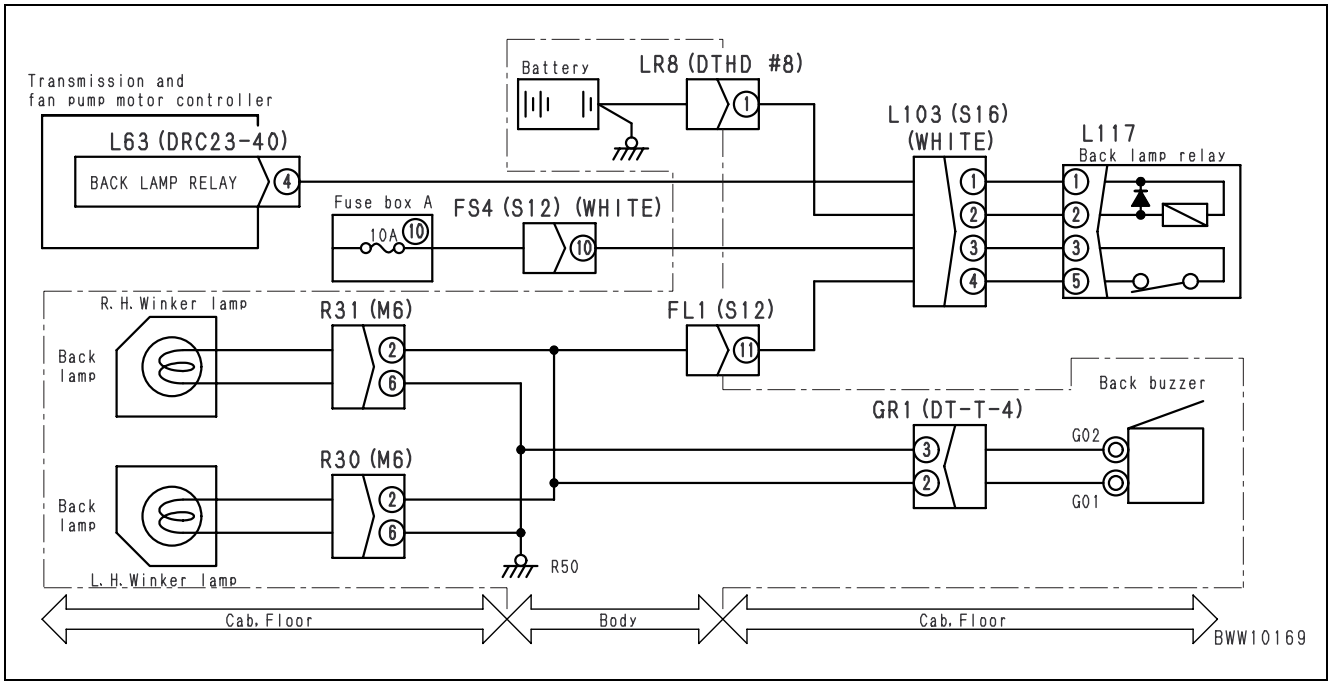
https://truckmanualshub.com/

Action code [TM-18]

Action Code	Error Code	Controller Code	Trouble	Back lamp relay output system hot short-circuiting
TM-18	—	—		
Description of Trouble	• Due to hot short-circuiting of the back lamp relay output system, the back lamp buzzer keeps beeping.			
Controller Reaction	• No reaction.			
Effect on Machine	• The back lamp buzzer keeps beeping.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L103. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (4), S103 (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (4) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



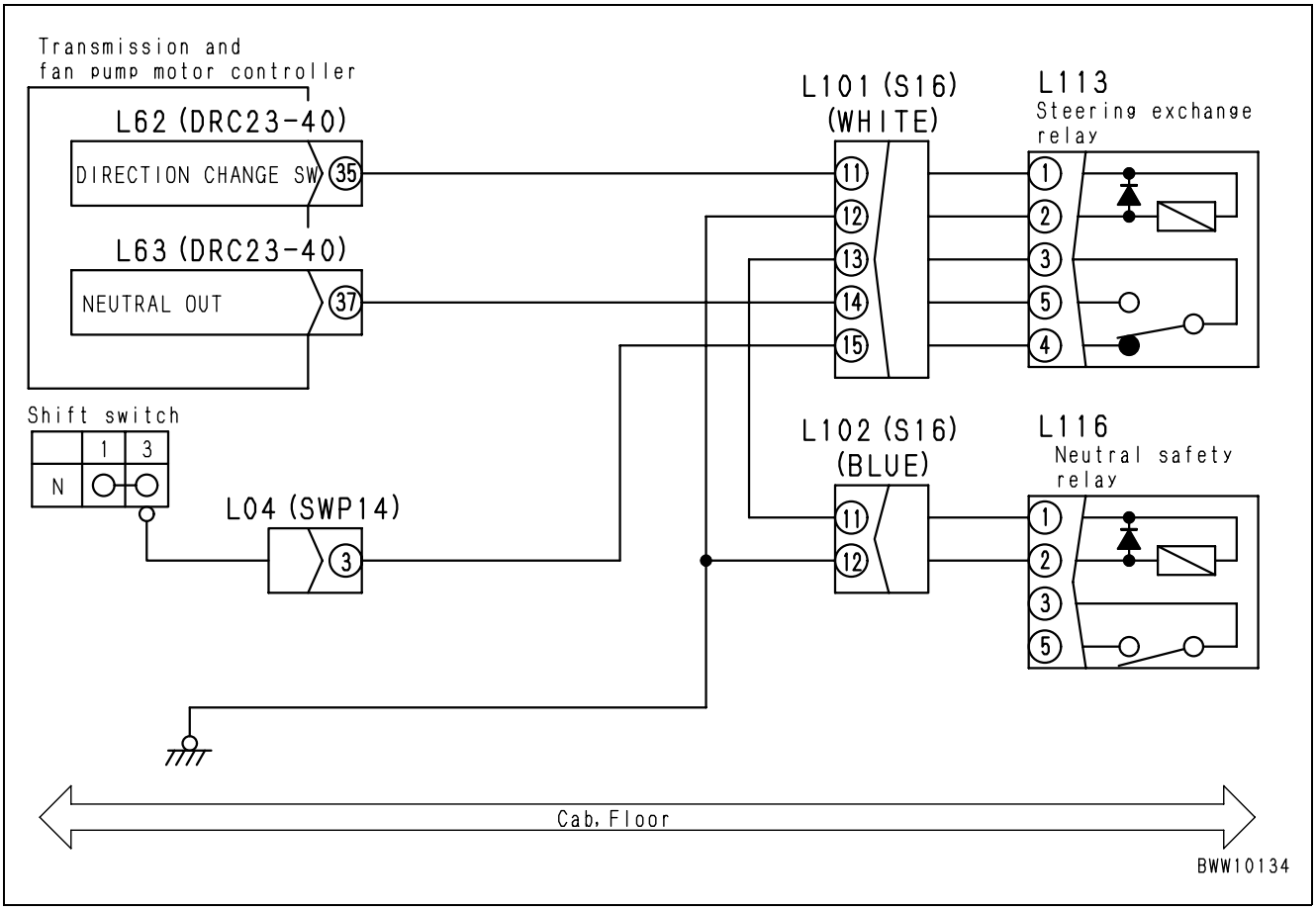
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Action code [TM-19]

Action Code	Error Code	Controller Code	Trouble	Neutral output system hot short-circuiting
TM-19	—	—		
Description of Trouble	• Due to hot short-circuiting of the neutral output system, engine can be started when the FNR lever or FNR seesaw switch is not in the "N" position in the seesaw switch mode (Joystick mode).			
Controller Reaction	• No reaction.			
Effect on Machine	• The engine can be started when the FNR lever or FNR seesaw switch is not in the "N" position in the seesaw switch mode (Joystick mode).			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L101. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (37), S101 (female) (14) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (37) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



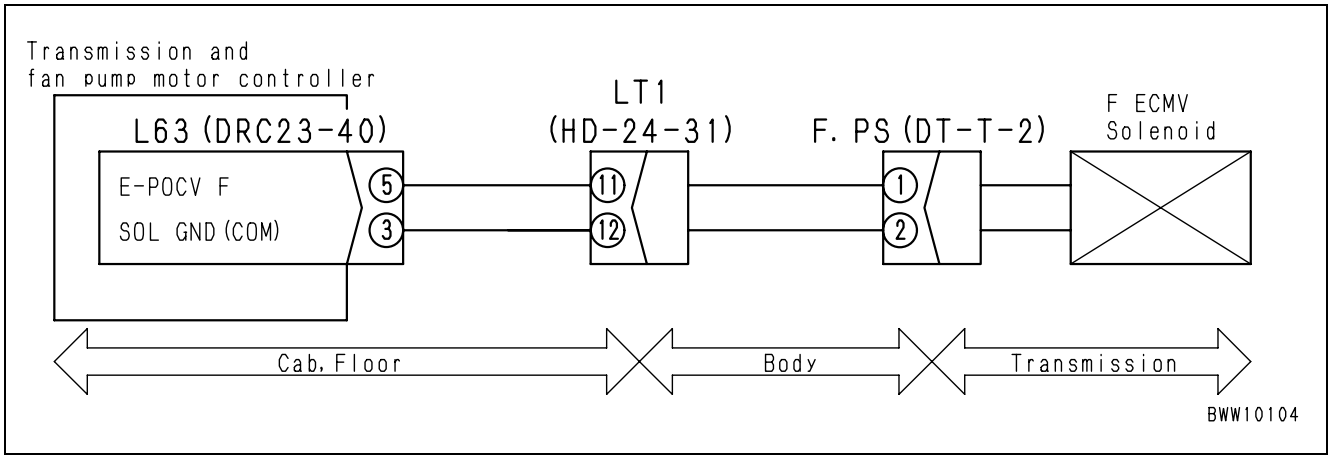
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Action code [TM-20]

Action Code	Error Code	Controller Code	Trouble	FECMV solenoid system hot short-circuiting
TM-20	—	—		
Description of Trouble	• Due to a failure of the FECMV solenoid system, FECMV is turned ON without DIR is turned to "F."			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission may be damaged. • Traveling may be disabled.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and F.PS. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (5) F.PS (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (5) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



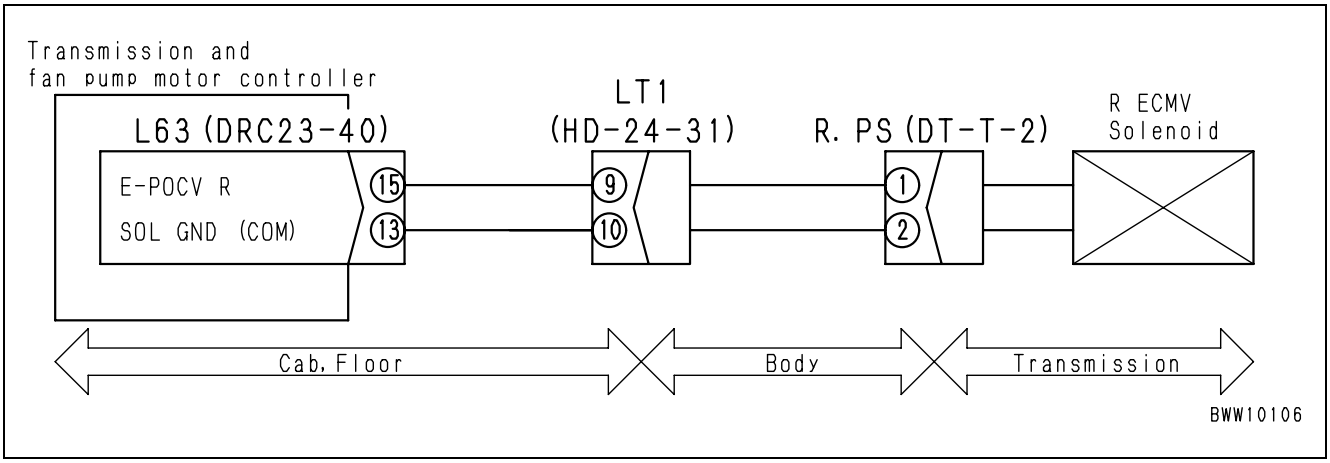
https://truckmanualshub.com/

Action code [TM-21]

Action Code	Error Code	Controller Code	Trouble	RECMV solenoid system hot short-circuiting
TM-21	—	—		
Description of Trouble	• Due to a failure of the RECMV solenoid system, RECMV is turned ON without DIR is turned to "R."			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission may be damaged. • Traveling may be disabled.			
Related Information	—			

Possible Causes and Standard Values		Causes	Standard Values in Normal State and Remarks on Troubleshooting		
	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and R.PS. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (15), R.PS (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (15) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



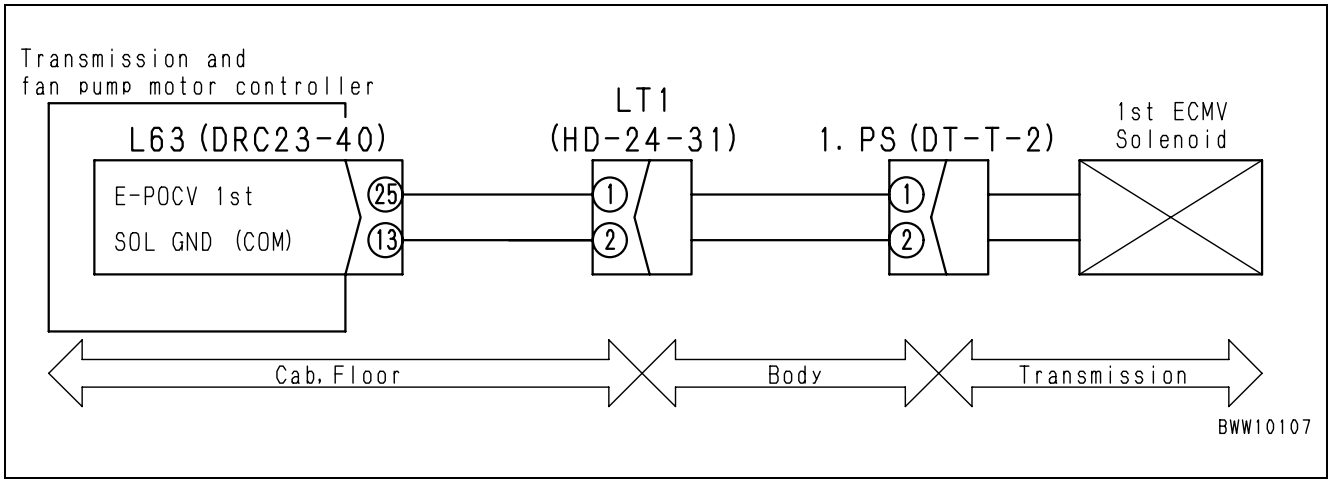
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Action code [TM-22]

Action Code	Error Code	Controller Code	Trouble	1st ECMV solenoid system hot short-circuiting
TM-22	—	—		
Description of Trouble	• Due to hot short-circuiting of the 1st ECMV solenoid system, 1st ECMV is turned ON without shifting the gear to "1st."			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission may be damaged. • Traveling may be disabled.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 1.PS. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (25), 1.PS (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (25) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



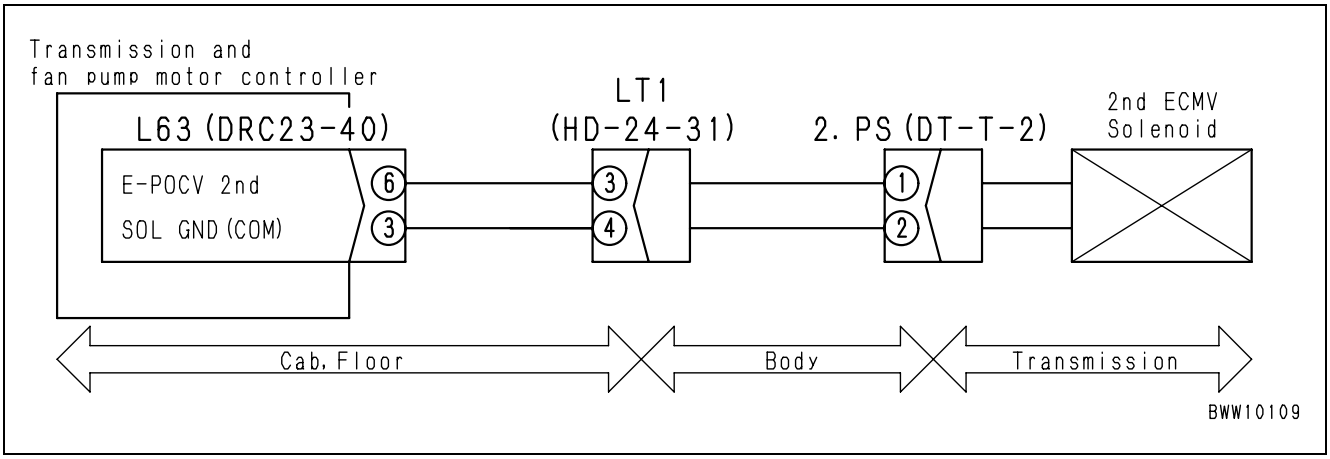
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Action code [TM-23]

Action Code	Error Code	Controller Code	Trouble	2nd ECMV solenoid system hot short-circuiting
TM-23	—	—		
Description of Trouble	• Due to hot short-circuiting of the 2nd ECMV solenoid system, 2nd ECMV is turned ON without shifting the gear to "2nd."			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission may be damaged. • Traveling may be disabled.			
Related Information	—			

Possible Causes and Standard Values		Causes	Standard Values in Normal State and Remarks on Troubleshooting		
	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 2.PS. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (6), 2.PS (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (6) ~ (3)	Resistance	15 ~ 25 Ω

Related circuit diagram



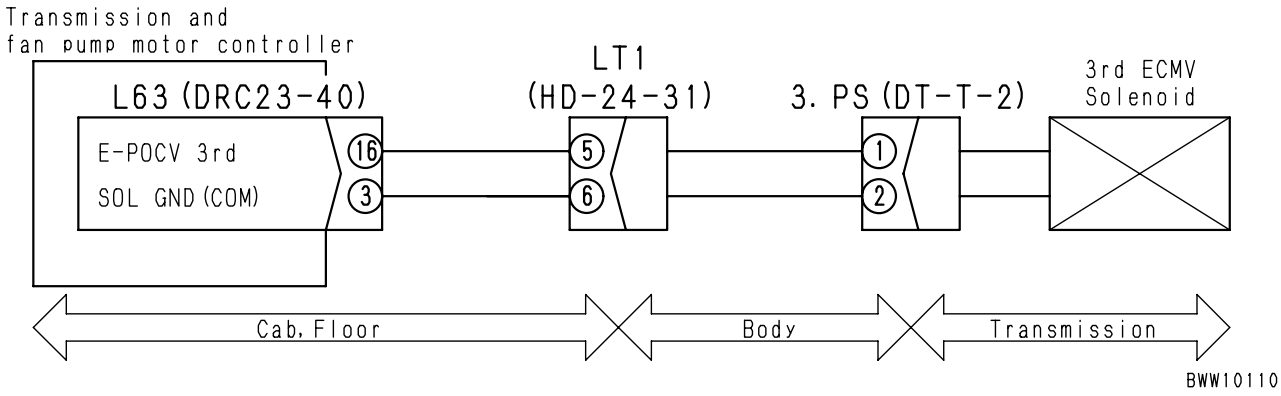
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Action code [TM-24]

Action Code	Error Code	Controller Code	Trouble	3rd ECMV solenoid system hot short-circuiting
TM-24	—	—		
Description of Trouble	• Due to hot short-circuiting of the 3rd ECMV solenoid system, 3rd ECMV is turned ON without shifting the gear to "3rd."			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission may be damaged. • Traveling may be disabled.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 3.PS. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (16), 3.PS (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (16) ~ (3)	Resistance	200 ~ 400 Ω

Related circuit diagram



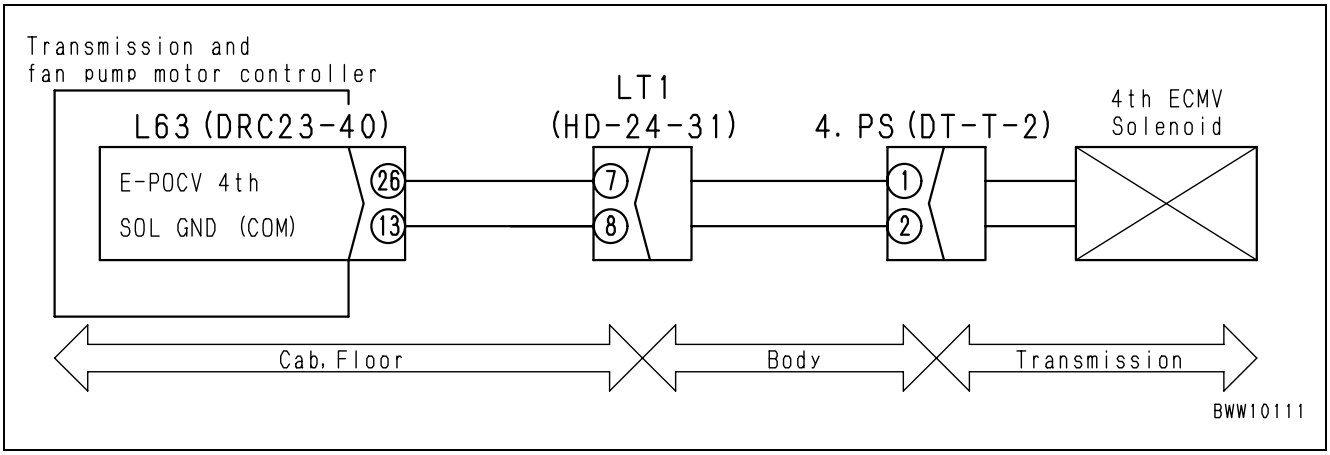
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Action code [TM-25]

Action Code	Error Code	Controller Code	Trouble	4th ECMV solenoid system hot short-circuiting
TM-25	—	—		
Description of Trouble	• Due to hot short-circuiting of the 4th ECMV solenoid system, 4th ECMV is turned ON without shifting the gear to "4th."			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission may be damaged. • Traveling may be disabled.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 4.PS. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (26), 4.PS (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (26) ~ (13)	Resistance	15 ~ 25 Ω

Related circuit diagram



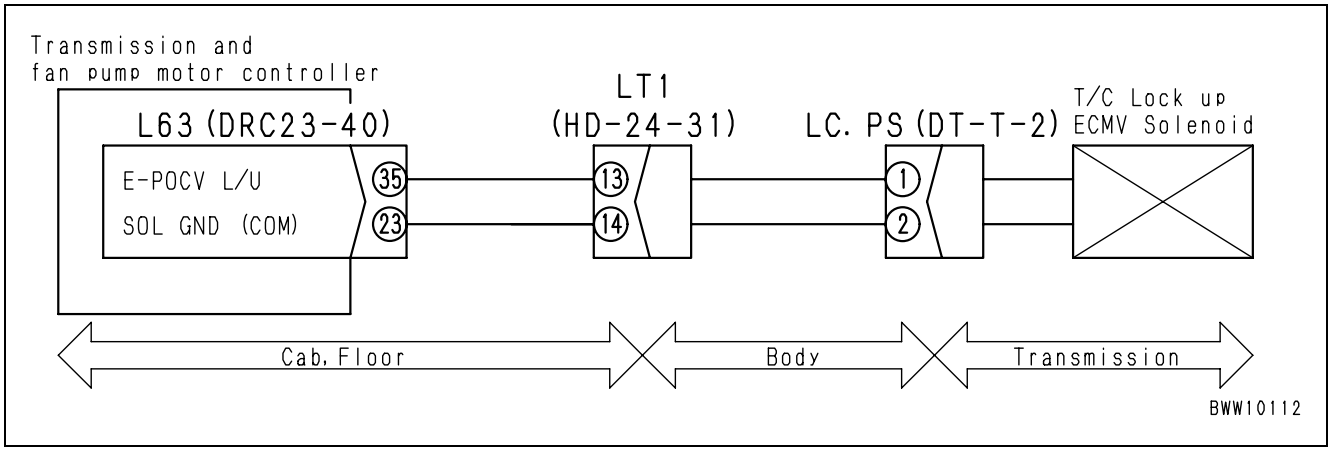
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Action code [TM-26]

Action Code	Error Code	Controller Code	Trouble	Lock-up ECMV solenoid system hot short-circuiting
TM-26	—	—		
Description of Trouble	• Due to hot short-circuiting of the lock-up ECMV solenoid system, lock-up suddenly turns ON.			
Controller Reaction	• No reaction.			
Effect on Machine	• Lock-up suddenly turns ON.			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and LC.PS. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (35), LC.PS (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (35) ~ (23)	Resistance	15 ~ 25 Ω

Related circuit diagram



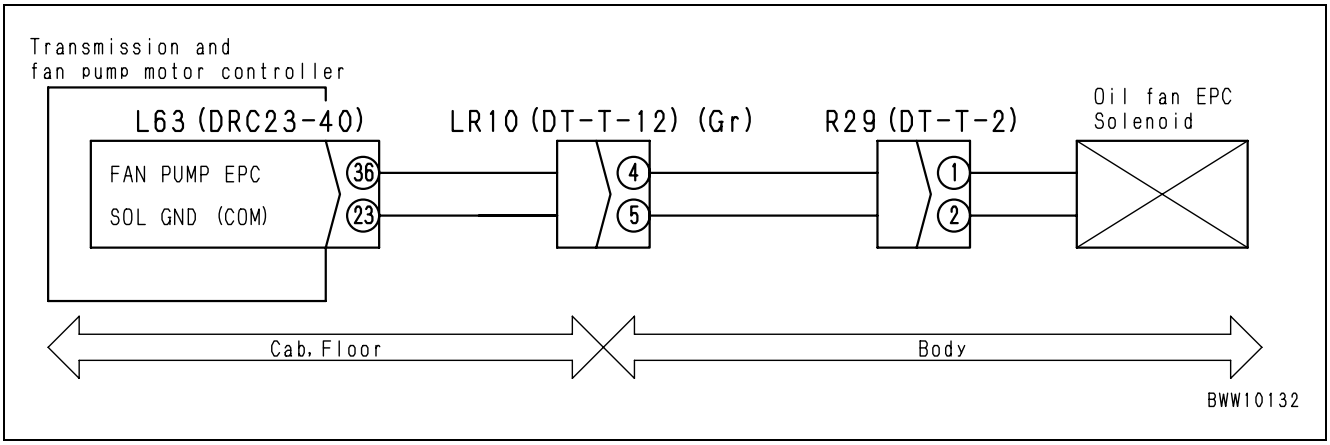
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Action code [TM-27]

Action Code	Error Code	Controller Code	Trouble	Fan pump EPC solenoid system hot short-circuiting
TM-27	—	—		
Description of Trouble	• Due to hot short-circuiting of the fan pump EPC solenoid system, the fan operates with minimum revolution.			
Controller Reaction	• No reaction.			
Effect on Machine	• The fan operates with minimum revolution.			
Related Information	—			

Possible Causes and Standard Values		Causes	Standard Values in Normal State and Remarks on Troubleshooting		
	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and R29. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (36), R29 (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (36) ~ (23)	Resistance	15 ~ 25 Ω

Related circuit diagram



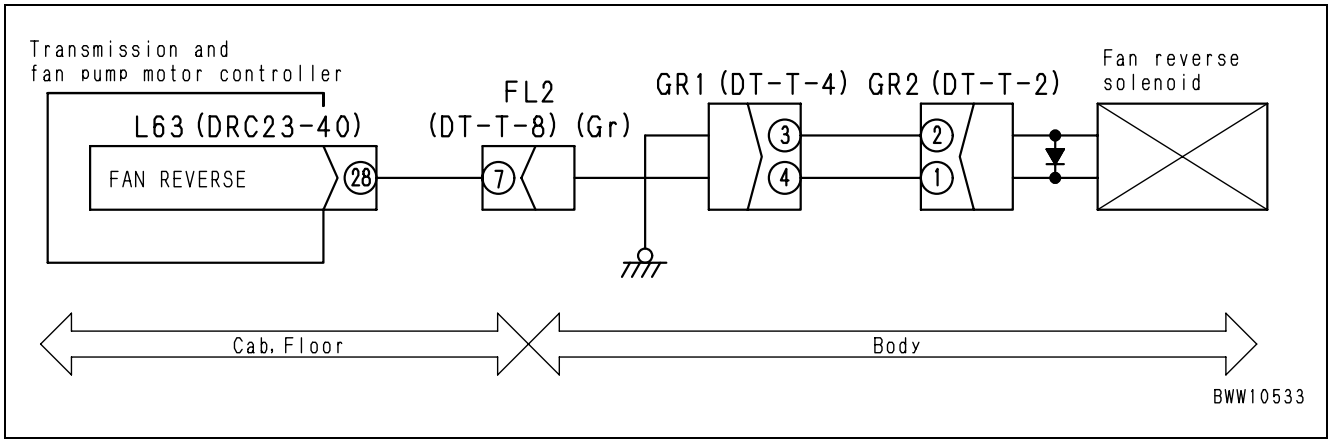
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Action code [TM-28]

Action Code	Error Code	Controller Code	Trouble	Fan reverse solenoid system hot short-circuiting
TM-28	—	—		
Description of Trouble	• Due to hot short-circuiting of the fan reverse solenoid system, the fan keeps operating in reverse revolution.			
Controller Reaction	• No reaction.			
Effect on Machine	• The fan keeps operating in reverse revolution.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and GR2. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (28), GR2 (female) (1) ~ body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (28) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



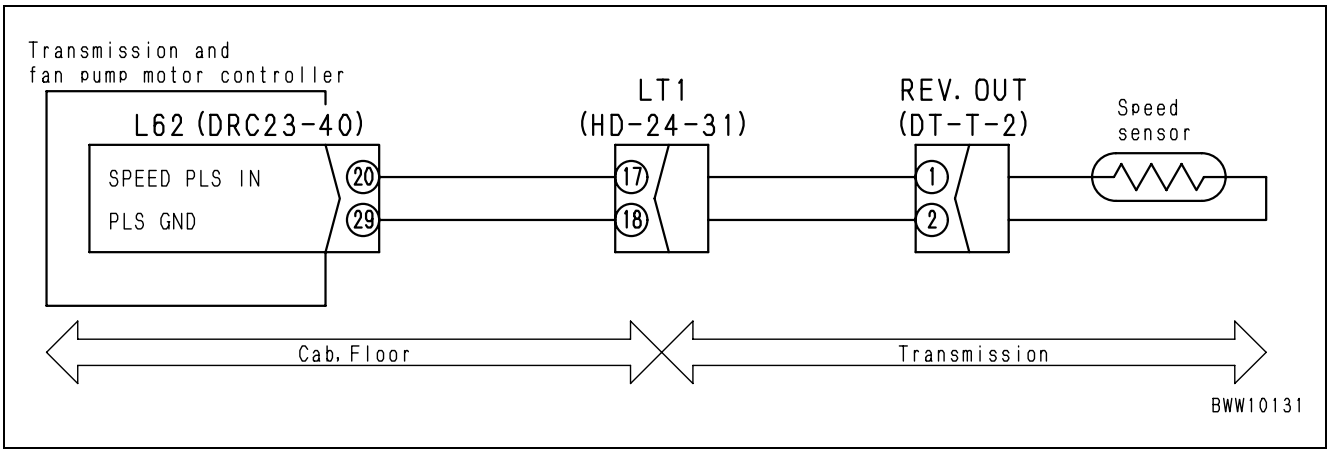
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Action code [TM-29]

Action Code	Error Code	Controller Code	Trouble	Speed sensor (transmission output shaft revolution) system failure
TM-29	—	—		
Description of Trouble	• Due to ground fault of the speed sensor system, speed sensor signal cannot be input.			
Controller Reaction	• No reaction.			
Effect on Machine	• Gear shift shock occurs. • Shift up cannot be performed in the auto-shift mode. (Traveling in the manual mode is possible.) • Engine overrun may occur.			
Related Information	—			

		Causes	Standard Values in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective installation of speed sensor	Check the clearance between the sensor and the gear. ★ See the checking/adjusting manual.		
	2	Defective speed sensor	1) Turn starting switch OFF. 2) Disconnect connector REV.OUT. 3) Connect T-adapter.		
			Between REV.OUT (male) (1) ~ (2)	Resistance	500 ~ 1000 Ω
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L62 and REV.OUT. 3) Connect T-adapter.		
			Between L62 (female) (20), REV.OUT (female) (1) ~ body	Resistance	1 MΩ or above
			Between L62 (female) (29), REV.OUT (female) (2) ~ body	Resistance	1 MΩ or above
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (20) ~ (29)	Resistance	500 ~ 1000 Ω

Related circuit diagram



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TROUBLESHOOTING OF WORK EQUIPMENT CONTROL SYSTEM (WORK MODE)

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Connector types and installation positions

★ The address column in the following table indicates the addresses of the connector layout drawing (cubic diagram) and the circuit diagram.

★ Codes indicated in the fields of the circuit diagram addresses: **ENG:** Engine control system, **TM:** Transmission control system, **WRK:** working equipment control system, **MON:** Monitor system, **E:** Electrical

★ The characters in parenthesis in the Connector Type fields indicate the colors of the connector bodies.

Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
1.PS	DT-T	2	1st solenoid	AJ-4	TM
1.SW	DT	2	1st fill switch	AJ-4	TM
2.PS	DT-T	2	2nd solenoid	AJ-3	TM
2.SW	DT	2	2nd fill switch	AI-3	TM
3.PS	DT-T	2	3rd solenoid	AJ-3	TM
3.SW	DT	2	3rd fill switch	AJ-4	TM
4.PS	DT-T	2	4th solenoid	AJ-5	TM
4.SW	DT	2	4th fill switch	AJ-5	TM
A1	M	6	Blower motor & resistor	U-2	—
A2	SWP	6	Air mix servo motor	U-2	—
A3	M	2	Thermistor	U-2	—
A4	X	2	Air servomotor	U-8	—
A5	X	2	Capacitor switch	T-1	—
A6	Yazaki	2	Hi and Lo switch	T-1	—
A7	Yazaki	4	Blower relay (Main)	W-6	—
A8	Yazaki	4	Blower relay (Hi)	W-6	—
A9	Yazaki	4	Blower relay (M2)	W-6	—
A10	Yazaki	4	Blower relay (M1)	W-5	—
A11	Yazaki	4	Capacitor relay	W-5	—
A12	Yazaki	4	Capacitor Hi (1) relay	W-5	—
A13	Yazaki	4	Capacitor Hi (2) relay	W-4	—
A14	Yazaki	4	MAG clutch relay	W-4	—
A20	Terminal	1	Ground	T-1	—
A21	Yazaki	2	Water temperature sensor (Auto-air conditioner vehicle)	W-3	—
A22	Yazaki	2	Indoor air temperature sensor (Auto-air conditioner vehicle)	U-2	—
A23	Yazaki	2	Outdoor air temperature sensor (Auto-air conditioner vehicle)	A-7	—
A24	DT-T	2	Diode (Auto-air conditioner vehicle)	W-3	—
A25	DT-T	2	Diode (Auto-air conditioner vehicle)	V-3	—
A26	DT-T	2	Intermediate connector (Auto-air conditioner vehicle)	W-4	—
AL1	M	6	Intermediate connector (Air conditioner relay)	U-2	—
AL2	S	12	Intermediate connector (Air conditioner relay)	V-2	—
B01	DT	3	Capacitor R	B-7	—
B02	DT	3	Capacitor L	A-7	—
B03	DT-T	2	Emergency brake switch 1	G-9	TM
B04	DT-T	2	Emergency brake switch 2	G-9	TM
B05	DT-T	2	Front brake ACC low pressure switch	K-3	TM
B06	DT-T	2	Rear brake ACC low pressure switch	J-2	TM
BR1	DT-T (Gr)	12	Intermediate connector (Bulk head)	I-2	TM
C01	Yazaki	9	AM/FM radio	L-9	—
C02	KES1	2	Speaker (Right)	E-9	—

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
C03	KES1	2	Speaker (Left)	G-9	—
C04	M	2	Front working lamp (Right)	B-8	—
C05	M	2	Front working lamp (Left)	B-8	—
C07	KES1	2	Room lamp	C-8	—
C08	M	1	Door switch (Right) (Room Lamp)	C-8	—
C09	M	1	Door switch (Left) (Room lamp)	B-8	—
C10	—	2	Cigarette lighter	A-7	—
C12	M	6	Front wiper motor	A-7	E
C15	M	4	Rear wiper motor	F-9	E
C17	Kyoritsu ES	4	Warning lamp switch	D-9	—
C18	Plug	1	Warning lamp (Beacon)	F-9	—
C19	DT-T	6	Glass heater switch	D-9	—
C29	M	1	Glass heater ON	E-9	—
C33	H	1	Rear glass heater	E-9	—
C35	H	1	Rear glass heater	G-9	—
C39	Terminal	1	Ground	C-8	—
C40	Terminal	1	Ground	C-8	E
C41	M	1	Warning lamp	E-9	—
C43	Yazaki	6	Rear wiper switch	B-8	E
C44	M	4	Right-side wiper switch	A-7	E
C45	M	4	Left-side wiper switch	F-1	E
C46	M	1	Intermediate connector (Power supply)	D-9	E
C47	Terminal	1	Ground	F-9	E
C47	AMP172021-2	16	A/C control AMP	P-1	—
C47	AMP040	20	A/C control AMP (Auto-air conditioner vehicle)	D-9	—
C48	AMP172245-2	12	A/C control AMP	P-1	—
C48	AMP040	16	A/C control AMP (Auto-air conditioner vehicle)	D-9	—
C49	SWP	8	Left Servomotor	R-1	—
C50	SWP	8	Right Servomotor	M-3	—
C51	Yazaki	2	Diode (Auto-air conditioner vehicle)	Q-1	—
CAN1	DT-T	3	CAN 1	O-1	H-8
CAN2	DT-T	3	CAN 2	R-9	—
CHK0	X	1	Connector for inspection 0	R-1	—
CHK1	X	1	Connector for inspection 1	R-1	—
CL1	S	8	Intermediate connector	A-4	—
CL2	S (L)	12	Intermediate connector (Wiper motor)	A-4	E
CL5	S	16	Intermediate connector	M-2	—
CL6	DT-T	12	Intermediate connector (Monitor panel controller)	M-2	I-3
CL6	M	6	Intermediate connector (Auto-air conditioner vehicle)	W-3	—
CL7	DT-T (Gr)	12	Intermediate connector (Monitor panel controller)	M-2	I-4
CL8	DT-T	12	Intermediate connector (Monitor panel controller)	N-1	—
CL9	DT-T	8	Intermediate connector (Monitor panel controller)	O-1	I-4
CL10	DT-T	8	Intermediate connector (Monitor panel controller)	O-1	I-3
CN1	DT-T	2	Injector	Y-5	ENG
CN2	DT-T	2	Injector	Y-5	ENG
CN3	DT-T	2	Injector	Y-9	ENG
CN4	DT-T	2	Injector	Z-9	ENG
CN5	DT-T	2	Injector	Z-9	ENG

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
CN6	DT-T	2	Injector	AC-8	ENG
COMBI	M	3	Front combination lamp (Right)	A-6	MON
COMBI	M	3	Front combination lamp (Left)	E-1	MON
DI	DT-T	2	Dust indicator	AB-9	MON
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	MON
E01	DT-T	2	Intermediate connector (Starting motor)	L-3	ENG
E02	Terminal	1	Alternator R	K-8	ENG
E03	Terminal	1	Alternator B	K-8	ENG
E04	Terminal	1	Alternator E	L-8	ENG
E06	Terminal	1	Heater relay	AC-8	ENG
E07	Terminal	1	Heater relay	AC-7	ENG
E10	DT-T	2	Compressor magnetic clutch	I-9	—
E11	DT-T	2	Diode	J-9	—
E14	Terminal	1	Ground	L-4	ENG
E28	DT	2	Diode (Engine heater relay)	Z-3	ENG
E29	Terminal	1	Engine oil pressure switch	Z-5	MON
E30	Terminal	1	Starting motor B	K-3	ENG
EL2	HD-24	31	Intermediate connector (Engine injector)	Z-1	WRK
EL3	HD-24	31	Intermediate connector (Engine)	Z-2	ENG
ER-1	DT-T	4	Intermediate connector (Starting motor)	L-4	ENG
EREV	DT-T	2	Engine speed sensor	AC-6	WRK
F.PS	DT-T	2	F solenoid	AJ-6	WRK
F.SW	DT	2	F fille switch	AJ-6	WRK
F01	M	6	Intermediate connector (Right head lamp)	A-5	MON
F02	M	6	Intermediate connector (Left head lamp)	D-1	MON
F03	Terminal	1	Horn	B-1	MON
F04	Terminal	1	Horn	A-1	MON
F05	Terminal	1	Horn	C-1	MON
F06	Terminal	1	Horn	C-1	MON
F07	DT-T	2	Switch pump cutoff solenoid	A-1	MON
F09	DT-T	3	Bucket positioner proximity switch	A-3	K-9
F10	DT-T	3	Lift arm positioner proximity switch (std)	A-3	K-8
F13	DT-T	2	Lift arm damper solenoid	D-1	K-7
F14	DT-T	2	Diode (Damper solenoid)	D-1	K-6
F15	DT-T	3	Lift arm angle signal (For load meter)	A-5	B-3
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1	B-3
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1	B-3
F18	DT-T	3	Lift arm angle sensor (For boom EPC)	A-5	H-8
F19	DT-T	3	Bucket positioner proximity switch (For boom EPC)	A-3	I-8
F20	DT-T	2	Lift arm raising EPC	A-2	G-8
F21	DT-T	2	Lift arm lowering EPC	A-1	G-8
F22	DT-T	2	Bucket tilt EPC	A-1	G-8
F23	DT-T	2	Bucket damp EPC	A-1	G-8
F24	DT-T	2	ATT EXT EPC (op)	A-2	I-8
F25	DT-T	2	ATT RET EPC (op)	A-2	I-8
F26	DT-T	2	Lift arm EPC cutoff solenoid	C-1	H-8
F27	DT-T	2	Diode (Boom RPC cutoff solenoid)	A-4	H-8
F28	DT-T	2	Oil temperature sensor	B-1	K-6

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
FF1	S	10	Intermediate connector (Head lamp)	E-1	MON
FF2	DT-T	8	Intermediate connector (Working equipment sensor)	E-1	J-6
FL1	S	12	Intermediate connector (Head lamp)	V-1	MON
FL2	DT-T	8	Intermediate connector (Working equipment sensor)	V-2	I-6
FL3	DT-T	6	Intermediate connector (Load meter)	X-3	D-3
FL7	DT-T (Br)	12	Intermediate connector (Work equipment solenoid)	N-1	F-6
FL8	DT-T (G)	8	Intermediate connector (Work equipment solenoid)	N-2	F-6
FL9	DT-T	6	Intermediate connector (3rd solenoid)	N-2	F-5
FS1	L	2	Intermediate connector (Fuse box)	W-7	ENG
FS2	L	2	Intermediate connector (Fuse box)	V-7	ENG
FS3	S	16	Intermediate connector (Fuse box)	V-8	I-8
FS4	S	12	Intermediate connector (Fuse box)	U-8	H-8
FS5	M	6	Intermediate connector (Fuse box)	V-7	MON
FS6	Plug	1	Intermediate connector (Fuse box)	V-7	—
FS7	Plug	1	Intermediate connector (Fuse box)	W-7	—
G	Yazaki	2	Engine G speed sensor	AA-5	ENG
G01	Terminal	1	Backup buzzer	L-8	TM
G02	Terminal	1	Backup buzzer	L-7	TM
G04	M	2	Rear working lamp (Left)	K-9	MON
G05	M	2	Rear working lamp (Right)	I-9	MON
GR1	DT-T	4	Intermediate connector (Fan reverse solenoid, rear working lamp)	L-7	J-5
GR2	DT-T	2	Fan reverse solenoid	J-9	K-5
HEAD	M	3	Head lamp (Right)	A-6	MON
HEAD	M	3	Head lamp (Left)	E-1	MON
HT	Terminal	1	Engine heater relay	AC-9	E-9
L01	SWP	6	Parking brake switch	M-5	TM
LO2	SWP	6	Dipping switch, light switch	M-4	MON
L03	SWP	6	Turn and hazard switch	M-5	MON
L04	SWP	14	Shift switch	M-3	I-8
L05	DT-T	2	S/T wheel horn switch	M-5	—
FL7	DT-T	12	Intermediate connector (Working equipment solenoid)	N-1	F-6
FL8	DT-T	8	Intermediate connector (Working equipment solenoid)	N-2	F-6
FL9	DT-T	6	Intermediate connector (3rd solenoid)	N-2	F-5
L07	DT-T	6	Monitor mode/cancel switch	P-1	MON
L08	DT-T	6	Monitor INC/DEC switch	P-1	MON
L09	DT-T	2	Stop lamp switch	P-1	MON
L10	DT-T	3	Left brake pressure sensor	R-1	TM
L11	DT-T	2	Air suspension seat	S-1	—
L12	DT-T	4	Right-hand direction switch, intermediate connector	O-7	D-3
L13	DT-T	2	Lift arm N lock switch	—	—
L14	DT-T	4	Lift arm lever KDS&HOLD	M-6	F-2
L15	DT-T	4	Bucket lever LDM cancel	M-6	F-2
L16	M	2	Intermediate connector	V-2	—
L17	M	4	DC24V/DC12 V converter	W-5	—
L18	Yazaki	2	DC12V socket	W-3	—
L19	M	4	Flasher unit	U-8	MON
L20	M	2	Alarm buzzer	U-8	MON

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L21	S	10	Front and rear wiper switches	N-2	E
L22	DT-T	3	Throttle pedal	O-1	ENG
L23	DT-T	3	Low idle switch	O-1	ENG
L25E	DT-T	2	Lift arm and bucket EPC lever	M-6	E-8
L25S	DT-T	2	PPC valve and electrical detent	N-6	E-2
L26E	DT-T	2	Lift arm and bucket EPC lever	O-7	E-2
L26S	DT-T	2	PPC valve and electrical detent	N-6	E-2
L27S	DT-T	2	PPC valve and electrical detent	N-7	E-2
L28	DT-T	4	Lift arm and bucket EPC lever	M-7	E-8
L29	DT-T	4	Lift arm and bucket EPC lever	N-6	E-8
L30	DT-T	4	3rd EPC lever	O-8	E-8
L31	M	6	Intermittent wiper timer	W-7	OTH
L34	DT-T	4	Joystick level positioner	W-6	B-1
L35	DT-T	2	Joystick EPC solenoid	P-1	C-8
L36	DT-T	2	Joystick EPC solenoid	P-1	C-8
L37	DTM	12	Joystick lever switch	Q-1	TM
L38	DT-T	3	Joystick N lock switch	W-7	B-2
L39	DT-T	6	Joystick ON/OFF switch	T-1	B-2
L40	DT-T	6	Steering speed mode switch	S-1	B-1
L41	Relay	6	Joystick cutoff relay	M-5	B-8
L42	Plug	1	Connector (Emergency power)	A-5	—
L43	Plug	1	Connector (Emergency power)	A-5	—
L44	M	6	Intermediate connector (Printer)	V-3	MON
L45	D-sub	25	Printer	—	MON
L46	G	4	Printer	—	MON
L51	AMP070	20	Monitor panel controller	M-2	K-2, MON
L52	AMP070	18	Monitor panel controller	M-3	MON
L53	AMP070	12	Monitor panel controller	M-3	MON
L54	AMP070	18	Monitor panel controller	M-3	K-2, MON
L55	AMP070	12	Monitor panel controller	M-4	K-2, MON
L56	AMP070	12	Monitor panel controller	M-3	K-2, MON
L57	AMP070	14	Monitor panel controller	M-4	MON
L58	AMP040	8	Monitor panel controller	M-4	MON
L61	DRC23	24	Transmission and fan pump motor controller	P-8	G8, TM
L62	DRC23	40	Transmission and fan pump motor controller	P-8	G8, TM
L63	DRC23	40	Transmission and fan pump motor controller	Q-8	H8, TM
L71	DRC23	24	Lift arm bucket and joystick controller	Q-9	A-8
L72	DRC23	40	Lift arm bucket and joystick controller	Q-9	A-8
L73	DRC23	40	Lift arm bucket and joystick controller	R-9	B-8
L81	DRC23	24	Engine controller	Q-8	ENG
L82	DRC23	40	Engine controller	Q-8	ENG
L83	DRC23	40	Engine controller	Q-8	ENG
L90	DT-T	4	Modal selection connector	P-8	ENG
L100	Terminal	1	Ground	R-1	H-1
L101	S (W)	16	Intermediate connector (Relay sub unit)	T-9	J-6
L102	S (L)	16	Intermediate connector (Relay sub unit)	T-9	J-5
L103	S (W)	16	Intermediate connector (Relay sub unit)	S-9	MON
L104	S (W)	16	Intermediate connector (Relay sub unit)	T-9	WRK

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L105	S (W)	12	Intermediate connector (Relay sub unit)	T-9	—
L106	S (W)	16	Intermediate connector (Relay sub unit)	S-9	MON
L111	—	5	Winker and hazard relay	X-7	MON
L112	—	5	Air cleaner clogging relay	W-7	MON
L113	—	5	Steering changeover relay	W-8	L-6
L114	—	5	Automatic preheating relay	V-8	L-5
L115	—	5	Engine controller power supply relay	V-9	—
L116	—	4	Neutral safety relay	W-7	TM
L117	—	4	Backup lamp relay	W-7	TM
L118	—	4	Stop lamp relay	V-8	MON
L119	—	4	Horn relay	V-8	MON
L120	—	4	Parking brake relay	V-8	TM
L123	—	5	Lift arm detent relay	X-9	—
L124	—	5	Bucket detent relay	W-9	—
L125	—	5	Lift arm damper relay	V-9	TM
L126	—	4	Emergency steering relay	X-8	TM
L127	—	4	Front working lamp relay	X-7	—
L128	—	4	Rear working lamp relay	X-9	MON
L129	—	4	Rear glass heater relay	V-9	—
L130	—	4	Transmission pump cut-off relay	V-9	TM
LC.PS	DT-T	2	Torque converter lockup solenoid (op)	AJ-5	TM
LC.SW	DT	2	Torque converter lockup fill switch (op)	AJ-5	TM
LL1	DT-T	6	Intermediate connector (Relay)	O-7	ENG
LL2	DT-T	8	Intermediate connector (Monitor panel controller)	O-7	ENG
LL3	DTHD#12	1	Intermediate connector (Ground)	N-7	ENG
LL4	DT-T	12	Intermediate connector (Throttle panel)	N-6	ENG
LL5	DT	3	Intermediate connector (Joystick vehicle)	M-5	D-5
LL6	DT-T	12	Intermediate connector (Joystick vehicle)	Q-1	D-4
LL7	DT-T	12	Intermediate connector (Joystick vehicle)	Q-1	D-4
LL8	DT-T	8	Intermediate connector (Joystick switch)	Q-1	C-2
LR1	DTHD#12	1	Intermediate connector (Slow-blow fuse)	X-2	ENG
LR4	L	2	Intermediate connector (Slow-blow fuse)	X-1	ENG
LR5	DT-T	6	Intermediate connector (Auto-greasing controller)	X-3	MON
LR6	L	2	Intermediate connector (Ground)	X-2	ENG
LR8	DTHD#8	1	Intermediate connector (Ground)	X-2	ENG
LR9	DT-T	12	Intermediate connector (Steering, brake oil pressure switch)	X-1	TM
LR10	DT-T	12	Intermediate connector	X-1	ENG
LT1	HD-24	31	Intermediate connector (Transmission)	W-3	TM
NE	Yazaki	2	Engine NE speed sensor	AB-6	ENG
OL	DT-T	2	Engine oil level sensor	AC-1	MON
PB.PS	DT-T	2	Parking brake solenoid	AI-2	TM
PB.SW	DT-T	2	Parking brake indicate switch	AI-2	TM
PCV1	Sumitomo	2	Supply pump (No.1)	Z-4	ENG
PCV2	Sumitomo	2	Supply pump (No.2)	AA-5	ENG
PFUEL	AMP174357-2	3	Common rail pressure signal	AB-5	ENG
PIM	Sumitomo	3	Boost pressure signal	AC-7	ENG
R.PS	DT-T	2	R clutch solenoid	AJ-6	TM

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
R.SW	DT	2	R clutch fill switch	AJ-6	TM
R01	Terminal	1	Battery relay	J-2	ENG
R02	Terminal	1	Slow-blow fuse	L-2	ENG
R03	Terminal	1	Slow-blow fuse	L-2	ENG
R04	Terminal	1	Battery relay	K-2	ENG
R05	Terminal	1	Slow-blow fuse	K-2	ENG
R06	Terminal	1	Slow-blow fuse	K-2	ENG
R11	Terminal	1	Slow-blow fuse	K-2	ENG
R13	Terminal	1	Battery relay	L-1	ENG
R14	Terminal	1	Battery relay	L-1	ENG
R15	Terminal	1	Emergency steering relay	J-1	TM
R16	Terminal	1	Emergency steering relay	J-1	TM
R22	Terminal	1	Battery	H-9	ENG
R23	Terminal	1	Battery	H-9	ENG
R24	DT-T	2	Diode (Battery relay)	I-1	ENG
R25	DT-T	2	Diode (Battery relay)	J-2	ENG
R26	DT-T	2	Diode (Starting motor)	H-1	ENG
R27	DT-T	2	Diode (Starting motor)	I-2	ENG
R29	DT-T	2	Oil fan EPC	A-6	TM
R30	M	6	Rear combination lamp (Left)	L-7	TM
R31	M	6	Rear combination lamp (Right)	I-9	TM
R32	DT-T	2	Coolant level sensor	B-8	MON
R33	DT-T	2	Fuel gauge sensor	K-3	MON
R34	M	2	License lamp	L-6	MON
R36	DT-T	3	Steering pump pressure switch	D-1	TM
R37	DT-T	3	Emergency steering pressure switch	F-1	TM
R38	DT-T	6	Auto-greasing controller	F-1	MON
R39	DT-T	2	Battery level sensor	L-6	MON
R43	KES1	2	Front windshield washer	G-1	OTH
R44	DT-T	2	Diode (Washer)	G-1	OTH
R45	KES1	2	Rear windshield washer	H-1	OTH
R46	DT-T	2	Diode (Washer)	G-1	OTH
R50	Terminal	1	Ground	H-9	I-5
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	TM
R56	DT-T	2	Rear brake oil temperature sensor	H-1	TM
R63	Terminal	1	Slow-blow fuse	L-2	—
R64	Terminal	1	Ground	L-5	—
R65	DT-T	6	Auto-tilt motor switch (op)	L-5	—
R66	DT-T	2	Auto-tilt motor	H-9	—
REV OUT	DT-T	2	Speed sensor	AH-2	TM
R.PS	DT-T	2	R clutch solenoid	AJ-6	TM
R.SW	DT	2	R clutch fill switch	AJ-6	TM
S01	DT-T	6	Front working lamp switch	P-1	MON
S02	DT-T	6	Rear working lamp switch	P-1	MON
S03	DT-T	6	Transmission cutoff ON/OFF switch	M-4	TM
S04	DT-T	6	Right-hand direction ON/OFF switch	N-9	TM
S05	DT-T	6	Transmission cutoff set switch	M-9	TM
S06	DT-T	6	Torque converter lock-up ON/OFF switch	O-8	TM

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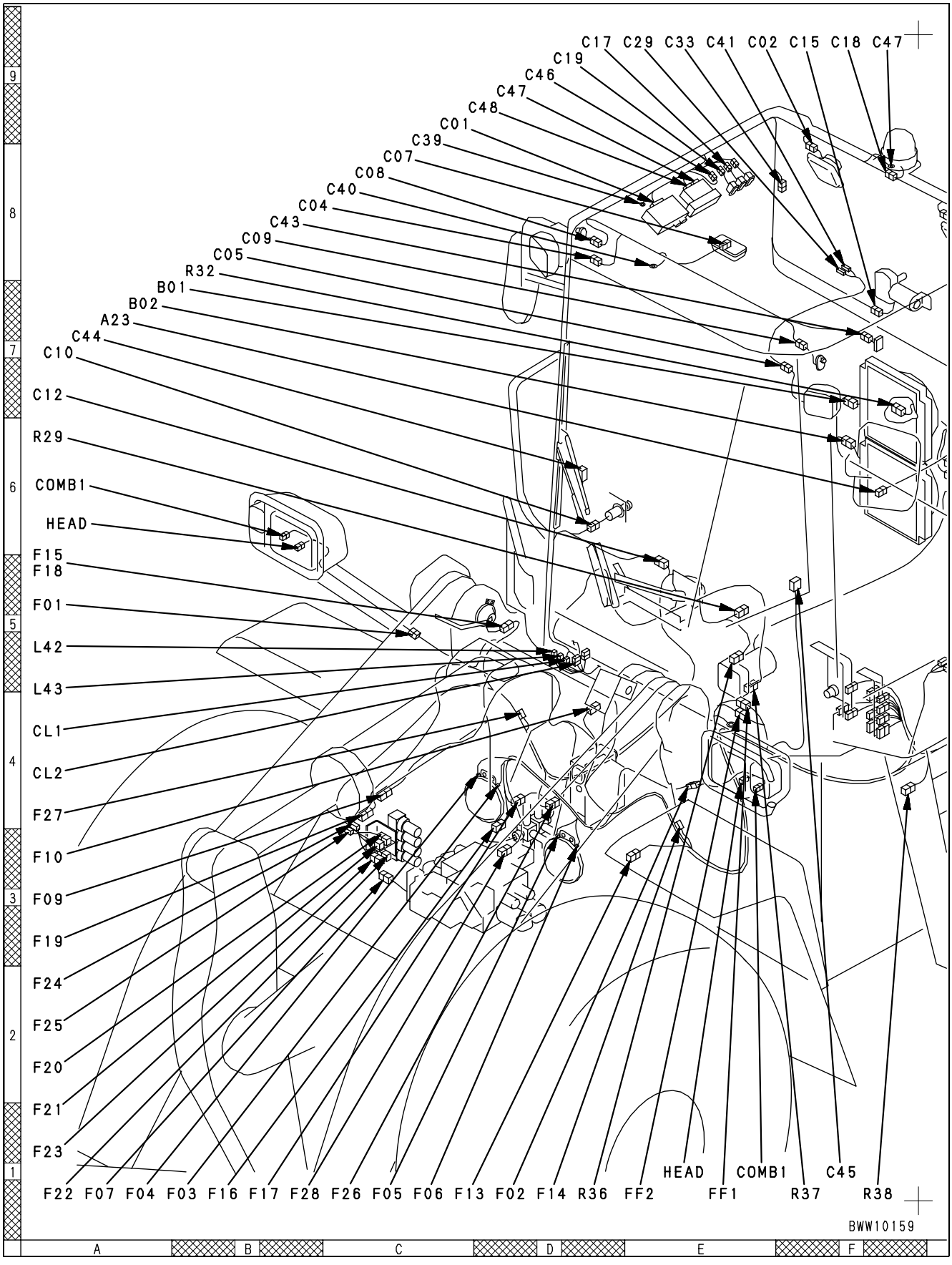
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
S07	DT-T	6	Lift arm damper ON/OFF switch	O-1	TM
S12	DT-T	6	Remote positioner set switch (Joystick vehicle)	N-7	I-2
S13	DT-T	6	Upper remote positioner ON/OFF switch (Joystick vehicle)	N-9	I-2
S14	DT-T	6	Lower remote positioner ON/OFF switch (Joystick vehicle)	N-8	I-2
S15	DT-T	6	Auto-excavation switch (Joystick vehicle)	N-9	J-2
S16	DT-T	6	Hydraulic fan reverse switch	M-9	TM
S17	DT-T	6	Auto-greasing switch	O-8	—
S19	DT-T	6	Emergency steering check switch	M-9	TM
S21	DT-T	4	Engine power mode switch	M-8	TM
S22	DT-T	4	Auto-shifting mode switch	N-7	TM
S31	DT	4	Starting switch	N-7	I-2
TC.C	DT-T	2	Torque converter oil temperature sensor (Monitor)	—	TM
TEL	DT-T (Gr)	12	Connector (KOMTRAX)	Q-1	—
THL	DT-T	3	Fuel temperature sensor	AB-5	ENG
TM.T	DT-T	2	Transmission oil temperature sensor	AJ-4	—
TWH	DT-T	2	Engine water temperature sensor (Monitor)	AD-2	MON
TWL	DT-T	3	Engine water temperature sensor (Preheating)	AB-1	ENG

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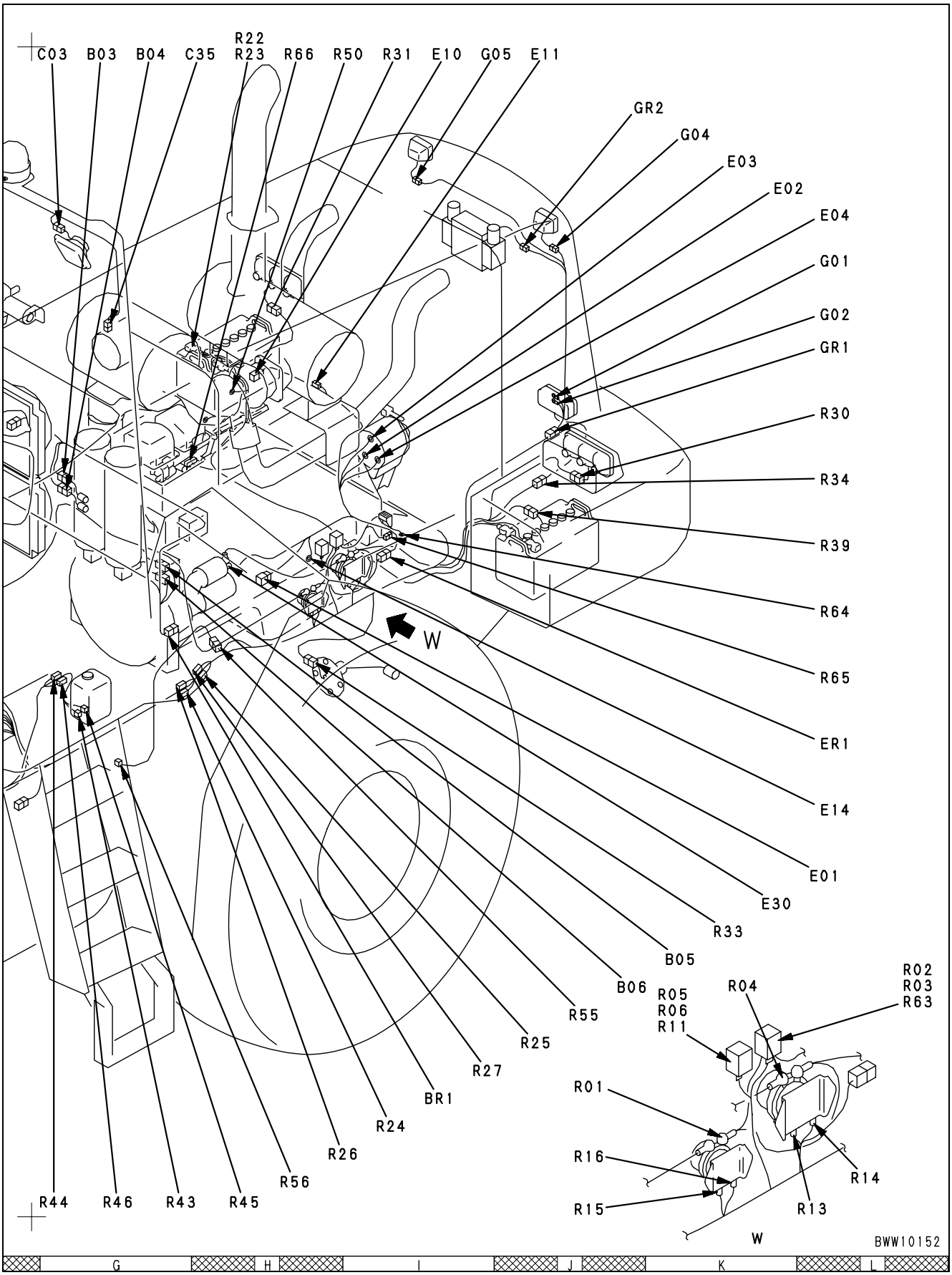
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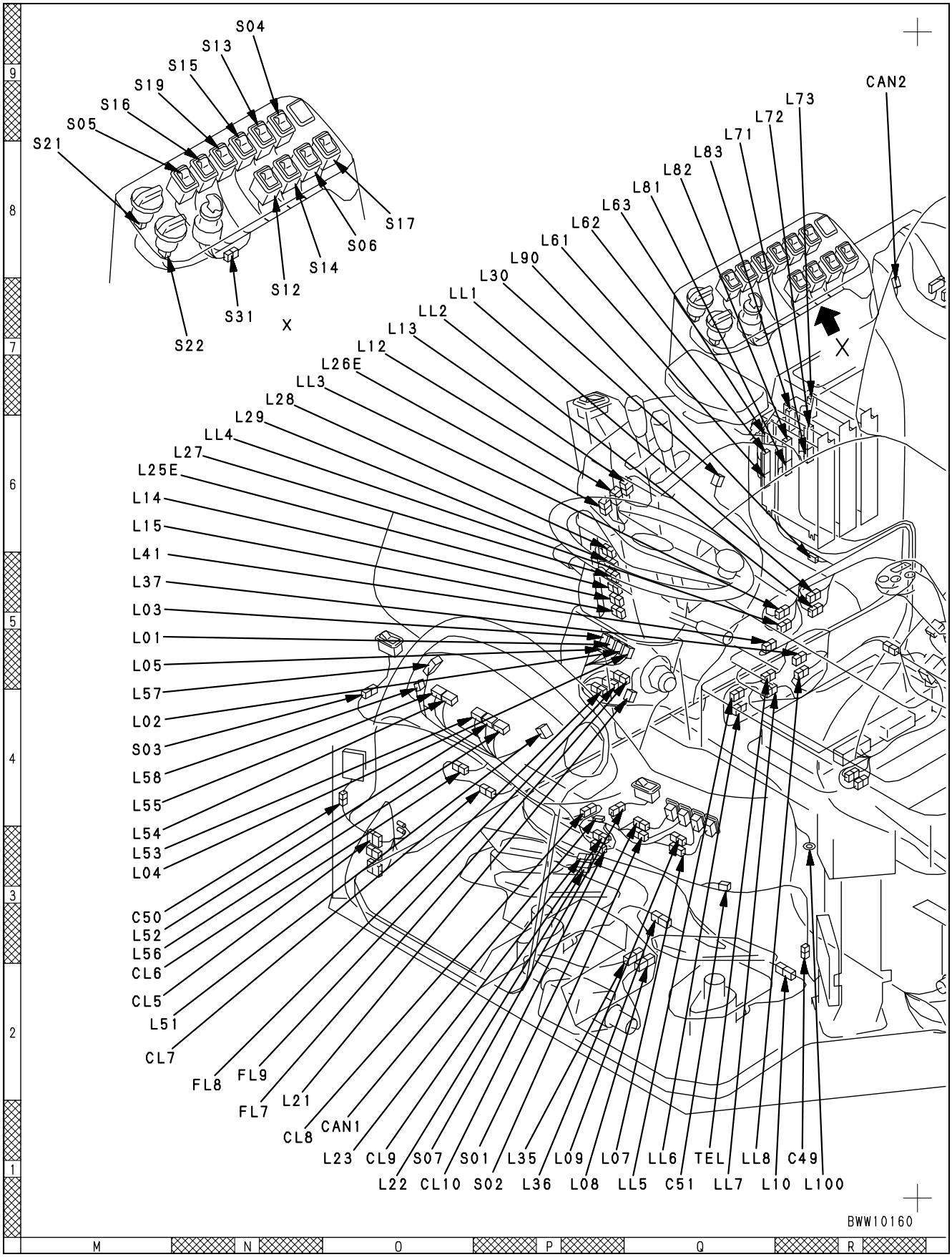
Connector layout drawing



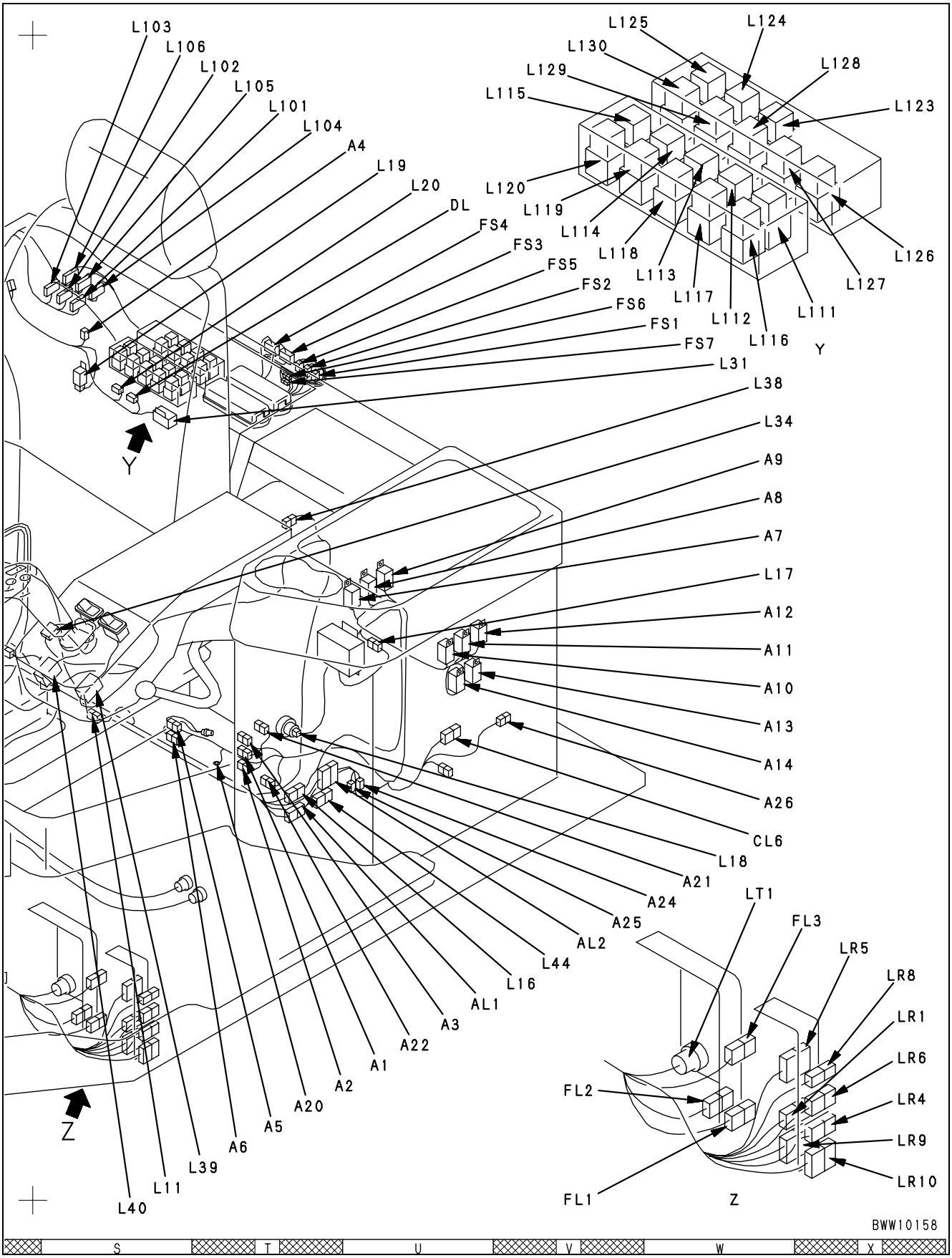
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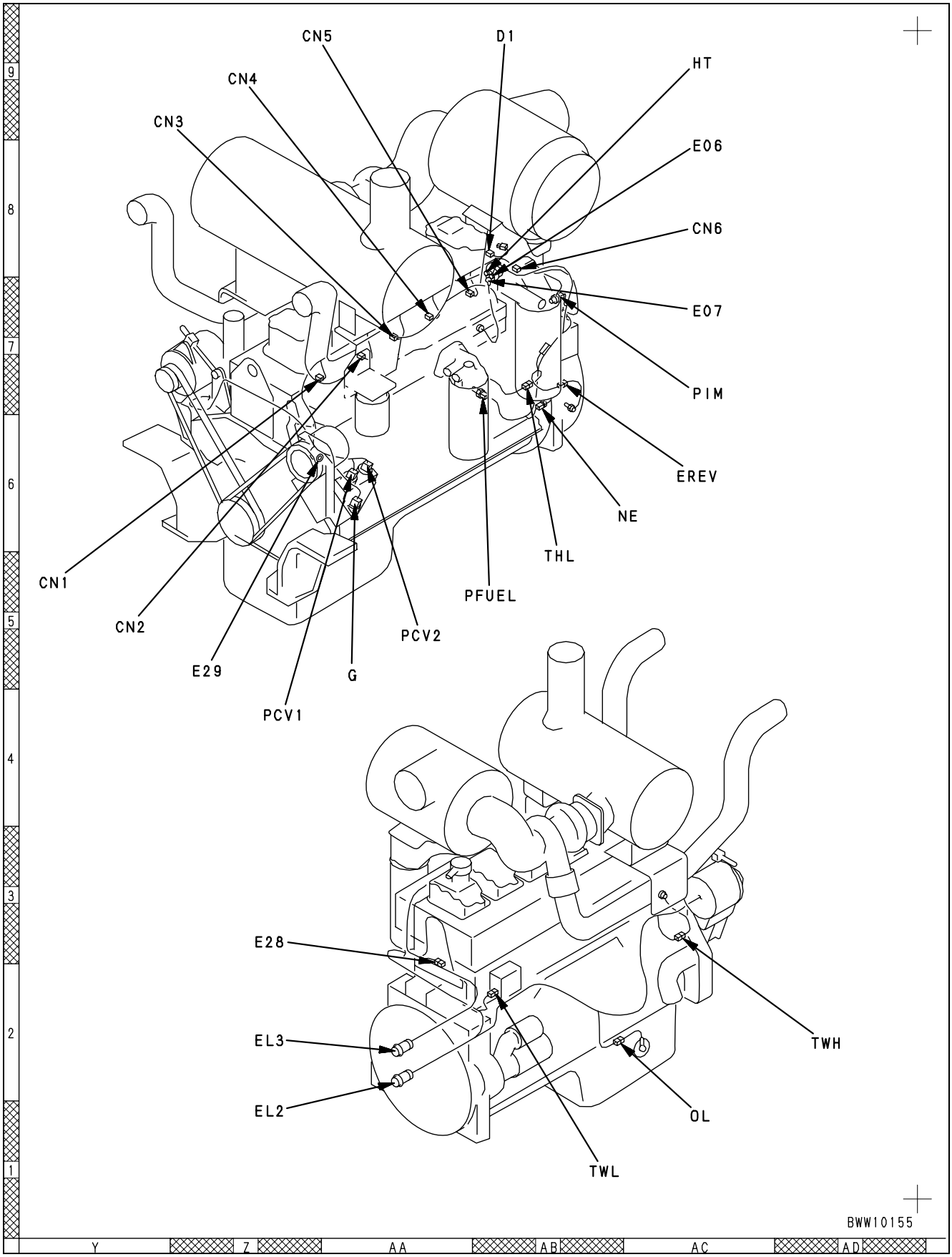
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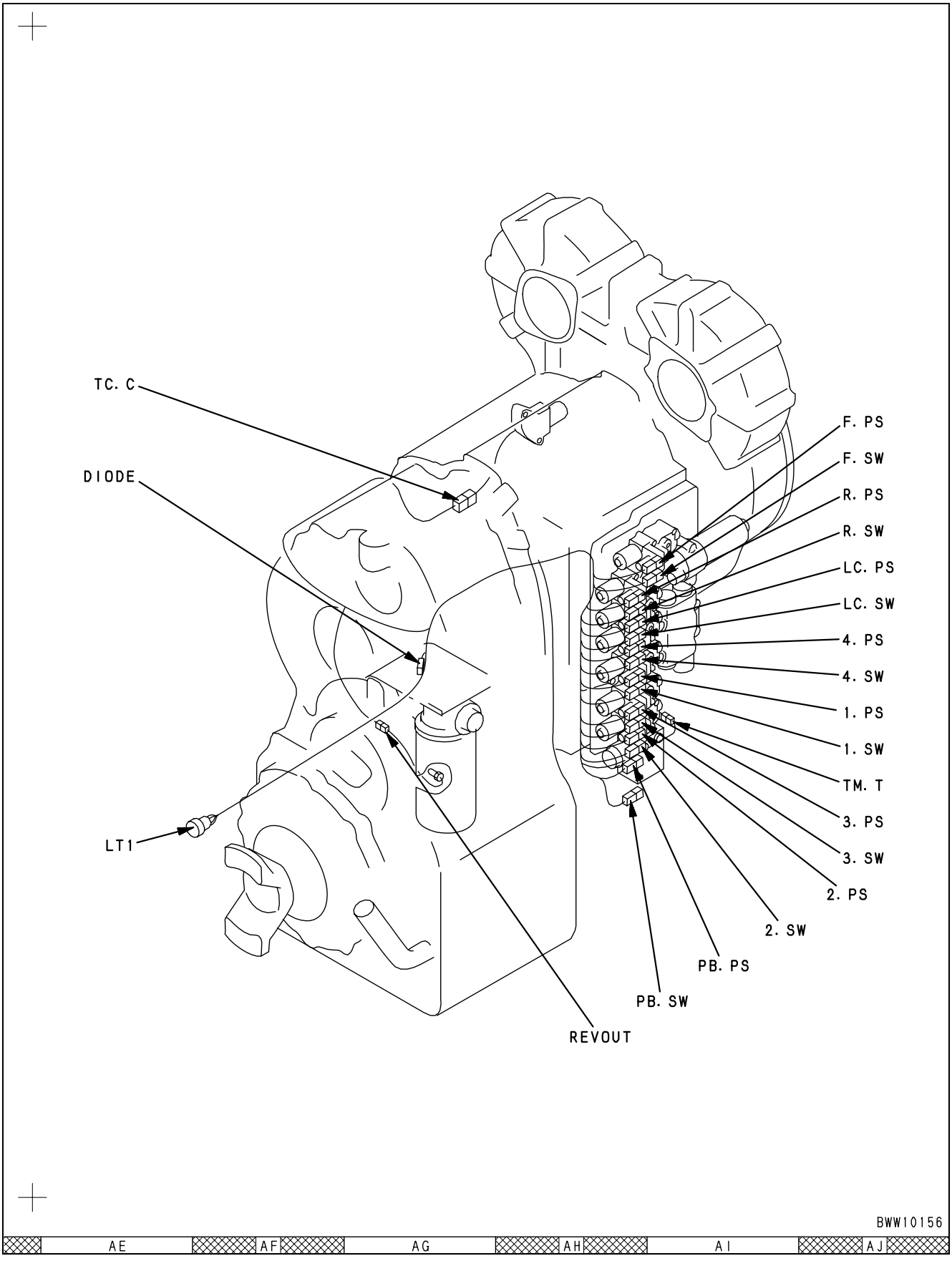
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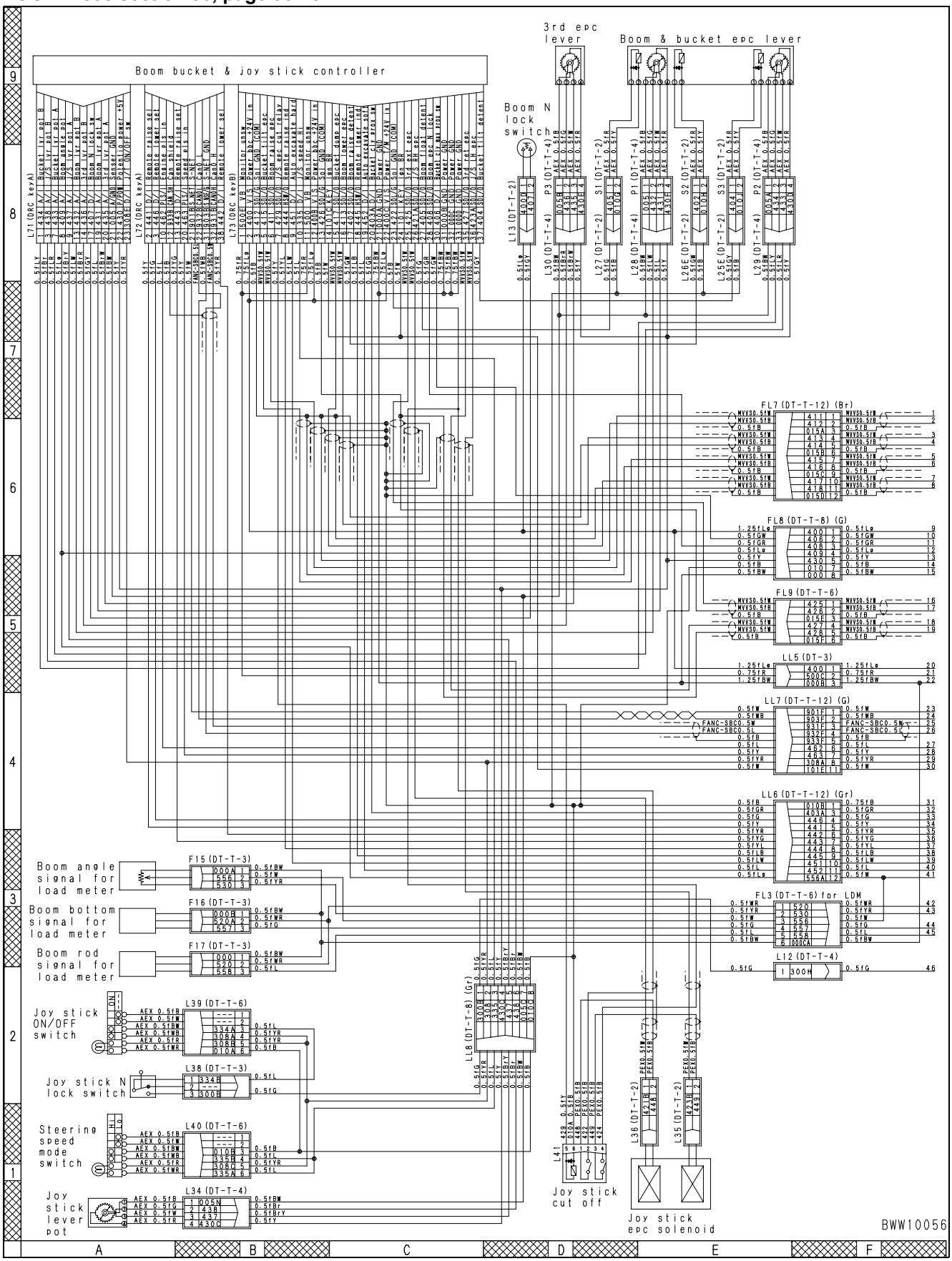
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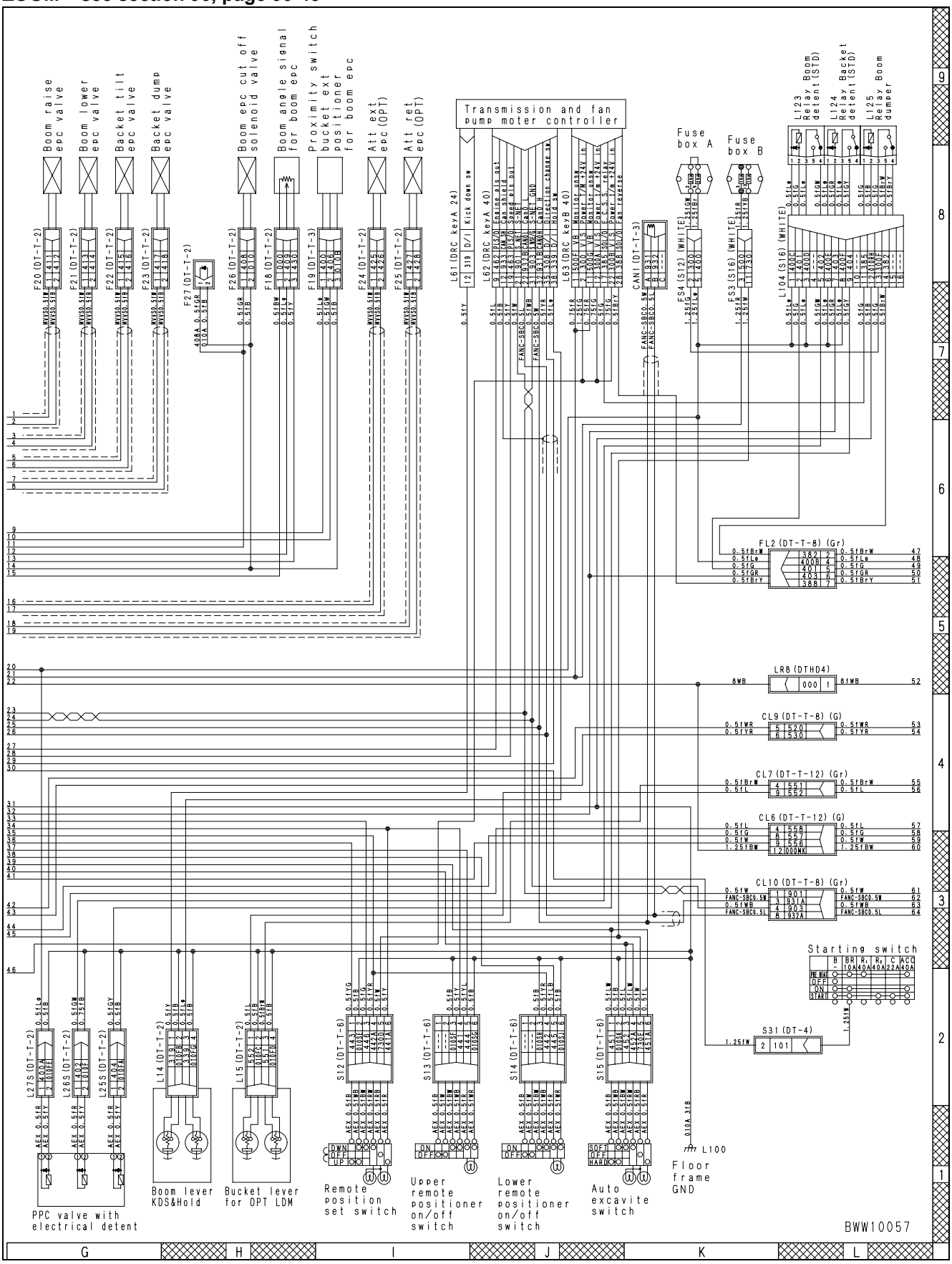
Work equipment control system diagram

ZOOM – see section 90, page 90-43



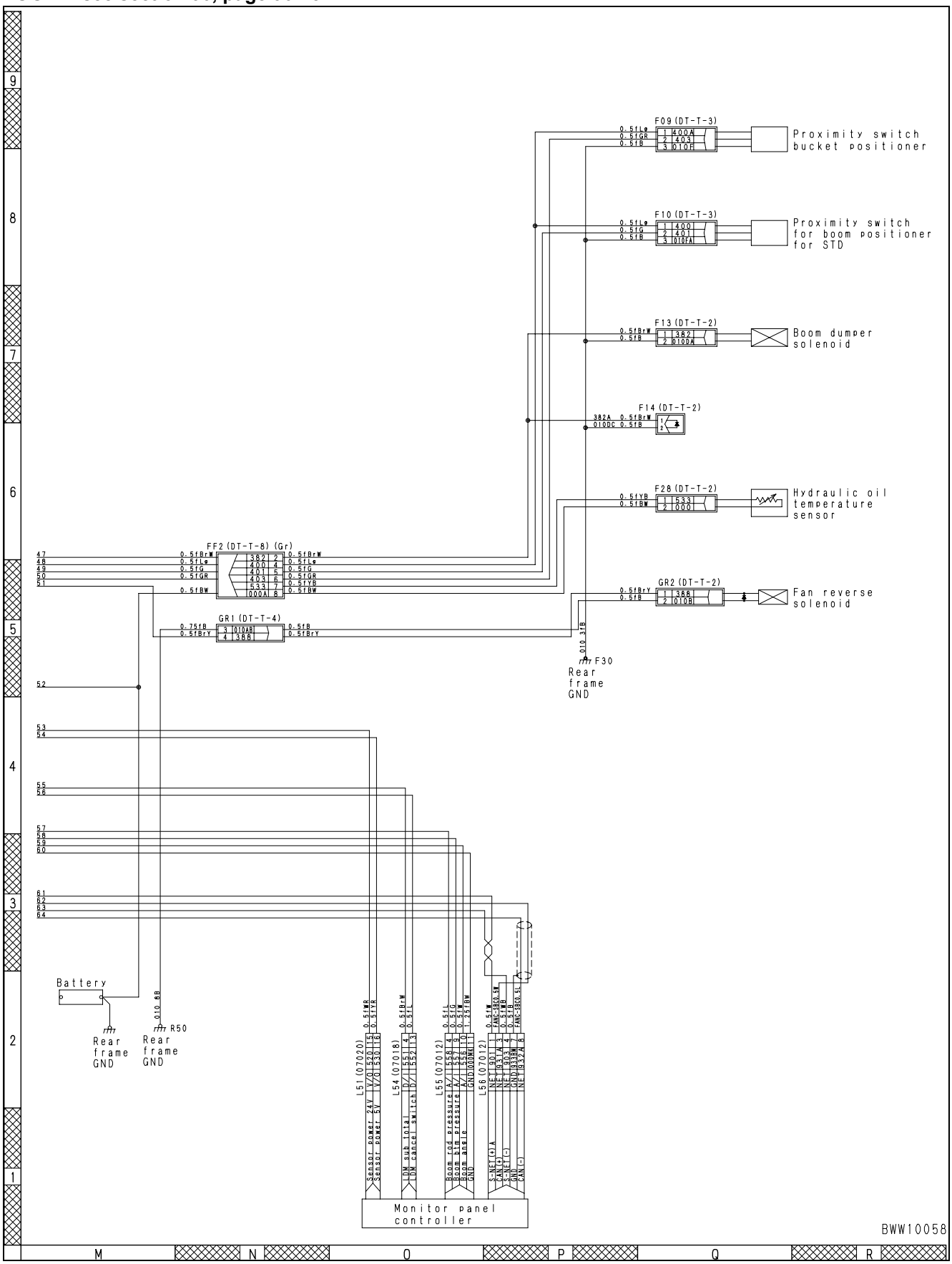
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ZOOM – see section 90, page 90-43



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ZOOM – see section 90, page 90-45



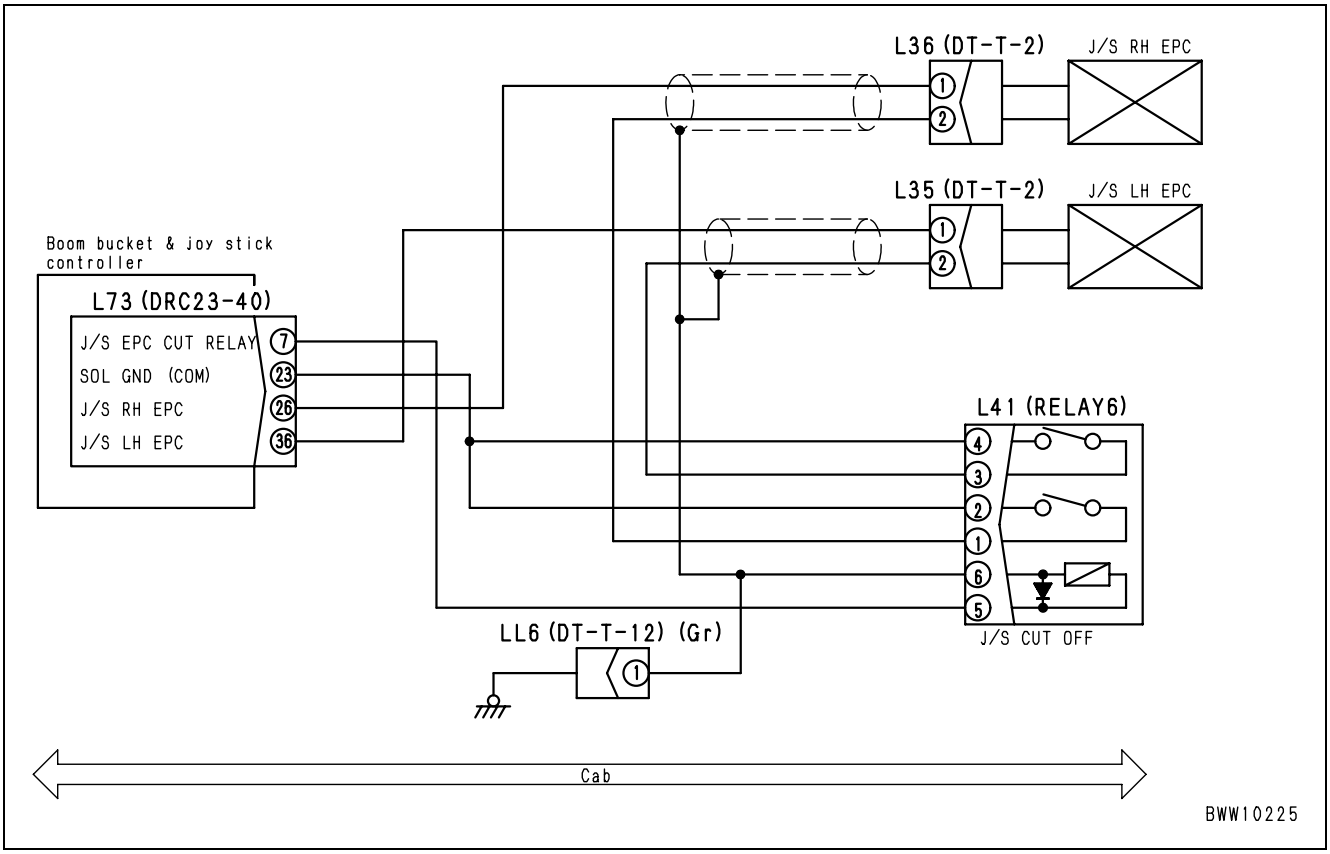
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Error code [D193KA]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering cut relay output system (Disconnected)
E03	D193KA	WRK		
Description of Trouble	• The joystick steering solenoid cut relay output system is disconnected (Defective).			
Controller Reaction	• Stops the joystick steering solenoid cut relay output and joystick steering EPC solenoid output (Both left and right).			
Effect on Machine	• The joystick steering cannot be operated.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective relay (L41)	1) Turn starting switch OFF. 2) Disconnect connector L41. 3) Connect T-adapter.		
			Between L41 (male) (5) ~ (6)	Resistance	200 ~ 400 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L41. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (7) ~ L41 (female) (5)	Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (7) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



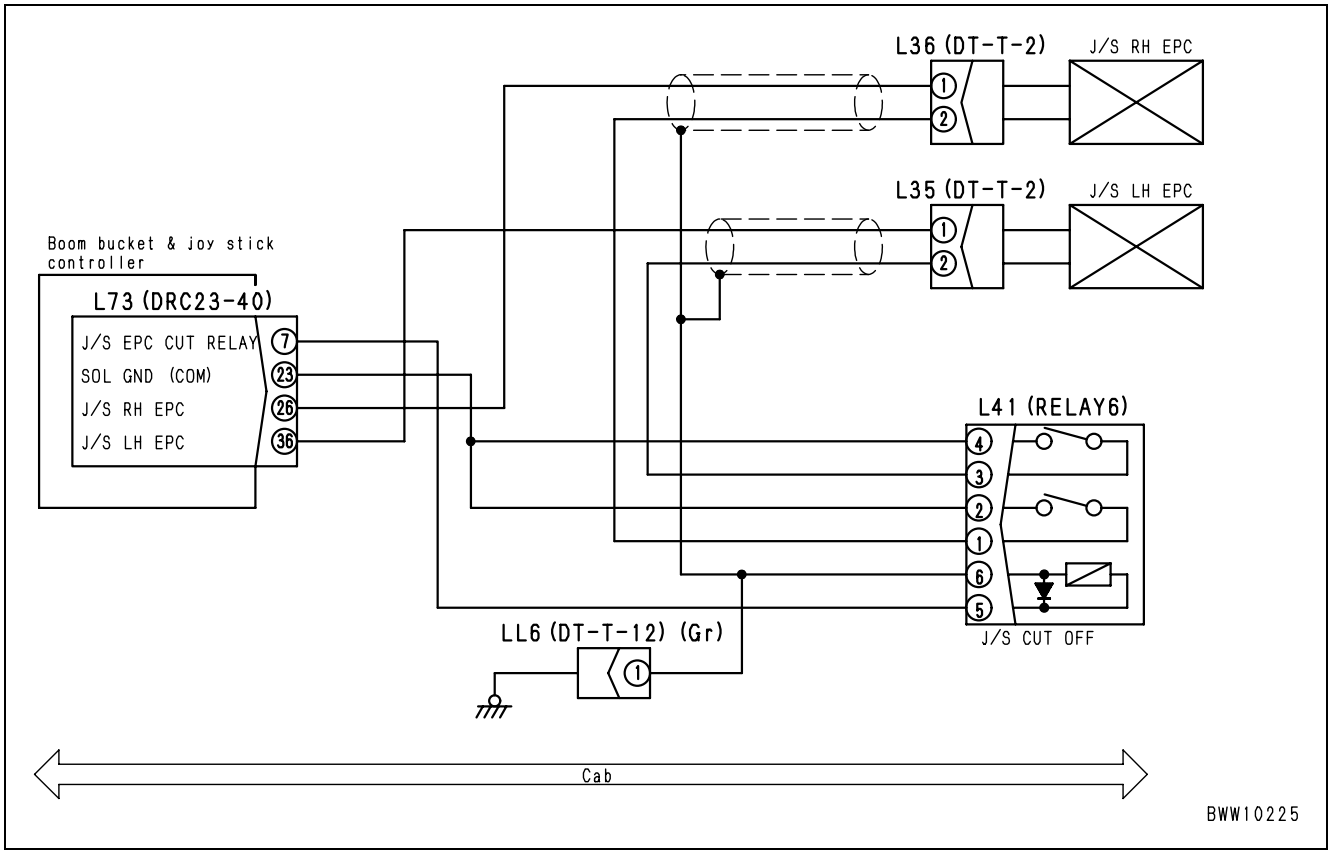
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Error code [D193KB]

Action Code	Error Code	Controller Code	Trouble	The joystick solenoid cut relay output system is grounded properly
E03	D193KB	WRK		
Description of Trouble	• The joystick solenoid cut relay output system is grounded properly.			
Controller Reaction	• Stops joystick solenoid cut relay and joystick solenoid output.			
Effect on Machine	• The joystick steering cannot be operated.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective relay (L41)	1) Turn starting switch OFF. 2) Disconnect connector L41. 3) Connect T-adapter.		
			Between L41 (male) (5) ~ (6)	Resistance	200 ~ 400 Ω
	2	Wiring harness ground fault (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L41. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (7), L41 (female) (5) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (7) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



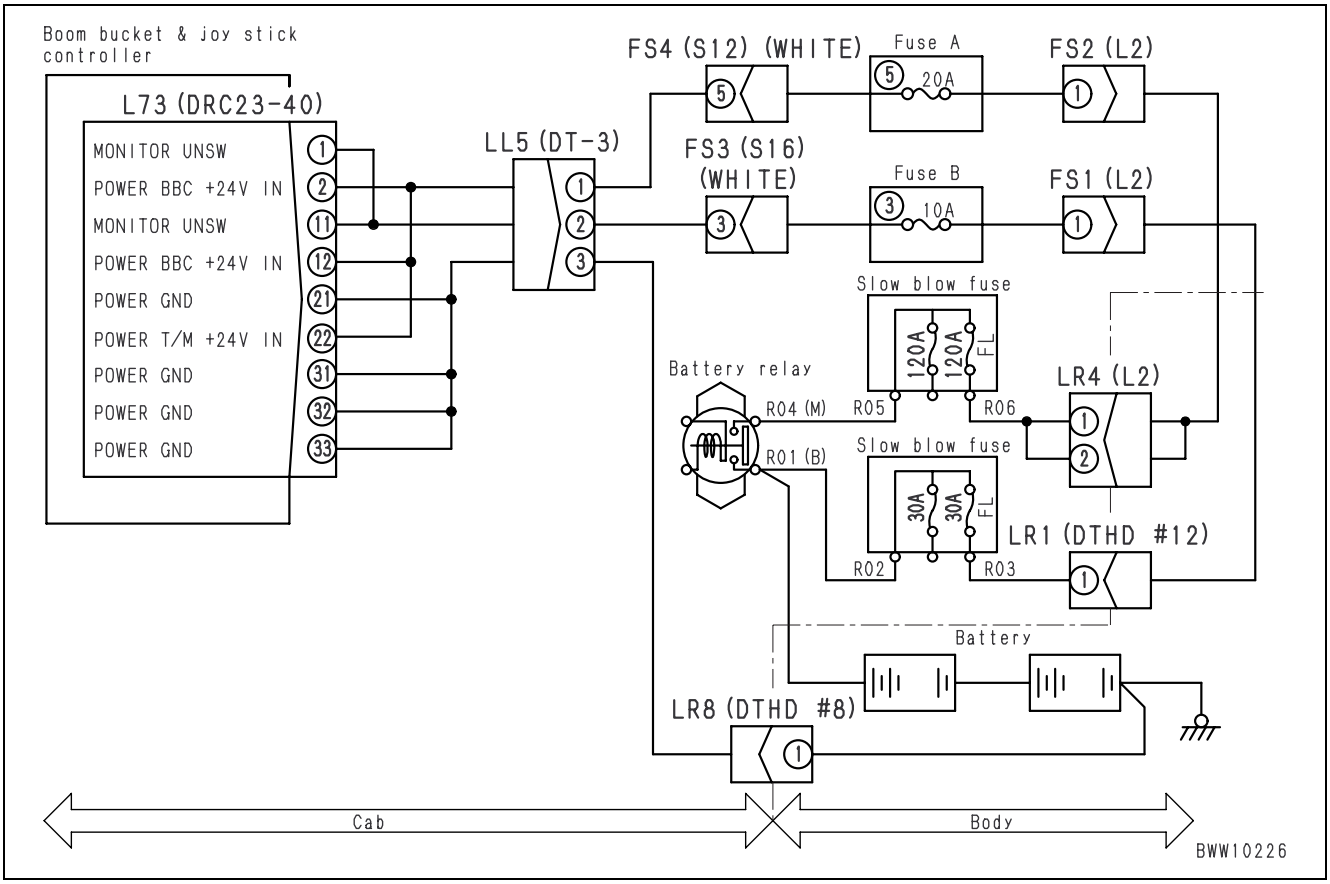
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Error code [DB90KK]

Action Code	Error Code	Controller Code	Trouble	Lowering work equipment controller power supply.
E03	DB90KK	WRK		
Description Of Trouble	• Controller power supply voltage is lowered.			
Controller Reaction	• The input signal cannot be detected normally.			
Effect on Machine	• Normal operation is impossible.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective connector contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and FS3. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (1), (11) ~ FS3 (female) (3)		Resistance	1 Ω and below
			Between L73 (female) (21), (31), (32), (33) ~ body		Resistance	1 Ω and below
	2	Wiring harness ground fault ★ In this case, FS B-d is broken.	1) Turn starting switch OFF. 2) Disconnect connectors L73 and FS4. 3) Connect T-adapter.			
			Between L73 (female) (1), (11), FS3 (female) (3) ~ body		Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (1), (11) ~ body	Constant (NSW) electric power supply	Voltage	20 ~ 30 V

Related circuit diagram



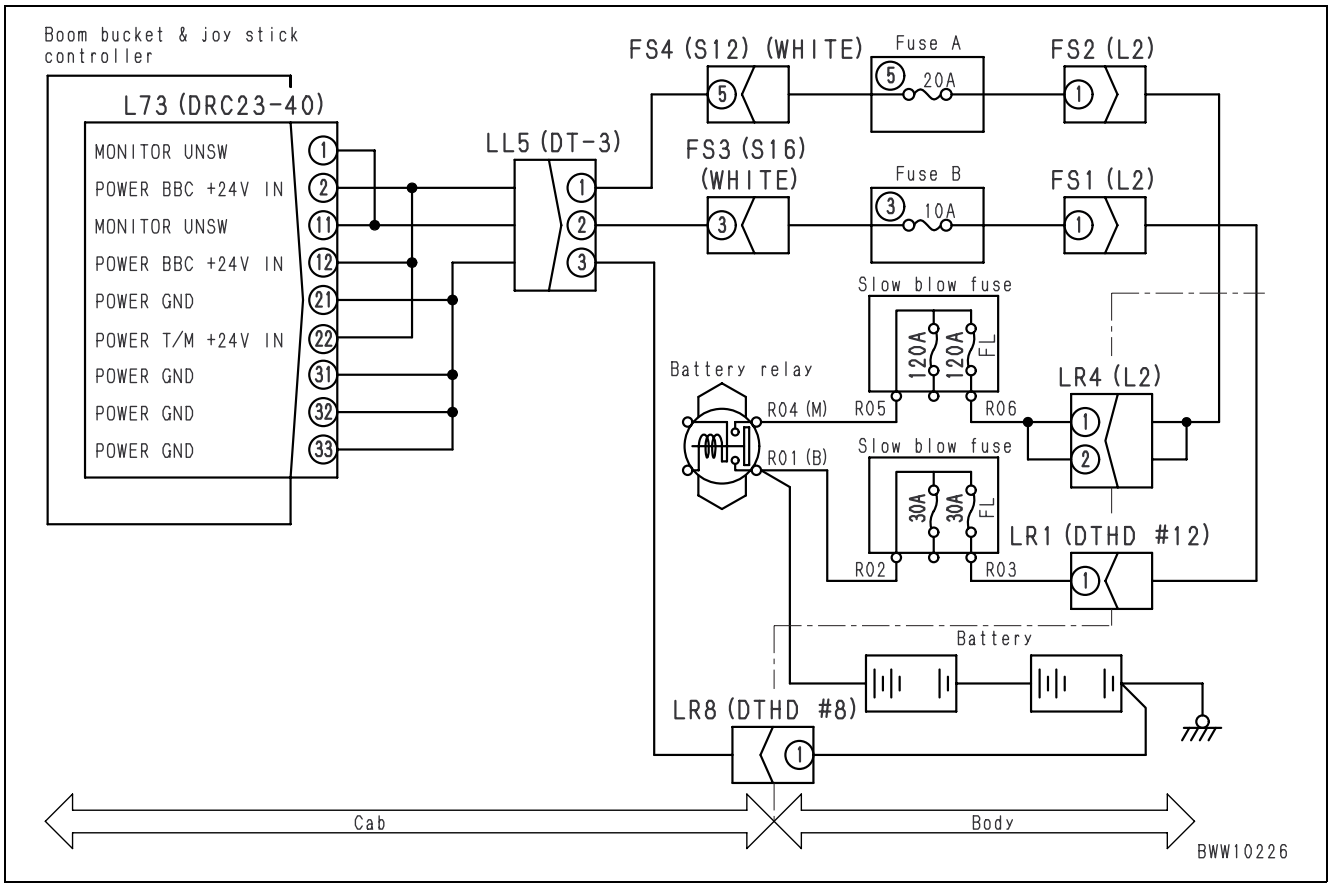
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Error code [DB92KK]

Action Code	Error Code	Controller Code	Trouble	Defective solenoid electric power supply system
E03	DB92KK	WRK		
Description of Trouble	• The solenoid power supply voltage is lowered.			
Controller Reaction	• No output to solenoid (Stops all the electric power supply voltage at 18 V and below).			
Effect on Machine	• The work equipment cannot be operated.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection of defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and FS4. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (2), (12), (22) ~ FS4 (female) (5)		Resistance	1 Ω and below
			Between L73 (female) (21), (31), (32), (33) ~ body		Resistance	1 Ω and below
	2	Wiring harness ground fault ★ In this case, FS A-f is broken.	1) Turn starting switch OFF. 2) Disconnect connectors FS2 and battery relay M terminal. 3) Connect T-adapter to F32.			
			Between L73 (female) (2), (12), (22) FS4 (female) (5) ~ body		Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Insert T-adapter. 4) Connect connector L73. 5) Turn starting switch ON.			
			Between L73 (2), (12), (22) ~ body	(SLU) electric power supply	Voltage	20 ~ 30 V

Related circuit diagram



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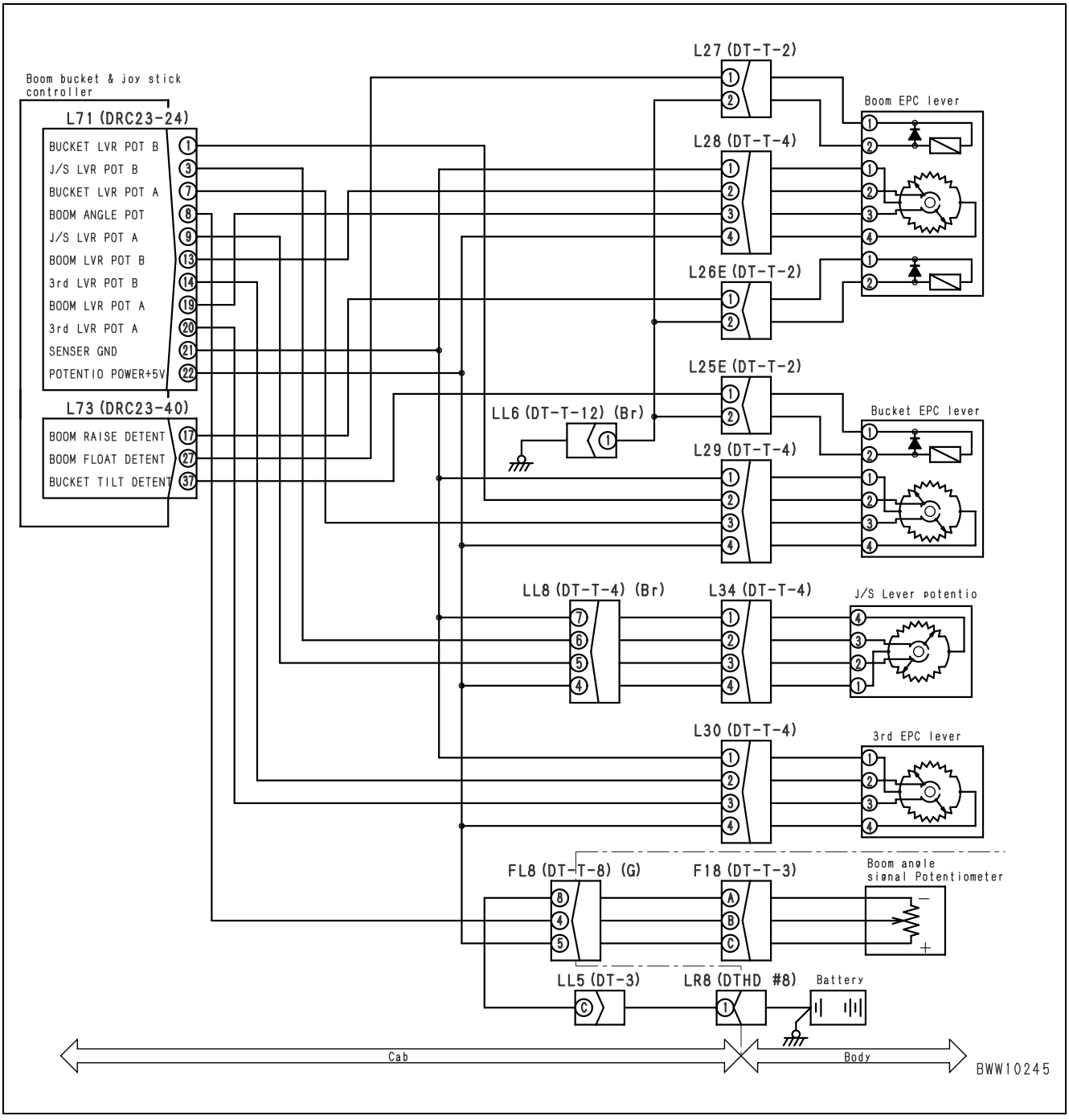
Error code [DB95KX]

Action Code	Error Code	Controller Code	Trouble	Defective 5 V electric power supply system
E03	DB95KX	WRK		
Description of Trouble	• 5 V sensor electric power supply system is grounded improperly.			
Controller Reaction	• Turns off the output to all EPC.			
Effect on Machine	• The work equipment and the joystick cannot be operated.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71, L28, L29, L34, and L30. Disconnect F18. 3) Connect T-adapter.		
			Between L71 (female) (22) ~ body	Resistance	1 MΩ and above
	2	Defective boom EPC lever potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L28. 3) Connect T-adapter.		
			Between L28 (male) (4) ~ (1)	Resistance	2.5 ~ 3.9 kΩ
			Between L28 (male) (4) ~ body	Resistance	1 MΩ and above
	3	Defective bucket EPC lever potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L29. 3) Connect T-adapter.		
			Between L29 (male) (4) ~ (1)	Resistance	2.5 ~ 3.9 kΩ
			Between L29 (male) (4) ~ body	Resistance	1 MΩ and above
	4	Defective joystick steering EPC lever potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L34. 3) Connect T-adapter.		
			Between L34 (male) (4) ~ (1)	Resistance	2.5 ~ 3.9 kΩ
			Between L34 (male) (4) ~ body	Resistance	1 MΩ and above
	5	Defective 3rd EPC lever potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L30. 3) Connect T-adapter.		
			Between L30 (male) (4) ~ (1)	Resistance	2.5 ~ 3.9 kΩ
			Between L30 (male) (4) ~ body	Resistance	1 MΩ and above
	6	Defective boom EPC lever potentiometer	1) Turn starting switch OFF. 2) Disconnect connector F18. 3) Connect T-adapter.		
			Between F18 (male) (4) ~ (1)	Resistance	4 ~ 6 kΩ
			Between F18 (male) (4) ~ body	Resistance	1 MΩ and above
	7	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L71 (22) ~ (21)	Voltage	4.75 ~ 5.25 V

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Related circuit diagram



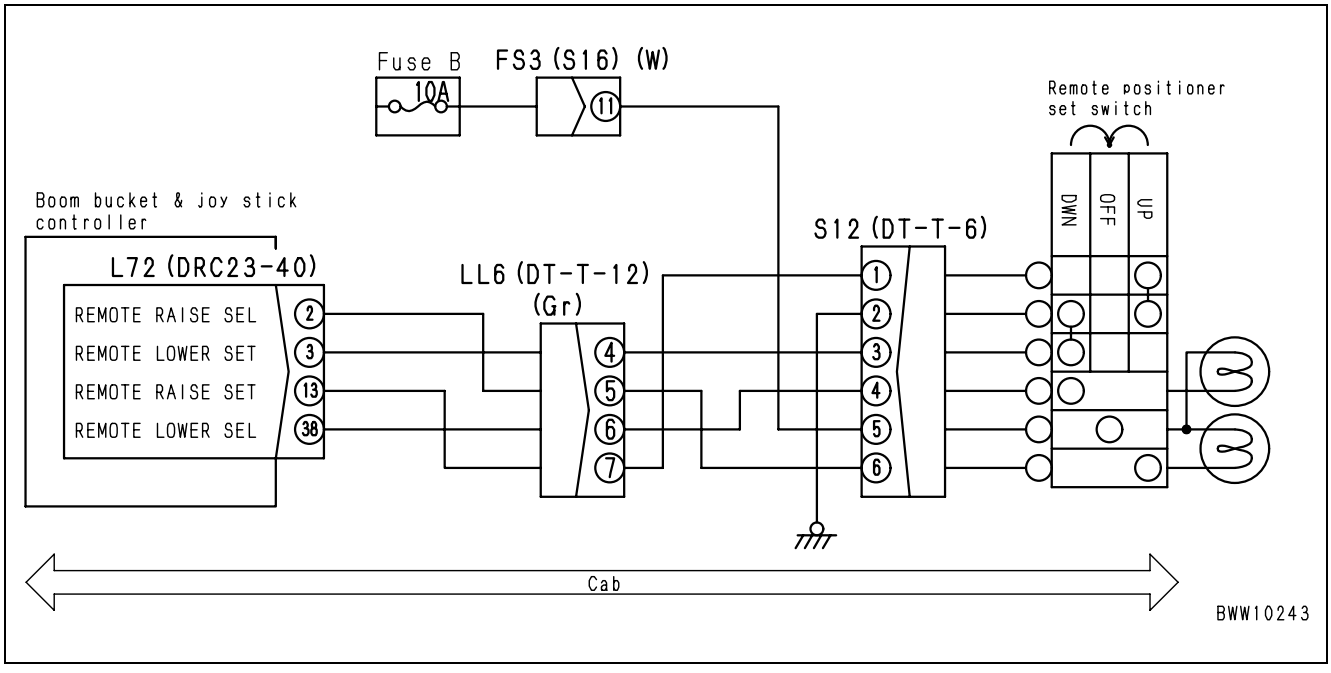
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Error code [DD1ALD]

Action Code	Error Code	Controller Code	Trouble	Defective remote positioner UP set switch (Ground fault)
E03	DD1ALD	WRK		
Description of Trouble	• Cannot be set to up because the remote positioner UP set switch system is grounded improperly.			
Controller Reaction	• Cancels the UP set position setting and the remote UP stop setting. • The UP set indicator is switched off the light. • UP set indicator goes out.			
Effect on Machine	• The UP set position cannot be set.			
Related Information	• Can be checked with the monitoring function (Code: 40917).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L72 and S12. 3) Connect T-adapter.			
			Between L72 (female) (13) S12 (female) (1) ~ body		Resistance	1 MΩ and above
	2	Defective remote positioner set switch	1) Turn starting switch OFF. 2) Disconnect connector S12. 3) Connect T-adapter.			
			Between S12 (male) (1) ~ (2)	Remote positioner set switch = Up	Resistance	1 Ω and below
				Remote positioner set switch = Other than above	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L72 (male) (13)~ body	Remote positioner set switch = Up	Voltage	1 V and below
				Remote positioner set switch = Other than above	Voltage	17 ~ 30 V

Related circuit diagram



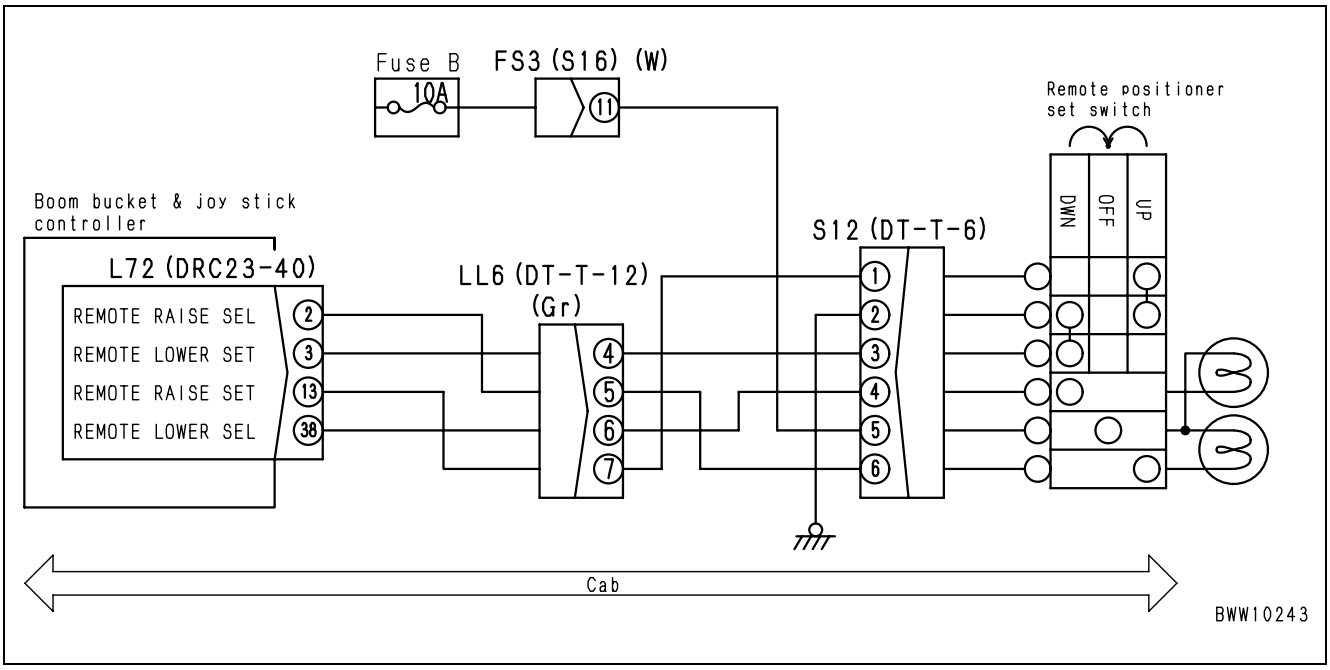
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Error code [DD1BLD]

Action Code	Error Code	Controller Code	Trouble	Defective remote positioner DOWN set switch (Ground fault)
E03	DD1BLD	WRK		
Description of Trouble	• Cannot be set to DOWN because the remote positioner DOWN set switch system is grounded improperly.			
Controller Reaction	• Cancels the DOWN set position setting and the remote DOWN stop setting. • The DOWN set indicator is switched off the light. • DOWN set indicator goes out.			
Effect on Machine	• The DOWN set position cannot be set.			
Related Information	• Can be checked with the monitoring function (Code: 40917).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L72 and S12. 3) Connect T-adapter.			
			Between L72 (female) (13), S12 (female) (1) ~ body		Resistance	1 MΩ and above
	2	Defective remote positioner set switch	1) Turn starting switch OFF. 2) Disconnect connector S12. 3) Connect T-adapter.			
			Between S12 (male) (3) ~ (2)	Remote positioner set switch = Up	Resistance	1 Ω and below
				Remote positioner set switch = Other than above	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L72 (male) (3) ~ body	Remote positioner set switch = Up	Voltage	1 V and below
				Remote positioner set switch = Other than above	Voltage	20 ~ 30 V

Related circuit diagram



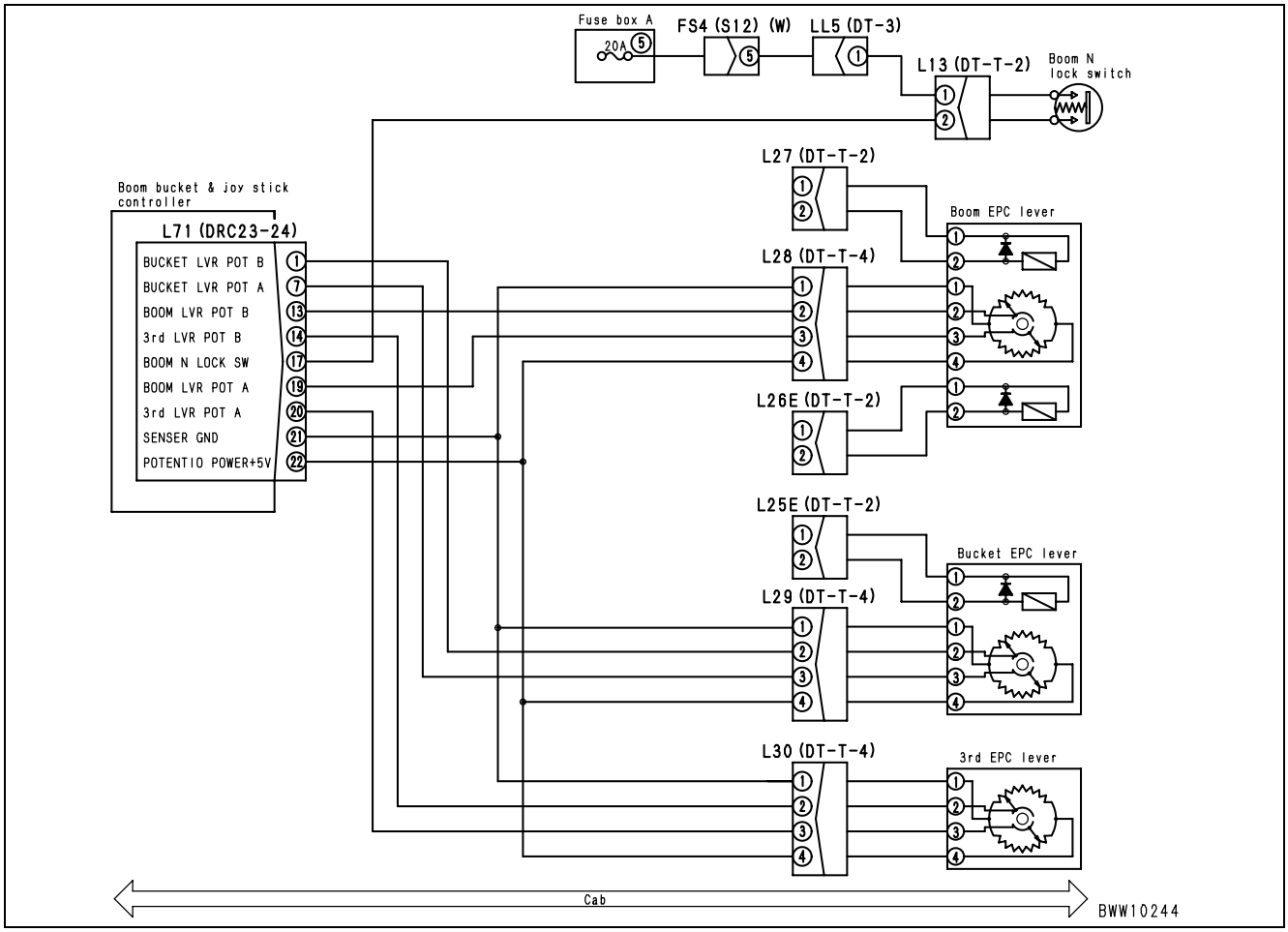
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Error code [DFAOKM]

Action Code	Error Code	Controller Code	Trouble	Defective neutral caution for joystick work equipment lever
E00	DFAOKM	WRK		
Description Of Trouble	• The neutral system for joystick work equipment lever is operated mistakenly.			
Controller Reaction	• Stops the joystick EPC solenoid output (Process after resetting from error: Return the lever to neutral position once).			
Effect on Machine	• The work equipment cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42000).			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes And Standard Values	1	Defective boom neutral lock switch	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lock lever to lock position.		
			Between L71 (17) ~ body	Voltage	1 V and below
	2	Defective boom EPC lever potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lock lever to neutral position.		
			Between L71 (19) ~ (21)	Voltage	2.4 ~ 3.9 V
	3	Defective bucket EPC lever potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lock lever to neutral position.		
			Between L71 (7) ~ (21)	Voltage	2.4 ~ 3.9 V
	4	Defective 3rd EPC lever position	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter 4) Turn starting switch ON. 5) Set lock lever to neutral position.		
			Between L71 (20) ~ (21)	Voltage	2.4 ~ 3.9 V

Related circuit diagram



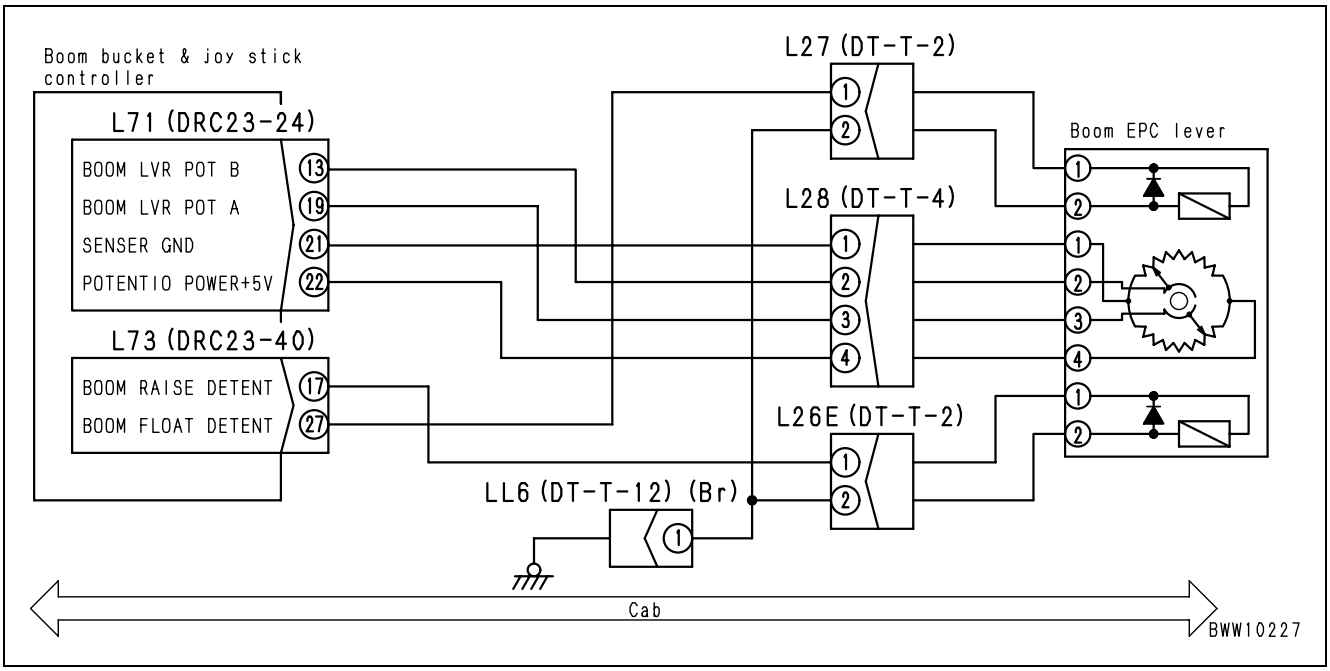
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Error code [DK59KA]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm EPC lever potentiometer system (Main circuit discontinuity or ground fault)
E03	DK59KA	WRK		
Description Of Trouble	• The lift arm EPC lever potentiometer signal system is disconnected (Main circuit discontinuity or ground fault).			
Controller Reaction	• Stops the lift arm EPC solenoid output and the lift arm lever magnet detent output.			
Effect on Machine	• The lift arm cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42001).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes And Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L71 and L28. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (19) ~ L28 (female) (3)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L71 and L28. 3) Connect T-adapter.		
			Between L71 (female) (19) ~ Body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L28. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lock lever to neutral position.		
			Between L28 (3) ~ (1)	Voltage	2.4 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L71 (19) ~ (21) (Set lever to neutral position)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



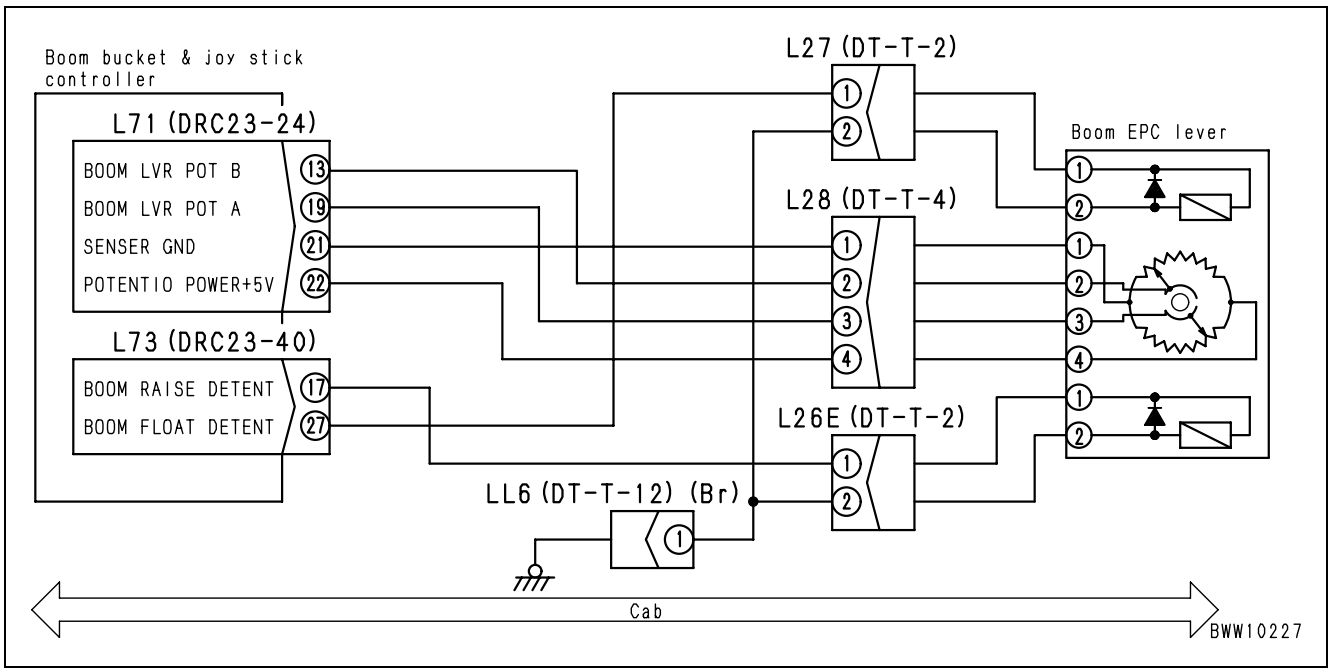
https://truckmanualshub.com/

Error code [DK59KY]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm EPC lever potentiometer system (Main short circuit)
E03	DK59KY	WRK		
Description Of Trouble	• The electrical power supply is contacted to the lift arm EPC lever potentiometer signal system.			
Controller Reaction	• Stops the lift arm EPC solenoid output and the lift arm EPC lever magnet detent output.			
Effect on Machine	• The lift arm cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42000).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Harness shorted to electric power supply (Contacted to electric power supply harness)	1) Turn starting switch OFF. 2) Disconnect connector L71 and L28. 3) Connect T-adapter.		
			Between L71 (female) (19), L28 (female) (3) ~ body	Voltage	1 V and below
			Between L71 (female) (19) ~ (21)	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connectors L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (female) (19) ~ (21)	Voltage	2.4 to 2.6 V

Related circuit diagram



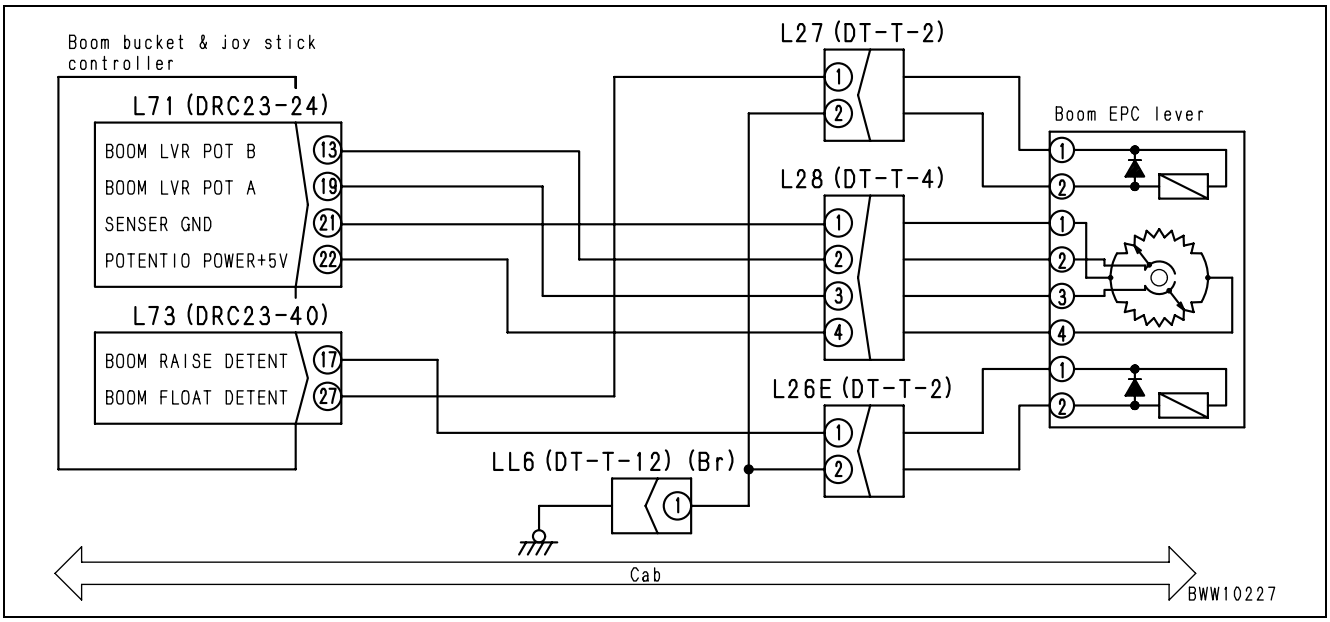
https://truckmanualshub.com/

Error code [DK59L8]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm EPC potentiometer system (Displacement of main and sub circuit)
E03	DK59L8	WRK		
Description Of Trouble	• The input signal for the lift arm EPC lever potentiometer system (Main and sub circuit) is not coincided.			
Controller Reaction	• Stops the lift arm EPC solenoid output and the lift arm EPC lever magnet detent output.			
Effect on Machine	• The lift arm cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42000 and 42001).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective potentiometer ★ Defective installation (Loose and play)	1) Turn starting switch OFF. 2) Disconnect connector L71 and L28. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L28 (3) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the up side	Voltage	3.9 ~ 4.4 V
				Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V
			Between L28 (2) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V
				Lever = Full stroke at the up side	Voltage	3.9 ~ 4.4 V
			Between L28 (4) ~ (1)	Lever = Neutral	Voltage	4.75 ~ 5.25 V
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L28. 3) Connect T-adapter.			
			Wiring harness between L71 (female) (19) ~ L28 (female) (3)		Resistance	1 Ω and below
			Wiring harness between L71 (female) (13) ~ L28 (female) (2)		Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L71 (19) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the up side	Voltage	3.9 ~ 4.4 V
				Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V
			Between L71 (13) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V
				Lever = Full stroke at the up side	Voltage	3.9 ~ 4.4 V

Related circuit diagram



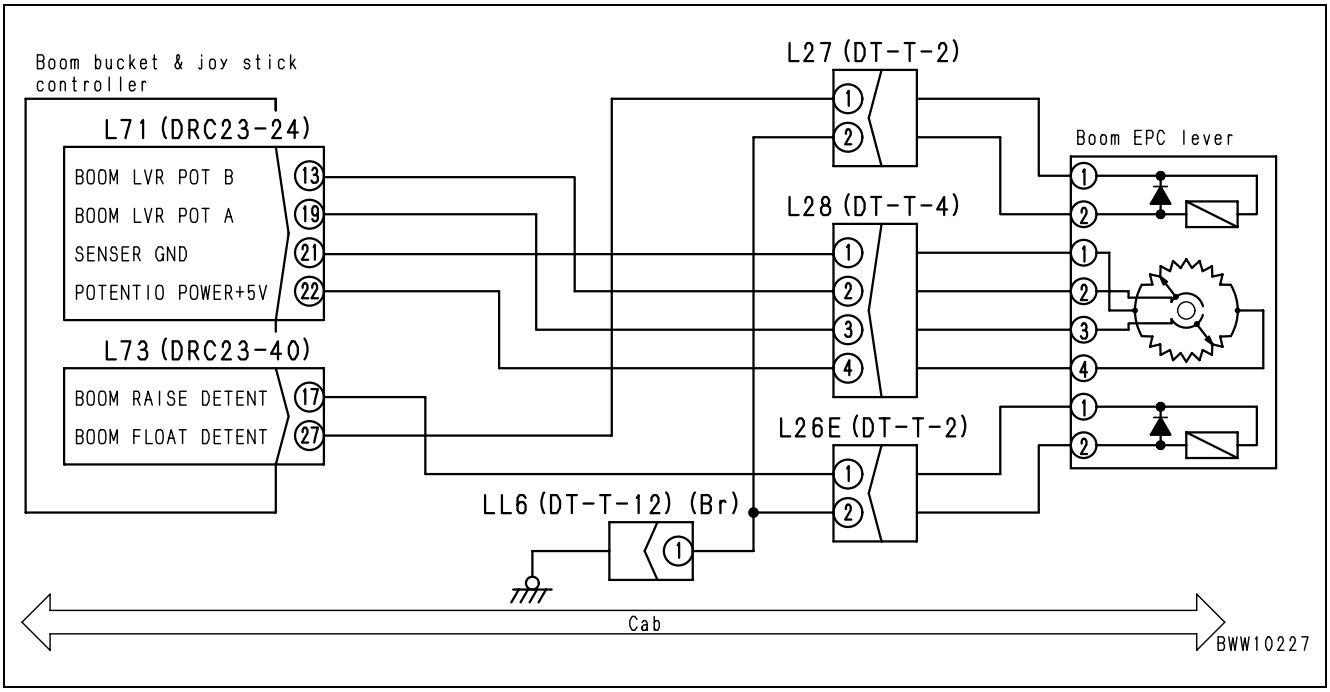
https://truckmanualshub.com/

Error code [DK5AKA]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm EPC lever potentiometer system (Disconnection of main) (Disconnection, ground of sub)
E03	DK5AKA	WRK		
Description Of Trouble	• Defective lift arm EPC lever potentiometer system (Main circuit discontinuity) (Sub circuit discontinuity or ground fault).			
Controller Reaction	• Stops the lift arm EPC solenoid output.			
Effect on Machine	• The lift arm cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42001).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L28. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (13) ~ L28 (female) (2)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L28. 3) Connect T-adapter.		
			Between L71 (female) (13), L28 (female) (2) ~ body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L28 (2) ~ (1)	Voltage	2.4 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (13) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



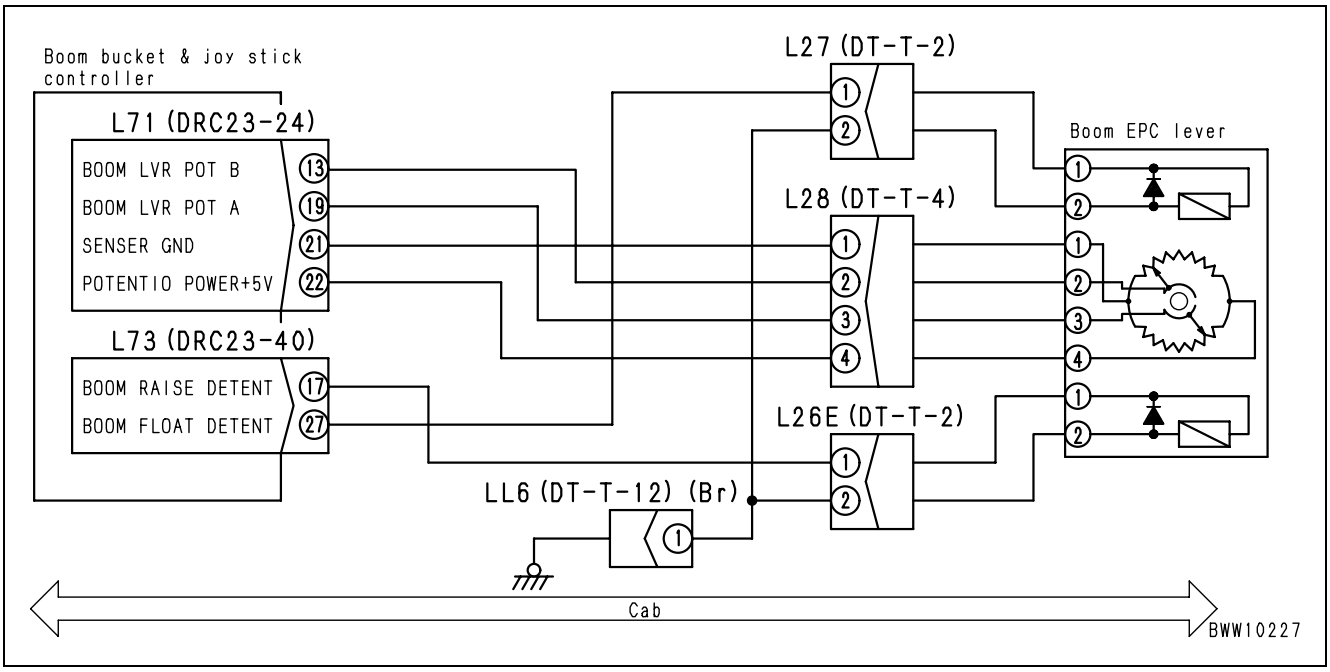
https://truckmanualshub.com/

Error code [DK5AKY]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm EPC lever potentiometer system (Short sub circuit)
E03	DK5AKY	WRK		
Description Of Trouble	• The electric power supply harness is contacted to the lift arm EPC lever potentiometer sub circuit signal system harness.			
Controller Reaction	• Stops the lift arm EPC solenoid output.			
Effect on Machine	• The lift arm cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42001).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective harness hot short (Contacted to electric power supply harness)	1) Turn starting switch OFF. 2) Disconnect connector L71 and L28. 3) Connect T-adapter.		
			Between L71 (female) (13), L28 (female) (3) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (13) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



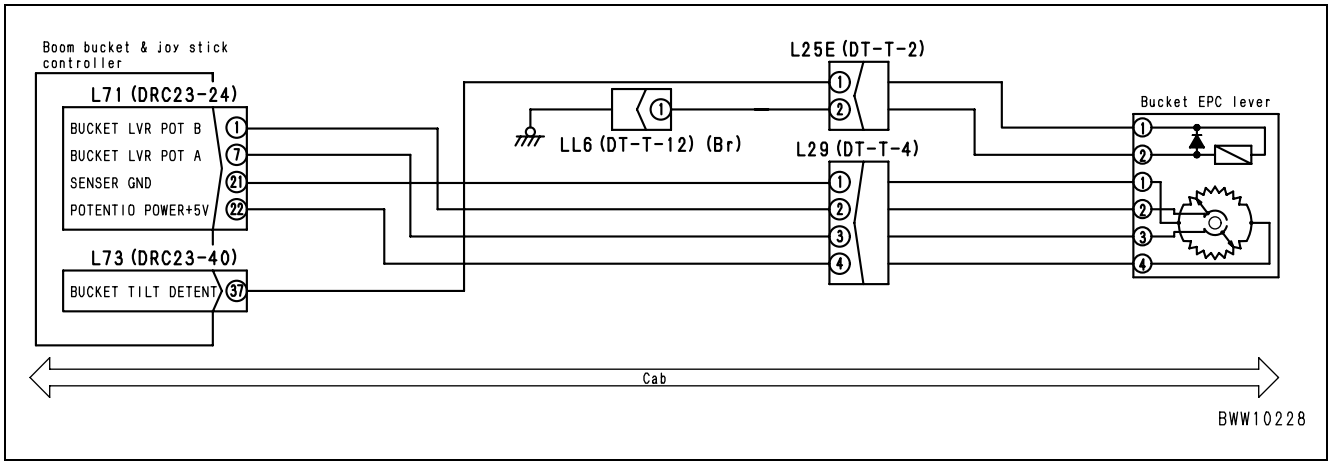
https://truckmanualshub.com/

Error code [DK5BKA]

Action Code	Error Code	Controller Code	Trouble	Defective bucket EPC lever potentiometer system (Main circuit discontinuity or ground fault)
E03	DK5BKA	WRK		
Description Of Trouble	• The bucket EPC lever potentiometer signal system is disconnected (Main circuit discontinuity or ground fault).			
Controller Reaction	• Turns off the bucket EPC solenoid output and the bucket magnet detent output.			
Effect on Machine	• The bucket cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42002).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L29. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (7) ~ L29 (female) (3)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L29. 3) Connect T-adapter.		
			Between L71 (female) (7) ~ body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L29. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L29 (3) ~ (1)	Voltage	2.4 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connectors L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (7) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



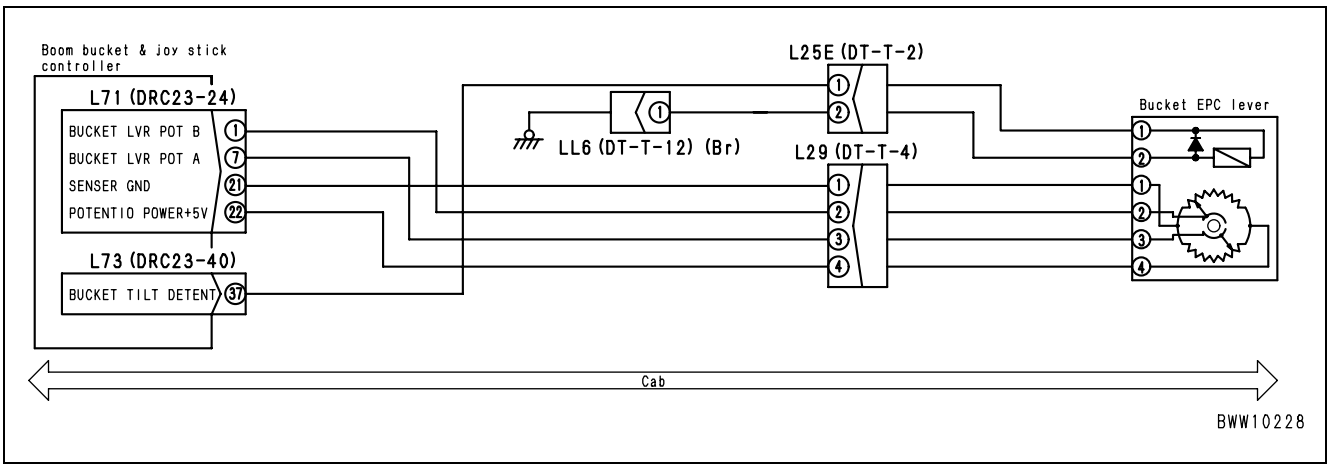
https://truckmanualshub.com/

Error code [DK5BKY]

Action Code	Error Code	Controller Code	Trouble	Defective bucket EPC lever potentiometer system (Main circuit short circuit)
E03	DK5BKY	WRK		
Description Of Trouble	• The electric power supply harness is contacted to the bucket EPC lever potentiometer signal system.			
Controller Reaction	• Turns off the bucket EPC solenoid output and the bucket magnet detent output.			
Effect on Machine	• The bucket cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42002).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L29. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L71 (female) (7), L29 (female) (3) ~ body	Voltage	1 V and below
			Between L71 (female) (7) ~ (21)	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (7) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



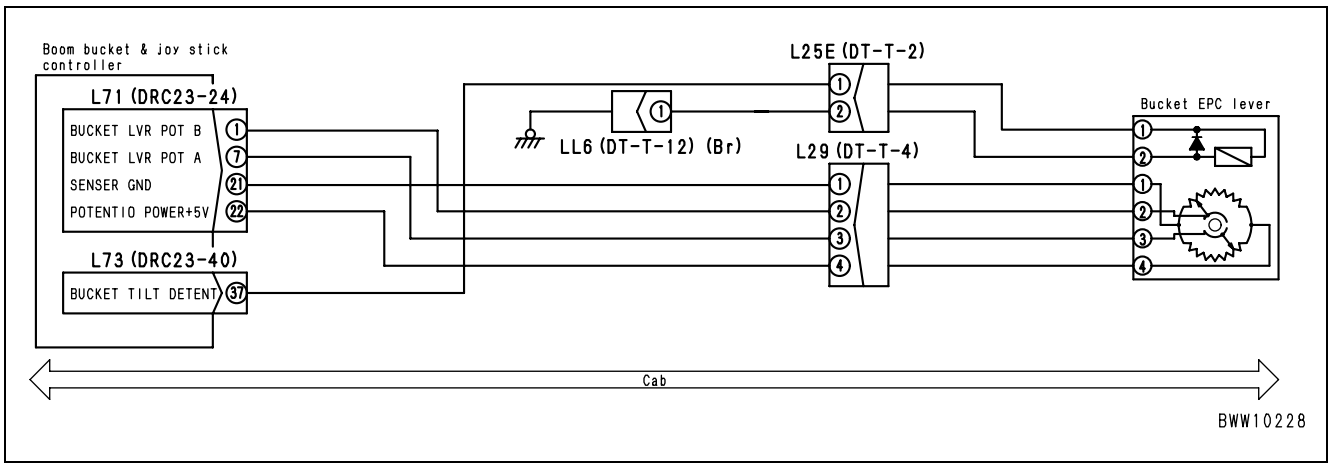
https://truckmanualshub.com/

Error code [DK5BL8]

Action Code	Error Code	Controller Code	Trouble	Defective input signal for bucket EPC lever potentiometer system (Displacement of main and sub circuit).
E03	DK5BL8	WRK		
Description of Trouble	• The input signal for the bucket EPC lever potentiometer system (main and sub circuit) is not coincided.			
Controller Reaction	• Turns off the bucket EPC solenoid output and the boom EPC lever magnet detent output.			
Effect on Machine	• The bucket cannot be operated.			
Related Information	• Can be checked with the monitoring function (Codes: 42002 and 42003).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective potentiometer ★ Defective installation (Loose and play)	1) Turn starting switch OFF. 2) Disconnect connector L29. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L29 (3) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the tilt side	Voltage	3.9 ~ 4.4 V
				Lever = Full stroke at the dump side	Voltage	0.6 ~ 1.1 V
			Between L29 (2) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the tilt side	Voltage	0.6 ~ 1.1 V
				Lever = Full stroke at the dump side	Voltage	3.9 ~ 4.4 V
			Between L29 (4) ~ (1)		Voltage	4.75 ~ 5.25 V
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch ON. 2) Disconnect connectors L71 and L29. 3) Connect T-adapter.			
			Wiring harness between L71 (female) (7) ~ L29 (female) (3)		Resistance	1 Ω and below
			Wiring harness between L71 (female) (1) ~ L29 (female) (2)		Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L71 (7) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the tilt side	Voltage	3.9 ~ 4.4 V
				Lever = Full stroke at the dump side	Voltage	0.6 ~ 1.1 V
			Between L71 (1) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the tilt side	Voltage	0.6 ~ 1.1 V
				Lever = Full stroke at the dump side	Voltage	3.9 ~ 4.4 V

Related circuit diagram



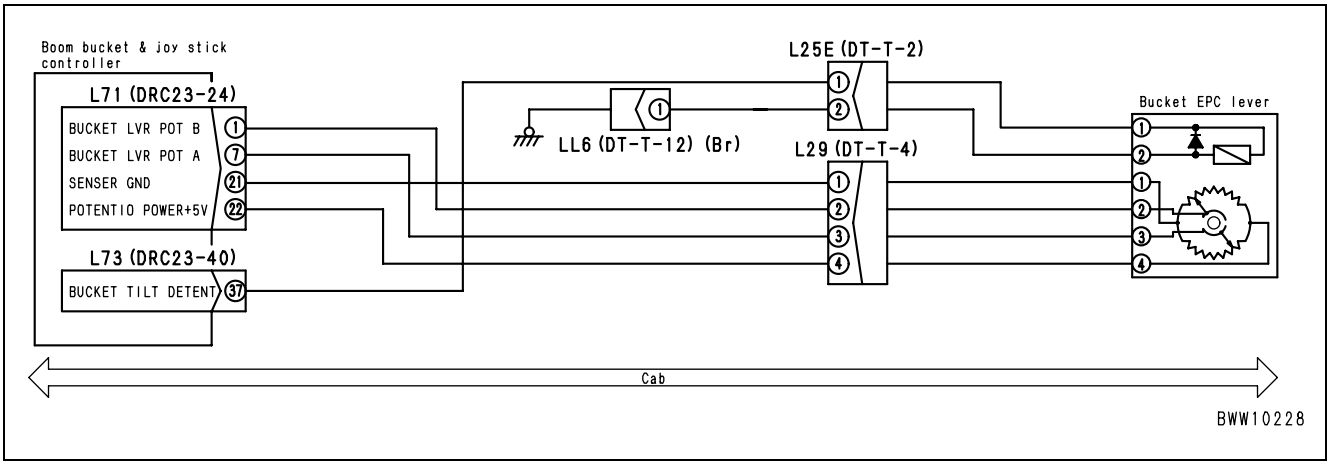
https://truckmanualshub.com/

Error code [DK5CKA]

Action Code	Error Code	Controller Code	Trouble	Defective bucket EPC lever potentiometer system (Sub circuit discontinuity or ground fault)
E03	DK5CKA	WRK		
Description Of Trouble	• The bucket EPC lever potentiometer signal system is disconnected (Sub circuit discontinuity or ground fault).			
Controller Reaction	• Turns off the bucket EPC solenoid output.			
Effect on Machine	• The bucket cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42003).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L29. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (1) ~ L29 (female) (2)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L29. 3) Connect T-adapter.		
			Between L71 (female) (1) ~ body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L29. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L29 (2) ~ (1)	Voltage	2.4 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (7) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



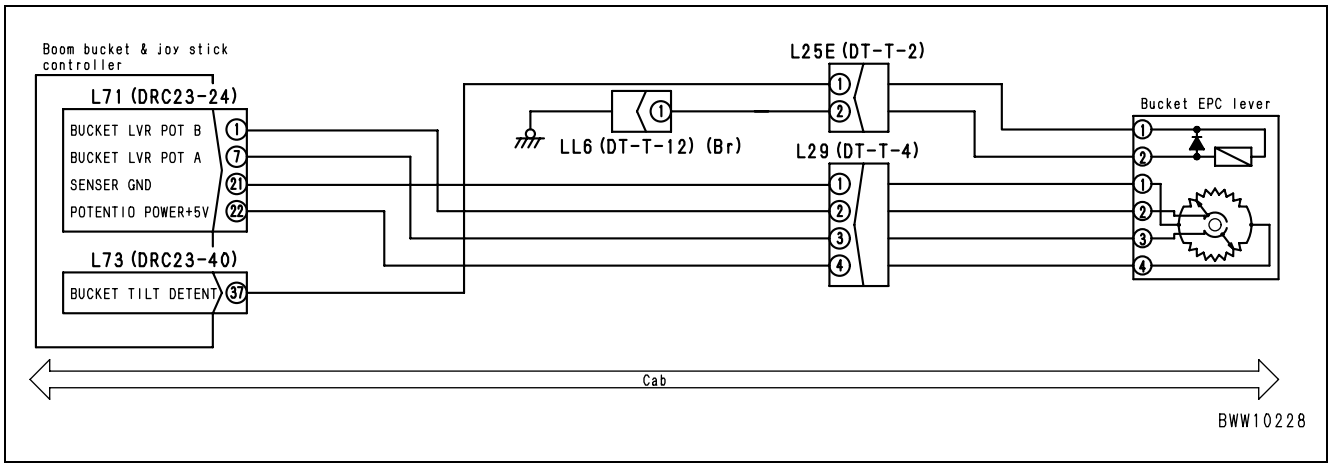
https://truckmanualshub.com/

Error code [DK5CKY]

Action Code	Error Code	Controller Code	Trouble	Defective bucket EPC lever potentiometer system (Short sub circuit)
E03	DK5CKY	WRK		
Description Of Trouble	• The electric power supply harness is contacted to the bucket EPC lever potentiometer signal system.			
Controller Reaction	• Turns off the bucket EPC solenoid output.			
Effect on Machine	• The bucket cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42003).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Electric power supply shorted to harness	1) Turn starting switch OFF. 2) Disconnect connector L71 and L29. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L71 (female) (1), L29 (female) (2) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (1) ~ (21) (Lever neutral)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



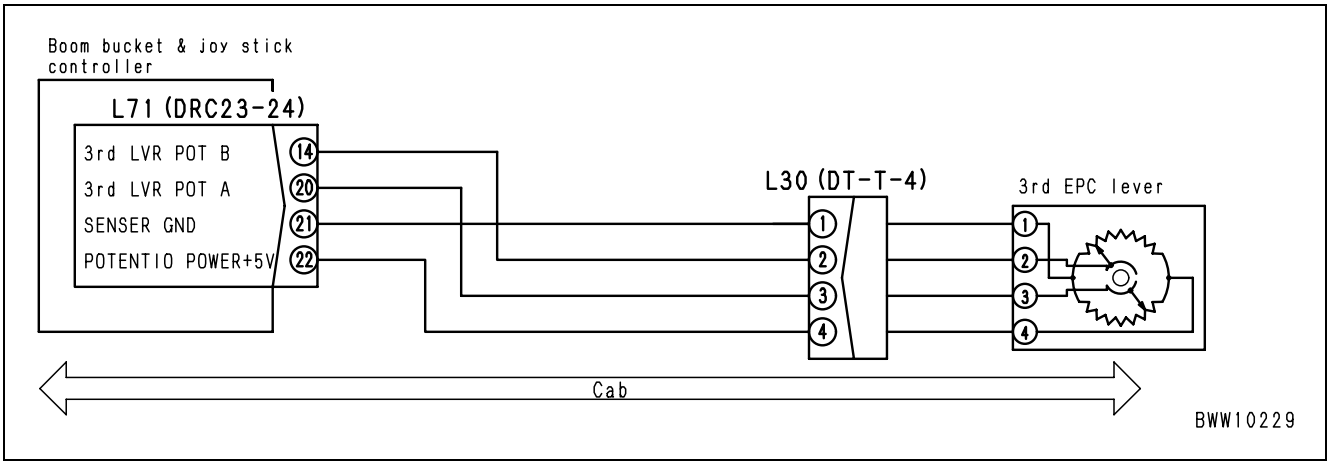
https://truckmanualshub.com/

Error code [DK5DKA]

Action Code	Error Code	Controller Code	Trouble	Defective 3rd valve lever potentiometer system (Main circuit discontinuity or ground fault)
E03	DK5DKA	WRK		
Description Of Trouble	• The 3rd valve lever potentiometer signal system is disconnected (Main circuit discontinuity or ground fault).			
Controller Reaction	• Turns off the 3rd RPC solenoid output.			
Effect on Machine	• The 3rd valve cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42003).			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (20) ~ L30 (female) (2)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter.		
			Between L71 (female) (20) ~ body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L30. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L30 (2) ~ (1)	Voltage	2.5 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L30 (20) ~ (21) (Lever neutral)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



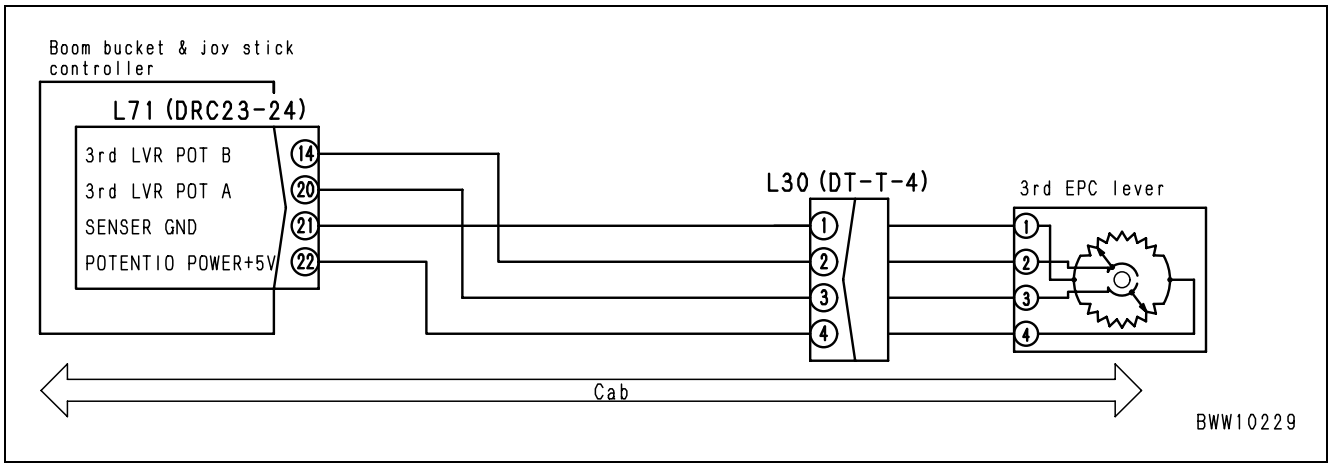
https://truckmanualshub.com/

Error code [DK5DKY]

Action Code	Error Code	Controller Code	Trouble	Defective 3rd valve lever potentiometer system (Short circuit)
E03	DK5DKY	WRK		
Description Of Trouble	• The electric power supply harness is contacted to the 3rd valve lever potentiometer signal system.			
Controller Reaction	• Turns off the 3rd valve RPC solenoid output.			
Effect on Machine	• The 3rd valve cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42006).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective harness hot short (Contacted to electric power supply harness)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L71 (female) (20), L30 (female) (3) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (20) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



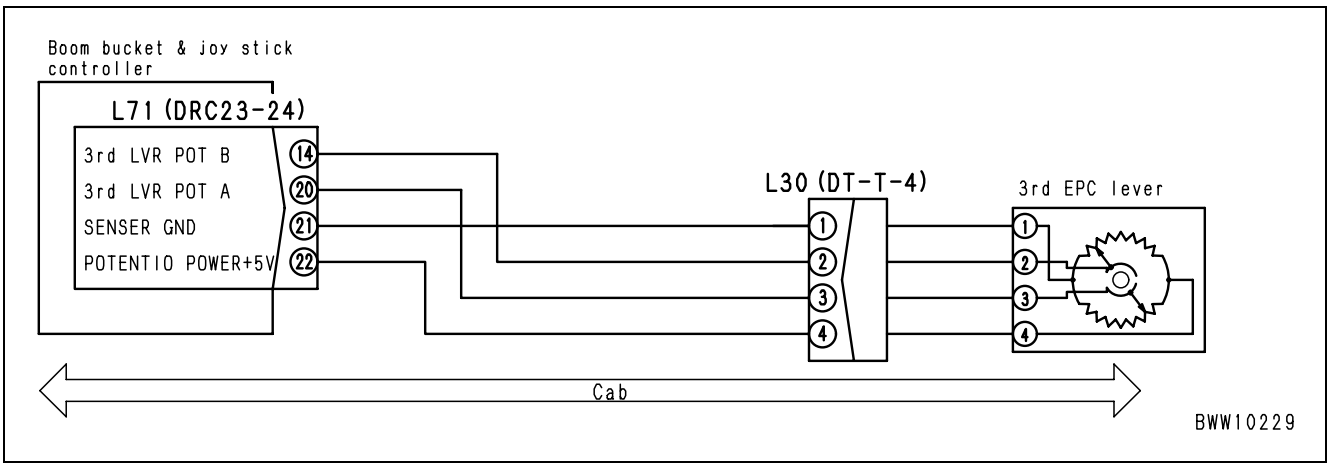
https://truckmanualshub.com/

Error code [DK5DL8]

Action Code	Error Code	Controller Code	Trouble	Defective 3rd valve EPC lever potentiometer system (Displacement of main and sub circuit)
E03	DK5DL8	WRK		
Description Of Trouble	• The input signal for the 3rd EPC lever potentiometer 2 systems (Main and sub circuit) is not coincided.			
Controller Reaction	• Turns off the 3rd valve EPC solenoid output and the 3rd EPC lever magnet detent output.			
Effect on Machine	• The 3rd valve cannot be operated.			
Related Information	• Can be checked with the monitoring function (Codes: 42006 and 42007).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective potentiometer Defective installation (Loose and play)	1) Turn starting switch OFF. 2) Disconnect connector L30. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L30 (3) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the extension side	Voltage	1.1 ~ 1.5 V
				Lever = Full stroke at the shrinkage side	Voltage	3.4 ~ 4.0 V
			Between L30 (2) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the extension side	Voltage	3.5 ~ 4.0 V
				Lever = Full stroke at the shrinkage side	Voltage	1.1 ~ 1.5 V
			Between L30 (4) ~ (1)		Voltage	4.75 ~ 5.25 V
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L30. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Wiring harness between L71 (female) (20) ~ L30 (female) (3)		Resistance	1 Ω and below
			Wiring harness between L71 (female) (14) ~ L30 (female) (2)		Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON.			
			L71 (20) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the extension side	Voltage	1.1 ~ 1.5 V
				Lever = Full stroke at the shrinkage side	Voltage	3.4 ~ 4.0 V
			L71 (14) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the extension side	Voltage	3.4 ~ 4.0 V
				Lever = Full stroke at the shrinkage side	Voltage	1.1 ~ 1.5 V

Related circuit diagram



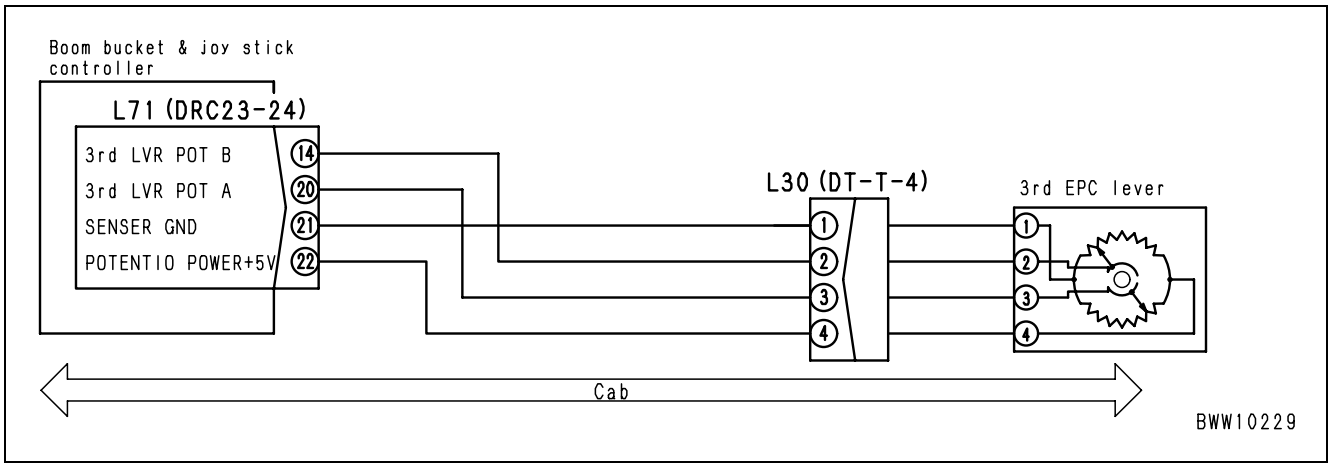
https://truckmanualshub.com/

Error code [DK5EKA]

Action Code	Error Code	Controller Code	Trouble	Defective 3rd valve EPC lever potentiometer system (Sub circuit discontinuity or ground fault)
E03	DK5EKA	WRK		
Description Of Trouble	• The 3rd valve EPC lever potentiometer signal system is disconnected (Sub circuit discontinuity or ground fault).			
Controller Reaction	• Turns off the 3rd valve EPC solenoid output.			
Effect on Machine	• The 3rd valve cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42007).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (14) ~ L30 (female) (2)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter.		
			Between L71 (female) (14) ~ body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L30. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L30 (2) ~ (1)	Voltage	2.5 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (14) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



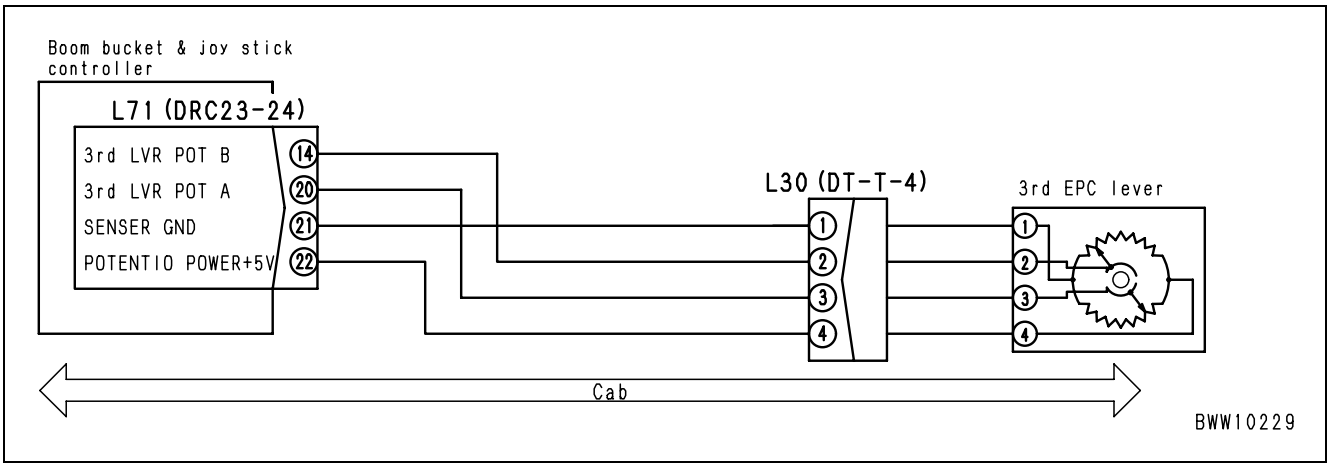
https://truckmanualshub.com/

Error code [DK5EKY]

Action Code	Error Code	Controller Code	Trouble	Defective 3rd valve EPC lever potentiometer 2 system (Short sub circuit)
E03	DK5EKY	WRK		
Description Of Trouble	• The electric power supply harness is contacted to the 3rd valve EPC lever potentiometer signal system.			
Controller Reaction	• Turns off the 3rd valve EPC solenoid output.			
Effect on Machine	• The 3rd valve cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42007).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective harness hot short (Contacted to electric power supply harness)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L71 (female) (14), L30 (female) (2) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (14) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



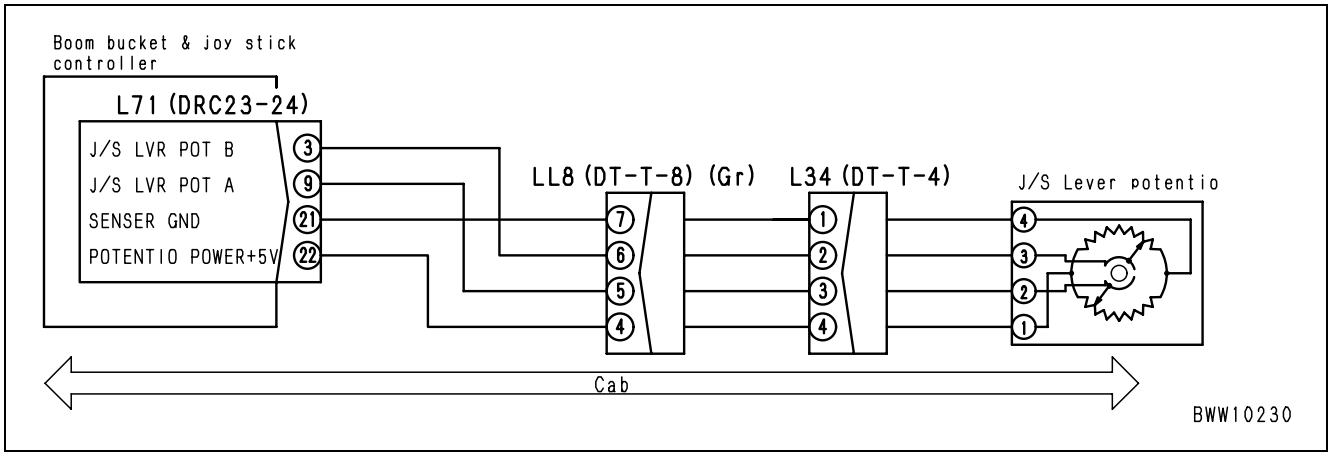
https://truckmanualshub.com/

Error code [DK5FKA]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering EPC lever potentiometer system (Main circuit discontinuity or ground fault)
E03	DK5FKA	WRK		
Description Of Trouble	• The joystick steering EPC lever potentiometer signal system is disconnected (Main circuit discontinuity or ground fault).			
Controller Reaction	• Turns off the joystick steering EPC solenoid output. • Stops the joystick steering EPC lever magnet detent output.			
Effect on Machine	• The joystick lever steering cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (9) ~ L34 (female) (3)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter.		
			Between L71 (female) (9), L34 (female) (3) ~ body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L34. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L30 (3) ~ (1)	Voltage	2.4 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (9) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



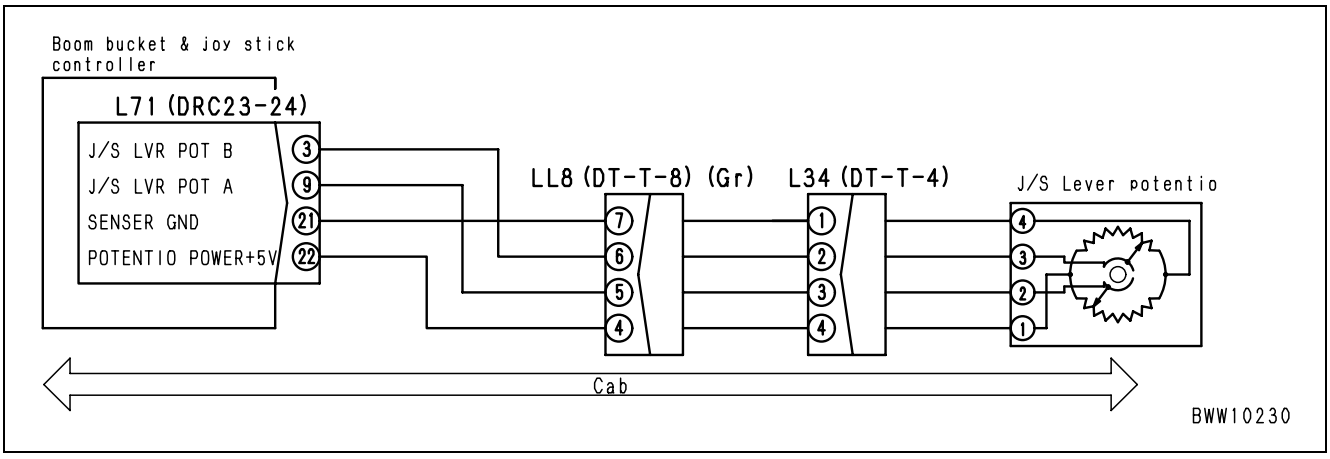
https://truckmanualshub.com/

Error code [DK5FKY]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering EPC lever potentiometer system (Main circuit discontinuity)
E03	DK5FKY	WRK		
Description Of Trouble	• The electric power supply harness is contacted to the joystick steering EPC lever magnet detent output.			
Controller Reaction	• Turns off the joystick steering EPC solenoid output and the joystick steering EPC lever magnet detent output.			
Effect on Machine	• The steering cannot be operated by the joystick lever.			
Related Information	• Can be checked with the monitor system function (Codes: 42004).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (9) ~ L34 (female) (3)	Resistance	1 Ω and below
	2	Wiring harness hot short circuit (Electric power supply harness is contacted)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Wiring harness between L71 (female) (9), L34 (female) (3) ~ body	Voltage	1 V and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (9) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



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Error code [DK5FKM]

Action Code	Error Code	Controller Code	Trouble	Joystick steering EPC lever neutral system
E00	DK5FKM	WRK		
Description Of Trouble	• The joystick steering EPC lever neutral operation is abnormal.			
Controller Reaction	• Turns off the joystick steering EPC solenoid output.			
Effect on Machine	• The steering cannot be operated by the joystick lever.			
Related Information	—			

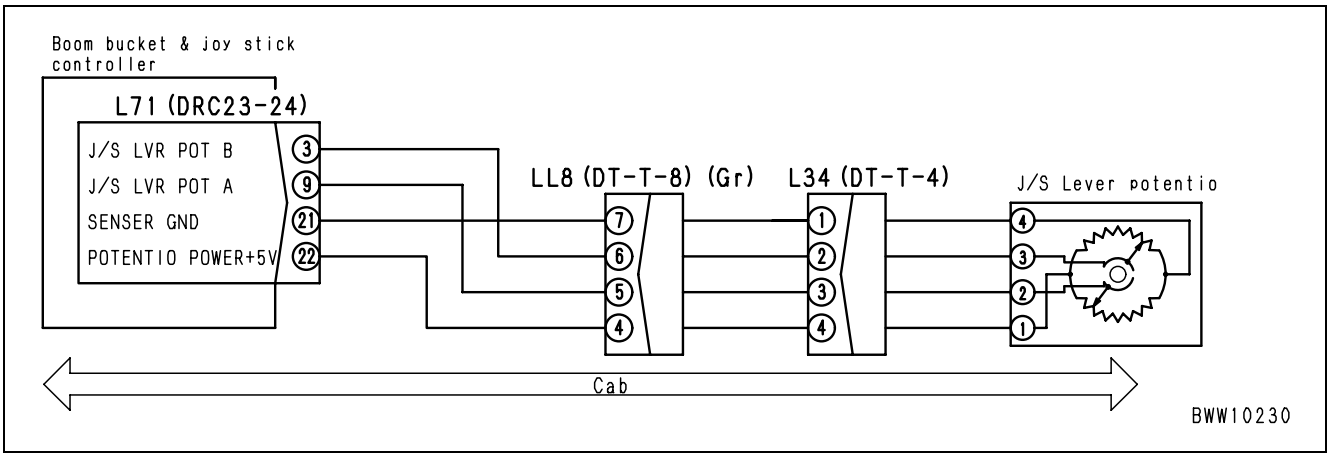
https://truckmanualshub.com/

Error code [DK5FL8]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering EPC lever potentiometer 2 system (Deviation of positional signals of main and sub circuits)
E03	DK5FL8	WRK		
Description Of Trouble	• Input signals of the joystick steering EPC lever potentiometer 2 systems (Main and sub circuits) are not identical.			
Controller Reaction	• Stops joystick steering EPC solenoid output.			
Effect on Machine	• The steering cannot be operated by joystick. • It is operable by using the handle in the handle mode.			
Related Information	• Can be checked with the monitoring function (Code: 42004 and 42005).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective potentiometer ★ Defective installation (Loose and play)	1) Turn starting switch OFF. 2) Disconnect connector L34. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L34 (3) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = left (Full stroke)	Voltage	1.1 ~ 1.5 V
				Lever = right (Full stroke)	Voltage	3.5 ~ 4.0 V
			Between L34 (2) ~ (1)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = left (Full stroke)	Voltage	3.5 ~ 4.0 V
				Lever = right (Full stroke)	Voltage	1.1 ~ 1.5 V
			Between L34 (4) ~ (1)		Voltage	4.75 ~ 5.25 V
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch ON. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter.			
			Between wiring harnesses between L71 (female) (9), L (female) (3)		Resistance	1 Ω and below
			Between wiring harnesses between L71 (female) (3) ~ L (female) (2)		Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L71 (9) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = left (Full stroke)	Voltage	1.1 ~ 1.5 V
				Lever = right (Full stroke)	Voltage	3.5 ~ 4.0 V
			Between L71 (3) ~ (21)	Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = left (Full stroke)	Voltage	3.5 ~ 4.0 V
				Lever = right (Full stroke)	Voltage	1.1 ~ 1.5 V

Related circuit diagram



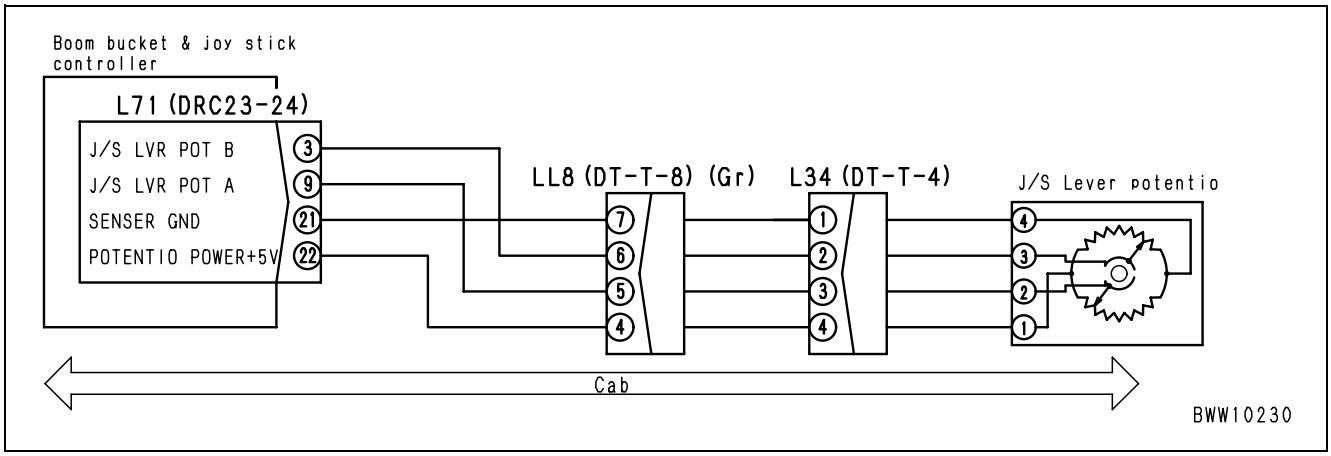
https://truckmanualshub.com/

Error code [DK5GKA]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering EPC lever potentiometer system (Disconnection or ground fault of sub circuit)
E03	DK5GKA	WRK		
Description Of Trouble	• The joystick steering EPC lever potentiometer (Sub) signal system is disconnected (Disconnection or ground fault of sub circuit).			
Controller Reaction	• Stops joystick steering EPC solenoid output.			
Effect on Machine	• Steering cannot be operated by using the joystick.			
Related Information	• Can be checked with the monitoring function (Code 42005).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter.		
			Between L71 (female) (3), L34 (female) (2) ~ body	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter.		
			Between L71 (female) (3), L34 (female) (2) ~ body	Resistance	1 Ω and below
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L34. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L34 (2) ~ (1)	Voltage	2.4 ~ 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L73 (3) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



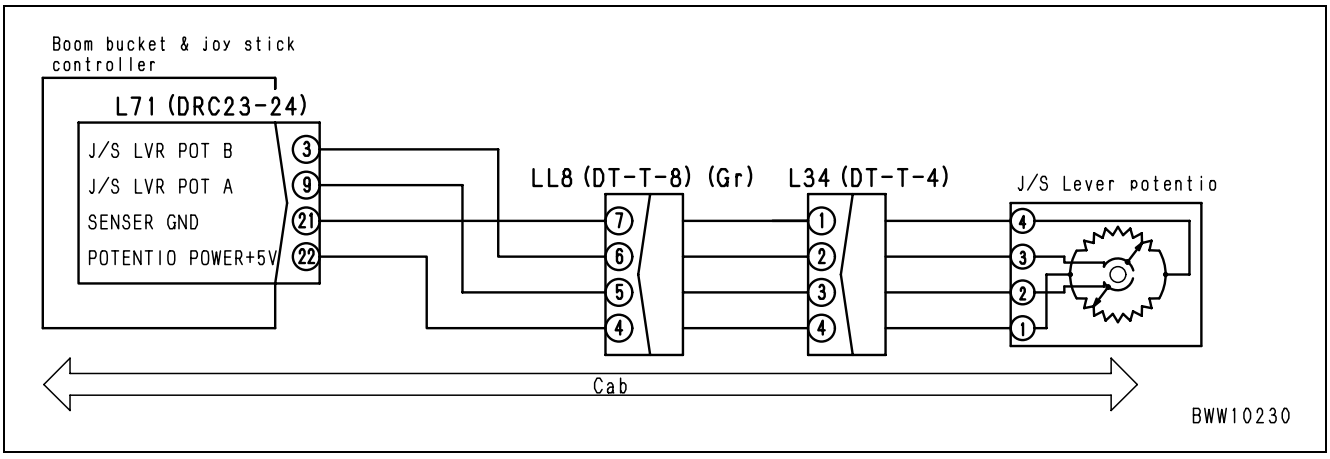
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Error code [DK5GKY]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering EPC lever potentiometer system (Sub circuit short circuit)
E03	DK5GKY	WRK		
Description Of Trouble	• The power supply line is contacting the joystick steering EPC lever potentiometer signal (Sub), which prevents output to the joystick EPC solenoid.			
Controller Reaction	• Stops joystick steering EPC solenoid output until lever's neutral position will be detected.			
Effect on Machine	• The steering cannot be operated by using the joystick. It is operable by using the handle in the handle mode.			
Related Information	• Can be checked with the monitoring function (Code 42005).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter.		
			Wiring harness between L71 (female) (3) ~ L34 (female) (2)	Resistance	1 Ω and below
	2	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L34. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Wiring harness between L71 (female) (3), L34 (female) (2) ~ body	Voltage	1 V and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 (3) ~ (21)	Voltage	2.4 ~ 2.6 V

Related circuit diagram



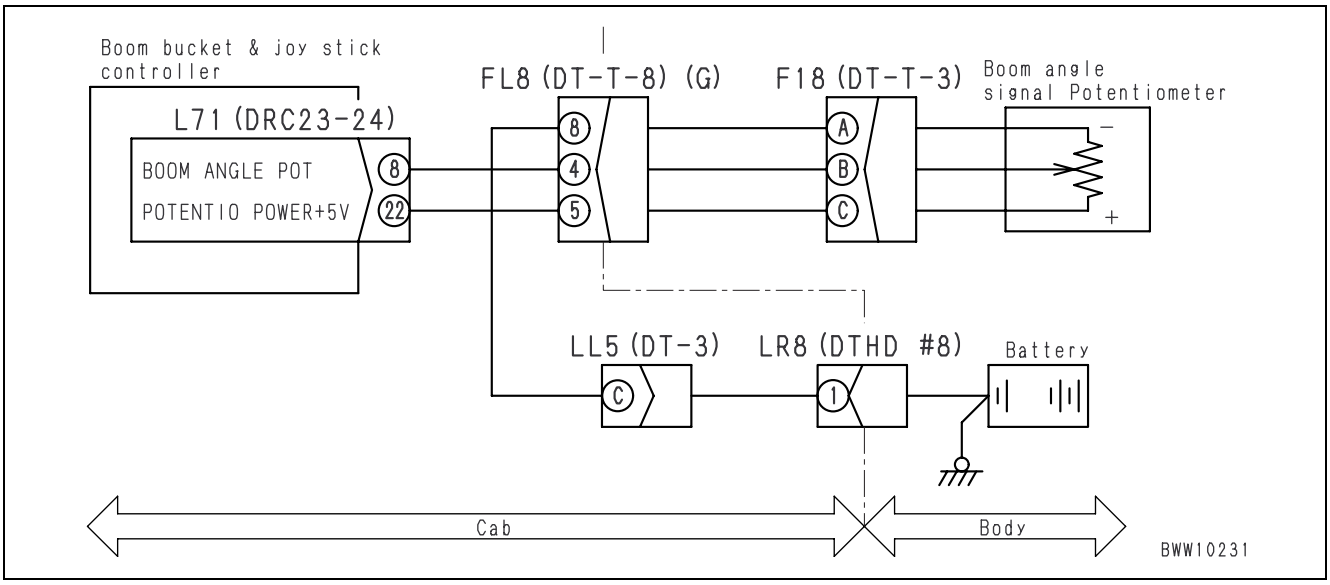
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Error code [DKAOKA]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm angle sensor system (Disconnection or ground fault)
E01	DKAOKA	WRK		
Description Of Trouble	• Disconnection or ground fault of lift arm angle signal system and power supply system disconnection.			
Controller Reaction	• Controls the voltage value of the lift arm EPC potentiometer signal as input voltage. • Cancels the remote positioner function. • Cancels semi-auto excavation function.			
Effect on Machine	• The remote positioner and the semi-auto excavation function cannot operate.			
Related Information	• Can be checked with the monitoring function (Code: 06002).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF 2) Disconnect connectors L71 and F18. 3) Connect T-adapter.			
			Wiring harness between L 71 (female) (8) ~ F18 (female) (2)		Resistance	1 Ω and below
			Wiring harness between L71 (female) (22) ~ F18 (female) (3)		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and F18. 3) Connect T-adapter.			
			Wiring harness between L71 (female) (8), F18 (female) (2) ~ body		Resistance	1 MΩ and above
			Wiring harness between L71 (female) (22), F18 (female) (3) ~ body		Resistance	1 MΩ and above
	3	Defective boom angle sensor	1) Turn starting switch OFF. 2) Disconnect connector F18. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between F18 (3) ~ (1)		Voltage	4.75 ~ 5.25 V
			Between F18 (2) ~ (1)	At the time of boom RAISE stroke end	Voltage	3.5 ~ 4.0 V
				At the time of boom LOWER stroke end	Voltage	1.0 ~ 2.0 V
			1) Turn starting switch OFF. 2) Disconnect connector F18. 3) Connect T-adapter.			
			Between F18 (3) ~ (1)		Resistance	4 ~ 6 kΩ
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L71 (22) ~ body	The whole gamut	Voltage	4.75 ~ 5.25 V
			Between L71 (8) ~ body	At the time of the boom maximum raising	Voltage	3.5 ~ 4.0 V
				At the time of the boom maximum lowering	Voltage	1.0 ~ 2.0 V

Related circuit diagram



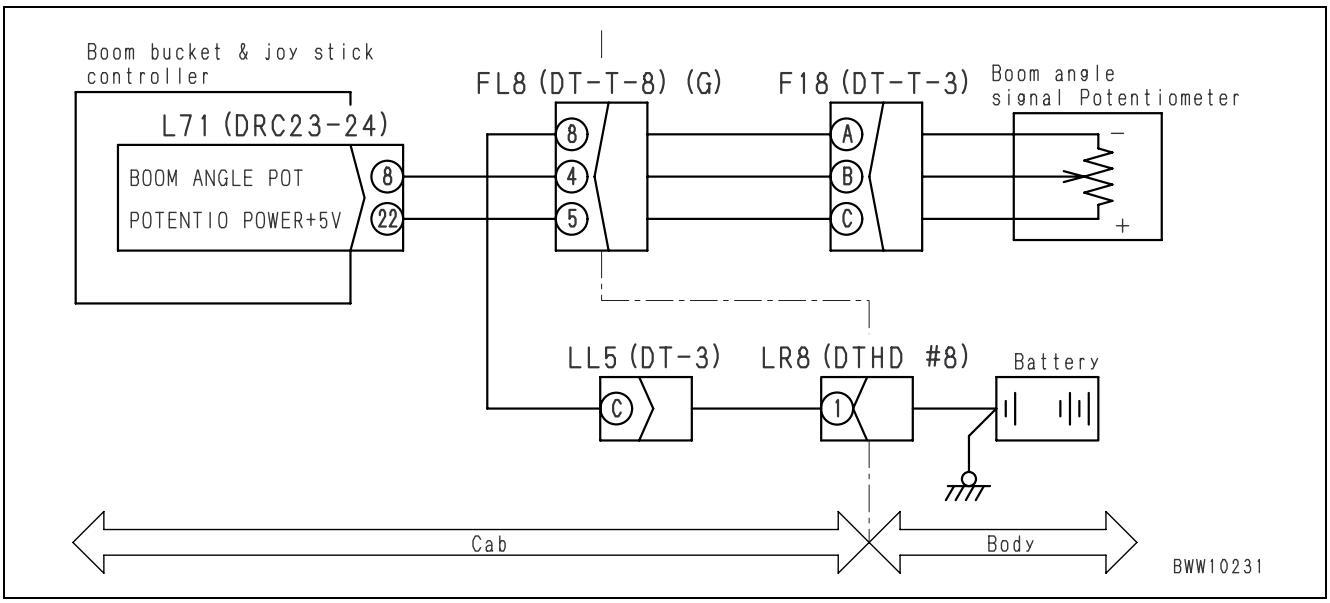
https://truckmanualshub.com/

Error code [DKAOKY]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm angle sensor system (Short circuit)
E01	DKAOKY	WRK		
Description Of Trouble	• Short circuit of the lift arm angle signal system and the GND system disconnection.			
Controller Reaction	• Controls the voltage value of the lift arm EPC potentiometer signal as input voltage. • Cancels the remote positioner function. • Cancels the semi-auto excavation function.			
Effect on Machine	• The remote positioner and the semi-auto excavation function cannot operate.			
Related Information	• Can be checked with the monitoring function (Code: 06002).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective wiring harness short circuit (The signal harness contacts the power supply harness)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and F18. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Wiring harness between L71 (female) (8), F18 (female) (2) ~ body		Voltage	1 V and below
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and F18. 3) Connect T-adapter.			
			Wiring harness between F18 (female) (1) ~ body		Resistance	1 Ω and below
	3	Defective lift arm angle sensor	1) Turn starting switch OFF. 2) Disconnect connector F18. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between F18 (3) ~ (1)		Voltage	4.75 ~ 5.25 V
			Between F18 (2) ~ (1)	At the time of boom RAISE stroke end	Voltage	3.5 ~ 4.0 V
				At the time of boom LOWER stroke end	Voltage	1.0 ~ 2.0 V
			1) Turn starting switch OFF. 2) Disconnect connector F18. 3) Connect T-adapter.			
			Between F18 (3) ~ (1)		Resistance	4 ~ 6 kΩ
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L71 (22) ~ body	The whole gamut	Voltage	4.75 ~ 5.25 V
			Between L71 (8) ~ body	At the time of the boom maximum raising	Voltage	3.5 ~ 4.0 V
				At the time of the boom maximum lowering	Voltage	1.0 ~ 2.0 V

Related circuit diagram



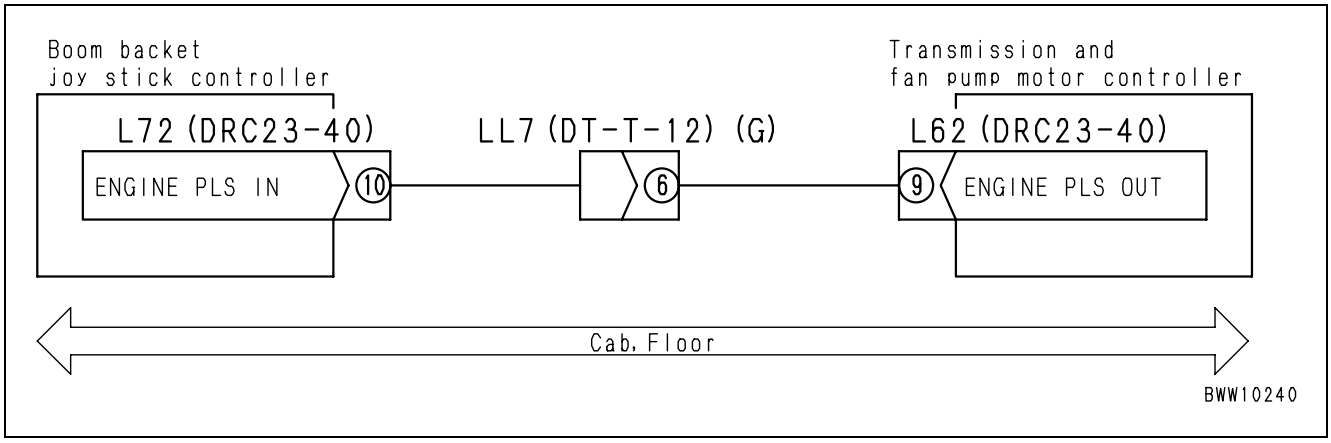
https://truckmanualshub.com/

Error code [DLE2LC]

Action Code	Error Code	Controller Code	Trouble	Defective engine speed sensor system
E01	DLE2LC	WRK		
Description Of Trouble	• The engine speed sensor system ground fault prevents the engine speed signal input.			
Controller Reaction	• Cannot detect engine speed (Recognizes engine speed as 2000 rpm).			
Effect on Machine	• Work equipment feeling decreases.			
Related Information	• Can be checked with the monitoring function (Code: 01003).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values			1) Turn starting switch OFF. 2) Disconnect connectors L72 and F62. 3) Connect T-adapter.		
	1	Wiring harness discontinuity (Disconnection or defective contact)	Wiring harness between L72 (female) (10) ~ L62 (female) (8)	Resistance	1 Ω and below
			★ When the transmission controller does not detect "Defective engine speed sensor" (Failure code: DLE2KA and DLE2LC)		

Related circuit diagram



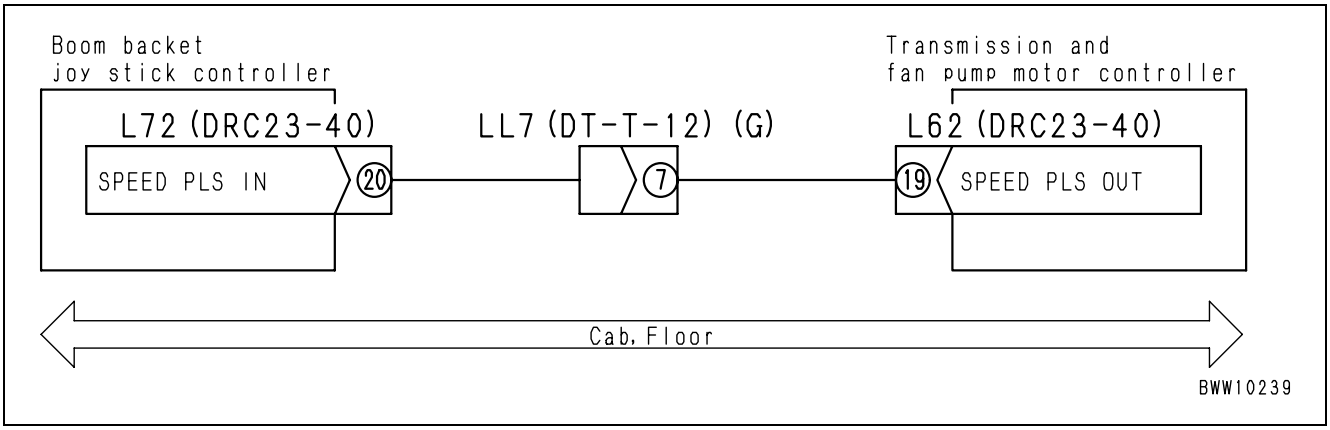
https://truckmanualshub.com/

Error code [DLT3LC]

Action Code	Error Code	Controller Code	Trouble	Defective transmission output axis speed sensor system (Disconnected)
E03	DLT3LC	WRK		
Description Of Trouble	• Speed sensor system disconnection prevents the speed sensor signal from being input.			
Controller Reaction	• Cannot detect travel speed.			
Effect on Machine	• The semi-auto excavator cannot be used. • Feeling of the joystick steering decreases.			
Related Information	• Can be checked with the monitoring function (Code: 01003).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L72 and L62. 3) Connect T-adapter.		
			Wiring harness between L72 (female) (20) ~ L62 (female) (19)	Resistance	1 Ω and below
			★ When the transmission controller does not detect "Defective engine speed sensor" (Failure code: DLT3KA)		

Related circuit diagram



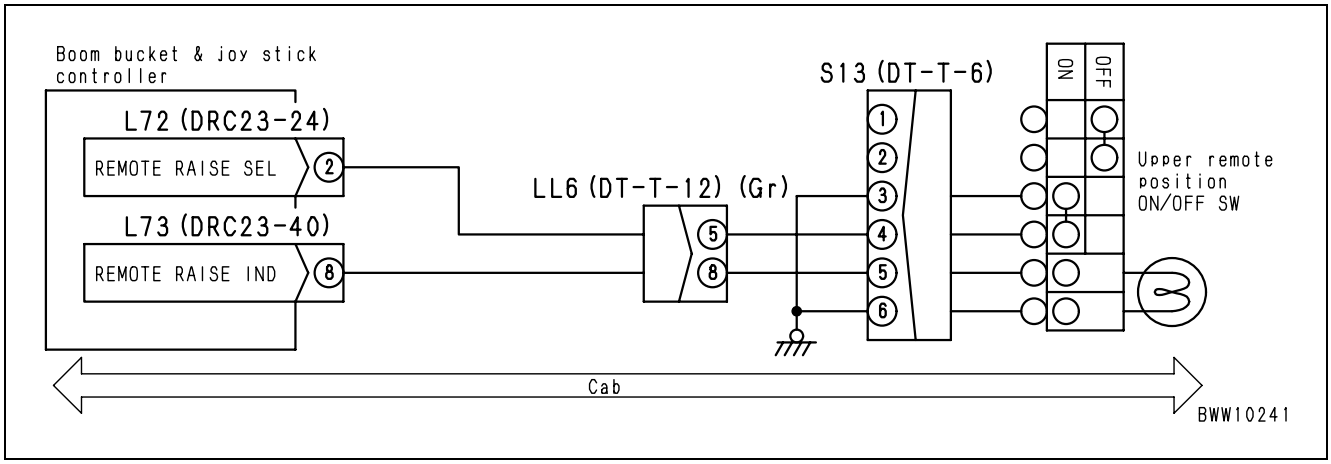
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Error code [DUM1KA]

Action Code	Error Code	Controller Code	Trouble	Remote positioner RAISE lamp system ground fault
E03	DUM1KA	WRK		
Description Of Trouble	• The remote positioner RAISE lamp system ground fault prevents output to the indicator lamp.			
Controller Reaction	• No reaction.			
Effect on Machine	• The remote positioner RAISE indicator lamp cannot be turned on.			
Related Information	• Can be checked with the monitoring function (Code: 40917).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective remote positioner RAISE indicator lamp	1) Turn starting switch OFF. 2) Disconnect connector S13. 3) Connect T-adapter.			
			Between S13 (male) (5) ~ (6)		Resistance	Approx. 20 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and S13. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (8), S13 (female) (5) ~ body		Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (8) ~ body	When the remote positioner RAISE lamp is ON.	Voltage	17 ~ 30 V
				When the remote positioner RAISE lamp is OFF.	Voltage	1 V and below

Related circuit diagram



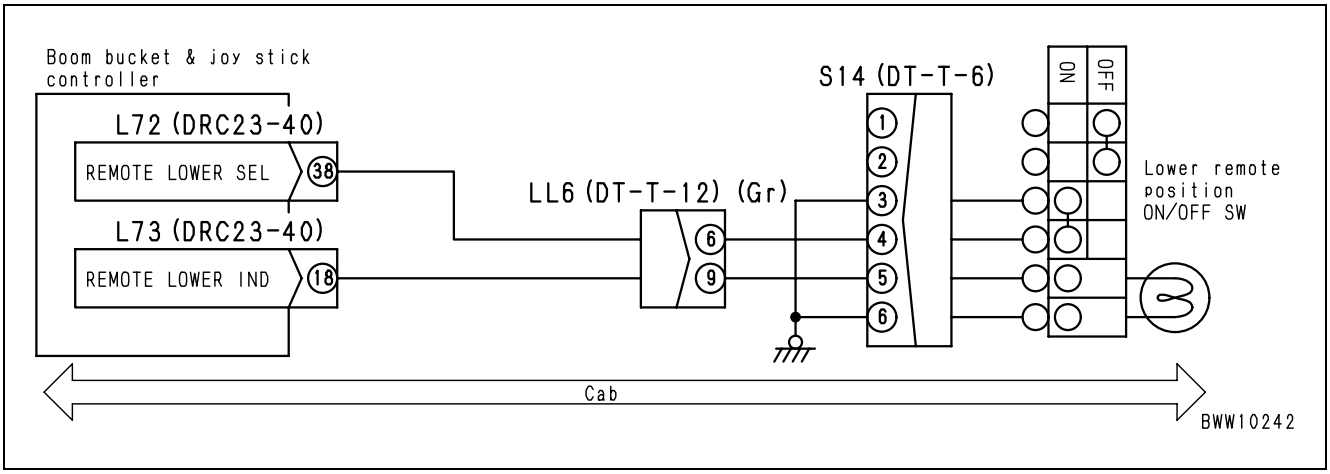
https://truckmanualshub.com/

Error code [DUM1KB]

Action Code	Error Code	Controller Code	Trouble	Remote positioner LOWER lamp system ground fault
E03	DUM1KB	WRK		
Description Of Trouble	• The remote positioner LOWER lamp system ground fault prevents output to the indicator lamp.			
Controller Reaction	• No reaction.			
Effect on Machine	• The remote positioner LOWER indicator lamp cannot be turned on.			
Related Information	• Can be checked with the monitoring function (Code: 40917).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective remote positioner LOWER indicator lamp	1) Turn starting switch OFF. 2) Disconnect connector S14. 3) Connect T-adapter.			
			Between S14 (male) (5) ~ (6)		Resistance	Approx. 20 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and S13. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (18), S14 (female) (5) ~ body		Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector SL73. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (8) ~ body	When the remote positioner LOWER lamp is ON.	Voltage	17 ~ 30 V
				When the remote positioner LOWER lamp is OFF.	Voltage	1 V and below

Related circuit diagram



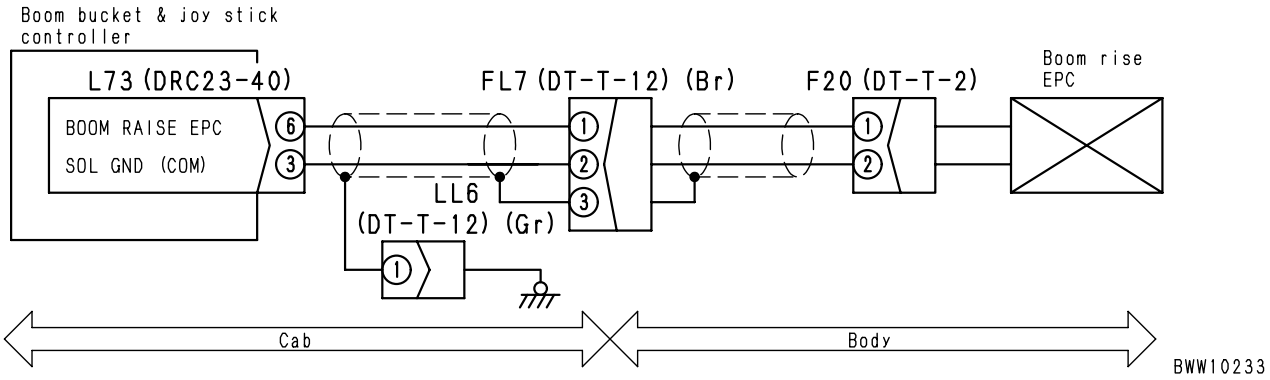
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Error code [DW4PKA]

Action Code	Error Code	Controller Code	Trouble	Disconnected lift arm RAISE EPC solenoid system
E03	DW4PKA	WRK		
Description Of Trouble	• The lift arm RAISE EPC solenoid system disconnection prevents output to the lift arm RAISE EPC solenoid.			
Controller Reaction	• Stops the output to the lift arm RAISE EPC solenoid. • Stops the output to the lift arm RAISE detent.			
Effect on Machine	• The lift arm cannot raise.			
Related Information	• Can be checked with the monitoring function (Code: 41900).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm RAISE EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F20. 3) Connect T-adapter.		
			Between F20 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
			Between F20 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F20. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (6) ~ F20 (female) (2)	Resistance	1 Ω and below
			Wiring harness between L73 (female) (3) ~ F20 (female) (2)	Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (6) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



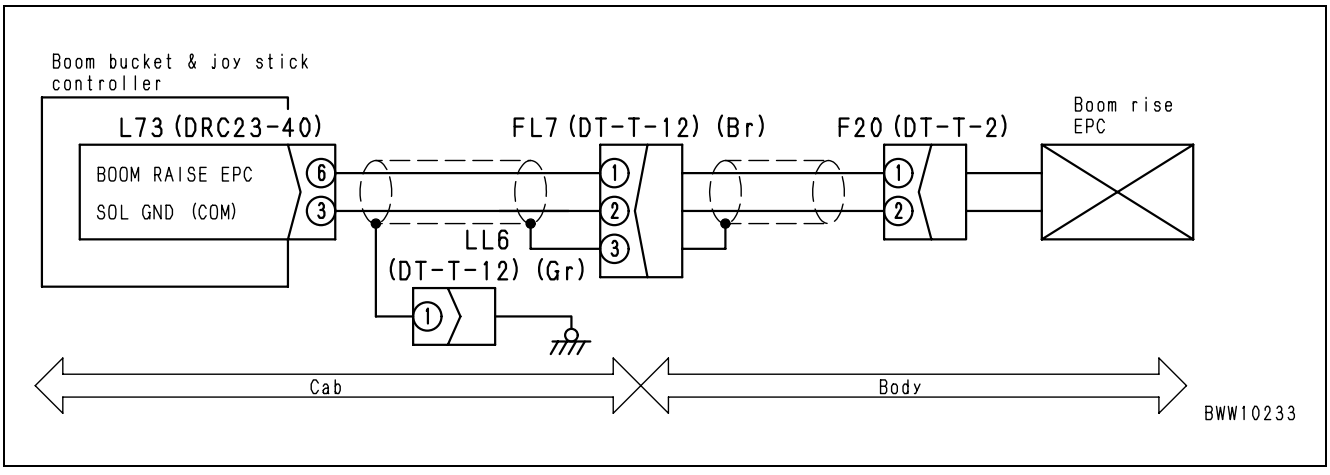
https://truckmanualshub.com/

Error code [DW4PKB]

Action Code	Error Code	Controller Code	Trouble	Lift arm RAISE EPC solenoid system ground fault
E03	DW4PKB	WRK		
Description Of Trouble	• The lift arm RAISE EPC solenoid system ground fault prevents output to the lift arm RAISE EPC solenoid.			
Controller Reaction	• Stops the output to the lift arm RAISE EPC solenoid. • Stops the output to the lift arm RAISE detent.			
Effect on Machine	• The lift arm cannot raise.			
Related Information	• Can be checked with the monitoring function (Code: 41900).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm RAISE EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F20. 3) Connect T-adapter.		
			Between F20 (male) (2) ~ (3)	Resistance	9 ~ 10.2 Ω
	2	Wiring harness ground fault or defective short circuit	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F20. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (6) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (6) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



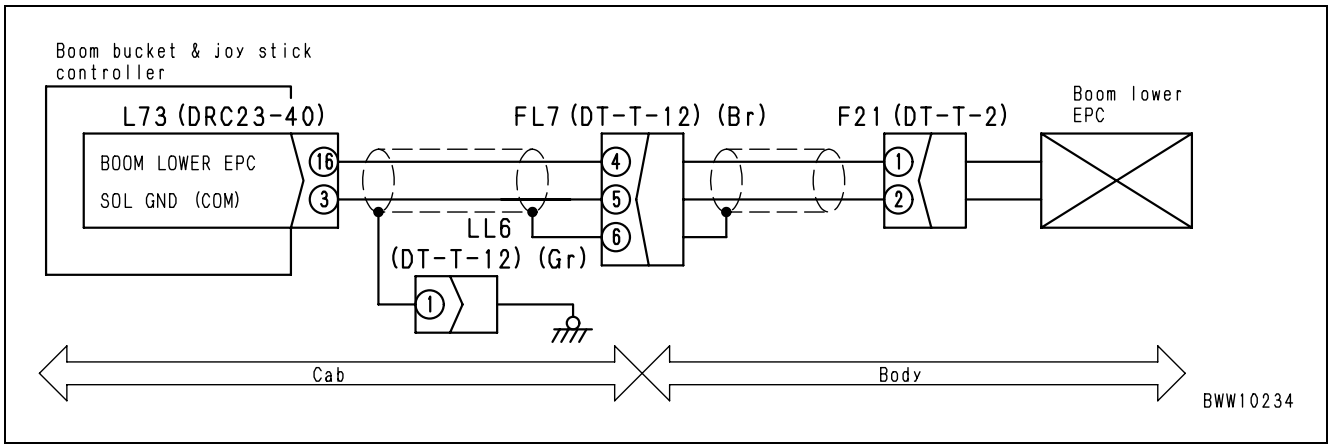
https://truckmanualshub.com/

Error code [DW4QKA]

Action Code	Error Code	Controller Code	Trouble	Disconnected lift arm LOWER EPC solenoid system
E03	DW4QKA	WRK		
Description Of Trouble	• The lift arm LOWER EPC solenoid system disconnection prevents output to the lift arm LOWER EPC solenoid.			
Controller Reaction	• Stops the output to the lift arm LOWER EPC solenoid. • Stops the output to the lift arm LOWER detent.			
Effect on Machine	• The lift arm cannot lower.			
Related Information	• Can be checked with the monitoring function (Code: 41901).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm LOWER EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F21. 3) Connect T-adapter.		
			Between F21 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
			Between F21 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F2. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (16) ~ F21 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L73 (female) (3) ~ F21 (female) (2)	Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (16) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



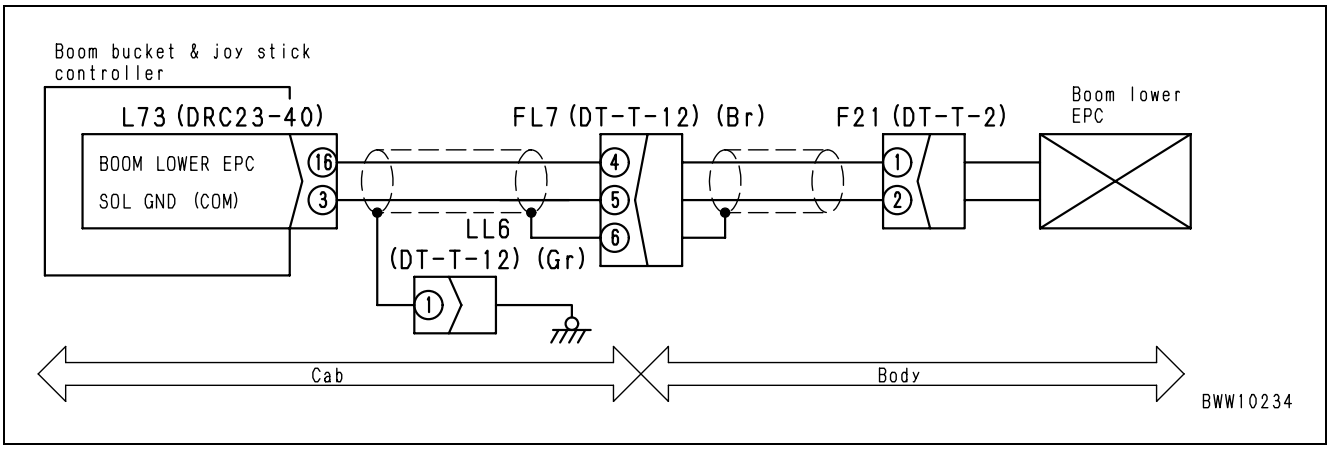
https://truckmanualshub.com/

Error code [DW4QKB]

Action Code	Error Code	Controller Code	Trouble	Lift arm LOWER EPC solenoid system ground fault
E03	DW4QKB	WRK		
Description Of Trouble	• The lift arm LOWER EPC solenoid system ground fault prevents output to the lift arm LOWER EPC solenoid.			
Controller Reaction	• Stops the output to the lift arm LOWER EPC solenoid. • Stops the output to the lift arm LOWER detent.			
Effect on Machine	• The lift arm cannot lower.			
Related Information	• Can be checked with the monitoring function (Code: 41901).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm LOWER EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F21. 3) Connect T-adapter.		
			Between F21 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
	2	Wiring harness ground fault or defective short circuit	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F21. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (16) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (16) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



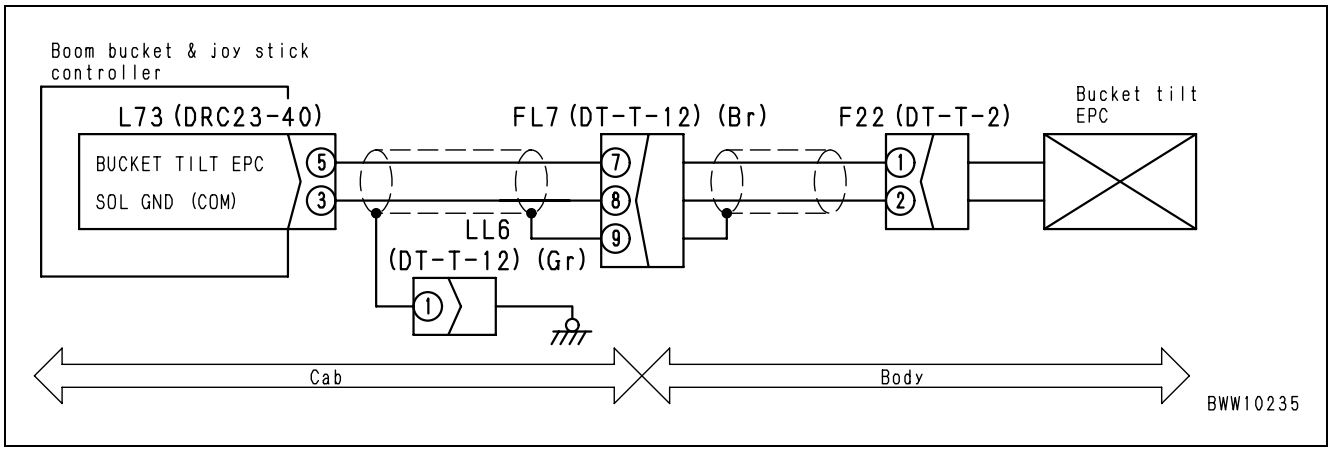
https://truckmanualshub.com/

Error code [DW4RKA]

Action Code	Error Code	Controller Code	Trouble	Disconnected bucket tilt EPC solenoid system
E03	DW4RKA	WRK		
Description Of Trouble	• The bucket tilt EPC solenoid system disconnection prevents output to the boom bucket tilt EPC solenoid.			
Controller Reaction	• Stops the output to the bucket tilt EPC solenoid. • Stops the output to the bucket tilt detent.			
Effect on Machine	• The bucket tilt cannot move.			
Related Information	• Can be checked with the monitoring function (Code: 41902).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective packet tilt EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F22. 3) Insert and connect T-adapter.		
			Between F22 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
			Between F22 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F22. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (5) ~ F22 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L73 (female) (5)~ F22 (female) (2)	Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (5) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



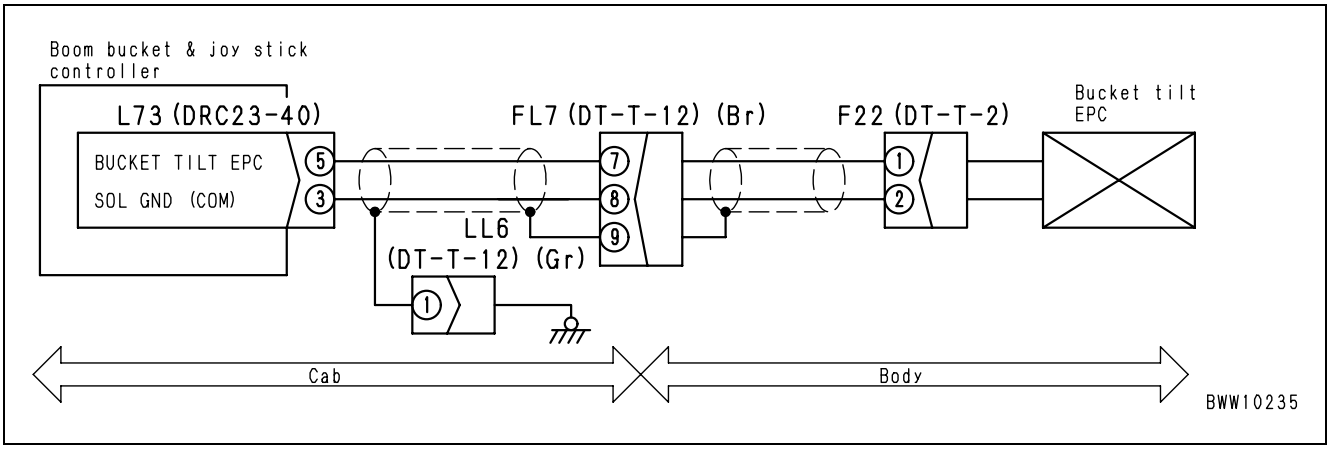
https://truckmanualshub.com/

Error code [DW4RKB]

Action Code	Error Code	Controller Code	Trouble	Bucket tilt EPC solenoid system ground fault
E03	DW4RKB	WRK		
Description Of Trouble	• The bucket tilt EPC solenoid system ground fault prevents output to the bucket tilt EPC solenoid.			
Controller Reaction	• Stops the output to the bucket tilt EPC solenoid. • Stops the output to the bucket tilt detent.			
Effect on Machine	• The bucket tilt cannot move.			
Related Information	• Can be checked with the monitoring function (Code: 41902).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective packet tilt EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F22. 3) Insert and connect T-adapter.		
			Between F22 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
	2	Wiring harness ground fault and defective short circuit	1) Turn starting switch OFF. 2) Disconnect connector L73 and F22. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (5) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (5) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



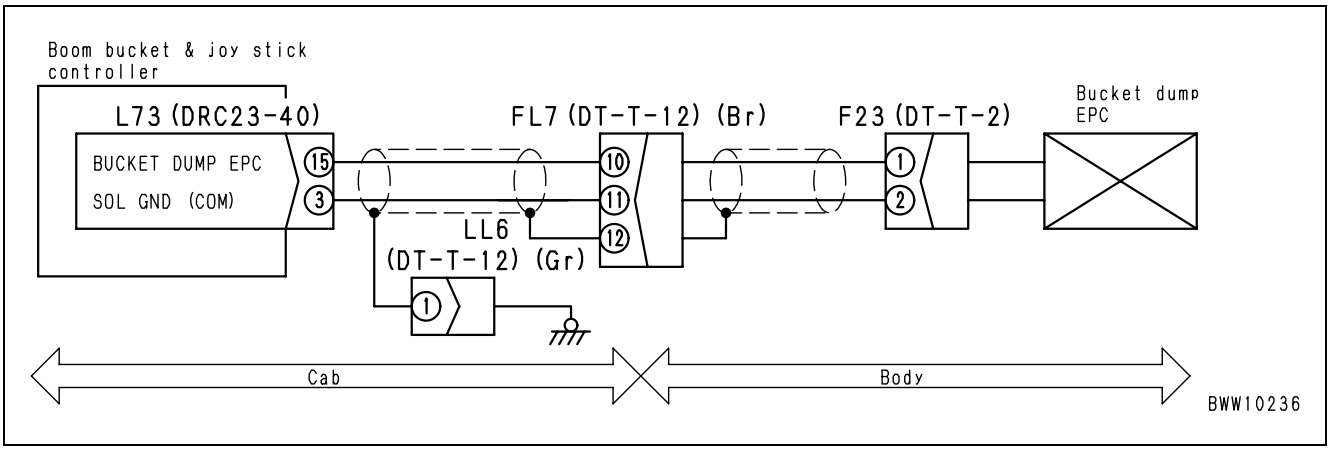
https://truckmanualshub.com/

Error code [DW4SKA]

Action Code	Error Code	Controller Code	Trouble	Bucket DUMP EPC solenoid system disconnection
E03	DW4SKA	WRK		
Description Of Trouble	• The bucket DUMP EPC solenoid system disconnection prevents output to the bucket DUMP EPC solenoid.			
Controller Reaction	• Stops the output to the bucket DUMP EPC solenoid.			
Effect on Machine	• The bucket DUMP cannot move.			
Related Information	• Can be checked with the monitoring function (Code: 41903).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective bucket DUMP EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F23. 3) Connect T-adapter.		
			Between F23 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
			Between F23 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F2. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (15) ~ F23 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L73 (female) (15) ~ body	Resistance	1 MΩ and above
			Wiring harness between L73 (female) (3) ~ F23 (female) (2)	Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (15) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



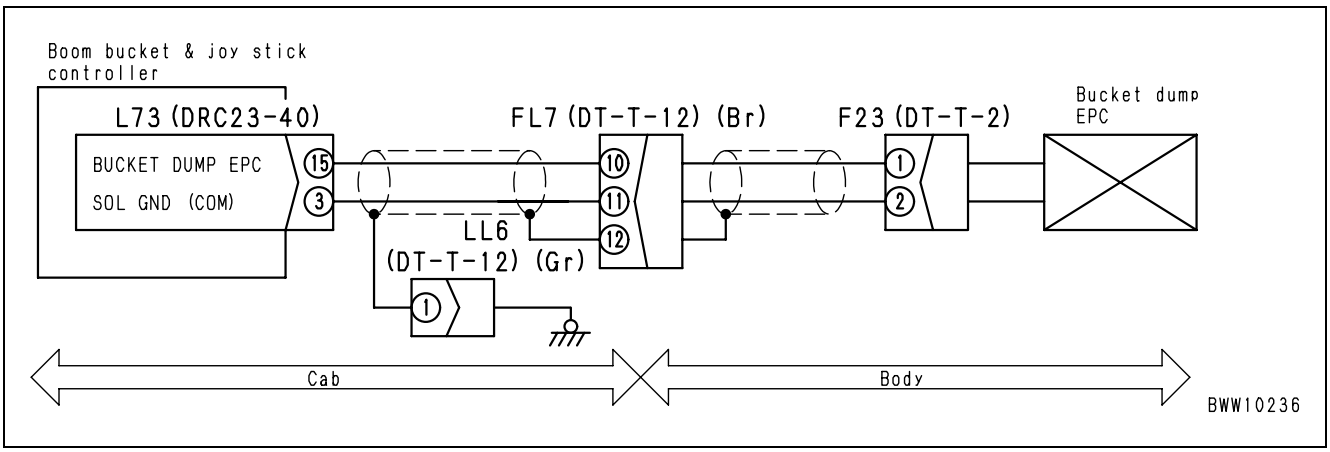
https://truckmanualshub.com/

Error code [DW4SKB]

Action Code	Error Code	Controller Code	Trouble	Bucket DUMP EPC solenoid system ground fault
E03	DW4SKB	WRK		
Description Of Trouble	• The bucket DUMP EPC solenoid system ground fault prevents output to the bucket DUMP EPC solenoid.			
Controller Reaction	• Stops the output to the bucket DUMP EPC solenoid.			
Effect on Machine	• The bucket DUMP cannot move.			
Related Information	• Can be checked with the monitoring function (Code: 41903).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective bucket DUMP EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F23. 3) Connect T-adapter.		
			Between F23 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
	2	Wiring harness ground fault and defective short circuit	1) Turn starting switch OFF. 2) Disconnect connector L73 and F23. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (15) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (15) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



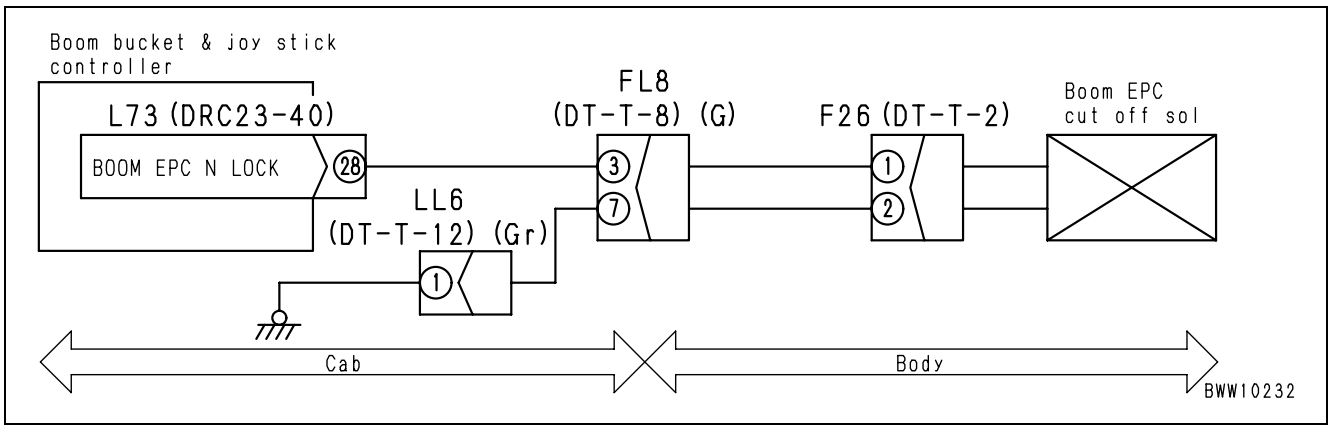
https://truckmanualshub.com/

Error code [DWM1KA]

Action Code	Error Code	Controller Code	Trouble	Work equipment neutral lock solenoid system disconnection
E01	DWM1KA	WRK		
Description Of Trouble	• Work equipment neutral lock solenoid power supply system is disconnected.			
Controller Reaction	• No reaction.			
Effect on Machine	• Normal operation is possible (Does not affect the lock lever).			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes And Standard Values	1	Defective neutral lock solenoid	1) Turn starting switch OFF. 2) Disconnect connector F26. 3) Connect T-adapter.		
			Between F26 (male) (1) ~ (2)	Resistance	35 ~ 45 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F26. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (28) ~ F26 (female) (1)	Resistance	1 Ω or below
			Wiring harness between F26 (female) (2) ~ body	Resistance	1 Ω or below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter		
			Between L73 (female) (28) ~ body	Resistance	1 MΩ and above

Related circuit diagram



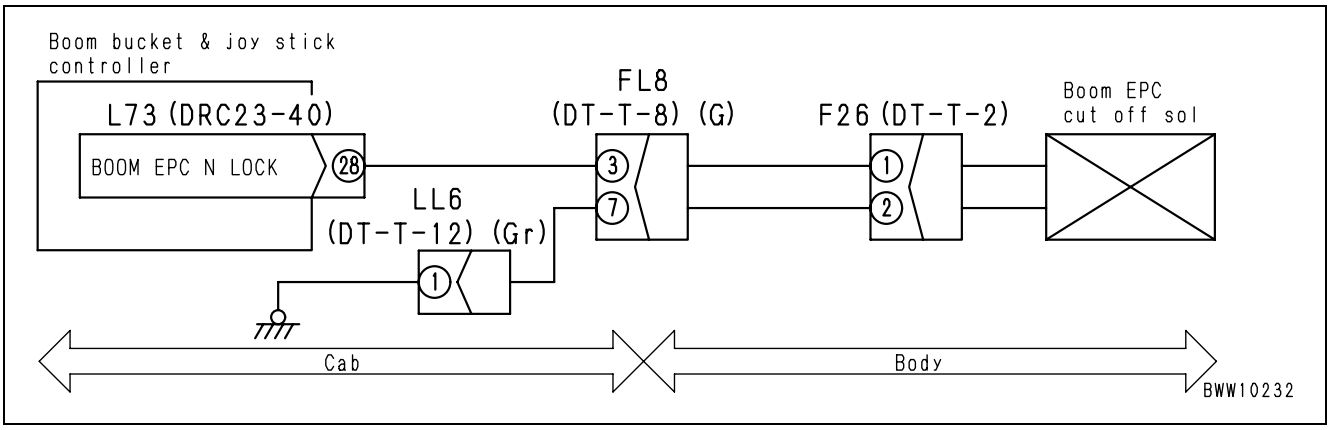
https://truckmanualshub.com/

Error code [DWM1KB]

Action Code	Error Code	Controller Code	Trouble	Work equipment neutral lock solenoid power supply system ground fault
E01	DWM1KB	WRK		
Description Of Trouble	• Work equipment neutral lock solenoid system ground fault.			
Controller Reaction	• Stops output to the neutral lock solenoid.			
Effect on Machine	• Normal operation is possible (Does not affect the lock lever).			
Related Information	—			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective neutral lock solenoid (Ground fault)	1) Turn starting switch OFF. 2) Disconnect connector F26. 3) Connect T-adapter. 4) Connect the connector. 5) Turn starting switch ON.		
			Between F26 (male) (1) ~ (2)	Resistance	35 ~ 45 Ω
			Between F26 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness ground fault or defective short circuit	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F26. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (28), F26 (female) (1) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (28) ~ body	Resistance	1 MΩ and above

Related circuit diagram



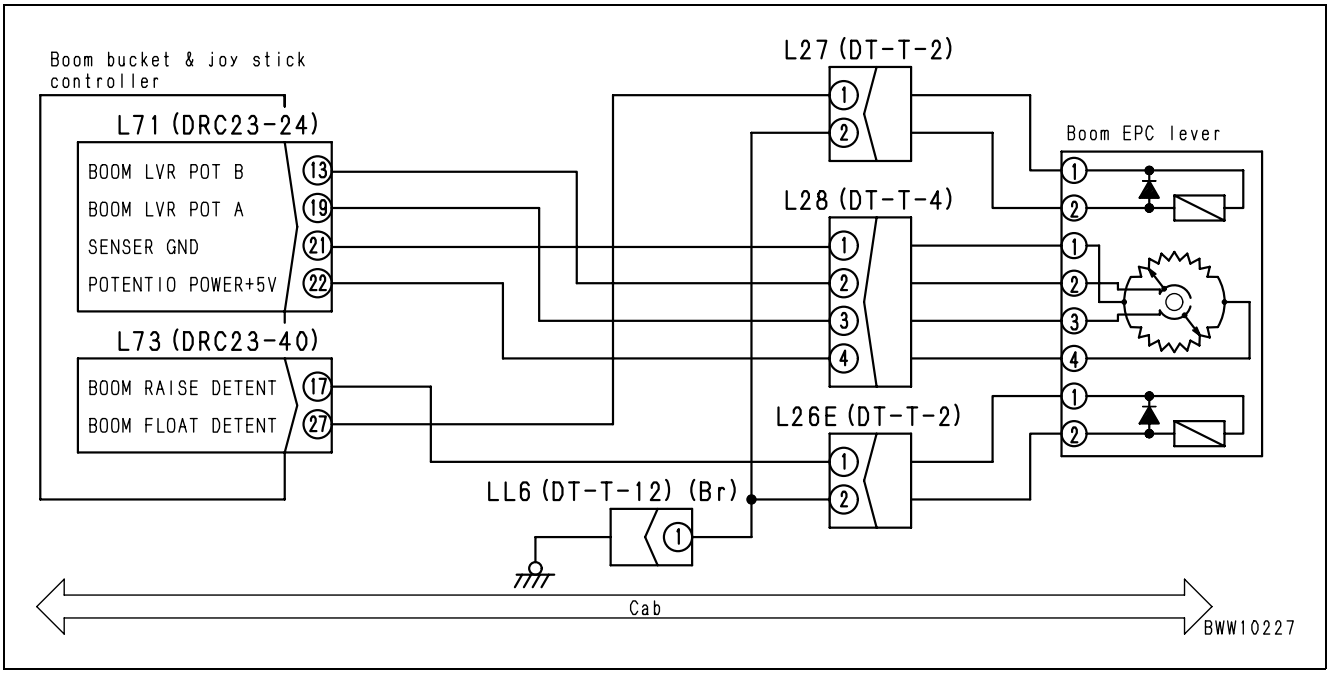
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Error code [DWN6KA]

Action Code	Error Code	Controller Code	Trouble	Lift arm RAISE magnet detent system disconnection
E01	DWN6KA	WRK		
Description Of Trouble	• The detent cannot be controlled due to the lift arm RAISE magnet detent system disconnection.			
Controller Reaction	• Stops output to the magnet detent solenoid. • Stops the remote RAISE function. • Stops the output of the remote positioner RAISE lamp.			
Effect on Machine	• The detent does not work but normal operation is possible.			
Related Information	• Can be checked with the monitoring function (Code: 40916).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective lift arm RAISE magnet detent	1) Turn starting switch OFF. 2) Disconnect connector L26E. 3) Connect T-adapter.			
			Between L26E (male) (1) ~ (2)		Resistance	35 ~ 45 Ω
			Between L26E ~ body		Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L26E. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (17) ~ L26E (female) (1)		Resistance	1 MΩ and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L26E. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (17) ~ L26 (female) (1)		Resistance	1 Ω and below
			1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (17) ~ body	Lever neutral	Voltage	1 V and below
				Lever maximum raise position	Voltage	17 ~ 30 V

Related circuit diagram



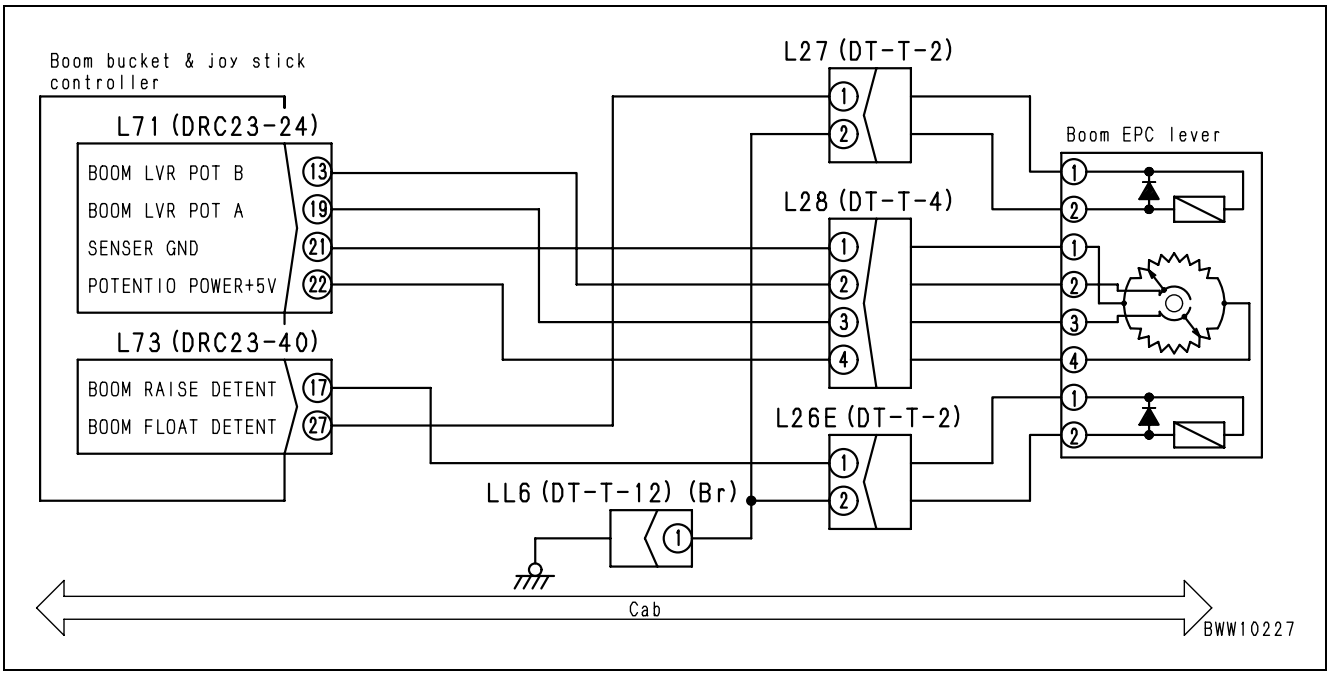
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Error code [DWN6KB]

Action Code	Error Code	Controller Code	Trouble	Lift arm RAISE magnet detent system ground fault
E01	DWN6KB	WRK		
Description Of Trouble	• The detent cannot be controlled due to the lift arm RAISE magnet detent system ground fault.			
Controller Reaction	• Stops output to the magnet detent solenoid. • Stops the remote RAISE function. • Stops the output of the remote positioner RAISE lamp.			
Effect on Machine	• The detent does not work but normal operation is possible.			
Related Information	• Can be checked with the monitoring function (Code: 40916).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm RAISE magnet detent	1) Turn starting switch OFF. 2) Disconnect connector L26E. 3) Connect T-adapter.		
			Between L26E (male) (1) ~ (2)	Resistance	35 ~ 45 Ω
			Wiring harness between L26E (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness ground fault (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L26E. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (17), L26E (female) (1) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (17) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



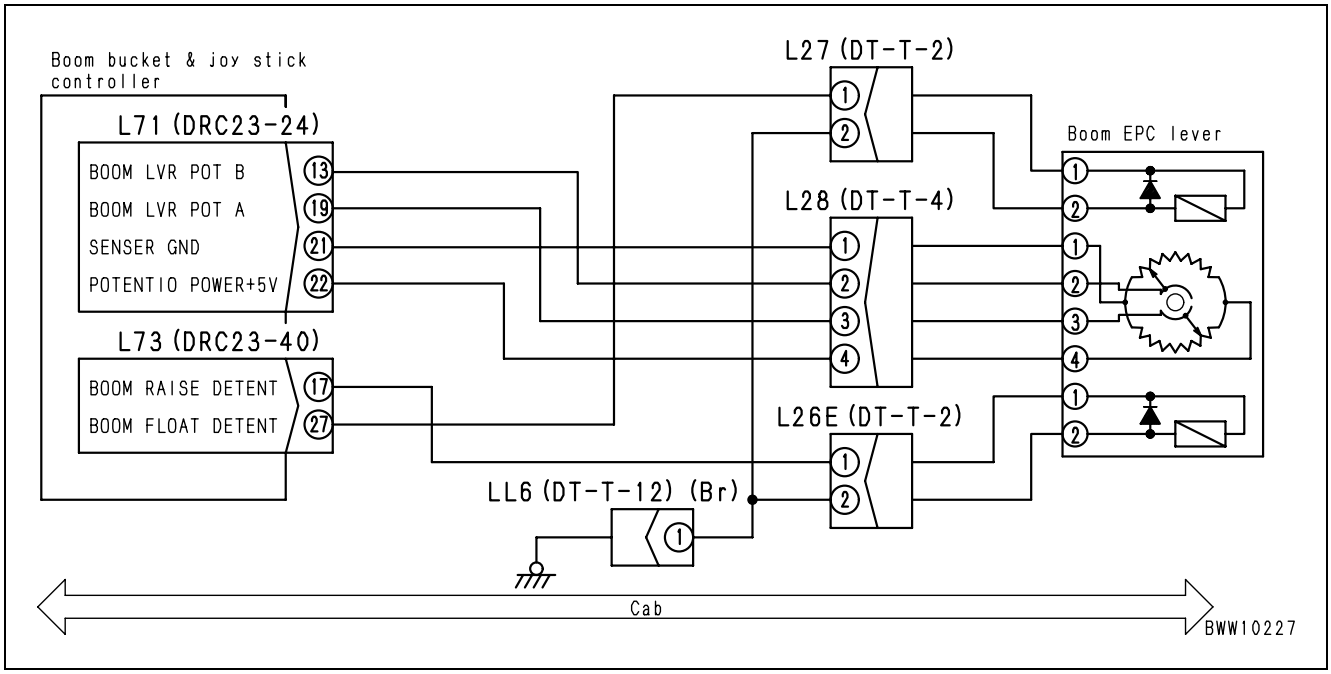
https://truckmanualshub.com/

Error code [DWN7KA]

Action Code	Error Code	Controller Code	Trouble	Lift arm floating magnet detent system disconnection
E01	DWN7KA	WRK		
Description Of Trouble	• The detent cannot be controlled due to the lift arm floating magnet detent system disconnection.			
Controller Reaction	• Stops output to the magnet detent solenoid. • Stops the remote floating function. • Stops the output of the remote positioner floating lamp.			
Effect on Machine	• The detent does not work but normal operation is possible.			
Related Information	• Can be checked with the monitoring function (Code: 40916).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective lift arm floating magnet detent	1) Turn starting switch OFF. 2) Disconnect connector L27. 3) Connect T-adapter.			
			Between L27 (male) (1) ~ (2)		Resistance	35 ~ 45 Ω
			Between L27 ~ body		Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L27. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (27) ~ L27 (female) (1)		Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (27) ~ body	Lever neutral	Voltage	1 V and below
				Lever floating position	Voltage	17 ~ 30 V

Related circuit diagram



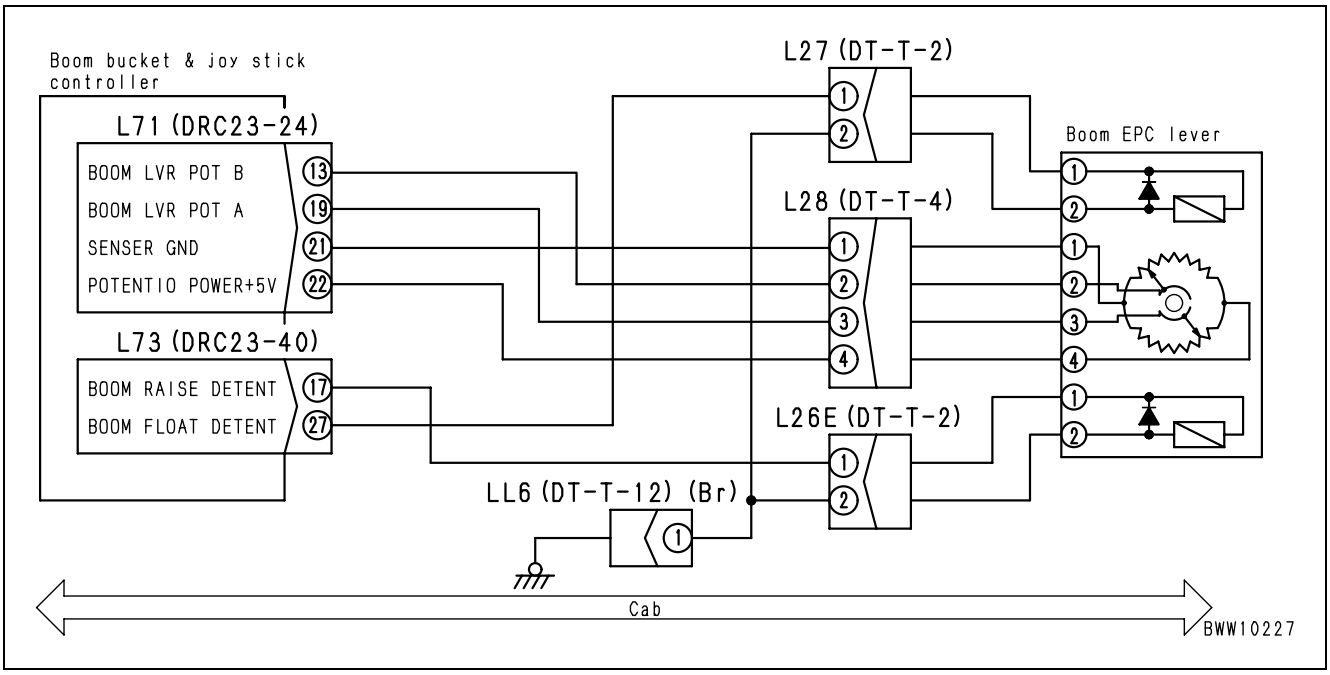
https://truckmanualshub.com/

Error code [DWN7KB]

Action Code	Error Code	Controller Code	Trouble	Lift arm floating magnet detent system ground fault
E01	DWN7KB	WRK		
Description of Trouble	• The detent cannot be controlled due to the lift arm floating magnet system ground fault.			
Controller Reaction	• Stops output to the magnet detent solenoid. • Stops the remote floating function. • Stops the output of the remote positioner floating lamp.			
Effect on Machine	• The detent does not work but normal operation is possible.			
Related Information	• Can be checked with the monitoring function (Code: 40916).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm floating magnet detent	1) Turn starting switch OFF. 2) Disconnect connector L27. 3) Connect T-adapter.		
			Between L27 (male) (1) ~ (2)	Resistance	35 ~ 45 Ω
			Wiring harness between L27 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness ground fault (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L27. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (27), L27 (female) (1) ~ body	Resistance	1 Ω and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (27) ~ body	Resistance	35 ~ 40 Ω

Related circuit diagram



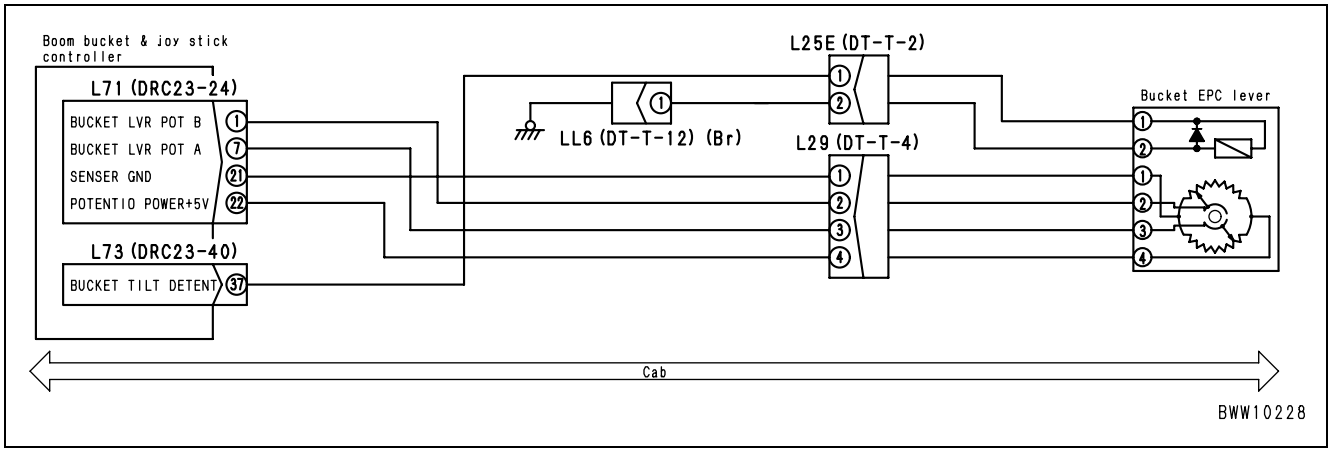
https://truckmanualshub.com/

Error code [DWN8KA]

Action Code	Error Code	Controller Code	Trouble	Bucket tilt magnet detent system disconnection
E01	DWN8KA	WRK		
Description of Trouble	• The detent cannot be controlled due to the bucket tilt magnet detent system disconnection.			
Controller Reaction	• Stops output to the magnet detent solenoid. • Stops the remote bucket tilt function. • Stops the output of the remote positioner bucket tilt lamp.			
Effect on Machine	• The detent does not work but normal operation is possible.			
Related Information	• Can be checked with the monitoring function (Code: 40916).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective bucket tilt magnet detent	1) Turn starting switch OFF. 2) Disconnect connector L25E. 3) Connect T-adapter.			
			Between L25E (male) (1) ~ (2)		Resistance	35 ~ 45 Ω
			Between L25E ~ body		Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L25E. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (37) ~ L25E (female) (1)		Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (37) ~ body	Lever neutral	Voltage	1 V and below
				Lever tilt position	Voltage	17 ~ 30 V

Related circuit diagram



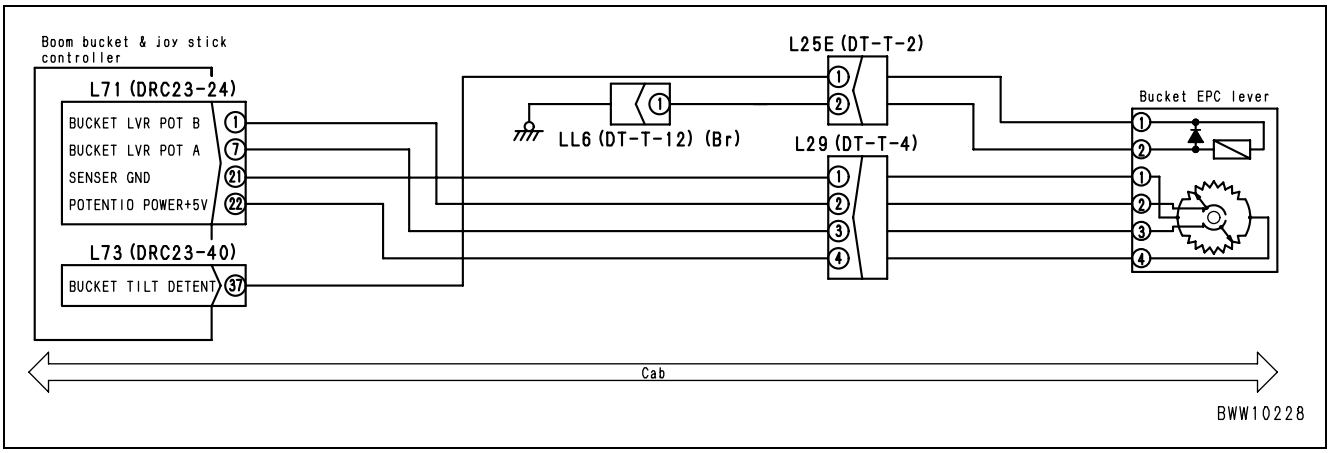
https://truckmanualshub.com/

Error code [DWN8KB]

Action Code	Error Code	Controller Code	Trouble	Bucket tilt magnet detent system failure (Power supply system ground fault)
E01	DWN8KB	WRK		
Description of Trouble	• The detent cannot be controlled due to the ground fault of the power supply system of the bucket tilt magnet detent system.			
Controller Reaction	• Stops output to the magnet detent solenoid. • Stops the remote bucket tilt function. • Stops the output of the remote positioner bucket tilt lamp.			
Effect on Machine	• The detent does not work but normal operation is possible.			
Related Information	• Can be checked with the monitoring function (Code: 40916).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective bucket tilt magnet detent	1) Turn starting switch OFF. 2) Disconnect connector L25E. 3) Connect T-adapter.		
			Between L25E (male) (1) ~ (2)	Resistance	35 ~ 45 Ω
			Wiring harness between L25E (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness ground fault (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L25E. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (37), L25E (female) (1) ~ body	Resistance	1 Ω and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L25E. 3) Connect T-adapter.		
			Between L73 (female) (37) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



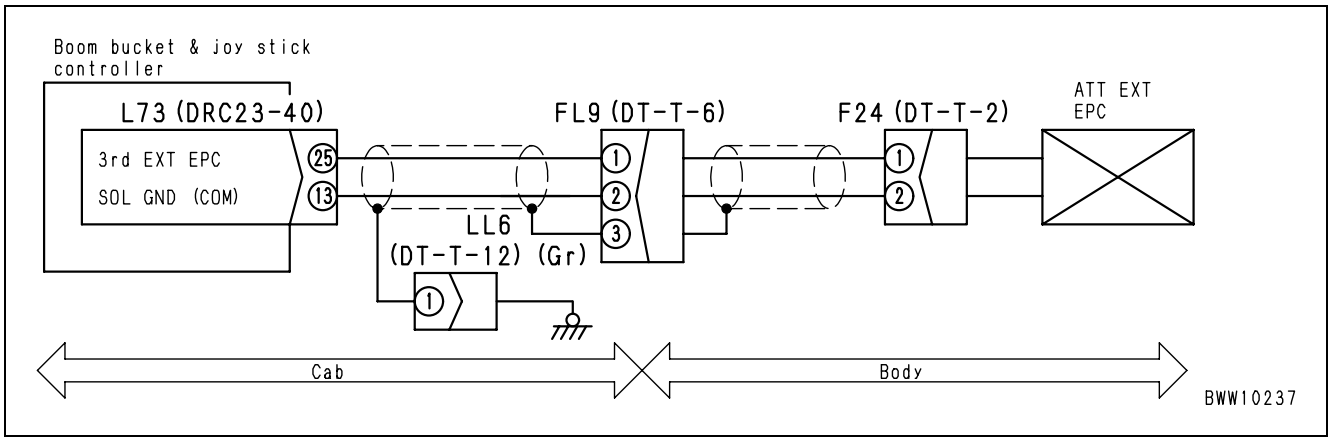
https://truckmanualshub.com/

Error code [DXHJKA]

Action Code	Error Code	Controller Code	Trouble	3rd valve extension EPC solenoid system disconnection
E03	DXHJKA	WRK		
Description Of Trouble	• 3rd valve extension EPC solenoid system disconnection prevents output to the 3rd valve EPC solenoid.			
Controller Reaction	• Stops output to the 3rd valve extension EPC solenoid.			
Effect on Machine	• The 3rd valve cannot extend.			
Related Information	• Can be checked with the monitoring function (Code: 41906).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 3rd valve extension EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F24. 3) Connect T-adapter.		
			Between F24 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
			Between F24 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L73 and F24. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (25) ~ F24 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L73 (female) (13) ~ F24 (female) (2)	Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (25) ~ (13)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



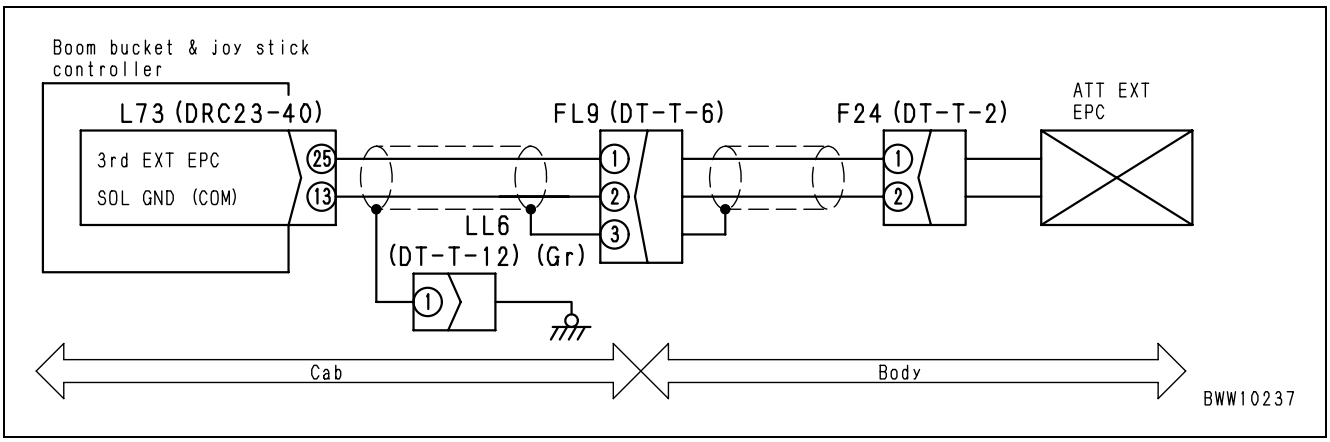
https://truckmanualshub.com/

Error code [DXHJKB]

Action Code	Error Code	Controller Code	Trouble	3rd valve extension EPC solenoid system ground fault
E03	DXHJKB	WRK		
Description Of Trouble	• 3rd valve extension EPC solenoid system ground fault prevents output to the 3rd valve EPC solenoid.			
Controller Reaction	• Stops output to the 3rd valve extension EPC solenoid.			
Effect on Machine	• The 3rd valve cannot extend.			
Related Information	• Can be checked with the monitoring function (Code: 41906).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 3rd valve extension EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F24. 3) Connect T-adapter.		
			Between F24 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
	2	Wiring harness ground fault and defective short circuit	1) Turn starting switch OFF. 2) Disconnect connector L73 and F24. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (25) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (25) ~ (13)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



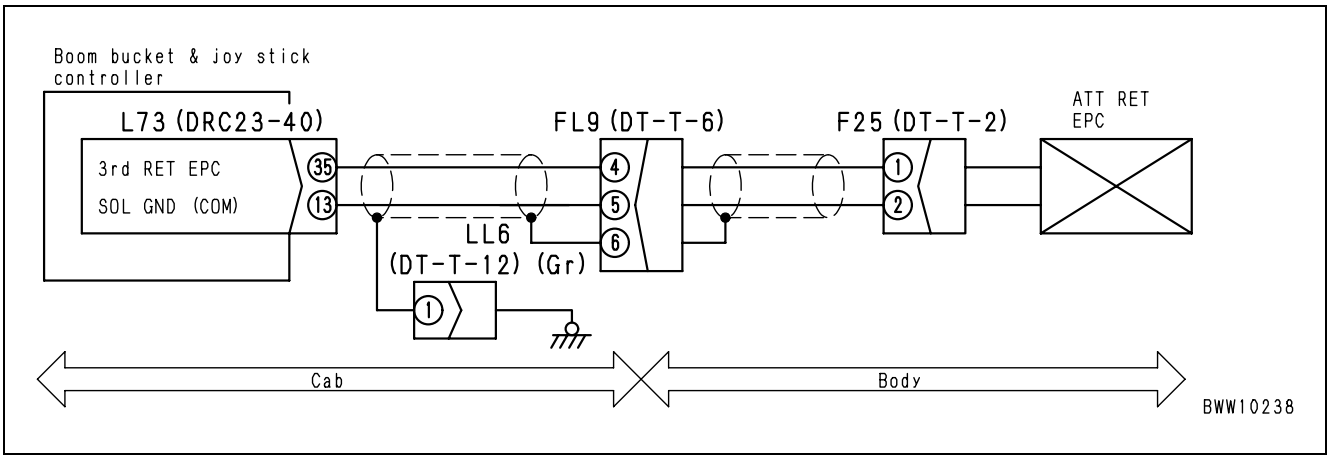
https://truckmanualshub.com/

Error code [DXHKKA]

Action Code	Error Code	Controller Code	Trouble	3rd valve retraction EPC solenoid system disconnection
E03	DXHKKA	WRK		
Description Of Trouble	• 3rd valve retraction EPC solenoid system disconnection prevents output to the 3rd valve EPC solenoid.			
Controller Reaction	• Stops output to the 3rd valve retraction EPC solenoid.			
Effect on Machine	• The 3rd valve cannot retract.			
Related Information	• Can be checked with the monitoring function (Code: 41907).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 3rd valve retraction EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F25. 3) Connect T-adapter.		
			Between F25 (male) (1) ~ (2)	Resistance	9 ~ 10.2 Ω
			Between F25 (male) (1) ~ body	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connector L73 and F25. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (35) ~ F20 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L73 (female) ~ F25 (female) (2)	Resistance	1 Ω and below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (35) ~ (13)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



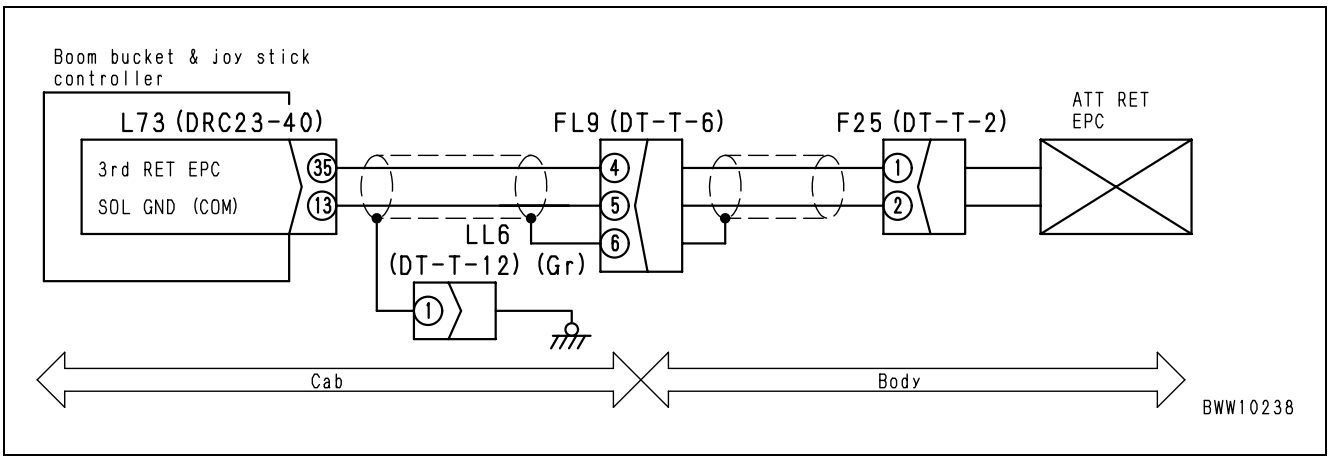
https://truckmanualshub.com/

Error code [DXHKKB]

Action Code	Error Code	Controller Code	Trouble	3rd valve retraction EPC solenoid system ground fault
E03	DXHKKB	WRK		
Description Of Trouble	• 3rd valve retraction EPC solenoid system ground fault prevents output to the 3rd valve EPC solenoid.			
Controller Reaction	• Stops output to the 3rd valve retraction EPC solenoid.			
Effect on Machine	• The 3rd valve cannot retracted.			
Related Information	• Can be checked with the monitoring function (Code: 41907).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective 3rd valve retraction EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F25. 3) Connect T-adapter.		
			Between F2 (male) (1) ~ (3)	Resistance	9 ~ 10.2 Ω
	2	Wiring harness ground fault and defective short circuit	1) Turn starting switch OFF. 2) Disconnect connector L73 and F25. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (35) ~ body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (35) ~ (3)	Resistance	9 ~ 10.2 Ω

Related circuit diagram



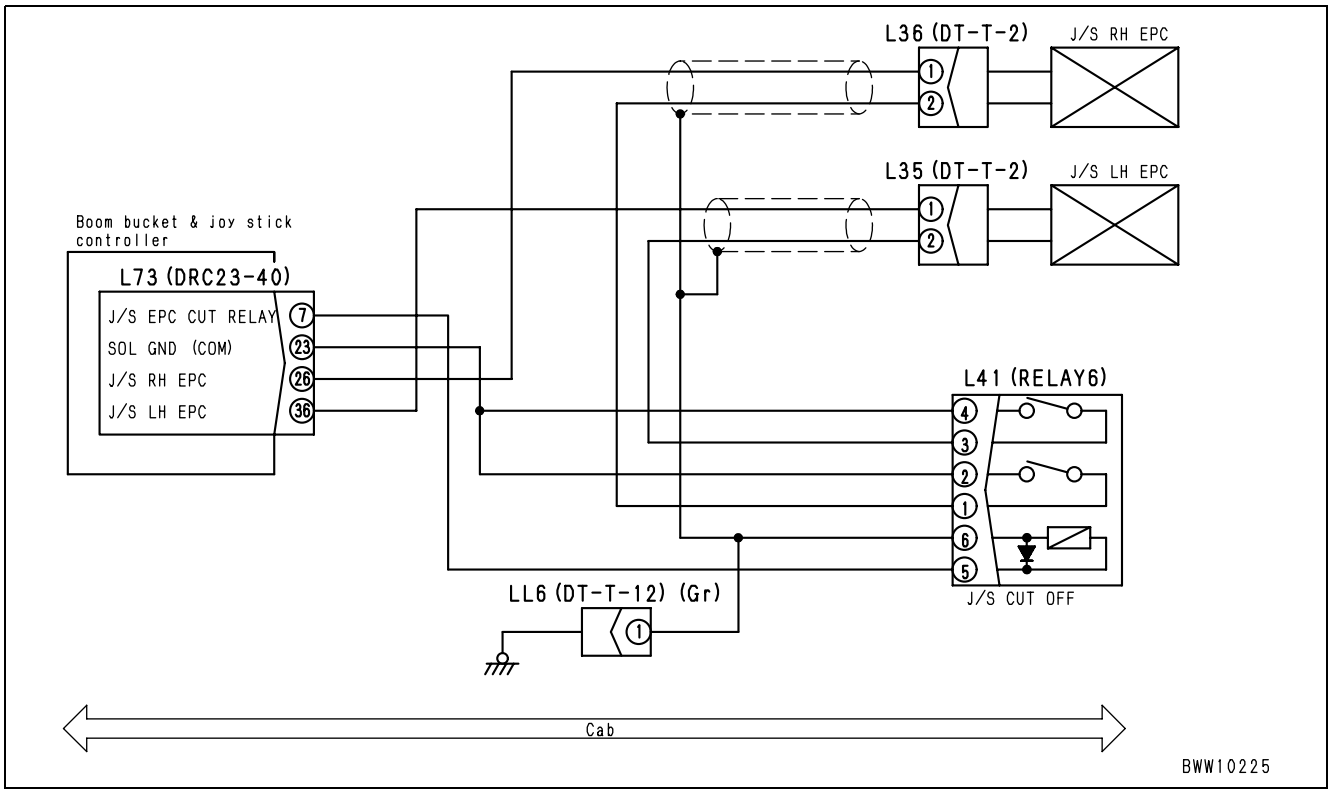
https://truckmanualshub.com/

Error code [DXHLKA]

Action Code	Error Code	Controller Code	Trouble	Joystick steering right-hand EPC solenoid system disconnection
E03	DXHLKA	WRK		
Description of Trouble	• Joystick steering right-hand EPC solenoid system disconnection prevents output to the joystick steering right-hand EPC solenoid.			
Controller Reaction	• Stops output to the joystick steering right-hand EPC solenoid (Both sides).			
Effect on Machine	• Stops output to the joystick steering right-hand EPC solenoid (Both sides). • Stops output to the joystick solenoid cutoff relay.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective joystick steering right-hand EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector L36. 3) Connect T-adapter.		
			Between L36 (male) (1) ~ (2)	Resistance	10 ~ 15 Ω
			Between L36 (male) (1) ~ body	Resistance	1 MΩ or more
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L36. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (26) ~ L36 (female) (1)	Resistance	1 Ω or below
			Wiring harness between L36 (female) (3) ~ L41 (female) (1)	Resistance	1 Ω or below
			Wiring harness between L36 (female) (2) ~ body	Resistance	1 Ω or below
			Wiring harness between L73 (female) (23) ~ L41 (female) (2)	Resistance	1 Ω or below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (26) ~ L41 (female) (1)	Resistance	10 ~ 15 Ω

Related circuit diagram



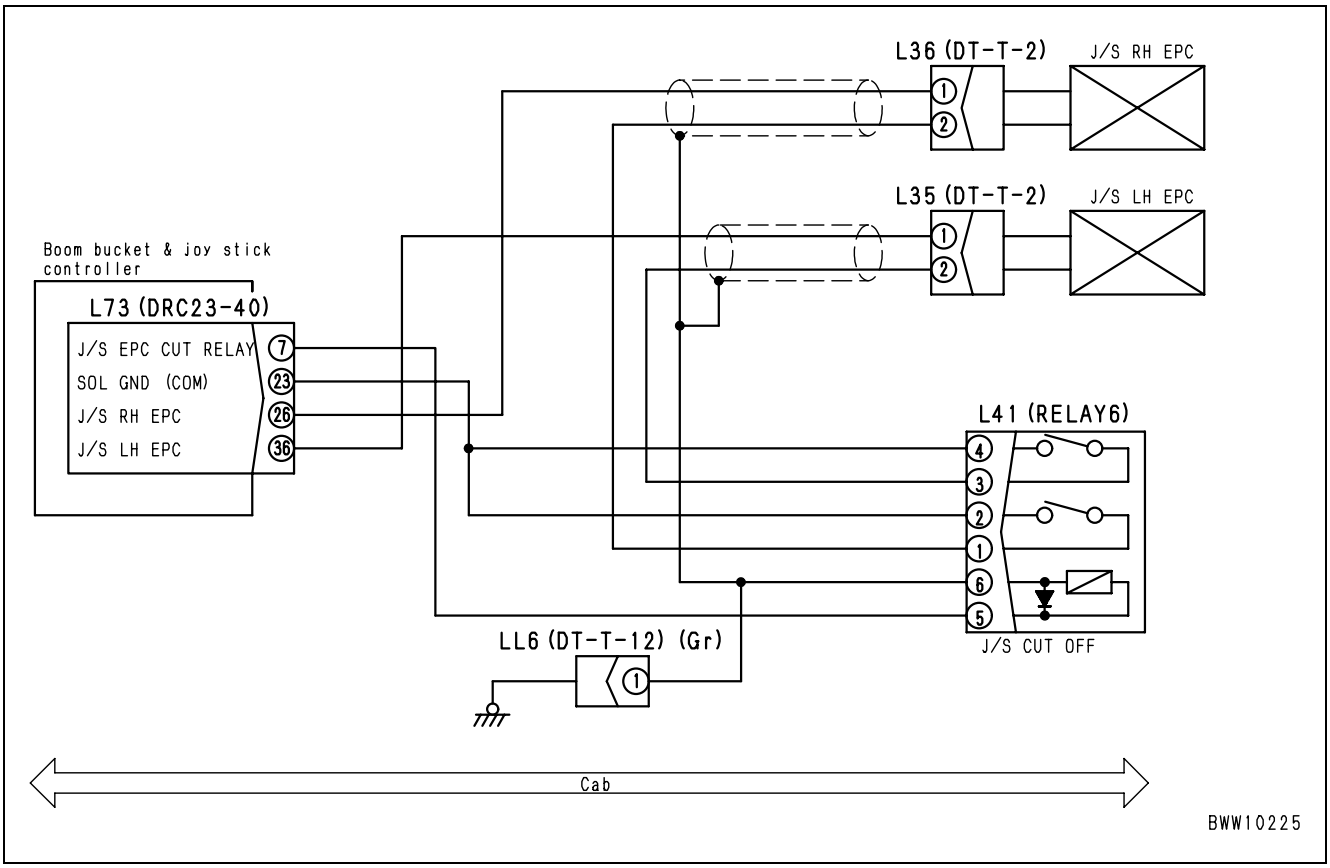
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Error code [DXHLKB]

Action Code	Error Code	Controller Code	Trouble	Joystick steering right-hand EPC solenoid system ground fault
E03	DXHLKB	WRK		
Description of Trouble	• Joystick steering right-hand EPC solenoid system ground fault prevents output to the joystick steering right-hand EPC solenoid.			
Controller Reaction	• Stops output to the joystick steering right-hand EPC solenoid (Both sides). • Stops output to the joystick solenoid cutoff relay.			
Effect on Machine	• Cannot operate the steering with the joystick steering lever.			
Related Information	—			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective joystick steering right-hand EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector L36. 3) Connect T-adapter.		
			Between L36 (male) (1) ~ (2)	Resistance	10 ~ 15 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L36. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (26), L36 (female) (1) ~ body	Resistance	1 MΩ or more
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (26) ~ L41 (female) (1)	Resistance	10 ~ 15 Ω

Related circuit diagram



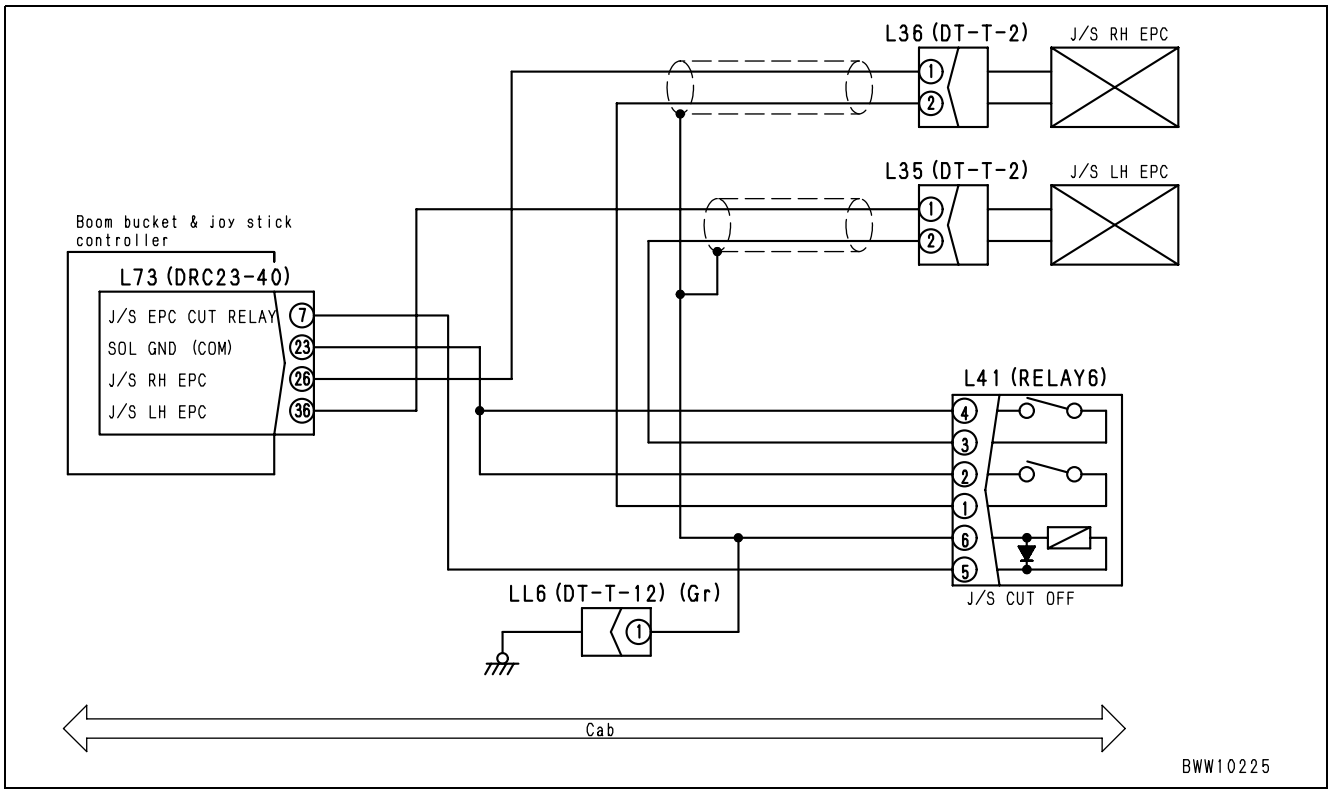
https://truckmanualshub.com/

Error code [DXHMKA]

Action Code	Error Code	Controller Code	Trouble	Joystick steering left-hand EPC solenoid system disconnection
E03	DXHMKA	WRK		
Description of Trouble	• Joystick steering left-hand EPC solenoid system prevents output to the joystick steering left-hand EPC solenoid.			
Controller Reaction	• Stops output to the joystick steering left-hand EPC solenoid (Both sides).			
Effect on Machine	• Stops output to the joystick steering left-hand EPC solenoid (Both sides). • Stops output to the joystick solenoid cutoff relay.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective joystick steering left-hand EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector L35. 3) Connect T-adapter.		
			Between L35 (male) (1) ~ (2)	Resistance	10 ~ 15 Ω
			Between L35 (male) (1) ~ body	Resistance	1 MΩ or more
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L35. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (36) ~ L35 (female) (1)	Resistance	1 Ω or below
			Wiring harness between L35 (female) (2) ~ L41 (female) (3)	Resistance	1 Ω or below
			Wiring harness between L35 (female) (2) ~ body	Resistance	1 Ω or below
			Wiring harness between L73 (female) (23) ~ L41 (female) (4)	Resistance	1 Ω or below
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (36) ~ L41 (female) (3)	Resistance	10 ~ 15 Ω

Related circuit diagram



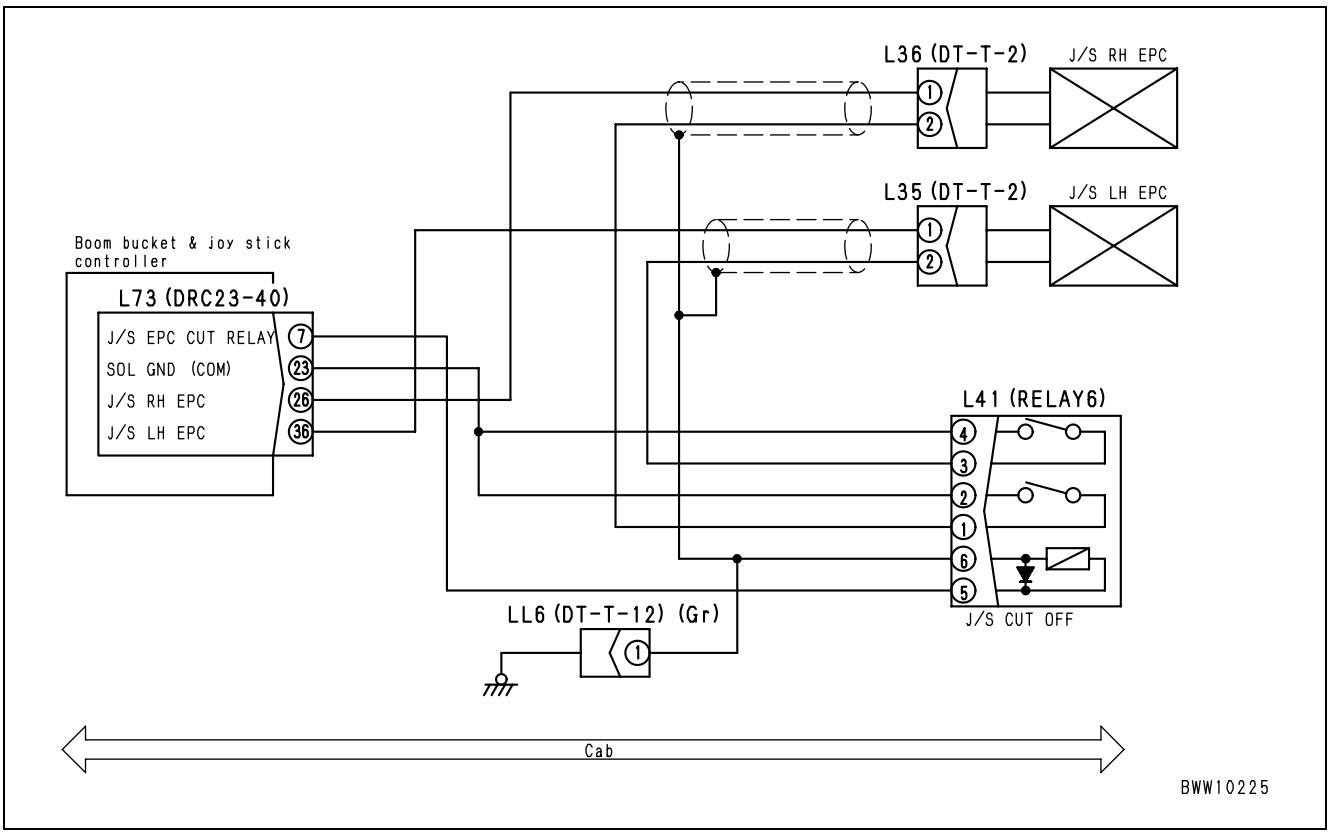
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Error code [DXHMKB]

Action Code	Error Code	Controller Code	Trouble	Joystick steering left-hand EPC solenoid system ground fault
E03	DXHMKB	WRK		
Description of Trouble	• Joystick steering left-hand EPC solenoid system ground fault prevents output to the joystick steering left-hand EPC solenoid.			
Controller Reaction	• Stops output to the joystick steering left-hand EPC solenoid (Both sides).			
Effect on Machine	• Stops output to the joystick steering left-hand EPC solenoid (Both sides). • Stops output to the joystick solenoid cutoff relay.			
Related Information	—			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective joystick steering left-hand EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector L3. 3) Connect T-adapter.		
			Between L35 (male) (1) ~ (2)	Resistance	10 ~ 15 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L35. 3) Connect T-adapter.		
			Wiring harness between L73 (female) (36), L35 (female) (1) ~ body	Resistance	1 MΩ or more
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (36) ~ L41 (female) (3)	Resistance	10 ~ 15 Ω

Related circuit diagram



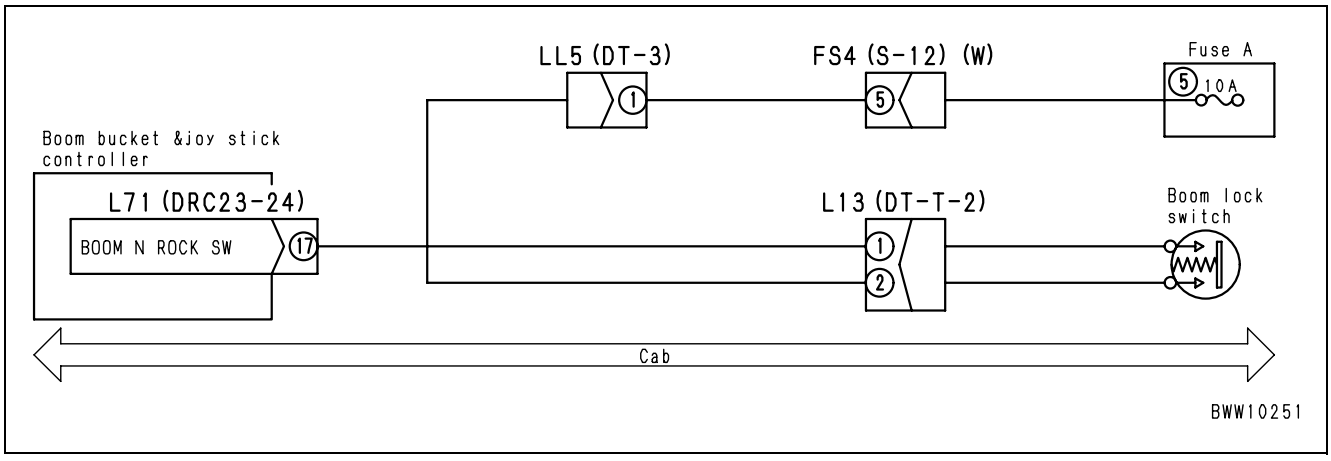
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Action code [WRK-1]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm lock switch system
WRK-1	—	(WRK)		
Description of Trouble	• The work equipment (Lift arm and packet) does not operate due to incorrectly disconnected, short-circuited or grounded lift arm lock (Work equipment lock lever) switch system or cannot be locked.			
Controller Reaction	• No reaction.			
Effect on Machine	• The work equipment (Lift arm and packet) does not operate or cannot be locked.			
Related Information	• Can be checked with the monitoring function (Code: 40917_D_IN_1).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective lift arm lock switch	1) Turn starting switch OFF. 2) Disconnect connectors L13. 3) Connect T-adapter.			
			Between L13 (male) (1) ~ (2)	Boom lock switch = ON	Resistance	1 Ω and below
				Boom lock switch = OFF	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71, L13, and FS4. 3) Connect T-adapter.			
			Between FS4 (female) (5) ~ L13 (male) (2)		Resistance	1 Ω and below
			Wiring harness between L13 (female) (1) ~ L71 (female) (17)		Resistance	1 Ω and below
	3	Wiring harness grounded or short-circuited incorrectly ★ Fuse A-5 blows in this case	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L13. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L13 (female) (1), L71 (female) (17) ~ body		Resistance	1 MΩ and above
	4	Wiring harness hot-shorted incorrectly	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L13. 3) Connect T-adapter.			
			Between L13 (female) (1), L71 (female) (17) ~ body		Voltage	1 V and below
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L71 (17) ~ body	Boom lock switch = ON	Voltage	1 V and below
				Boom lock switch = OFF	Voltage	20 ~ 30 V

Related circuit diagram



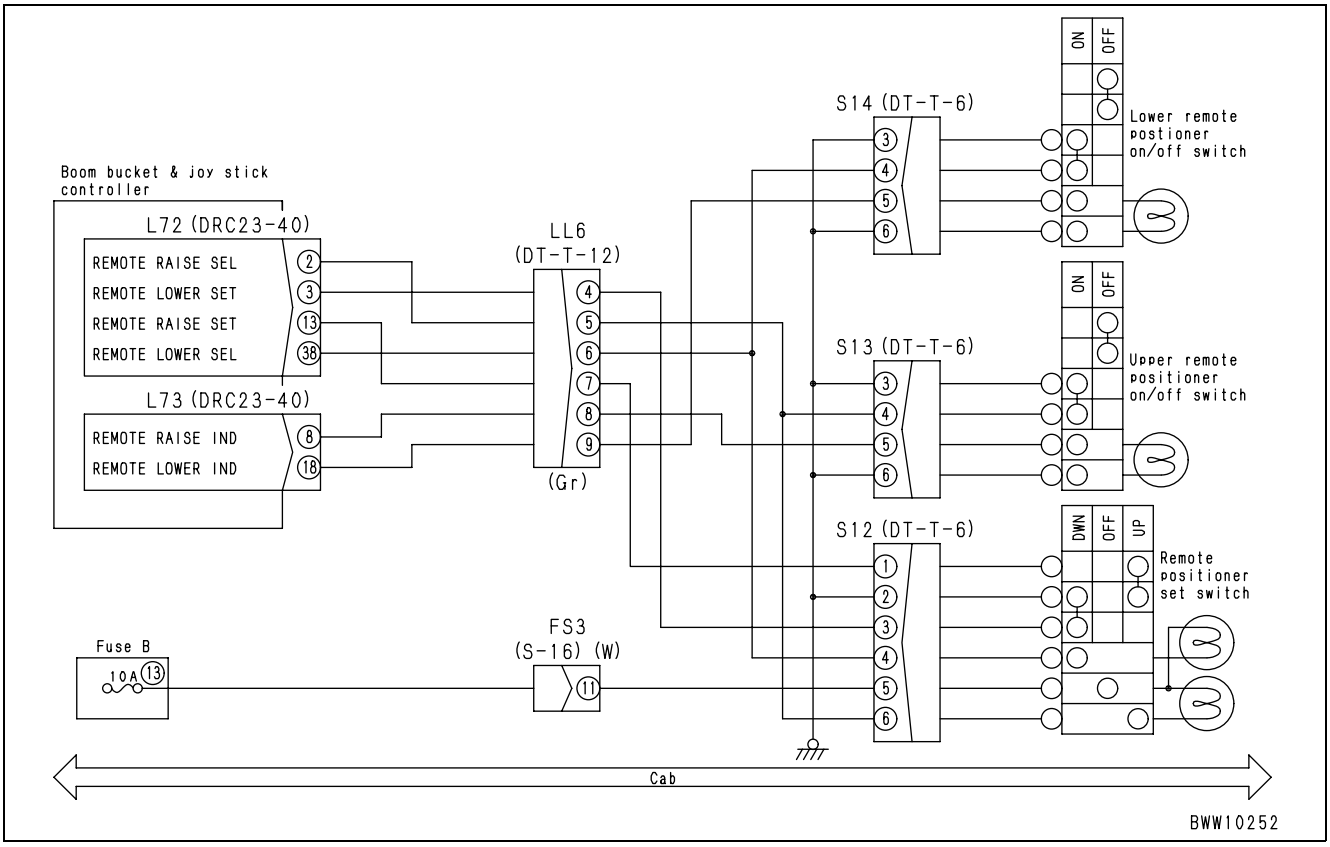
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Action code [WRK-2]

Action Code	Error Code	Controller Code	Trouble	Defective remote positioner RAISE setting switch system.
WRK-2	—	(WRK)		
Description of Trouble	• The RAISE stopping position of the remote positioner cannot be set due to incorrectly disconnected remote positioner RAISE setting switch system and hot-short.			
Controller Reaction	• No reaction.			
Effect on Machine	• The stopping position of the remote positioner RAISE setting cannot be set.			
Related Information	• Can be checked with the monitoring function (Code: 40913_D-IN-28).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective remote positioner RAISE setting switch	1) Turn starting switch OFF. 2) Disconnect connector S12. 3) Connect T-adapter.			
			Between S12 (male) (1) ~ (2)	Remote positioner setting switch = RAISE	Resistance	1 Ω and below
				Remote positioner setting switch = Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L72 and S12. 3) Connect T-adapter.			
			Wiring harness between L72 (female) (13) ~ S12 (female) (1)		Resistance	1 Ω and below
	3	Wiring harness ground fault or hot-shorted	1) Turn starting switch OFF. 2) Disconnect connectors L72 and S12. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (female) (13), S12 (female) (1) ~ body		Voltage	1 V and below
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (male) (13) ~ body	Remote positioner setting switch = RAISE	Voltage	1 V and below
				Remote positioner setting switch = Other than above	Voltage	20 ~ 30 V

Related circuit diagram



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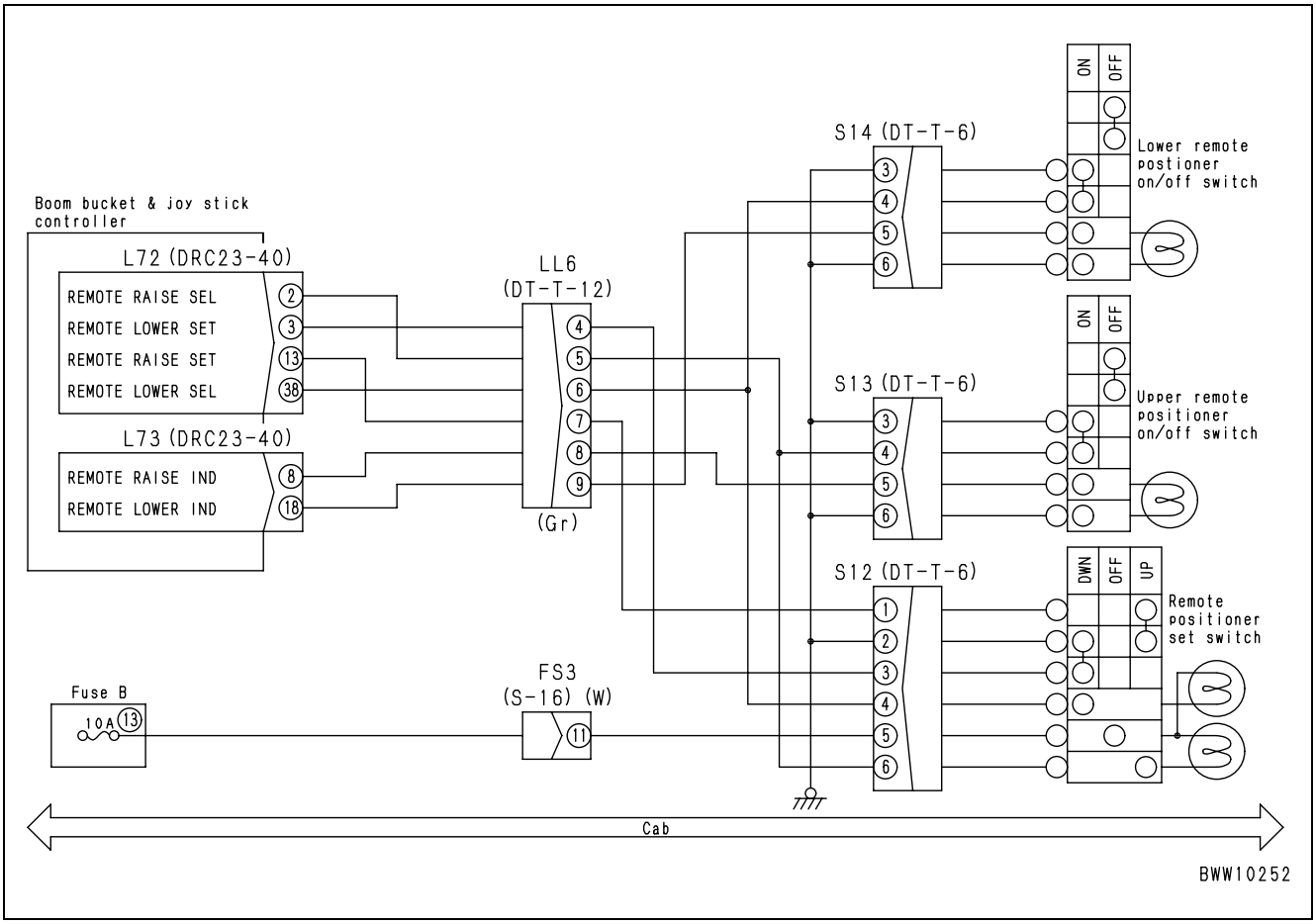
Action code [WRK-3]

Action Code	Error Code	Controller Code	Trouble	Defective remote positioner LOWER setting switch system
WRK-3	—	(WRK)		
Description of Trouble	• The LOWER stopping position of the remote positioner cannot be set due to incorrectly disconnected remote positioner LOWER setting switch system and hot-short.			
Controller Reaction	• No reaction.			
Effect on Machine	• The remote positioner LOWER stopping position cannot be set.			
Related Information	• Can be checked with the monitoring function (Code: 40913_D-IN-29).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective remote positioner LOWER setting switch	1) Turn starting switch OFF. 2) Disconnect connector S12. 3) Connect T-adapter.			
			Between S12 (male) (3) ~ (2)	Remote positioner setting switch = LOWER	Resistance	1 Ω and below
				Remote positioner setting switch = Other than above	Resistance	1 MΩ and above
	2	Wiring harness _discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L72 and S12. 3) Connect T-adapter.			
			Wiring harness between L72 (female) (3) ~ S12 (female) (3)		Resistance	1 Ω and below
	3	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L72 and S12. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (female) (3) ~ S12 (female) (3)		Voltage	1 V and below
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (male) (3) ~ body	Remote positioner setting switch = LOWER	Voltage	1 V and below
				Remote positioner setting switch = Other than above	Voltage	20 ~ 30 V

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Related circuit diagram



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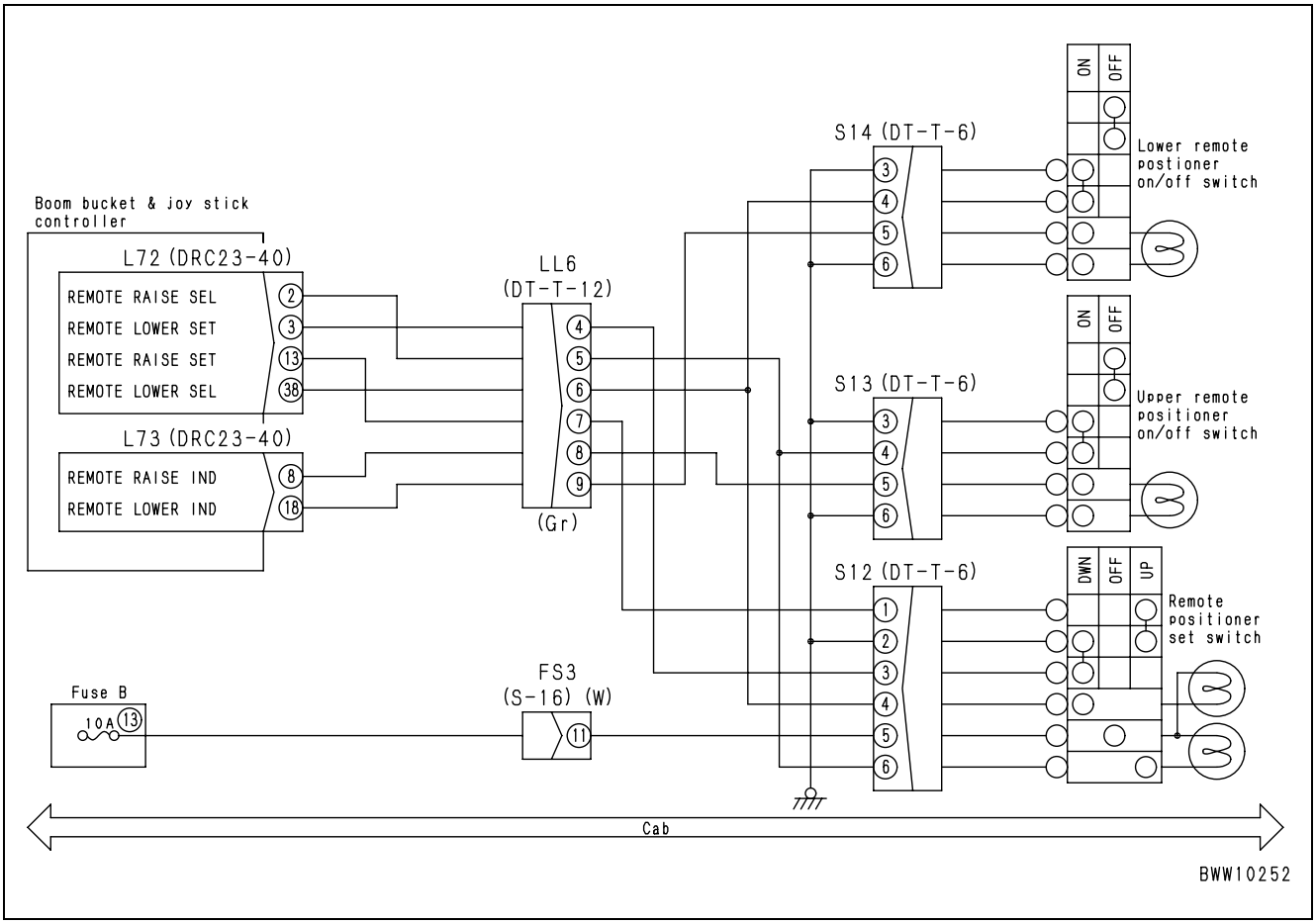
Action code [WRK-4]

Action Code	Error Code	Controller Code	Trouble	Defective remote positioner RAISE selection switch system.
WRK-4	—	(WRK)		
Description of Trouble	• The remote positioner cannot select RAISE or cancel RAISE selection due to incorrectly disconnected, grounded or hot-shorted remote positioner RAISE selection switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• The remote positioner cannot select RAISE or cancel RAISE selection.			
Related Information	• Can be checked with the monitoring function (Code: 40913_D-IN-30).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective remote positioner RAISE selection switch	1) Turn starting switch OFF. 2) Disconnect connector S13. 3) Connect T-adapter.			
			Between S13 (male) (4) ~ (3)	Remote positioner RAISE selection switch = ON	Resistance	1 Ω and below
				Remote positioner RAISE selection switch = OFF	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L72, S13, S12, and FS3. 3) Connect T-adapter.			
			Wiring harness between L72 (female) (2), S13 (female) (4) ~ S12 (female) (6)		Resistance	1 Ω and below
			Wiring harness between FS3 (female) (11) ~ S12 (female) (5)		Resistance	1 Ω and below
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L72, S13, and S12. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L72 (female) (2), S13 (female) (4), S12 (female) (6) ~ body		Resistance	1 MΩ and above
	4	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L72, S13, and S12. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L72 (female) (2), S13 (female) (4), S12 (female) (6) ~ body		Voltage	1 V and below
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (female) (2) ~ body	Remote positioner ON/OFF switch = ON	Voltage	1 V and below
				Remote positioner ON/OFF switch = OFF	Voltage	20 ~ 30 V

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Related circuit diagram



https://truckmanualshub.com/

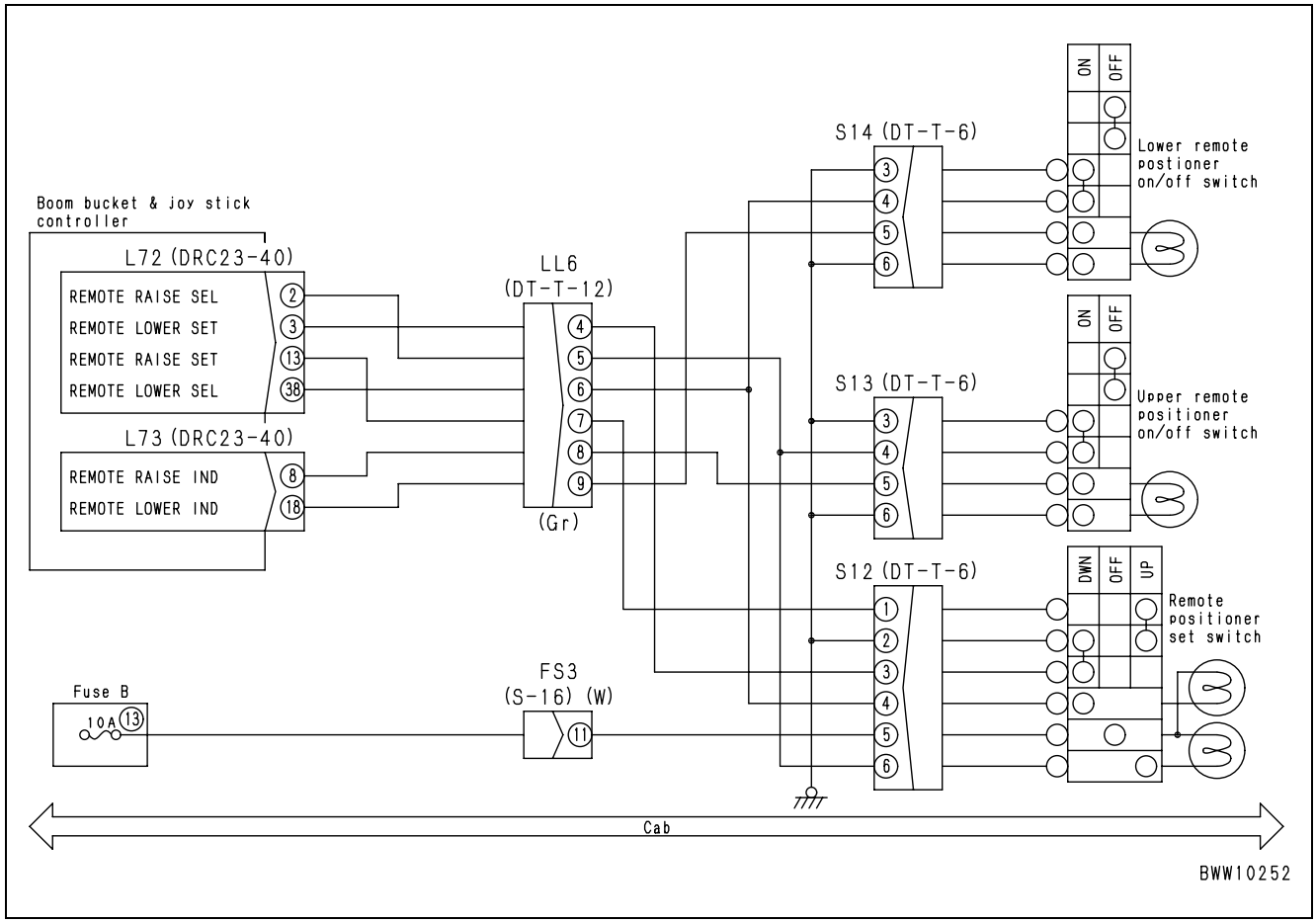
Action code [WRK-5]

Action Code	Error Code	Controller Code	Trouble	Defective remote positioner LOWER ON/OFF switch system
WRK-5	—	(WRK)		
Description of Trouble	• The remote positioner cannot select LOWER or cancel LOWER selection due to incorrectly disconnected, grounded or hot-shorted remote positioner LOWER ON/OFF switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• The remote positioner cannot select LOWER or cancel LOWER selection.			
Related Information	• Can be checked with the monitoring function (Code: 40913_D-IN-31).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective remote positioner LOWER ON/OFF switch	1) Turn starting switch OFF. 2) Disconnect connector S13. 3) Connect T-adapter.			
			Between S14 (male) (4) ~ (3)	Remote positioner ON/OFF switch = ON	Resistance	1 Ω and below
				Remote positioner ON/OFF switch = OFF	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L72, S13, S12, and FS3. 3) Connect T-adapter.			
			Wiring harness between L72 (female) (38) ~ S14 (female) (4) ~ S12 (female) (4)		Resistance	1 Ω and below
			Wiring harness between FS3 (female) (11) ~ S12 (female) (5)		Resistance	1 Ω and below
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L72, S13, and L72. 3) Connect T-adapter.			
			Between L72 (female) (38), S14 (female) (4), S12 (female) (4) ~ body		Resistance	1 MΩ and above
	4	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L72, S14, and S12. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L72 (female) (38), S14 (female) (4), S12 (female) (4) ~ body		Voltage	1 V and below
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connectors L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (female) (38) ~ body	Remote positioner ON/OFF switch = ON	Voltage	1 V and below
				Remote positioner ON/OFF switch = OFF	Voltage	20 ~ 30 V

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Related circuit diagram



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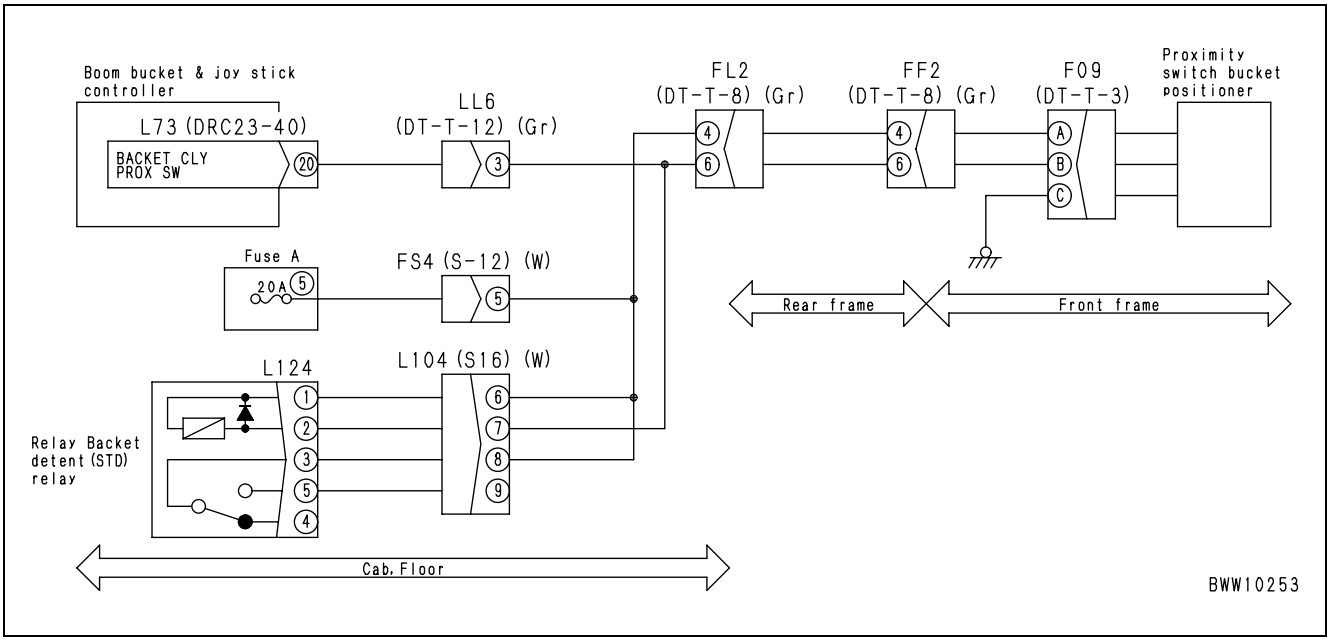
Action code [WRK-6]

Action Code	Error Code	Controller Code	Trouble	Defective bucket cylinder proximity switch system
WRK-6	—	(WRK)		
Description of Trouble	• The bucket leveler does not function due to incorrectly disconnected, grounded or short-circuited bucket cylinder proximity switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• The bucket leveler does not function.			
Related Information	• Can be checked with the monitoring function (Code: 40911_D-IN-9).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73, F09, and L104. 3) Connect T-adapter.			
			Wiring harness between FS4 (female) (4) ~ F09 (female) (1)		Resistance	1 Ω and below
			Wiring harness between L73 (female) (20) ~ F09 (female) (2)		Resistance	1 Ω and below
			Wiring harness between F09 (female) (3) ~ body		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73, F09, and L104. 3) Connect T-adapter.			
			Between L73 (female) (20), F09 (female) (2), L104 (7) ~ body		Resistance	1 MΩ and above
			FS4 (female) (5), F09 (female) (1) ~ body ★ Fuse A-F blows in this case		Resistance	1 MΩ and above
	3	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73, F09, and L104. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (female) (20), F09 (female) (2), L104 (7) ~ body		Voltage	1 V and below
	4	Defective bucket cylinder proximity switch	1) Turn starting switch OFF. 2) Disconnect connector F09. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between F09 (2) ~ (3)	Bucket under level	Voltage	1 V and below
				Bucket above level	Voltage	20 ~ 30 V
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (20) ~ body	Bucket under level	Voltage	1 V and below
				Bucket above level	Voltage	20 ~ 30 V

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Related circuit diagram



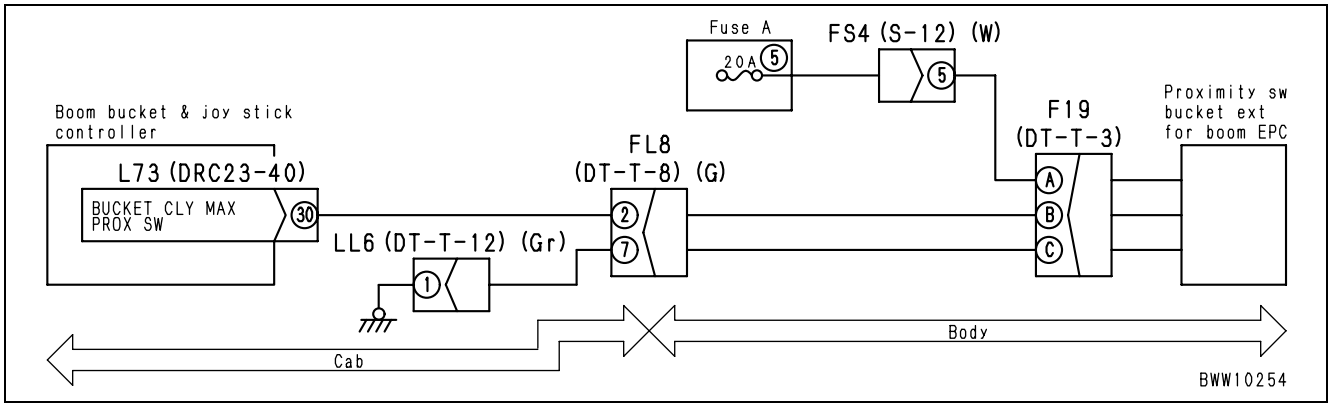
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Action code [WRK-7]

Action Code	Error Code	Controller Code	Trouble	Defective bucket cylinder full stroke detection system
WRK-7	—	(WRK)		
Description of Trouble	• The semi-automatic general operation mode is not available or cannot be cancelled due to incorrectly disconnected, grounded or short-circuited bucket cylinder full stroke detection switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Semi-automatic general operation mode is not available or cannot be cancelled.			
Related Information	• Can be checked with the monitoring function (Code: 40911_D-IN-10).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73, F19, and L104. 3) Connect T-adapter.			
			Wiring harness between FS4 (female) (5) ~ F19 (female) (1)		Resistance	1 Ω and below
			Wiring harness between L73 (female) (30) ~ F19 (female) (2)		Resistance	1 Ω and below
			Wiring harness between F19 (female) (3) ~ body		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F19. 3) Connect T-adapter.			
			Between L73 (female) (30), F19 (female) (2) ~ body		Resistance	1 MΩ and above
			FS4 (female) (5), F19 (female) (2) ~ body ★ Fuse A-F blows in this case		Resistance	1 MΩ and above
	3	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F19. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (female) (30), F19 (female) (2) ~ body		Voltage	1 V and below
	4	Defective bucket cylinder full stroke detection switch	1) Turn starting switch OFF. 2) Disconnect connector F19. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between F19 (2) ~ (3)	Other than tilt stroke end	Voltage	1 V and below
				Tilt stroke end	Voltage	20 ~ 30 V
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (30) ~ body	Other than tilt stroke end	Voltage	1 V and below
				Tilt stroke end	Voltage	20 ~ 30 V

Related circuit diagram



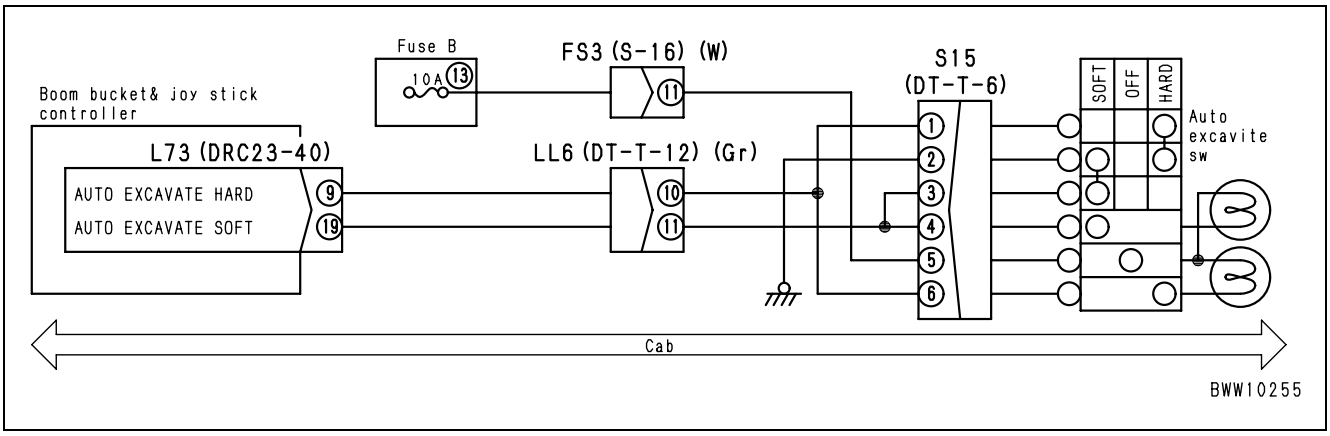
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Action code [WRK-8]

Action Code	Error Code	Controller Code	Trouble	Defective semi-automatic digging hardware selection switch system
WRK-8	—	(WRK)		
Description of Trouble	• The semi-automatic digging hardware control is not available or the semi-automatic digging hardware mode cannot be cancelled due to incorrectly disconnected, grounded or short-circuited semi-automatic digging hardware selection switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Semi-automatic digging hardware control is not available or the semi-automatic digging hardware mode cannot be cancelled.			
Related Information	• Can be checked with the monitoring function (Code: 40911_D-IN-12).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73, and S15. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (9) ~ S15 (female) (1)		Resistance	1 Ω and below
			Wiring harness between S15 (female) (2) ~ body		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73 and S15. 3) Connect T-adapter.			
			Between L73 (female) (9), S15 (female) (1) ~ body		Resistance	1 MΩ and above
			FS4 (female) (11), S15 (female) (5) ~ body ★ Fuse A-F blows in this case		Resistance	1 MΩ and above
	3	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and S15. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (female) (9), S15 (female) (1) ~ body		Voltage	1 V and below
	4	Defective semi-automatic digging (Hardware)	1) Turn starting switch OFF. 2) Disconnect connector S15. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between S15 (1) ~ (2)	Semi-automatic digging switch (Hardware) = ON	Voltage	1 V and below
				Semi-automatic digging switch (Hardware) = Other than ON	Voltage	20 ~ 30 V
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (9) ~ body	Semi-automatic digging switch (Hard) = ON	Voltage	1 V and below
				Semi-automatic digging switch (Hard) = Other than ON	Voltage	20 ~ 30 V

Related circuit diagram



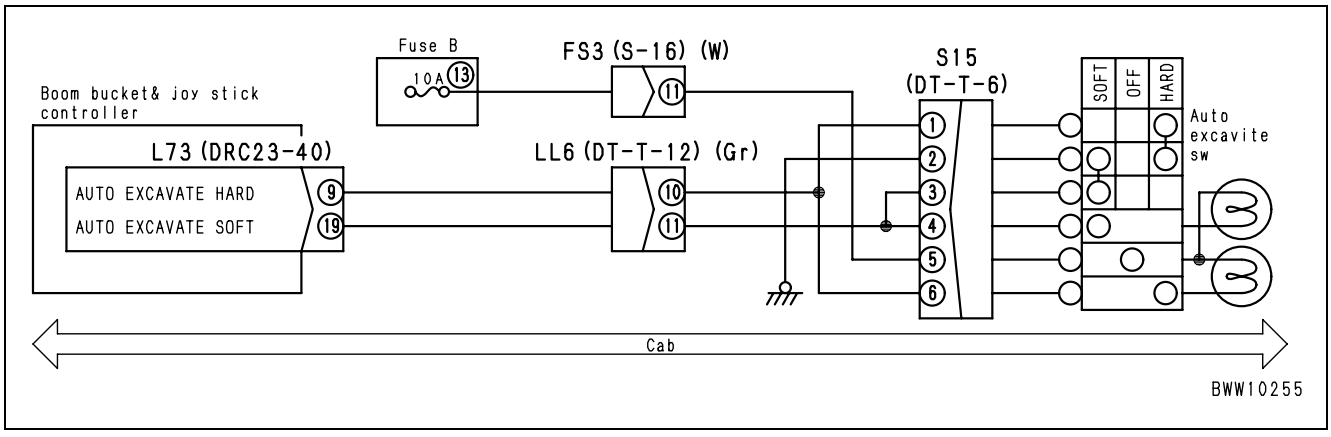
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Action code [WRK-9]

Action Code	Error Code	Controller Code	Trouble	Defective semi-automatic digging software selection switch system
WRK-9	—	(WRK)		
Description of Trouble	• The semi-automatic digging software control is not available or the semi-automatic digging hardware mode cannot be cancelled due to incorrectly disconnected, grounded or short-circuited semi-automatic digging software selection switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Semi-automatic digging software control is not available or the semi-automatic digging software mode cannot be cancelled.			
Related Information	• Can be checked with the monitoring function (Code: 40911_D-IN-13).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and S15. 3) Connect T-adapter.			
			Wiring harness between L73 (female) (19) ~ S15 (female) (3)		Resistance	1 Ω and below
			Wiring harness between S15 (female) (2) ~ body		Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73 and S15. 3) Connect T-adapter.			
			Between L73 (female) (19), S15 (female) (3) ~ body		Resistance	1 MΩ and above
			FS4 (female) (11), S15 (female) (5) ~ body ★ Fuse A-F blows in this case		Resistance	1 MΩ and above
	3	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and S15. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (female) (19), S15 (female) (3) ~ body		Voltage	1 V and below
	4	Defective semi-automatic digging switch (Software)	1) Turn starting switch OFF. 2) Disconnect connector S15. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between S15 (3) ~ (2)	Semi-automatic digging switch (Software) = ON	Voltage	1 V and below
				Semi-automatic digging switch (Software) = Other than ON	Voltage	20 ~ 30 V
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L72 (19)~ body	Semi-automatic digging switch (Software) = ON	Voltage	1 V and below
				Semi-automatic digging switch (Software) = Other than ON	Voltage	20 ~ 30 V

Related circuit diagram



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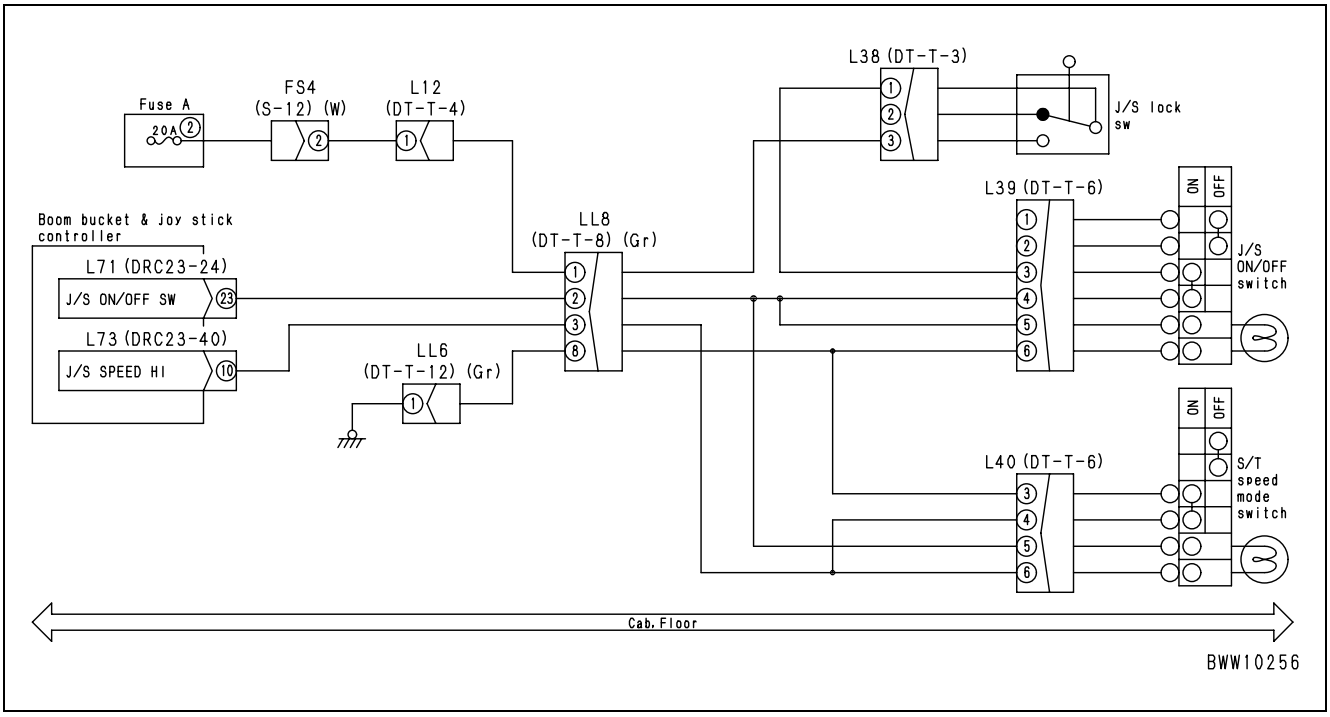
Action code [WRK-10]

Action Code	Error Code	Controller Code	Trouble	Defective joystick ON/OFF switch system
WRK-10	—	(WRK)		
Description of Trouble	• The joystick mode cannot be used or be cancelled due to defective joystick ON/OFF switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• The joystick mode cannot be used or cancelled.			
Related Information	• Can be checked with the monitoring function (Code: 40910_D-IN-0).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective joystick ON/OFF switch	1) Turn starting switch OFF. 2) Disconnect connector L39. 3) Connect T-adapter.			
			Between L39 (female) (4) ~ (3)	Joystick ON/OFF switch = ON	Resistance	1 Ω and below
				Other than above = OFF	Resistance	1 MΩ and above
	2	Defective joystick N lock switch	1) Turn starting switch OFF. 2) Disconnect connector L38. 3) Connect T-adapter.			
			Between L38 (female) (4) ~ (3)	Left arm rest = Lock	Resistance	1 Ω and below
				Other than above = OFF	Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71, L39, and L38. 3) Connect T-adapter.			
			Wiring harness between L71 (female) (23) ~ L39 (female) (4)		Resistance	1 Ω and below
			Wiring harness between L38 (female) (1) and L39 (female) (3)		Resistance	1 Ω and below
			1) Turn starting switch OFF. 2) Disconnect connectors L71 and L38. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L38 (female) (1) ~ body		Voltage	20 ~ 30 V
	4	Hot-shorted wiring harness (Contacting 24 V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and S40. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L71 (female) (23), S04 (female) (4) ~ body		Voltage	1 V and below
	5	Wiring harness ground fault Fuse A-2 blows at switch operation in this case	1) Turn starting switch OFF. 2) Disconnect connectors L71, S04, L71, L39, and L40.			
			Between L71 (female) (23), S04 (female) (4) ~ body		Resistance	1 MΩ and above
	6	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L71 (23) ~ body	Joystick ON/OFF switch = ON	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

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Related circuit diagram



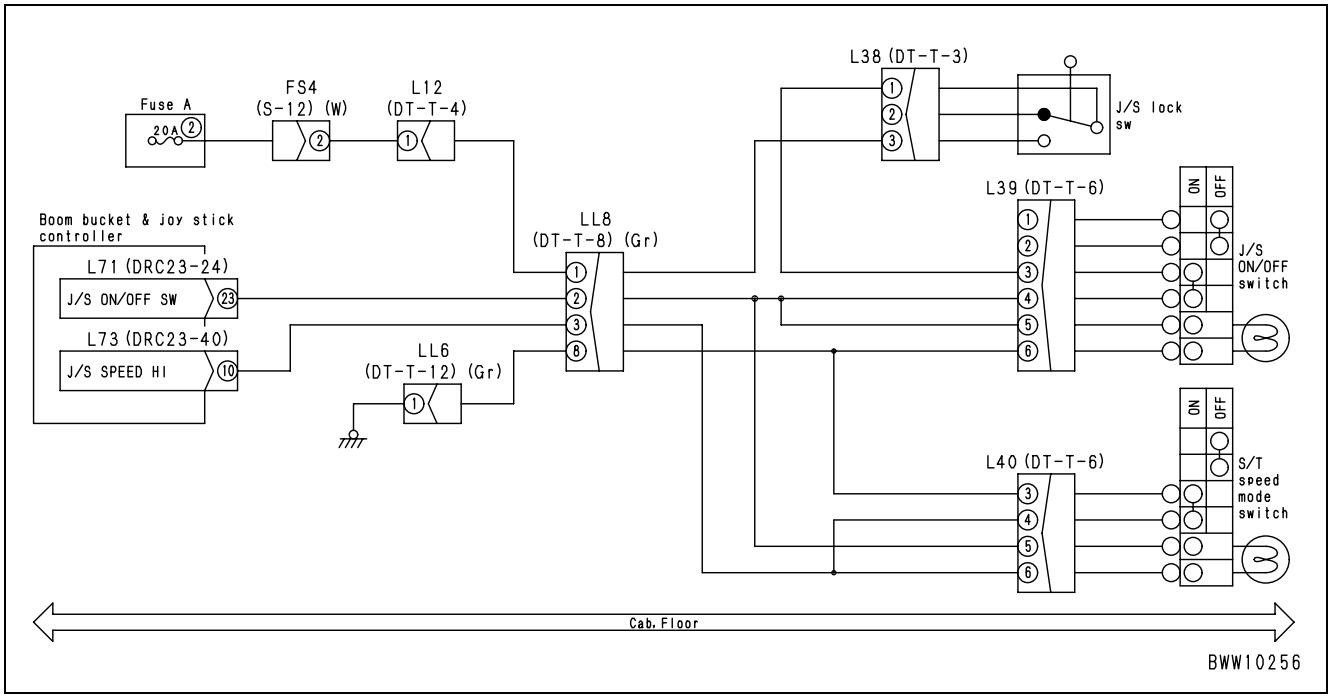
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Action code [WRK-11]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering speed HI/LO switch system
WRK-11	—	(WRK)		
Description of Trouble	• The joystick steering speed slows or accelerates (Cannot be switched between HI/LO) due to defective joystick steering speed HI/LO switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• The joystick steering speed slows or accelerates (Cannot be switched between HI/LO).			
Related Information	• Can be checked with the monitoring function (Code: 40910_D-IN-8).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective joystick HI/LO switch	1) Turn starting switch OFF. 2) Disconnect connector L40. 3) Connect T-adapter.			
			Between L40 (female) (4) ~ (3)	Joystick ON/OFF switch = ON	Resistance	1 Ω and below
				Other than above = OFF	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L40. 3) Connect T-adapter.			
			Wiring harness between L73 (10) ~ L40 (female) (4)		Resistance	1 Ω and below
			Between L40 (female) (3) ~ body		Resistance	1 Ω and below
	3	Hot-shorted wiring harness (Contacting 24 V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L73, and L40. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L73 (10), L40 (female) (4) ~ body		Voltage	1 V and below
	4	Wiring harness ground fault ★ Fuse A-2 blows at switch operation in this case	1) Turn starting switch OFF. 2) Disconnect connector L73, S04, L71, L40 and L40.			
			Between L73 (10), L40 (female) (4) ~ body		Resistance	1 MΩ and above
	5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L73 (10) ~ body	Joystick ON/OFF switch = ON	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

Related circuit diagram



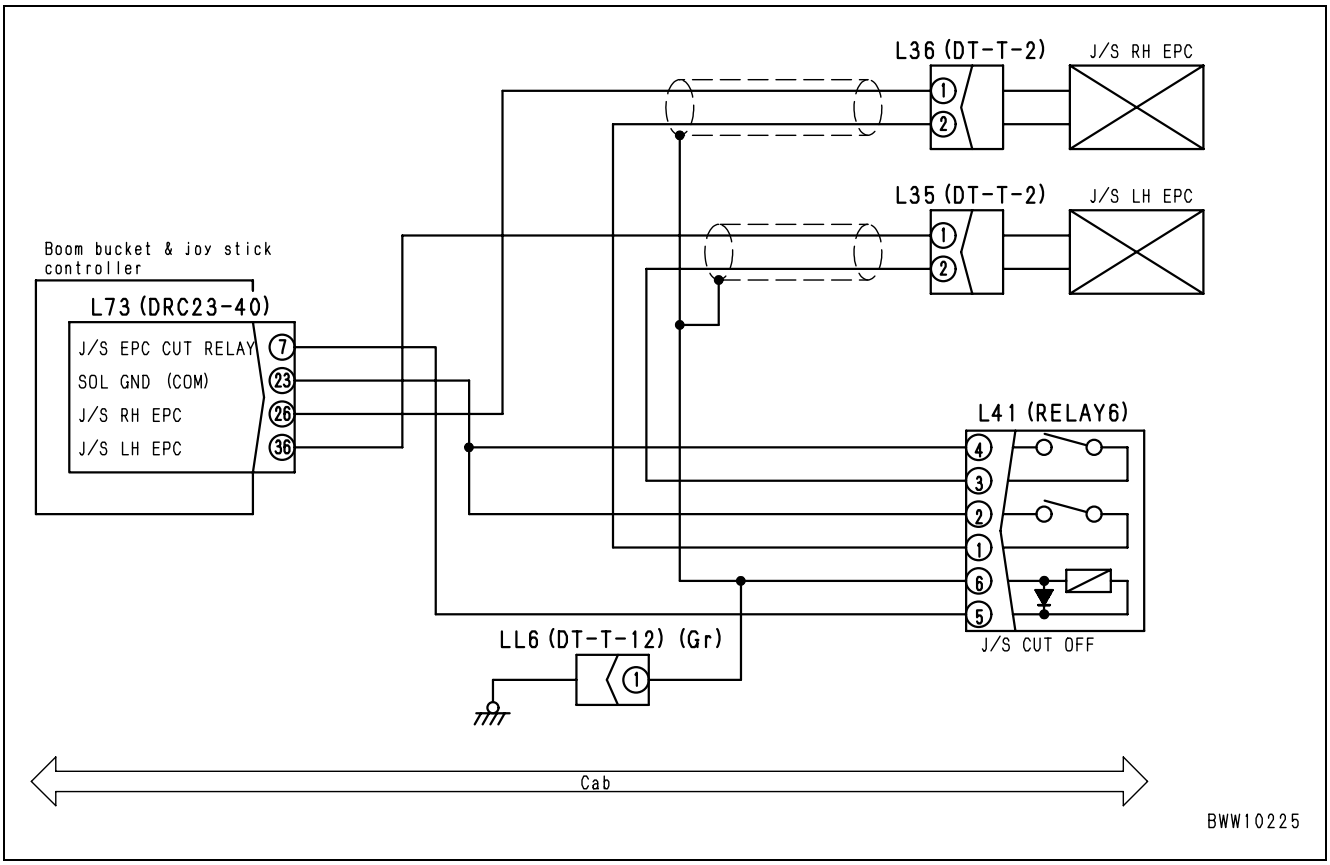
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Action code [WRK-12]

Action Code	Error Code	Controller Code	Trouble	Defective joystick solenoid cut relay output system
WRK-12	—	(WRK)		
Description of Trouble	• The joystick mode cannot be used or be cancelled due to defective joystick ON/OFF switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• The joystick steering solenoid cannot be turned OFF.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Hot-shorted wiring harness (Contacting 24 V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L41. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (7), L41 (female) (5) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	5) Turn starting switch OFF. 6) Disconnect connector L63. 7) Connect T-adapter.		
			Between L73 (female) (7) ~ body	Resistance	200 ~ 400 Ω

Related circuit diagram



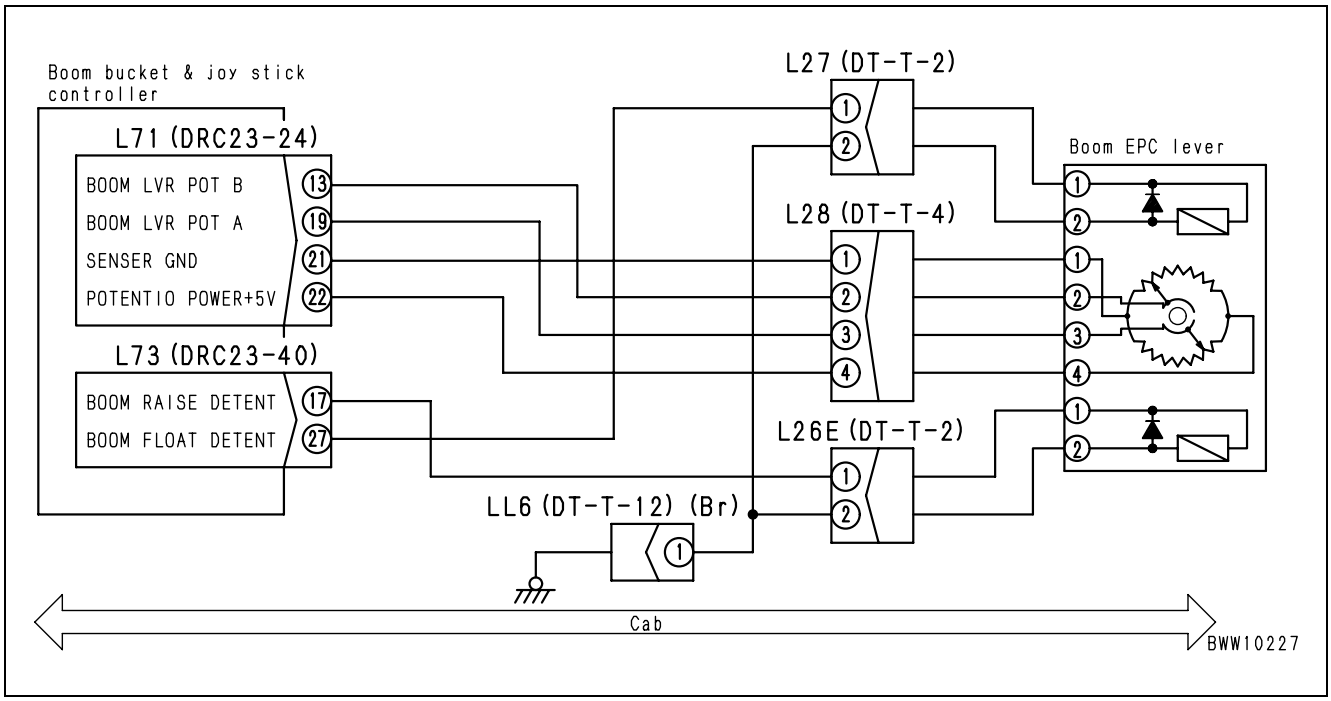
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Action code [WRK-13]

Action Code	Error Code	Controller Code	Trouble	Short-circuited lift arm RAISE magnet detent output system
WRK-13	—	(WRK)		
Description of Trouble	• RAISE detent cannot be cancelled due to short-circuited lift arm RAISE magnet detent output system.			
Controller Reaction	• No reaction.			
Effect on Machine	• RAISE detent left turned ON. • Normal operation is possible excluding automatic cancel of detent.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L26. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (17), L26 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (17) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



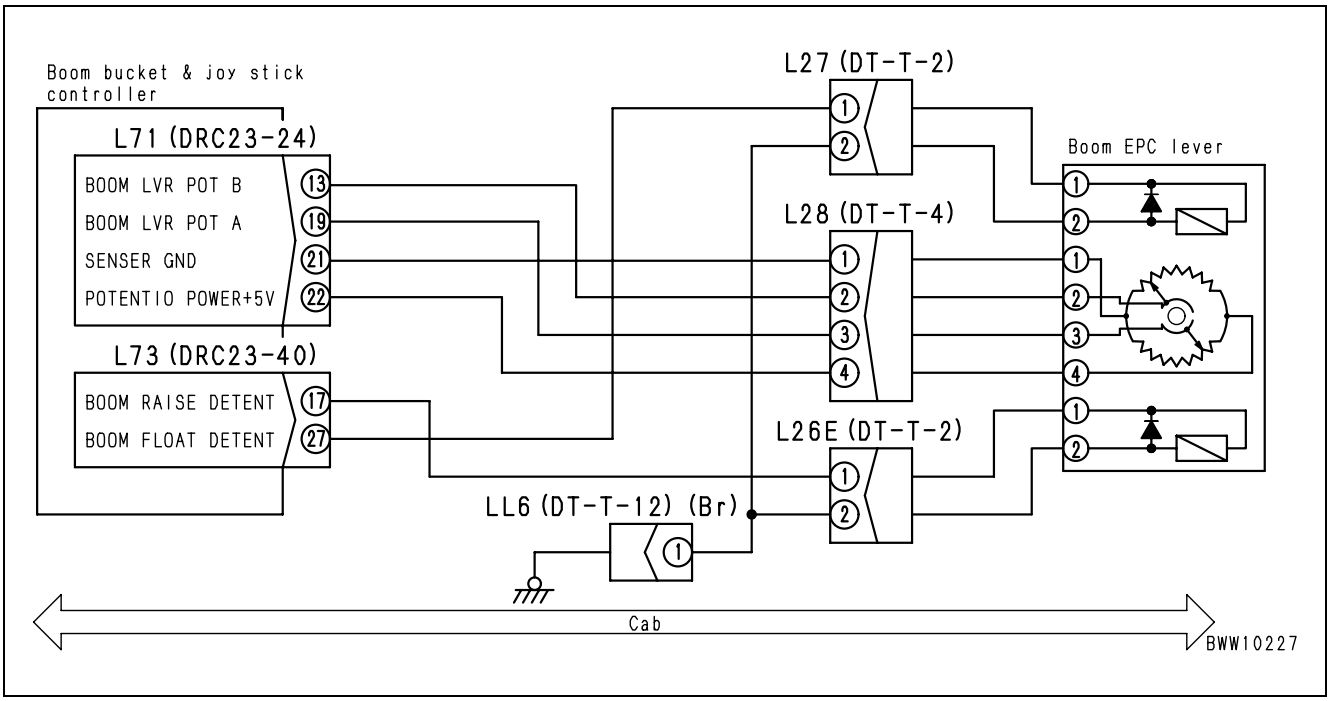
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Action code [WRK-14]

Action Code	Error Code	Controller Code	Trouble	Short-circuited lift arm floating magnet detent output system
WRK-14	—	(WRK)		
Description of Trouble	• Floating detent cannot be cancelled due to short-circuited lift arm floating magnet detent output system.			
Controller Reaction	• No reaction.			
Effect on Machine	• RAISE detent left turned ON. • Normal operation is possible excluding automatic cancel of detent.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L27. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (27), L26 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (27) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



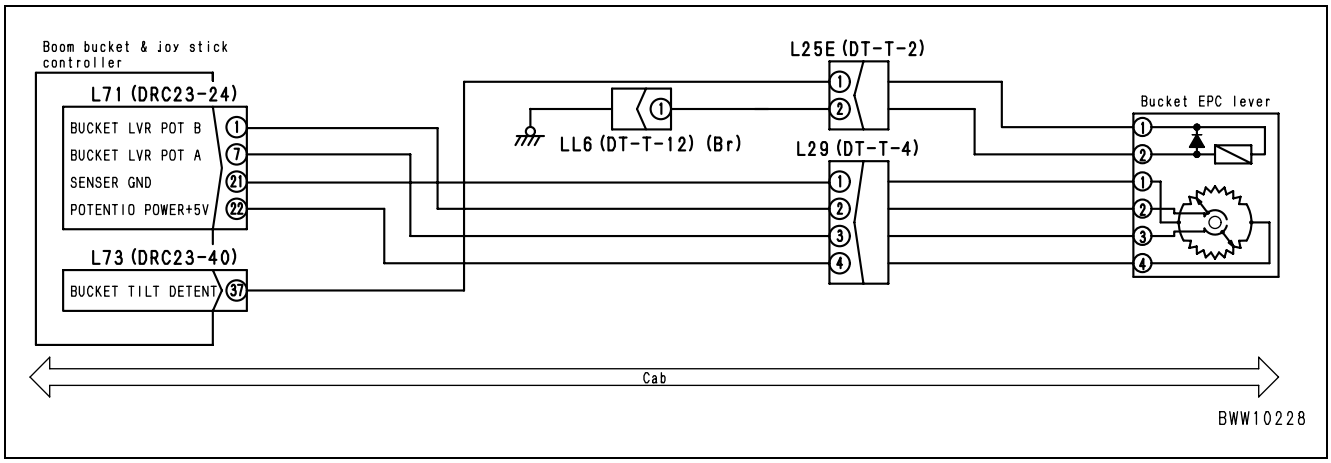
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Action code [WRK-15]

Action Code	Error Code	Controller Code	Trouble	Short-circuited bucket tilt magnet detent output system
WRK-15	—	(WRK)		
Description of Trouble	• Tilt detent cannot be cancelled due to short-circuited bucket tilt magnet detent output system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Tilt detent left turned ON. • Normal operation is possible excluding automatic cancel of detent.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L25. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (37), L25 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (37) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



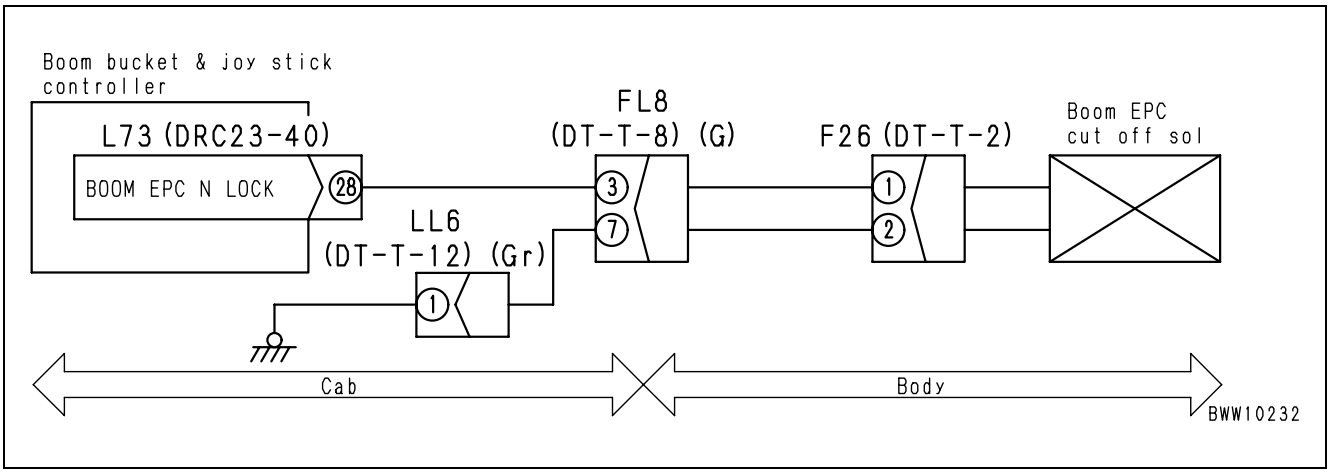
https://truckmanualshub.com/

Action code [WRK-16]

Action Code	Error Code	Controller Code	Trouble	Short-circuited work equipment neutral lock solenoid output system
WRK-16	—	(WRK)		
Description of Trouble	• Neutral lock solenoid cannot be turned OFF due to short-circuited work equipment neutral lock solenoid output system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Working equipment locked even when the lock lever is free.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F26. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (28), F26 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (28) ~ body	Resistance	35 ~ 45 Ω

Related circuit diagram



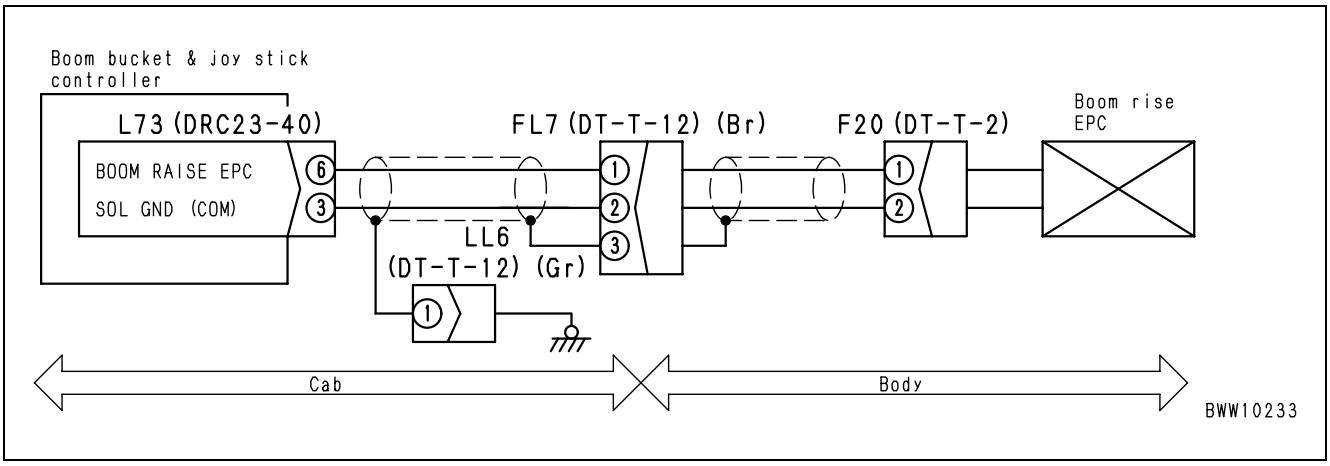
https://truckmanualshub.com/

Action code [WRK-17]

Action Code	Error Code	Controller Code	Trouble	Short-circuited lift arm RAISE EPC solenoid
WRK-17	—	(WRK)		
Description of Trouble	• Lift arm RAISE EPC solenoid gets turned on due to short-circuited lift arm RAISE EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Lift arm raises in full speed.			
Related Information	—			

Possible Causes and Standard Values		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F20. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (6), F20 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (6) ~ body	Resistance	9 ~ 10.2 Ω

Related circuit diagram



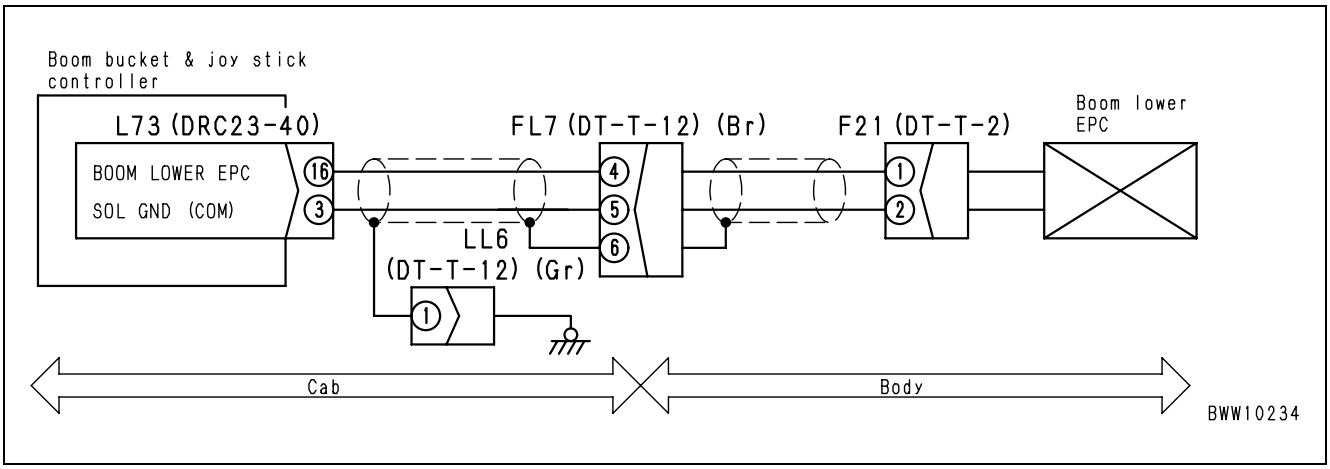
https://truckmanualshub.com/

Action code [WRK-18]

Action Code	Error Code	Controller Code	Trouble	Short-circuited lift arm LOWER EPC solenoid
WRK-18	—	(WRK)		
Description of Trouble	• Lift arm LOWER EPC solenoid gets turned on due to short-circuited lift arm LOWER EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Lift arm lowers in full speed.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F21. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (16), F21 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (16) ~ body	Resistance	9 ~ 10.2 Ω

Related circuit diagram



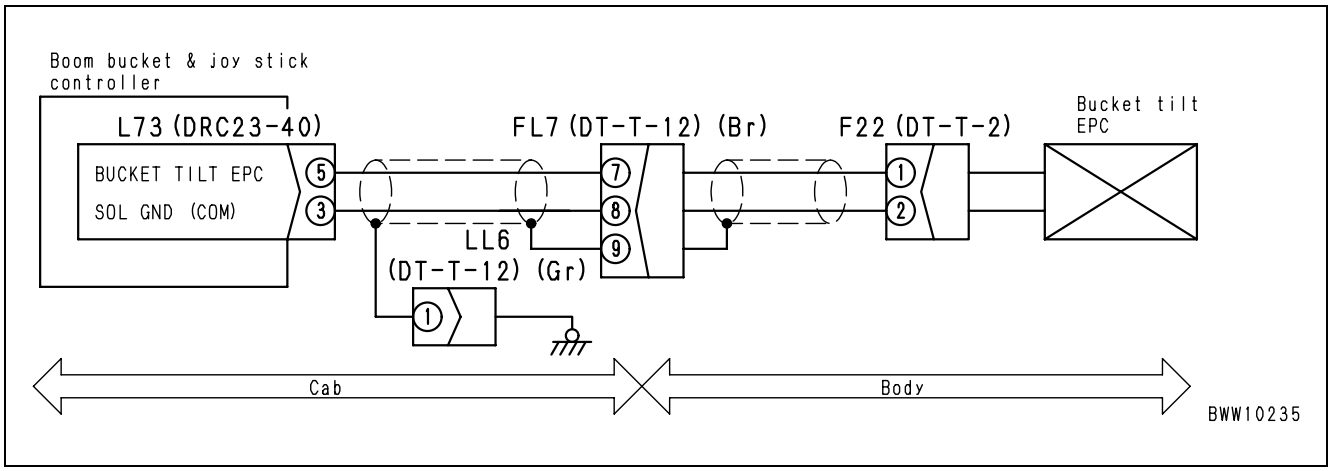
https://truckmanualshub.com/

Action code [WRK-19]

Action Code	Error Code	Controller Code	Trouble	Short-circuited bucket tilt EPC solenoid system
WRK-19	—	(WRK)		
Description of Trouble	• Bucket tilt EPC solenoid gets turned on due to short-circuited bucket tilt EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Lift arm tilts in full speed.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F22. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (5), F22 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (5) ~ body	Resistance	9 ~ 10.2 Ω

Related circuit diagram



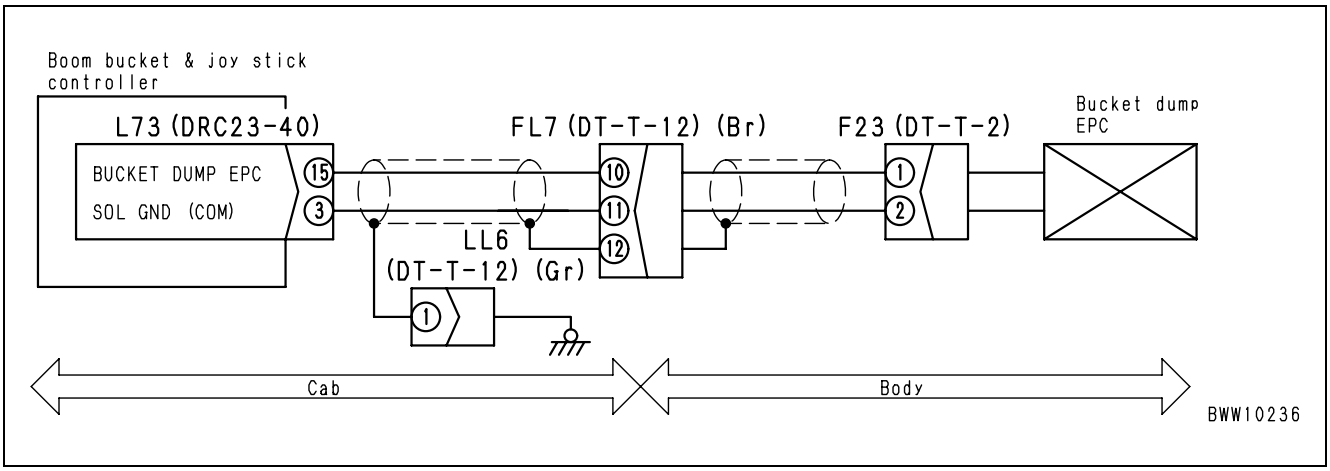
https://truckmanualshub.com/

Action code [WRK-20]

Action Code	Error Code	Controller Code	Trouble	Short-circuited bucket dump EPC solenoid system
WRK-20	—	(WRK)		
Description of Trouble	• Bucket dump EPC solenoid gets turned on due to short-circuited bucket dump EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Bucket dumps in full speed.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F23. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (15), F23 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (15) ~ body	Resistance	9 ~ 10.2 Ω

Related circuit diagram



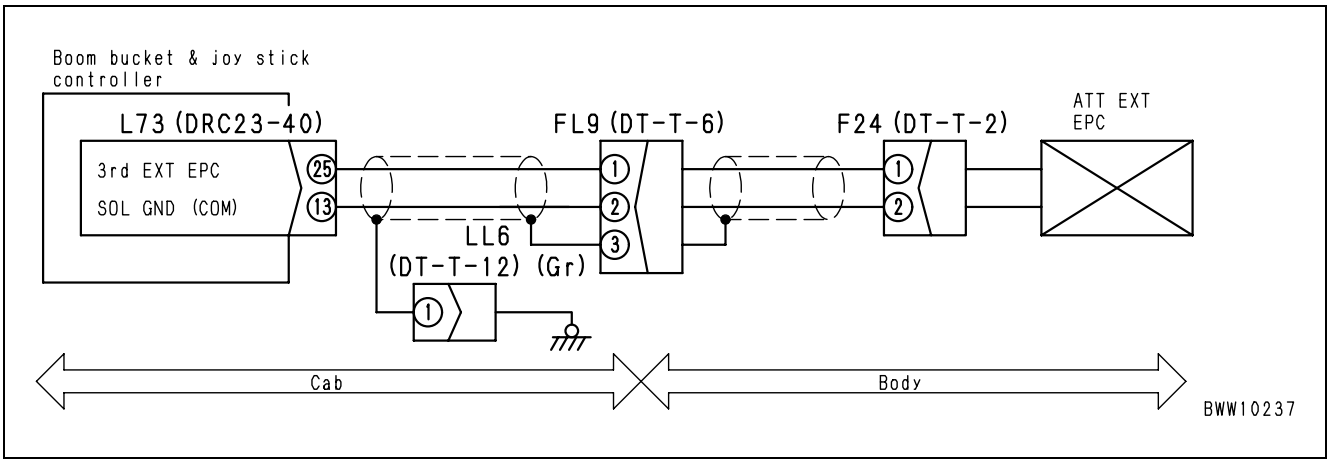
https://truckmanualshub.com/

Action code [WRK-21]

Action Code	Error Code	Controller Code	Trouble	Short-circuited 3 valves extension EPC solenoid system
WRK-21	—	(WRK)		
Description of Trouble	• 3 valves extension EPC solenoid gets turned on due to short-circuited 3 valves extension EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• 3 valves extend in full speed.			
Related Information	—			

Possible Causes and Standard Values		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F23. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (25), F24 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (25) ~ body	Resistance	9 ~ 10.2 Ω

Related circuit diagram



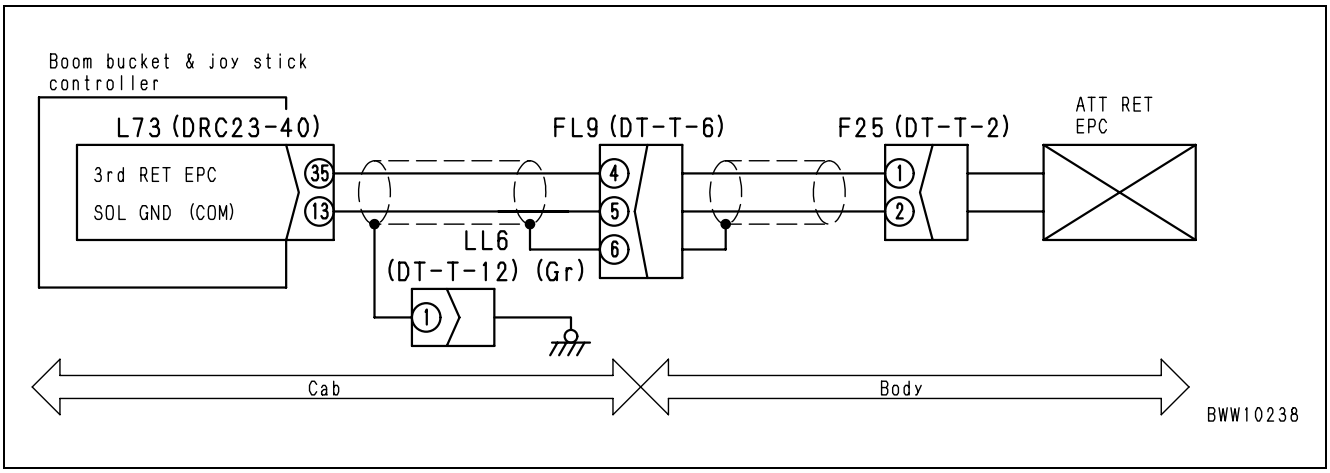
https://truckmanualshub.com/

Action code [WRK-22]

Action Code	Error Code	Controller Code	Trouble	Short-circuited 3 valves retraction EPC solenoid system
WRK-22	—	(WRK)		
Description of Trouble	• 3 valves retraction EPC solenoid gets turned on due to short-circuited 3 valves retraction EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• 3 valves retract in full speed.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F25. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (35), F25 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (35) ~ body	Resistance	9 ~ 10.2 Ω

Related circuit diagram



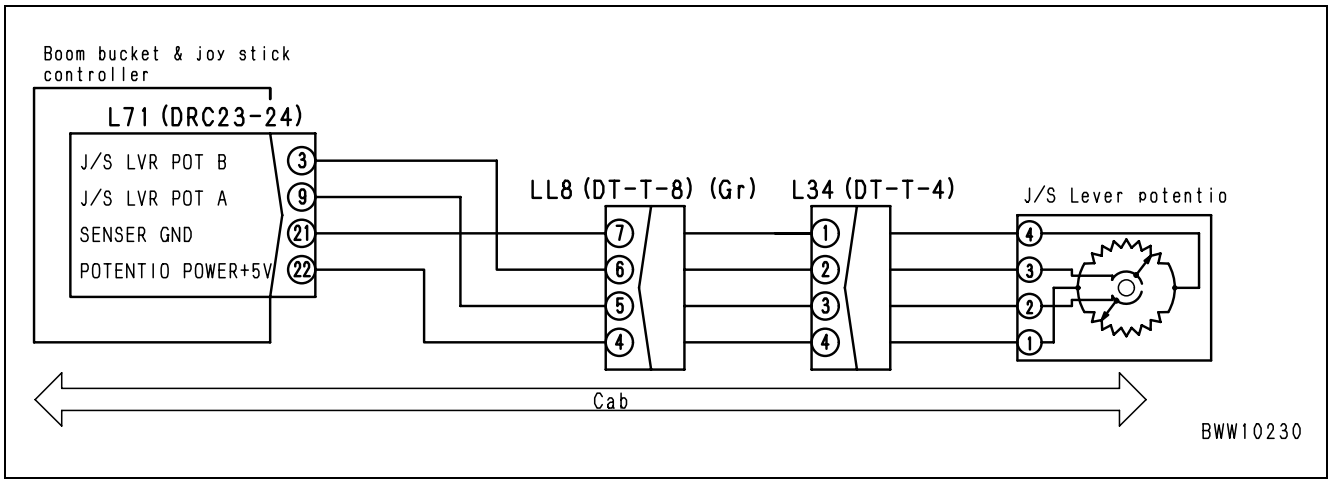
https://truckmanualshub.com/

Action code [WRK-23]

Action Code	Error Code	Controller Code	Trouble	Short-circuited joystick steering right EPC solenoid system
WRK-23	—	(WRK)		
Description of Trouble	• The joystick steering right EPC solenoid gets turned on due to short-circuited joystick steering speed right EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Steering all the way to the right is possible.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L36. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (female) (26), L36 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (26) ~ body	Resistance	10 ~ 15 Ω

Related circuit diagram



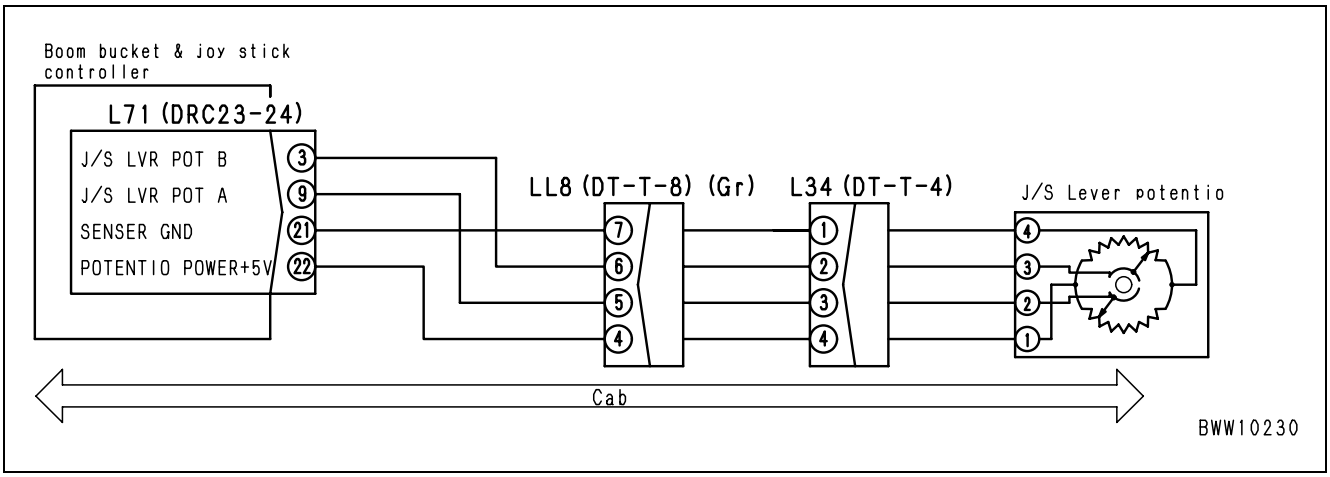
https://truckmanualshub.com/

Action code [WRK-24]

Action Code	Error Code	Controller Code	Trouble	Short-circuited joystick steering left EPC solenoid system
WRK-24	—	(WRK)		
• Description of Trouble	• The joystick steering left EPC solenoid gets turned on due to short-circuited joystick steering speed left EPC solenoid system.			
• Controller Reaction	• No reaction.			
• Effect on Machine	• Steering all the way to the left is possible.			
• Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Short-circuited wiringharness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L35. 3) Connect T-adapter. 3) Turn starting switch ON.		
			Between L73 (female) (36), L35 (female) (1) ~ body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (female) (36) ~ body	Resistance	10 ~ 15 Ω

Related circuit diagram



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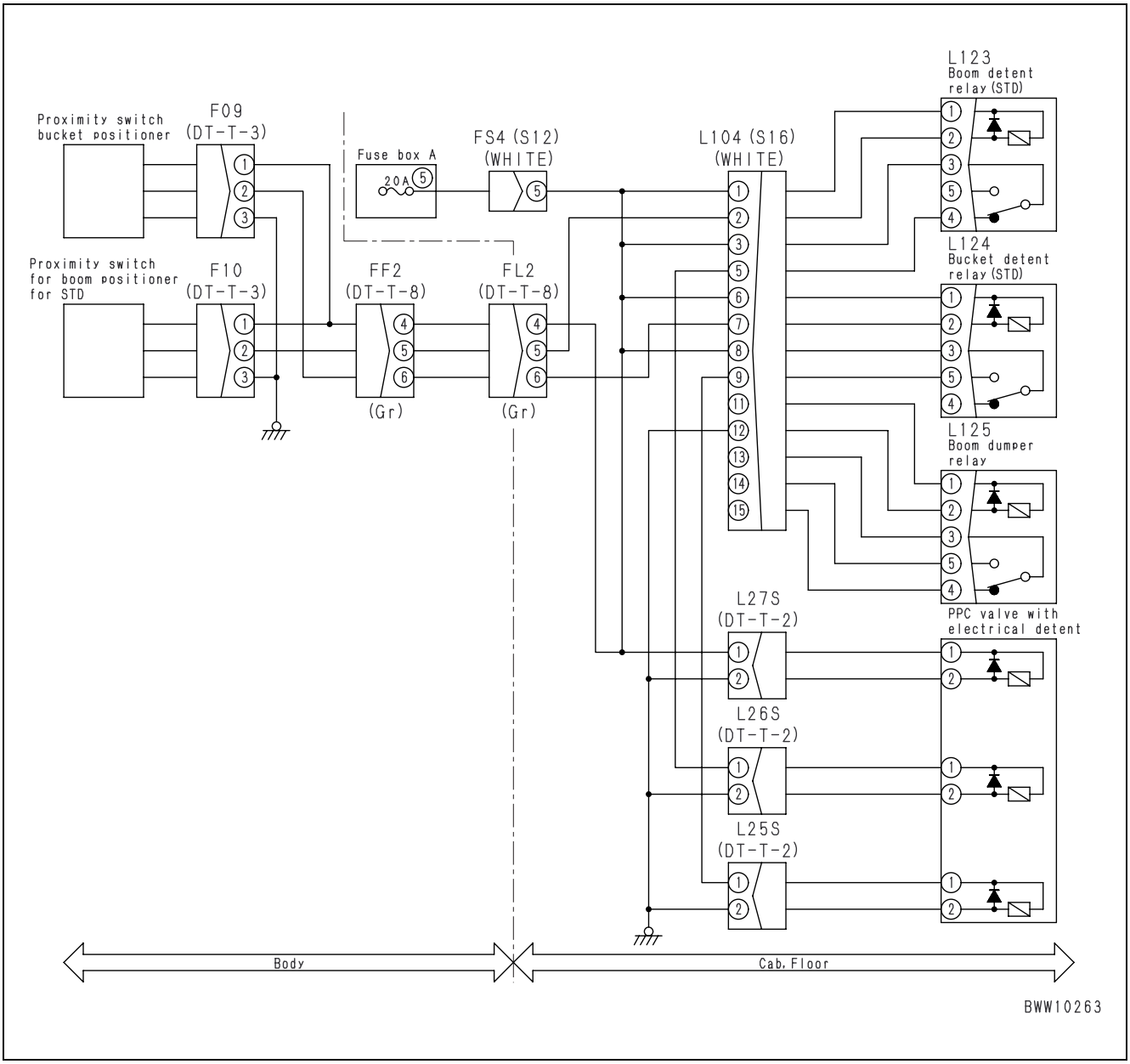
Action code [WRK-25]

Action Code	Error Code	Controller Code	Trouble	Defective bucket positioner, lift arm kick-out and floating maintenance function
WRK-25	—	—		
Description of Trouble	• Bucket positioner, lift arm kick-out and lift arm floating maintenance functions do not function due to proximity switch and PPC detent circuit battery system ground fault.			
Controller Reaction	• No reaction.			
Effect on Machine	• Bucket positioner, lift arm kick-out and floating maintenance do not function.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness ground fault ★ Fuse A-c blows in this case	1) Turn starting switch OFF. 2) Disconnect connector FS4, L104, L27S, (LL5), F9 and F10. 3) Connect T-adapter.		
			Between FS4 (female) (5) ~ body	Resistance	1 MΩ and above
	2	Relay sub-wiring harness ground fault ★ Fuse A-c blows in this case	1) Turn starting switch OFF. 2) Disconnect connector L104. 3) Disconnect relays L123, L124. 4) Connect T-adapter		
			Between L04 (male) (1) ~ (2), (7), (12) ~ body	Resistance	1 MΩ and above
			Between L04 (male) (3) ~ (2), (7), (12) ~ body	Resistance	1 MΩ and above
			Between L04 (male) (6) ~ (2), (7), (12) ~ body	Resistance	1 MΩ and above
			Between L04 (male) (8) ~ (2), (7), (12) ~ body	Resistance	1 MΩ and above
	3	Relay ground fault ★ Fuse A-c blows in this case	1) Turn starting switch OFF. 2) Disconnect connectors L104. 3) Connect T-adapter. ★ In case 2 items are normal		
			Between L04 (male) (1) ~ (2)	Resistance	1 MΩ and above
			Between L04 (male) (6) ~ (7)	Resistance	1 MΩ and above
	4	Proximity switch ground fault ★ Fuse A-2 blows at switch operation in this case	1) Turn starting switch OFF. 2) Disconnect connectors F9 and F10. 3) Connect T-adapter.		
			Between F9 (male) (1) ~ (2), (3) ~ body	Resistance	1 MΩ and above
			Between F10 (male) (1) ~ (2), (3) ~ body	Resistance	1 MΩ and above

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Related circuit diagram



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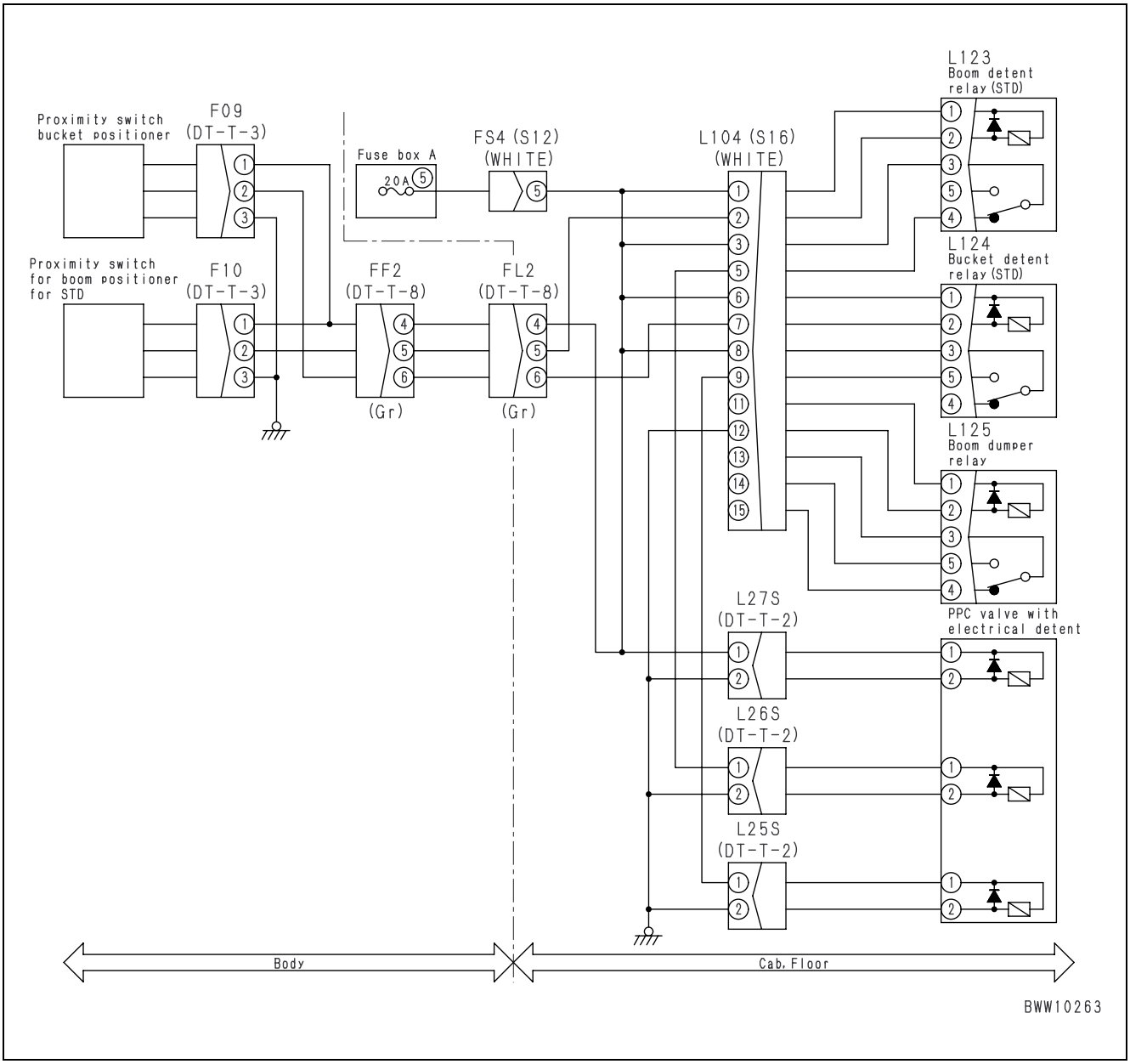
Action code [WRK-26]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm kick-out function and cancellation
WRK-26	—	—		
Description of Trouble	• Lift arm kick-out does not function or cannot be cancelled due to defective lift arm kick-out proximity switch system, lift arm PPC detent system and lift arm detent relay system.			
Controller Reaction				
Effect on Machine	• Lift arm kick-out does not function or cannot be cancelled.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective lift arm detent relay	1) Turn starting switch OFF. 2) Disconnect connector L123. 3) Connect T-adapter.		
			Between L123 (male) (1) ~ (2)	Resistance	200 ~ 400 Ω
			1) Turn starting switch OFF. 2) Disconnect connector L123. 3) Replace boom detent relay (L123) with other relay. 4) Boom kick-out operation.		
			Boom kick-out functions	Boom detent relay (L123) is abnormal	
			Boom kick-out does not function	Boom detent relay (L123) is abnormal	
	2	Defective lift arm PPC detent	1) Turn starting switch OFF. 2) Disconnect connector L26S. 3) Connect T-adapter.		
			Between L26S (male) (1) ~ (2)	Resistance	30 ~ 50 Ω
	3	Defective lift arm positioner proximity switch	1) Turn starting switch OFF. 2) Disconnect connectors L123. 3) Replace boom positioner proximity switch (F10) with bucket leveler proximity switch (F9). 4) Boom kick-out operation.		
			Boom kick-out functions	Boom kick-out proximity switch (F10) is abnormal	
			Boom kick-out does not function	Boom kick-out proximity switch (F10) is normal	
	4	Wiring harness discontinuity	1) Turn starting switch OFF. 2) Disconnect connectors FS4, L104, L26S, and F10. 3) Connect T-adapter.		
			Wiring harness between FS4 (female) (5) ~ F10 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L104 (female) (2) ~ F10 (female) (2)	Resistance	1 Ω and below
			Wiring harness between F10 (female) (3) ~ body	Resistance	1 Ω and below
			Wiring harness between L104 (female) (5) ~ L26S (female) (1)	Resistance	1 Ω and below
			Wiring harness between L26S (female) (2) ~ body	Resistance	1 Ω and below
			★ Boom kick-out does not function in all items		
	5	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L104, F10, and FS4. 3) Connect T-adapter.		
			Between L104 (female) (2), F10 (female) (2) ~ body ★ Boom kick-out detent function is not effective in this case (Lever returns to neutral)	Resistance	1 MΩ and above
			Between L104 (female) (5), L26S (female) (1) and body ★ Fuse A-2 blows and all detents will not function (Lever returns to neutral)	Resistance	1 MΩ and above
			Between FS4 (female) (5), F10 (female) (1) ~ body ★ Fuse A-2 blows and all detents will not function (Lever returns to neutral)	Resistance	1 MΩ and above
	6	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L104 and F10. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L104 (female) (2), F10 (female) (2) ~ body ★ Fuse of hot-shorted circuit blows in this case	Voltage	1 V and below
			1) Turn starting switch OFF. 2) Disconnect connectors L104 and L26S. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L104 (female) (5), L26S (female) (1) ~ body ★ Boom kick-out does not function in this case (Lever does not return to neutral).	Voltage	1 V and below

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Related circuit diagram



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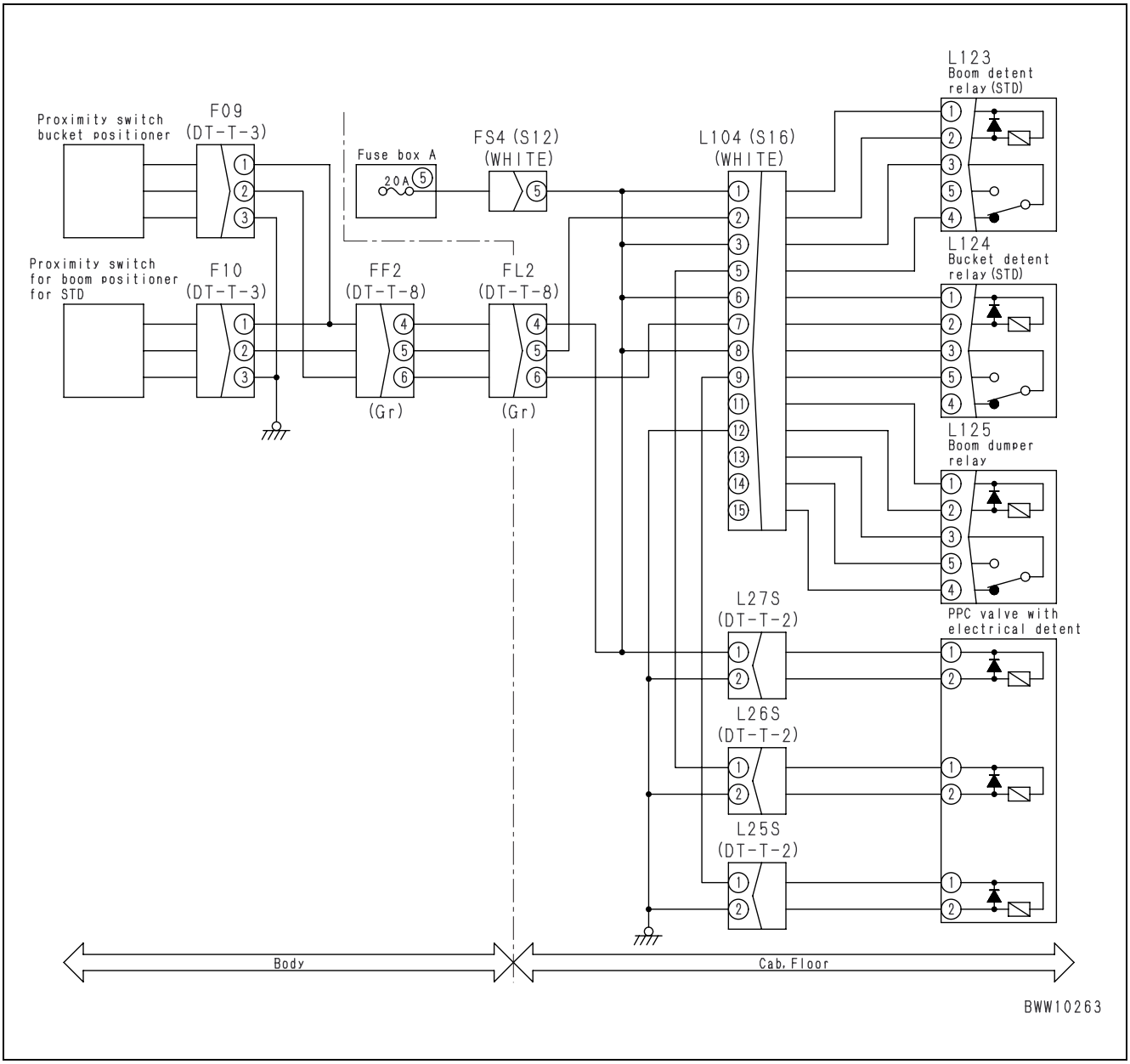
Action code [WRK-27]

Action Code	Error Code	Controller Code	Trouble	Defective bucket leveler function and cancellation
WRK-27	—	—		
Description of Trouble	• Bucket kick-out does not function or cannot be cancelled due to defective bucket leveler proximity switch system, bucket PPC detent system and bucket detent relay system.			
Controller Reaction	—			
Effect on Machine	• Bucket leveler does not function or cannot be cancelled.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective bucket detent relay	1) Turn starting switch OFF. 2) Disconnect connector L124. 3) Connect T-adapter.		
			Between L124 (male) b ~ c	Resistance	200 ~ 400 Ω
			1) Turn starting switch OFF. 2) Disconnect connector L124. 3) Replace bucket detent relay (L124) with other relay. 4) Bucket leveler operation.		
			Bucket leveler functions	Bucket detent relay (L124) is abnormal	
			Bucket leveler does not function	Bucket detent relay (L124) is abnormal	
	2	Defective bucket PPC detent	1) Turn starting switch OFF. 2) Disconnect connector L25S. 3) Connect T-adapter.		
			Between L25S (male) (1) ~ (3)	Resistance	30 ~ 50 Ω
	3	Defective bucket leveler positioner proximity switch	1) Turn starting switch OFF. 2) Disconnect connectors L124. 3) Replace bucket leveler proximity switch (F9) with boom kick-out proximity switch (F9). 4) Bucket leveler operation.		
			Bucket leveler functions	Bucket leveler proximity switch (F9) is abnormal	
			Bucket leveler does not function	Bucket leveler proximity switch (F9) is normal	
	4	Wiring harness discontinuity (Disconnection and defective contact)	1)Turn starting switch OFF. 2) Disconnect connectors FS4, L104, L25S, and F9. 3) Connect T-adapter.		
			Wiring harness between FS4 (female) (9) ~ F9 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L104 (female) (7) ~ F9 (female) (2)	Resistance	1 Ω and below
			Wiring harness between F9 (female) (3) ~ body	Resistance	1 Ω and below
			Wiring harness between L104 (female) (9) ~ L25S (female) (1)	Resistance	1 Ω and below
			Wiring harness between L25S (female) (2) ~ body	Resistance	1 Ω and below
			★ Bucket positioner does not function in all items		
	5	Wiring harness ground fault	1)Turn starting switch OFF. 2) Disconnect connectors L104, F9, and FS4. 3) Connect T-adapter.		
			Between L104 (female) (7), F9 (female) (2) ~ body ★ Bucket leveler does not function in this case (Lever returns to neutral)	Resistance	1 MΩ and above
			Between L104 (female) (9), L25S (female) (1) and body ★ Fuse A-2 blows and all detents will not function (Lever returns to neutral)	Resistance	1 MΩ and above
			Between FS4 (female) (5), F9 (female) (1) ~ body ★ Fuse A-2 blows and all detents will not function (Lever returns to neutral)	Resistance	1 MΩ and above
	6	Hot-shorted wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L104 and F9. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L104 (female) (7), F9 (female) (2) ~ body ★ Fuse of hot-shorted circuit blows in this case	Voltage	1 V and below
			1) Turn starting switch OFF. 2) Disconnect connectors L104 and L25S. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L104 (female) (9), L25S (female) (1) ~ body ★ Bucket leveler does not function in this case (Lever does not return to neutral).	Voltage	1 V and below

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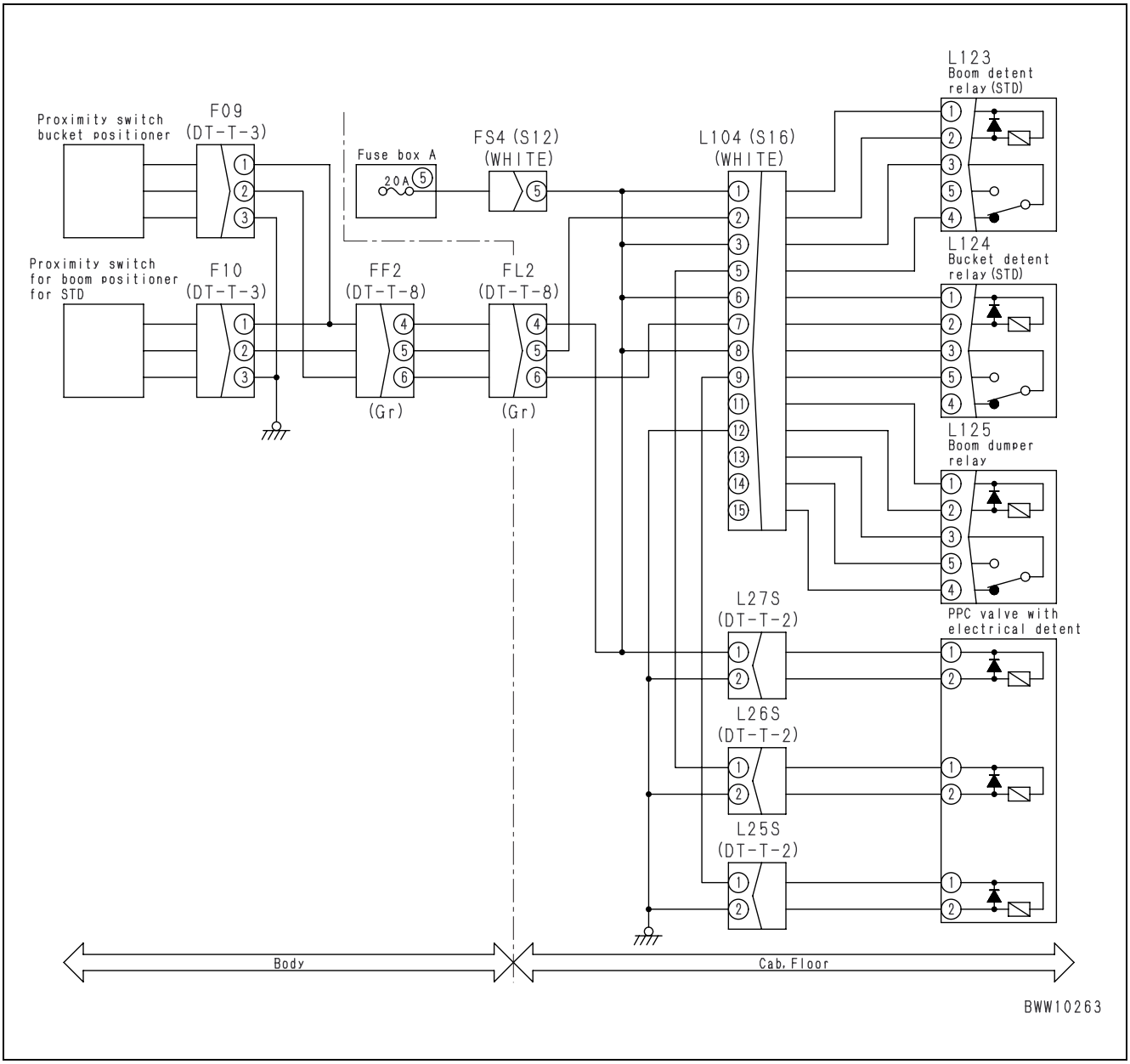
Action code [WRK-28]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm floating maintenance and cancellation
WRK-28	—	—		
Description of Trouble	• Lift arm floating maintenance does not function or cannot be cancelled due to defective lift arm floating PPC detent system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Lift arm floating maintenance does not function or cannot be cancelled.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective bucket PPC detent	(1) Turn starting switch OFF. (2) Disconnect connector L27S. (3) Connect T-adapter.		
			Between L27S (male) (1) ~ (2)	Resistance	30 ~ 50 Ω
	2	Wiring harness discontinuity (Disconnection or defective contact)	(1) Turn starting switch OFF. (2) Disconnect connectors FS4 and L27S. (3) Connect T-adapter.		
			Wiring harness between FS4 (female) (9) and L27 (female) (1)	Resistance	1 Ω and below
			Wiring harness between L27S (female) (2) and body	Resistance	1 Ω and below

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Related circuit diagram



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TROUBLESHOOTING OF MONITOR SYSTEM (MON MODE)

Connector types and installation positions 20-803
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Error code [2G43ZG] Accumulator oil pressure (Rear brake circuit) low 20-823
Error code [AA1ANX] Air cleaner 1 clogged 20-824
Error code [AB00L6] Defective battery charging circuit (alternator terminal R signal detected when engine stopped 20-826
Error code [AB00MA] Defective battery charging circuit (No alternator terminal R signal detected, detection failure) 20-827
Error code [B@BAZG] Engine oil pressure low. 20-828
Error code [B@BAZK] Engine oil level low 20-829
Error code [B@BCNS] Engine water temperature overheating 20-830
Error code [B@BCZK] Alarm indicating low coolant level 20-831
Error code [B@HANS] Hydraulic oil temperature overheating 20-832
Error code [B@CENS] Torque converter oil temperature overheating 20-833
Error code [D5ZHL6] Starting switch C (IGN "C") input failure 20-834
Error code [DA80L4] Auto grease input failure 20-835
Error code [DAF3KK] SW power supply (for operation) = On and NSW power supply (For memory) = off 20-836
Error code [DAF5KP] 5-V power supply output failure. 20-838
Error code [DAF6KP] 24-V power supply output failure 20-840
Error code [DAFBKM] Wrong information on model selection 20-842
Error code [DAFSKQ] Wrong information on meter display selection. 20-843
Error code [DAQSKR] S-NET communication failure (between monitor panel and transmission controller) 20-844
Error code [DBQSKR] S-NET communication failure (between monitor panel and engine controller) 20-845
Error code [DB9SKR] S-NET communication failure (between monitor panel and work equipment controller) 20-846
Error code [DD15LD] Monitor panel mode selector switch 1 [■] (panel SW1) input error 20-847
Error code [DD16LD] Monitor panel mode selector switch 1 [◇] (panel SW2) input error. 20-848
Error code [DD17LD] The monitor panel mode selector switch 2 [<] (panel SW3) input circuit remains closed for more than one minute 20-849
Error code [DD18LD] Monitor panel mode selector switch 2 [>] (panel SW4) input error 20-850
Error code [DD1CLD] Sub-total switch failure 20-851
Error code [DDK3KM] Right FNR switch is in N (neutral) 20-852
Error code [DDK4KM] Joystick FNR switch is in N (neutral) 20-853
Error code [DDK6KM] FNR (Forward-reverse) lever switch is in N (neutral) 20-854
Error code [DDS5L6] Decreased steering oil pressure 20-855
Error code [DDY0LD] Cancel switch failure 20-856
Error code [DGE2KX] Engine water temperature sensor system failure 20-857
Error code [DGH2KX] Hydraulic oil temperature sensor system failure 20-858
Error code [DGT1KX] Torque converter oil temperature sensor system failure. 20-859
Error code [DHE4L6] Engine oil pressure sensor system failure 20-860
Error code [DHPCKX] Bottom pressure sensor failure 20-862
Error code [DHPDKX] Head pressure sensor failure 20-864
Error Code [DKA0KX] Boom angle sensor failure. 20-865
Error code [DV00KB] Short-circuited alarm buzzer output system 20-866
Error code [DY30ME] The emergency steering remains actuated for more than one minute 20-868

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Action code [MON-1] The parking brake indicator lamp does not light up when the parking brake switch is turned ON (The parking brake indicator switch circuit suffers a ground fault) 20-870

Action code [MON-2] The brake oil pressure caution lamp does not light up when the emergency brake is applied (Front circuit) 20-872

Action code [MON-3] The brake oil pressure caution lamp does not light up when the emergency brake is applied (Rear circuit) 20-873

Action code [MON-4] The air cleaner clogging indicator lamp does not light ON 20-874

Action code [MON-5] The engine hydraulic caution lamp does not light ON 20-876

Action code [MON-6] The engine oil level caution lamp does not light ON 20-877

Action code [MON-7] The engine water temperature caution lamp does not light ON 20-878

Action code [MON-8] The radiator water volume caution lamp does not light ON 20-879

Action code [MON-9] The hydraulic oil temperature caution lamp does not light ON
After the engine starts, the hydraulic oil temperature gauge does not rise 20-880

Action code [MON-10] The torque converter oil temperature caution lamp does not light ON 20-881

Action code [MON-11] The steering hydraulic caution lamp does not light ON 20-882

Action code [MON-12] Input fault in monitor panel mode switch 1 [■] (Panel SW1) 20-883

Action code [MON-13] Input fault in monitor panel mode switch 1 [◇] (Panel SW2) 20-884

Action code [MON-14] Input fault in monitor panel mode switch 2 [<] (Panel SW3) 20-885

Action code [MON-15] Input fault in monitor panel mode switch 2 [>] (Panel SW4) 20-886

Action code [MON-16] Defective subtotal switch 20-887

Action code [MON-17] Defective cancel switch 20-888

Action code [MON-18] Defective bottom pressure sensor (Hot short fault) 20-889

Action code [MON-19] Defective head sensor 20-890

Action code [MON-20] The alarm buzzer does not sound or stop
(disconnection or short circuit with chassis ground in buzzer output system) 20-891

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Connector types and installation positions

★ The address column in the following table indicates the addresses of the connector layout drawing (cubic diagram) and the circuit diagram.
★ Codes indicated in the fields of the circuit diagram addresses: **ENG:** Engine control system, **TM:** Transmission control system, **WRK:** working equipment control system, **MON:** Monitor system, **OTH:** Others
★ The characters in parenthesis in the Connector Type fields indicate the colors of the connector bodies.

Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
1.PS	DT-T	2	1st solenoid	AJ-4	TM
1.SW	DT	2	1st fill switch	AJ-4	TM
2.PS	DT-T	2	2nd solenoid	AJ-3	TM
2.SW	DT	2	2nd fill switch	AI-3	TM
3.PS	DT-T	2	3rd solenoid	AJ-3	TM
3.SW	DT	2	3rd fill switch	AJ-4	TM
4.PS	DT-T	2	4th solenoid	AJ-5	TM
4.SW	DT	2	4th fill switch	AJ-5	TM
A1	M	6	Blower motor & resistor	U-2	—
A2	SWP	6	Air mix servo motor	U-2	—
A3	M	2	Thermistor	U-2	—
A4	X	2	Air servomotor	U-8	—
A5	X	2	Capacitor switch	T-1	—
A6	Yazaki	2	Hi and Lo switch	T-1	—
A7	Yazaki	4	Blower relay (Main)	W-6	—
A8	Yazaki	4	Blower relay (Hi)	W-6	—
A9	Yazaki	4	Blower relay (M2)	W-6	—
A10	Yazaki	4	Blower relay (M1)	W-5	—
A11	Yazaki	4	Capacitor relay	W-5	—
A12	Yazaki	4	Capacitor Hi (1) relay	W-5	—
A13	Yazaki	4	Capacitor Hi (2) relay	W-4	—
A14	Yazaki	4	MAG clutch relay	W-4	—
A20	Terminal	1	Ground	T-1	—
A21	Yazaki	2	Water temperature sensor (Auto-air conditioner vehicle)	W-3	—
A22	Yazaki	2	Indoor air temperature sensor (Auto-air conditioner vehicle)	U-2	—
A23	Yazaki	2	Outdoor air temperature sensor (Auto-air conditioner vehicle)	A-7	—
A24	DT-T	2	Diode (Auto-air conditioner vehicle)	W-3	—
A25	DT-T	2	Diode (Auto-air conditioner vehicle)	V-3	—
A26	DT-T	2	Intermediate connector (Auto-air conditioner vehicle)	W-4	—
AL1	M	6	Intermediate connector (Air conditioner relay)	U-2	—
AL2	S (W)	12	Intermediate connector (Air conditioner relay)	V-2	—
B01	DT	3	Capacitor R	B-7	—
B02	DT	3	Capacitor L	A-7	—
B03	DT-T	2	Emergency brake switch 1	G-9	TM
B04	DT-T	2	Emergency brake switch 2	G-9	TM
B05	DT-T	2	Front brake ACC low pressure switch	K-3	W-8
B06	DT-T	2	Rear brake ACC low pressure switch	J-2	W-8
BR1	DT-T (Gr)	12	Intermediate connector (Bulk head)	I-2	W-6
C01	Yazaki	9	AM/FM radio	L-9	—
C02	KES0	2	Speaker (Right)	E-9	—

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
C03	KES0	2	Speaker (Left)	G-9	—
C04	M	2	Front working lamp (Right)	B-8	—
C05	M	2	Front working lamp (Left)	B-8	—
C07	KES1	2	Room lamp	C-8	—
C08	M	1	Door switch (Right) (Room Lamp)	C-8	—
C09	M	1	Door switch (Left) (Room lamp)	B-8	—
C10	-	2	Cigarette lighter	A-7	—
C12	M	6	Front wiper motor	A-7	E
C15	M	4	Rear wiper motor	F-9	E
C17	Kyoritsu ES	4	Warning lamp switch	D-9	—
C18	Plug	1	Warning lamp (Beacon)	F-9	—
C19	DT-T	6	Glass heater switch	D-9	—
C29	M	1	Glass heater ON	E-9	—
C33	H	1	Rear glass heater	E-9	—
C35	H	1	Rear glass heater	G-9	—
C39	Terminal	1	Ground	C-8	—
C40	Terminal	1	Ground	C-8	E
C41	M	1	Warning lamp	E-9	—
C43	Yazaki	6	Rear wiper switch	B-8	E
C44	M	4	Right-side wiper switch	A-7	E
C45	M	4	Left-side wiper switch	F-1	E
C46	M	1	Intermediate connector (Power supply)	D-9	E
C47	Terminal	1	Ground	F-9	E
C47	AMP172021-2	16	A/C control AMP	P-1	—
C47	AMP040	20	A/C control AMP (Auto-air conditioner vehicle)	D-9	—
C48	AMP172245-2	12	A/C control AMP	P-1	—
C48	AMP040	16	A/C control AMP (Auto-air conditioner vehicle)	D-9	—
C49	SWP	8	Left Servomotor	R-1	—
C50	SWP	8	Right Servomotor	M-3	—
C51	Yazaki	2	Diode (Auto-air conditioner vehicle)	Q-1	—
CAN1	DT-T	3	Resister	O-1	B-2
CAN2	DT-T	3	Resister	R-9	—
CHK0	X	1	Connector for inspection 0	R-1	—
CHK1	X	1	Connector for inspection 1	R-1	—
CL1	S	8	Intermediate connector	A-4	—
CL2	S (L)	12	Intermediate connector (Wiper motor)	A-4	OTH
CL5	S	16	Intermediate connector	M-2	—
CL6	DT-T (G)	12	Intermediate connector (Monitor panel controller)	M-2	C-4
CL6	M	6	Intermediate connector (Auto-air conditioner vehicle)	W-3	C-4
CL7	DT-T (Gr)	12	Intermediate connector (Monitor panel controller)	M-2	C-5
CL8	DT-T	12	Intermediate connector (Monitor panel controller)	N-1	C-5
CL9	DT-T	8	Intermediate connector (Monitor panel controller)	O-1	C-6
CL10	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	0-1	C-3
CN1	DT-T	2	Injector	Y-5	ENG
CN2	DT-T	2	Injector	Y-5	ENG
CN3	DT-T	2	Injector	Y-9	ENG
CN4	DT-T	2	Injector	Z-9	ENG
CN5	DT-T	2	Injector	Z-9	ENG

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
CN6	DT-T	2	Injector	AC-8	ENG
COMBI	M	3	Front combination lamp (Right)	A-6	W-3
COMBI	M	3	Front combination lamp (Left)	E-1	W-2
DI	DT-T	2	Dust indicator	AB-9	P-8
DIODE	DT-T	2	Diode (Parking brake solenoid)	AE-6	TM
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	B-2
E01	DT-T	2	Intermediate connector (Starting motor)	L-3	W-4
E02	Terminal	1	Alternator R	K-8	X-5
E03	Terminal	1	Alternator B	K-8	X-5
E04	Terminal	1	Alternator E	L-8	X-5
E06	Terminal	1	Heater relay	AC-8	Q-9
E07	Terminal	1	Heater relay	AC-7	Q-9
E10	DT-T	2	Compressor magnetic clutch	I-9	—
E11	DT-T	2	Diode	J-9	—
E14	Terminal	1	Ground	L-4	X-5
E28	DT	2	Diode (Engine heater relay)	Z-3	O-8
E29	Terminal	1	Engine oil pressure switch	Z-5	P-8
E30	Terminal	1	Starting motor B	K-3	X-4
EL2	HD-24	31	Intermediate connector (Engine injector)	Z-1	O-5
EL3	HD-24	31	Intermediate connector (Engine)	Z-2	ENG
ER-1	DT-T	4	Intermediate connector (Starting motor)	L-4	U-4
EREV	DT-T	2	Engine speed sensor	AC-6	TM
F01	M	6	Intermediate connector (Right head lamp)	A-5	U-3
F02	M	6	Intermediate connector (Left head lamp)	D-1	U-2
F03	Terminal	1	Horn	B-1	W-2
F04	Terminal	1	Horn	A-1	W-1
F05	Terminal	1	Horn	C-1	W-1
F06	Terminal	1	Horn	C-1	W-1
F07	DT-T	2	Switch pump cutoff solenoid	A-1	TM
F09	DT-T	3	Bucket positioner proximity switch	A-3	WRK
F10	DT-T	3	Lift arm positioner proximity switch (std)	A-3	WRK
F13	DT-T	2	Lift arm damper solenoid	D-1	TM
F14	DT-T	2	Diode (Damper solenoid)	D-1	TM
F15	DT-T	3	Lift arm angle signal (For load meter)	A-5	M-8
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1	M-8
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1	M-8
F27	DT-T	2	Diode (Boom EPC cutoff solenoid)	A-4	WRK
F28	DT-T	2	Oil temperature sensor	B-1	W-1
FF1	S	10	Intermediate connector (Head lamp)	E-1	N-3
FF2	DT-T (Gr)	8	Intermediate connector (Working equipment sensor)	E-1	N-3
FL1	S	12	Intermediate connector (Head lamp)	V-1	K-3
FL2	DT-T (Gr)	8	Intermediate connector (Working equipment sensor)	V-2	TM
FL3	DT-T	6	Intermediate connector (Load meter)	X-3	K-6
FS1	L	2	Intermediate connector (Fuse box)	W-7	ENG
FS2	L	2	Intermediate connector (Fuse box)	V-7	ENG
FS3	S (W)	16	Intermediate connector (Fuse box)	V-8	G-8
FS4	S (W)	12	Intermediate connector (Fuse box)	U-8	G-8
FS5	M	6	Intermediate connector (Fuse box)	V-7	G-8

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
FS7	Plug	1	Intermediate connector (Fuse box)	W-7	—
FS6	Plug	1	Intermediate connector (Fuse box)	V-7	—
F.PS	DT-T	2	F clutch solenoid	AJ-6	TM
F.SW	DT	2	F clutch fill switch	AJ-6	TM
G	Yazaki	2	Engine G speed sensor	AA-5	ENG
G01	Terminal	1	Backup buzzer	L-8	V-7
G02	Terminal	1	Backup buzzer	L-7	V-7
G04	M	2	Rear working lamp (Left)	K-9	U-8
G05	M	2	Rear working lamp (Right)	I-9	U-8
GR1	DT-T	4	Intermediate connector (Fan reverse solenoid, rear working lamp)	L-7	U-6
GR2	DT-T	2	Fan reverse solenoid	J-9	TM
HEAD	M	3	Head lamp (Right)	A-6	W-3
HEAD	M	3	Head lamp (Left)	E-1	W-2
HT	Terminal	1	Engine heater relay	AC-9	Q-9
L01	SWP	6	Parking brake switch	M-5	TM
LO2	SWP	6	Dipping switch, light switch	M-4	B-1
L03	SWP	6	Turn and hazard switch	M-5	B-1
L04	SWP	14	Shift switch	M-3	TM
L05	DT-T	2	S/T wheel horn switch	M-5	—
L07	DT-T	6	Monitor mode/cancel switch	P-1	B-8
L08	DT-T	6	Monitor INC/DEC switch	P-1	A-8
L09	DT-T	2	Stop lamp switch	P-1	E-8
L10	DT-T	3	Left brake pressure sensor	R-1	TM
L11	DT-T	2	Air suspension seat	S-1	—
L12	DT-T	4	Right-hand direction switch, intermediate connector	O-7	TM
L13	DT-T	2	Lift arm N lock switch	—	—
L14	DT-T	4	Lift arm lever KDS&HOLD	M-6	TM
L15	DT-T	4	Bucket lever LDM cancel	M-6	D-8
L16	M	2	Intermediate connector	V-2	—
L17	M	4	24 VDC/12 VDC converter	W-5	—
L18	Yazaki	2	12 VDC socket	W-3	—
L19	M	4	Flasher unit	U-8	H-8
L20	M	2	Alarm buzzer	U-8	I-7
L21	S	10	Front and rear wiper switches	N-2	E
L22	DT-T	3	Throttle pedal	O-1	ENG
L23	DT-T	3	Low idle switch	O-1	ENG
L25E	DT-T	2	Lift arm and bucket EPC lever	M-6	E-8
L25S	DT-T	2	PPC valve and electrical detent	N-6	E-2
L26E	DT-T	2	Lift arm and bucket EPC lever	O-7	E-2
L26S	DT-T	2	PPC valve and electrical detent	N-6	E-2
L27S	DT-T	2	PPC valve and electrical detent	N-7	E-2
L31	M	6	Intermittent wiper timer	W-7	E
L34	DT-T	4	Joystick level positioner	W-6	B-1
L35	DT-T	2	Joystick EPC solenoid	P-1	C-8
L36	DT-T	2	Joystick EPC solenoid	P-1	C-8
L37	DTM	12	Joystick lever switch	Q-1	TM
L38	DT-T	3	Joystick N lock switch	W-7	B-2

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L39	DT-T	6	Joystick ON/OFF switch	T-1	B-2
L40	DT-T	6	Steering speed mode switch	S-1	B-1
L41	Relay	6	Joystick cutoff relay	M-5	B-8
L42	Plug	1	Connector (Emergency power)	A-5	—
L43	Plug	1	Connector (Emergency power)	A-5	—
L44	M	6	Intermediate connector (Printer)	V-3	I-7
L45	D-sub	25	Printer	—	I-8
L46	G	4	Printer	—	H-8
L51	AMP070	20	Monitor panel controller	M-2	B-7
L52	AMP070	18	Monitor panel controller	M-3	B-6
L53	AMP070	12	Monitor panel controller	M-3	B-5
L54	AMP070	18	Monitor panel controller	M-3	B-4
L55	AMP070	12	Monitor panel controller	M-4	B-4
L56	AMP070	12	Monitor panel controller	M-3	B-3
L57	AMP070	14	Monitor panel controller	M-4	B-2
L58	AMP040	8	Monitor panel controller	M-4	—
L61	DRC23	24	Transmission and fan pump motor controller	P-8	E-8
L62	DRC23	40	Transmission and fan pump motor controller	P-8	F-8
L63	DRC23	40	Transmission and fan pump motor controller	Q-8	F-8
L71	DRC23	24	Lift arm bucket and joystick controller	Q-9	A-8
L72	DRC23	40	Lift arm bucket and joystick controller	Q-9	A-8
L73	DRC23	40	Lift arm bucket and joystick controller	R-9	B-8
L81	DRC23	24	Engine controller	Q-8	N-8
L82	DRC23	40	Engine controller	Q-8	O-8
L83	DRC23	40	Engine controller	Q-8	ENG
L90	DT-T	4	Modal selection connector	P-8	ENG
L100	Terminal	1	Ground	R-1	J-1
L101	S (W)	16	Intermediate connector (Relay sub-unit)	T-9	I-7
L102	S (L)	16	Intermediate connector (Relay sub-unit)	T-9	J-7
L103	S (W)	16	Intermediate connector (Relay sub-unit)	S-9	K-7
L104	S (W)	16	Intermediate connector (Relay sub-unit)	T-9	WRK
L105	S (W)	12	Intermediate connector (Relay sub-unit)	T-9	—
L106	S (W)	16	Intermediate connector (Relay sub-unit)	S-9	K-7
L111	—	5	Turn signal lamp and hazard relay	X-7	I-9
L112	—	5	Air cleaner clogging relay	W-7	J-9
L113	—	5	Steering switching relay	W-8	J-9
L114	—	5	Automatic preheating relay	V-8	J-9
L115	—	5	Engine controller power supply relay	V-9	—
L116	—	4	Neutral safety relay	W-7	J-9
L117	—	4	Backup lamp relay	W-7	K-9
L118	—	4	Stop lamp relay	V-8	K-9
L119	—	4	Horn relay	V-8	K-9
L120	—	4	Parking brake relay	V-8	TM
L123	—	5	Lift arm detent relay	X-9	—
L124	—	5	Bucket detent relay	W-9	—
L125	—	5	Lift arm damper relay	V-9	TM
L126	—	4	Emergency steering relay	X-8	TM
L127	—	4	Front working lamp relay	X-7	—

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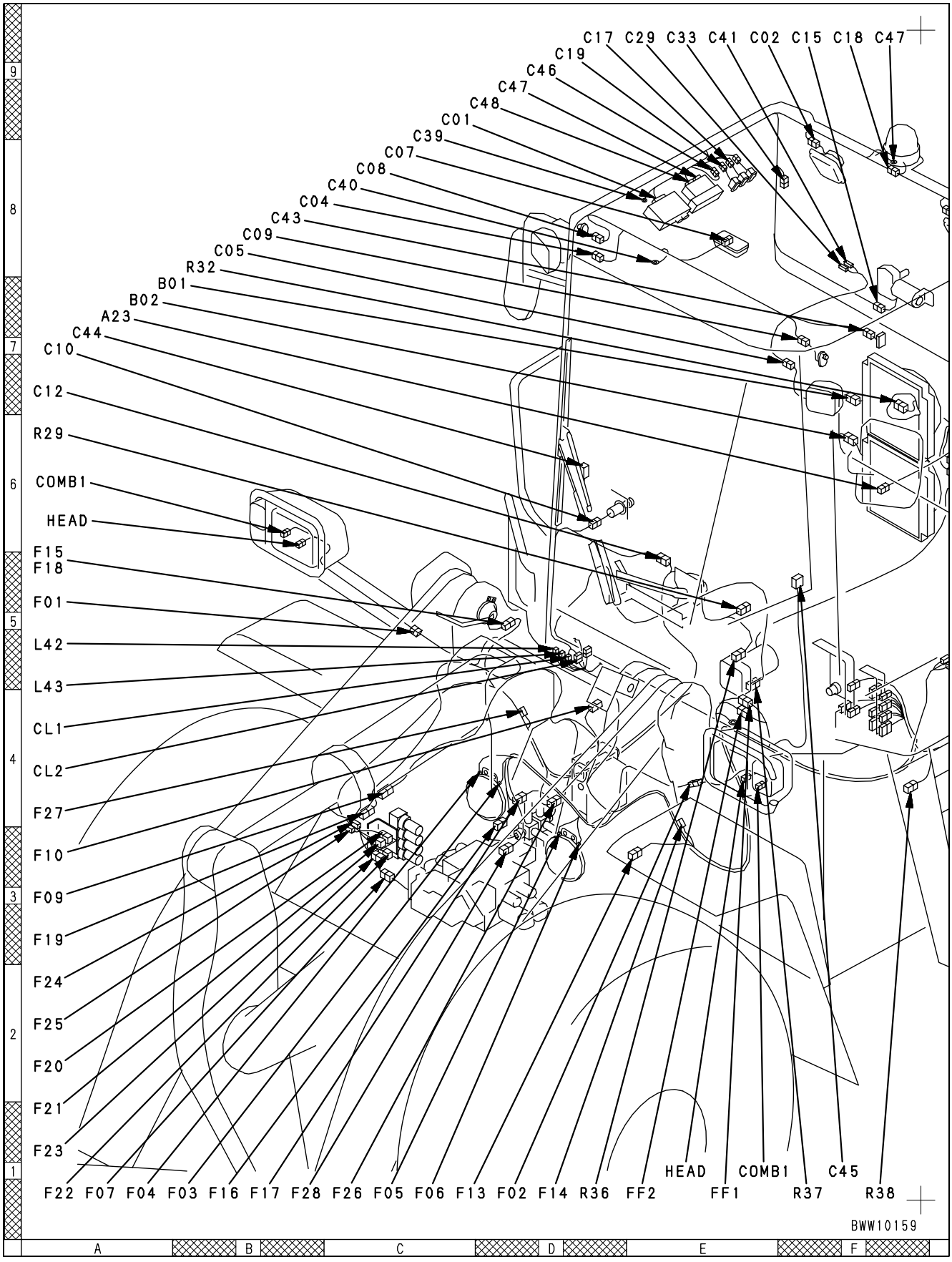
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L128	—	4	Rear working lamp relay	X-9	L-9
L129	—	4	Rear glass heater relay	V-9	—
L130	—	4	Transmission pump cutoff relay	V-9	TM
LC.PS	DT-T	2	Torque converter lockup solenoid (op)	AJ-5	TM
LC.SW	DT	2	Torque converter lockup fill switch (op)	AJ-5	TM
LL1	DT-T	6	Intermediate connector (Relay)	O-7	K-4
LL2	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-7	K-4
LL3	DTHD#12	1	Intermediate connector (Ground)	N-7	ENG
LL4	DT-T (Br)	12	Intermediate connector (Throttle panel)	N-6	K-5
LL5	DT	3	Intermediate connector (Joystick vehicle)	M-5	WRK
LL6	DT-T (Gr)	12	Intermediate connector (Joystick vehicle)	Q-1	K-5
LL7	DT-T (G)	12	Intermediate connector (Joystick vehicle)	Q-1	K-5
LL8	DT-T (Gr)	8	Intermediate connector (Joystick switch)	Q-1	TM
LR1	DTHD#12	1	Intermediate connector (Slow-blow fuse)	X-2	ENG
LR4	L	2	Intermediate connector (Slow-blow fuse)	X-1	ENG
LR5	DT-T	6	Intermediate connector (Auto-greasing controller)	X-3	K-1
LR6	L	2	Intermediate connector (Ground)	X-2	ENG
LR8	DTHD#8	1	Intermediate connector (Ground)	X-2	K-1
LR9	DT-T	12	Intermediate connector (Steering, brake oil pressure switch)	X-1	K-2
LR10	DT-T	12	Intermediate connector	X-1	K-2
LT1	HD-24	31	Intermediate connector (Transmission)	W-3	K-4
NE	Yazaki	2	Engine NE speed sensor	AB-6	ENG
OL	DT-T	2	Engine oil level sensor	AC-1	P-8
PB.PS	DT-T	2	Parking brake solenoid	AI-2	TM
PB.SW	DT-T	2	Parking brake indicate switch	AI-2	P-8
PCV1	Sumitomo	2	Supply pump (No.1)	Z-4	ENG
PCV2	Sumitomo	2	Supply pump (No.2)	AA-5	ENG
PFUEL	AMP174357-2	3	Common rail pressure signal	AB-5	ENG
PIM	Sumitomo	3	Boost pressure signal	AC-7	ENG
R01	Terminal	1	Battery relay	J-2	X-6
R02	Terminal	1	Slow-blow fuse	L-2	ENG
R03	Terminal	1	Slow-blow fuse	L-2	ENG
R04	Terminal	1	Battery relay	K-2	X-6
R05	Terminal	1	Slow-blow fuse	K-2	X-7
R06	Terminal	1	Slow-blow fuse	K-2	ENG
R11	Terminal	1	Slow-blow fuse	K-2	X-7
R13	Terminal	1	Battery relay	L-1	X-6
R14	Terminal	1	Battery relay	L-1	X-6
R15	Terminal	1	Emergency steering relay	J-1	TM
R16	Terminal	1	Emergency steering relay	J-1	TM
R22	Terminal	1	Battery	H-9	ENG
R23	Terminal	1	Battery	H-9	ENG
R24	DT-T	2	Diode (Battery relay)	I-1	P-1
R25	DT-T	2	Diode (Battery relay)	J-2	P-1
R26	DT-T	2	Diode (Starting motor)	H-1	P-1
R27	DT-T	2	Diode (Starting motor)	I-2	Q-1
R29	DT-T	2	Oil fan EPC	A-6	TM

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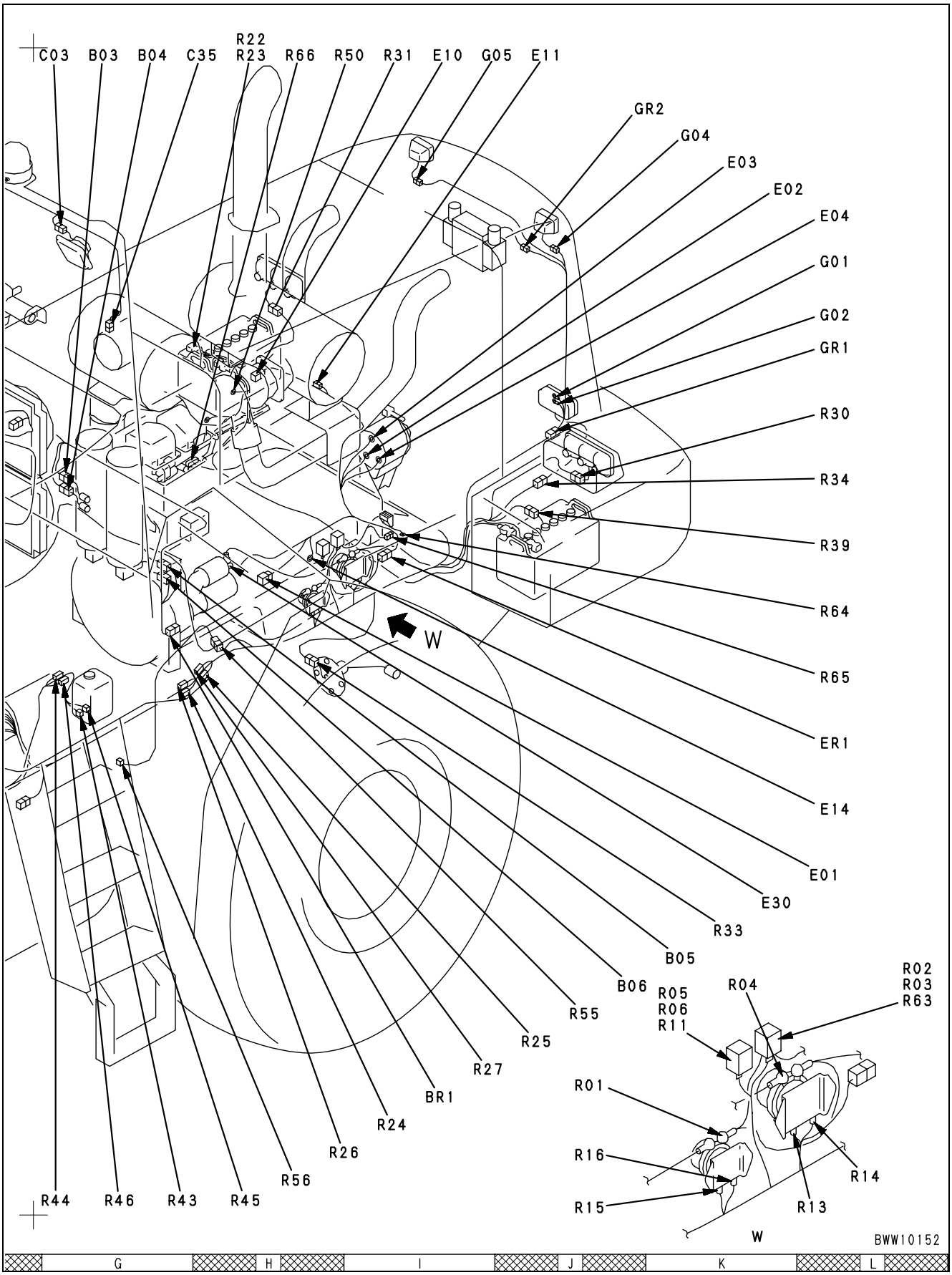
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
R30	M	6	Rear combination lamp (Left)	L-7	S-8
R31	M	6	Rear combination lamp (Right)	I-9	S-8
R32	DT-T	2	Coolant level sensor	B-8	X-8
R33	DT-T	2	Fuel gauge sensor	K-3	U-8
R34	M	2	License lamp	L-6	U-8
R36	DT-T	3	Steering pump pressure switch	D-1	V-8
R37	DT-T	3	Emergency steering pressure switch	F-1	W-9
R38	DT-T	6	Auto-greasing controller	F-1	W-4
R39	DT-T	2	Battery level sensor	L-6	T-7
R43	KES1	2	Front windshield washer	G-1	E
R44	DT-T	2	Diode (Washer)	G-1	E
R45	KES1	2	Rear windshield washer	H-1	E
R46	DT-T	2	Diode (Washer)	G-1	E
R50	Terminal	1	Ground	H-9	T-1
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	TM
R56	DT-T	2	Rear brake oil temperature sensor	H-1	TM
R63	Terminal	1	Slow-blow fuse	L-2	—
R64	Terminal	1	Ground	L-5	—
F65	DT-T	6	Auto-tilt motor switch (op)	L-5	—
R66	DT-T	2	Auto-tilt motor	H-9	—
REV OUT	DT-T	2	Speed sensor	AH-2	TM
R.PS	DT-T	2	R clutch solenoid	AJ-6	TM
R.SW	DT	2	R clutch fill switch	AJ-6	TM
S01	DT-T	6	Front working lamp switch	P-1	C-8
S02	DT-T	6	Rear working lamp switch	P-1	C-8
S03	DT-T	6	Transmission cutoff ON/OFF switch	M-4	TM
S04	DT-T	6	Right-hand direction ON/OFF switch	N-9	TM
S05	DT-T	6	Transmission cutoff set switch	M-9	TM
S06	DT-T	6	Torque converter lock-up ON/OFF switch	O-8	TM
S07	DT-T	6	Lift arm damper ON/OFF switch	0-1	TM
S12	DT-T	6	Remote positioner set switch (Joystick vehicle)	N-7	I-2
S13	DT-T	6	Upper remote positioner ON/OFF switch (Joystick vehicle)	N-9	I-2
S14	DT-T	6	Lower remote positioner ON/OFF switch (Joystick vehicle)	N-8	I-2
S15	DT-T	6	Auto-excavation switch (Joystick vehicle)	N-9	J-2
S16	DT-T	6	Hydraulic fan reverse switch	M-9	TM
S17	DT-T	6	Auto-greasing switch	O-8	—
S19	DT-T	6	Emergency steering check switch	M-9	TM
S21	DT-T	4	Engine power mode switch	M-8	TM
S22	DT-T	4	Auto-shifting mode switch	N-7	TM
S31	DT	4	Starting switch	N-7	L-7
TC.C	DT-T	2	Torque converter oil temperature sensor (Monitor)	—	P-8
TEL	DT-T (Gr)	12	Connector (KOMTRAX)	Q-1	K-1
THL	DT-T	3	Fuel temperature sensor	AB-5	TM
TM.T	DT-T	2	Transmission oil temperature sensor	AJ-4	—
TWH	DT-T	2	Engine water temperature sensor (Monitor)	AD-2	O-8
TWL	DT-T	3	Engine water temperature sensor (Preheating)	AB-1	ENG

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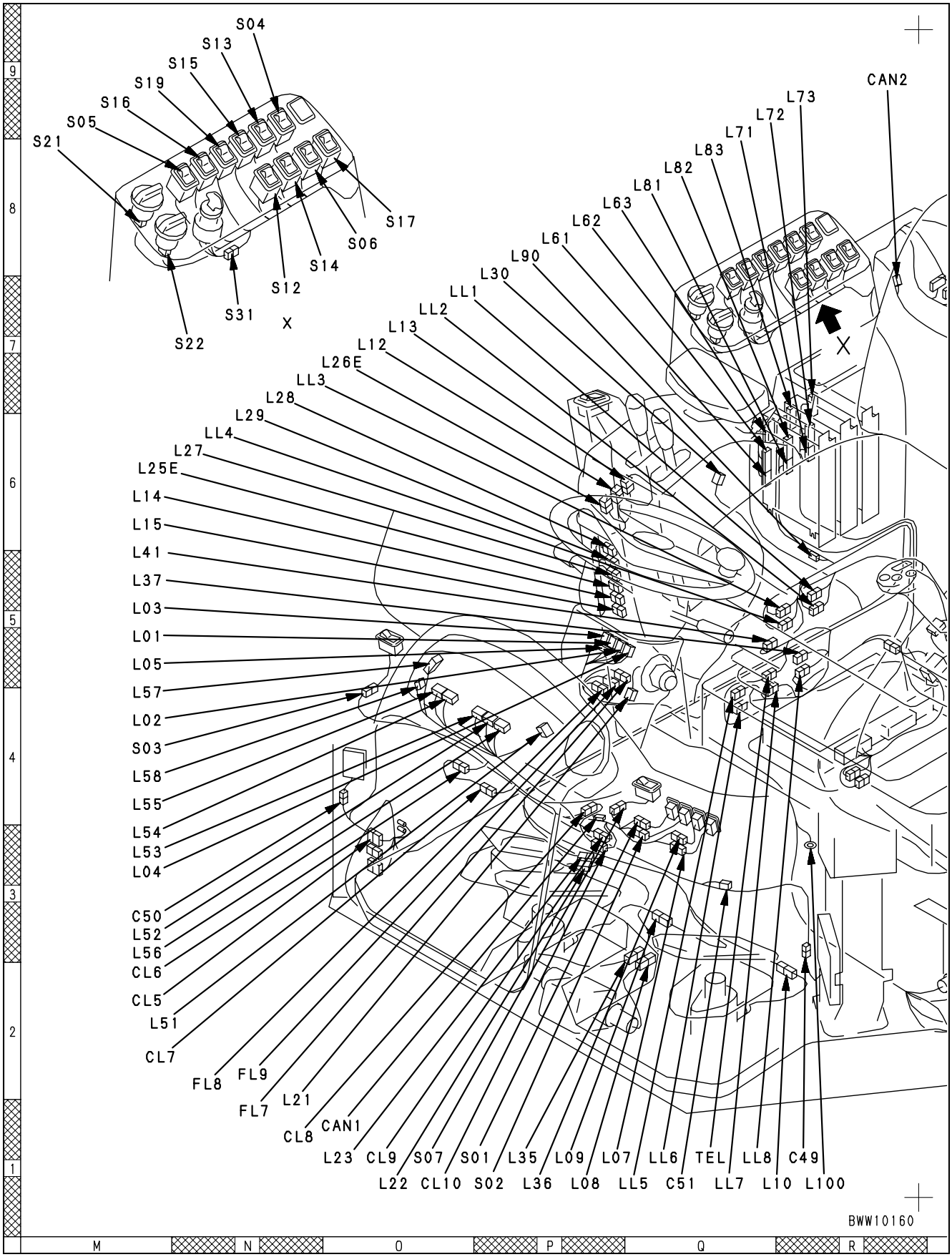
Connector layout drawing



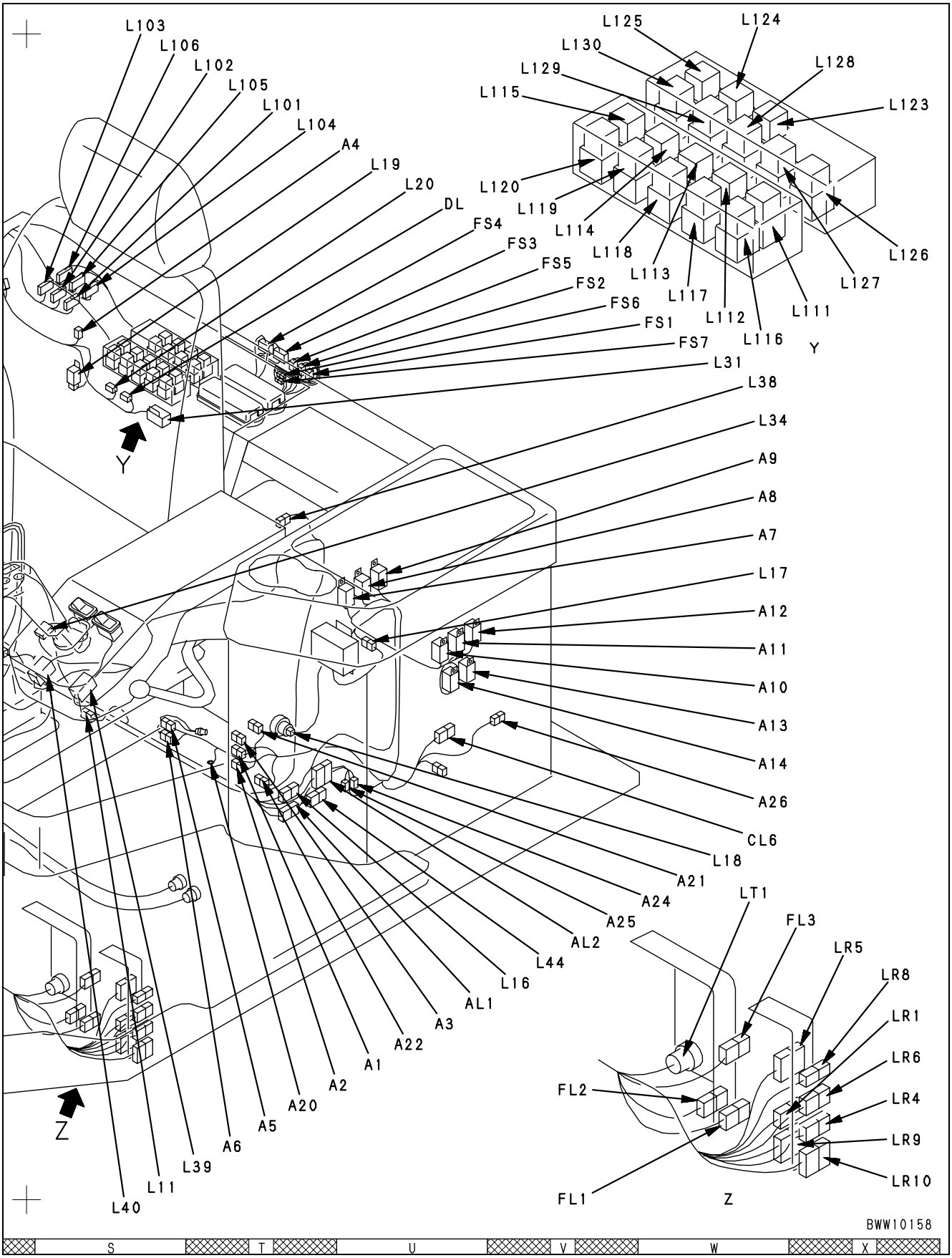
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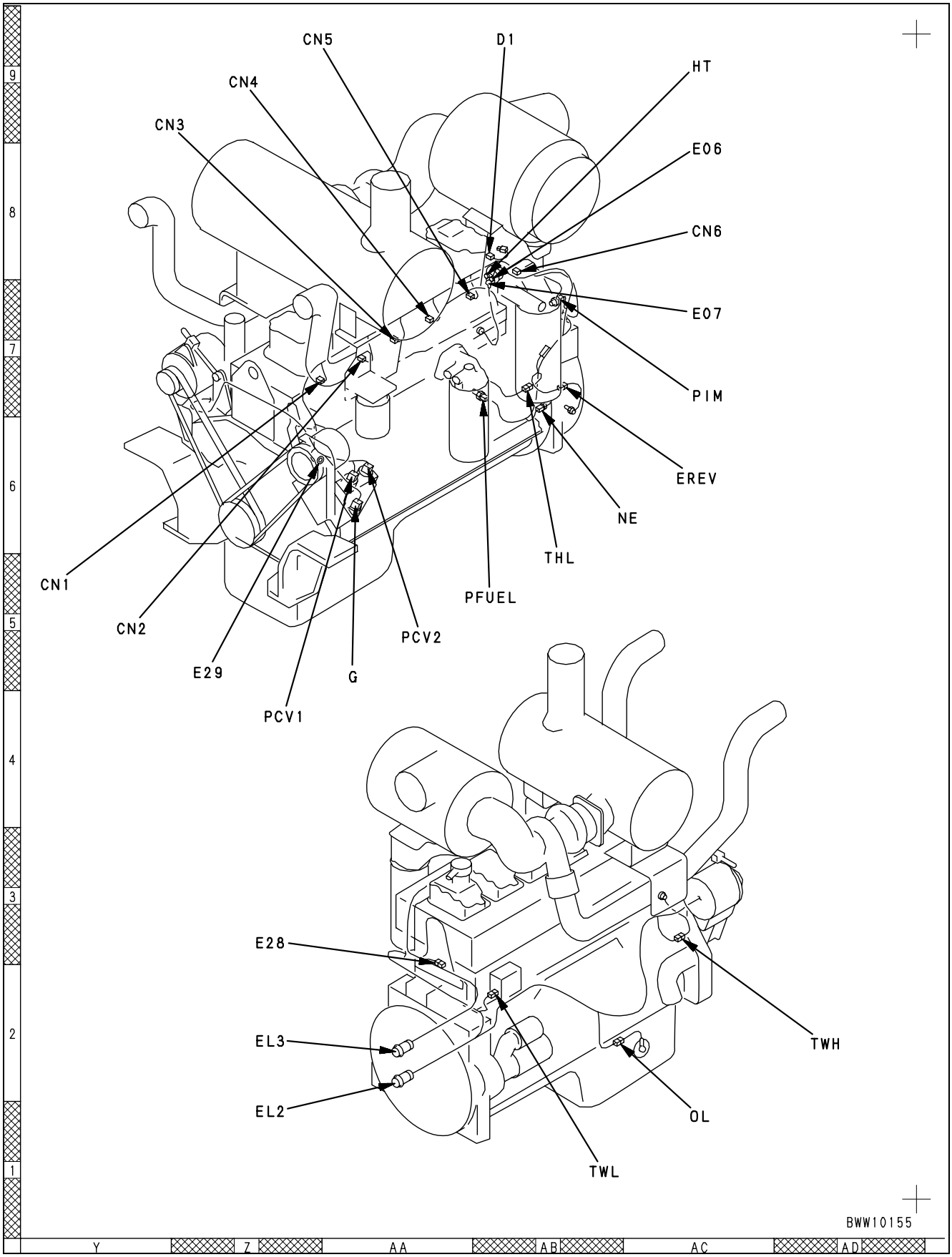
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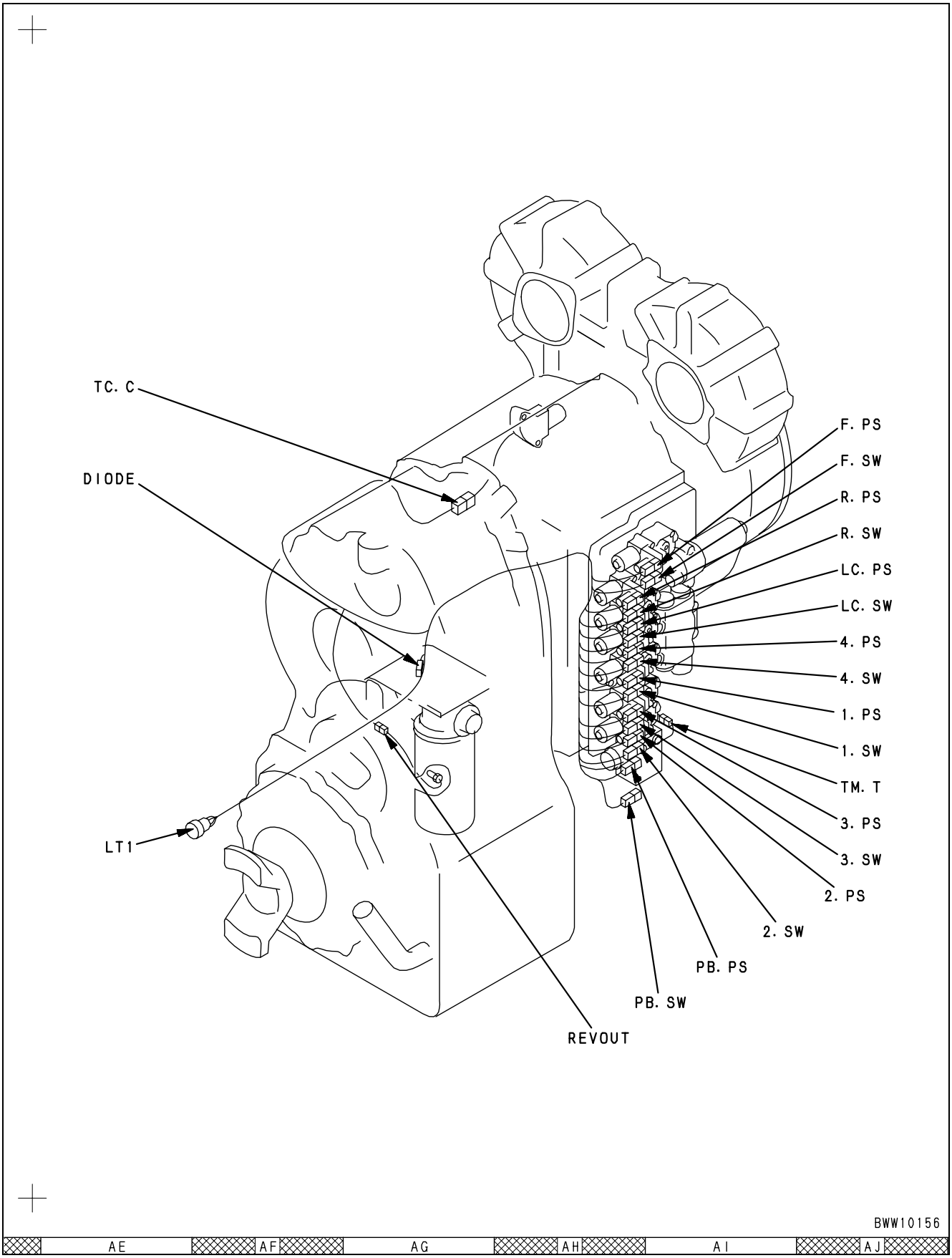
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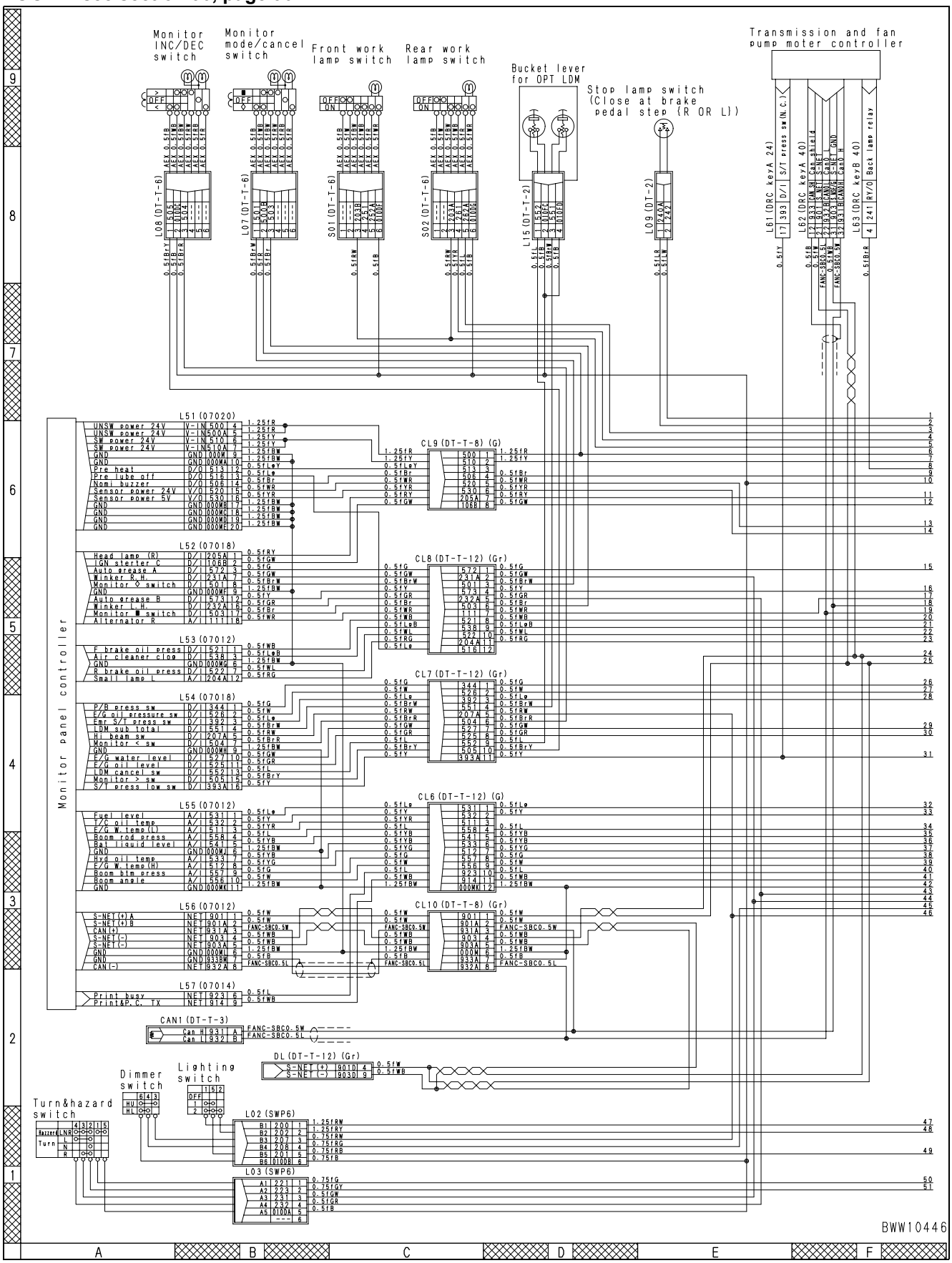
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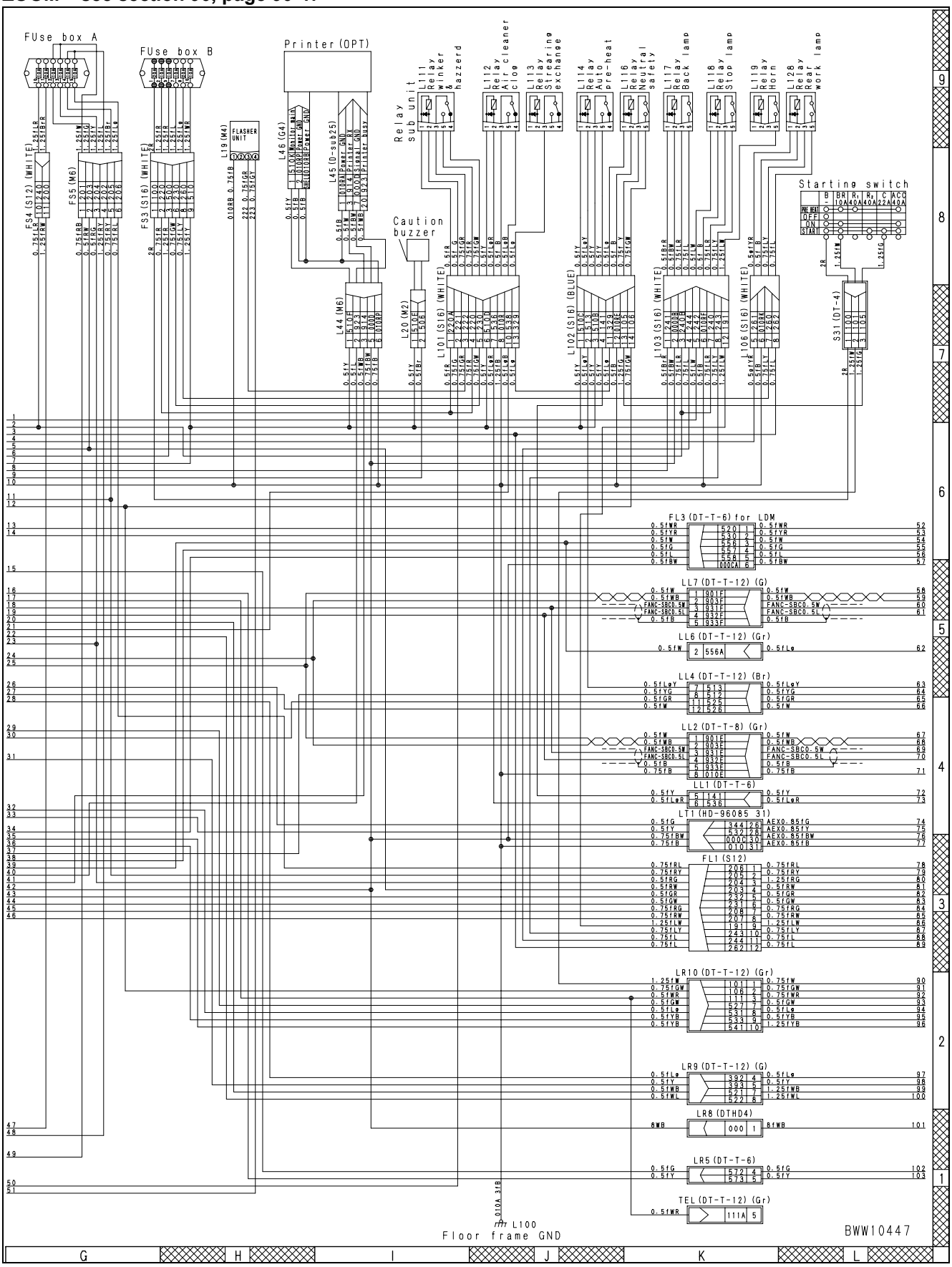
Monitor system diagram

ZOOM – see section 90, page 90-47



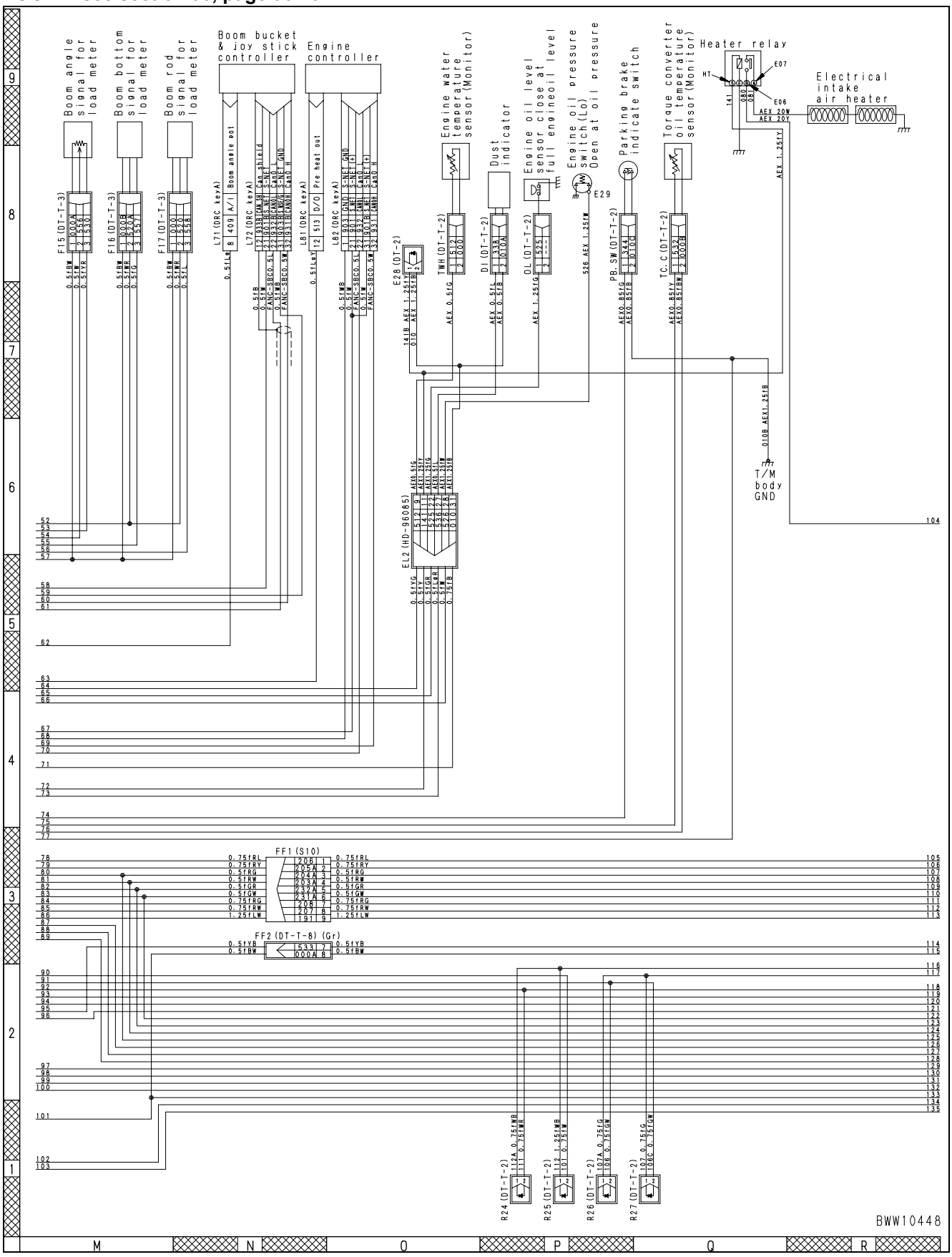
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ZOOM – see section 90, page 90-47



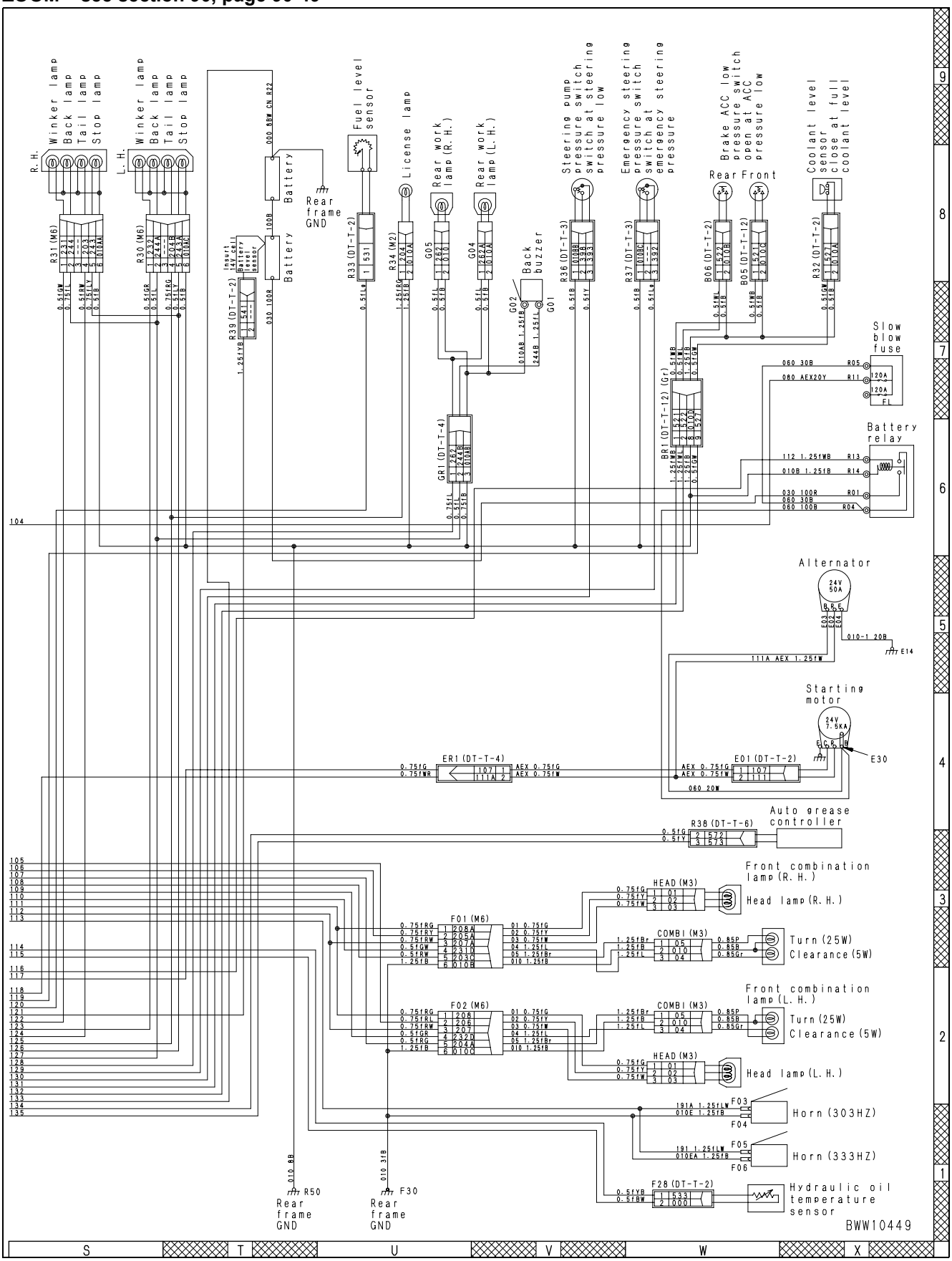
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ZOOM – see section 90, page 90-49



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ZOOM – see section 90, page 90-49



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Error code [2F00KM]

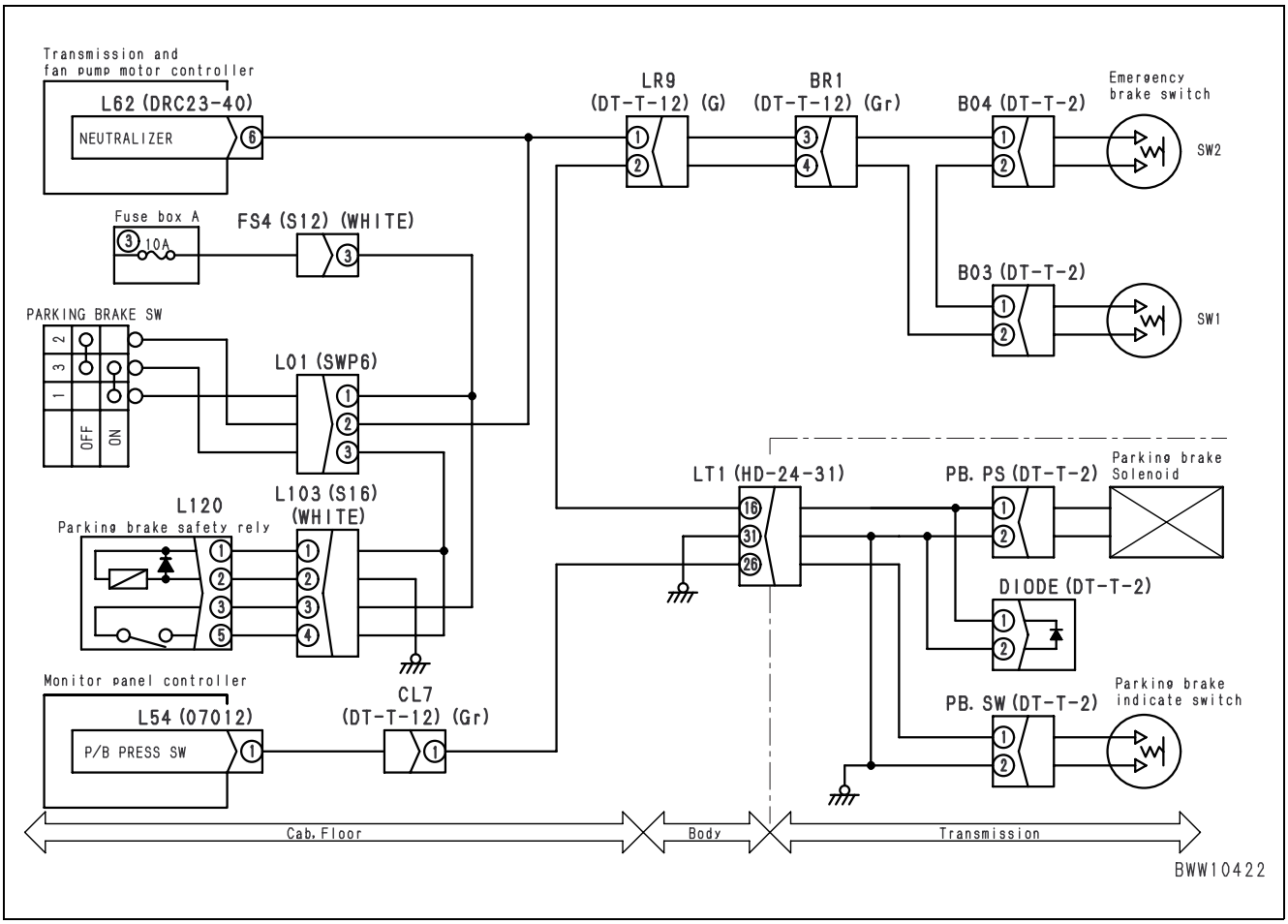
Action Code	Error Code	Controller Code	Trouble	Dragging of parking brake
E00	2F00KM	MON		
Description of Trouble	• The parking brake operating detection circuit is opened when the gear shift lever is not "N".			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• Dragging of parking brake.			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-26). • The transmission gear shift lever input signal can be checked with the monitoring function (code: 40907, D-IN-20, 21 or 22).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective parking brake operation	—			
	2	Defective parking brake indicator switch	1) Turn starting switch OFF. 2) Disconnect connector PB.SW. 3) Connect t-adapter.			
			Between PB.SW (male) (1) ~ (2)	Parking brake oil pressure = 0.6 MPa (6.1 kg/cm²) and above	Resistance	1 Ω and below
				Parking brake oil pressure = 0.34 MPa (3.5 kg/cm²) and below	Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and PB.SW. 3) Connect t-adapter.			
			Wiring harness between L54 (female) (1) ~ PB.SW (female) (1)		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Start engine.			
			Between L54 (female) (1) ~ body	Parking brake oil pressure = 0.6 MPa (6.1 kg/cm²) and above	Voltage	1 V and below
				Parking brake oil pressure = 0.34 MPa (3.5 kg/cm²) and below	Voltage	20 ~ 30 V
	5	Defective parking brake switch	1) Turn starting switch OFF. 2) Disconnect connector L01. 3) Connect t-adapter.			
			Between L01 (male) (1) ~ (3)	Parking brake switch = ON	Resistance	1 Ω and below
				Parking brake switch = OFF	Resistance	1 MΩ and above
			Between L01 (male) (2) ~ (3)	Parking brake switch = ON	Resistance	1 MΩ and above
				Parking brake switch = OFF	Resistance	1 Ω and below
			Between L01 (male) (1) ~ (2)	At any time	Resistance	1 MΩ and above
	6	Defective parking brake solenoid	1) Turn starting switch OFF. 2) Disconnect connector PB.PS. 3) Connect t-adapter.			
			Between PB.PS (male) (1) ~ (2)		Resistance	10 ~ 40 Ω
			Between PB.PS (female) (2) ~ body		Resistance	1 Ω and below
			Between PB.PS (male) (1)/(2) ~ body		Resistance	1 MΩ and above

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	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	7	Defective emergency brake pressure switch	1) Turn starting switch OFF. 2) Disconnect connector B03. 3) Connect t-adapter.			
			Between B03 (male) (1) ~ (2)	Parking brake oil pressure = 4.41 MPa (45 kg/cm²) and above	Resistance	1 Ω and below
				Parking brake oil pressure = 4.41 MPa (45 kg/cm²) and below	Resistance	1 MΩ and above
			1) Turn starting switch OFF. 2) Disconnect connector B04. 3) Connect t-adapter.			
			Between B04 (male) (1) ~ (2)	Parking brake oil pressure = 4.41 MPa (45 kg/cm²) and above	Resistance	1 Ω and below
				Parking brake oil pressure = 4.41 MPa (45 kg/cm²) and below	Resistance	1 MΩ and above
	8	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L01 and PB.SW. 3) Connect t-adapter.			
			Wiring harness between L01 (female) (2) and PB.SW (female) (1)		Resistance	1 Ω and below

Related circuit diagram



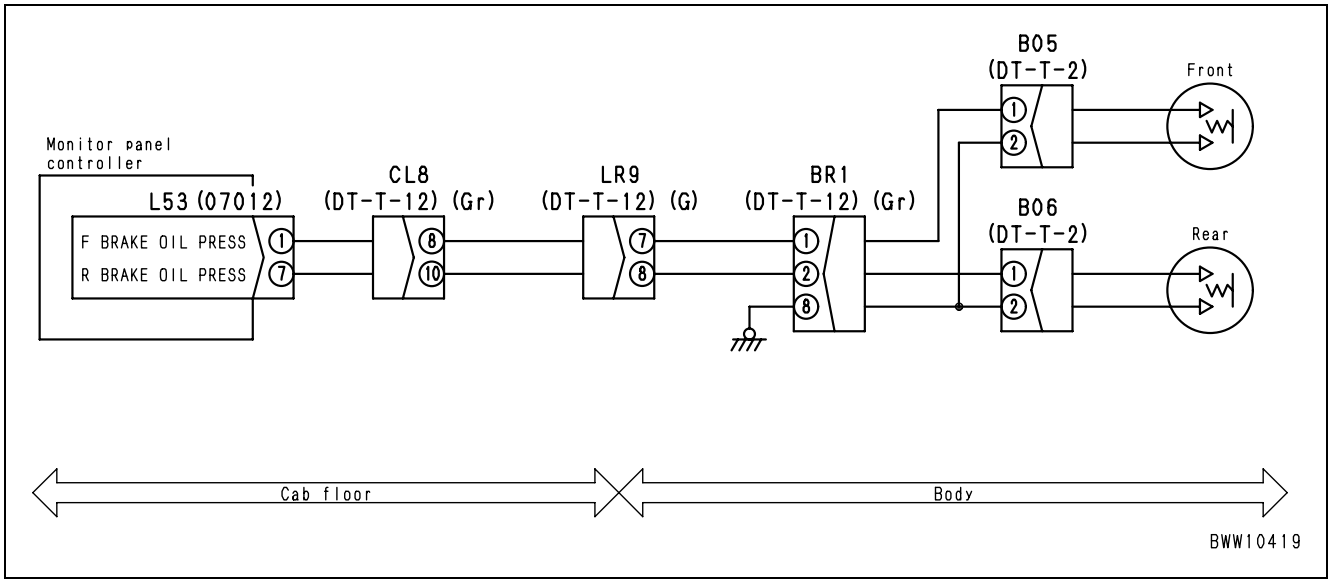
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Error code [2G42ZG]

Action Code	Error Code	Controller Code	Trouble	Accumulator oil pressure (Front circuit) low
E03	2G42ZG	MON		
Description of Trouble	• The accumulator pressure sensor (Front) circuit is opened 30 seconds after the engine started.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The accumulator oil pressure (Front brake circuit) is low. • The front brake may be disabled. • The parking brake may remain ON.			
Related Information	• Can be checked with the monitoring function (Code: 40902_D-IN-16).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Low accumulator oil pressure (Front brake circuit)	—			
	2	Defective brake oil pressure sensor (Front brake circuit)	1) Turn starting switch OFF. 2) Disconnect connector B05. 3) Connect t-adapter. 4) Start engine.			
			Between B05 (male) (1) ~ (2)	Front brake oil pressure = 5.88 MPa (60 kg/cm²) and above	Resistance	1 Ω and below
				Front brake oil pressure = 5.88 MPa (60 kg/cm²) and below	Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L53 and B05. 3) Connect t-adapter.			
			Wiring harness between L53 (female) (1) and B05 (female) (1)		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L53. 3) Connect t-adapter. 4) Start engine.			
			Between L53 (female) (1) ~ body	Front brake oil pressure = 5.88 MPa (60 kg/cm²) and above	Resistance	1 Ω and below
				Front brake oil pressure = 5.88 MPa (60 kg/cm²) and below	Resistance	1 MΩ and above

Related circuit diagram



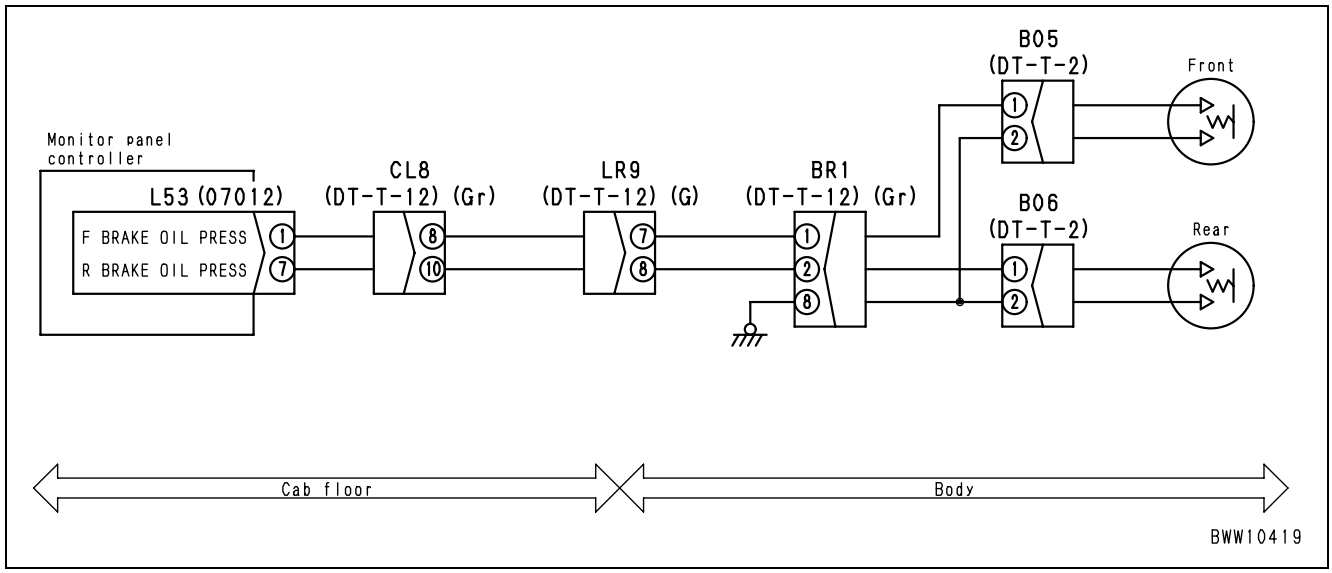
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Error code [2G43ZG]

Action Code	Error Code	Controller Code	Trouble	Accumulator oil pressure (Rear brake circuit) low
E03	2G43ZG	MON		
Description of Trouble	• The accumulator pressure sensor (Rear) circuit is opened 30 seconds after the engine started.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The accumulator oil pressure (Rear brake circuit) is low. • The front brake may be disabled. • The parking brake may remain ON.			
Related Information	• Can be checked with the monitoring function (Code: 40902_D-IN-17).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Low accumulator oil pressure (Rear brake circuit)	—			
	2	Defective brake oil pressure sensor (Rear brake circuit)	1) Turn starting switch OFF. 2) Disconnect connector B06. 3) Connect t-adapter. 4) Start engine.			
			Between B06 (male) (1) ~ (2)	Rear brake oil pressure = 5.88 MPa (60 kg/cm²) and above	Resistance	1 Ω and below
				Rear brake oil pressure = 5.88 MPa (60 kg/cm²) and below	Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L53 and B06. 3) Connect t-adapter.			
			Wiring harness between L53 (female) (7) ~ B06 (female) (1)		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L53. 3) Connect t-adapter. 4) Start engine.			
			Between L53 (female) (7) ~ body	Rear brake oil pressure = 5.88 MPa (60 kg/cm²) and above	Resistance	1 Ω and below
				Rear brake oil pressure = 5.88 MPa (60 kg/cm²) and below	Resistance	1 MΩ and above

Related circuit diagram



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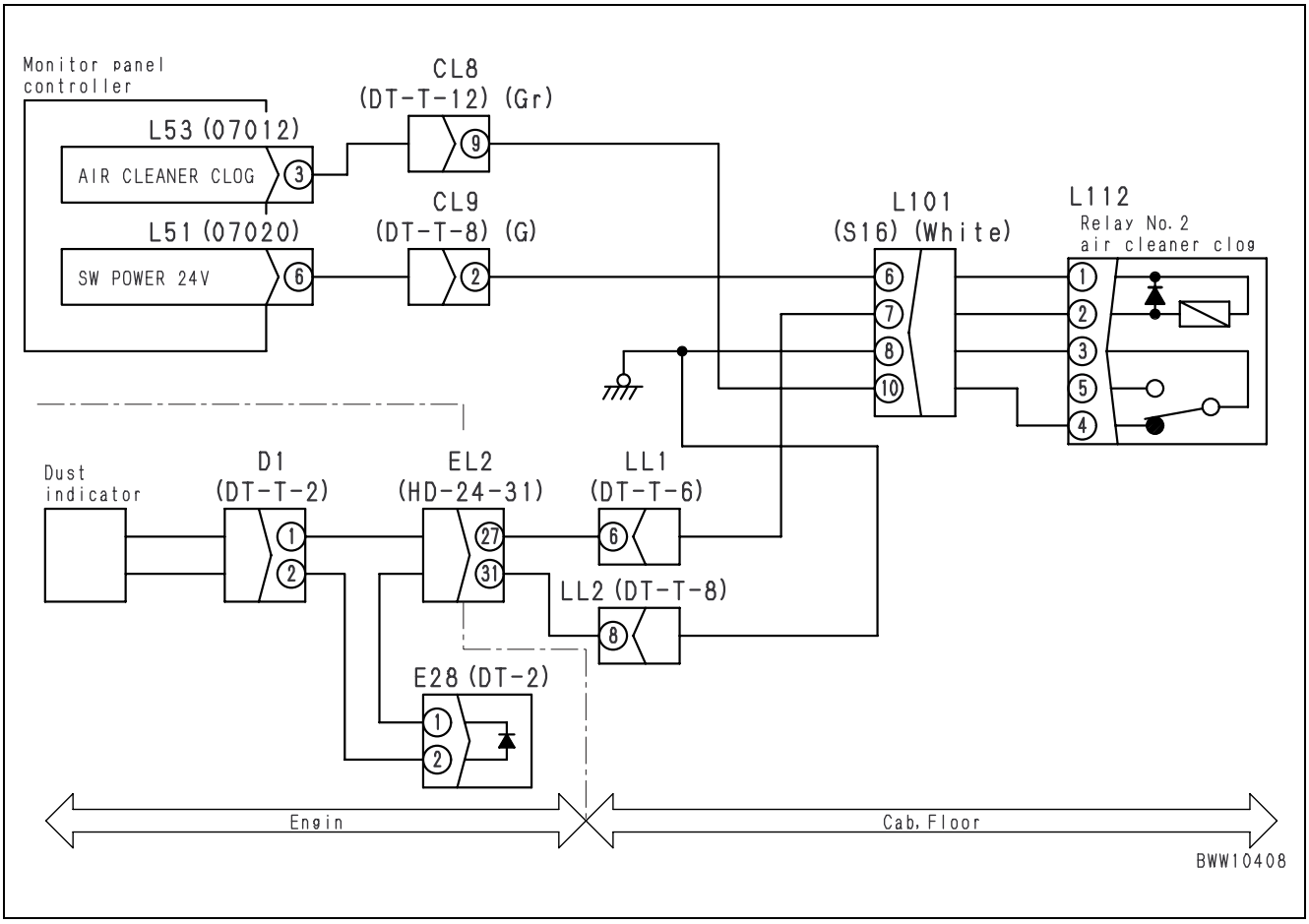
Error code [AA1ANX]

Action Code	Error Code	Controller Code	Trouble	Air cleaner 1 clogged
E01	AA1ANX	MON		
Description of Trouble	• The clogging sensor circuit for air cleaner 1 is opened.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• Air cleaner 1 is clogged (The engine may be damaged).			
Related Information	• Can be checked with the monitoring function (Code: 40902, D-IN-20).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Clogged air cleaner	—			
	2	Defective dust indicator 1	1) Turn starting switch OFF. 2) Disconnect connector D1.			
			Short-circuit between D1 (female) (1) ~ (2)	This failure code (AA1ANX) issued	Dust indicator 1 is not defective.	
				This failure code (AA1ANX) not issued	Dust indicator 1 is defective (Air cleaner clogged).	
	3	Defective dust indicator relay 1	1) Turn starting switch OFF. 2) Disconnect connector D1. 3) Connect t-adapter.			
			Between L112 (male) (1) ~ (2)		Resistance	200 - 400 Ω
			1) Turn starting switch OFF. 2) Replace relay. 3) Start engine.			
			This failure code (AA1ANX) issued	Dust indicator relay 1 is not defective.		
			This failure code (AA1ANX) not issued	Dust indicator relay 1 is defective.		
	4	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L53 and L112. 3) Connect t-adapter.			
			Wiring harness between L112 (female) (3) ~ body		Resistance	1 Ω and below
			Wiring harness between L53 (female) (3) ~ (3) L112 (female) (4)		Resistance	1 Ω and below
	5	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L112 and D1. 3) Connect t-adapter.			
			Between L112 (female) (2)/D1 (female) (1) ~ body		Resistance	1 MΩ and above
	6	Wiring harness hot-shorted incorrectly	1) Turn starting switch OFF. 2) Disconnect connectors L51 and L112. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L51 (female) (6)/L112 (female) (1) ~ body		Voltage	1 V or below
	7	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L51 and L53. 3) Insert t-adapter. 4) Start engine.			
			Between L53 (female) (3) ~ body	Dust indicator 0 is not defective (Air cleaner not clogged)	Voltage	20 ~ 30 V
				Dust indicator 0 is defective (Air cleaner clogged)	Voltage	1 V or below
			1) Turn starting switch OFF. 2) Disconnect connector D1. 3) Connect t-adapter.			
			Between L51 (male) (6) ~ body		Resistance	200 - 400 Ω

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Related circuit diagram



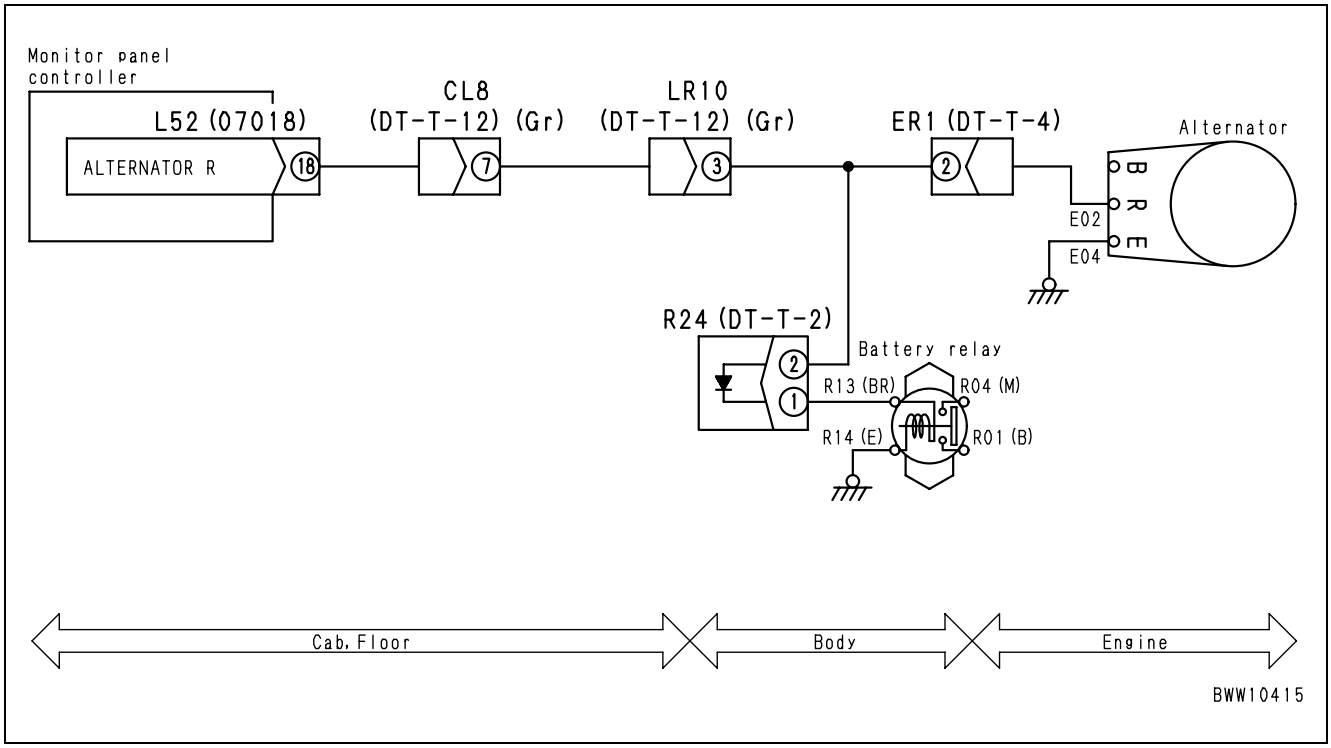
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Error code [AB00L6]

Action Code	Error Code	Controller Code	Trouble	Defective battery charging circuit (Alternator terminal R signal detected when engine stopped)
E03	AB00L6	MON		
Description of Trouble	• The alternator terminal R input voltage is 12 V or higher before the engine started.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The engine cannot be started. • The service meter increases simply by disabling key-on.			
Related Information	• Can be checked with the monitoring function (Code: 04302).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective alternator	Between alternator terminal R (E02) ~ body	Engine started (Throttle 1/2 or more)	Voltage	27.5 ~ 29.5 V
				Engine stopped	Voltage	1 V or below
	2	Wiring harness hot-shorted incorrectly	1) Turn starting switch OFF. 2) Disconnect connectors L52, ER1 and alternator terminal R. 3) Connect t-adapter.			
			Wiring harness between connector L52 (female) (18), ER1 (female) (2) ~ alternator terminal R (E02)		Voltage	1 V or below
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Insert t-adapter.			
			Between L52 (18) ~ body	Engine started (Throttle 1/2 or more)	Voltage	27.5 ~ 29.5 V
				Engine stopped	Voltage	1 V or below
	4	Defective diode R24	1) Turn starting switch OFF. 2) Disconnect connectors L52, ER1 and alternator terminal R. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Wiring harness between connector L52 (female) (18), ER1 (female) (2) ~ alternator terminal R (E02)		Voltage	1 V or below

Related circuit diagram



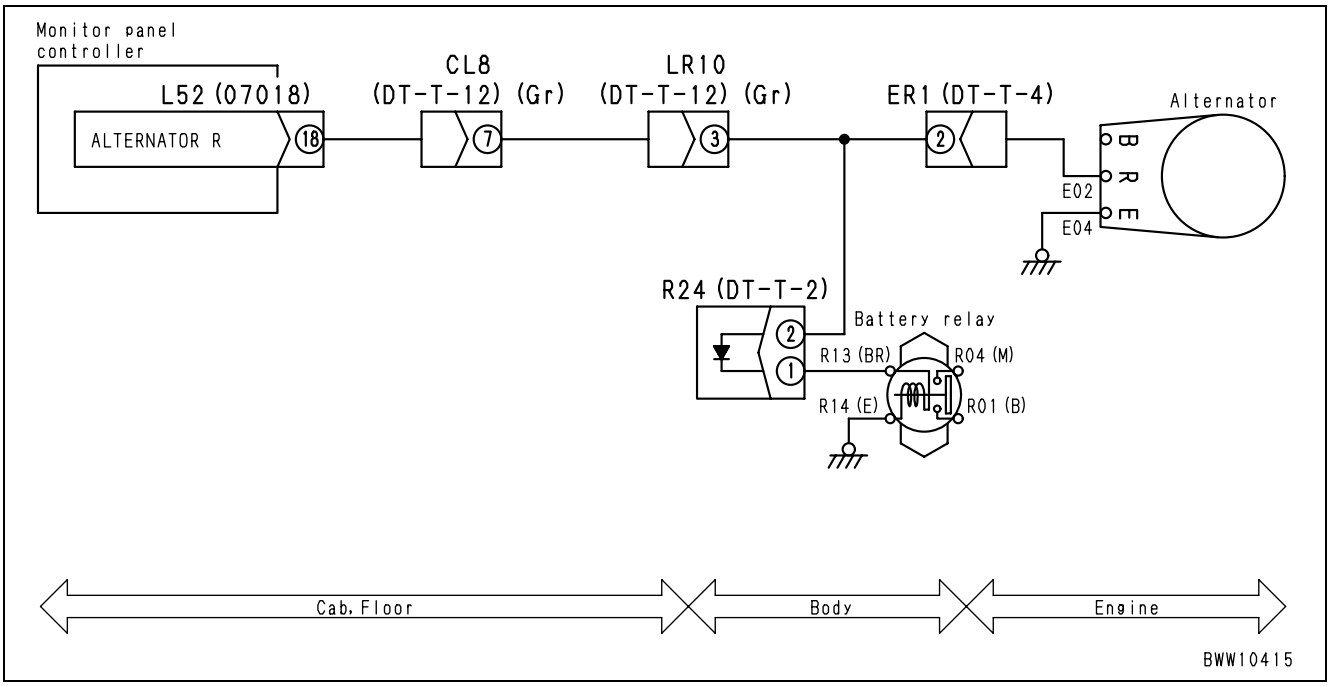
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Error code [AB00MA]

Action Code	Error Code	Controller Code	Trouble	Defective battery charging circuit (No alternator terminal R signal detected, detection failure)
E03	AB00MA	MON		
Description of Trouble	• The alternator terminal R input voltage is 5 V or lower while the engine rotating.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The battery deteriorates. • The engine cannot be started. • The service meter does not increase.			
Related Information	• Can be checked with the monitoring function (Code: 04302).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Deteriorated battery	—			
	2	Defective alternator	Between alternator terminal R (E02) ~ body	Engine started (Throttle 1/2 or more)	Voltage	27.5 ~ 29.5 V
				Engine stopped	Voltage	1 V or below
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L52, ER1 and alternator terminal R. 3) Connect t-adapter.			
			Wiring harness between connector L52 (female) (18), ER1 (female) (2) and alternator terminal R (E02)		Resistance	1 Ω and below
	4	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L52, ER1 and alternator terminal R. 3) Connect t-adapter.			
			Between connector L52 (female) (18), ER1 (female) (2) ~ alternator terminal R (E02)		Resistance	1 MΩ and above
	5	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Insert t-adapter.			
			Between L52 (18) ~ body	Engine started (Throttle 1/2 or more)	Voltage	27.5 ~ 29.5 V
				Engine stopped	Voltage	1 V or below

Related diagram circuit



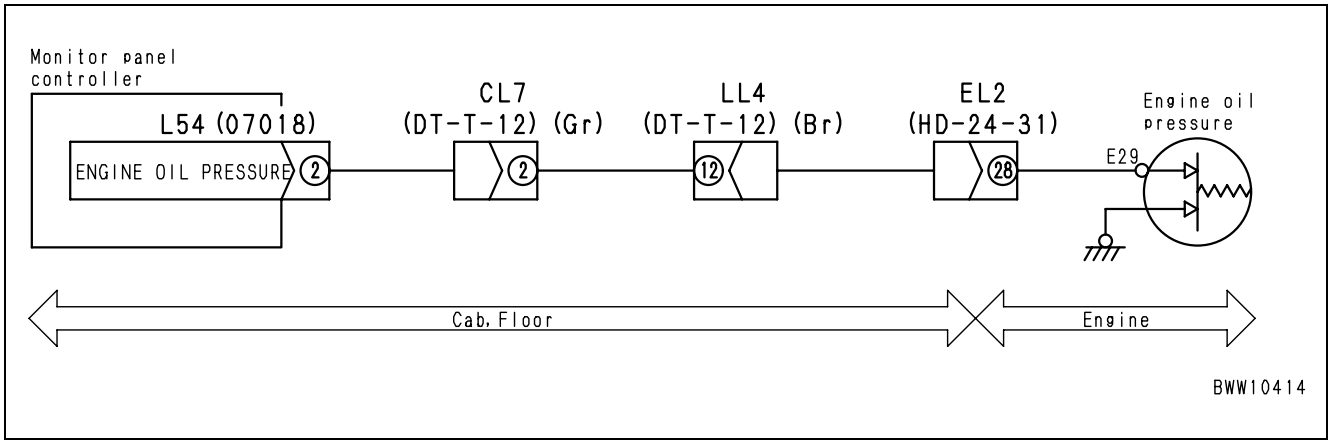
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Error code [B@BAZG]

Action Code	Error Code	Controller Code	Trouble	Engine oil pressure low
E03	B@BAZG	MON		
Description of Trouble	• The engine oil pressure sensor circuit is closed 15 minutes after the engine started and when the engine speed is 1,500 rpm or higher.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The engine oil pressure is low (The engine may be damaged).			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-28).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Low engine oil pressure	—			
	2	Defective engine oil pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector E29. 3) Connect t-adapter.			
			Between oil pressure switch terminal and body	Engine stopped	Resistance	1 Ω and below
				Engine rotating	Resistance	1 MΩ and above
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and E29. 3) Connect t-adapter.			
			Between L54 (female) (2)/E29 ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (female) (2) ~ body	Engine stopped	Voltage	1 V and below
				Engine rotating	Voltage	20 ~ 30 V

Related circuit diagram



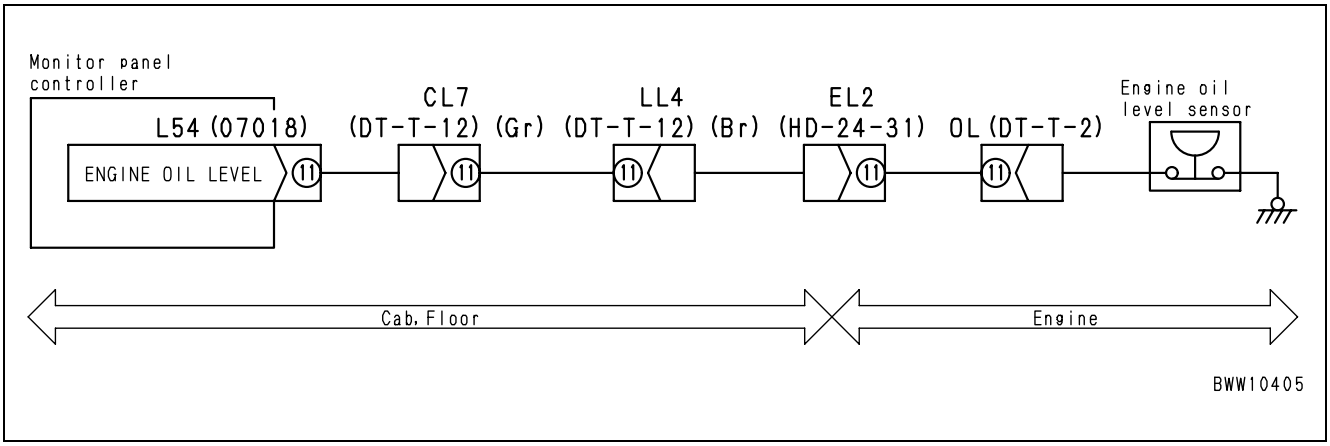
https://truckmanualshub.com/

Error code [B@BAZK]

Action Code	Error Code	Controller Code	Trouble	Engine oil level low
E01	B@BAZK	MON		
Description of Trouble	• The engine oil level sensor circuit is opened.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The engine oil level is low (The engine may be damaged).			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-29).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Low engine oil level	—			
	2	Defective engine oil level sensor	1) Turn starting switch OFF. 2) Disconnect connector OL. 3) Connect t-adapter.			
			Between OL (male) (1) ~ body	Oil level is normal	Resistance	1 Ω and below
				Oil level is low	Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and OL. 3) Connect t-adapter.			
			Wiring harness between L54 (female) (11) ~ OL (female) (1)		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (female) (11) ~ body	Oil level is normal	Resistance	1 Ω and below
				Oil level is low	Resistance	1 MΩ and above

Related circuit diagram



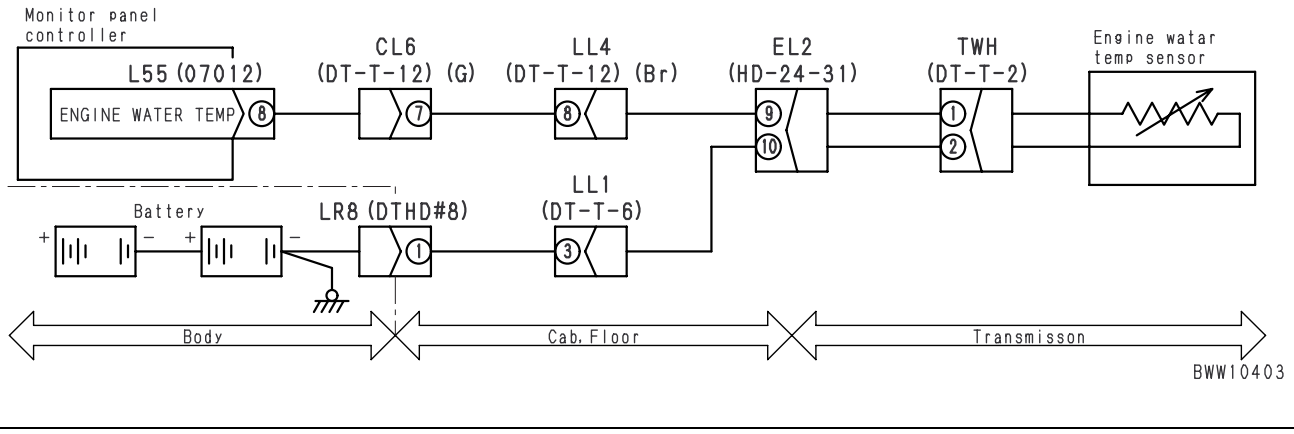
https://truckmanualshub.com/

Error code [B@BCNS]

Action Code	Error Code	Controller Code	Trouble	Engine water temperature overheating
E02	B@BCNS	MON		
Description of Trouble	• The engine water temperature is above 105°C			
Controller Reaction	• Triggers an alarm (Turns the engine water temperature caution lamp ON at 102 °C and issues this failure code at 105°C).			
Effect on Machine	• The engine water temperature overheat alarm is issued (The engine may be damaged if operation continues).			
Related Information	• Can be checked with the monitoring function (Code: 04103).			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Overheating engine water temperature	—			
	2	Defective engine water temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector TWH. 3) Connect t-adapter.			
			Between TWH (male) (1) ~ (2)	Normal temperature (25°)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55 and TWH. 3) Connect t-adapter.			
			Wiring harness between L55 (female) (8)/TWH (female) (1) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter.			
			Between L55 (female) (8) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



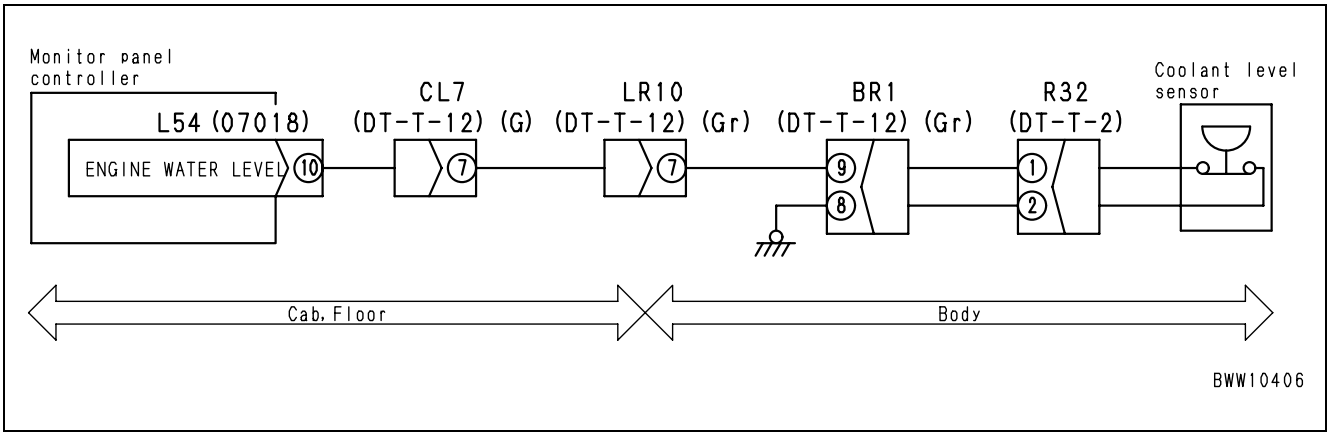
https://truckmanualshub.com/

Error code [B@BCZK]

Action Code	Error Code	Controller Code	Trouble	Alarm indicating low coolant level
E01	B@BCZK	MON		
Description of Trouble	• The coolant level sensor circuit is opened.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The coolant level is low (The engine may be damaged).			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-27).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Low coolant level	—			
	2	Defective coolant level sensor	1) Turn starting switch OFF. 2) Disconnect connector R32. 3) Connect t-adapter.			
			Between R32 (male) (1) ~ (2)	Reserve tank low level and below (abnormal	Resistance	1 MΩ and above
				Reserve tank low level and above (normal)	Resistance	1 Ω and below
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and R32. 3) Connect t-adapter.			
			Wiring harness between L54 (female) (10) ~ (female) (1)		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (female) (10) ~ body	Reserve tank Clow level and below (abnormal)	Resistance	1 MΩ and above
				Reserve tank low level and above (normal)	Resistance	1 Ω and below

Related circuit diagram



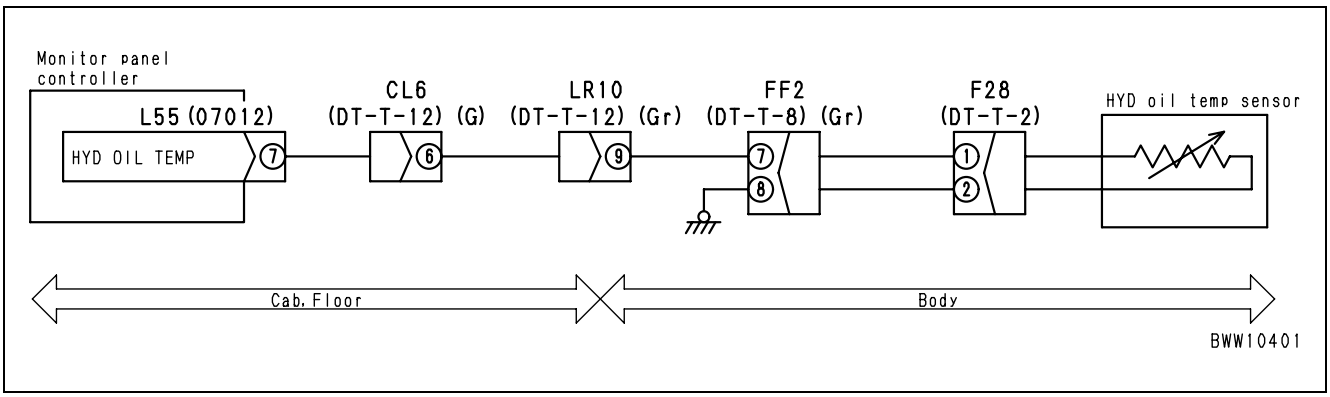
https://truckmanualshub.com/

Error code [B@HANS]

Action Code	Error Code	Controller Code	Trouble	Hydraulic oil temperature overheating
E02	B@HANS	MON		
Description of Trouble	The hydraulic oil temperature is above 110°C.			
Controller Reaction	Triggers an alarm.			
Effect on Machine	The hydraulic oil temperature overheat alarm is issued (The pump/cylinder sealing may be damaged if operation continues).			
Related Information	Can be checked with the monitoring function (Code: 04401).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Overheating hydraulic oil temperature	—			
	2	Defective hydraulic oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector F28. 3) Connect t-adapter.			
			Between F28 (male) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55 and F28. 3) Connect t-adapter.			
			Wiring harness between L55 (female) (7)/F28 (female) (1) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter.			
			Between L55 (female) (7) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



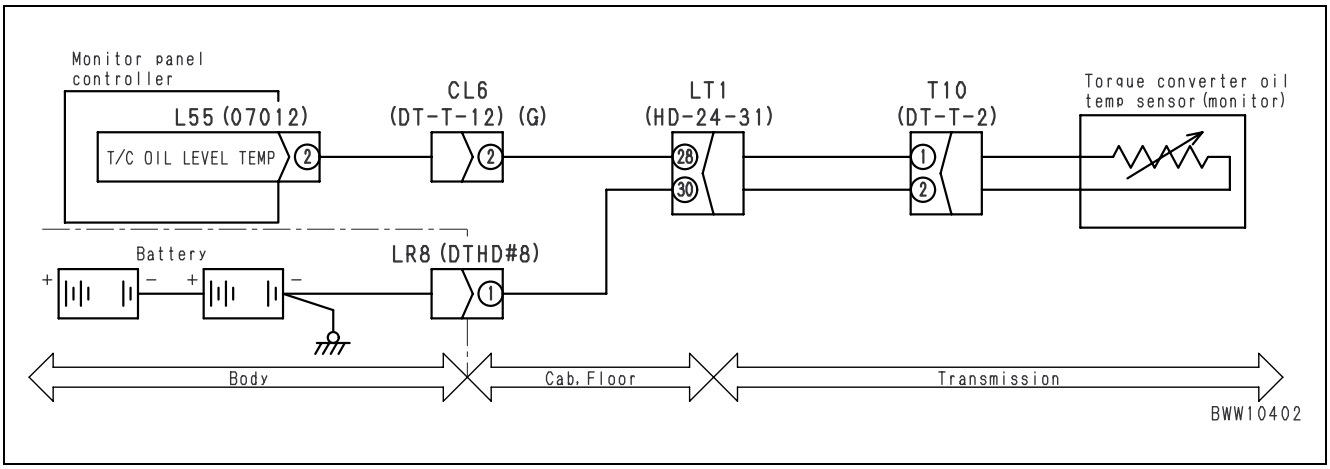
https://truckmanualshub.com/

Error code [B@CENS]

Action Code	Error Code	Controller Code	Trouble	Torque converter oil temperature overheating
E02	B@CENS	MON		
Description of Trouble	The torque converter oil temperature is above 130°C.			
Controller Reaction	Triggers an alarm (Turns the torque converter oil temperature caution lamp ON at 120°C and issues this failure code at 130°C).			
Effect on Machine	The torque converter oil temperature overheat alarm is issued (The torque converter may be damaged if operation continues).			
Related Information	Can be checked with the monitoring function (Code: 40100).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Overheating torque converter	—			
	2	Defective torque converter oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector TC.C. 3) Connect t-adapter.			
			Between T2 (male) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55 and TC.C. 3) Connect t-adapter.			
			Wiring harness between L55 (female) (2)/TC.C (female) (1) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter.			
			Between L54 (female) (10) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



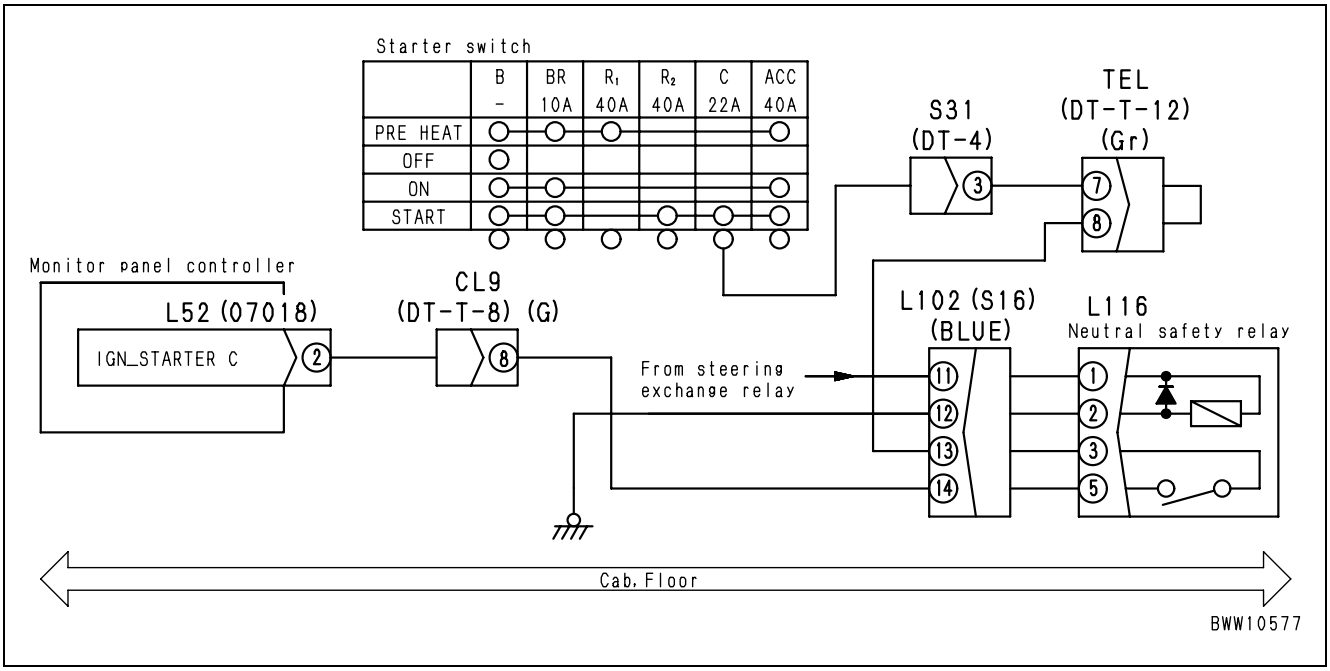
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Error code [D5ZHL6]

Action Code	Error Code	Controller Code	Trouble	Starting switch C (IGN "C") input failure
E01	D5ZHL6	MON		
Description of Trouble	• No starting switch terminal C (IGN "C") signal is input after the engine started (The input circuit disconnected or grounded).			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The engine cannot be started (The starting switch cannot be turned ON since fuse B-1 blows when the circuit is grounded).			
Related Information	• The starting switch terminal C (IGN "C") input signal (0/1) can be checked with the monitoring function (Code: 40900, D-IN-2).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective starting switch	1) Turn starting switch OFF. 2) Disconnect starting switch terminal. 3) Connect t-adapter.			
			Between starting switch terminals B ~ C	Starting switch = Start	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity	1) Turn starting switch OFF. 2) Disconnect starting switch terminal C and connector L116. 3) Connect t-adapter.			
			Wiring harness between starting switch terminal C (Wiring harness) ~ L116 (female) (3)		Resistance	1 Ω and below
	3	Wiring harness ground fault Fuse B-1 blows when this failure occurs.	1) Turn starting switch OFF. 2) Disconnect starting switch terminal C and connector L116. 3) Connect t-adapter.			
			Between starting switch terminal C (Wiring harness)/L116 (female) (3) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect t-adapter.			
			Between L52 (female) (2) ~ body	Starting switch = Start	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

Related circuit diagram



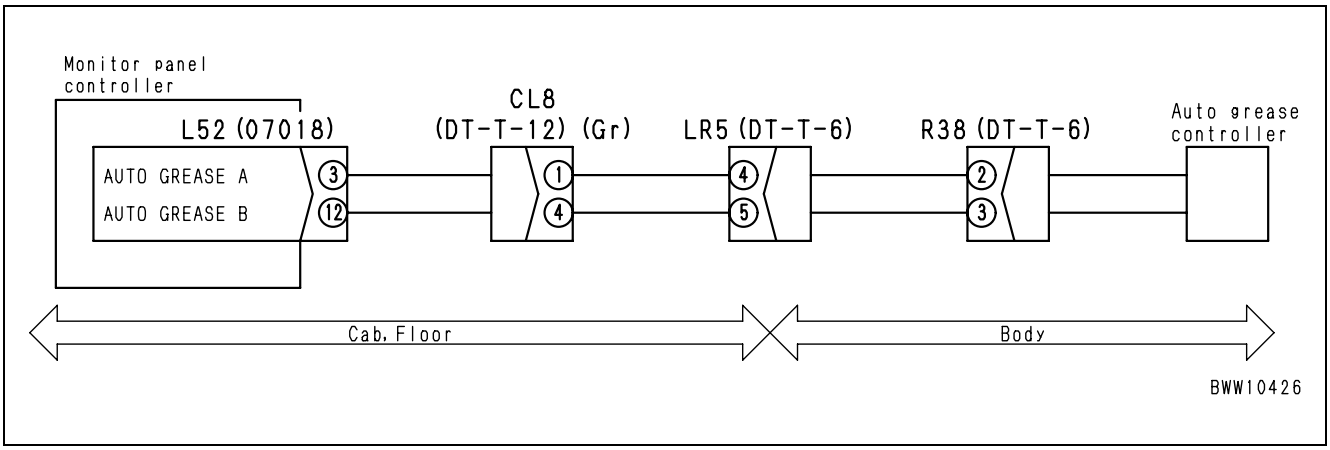
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Error code [DA80L4]

Action Code	Error Code	Controller Code	Trouble	Auto grease input failure
E01	DA80L4	MON		
Description of Trouble	• Auto grease sensor input circuits A and B are opened or closed simultaneously.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The auto grease operating state, failure state or empty tank cannot be checked.			
Related Information	• The auto grease input signal (2-system, 0/1) can be checked with the monitoring function (Code: 40900, D-IN-4 or 5)			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L52 and R38. 3) Connect t-adapter.			
			Wiring harness between L52 (female) (3) ~ R38 (female) (2)		Voltage	1 V and below
			Wiring harness between L52 (female) (12) ~ R38 (female) (3)		Voltage	1 V and below
	2	Wiring harness hot-shorted incorrectly	1) Turn starting switch OFF. 2) Disconnect connectors L52 and R38. 3) Connect t-adapter.			
			Between L52 (female) (3)/R38 (female) (2) ~ body		Voltage	1 V and below
			Between L52 (female) (12)/R38 (female) (3) ~ body		Voltage	1 V and below
	3	Defective auto grease controller	1) Turn starting switch OFF. 2) Disconnect connectors L52 and R38. 3) Insert t-adapter. 4) Disconnect connectors. 5) Turn starting switch ON.			
			Between L38 (2) ~ body	Auto grease = Operating	Voltage	1 V and below
				Auto grease = Not operating (Empty tank)	Voltage	20 ~ 30 V
			Between L38 (3) ~ body	Auto grease = Operating	Voltage	20 ~ 30 V
				Auto grease = Not operating (Empty tank)	Voltage	1 V and below
			If no failure has been detected in the above procedure, diagnose the machine by referring to the auto grease system troubleshooting.			
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52 and R38. 3) Connect t-adapter. 4) Disconnect connectors.			
			Between L52 (female) (3) ~ body	Auto grease = Operating	Voltage	1 V and below
				Auto grease = Not operating (Empty tank)	Voltage	20 ~ 30 V
			Between L52 (12) ~ body	Auto grease = Operating	Voltage	20 ~ 30 V
				Auto grease = Not operating (Empty tank)	Voltage	1 V and below
			If no failure has been detected in the above procedure, diagnose the machine by referring to the auto grease system troubleshooting.			

Related circuit diagram



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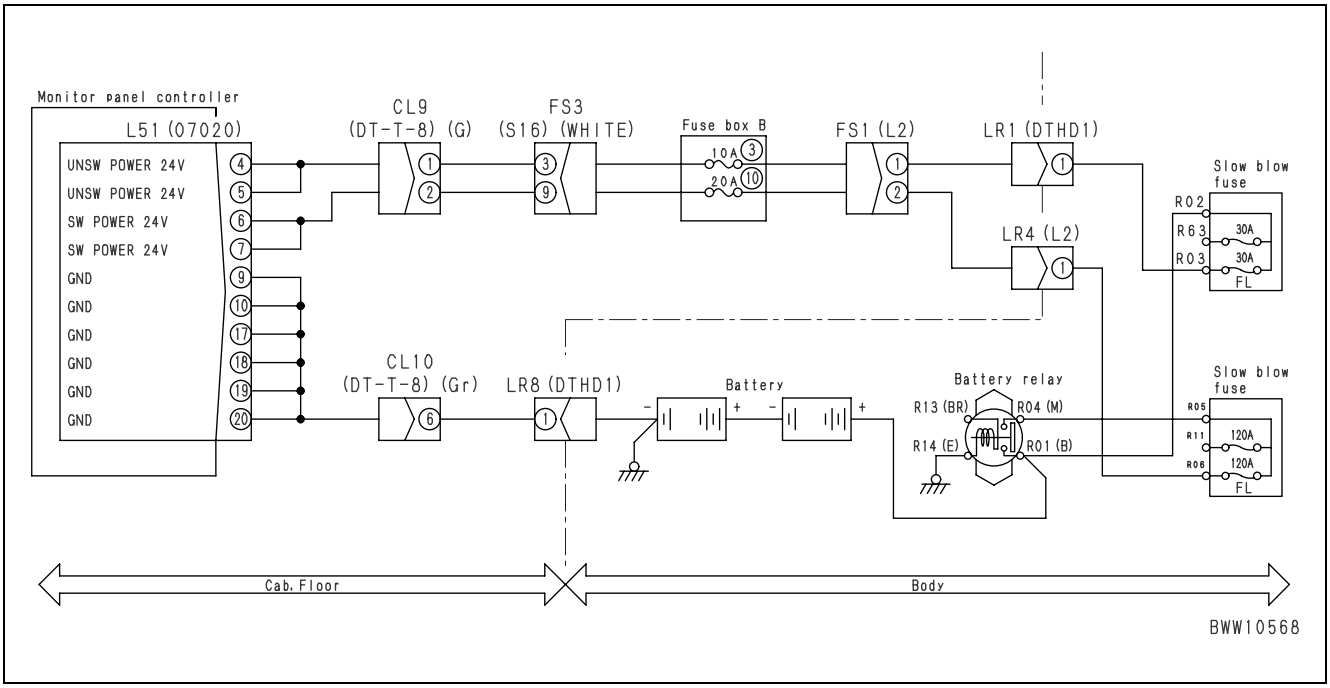
Error code [DAF3KK]

Action Code	Error Code	Controller Code	Trouble	SW power supply (For operation) = ON and NSW power supply (For memory) = OFF
E03	DAF3KK	MON		
Description of Trouble	• The NSW power supply (For memory) voltage is below 17 V when the SW power supply (For operation) voltage is 17 V or above.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The service meter time deviates, the odometer value (Travel distance integrated value) does not increase and no failure history data is stored.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective fuse B-3	Fuse should not be blown.		
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect battery relay terminal B, connectors FS1 and L51. 3) Connect t-adapter.		
			Wiring harness between battery relay terminal B ~ FS1 (female) (1)	Resistance	1 Ω and below
			Wiring harness between FS1 (female) (1) ~ L51 (female) (4)/(5)	Resistance	1 Ω and below
			Wiring harness between L51 (female) (9)/(10)/(17)/(18)/(19)/(20) ~ body	Resistance	1 Ω and below
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect battery relay terminal B, connectors FS1, L51, L63 and L80 (and possibly L72).		
			Between battery relay terminal B/FS1 (female) (1) ~ body	Resistance	1 MΩ and above
			Between FS1 (female) (1)/L51 (female) (4)/(5) ~ body	Resistance	1 MΩ and above
			★ Fuse B-3 has been blown if this system is grounded.		
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51. 3) Connect t-adapter.		
			Between L54 (4)/(5) ~ body	Voltage	20 ~ 30 V
			Between L51 (4)/(5) ~ (9)/(10)/(17)/(18)/(19)/(20) ~ body	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L51. 3) Insert t-adapter. 4) Turn starting switch ON.		
			Between L51 (6)/(7) ~ body	Voltage	20 ~ 30 V
			Between L51 (6)/(7) ~ (9)/(10)/(17)/(18)/(19)/(20) ~ body	Voltage	20 ~ 30 V

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Related circuit diagram



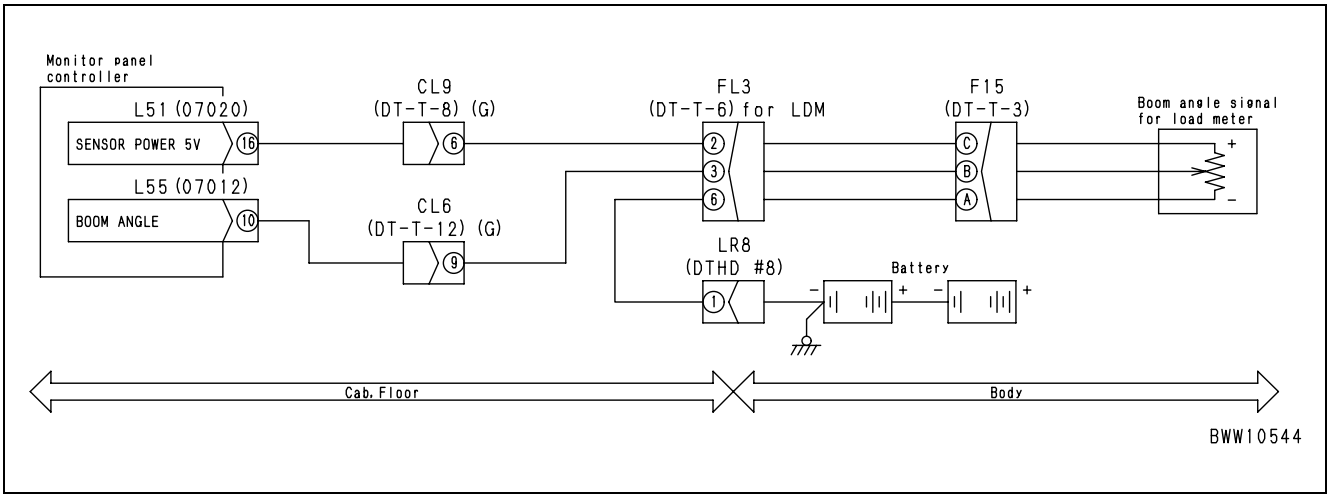
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Error code [DAF5KP]

Action Code	Error Code	Controller Code	Trouble	5-V power supply output failure
E01	DAF5KP	MON		
Description of Trouble	• The 5-V power supply output sensor line is grounded.			
Controller Reaction	• Stops 5-V power supply output until the starting switch is turned OFF. • Does not display the load.			
Effect on Machine	• The load cannot be detected (Displayed).			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective coolant level sensor	1) Turn starting switch OFF. 2) Disconnect connector F15 3) Connect t-adapter.			
			Between F15 (male) (4) ~ (6)		Resistance	4 ~ 6 kΩ
			1) Turn starting switch OFF. 2) Disconnect connector F15 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between F15 (3) ~ (1)		Voltage	4.75 ~ 5.25 V
			Between F15 (2) ~ (1)	Boom height = Highest	Voltage	3.5 ~ 4.0 V
				Boom height = Lowest	Voltage	1.0 ~ 2.0 V
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L51 and F15. 3) Connect t-adapter.			
			Between L51 (female) (16)/F15 (female) (3) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L51 and L55. 3) Connect t-adapter.			
			Between L51 (male) (16) ~ body		Resistance	4 ~ 6 kΩ
			1) Turn starting switch OFF. 2) Disconnect connectors L51 and L55. 3) Insert t-adapter. 4) Turn starting switch ON.			
			Between L51 (16) ~ body		Voltage	4.75 ~ 5.25 V
			Between L51 (10) ~ body	Boom height = Highest	Voltage	3.5 ~ 4.0 V
				Boom height = Lowest	Voltage	1.0 ~ 2.0 V

Related circuit diagram



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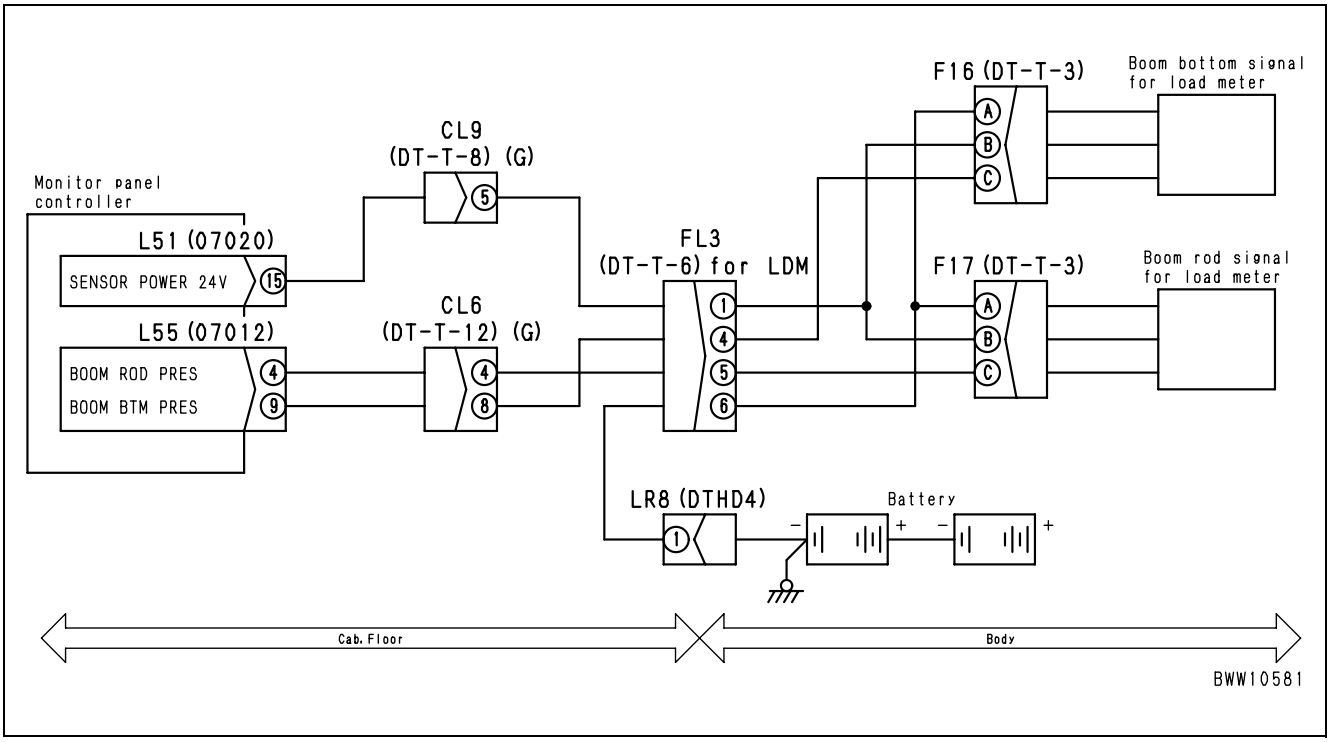
Error code [DAF6KP]

Action Code	Error Code	Controller Code	Trouble	24-V power supply output failure
E01	DAF6KP	MON		
Description of Trouble	• The 24-V power supply output sensor line is grounded.			
Controller Reaction	• Stops 24-V power supply output until the starting switch is turned OFF. • Does not display the load.			
Effect on Machine	• The load cannot be detected (Displayed).			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective boom pressure sensor (Bottom)	1) Turn starting switch OFF. 2) Disconnect connector F16. 3) Insert t-adapter. 4) Turn starting switch ON.			
			Between F16 (2) ~ (1)		Voltage	20 ~ 30 V
			Between F16 (2) ~ (1)	During operation	Voltage	0.7 ~ 5.3 V
				Open to atmosphere	Voltage	0.5 ~ 1.5 V
	2	Defective boom pressure sensor (Head)	1) Turn starting switch OFF. 2) Disconnect connector F17. 3) Insert t-adapter. 4) Turn starting switch ON.			
			Between F17 (2) ~ (1)		Voltage	20 ~ 30 V
			Between F17 (2) ~ (1)	During operation	Voltage	0.7 ~ 5.3 V
				Open to atmosphere	Voltage	0.5 ~ 1.5 V
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L51, F16 and F17. 3) Connect t-adapter.			
			Between L51 (female) (15)/F16 (female) (2),F17 (female) (2) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L51, F16 and F17. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L51 (male) (15) ~ body		Voltage	20 ~ 30 V
			Between L55 (4) ~ body	During operation	Voltage	0.7 ~ 5.3 V
			Between L55 (9) ~ body	During operation	Voltage	0.7 ~ 5.3 V
			Between L55 (4)(9)/~ body	Open to atmosphere	Voltage	0.5 ~ 1.5 V

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Related circuit diagram



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Error code [DAFBKM]

Action Code	Error Code	Controller Code	Trouble	Wrong information ON model selection
E01	DAFBKM	MON		
Description of Trouble	• The switch for model selection (SW1) is set to ONe of the values between (A) and (F).			
Controller Reaction	• Operates assuming "WA380".			
Effect on Machine	• The travel speed, engine speed or odometer display does not show the actual value. • The gear shift shock is large. • The load meter weight is different from the actual weight.			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
	1	Wrong model setting	SW1 setting (Rear side of monitor)	Normal	(0) ~ (9)
				Abnormal	(A) ~ (F)
	2	Defective monitor panel	—		

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Error code [DAFSKQ]

Action Code	Error Code	Controller Code	Trouble	Wrong information on meter display selection
E01	DAFSKQ	MON		
Description of Trouble	• The switch for meter display selection (SW3) is set to one of the values between (9) ~ (F).			
Controller Reaction	• Operates assuming km/h display.			
Effect on Machine	• The travel speed or odometer display may not show the actual value since the speed is calculated by assuming the std tire.			
Related Information	• Meter display selection information (SW3) signals (0) to (F) can be checked using the monitoring function (Code: 30802, SW3).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wrong model setting	SW3 setting (Rear side of monitor)	Normal	(0) ~ (8)
				Abnormal	(9) ~ (F)
	2	Defective monitor panel	—		

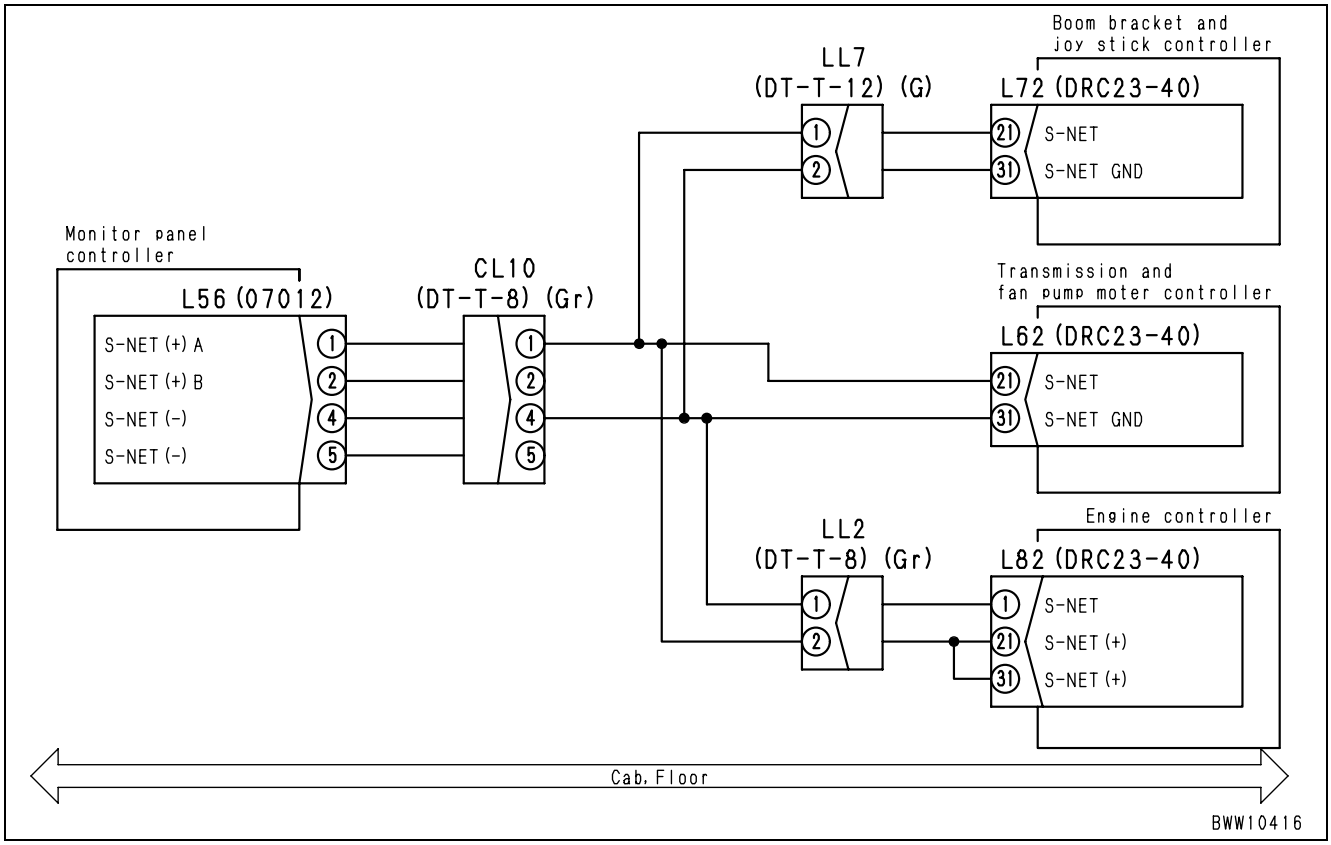
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Error code [DAQSKR]

Action Code	Error Code	Controller Code	Trouble	S-NET communication failure (Between monitor panel and transmission controller) selection
E03	DAQSKR	MON		
Description of Trouble	• Disconnection, ground fault, or hot-short has occurred in the S-NET (+) signal line between the monitor panel and the transmission controller.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The monitor display does not properly function (Shift indicator and travel speed/engine speed do not appear).			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L62. 3) Connect T-adapter.		
			Wiring harness between L56 (female) (1) ~ L62 (female) (21)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L62. 3) Insert T-adapter.		
			Between L56 (female) (1)/L62 (female) (21) ~ body	Resistance	1 MΩ and above
	3	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L56, L62, (L72), L80, L82, and L07. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L56 (female) (1)/L62 (female) (21) ~ body	Voltage	1 V or less
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L62. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L56 (1)/(2) ~ body	Voltage	4 ~ 8 V
			Between L56 (1)/(2) ~ L56 (4)/(5)	Voltage	4 ~ 8 V

Related circuit diagram



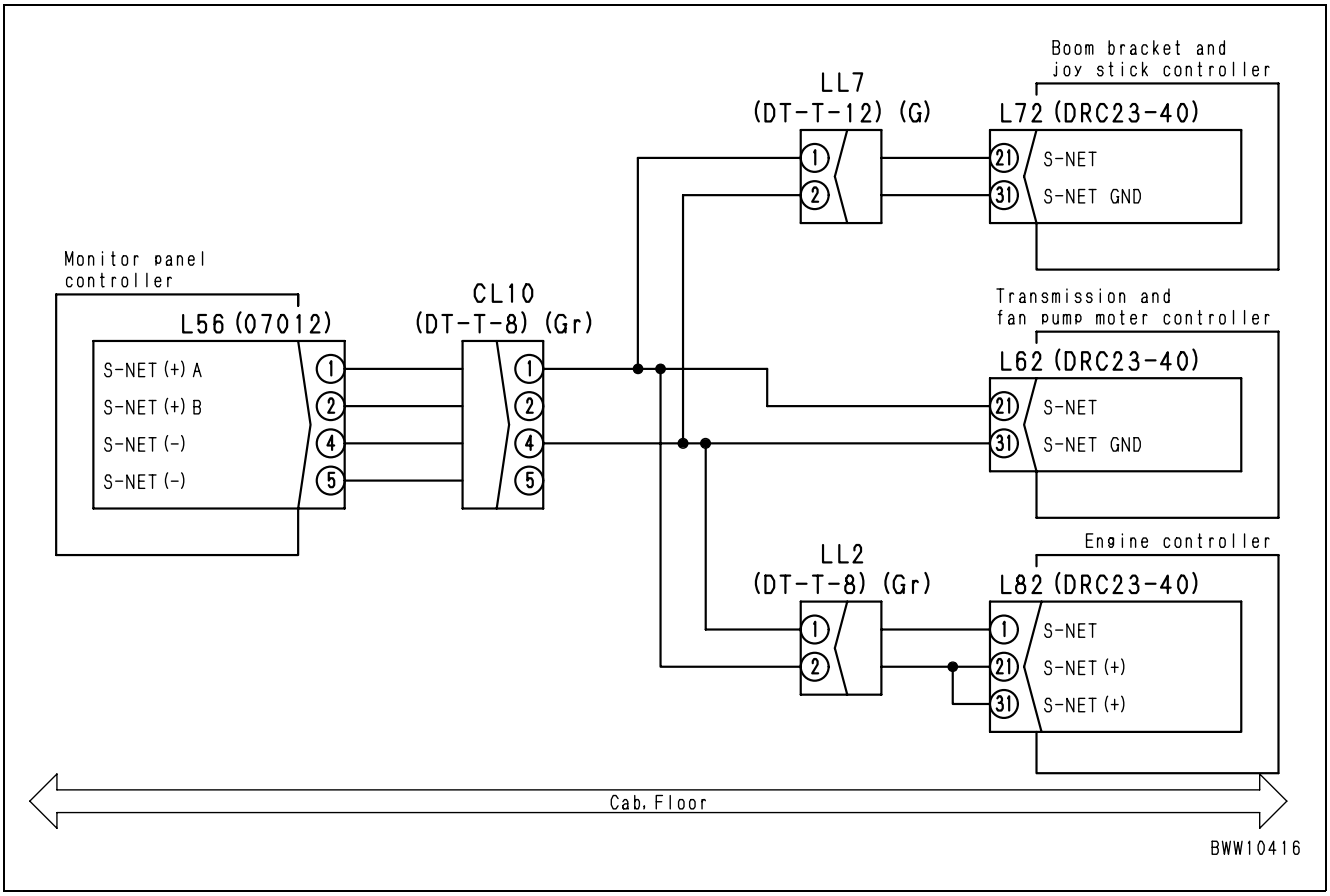
https://truckmanualshub.com/

Error code [DBQSKR]

Action Code	Error Code	Controller Code	Trouble	S-NET communication failure (Between monitor panel and engine controller)
E03	DBQSKR	MON		
Description of Trouble	• Disconnection, ground fault, or hot-short has occurred in the S-NET (+) signal line between the monitor panel and the engine controller.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The engine pre-heating monitor does not turn ON during automatic pre-heating cycle. • An engine stop may occur when the machine is running in the FR crosscut mode.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L82. 3) Connect T-adapter.		
			Wiring harness between L56 (female) (1) ~ L82 (female) (21)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L56, L62, (L72), L80, L82, and L07. 3) Insert T-adapter.		
			Between L56 (female) (1)/L62 (female) (21) ~ body	Resistance	1 MΩ and above
	3	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L82 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L56 (female) (1)/L82 (female) (21) ~ body	Voltage	1 V or less
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L56. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L56 (1)/(2) ~ body	Voltage	4 ~ 8 V
			Between L56 (1)/(2) ~ L56 (4)/(5)	Voltage	4 ~ 8 V

Related circuit diagram



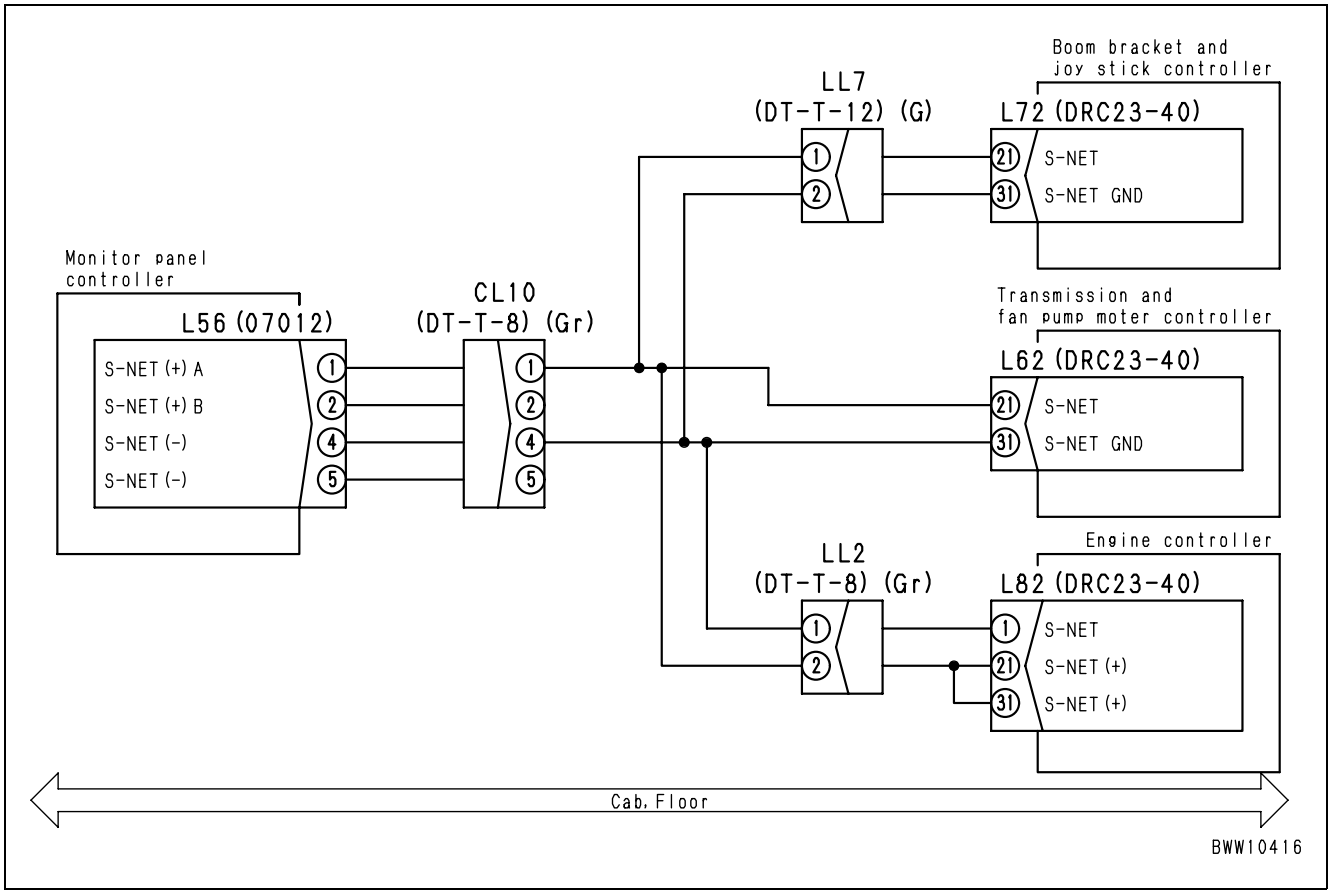
https://truckmanualshub.com/

Error code [DB9SKR]

Action Code	Error Code	Controller Code	Trouble	S-NET communication failure (Between monitor panel and work equipment controller)
E03	DB9SKR	MON		
Description of Trouble	• Disconnection, ground fault, or hot-short has occurred in the S-NET (+) signal line between the monitor panel and the engine controller.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The joystick indicator pilot lamp does not turn ON. • The work equipment controller functions with WA380-5. (A faulty joystick feeling.)			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L72. 3) Connect T-adapter.		
			Wiring harness between L56 (female) (1) ~ L72 (female) (21)	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L56, L62, (L72), L80, L82, and L07. 3) Insert T-adapter.		
			Between L56 (female) (1)/L72 (female) (21) ~ body	Resistance	1 MΩ and above
	3	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L72. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L56 (female) (1)/L72 (female) (21) ~ body	Voltage	1 V or less
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L56 and L72. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L56 (1)/(2) ~ body	Voltage	4 ~ 8 V
			Between L56 (1)/(2) ~ L56 (4)/(5)	Voltage	4 ~ 8 V

Related circuit diagram



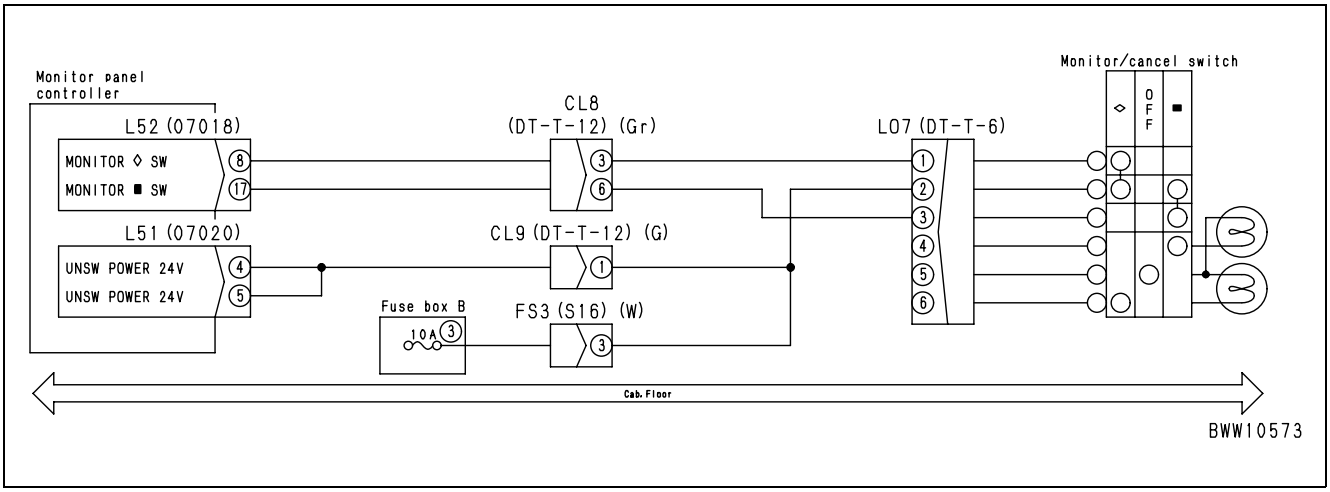
https://truckmanualshub.com/

Error code [DD15LD]

Action Code	Error Code	Controller Code	Trouble	Monitor panel mode selector switch 1 [■] (Panel SW1) input error
E01	DD15LD	MON		
Description of Trouble	• The monitor panel mode selector switch 1 [■] (Panel SW1) input circuit remains closed for more than ONe minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The monitor does not work (Service mode cannot be activated).			
Related Information	• The input signal (0 or 1)of the monitor panel mode selector switch 1 ¦ (Panel SW1) can be verified with the monitoring function (Code: 40901, D-IN-15). • Since ¦ switch is faulty, the monitoring function may not be activated.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty monitor panel mode selector switch 1 [■]	1) Turn starting switch OFF. 2) Disconnect connector L07. 3) Connect T-adapter.			
			Between L07 (female) (2) ~ (3)	When monitor panel mode selector switch 1 [■] is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L52 and L07. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L52 (female) (17)/L07 (female) (3) ~ body		Voltage	1 V or less
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L52 (female) (17) ~ body	When monitor panel mode selector switch 1 [■] is turned ON	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

Related circuit diagram



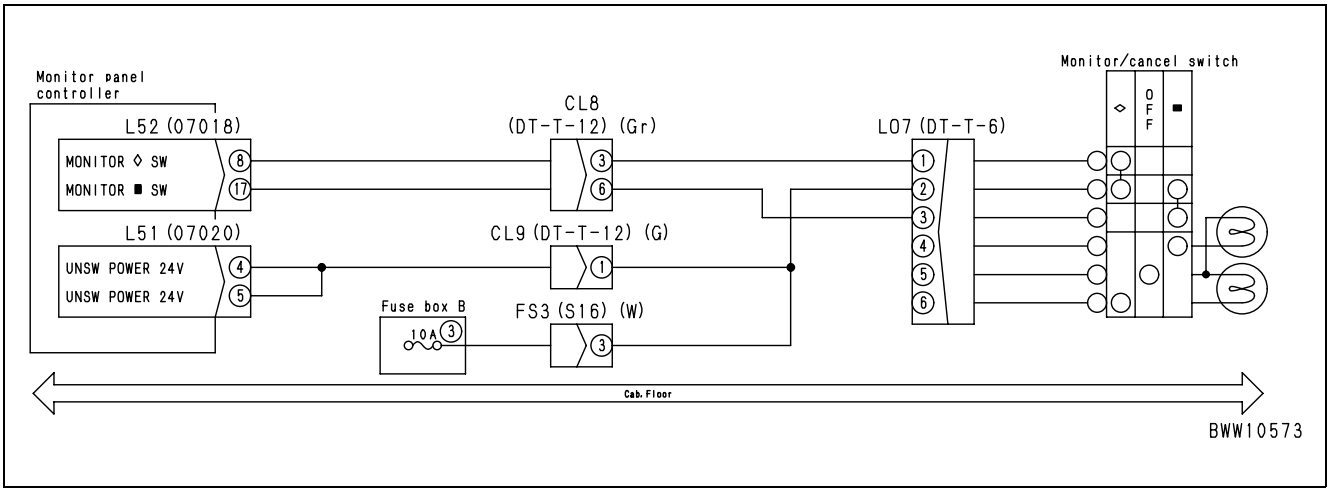
https://truckmanualshub.com/

Error code [DD16LD]

Action Code	Error Code	Controller Code	Trouble	Monitor panel mode selector switch 1 [◇] (Panel SW2) input error
E01	DD16LD	MON		
Description of Trouble	• The monitor panel mode selector switch 1 [◇] (Panel SW1) input circuit remains closed for more than one minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The monitor does not.			
Related Information	• The input signal (0 or 1)of the monitor panel mode selector switch 1 [◇] (Panel SW2) can be verified with the monitoring function (Code: 40901, D-IN-14). • Since [◇] switch is faulty, the monitoring function may not be activated.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty monitor panel mode selector switch 1 [◇]	1) Turn starting switch OFF. 2) Disconnect connector L07. 3) Connect T-adapter.			
			Between L07 (female) (2) ~ (1)	When monitor panel mode selector switch 1 [◇] is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L52 and L07. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L52 (female) (8)/L07 (female) ~ body (1)		Voltage	1 V or less
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L52 (8) ~ body	When monitor panel mode selector switch 1 [◇] is turned ON	Voltage	20 ~ 30 V
				Other than above	Voltage	1 V and below

Related circuit diagram



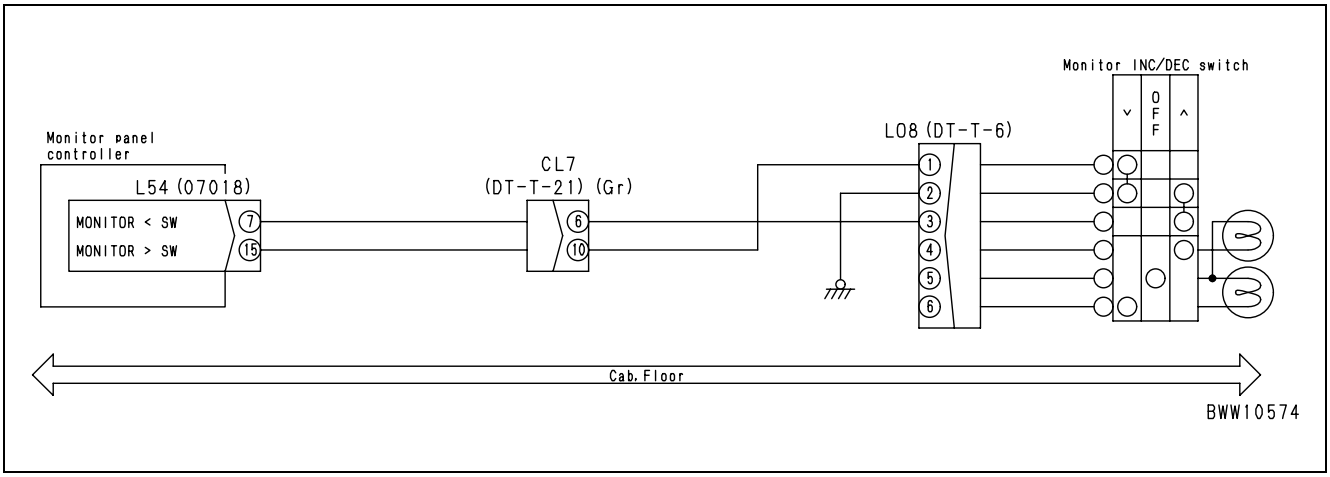
https://truckmanualshub.com/

Error code [DD17LD]

Action Code	Error Code	Controller Code	Trouble	Monitor panel mode selector switch 2 [<] (Panel SW3) input error
E01	DD17LD	MON		
Description of Trouble	• The monitor panel mode selector switch 2 < (Panel SW3) input circuit remains closed for more than one minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The monitor does not.			
Related Information	• The input signal (0 or 1) of the monitor panel mode selector switch 2 [<] (Panel SW3) can be verified with the monitoring function (Code: 40904, D-IN-38). • Since [<] switch is faulty, the monitoring function may not be activated.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty monitor panel mode selector switch 2 [<]	1) Turn starting switch OFF. 2) Disconnect connector L08. 3) Connect T-adapter.			
			Between L08 (female) (3) ~ (2)	When monitor panel mode selector switch 2 [<] is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter.			
			Between L54 (female) (7)/L08 (female) ~ body (3)		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (7) ~ body	When monitor panel mode selector switch 2 [<] is turned ON	Voltage	1 V or less
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



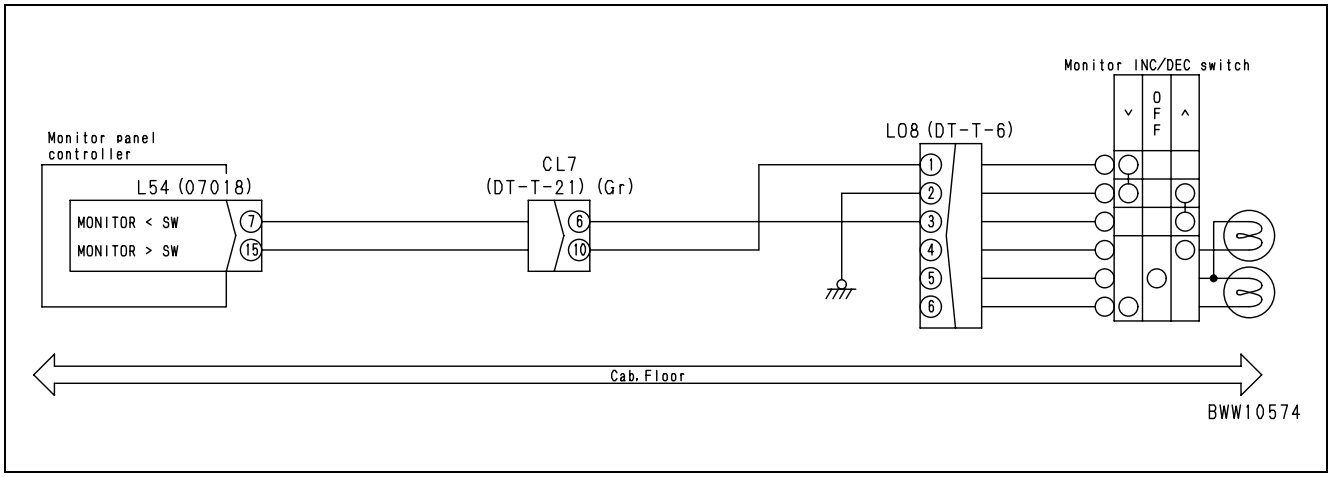
https://truckmanualshub.com/

Error code [DD18LD]

Action Code	Error Code	Controller Code	Trouble	Monitor panel mode selector switch 2 [<] (Panel SW3) input error
E01	DD18LD	MON		
Description of Trouble	• The monitor panel mode selector switch 2 [>] (Panel SW4) input circuit remains closed for more than one minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The monitor does not.			
Related Information	• The input signal (0 or 1) of the monitor panel mode selector switch 2 [>] (Panel SW4) can be verified with the monitoring function (Code: 40904, D-IN-37). • Since [<] switch is faulty, the monitoring function may not be activated.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty monitor panel mode selector switch 2 [>]	1) Turn starting switch OFF. 2) Disconnect connector L08. 3) Connect T-adapter.			
			Between L08 (female) (1) ~ (2)	When monitor panel mode selector switch 2 [>] is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter.			
			Between L54 (female) (15)/L08 (female) ~ body (1)		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (15) ~ body	When monitor panel mode selector switch 2 [>] is turned ON	Voltage	1 V or less
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



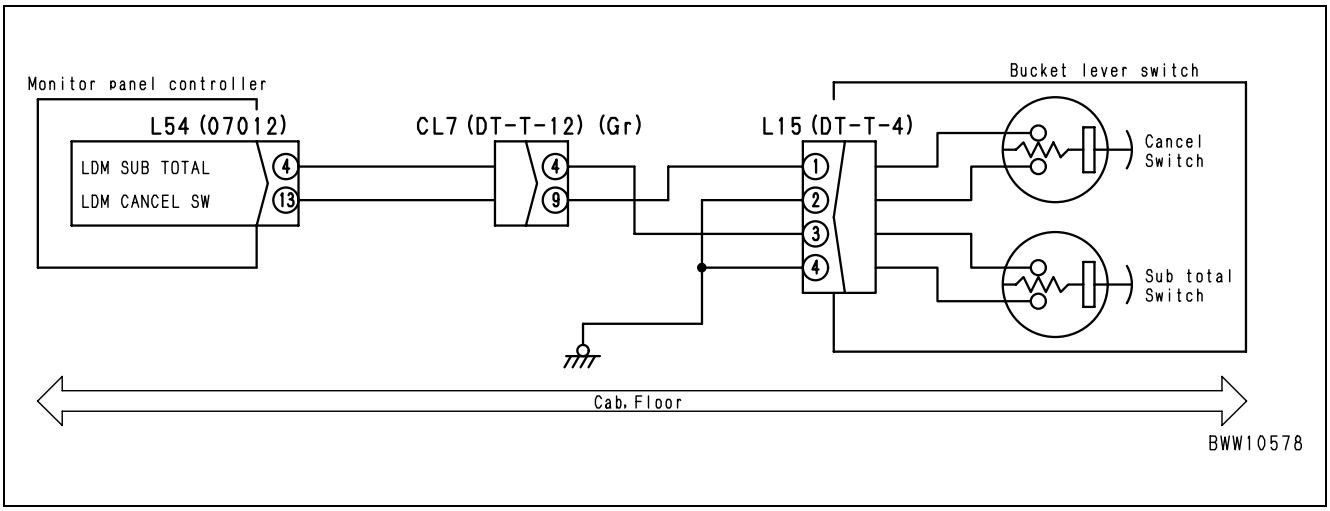
https://truckmanualshub.com/

Error code [DD1CLD]

Action Code	Error Code	Controller Code	Trouble	Sub-total switch failure
E01	DD1CLD	MON		
Description of Trouble	• The sub-total switch input circuit remains closed for more than one minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The sub-total control ON the load meter monitor does not work.			
Related Information	• The input signal (0 or 1)of the sub-total switch can be verified with the monitoring function (Code: 40904, D-IN-32).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty sub-total switch (Bucket lever for opt LDM)	1) Turn starting switch OFF. 2) Disconnect connector L15. 3) Connect T-adapter.			
			Between L15 (female) (3) ~ (4)	When the sub-total switch is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and 115. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (4)/L15 (female) (3) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (4) ~ body	When the sub-total switch is turned ON	Voltage	1 V or less
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



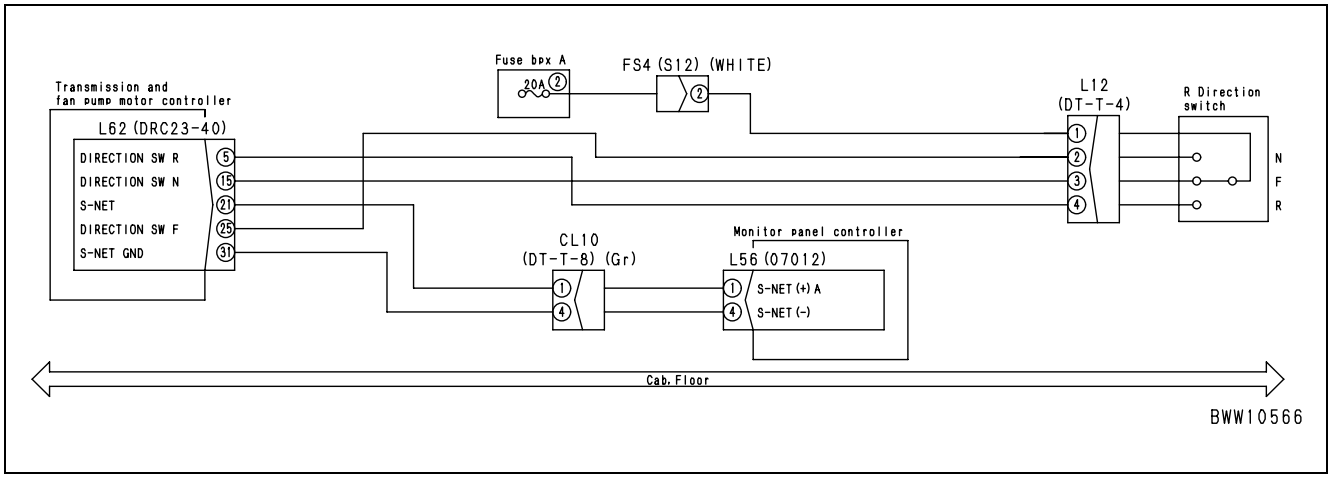
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Error code [DDK3KM]

Action Code	Error Code	Controller Code	Trouble	Caution: Right FNR switch is in N (Neutral)
E01	DDK3KM	MON		
Description of Trouble	• The switch is set to F or R when the right FNR switch is selected or during engine stop.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The right FNR switch is held in the neutral position (N) until it is returned to that position.			
Related Information	• Can be verified with the monitoring function (Code: 40907, D-IN-17, 18, 19).			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting
	1	Faulty right FNR switch positions (Other than N)	Return right FNR switch to the neutral position (N).
	2	See DAQSKR (S-NET failure) or transmission controller failure code DDK4KA (N signal failure).	

Related circuit diagram



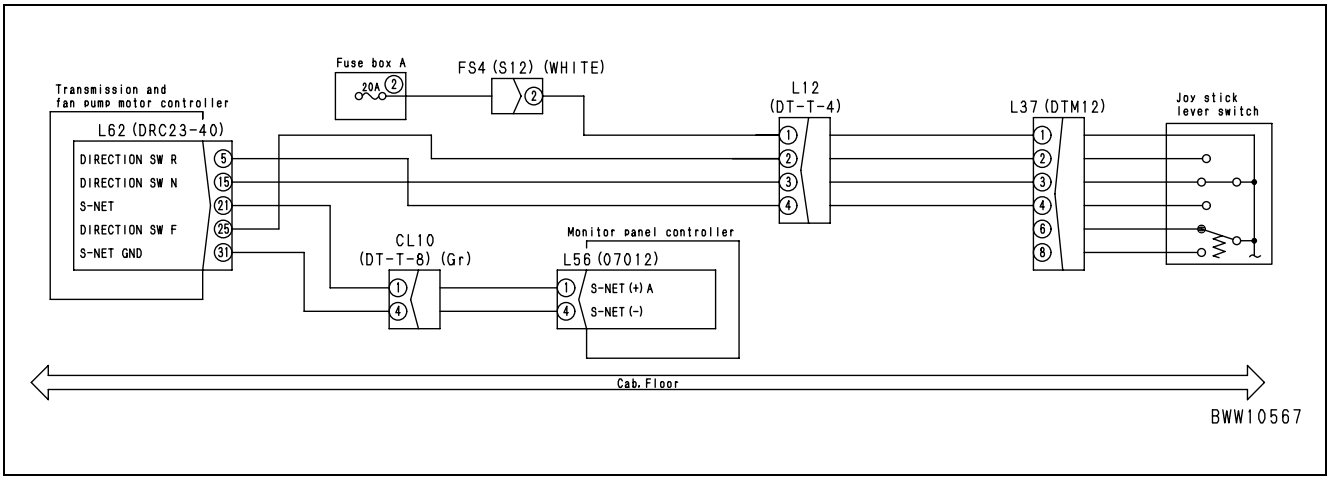
https://truckmanualshub.com/

Error code [DDK4KM]

Action Code	Error Code	Controller Code	Trouble	Caution: Joystick FNR switch is in N (Neutral)
E00	DDK4KM	MON		
Description of Trouble	• The lever is set to F or R when the joystick steering mode is selected or during engine stop.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The joystick FNR switch is held in the neutral position (N) until it is returned to that position.			
Related Information	• Can be verified with the monitoring function (Code: 40907, D-IN-17, 18, 19).			

Possible Causes and Standard Values		Causes	Standard Value in Normal State and Remarks on Troubleshooting
	1	Faulty joystick FNR switch positions (Other than N)	Return joystick FNR switch to the neutral position (N).
	2	See DAQSKR (S-NET failure) or transmission controller failure code DDK4KA (N signal failure).	

Related circuit diagram



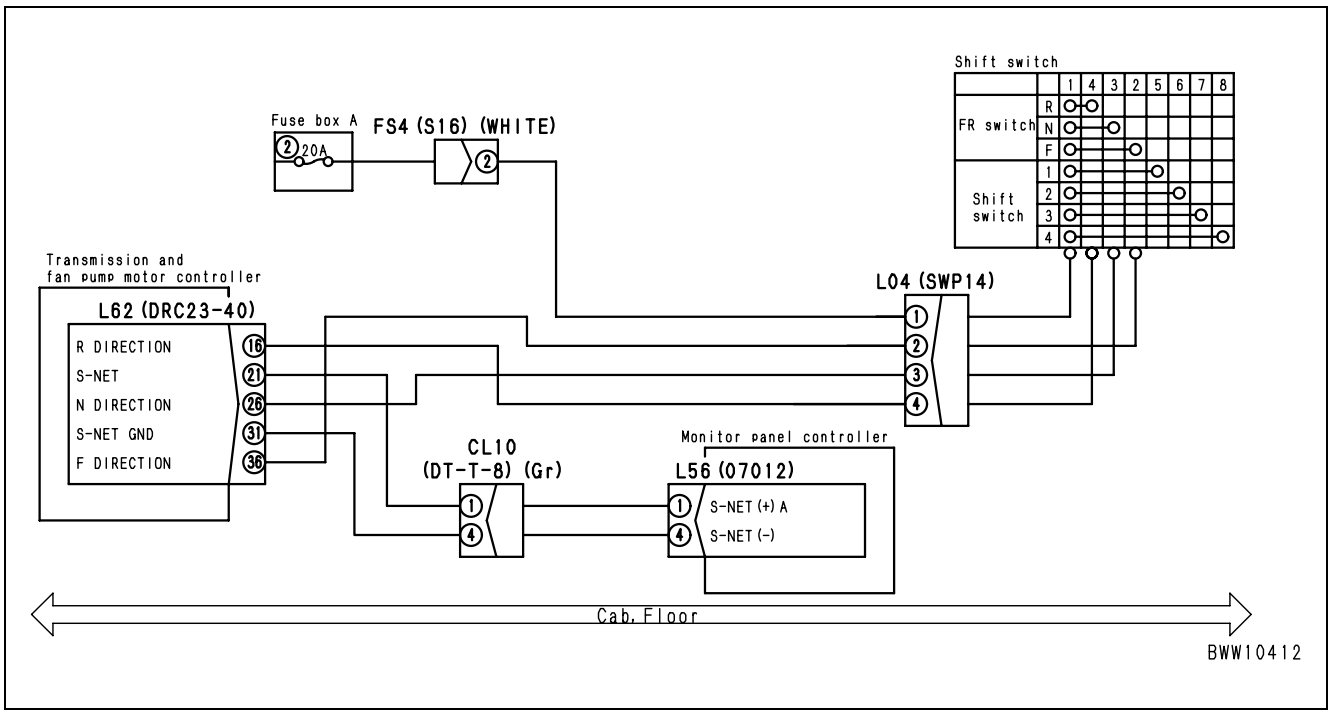
https://truckmanualshub.com/

Error code [DDK6KM]

Action Code	Error Code	Controller Code	Trouble	Caution: FNR (Forward-reverse) lever switch is in N (Neutral)
E00	DDK6KM	MON		
Description of Trouble	• The FNR (Forward-reverse) lever is set to F or R when the lever is selected or during engine stop.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The FNR (Forward-reverse) lever is held in the neutral position (N) until it is returned to that position.			
Related Information	• Can be verified with the monitoring function (Code: 40907, D-IN-20, 21, 22).			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting
	1	Faulty forward-reverse lever positions (Other than N)	Return forward-reverse lever to the neutral position (N).
	2	See DAQSKR or DB9QSKR (S-NET failure) or DDK6KA (N signal failure).	

Related circuit diagram



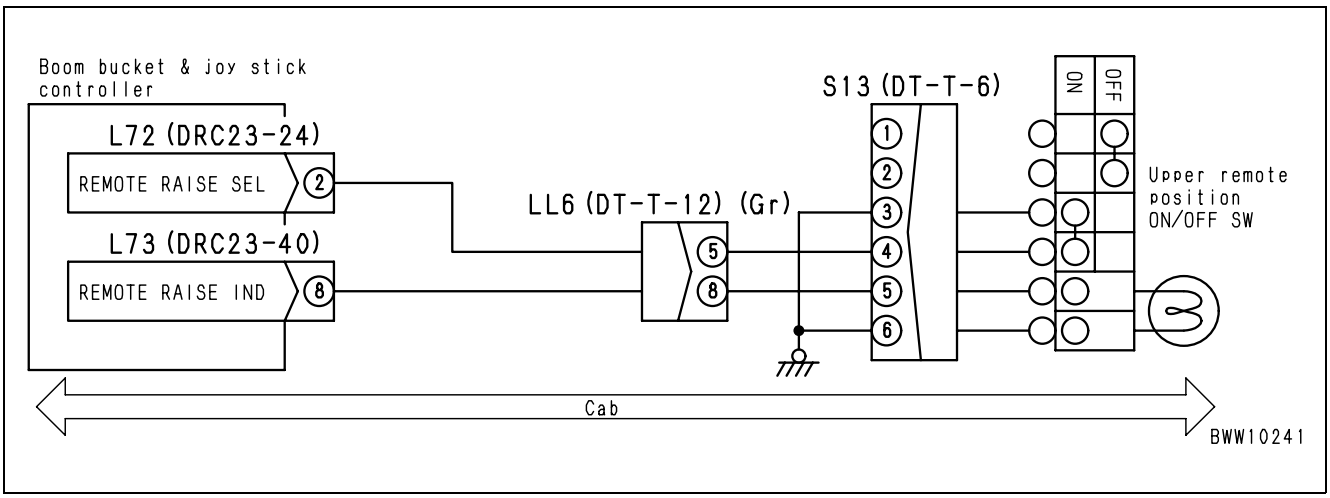
https://truckmanualshub.com/

Error code [DDS5L6]

Action Code	Error Code	Controller Code	Trouble	Decreased steering oil pressure
E03	DDS5L6	MON		
Description of Trouble	• The steering sensor circuit remains closed when the engine speed is over 500 rpm.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• Due to detection of decreased steering oil pressure, the emergency steering pump (Motor) may cause steering control to be selected when the speed is over 1 km/h.			
Related Information	• Can be verified with the monitoring function (Code: 40904, D-IN-39).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Decreased steering oil pressure	—			
	2	Faulty steering oil pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector R36. 3) Connect t-adapter.			
			Between T36 (male) (3) ~ (1)	With engine stopped	Resistance	1 Ω and below
				With pressure released to air (For reference purpose)	Resistance	1 MΩ and above
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54, R36 and L61. 3) Connect t-adapter.			
			Between L54 (female) (16)/R36 (female) (3) ~ body		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (female) (16) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



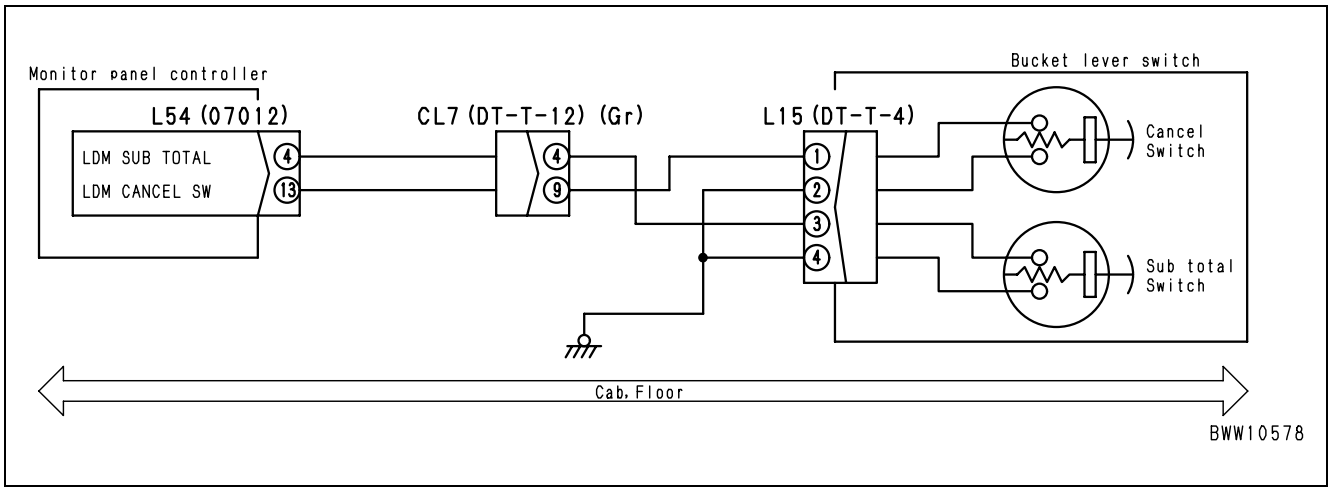
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Error code [DDY0LD]

Action Code	Error Code	Controller Code	Trouble	Cancel switch failure
E01	DDY0LD	MON		
Description of Trouble	• The cancel switch input circuit remains closed for more than one minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The cancellation of weight ON the load meter is disabled.			
Related Information	• The cancel switch input signal can be verified with the monitoring function (Code: 40904, D-IN-33).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty cancel switch (Bucket lever for opt LDM)	1) Turn starting switch OFF. 2) Disconnect connector L15. 3) Connect T-adapter.			
			Between L15 (female) (1) ~ (2)	When the cancel switch is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L15. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (13)/L15 (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (13) ~ body	When the sub-total switch is turned ON	Voltage	1 V or less
				Other than above	Voltage	20 ~ 30 V

Related circuit diagram



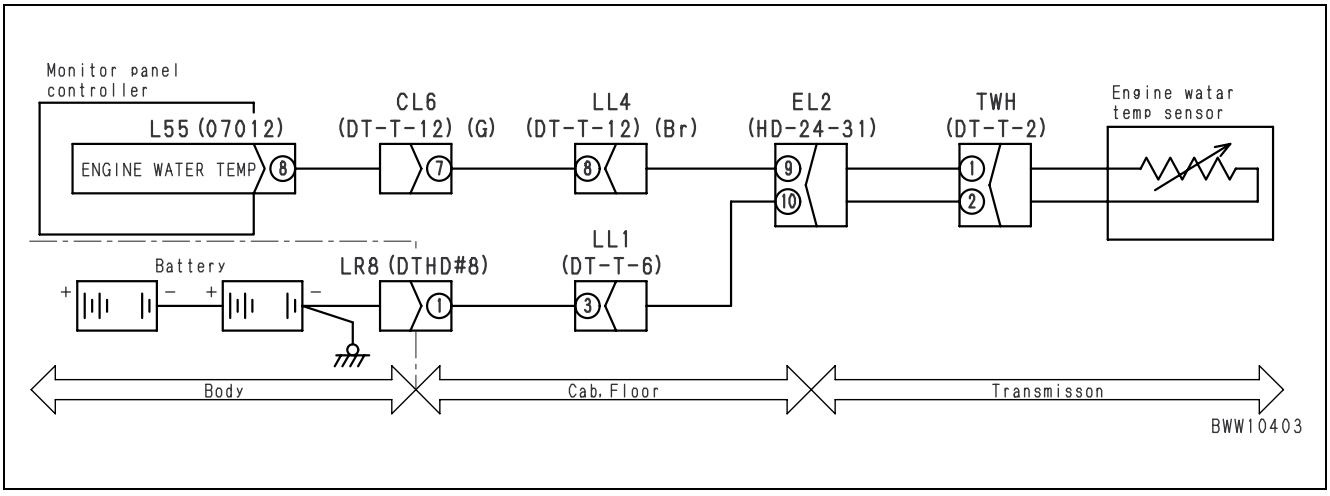
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Error code [DGE2KX]

Action Code	Error Code	Controller Code	Trouble	Engine water temperature sensor system failure
E01	DGE2KX	MON		
Description of Trouble	• The engine water temperature is more than 150°C (The engine water temperature sensor input voltage is less than 0.98 V)			
Controller Reaction	• Activates the engine water temperature overheat alarm. The failure is stored in the electrical system failure history only; not in the machine system failure history.			
Effect on Machine	• The engine water temperature gauge is in the MAX position.			
Related Information	• Can be verified with the monitoring function (Code: 04103).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty engine water temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector TWH. 3) Connect T-adapter.			
			Between TWH (female) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 Ω
				100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and 115. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L55 (female) (8)/TWH (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L55(female) (8) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 Ω
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



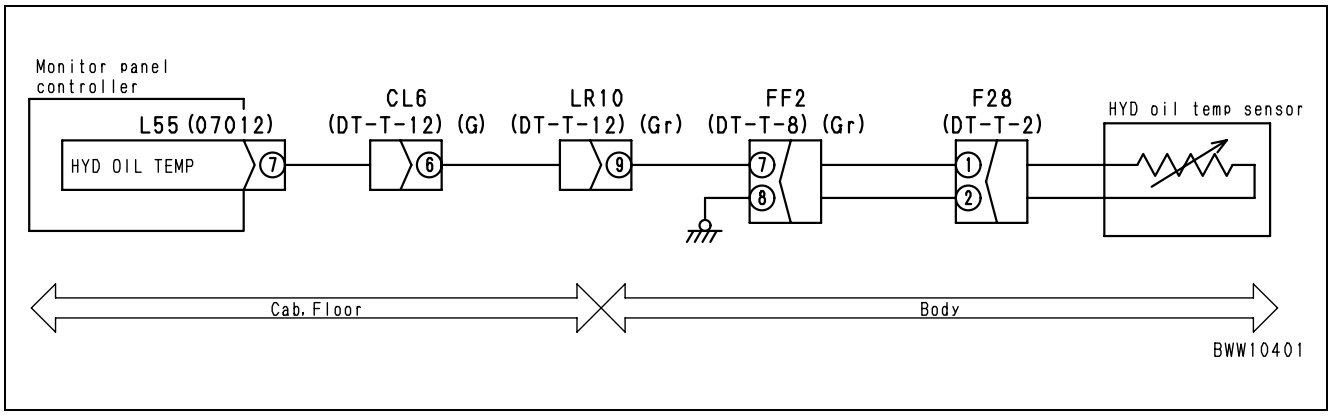
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Error code [DGH2KX]

Action Code	Error Code	Controller Code	Trouble	Hydraulic oil temperature sensor system failure
E01	DGH2KX	MON		
Description of Trouble	• The hydraulic oil temperature sensor input voltage is less than 0.98 V.			
Controller Reaction	• Activates the hydraulic oil temperature overheat alarm. The failure is stored in the electrical system failure history only; not in the machine system failure history.			
Effect on Machine	• The hydraulic oil temperature gauge is in the MAX position.			
Related Information	• Can be verified with the monitoring function (Code: 04401).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty hydraulic oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector F28. 3) Connect T-adapter.			
			Between F28 (male) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 Ω
				100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55 and F28. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L55 (female) (7)/F28 (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L55 (female) (7) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 Ω
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



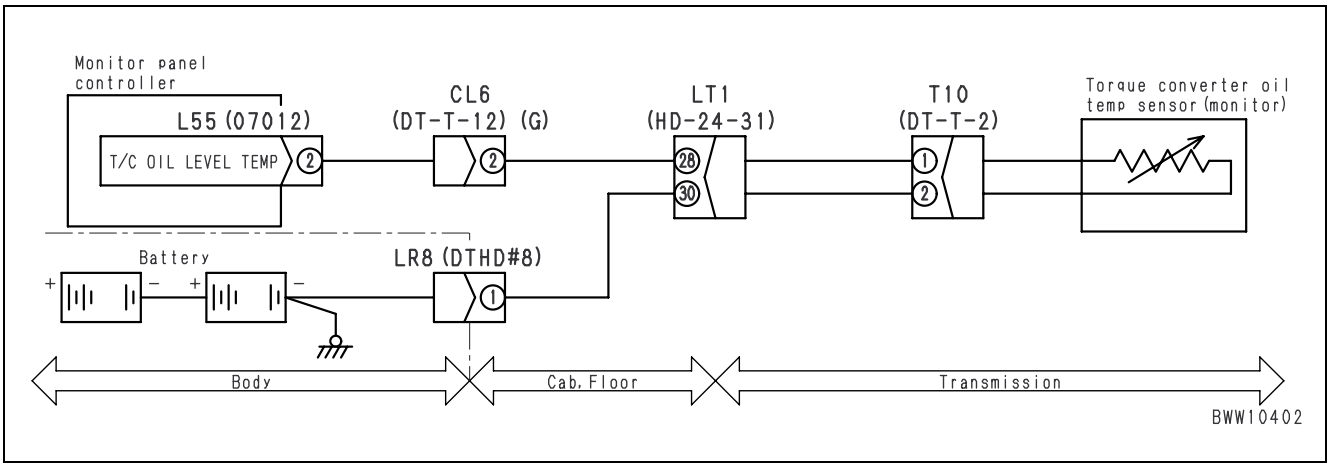
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Error code [DGT1KX]

Action Code	Error Code	Controller Code	Trouble	Torque converter oil temperature sensor system failure
E01	DGT1KX	MON		
Description of Trouble	• The torque converter oil temperature sensor input voltage is less than 0.98 V.			
Controller Reaction	• Activates the torque converter oil temperature overheat alarm. The failure is stored in the electrical system failure history only; not in the machine system failure history.			
Effect on Machine	• The torque converter oil temperature gauge is in the MAX position.			
Related Information	• Can be verified with the monitoring function (Code: 40100).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty torque converter oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector TC.C. 3) Connect T-adapter.			
			Between TC.C (male) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 Ω
				100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55 and TC.C. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L55 (female) (2)/TC.C (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L55 (female) (2) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 Ω
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



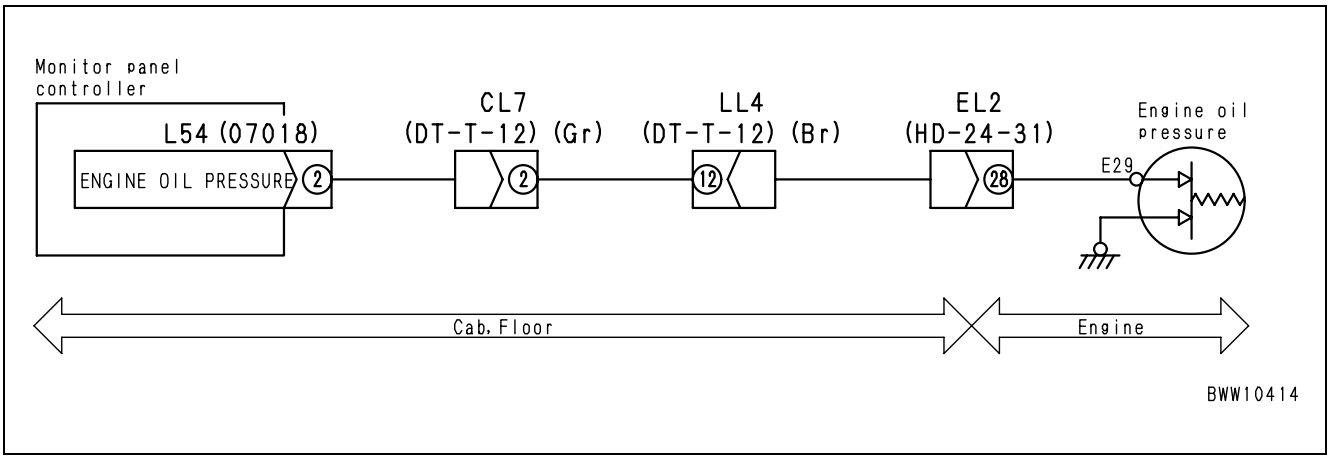
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Error code [DHE4L6]

Action Code	Error Code	Controller Code	Trouble	Engine oil pressure sensor system failure
E01	DHE4L6	MON		
Description of Trouble	• The engine oil pressure sensor circuit remains open when the engine is not running.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The decreased engine oil pressure alarm is disabled. • After engine start has failed (Once the key is put ON the terminal C position), an erroneous alarm may be issued.			
Related Information	• Can be verified with the monitoring function (Code: 40903, D-IN-28).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Decreased engine oil pressure	—			
	2	Faulty engine oil pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector EL2. 3) Connect t-adapter.			
			Between EL2 (male) (1) ~ (2)	When engine is NOT running	Resistance	1 Ω and below
				When engine is running	Resistance	1 MΩ and above
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and E29. 3) Connect t-adapter.			
			Between L54 (female) (2) ~ E29.		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (female) (2) ~ body	When engine is NOT running	Voltage	1 V or less
				When engine is running	Voltage	20 ~ 30 V

Related circuit diagram



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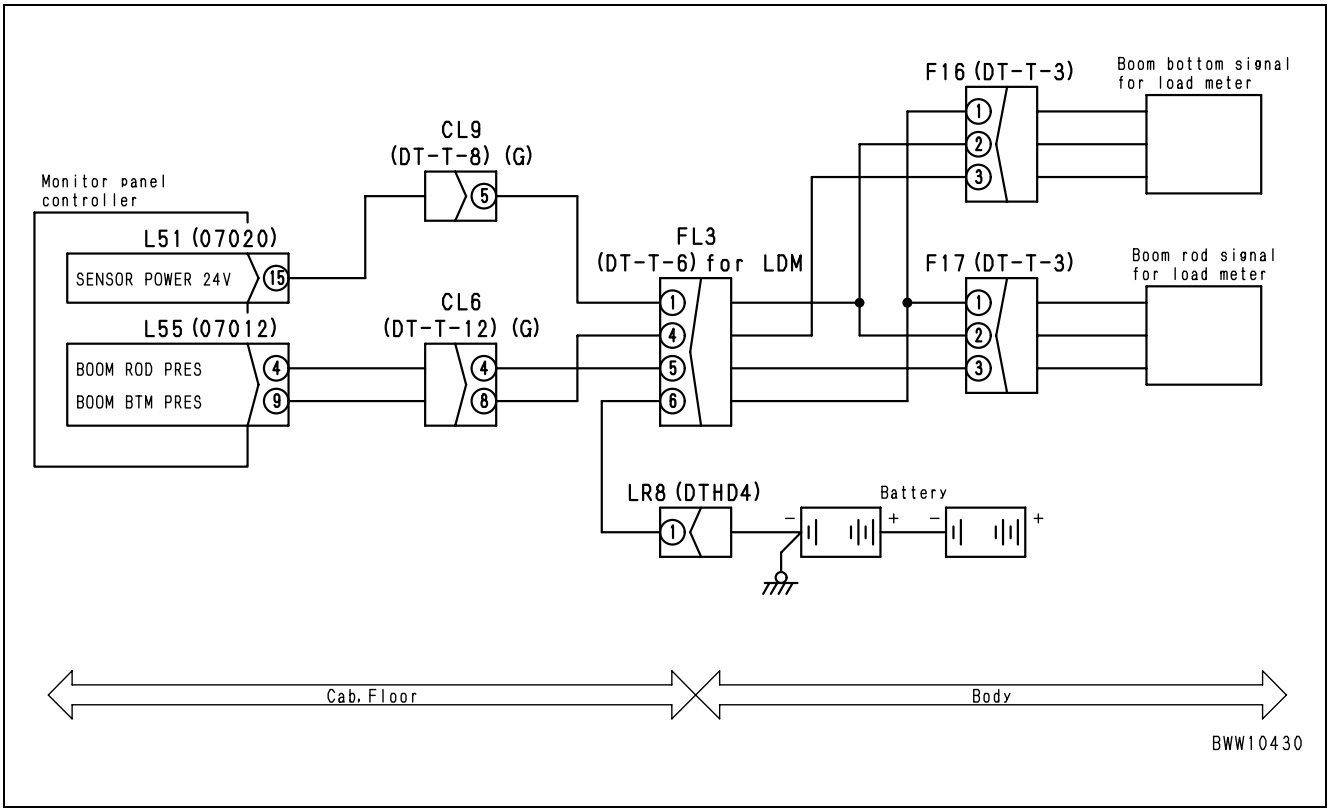
Error code [DHPCKX]

Action Code	Error Code	Controller Code	Trouble	Bottom pressure sensor failure
E01	DHPCKX	MON		
Description of Trouble	• The bottom pressure sensor input voltage is less than 0.5 V.			
Controller Reaction	• Activates an alarm and disables load display.			
Effect on Machine	• Activates an alarm and disables load display.			
Related Information	• The bottom pressure signal (0.01 Mpa) can be verified with the monitoring function (Code: 40400).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty boom pressure sensor (Bottom side)	1) Turn starting switch OFF. 2) Disconnect connector F16. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between F16 (2) ~ (1)		Voltage	20 ~ 30 V
			Between F16 (2) ~ (1)	When machine is in operation	Voltage	0.7 ~ 5.3 V
				When pressure is released to air	Voltage	0.5 ~ 1.5 V
	2	Wiring harness discontinuity (Broken wires or loose connections)	1) Turn starting switch OFF. 2) Disconnect connectors L51, L55 and F16. 3) Connect t-adapter.			
			Between L55 (female) (9) ~ F16 (female) (3)		Resistance	1 Ω and below
			Between L51 (female) (15) ~ F16 (female) (2)		Resistance	1 Ω and below
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55, F16, F17. 3) Connect t-adapter.			
			Between L55 (female) (9), F16 (female) (3), F17 (female) (3) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L51, F16 and F17. 3) Insert T-adapter. 4) Turn starting switch ON.		Voltage	20 ~ 30 V
			Between L51 (15) ~ body		Voltage	20 ~ 30 V
			Between L55 (9) ~ body	When machine is in operation	Voltage	0.7 ~ 5.3 V
				When pressure is released to air	Voltage	0.5 ~ 1.5 V

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Related circuit diagram



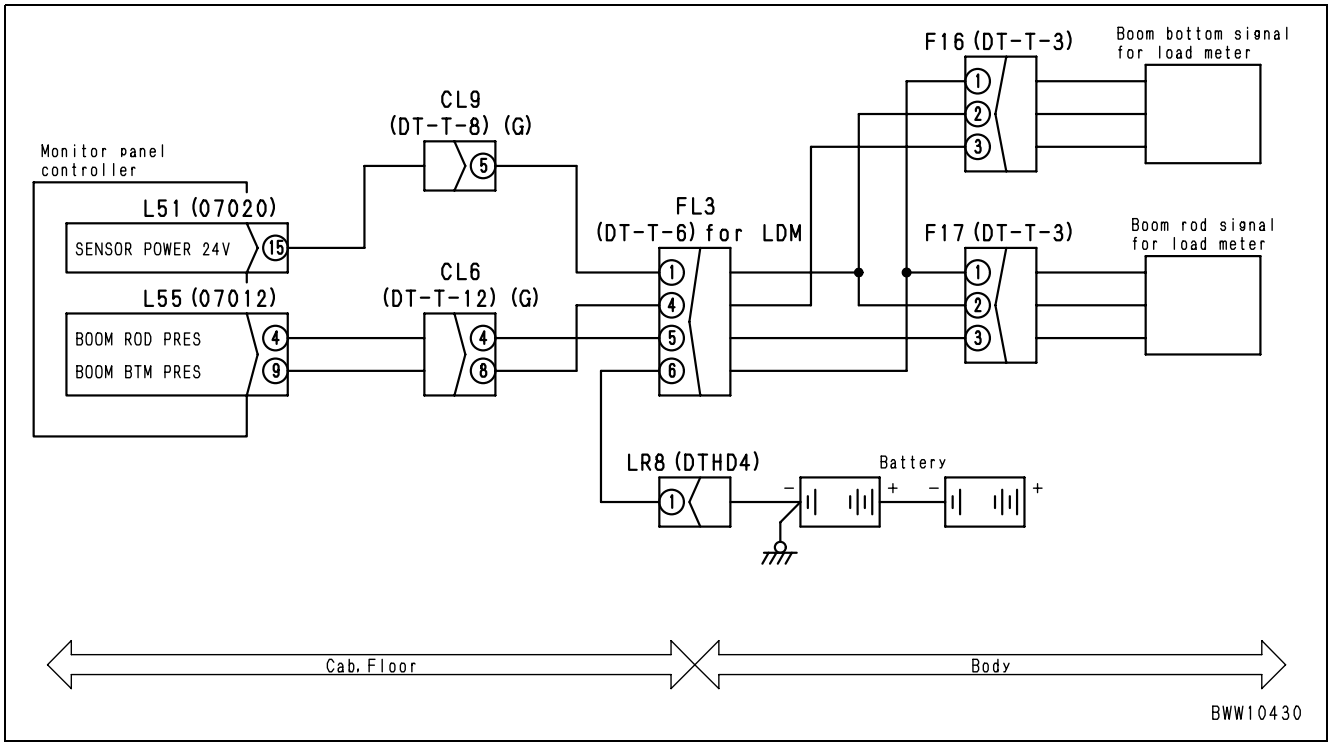
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Error code [DHPDKX]

Action Code	Error Code	Controller Code	Trouble	Head pressure sensor failure
E01	DHPDKX	MON		
Description of Trouble	• The head pressure sensor input voltage is less than 0.5 V.			
Controller Reaction	• Activates an alarm and disables load display.			
Effect on Machine	• Activates an alarm and disables load display.			
Related Information	• The head pressure signal (0.01 Mpa) can be verified with the monitoring function (Code: 40500).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty head pressure sensor (Head side)	1) Turn starting switch OFF. 2) Disconnect connector F16. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between F17 (2) ~ (1)		Voltage	20 ~ 30 V
			Between F16 (2) ~ (1)	When machine is in operation	Voltage	0.7 ~ 5.3 V
				When pressure is released to air	Voltage	0.5 ~ 1.5 V
	2	Wiring harness discontinuity (Broken wires or loose connections)	1) Turn starting switch OFF. 2) Disconnect connectors L51, L55, F17. 3) Connect t-adapter.			
			Between L55 (female) (4) ~ F17 (female) (3)		Resistance	1 Ω and below
			Between L51 (female) (15) ~ F16 (female) (2)		Resistance	1 Ω and below
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55, F16, F17. 3) Connect t-adapter.			
			Between L55 (female) (4) F17 (female) (3) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L51 and F17. 3) Insert T-adapter. 4) Turn starting switch ON.		Voltage	20 ~ 30 V
			Between L51 (15) ~ body		Voltage	20 ~ 30 V
			Between L55 (4) ~ body	When machine is in operation	Voltage	0.7 ~ 5.3 V
				When pressure is released to air	Voltage	0.5 ~ 1.5 V

Related circuit diagram



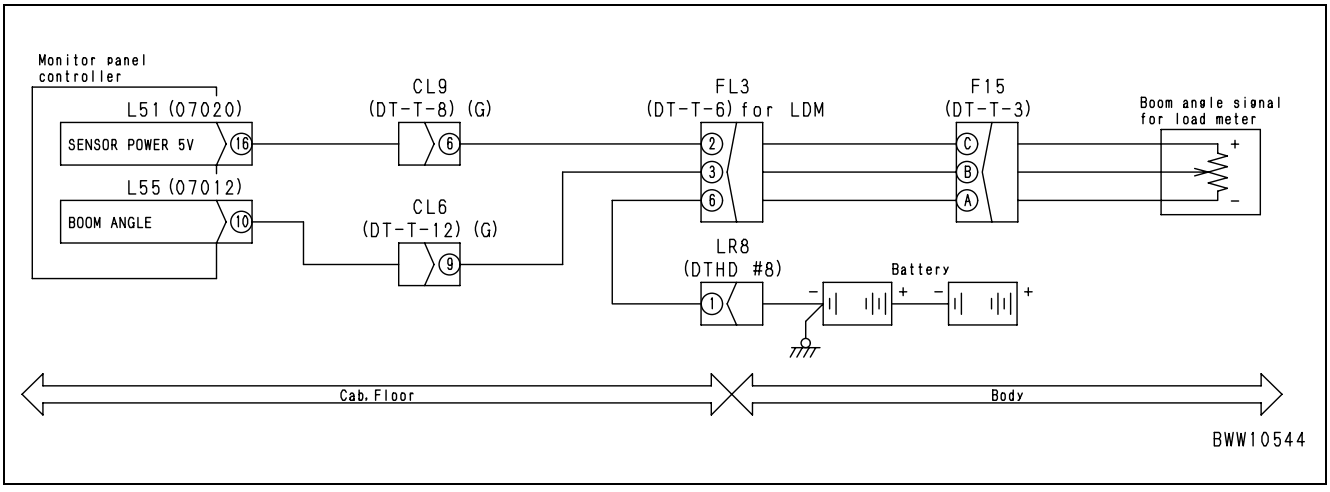
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Error Code [DKA0KX]

Action Code	Error Code	Controller Code	Trouble	Boom angle sensor failure
E01	DKA0KX	MON		
Description of Trouble	• The boom angle sensor input voltage is less than 1 V or more than 4 V.			
Controller Reaction	• Activates an alarm and disables load display.			
Effect on Machine	• Activates an alarm and disables load display.			
Related Information	• The boom angle signal (O) can be verified with the monitoring function (Code: 06001).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty boom angle sensor	1) Turn starting switch OFF. 2) Disconnect connector F15. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between F15 (male) (4) ~ (6)		Resistance	4 ~ 6 kΩ
			1) Turn starting switch OFF. 2) Disconnect connector F15. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between F15 (male) (3) ~ (1)		Voltage	4.75 ~ 5.25
			Between F15 (male) (2) ~ (1)	With boom fully lowered	Voltage	3.5 ~ 4.0 V
				With boom fully raised	Voltage	1.0 ~ 2.0 V
	2	Wiring harness discontinuity (Broken wires or loose connections)	1) Turn starting switch OFF. 2) Disconnect connectors L51 and F15. 3) Connect t-adapter.			
			Between L55 (female) (10)~ F15 (female) (2)		Resistance	1 Ω and below
			Between L51 (female) (16) ~ F15 (female) (3)		Resistance	1 Ω and below
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L51 and F15. 3) Connect t-adapter.			
			Between L51 (female) (16) F15 (female) (3) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connectors L51 and L55. 3) Insert T-adapter. 4) Turn starting switch ON.		Voltage	20 ~ 30 V
			Between L51 (16) ~ body		Voltage	4.75 ~ 5.25
			Between L55 (10) ~ body	With boom fully lowered	Voltage	3.5 ~ 4.0 V
				With boom fully raised	Voltage	1.0 ~ 2.0 V

Related circuit diagram



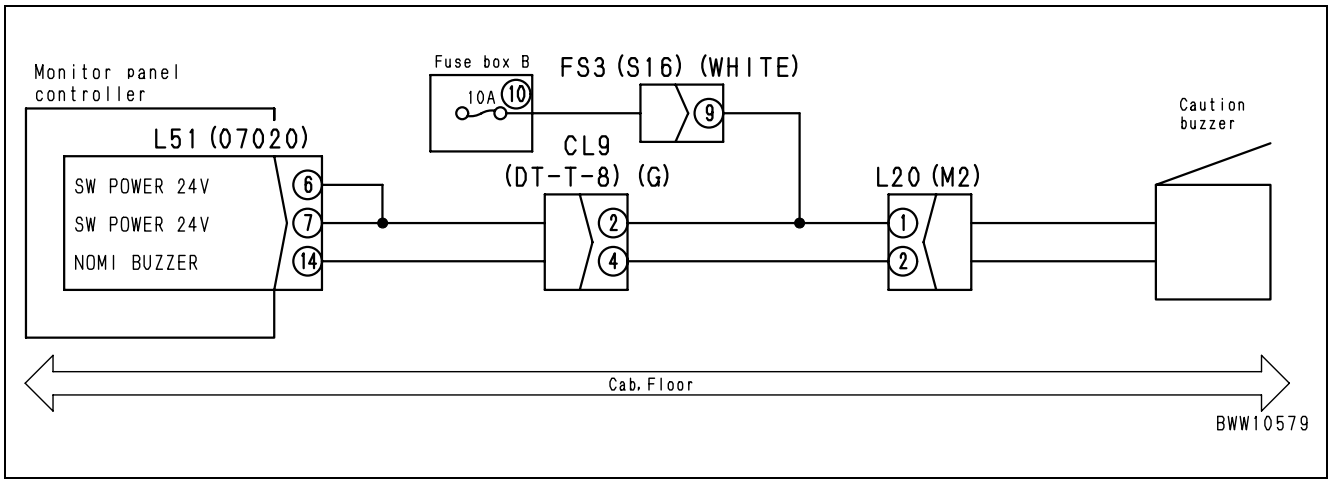
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Error code [DV00KB]

Action Code	Error Code	Controller Code	Trouble	Short-circuited alarm buzzer output system
E01	DV00KB	MON		
Description of Trouble	• Hot-short has occurred in the alarm buzzer output circuit.			
Controller Reaction	• The alarm buzzer output is stopped until the starting switch is turned OFF.			
Effect on Machine	• The alarm buzzer does not sound until the starting switch is turned OFF.			
Related Information	• Faulty alarm buzzer.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty hydraulic oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector L20. 3) Connect T-adapter. 4) Turn starting switch ON and wait until 5 seconds have elapsed.			
			With L20 (2) grounded to machine body	Alarm buzzer sounds.	Alarm buzzer is normal.	
				Alarm buzzer does not sound.	Alarm buzzer is faulty.	
	2	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L51 and L20. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L51 (female) (14), L20 (female) (2) ~ body		Voltage	1 V or less
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51. 3) Connect t-adapter.			
			Between L51 (14) ~ body	When starting switch is turned ON.	Voltage	20 ~ 30 V
				2 seconds after starting switch is turned ON (Alarm buzzer does not sound).	Voltage	1 V or less
				3 seconds after 2 seconds has elapsed when starting switch was turned ON (Alarm buzzer sounds).	Voltage	17 ~ 30 V

Related circuit diagram



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Error code [DY30ME]

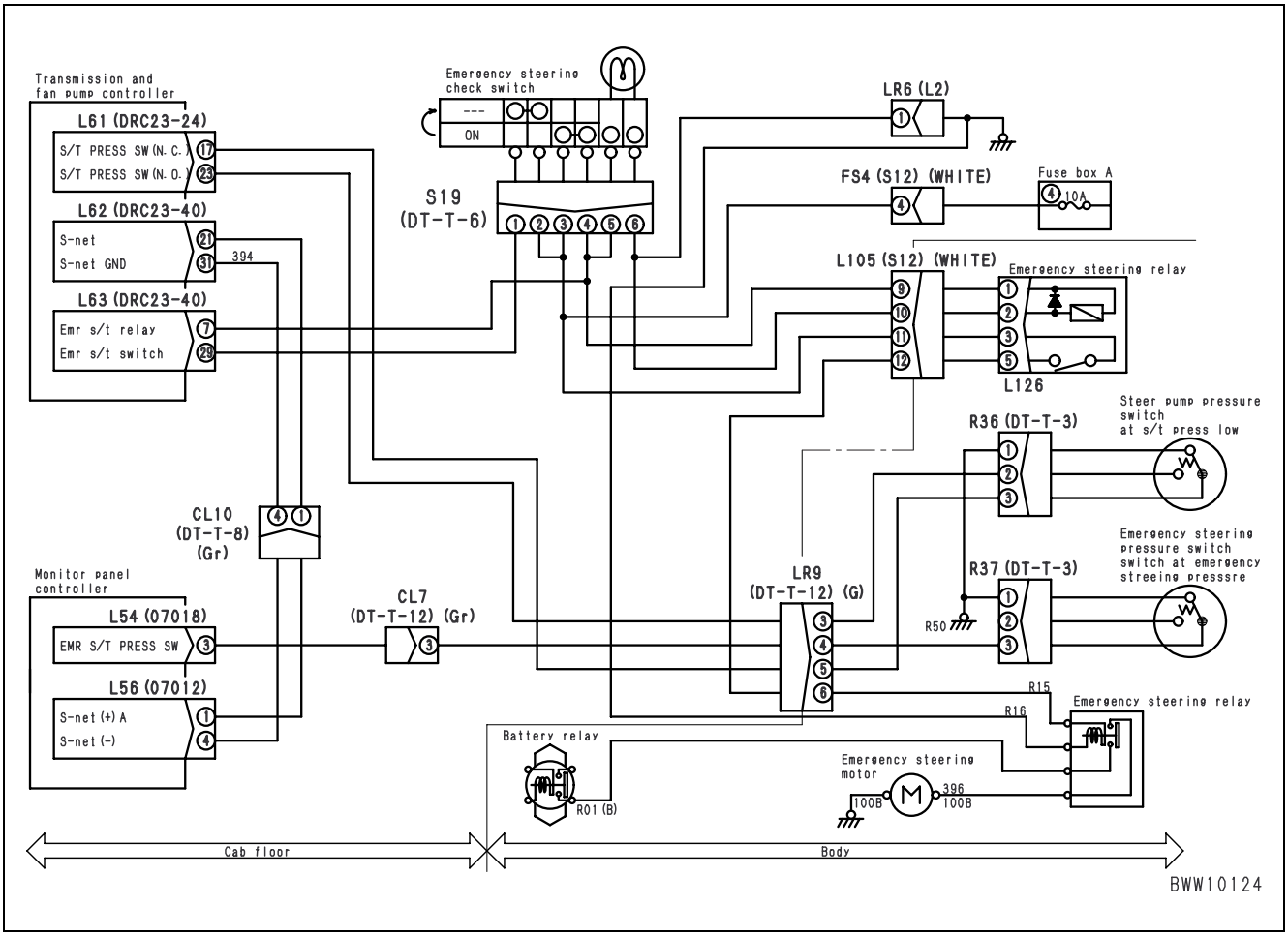
Action Code	Error Code	Controller Code	Trouble	The emergency steering remains actuated for more than one minute
E02	DY30ME	MON		
Description of Trouble	• The emergency steering detector circuit remains open for more than one minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• An alarm is issued if the emergency steering remains actuated for more than one minute (the emergency steering motor may be defective or burn out). • Even though the emergency steering motor is not in operation, the indicator lights up. • The emergency steering always actuates.			
Related Information	• Can be verified with the monitoring function (Code: 40903, D-IN-30).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Actuation of emergency steering for more than one minute	—			
	2	Faulty emergency steering pressure switch	1) Turn starting switch OFF. 2) Disconnect connector R37. 3) Connect T-adapter.			
			Between R37 (male) (3) ~ (1)	When emergency steering is not turned ON	Resistance	1 Ω and below
				When pressure is released to air (For reference purpose)	Resistance	1 Ω and below
				When emergency steering is turned ON (Under high pressure)	Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Broken wires or loose connections)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and R37. 3) Connect t-adapter.			
			Between L54 (female) (3) ~ R37 (female) (3)		Resistance	1 Ω and below
			Between R37 (female) (1) ~ body		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L54 (3) ~ body	When emergency steering is not turned ON	Voltage	1 V or less
				When emergency steering is turned ON (Under high pressure)	Voltage	20 ~ 30 V
	5	Faulty steering pressure switch	1) Turn starting switch OFF. 2) Disconnect connector R36. 3) Connect T-adapter.			
			Between R36 (male) (3) ~ (1)	When engine is not running	Resistance	1 Ω and below
				When pressure is released to air (For reference purpose)	Resistance	1 Ω and below
				When engine is starting	Resistance	1 MΩ and above
			Between R36 (male) (2) ~ (1)	When engine is not running	Resistance	1 MΩ and above
				When pressure is released to air (For reference purpose)	Resistance	1 MΩ and above
				When engine is starting	Resistance	1 Ω and below
	6	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L61 and R36. 3) Connect t-adapter. 4) Apply left brake after motor starts.			
			Between L61 (female) (17)/R36 (female) (3) ~ body		Resistance	1 MΩ and above
			Between L61 (female) (23) F15 (female) (2) ~ body		Resistance	1 MΩ and above
	7	Faulty emergency steering manual switch	1) Turn starting switch OFF. 2) Disconnect connector S19. 3) Insert T-adapter.			
				When emergency steering switch is turned ON	Resistance	1 Ω and below
				When emergency steering switch is turned OFF	Resistance	1 MΩ and above

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	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	8	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63, L126 and S19. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L63 (female) (29)/L126 (1) /S19 (female) (4) ~ body	Resistance	1 MΩ and above
	9	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L126 and R15. 3) Insert T-adapter. 4) Turn starting switch ON.		
			Between L126 (5)/R15 ~ body	Resistance	1 MΩ and above
	10	Faulty emergency steering relay (L126)	1) Turn starting switch OFF. 2) Disconnect connector L126. 3) Insert T-adapter.		
			Between L126 (female) (3)/L126 (female) (5) ~ body	Resistance	1 MΩ and above
	11	Faulty emergency steering actuating relay (L126)	1) Turn starting switch OFF. 2) Disconnect connectors R15 and R16 and two power supply wires.		
			Between relay contacts	Resistance	1 MΩ and above

Related circuit diagram



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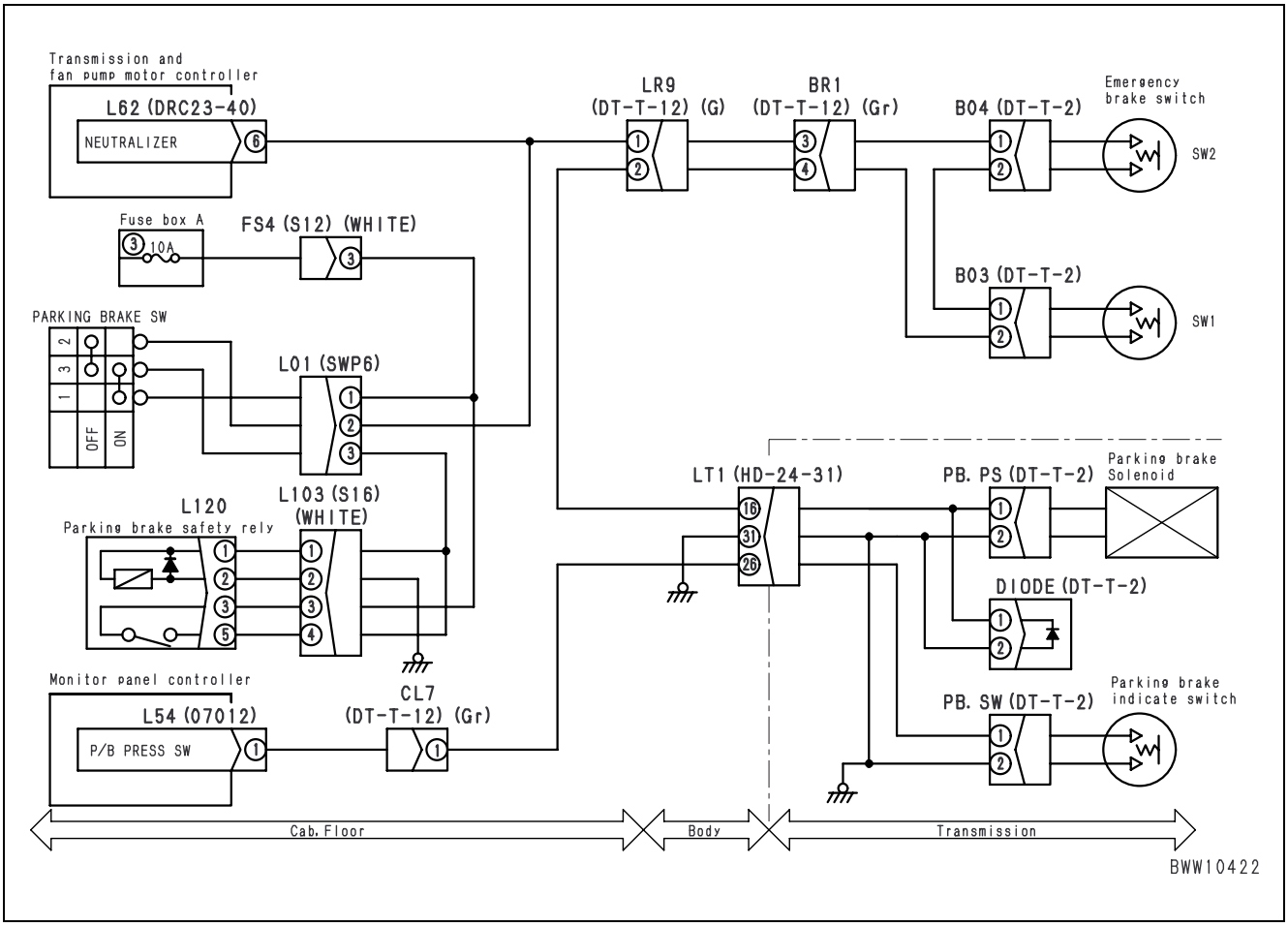
Action code [MON-1]

Action Code	Error Code	Controller Code	Trouble	The parking brake indicator lamp does not light up when the parking brake switch is turned ON (The parking brake indicator switch circuit suffers a ground fault).
MON-1	—	MON		
Description of Trouble	• The parking brake detector circuit remains closed when the parking brake switch is operated.			
Controller Reaction	• No reaction.			
Effect on Machine	• When the parking brake switch is turned ON, neither the parking brake indicator lamp light up nor the parking brake is applied.			
Related Information	• Can be verified with the monitoring function (Code: 40903, D-IN-26). • The state of the parking brake switch can be verified with the monitoring function (Code: 40907, D-IN-23).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty parking brake	—			
	2	Faulty parking brake indicator switch	1) Turn starting switch OFF. 2) Disconnect parking brake (PB) switch connectors. 3) Connect T-adapter.			
			Between PB switch connectors (male) (1) ~ (2)	When parking brake oil pressure is above 0.6 MPa {6.1 kg/cm²}	Resistance	1 Ω and below
				When parking brake oil pressure is below 0.34 MPa {3.5 kg/cm²}	Resistance	1 MΩ and above
	3	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L54 and PB switch. 3) Connect T-adapter.			
					Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect T-adapter. 4) Start engine.			
			Between L54 (female) (1) ~ body	When parking brake oil pressure is above 0.6 MPa {6.1 kg/cm²}	Voltage	1 V or less
				When parking brake oil pressure is below 0.34 MPa {3.5 kg/cm²}	Voltage	20 ~ 30 V
	5	Faulty parking brake switch	1) Turn starting switch OFF. 2) Disconnect connector L01. 3) Connect T-adapter.			
			Between L01 (male) (1) ~ (3)	When parking brake switch is turned ON	Resistance	1 Ω and below
				When parking brake switch is turned OFF	Resistance	1 MΩ and above
			Between L01 (male) (2) ~ (3)	When parking brake switch is turned ON	Resistance	1 MΩ and above
				When parking brake switch is turned OFF	Resistance	1 Ω and below
			Between L01 (male) (1) ~ (2)	At all times	Resistance	1 MΩ and above
	6	Faulty parking brake solenoid	1) Turn starting switch OFF. 2) Disconnect PB.PS connectors. 3) Connect T-adapter.			
			Between PB.PS connectors (male) (1) ~ (3)		Resistance	10 ~ 40 Ω
			Between PB.PS connectors (female) (2) ~ body		Resistance	1 Ω and below
			Between PB.PS connectors (male) (1) / (3) ~ body		Resistance	1 MΩ and above
	7	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L01 and PB.PS. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between PB.PS connectors (female) (1) ~ (2)		Voltage	1 V or less

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Related circuit diagram



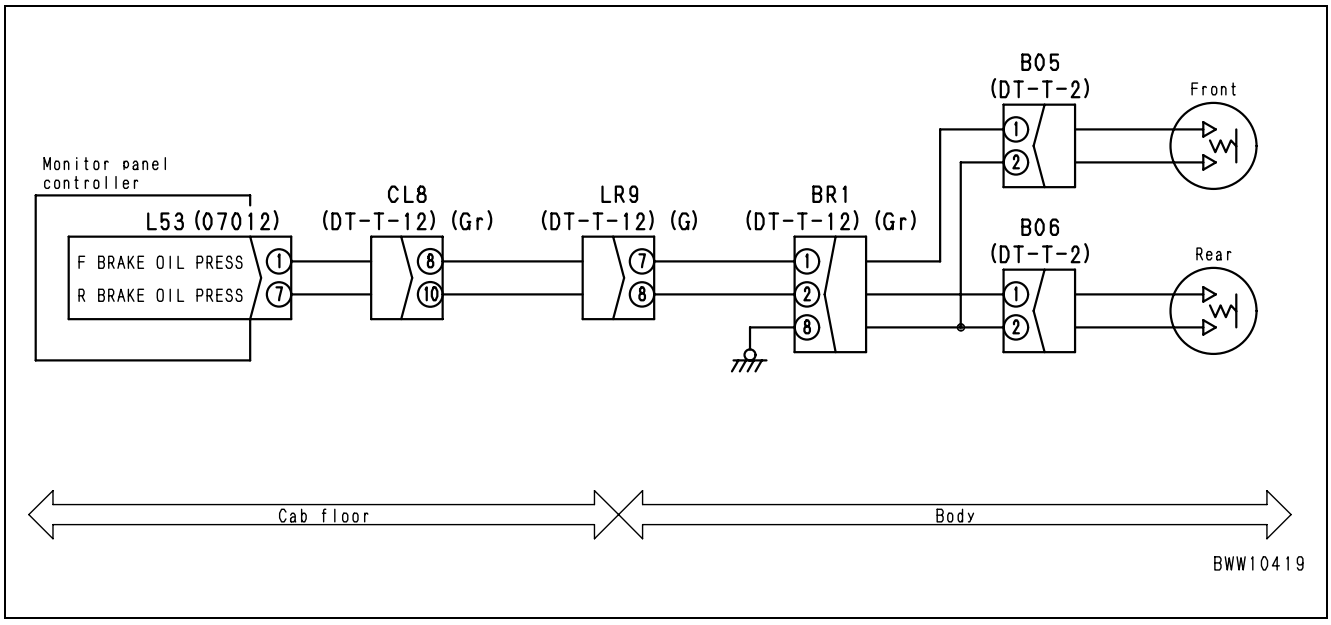
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Action code [MON-2]

Action Code	Error Code	Controller Code	Trouble	The brake oil pressure caution lamp does not light up when the emergency brake is applied (Front circuit)
MON-2	—	MON		
Description of Trouble	• The accumulator pressure sensor (Front) circuit remains closed (i.e. front brake oil pressure is normal) when the emergency brake is actuated.			
Controller Reaction	• No reaction.			
Effect on Machine	• The brake oil pressure caution lamp does not light up when the emergency brake is actuated and when the brake oil pressure is decreased.			
Related Information	• Can be verified with the monitoring function (Code: 40902_D-IN-16).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty brake oil pressure sensor (Front brake circuit)	1) Turn starting switch OFF. 2) Disconnect connector B05. 3) Connect T-adapter. 4) Start engine.			
			Between B05 (male) (1) ~ (2)	When front brake oil pressure is above 5.88 MPa {60 kg/cm²}	Resistance	1 Ω and below
				When front brake oil pressure is below 5.88 MPa {60 kg/cm²}	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L53 and B05. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L53 (female) (1)/B05 (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L53. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L53 (female) (1) ~ body	When front brake oil pressure is above 5.88 MPa {60 kg/cm²}	Resistance	1 Ω and below
				When front brake oil pressure is below 5.88 MPa {60 kg/cm²}	Resistance	1 MΩ and above

Related circuit diagram



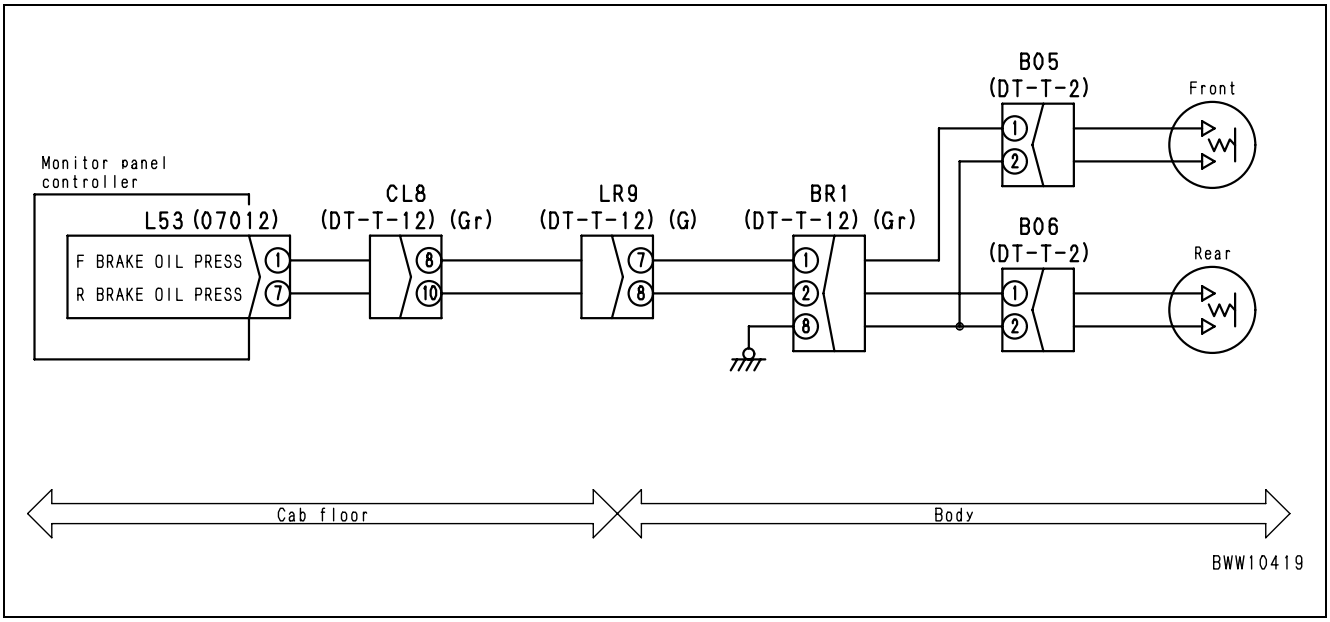
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Action code [MON-3]

Action Code	Error Code	Controller Code	Trouble	The brake oil pressure caution lamp does not light up when the emergency brake is applied (Rear circuit)
MON-3	—	MON		
Description of Trouble	• The accumulator pressure sensor (Rear) circuit remains closed (i.e. rear brake oil pressure is normal) when the emergency brake is actuated.			
Controller Reaction	• No reaction.			
Effect on Machine	• The brake oil pressure caution lamp does not light up when the emergency brake is actuated and when the brake oil pressure is decreased.			
Related Information	• Can be verified with the monitoring function (Code: 40902_D-IN-17).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty brake oil pressure sensor (Rear brake circuit)	1) Turn starting switch OFF. 2) Disconnect connector B06. 3) Connect T-adapter. 4) Start engine.			
			Between B06 (male) (1) ~ (2)	When rear brake oil pressure is above 5.88 MPa {60 kg/cm²}	Resistance	1 Ω and below
				When rear brake oil pressure is below 5.88 MPa {60 kg/cm²}	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L53 and B06. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L53 (female) (7)/B06 (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L53. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L53 (female) (7) ~ body	When rear brake oil pressure is above 5.88 MPa {60 kg/cm²}	Resistance	1 Ω and below
				When rear brake oil pressure is below 5.88 MPa {60 kg/cm²}	Resistance	1 MΩ and above

Related circuit diagram



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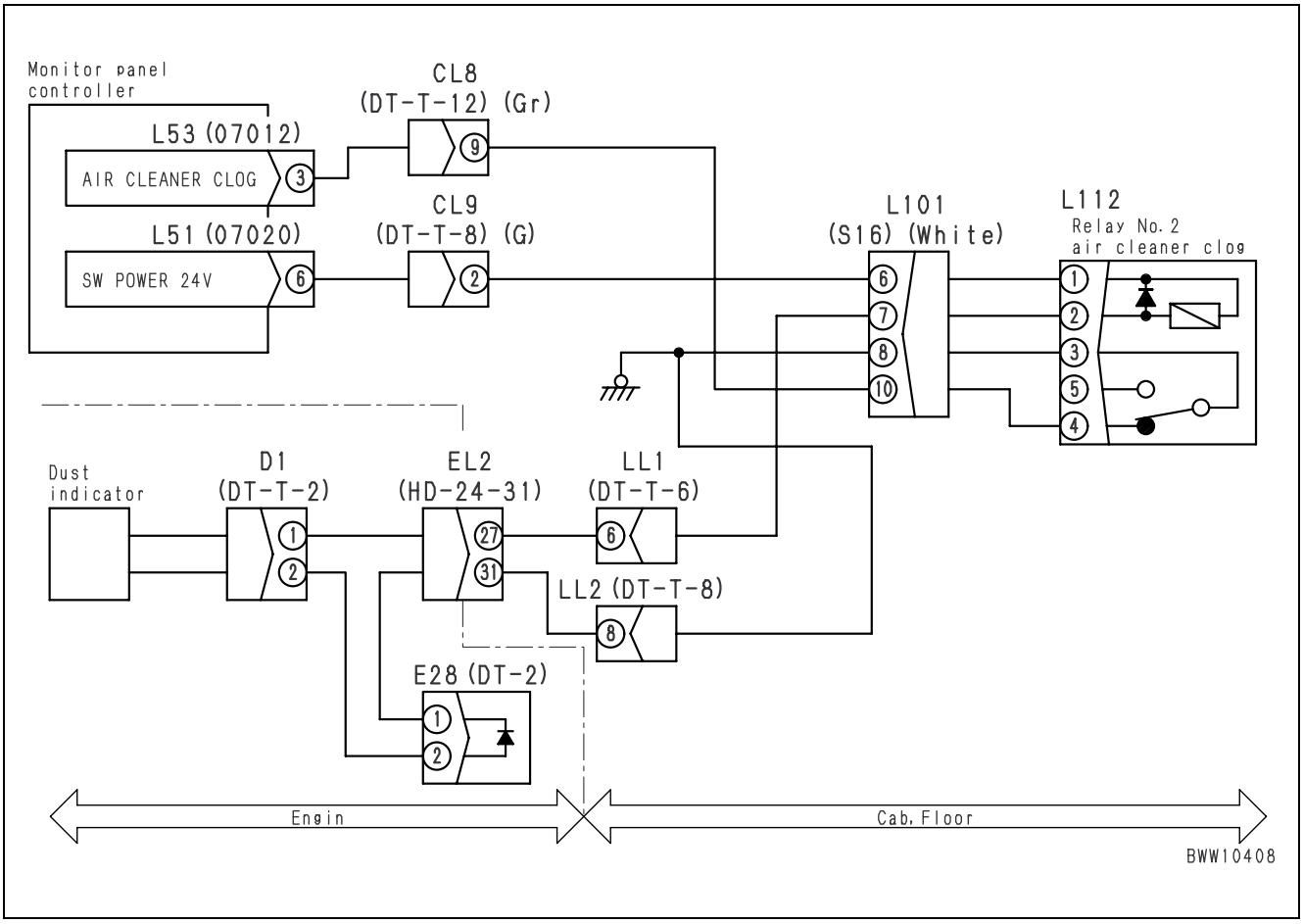
Action code [MON-4]

Action Code	Error Code	Controller Code	Trouble	The air cleaner clogging indicator lamp does not light ON
MON-4	—	MON		
Description of Trouble	• When the air cleaner is clogged, the sensor circuit is in the CLOSE (Not clogged) state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The air cleaner caution lamp does not go OFF.			
Related Information	• Can be checked with the monitoring function (Code: 40902, D-IN-20).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective dust indicator 1	—			
	2	Defective dust indicator relay 1	1) Turn starting switch OFF. 2) Disconnect connector DI. 3) Connect T-adapter.			
			Between L112 (male) (1) ~ (2)		Resistance	200 ~ 400 Ω
	3	Harness disconnection (Disconnection or defective connector contact)	1) Turn starting switch OFF. 2) Disconnect connector L53, L112 and DI. 3) Connect T-adapter.			
			Between L51 (female) (6) ~ (female) (1)		Resistance	1 Ω and below
			Between L112 (female) (2) ~ (female) (1)		Resistance	1 Ω and below
			Between DI (female) (2) ~ (female) (1)		Resistance	1 Ω and below
	4	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L53 and L112. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L53 (female) (3), L112 (female) (4) ~ body		Resistance	1 MΩ and above
	5	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L53 and L112. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L53 (female) (3), L112 (female) (4) ~ body		Voltage	1 V or below
	6	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51 and L53. 3) Connect t-adapter. 4) Start the engine.			
			Between L53 (3) ~ body	Dust indicator 0 normal (Air cleaner not clogged)	Voltage	20 ~ 30 V
				Dust indicator 0 abnormal (Air cleaner clogged)	Voltage	1 V or below
			1) Turn starting switch OFF. 2) Disconnect connector Di. 3) Connect t-adapter.			
			Between L51 (male) (6) ~ body		Resistance	200 ~ 400 Ω

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Related circuit diagram



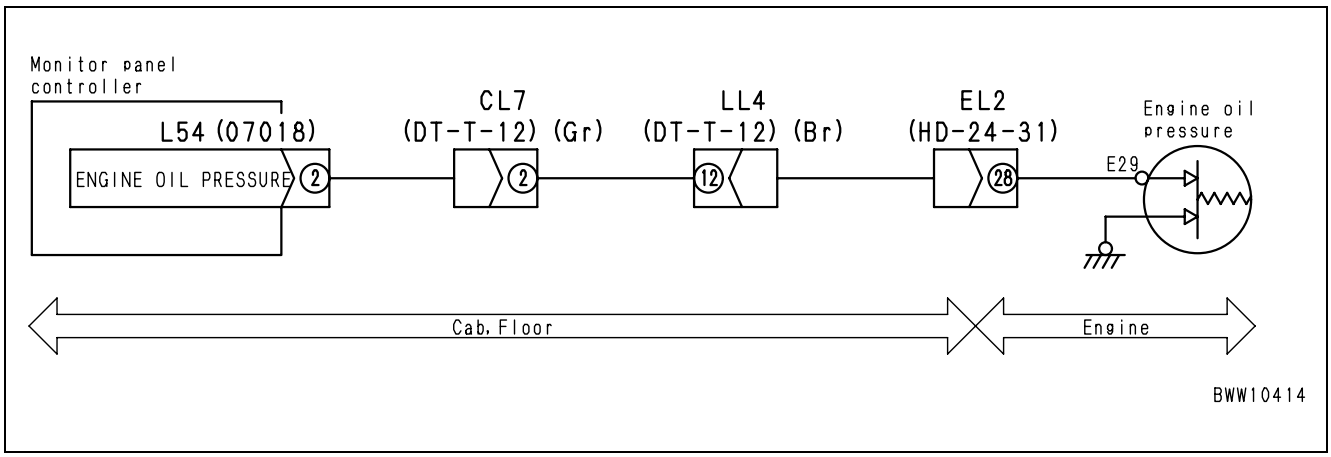
https://truckmanualshub.com/

Action code [MON-5]

Action Code	Error Code	Controller Code	Trouble	The engine hydraulic caution lamp does not light ON
MON-5	—	MON		
Description of Trouble	• When the starting switch is ON (the engine stops), the engine hydraulic sensor circuit is in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The engine hydraulic caution lamp does not light ON.			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-28).			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective engine hydraulic sensor	1) Turn starting switch OFF. 2) Disconnect connector E29. 3) Connect T-adapter.			
			Hydraulic switch pin and body	When the engine stops	Resistance	1 Ω and below
				When the engine runs	Resistance	1 MΩ and above
	2	Harness disconnection	1) Turn starting switch OFF. 2) Disconnect connectors L54 and E29. 3) Connect T-adapter.			
			Between L54 (female) (2)/E29 (female)		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (2) ~ body	When the engine stops	Resistance	1 V and below
				When the engine runs	Resistance	20 ~ 30 V

Related circuit diagram



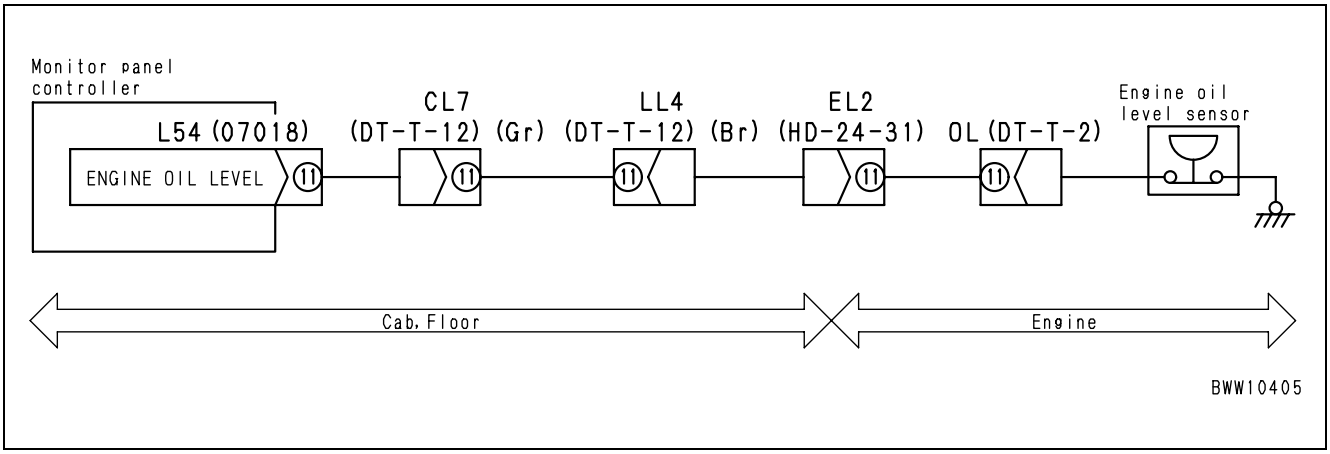
https://truckmanualshub.com/

Action code [MON-6]

Action Code	Error Code	Controller Code	Trouble	The engine oil level caution lamp does not light ON
MON-6	—	MON		
Description of Trouble	• The engine oil level sensor circuit is in the CLOSE state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The engine oil level caution lamp does not light ON.			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-29).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective engine oil level sensor	1) Turn starting switch OFF. 2) Disconnect connector OL. 3) Connect T-adapter.			
			Between OL (male) (1) ~ body	Oil level normal	Resistance	1 Ω and below
				Oil level insufficient (Reduces)	Resistance	1 MΩ and above
	2	Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and OL. 3) Connect T-adapter.			
			Between L54 (female) (11), OL (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (11) ~ body	Oil level normal	Resistance	1 Ω and below
				Oil level insufficient (Reduces)	Resistance	1 MΩ and above

Related circuit diagram



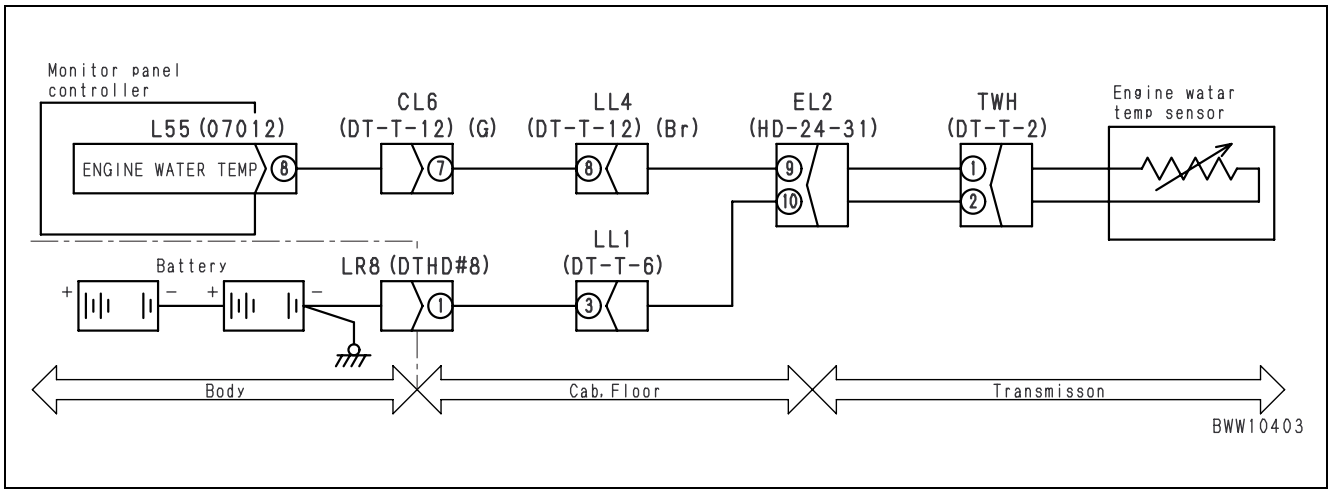
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Action code [MON-7]

Action Code	Error Code	Controller Code	Trouble	The engine water temperature caution lamp does not light ON After the engine starts, the engine water temperature gauge does not rise
MON-7	—	MON		
Description of Trouble	• The engine water temperature sensor circuit is always in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The engine water temperature caution lamp does not light ON. • After the engine starts, the engine water temperature gauge does not rise.			
Related Information	• Can be checked with the monitoring function (Code: 04103).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective engine water temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector TWH. 3) Connect T-adapter.			
			Between TWH (male) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L55 and TWH. 3) Connect T-adapter.			
			Between L55 (female) (8), TWH (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter.			
			Between L55 (female) (8) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



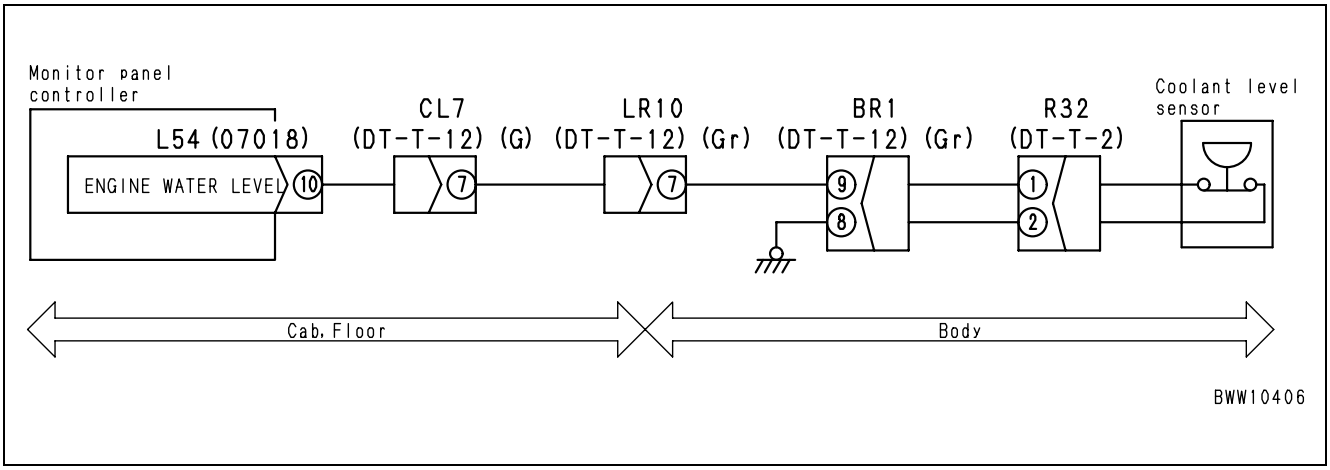
https://truckmanualshub.com/

Action code [MON-8]

Action Code	Error Code	Controller Code	Trouble	The radiator water volume caution lamp does not light ON
MON-8	—	MON		
Description of Trouble	• The coolant level sensor circuit is always in the CLOSE state.			
Controller Reaction	• No reaction.			
Effect on Machine	• When the radiator water volume (Coolant water volume) is insufficient, the radiator water volume caution lamp does not light ON. (The engine may be damaged.)			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-27).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective coolant level sensor	1) Turn starting switch OFF. 2) Disconnect connector R32. 3) Connect T-adapter.			
			Between R32 (male) (1) ~ (2)	Subtank low level or less (Abnormal)	Resistance	1 MΩ and above
				Subtank low level or more (Normal)	Resistance	1 Ω or below
	2	Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and R32. 3) Connect T-adapter.			
			Between L54 (female) (10), R32 (female) (1) ~ body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (female) (10) ~ body	Subtank low level or less (Abnormal)	Resistance	1 MΩ and above
				Subtank low level or more (Normal)	Resistance	1 Ω or below

Related circuit diagram



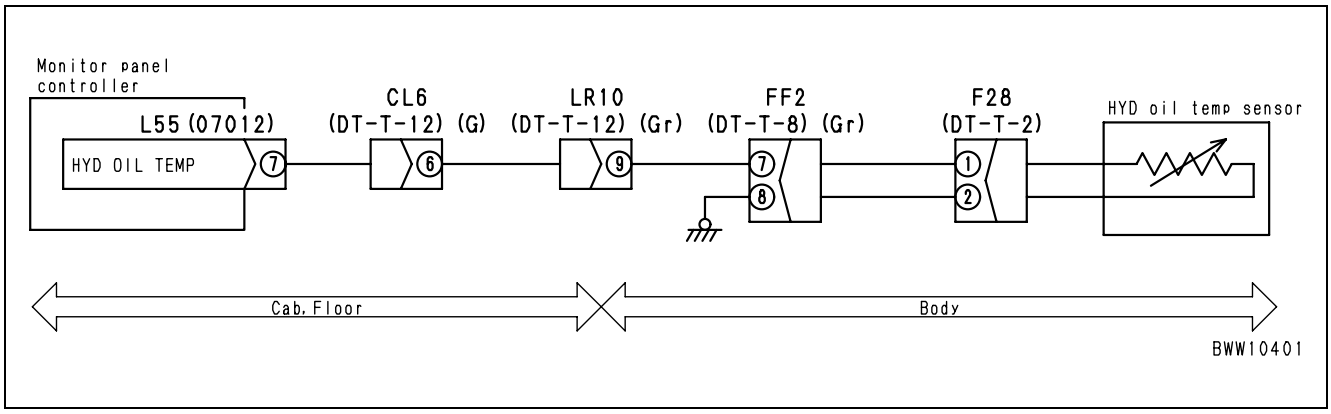
https://truckmanualshub.com/

Action code [MON-9]

Action Code	Error Code	Controller Code	Trouble	The hydraulic oil temperature caution lamp does not light ON After the engine starts, the hydraulic oil temperature gauge does not rise
MON-9	—	MON		
Description of Trouble	• The hydraulic oil temperature sensor circuit is always in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The hydraulic oil temperature caution lamp does not light ON. • After the engine starts, the hydraulic oil temperature gauge does not rise.			
Related Information	• Can be checked with the monitoring function (Code: 04401).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective hydraulic oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector F28. 3) Connect T-adapter.			
			Between F28 (male) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L55 and F28. 3) Connect T-adapter.			
			Between L55 (female) (7) ~ F28 (female) (1)		Resistance	1 Ω and below
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter.			
			Between L55 (female) (7) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



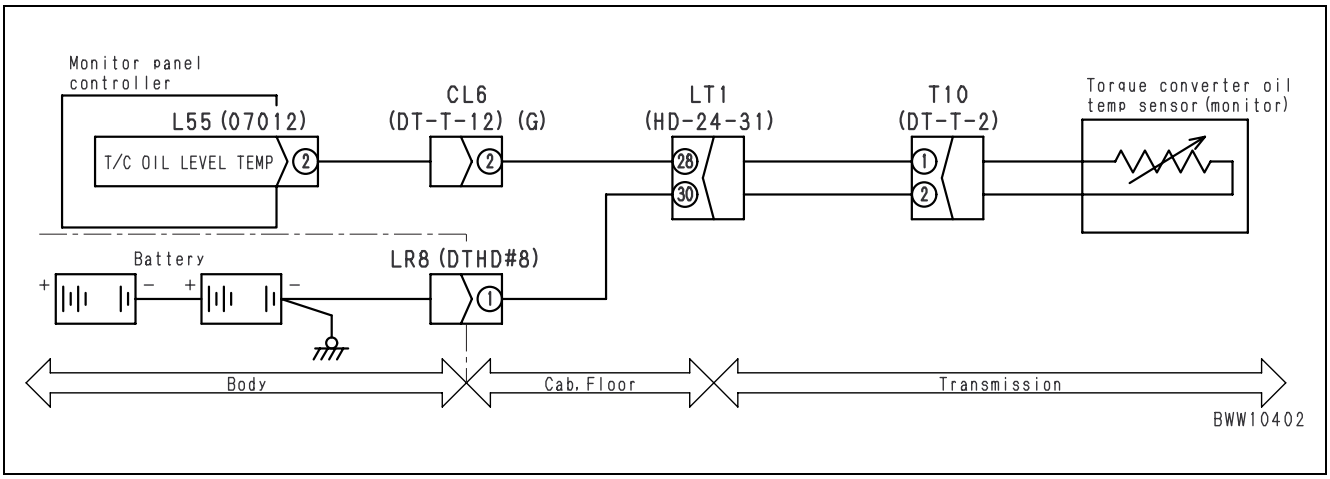
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Action code [MON-10]

Action Code	Error Code	Controller Code	Trouble	The torque converter oil temperature caution lamp does not light ON After the engine starts, the torque converter oil temperature gauge does not rise
MON-10	—	MON		
Description of Trouble	• The torque converter oil temperature sensor circuit is always in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The torque converter oil temperature caution lamp does not light ON. • After the engine starts, the torque converter oil temperature gauge does not rise.			
Related Information	• Can be checked with the monitoring function (Code: 40100).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective torque converter oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector TC.C. 3) Connect T-adapter.			
			Between TC.C (male) (1) ~ (2)	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L55 and TC.C. 3) Connect T-adapter.			
			Between L55 (female) (2) ~ TC.C (female) (1)		Resistance	1 Ω and below
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect t-adapter.			
			Between L55 (female) (2) ~ body	Normal temperature (25°C)	Resistance	35 ~ 50 kΩ
				100°C	Resistance	3.1 ~ 4.5 kΩ

Related circuit diagram



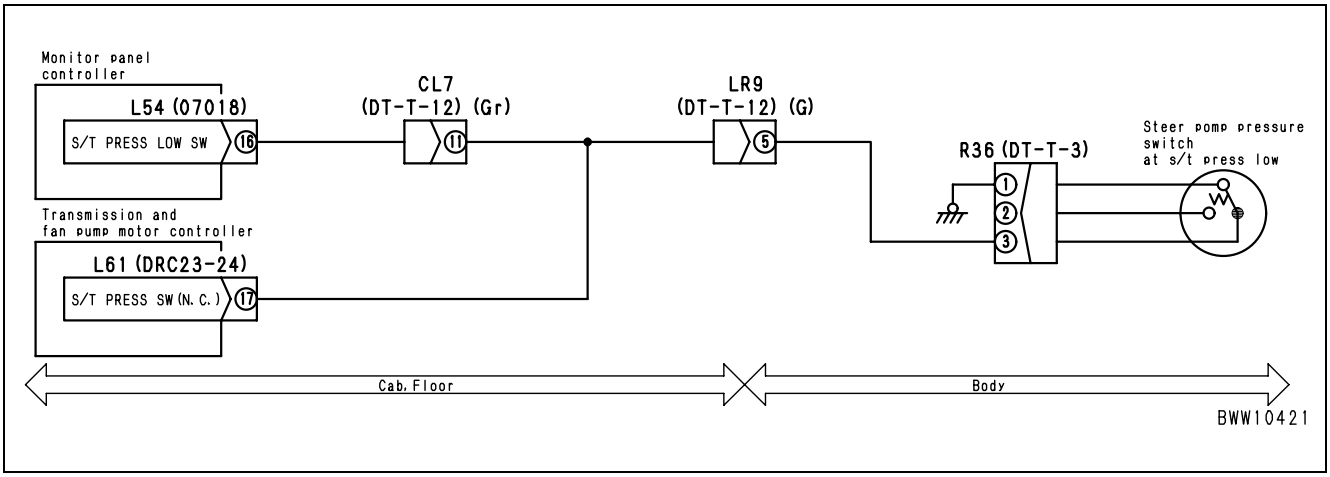
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Action code [MON-11]

Action Code	Error Code	Controller Code	Trouble	The steering hydraulic caution lamp does not light ON
MON-11	—	MON		
Description of Trouble	• The steering hydraulic sensor circuit is always in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• At emergency steering self-check, the steering hydraulic caution lamp does not light ON. • The emergency steering self-check may not be performed.			
Related Information	• Can be checked with the monitoring function (Code: 40904, D-IN-39).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective steering hydraulic sensor	1) Turn starting switch OFF. 2) Disconnect connector R36. 3) Connect T-adapter.			
			Between R36 (male) (1) ~ (2)	The engine stops	Resistance	1 Ω and below
				Atmosphere open (Reference)	Resistance	1 Ω and below
				The engine starts	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54, R36, and L61. 3) Connect T-adapter.			
			Between L54 (female) (16), R36 (female) (3) ~ body		Resistance	1 Ω and below
	3	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L54, R36, and L61. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (16), R36 (female) (3) ~ body		Voltage	1 V or below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (female) (16) ~ body	The engine stops	Resistance	1 Ω and below
				Atmosphere open (Reference)	Resistance	1 Ω and below
				The engine starts	Resistance	1 MΩ and above

Related circuit diagram



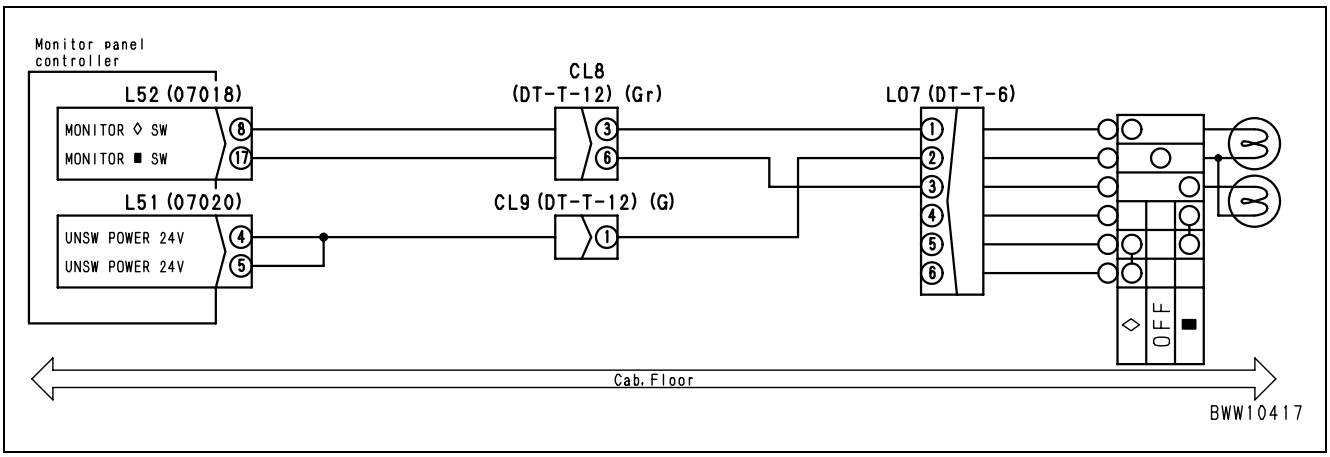
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Action code [MON-12]

Action Code	Error Code	Controller Code	Trouble	Input fault in monitor panel mode switch 1 [■] (Panel SW1)
MON-12	—	MON		
Description of Trouble	• The input circuit of the monitor panel mode switch 1 [■] (Panel SW1) is in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The monitor operation is impossible. (Not placed into the service mode.)			
Related Information	• The input signal (0/1) of the monitor panel mode switch 1 [■] (Panel SW1) can be checked with the monitoring function (Code: 40901, D-IN-15). • Since the [■] switch is abnormal, the monitoring function may not be implemented.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective monitor panel mode switch 1 [■]	1) Turn starting switch OFF. 2) Disconnect connector L07. 3) Connect T-adapter.			
			Between L07 (female) (2) ~ (3)	When the monitor panel mode switch 1 [■] is ON	Resistance	1 Ω and below
				Others	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L51, L52, and L07. 3) Connect T-adapter.			
			Between L52 (female) (17) ~ L07 (female) (3)		Resistance	1 Ω and below
			Between L51 (female) (4), (5), L07 (female) (2)		Resistance	1 Ω and below
	3	Harness ground fault (At occurrence of a ground fault, the fuse blows during switch operation, and the sub-sequence operation is impossible.)	1) Turn starting switch OFF. 2) Disconnect connectors L51, L52, and L07. 3) Connect T-adapter.			
			Between L52 (female) (17) and L07 (female) (3) ~ body		Resistance	1 MΩ and above
			Between L51 (female) (4), (5), L07 (female) (2) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect t-adapter. 4.) Turn starting switch ON.			
			Between L52 (17) ~ body	When the monitor panel mode switch 1 [■] is ON	Voltage	20 ~ 30 V
				Others	Voltage	1 V and below

Related circuit diagram



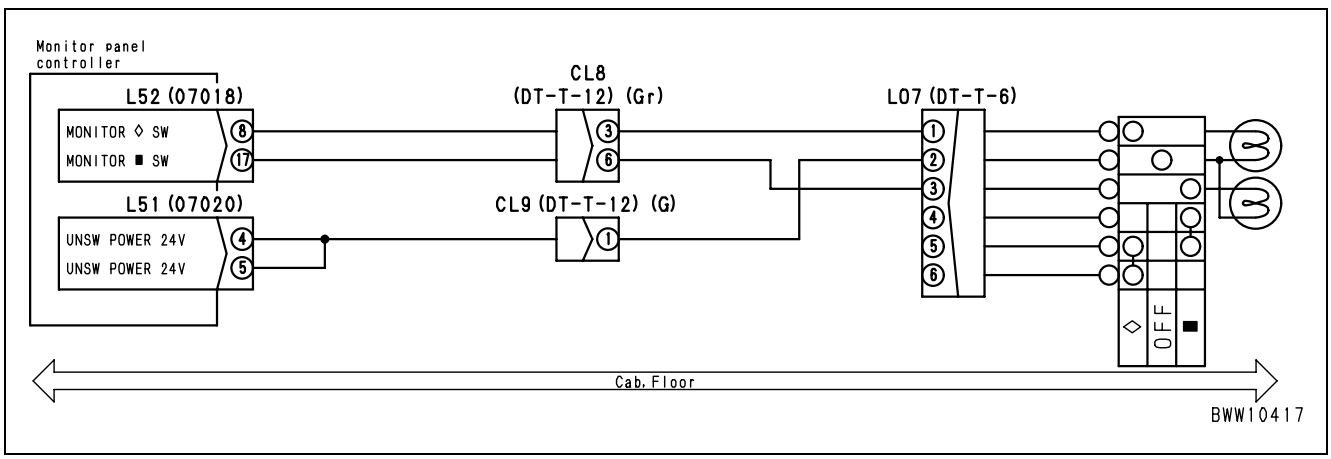
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Action code [MON-13]

Action Code	Error Code	Controller Code	Trouble	Input fault in monitor panel mode switch 1 [◇] (Panel SW2)
MON-13	—	MON		
Description of Trouble	• The input circuit of the monitor panel mode switch 1 [◇] (Panel SW2) is in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The monitor operation is impossible.			
Related Information	• The input signal (0/1) of the monitor panel mode switch 1 [◇] (Panel SW2) can be checked with the monitoring function (Code: 40901, D-IN-14). • Since the [◇] switch is abnormal, the monitoring function may not be implemented.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective monitor panel mode switch 1 [◇]	1) Turn starting switch OFF. 2) Disconnect connector L07. 3) Connect T-adapter.			
			Between L07 (female) (2) ~ (1)	When the monitor panel mode switch 1 [◇] is ON	Resistance	1 Ω and below
				Others	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L51, L52, and L07. 3) Connect T-adapter.			
			Between L52 (female) (8) ~ L07 (female) (1)		Resistance	1 Ω and below
			Between L51 (female) (4), (5) ~ L07 (female) (2)		Resistance	1 Ω and below
	3	Harness ground fault (At occurrence of a ground fault, the fuse blows during switch operation, and the sub-sequence operation is impossible.)	1) Turn starting switch OFF. 2) Disconnect connectors L51, L52, and L07. 3) Connect T-adapter.			
			Between L52 (female) (8), L07 (female) (1) ~ body		Resistance	1 MΩ and above
			Between L51 (female) (4), (5), L07 (female) (2) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L52 (8) ~ body	When the monitor panel mode switch 1 [◇] is ON	Voltage	20 ~ 30 V
				Others	Voltage	1 V and below

Related circuit diagram



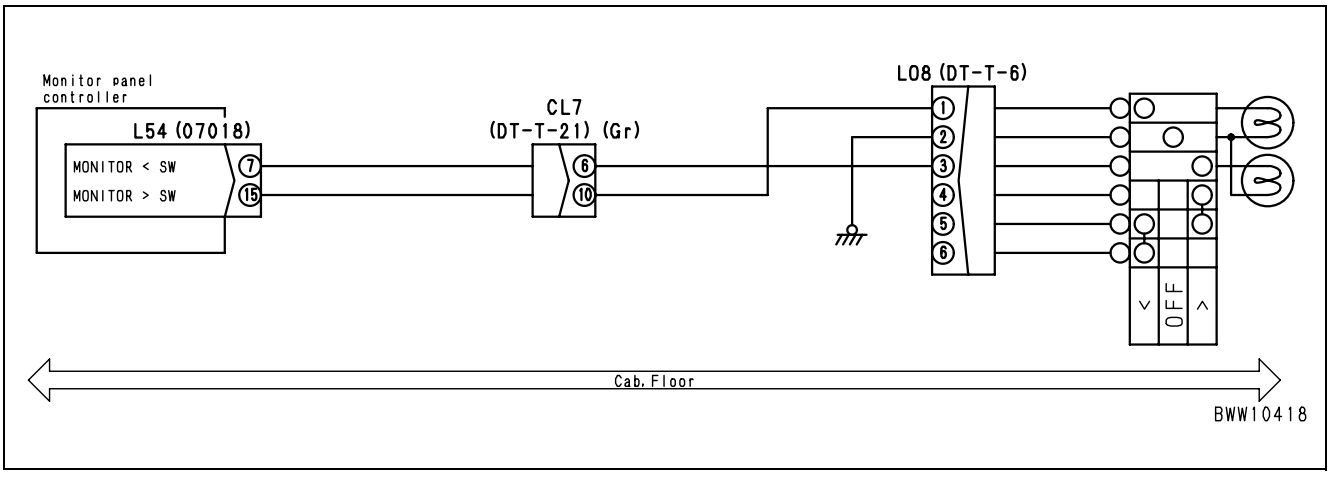
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Action code [MON-14]

Action Code	Error Code	Controller Code	Trouble	Input fault in monitor panel mode switch 2 [<] (Panel SW3)
MON-14	—	MON		
Description of Trouble	• The input circuit of the monitor panel mode switch 1 [<] (Panel SW3) is in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The monitor operation is impossible.			
Related Information	• The input signal (0/1) of the monitor panel mode switch 2 [<] (Panel SW3) can be checked with the monitoring function (Code: 40904, D-IN-38). • Since the [<] switch is abnormal, the monitoring function may not be implemented.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective monitor panel mode switch 2 [<]	1) Turn starting switch OFF. 2) Disconnect connector L08. 3) Connect T-adapter.			
			Between L08 (female) (3) ~ (2)	When the monitor panel mode switch 2 [<]is ON	Resistance	1 Ω and below
				Others	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter.			
			Between L54 (female) (7) ~ L08 (female) (3)		Resistance	1 Ω and below
	3	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (7), L08 (female) (3) ~ body		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (7) ~ body	When the monitor panel mode switch 2 [<] is ON	Voltage	1 V and below
				Others	Voltage	20 ~ 30 V

Related circuit diagram



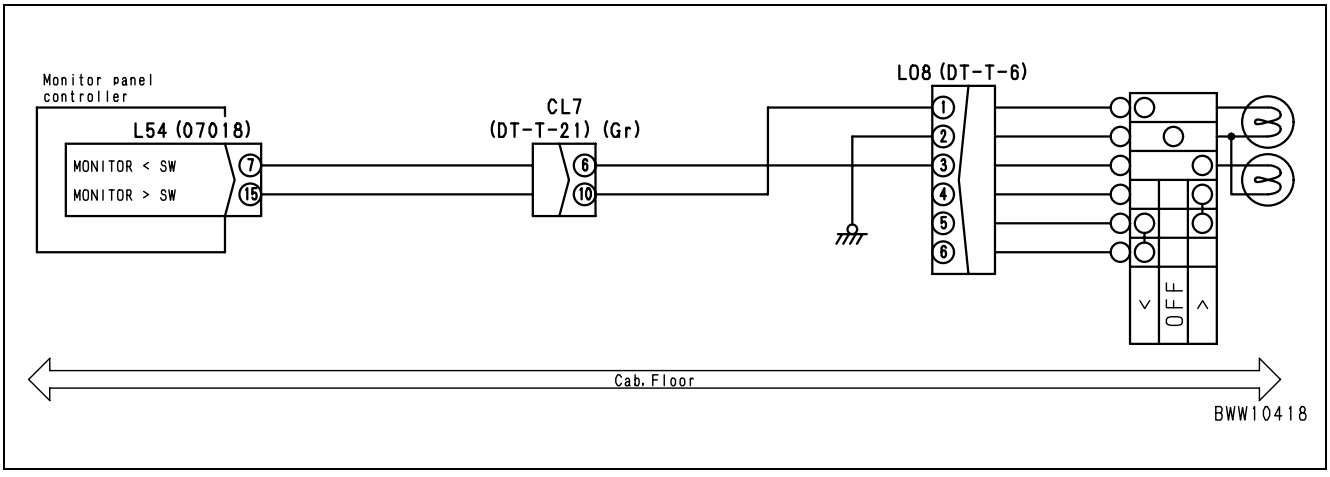
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Action code [MON-15]

Action Code	Error Code	Controller Code	Trouble	Input fault in monitor panel mode switch 2 [>] (Panel SW4)
MON-15	—	MON		
Description of Trouble	• The input circuit of the monitor panel mode switch 1 [>] (Panel SW4)is in the CLOSE state continuously for 1 minute or more.			
Controller Reaction	• No reaction.			
Effect on Machine	• The monitor operation is impossible.			
Related Information	• The input signal (0/1) of the monitor panel mode switch 2 [>] (Panel SW4) can be checked with the monitoring function (Code: 40904, D-IN-37). • Since the [>] switch is abnormal, the monitoring function may not be implemented.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective monitor panel mode switch 2 [>]	1) Turn starting switch OFF. 2) Disconnect connector L08. 3) Connect T-adapter.			
			Between L08 (female) (1) ~ (2)	When the monitor panel mode switch 2 [>] is ON	Resistance	1 Ω and below
				Others	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter.			
			Between L54 (female) (15) ~ L08 (female) (1)		Resistance	1 Ω and below
	3	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (15), L08 (female) (1) ~ body		Voltage	1 V and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (15) ~ body	When the monitor panel mode switch 2 [>] is ON	Voltage	1 V and below
				Others	Voltage	20 ~ 30 V

Related circuit diagram



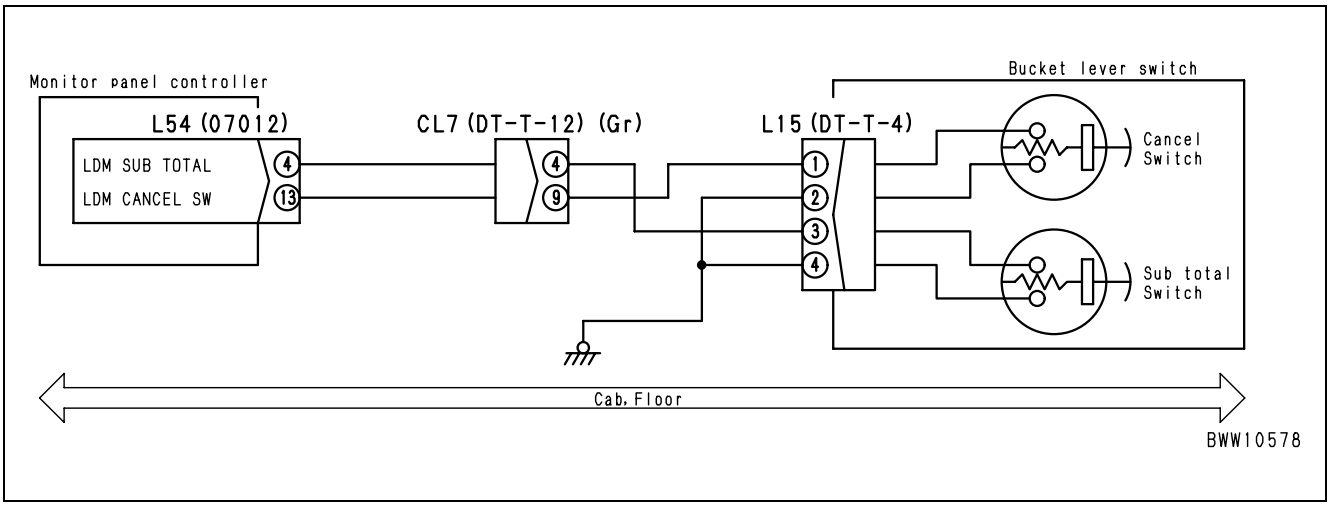
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Action code [MON-16]

Action Code	Error Code	Controller Code	Trouble	Defective subtotal switch
MON-16	—	MON		
Description of Trouble	• The subtotal switch input circuit is in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The load meter subtotal operation is impossible.			
Related Information	• The subtotal switch input signal (0/1) can be checked with the monitoring function (Code: 40904, D-IN-32).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective subtotal switch (Bucket lever for OPTLDM)	1) Turn starting switch OFF. 2) Disconnect connector L15. 3) Connect T-adapter.			
			Between L15 (female) (3) ~ (4)	Subtotal switch = ON	Resistance	1 Ω and below
				Others	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L15. 3) Connect T-adapter.			
			Between L54 (female) (4) ~ L15 (female) (3)		Resistance	1 Ω and below
	3	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L15. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (4), L15 (female) (3) ~ body		Voltage	1 V and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (4) ~ body	Subtotal switch = ON	Voltage	1 V and below
				Others	Voltage	20 ~ 30 V

Related circuit diagram



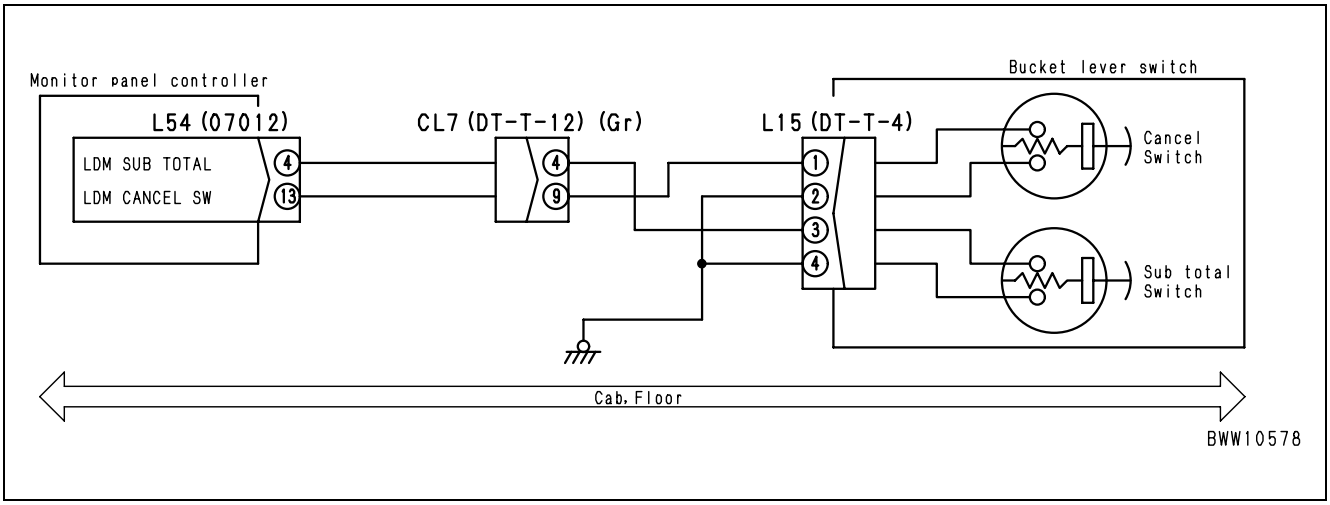
https://truckmanualshub.com/

Action code [MON-17]

Action Code	Error Code	Controller Code	Trouble	Defective cancel switch
MON-17	—	MON		
Description of Trouble	• The cancel switch input circuit is always in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The load meter weight cancel operation is impossible.			
Related Information	• The cancel switch input signal (0/1) can be checked with the monitoring function (Code: 40904, D-IN-33).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective cancel switch (Bucket lever for OPTLDM)	1) Turn starting switch OFF. 2) Disconnect connector L15. 3) Connect T-adapter.			
			Between L15 (female) (1) ~ (2)	Cancel switch = ON	Resistance	1 Ω and below
				Others	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L15. 3) Connect T-adapter.			
			Between L54 (female) (13) ~ L15 (female) (1)		Resistance	1 Ω and below
	3	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L15. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (13), L15 (female) (1) ~ body		Voltage	1 V and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (female) (13) ~ body	Cancel switch = ON	Voltage	1 V and below
				Others	Voltage	20 ~ 30 V

Related circuit diagram



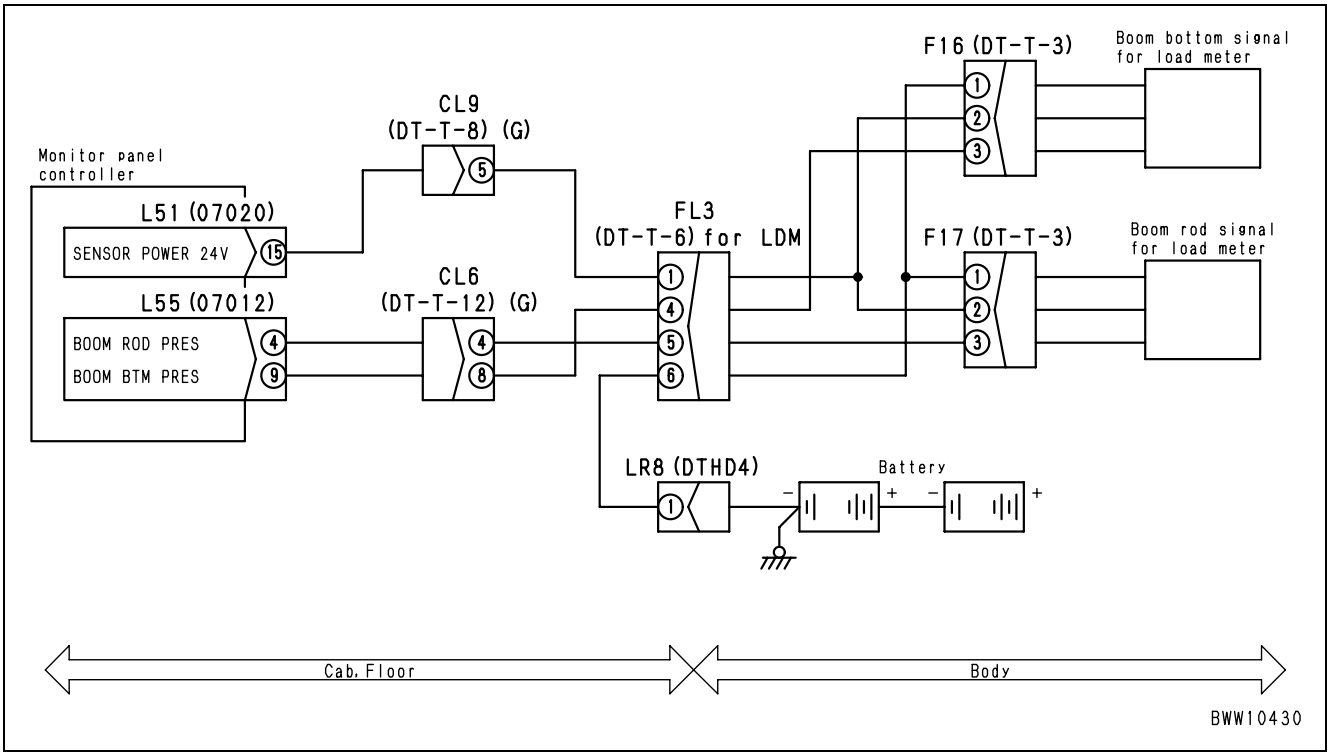
https://truckmanualshub.com/

Action code [MON-18]

Action Code	Error Code	Controller Code	Trouble	Defective bottom pressure sensor (Hot short fault)
MON-18	—	MON		
Description of Trouble	• The input voltage from the bottom pressure sensor is 5.3 V and above.			
Controller Reaction	• No reaction.			
Effect on Machine	• The alarm does not function and the load is not displayed.			
Related Information	• The bottom pressure signal (0.01 Mpa) can be checked with the monitoring function (Code: 40400).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective boom pressure sensor (Bottom side)	1) Turn starting switch OFF. 2) Disconnect connector F16. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between F16 (1) ~ (2)		Voltage	20 ~ 30 V
			Between F16 (2) ~ (1)	At running	Voltage	0.7 ~ 5.3 V
				At atmosphere	Voltage	0.5 ~ 1.5 V
	2	Harness hot short fault (Contact with power harness)	1) Turn starting switch OFF. 2) Disconnect connectors L51, F16 and F17. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L55 (female) (9), F16 (female) (3) ~ body		Voltage	1 V and below
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51, F16 and F17. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L51 (15) ~ body		Voltage	20 ~ 30 V
			Between L55 (9) ~ body	At running	Voltage	0.7 ~ 5.3 V
				At atmosphere	Voltage	0.5 ~ 1.5 V

Related circuit diagram



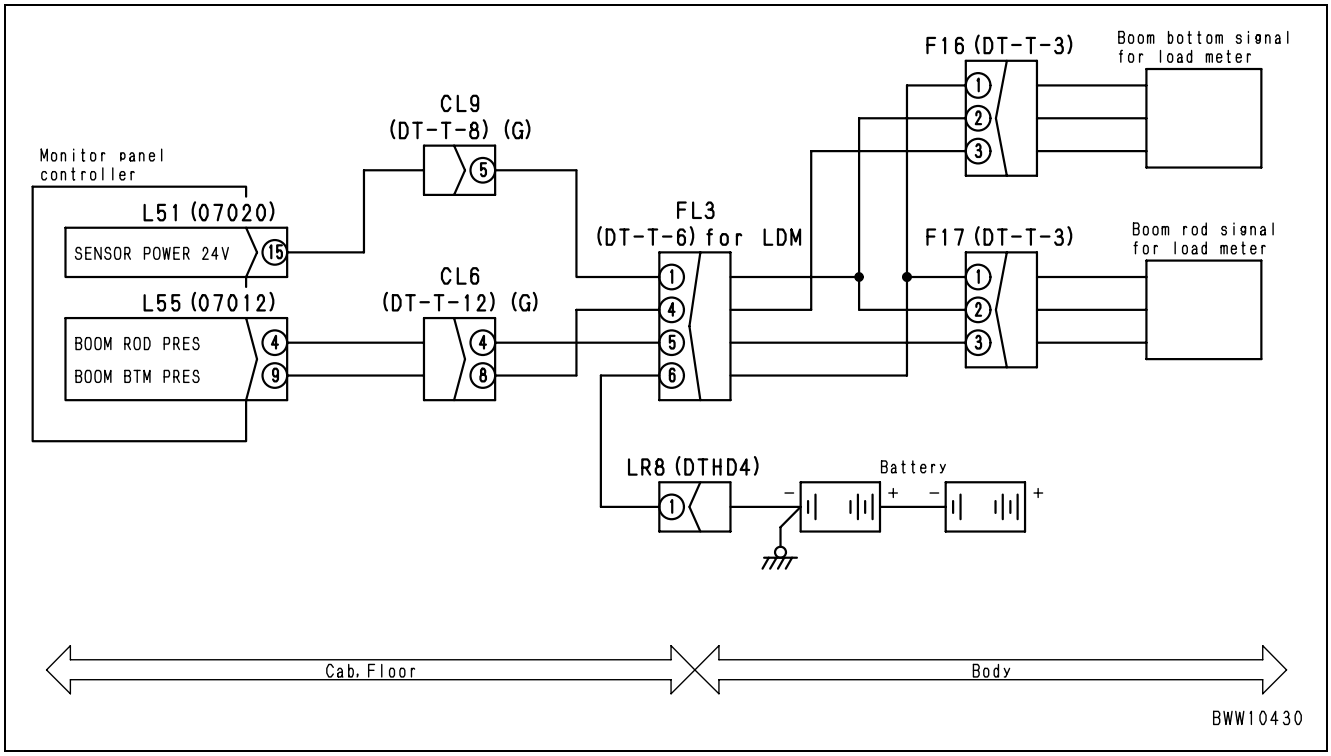
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Action code [MON-19]

Action Code	Error Code	Controller Code	Trouble	Defective head sensor
MON-19	—	MON		
Description of Trouble	• The input voltage from the head pressure sensor is 5.3V and above.			
Controller Reaction	• No reaction.			
Effect on Machine	• The alarm does not function and the load is not displayed.			
Related Information	• The bottom pressure signal (0.01 Mpa) can be checked with the monitoring function (Code: 40500).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective head pressure sensor (Head side)	1) Turn starting switch OFF. 2) Disconnect connector F16. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between F17 (2) ~ (1)		Voltage	20 ~ 30 V
			Between F17 (2) ~ (1)	At running	Voltage	0.7 ~ 5.3 V
				At atmosphere open	Voltage	0.5 ~ 1.5 V
	2	Harness hot short fault (Contact with power harness)	1) Turn starting switch OFF. 2) Disconnect connectors F17. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L55 (female) (4), F17 (female) (3) ~ body		Voltage	1 V and below
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51 and F17. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L51 (15) ~ body		Voltage	20 ~ 30 V
			Between L55 (4) ~ body	At running	Voltage	0.7 ~ 5.3 V
				At atmosphere open	Voltage	0.5 ~ 1.5 V

Related circuit diagram



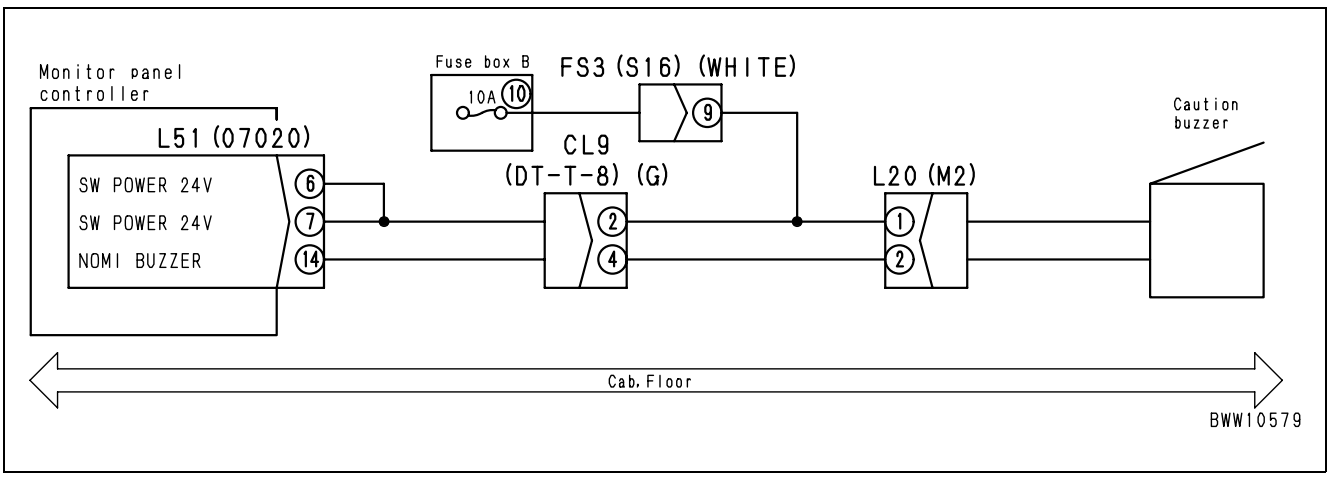
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Action code [MON-20]

Action Code	Error Code	Controller Code	Trouble	The alarm buzzer does not sound or stop. (Disconnection in alarm buzzer output system, or ground fault)
MON-20	—	MON		
Description of Trouble	• A disconnection or ground fault occurs in the alarm buzzer output circuit.			
Controller Reaction	• No reaction.			
Effect on Machine	• The alarm buzzer does not sound or stop.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective alarm buzzer	1) Turn starting switch OFF. 2) Disconnect connectorL20. 3) Connect T-adapter. 4) Connect connector L20. 5) 5 sec. lapsed after the starting switch was turned OFF.			
			L20 (2) to body earth	The alarm buzzer sounds	Alarm buzzer normal	
				The alarm buzzer does not sound.	Alarm buzzer abnormal	
	2	Harness disconnection (Disconnection or contact fault)	1) Turn starting switch OFF. 2) Disconnect connectors FS3 and L20. 3) Connect T-adapter.			
			Harness between L51 (female) (14) ~ L20 (female) (2)		Resistance	1 Ω and below
			Harness between FS3 (female) (9) ~ L20 (female) (1)		Resistance	1 Ω and below
	3	Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L51, FS3, and L20. 3) Connect T-adapter.			
			Between L51 (female) (14), L20 (female) (2) ~ body		Resistance	1 MΩ and above
			Between FS3 (female) (9) and L51 (female) (6), (7), L20 (female) (1) and body ★ In this case, fuse B-(9) blows, and the monitor does not start.		Resistance	1 MΩ and above
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51. 3) Connect t-adapter.			
			Between L51 (14) ~ body	Turn starting switch ON.	Voltage	20 ~ 30 V
				For 2 sec. after the starting switch was turned ON. (The alarm buzzer sounds.)	Voltage	1 V and below
				For 1 sec. after 2 sec. lapsed after the starting switch was turned ON. (The alarm buzzer does not sound.)	Voltage	17 ~ 30 V

Related circuit diagram



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TROUBLESHOOTING OF HYDRAULIC, MECHANICAL SYSTEM (H MODE)

H-1 The machine does not start 20-902
H-2 The lock-up clutch is not released (The engine stops) (When the lock-up clutch is provided) . . . 20-904
H-3 – a The travel speed is slow, the thrusting force is weak, the uphill traveling power is weak, and the gear is not shifted 20-905
H-3 – b The torque converter lock-up clutch is not let in (When the lock-up clutch is provided) 20-907
H-4 Shocks are large at the times of starting and shifting gear 20-908
H-5 Time lag is large at the times of starting and shifting gear 20-910
H-6 The torque converter oil temperature is high 20-912
H-7 The steering wheel does not turn 20-913
H-8 The steering wheel is heavy 20-914
H-9 The steering wheel fluctuates or is strongly shocked 20-915
H-10 The steering wheel fluctuates or is strongly shocked 20-915
H-11 The right and left swing radii are different 20-915
H-12 The brake does not work or does not work well 20-916
H-13 The brake is not released or is dragged 20-917
H-14 The brake is not released or dragged 20-918
H-15 The boom does not rise 20-919
H-16 The boom moves slowly or the boom rising force is insufficient 20-920
H-17 When rising, the boom comes to move slowly at specific height 20-921
H-18 The boom cylinder cannot hold down the bucket (The bucket rises in the air) 20-921
H-19 Hydraulic drifts of the boom occur often 20-921
H-20 The boom wobbles during operation 20-921
H-21 When the control lever is switched from "HOLD" to "RAISE," the boom falls temporarily 20-922
H-22 The bucket does not tilt back 20-923
H-23 The bucket moves slowly or the tilting-back force is insufficient 20-924
H-24 The bucket comes to operate slowly in he midst of tilting-back 20-925
H-25 The bucket cylinder cannot hold down the bucket 20-925
H-26 Hydraulic drifts of the bucket occur often 20-925
H-27 The bucket wobbles during travel with cargo (The work equipment valve is set to "HOLD") 20-926
H-28 When the control lever is switched from "HOLD" to "TILT," the bucket falls temporarily 20-926
H-29 The control levers of boom and bucket do not move smoothly and heavy 20-927

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H-1

The machine does not start

Ask the operator about the following:

- Has the machine come not to start suddenly?
  → Seizure of clutch, breakage of parts
  Did the machine cause any abnormal noise at the time and where?

Inspection before diagnosis

- Does the machine monitor function normally?
- Has the machine monitor displayed any failurecode of the electrical system?
- Did you smell deteriorated or burnt transmission oil?
- Have the transmission filter and strainer been clogged?
- Can you find any damage or oil leak from the appearance?
- Has the drive shaft been broken?
- Have the wheel brake and the parking brake been locked?

No.	Diagnosis \ Remedy		Cause															
			Torque Converter Charging Pump				Torque Converter	Main Relief Valve			ECMV	Transmission				Parking Brake	
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
			The PTO is defective	Clogging of strainer	Air intake on suction side	The charging pump is defective	Internal breakage of torque converter	Defective operation of torque converter relief valve	Set pressure drop of main relief valve	Clogging of last change filter	Defective operation of relevant ECMV	Internal breakage of transmission	War or seizure of relevant clutch	The relevant clutch piston seal is defective	The relevant clutch shaft seal is defective	Defective operation of parking brake solenoid valve	The parking brake piston seal is defective
			Δ X	Δ C	Δ X	X	Δ X	Δ X	Δ X	X	※	Δ X	※	※	X	X	X
1	The machine does not start at all gear speeds		○	○	○	○	○	○	○	○		○				○	○
2	The machine does not start at specific gear speeds										○	○	○	○	○		
3	When the transmission oil temperature is low, the charging pump or the transmission filter causes abnormal noise(s)			○	○												
4	When the transmission oil temperature rises, the machine comes not to start					○								○	○		○
5	Metal (Aluminum, copper, iron, etc.) powers are adhered to the transmission filter or the strainer					○	○					○					
6	When the stall speed of the torque converter is measured	The speed is higher at all gear speeds	○	○	○	○	○	○	○	○							
7		The speed is higher at specific gear speeds									○	○	○	○	○		
8	When the ECMV output (Clutch) oil pressure is measured	The oil pressure is low at all gear speeds	○	○	○	○			○	○							○
9		The oil pressure is low at specific gear speeds									○	○		○	○		
10		The oil pressure does not become stable as the gauge touches the oil		○	○												
11	When the torque converter relief (Inlet) oil pressure is measured, the oil pressure is low		○	○	○	○	○	○									

※ Proceed to the paragraph of "Defective clutch and ECMV Specifying Method (Check by Failure Code)."

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※ Defective Clutch and ECMV Specifying Method (Check by Failure Code)

★ For the checking method of failure code display, see the paragraph of "Special Functions of Machine Monitor."

★ When replacing the ECMV for diagnosis, remove mud and dust around the ECMV completely and clean it, and then tighten the mounting bolt with the specified torque.

★ For the following diagnoses, start the engine and select the manual mode:

Table of Applicable Clutches

Gear Speed		Clutch F	R	1st	2nd	3rd	4th
N	In the Automatic Mode				●		
N	In the Manual Mode			○	○	○	○
F1		●		●			
F2		●			●		
F3		●				●	
F4		●					●
R1			●	●			
R2			●		●		
R3			●			●	
R4			●				●

★ When the gear speed is N in the manual mode, the clutch of the gear speed (Marked with O), to which the gear shift lever is set, is ON.

• Even if the gear shift lever is used when the gear speed is N, the clutch position cannot be changed.

No.		Diagnosis / Remedy	Failure Code	Cause: Transmission a: Wear or seizure of F clutch disk or wear of piston seal	b: Wear or seizure of R clutch disk or wear of piston seal	c: Wear or seizure of 1st clutch disk or wear of piston seal	d: Wear or seizure of 2nd clutch disk or wear of piston seal	e: Wear or seizure of 3rd clutch disk or wear of piston seal	f: Wear or seizure of 4th clutch disk or wear of piston seal	Cause: ECMV g: Defective operation of F clutch ECMV (Fill switch)	h: Defective operation of R clutch ECMV (Fill switch)	i: Defective operation of 1st clutch ECMV (Fill switch)	j: Defective operation of 2nd clutch ECMV (Fill switch)	k: Defective operation of 3rd clutch ECMV (Fill switch)	l: Defective operation of 4th clutch ECMV (Fill switch)
				X	X	X	X	X	X	X	X	X	X	X	X
1	A	The code is not displayed at R1~R4 but is displayed at F1~F4	15SALI	○						○					
	B	When the failure code is 15SALI after the diagnosis in B, the failure code comes not to be displayed when the F fill switch connector (CN-F.SW) is disconnected. When the failure code is 15SALH, the failure code comes not to be displayed when the ECMV is replaced with any one other than F clutch ECMV	15SALH							○					
2	A	The code is not displayed at F1~F4 but is displayed at R1~R4	15SBLI		○						○				
	B	When the failure code is 15SBLI after the diagnosis in B, the failure code comes not to be displayed when the R fill switch connector (CN-R.SW) is disconnected. When the failure code is 15SBLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than R clutch ECMV	15SBLH								○				
3	A	The code is not displayed at F2, F3, and F4 but is displayed at F1	15SELI			○						○			
	B	When the failure code is 15SELI after the diagnosis in B, the failure code comes not to be displayed when the 1st fill switch connector (CN-1.SW) is disconnected. When the failure code is 15SELH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 1st clutch ECMV	15SELH									○			
4	A	The code is not displayed at F1, F3, and F4 but is displayed at F2	15SFLI				○						○		
	B	When the failure code is 15SFLI after the diagnosis in B, the failure code comes not to be displayed when the 2nd fill switch connector (CN-2.SW) is disconnected. When the failure code is 15SFLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 2nd clutch ECMV	15SFLH										○		
5	A	The code is not displayed at F1, F2, and F4 but is displayed at F3	15SGLI					○						○	
	B	When the failure code is 15SGLI after the diagnosis in B, the failure code comes not to be displayed when the 3rd fill switch connector (CN-3.SW) is disconnected. When the failure code is 15SGLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 3rd clutch ECMV	15SGLH											○	
6	A	The code is not displayed at F1, F2, and F3 but is displayed at F4	15SHLI						○						○
	B	When the failure code is 15SHLI after the diagnosis in B, the failure code comes not to be displayed when the 4th fill switch connector (CN-4.SW) is disconnected. When the failure code is 15SHLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 4th clutch ECMV	15SHLH												○

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H-2

The lock-up clutch is not released (The engine stops) (When the lock-up clutch is provided)

Inspection before diagnosis
- Is the oil level in the transmission case appropriate?

No.	Diagnosis \ Remedy	Cause a: Defective operation of lock-up ECMV	Cause b: Seizure of lock-up clutch
		X	X
1	The lock-up oil pressure does not come to 0	○	
2	The clutch is not released even when the lock-up oil pressure is 0		○

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H-3 – a

The travel speed is slow, the thrusting force is weak, the uphill traveling power is weak, and the gear is not shifted

Ask the operator about the following:
- Has an abnormality occurred suddenly?
  → Breakage of related equipment
- Did any abnormal noise occur at the time and where?
- Have any abnormal signs come to occur gradually?
  → Wear of related equipment, defective seal

Check of abnormality
- Execute digging and measure traveling speeds on a level ground and on a slope to check whether the abnormality actually occurs or is a matter of operator's sense

Inspection before diagnosis
- Is any failure code of the electrical system displayed on the machine monitor?
- Are the transmission oil level and the oil type appropriate?
- Haven't the transmission filter and strainer been clogged?
- Is any external oil leak found on the mating faces of pipes and valves around the torque converter and the transmission?
- Isn't the wheel brake or the parking brake being dragged?
- Are the tire air pressure and the tread shape appropriate?
- Is the operating method correct?

NOTE
When the inspection result was "Engine Degradation," proceed to Engine System Troubleshooting (S Mode).

No.	Diagnosis \ Remedy		a Clogging of strainer	b Air intake on pump suction side	c The charging pump is defective	d Clogging of oil cooler and pipe (After torque converter outlet)	e Breakage of oil cooler and pipe (After torque converter outlet)	f Oil leak inside torque converter	g Internal breakage of torque converter	h Defective operation of torque converter relief valve	i Drop of main relief valve set pressure	j Clogging of last change filter	k Defective operation of relevant ECMV	l Internal breakage of transmission	m Defective seal of relevant clutch piston	n Defective seal of relevant clutch shaft	o Clogging of breather	p Defective seal of parking brake piston	q Defective seal of work equipment and steering system hydraulic pump shaft (Mixing of hydraulic oil in transmission case)	r Engine degradation
			Cause: Torque Converter Charging Pump			Torque Converter Oil Cooler		Torque Converter		Main Relief Valve			ECMV	Transmission				Parking Brake	Others	
			C	Δ		Δ		Δ	Δ	Δ	Δ			Δ			C		Δ	
			X	X	X	X	X	X	X	X	X	X	※	X	※	X	X	X	X	Note
1	Any abnormality occurs at all gear speeds		○	○	○	○	○	○	○	○	○	○		○			○	○	○	○
2	Any abnormality occurs at specific gear speeds												○	○	○	○				
3	When the transmission oil temperature is low, the charging pump or the transmission filter causes any abnormal noise		○	○																
4	The torque converter oil temperature rises abnormally high		○	○	○	○	○	○	○	○				○			○		○	
5	The transmission oil level rises or falls					○	○										○		○	○
6	Metal (Aluminum, copper, iron, etc.) powers are adhered to the transmission filter or the strainer				○				○					○						
7	The engine low idling and high idling speeds are measured to be abnormal								○					○						○
8	When the stall speed of the torque converter is measured	The speed is high	○	○	○		○	○	○	○		○		○			○			
9		The speed is low																		○
10	When the ECMV output (Clutch) oil pressure is measured	The oil pressure drops as the temperature rises			○										○	○		○		
11		The oil pressure is low at all gear speeds	○	○	○						○	○		○			○	○		○
12		The oil pressure is low at specific gear speeds											○	○	○	○				
13		The oil pressure does not become stable as the gauge touches the oil	○	○																
14	When the torque converter relief (Inlet) oil pressure is measured, the oil pressure is low. (Nos. 11~13 are normal.)				—			○	○	○										
15	When the oil pressure at the torque converter outlet is measured, the oil pressure is low. (No. 14 is normal.)						○													

※ Proceed to the paragraph of "Defective clutch and ECMV Specifying Method (Check by Failure Code)."

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※ Defective Clutch and ECMV Specifying Method (Check by Failure Code)

★ For the checking method of failure code display, see the paragraph of "Special Functions of Machine Monitor."

★ When replacing the ECMV for diagnosis, remove mud and dust around the ECMV completely and clean it, and then tighten the mounting bolt with the specified torque.

★ For the following diagnoses, start the engine and select the manual mode:

Table of Applicable Clutches

Gear Speed		Clutch F	R	1st	2nd	3rd	4th
N	In the Automatic Mode				●		
N	In the Manual Mode			○	○	○	○
F1		●		●			
F2		●			●		
F3		●				●	
F4		●					●
R1			●	●			
R2			●		●		
R3			●			●	
R4			●				●

★ When the gear speed is N in the manual mode, the clutch of the gear speed (Marked with O), to which the gear shift lever is set, is ON.

• Even if the gear shift lever is used when the gear speed is N, the clutch position cannot be changed.

No.		Diagnosis / Remedy	Failure Code	Cause: Transmission a: Wear or seizure of F clutch disk or wear of piston seal	b: Wear or seizure of R clutch disk or wear of piston seal	c: Wear or seizure of 1st clutch disk or wear of piston seal	d: Wear or seizure of 2nd clutch disk or wear of piston seal	e: Wear or seizure of 3rd clutch disk or wear of piston seal	f: Wear or seizure of 4th clutch disk or wear of piston seal	ECMV g: Defective operation of F clutch ECMV (Fill switch)	h: Defective operation of R clutch ECMV (Fill switch)	i: Defective operation of 1st clutch ECMV (Fill switch)	j: Defective operation of 2nd clutch ECMV (Fill switch)	k: Defective operation of 3rd clutch ECMV (Fill switch)	l: Defective operation of 4th clutch ECMV (Fill switch)
				X	X	X	X	X	X	X	X	X	X	X	X
1	A	The code is not displayed at R1~R4 but is displayed at F1~F4	15SALI	○						○					
	B	When the failure code is 15SALI after the diagnosis in B, the failure code comes not to be displayed when the F fill switch connector (CN-F.SW) is disconnected. When the failure code is 15SALH, the failure code comes not to be displayed when the ECMV is replaced with any one other than F clutch ECMV	15SALH							○					
2	A	The code is not displayed at F1~F4 but is displayed at R1~R4	15SBLI		○						○				
	B	When the failure code is 15SBLI after the diagnosis in B, the failure code comes not to be displayed when the R fill switch connector (CN-R.SW) is disconnected. When the failure code is 15SBLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than R clutch ECMV	15SBLH								○				
3	A	The code is not displayed at F2, F3, and F4 but is displayed at F1	15SELI			○						○			
	B	When the failure code is 15SELI after the diagnosis in B, the failure code comes not to be displayed when the 1st fill switch connector (CN-1.SW) is disconnected. When the failure code is 15SELH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 1st clutch ECMV	15SELH									○			
4	A	The code is not displayed at F1, F3, and F4 but is displayed at F2	15SFLI				○						○		
	B	When the failure code is 15SFLI after the diagnosis in B, the failure code comes not to be displayed when the 2nd fill switch connector (CN-2.SW) is disconnected. When the failure code is 15SFLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 2nd clutch ECMV	15SFLH										○		
5	A	The code is not displayed at F1, F2, and F4 but is displayed at F3	15SGLI					○						○	
	B	When the failure code is 15SGLI after the diagnosis in B, the failure code comes not to be displayed when the 3rd fill switch connector (CN-3.SW) is disconnected. When the failure code is 15SGLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 3rd clutch ECMV	15SGLH											○	
6	A	The code is not displayed at F1, F2, and F3 but is displayed at F4	15SHLI						○						○
	B	When the failure code is 15SHLI after the diagnosis in B, the failure code comes not to be displayed when the 4th fill switch connector (CN-4.SW) is disconnected. When the failure code is 15SHLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 4th clutch ECMV	15SHLH												○

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H-3 – b

The torque converter lock-up clutch is not let in (When the lock-up clutch is provided)

Ask the operator about the following:

- Has the torque converter lock-up clutch come not to be let in suddenly?
  → Internal seizure or breakage
- Did any abnormal noise occur at the time?
  → Breakage of parts

Inspection before diagnosis

- Is the transmission oil level appropriate?
- Isn't oil leaking outside?

Check of abnormality

- Oil pressure of main relief valve
- Oil pressure of lock-up clutch
- Traveling speed

No.	Diagnosis	Remedy / Self-diagnosis / Display of T/M Controller	Cause a: Drop of main relief valve set pressure	b: Defective operation of lock-up ECMV	c: Wear of lock-up clutch piston seal ring	d: Wear of lock-up clutch disk	e: Crack on lock-up clutch case	f: Clogging of last change filter	g: Wear of input shaft seal ring
		Δ		X	X	X	X	C	X
		X							
1	The main relief valve oil pressure is low		○						
2	No. 1 is normal but the lock-up clutch oil pressure is low or 0			○	○		○	○	○
3	The oil pressure is normal in No. 2					○			
4	Letting the lock-up clutch in takes a long time	15SJLH		○					

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H-4

Shocks are large at the times of starting and shifting gear

Ask the operator about the following:

- Did shocks become large suddenly?
  → Breakage of related equipment
- Did any abnormal noise occur at the time and where?
- Did shocks become large gradually?
  → Wear of related equipment, defective seal

Check of abnormality

- Did any of the following abnormal phenomena occur at the same time: The traveling speed is slow, the braking is weak, the uphill travelling power is weak, the gear is not shifted.
  → Execute H-3

Inspection before diagnosis

- Is any failure code of the electrical system displayed on the machine monitor?
- Are the transmission oil level and the oil type appropriate?
- Haven't the transmission filter and strainer been clogged?
- Is any external oil leak found on the mating faces of pipes and valves around the torque converter and the transmission?
- Isn't the engine speed high at the time of low idling?
- Isn’t play of each drive shaft large?

No.	Diagnosis \ Remedy		Cause: Torque Converter Charging Pump a: Clogging of strainer	b: Air intake on pump suction side	c: The charging pump is defective	Main Relief Valve d: Defective operation of main relief valve	e: Clogging of last change filter	ECMV f: Defective operation of relevant ECMV ★	g: Defect of transmission controller system	Transmission h: Defective seal of relevant clutch piston	i: Defective return (Release) of relevant clutch piston	j: Defective seal of relevant clutch shaft	Parking Brake k: Defective seal of parking brake piston
			C X	Δ X	X	Δ X	X	※	※ ※	※	※	X	X
1	Shocks are large at all gear speeds		○	○	○	○	○		○				○
2	Shocks are large at specific gear speeds							○	○	○	○	○	
3	When the ECMV output (Clutch) oil pressure is measured	The oil pressure is low at all gear speeds	○	○	○	○	○						○
4		The oil pressure is low at specific gear speeds						○		○		○	
5		The oil pressure is high at all gear speeds				○							

★ Defective operation of relevant ECMV or defective operations of fill switch and solenoid due to bolting wastes of pressure control valve spool.

※ Proceed to the paragraph of "Defective Clutch and ECMV Specifying Method (Check by Failure Code)."

※※ Proceed to the paragraph of "Troubleshooting of Transmission Controller System (TM Mode)."

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※ Defective Clutch and ECMV Specifying Method (Check by Failure Code)

★ For the checking method of failure code display, see the paragraph of "Special Functions of Machine Monitor."

★ When replacing the ECMV for diagnosis, remove mud and dust around the ECMV completely and clean it, and then tighten the mounting bolt with the specified torque.

★ For the following diagnoses, start the engine and select the manual mode:

Table of Applicable Clutches

Gear Speed		Clutch F	R	1st	2nd	3rd	4th
N	In the Automatic Mode				●		
N	In the Manual Mode			○	○	○	○
F1		●		●			
F2		●			●		
F3		●				●	
F4		●					●
R1			●	●			
R2			●		●		
R3			●			●	
R4			●				●

★ When the gear speed is N in the manual mode, the clutch of the gear speed (Marked with O), to which the gear shift lever is set, is ON.

• Even if the gear shift lever is used when the gear speed is N, the clutch position cannot be changed.

No.		Diagnosis / Remedy	Failure Code	Cause: Transmission a: Wear or seizure of F clutch disk or wear of piston seal	b: Wear or seizure of R clutch disk or wear of piston seal	c: Wear or seizure of 1st clutch disk or wear of piston seal	d: Wear or seizure of 2nd clutch disk or wear of piston seal	e: Wear or seizure of 3rd clutch disk or wear of piston seal	f: Wear or seizure of 4th clutch disk or wear of piston seal	ECMV g: Defective operation of F clutch ECMV (Fill switch)	h: Defective operation of R clutch ECMV (Fill switch)	i: Defective operation of 1st clutch ECMV (Fill switch)	j: Defective operation of 2nd clutch ECMV (Fill switch)	k: Defective operation of 3rd clutch ECMV (Fill switch)	l: Defective operation of 4th clutch ECMV (Fill switch)
				X	X	X	X	X	X	X	X	X	X	X	X
1	A	The code is not displayed at R1~R4 but is displayed at F1~F4	15SALI	○						○					
	B	When the failure code is 15SALI after the diagnosis in B, the failure code comes not to be displayed when the F fill switch connector (CN-F.SW) is disconnected. When the failure code is 15SALH, the failure code comes not to be displayed when the ECMV is replaced with any one other than F clutch ECMV	15SALH							○					
2	A	The code is not displayed at F1~F4 but is displayed at R1~R4	15SBLI		○						○				
	B	When the failure code is 15SBLI after the diagnosis in B, the failure code comes not to be displayed when the R fill switch connector (CN-R.SW) is disconnected. When the failure code is 15SBLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than R clutch ECMV	15SBLH								○				
3	A	The code is not displayed at F2, F3, and F4 but is displayed at F1	15SELI			○						○			
	B	When the failure code is 15SELI after the diagnosis in B, the failure code comes not to be displayed when the 1st fill switch connector (CN-1.SW) is disconnected. When the failure code is 15SELH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 1st clutch ECMV	15SELH									○			
4	A	The code is not displayed at F1, F3, and F4 but is displayed at F2	15SFLI				○						○		
	B	When the failure code is 15SFLI after the diagnosis in B, the failure code comes not to be displayed when the 2nd fill switch connector (CN-2.SW) is disconnected. When the failure code is 15SFLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 2nd clutch ECMV	15SFLH										○		
5	A	The code is not displayed at F1, F2, and F4 but is displayed at F3	15SGLI					○						○	
	B	When the failure code is 15SGLI after the diagnosis in B, the failure code comes not to be displayed when the 3rd fill switch connector (CN-3.SW) is disconnected. When the failure code is 15SGLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 3rd clutch ECMV	15SGLH											○	
6	A	The code is not displayed at F1, F2, and F3 but is displayed at F4	15SHLI						ô						○
	B	When the failure code is 15SHLI after the diagnosis in B, the failure code comes not to be displayed when the 4th fill switch connector (CN-4.SW) is disconnected. When the failure code is 15SHLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 4th clutch ECMV	15SHLH												○

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H-5

Time lag is large at the times of starting and shifting gear

Ask the operator about the following:

- Did the time lag become large suddenly?
  → Breakage of related equipment

  Did any abnormal noise occur at the time and where?
- Has the time lag become large gradually?

  → Wear of related equipment, defective seal

Check of abnormality

- Did any of the following abnormal phenomena occur at the same time: The traveling speed is slow, the braking is weak, the uphill travelling power is weak, the gear is not shifted → Execute H-3

Inspection before diagnosis

- Is any failure code of the electrical system displayed on the machine monitor?
- Are the transmission oil level and the oil type appropriate?
- Haven't the transmission filter and strainer been clogged?
- Is any external oil leak found on the mating faces of pipes and valves around the torque converter and the transmission?

No.	Diagnosis \ Remedy		Cause								
			Torque Converter Charging Pump			Main Relief Valve		ECMV	Transmission		Parking Brake
			a	b	c	d	e	f	g	h	i
			Clogging of strainer	Air intake on pump suction side	The charging pump is defective	Drop of main relief valve set pressure	Clogging of last change filter	Defective operation of relevant ECMV★	Defective seal of relevant clutch piston	Defective seal of relevant clutch shaft	Defective seal of parking brake piston
			C X	Δ X	X	Δ X	X	※	※	X	X
1	Time lag is large at all gear speeds		○	○	○	○	○				○
2	Time lag is large at specific gear speeds							○	○	○	
3	When the transmission oil temperature is low, any abnormal noise occurs from the charging pump or the transmission filter		○	○							
4	The torque converter oil temperature is heated abnormally high		○	○	○		○				
5	When the ECMV output (Clutch) oil pressure is measured	The oil pressure is low at all gear speeds	○	○	○	○					○
6		The oil pressure is low at specific gear speeds						○	○	○	

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※ Defective Clutch and ECMV Specifying Method (Check by Failure Code)

★ For the checking method of failure code display, see the paragraph of " Special Functions of Machine Monitor."

★ When replacing the ECMV for diagnosis, remove mud and dust around the ECMV completely and clean it, and then tighten the mounting bolt with the specified torque.

★ For the following diagnoses, start the engine and select the manual mode:

Table of Applicable Clutches

Gear Speed		Clutch F	R	1st	2nd	3rd	4th
N	In the Automatic Mode				●		
N	In the Manual Mode			○	○	○	○
F1		●		●			
F2		●			●		
F3		●				●	
F4		●					●
R1			●	●			
R2			●		●		
R3			●			●	
R4			●				●

★ When the gear speed is N in the manual mode, the clutch of the gear speed (Marked with O), to which the gear shift lever is set, is ON.

• Even if the gear shift lever is used when the gear speed is N, the clutch position cannot be changed.

No.		Diagnosis / Remedy	Failure Code	Cause: Transmission a Wear or seizure of F clutch disk or wear of piston seal	b Wear or seizure of R clutch disk or wear of piston seal	c Wear or seizure of 1st clutch disk or wear of piston seal	d Wear or seizure of 2nd clutch disk or wear of piston seal	e Wear or seizure of 3rd clutch disk or wear of piston seal	f Wear or seizure of 4th clutch disk or wear of piston seal	ECMV g Defective operation of F clutch ECMV (Fill switch)	h Defective operation of R clutch ECMV (Fill switch)	i Defective operation of 1st clutch ECMV (Fill switch)	j Defective operation of 2nd clutch ECMV (Fill switch)	k Defective operation of 3rd clutch ECMV (Fill switch)	l Defective operation of 4th clutch ECMV (Fill switch)
		X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	A	The code is not displayed at R1~R4 but is displayed at F1~F4	15SALI	○						○					
	B	When the failure code is 15SALI after the diagnosis in B, the failure code comes not to be displayed when the F fill switch connector (CN-F.SW) is disconnected. When the failure code is 15SALH, the failure code comes not to be displayed when the ECMV is replaced with any one other than F clutch ECMV	15SALH							○					
2	A	The code is not displayed at F1~F4 but is displayed at R1~R4	15SBLI		○						○				
	B	When the failure code is 15SBLI after the diagnosis in B, the failure code comes not to be displayed when the R fill switch connector (CN-R.SW) is disconnected. When the failure code is 15SBLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than R clutch ECMV	15SBLH								○				
3	A	The code is not displayed at F2, F3, and F4 but is displayed at F1	15SELI			○						○			
	B	When the failure code is 15SELI after the diagnosis in B, the failure code comes not to be displayed when the 1st fill switch connector (CN-1.SW) is disconnected. When the failure code is 15SELH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 1st clutch ECMV	15SELH									○			
4	A	The code is not displayed at F1, F3, and F4 but is displayed at F2	15SFLI				○						○		
	B	When the failure code is 15SFLI after the diagnosis in B, the failure code comes not to be displayed when the 2nd fill switch connector (CN-2.SW) is disconnected. When the failure code is 15SFLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 2nd clutch ECMV	15SFLH										○		
5	A	The code is not displayed at F1, F2, and F4 but is displayed at F3	15SGLI					○						○	
	B	When the failure code is 15SGLI after the diagnosis in B, the failure code comes not to be displayed when the 3rd fill switch connector (CN-3.SW) is disconnected. When the failure code is 15SGLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 3rd clutch ECMV	15SGLH											○	
6	A	The code is not displayed at F1, F2, and F3 but is displayed at F4	15SHLI						○						○
	B	When the failure code is 15SHLI after the diagnosis in B, the failure code comes not to be displayed when the 4th fill switch connector (CN-4.SW) is disconnected. When the failure code is 15SHLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 4th clutch ECMV	15SHLH												○

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H-6

The torque converter oil temperature is high

Ask the operator about the following:

- Does the oil temperature rise when the torque converter stalls and does the temperature fall at the time of no load?
  → Selection of improper gear speed
  Did any abnormal noise occur at the time and where?
- Does the oil temperature rise only at the time of lifting?
  → Improvement of operating method

Check of abnormality

- Measure the torque converter oil temperature to find if the oil temperature is really high.
  → The torque converter oil temperature gauge is defective

Inspection before diagnosis

- Are the water level in the radiator and the belt tension appropriate?
- Are the oil level in the transmission and the oil type appropriate?
- Haven't the transmission filter and strainer been clogged?
- Aren't the transmission filter and the strainer clogged?

NOTE
When the inspection result was "Engine Degradation," proceed to Engine System Troubleshooting (S Mode).

No.	Diagnosis \ Remedy		Cause: Torque Converter Charging Pump			Torque Converter Oil Cooler		Torque Converter		Main Relief Valve	Transmission		Others		Note
			a	b	c	d	e	f	g	h	i	j	k	l	
			Clogging of strainer	Air intake on pump suction side	The charging pump is defective	Clogging of oil cooler and pipe (After torque converter outlet)	Breakage of oil cooler and pipe (After torque converter outlet)	Oil leak inside torque converter	Internal breakage of torque converter	Drop of main relief valve set pressure	Internal breakage of transmission	Clogging of breather	Defective seal of work equipment and steering system hydraulic pump shaft (Mixing of hydraulic oil in transmission case)	Engine degradation	
			C X	Δ X	X	Δ X	X	Δ X	Δ X	Δ X	Δ X	C X	Δ X		
1	When the transmission oil temperature is low, the charging pump or the transmission filter causes any abnormal noise		○	○											
2	Traveling speed, braking force and uphill travelling power do not occur at all gear speeds		○	○	○	○	○	○	○	○	○		○	○	
3	Traveling speed, braking force and uphill travelling power do not occur at specific gear speeds										○				
4	The transmission oil level rises and falls					○	○					○			
5	Metal powders (Aluminum, copper, iron, etc.) are adhered to the transmission filter and the strainer				○				○		○				
6	The engine low idling and high idling speeds are measured to be abnormal								○		○				○
7	When the stall speed of the torque converter is measured, the speed is high		○	○	○		○	○	○	○	○	○			
8	When the ECMV output (Clutch) oil pressure is measured	The oil pressure drops as the oil temperature rises			○										
9		The oil pressure is low at all gear speeds	○	○	○						○	○			
10		The oil pressure is low at specific gear speeds									○				
11		The oil pressure does not become stable as the gauge vibrates	○	○											
12	When the torque converter relief (Inlet) oil pressure is measured, the oil pressure is low. (Nos. 9~11 are normal.)							○	○	○					
13	When the oil pressure at the torque converter outlet is measured, the oil pressure is low. (No. 12 is normal.)						○								

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H-7

The steering wheel does not turn

Ask the operator about the following:

- Has the steering wheel come not to turn suddenly?
  → Breakage of steering-related equipment
- Was there the sign that the steering wheel did not turn smoothly?
  → Wear inside steering-related equipment, defective seal

Inspection before diagnosis

- Are the oil level in the hydraulic tank and the oil type appropriate?
- Breakage of steering gear box and steering linkage
- Is the frame safety lever off?
- Has the steering linkage been properly adjusted?

No.	Diagnosis \ Remedy	Cause: Hydraulic Pump a: Steering and switch pump (Δ / X)	Valve b: Steering relief valve (Δ / X)	Valve c: Safety valve (Δ / X)	Valve d: Demand spool (Δ / X)	Others e: Breakage inside steering gear box (Δ / X)	Others f: Defect inside steering cylinder (Breakage of piston seal) (Δ / X)
		a: Breakage of hydraulic pump, PTO or pump	b, c, d: Defect inside steering valve			e	f
1	The steering wheel does not turn both right and left	○	○		○	○	○
2	The work equipment operates abnormally in No. 1	○					
3	The steering wheel turns either right or left			○			○
4	The steering wheel is too heavy to turn	○	○		○	○	
5	The steering circuit oil pressure does not rise at all	○	○				

※ Since the steering circuit is closely related to the work equipment circuit, check how the work equipment operates when the steering is felt abnormal.

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H-8

The steering wheel is heavy

Ask the operator about the following:

- Has the steering wheel come not to turn suddenly?
  → Breakage of steering-related equipment
- Was there the sign that the steering wheel did not turn smoothly?
  → Wear inside steering-related equipment, defective seal

Inspection before diagnosis

- Are the oil level in the hydraulic tank and the oil type appropriate?
- Aren't the steering gear box mounting portion, the column and the linkage abnormal?
- Has the steering valve control lever stopper been adjusted properly?
- Is or isn't oil leaking from the hydraulic hoses, valves, cylinders, etc.?
- Are or aren't the center hinge pin bearing, the steering cylinder pin and bushings galled?
- Tire air pressure

Check of Abnormality

- Measure the steering wheel operating effort and the time taken to swing the steering to check if there is any abnormality according to the criterion values.

No.	Diagnosis / Remedy	Cause: Tank Pump	Valve			Others			
		a	b	c	d	e	f	g	h
		The hydraulic pump is defective	Defect inside steering valve			Defect inside steering cylinder (Oil leak from piston seal)	The hydraulic oil return side filter is clogged or the bypass valve is defective	Improper play adjustment of steering gear box	Defect inside steering gear box (Bearing, worm nut)
		Steering and switch pump	Steering relief valve	Safety valve	Demand spool				
		Δ X	Δ A X	Δ X	Δ X	Δ X	Δ C X	A	Δ X
1	The steering wheel is heavy to turn both right and left	○	○		○	○		○	
2	The steering wheel is heavy to turn right or left			○		○			
3	The steering wheel is heavy when the engine rotates slowly	○				○			
4	When the engine rotates at full throttle, the boom raising speed is insufficient	○							
5	The steering wheel is heavy and jerks	○							
6	The steering circuit oil pressure is low		○	○	○	○			
7	The oil pressure rises in the pipe on the steering cylinder return side						ô		

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H-9

The steering wheel fluctuates or is strongly shocked

Inspection before diagnosis
- Are the oil level in the hydraulic tank and the oil type appropriate?
- Are the steering gear box mounting section, the column and the linkage normal?
- Play of center hinge pin bearing, steering cylinder pin and bushing?
- Irregular tire air pressure?
- Play of steering wheel?

Check of Abnormality
- Operate the machine in a safe place and check how the steering wheel fluctuates under which conditions

※ When the steering wheel fluctuates and is heavy as well, see "H-8, The steering wheel is heavy."

No.	Diagnosis \ Remedy	Cause: Valve: The steering valve is defective: Safety valve (Δ A / X)	Cause: Valve: The steering valve is defective: Misalignment of steering valve selector spool (Δ / X)	Cause: Cylinder: Defect inside steering cylinder (Cylinder inner plane, piston seal, nut, bolt) (Δ / X)
		a	b	c
1	When traveling, the machine fluctuates on rough roads	○	○	○
2	When the steering wheel is turned quickly in operation or travel, the machine fluctuates			○
3	When accelerated in travel, the machine fluctuates	○	○	○
4	When the engine starts, the machine fluctuates		○	

H-10

The steering wheel fluctuates or is strongly shocked

Cause: The steering valve is defective
- Misalignment of spool

Cause: Oil leak inside steering cylinder

Cause: Irregular tire air pressure

H-11

The right and left swing radii are different

Cause: Improper adjustment of steering linkage
Difference between right and left halves, stopper locking position
(Valve relief sound is heard at the end of swing.)

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H-12

The brake does not work or does not work well

Ask the operator about the following:

- Has the brake come not to turn suddenly?
  → Breakage of brake
- Has the brake come not to work gradually?
  → Wear of seals, lining, disk

Inspection before diagnosis

- Is the hydraulic oil level appropriate?
- Is the play of brake pedal appropriate?
- Oil leak from brake tube and connector, deformation of tube
- Tire air pressure and state of tire tread

Check of Abnormality

- Measure the braking force and check referring to the standard value table if the brake does not work practically.

No.	Diagnosis \ Remedy	Cause									
		a	b	c	d	e	f	g	h	i	j
		Defective seal of brake piston in axle	Defective operation of brake piston in axle	The brake in axle is defective	Wear or abnormality of brake lining in axle	Metal contact due to complete wear of brake lining in axle	Mixing of air in brake circuit	Defect inside brake valve	Defective seal of accumulator piston, insufficient gas pressure	Defective operation of charge valve	Insufficient scuffing of pilot pump (For charge)
		Δ X	Δ X	Δ X	Δ X	Δ X	Δ	Δ X	Δ X	Δ X	Δ X
1	When the brake pedal is stepped on, only a little resistance is felt	○					○	○		○	
2	When the brake pedal is stepped on, a strong resistance is felt							○			
3	To get the specified braking force, an abnormal leg-power is required		○		○	○		○	○		
4	When the brake works, an abnormal noise occurs from the axle brake				○	○					
5	The machine does not travel well. (Insufficient drawbar pull)							○			
6	When the four wheels are jacked up, the axle is placed on a table and the brake is applied at the first forward speed, only a specific wheel rotates	○	○	○	○	○	○				
7	An airflow is observed in bleeding air from the brake circuit, and the brake returns to normal after the bleeding							○			
8	Brake oil leaks abnormally from the axle during inspection	○									
9	Much metal powders are mixed in the axle oil					○					
10	The brake pedal leg-power and stroke are normal, but the brake does not work well		○	○	○	○					
11	The brake does not work often when the engine is stopped	○						○	○	○	
12	The accumulator is not charged, and a buzzer sounds								○	○	○
13	The brake works after some time lag						○				

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H-13

The brake is not released or is dragged

Inspection before diagnosis
- Has the brake pedal returned completely?
- Is the parking brake released completely?

Check of Abnormality
- Abnormal heat of brake
- Does the machine travel smoothly by inertia on a level ground?

No.	Diagnosis \ Remedy	Cause		
		a	b	c
		Defect inside brake valve (Stocking of piston)	Abnormal lining of brake in axle	Defective operation of brake piston in axle
		Δ X	Δ X	Δ X
1	The brake pedal is released, but the brake is still applied	○	○	○
2	When the brake pedal is released, oil is drained from the air bleeder, the circuit pressure drops and the brake is released	○		
3	The four wheels are jacked up, the axle is placed on a table, the engine is stopped, the parking brake is released and the tires are rotated by hand but a specific tire hardly rotates		○	○

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H-14

The brake is not released or dragged

Inspection before diagnosis
- Check if the emergency parking brake release valve is closed. (When this valve is open, the parking brake is always released.)
- Check if the parking brake is automatically applied when the engine stops.

Check of Abnormality
- Abnormal heat of brake
- Does the machine travel smoothly by inertia on a level ground?

No.	Diagnosis \ Remedy	Cause				
		a	b	c	d	e
		Defect inside parking brake solenoid valve	Insufficient oil level due to defect of transmission valve	Being pinched due to peeling of parking brake disk lining	Broken harness of parking brake switch line	Defective operation of parking brake piston
		Δ X	Δ X	Δ X	Δ	Δ X
1	When the parking brake switch is off, the parking brake is not released	○	○	○	○	○
2	When the parking brake switch is off, the brake is not applied even if the engine stops					○
3	When the parking brake switch is on, the parking brake does not work well		○	○		

- The parking brake is not released even if the emergency parking brake release valve is opened. The following causes are considered:

  a. Defective operation of emergency parking brake release valve

  b. Insufficient gas pressure of accumulator for brake or breakage of piston seal

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H-15

The boom does not rise

Ask the operator about the following:

- Has the boom come not to work suddenly
  → Seizure or breakage of each equipment
- Did any abnormal noise occur at the time (And where)?
- Was there the phenomenon that the boom worked slowly?
  → Wear of parts or deformation of spring

Inspection before diagnosis

- Is the oil level in the hydraulic tank appropriate?
- Is the stroke of the boom control lever appropriate?

No.	Diagnosis \ Remedy	Cause: Tank Pump a: Clogging of pump suction port or mixing of much air in oil	Tank Pump b: The pump PTO does not drive	Tank Pump c: The hydraulic pump and the switch pump are defective	Tank Pump d: The PPC pump is defective	Steering Valve e: Defective operation of demand spool	PPC Valve f: Defective operation of relief valve	PPC Valve g: Defective operation of spool	Work Equipment Valve h: Defective operation of main relief valve	Work Equipment Valve i: Breakage inside valve body (Boom spool)	Cylinder j: Damage of boom cylinder piston seal
		C Δ	Δ X	Δ X	Δ X	X	Δ X	Δ X	Δ X	X	X
1	The bucket cannot operate and the boom cannot rise	○	○	○	○	○	○		○	○	
2	The boom can lift the machine but cannot rise, or the bucket operates but the boom cannot rise							○		○	○
3	The boom can rise without load but cannot rise when loaded	○		○					○		
4	The hydraulic pump causes an abnormal noise	○		○	○						
5	Large hydraulic drift of boom cylinder									○	○
6	When the engine is at full throttle, the steering operation is light and too fast					○					
7	When the engine is at full throttle, the steering operation is heavy and slow	○		○							

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H-16

The boom moves slowly or the boom rising force is insufficient

Inspection before diagnosis

- Is the stroke of the boom control lever appropriate?

Check of Abnormality

- Rising force and speed problem are closely related, and this problem occurs as insufficient rising speed at first. Measure the boom rising speed when the boom is loaded and make sure referring to the criterion table that the speed is abnormal.

No.	Diagnosis \ Remedy	Cause								
		Tank Pump		Steering Valve	PPC Valve		Work Equipment Valve		Cylinder	Cutoff Valve
		a	b	c	d	e	f	g	h	i
		Clogging of pump suction port or mixing of much air in oil	The hydraulic pump and the switch pump are defective	Defective operation of demand spool	Defective operation of relief valve	Defective operation of spool	Defective operation or improper adjustment of main relief valve	Wear or breakage inside valve body (Boom spool)	Damage of boom cylinder piston seal	Defective operation or improper adjustment of cutoff valve
		C X	Δ X	Δ X	Δ X	Δ X	A X	X	Δ X	Δ X
1	The bucket tilting force and speed are abnormal, and the boom rising speed is slow	○	○				○			
2	The bucket tilting force and speed are normal, and the boom rising speed is slow					○		○	○	
3	When the oil temperature rises in No. 1, the boom speed becomes very slow		○							
4	The hydraulic pump is causing an abnormal noise	○	○							
5	When the engine is at full throttle, the steering operation is light and too fast			○						
6	When the engine is at full throttle, the steering operation is heavy and slow	○		○						
7	Large hydraulic drift of cylinder							○	○	
8	The relief oil pressure from the relief valve of the work equipment valves is low				○		○	○	○	
9	The relief oil pressure from the relief valve of the work equipment valves is too high									○

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H-17

When rising, the boom comes to move slowly at specific height

Inspection before diagnosis
- Deformation of boom cylinder in appearance

Cause
- Expansion of boom cylinder tube or damage inside

★ For other abnormal phenomena during boom rise, see "H-16. The boom moves slowly or the boom rising force is insufficient."

H-18

The boom cylinder cannot hold down the bucket (The bucket rises in the air)

See "H-16. The boom moves slowly or the boom rising force is insufficient."

Inspection before diagnosis
- Is the stroke of the boom control lever appropriate?

Cause
- Defective seat of suction valve on the boom cylinder rod side of work equipment valve
- Oil leak from boom cylinder piston seal

H-19

Hydraulic drifts of the boom occur often

Ask the operator about the following:
- Have hydraulic drifts come to occur often suddenly? → Wastes pinched in valve or damage of parts
- Have hydraulic drifts come to occur often gradually? → Wear of parts

Inspection before diagnosis
- Is the boom spool at the neutral position? → The spool detent is defective

Diagnosis and Cause
- Does any leaking noise occur inside the boom cylinder when hydraulic drift is measured? → The cylinder packing is defective

H-20

The boom wobbles during operation

The bucket and the boom moves up and down as the topography goes in digging or leveling with the boom control lever in "HOLD" position.

Diagnosis and Cause

Check at first the hydraulic drift and if the boom cylinder can lift the machine

1. When the hydraulic drift is more than the standard value, see "H-19. Hydraulic drifts of the boom occur often."
2. When the boom cylinder cannot lift the machine, see "H-18. The boom cylinder cannot hold down the bucket."
3. When the boom cylinder comes to enable to lift the machine after the boom is operated several times with the normal hydraulic drift and after the boom cylinder operates to full stroke → The cause is vacuum generated inside the cylinder

★ Frequent hydraulic drifts → The suction valve on the boom cylinder rod side is defective

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H-21

When the control lever is switched from "HOLD" to "RAISE," the boom falls temporarily

Check of Phenomenon

- When the control lever is switched from "HOLD" to "RAISE" gradually at low idling of the engine, the boom falls temporarily due to its own weight. When the control lever is completely set to "RAISE," the boom returns to normal.

Cause

- Improper adhesion of boom spool check valve of the work equipment valve

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H-22

The bucket does not tilt back

Ask the operator about the following:

- Has the bucket come not to work suddenly
  → Seizure or breakage of each equipment
- Did any abnormal noise occur at the time (And where)?
- Was there the phenomenon that the bucket worked slowly?
  → Wear of parts or deformation of spring

Inspection before diagnosis

- Is the stroke of the bucket control lever appropriate?

No.	Diagnosis \ Remedy	Cause: Tank Pump a: Clogging of pump suction port or mixing of much air in oil	Tank Pump b: The pump PTO does not drive	Tank Pump c: The hydraulic pump and the switch pump are defective	Tank Pump d: The PPC pump is defective	Steering Valve e: Defective operation of demand spool	PPC Valve f: The relief valve is defective	PPC Valve g: The spool is defective	Work Equipment Valve h: Defective operation of main relief valve	Work Equipment Valve i: Breakage inside valve body (Bucket spool)	Cylinder j: Damage of bucket cylinder piston seal
		C Δ	Δ X	Δ X	Δ X	X	Δ X	Δ X	A X	X	X
1	The boom cannot operate and the bucket cannot tilt back	○	○	○	○	○	○		○		
2	The bucket can lift the machine but cannot tilt back, or the boom operates but the boom cannot tilt back							○		○	○
3	The bucket can tilt back without load but cannot in digging or scooping up	○		○							
4	The hydraulic pump causes an abnormal noise	○		○	○						
5	Large hydraulic drift of bucket cylinder									○	○
6	When the engine is at full throttle, the steering operation is light and too fast					○					
7	When the engine is at full throttle, the steering operation is heavy and slow	○									

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H-23

The bucket moves slowly or the tilting-back force is insufficient

Inspection before diagnosis

- Is the stroke of the bucket control lever appropriate?
- Seizure of work equipment linkage bushing (Does any abnormal noise occur?)

Check of Abnormality

- Make sure in an actual operation that the tilting-back force is insufficient.
- Measure the operating speed of the bucket, and make sure referring to the criterion value table that the speed is abnormal

No.	Diagnosis \ Remedy	Cause									
		Tank Pump		Steering Valve	PPC Valve		Work Equipment Valve			Cylinder	Cutoff Valve
		a	b	c	d	e	f	g	h	i	j
		Clogging of pump suction port or mixing of much air in oil	The hydraulic pump and the switch pump are defective	Defective operation of demand spool	Defective operation of relief valve	Defective operation of spool	Defective operation or improper adjustment of main relief valve	Defective operation of safety valve (With suction valve) on bucket cylinder bottom side	Wear or breakage inside valve body (Bucket spool)	Damage of bucket cylinder piston seal	Defective operation or improper adjustment of cutoff valve
		C Δ	Δ X	Δ X	Δ X	Δ X	Δ A X	Δ X	X	X	Δ X
1	The boom rising force and speed are abnormal, and the bucket tilting force and speed are abnormal	○	○	○	○		○				ô
2	The boom rising force and speed are normal, and the bucket tilting force and speed are abnormal					○		○	○	○	
3	When the oil temperature rises in No. 1, the bucket speed becomes worse		○								
4	The hydraulic pump is causing an abnormal noise	○	○								
5	When the engine is at full throttle, the steering operation is light and too fast			○							
6	When the engine is at full throttle, the steering operation is heavy and slow	○									
7	Large hydraulic drift of bucket cylinder							○	○	○	
8	The relief oil pressure from the relief valve of the work equipment valves is low						○	○	○	○	
9	The relief oil pressure from the relief valve of the work equipment valves is too high						○				○

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H-24

The bucket comes to operate slowly in he midst of tilting-back

Inspection before diagnosis
- Deformation of bucket cylinder in appearance

Cause
- Expansion of bucket cylinder tube or damage inside
  For other abnormal phenomena during bucket operation, see "H-23. The bucket moves slowly or the tilting-back force is insufficient."

H-25

The bucket cylinder cannot hold down the bucket

See "H-23. The bucket moves slowly or the tilting-back force is insufficient."

Inspection before diagnosis
- Is the stroke of the bucket control lever appropriate?

Cause
- Defective seat of suction valve on the bucket cylinder rod side of work equipment valve
- Oil leak from bucket cylinder piston seal

H-26

Hydraulic drifts of the bucket occur often

Ask the operator about the following:
- Have hydraulic drifts come to occur often suddenly? → Wastes pinched in valve or damage of parts
- Have hydraulic drifts come to occur often gradually? → Wear of parts

Inspection before diagnosis
- Is the bucket spool at the neutral position? → Seizure of link bushing or the spool detent is defective

Check of Abnormality
- Refer to the criterion value table and check if the hydraulic drift of the bucket occurs often practically

Cause
- Oil leak in bucket cylinder
- Improper adhesion of safety valve (With suction valve) on the bottom side
- Improper oil tight of bucket spool

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H-27

The bucket wobbles during travel with cargo (The work equipment valve is set to "HOLD")

Inspection before diagnosis

- Pin of work equipment linkage and "play of bushing" (Is any abnormal noise heard?)

Cause

- Defective seal of bucket cylinder piston
- Defective operation of safety valve (With suction valve) on bucket cylinder rod side.
  For other abnormal phenomena, refer to diagnoses for relevant abnormal phenomena.

H-28

When the control lever is switched from "HOLD" to "TILT," the bucket falls temporarily

Check of Phenomenon

- When the control lever is switched from "HOLD" to "RAISE" gradually at low idling of the engine, the bucket falls temporarily due to its own weight. When the control lever is completely set to "TILT," the bucket returns to normal.

Cause

- Improper adhesion of bucket spool check valve of the work equipment valve

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H-29

The control levers of boom and bucket do not move smoothly and heavy

Check of Abnormality

- Refer to the criterion value table and check if the lever operating efforts are large practically.

No.	Diagnosis \ Remedy	Cause: PPC Valve a: The PPC valve spool is bent	b: Improper clearance between PPC valve body and spool	c: Improper roundness between PPC valve body and spool	d: Foreign matter pinched in PPC valve spool	Work Equipment Valve e: Strain of valve body due to uneven tightening of valve mounting bolt	f: The work equipment valve spool is bent	g: Defective operation of work equipment valve spool detent	h: Improper clearance between work equipment valve body and spool	i: Improper roundness between work equipment valve body and spool	j: Foreign matter pinched in work equipment valve spool
		X	Δ X	Δ X	C Δ						
1	When the machine is loaded and the oil pressure rises, the levers come not to move smoothly		○	○		○			○	○	
2	The levers come not to move smoothly as the oil pressure rises		○	○		○			○	ô	
3	The levers partly come not to move smoothly during operation irrespective of oil pressure and oil temperature							○			
4	The levers totally come not to move smoothly during operation irrespective of oil pressure and oil temperature	○			○	○	○				○

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TROUBLESHOOTING OF ELECTRICAL SYSTEM (E MODE)

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Connector types and installation positions

★ The address column in the following table indicates the addresses of the connector layout drawing (cubic diagram) and the circuit diagram.

★ Codes indicated in the fields of the circuit diagram addresses: **ENG:** Engine control system, **TM:** Transmission control system, **WRK:** working equipment control system, **MON:** Monitor system, **E:** Electrical System

★ The characters in parenthesis in the Connector Type fields indicate the colors of the connector bodies.

Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
1.PS	DT-T	2	1st solenoid	AJ-4	TM
1.SW	DT	2	1st fill switch	AJ-4	TM
2.PS	DT-T	2	2nd solenoid	AJ-3	TM
2.SW	DT	2	2nd fill switch	AI-3	TM
3.PS	DT-T	2	3rd solenoid	AJ-3	TM
3.SW	DT	2	3rd fill switch	AJ-4	TM
4.PS	DT-T	2	4th solenoid	AJ-5	TM
4.SW	DT	2	4th fill switch	AJ-5	TM
A1	M	6	Blower motor & resistor	U-2	—
A2	SWP	6	Air mix servo motor	U-2	—
A3	M	2	Thermistor	U-2	—
A4	X	2	Air servomotor	U-8	—
A5	X	2	Capacitor switch	T-1	—
A6	Yazaki	2	Hi and Lo switch	T-1	—
A7	Yazaki	4	Blower relay (Main)	W-6	—
A8	Yazaki	4	Blower relay (Hi)	W-6	—
A9	Yazaki	4	Blower relay (M2)	W-6	—
A10	Yazaki	4	Blower relay (M1)	W-5	—
A11	Yazaki	4	Capacitor relay	W-5	—
A12	Yazaki	4	Capacitor Hi (1) relay	W-5	—
A13	Yazaki	4	Capacitor Hi (2) relay	W-4	—
A14	Yazaki	4	MAG clutch relay	W-4	—
A20	Terminal	1	Ground	T-1	—
A21	Yazaki	2	Water temperature sensor (Auto-air conditioner vehicle)	W-3	—
A22	Yazaki	2	Indoor air temperature sensor (Auto-air conditioner vehicle)	U-2	—
A23	Yazaki	2	Outdoor air temperature sensor (Auto-air conditioner vehicle)	A-7	—
A24	DT-T	2	Diode (Auto-air conditioner vehicle)	W-3	—
A25	DT-T	2	Diode (Auto-air conditioner vehicle)	V-3	—
A26	DT-T	2	Intermediate connector (Auto-air conditioner vehicle)	W-4	—
AL1	M	6	Intermediate connector (Air conditioner relay)	U-2	—
AL2	S (W)	12	Intermediate connector (Air conditioner relay)	V-2	—
B01	DT	3	Capacitor R	B-7	—
B02	DT	3	Capacitor L	A-7	—
B03	DT-T	2	Emergency brake switch 1	G-9	TM
B04	DT-T	2	Emergency brake switch 2	G-9	TM

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
B05	DT-T	2	Front brake ACC low pressure switch	K-3	WRK
B06	DT-T	2	Rear brake ACC low pressure switch	J-2	WRK
BR1	DT-T (Gr)	12	Intermediate connector (Bulk head)	I-2	WRK
C01	Yazaki	9	AM/FM radio	L-9	—
C02	KES0	2	Speaker (Right)	E-9	—
C03	KES0	2	Speaker (Left)	G-9	—
C04	M	2	Front working lamp (Right)	B-8	—
C05	M	2	Front working lamp (Left)	B-8	—
C07	KES1	2	Room lamp	C-8	—
C08	M	1	Door switch (Right) (Room lamp)	C-8	—
C09	M	1	Door switch (Left) (Room lamp)	B-8	—
C10	—	2	Cigarette lighter	A-7	—
C12	M	6	Front wiper motor	A-7	C-8
C15	M	4	Rear wiper motor	F-9	F-8
C17	Kyoritsu ES	4	Warning lamp switch	D-9	—
C18	Plug	1	Warning lamp (Beacon)	F-9	—
C19	DT-T	6	Glass heater switch	D-9	—
C29	M	1	Glass heater ON	E-9	—
C33	H	1	Rear glass heater	E-9	—
C35	H	1	Rear glass heater	G-9	—
C39	Terminal	1	Ground	C-8	—
C40	Terminal	1	Ground	C-8	E-7
C41	M	1	Warning lamp	E-9	—
C43	Yazaki	6	Right-side wiper switch	B-8	F-9
C44	M	4	Left-side wiper switch	A-7	F-8
C45	M	4	Intermediate connector (Power Supply)	F-1	C-8
C46	M	1	Ground	D-9	D-8
C47	Terminal	1	A/C control AMP	F-9	F-7
C47	AMP172021-2	16	A/C control AMP (Auto-air conditioner vehicle)	P-1	—
C47	AMP040	20	A/C control AMP	D-9	—
C48	AMP172245-2	12	A/C control AMP (Auto-air conditioner vehicle)	P-1	—
C48	AMP040	16	Left Servomotor	D-9	—
C49	SWP	8	Right Servomotor	R-1	—
C50	SWP	8	Diode (Auto-air conditioner vehicle)	M-3	—
C51	Yazaki	2	Resistor	Q-1	—
CAN1	DT-T	3	Resistor	O-1	ENG
CAN2	DT-T	3	Connector for inspection 0	R-9	—
CHK0	X	1	Connector for inspection 1	R-1	—
CHK1	X	1	Intermediate connector	R-1	—
CL1	S	8		A-4	—

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
CL2	S (L)	12	Intermediate connector (Wiper motor)	A-4	D-5
CL5	S	16	Intermediate connector	M-2	—
CL6	DT-T (G)	12	Intermediate connector (Monitor panel controller)	M-2	WRK
CL6	M	6	Intermediate connector (Auto-air conditioner vehicle)	W-3	—
CL7	DT-T (Gr)	12	Intermediate connector (Monitor panel controller)	M-2	WRK
CL8	DT-T	12	Intermediate connector (Monitor panel controller)	N-1	WRK
CL9	DT-T	8	Intermediate connector (Monitor panel controller)	O-1	WRK
CL10	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-1	ENG
CN1	DT-T	2	Injector	Y-5	ENG
CN2	DT-T	2	Injector	Y-5	ENG
CN3	DT-T	2	Injector	Y-9	ENG
CN4	DT-T	2	Injector	Z-9	ENG
CN5	DT-T	2	Injector	Z-9	ENG
CN6	DT-T	2	Injector	AC-8	ENG
COMBI	M	3	Front combination lamp (Right)	A-6	B-3
COMBI	M	3	Front combination lamp (Left)	E-1	B-2
DI	DT-T	2	Dust indicator	AB-9	MON
DIODE	DT-T	2	Diode (Parking brake solenoid)	AE-6	WRK
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	MON
E01	DT-T	2	Intermediate connector (Starting motor)	L-3	ENG
E02	Terminal	1	Alternator R	K-8	ENG
E03	Terminal	1	Alternator B	K-8	ENG
E04	Terminal	1	Alternator E	L-8	ENG
E06	Terminal	1	Heater relay	AC-8	ENG
E07	Terminal	1	Heater relay	AC-7	ENG
E10	DT-T	2	Compressor magnetic clutch	I-9	—
E11	DT-T	2	Diode	J-9	—
E14	Terminal	1	Ground	L-4	ENG
E28	DT	2	Diode (Engine heater relay)	Z-3	ENG
E29	Terminal	1	Engine oil pressure switch	Z-5	MON
E30	Terminal	1	Starting motor B	K-3	ENG
EL2	HD-24	31	Intermediate connector (Engine injector)	Z-1	ENG
EL3	HD-24	31	Intermediate connector (Engine)	Z-2	ENG
ER-1	DT-T	4	Intermediate connector (Starting motor)	L-4	ENG
EREV	DT-T	2	Engine speed sensor	AC-6	ENG
F01	M	6	Intermediate connector (Right head lamp)	A-5	C-3
F02	M	6	Intermediate connector (Left head lamp)	D-1	C-2
F03	Terminal	1	Horn	B-1	B-1
F04	Terminal	1	Horn	A-1	B-1
F05	Terminal	1	Horn	C-1	B-1

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Connector No.	Connector Type	Number of pins	Installation Name	Address	
				Layout drawing	System drawing
F06	Terminal	1	Horn	C-1	B-1
F07	DT-T	2	Switch pump cutoff solenoid	A-1	MON
F09	DT-T	3	Bucket positioner proximity switch	A-3	B-2
F10	DT-T	3	Boom positioner proximity switch (std)	A-3	B-1
F13	DT-T	2	Boom damper solenoid	D-1	WRK
F14	DT-T	2	Diode (Damper solenoid)	D-1	WRK
F15	DT-T	3	Boom angle signal (For load meter)	A-5	WRK
F16	DT-T	3	Boom bottom signal (For load meter)	B-1	WRK
F17	DT-T	3	Boom rod signal (For load meter)	B-1	WRK
F27	DT-T	2	Diode (Boom EPC cutoff solenoid)	A-4	WRK
F28	DT-T	2	Oil temperature sensor	B-1	WRK
FF1	S	10	Intermediate connector (Headlamp)	E-1	D-3
FF2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	E-1	D-3
FL1	S	12	Intermediate connector (Headlamp)	V-1	D-5
FL2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	V-2	D-5
FL3	DT-T	6	Intermediate connector (Load meter)	X-3	WRK
FS1	L	2	Intermediate connector (Fuse box)	W-7	ENG
FS2	L	2	Intermediate connector (Fuse box)	V-7	ENG
FS3	S (W)	16	Intermediate connector (Fuse box)	V-8	E-5
FS4	S (W)	12	Intermediate connector (Fuse box)	U-8	E-6
FS5	M	6	Intermediate connector (Fuse box)	V-7	E-6
FS6	Plug	1	Intermediate connector (Fuse box)	V-7	V
FS7	Plug	1	Intermediate connector (Fuse box)	W-7	—
F.PS	DT-T	2	F clutch solenoid	AJ-6	WRK
F.SW	DT	2	F clutch fill switch	AJ-6	WRK
G	Yazaki	2	Engine G speed sensor	AA-5	ENG
G01	Terminal	1	Backup buzzer	L-8	TM
G02	Terminal	1	Backup buzzer	L-7	TM
G04	M	2	Rear working lamp (Left)	K-9	MON
G05	M	2	Rear working lamp (Right)	I-9	MON
GR1	DT-T	4	Intermediate connector (Fan reverse solenoid, rear working lamp)	L-7	WRK
GR2	DT-T	2	Fan reverse solenoid	J-9	WRK
HEAD	M	3	Headlamp (Right)	A-6	B-3
HEAD	M	3	Headlamp (Left)	E-1	B-2
HT	Terminal	1	Engine heater relay	AC-9	ENG
L01	SWP	6	Parking brake switch	M-5	TM
L02	SWP	6	Dipping switch, light switch	M-4	B-7
L03	SWP	6	Turn and hazard switch	M-5	B-6
L04	SWP	14	Shift switch	M-3	ENG
L05	DT-T	2	S/T wheel horn switch	M-5	B-5

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L07	DT-T	6	Monitor mode/cancel switch	P-1	MON
L08	DT-T	6	Monitor INC/DEC switch	P-1	MON
L09	DT-T	2	Stop lamp switch	P-1	MON
L10	DT-T	3	Left brake pressure sensor	R-1	TM
L11	DT-T	2	Air suspension seat	S-1	—
L12	DT-T	4	Right-hand direction switch, intermediate connector	O-7	TM
L14	DT-T	4	Boom lever KDS&HOLD	M-6	TM
L15	DT-T	4	Bucket lever LDM cancel	M-6	WRK
L16	M	2	Intermediate connector	V-2	V
L17	M	4	24 VDC/12 VDC converter	W-5	—
L18	Yazaki	2	12 VDC socket	W-3	—
L19	M	4	Flasher unit	U-8	A-4
L20	M	2	Alarm buzzer	U-8	MON
L21	S	10	Front and rear wiper switches	N-2	E-4
L22	DT-T	3	Throttle pedal	O-1	ENG
L23	DT-T	3	Low idle switch	O-1	ENG
L25S	DT-T	2	PPC valve and electrical detent	N-6	B-8
L26S	DT-T	2	PPC valve and electrical detent	N-6	B-8
L27S	DT-T	2	PPC valve and electrical detent	N-7	B-8
L31	M	6	Intermittent wiper timer	W-7	E-3
L42	Plug	1	Connector (Emergency power)	A-5	—
L43	Plug	1	Connector (Emergency power)	A-5	—
L44	M	6	Intermediate connector (Printer)	V-3	MON
L45	D-sub	25	Printer	—	MON
L46	G	4	Printer	—	MON
L51	AMP070	20	Monitor panel controller	M-2	MON
L52	AMP070	18	Monitor panel controller	M-3	MON
L53	AMP070	12	Monitor panel controller	M-3	MON
L54	AMP070	18	Monitor panel controller	M-3	MON
L55	AMP070	12	Monitor panel controller	M-4	MON
L56	AMP070	12	Monitor panel controller	M-3	MON
L57	AMP070	14	Monitor panel controller	M-4	MON
L58	AMP040	8	Monitor panel controller	M-4	—
L61	DRC23	24	Transmission and fan pump motor controller	P-9	TM
L62	DRC23	40	Transmission and fan pump motor controller	P-8	TM
L63	DRC23	40	Transmission and fan pump motor controller	Q-8	TM
L79	Relay	5	KOMTRAX engine cut relay	R-9	ENG
L80	DRC23	40	KOMTRAX controller	R-1	ENG
L81	DRC23	24	Engine controller	Q-8	ENG
L82	DRC23	40	Engine controller	Q-8	ENG

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
L83	DRC	40	Engine controller	Q-8	ENG
L90	DT-T	4	Modal selection connector	P-8	ENG
L100	Terminal	1	Ground	R-1	ENG
L101	S (W)	16	Intermediate connector (Relay sub-unit)	T-9	B-5
L102	S (L)	16	Intermediate connector (Relay sub-unit)	T-9	ENG
L103	S (W)	16	Intermediate connector (Relay sub-unit)	S-9	B-5
L104	S (W)	16	Intermediate connector (Relay sub-unit)	T-9	B-8
L105	S (W)	12	Intermediate connector (Relay sub-unit)	T-9	—
L106	S (W)	16	Intermediate connector (Relay sub-unit)	S-9	MON
L111	—	5	Turn signal lamp and hazard relay	X-7	MON
L112	—	5	Air cleaner clogging sensor	W-7	MON
L113	—	5	Steering change-over relay	W-8	ENG
L114	—	5	Auto-preheating relay	V-8	ENG
L115	—	5	Engine controller power supply relay	V-9	—
L116	—	4	Neutral safety relay	W-7	TM
L117	—	4	Backup lamp relay	W-7	TM
L118	—	4	Stop lamp relay	V-8	MON
L119	—	4	Horn relay	V-8	MON
L120	—	4	Parking brake relay	V-8	TM
L123	—	5	Boom detent relay	X-9	—
L124	—	5	Bucket detent relay	W-9	—
L125	—	5	Boom damper relay	V-9	TM
L126	—	4	Emergency steering relay	X-8	TM
L127	—	4	Front working lamp relay	X-7	—
L128	—	4	Rear working lamp relay	X-9	MON
L129	—	4	Rear glass heater relay	V-9	—
L130	—	4	Transmission pump cutoff relay	V-9	TM
LC.PS	DT-T	2	Torque converter lockup solenoid (op)	AJ-5	TM
LC.SW	DT	2	Torque converter lockup fill switch (op)	AJ-5	TM
LL1	DT-T	6	Intermediate connector (Relay)	O-7	ENG
LL2	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-7	ENG
LL3	DTHD#12	1	Intermediate connector (Ground)	N-7	ENG
LL4	DT-T (Br)	12	Intermediate connector (Throttle panel)	N-6	ENG
LL5	DT	3	Intermediate connector (Joystick vehicle)	M-5	WRK
LL6	DT-T (Gr)	12	Intermediate connector (Joystick vehicle)	Q-1	WRK
LL7	DT-T (G)	12	Intermediate connector (Joystick vehicle)	Q-1	WRK
LL8	DT-T (Gr)	8	Intermediate connector (Joystick switch)	Q-1	WRK
LR1	DTHD#12	1	Intermediate connector (Slow-blow fuse)	X-2	ENG
LR4	L	2	Intermediate connector (Slow-blow fuse)	X-1	ENG
LR5	DT-T	6	Intermediate connector (Auto-greasing controller)	X-3	MON

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Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
LR6	L	2	Intermediate connector (Ground)	X-2	ENG
LR8	DTHD#8	1	Intermediate connector (Ground)	X-2	ENG
LR9	DT-T	12	Intermediate connector (Steering, brake oil pressure switch)	X-1	TM
LR10	DT-T	12	Intermediate connector	X-1	D-2
LT1	HD-24	31	Intermediate connector (Transmission)	W-3	TM
NE	Yazaki	2	Engine NE speed sensor	AB-6	ENG
OL	DT-T	2	Engine oil level sensor	AC-1	MON
PB.PS	DT-T	2	Parking brake solenoid	AI-2	TM
PB.SW	DT-T	2	Parking brake indicate switch	AI-2	TM
PCV1	Sumitomo	2	Supply pump (No.1)	Z-4	ENG
PCV2	Sumitomo	2	Supply pump (No.2)	AA-5	ENG
PFUEL	AMP174357-2	3	Common rail pressure signal	AB-5	ENG
PIM	Sumitomo	3	Boost pressure signal	AC-7	ENG
R01	Terminal	1	Battery relay	J-2	ENG
R02	Terminal	1	Slow-blow fuse	L-2	ENG
R03	Terminal	1	Slow-blow fuse	L-2	ENG
R04	Terminal	1	Battery relay	K-2	ENG
R05	Terminal	1	Slow-blow fuse	K-2	ENG
R06	Terminal	1	Slow-blow fuse	K-2	ENG
R11	Terminal	1	Slow-blow fuse	K-2	ENG
R13	Terminal	1	Battery relay	L-1	ENG
R14	Terminal	1	Battery relay	L-1	ENG
R15	Terminal	1	Emergency steering relay	J-1	TM
R16	Terminal	1	Emergency steering relay	J-1	TM
R22	Terminal	1	Battery	H-9	ENG
R23	Terminal	1	Battery	H-9	ENG
R24	DT-T	2	Diode (Battery relay)	I-1	ENG
R25	DT-T	2	Diode (Battery relay)	J-2	ENG
R26	DT-T	2	Diode (Starting motor)	H-1	ENG
R27	DT-T	2	Diode (Starting motor)	I-2	ENG
R29	DT-T	2	Oil fan EPC	A-6	TM
R30	M	6	Rear combination lamp (Left)	L-7	B-3
R31	M	6	Rear combination lamp (Right)	I-9	B-4
R32	DT-T	2	Coolant level sensor	B-8	MON
R33	DT-T	2	Fuel gauge sensor	K-3	MON
R34	M	2	License lamp	L-6	MON
R36	DT-T	3	Steering pump pressure switch	D-1	TM
R37	DT-T	3	Emergency steering pressure switch	F-1	TM
R38	DT-T	6	Auto-greasing controller	F-1	MON
R39	DT-T	2	Battery level sensor	L-6	MON

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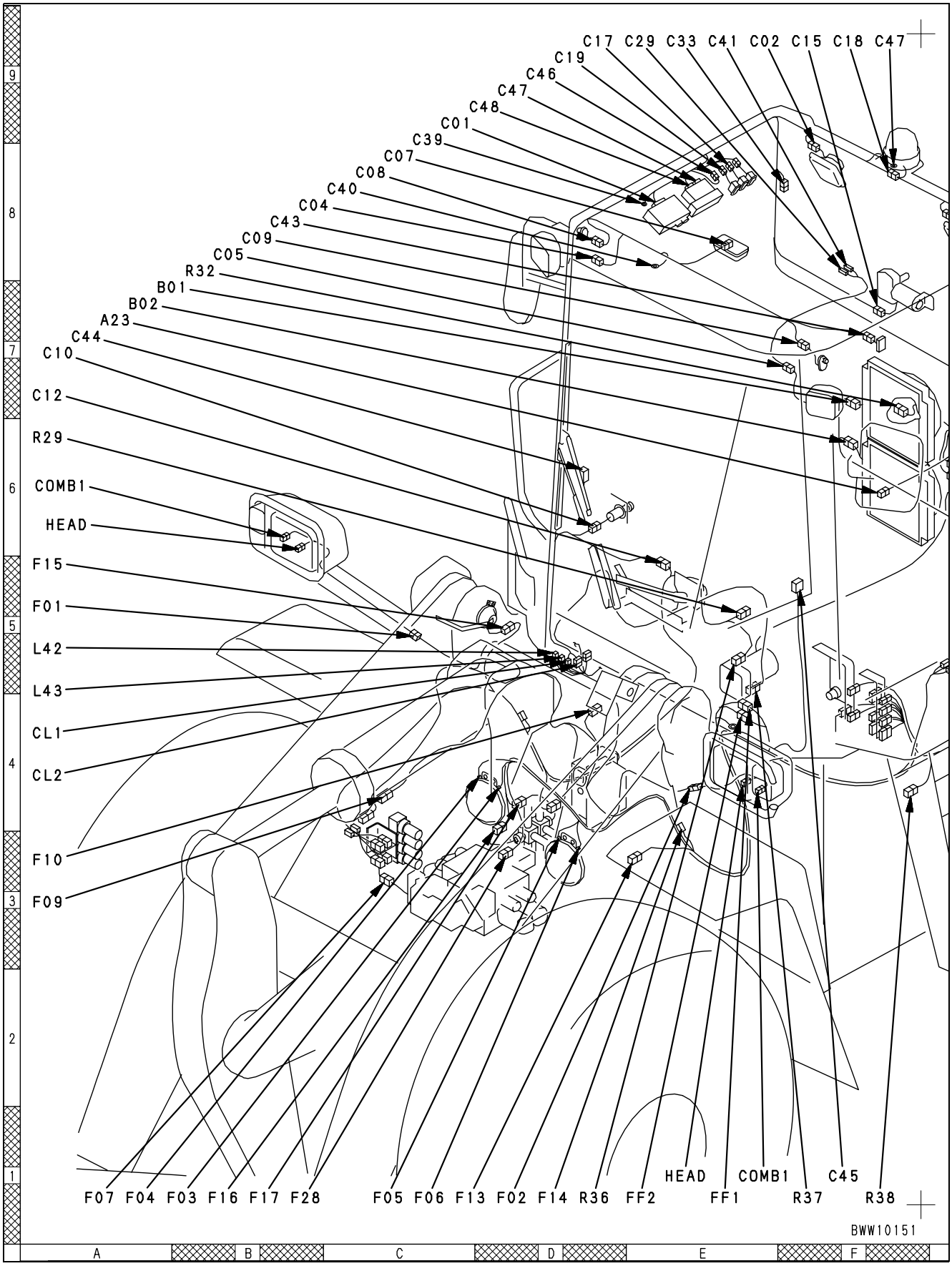
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
R43	KES1	2	Front windshield washer	G-1	E-2
R44	DT-T	2	Diode (Washer)	G-1	E-2
R45	KES1	2	Rear windshield washer	H-1	E-2
R46	DT-T	2	Diode (Washer)	G-1	E-2
R50	Terminal	1	Ground	H-9	C-3, D-1
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	TM
R56	DT-T	2	Rear brake oil temperature sensor	H-1	TM
R63	Terminal	1	Slow-blow fuse	L-2	—
R64	Terminal	1	Ground	L-5	—
R65	DT-T	6	Auto-tilt motor switch (op)	L-5	—
R66	DT-T	2	Auto-tilt motor	H-9	—
REV OUT	DT-T	2	Speed sensor	AH-2	TM
R.PS	DT-T	2	R clutch solenoid	AJ-6	TM
R.SW	DT	2	R clutch fill switch	AJ-6	TM
S01	DT-T	6	Front working lamp switch	P-1	MON
S02	DT-T	6	Rear working lamp switch	P-1	MON
S03	DT-T	6	Transmission cutoff ON/OFF switch	M-4	TM
S04	DT-T	6	Right-hand direction ON/OFF switch	N-9	ENG
S05	DT-T	6	Transmission cutoff set switch	M-9	TM
S06	DT-T	6	Torque converter lock-up ON/OFF switch	O-8	TM
S07	DT-T	6	Boom damper ON/OFF switch	O-1	TM
S16	DT-T	6	Emergency steering check switch	M-9	TM
S17	DT-T	6	Auto-greasing switch	O-8	—
S19	DT-T	6	Hydraulic fan reverse switch	M-9	TM
S21	DT-T	4	Engine power mode switch	M-8	ENG
S22	DT-T	4	Auto-shifting mode switch	N-7	TM
S31	DT	4	Starting switch	N-7	ENG
TC.C	DT-T	2	Torque converter oil temperature sensor (Monitor)	—	TM
TEL	DT-T (Gr)	12	Connector (KOMTRAX)	Q-1	ENG
THL	DT-T	3	Fuel temperature sensor	AB-5	ENG
TM.T	DT-T	2	Transmission oil temperature sensor	AJ-4	—
TWH	DT-T	2	Engine water temperature sensor (Monitor)	AD-2	MON
TWL	DT-T	3	Engine water temperature sensor (Preheating)	AB-1	ENG

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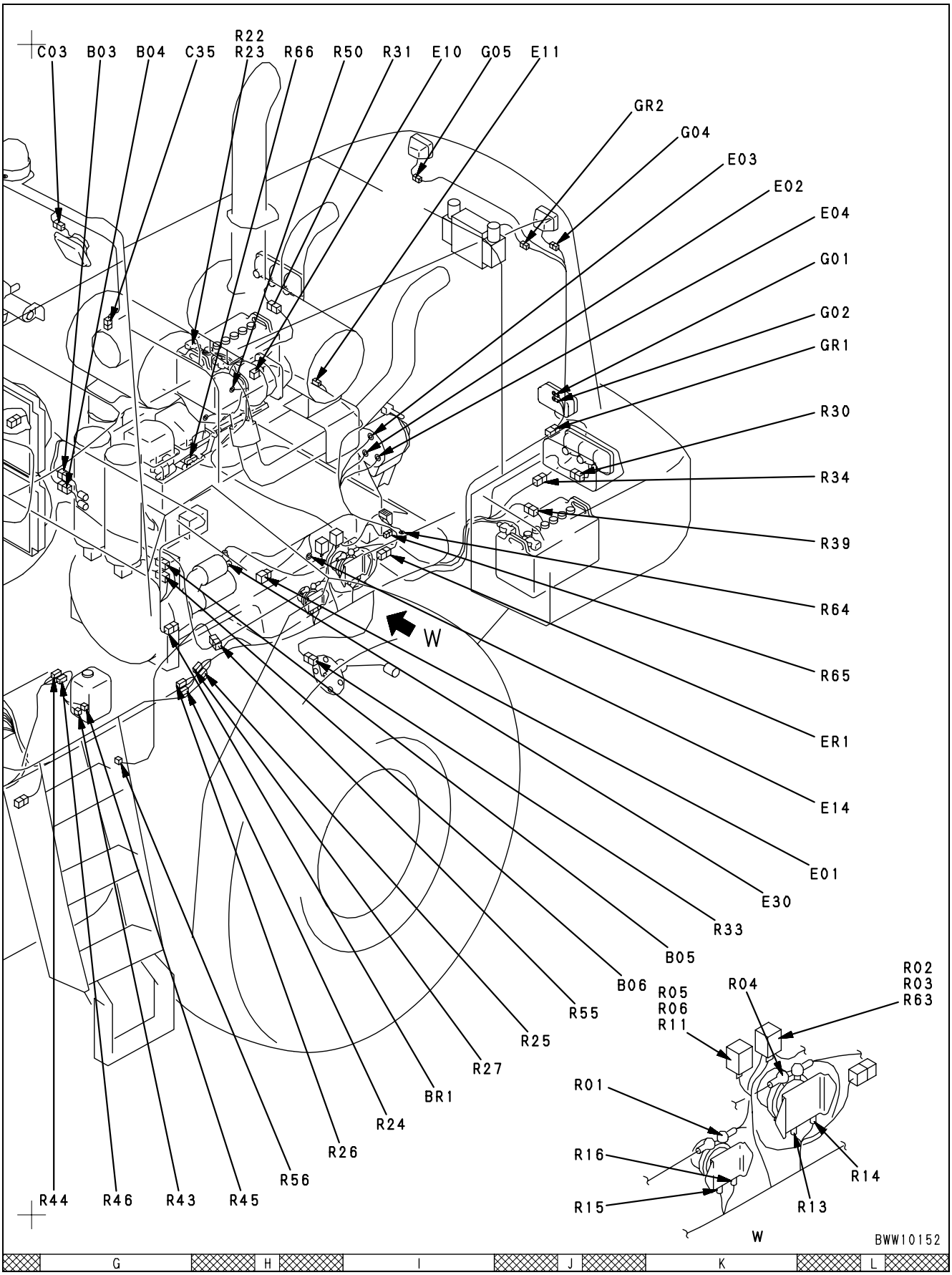
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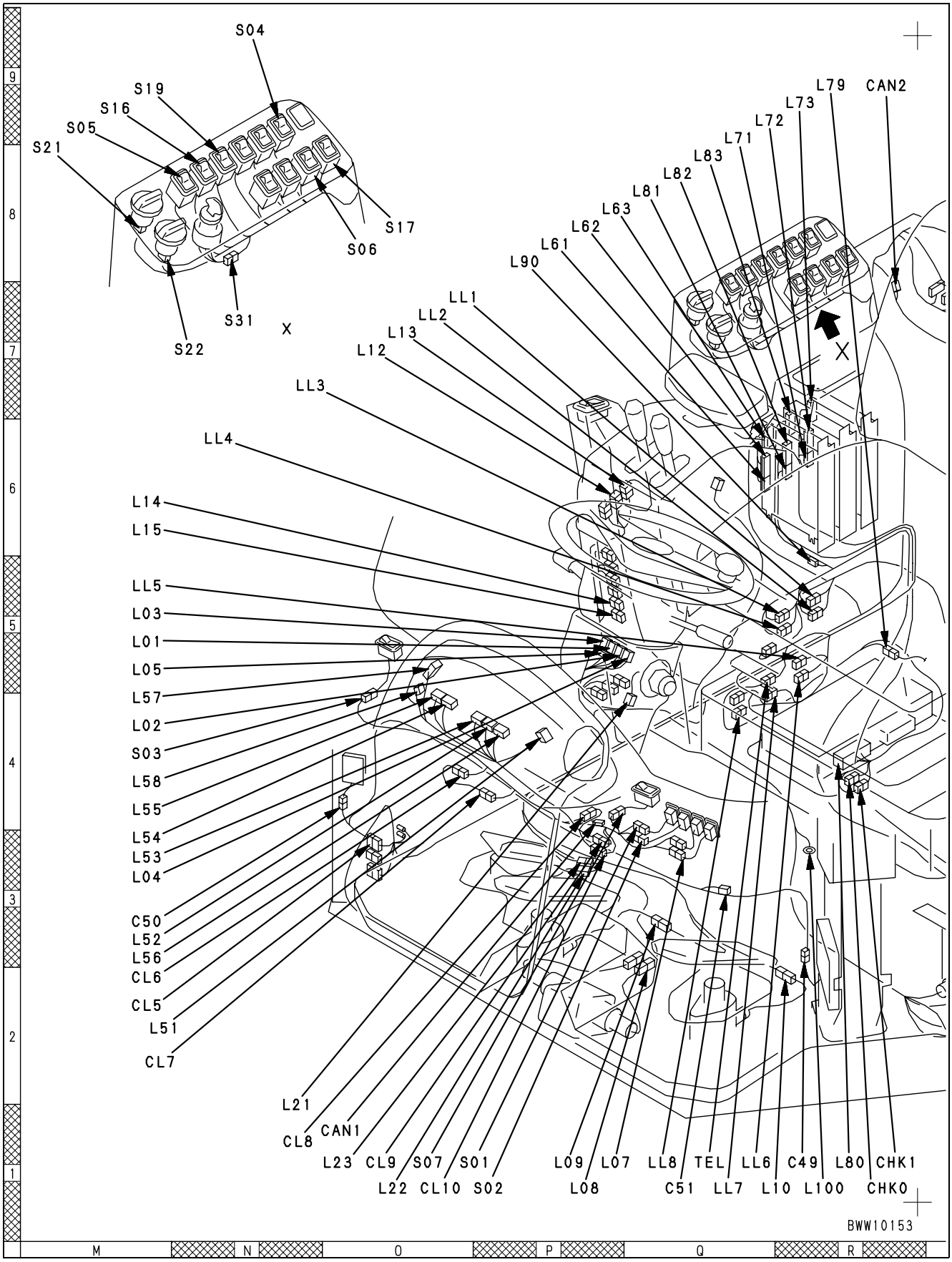
Connector layout drawing



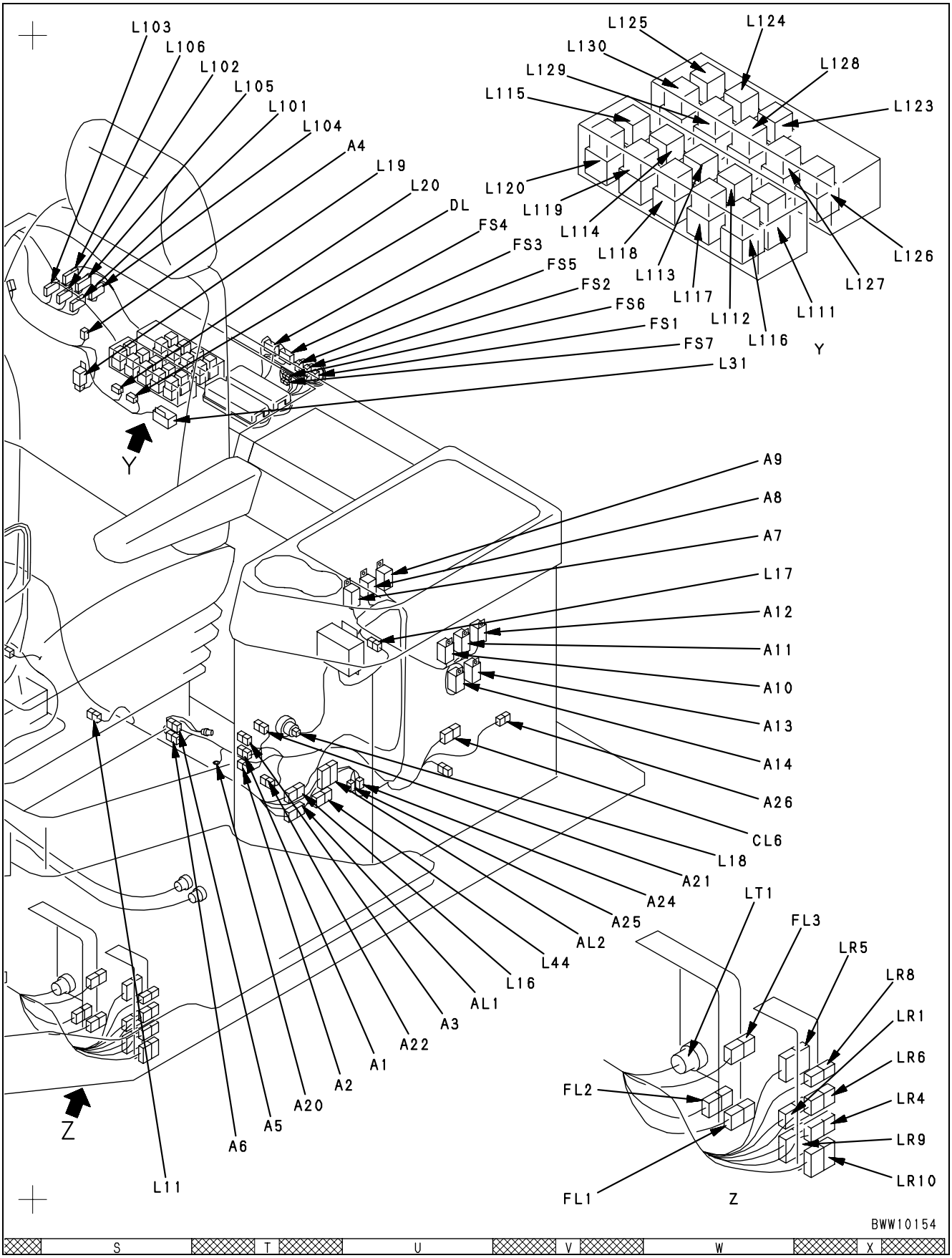
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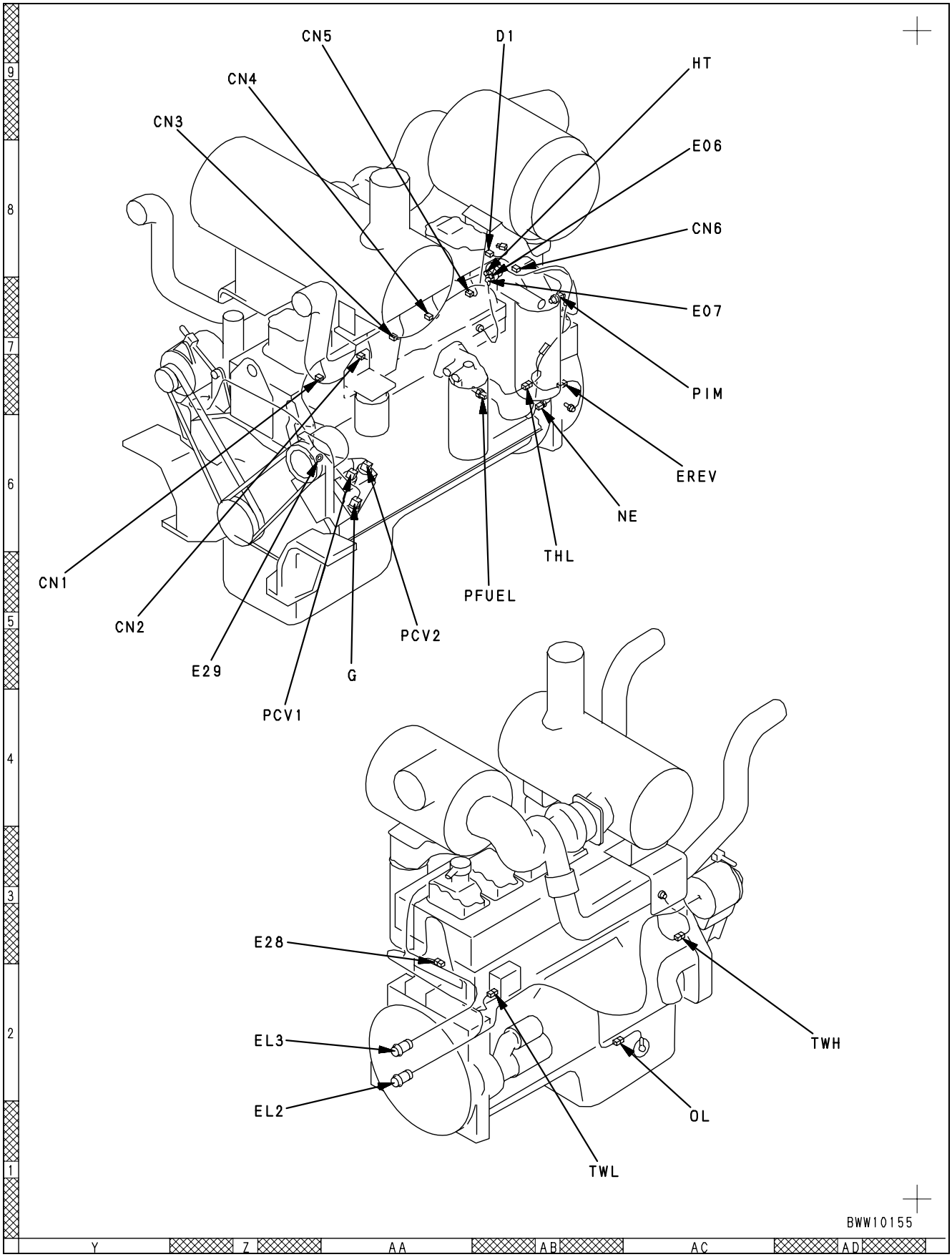
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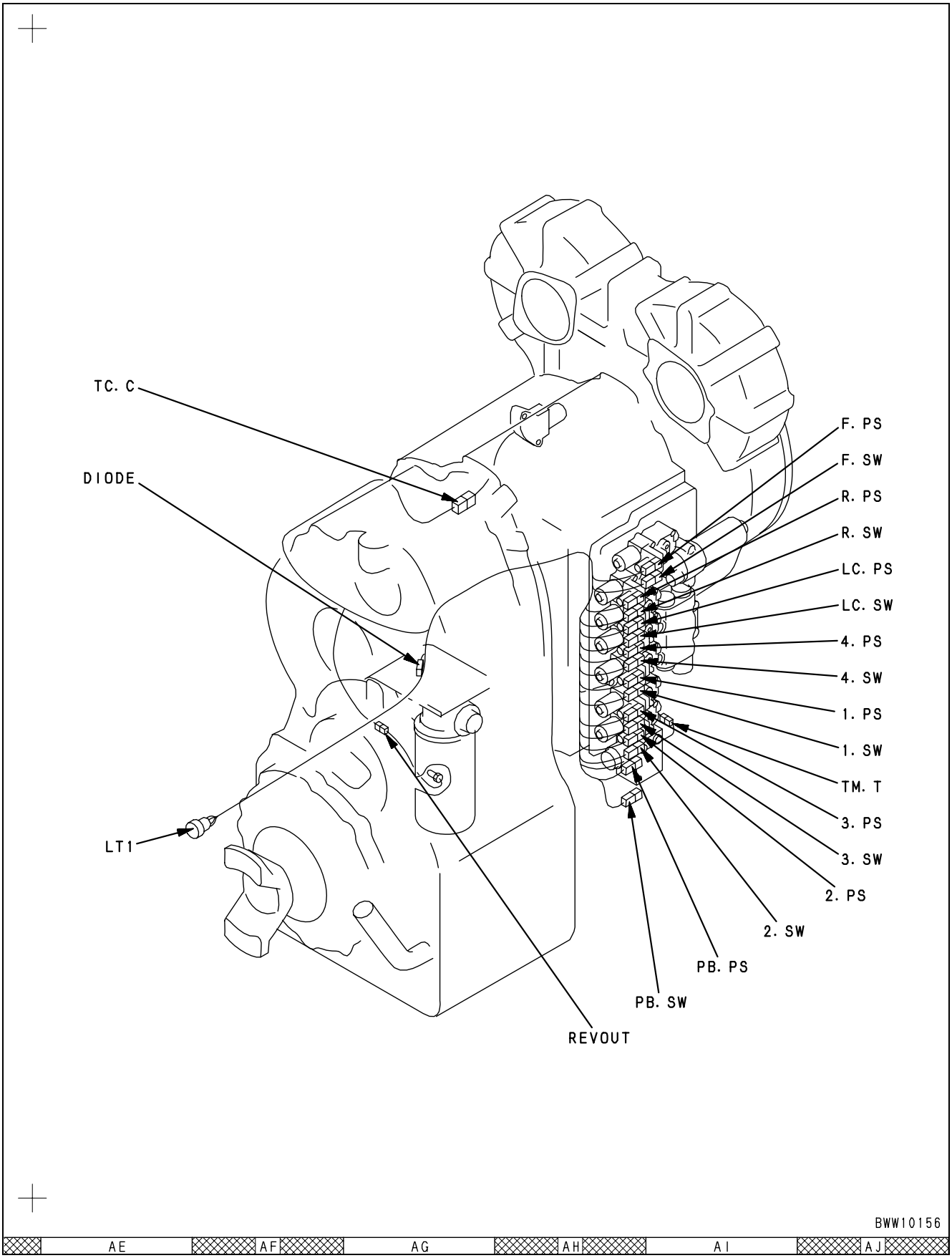
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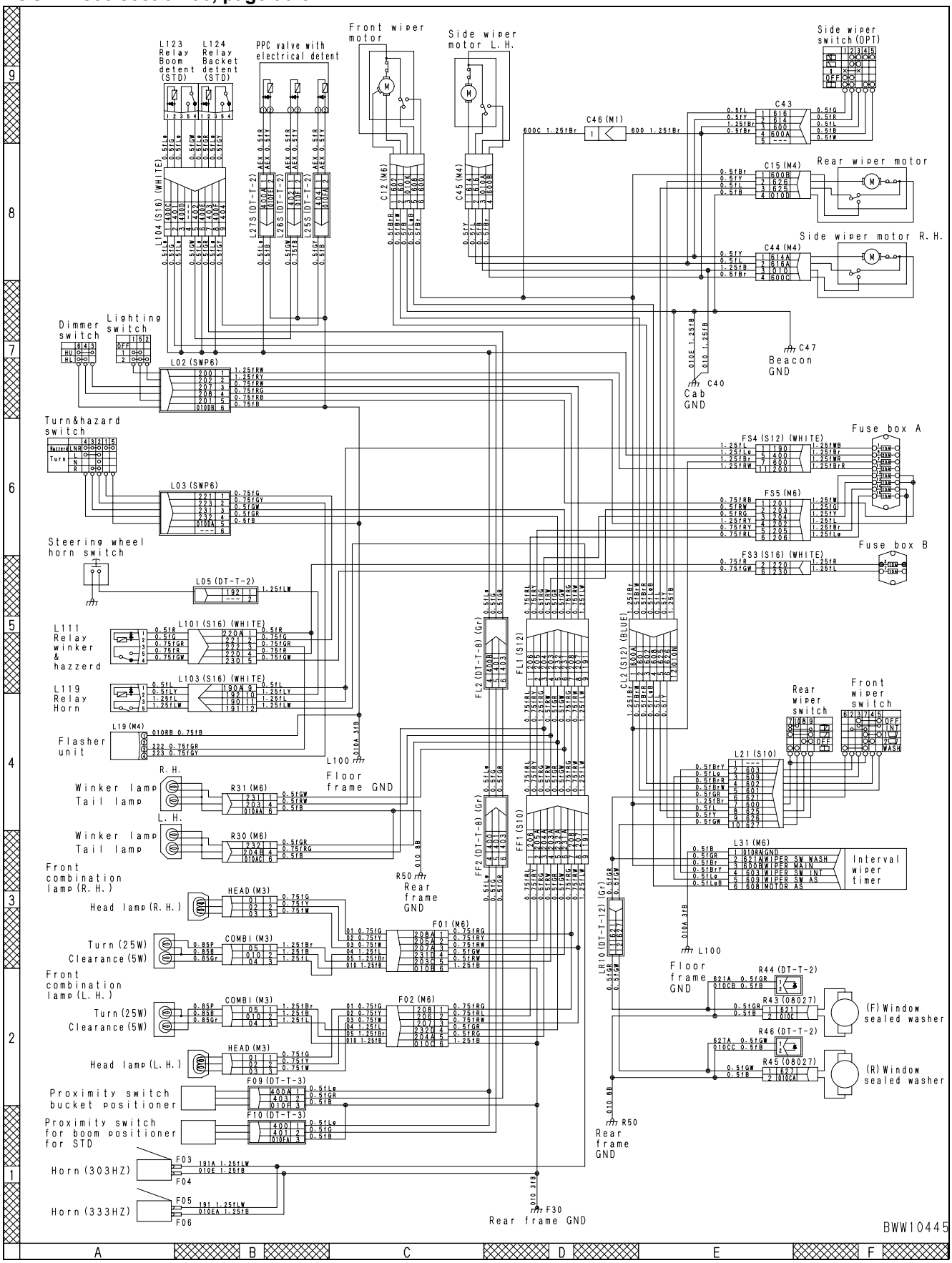
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Monitor system diagram

ZOOM – see section 90, page 90-51



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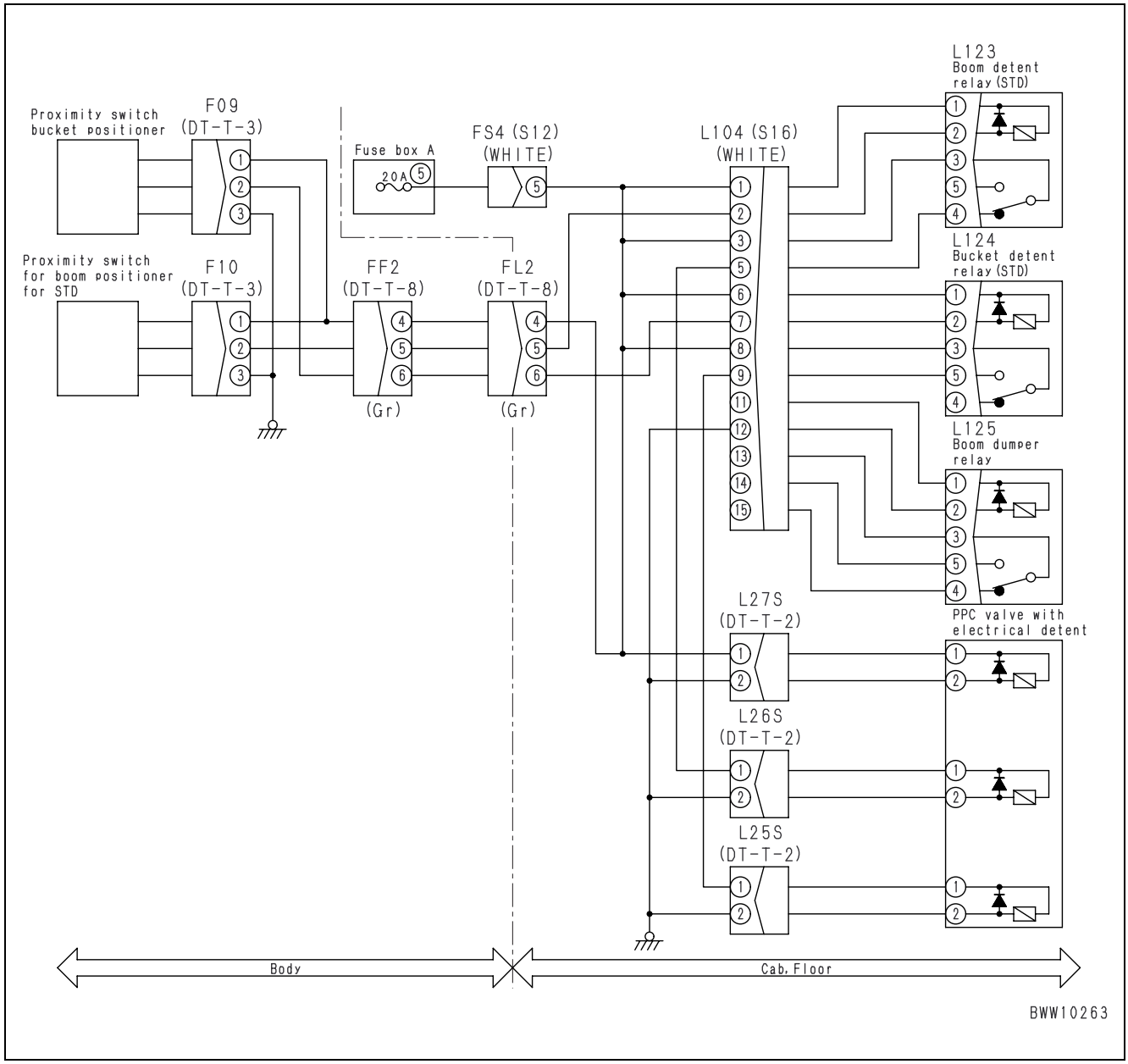
Action code [E-1]

Action Code	Error Code	Controller Code	Trouble	All of the bucket positioner, boom kick-out, and floating holder do not function
E-1	—	—		
Description of Trouble	• Since a ground fault occurs in the adjacent switches and PPC detent circuit power system, all of the bucket positioner, boom kick-out, and floating holder do not function.			
Controller Reaction	—			
Effect on Machine	• All of the bucket positioner, boom kick-out, and floating holder do not function.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Harness ground fault ★ Fuse A-C blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors FS4, L104, L27S, (LL5), F9, and F10. 3) Connect t-adapter.		
			Between FS4 (female) (5) ~ body	Resistance	1 MΩ and above
	2	Wiring harness ground fault ★ Fuse A-C blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors L104. 3) Disconnect relays L123 and L124. 4) Connect t-adapter.		
			Between L104 (male) (1) ~ (2), (7), (12) and body	Resistance	1 MΩ and above
			Between L104 (male) (3) ~ (2), (7), (12) and body	Resistance	1 MΩ and above
			Between L104 (male) (6) ~ (2), (7), (12) and body	Resistance	1 MΩ and above
			Between L104 (male) (8) ~ (2), (7), (12) and body	Resistance	1 MΩ and above
	3	Harness ground fault ★ Fuse A-C blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors F9 and F10. 3) Connect t-adapter. ★ When item 2 is normal		
			Between L104 (male) (1) ~ (2)	Resistance	200 ~ 400 Ω
			Between L104 (male) (7) ~ (7)	Resistance	200 ~ 400 Ω
	4	Ground fault in adjacent switch ★ Fuse A-C blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors F9 and F10. 3) Connect t-adapter.		
			Between F9 (male) (1) ~ (2), (3) and body	Resistance	1 MΩ and above
			Between F10 (male) (1) ~ (2), (3) and body	Resistance	1 MΩ and above

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Related circuit diagram



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Action code [E-2]

Action Code	Error Code	Controller Code	Trouble	The boom kick-out does not function or cannot be released
E-2	—	—		
Description of Trouble	• Since a fault occurs in the boom kick-out adjacent switch system, boom PPC detent system, and boom detent relay system, the boom kick-out does not function or could not be released.			
Controller Reaction	—			
Effect on Machine	• The boom kick-out does not function or cannot be released.			
Related Information	—			

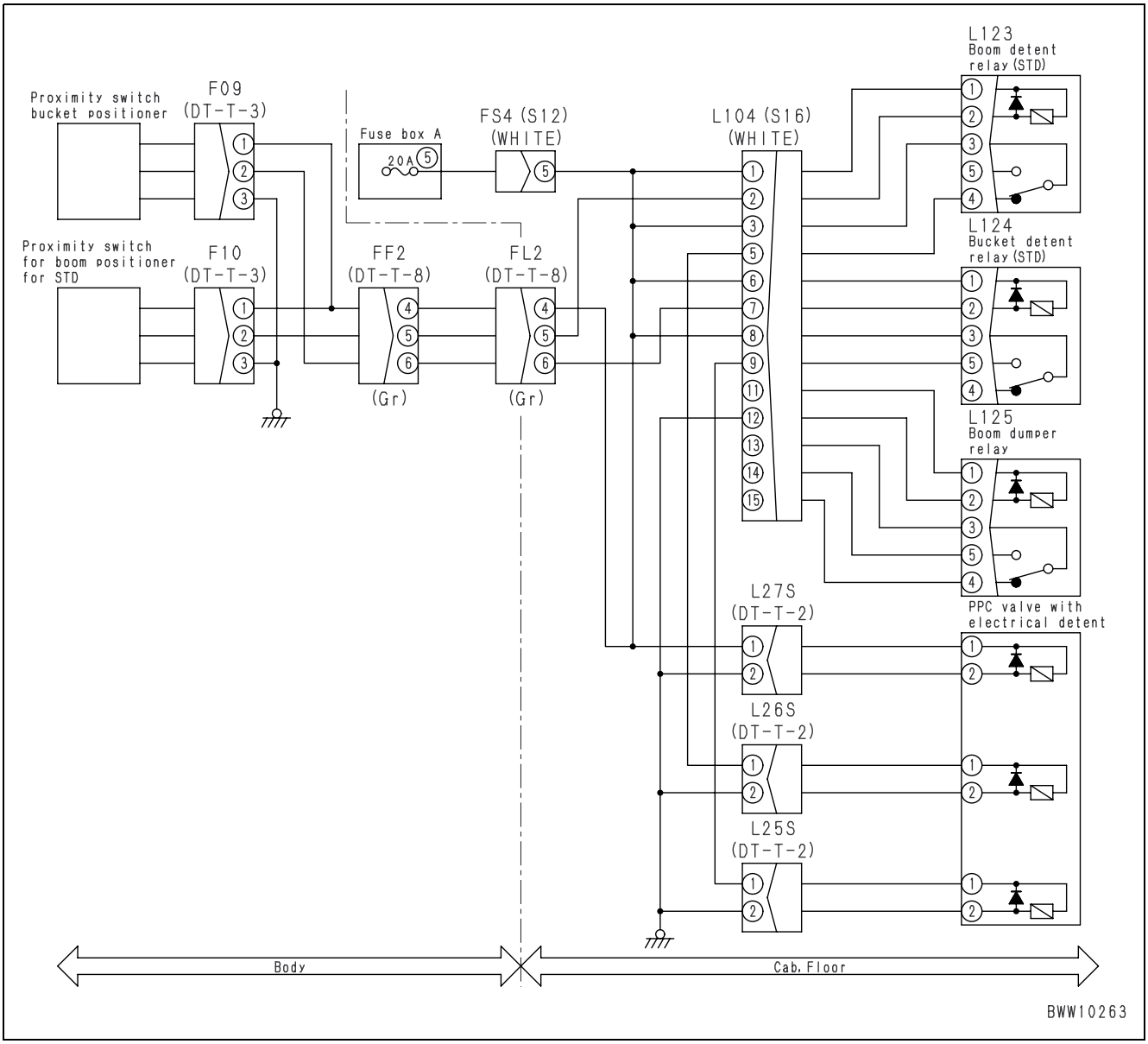
	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Boom detent relay fault	1) Turn starting switch OFF. 2) Disconnect connector L123. 3) Connect t-adapter.		
			Between L123 (male) (1) ~ (2)	Resistance	200 ~ 400 Ω
			1) Turn starting switch OFF. 2) Disconnect connectors L123. 3) Exchange the boom detent relay (L123) with another one. 4) Boom kick-out operation.		
			The boom kick-out functions	Boom detent relay (L123) abnormal	
			The boom kick-out does not function	Boom detent relay (L123) normal	
	2	Boom PPC detent fault	1) Turn starting switch OFF. 2) Disconnect connector L26S. 3) Connect t-adapter.		
			Between L26S (male) (1) ~ (2)	Resistance	30 ~ 50 Ω
	3	Boom positioner adjacent switch	1) Turn starting switch OFF. 2) Disconnect connector L123. 3) Exchange the boom positioner adjacent switch (F10) with the bucket leveler adjacent switch (F9). 4) Boom kick-out operation.		
			The boom kick-out functions	Boom kick-out adjacent switch (F10) abnormal	
			The boom kick-out does not function	Boom kick-out adjacent switch (F10) normal	
	4	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors FS4, L104, L26S, and F10. 3) Connect t-adapter.		
			Harness between FS4 (female) (5) ~ F10 (female) (1)	Resistance	1 Ω and below
			Harness between L104 (female) (2) ~ F10 (female) (2)	Resistance	1 Ω and below
			Harness between F10 (female) (3) ~ body	Resistance	1 Ω and below
			Harness between L104 (female) (5) ~ L26S (female) (1)	Resistance	1 Ωand below
			Harness between L26S (female) (2) ~ body	Resistance	1 Ω and below
			★ The boom kick-out does not function in all items.		
	5	Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L104, F10, and FS4. 3) Connect t-adapter.		
			Between L104 (female) (2), F10 (female) (2) ~ body ★ The boom kick-out detent does not function in this case. (The lever returns to the neutral level.)	Resistance	1 MΩ and above
			Between L104 (female) (5), L26S (female) (1) ~ body ★ Fuse A-2 blows and all the detents do not function in this case. (The lever returns to the neutral level.)	Resistance	1 MΩ and above
			Between FS4 (female) (5), F10 (female) (1) ~ body ★ Fuse A-2 blows and all the detents do not function in this case. (The lever returns to the neutral level.)	Resistance	1 MΩ and above

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Action Code	Error Code	Controller Code	Trouble	The boom kick-out does not function or cannot be released
E-2	—	—		

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
	6	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L104 and F10. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L104 (female) (2), F10 (female) (2) ~ body ★ The fuse in the hot short circuit blows in this case.	Voltage	1 V and below
			1) Turn starting switch OFF. 2) Disconnect connectors L104 and F26S. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L104 (female) (5), F26S (female) (1) ~ body ★ The boom kick-out does not function in this case. (The lever does not return to the neutral level.)	Voltage	1 V and below

Related circuit diagram



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Action code [E-3]

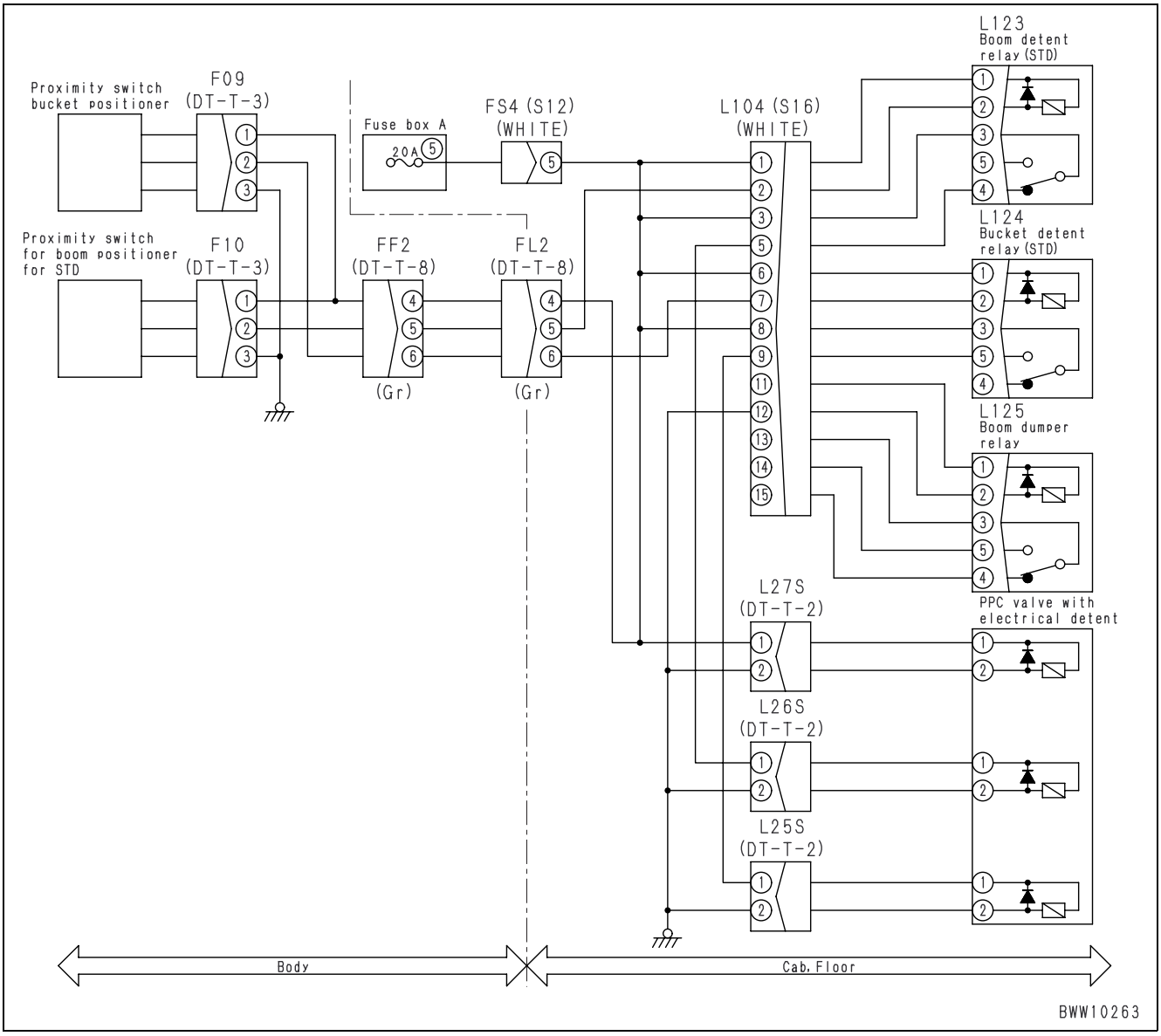
Action Code	Error Code	Controller Code	Trouble	The bucket lever does not function or cannot be released.
E-3	—	—		
Description of Trouble	• Since a fault occurs in the bucket lever adjacent switch system, bucket PPC detent system, and bucket detent relay system, the bucket kick-out does not function or cannot be released.			
Controller Reaction	—			
Effect on Machine	• The bucket lever does not function or cannot be released.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Bucket detent relay fault	1) urn starting switch OFF. 2) Disconnect connectors L104 and F10. 3) Connect t-adapter.		
			Between L124 (male) (1) ~ (2)	Resistance	200 ~ 400 Ω
			1) Turn starting switch OFF. 2) Disconnect connectors L124. 3) Exchange the boom detent relay (L124) with another one. 4) Bucket lever operation.		
			The bucket lever functions	Bucket detent relay (L124) abnormal	
			The bucket lever does not function	Bucket detent relay (L124) normal	
	2	Bucket PPC detent fault	1) Turn starting switch OFF. 2) Disconnect connector L26S. 3) Connect t-adapter.		
			Between L26S (male) (1) ~ (2)	Resistance	30 ~ 50 Ω
	3	Bucket lever adjacent switch	1) Turn starting switch OFF. 2) Disconnect connector L124. 3) Exchange bucket lever adjacent switch (F9) with boom kick-out adjacent switch (F9). 4) Bucket lever operation.		
			The bucket lever functions	Bucket lever adjacent switch (F9) abnormal	
			The bucket lever does not function	Bucket lever adjacent switch (F9) normal.	
	4	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors FS4, L104, L26S, and F9. 3) Connect t-adapter.		
			Harness between FS4 (female) (9) ~ F9 (female) (1)	Resistance	1Ω and below
			Harness between L104 (female) (7) ~ F9 (female) (1)	Resistance	1 Ω and below
			Harness between F9 (female) (3) ~ body	Resistance	1 Ω and below
			Harness between L104 (female) (9) ~ L25S (female) (1)	Resistance	1 Ω and below
			Harness between L25S (female) (2) ~ body	Resistance	1 Ω and below
			★ The bucket positioner does not function in all items.		
	5	Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L104, F9, and FS4. 3) Connect t-adapter.		
			Between L104 (female) (7) ~ F9 (female) (2) ~ body ★ The bucket lever does not function in this case. (The lever does not return to the neutral level.)	Resistance	1 MΩ and above
			Between L104 (female) (9) ~ L25S (female) (1) ~ body ★ Fuse A-2 blows and all the detents do not function in this case. (The lever returns to the neutral level.)	Resistance	1 MΩ and above
			Between FS4 (female) (5) ~ F9 (female) (1) ~ body ★ Fuse A-2 blows and all the detents do not function in this case. (The lever returns to the neutral level.)	Resistance	1 MΩ and above

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Action Code	Error Code	Controller Code	Trouble	The bucket lever does not function or cannot be released	
E-3	—	—			
	Causes	Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	6 Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L104 and F9. 3) Connect t-adapter. 4) Turn starting switch ON.			
		Between L104 (female) (7), F9 (female) (2) ~ body ★ The fuse in the hot short circuit blows in this case.		Voltage	1 V and below
		1) Turn starting switch OFF. 2) Disconnect connectors L104 and L25S. 3) Connect t-adapter. 4) Turn starting switch ON.			
		Between L104 (female) (9) ~ L25S (female) (1) ~ body ★ The bucket lever does not function in this case. (The lever does not return to the neutral level.)		Voltage	1 V and below

Related circuit diagram



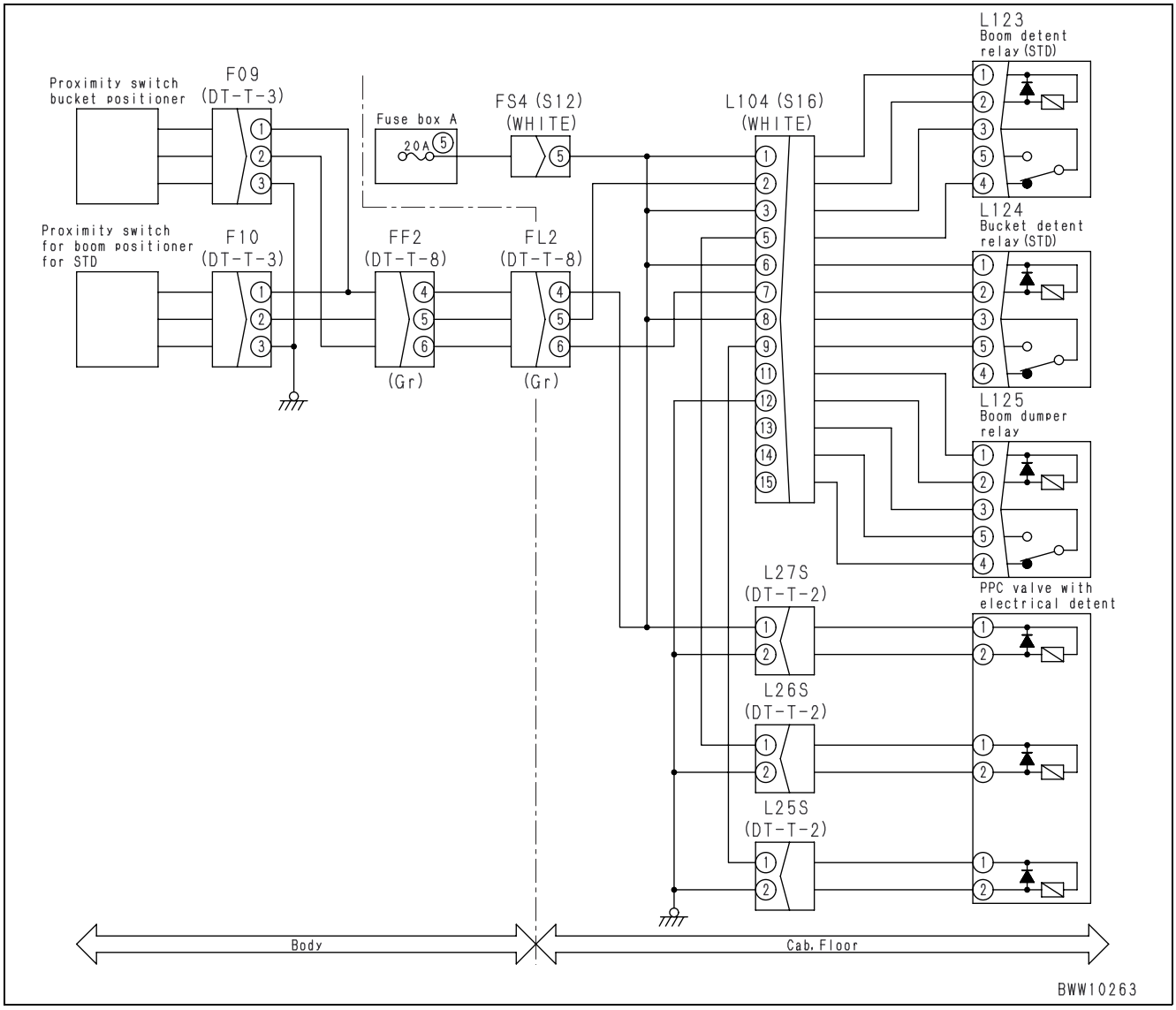
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Action code [E-4]

Action Code	Error Code	Controller Code	Trouble	The boom floating holder does not function or cannot be released
E-4	—	—		
Description of Trouble	• Since a fault occurs in the boom floating holder PPC detent system, the boom floating holder does not function or cannot be released.			
Controller Reaction	—			
Effect on Machine	• The boom floating holder does not function or cannot be released.			
Related Information	—			

		Causes	Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Boom floating PPC detent fault	1) Turn starting switch OFF. 2) Disconnect connector L27S. 3) Connect t-adapter.		
			Between L27S (male) (1) ~ (2)	Resistance	30 ~ 50 Ω
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors FS4 and L27S. 3) Connect t-adapter.		
			Harness between FS4 (female) (9) ~ L27S (female) (1)	Resistance	1 Ω and below
			Harness between L27S (female) (2) ~ body	Resistance	1 Ω and below

Related circuit diagram



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Action code [E-5-A]

Action Code	Error Code	Controller Code	Trouble	The front wiper does not function
E-5-A	—	—		
Description of Trouble	• Since a fault occurs in the front wiper, switch timer, or harness, the front wiper does not function			
Controller Reaction	—			
Effect on Machine	• The front wiper does not function			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Front wiper motor fault	1) Turn starting switch OFF. 2) Disconnect connector C12. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between C12 (2) ~ body (Wiper switch Lo)	Voltage	20 ~ 30 V
			Between C12 (1) ~ body (Wiper switch Hi)	Voltage	20 ~ 30 V
			Between C12 (6) ~ body	Voltage	20 ~ 30 V
			When the wiper switch is turned OFF during running of the wiper, the voltage is applied between the C12 (5) ~ body until the wiper motor stops		
	2	Wiper timer (relay) fault	1) Turn starting switch OFF 2) Disconnect connector C31. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L31 (3) ~ body	Voltage	20 ~ 30 V
			Between L31 (4) ~ body (Wiper switch INT)	Voltage	20 ~ 30 V
			Between L31 (2) ~ body (Wiper switch washer side)	Voltage	20 ~ 30 V
			Between L31 (5) ~ body (The voltage is output intermittently by wiper switch INT) 20 to 30 C → 0 V → 20 to 30 V → 0 V repeated		
	3	Front wiper switch fault	1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L21 (7) ~ body	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect t-adapter.		
			Between L21 (male) (7) ~ (5) (Wiper switch Lo)	Resistance	1 Ω and below
			Between L21 (male) (7) ~ (4) (Wiper switch Hi)	Resistance	1 Ω and below
			Between L21 (male) (7) ~ (2) (Wiper switch INT)	Resistance	1 Ω and below
			Between L21 (male) (3) ~ (5) (Wiper switch INT)	Resistance	1 Ω and below
			Others	Resistance	1 MΩ and above

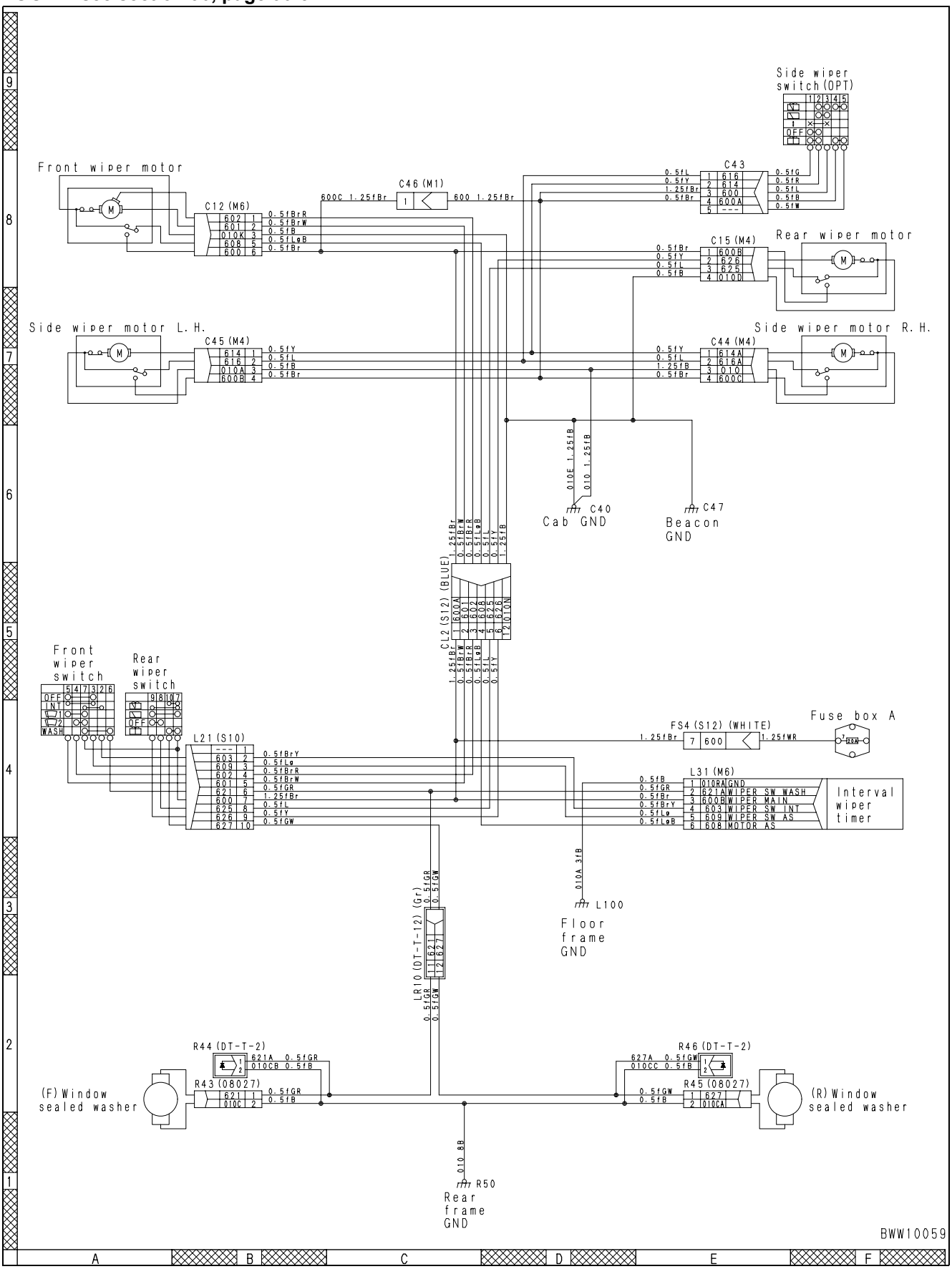
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Action Code	Error Code		Controller Code	Trouble	The front wiper does not function	
E-5-A	—		—			
Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
	4	Harness disconnection or ground fault ★ Fuse A-H blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors L21, L31, and C12. 3) Connect t-adapter.			
			Harness between L21 (female) (2) ~ L31 (female) (4)	Resistance	1 Ω and below	
			Between L21 (female) (2), L31 (female) (4) ~ body	Resistance	1 MΩ and above	
			Harness between L21 (female) D ~ L31 (female) F	Resistance	1 Ω and below	
			Between L21 (female) (3), L31 (female) (5) ~ body	Resistance	1 MΩ and above	
			Harness between L21 (female) (5) ~ C12 (female) (2)	Resistance	1 Ω and below	
			Between L21 (female) (5), C12 (female) (2) ~ body	Resistance	1 MΩ and above	
			Harness between L21 (female) (4) ~ C12 (female) (1)	Resistance	1 Ω and below	
			Between L21 (female) (4), C12 (female) (1) ~ body	Resistance	1 MΩ and above	
			Harness between L31 (female) (6) ~ C12 (female) (5)	Resistance	1 Ω and below	
			Between L31 (female) (6), C12 (female) (5) ~ body	Resistance	1 MΩ and above	
	5	Harness disconnection or ground fault ★ Fuse A-H blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors FS4, L21, C12, C15, C43, C44, and C45. 3) Connect t-adapter			
			Harness between L21 (female) (7) ~ FS4 (female) (7)	Resistance	1 Ω and below	
			Between L21 (female) (7), FS4 (female) (7) ~ body	Resistance	1 MΩ and above	

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Related circuit diagram

ZOOM – see section 90, page 90-51



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Action code [E-5-B]

Action Code	Error Code	Controller Code	Trouble	The rear wiper does not function
E-5-B	—	—		
Description of Trouble	• Since a fault occurs in the rear wiper, switch, or harness, the rear wiper does not function.			
Controller Reaction	—			
Effect on Machine	• The rear wiper does not function.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Rear wiper motor fault	1) Turn starting switch OFF. 2) Disconnect connector C15. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between C15 (2) ~ body (Wiper switch Lo)	Voltage	20 ~ 30 V
			Between C15 (1) ~ body	Voltage	20 ~ 30 V
			When the wiper switch is turned OFF during running of the wiper, the voltage is applied between the C15 d ~ body until the wiper motor stops		
	2	Rear wiper switch fault	1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L21 (7) ~ body	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect t-adapter.		
			Between L21 (male) (7) ~ (9) (Wiper switch Lo)	Resistance	1 Ω and below
			Between L21 (male) (8) ~ (9) (Wiper switch OFF)	Resistance	1 Ω and below
			Others	Resistance	1 MΩ and above
	3	Harness disconnection or defective contact ★ Fuse A-h blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors L21 and C15. 3) Connect t-adapter.		
			Harness between L21 (female) (8) ~ C15 (female) (3)	Resistance	1 Ω and below
			Between L21 (female) (8), C15 (female) (3) ~ body	Resistance	1 MΩ and above
			Harness between L21 (female) (9) ~ C15 (female) (2)	Resistance	1 Ω and below
			Between L21 (female) (9), C15 (female) (2) ~ body	Resistance	1 MΩ and above
			1) Turn starting switch OFF. 2) Disconnect connectors FS4, L21, C12, C15, C43, C44, and C45... 3) Connect t-adapter.		
			Harness between L21 (female) (7) ~ FS4 (female) (7)	Resistance	1 Ω and below
			Between L21 (female) (7), FS4 (female) (7) ~ body	Resistance	1 MΩ and above

Related circuit diagram (For others, see item E-5-A.)

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Action code [E-5-C]

Action Code	Error Code	Controller Code	Trouble	The side wiper does not function (op)
E-5-C	—	—		
Description of Trouble	• Since a fault occurs in the side wiper, switch, or harness, the side wiper does not function.			
Controller Reaction	—			
Effect on Machine	• The side wiper does not function.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Side wiper fault	1) Turn starting switch OFF. 2) Disconnect connectors C44 and C45. 3) Connect t-adapter. 4) Turn starting switch ON.		
			• Right side wiper		
			Between C44 (1) ~ body (Wiper switch Lo)	Voltage	20 ~ 30 V
			When the wiper switch is turned OFF during running of the wiper, the voltage is applied between the C44 (2) ~ body until the wiper motor stops		
			Between C44 (4) ~ body (Power)	Voltage	20 ~ 30 V
			• Left side wiper		
			Between C45 (1) ~ body (Wiper switch Lo)	Voltage	20 ~ 30 V
			When the wiper switch is turned OFF during running of the wiper, the voltage is applied between the C45 (2) ~ body until the wiper motor stops		
			Between C45 (3) ~ body (Power)	Voltage	20 ~ 30 V
	2	Side wiper switch fault	1) Turn starting switch OFF. 2) Disconnect connector C43. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between C43 (3) ~ body (Power)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector C43. 3) Connect t-adapter.		
			Between C43 (female) (3) ~ (2) (Wiper switch Lo)	Resistance	1 Ω and below
			Between C43 (female) (2) ~ (1) (Wiper switch OFF)	Resistance	1 Ω and below
			Others	Resistance	1 MΩ and above
	3	Harness disconnection or defective contact ★ Fuse A-h blows in this case.	1) Turn starting switch OFF. 2) Disconnect connectors C43, C44, and C45. 3) Connect t-adapter.		
			Harness between C43 (female) (2)~ C44 (female) (1) (C45 (female) (1))	Resistance	1 Ω and below
			Between C43 (female) (2), C44 (female) (1) (C45 (female) (1) ~ body)	Resistance	1 MΩ and above
			Harness between C43 (female) (1) ~ C44 (female) (2) (C45 (female) (2))	Resistance	1 Ω and below
			Between C43 (female) (1), C44 (female) (2) (C45 (female) (2))	Resistance	1 MΩ and above
			1) Turn starting switch OFF. 2) Disconnect connectors L21, L31, FS4, R43, R45, C12, C15, C43, C44, and C45. 3) Connect t-adapter.		
			Harness between C43 (female) (3) ~ FS4 (female) (7)	Resistance	1 Ω and below
			Between C43 (female) (3), FS4 (female) (7) ~ and body	Resistance	1 MΩ and above

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Action code [E-6]

Action Code	Error Code	Controller Code	Trouble	The wind washer does not function
E-6	—	—		
Description of Trouble	• Since a fault occurs in the window washer motor, switch, timer (Front only), or harness, the wind washer does not function.			
Controller Reaction	—			
Effect on Machine	• The wind washer does not function.			
Related Information	• When the wiper function is normal (When the wiper function is also abnormal, first diagnose the wiper function fault in Others-1).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Washer motor fault	1) Turn starting switch OFF. 2) Disconnect connectors R43 and R45. 3) Connect t-adapter. 4) Turn starting switch ON.		
			• Front washer motor		
			Between R43 (1) ~ body	Voltage	20 ~ 30 V
			• Rear washer motor		
			Between R45 (1) ~ body	Voltage	20 ~ 30 V
	2	Wiper switch fault	1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect t-adapter.		
			• Common to front switch and rear switch		
			Between L21 (7) ~ body	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect t-adapter.		
			• Front switch		
			Between L21 (male) (7) ~ (6) (Washer switch OFF)	Resistance	1 Ω and below
			Between L21 (male) (7) ~ (6) (Washer switch ON)	Resistance	1 MΩ and above
			• Rear switch		
			Between L21 (male) (7) ~ (10) (Washer switch ON)	Resistance	1 Ω and below
			Between L21 (male) (7) ~ (10) (Washer switch OFF)	Resistance	1 MΩ and above
			Between L21 (male) (7) ~ (9), and (10) (Washer wiper Lo switch ON)	Resistance	1 Ω and below
	3	Wiper timer (Relay) fault (Front wiper only)	1) Turn starting switch OFF. 2) Disconnect connector L31. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L31 (3) ~ body	Voltage	20 ~ 30 V
			Between L31 (2) ~ body (Washer switch ON)	Voltage	20 ~ 30 V
			Between L31 (5) ~ body (0.2 ~ 0.8 sec. after the washer switch was turned ON)	Voltage	20 ~ 30 V

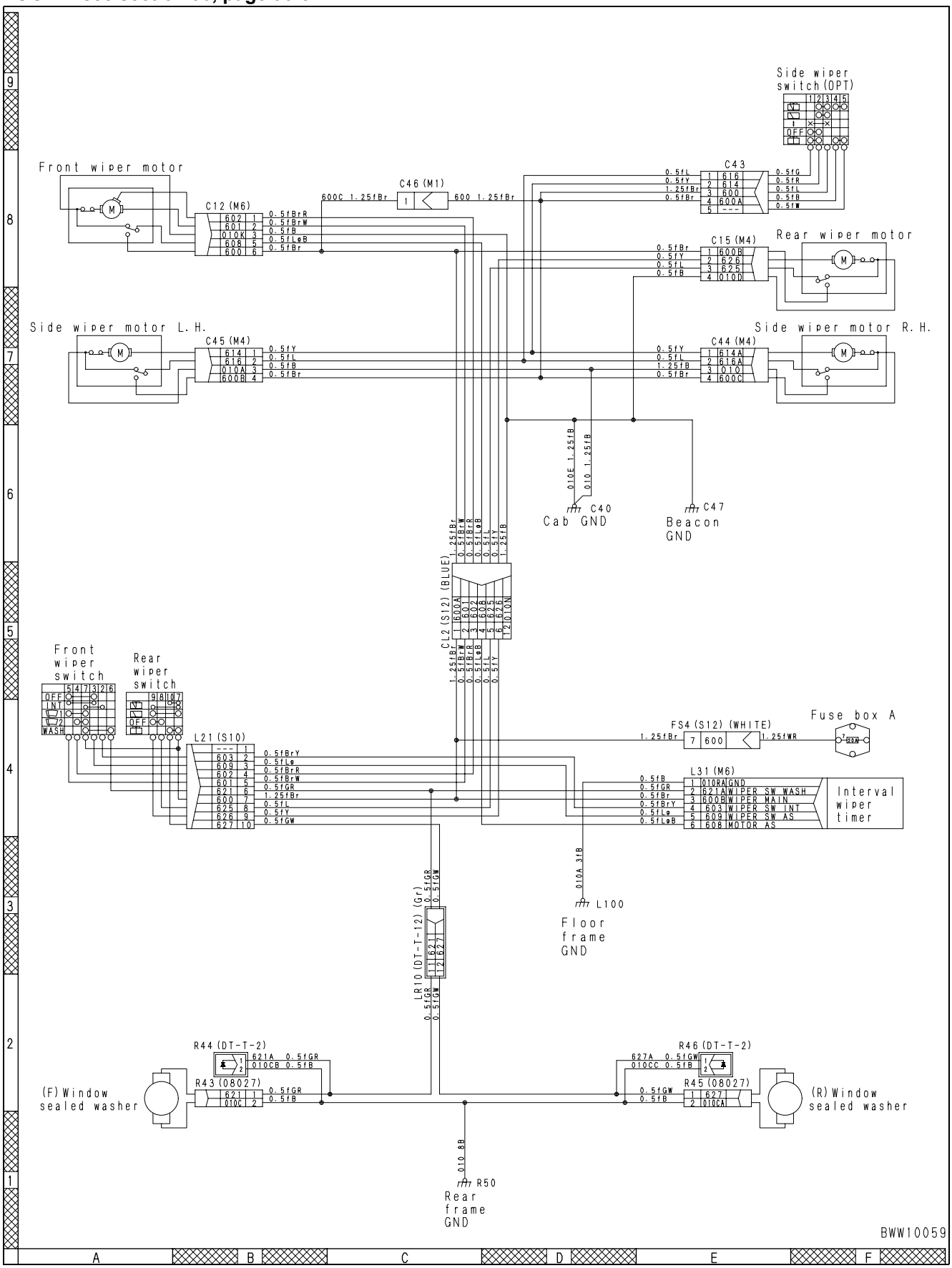
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Action Code	Error Code	Controller Code	Trouble	The wind washer does not function	
E-6	—	—			
Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting			
	4 ★ Harness disconnection or ground fault ★ Fuse A-H blows at occurrence of a ground fault.	1) Turn starting switch OFF. 2) Disconnect connectors L21, R43, R45, and L31. 3) Connect t-adapter.			
		• Front washer motor circuit			
		Harness between L21 (female) (6) ~ R43 (female) (1)		Resistance	1 Ω and below
		Between L21 (female) G, R43 (female) B ~ body		Resistance	1 MΩ and above
		Harness between L21 (female) (6) ~ L31 (female) (2)		Resistance	1 Ω and below
		Between L21 (female) (6), L31 (female) (2) ~ body		Resistance	1 MΩ and above
		Harness between L21 (female) (3) ~ L31 (female) (3)		Resistance	1 Ω and below
		Between L21 (female) (3), L31 (female) (3) ~ body		Resistance	1 MΩ and above
		• Rear washer motor circuit			
		Harness between L21 (female) (10) ~ R45 (female) (1)		Resistance	1 Ω and below
		Between L21 (female) (10), R45 (female) (1) ~ body		Resistance	1 MΩ and above
		1) Turn starting switch OFF. 2) Disconnect connectors L21, L31, FS4, R43, R45, C12, C15, C43, C44, and C45.			
		Harness between L21 (female) (7) ~ FS4 (female) (7)		Resistance	1 Ω and below
		Between L21 (female) (7), FS4 (female) (7) ~ body		Resistance	1 MΩ and above

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Related circuit diagram

ZOOM – see section 90, page 90-51



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Action code [E-7-A]

Action Code	Error Code	Controller Code	Trouble	The headlamp (Lo beam) does not light on
E-7-A	—	—		
Description of Trouble	• Since a disconnection (Ground fault) occurs in the switch, lamp, or harness in the headlamp system, the headlamp (Lo beam) does not light on.			
Controller Reaction	—			
Effect on Machine	• The headlamp (Lo beam) does not light on.			
Related Information	—			

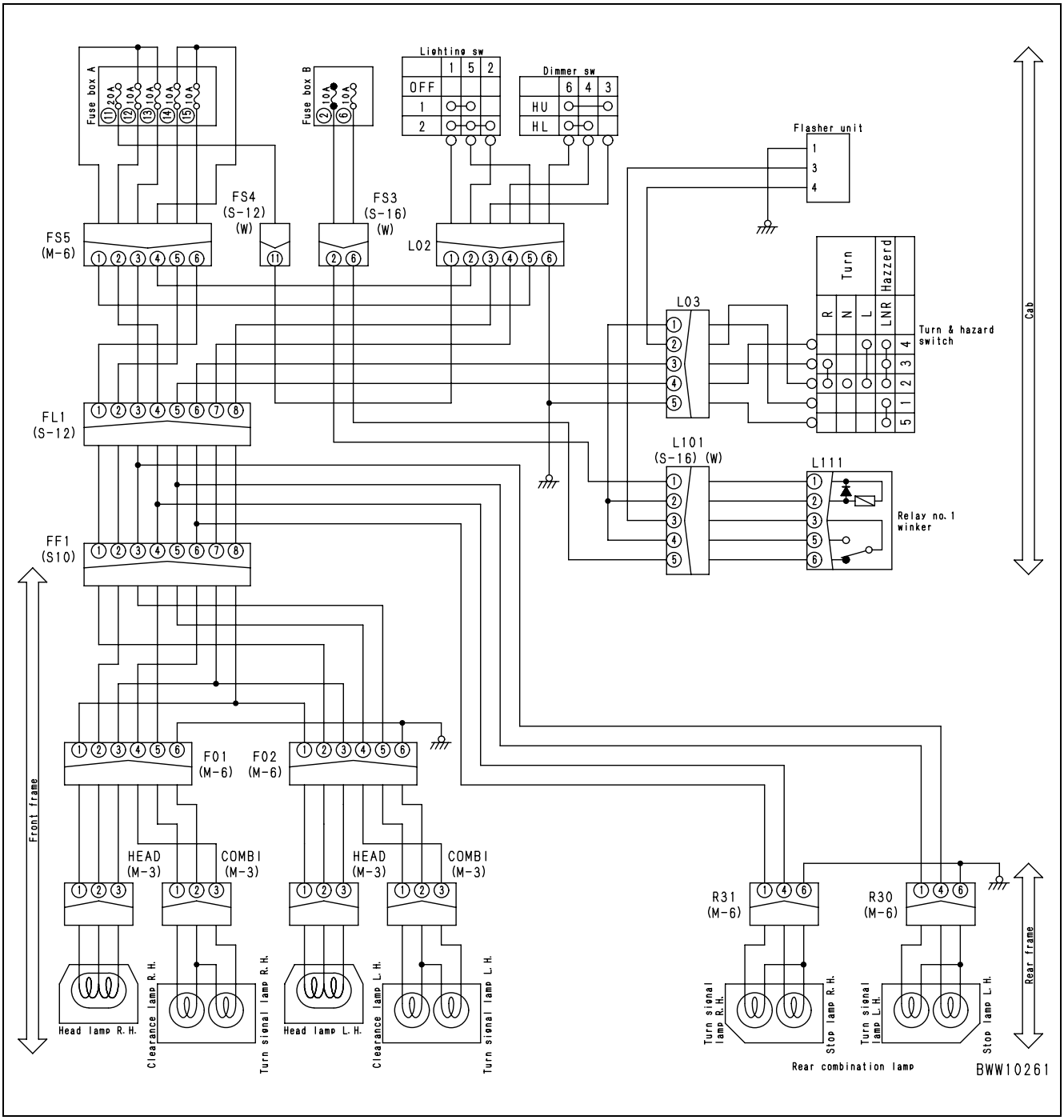
	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Lamp fault	1) Turn starting switch OFF. 2) Disconnect the connector heads on the left and right. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between head (2) (Left and right) ~ body (Lamp switch 2nd row)	Voltage	20 ~ 30 V
			Between head (1) (Left and right) ~ body (Lamp switch 2nd row, Dimmer switch Lo)	Voltage	20 ~ 30 V
	2	Lamp switch or dimmer switch fault	1) Turn starting switch OFF. 2) Disconnect connector L02. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L02 (1) ~ body	Voltage	20 ~ 30 V
			Between L02 (2) ~ body (Lamp switch 2nd row)	Voltage	20 ~ 30 V
			Between L02 (4) ~ body (Lamp switch 2nd row, Dimmer switch Lo)	Voltage	1 V and below
			Between L02 e ~ body (Lamp switch OFF, Dimmer switch Hi)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L02. 3) Connect t-adapter.		
			Between L02 (male) (1) ~ (2) (Lamp switch 2nd row)	Resistance	1 Ω and below
			Between L02 (male) (4) ~ (6) (Dimmer switch Lo)	Resistance	1 Ω and below
			Others	Resistance	1 MΩ and above

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Action Code	Error Code		Controller Code	Trouble	The headlamp (Lo beam) does not light on	
E-7-A	—		—			
	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	3	Harness disconnection or ground fault ★ Fuses A-1, A-12, and A-13 blow at occurrence of a ground fault.	1) Turn starting switch OFF. 2) Disconnect connectors L02, FS4, FS5, and left and right heads. 3) Connect t-adapter.			
			Harness between L02 (female) (1) ~ FS4 (female) (11)		Resistance	1 Ω and below
			Between L02 (female) (1) ~ FS4 (female) (11) harness ~ body		Resistance	1 MΩ and above
			Harness between L02 (female) (2) ~ FS5 (female) (4)		Resistance	1 Ω and below
			Between L02 (female) (2) ~ FS5 (female) (4) harness ~ body		Resistance	1 MΩ and above
			Harness between FS5 (female) (5) ~ right head (female) (2)		Resistance	1 Ω and below
			Between FS5 (female) (5) ~ right head (female) (2) harness ~ body		Resistance	1 MΩ and above
			Harness between FS5 (female) (6) ~ left head (female) (2)		Resistance	1 Ω and below
			Between FS5 (female) (6) ~ left head (2) harness ~ body		Resistance	1 MΩ and above
			Harness between L02 (female) (4) ~ right head (female) (1)		Resistance	1 Ω and below
			Between L02 (female) (4) ~ right head (female) (1) harness ~ body		Resistance	1 MΩ and above
			Harness between L02 (female) (4) ~ right head (female) (1)		Resistance	1 Ω and below
			Between L02 (female) (4) ~ left head (female) (1) harness ~ body		Resistance	1 MΩ and above
			Harness between FS5 (male) (4) ~ (5) (Including fuse A-13)		Resistance	1 Ω and below
			Between FS5 (male) (4) ~ (5) harness ~ body		Resistance	1 MΩ and above
			Harness between FS5 (male) (4) ~ (6) (Including fuse A-12)		Resistance	1 Ω and below
			Between FS5 (male) (4) ~ (6) harness ~ body		Resistance	1 MΩ and above
			Between L02 (female) (6) ~ body		Resistance	1 Ω and below

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Related circuit diagram



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Action code [E-7-B]

Action Code	Error Code	Controller Code	Trouble	The headlamp (Hi beam) does not function
E-7-B	—	—		
Description of Trouble	• Since a disconnection (Ground fault) occurs in the switch, lamp, or harness in the headlamp system, the headlamp (Hi beam) does not light on.			
Controller Reaction	—			
Effect on Machine	• The headlamp (Hi beam) does not light on.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Lamp fault	1) Turn starting switch OFF. 2) Disconnect the connector heads on the left and right. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between head (2) (Left and right) ~ body (Lamp switch 2nd row)	Voltage	20 ~ 30 V
			Between head (3) (Left and right) ~ body (Lamp switch 2nd row, dimmer switch Hi)	Voltage	20 ~ 30 V
	2	Lamp switch or dimmer switch fault	1) Turn starting switch OFF. 2) Disconnect connector L02. 3) Connect t-adapter.		
			Between L02 (1) ~ body	Voltage	20 ~ 30 V
			Between L02 (2) ~ body (Lamp switch 2nd row)	Voltage	20 ~ 30 V
			Between L02 (3) ~ body (Lamp switch 2nd row, Dimmer switch Hi)	Voltage	1 V and below
			Between L02 (3) ~ body (Lamp switch OFF, Dimmer switch Lo)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L02. 3) Connect t-adapter.		
			Between L02 (male) (1) ~ (2) (Lamp switch 2nd row)	Resistance	1 Ω and below
			Between L02 (male) (3) ~ (6) (Dimmer switch Hi)	Resistance	1 Ω and below
			Others	Resistance	1 MΩ and above
	3	Harness disconnection or ground fault ★ Fuses A-1, A-12, and A-13 blow at occurrence of a ground fault.	1) Turn starting switch OFF. 2) Disconnect connectors L02, FS4, FS5, and left and right heads. 3) Connect t-adapter.		
			Harness between L02 (female) (1) ~ FS4 (female) (11)	Resistance	1 Ω and below
			Between L02 (female) (1) ~ FS4 (female) (11) harness ~ body	Resistance	1 MΩ and above
			Harness between L02 (female) (2) ~ FS5 (female) (4)	Resistance	1 Ω and below
			Between L02 (female) (2) ~ FS5 (female) (4) harness ~ body	Resistance	1 MΩ and above
			Harness between FS5 (female) (5) ~ right head (female) (2)	Resistance	1 Ω and below
			Between FS5 (female) (5) ~ right head (female) (2) harness ~ body	Resistance	1 MΩ and above
			Harness between FS5 (female) (6) ~ left head (female) (2)	Resistance	1 Ω and below
			Between FS5 (female) (6) ~ left head (2) harness ~ body	Resistance	1 MΩ and above

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Action Code	Error Code		Controller Code	Trouble	The headlamp (Hi beam) does not light on	
E-7-B	—		—			
Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
	3	Harness disconnection or ground fault ★ Fuses A-1, A-12, and A-13 blow at occurrence of a ground fault.	Harness between L02 (female) (3) ~ right head (female) (1)		Resistance	1 Ω and below
			Between L02 (female) (3) ~ right head (female) (1) harness ~ body		Resistance	1 MΩ and above
			Harness between L02 (female) (3) ~ left head (female) (1)		Resistance	1 Ω and below
			Between L02 (female) (3) ~ left head (female) (1) harness ~ body		Resistance	1 MΩ and above
			Harness between FS5 (male) (4) ~ (5) (Including fuse A-13)		Resistance	1 Ω and below
			Between FS5 (male) (4) ~ (5) harness ~ body		Resistance	1 MΩ and above
			Harness between FS5 (male) (4) ~ (5) (Including fuse A-12)		Resistance	1 Ω and below
			Between FS5 (male) (4) ~ (5) harness ~ body		Resistance	1 MΩ and above
			Between L02 (female) (6) ~ body		Resistance	1 Ω and below

Related circuit diagram (For others, see item E-7-A.)

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Action code [E-7-C]

Action Code	Error Code	Controller Code	Trouble	The clearance lamp does not light on (Small lamp)
E-7-C	—	—		
Description of Trouble	• Since a disconnection (Ground fault) occurs in the switch, lamp, or harness in the clearance lamp system, the clearance lamp does not light on.			
Controller Reaction	—			
Effect on Machine	• The clearance lamp does not light on (Small lamp).			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Lamp fault	1) Turn starting switch OFF. 2) Disconnect the connector COMB1 (Left and right). 3) Connect t-adapter. 3) Turn starting switch ON.		
			Between COMB1 (1) (Left and right) ~ body (Lamp switch 1st row)	Voltage	20 ~ 30 V
	2	Lamp switch fault	1) Turn starting switch OFF. 2) Disconnect connector L02. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L02 (1) ~ body	Voltage	20 ~ 30 V
			Between L02 (5) ~ body (Lamp switch 5th row)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L02. 3) Connect t-adapter.		
			Between L02 (male) (1) ~ (5) (Lamp switch 1st row)	Resistance	1 Ω and below
			Others	Resistance	1 MΩ and above
	3	Harness disconnection or ground fault ★ Fuses A-1, A-14, and A-15 blow at occurrence of a ground fault.	1) Turn starting switch OFF. 2) Disconnect connectors L02, FS4, FS5, and left and right heads. 3) Connect t-adapter.		
			Harness between L02 (female) (1) ~ FS4 (female) (11)	Resistance	1 Ω and below
			Between L02 (female) (1) ~ FS4 (female) (11) harness ~ body	Resistance	1 MΩ and above
			Harness between L02 (female) (2) ~ FS5 (female) (4)	Resistance	1 Ω and below
			Between L02 (female) (2) ~ FS5 (female) (4) harness ~ body	Resistance	1 MΩ and above
			Harness between L02 (female) (2) ~ COMB1 right (1)	Resistance	1 Ω and below
			Between FS5 (female) (2) ~ COMB1 (female) (1) harness ~ body	Resistance	1 MΩ and above
			Harness between FS5 (female) (3) ~ COMB1 (female) (1)	Resistance	1 Ω and below
			Between FS5 (female) (3) ~ COMB1 right (female) (1) harness ~ body	Resistance	1 MΩ and above
			Harness between FS5 (male) (1) ~ (2) (Including fuse A-13)	Resistance	1 Ω and below
			Between FS5 (male) (1) ~ (2) harness ~ body	Resistance	1 MΩ and above
			Harness between FS5 (male) (1) ~ (3) (Including fuse A-12)	Resistance	1 Ω and below
			Between FS5 (male) (1) ~ (3) harness ~ body	Resistance	1 MΩ and above
			Between COMB (female) (Left and right) (3) ~ body	Resistance	1 Ω and below

Related circuit diagram (For others, see item E-7-A.)

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Action code [E-7-D]

Action Code	Error Code	Controller Code	Trouble	The turn signal does not blink
E-7-D	—	—		
Description of Trouble	• Since a disconnection (Ground fault) occurs in the switch, relay, or harness in the turn signal system, the turn signal does not blink.			
Controller Reaction	—			
Effect on Machine	• The turn signal does not blink.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Turn signal relay fault	1) Turn starting switch OFF. 2) Disconnect connector L111. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L111 (4) ~ body (Power)	Voltage	20 ~ 30 V
			Between L111 (3) ~ body (Turn signal switch = Neutral)	Voltage	20 ~ 30 V
			Between L111 (2) ~ body (Turn signal switch = Neutral)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L111. 3) Connect t-adapter.		
			Between L111 (male) (3) ~ (4) (Between contacts)	Resistance	1 Ω and below
	2	Turn signal switch fault	1) Turn starting switch OFF. 2) Disconnect connector L03. 3) Connect t-adapter. 4) Turn starting switch ON.		
			Between L03 (2) ~ body (Turn signal L or R)	Voltage	20 ~ 30 V and 0 V repeated
			Between L03 (3) ~ body (Turn signal switch R)	Voltage	20 ~ 30 V and 0 V repeated
			Between L03 (4) ~ body (Turn signal switch L)	Voltage	20 ~ 30 V and 0 V repeated
			1) Turn starting switch OFF. 2) Disconnect connector L03. 3) Connect t-adapter.		
			Between L03 (male) (2) ~ (3) (Turn signal switch R)	Resistance	1 Ω and below
			Between L03 (male) (2) ~ (4) (Turn signal switch L)	Resistance	1 Ω and below
	3	Flasher unit fault	1) Turn starting switch ON.		
			Between flasher unit pin (3) ~ body	Voltage	20 ~ 30 V
			Between flasher unit pin (4) ~ body (Turn signal switch L or R)	Voltage	20 ~ 30 V and 0 V repeated

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Action Code	Error Code	Controller Code	Trouble	The turn signal does not blink	
E-7-D	—	—			
Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting			
	4 ★ Harness disconnection or ground fault ★ Fuse B-5 blows at occurrence of a ground fault.	1) Turn starting switch OFF. 2) Disconnect connectors L101, L03, FS3, COMB1 (Left and right), R30, R31, and flasher unit pins (3) and (4). 3) Connect t-adapter.			
		Harness between L101 (female) (3) ~ flasher unit pin (3)		Resistance	1 Ω and below
		Between L101 (female) (3) ~ flasher unit pin (3) harness ~ body		Resistance	1 MΩ and above
		Harness between L03 (female) (2) ~ flasher unit pin (4)		Resistance	1 Ω and below
		Between L03 (female) (2) ~ flasher unit pin (4) harness ~ body		Resistance	1 MΩ and above
		Harness between L101 (female) (5) ~ FS3 (female) (5)		Resistance	1 Ω and below
		Between L101 (female) (5) ~ FS3 (female) (5) harness ~ body		Resistance	1 MΩ and above
		Harness between L03 (female) (3) ~ COMB1 right (female) (3)		Resistance	1 Ω and below
		Between L03 (female) (3) ~ COMB1 right (female) (3) harness ~ body		Resistance	1 MΩ and above
		Harness between L03 (female) (4) ~ COMB1 left (female) (3)		Resistance	1 Ω and below
		Between L03 (female) (4) ~ COMB1 left (female) (3) harness ~ body		Resistance	1 MΩ and above
		Harness between L03 (female) (4) ~ R31 (female) (1)		Resistance	1 Ω and below
		Between L03 (female) (3) ~ R31 (female) (1) harness ~ body		Resistance	1 MΩ and above
		Harness between L03 (female) (4) ~ R30 (female) (1)		Resistance	1 Ω and below
		Between L03 (female) (4) ~ R30 (female) (1) harness ~ body		Resistance	1 MΩ and above
		Between COMB1 (female) (Left and right) (3) ~ body		Resistance	1 Ω and below
		Between R30 (female) (6), R31 (female) (6) ~ body		Resistance	1 Ω and below
		Between flasher unit pin (1) ~ body		Resistance	1 Ω and below

Related circuit diagram (For others, see item E-7-a.)

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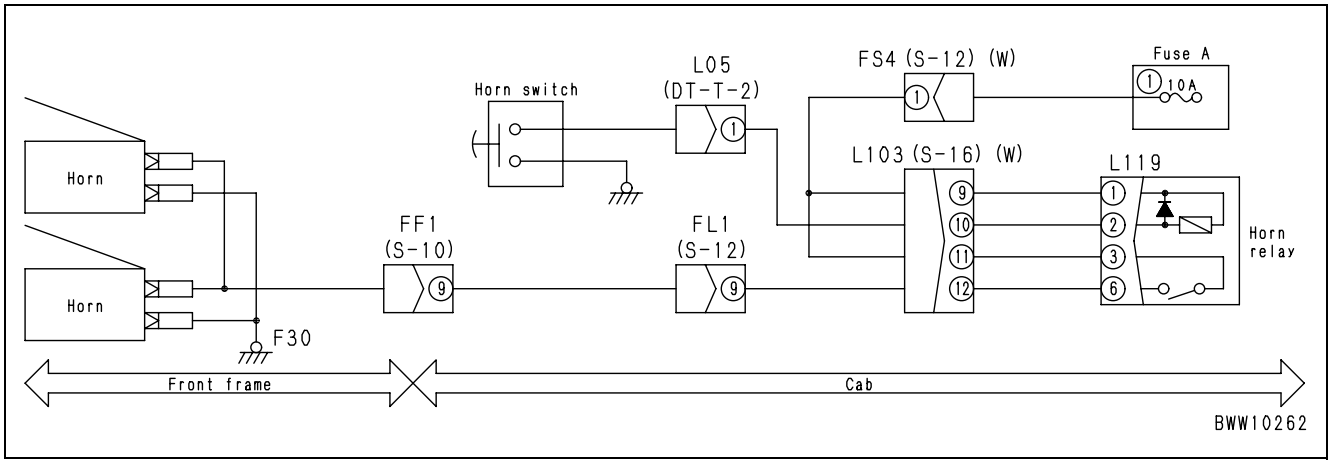
Action code [E-8]

Action Code	Error Code	Controller Code	Trouble	The horn does not sound
E-8	—	—		
Description of Trouble	• Since a disconnection or (Ground fault) occurs in the switch, relay, horn, or harness in the horn system, the horn does not sound.			
Controller Reaction	—			
Effect on Machine	• The horn does not sound.			
Related Information	—			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Horn relay fault	1) Turn starting switch OFF. 2) Disconnect connector L119. 3) Connect t-adapter (Insert). 4) Turn starting switch ON.		
			Between L119 (1), (3) ~ body (Power)	Voltage	20 ~ 30 V
			Between L110 (2) ~ body (Horn switch OFF)	Voltage	20 ~ 30 V
			Between L119 (2) ~ body (Horn switch ON)	Voltage	1 V and below
			Between L119 (5) ~ body (Horn switch ON)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L119. 3) Connect t-adapter.		
			Between L119 (male) (1) ~ (2) (Coil resistance)	Resistance	200 ~ 400 Ω
			Between L119 (male) (3) ~ (5) (Between pints)	Resistance	1 MΩ and above
	2	Horn switch fault	1) Turn starting switch ON.		
			Between horn switch pin ~ body (Horn switch ON)	Voltage	1 V and below
			Between horn switch pin ~ body (Horn switch OFF)	Voltage	20 ~ 30 V
			1) Turn starting switch OFF. 2) Disconnect the horn switch pin.		
			Between horn switch pin ~ body (Switch ON)	Resistance	1 Ω and below
	3	Horn fault	1) Turn starting switch ON.	Resistance	1 MΩ and above
			Between horn pin ~ body (Horn switch ON)	Resistance	35 ~ 45 Ω
	4	Harness disconnection or ground fault ★ Fuse A-1 blows at occurrence of a ground fault.	1) Turn starting switch OFF. 2) Disconnect the horn pin, horn switch pin, and connectors L103 and FS4. 3) Connect t-adapter.		
			Harness between FS4 (female) (1) ~ L103 (female) (9), (11)	Resistance	1 Ω and below
			Between FS4 (female) (1), L103 (female) (9), (11) ~ body	Resistance	1 MΩ and above
			Harness between horn switch pin ~ L103 (female) (10)	Resistance	1 Ω and below
			Between horn switch pin, L103 (female) (10) ~ body	Resistance	1 MΩ and above
			Harness between horn pin ~ L103 (female) (12)	Resistance	1 Ω and below
			Between horn pin, L103 (female) (12) ~ body	Resistance	1 MΩ and above

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Related circuit diagram



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Shop Manual
Part II

VEBM180101

WA470-5H
WA480-5H

WHEEL LOADER

MODEL	SERIAL NUMBER
WA470-5H	WA470H50051 AND UP
WA480-5H	WA480H50051 AND UP

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local KOMATSU distributor for those items you may require. Materials and specifications are subject to change without notice.
- WA470-5 and WA480-5 mount the SAA6D125-3 engine.
  For details of the engine, see the 125-3 Series Engine Shop Manual

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Method of using manual

1. When removing or installing unit assemblies

a. When removing or installing a unit assembly, the order of work and techniques used are given for the removal operation; the order of work for the installation operation is not given.

b. Any special techniques applying only to the installation procedure are marked ※1, and the same mark is placed after the relevant step in the removal procedure to indicate which step in the installation procedure it applies to.

(Example)

REMOVAL OF ○○○ ASSEMBLY	Title of operation
⚠	Precautions related to safety when carrying out the operation
1. XXXX (1)	Step in operation
★	Technique or important point to remember when removing XXXX (1).
2. ♦♦♦♦ (2)	※1 Indicates that a technique is listed for use during installation
3. ❒❒❒❒ assembly (3)	
	See lubricant and coolant table.
INSTALLATION OF ○○○ ASSEMBLY	Title of operation
• Carry out installation in the reverse order of removal	
※1	Technique used during installation
★	Technique or important point to remember when installing ♦♦♦♦ (2).
• Adding water, oil	Step in operation
★	Point to remember when adding water or oil
	Quantity when filling with oil and water

c. General precautions when carrying out installation or removal (disassembly or assembly) of units are given together as PRECAUTION WHEN CARRYING OUT OPERATION, so be sure to follow these precautions when carrying out the operation.

2. Listing of special tools

a. For details of the description, part number, and quantity of any tools (**A1**, etc.) that appear in the operation procedure, see the SPECIAL TOOL LIST given in this manual.

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Precautions when carrying out operation

[When carrying out removal or installation (disassembly or assembly) of units, be sure to follow the general precautions given below when carrying out the operation.]

1. Precautions when carrying out removal work

- If the coolant contains antifreeze, dispose of it correctly.
- After disconnecting hoses or tubes, cover them or fit blind plugs to prevent dirt or dust from entering.
- When draining oil, prepare a container of adequate size to catch the oil.
- Confirm the match marks showing the installed position, or make match marks in the necessary places before removal to prevent any mistake when assembling.
- To prevent any excessive force from being applied to the wiring, disconnect connectors by grasping the connector, not the wire.
- Tag wires and hoses to show their installed position to prevent any mistake when reinstalling.
- Check the number and thickness of the shims, and keep in a safe place.
- When raising components, be sure to use lifting equipment of ample strength.
- When using forcing screws to remove any components, tighten the forcing screws alternately.
- Before removing any unit, clean the surrounding area and fit a cover to prevent dust or dirt from entering after removal.

★ Precautions when handling piping during disassembling

Fit the following blind plugs into the piping after disconnecting it during disassembly operations.

a. Hoses and tubes using sleeve nuts

Nominal number	Plug (nut end)	Sleeve nut (elbow end) Use the two items below as a set
02	07376-50210	07221-20210 (Nut), 07222-00210 (Plug)
03	07376-50315	07221-20315 (Nut), 07222-00312 (Plug)
04	07376-50422	07221-20422 (Nut), 07222-00414 (Plug)
05	07376-50522	07221-20522 (Nut), 07222-00515 (Plug)
06	07376-50628	07221-20628 (Nut), 07222-00616 (Plug)
10	07376-51034	07221-21034 (Nut), 07222-01018 (Plug)
12	07376-51234	07221-21234 (Nut), 07222-01219 (Plug)

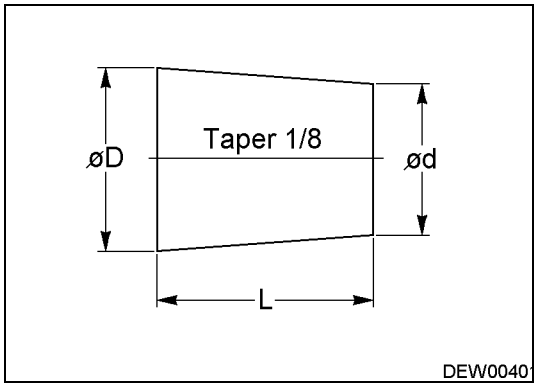
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a. Split flange type hoses and tubes

Nominal number	Flange (hose end)	Sleeve head (tube end)	Split flange
04	07379-00400	07378-10400	07371-30400
05	07379-00500	07378-10500	07371-30500

b. If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Part Number	Dimensions		
		D	d	L
06	07049-00608	6	5	8
08	07049-00811	8	6.5	11
10	07049-01012	10	8.5	12
12	07049-01215	12	10	15
14	07049-01418	14	11.5	18
16	07049-01620	16	13.5	20
18	07049-01822	18	15	22
20	07049-02025	20	17	25
22	07049-02228	22	18.5	28
24	07049-02430	24	20	30
27	07049-02734	27	22.5	34



2. Precautions when carrying out installation work

- Tighten all bolts and nuts (sleeve nuts) to the specified (KES) torque.
- Install the hoses without twisting or interference.
- Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
- Bend the cotter pin or lock plate securely.
- When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2 - 3 drops of adhesive.
- When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
- Clean all parts, and correct any damage, dents, burrs, or rust.
- Coat rotating parts and sliding parts with engine oil.
- When press fitting parts, coat the surface with anti-friction compound (LM-P).
- After fitting snap rings, check that the snap ring is fitted securely in the ring groove.

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- When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
- When using eye bolts, check that there is no deformation or deterioration, screw them fully, and align the direction of the hook.
- When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.

3. Precautions when completing the operations

- If the coolant has been drained, tighten the drain valve, and add water to the specified level. Run the engine to circulate the water through the system. Then check the coolant water level again.
- If the hydraulic equipment has been removed and installed again, add hydraulic oil to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.
- If the piping or hydraulic equipment, such as hydraulic cylinders, pumps, or motors, have been removed for repair, always bleed the air from the system after reassembling the parts.

★ For details, see TESTING AND ADJUSTING, Bleeding air.

- Add the specified amount of grease (molybdenum disulphide grease) to the work equipment related parts.

4. Other precautions

- To maintain the performance of the machine and to prevent failures, it is particularly important to pay attention to the degree of cleanliness of the oil in the hydraulic circuits. When adding oil or changing the oil, or when replacing the filters, check that the oil container and area around the filler of the hydraulic tank are clean.
- To keep the hydraulic circuits clean and to protect the hydraulic equipment, be careful of the following points when disassembling or assembling.
- Before disassembling, wash the machine. Be particularly careful to completely clean the area that is to be disassembled.
- Do not let dirt or dust get into the hydraulic circuits when disassembling or assembling.
- Carry out thorough flushing of the parts, and be particularly careful to do this thoroughly for the circuits of parts that have failed.
- When disassembling or after flushing, always mask the openings of the piping or hydraulic equipment completely.

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- Do not use the seal tape for the thread of the plug mounts or connectors.
- If any internal part of the hydraulic equipment breaks, disassemble and clean all the hydraulic equipment and circuits to remove any dirt or pieces from the circuit. If any parts of the hydraulic circuits are disassembled and assembled, also carry out thorough flushing of the hydraulic circuits.
- When changing the oil in the hydraulic tank, or when removing the piston pump or piston pump piping, always bleed the air before starting the engine to prevent seizure of the pump.
  For details, see TESTING AND ADJUSTING, Bleeding air from piston pump.

★ After replacing or flushing the hydraulic tank oil, filter element, or strainer, or when removing and installing any hydraulic cylinder, hydraulic pump or any other hydraulic equipment or work equipment piping, always bleed the air as follows after completion of installation.

a. Run the engine at low idling, and extend and retract the steering, bucket, and lift arm cylinders 4 - 5 times without going to the end of this strike. (Stop approx. 100 mm before the end of the stroke.)

b. Operate the steering, bucket, and lift arm cylinders 3 - 4 times to the end of the stroke, then stop the engine and bleed the air from the plugs at the top of the hydraulic tank filter.

c. Raise the engine speed and repeat Step 2. to bleed the air. Repeat this procedure until no more air comes out from the plugs.

d. After completing bleeding the air, tighten the plugs

   kgm Plug: **11.3 ± 1.5 N·m {1.15 ± 0.15 kgm}**

   ★ If the engine is run at high speed from the start, or the cylinders are operated to the end of their stroke, the air inside the cylinder will cause damage to the piston packing.

   ★ After repair or long storage, follow the same procedure.

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Fuel supply pump assembly

Special tools

Symbol	Part Number	Part Name	Level of need	Qty	New or Revised	Schematic Drawing
A1	795-471-1500	Remover	■	1	N	○
	795-471-1510	Block		1	N	○
	795-471-1530	Bolt		1	N	○
	01435-01070	Bolt		2		

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the (-) terminal of the battery.**

1. Baffle

   Open the right and left-hand side covers, remove the mounting bolts from baffle (1) and place the baffle close to the air aftercooler.

   ★ To protect the air aftercooler, insert waste cloth between the baffle and the air aftercooler.



2. Air compressor

   Remove the air compressor and fix it with rope to the side of the machine, referring to the "Removal and installation of air compressor" section.

   ★ Do not disconnect the air compressor piping.

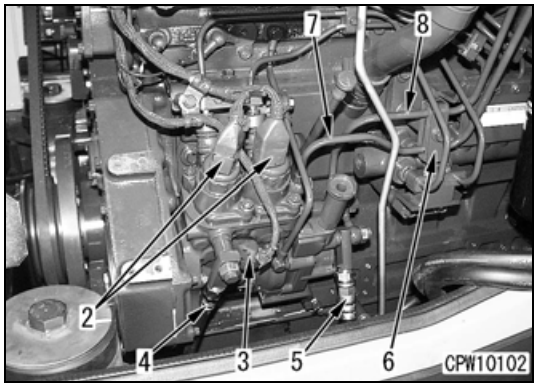
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3. Harnesses and piping

   a. Remove harness connectors (2) (CN-PCV.1 and CN-PCV.2) and (3)(CN-G).

   b. Remove fuel hoses (4) and (5). ※ 1

   c. Remove clamp (6) to remove fuel tubes (7) and (8). ※ 2

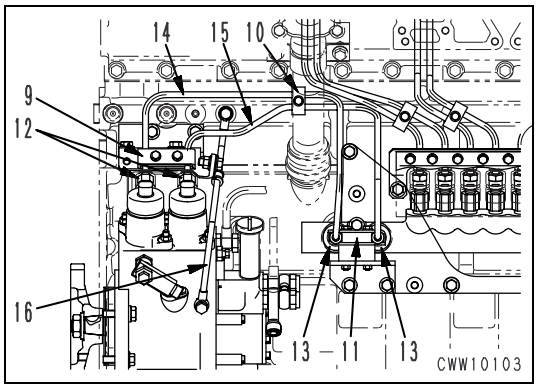


   d. Remove high-pressure pipe clamps (9), (10) and (11).

   e. Remove covers (12) and (13). ※ 3

   f. Remove high-pressure pipes (14) and (15).

   g. Remove lubrication tube (16). ※ 4



4. Fuel supply pump drive gear

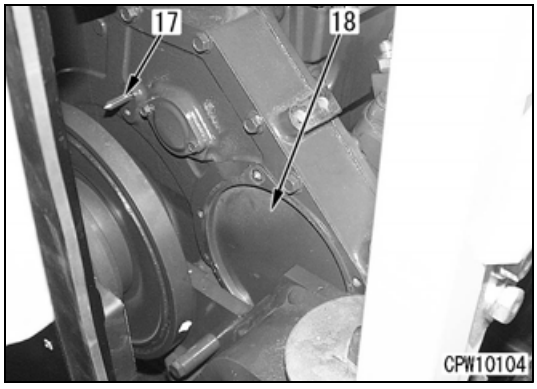
   a. Align the damper's stamp line for 1.6TOP with pointer (17).

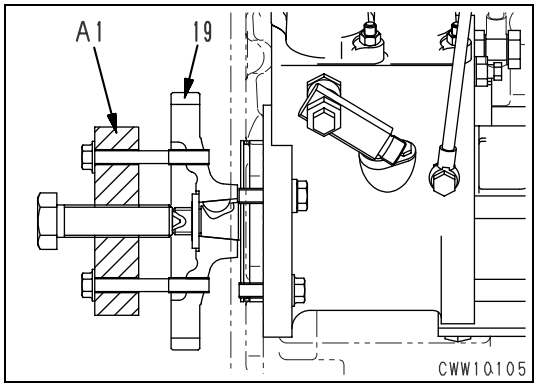
   b. Remove cover (18).

   c. Remove the gear mounting nut and remove fuel supply pump drive gear (19) using tool **A1**.

      ★ Be careful so as not to allow the nuts, washers and woodruff key on the shaft to drop into the case.

      ※ 5

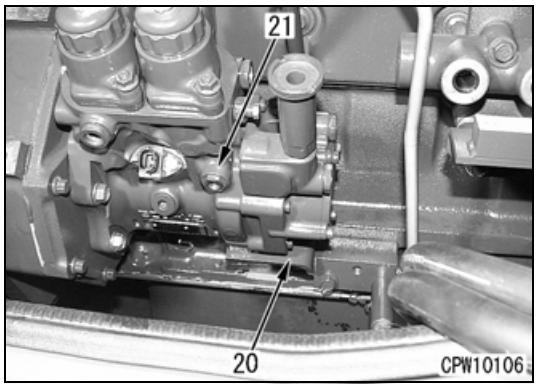




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5. Fuel supply pump

   Remove bracket (20) to remove fuel supply pump assembly (21).



Installation

- Carry out installation in the reverse order to removal.

※ 1

kgm Fuel hoses (4) and (5):
14.7 ~ 19.6 Nm {1.5 ~ 2.0 kgm}

※ 2

kgm Fuel tubes (7) and (8) on filter side and the fuel supply pump side: **24.5 ~ 34.3 Nm {2.5 ~ 3.5 kgm}**

※ 3

★ Mounting cover (12) with its slit facing the cylinder block.

★ Mounting cover (13) with its slit facing down.

※ 4

kgm Lubrication tube (16)

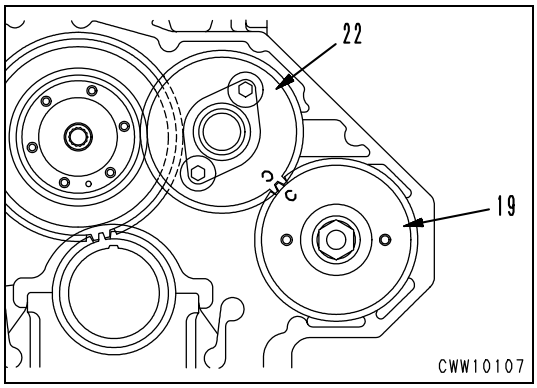
On the fuel supply pump side:
7.9 ~ 12.7 Nm {0.8 ~ 1.3 kgm}

On the cylinder block side:
9.8 ~ 12.7 Nm {1.0 ~ 1.3 kgm}

※ 5

★ Mount fuel supply pump drive gear (19) so that stamp line **C** on the surface falls on stamp line **C** on the surface of camshaft gear (22).

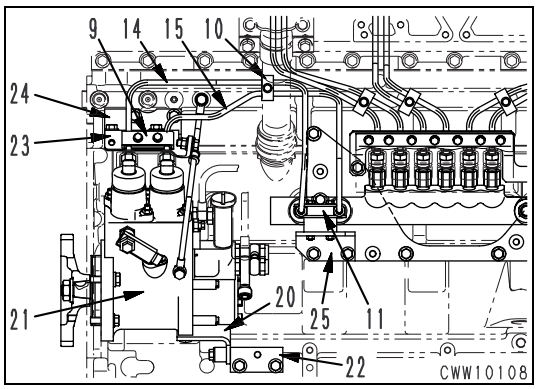
kgm Fuel supply pump gear:
27 ~ 147 Nm {13 ~ 15 kgm}



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- Steps for mounting the fuel supply pump and the high-pressure pipe between the fuel supply pump and the common rail:

• Do not reuse a high-pressure pipe by bending it.
• Be sure to use genuine parts for high-pressure pipe clamps and to strictly comply with the tightening torque specifications.



1. Temporarily mount fuel supply pump (21), brackets (20) and (22) and high-pressure pipes (14) and (15), tightening them by hand.
2. Tighten high-pressure pipes (14) and (15) with the following torque.

   kgm Sleeve nut on the common rail side:
   39.2 ~ 58.8 Nm {4 ~ 6 kgm}

   kgm Sleeve nut on the fuel supply pump side:
   39.2 ~ 49 Nm {4 ~ 5 kgm}
3. Tighten the fuel supply pump mounting bolts.

   Thread of mounting bolt: **Thread tightener (LG-6)**
4. Tighten the mounting bolts of brackets (20) and (22).

   kgm Between bracket (20) and the fuel supply pump:
   19.6 ~ 29.4 Nm {2.0 ~ 3.0 kgm}
5. Temporarily mount high-pressure pipe clamp (9) and brackets (23) and (24), tightening them by hand.
6. Tighten high-pressure pipe clamp (9) with the following torque:

   kgm High-pressure clamp:
   11.8 ~ 14.7 Nm {1.2 ~ 1.5 kgm}
7. Tighten the mounting bolts for brackets (24) and (23), in this order.
8. Tighten high-pressure pipe clamp (10) with the following torque.

   kgm High-pressure pipe clamp:
   8.8 ~ 14.7 Nm {0.9 ~ 1.5 kgm}
9. Temporarily mount high-pressure pipe clamp (11) and bracket (25), tightening them by hand.
10. Tighten high-pressure pipe clamp (11) with the following torque.

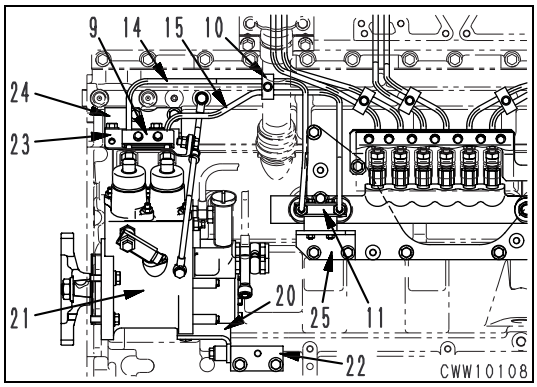
    kgm High-pressure pipe clamp:
    8.8 ~ 14.7 Nm {0.9 ~ 1.5 kgm}

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11. Tighten the mounting bolts of bracket (25).

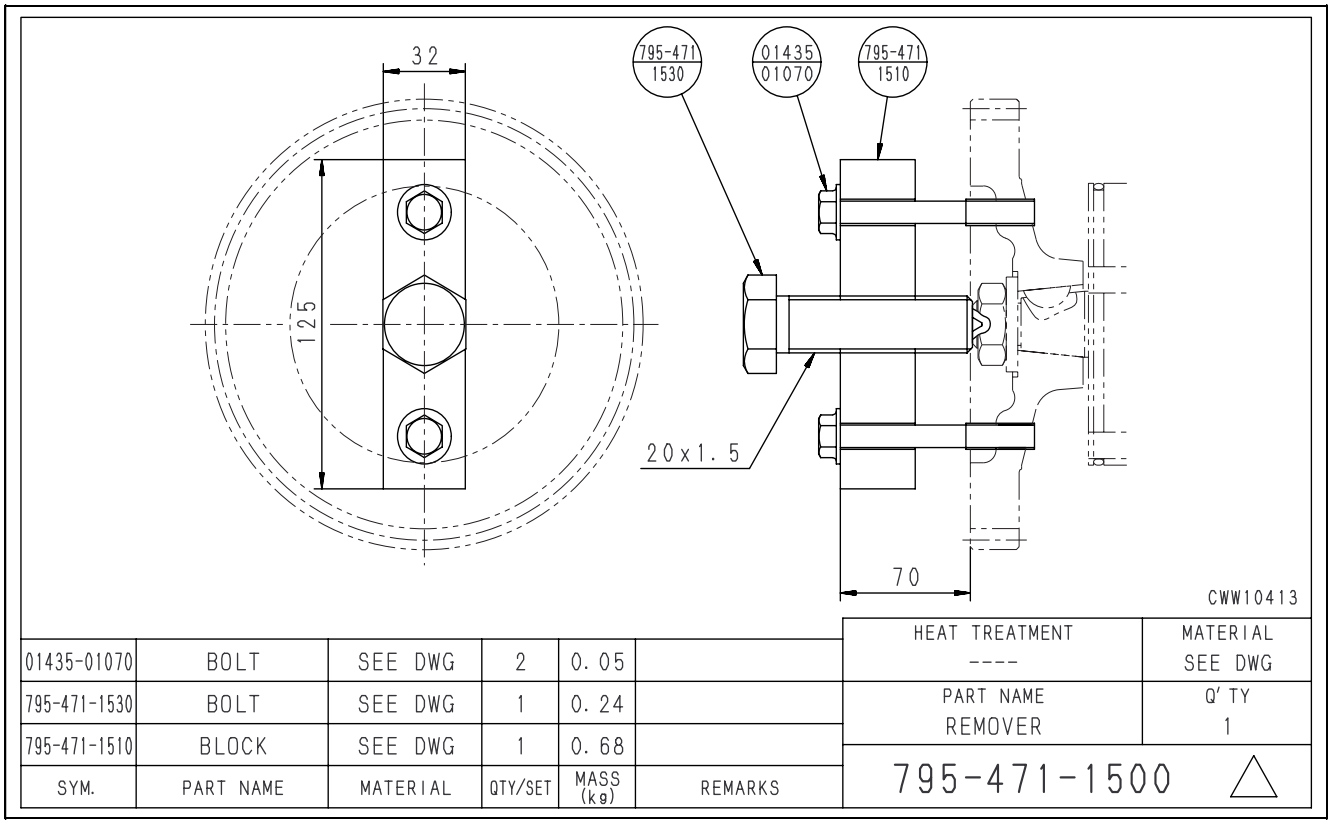
- Bleeding Air

  ★ Perform air bleeding, referring to the "Air bleeding for fuel circuitry" section in the testing and adjusting manual.



Schematic drawings of special tools

A1 Remover

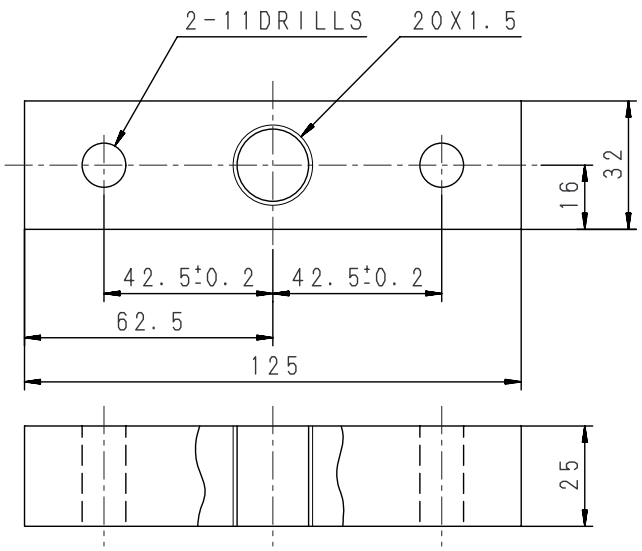


SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
01435-01070	BOLT	SEE DWG	2	0.05	
795-471-1530	BOLT	SEE DWG	1	0.24	
795-471-1510	BLOCK	SEE DWG	1	0.68	

HEAT TREATMENT	MATERIAL
----	SEE DWG
PART NAME	Q'TY
REMOVER	1
795-471-1500 △	

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A1 Block

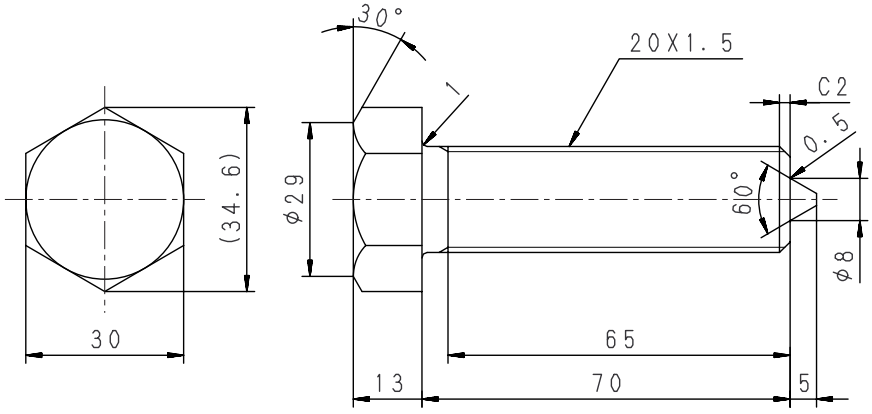


DJW05814

Unless otherwise specified, free from flashes and burrs for all corners.

HEAT TREATMENT	MATERIAL
1125001500	S43C
PART NAME	Q'TY
BLOCK	1
795-471-1510	

A1 Bolt



DJW05815

Unless otherwise specified, free from flashes and burrs for all corners.

HEAT TREATMENT	MATERIAL
1324001500	S43C
PART NAME	Q'TY
BOLT	1
795-471-1530	

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Nozzle holder assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the (-) terminal of the battery.**

1. Exhaust pipe and muffler
   (for removing nozzle holders Nos. 1 and 2)

   a. Remove exhaust pipe (1).

   b. Open the right and left-hand side covers to remove tube (2).

   c. Remove the bolts and nuts between the muffler and the turbocharger.

   d. Place a block between the muffler and the head cover to retain the muffler.

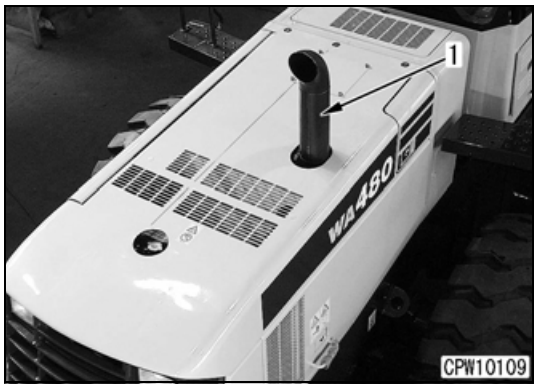
      ★ Place the block away from the high-pressure pipes.

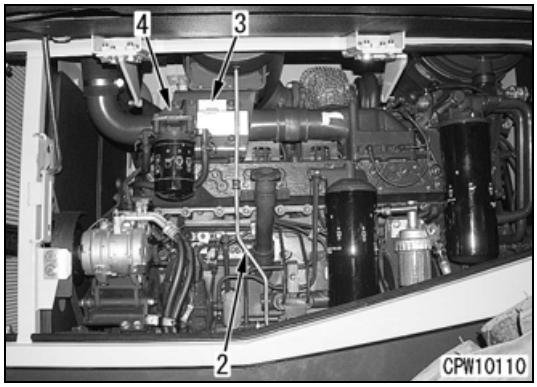
   e. Remove brackets (3) and (4).

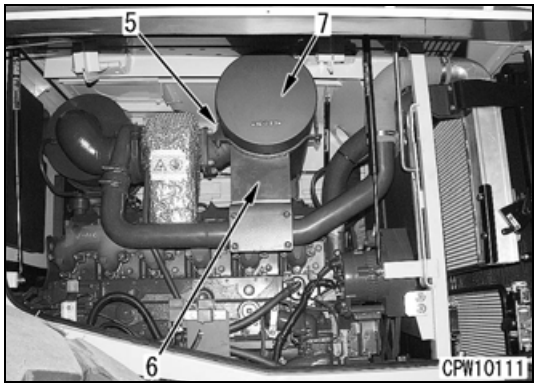
   f. Remove clamp (5) and bracket (6) for mounting the muffler and remove muffler (7) from left side of the machine. ※1

      ★ Use two or more persons for this operation.

      kg Muffler assembly: **45 kg**

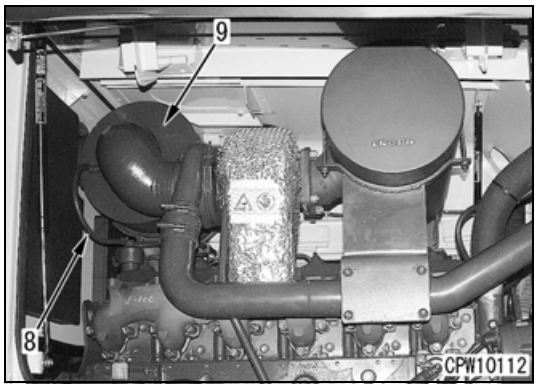






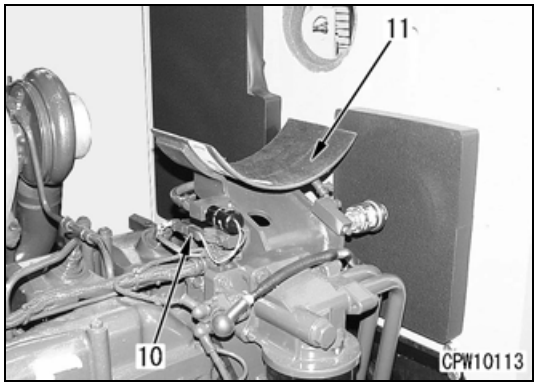
https://truckmanualshub.com/

2. Air cleaner assembly
(for removing nozzle holders Nos. 5 and 6)



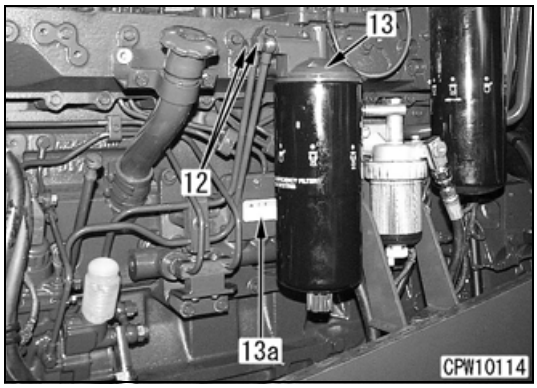
a. Remove hose (8) to loosen the clamps on the turbocharger. ※ 2

b. Remove the mounting clamps to remove air cleaner assembly (9). ※ 3



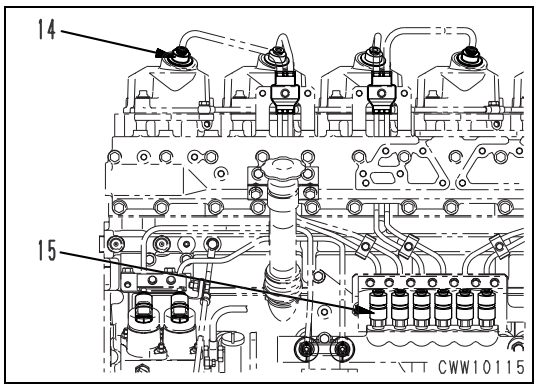
c. Remove connectors (10) and (CN-D), then remove air cleaner bracket (11).

3. Fuel tube and high-pressure pipe



a. Remove mounting bolt (12) on the filter side of the fuel tube, then remove filter bracket assembly (13). ※ 4

b. Remove high-pressure pipe junction cover (13a) on the common rail.



c. Remove high-pressure pipe junction cover (14) on the injector side and cover (15) on the common rail side. (The figure shows a typical operation for removing cylinder No.1.) ※ 5

d. Remove high-pressure pipe clamp (16) for the double-housing frame.

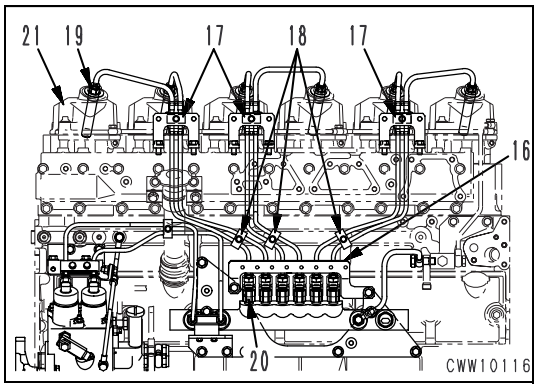
e. Remove high-pressure pipe clamps (17) and (18) corresponding to the cylinders to be removed.

f. Completely loosen sleeve nut (19) on the injector side and sleeve nut (20) on the common rail side of the high-pressure pipe. (The figure shows a typical operation for removing cylinder No.1.)

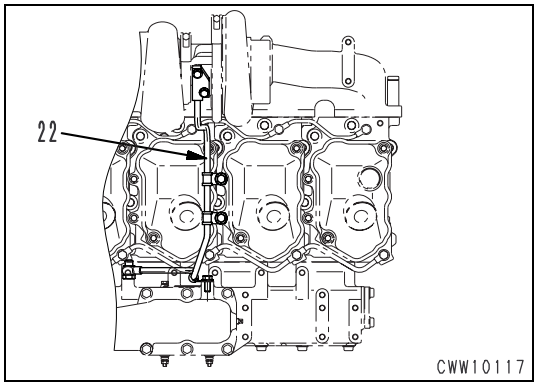
https://truckmanualshub.com/

4. Head cover

   Remove the head cover mounting bolts and place head cover (21) close to the air intake connector. (The figure shows a typical operation for removing cylinder No.1.) ※ 6



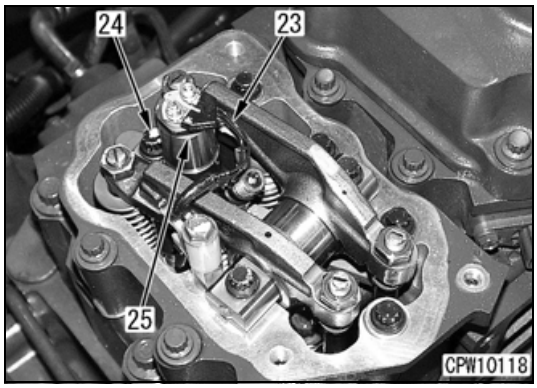
   ★ Remove the mounting bolts of tube (22) to remove the No. 4 cylinder head cover. ※ 7



5. Nozzle holder

   a. Remove harness (23) from the injector. ※ 8

   b. 2) Remove bolt (24) for mounting the nozzle holder, then remove injector (25) along with the holder. ※ 9



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Installation

- Carry out installation in the reverse order to removal.

※ 1

kgm Mounting clamp:
9.8 ~ 14.7 Nm {1.0 ~ 1.5 kgm}

※ 2

kgm Clamp:
8.3 ~ 9.3 Nm {0.85 ~ 0.95 kgm}

※ 3

kgm Mounting clamp:
9.8 ~ 11.8 Nm {1.0 ~ 1.2 kgm}

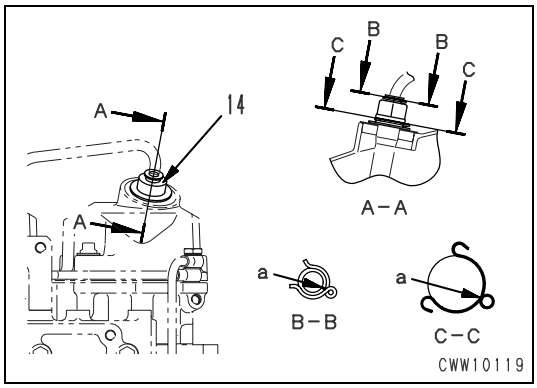
※ 4

kgm Fuel tube mounting bolt:
24.5 ~ 34.3 Nm {2.5 ~ 3.5 kgm}

※ 5

★ Fit the slit of cover (14) in position "a" in the right figure.

★ Turn the slit of cover (15) toward the cylinder block.



※ 6

kgm Head cover mounting bolt:
8.33 ~ 10.8 Nm {0.9 ~ 1.1 kgm}

※ 7

kgm Lubrication tube for turbocharger
(on the cylinder block side):
24.5 ~ 34.3 Nm {2.5 ~ 3.5 kgm}

※ 8

kgm Harness mounting nut:
2.0 ~ 2.4 Nm {0.2 ~ 0.24 kgm}

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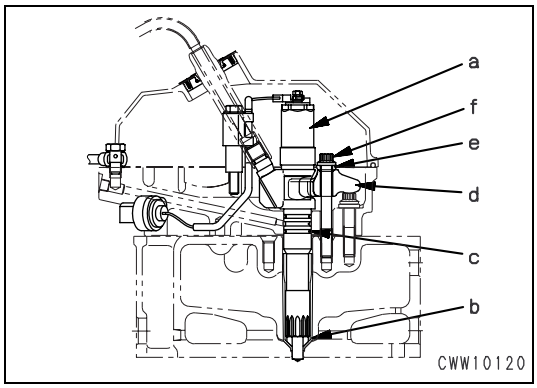
※ 9

- Steps for tightening the nozzle holder:

1. Insert gasket (b) and O-ring (c) into injector (a).
2. Insert holder (d) into injector (a) to mount it tentatively on the rocker housing.

   ★ Fit the key of the injector into the key slot of the rocker housing and securely insert the injector until its sealing face makes contact with that of the cylinder head.
3. Apply engine oil on the spherical portion of spherical washer (e).
4. Tighten bolt (f) of the holder.

   kgm Holder mounting bolt:
   58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}



- Steps for mounting the high-pressure pipe between the common rail and the injector:

⚠

- **Do not reuse a high-pressure pipe by bending it.**
- **Be sure to use genuine parts for high-pressure pipe clamps and to strictly comply with the tightening torque specifications.**

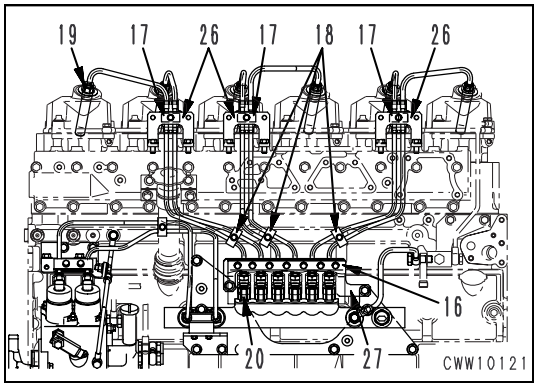
1. Tighten sleeve nuts (19) and (20) of the high-pressure pipe with the following torque:

   kgm Sleeve nut: **39.2 ~ 49 Nm {4 ~ 5 kgm}**
2. Temporarily mount high-pressure pipe clamps (17) and (18), tightening them by hand.
3. Tighten the mounting bolts of high-pressure pipe clamps (17) and (18) with the following torque:

   kgm Clamp mounting bolt:
   11.8 ~ 14.7 Nm {1.2 ~ 1.5 kgm}
4. Tighten the mounting bolts of bracket (26).
5. Temporarily mount high-pressure pipe clamp (16) and double-housing frame (27).
6. Tighten the mounting bolts of high-pressure pipe clamp (16) with the following torque:

   kgm Clamp mounting bolt:
   11.8 ~ 14.7 Nm {1.2 ~ 1.5 kgm}
7. Tighten the mounting bolts of the double-housing frame.

★ Bleeding Air
Perform air bleeding, referring to the "Air bleeding for fuel circuitry" section in the testing and adjusting manual.



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Nozzle tip

★ [EPA regulations]
For countries subject to EPA regulations, the entire nozzle assembly of the common rail engine shall be replaced if any of its components needs to be replaced. For other countries, the following procedure may be applied for replacing the nozzle tip.

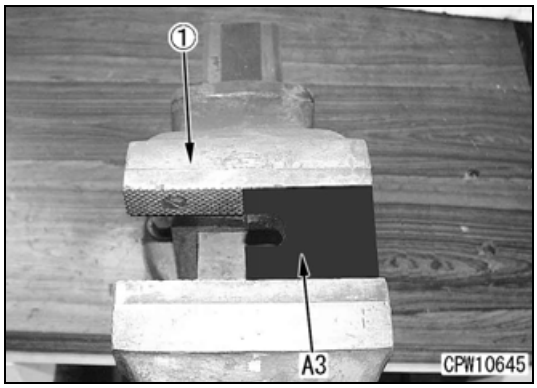
Special tool

Symbol	Part Number	Part Name	Level of need	Qty	New or Revised	Schematic Drawing
A3	795T-471-1550	Wrench	■	1		○

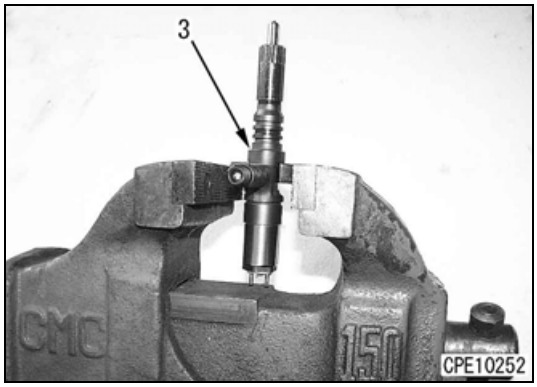
Removal

1. Fix tool **A3** in vice ①.

   ★ Do not pinch the injector directly in the vice.

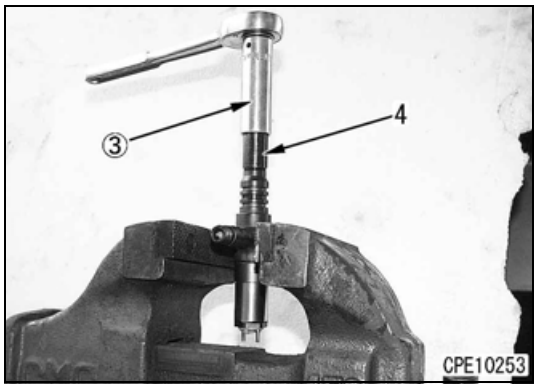


2. Set injector assembly (3) on tool **A3**.



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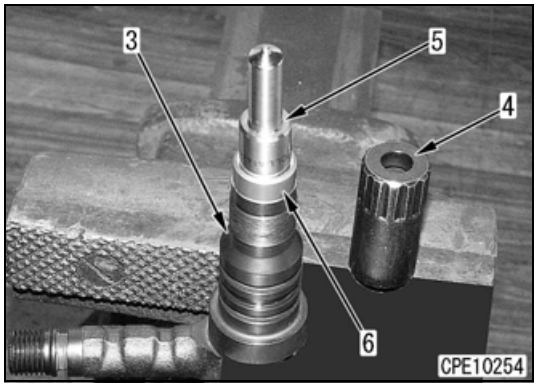
3. Loosen retaining nut (4) with 19 mm deep socket ③.
4. Remove retaining nut (4) from injector assembly (3).

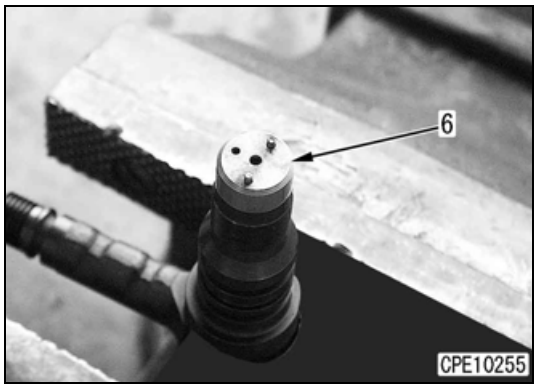


5. Lift nozzle assembly (5) perpendicularly upward to remove it.

   ★ Do not remove tip guide (6).
   (Disassembling the portion after the tip guide is not allowed.)

   ★ Be careful not to get the assembly dirty.





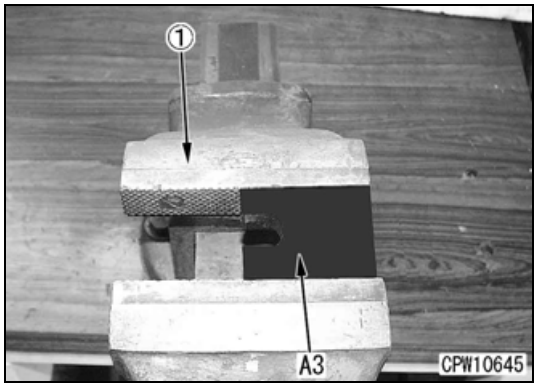
https://truckmanualshub.com/

Installation

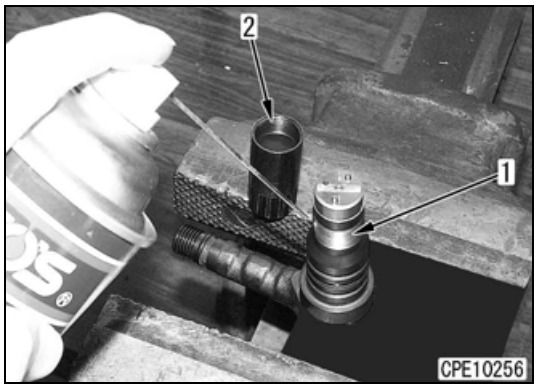
1. Fix tool **A3** in vice ①.

   ★ Do not pinch the injector directly in the vice.

2. Set injector assembly (1) on tool **A3**.

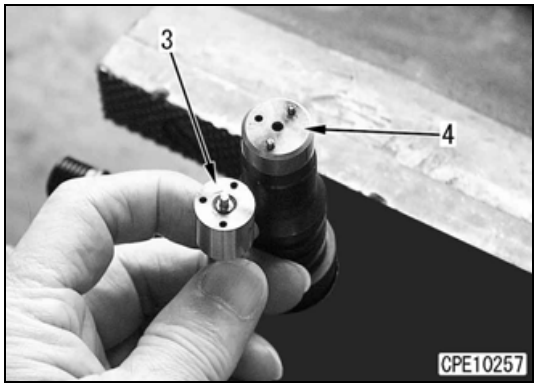


3. Completely clean the lower body and screw sections of retaining nut (2) with parts cleaner, and apply air blow.

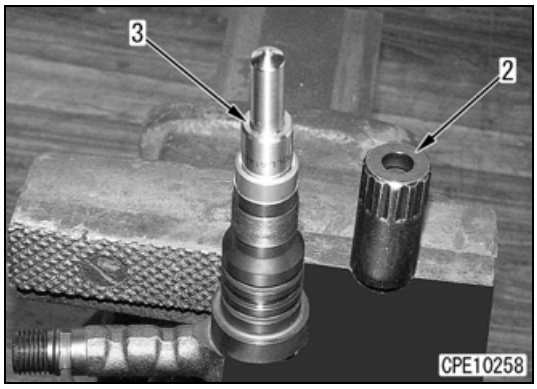


4. Mount new nozzle assembly (3) so that the assembly fits the knock pin of tip guide (4).

   ★ Be careful not to drop the tip.



5. Mount nozzle assembly (3) and manually tighten retaining nut (2).



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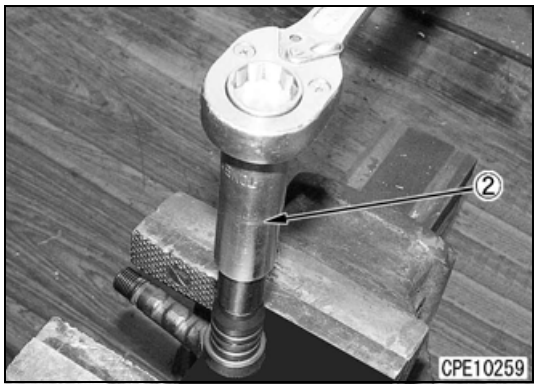
6. Set 19-mm deep socket (2) in the torque wrench, then tighten the retaining nut by following the steps below.

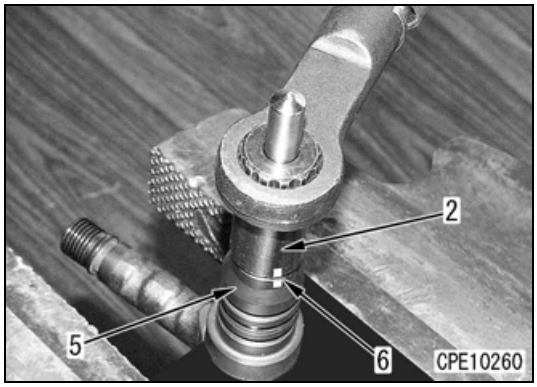
   ★ Apply rust prevention oil on the nozzle body.

   a. Tighten with torque of 88.3 Nm {9.0 kgm}.

   b. Attach identification mark (6) to retaining nut (2) and lower body (5).

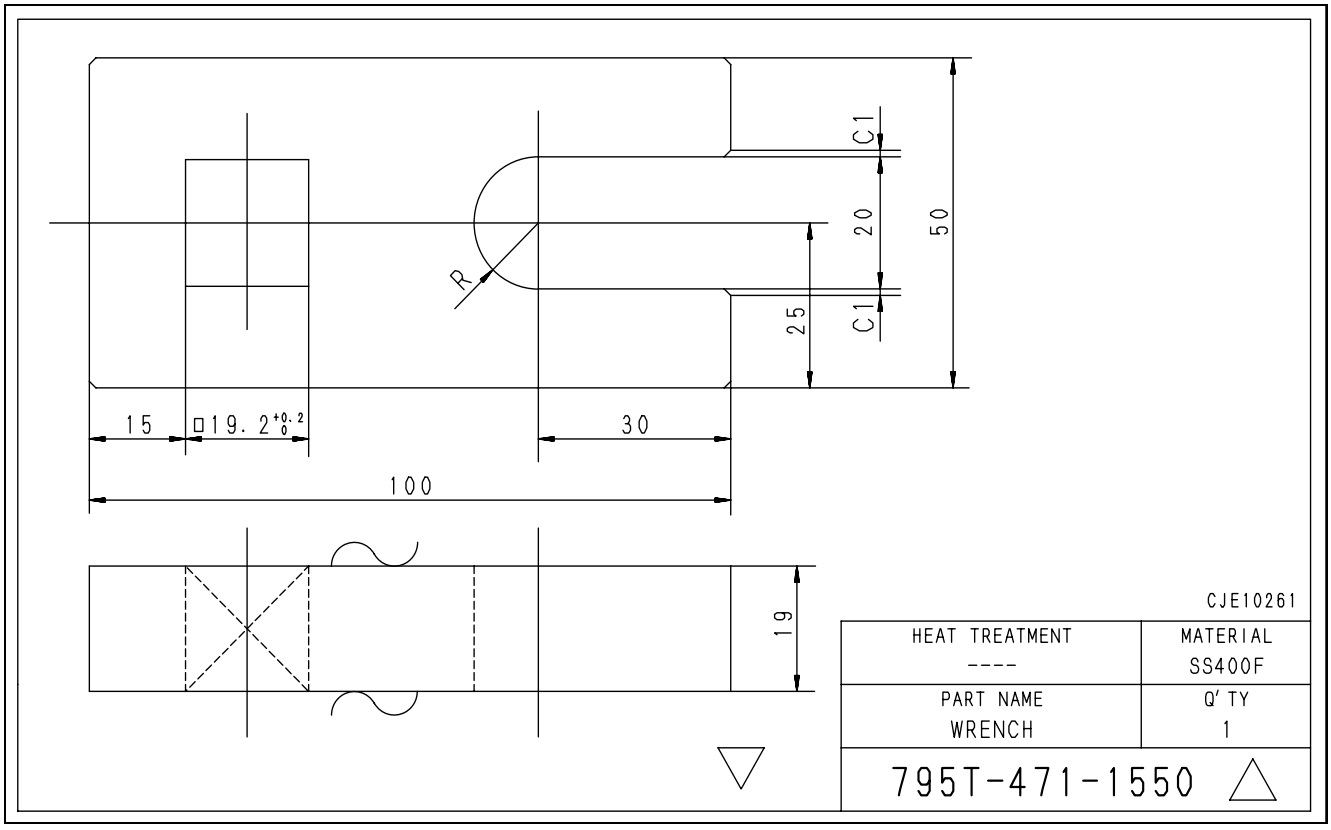
   c. Tighten at an angle of 45° (angle tightening).





Schematic drawing of special tool

A3 Wrench



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Cylinder head assembly

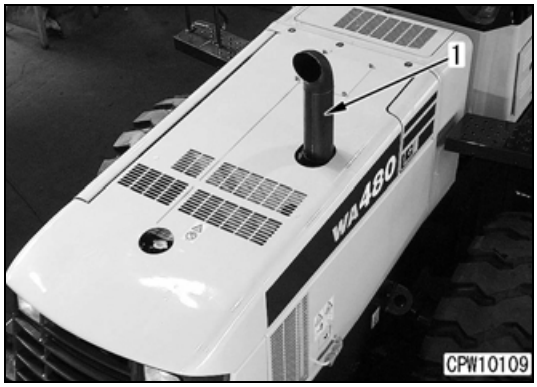
Special tool

Symbol	Part Number	Part Name	Level of need	Qty	New or Revised	Schematic Drawing
A2	790-331-1110	Wrench	■	1		

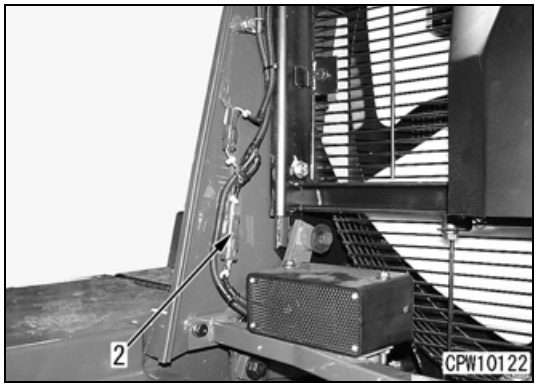
Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the (-) terminal of the battery.**

1. Drain coolant.
2. Hood assembly
   a. Remove exhaust pipe (1).



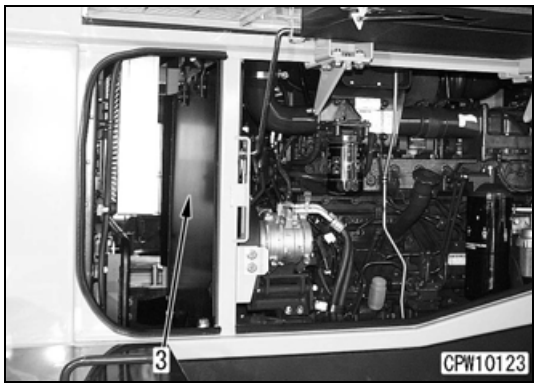
   b. Open the radiator guard and disconnect connector (2)(CN-GR1).



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c. Open the right and left-hand side covers, remove the mounting bolts of baffle (3), and place the baffle close to the air aftercooler.

★ To protect the air after cooler, insert waste cloth.

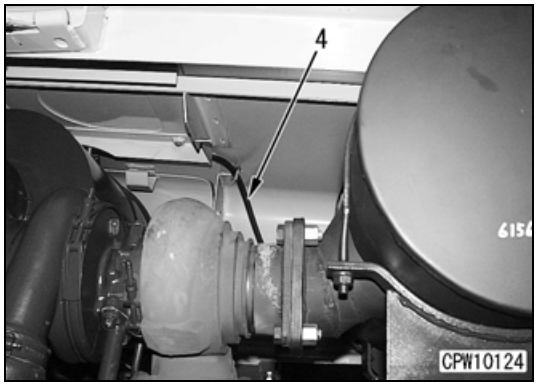


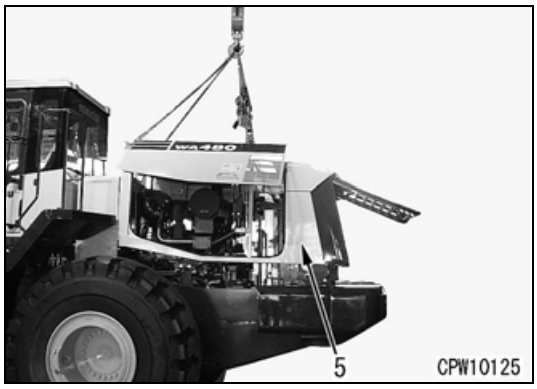
d. Remove all the mounting clamps used to mount reservoir hose (4) on the hood.

e. Remove the mounting bolts, then lift hood assembly (5) to remove it.

★ Lift the assembly while making sure that no sections are interfering with each other.

kg Hood assembly: **280 kg**



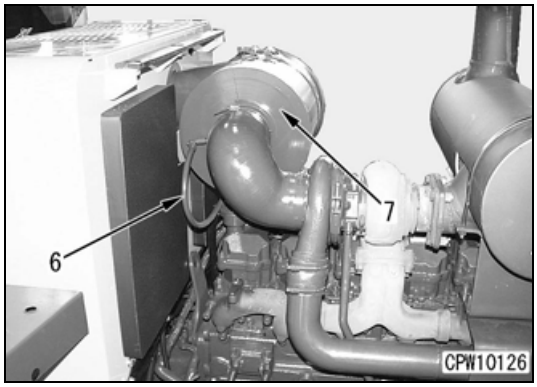


3. Air cleaner assembly

a. Remove the heat shield cover from the turbocharger.

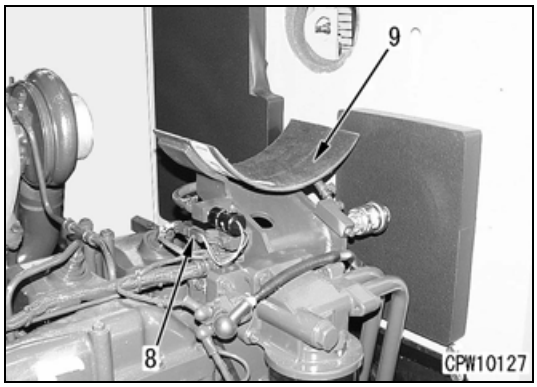
b. Remove hose (6) and loosen the clamp on the turbocharger. ※ 1

c. Remove the mounting clamp to remove air cleaner assembly (7). ※ 2



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d. Remove connector (8)(CN-D) and remove air cleaner bracket (9).



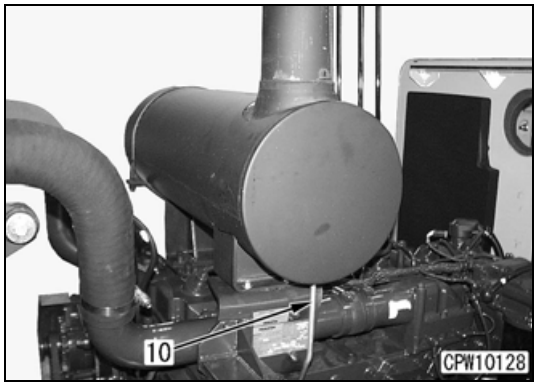
4. Muffler assembly

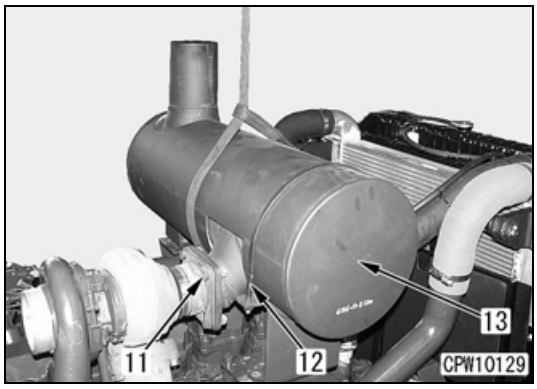
a. Remove tube (10).

b. Remove junction bolts and nuts (11) connecting the turbocharger and mounting clamp (12) of the muffler. ✳ 3

c. Remove the mounting bolts and lift muffler assembly (13) to remove it.

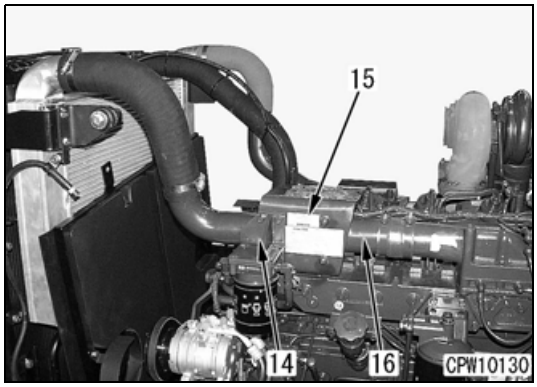
kg Muffler assembly: **45 kg**





5. Air intake manifold

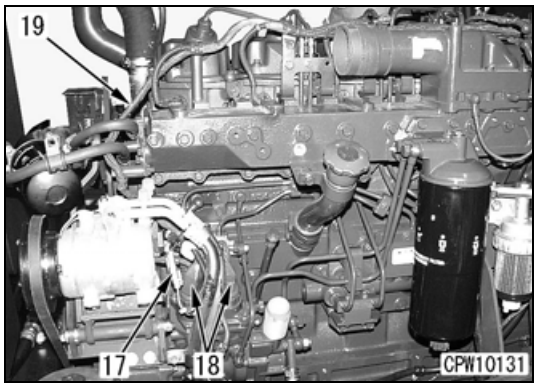
a. Remove brackets (14) and (15) as well as air intake pipe (16).



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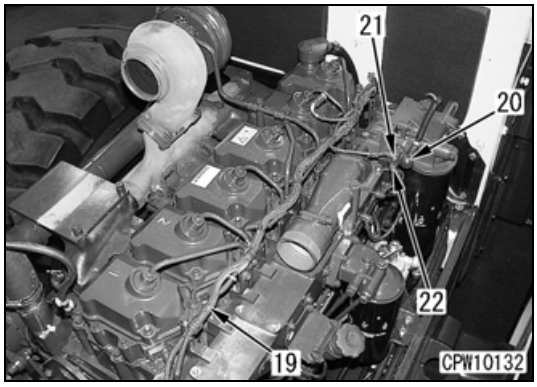
b. Disconnect connectors (17) and (18).

c. Remove the clamp fixing harness (19) on the air intake manifold.

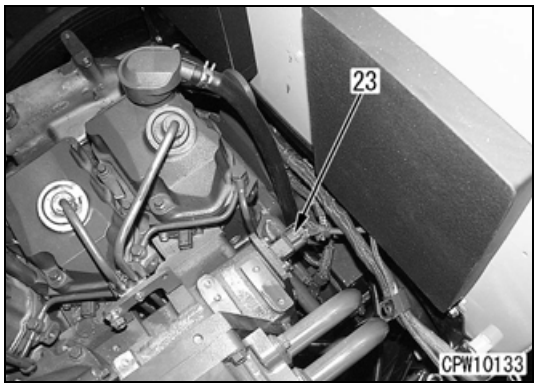


d. Disconnect terminals (20), (21) and (22).

e. Disconnect all the connectors on the injector to relocate harness (19).



f. Disconnect connector (23).



g. Remove high-pressure pipe bracket (24).

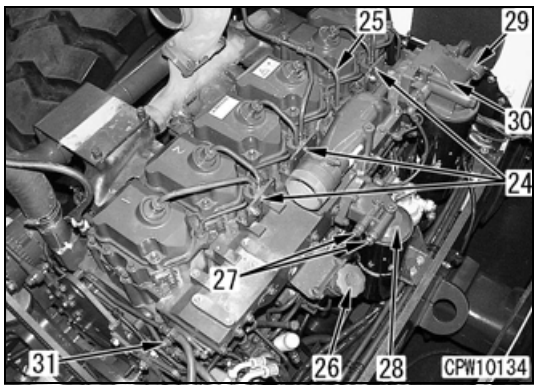
h. Remove the clamp fixing turbocharger lubrication tube (25) onto the air intake manifold.

i. Remove oil filler tube (26).

j. Remove mounting bolts (27) on the filter side of the fuel tube to remove the filter bracket assembly (28). ※4

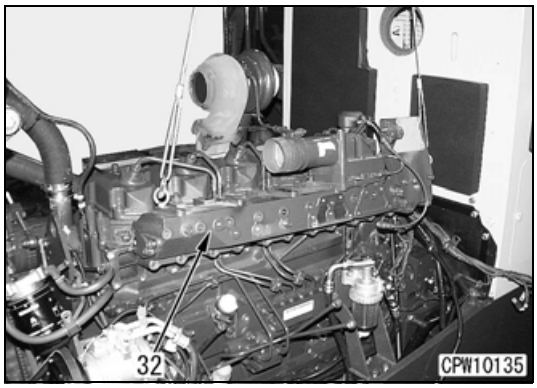
k. Remove oil tube (29), then remove oil filter, bracket assembly (30). ※5

l. Remove hose clamp (31) of the corrosion resistor.



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m. Sling air intake manifold assembly (32), remove the mounting bolts and remove the assembly. ※ 6

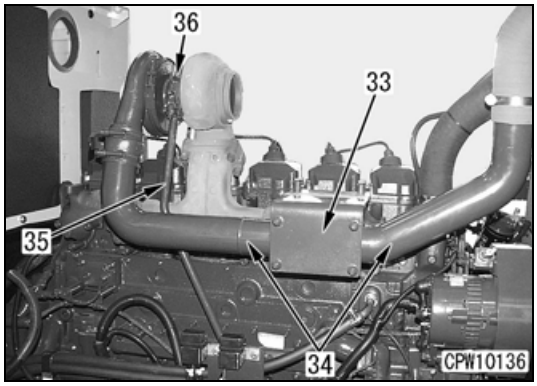


6. Exhaust manifold turbocharger assembly

a. Remove bracket (33) to remove air intake pipe (34).

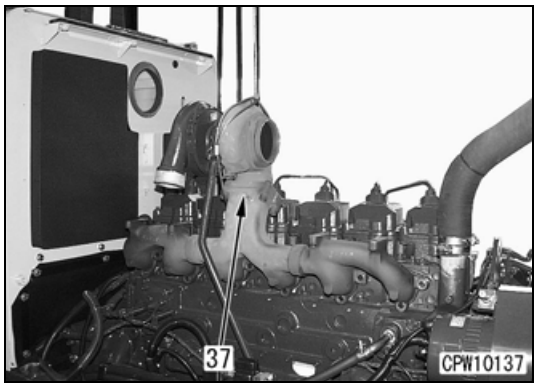
b. Remove the mounting bolts on the turbocharger side of lubrication tube (35).

c. Remove lubrication tube (36). ※ 7



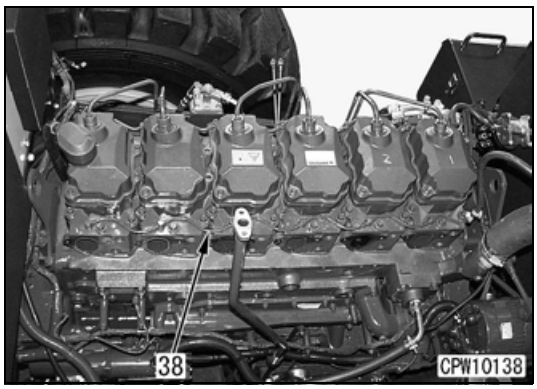
d. Sling exhaust manifold, turbocharger ass'y (37), and remove the mounting bolts to remove. ※ 8

kg Exhaust manifold, turbocharger assembly: **45 kg**



7. Water tube

Remove water tube (38).

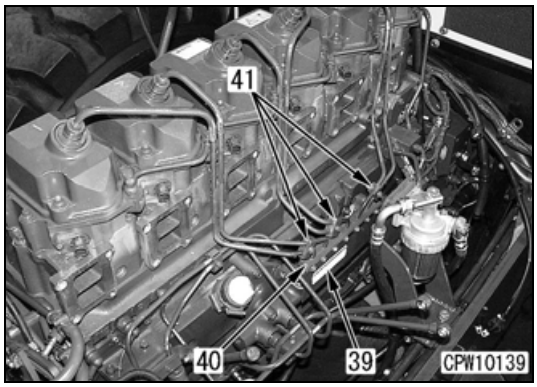


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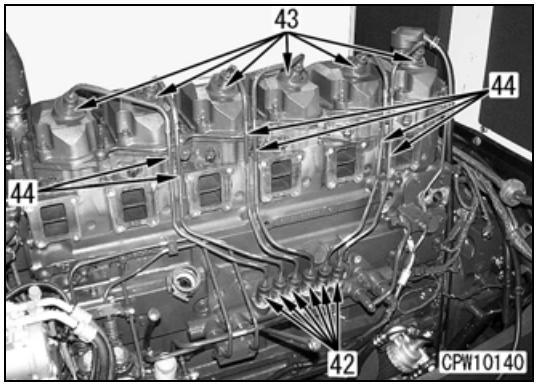
8. High-pressure pipe

   a. Remove cover (39) and clamp (40).

   b. Remove clamp (41) corresponding to the cylinder head to be removed.

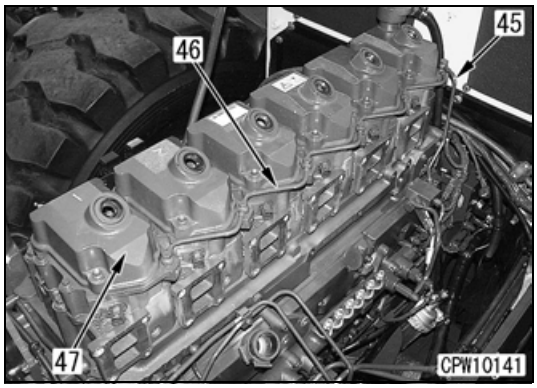


   c. Remove covers (42) and (43), as well as high-pressure pipe (44), corresponding to the cylinder head to be removed. ※9



9. Spill tube

   Remove spill tubes (45) and (46). ※10



10. Head cover

    Remove head cover (47). ※11

11. Nozzle holder

    a. Remove harness (48) from the injector. ※12

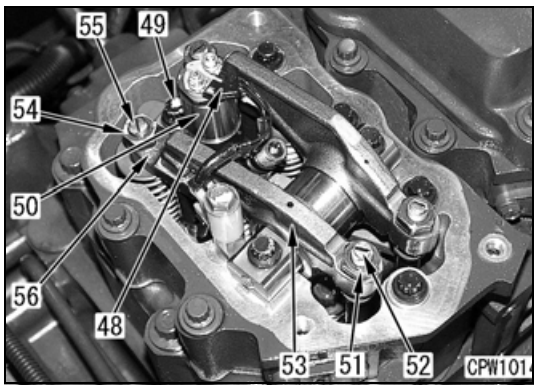
    b. Remove mounting bolt (49) of the nozzle holder, and remove injector (50) along with the holder. ※13

12. Rocker arm and rocker shaft assembly

    a. Loosen locknut (51), and loosen adjustment screw (52) two to three rounds.

    b. Remove the mounting bolt, and remove rocker arm and rocker shaft assembly (53). ※14

    ★ To remove crosshead (56), loosen locknut (54) and adjustment screw (55) two to three rounds if the crosshead needs to be replaced. (The cylinder head assembly can be removed with the crosshead mounted.) ※15



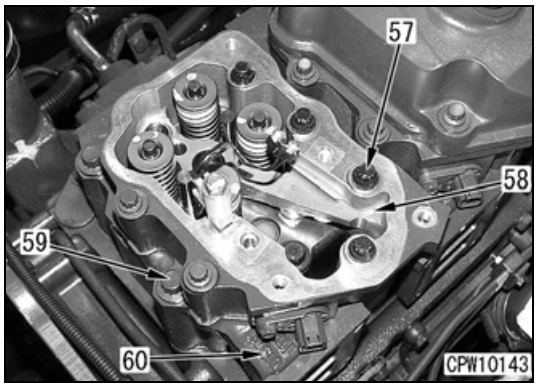
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13. Locker housing

    Remove six mounting bolts (57) to remove rocker housing (58). ※16

14. Cylinder head assembly

    Remove six mounting bolts (59) along with the auxiliary bolts to remove cylinder head assembly (60). ※17



Installation

- Carry out installation in the reverse order to removal.

※ 1

kgm Clamp:
8.3 ~ 9.3 Nm {0.85 ~ 0.95 kgm}

※ 2

kgm Mounting clamp:
9.8 ~ 11.8 Nm {1.0 ~ 1.2 kgm}

※ 3

kgm Mounting clamp:
9.8 ~ 14.7 Nm {1.0 ~ 1.5 kgm}

※ 4

kgm Fuel tube mounting bolt:
24.5 ~ 34.3 Nm {2.5 ~ 3.5 kgm}

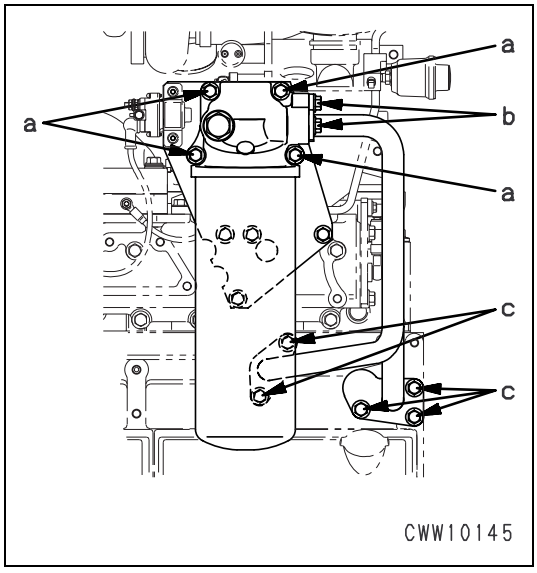
※ 5

★ To mount the oil filter, follow the steps below.

a. Temporarily tighten filter bracket mounting bolt (a).

b. Temporarily tighten oil tube mounting bolts (b) and (c).

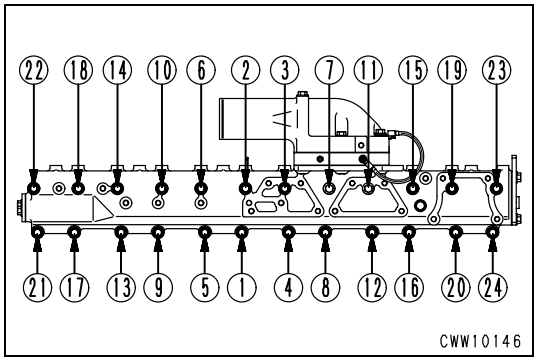
c. Tighten bolts (c), (b) and (a), in this order.



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※ 6

★ Tighten air intake manifold mounting bolts in the order shown in the illustration.

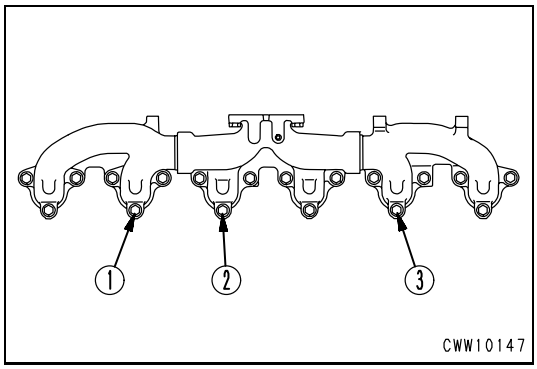


※ 7

kgm Mounting bolts of lubrication tube (36) cylinder block:
24.5 ~ 34.3 Nm {2.5 ~ 3.5 kgm}

※ 8

★ First tighten exhaust manifold mounting bolts in the order shown in the illustration, and then tighten the other bolts, starting with the ones in the center and proceeding to the outer ones.



kgm Exhaust manifold:
58.8 ~ 73.5 Nm {6 ~ 7.5 kgm}

※ 9

★ For the procedure for installing high-pressure pipes, see the "Nozzle holder assembly" section.

※10

kgm Spill tube (45) (at both ends):
24.5 ~ 34.2 Nm {2.5 ~ 3.5 kgm}

kgm Spill tube (46):
9.8 ~ 12.7 Nm {1.0 ~ 1.3 kgm}

※11

kgm Head cover:
8.8 ~ 10.8 Nm {0.9 ~ 1.1 kgm}

※12

kgm Harness mounting nut:
8.8 ~ 10.8 Nm {0.9 ~ 1.1 kgm}

※13

★ For the procedure for mounting the injector and the nozzle holder, see the "Nozzle holder assembly" section.

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※14

kgm Rocker shaft mounting bolt:
58.8 ~ 73.5 Nm {6 ~ 7.5 kgm}

★ For the procedure for adjusting the valve clearance, see the "Adjusting valve clearance" section in the checking and adjusting manual.

※15

★ To mount the crosshead, follow the steps below.

a. Mount the crosshead on the valve stem with locknut (54) and adjustment screw (55) loosened.

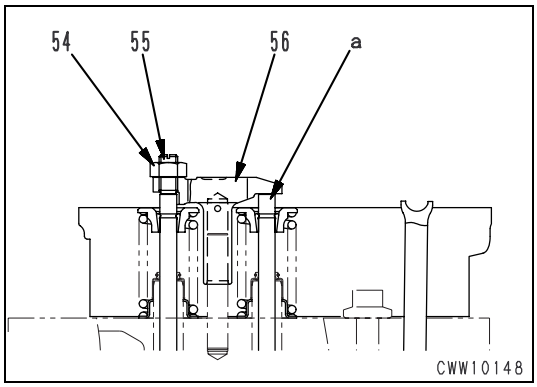
★ Loosen the adjustment screw (55) until it is off the valve stem.

b. Lightly hold the face of crosshead (56) contacting the rocker arm to keep it contacting valve stem (a) on the push rod side.

c. Tighten adjustment screw (55) until it contacts the valve stem.

d. Tighten locknut (54) while retaining adjustment screw (55).

kgm Locknut:
58.8 ~ 73.5 Nm {6 ~ 7.5 kgm}



※16

kgm Rocker housing mounting bolt:
58.8 ~ 73.5 Nm {6 ~ 7.5 kgm}

※17

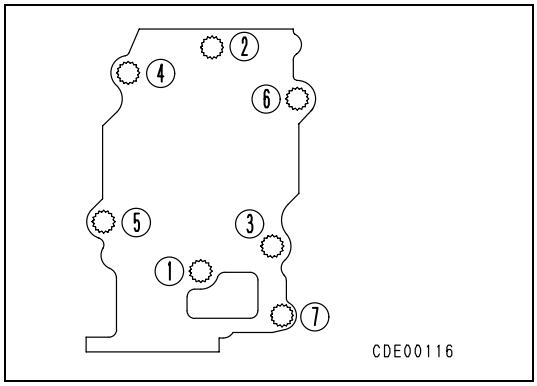
★ Tighten cylinder head bolts (59) in the order shown in the illustration.

Thread section and seat surface of bolts:
Engine oil (EO-CD)

kgm 1st round: **88.3 - 108 Nm {9 - 11 kgm}**

2nd round: **157 - 167 Nm {16 - 17 kgm}**

3rd round: Tighten by 90° ± 30° with tool **A2**. To tighten without tool **A2**, apply markings on the bolts and the cylinder head with paint for angle reference, and tighten to the angle specified above by using a protractor.



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Radiator assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Loosen the oil supply cap of the hydraulic oil tank to release inner pressure.**
- **Disconnect the (-) terminal of the battery.**

★ This section describes the procedure for removing the radiator assembly along with the cooling fan drive motor and air aftercooler.

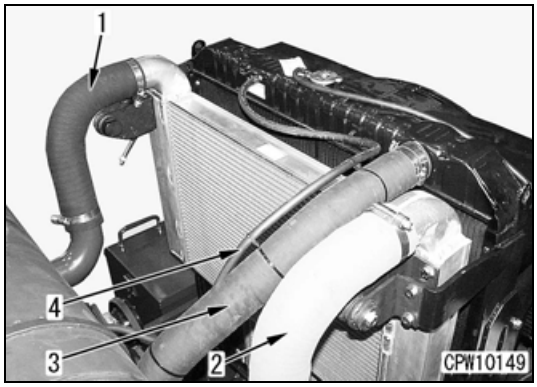
1. Remove the hood and the baffle between the air aftercooler and the engine, referring to the "Cylinder head assembly" section.

2. Coolant

   Drain coolant.

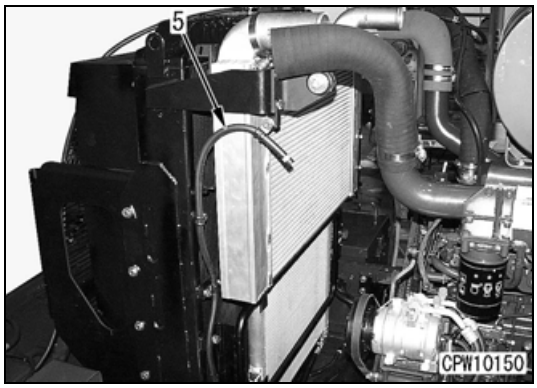
3. Air aftercooler hoses and radiator hoses.

   Remove hoses (1) and (2) from the air aftercooler, and hoses (3) and (4) from the radiator. ※1



4. Breather hose

   Remove the clamp mounting bolts to remove breather hose (5).



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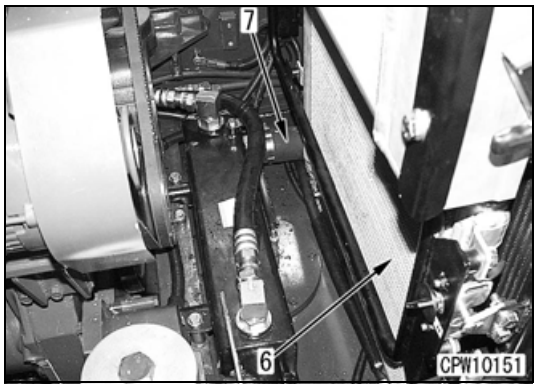
5. Oil cooler for cooling fan drive motor

   Remove the mounting bolts of the oil cooler and fix oil cooler (6) with rope to the side of the machine.

6. Lower hose of the radiator

   Completely loosen the clamp of lower hose (7) of the radiator connecting the torque converter cooler. ※ 1

   ★ The lower hose cannot be pulled out with the radiator mounted.



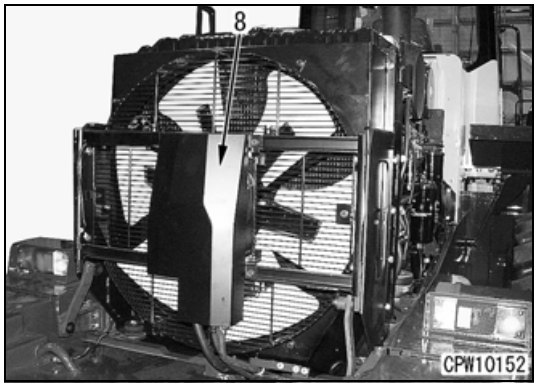
7. Cooling fan drive motor

   a. Remove cover (8).

   b. Remove fan guard (9).

      ★ The fan guard is tightened together with cover (8).

   c. Remove hoses (10), (11) and (12).

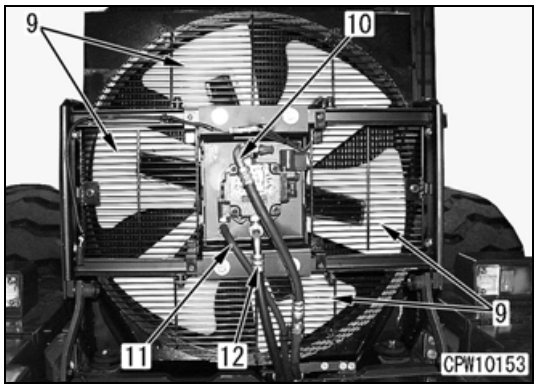


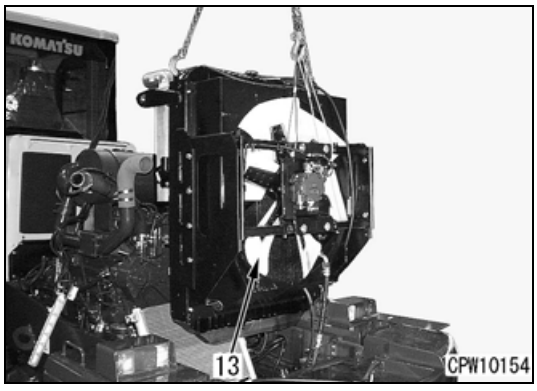
8. Radiator assembly

   a. Sling radiator assembly (13) as well as the cooling fan drive motor assembly and the air aftercooler assembly.

   b. To remove the radiator, remove the radiator mounting bolts and pull it backward while lifting it. ※ 2

      kg Cooling fan drive motor, radiator and air aftercooler assembly: **230 kg**





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Installation

- Carry out installation in the reverse order to removal.

※ 1

Slot for inserting the coolant hose:
Three Bond 1208E

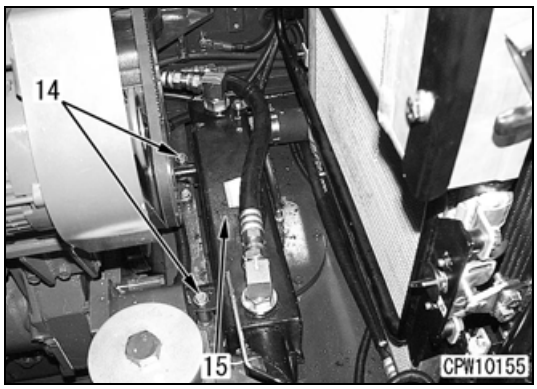
※ 2

a. Remove mounting bolts (14) of the torque converter oil cooler and insert a block (a cube of about 10 cm) between torque converter oil cooler (15) and the machine body.

   ★ This operation is to set out the position of the radiator hose and the destination flange.

b. Mount the radiator assembly while inserting the radiator hose on the hose flange of the torque controller.

   ★ Bleed air after mounting the assembly, referring to the "Bleeding air, Bleeding air from fan motor circuitry" sections of the relevant parts in the checking and adjusting manual.



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Air aftercooler assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**

1. Remove the hood, referring to the "Removing and mounting cylinder head assembly" section, and remove the baffle between the air aftercooler and the engine.
2. Air aftercooler hoses

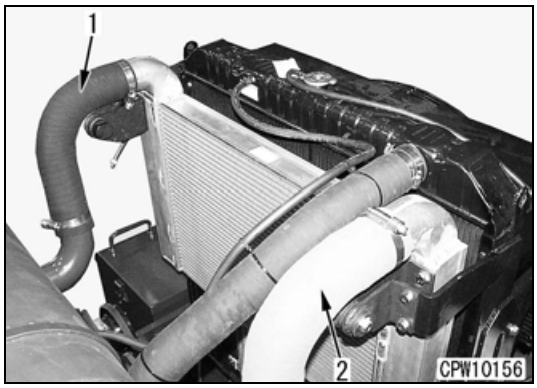
   Remove air aftercooler hoses (1) and (2).
3. Air aftercooler assembly

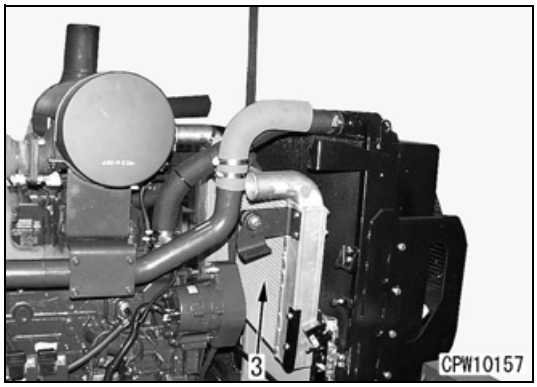
   a. Sling the air aftercooler assembly at its center with nylon sling.

   b. Remove the mounting bolts.

   c. Fend the upper hose of the radiator, move air aftercooler assembly (3) to the right side of the machine and remove the assembly.

   kg Air aftercooler assembly: **35 kg**





Installation

- Carry out installation in the reverse order to removal.

https://truckmanualshub.com/

Cooling fan drive motor

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Loosen the oil supply cap of the hydraulic oil tank to release inner pressure.**
- **Disconnect the (-) terminal of the battery.**

1. Remove the hood, referring to the "Removing and Mounting Cylinder Head Assembly" section, and remove the baffle between the air aftercooler and the engine.
2. Cover

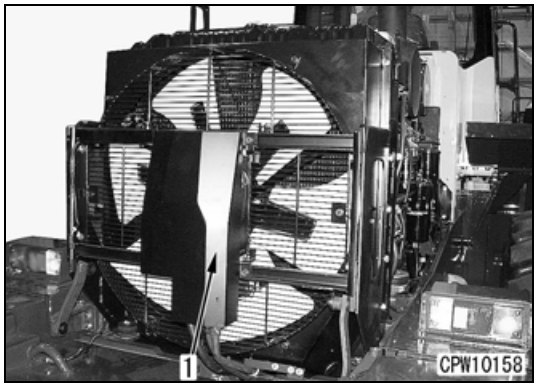
   Remove cover (1).
3. Fan guard

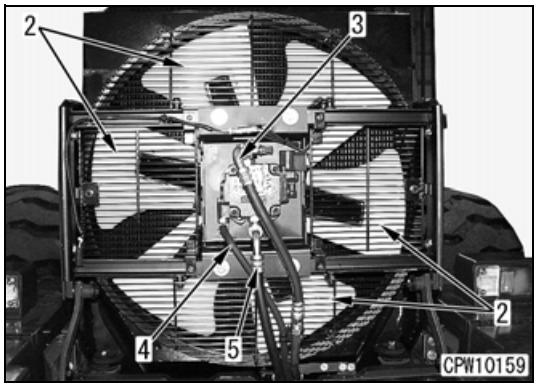
   Remove fan guard (2).
4. Hydraulic hoses

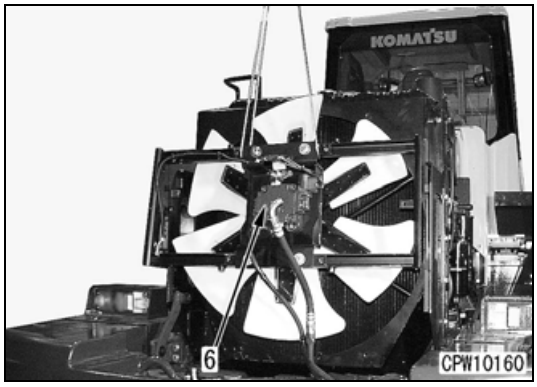
   Remove hoses (3), (4) and (5).
5. Cooling fan drive motor assembly

   Sling the fan assembly with wire applied on the frame, remove the frame mounting bolts and remove cooling fan drive motor assembly (6).

   kg Cooling fan drive motor assembly: **50 kg**







Installation

- Carry out installation in the reverse order to removal.

★ Bleed air after mounting the assembly, referring to the "Bleeding air, Bleeding air from fan motor circuitry" sections of the relevant parts in the checking and adjusting manual.

https://truckmanualshub.com/

Engine assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the (-) terminal of the battery.**

★ For information on the method of modifying the fuel injection amount control, contact the nearest Komatsu dealer.

1. Bleed air-conditioning gas, referring to the "Air Conditioner Compressor Assembly" section. ✳ 1

2. Drain coolant.

3. Remove the hood, referring to the "Cylinder Head Assembly" section, and remove the baffle between the air aftercooler and the engine.

4. Right and left rear fenders

   Remove both right and left rear fenders (1).

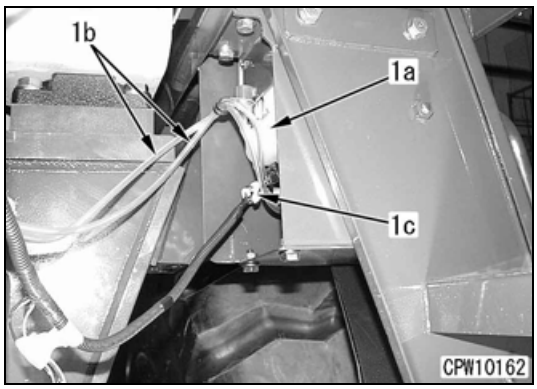
   ★ Remove the left-hand side rear fender as the rear fender ladder assembly.

   ★ As for the left-hand side rear fender, remove hose (1b) and harness connector (1c)(CN-R43, 45) from window washer tank (1a), and remove the window washer tank together with the ladder.

   kg Rear fender, ladder assembly (left): **65 kg**

   kg Rear fender (right): **40 kg**



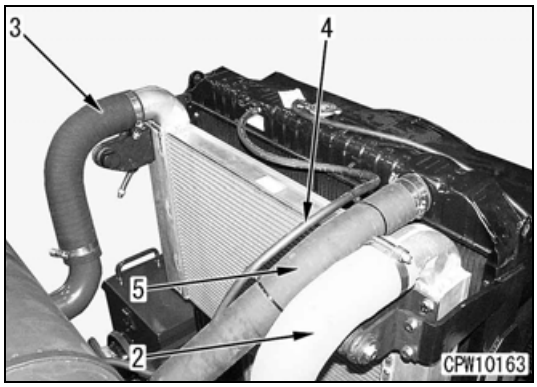


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5. Air cleaner

   Remove the air cleaner, referring to the "Cylinder Head Assembly" section.

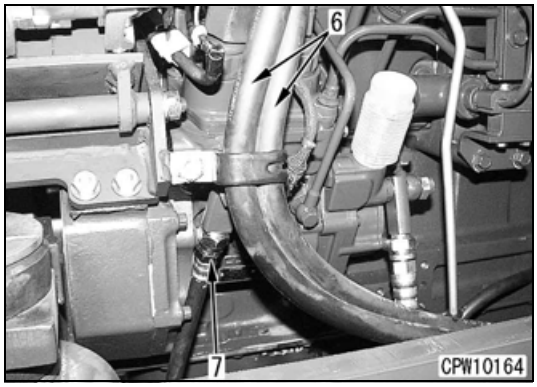
6. Remove air aftercooler and radiator hoses and hoses (2), (3), (4) and (5).



7. Working on the right-hand side of the machine

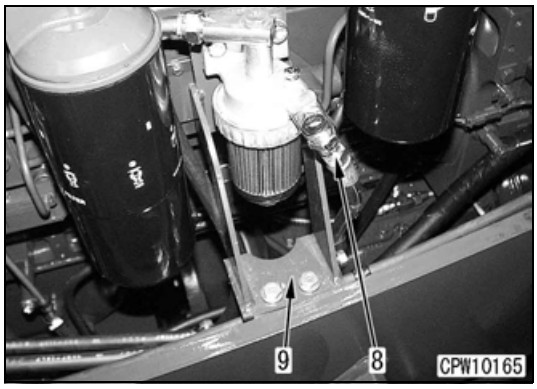
   a. Remove piping (6) from the air conditioner compressor, remove the clamp on the engine, and fix it to the machine side with rope.

   b. Remove fuel hose (7) from the fuel supply pump.

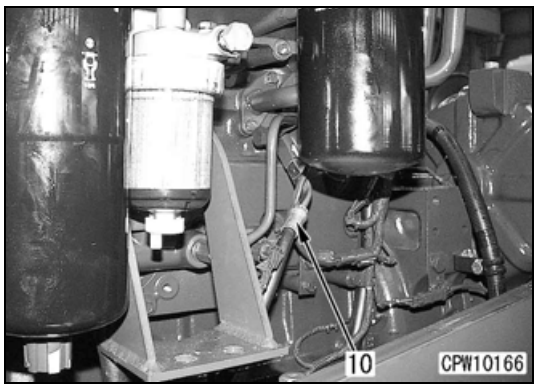


   c. Remove fuel hose (8) from the filter.

   d. Remove the mounting bolts of filter bracket (9) and fix the filter with rope to the side of the engine.

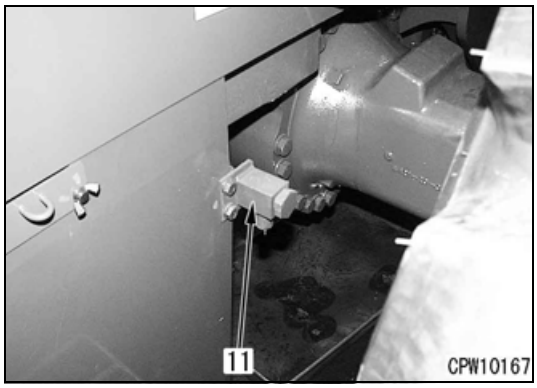


   e. Remove fuel hose (10) from the fuel tank.



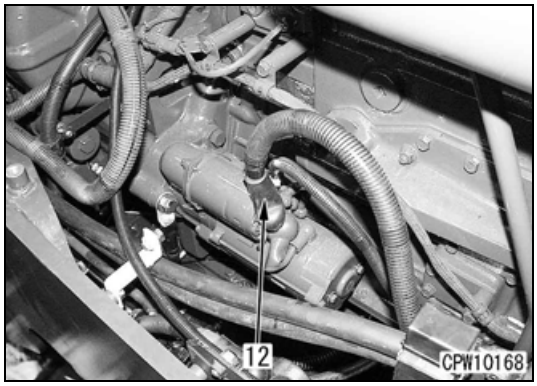
https://truckmanualshub.com/

f. Remove the mounting bolts of engine drain cock (11).

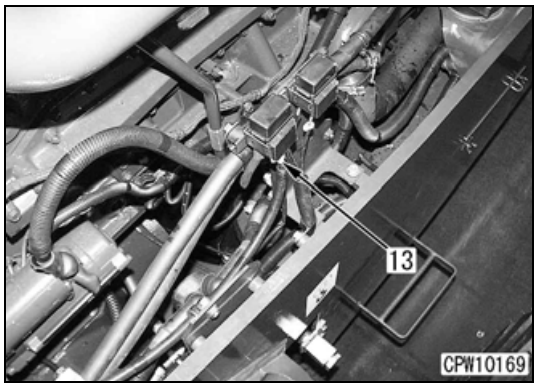


8. Working on the left-hand side of the machine

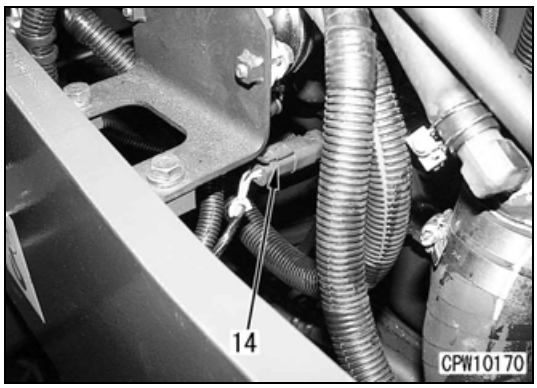
a. Remove starting motor wiring (12).



b. Remove terminal (13)(CN-R11).



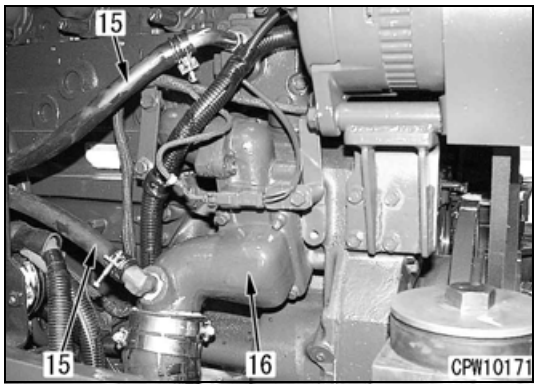
c. Remove connector (14)(CN-ER1).



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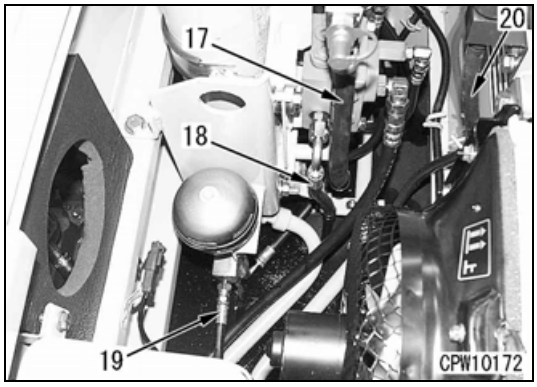
d. Remove heater hose (15).

e. Remove the mounting bolts of water connector (16).

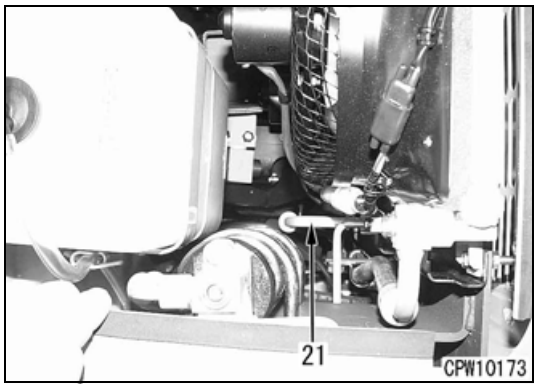


9. Bulkhead

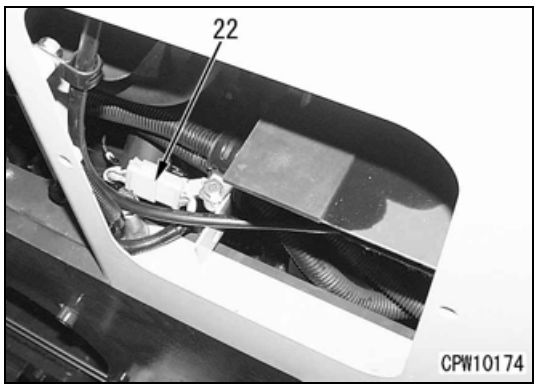
a. Open the top cover of the bulkhead and remove hoses (17), (18), (19) and (20).



b. Remove air conditioner piping (21).



c. Remove the cover at the lower left corner of the bulkhead to remove connector (22)(CN-BR1).



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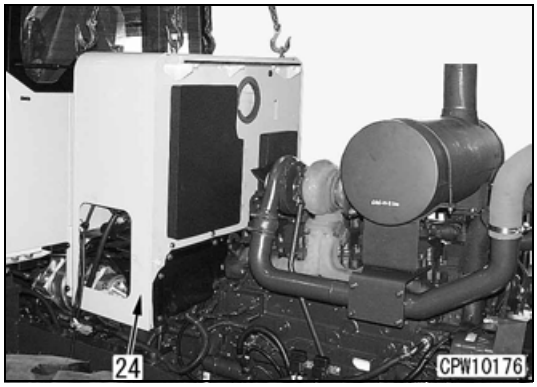
d. Remove the cover to the left of the transmission to remove hose (23).



e. Sling the bulkhead assembly (24) to remove it.

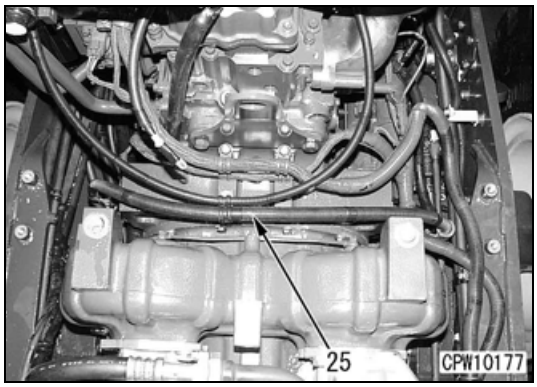
★ Check to see if there is any piping junction before removing it.

kg Bulkhead assembly: **190 kg**

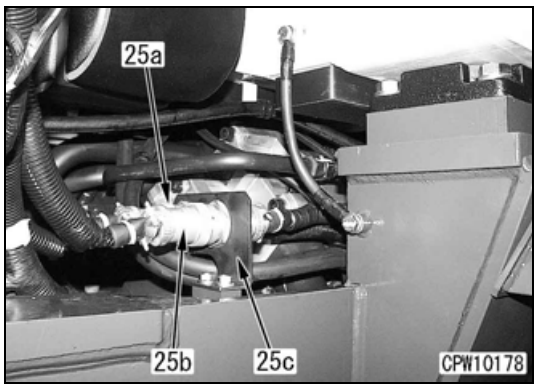


10. Harness

a. Remove the clamp of harness (25) at the junction of the engine and the transmission, and move the harness toward the front of the machine.



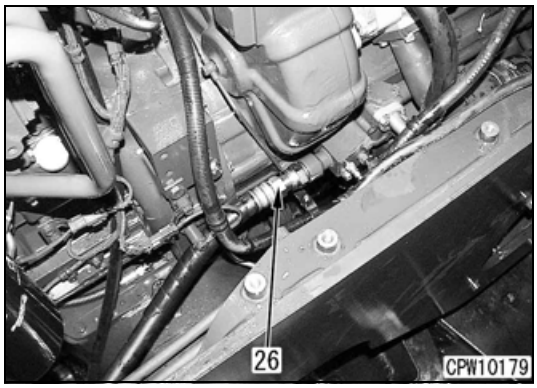
b. Remove harness connectors (25a)(CN-ER2), (25b)(CN-ER3), and keep the harness close to the engine after removing the mounting bolts of bracket (25c).



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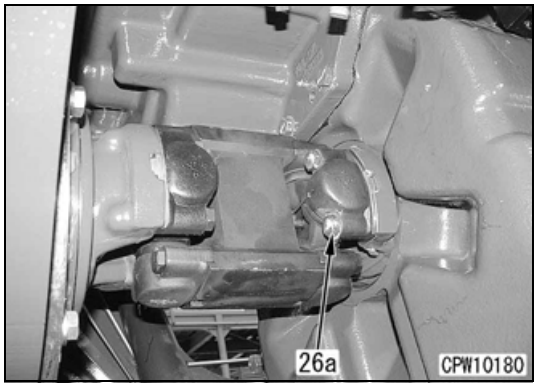
11. Torque converter hose

    Remove torque converter hose (26) located on the right-hand side of the machine.



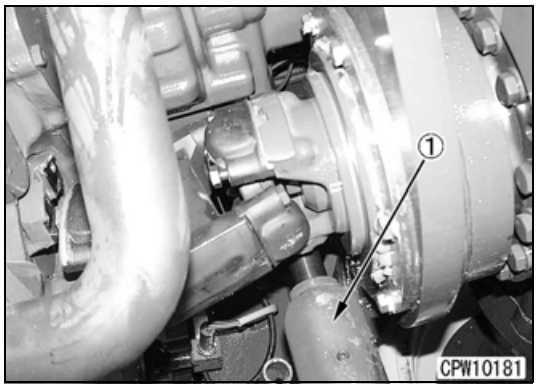
12. Removing the engine assembly

    a. Remove four mounting bolts (26a) connecting the rear propeller shaft with the transmission. ※2



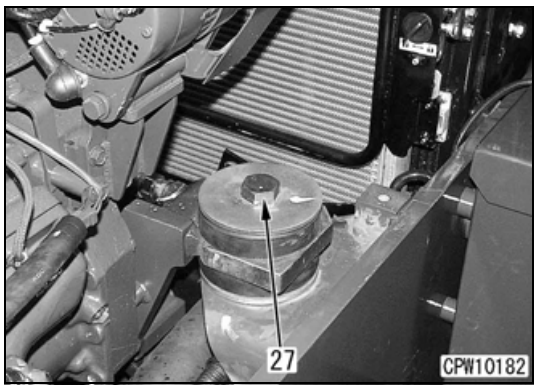
    b. Uphold the junction of the engine and the transmission by applying jack ① on the bottom of the transmission-side of the junction.

       ★ This operation is required to prevent the junction on the transmission side from dropping while being disconnected.



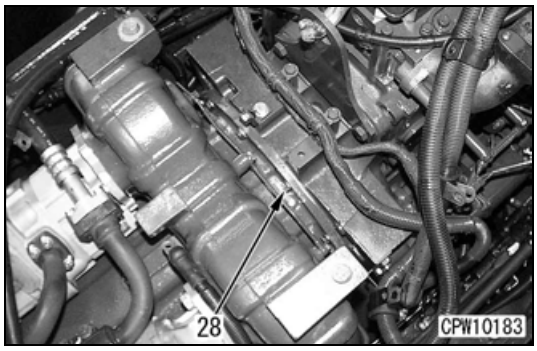
    c. Sling the engine assembly.

    d. Remove mounting bolts (27) of the right and left engine mounts. ※3



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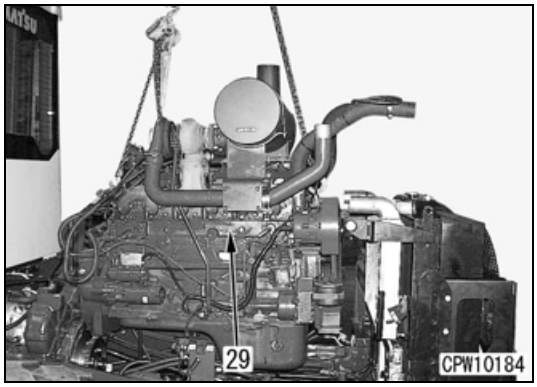
e. Remove all mounting bolts (28) of the torque converter housing.



f. Sling engine assembly (29) while slinging it. ※ 4

★ Check to see if there is any wiring or piping connected to the machine before removing the assembly. Be careful to avoid any interference with the machine.

kg Engine assembly: **1,250 kg**



Installation

- Carry out installation in the reverse order to removal.

★ For information on the method of modifying the fuel injector amount control, contact the nearest Komatsu dealer.

※ 1

★ Fill air-conditioning gas (R134a), referring to the "Air Conditioner Compressor Assembly" section.

※ 2

kgm Rear drive shaft:
98.1 ~ 122.6 Nm {10 ~ 12.5 kgm}

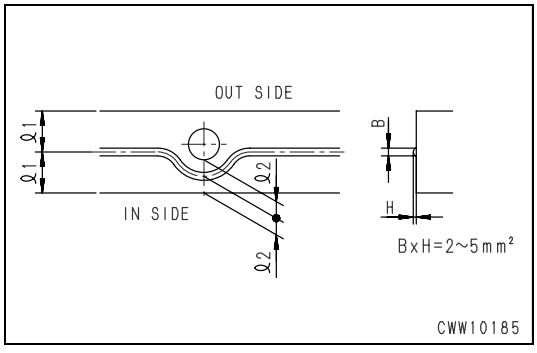
※ 3

kgm Engine mount bolt:
823 ~ 1,029 Nm {84.0 ~ 105 kgm}

※ 4

★ When connecting the engine to the torque converter, adjust the height so that the torque converter shaft and the ring gear may be smoothly installed.

Contacting face of the flywheel housing in the torque converter side (see figure):
Three Bond 1207B



Water supply

- Supply water up to the radiator inlet, start the engine to circulate coolant, and reconfirm the level by checking the reservoir tank.

https://truckmanualshub.com/

Steering, switch pump, cooling fan drive pump assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the (-) terminal of the battery.**

1. Oil drain

   Drain hydraulic oil.

   Hydraulic oil: **190 l**

2. Hood assembly

   Remove the hood, referring to the "Cylinder head assembly" section.

3. Bulkhead assembly

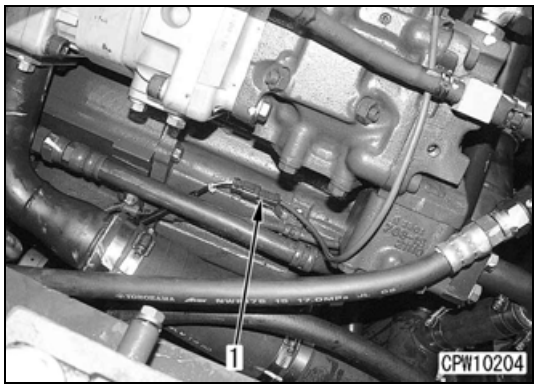
   Remove the bulkhead assembly, referring to the "Engine assembly" section.

4. Cab, floor frame assembly

   Remove the bulkhead assembly, referring to the "Cab, floor frame assembly" section.

5. Harness connector

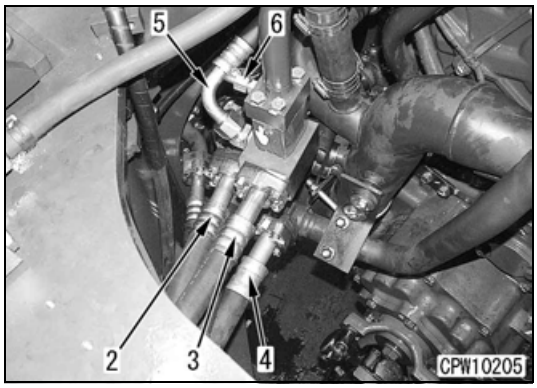
   Disconnect harness connector (1)(CN-R29) next to the transmission (on the right-hand side of the machine).



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6. Hydraulic piping

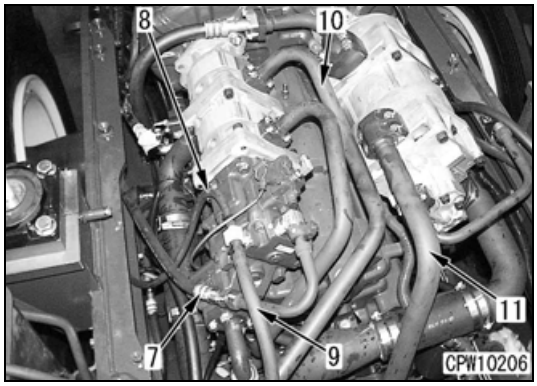
   a. Disconnect hoses (2), (3), (4), (5) and (6) from the machine front side of the transmission.



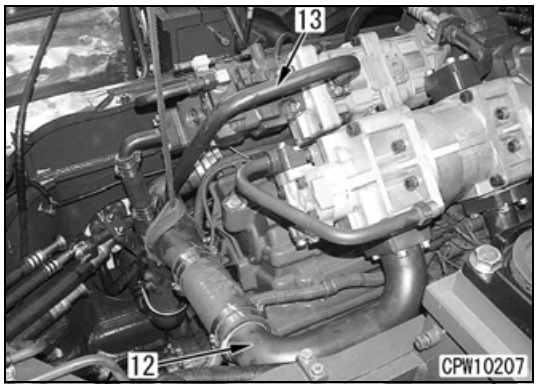
   b. Disconnect hoses (7), (8) and (9).

   c. Remove pipes (10) and (11).

   d. Remove the mounting bolts from the respective pumps and the hydraulic tank, and remove suction pipe assembly (12) while slinging it.



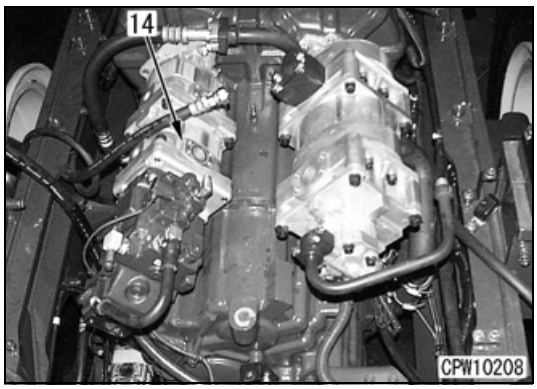
   e. Remove pipe (13).



7. Steering, switch pump, cooling fan drive pump assembly

   Remove steering, switch pump, cooling fan drive pump assembly (14) while slinging it.

   kg Steering, switch, pump cooling fan drive pump assembly: **60 kg**



Installation

- Carry out installation in the reverse order to removal.

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Torque converter charge, work equipment and PPC pump assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the (-) terminal of the battery.**

1. Oil drain

   Drain the hydraulic oil.

   Hydraulic oil: **190 l**

2. Hood assembly

   Referring to "Cylinder head assembly", remove the hood assembly.

3. Bulk head assembly

   Referring to "Engine assembly", remove the bulk head assembly.

4. Cab, floor frame assembly

   Referring to "Cab, floor flame assembly", remove the cab, floor flame assembly.

5. Hydraulic piping

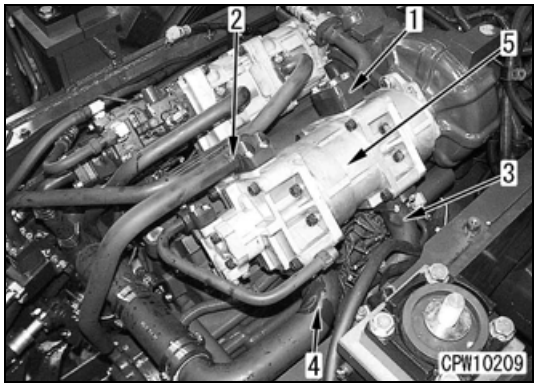
   a. Remove pipes (1) and (2).

   b. Remove the mounting bolts for pipes (3) and (4), used to attach the pipes to the pump.

6. Torque converter charge, work equipment and PPC pump assembly

   Using a lift, remove the torque converter charge, work equipment and PPC pump assembly.

   kg Torque converter charge, work equipment and PPC pump assembly: **50 kg**



Installation

- Carry out installation of the torque converter charge, work equipment and PPC pump assembly in the reverse order to removal.

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Torque converter, transmission assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the (-) terminal of the battery.**

1. Oil drain

   Drain the hydraulic oil and transmission oil.

   Hydraulic oil: **190 l**

   Transmission oil: **65 l**

2. Hood assembly

   Referring to "Cylinder head assembly", remove the hood assembly.

3. Bulk head assembly

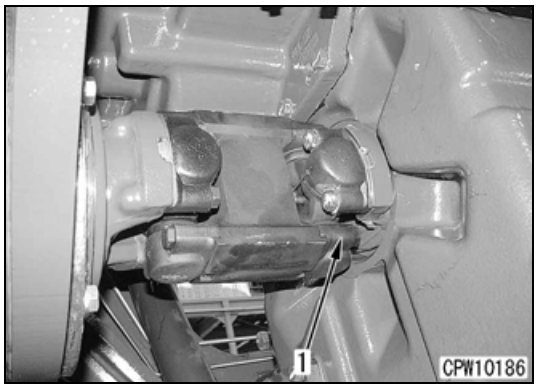
   Referring to "Engine assembly", remove the bulk head assembly.

4. Cab, floor frame assembly

   Referring to "Cab, floor flame assembly", remove the cab, floor flame assembly.

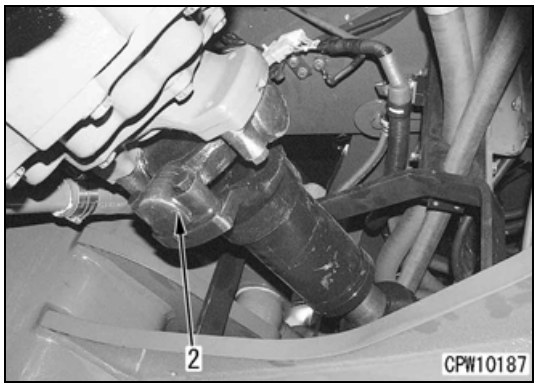
5. Drive shaft

   a. Disconnect the rear drive shaft (1) from the transmission. ※1



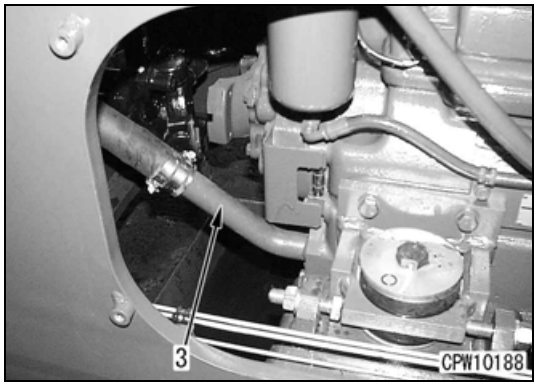
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b. Disconnect the center drive shaft (2) on the transmission side. ※ 2



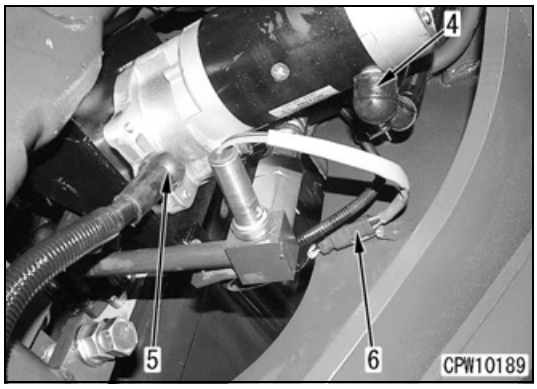
6. Oil pipe

   Remove the cover attached to the side of the transmission attached to the left side of the machine to disconnect the oil pipe (3).

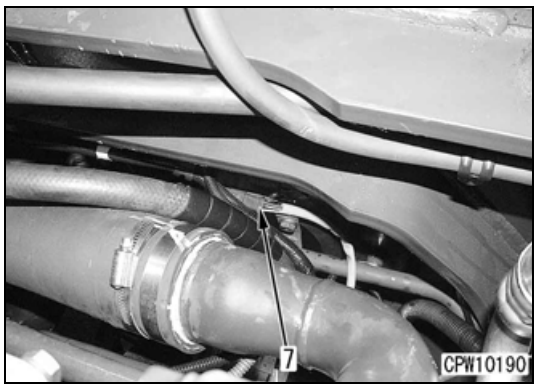


7. Wiring harness connectors

   a. Disconnect terminal (4), ground cable (5) and connector (6) CN-R37 from the emergency steering motor at the bottom of the machine.

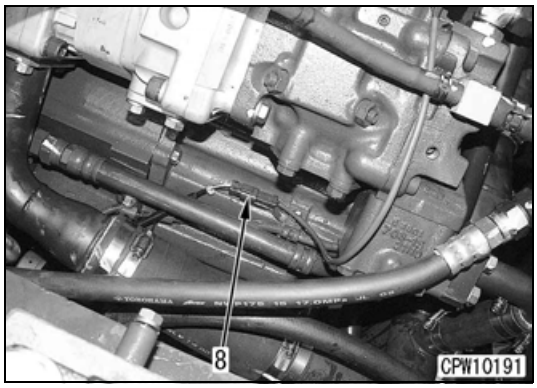


   b. Disconnect connector (7) CN-R36 attached between the right-hand chassis frame and the transmission.



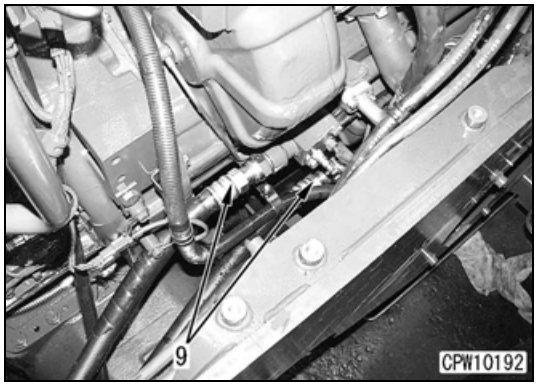
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c. Disconnect connector (8) CN-R29 attached to the side of transmission on the right side of the machine.

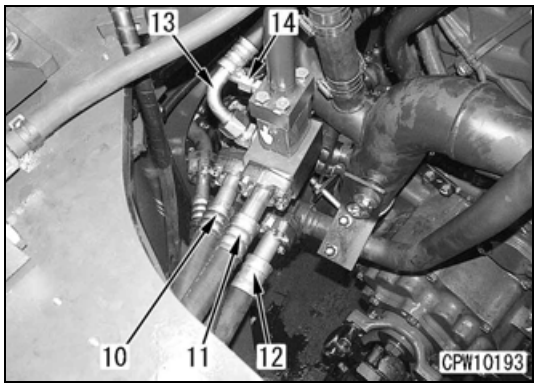


8. Hydraulic piping

a. Remove torque converter hose (9).

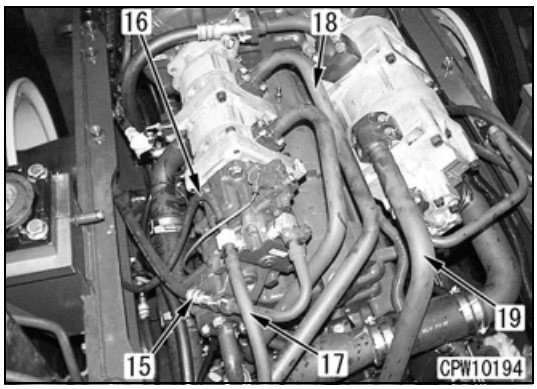


b. Remove hoses, (10) through (14), on the transmission in front side of the machine.



c. Disconnect hoses, (15) through (17).

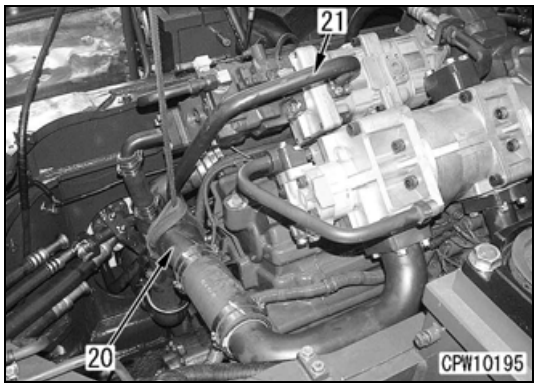
d. Remove pipes, (18) and (19).



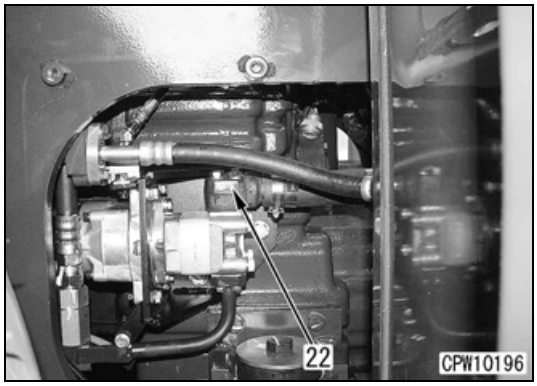
https://truckmanualshub.com/

e. Remove the mounting bolts from each of the pumps and hydraulic tank and then lift up suction pipe assembly (20) to remove.

f. Remove pipe (21).

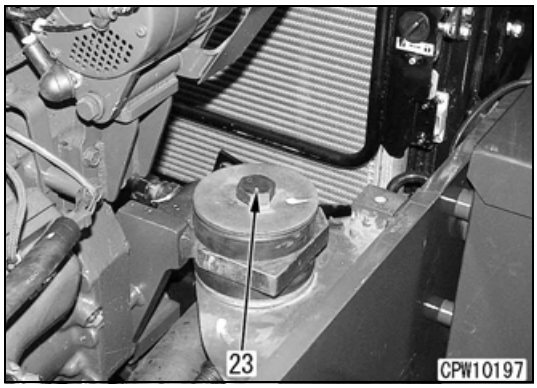


g. Remove the cover attached to the rear side of the hydraulic tank on the right side of the machine and then disconnect pipe (22).



9. Torque converter, transmission assembly

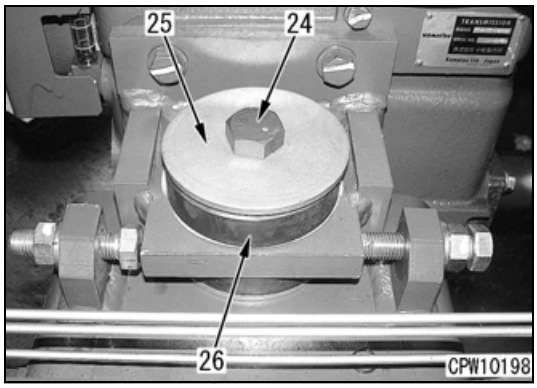
a. Fully loosen left-and-right engine mounting bolts (23). ※ 3



ALWAYS loosen the engine mounting bolts since one side of the engine transmission assembly facing toward the front of the machine has been raised in Step 4).

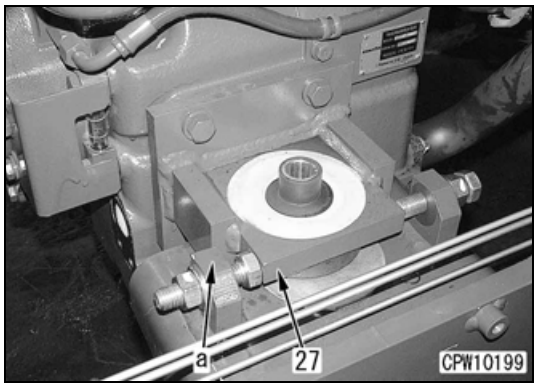
b. Temporarily lift up the torque converter, transmission assembly.

c. Remove mounting bolts (24) on the left and right sides of the transmission and then remove plate (25) and insulator (26). ※ 4



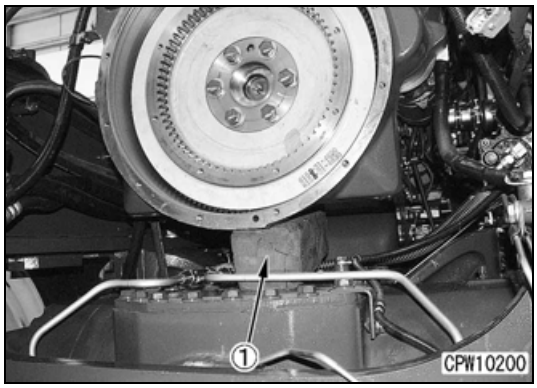
https://truckmanualshub.com/

d. Lift up the torque converters transmission assembly until the bottom of mounting bracket (27) is above the top of Part **a** facing toward the machine.

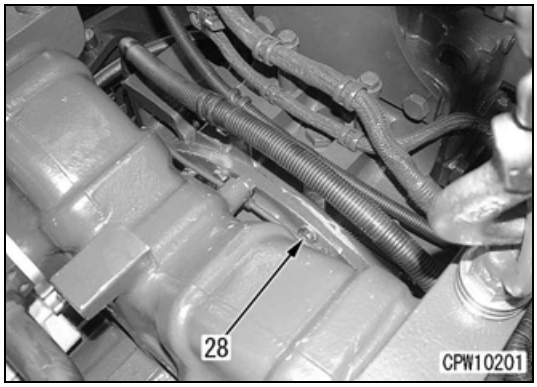


e. Place block ① (approximately 10 cm³) between the bottom of engine flywheel housing and the rear axle in such a manner that it does not disturb the piping to prevent the separated engine from falling.

★ The photo on the right shows the condition after the removal of the torque converter transmission assembly.



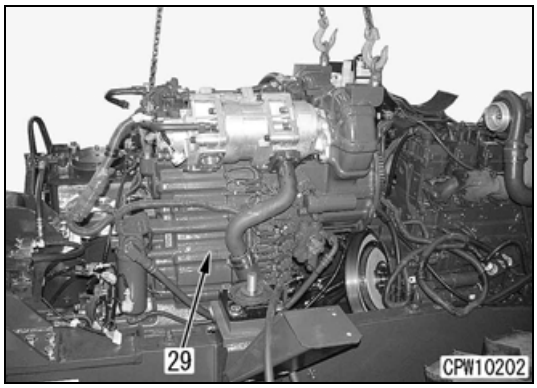
f. Remove mounting bolts (28) used to secure the torque converter housing to the engine.



g. Remove torque converter, transmission assembly (29).

★ When removing, check for any wires and pipes connected to the machine and use care not to interfere the machine.

kg Torque converter transmission assembly:
1,090 kg



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Installation

- Carry out installation in the reverse order to removal.

※ 1

kgm Rear drive shaft:
98.1 ~ 122.6 Nm {10 ~ 12.5 kgm}

※ 2

kgm Center drive shaft:
98.1 ~ 122.6 Nm {10 ~ 12.5 kgm}

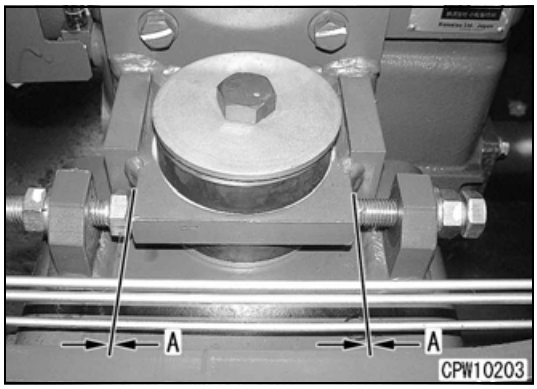
※ 3

kgm Engine mount:
823.8 ~ 1,029 Nm {84.0 ~ 105 kgm}

※ 4

★ Adjust Dimension **A** to a range from 1.0 to 1.5 mm before tightening.

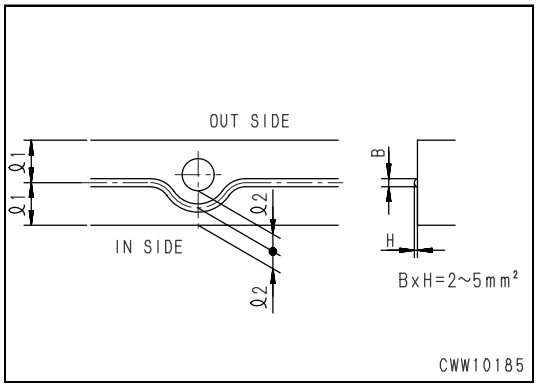
kgm Transmission mount:
823.8 ~ 1,029 Nm {84.0 ~ 105 kgm}



※ 5

★ Adjust the height of the torque converter to allow its shaft and ring gear to easily fit before connecting.

Mating face of torque converter side flywheel housing (see right):
Three Bond 1207B



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Torque converter assembly (standard specifications)

Special tools

Symbol	Part Number	Part Name	Level of need	Qty	New or Revised	Schematic Drawing
B1	790-501-5000	Unit repair stand	●	1		
	790-901-2110	Bracket	●	1		
	790-901-4240	Plate	●	1	R	

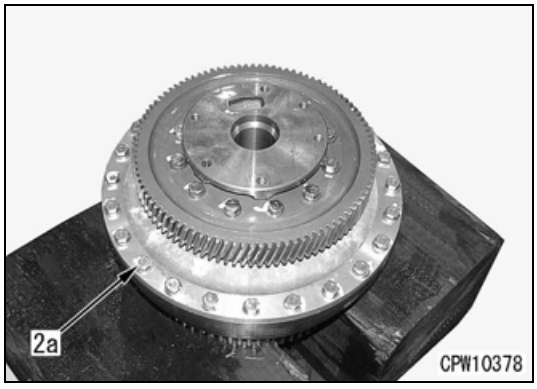
Disassembly

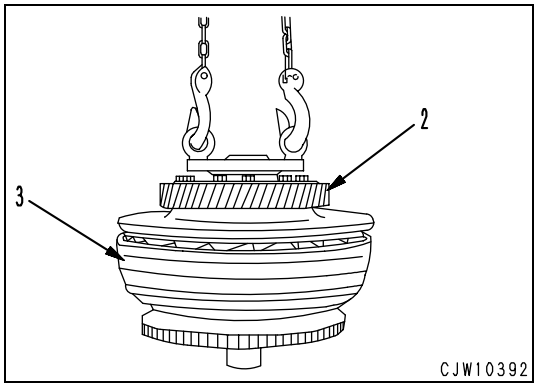
1. Perform steps 1 through 8 described in Disassembly and Reassembly of Transmission Assembly.

   ★ Perform the disassembly procedure with the torque converter assembly placed on a block (or with it secured to tool **B1**).

2. Turbine and case assembly

   a. Attach an eyebolt to the stator shaft and, then remove bolt (2a) to detach stator shaft pump assembly (2) from turbine, case assembly (3).



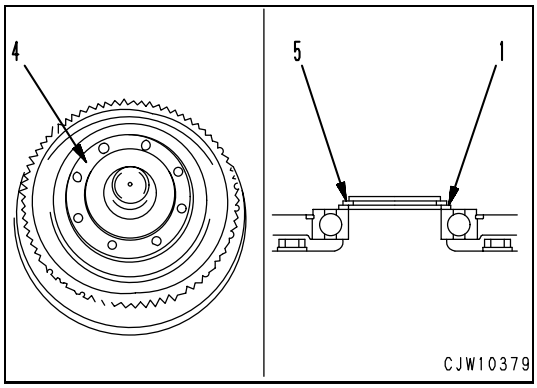


https://truckmanualshub.com/

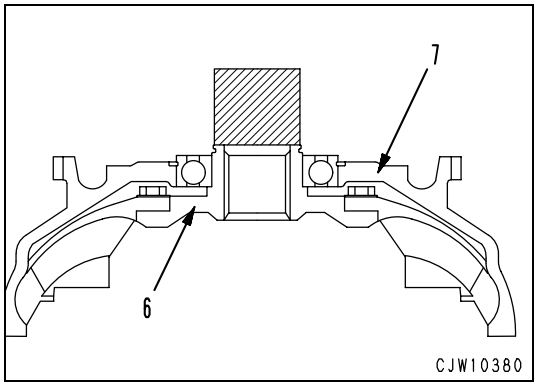
b. Disassemble turbine and case assembly as follows.

I. Remove pilot (4).

II. Remove snap ring (5), then remove plate (1).

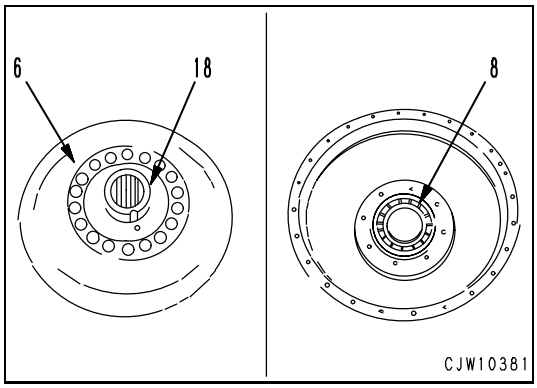


III. Push boss portion of turbine (6) and remove from case (7).



IV. Remove mounting bolts and disconnect turbine (6) and boss (18).

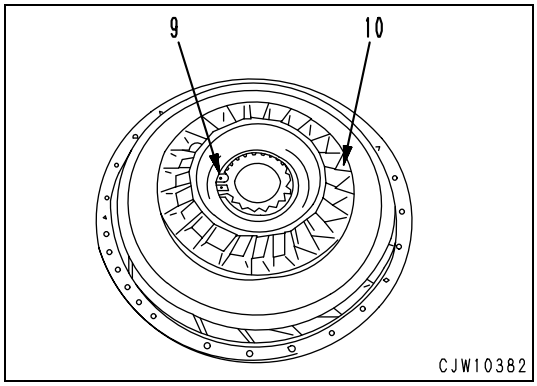
V. Remove bearing (8) from case.



3. Stator

a. Remove snap ring (9).

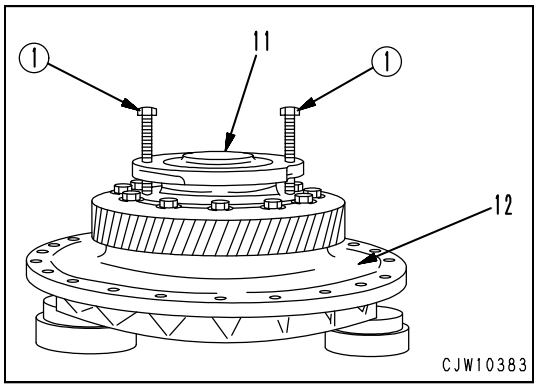
b. Remove stator (10).



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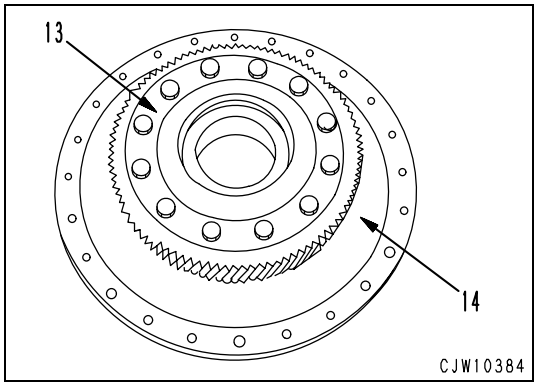
4. Stator shaft

   Using forcing screws ①, push stator shaft (11) end and disconnect from pump assembly (12).



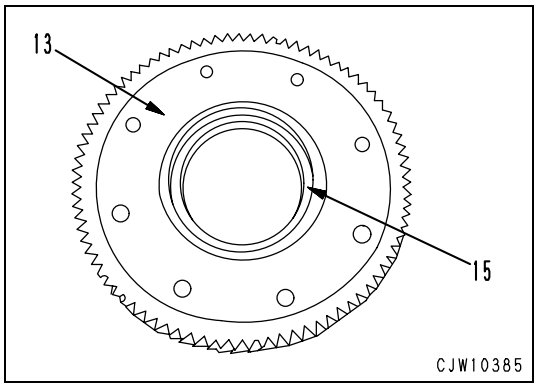
5. Gear

   Remove gear (13) from pump (14).



6. Bearing

   Remove bearing (15) from gear (13).

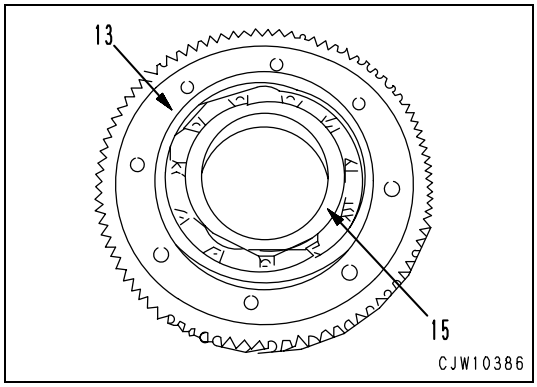


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Assembly

1. Bearing

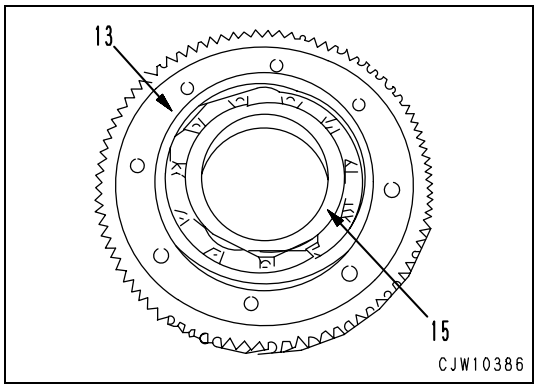
   Install bearing (15) to gear (13).



2. Gear

   Install gear (13) to pump (14).

   kgm Mounting bolt:
   58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}

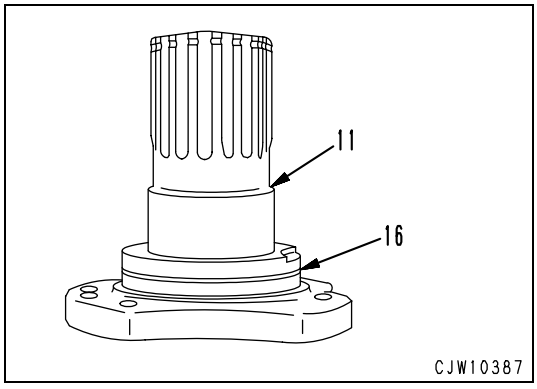


3. Stator shaft

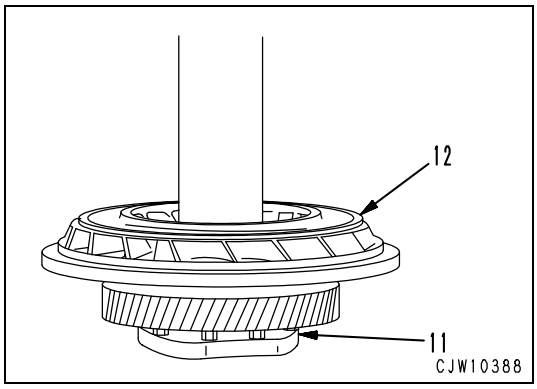
   a. Install seal ring (16) to stator shaft (11).

      Seal ring: **Grease (G2-LI)**

   ★ Make the protrusion of the seal ring uniform.



   b. Push inner race of bearing and install pump assembly (12) to shaft (11).

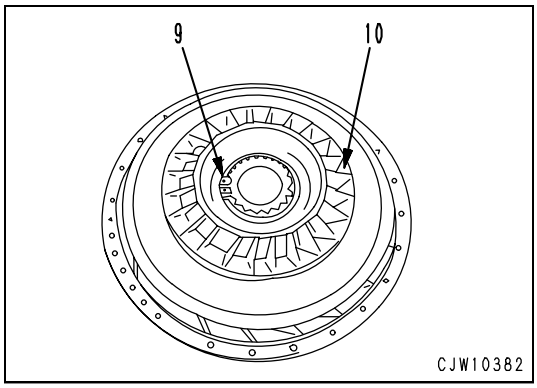


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4. Stator

   a. Install stator (10).

   b. Install snap ring (9).

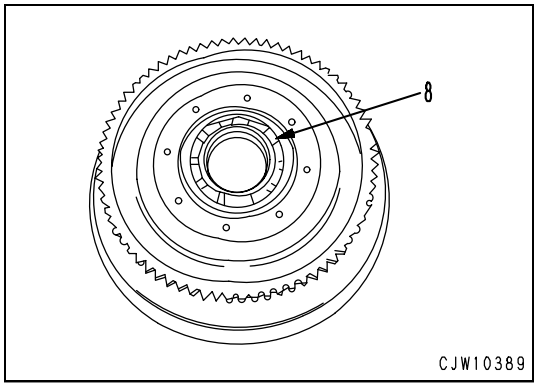


5. Turbine, case assembly

   a. Assemble turbine and case assembly as follows.

      I. Install bearing (8) to case.

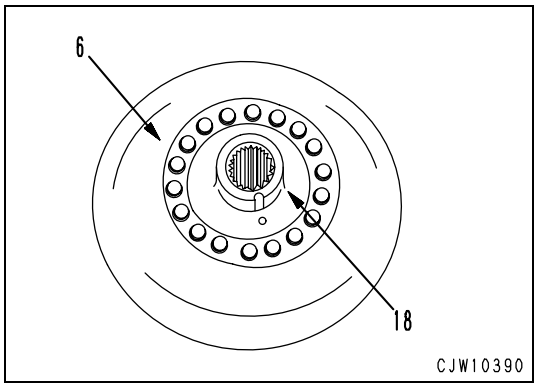
      ★ Press fit the bearing until it contacts the case.



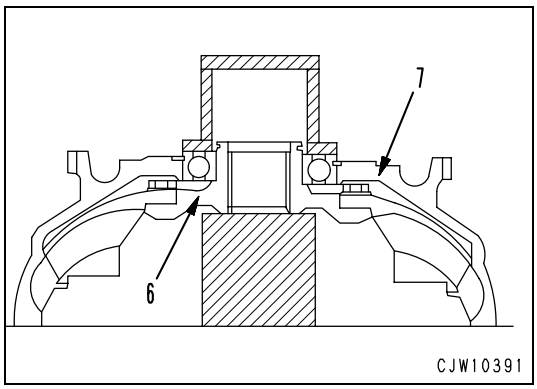
      II. Install boss (18) to turbine (6).

      Mounting bolt:
      Thread tightener (LT-2)

      Mounting bolt:
      58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}



      III. Push inner race of bearing and install turbine (6) to case (7).



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IV. Fit plate (1) and install snap ring (5).

V. Install pilot (4).

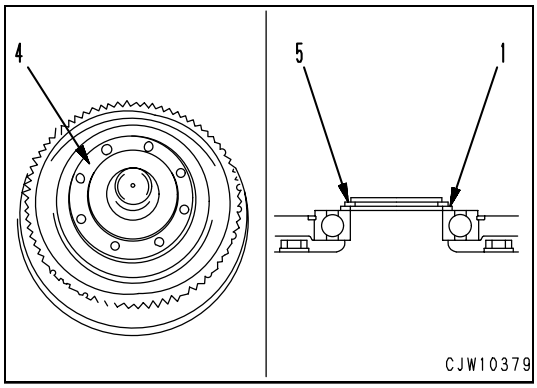
Mounting bolt:
Thread tightener (LT-2)

Mounting bolt:
58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}

b. Install turbine and case assembly (3) to stator shaft and pump assembly (2).

Mounting bolt:
Thread tightener (LT-2)

Mounting bolt:
58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}



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Torque converter assembly (lock-up specifications)

Special tools

Symbol		Part Number	Part Name	Level of need	Qty	New or Revised	Schematic Drawing
B1	1	790-501-5000	Unit repair stand	●	1		
	2	790-901-2110	Bracket	●	1		
	3	790-901-4240	Plate	●	1	R	
B2		793-647-1110	Wrench	■	1	N	

Disassembly

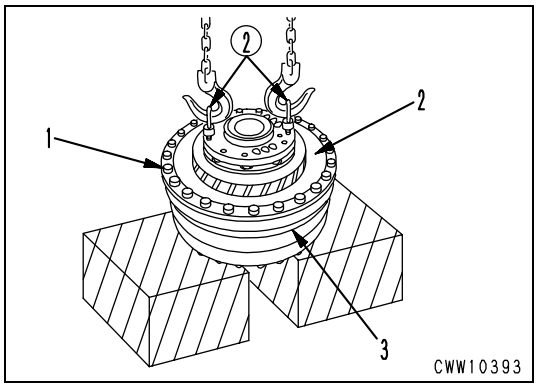
1. Perform steps 1 through 8 described in Disassembly and assembly of transmission assembly.

   ★ Perform the disassembly procedure with the torque converter assembly placed on a block (or with it secured to tool **B1**).

2. Stator shaft, pump assembly

   a. Remove mounting bolt (1) from the pump.

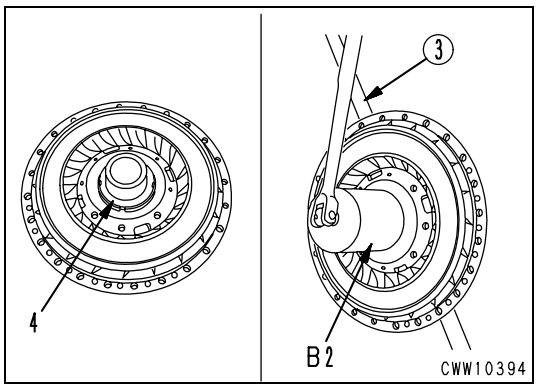
   b. Using eyebolt ②, lift up the stator shaft, pump assembly (2) and then remove it from turbine, case assembly (3).



   c. Disassemble the stator shaft pump assembly as follows:

      I. Using **B2** tool, remove nut (4).

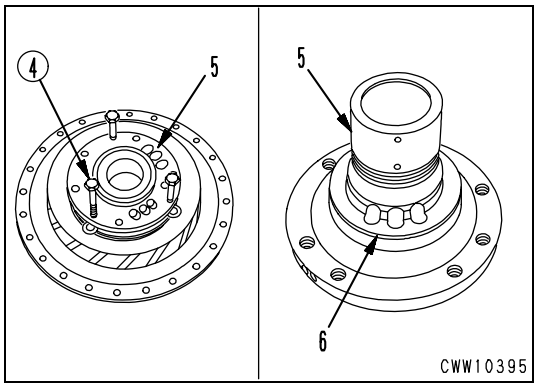
      ★ Screw the bolt in the stator shaft and secure it using bar ③ before loosening the nut.



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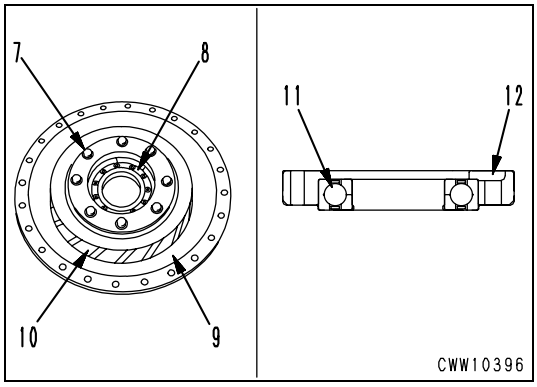
II. Using forcing screw ④, remove stator shaft (5).

III. Remove seal ring (6) from stator shaft (5).



IV. Remove mounting bolt (7) to detach gear (10) and guide, bearing assembly (8) from pump (9).

V. Remove bearing (11) from guide (12).

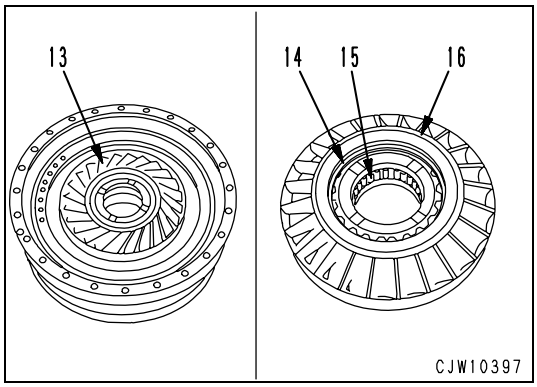


3. Stator assembly

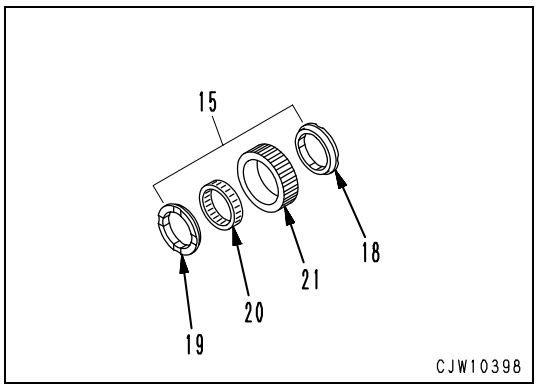
a. Remove stator assembly (13).

b. Disassemble the stator assembly as follows:

I. Remove snap ring (14) from the top and bottom of the assembly to detach race, free wheel assembly (15) from stator (16).



II. Remove bushings (18) and (19) from race, free wheel assembly (15) and then remove free wheel (20) from race (21).

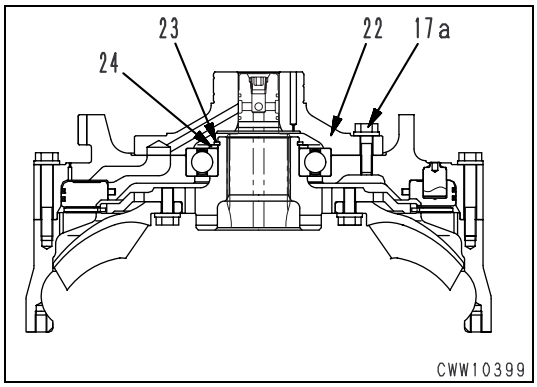


https://truckmanualshub.com/

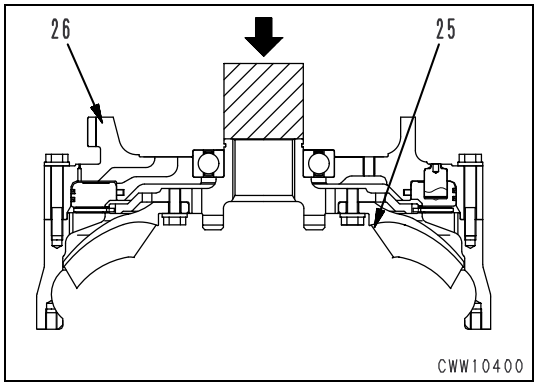
4. Disassembly of turbine, case assembly

   a. Remove bolt (17a) to detach pilot (22).

   b. Remove snap ring (23) to detach plate (24).

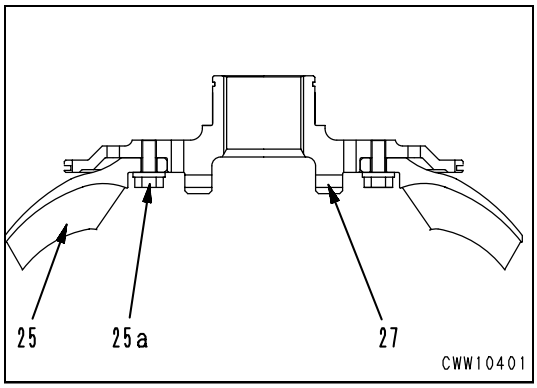


   c. Push the boss in turbine (25) to remove the turbine from case (26).

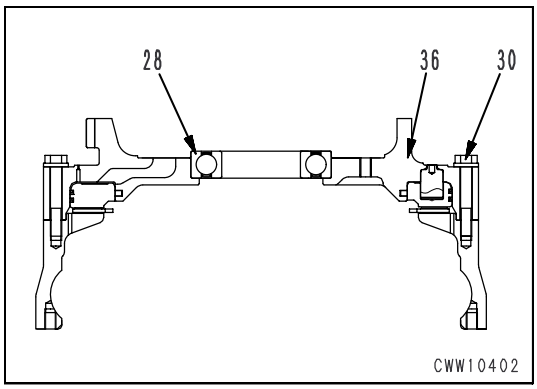


   d. Remove bolt (25a) to separate turbine (25) and boss (27).

   e. Remove bearing (28) from complete housing (36).



   f. Remove complete housing mounting bolt, (30).



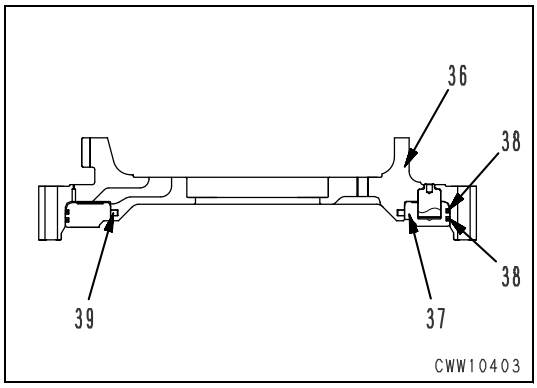
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g. Disassemble the complete housing assembly as follows:

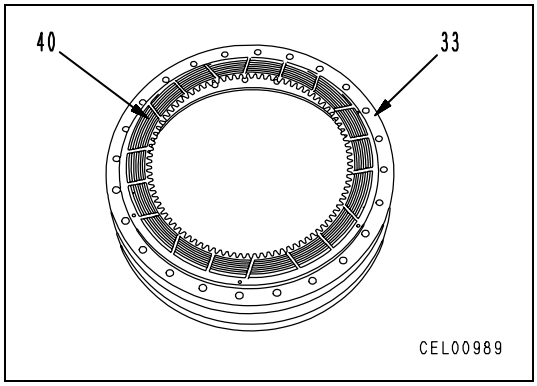
I. Remove piston (37) from complete housing (36).

II. Remove seal ring (38) from piston (37).

III. Remove seal ring (39) from complete housing (36).



h. Remove disc (40) from drive case (33).



Assembly

★ Before assembling components, clean all relevant parts and check for foreign particles and damages.

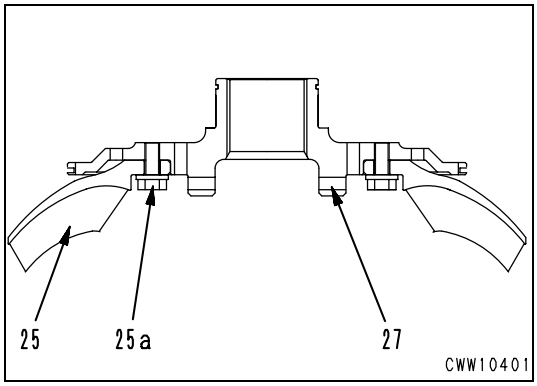
★ Make sure the snap ring is securely fit into the groove.

1. Complete turbine

Attach turbine (25) to boss (27) and then tighten bolt (25a).

Bolt: **Adhesive (LT-2)**

Bolt: **58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}**

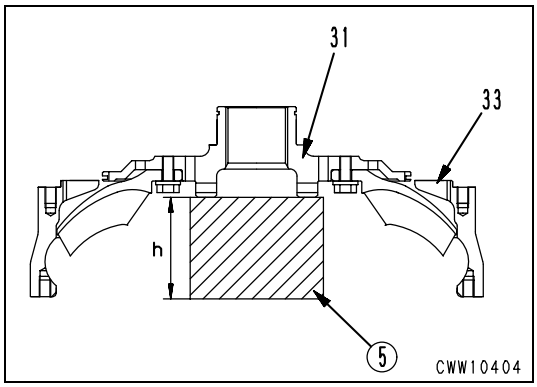


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2. Turbine, case

   Attach complete turbine (31) to block ⑤ to mount drive case (33).

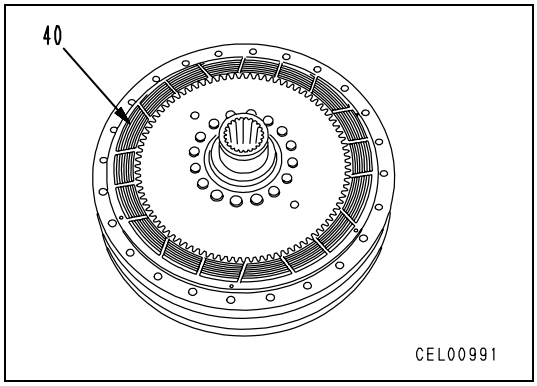
   ★ Height of block ⑤ **h**: Approx. 90 mm



3. Disc

   Attach disc (40).

   ★ Apply engine oil to the sliding surface of the disc before attaching.



4. Complete housing assembly

   a. Assemble the complete housing assembly as follows:

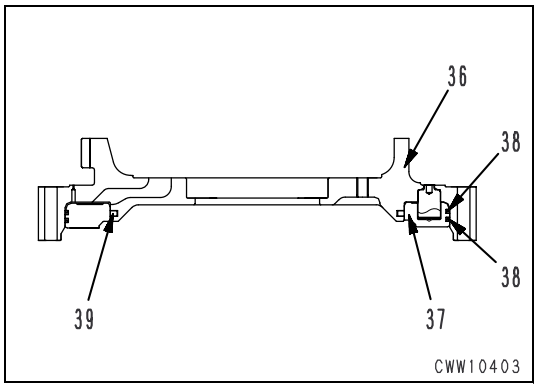
      I. Attach seal ring (39) to complete housing (36).

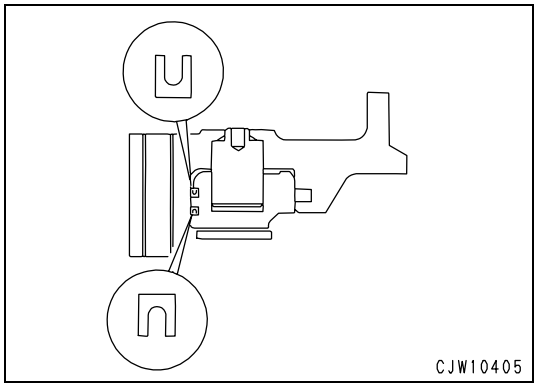
      Periphery of seal ring:
      Grease (G2-LI)

      II. Attach seal ring (38) to piston (37) and then fit them to complete housing (36).

      ★ Referring to the figure on the right, set seal ring (38) in the piston.

      Periphery of seal ring:
      Grease (G2-LI)





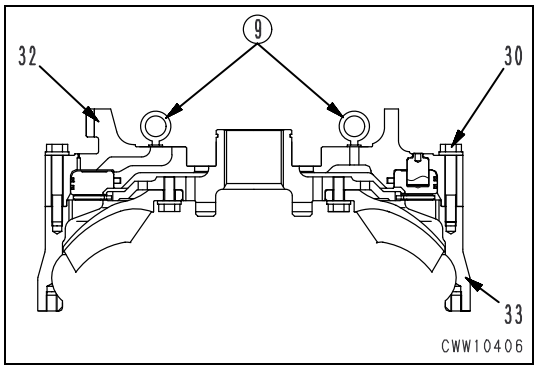
https://truckmanualshub.com/

b. Using eyebolt ⑨, lift up complete housing assembly (32) to fit it to drive case (33).

c. Tighten mounting bolt (30).

Mounting bolt:
Adhesive (LT-2)

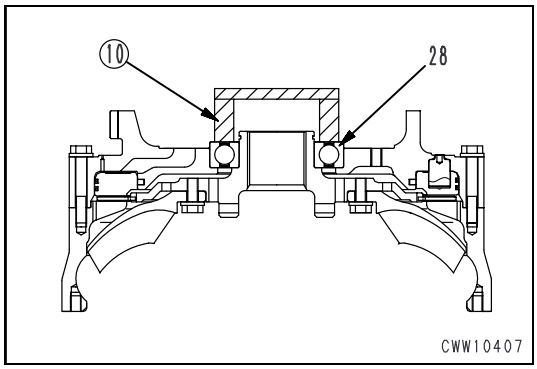
Mounting bolt:
58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}



5. Bearing

Using pushing tool ⑩, pressure-fit bearing (28).

★ After pressure-fitting the bearing, drop 6 cm³ of engine oil and then turn the bearing ten turns.



6. Plate and snap ring

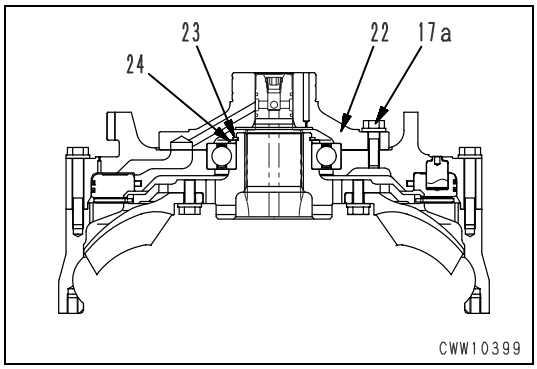
Fit spacer (24) and then attach snap ring (23).

7. Pilot

Attach pilot (22) and then tighten bolt (17a).

Mounting bolt:
Adhesive (LT-2)

Mounting bolt:
58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}



8. Stator assembly

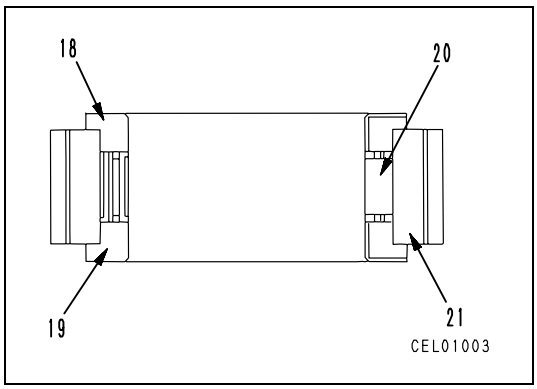
a. Assemble the stator assembly as follows:

I. Fit free wheel (20) to race (21) and then secure bushings (18), (19) with the expansion fit.

★ Apply engine oil to the sliding surface of the bushing and free wheel.

★ Use care not to damage the free wheel sprag.

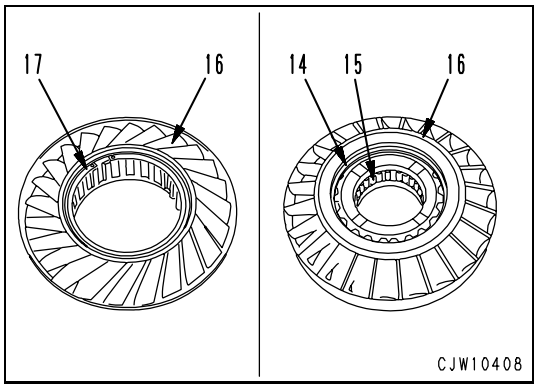
★ Assemble the stator assembly with the arrow indicated on the end of free wheel cage pointed to the turbine (IN).



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II. Attach snap ring (17) to stator (16).

III. Fit race free wheel assembly (15) to stator (16) before attaching snap ring (14).

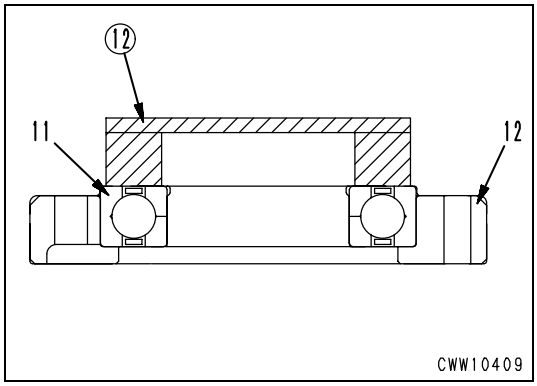


9. Stator shaft pump assembly

a. Assemble the stator shaft pump assembly as follows:

I. Using pushing tool ⑫, pressure-fit bearing (11) into guide (12).

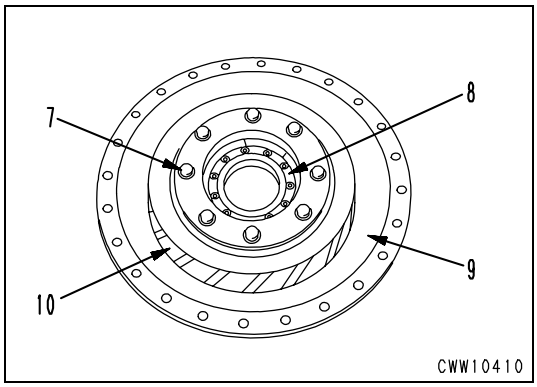
★ After pressure-fitting the bearing, drop 6 cc of engine oil and then turn the bearing ten turns.



II. Fit guide bearing assembly (8) and gear (10) to pump (9) before tightening mounting bolt (7).

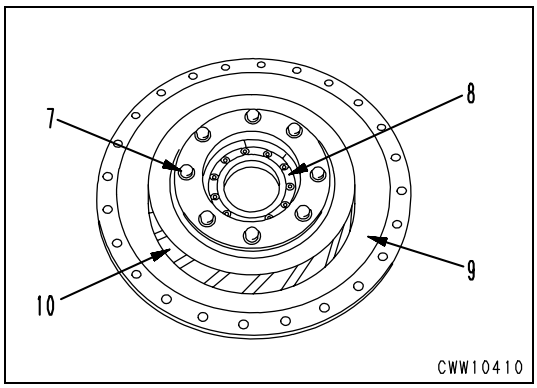
Mounting bolt:
Adhesive (LT-2)

Mounting bolt:
58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}



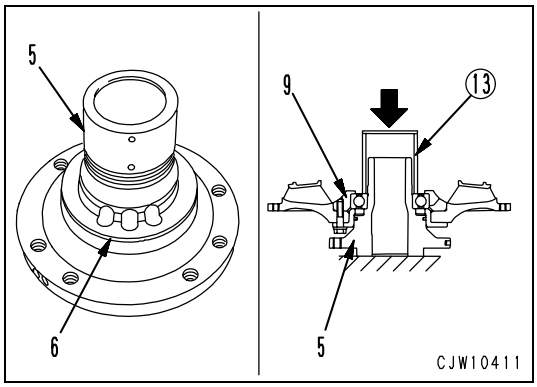
III. Attach seal ring (6) to stator shaft (5).

Periphery of seal ring:
Grease (G2-LI)



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IV. Using pushing tool ⑬, push the inner race of the bearing to attach pump assembly (9) to stator shaft (5).



V. Using **B2** tool, tighten nut (4).

★ Screw the bolt in the stator shaft and secure it using bar ③ before loosening the nut.

Nut: **Adhesive (LT-2)**

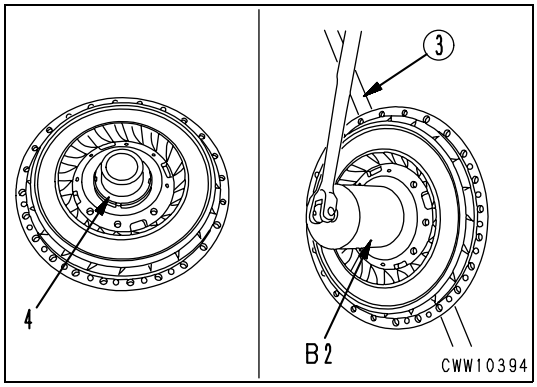
Nut: **147.1 ~ 176.5 Nm {15 ~ 18 kgm}**

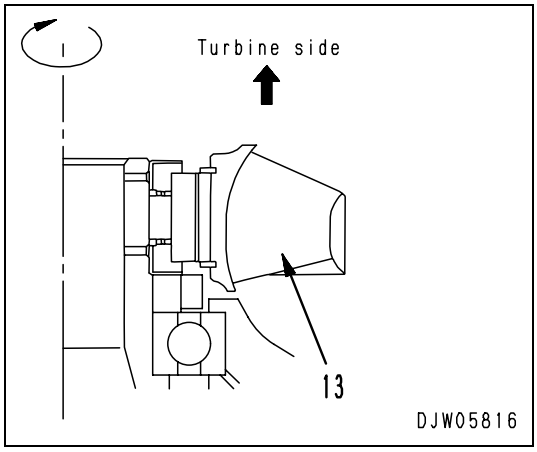
VI. Install stator assembly (13) as you turn it clockwise.

★ Check the stator for the direction of rotation when viewed from the turbine (IN).

- Clockwise: Idling
- Counterclockwise: Locked

★ When the direction of stator rotation differs from the above, re-assemble the stator by reversing the race and free wheel assembly to determine the direction of rotation again.



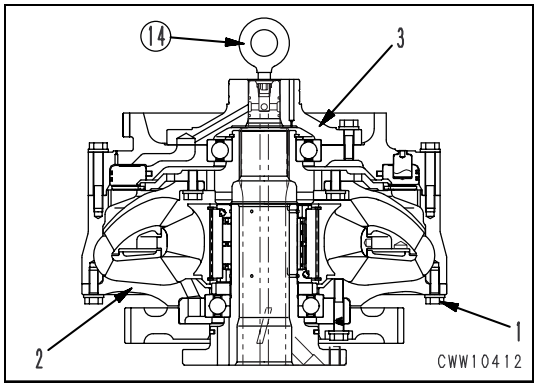


b. Using eyebolt ⑭, place turbine case assembly (3) on stator shaft pump assembly (2) and then temporarily tighten mounting bolt (1).

c. Turn over the assembly to tighten the bolt.

Mounting bolt:
Adhesive (LT-2)

Mounting bolt:
49.0 ~ 58.8 Nm {5.0 ~ 6.0 kgm}



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Transmission assembly

Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
C1	1	793T-607-1240	Bracket	■	2	N	❍
	2	01010-81640	Bolt	■	8		
C6	1	790-101-5421	Grip	■	1		
	2	01010-51240	Bolt	■	1		
	3	793T-607-1150	Pushing tool	■	1	N	❍
C7	1	790-101-5421	Grip	■	1		
	2	01010-51240	Bolt	■	1		
	3	793T-607-1150	Pushing tool	■	1	N	❍
	4	793T-607-1160	Spacer	■	1	N	❍
C11	1	793T-607-1220	Lifting tool	■	1	N	❍
	2	793-607-1230	Pin	■	1	N	
	3	793T-607-1210	Lifting tool	■	1	N	❍
	4	793-607-1230	Pin	■	1	N	
	5	04530-11222	Eyebolt	■	1		

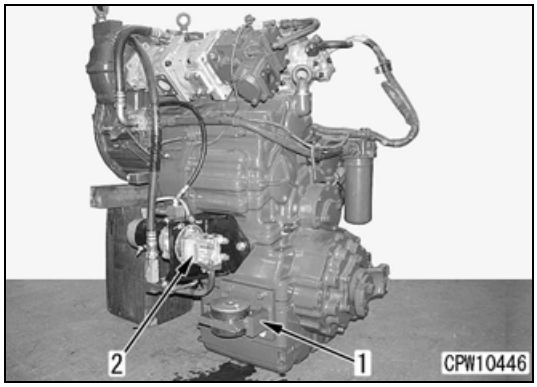
Disassembly

1. Mount brackets

   Remove mount brackets (1) on both sides.

2. Emergency steering pump, motor assembly

   Remove emergency steering, pump motor assembly (2).

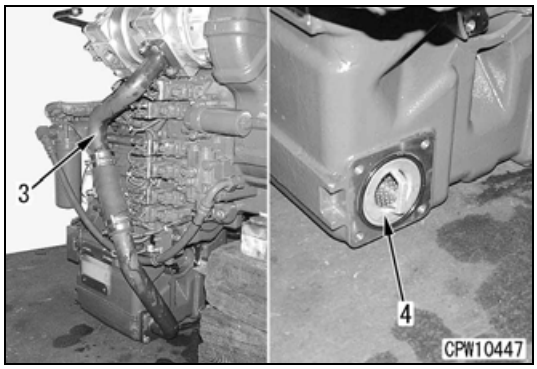


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3. Torque converter charge, work equipment, PPC pump assembly

   a. Remove pipe, hose assembly (3).

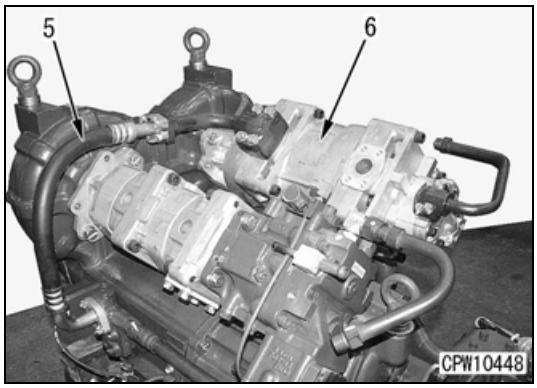
   b. Remove filter (4).

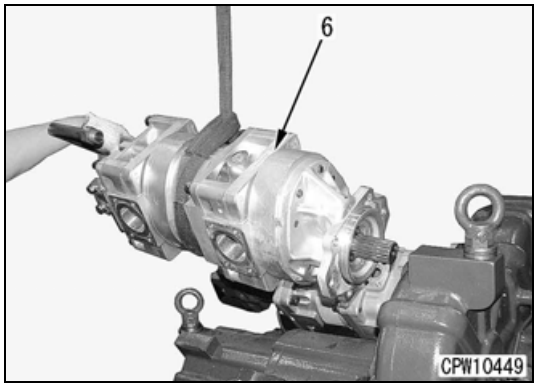


   c. Remove pipe, hose assembly (5).

   d. Lift up torque converter charge, work equipment, PPC pump assembly (6) and then remove it.

      kg Torque converter charge, work equipment, PPC pump assembly: **50 kg**

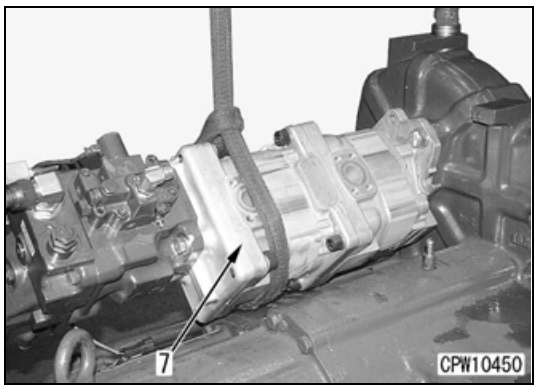




4. Steering, switch pump, cooling fan drive pump assembly

   Lift up steering, switch pump, cooling fan drive pump assembly (7) and then remove it.

      kg Steering, switch pump, cooling fan drive pump assembly: **60 kg**

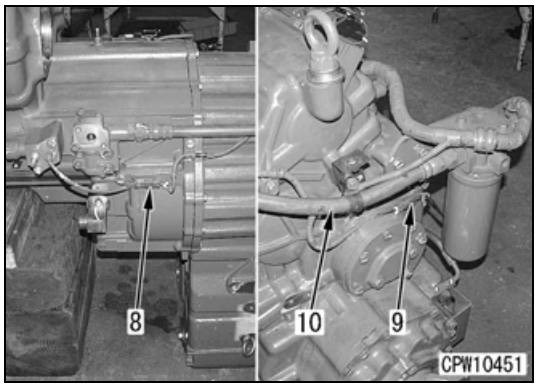


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5. Harness connectors and filter

   a. Disconnect connector (8) (CN-TC.C) and connector (9) (CN-REV OUT).

   b. Remove hose (10).



   c. Remove hoses (11) and (12).

   d. Disconnect connectors (13) and connector (14) (CN-TM.T) before removing harness (15).

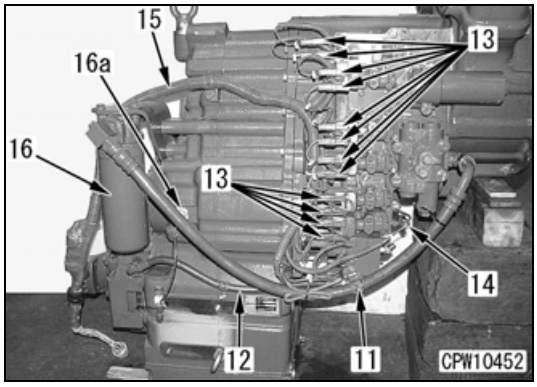
      ★ Connectors (13) include the following fourteen.

      ★ CN-LC.PS and LC.SW are optional for the Lock-Up Specifications.

      • CN-F.PS, F.SW, R.PS, R.SW, LC.PS, LC.SW, 4.PS, 4.SW, 1.PS, 1.SW, 3.PS, 3.SW, 2.PS, 2.SW

   e. Remove filter (16) together with the bracket.

   f. Remove speed sensor (16a).



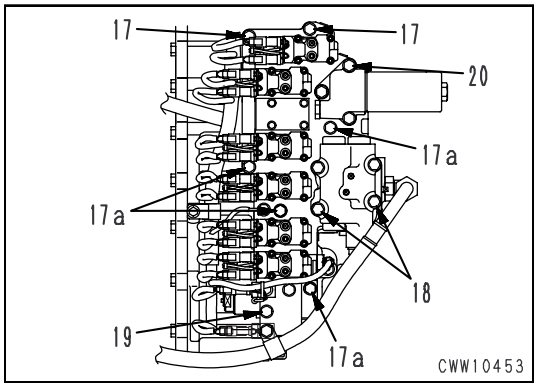
6. Transmission control valve assembly

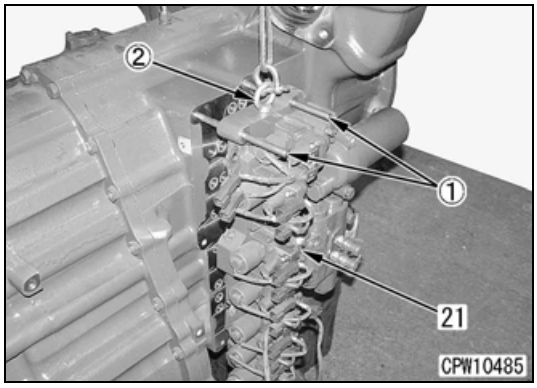
   a. Remove two mounting bolts (17) and then install guide bolt ①.

   b. Install eyebolt ② to sling the control valve assembly.

   c. Remove mounting bolts, (17a), (18), (19) and (20), to detach transmission control valve assembly (21).

      ★ Bolt stem length 55 mm: (17), (17a)
      105 mm: (18)
      110 mm: (19)
      120 mm: (20)

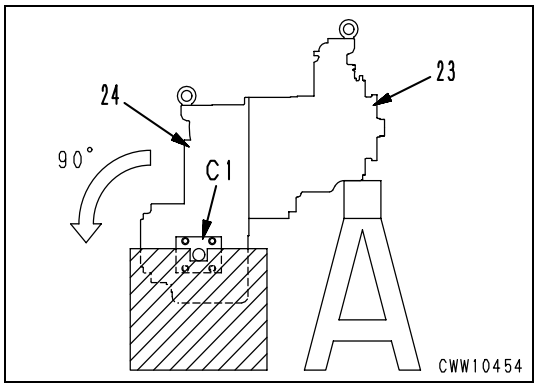




kg Control valve assembly: **45 kg**

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7. Separation of front and rear housings

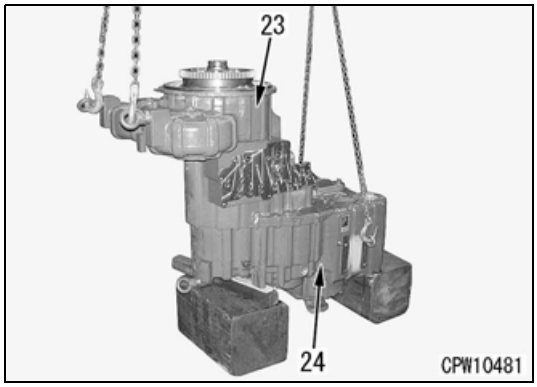


a. Attach **C1** tool to the position where the left- and right-transmission mount brackets are installed.

b. Lift up the torque converter transmission assembly. Support two places of **C1** tool shaft with a block. Using a jack, support the bottom of rear housing (23).

c. Turn rear housing (23) 90 degrees around **C1** tool shaft to position the rear housing above the front housing. Then, support the bottom of front housing (24) with blocks.

d. Lift up the torque converter transmission assembly to support the bottom of front housing (24) with blocks.

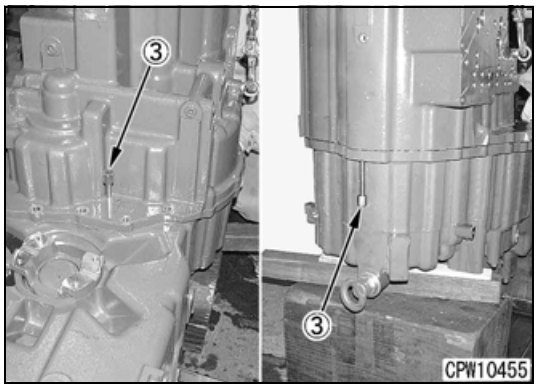


★ Make sure the top of rear housing (23) is level.

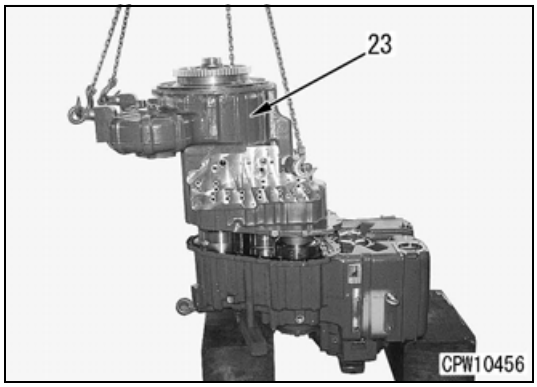
e. Remove **C1** tool.

f. Sling the rear housing and then remove the mounting bolts.

g. Tighten all forcing screws ③ with uniform torque and then separate the front and rear housings.



h. Lift up rear housing (23) and the remove it.



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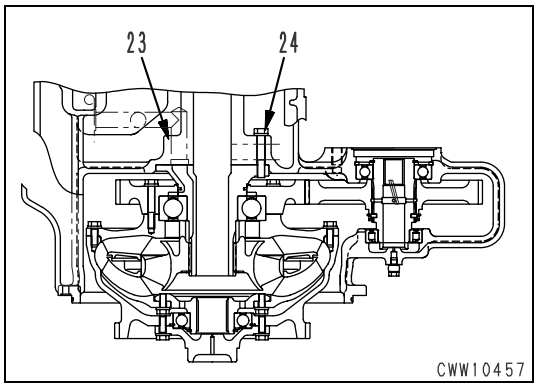
8. Torque converter assembly

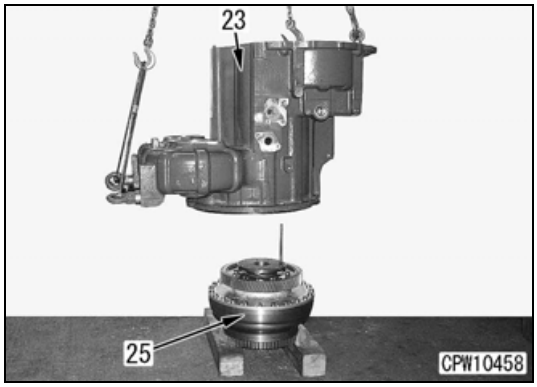
   a. Install rear housing (23) on blocks with the torque converter down.

   b. Remove mounting bolts (24) from the torque converter assembly and then install the guide mounting bolts.

   c. Lift up rear housing (23) and then remove torque converter assembly (25).

      ★ For the disassembly of the torque converter assembly, see "Torque converter assembly."

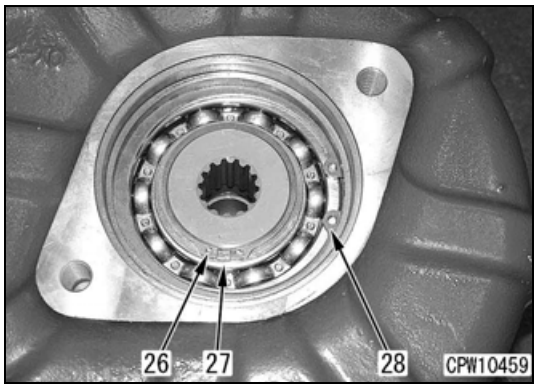




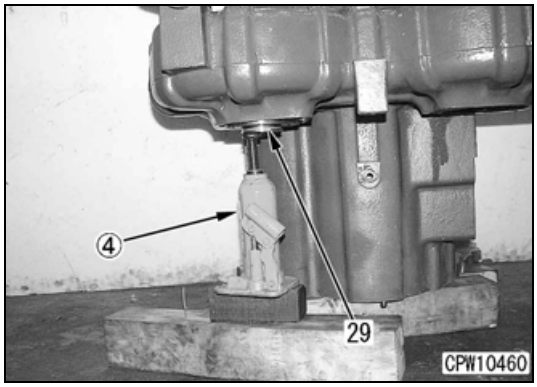
9. PTO gear

   a. Remove snap ring (26), plate (27) and snap ring (28).

   b. Install the rear housing on blocks with the PTO gear down.

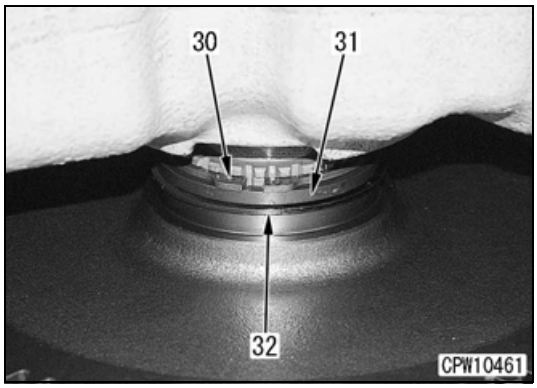


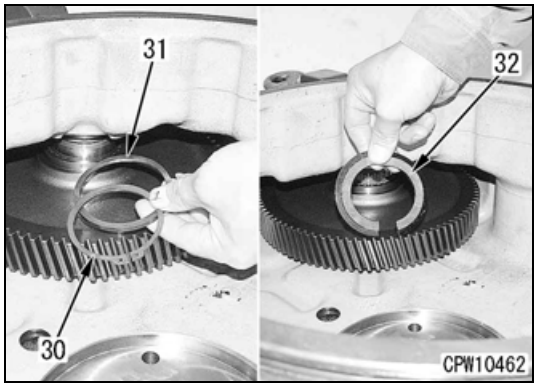
   c. Support shaft (29) with jack ④.



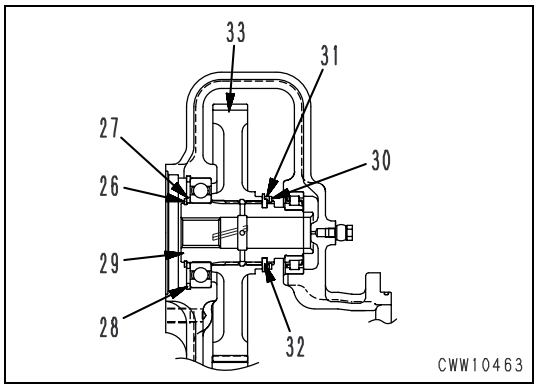
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d. Remove snap ring (30), plate (31) and semicircular thrust plate (32).

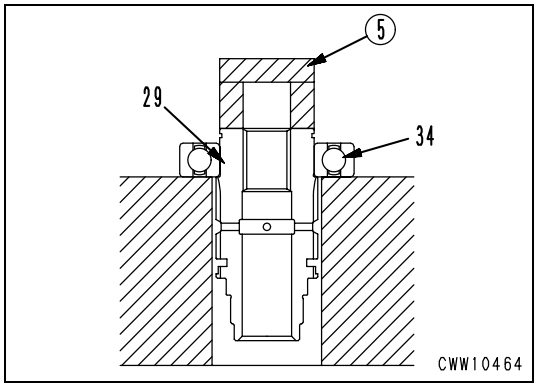




e. Jack down to pull shaft (29) out and then remove PTO gear (33).



f. Using bushing tool ⑤, push shaft (29) to remove bearing (34).

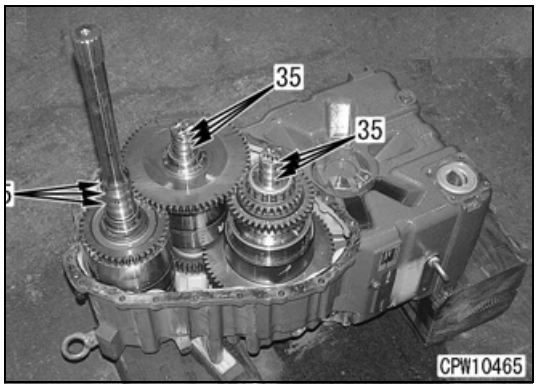


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10. Clutch pack assembly

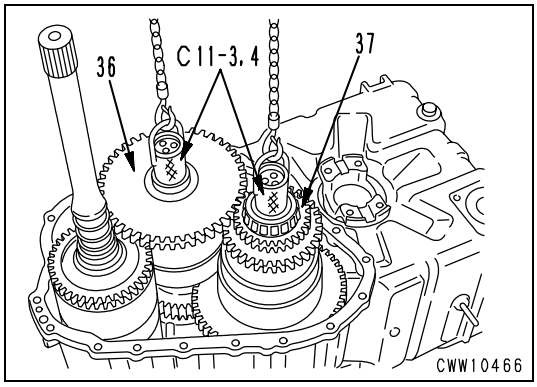
★ To remove all clutch pack assemblies, pull each of them upwards using care not to damage the bearing installed to the clutch pack bottom.

a. Remove seal ring (35) from each of the clutch packs.



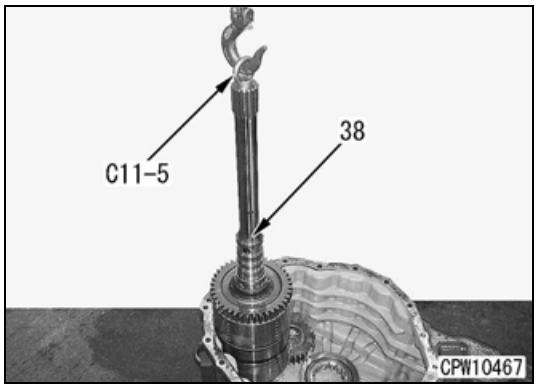
b. Using **C11-3** and **-4** tools, simultaneously lift up 1st-/fourth-speed clutch pack assembly (36) and 2nd-/3rd-speed clutch pack assembly (37) to remove them.

kg Clutch pack assembly: **160 kg**



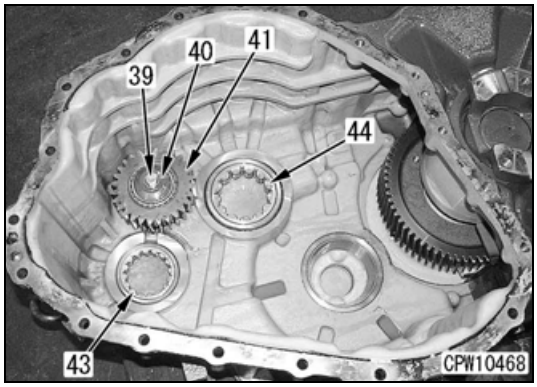
c. Using **C11-5** tool, lift up forward-reverse clutch pack assembly (38) to remove it.

kg Forward-reverse clutch pack assembly: **65 kg**



11. Idler gear and outer bearing

a. Remove bolt (39) and plate (40) to detach idler gear (41).

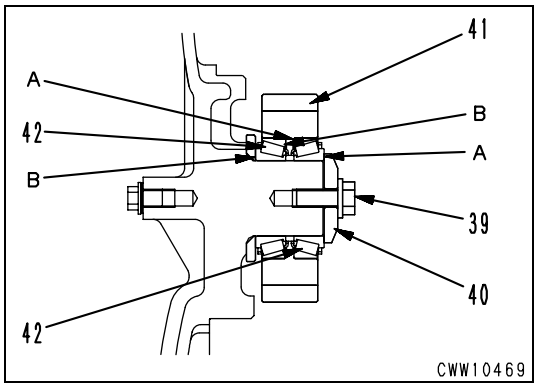


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b. Remove bearing (42) from idler gear (41).

★ Make sure the inner side of bearing (42) is marked **A** and the outer side of the bearing is marked **B**.

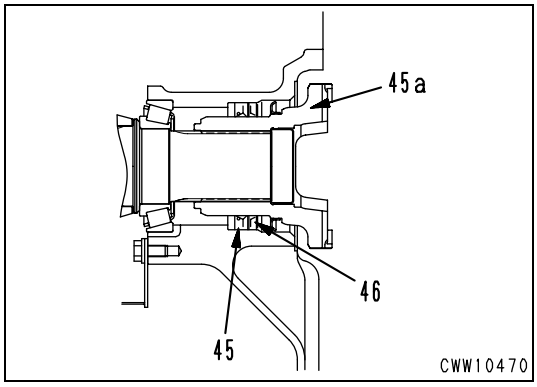
c. Remove forward-reverse outer bearing (43) and 1st-/ fourth-speed outer bearing (44).



12. Rear oil seal and dust seal

Remove rear coupling (45a) to remove oil seal (45) and dust seal (46).

★ Mark an identification point on both of the rear coupling and front housing for later installation.



13. Parking brake assembly

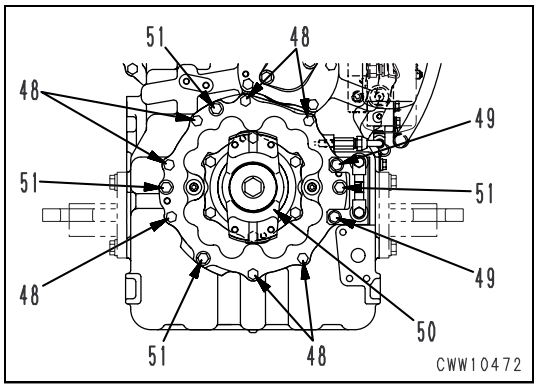
★ When removing the components of the parking brake assembly in order, refer to "Parking brake assembly."

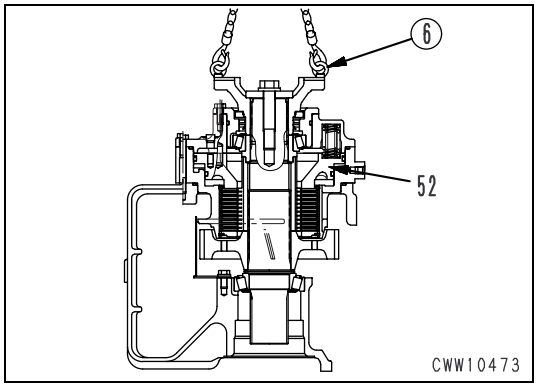
a. Reverse the front housing.

b. Remove bolts (48) and (49) to install eyebolt ⑥ to coupling (50).

★ DO NOT remove bolt (51).

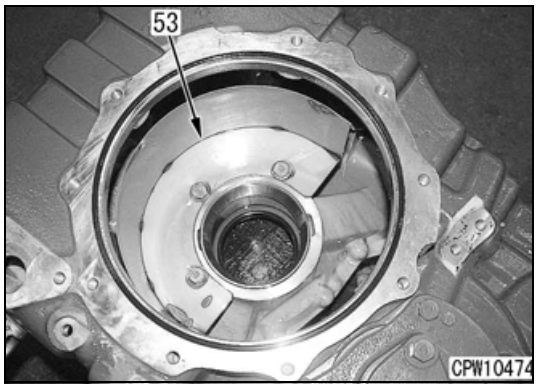
c. Lift up parking brake assembly (52) to remove it.





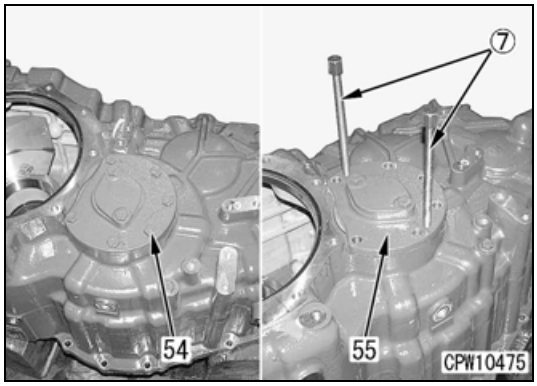
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d. Remove cover (53) from front housing.



14. 2nd • 3rd-speed bearing case and shim
Remove six bolts (54) and then using forcing screw ⑦ remove 2nd • 3rd-speed bearing case (55).

★ Note down the thickness of shim.



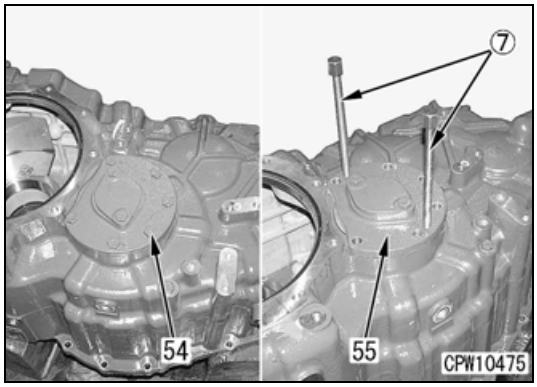
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Assembly

1. 2nd • 3rd-speed bearing case and shim.

   Install 2nd • 3rd-speed bearing case (55) and then tighten bolt (54).

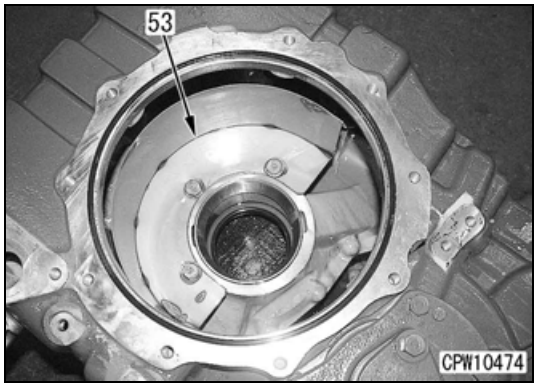
   ★ The shim must be adjusted later following step 9.



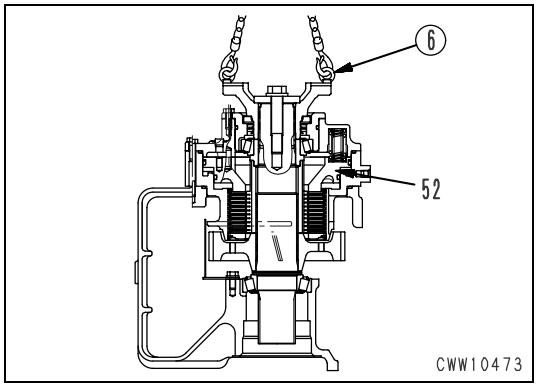
2. Parking brake assembly

   a. Install cover (53) to the front housing.

      Mounting bolt: **Adhesive (LT-2)**

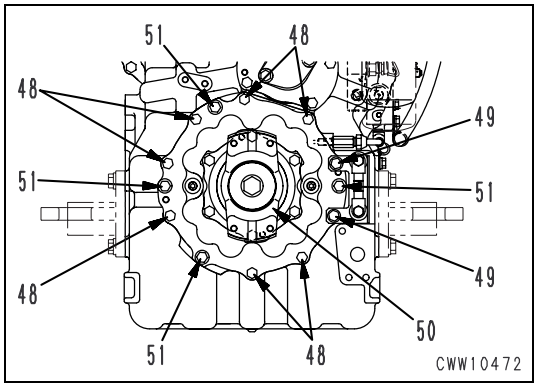


   b. Lift up parking brake assembly (52) to install it.



   c. Tighten bolts (48) and (49).

      Bolt: **98 ~ 123 Nm {10 ~ 12 kgm}**



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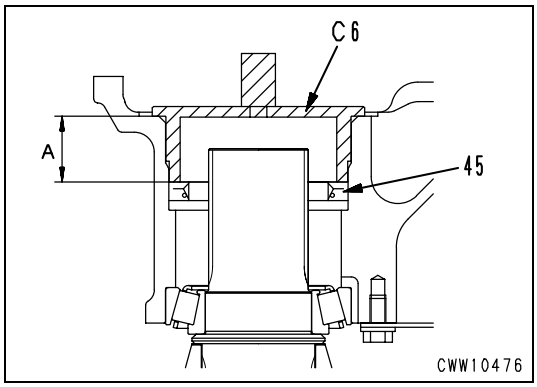
3. Rear oil seal and dust seal

   a. Reverse the front housing.

   b. Using **C6** tool, press fit oil seal (45) into the front housing.

      ★ Press fit the oil seal to 40.7±0.2 mm (Dimension **A**).

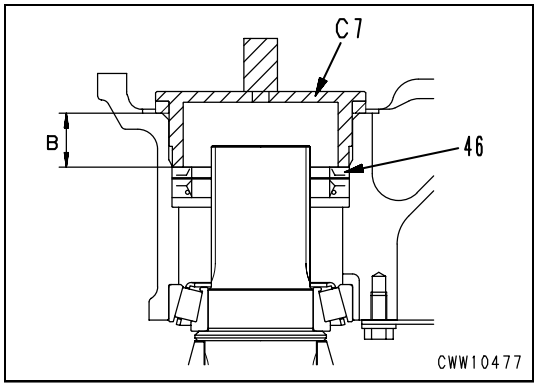
      Oil seal lip: **Silicon grease (Three Bond 1855)**



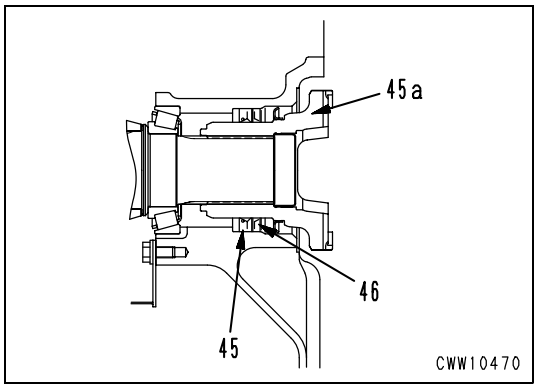
   c. Using **C7** tool, press fit dust seal (46) into the front housing.

      ★ Press fit the dust seal to 49.7±0.2 mm (Dimension **B**).

      Contact surface between dust seal lip and oil seal:
      Silicon grease (Three Bond 1855)



   d. Align the identification point on rear coupling (45a) with the same on the front housing before installation.



4. Idler gear and outer bearing

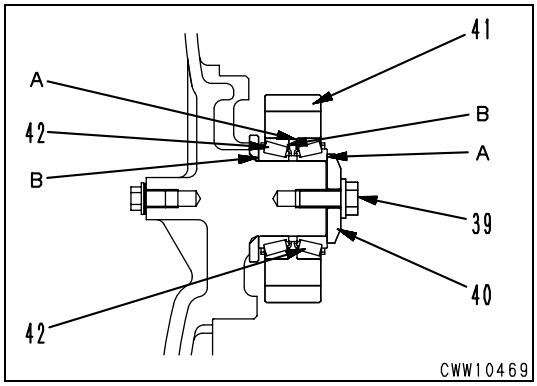
   a. Install bearing (42) to idler gear (41).

      ★ When installing the bearing, align identification points **A** and **B** on its inner and outer sides with those on the idler gear.

   b. Install idler gear (41) to the front housing and then install plate (40) before tightening bolt (39).

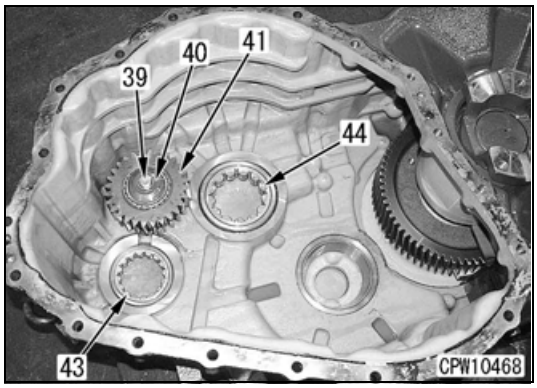
      Mounting bolt: **Adhesive (LT-2)**

      kgm Mounting bolt: **98 ~ 123 Nm {10 ~ 12.5 kgm}**



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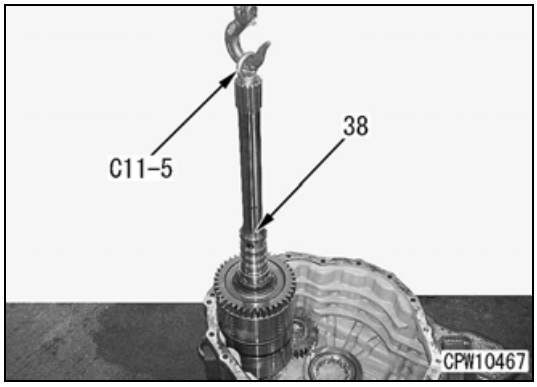
c. Install forward-reverse outer bearing (43) and 1st • 4th-speed outer bearing (44).



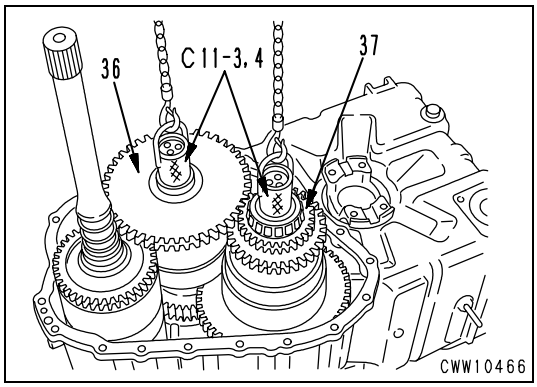
5. Clutch pack assembly

★ To install all clutch pack assemblies, lower each of them using care not to damage the bearing installed to the clutch pack bottom.

a. Using **C11-5** tool, install forward-backward clutch pack assembly (38).

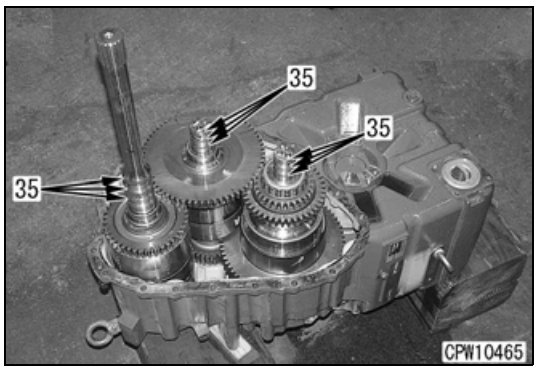


b. Using **C11-3, 4** tool, simultaneously install 1st • 4th-speed clutch pack assembly (36) and 2nd • 3rd-speed clutch pack assembly (37).



c. Install seal ring (35) to each of the clutch pack.

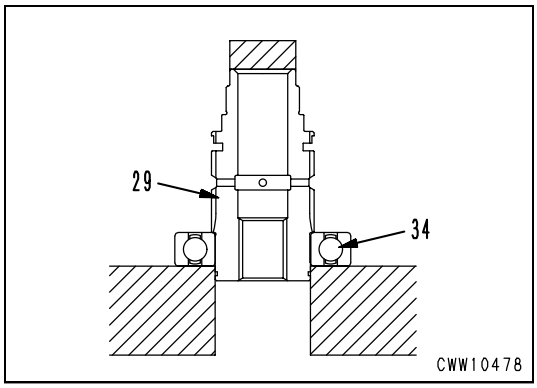
Periphery of seal ring: **Grease (G2-LI)**



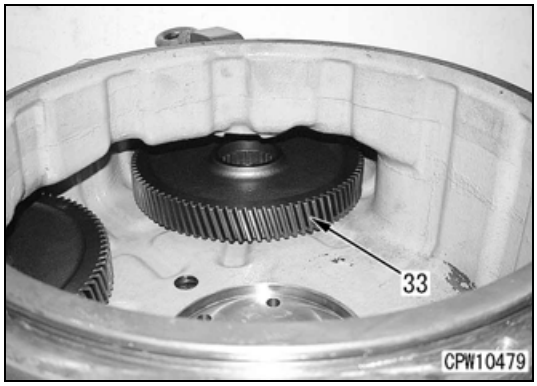
https://truckmanualshub.com/

6. PTO gear

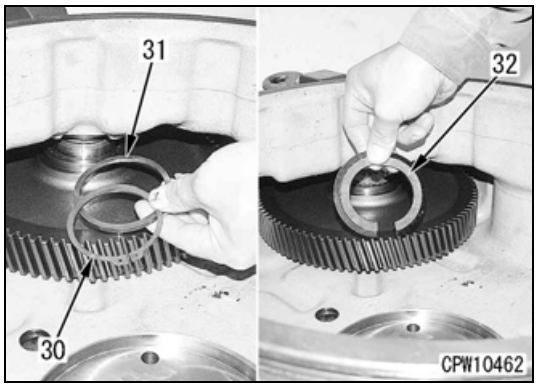
   a. Press fit shaft (29) to bearing (34).



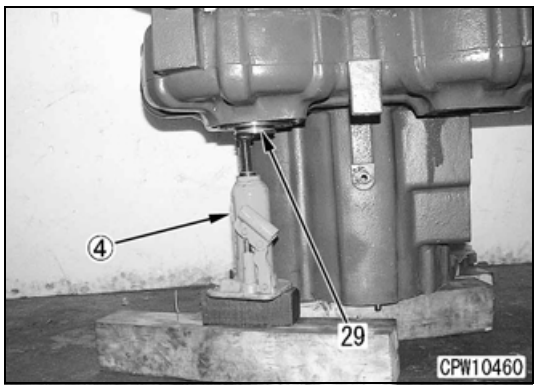
   b. Fit PTO gear (33) in the rear housing.



   c. Install semicircular thrust plate (32), plate (31) and snap ring (30) on the PTO gear.

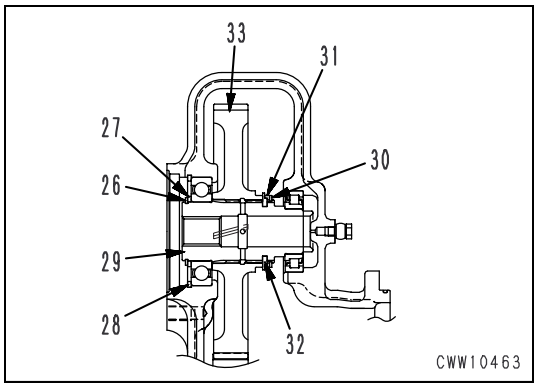


   d. Using jack ④, insert shaft (29) into the PTO gear and then install semicircular thrust plate (32), plate (31) and snap ring (30).

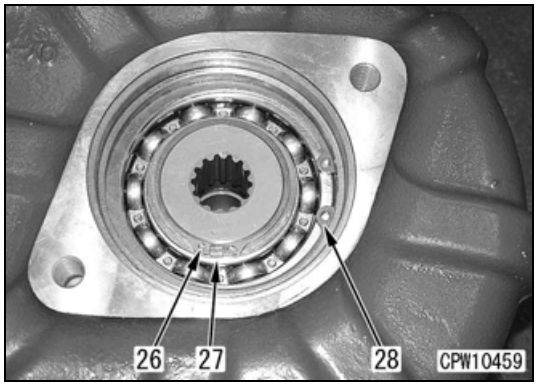


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e. Place the rear housing on blocks with the PTO down.



f. Install snap ring (28), plate (27) and snap ring (26).



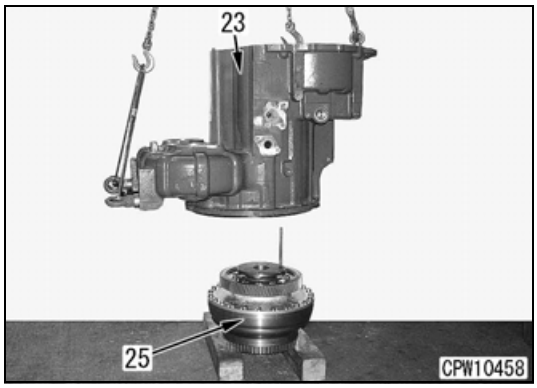
7. Torque converter assembly

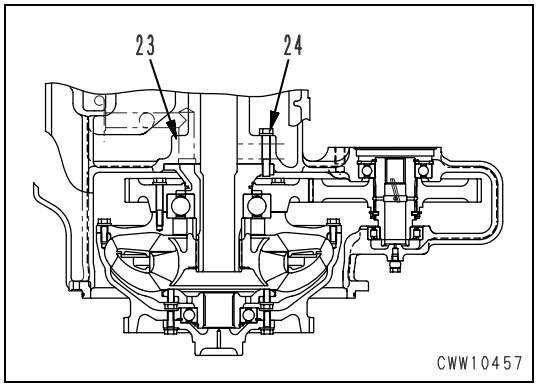
a. Fit the guide bolts in the holes in the rear housing of torque converter assembly (25).

b. Lower rear housing (23) and then tighten mounting bolts (24) of the torque converter assembly.

Mounting bolt: **Adhesive (LT-2)**

Mounting bolt: **98 ~ 123 Nm {10 ~ 12.5 kgm}**



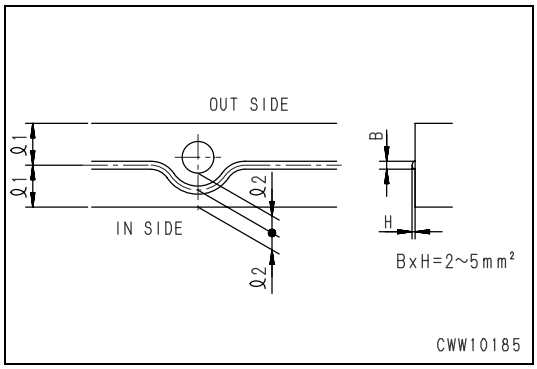


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8. Connection of front and rear housings

   a. Referring to the figure on the right, apply gasket sealant to the front housing contacting face.

      Housing contacting face:
      Gasket sealant (Three Bond 1207B)

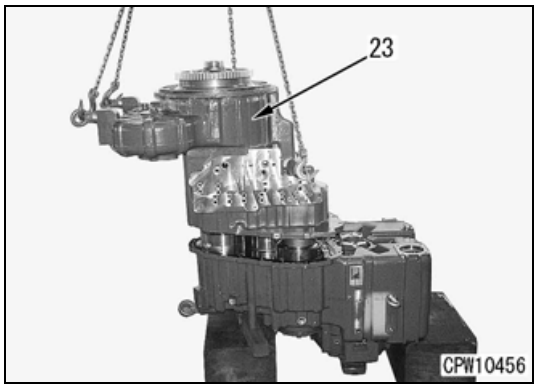


   b. Install the guide bolt to the bolt hole in the front housing.

   c. Lift up rear housing (23) keeping it as level as possible and then carefully lower it while allowing it to slide on the guide bolt to install it.

   d. Tighten the mounting bolts for the front and rear housings.

      Bolt: **98 ~ 123 Nm {10 ~ 12.5 kgm}**



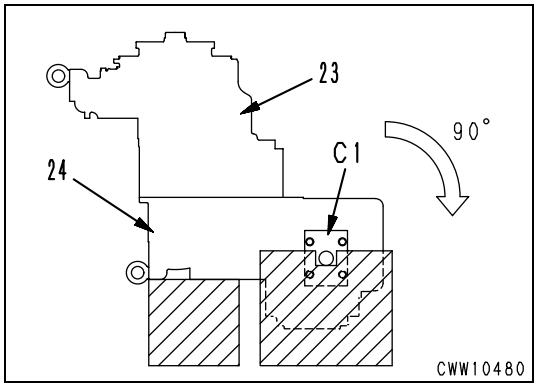
   e. Attach **C1** tool to the position where the left- and right-transmission mount brackets are installed.

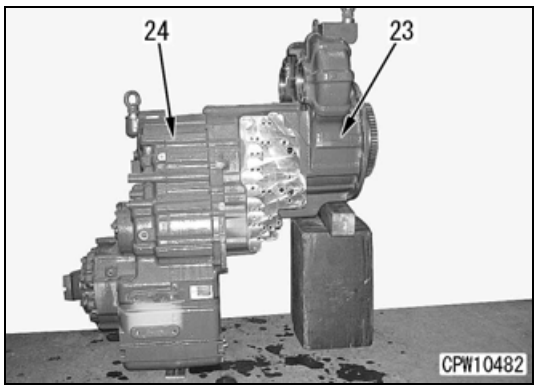
   f. Lift up the torque converter transmission assembly. Support two places of **C1** tool shaft with a block. Support the bottom of front housing (24) with blocks.

   g. Turn the torque converter transmission assembly 90° around **C1** tool shaft and then support the bottom of rear housing (23) with blocks.

   h. Lift up the torque converter transmission assembly to support the bottom of front housing (24) and rear housing (23) with blocks.

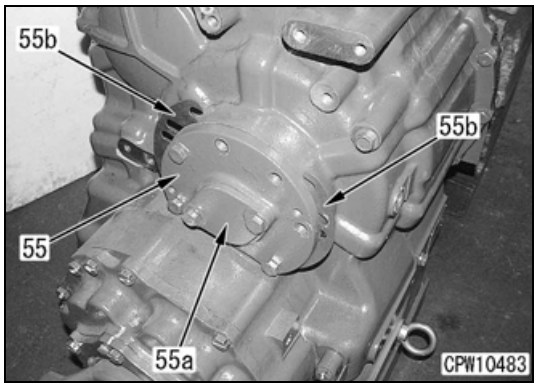
   i. Remove **C1** tool.





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9. Adjustment of shim in 2nd • 3rd-speed clutch taper roller bearing



   a. Referring to Step 8, a. in "Assembly of parking brake assembly", release the parking brake.

   b. Referring to Step 14 in "Disassembly", remove cover (55a), bearing case (55) and shim (55b).

   c. Install bearing case (55) and then tighten the bolt to the torque below.

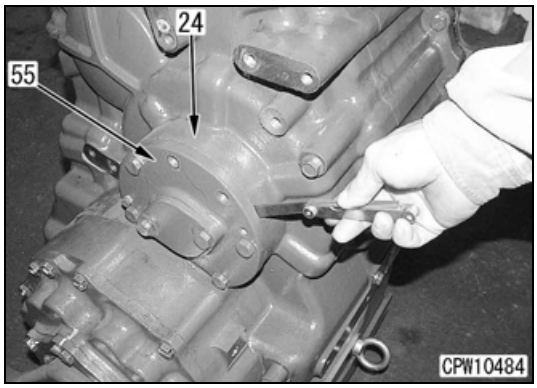
      kgm Mounting bolt: **9.8 ± 0.98 Nm {1 ± 0.1 kgm}**

   d. Turn the output shaft to turn the 2nd • 3rd-speed clutch shaft 20 turns.

      ★ Look through the mounting hole of cover (55a) for bearing case (55) to check the shaft for rotation.

   e. Check the tightening torque of the bearing case mounting bolt.

      ★ If the tightening torque fluctuates, repeat steps a. and b.



   f. Using a thickness gauge, measure any three or four points equally divided on the periphery for clearance between front housing (24) and bearing case (55).

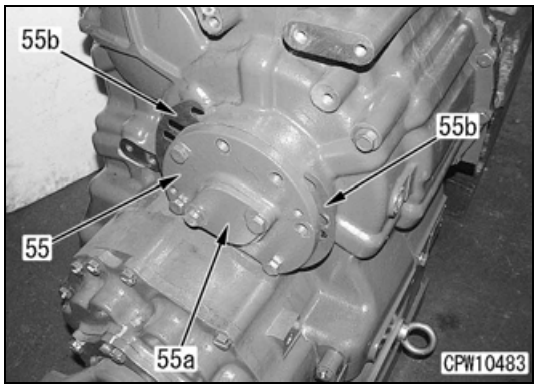
      ★ Possible causes for the fluctuation in the measurements that exceed 0.05 mm are improperly installed bearing or others. Determine and correct the cause to make the fluctuation within the standard value.

   g. Calculate the average of measured clearance values.

   h. Determine the thickness of the shim to be installed.

      ★ Thickness of shim =
      Averaged clearance + 0.35~0.40 mm

      ★ Reference: Standard thickness of shim = 1.45 mm



   i. Install selected shim (55b), bearing case (55) and cover (55a).

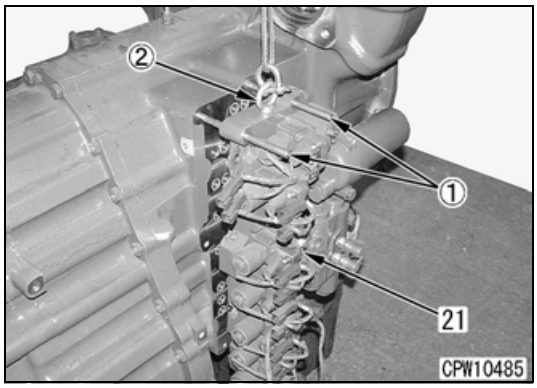
      O-ring for bearing case and cover:
      Grease (G2-LI)

      kgm Bearing case bolt:
      98.0 ~ 122.5 Nm {10 ~ 12.5 kgm}

   j. Referring to Step h., j., k. in "Assembly of parking brake assembly", reset the released parking brake.

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10. Transmission control valve assembly

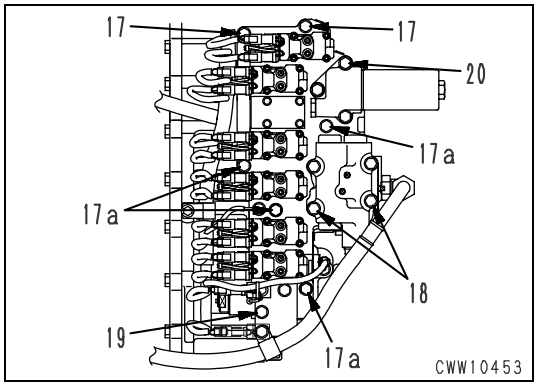


a. Securely install the O-ring to the rear housing mounting face.

b. Fit guide bolt ① to the rear housing mounting hole.

c. Install transmission control valve assembly (21).

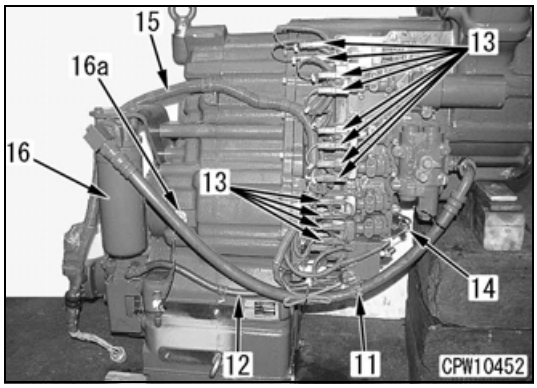
d. Referring to the following, tighten the bolts in several steps.



★ Bolt stem length 55 mm: (17), (17a)
105 mm: (18)
110 mm: (19)
120 mm: (20)

kgm Solenoid assembly:
58.8 ~ 73.5 Nm {6.0 ~ 7.5 kgm}

11. Harness connector and filter



a. Install speed sensor (16a).

★ For the information on how to install the sensor, refer to "Adjustment of transmission rotation sensor" in Testing and Adjusting Manual.

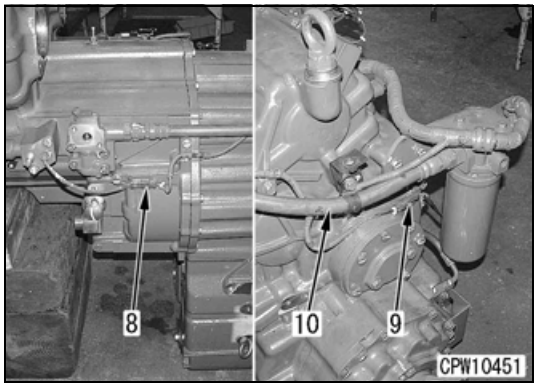
b. Install filter (16) together with the bracket.

c. Install harness (15) to the filter bracket and then connect connectors (13) and (14).

★ For the connector names, see "Disassembly."

d. Install hoses (11) and (12).

e. Install hose (10).

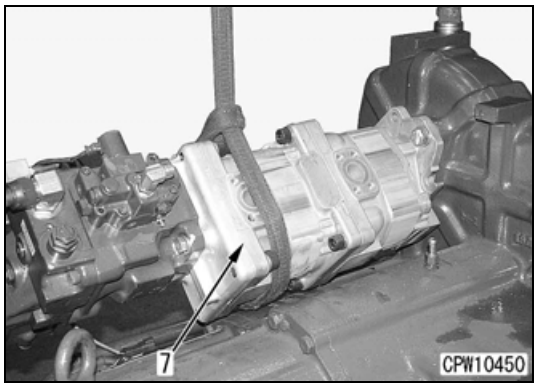


f. Connect connector (8) (CN-TC.C) and connector (9) (CN-REV OUT).

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12. Steering switch pump cooling fan drive assembly

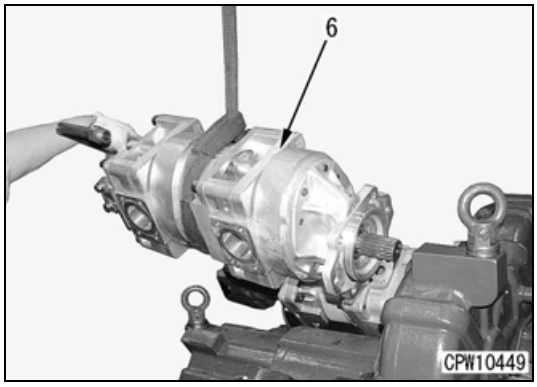
    Lift up steering switch pump cooling fan drive pump assembly (7) to install it.

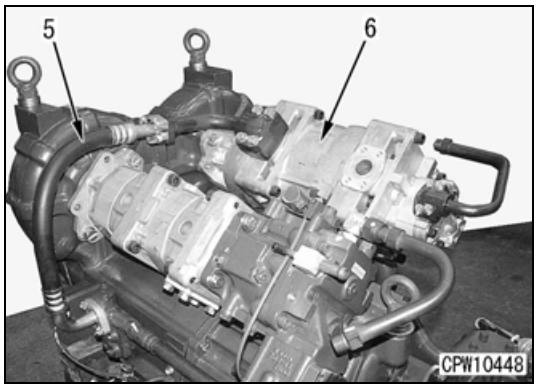


13. Torque converter charge, work equipment and PPC pump assembly

    a. Lift up torque converter charge, work equipment and PPC pump assembly (6) to install it.

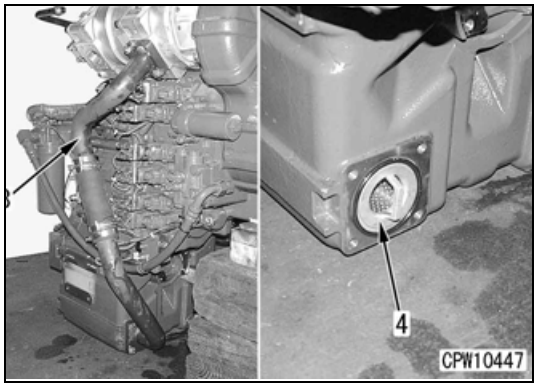
    b. Install pipe hose assembly (5).





    c. Install cartridge (4).

    d. Install pipe hose assembly (3).



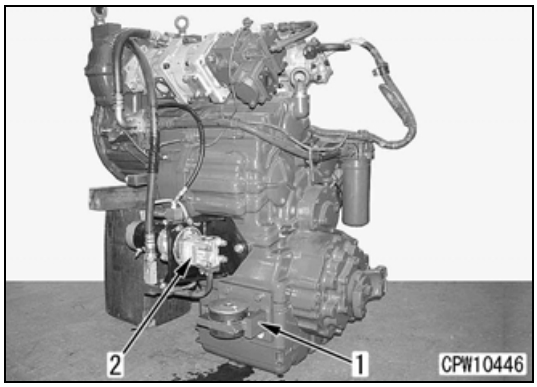
https://truckmanualshub.com/

14. Emergency steering pump, motor assembly

    Install emergency steering pump, motor assembly (2).

15. Mount bracket

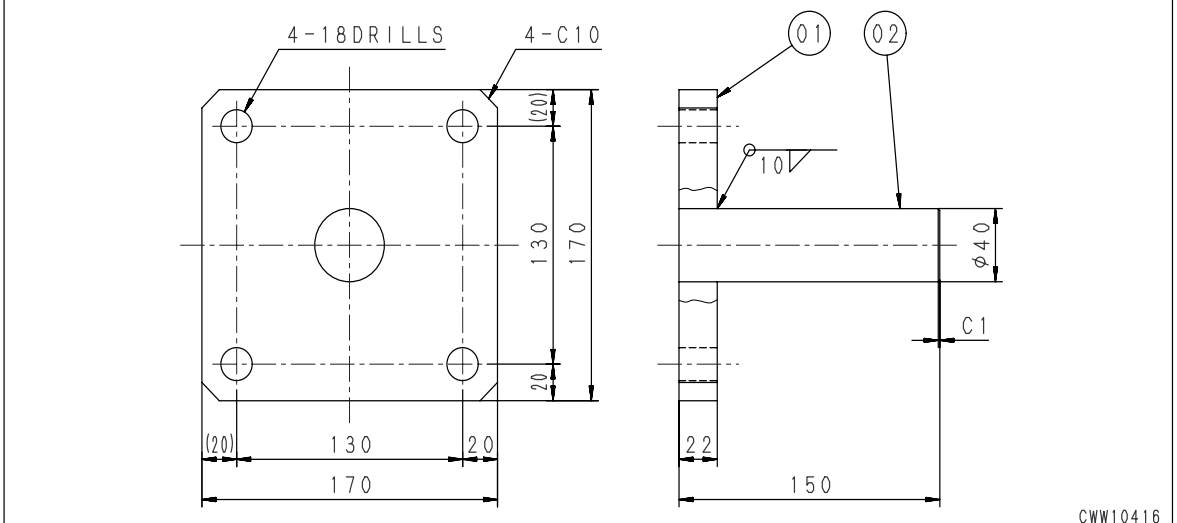
    Remove the left- and right-mount brackets (1).



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Schematics of special tools

C1 Bracket



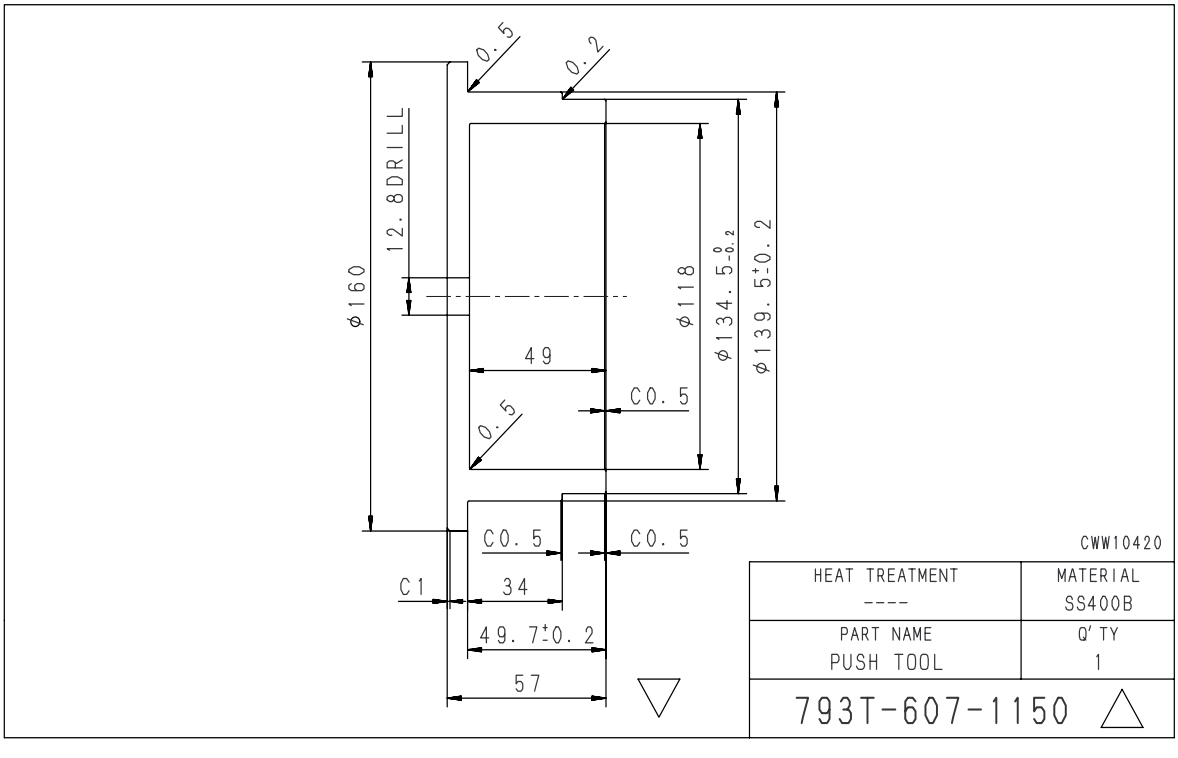
HEAT TREATMENT	MATERIAL
----	SEE DWG

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
02	BAR	SS400B	1	1.48	φ40
01	PLATE	SS400P	1	4.8	t22

PART NAME	Q'TY
BRACKET	2

793T-607-1240 △

C6, C7 Pushing tools



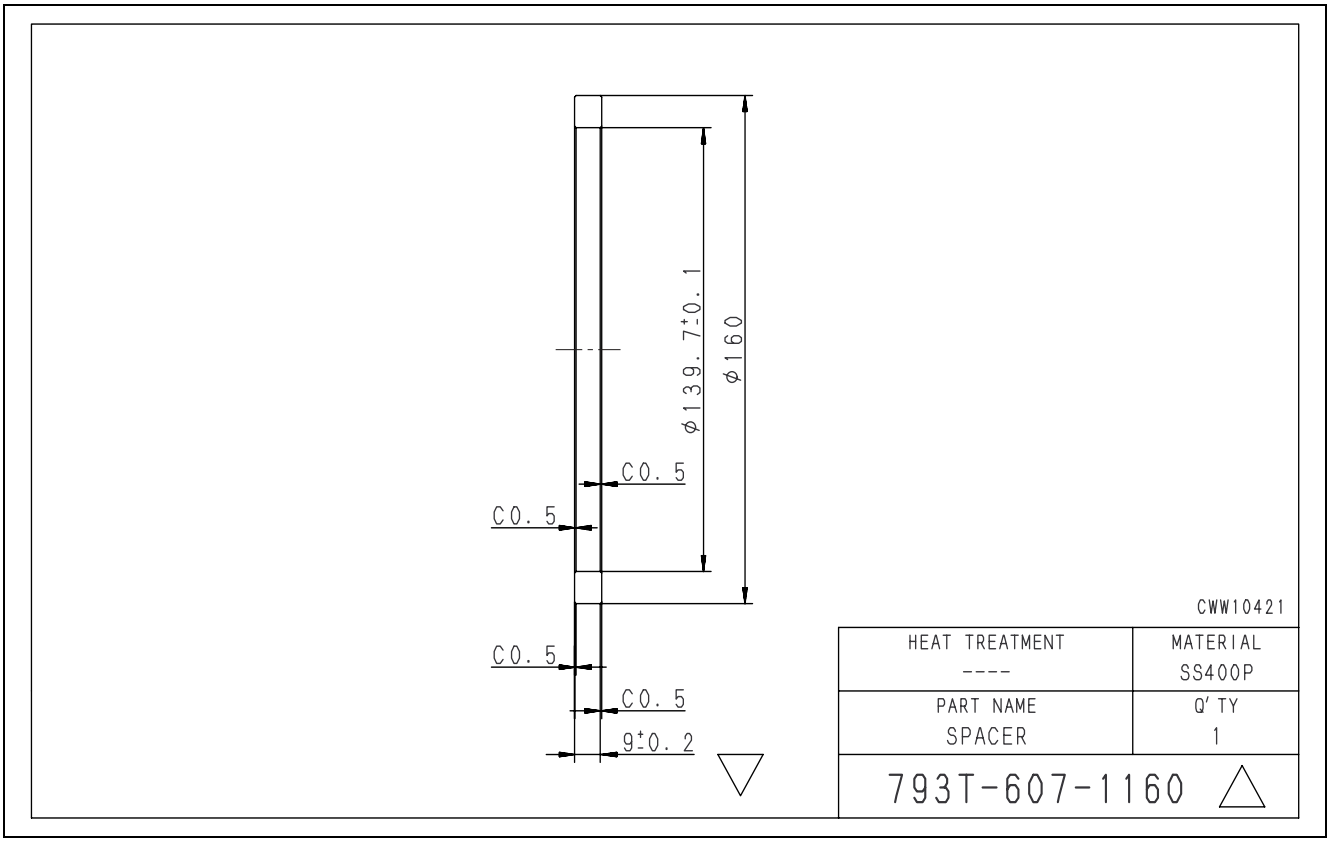
HEAT TREATMENT	MATERIAL
----	SS400B

PART NAME	Q'TY
PUSH TOOL	1

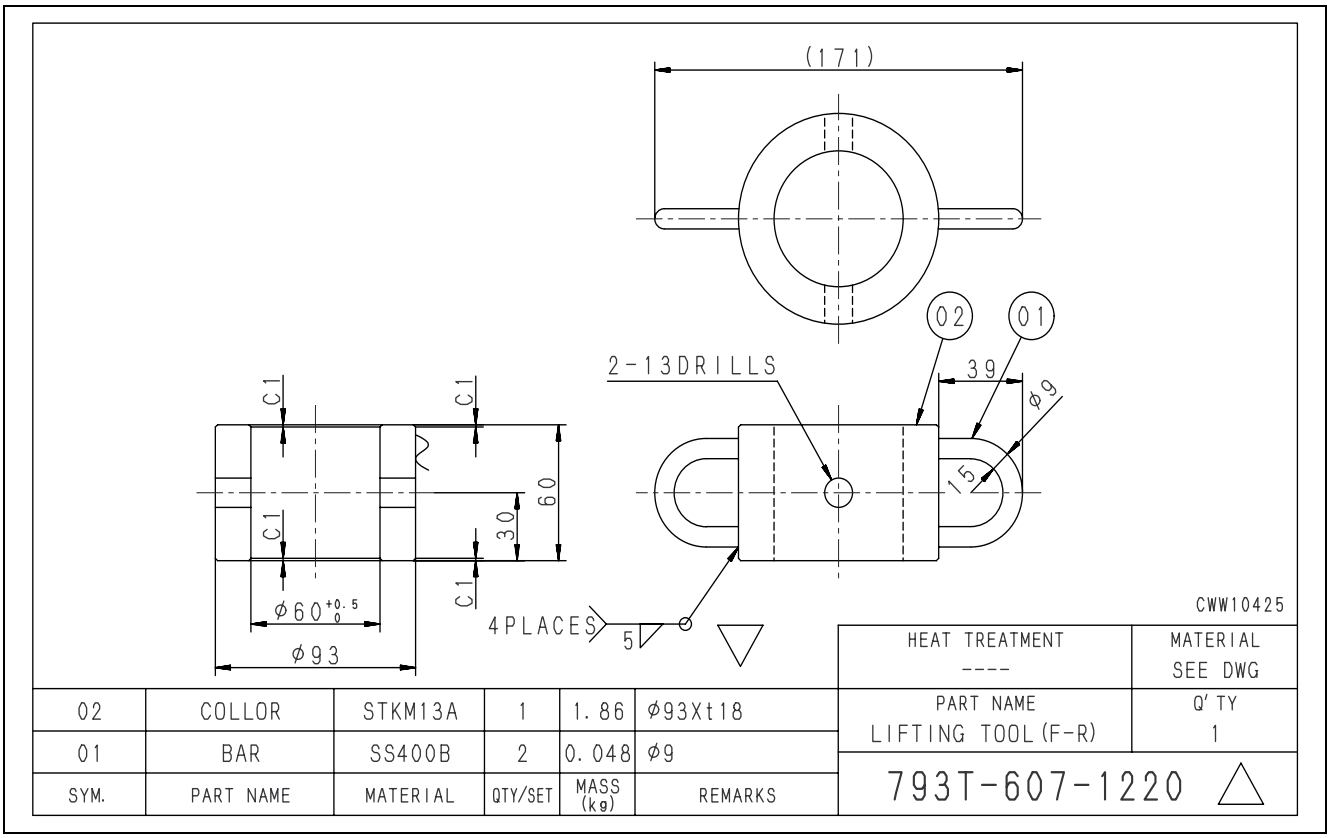
793T-607-1150 △

https://truckmanualshub.com/

C7 Spacer

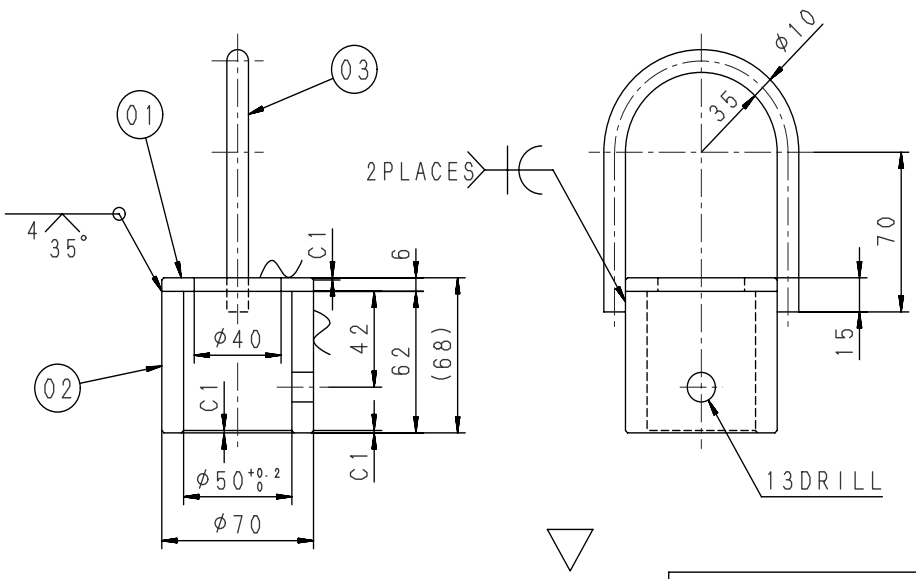


C11 Lifting tool



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C11 Lifting tool



SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
03	HOOK	SS400B	1	-	φ10
02	PLATE	SS400B	1	-	t6
01	TUBE	STKM13A	1	-	φ70

HEAT TREATMENT	MATERIAL
----	SEE DWG
PART NAME	Q'TY
LIFTING TOOL	1
793T-607-1210 △	

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Transmission clutch pack assembly

Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
C2	1	790-201-2170	Plate	■	1		
	2	790-201-2730	Spacer	■	1		
	3	796-465-1120	Push tool	■	1		❍
	4	790-201-2740	Spacer	■	1		
C3	1	793-607-1110	Seal holder	■	1	N	
	2	793-607-1120	Seal holder	■	1	N	
C12		799-301-1500	Oil leak tester kit	■	1		

Disassembly

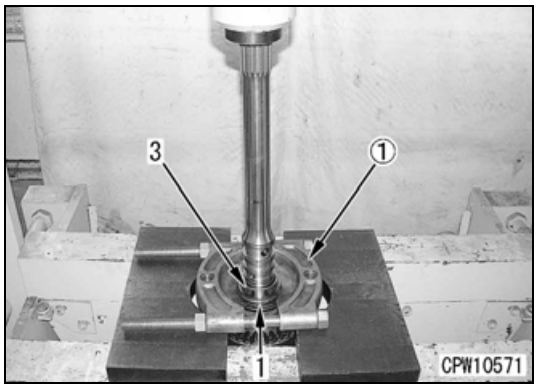
When mounting the clutch pack on the block or the like, be careful not to drop it as it is slippery due to oil. Otherwise, your fingers might get caught between the block and the clutch pack.

Disassembly of forward-reverse clutch packs

[Forward clutch]

1. Bearing

   Attach bearing puller ① to spacer (1) and press the shaft using the presser to remove spacer (1) and bearing (3).

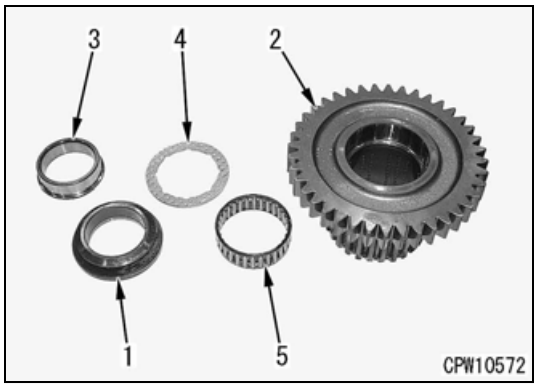


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2. Forward gear

   a. Remove thrust washer (4) and forward gear (2).

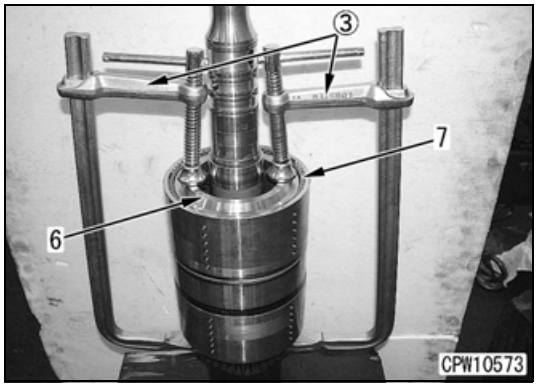
   b. Remove needle bearing (5) from the forward gear.



3. End plate

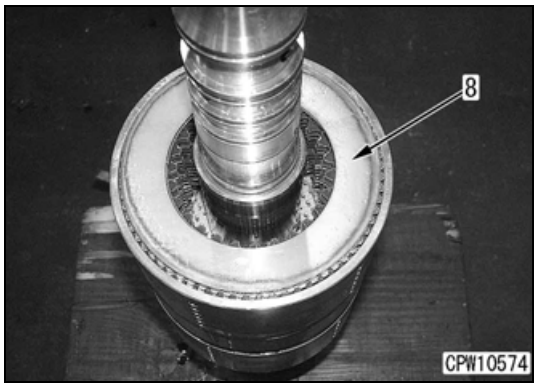
   a. Push end plate (6) using C vice ③ or the like to remove snap ring (7).

   b. Remove end plate (6).



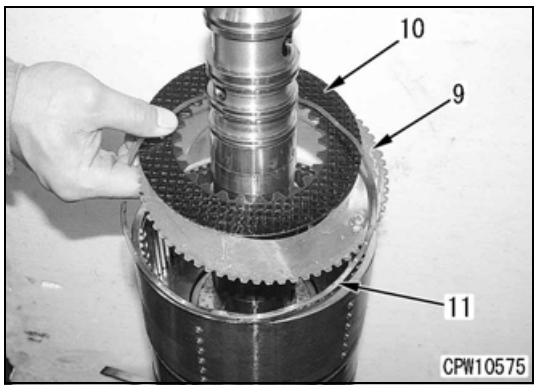
4. Clutch plate

   a. Remove spring plate (8) from the housing.



   b. Remove plate (9), disk (10) and spring (11) from the housing.

   c. Then, remove thrust washer (12).



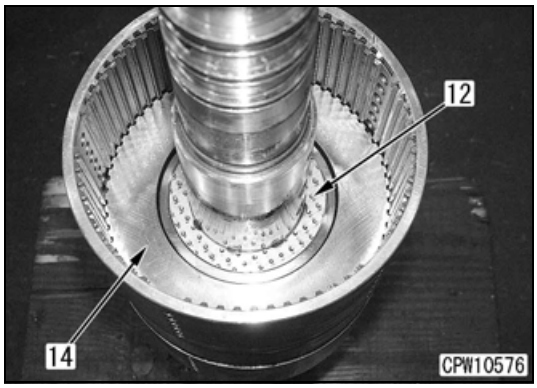
https://truckmanualshub.com/

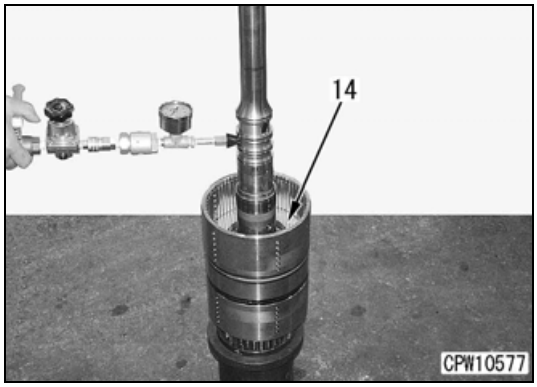
5. Piston

   Remove piston (14) by injecting air into the forward-side oil hole in the shaft.

   ★ If the piston is slanted and cannot be removed, push it back and try again.

   ★ Note that removing it by force may damage the cylinder perimeter.

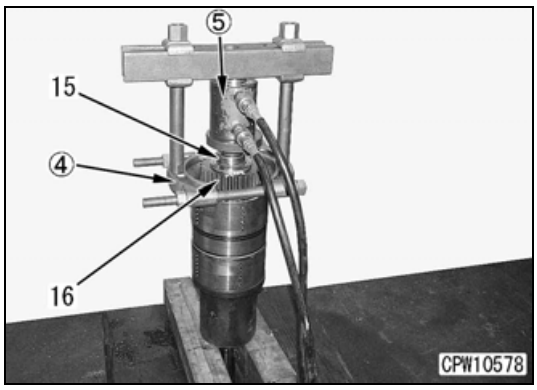




[Reverse clutch]

6. Bearing

   Attach bearing puller ④ to reverse gear (16) and remove bearing (15) using hydraulic cylinder ⑤.



7. Forward gear

   a. Remove spacer (17), thrust washer (18) and reverse gear (16).

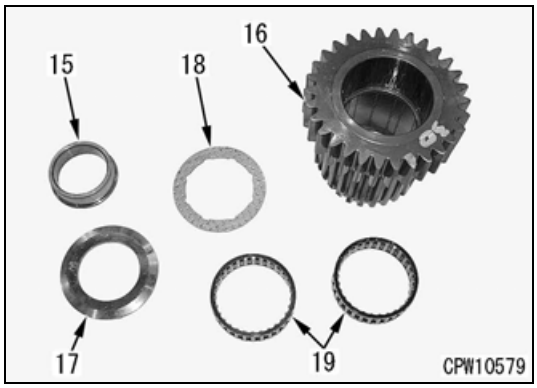
   b. Remove needle bearing (19) from the reverse gear.

8. End plate

9. Clutch plate

10. Piston

    ★ For procedures 8 to 10, disassemble the clutch pack in the same way as in procedures 3 to 5 for the forward clutch.



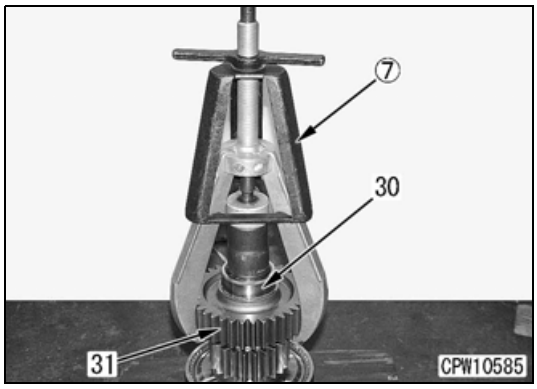
https://truckmanualshub.com/

Disassembly of 1st • 4th speed clutch packs

[1st speed clutch]

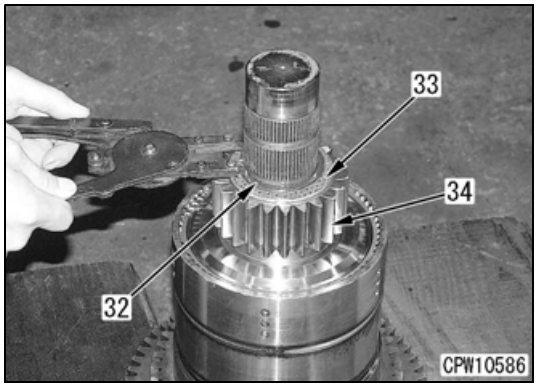
1. Idler gear

   Remove bearing (30) and idler gear (31) using puller ⑦.

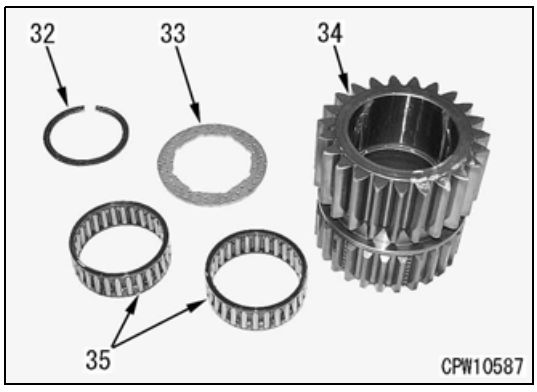


2. 1st gear

   a. Detach snap ring (32) to remove thrust washer (33) and 1st speed gear (34).



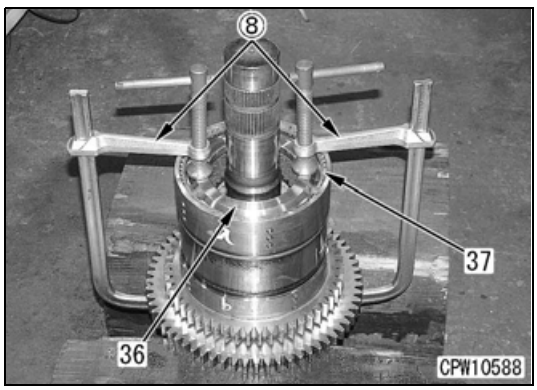
   b. Remove needle bearing (35) from the 1st speed gear.



3. End plate

   a. Push end plate (36) using C vice ⑧ or the like to remove snap ring (37).

   b. Remove end plate (36).

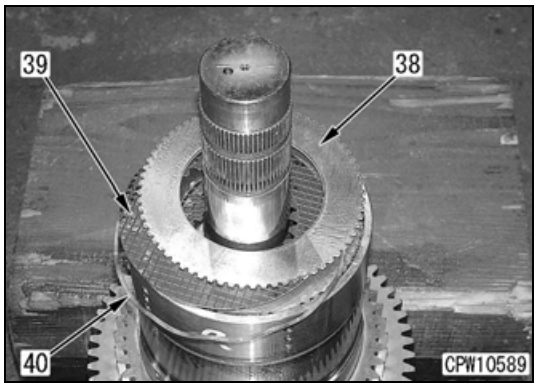


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4. Clutch plate

   a. Remove plate (38), disk (39) and spring (40) from the housing.

   b. Then, remove thrust washer (41).

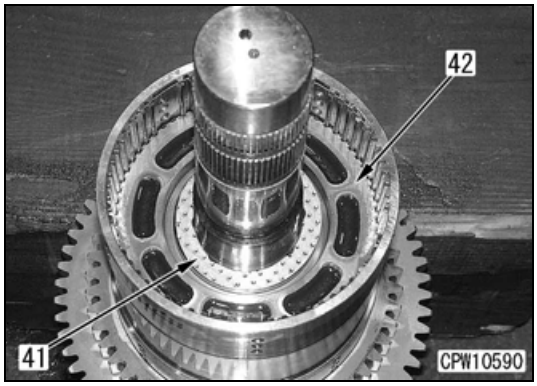


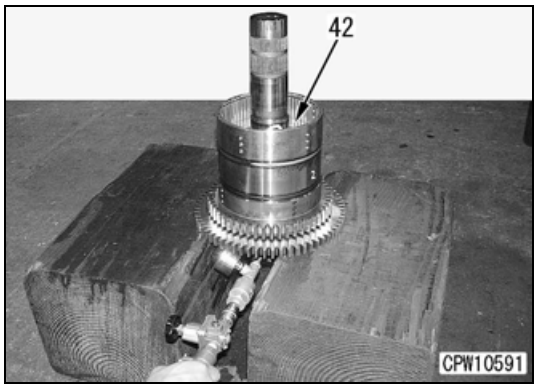
5. Piston

   Remove piston (42) by injecting air into the reverse-side oil hole in the shaft.

   ★ If the piston is slanted and cannot be removed, push it back and try again.

   ★ Note that removing it by force may damage the cylinder perimeter.



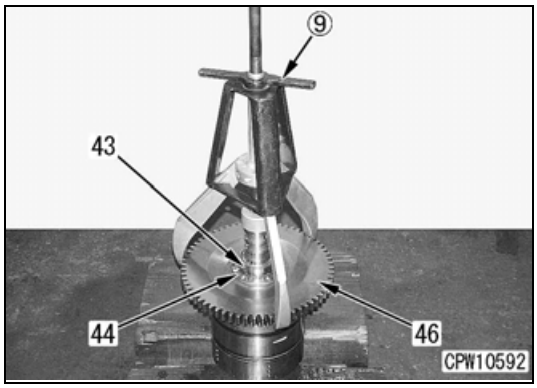


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[4th speed clutch]

6. Bearing

   Lift 4th speed gear (46) using puller ⑨ to remove bearing (43).



7. 4th speed gear

   a. Remove spacer (44), thrust washer (45) and 4th speed gear (46).

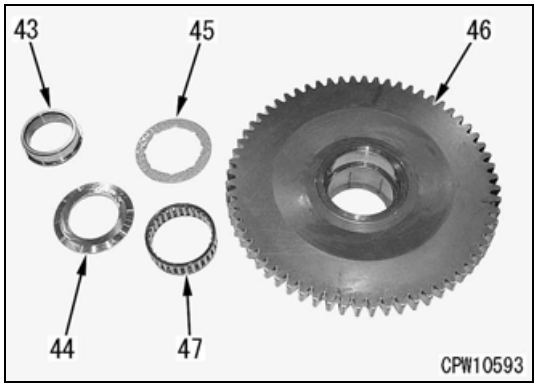
   b. Remove needle bearing (47) from the 4th gear.

8. End plate

9. Clutch plate

10. Piston

    ★ For procedures 8 to 10, disassemble the clutch pack in the same way as in procedures 3 to 5 for the 1st speed clutch.



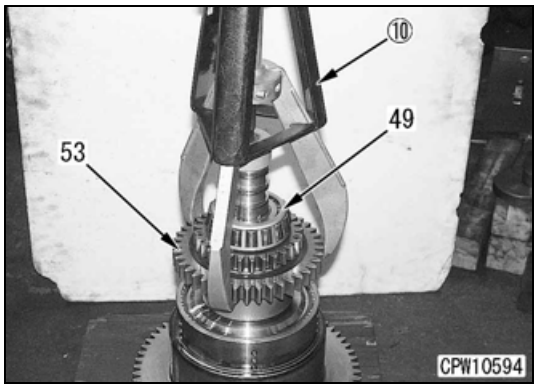
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Disassembly of 2nd • 3rd clutch packs

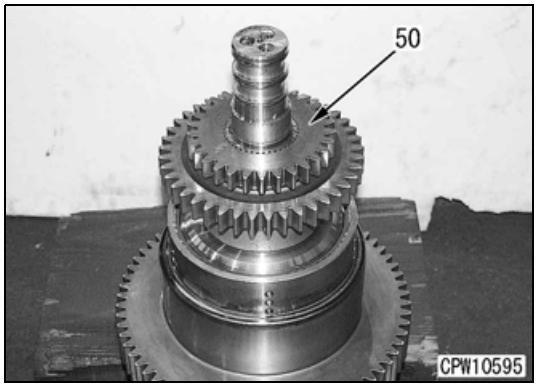
[3rd clutch]

1. Bearing

   a. Attach puller ⑩ to 3rd speed gear (53) to remove bearing (49).

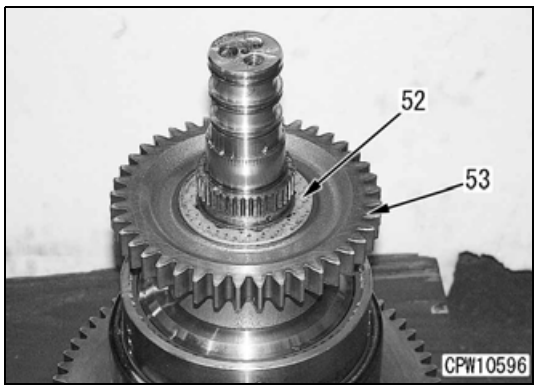


   b. Remove 4th speed gear (50).

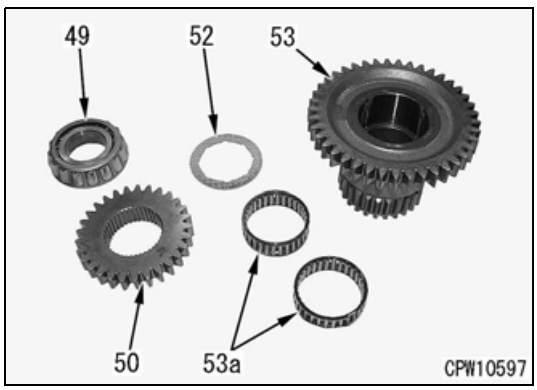


2. 3rd gear

   a. Remove thrust washer (52) and 3rd speed gear (53).



   b. Remove needle bearing (53a) from the 3rd speed gear.

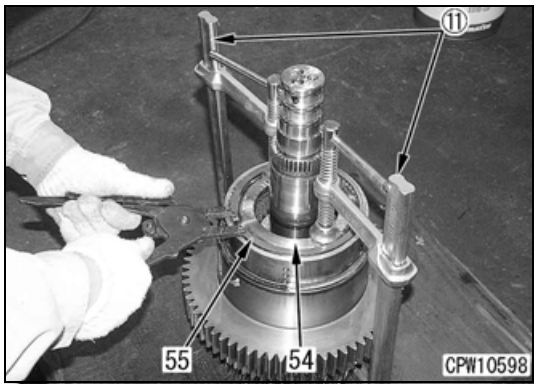


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3. End plate

   c. Push end plate (54) using C vice ⑪ or the like to remove snap ring (55).

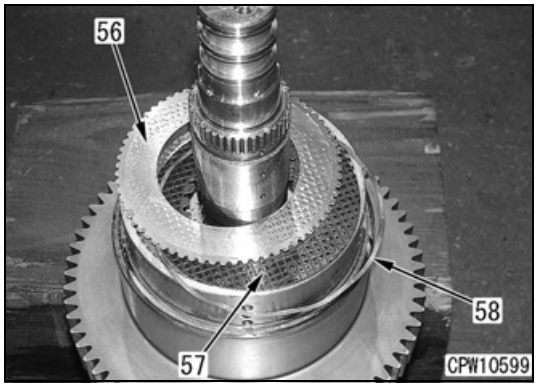
   d. Remove end plate (54).



4. Clutch plate

   a. Remove plate (56), disk (57) and spring (58) from the housing.

   b. Then, remove thrust washer (58a).

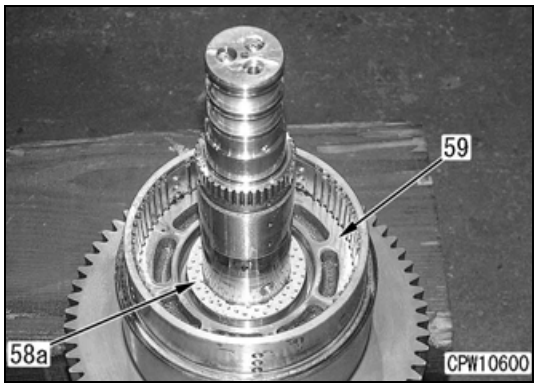


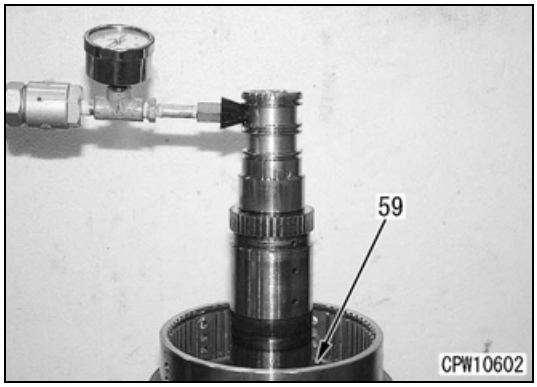
5. Piston

   Remove piston (59) by injecting air into the 3rd-speed-side oil hole in the shaft.

   ★ If the piston is slanted and cannot be removed, push it back and try again.

   ★ Note that removing it by force may damage the cylinder perimeter.





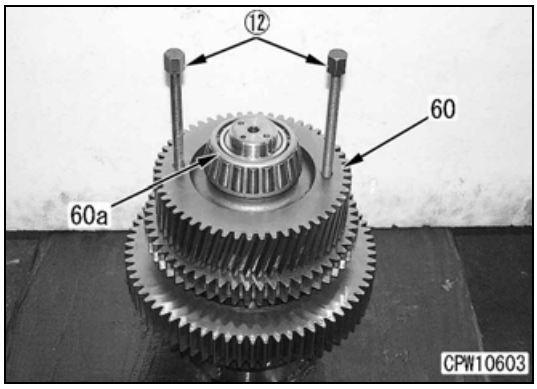
https://truckmanualshub.com/

[2nd speed clutch]

6. Bearing

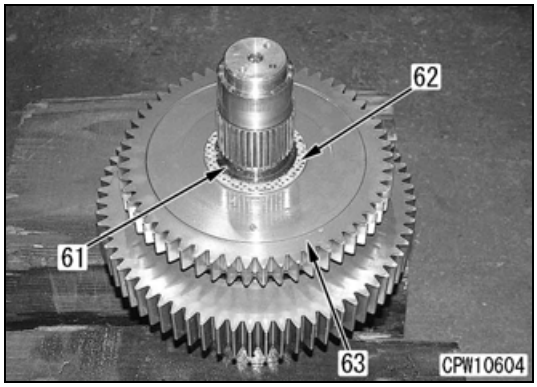
   a. Lift output gear (60) using forcing screw ⑫ to remove bearing (60a).

   b. Remove output gear (60).

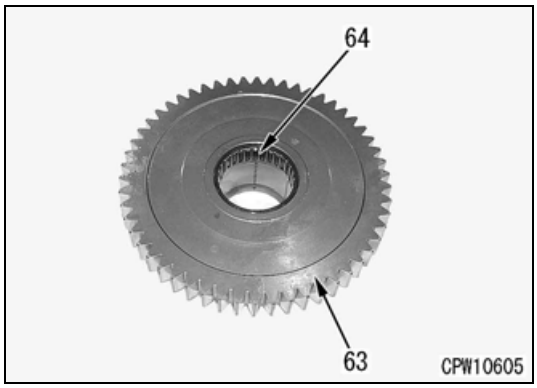


7. 2nd speed gear

   a. Detach snap ring (61) to remove thrust washer (62) and 2nd speed gear (63).



   b. Remove needle bearing (64) from the 2nd speed gear.



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Assembly

Assembly of forward-reverse clutch packs

[Reverse clutch]

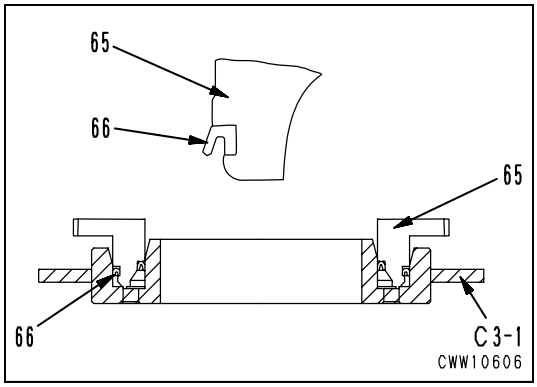
1. Piston seal

   Attach piston seal (66) to piston (65).

   ★ When using a new piston seal, use tool **C3-1** and wait for 2 to 3 minutes until it is lubricated, then attach it.

   ★ Note that attaching the seal to the cylinder without using tool **C3-1** might damage the seal.

   Inside of tool **C3-1: Transmission oil**



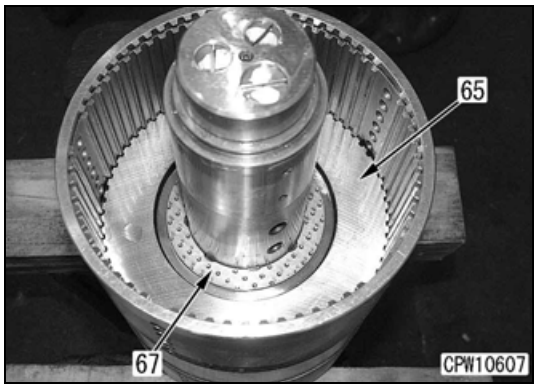
2. Reverse-side piston

   a. Attach reverse-side piston (65).

      ★ At this time, be careful not to damage the piston seal.

      Sliding surface of piston seal: **Transmission oil**

   b. Attach thrust washer (67).



3. Clutch plate

   a. Attach plate (68), disk (69) and spring (70) in this order.

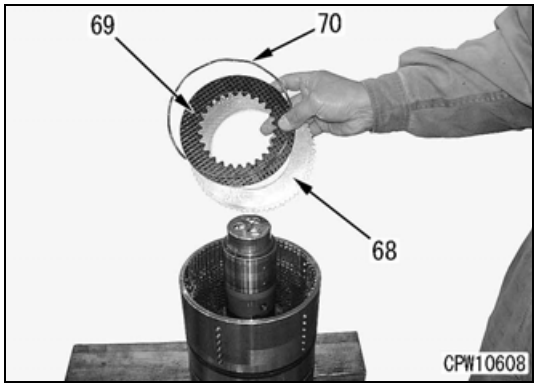
      ★ Soak disk (69) in clean transmission oil for at least 2 minutes beforehand.

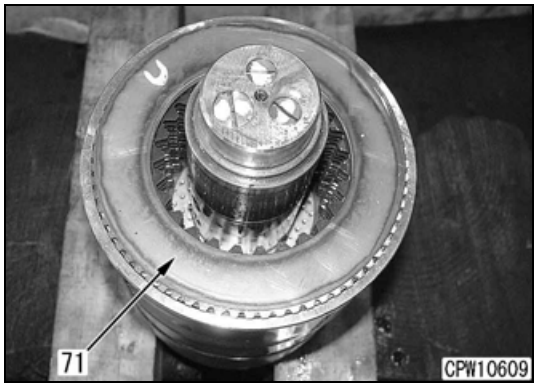
      ★ Care should be taken so that spring (70) and disk (69) do not overlap each other.

      ★ Attach them carefully so that the plate and the spring are not caught in the ring groove in the clutch housing.

   b. Attach spring plate (71).

      ★ Attach so that recognition mark **U** faces up.



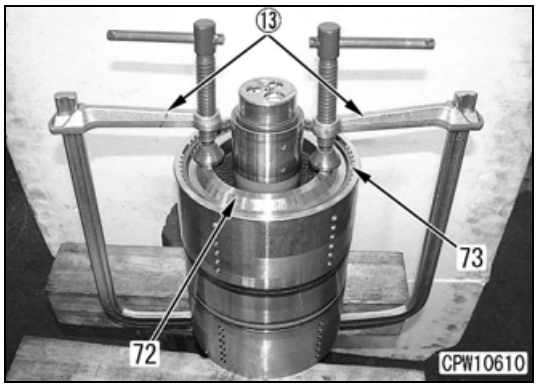


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4. End plate

   a. Push end plate (72) using C vice ⑬ or the like to attach snap ring (73).

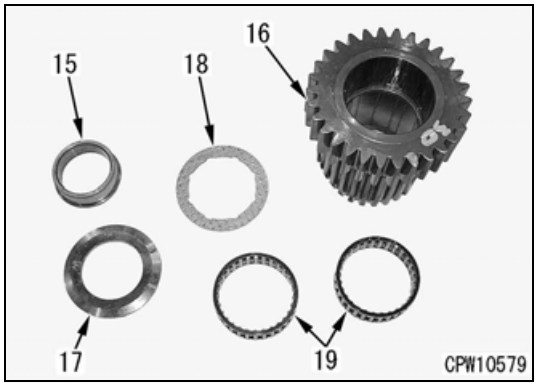
      ★ At this time, check to see that snap ring (73) is firmly engaged in the groove.



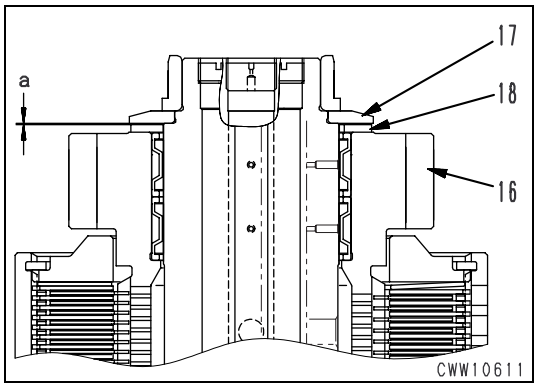
5. Reverse gear and bearing

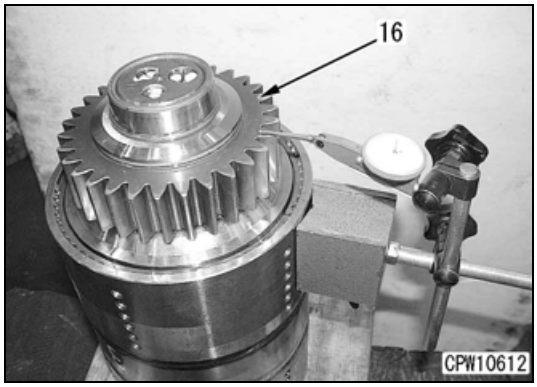
   a. Attach needle bearing (19) to reverse gear (16) and mount them on the housing.

   b. Mount thrust washer (18), spacer (17) and bearing (15) in this order.



   c. Move reverse gear (16) up and down to confirm the clearance **a** between spacer (17) and thrust washer (18), is within the standard range.
   Standard value **a**: 0.3 ~ 0.7 mm

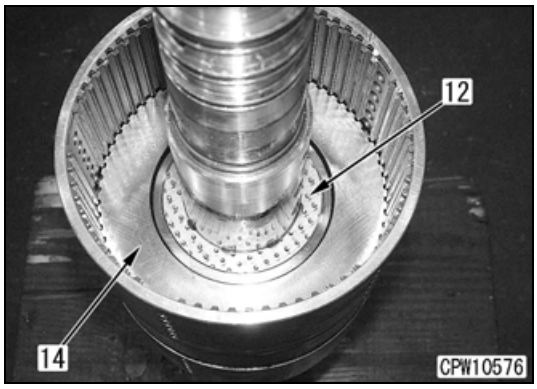




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[Forward clutch]

6. Forward-side piston



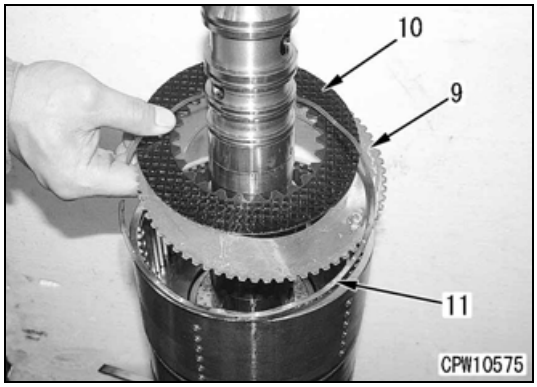
   a. Lubricate the piston seal in the same way as for the reverse clutch, then attach it to piston (14).

   b. Attach piston (14) in the same way as for the reverse clutch.

      Sliding surface of piston seal: **Transmission oil**

   c. Attach thrust washer (12).

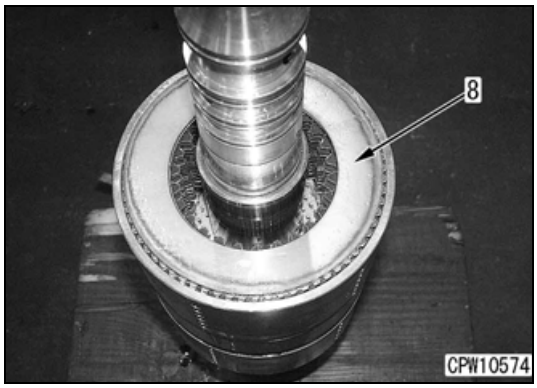
7. Clutch plate



   a. Attach plate (9), disk (10) and spring (11) in this order.

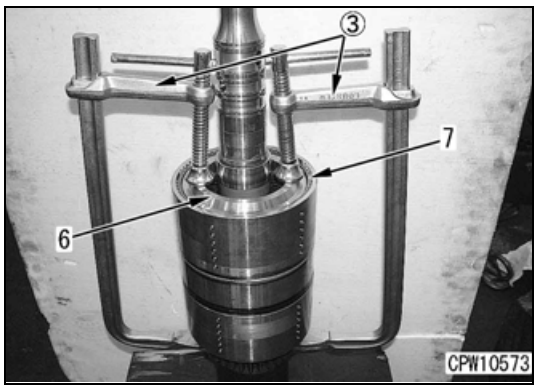
      ★ Attach them in the same way as for the reverse clutch.

   b. Attach the spring plate (8).



      ★ Attach so that recognition mark **U** faces up.

8. End plate

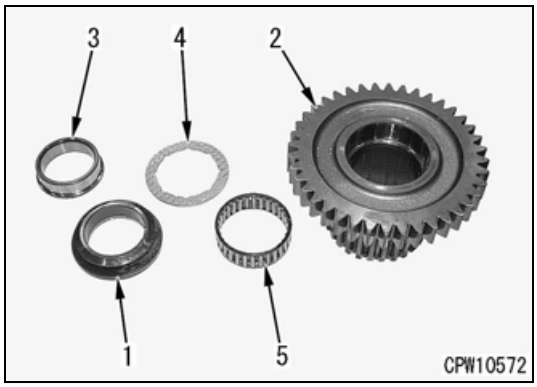


   a. Push end plate (6) using C vice ③ or the like to attach snap ring (7).

      ★ At this time, check to see that snap ring (7) is firmly engaged in the groove.

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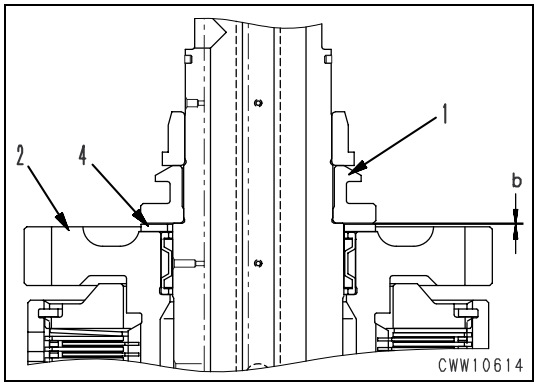
9. Forward gear and bearing

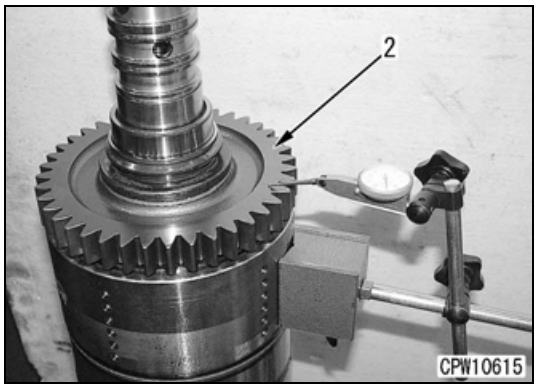


   a. Attach needle bearing (5) to forward gear (2) and mount them on the housing.

   b. Mount thrust washer (4), spacer (1) and bearing (3) in this order.

   c. Move forward gear (2) up and down to confirm the clearance **b** between spacer (1) and thrust washer (4), is within the standard range.
   Standard value **b**: 0.24 to 0.76 mm

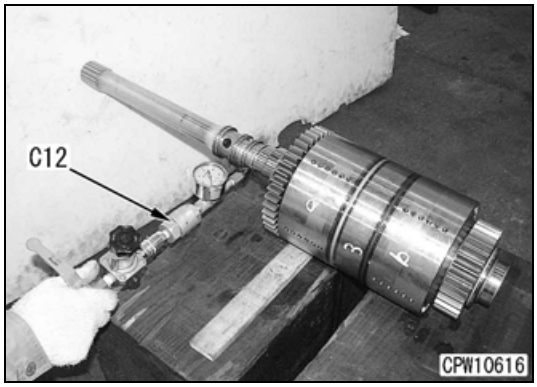




10. Clutch pack operation test

    Inject compressed air into the oil hole in the shaft using tool **C12** to check that each clutch operates properly.

    ★ If the gear is fixed by injecting compressed air into the shaft, the clutch is operating properly.



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Assembly of 1st • 4th clutch packs

[4th-speed clutch]

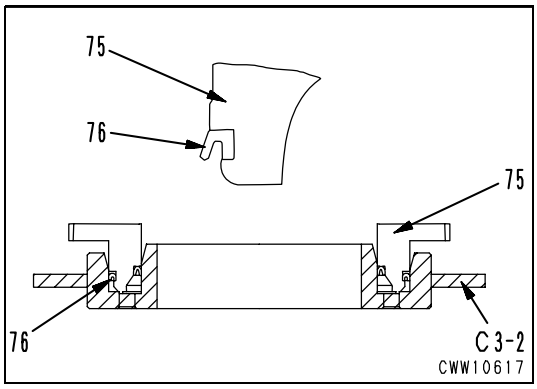
1. Piston seal

   Attach piston seal (76) to piston (75).

   ★ When using a new piston seal, use tool **C3-2** and wait for 2 to 3 minutes until it is lubricated, then attach it.

   ★ Note that attaching the seal to the cylinder without using tool **C3-2** might damage the seal.

   Inside of tool **C3-2**: **Transmission oil**



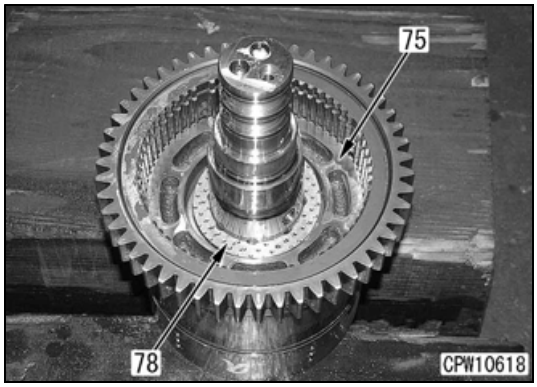
2. 4th-speed-side piston

   a. Attach 4th-speed-side piston (75).

   ★ At this time, be careful not to damage the piston seal.

   Sliding surface of piston seal: **Transmission oil**

   b. Attach thrust washer (78).



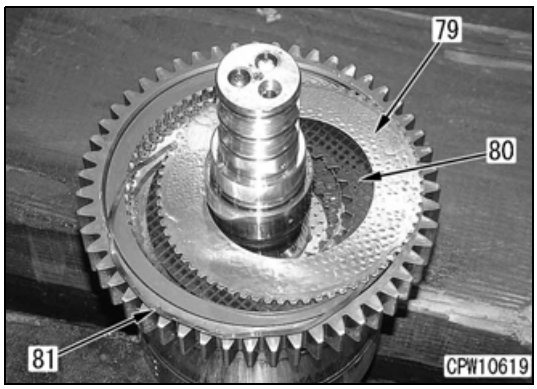
3. Clutch plate

   Attach plate (79), disk (80) and spring (81) in this order.

   ★ Soak disk (80) in clean transmission oil for at least 2 minutes beforehand.

   ★ Care should be taken so that spring (81) and disk (80) do not overlap each other.

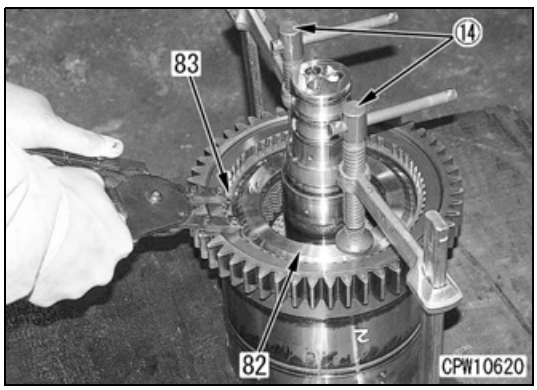
   ★ Attach them carefully so that plate (79) and spring (81) are not caught in the ring groove in the clutch housing.



4. End plate

   Push end plate (82) using C vice ⑭ or the like to attach snap ring (83).

   ★ At this time, check to see that snap ring (83) is firmly engaged in the groove.



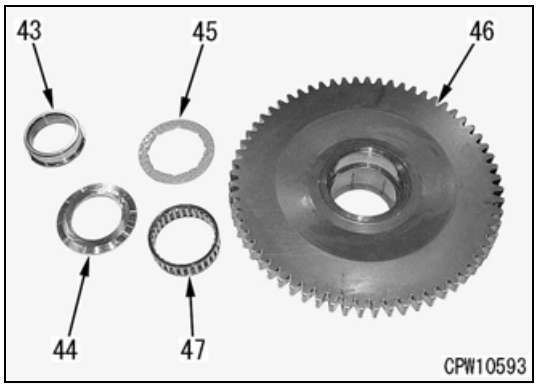
https://truckmanualshub.com/

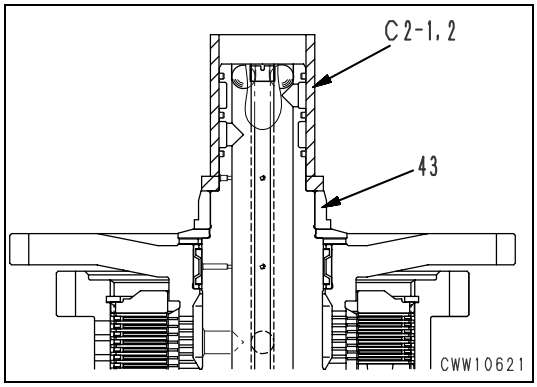
5. 4th-speed gear and bearing

   a. Attach needle bearing (47) to 4th-speed gear (46) and mount them on the housing.

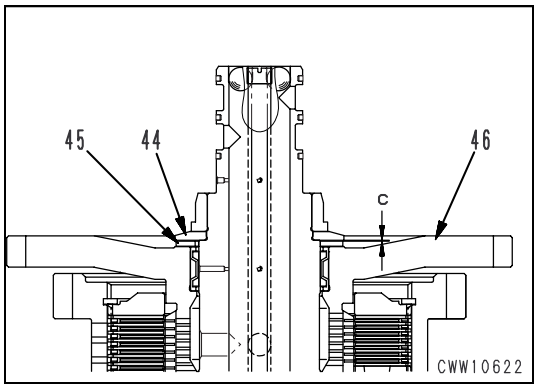
   b. Mount thrust washer (45) and spacer (44), then press-fit bearing (43).

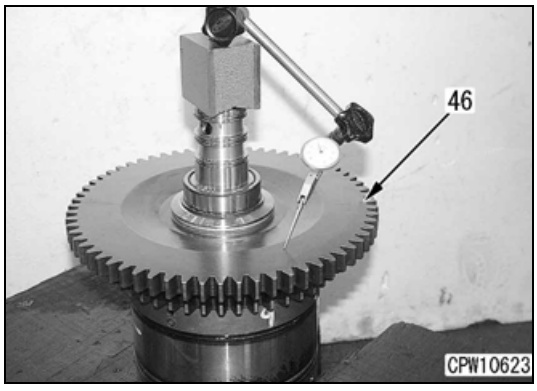
      ★ Press-fit bearing (43) by using tool **C2-1, 2**.





   c. Move 4th-speed gear (46) up and down to confirm the clearance **c** between spacer (44) and thrust washer (45) is within the standard range.
   Standard value **c**: 0.28 to 0.72 mm





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[1st-speed clutch]

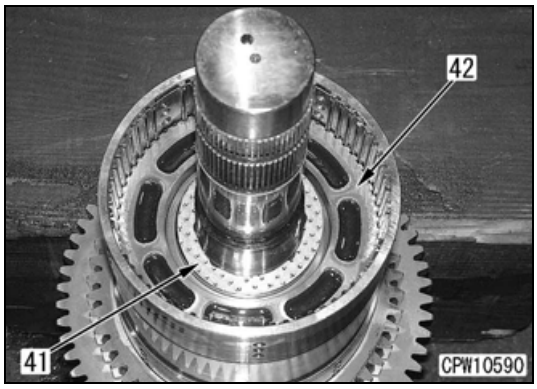
6. 1st-speed-side piston

   a. Lubricate the piston seal in the same way as for the 4th-speed clutch, then attach it to piston (42).

   b. Attach piston (42) in the same way as for the 4th-speed clutch.

      Sliding surface of piston seal: **Transmission oil**

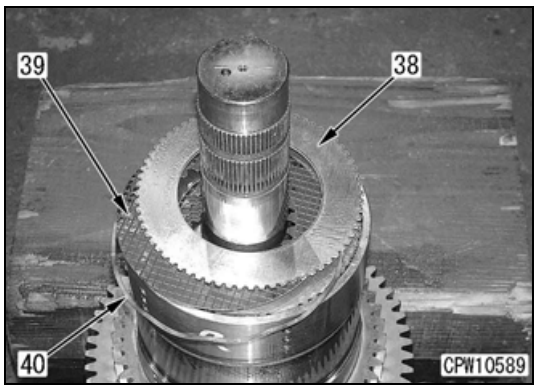
   c. Attach thrust washer (41).



7. Clutch plate

   Attach plate (38), disk (39) and spring (40) in this order.

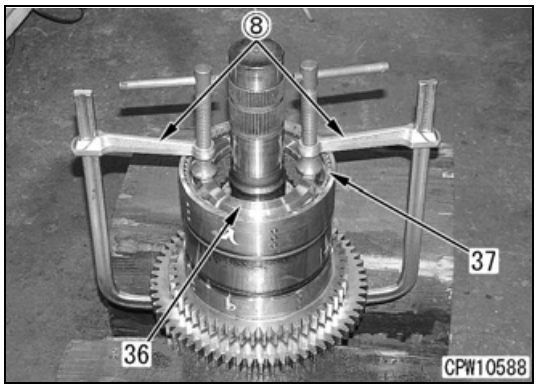
   ★ Attach them in the same way as for the 4th-speed clutch.



8. End plate

   Push end plate (36) using C vice ⑧ or the like to attach snap ring (37).

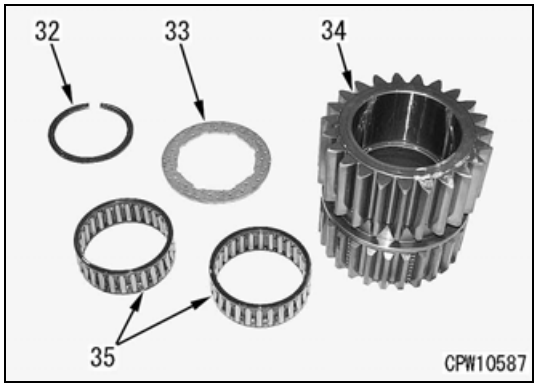
   ★ At this time, check to see that snap ring (37) is firmly engaged in the groove.



9. 1st-speed gear

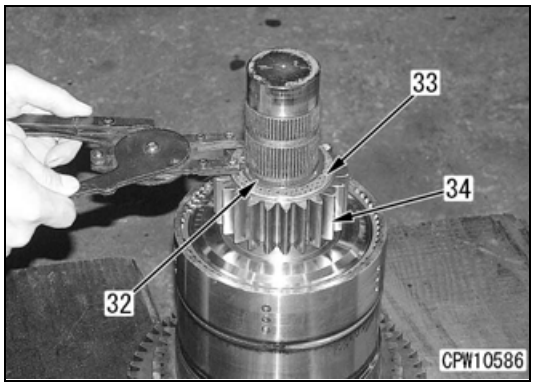
   a. Attach needle bearing (35) to 1st-speed gear (34).

   b. Mount the 1st gear to the shaft.



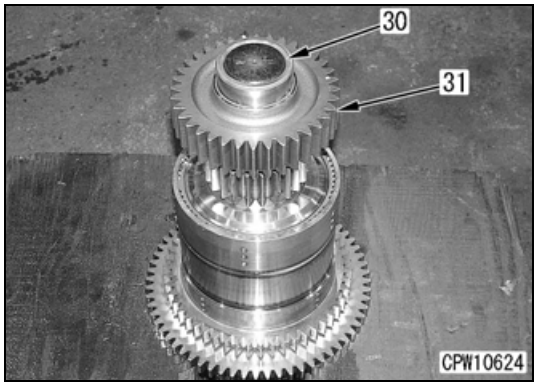
https://truckmanualshub.com/

c. Attach thrust washer (33) and snap ring (32).

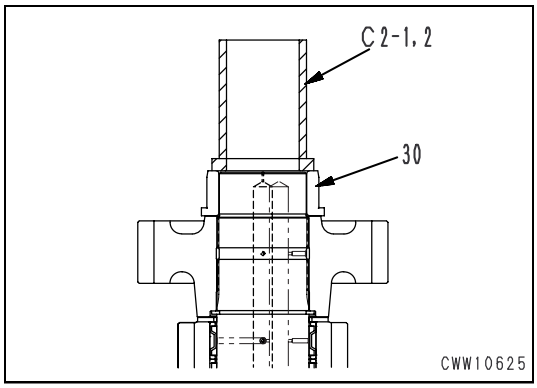


10. Idler gear

a. Attach idler gear (31) and press-fit bearing (30).

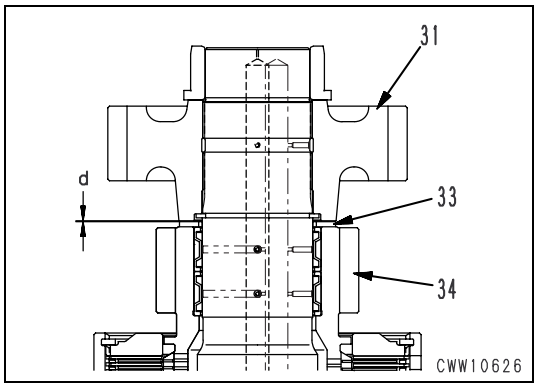


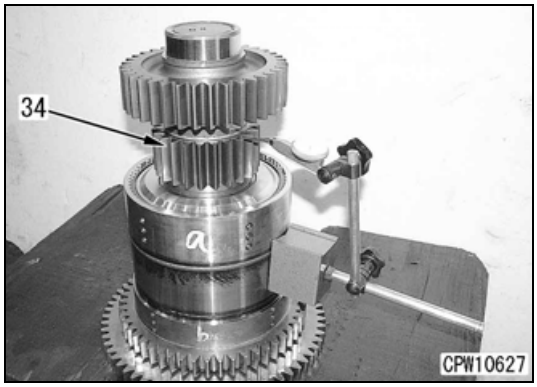
★ Press-fit bearing (30) using tool **C2-1, 2.**



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b. Move 1st-speed gear (34) up and down to confirm the clearance **d** between idler gear (31) and thrust washer (33), is within the standard range.
Standard value **d**: 0.26 to 0.74 mm

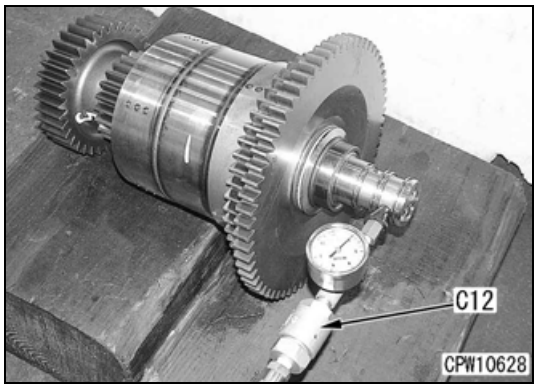




11. Clutch pack operation test

Inject compressed air into the oil hole in the shaft using tool **C12** to check that each clutch operates properly.

★ If the gear is fixed by injecting compressed air into the shaft, the clutch is operating properly.



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Assembly of 2nd • 3rd clutch packs

[2nd-speed clutch]

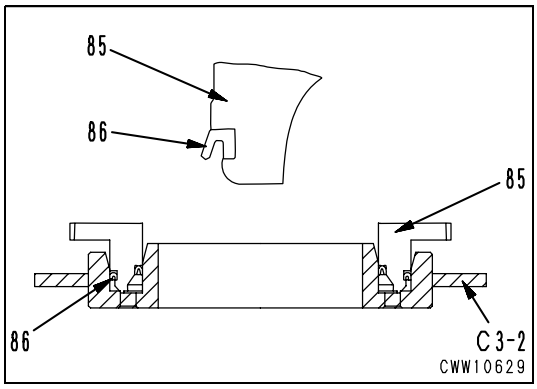
1. Piston seal

   Attach piston seal (86) to piston (85).

   ★ When using a new piston seal, use tool **C3-2** and wait for 2 to 3 minutes until it is lubricated, then attach it.

   ★ Note that attaching the seal to the cylinder without using tool **C3-2** might damage the seal.

   Inside of tool **C3-2: Transmission oil**



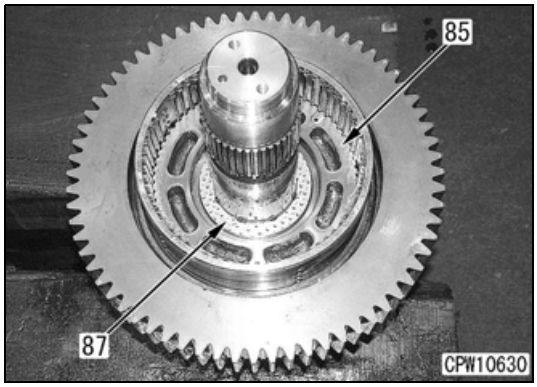
2. 2nd-speed-side piston

   a. Attach 2nd-speed-side piston (85).

      ★ At this time, be careful not to damage the piston seal.

      Sliding surface of piston seal: **Transmission oil**

   b. Attach thrust washer (87).



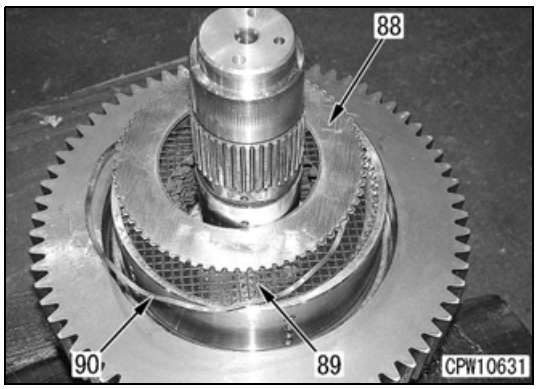
3. Clutch plate

   Attach housing plate (88), disk (89) and spring (90) in this order.

   ★ Soak disk (89) in clean transmission oil for at least 2 minutes beforehand.

   ★ Care should be taken so that spring (90) and plate (88) do not overlap each other.

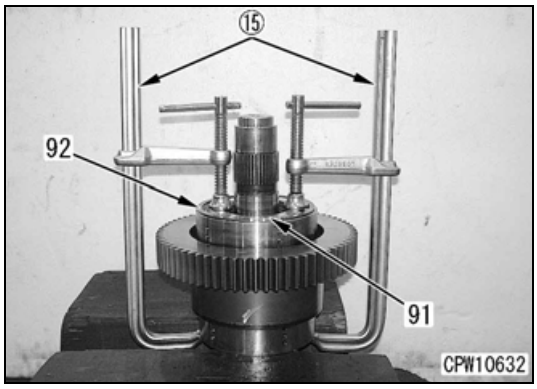
   ★ Attach them carefully so that the plate and spring are not caught in the ring groove in the clutch housing.



4. End plate

   Push end plate (91) using C vice ⑮ or the like to attach snap ring (92).

   ★ At this time, check to see that snap ring (92) is firmly engaged in the groove.



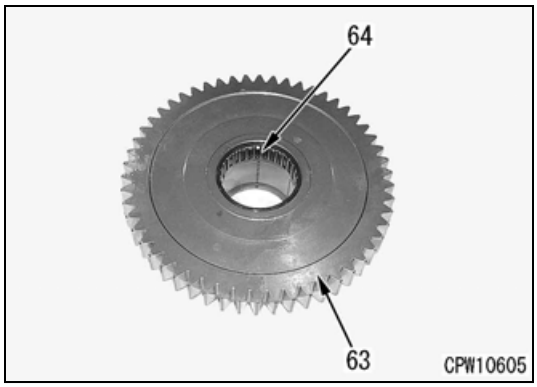
https://truckmanualshub.com/

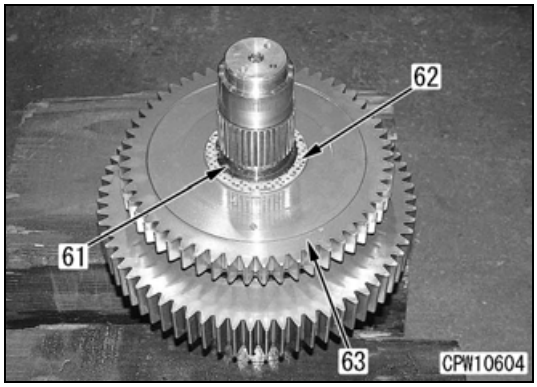
5. 2nd-speed gear

   a. Attach 2nd-speed gear (63), then needle bearing (64).

      ★ If the spline does not align with the gear, turn it slightly instead of forcing it onto the spline.

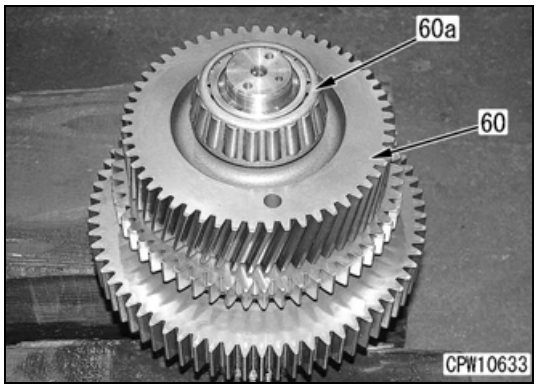
   b. Attach thrust washer (62) and snap ring (61).



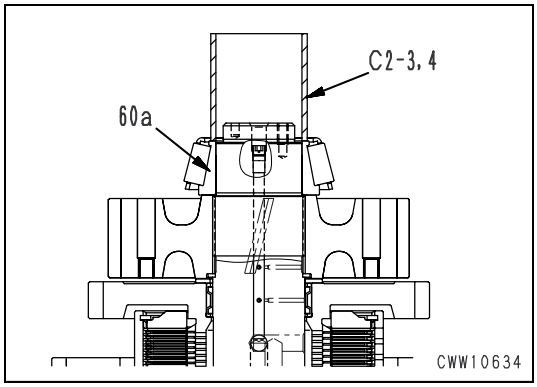


6. Idler gear and bearing

   a. Attach idler gear (60).

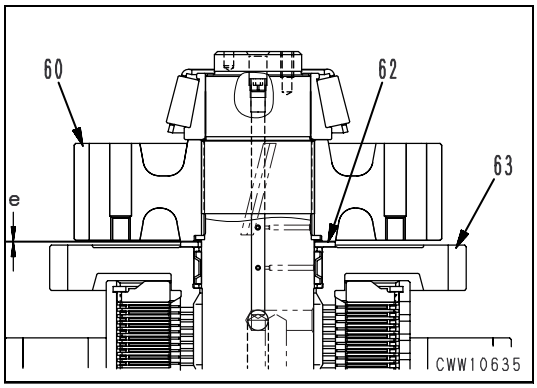


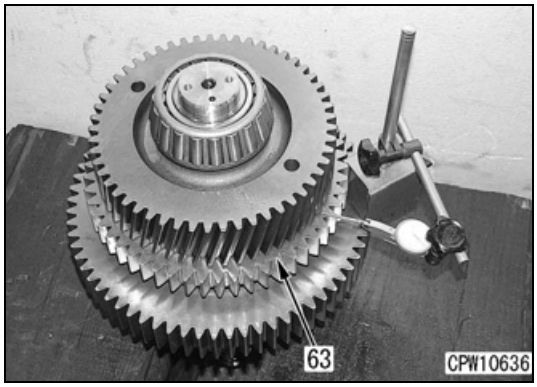
   b. Press-fit bearing (60a) using tool **C2-3, 4**.



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c. Move 2nd-speed gear (63) up and down to confirm the clearance **e** between idler gear (60) and thrust washer (62), is within the standard range.
Standard value **e**: 0.23 to 0.77 mm





[3rd-speed clutch]

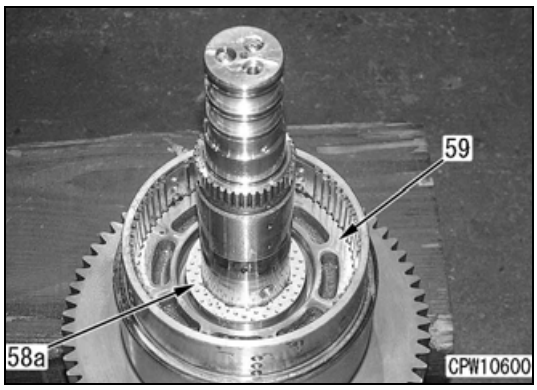
7. 3rd-speed-side piston

a. Lubricate the piston seal in the same way as for the 2nd-speed clutch, then attach it to piston (59).

b. Attach piston (59) in the same way as for the 2nd-speed clutch.

Sliding surface of piston seal: **Transmission oil**

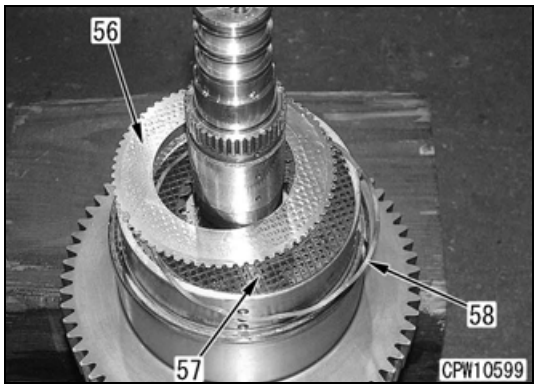
c. Attach thrust washer (58a).



8. Clutch plate

Attach housing plate (56), disk (57) and spring (58) in this order.

★ At this time, attach them in the same way as for the 2nd-speed clutch.

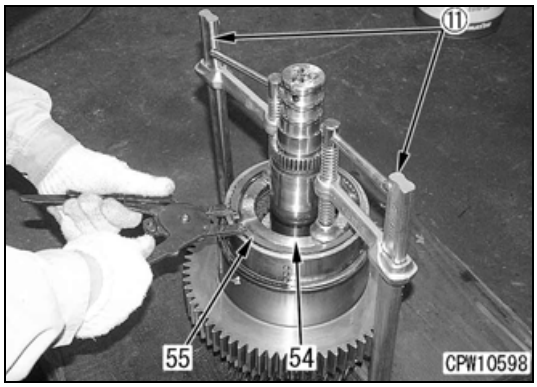


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9. End plate

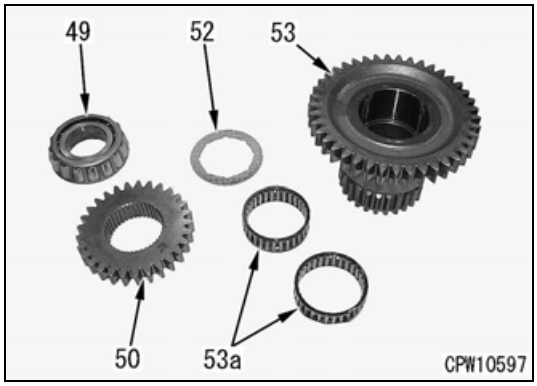
   Push end plate (54) using C vice ⑪ or the like to attach snap ring (55).

   ★ At this time, check to see that snap ring (55) is firmly engaged in the groove.

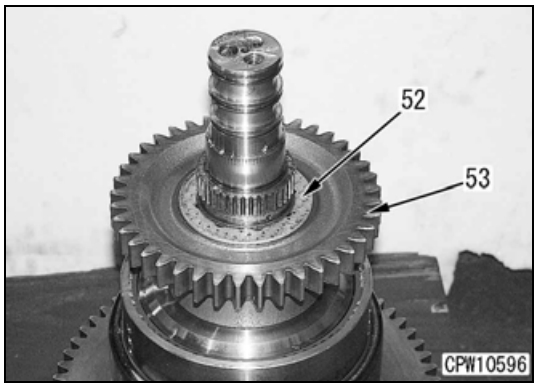


10. 3rd-speed gear

    a. Attach needle bearing (53a) to 3rd-speed gear (53), then mount them on the shaft.

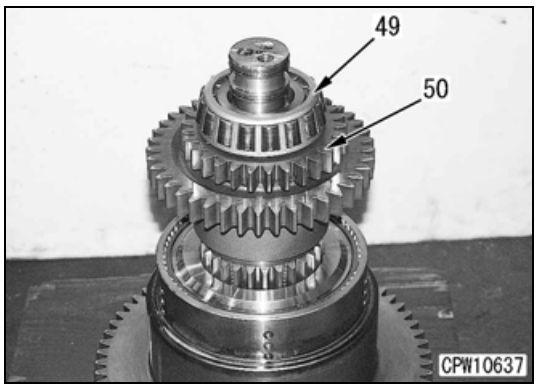


    b. Attach thrust washer (52).



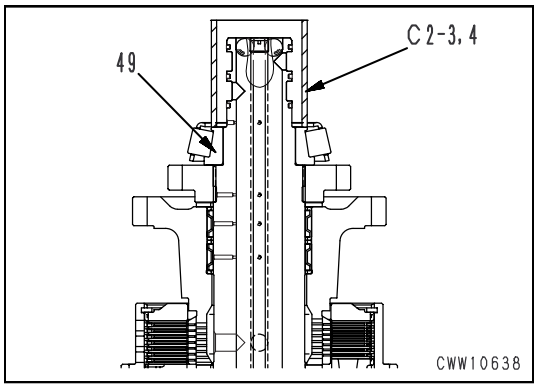
11. 4th-speed gear and bearing

    a. Attach 4th-speed gear (50).

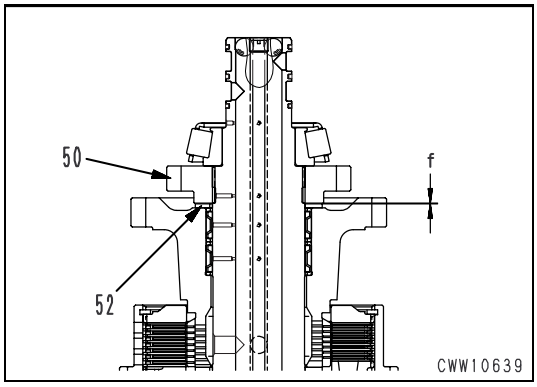


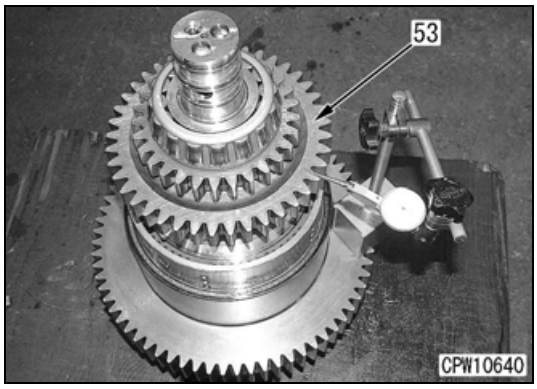
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b. Press-fit bearing (49) using tool **C2-3, 4**.



c. Move forward gear (53) up and down to confirm the clearance **f** between 4th-speed gear (50) and thrust washer (52), is within the standard range.
Standard value **f**: 0.28 to 0.72 mm

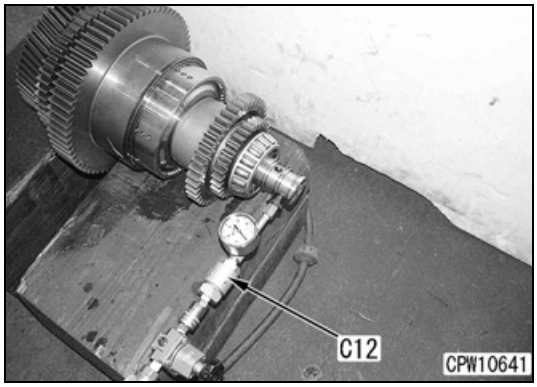




12. Clutch pack operation test

Inject compressed air into the oil hole in the shaft using tool **C12** to check that each clutch operates properly.

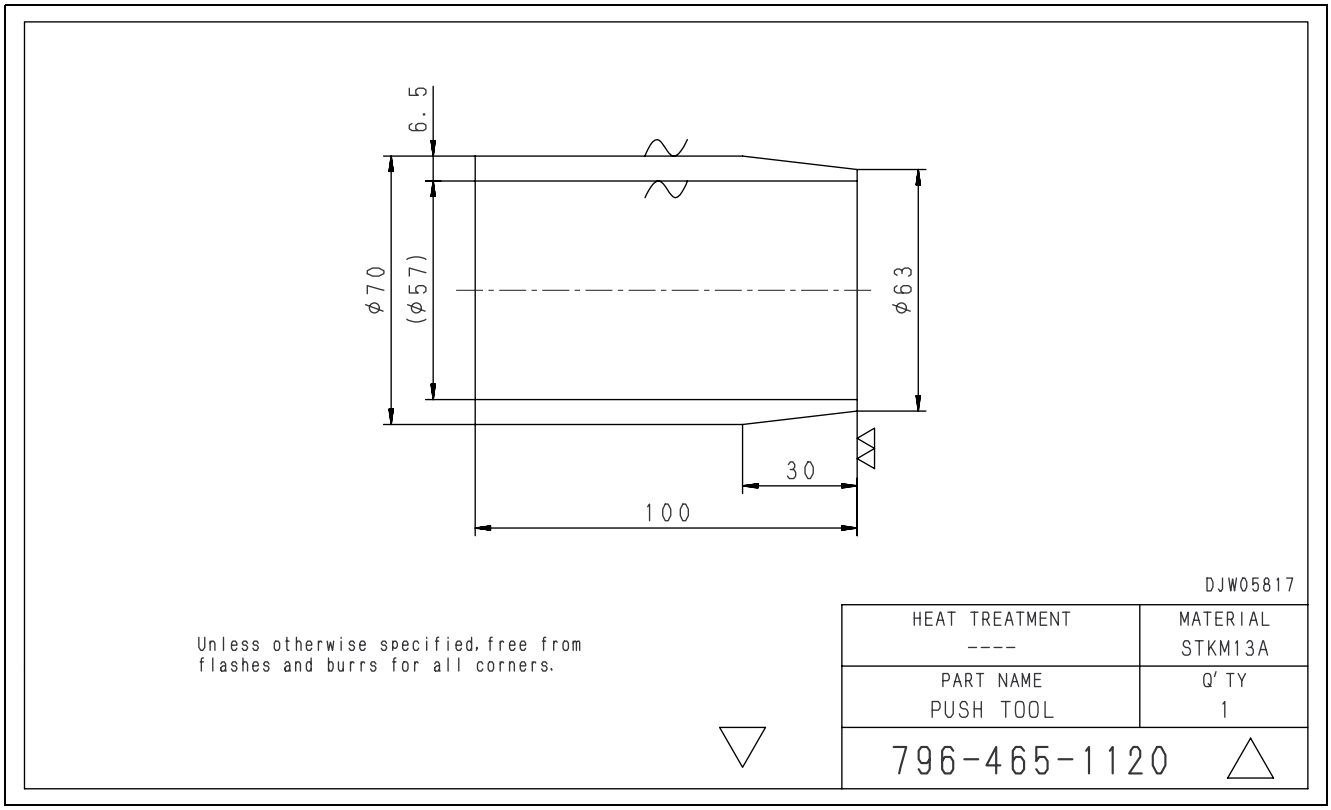
★ If the gear is fixed by injecting compressed air into the shaft, the clutch is operating properly.



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Schematic diagram of special tool

C2 Push tool



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Parking brake assembly

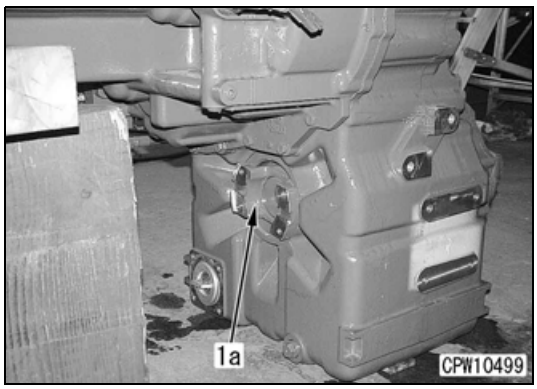
Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
C4	1	790-101-5421	Grip	■	1		
	2	01010-51240	Bolt	■	1		
	3	793T-607-1130	Push tool	■	1	N	❍
C5	1	790-101-5421	Grip	■	1		
	2	01010-51240	Bolt	■	1		
	3	793T-607-1130	Push tool	■	1	N	❍
	4	793T-607-1140	Spacer	■	1	N	❍
C8		797T-423-1360	Push tool	■	1		❍
C9		793T-607-1170	Push tool	■	1	N	❍
C10		793T-607-1180	Push tool	■	1	N	❍
C13	1	793T-607-1190	Bracket	■	1	N	❍
	2	425-15-13320	Plate	■	1		
	3	01050-62220	Bolt	■	1		

Disassembly

1. Rear coupling

   Dismount rear coupling (1a).

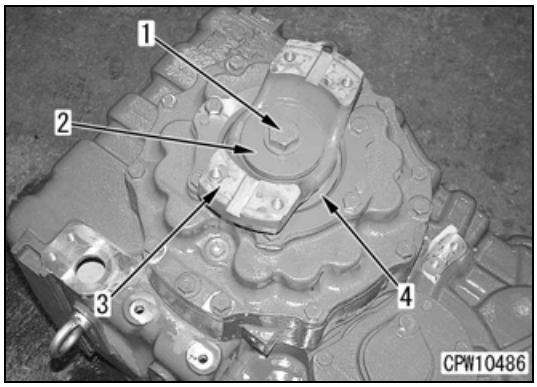


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2. Front coupling

   a. Remove bolt (1) and plate (2), and dismount coupling (3).

   b. Dismount cover (4) from the coupling.

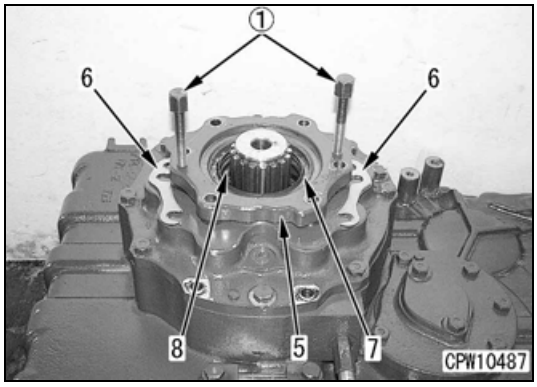


3. Bearing case

   a. Remove the mounting bolt and use forcing screw ① to dismount bearing case (5).

   b. Dismount shim (6).

   c. Dismount dust seal (7) and oil seal (8) from the bearing case.

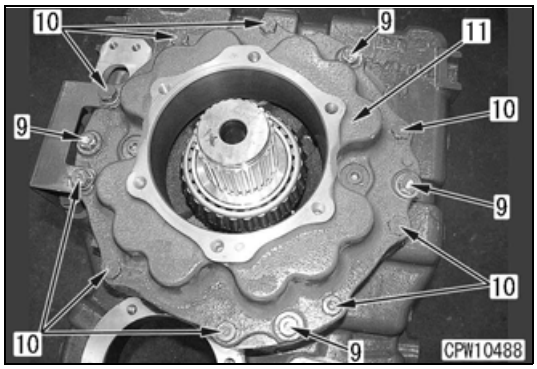


4. Cover

   a. Remove cover mounting bolt (9) and the through bolt (10) for parking brake case.

      ★ Slowly loosen several times to remove them.

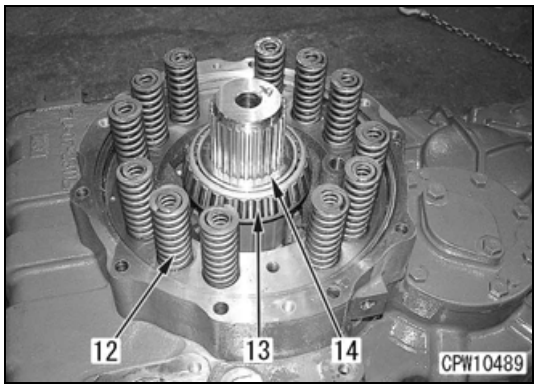
   b. Dismount cover (11).



5. Spring and bearing

   a. Dismount spring (12) (12 springs).

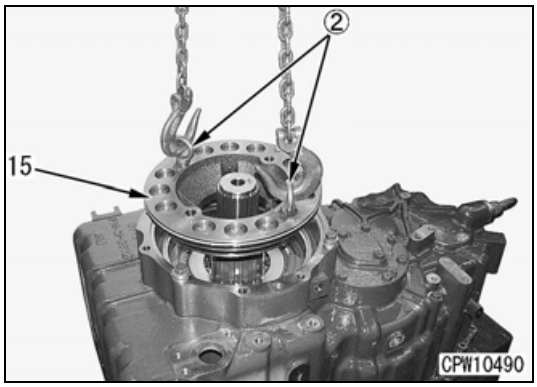
   b. Dismount bearing (13) together with spacer (14) and separate them if necessary.



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6. Piston

   Mount eyebolt ② to dismount piston (15).

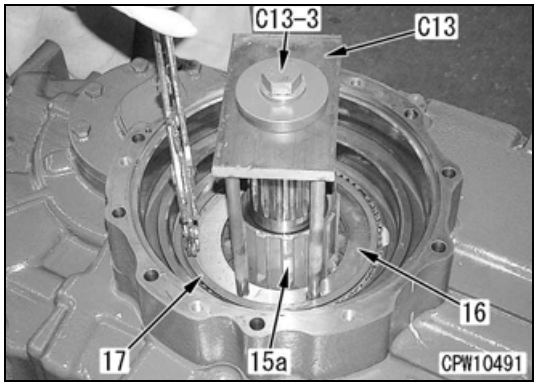


7. Plate and disc

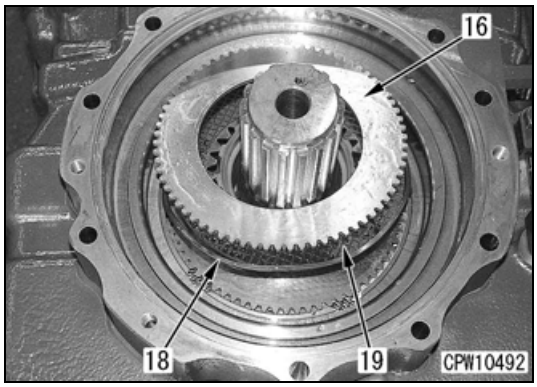
   a. Mount tool **C13** to the output shaft to tighten coupling mounting bolt **(C13-3)** and press plate (16).

   b. Dismount snap ring (17).

   c. Dismount hub (15a).

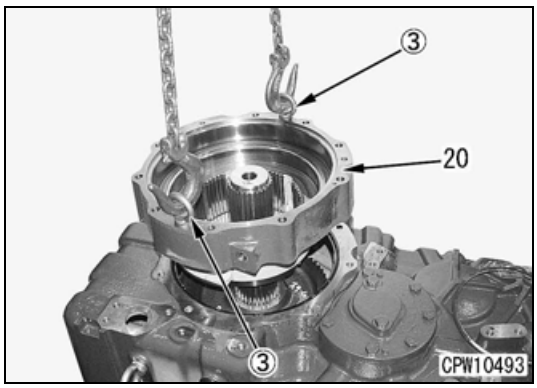


   d. Dismount plate (16), spring (18) and disc (19).



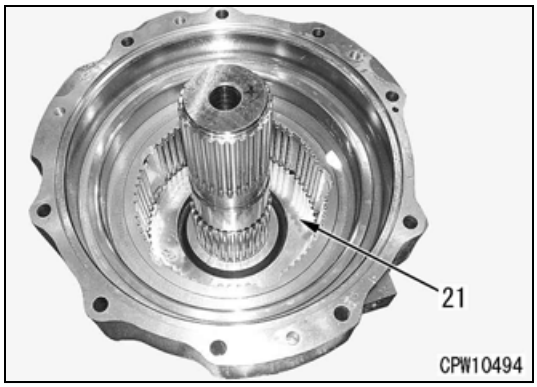
8. Parking brake case

   Mount eyebolt ③ to dismount parking brake (20).



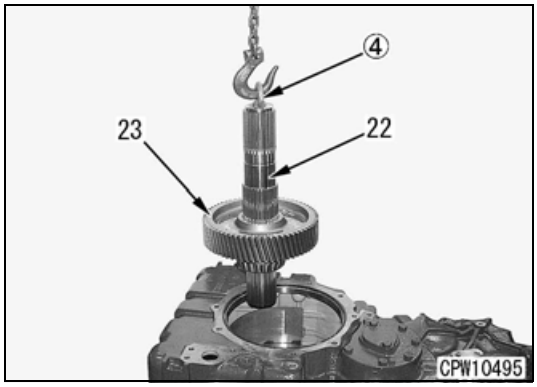
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★ Dismount end plate (21) by dismounting the snap ring on the rear after dismounting the parking brake case.

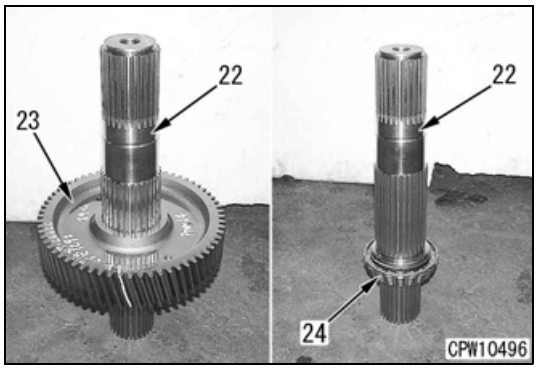


9. Output shaft

a. Mount eyebolt ④ to dismount output shaft (22) together with gear (23).



b. Dismount gear (23) and bearing (24) from output shaft (22).

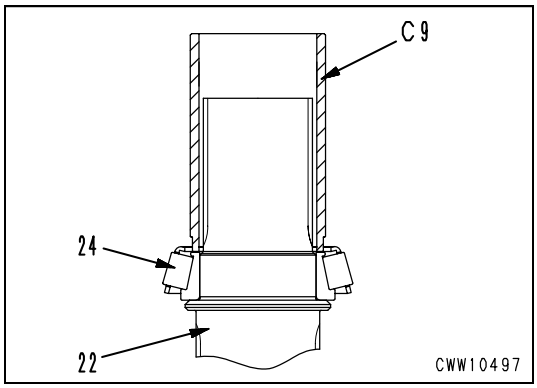


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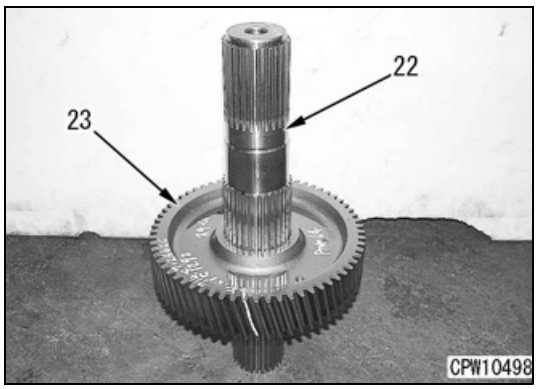
Assembly

1. Output shaft

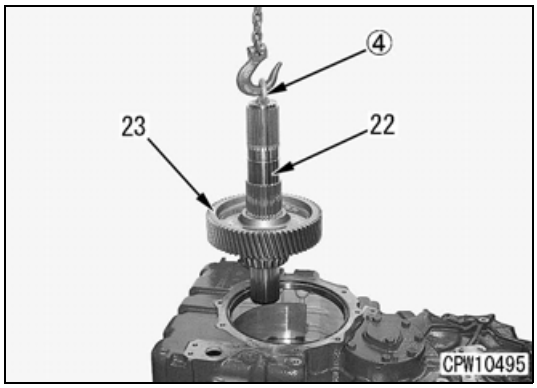
   a. Use tool **C9** to press fit bearing (24) onto output shaft (22).



   b. Mount gear (23) to output shaft (22).

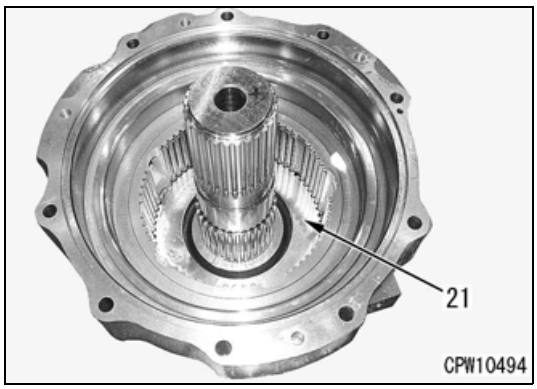


   c. Mount eyebolt ④ and mount output shaft (22) together with gear (23).



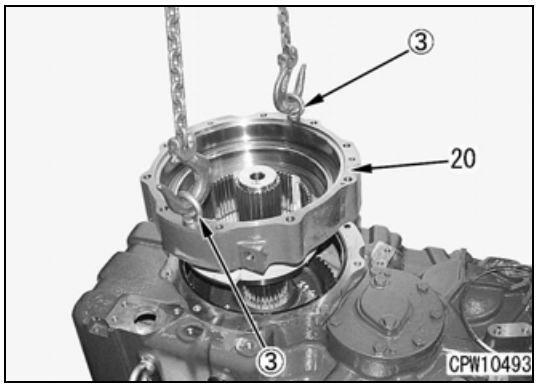
2. Parking brake case

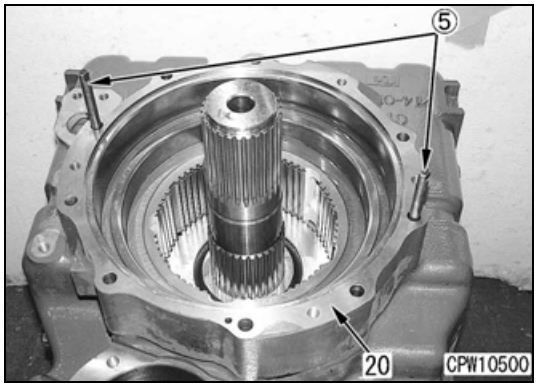
   a. Mount end plate (21) and mount the snap ring on the rear.



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b. Mount guide bolt ⑤ on the front housing and mount parking brake case (20).

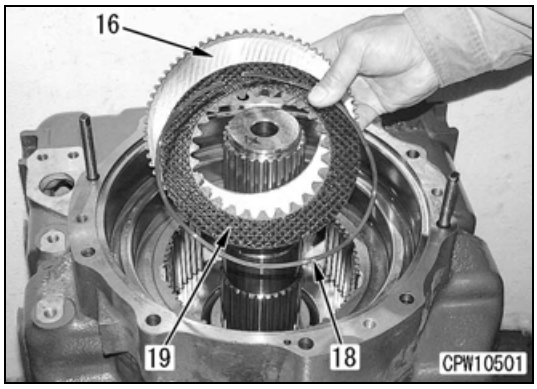




3. Plate and disc

a. Mount plate (16), spring (18) and disc (19) in this order.

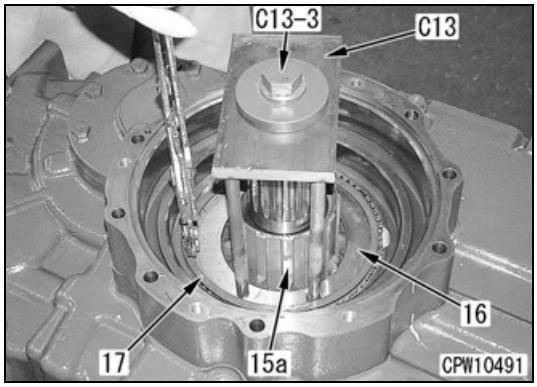
★ Be careful not to allow the spring and disc to overlap each other.



b. Mount hub (15a).

c. Mount tool **C13** onto the output shaft and tighten coupling mounting bolt (tool **C13-3)**, then press plate (16).

d. Mount snap ring (17).



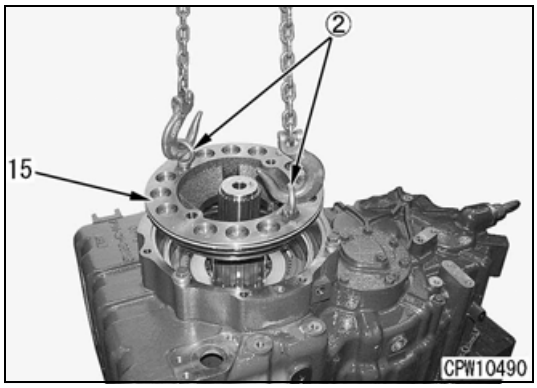
https://truckmanualshub.com/

4. Piston

   a. Mount the O-ring and backup ring on the piston.

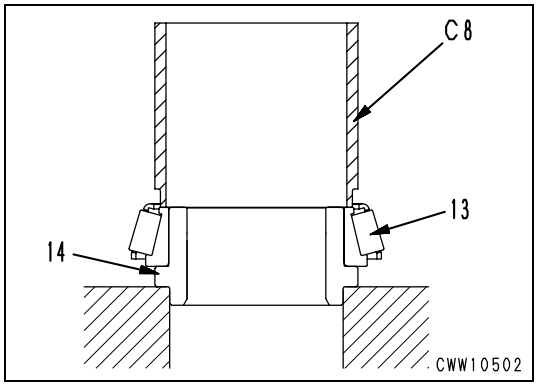
   O-ring: **Grease (G2-LI)**

   b. Mount eyebolt ②, then mount piston (15).



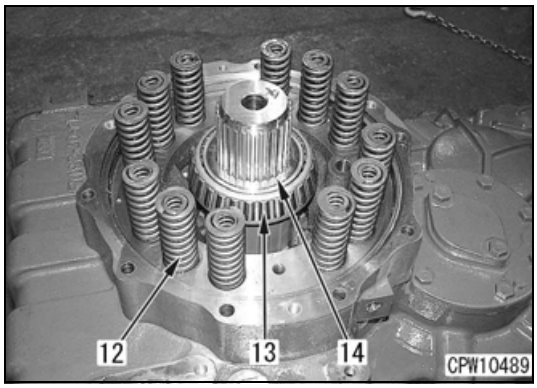
5. Spring and bearing

   a. Use tool **C8** to press fit bearing (13) onto spacer (14).



   b. Mount bearing (13) on the shaft.

   c. Mount spring (12) (12 springs).

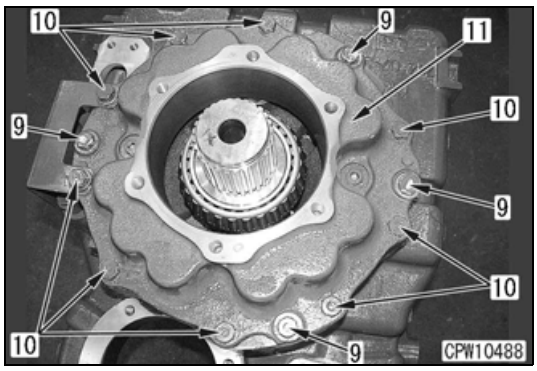


6. Cover

   a. Mount cover (11) so as to fit to the guide bolt that were mounted in procedure 2-b)

   b. Tighten the through bolt (10) for parking brake case and cover mounting bolt (9).

      ★ Equally tighten them several times.



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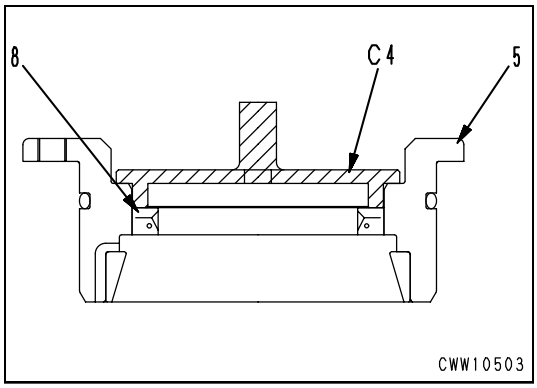
7. Bearing case

   a. Use tool **C4** to press fit oil seal (8) onto bearing case (5).

      Bearing case side:
      Liquid gasket (Three Bond 1110B)

      ★ Completely wipe extra liquid gasket out.

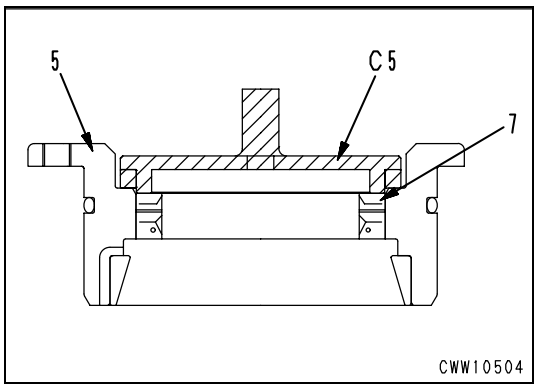
      Oil seal inside:
      Silicon grease (Three Bond 1855)



   b. Use tool **C5** to press fit dust seal (7) onto bearing case (5).

      Mating surface between inside dust and oil seals:
      Silicon grease (Three Bond 1855)

   c. Mount the O-ring to the bearing case.



8. Adjustment of shim for output shaft taper roller bearing

   a. Dismount the plug of the parking brake opening position and tighten bolt (9a) (12-1.75, 50 mm), then move the piston to the cover side and open the parking brake.

   b. Mount bearing case (5).

      ★ Do not mount the shim between cover (11) and bearing case (5).

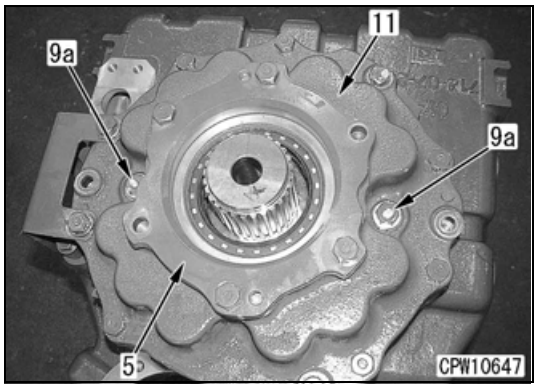
   c. Tighten the mounting bolt with the following torque:

      kgm Mounting bolt: **9.8 ± 0.98 Nm {1 ± 0.1 kgm}**

   d. Rotate the output shaft twenty times.

   e. Check the tightening torque of the bearing case mounting bolt.

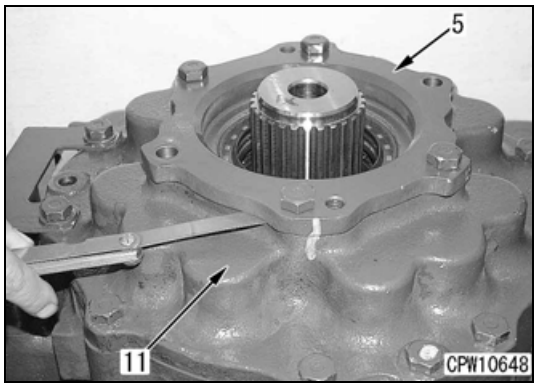
      ★ If the tightening torque changes, repeat procedures c. and d.



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f. Use a thickness gauge to measure the clearance between bearing case (5) and cover (11) at quarter positions around the circumference.

★ If the measured value range varies beyond 0.05 mm, set the range to the standard value after checking and correcting the corresponding position due to insufficient bearing incorporation or other causes.



g. Calculate the measured average clearance.

h. Select the shim thickness to be incorporated.

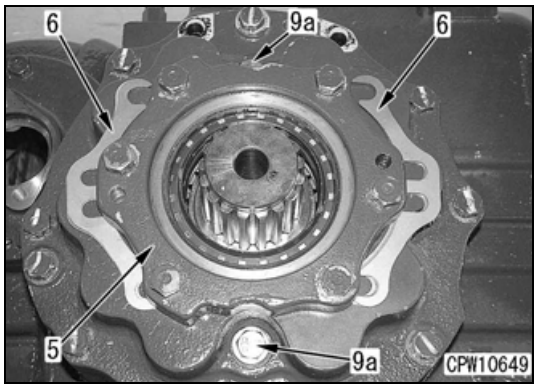
★ Shim thickness =
Average clearance + 0.25 - 0.30 mm

★ Reference: Standard shim thickness = 0.95 mm

i. Mount selected shim (6) and bearing case (5).

Bearing case O-ring:
Grease (G2-LI)

kgm Bearing case bolt:
98.0 ~ 122.5 Nm {10 ~ 12.5 kgm}

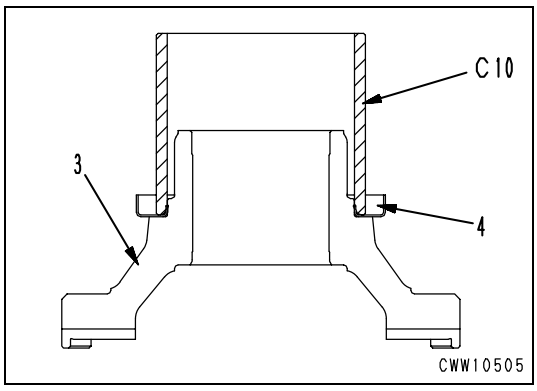


j. Remove bolt (9a) and release the opening state of the parking brake.

k. Mount the plug at the parking brake opening position.

9. Front coupling

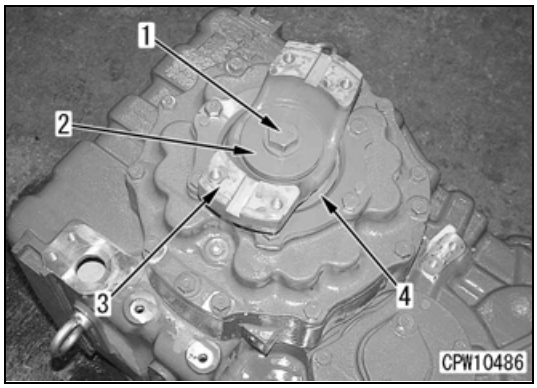
a. Use tool **C10** to press fit cover (4) onto coupling (3).



b. Mount coupling (3) and plate (2) and tighten bolt (1).

Bolt: **Adhesive compound (LT-2)**

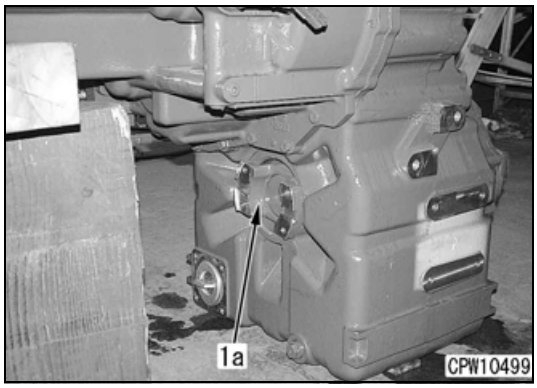
kgm Bolt: **662 ~ 829 Nm {67.5 ~ 84.5 kgm}**



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10. Rear coupling

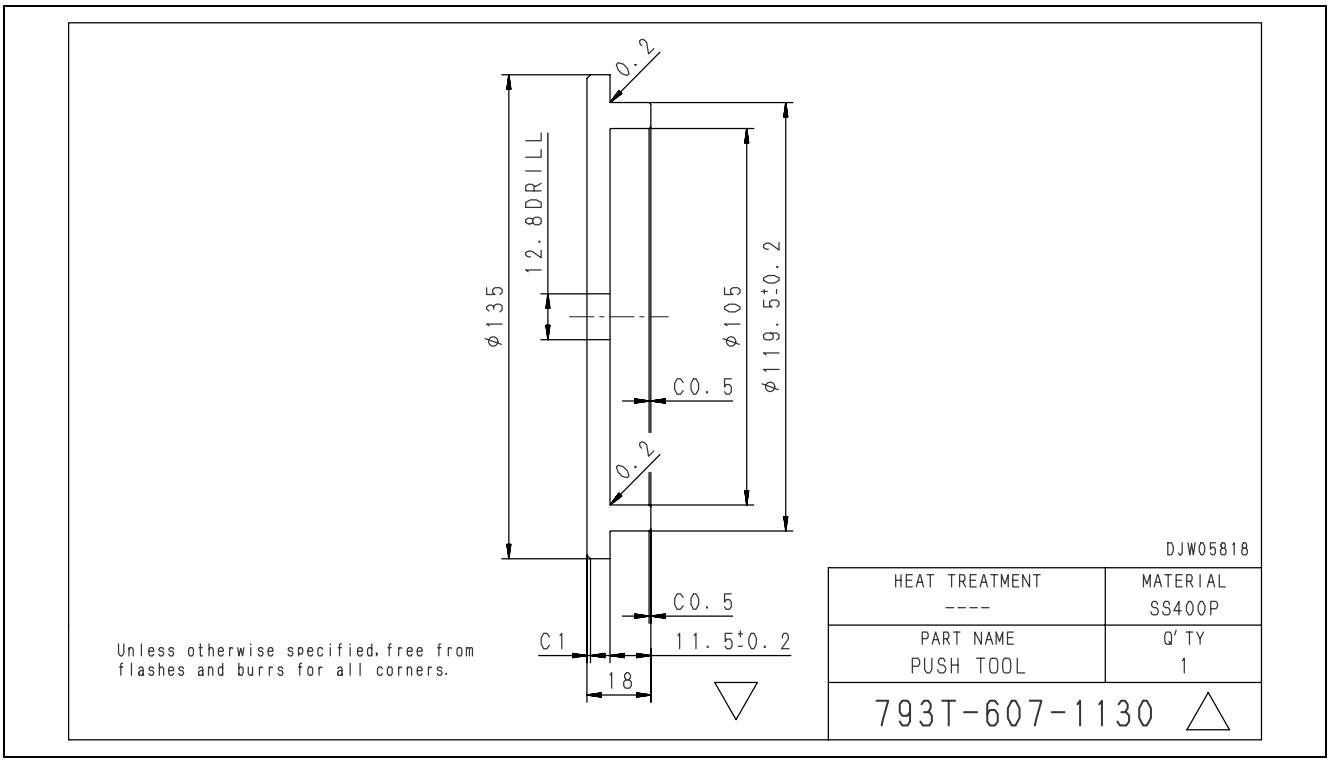
    a. Mount rear coupling (1a).



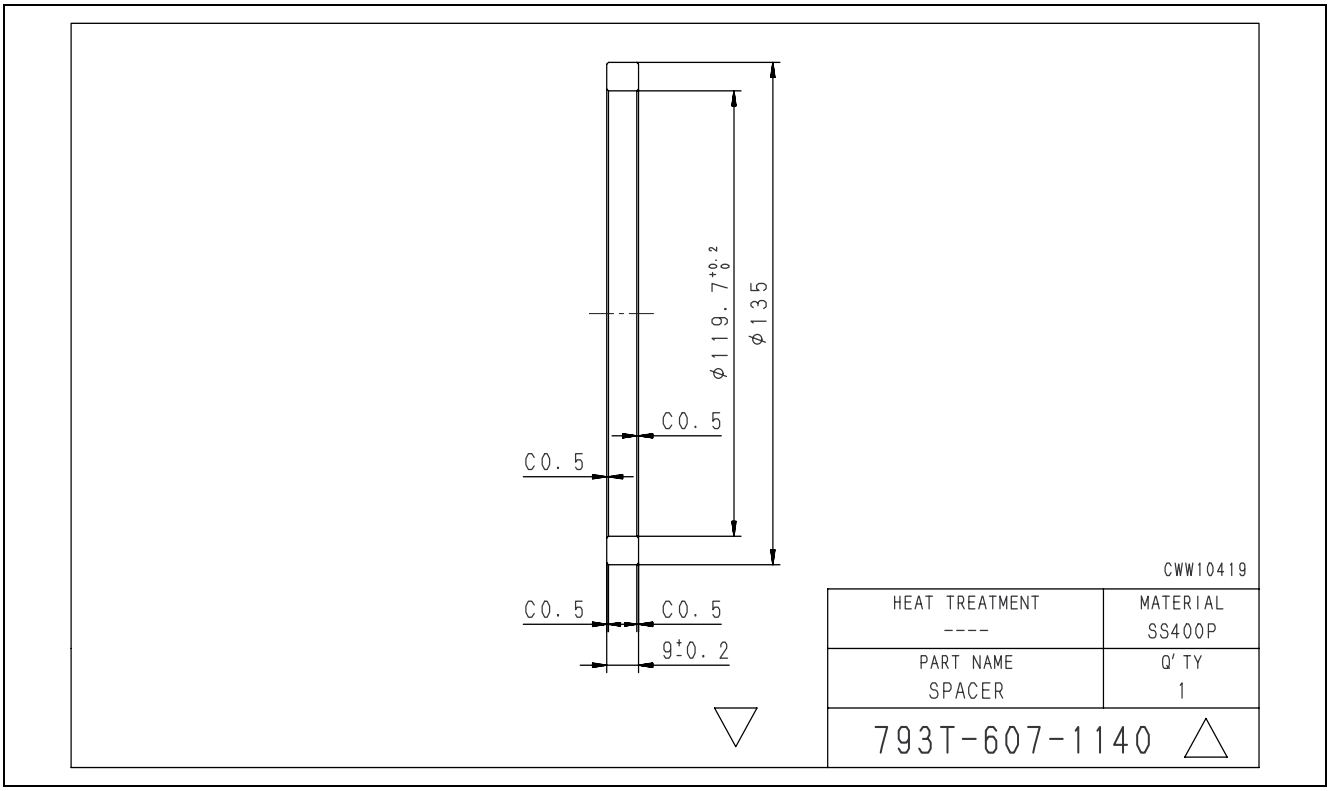
https://truckmanualshub.com/

Schematic drawing of special tools

C4, C5 Push tool

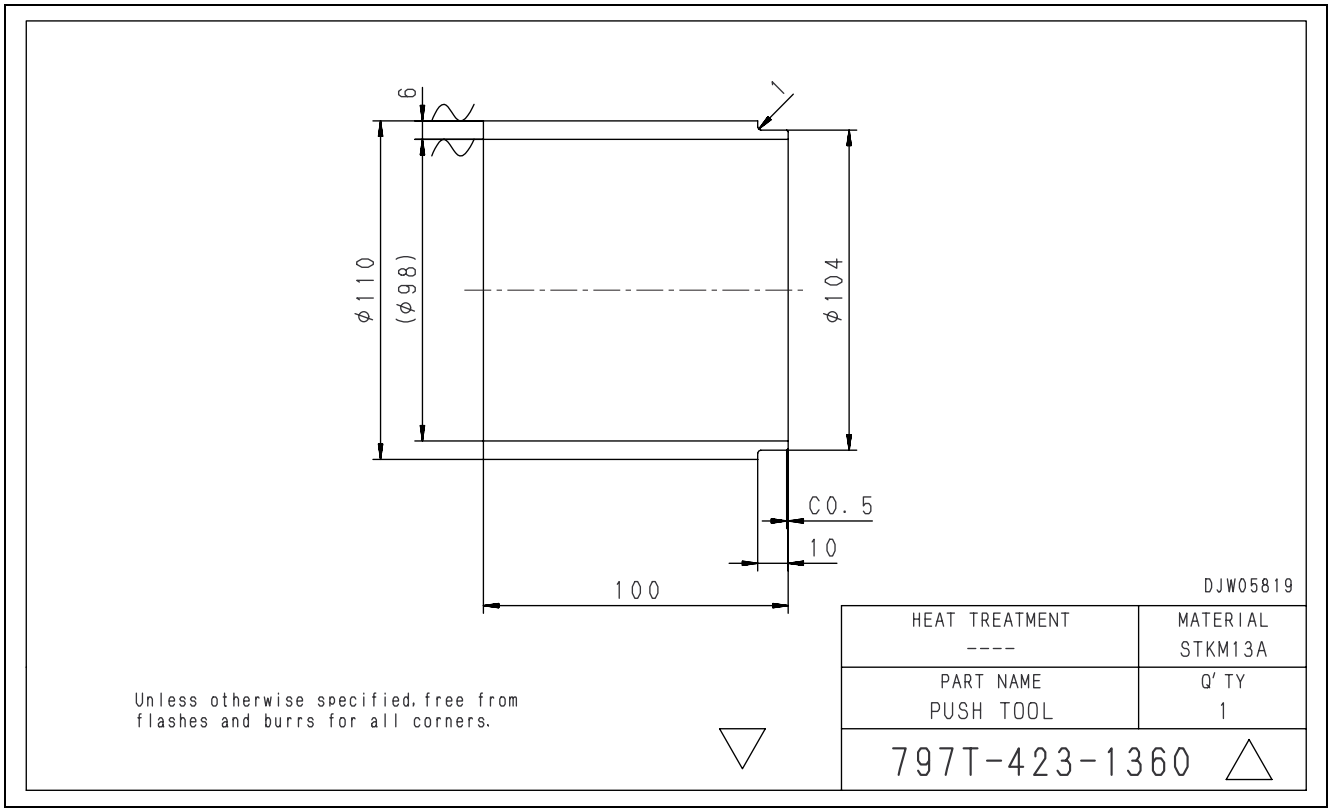


C5 Spacer

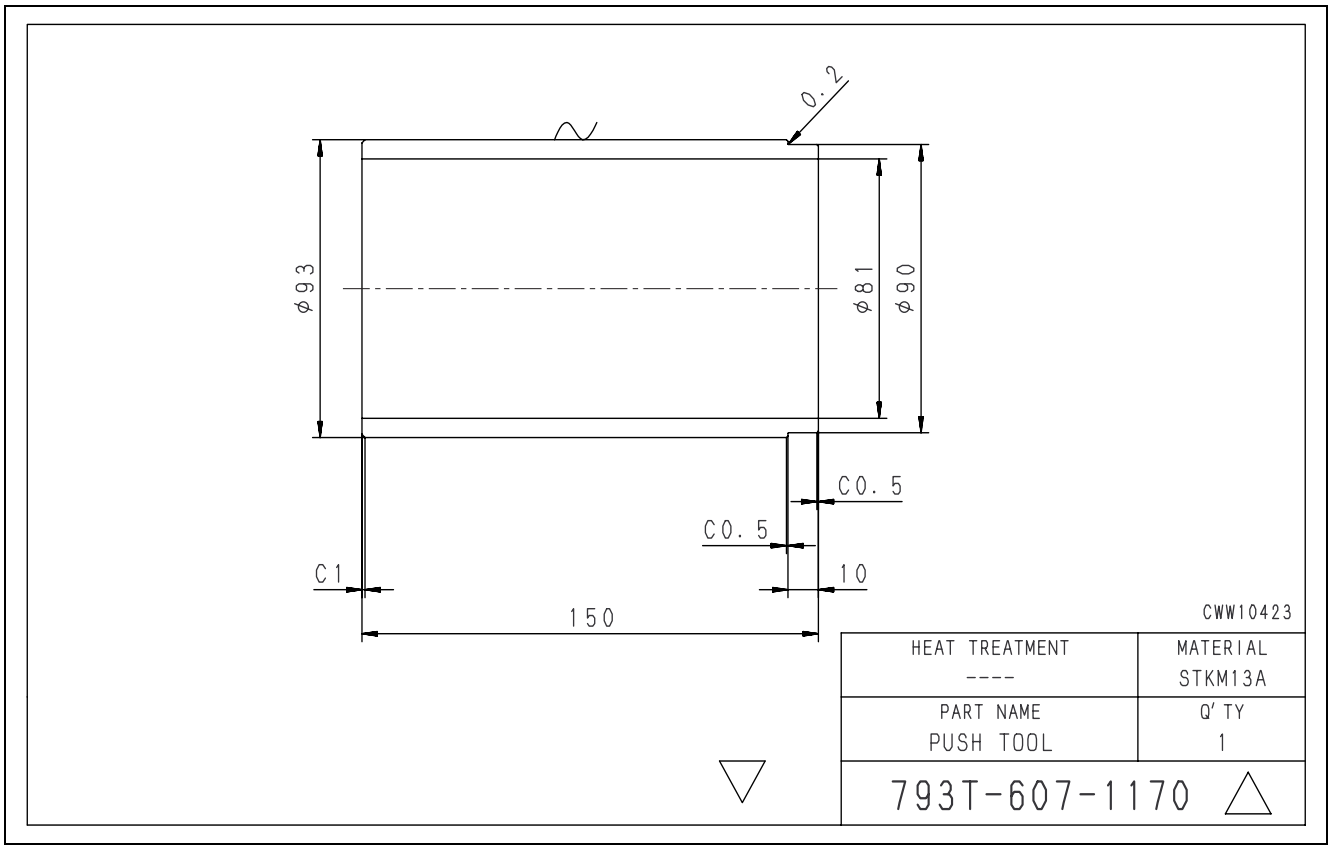


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C8 Push tool

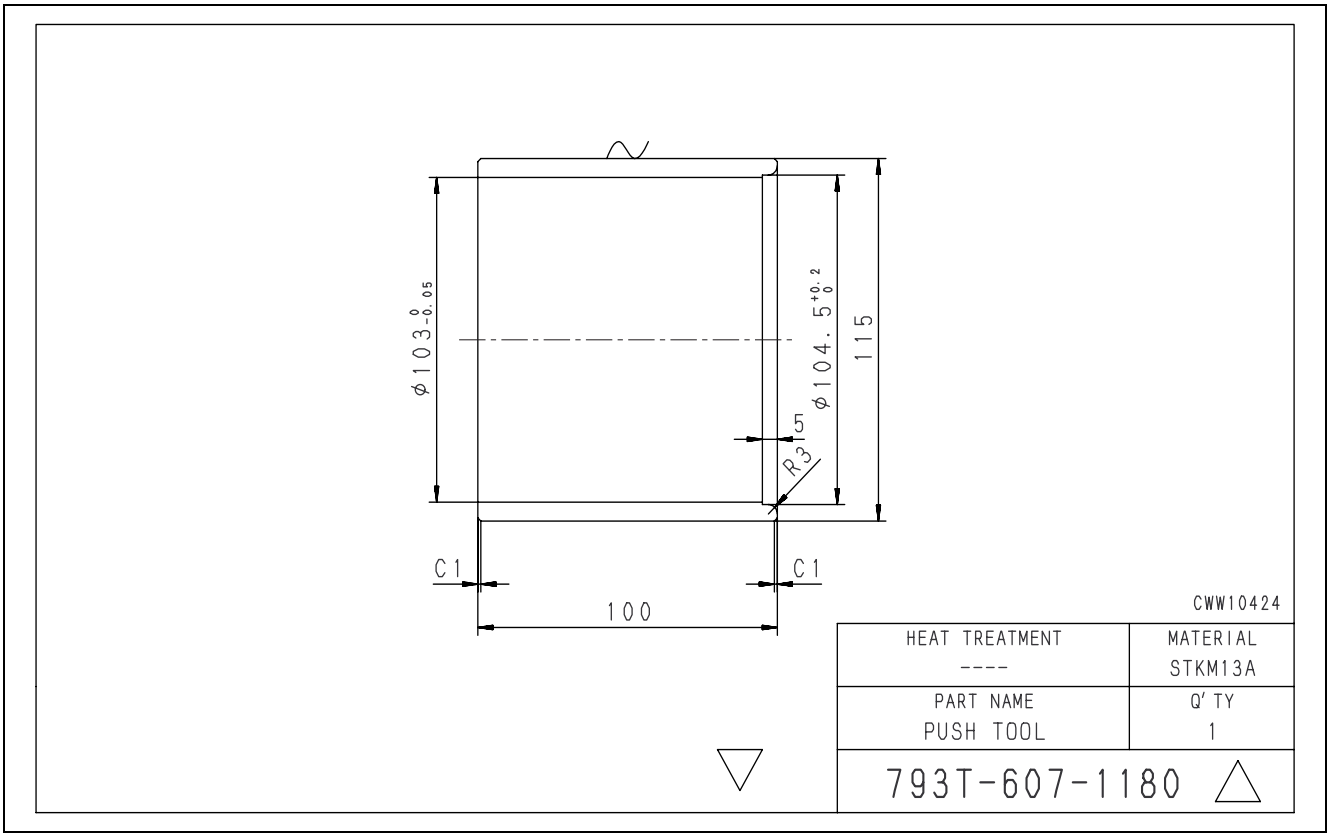


C9 Push tool

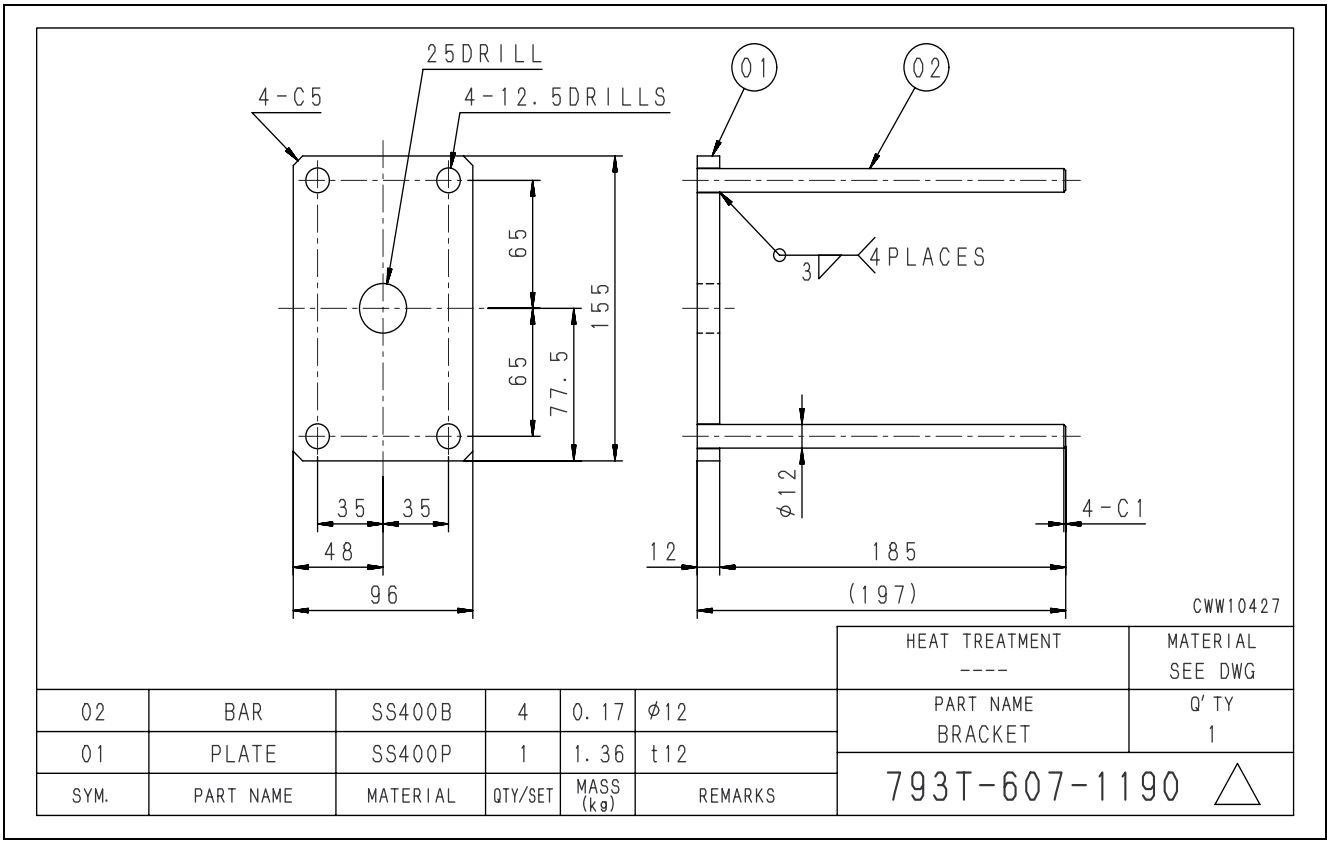


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C10 Push tool



C13 Bracket

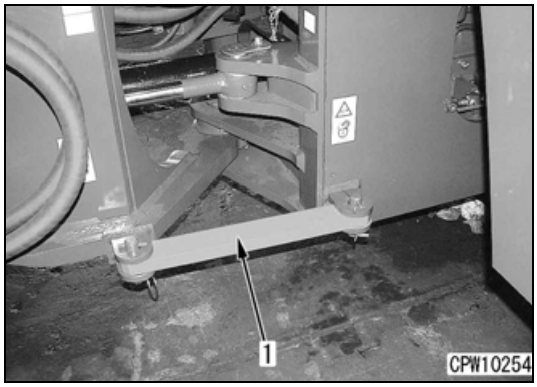


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Front axle assembly

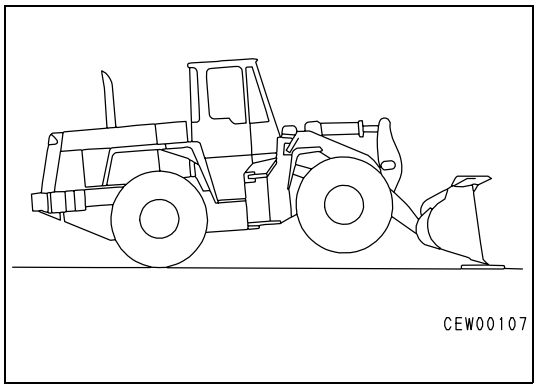
Disassembly

- **Park the machine on lever ground and lower the bucket onto the ground.**
- **Mount safety bar (1) on the frame.**

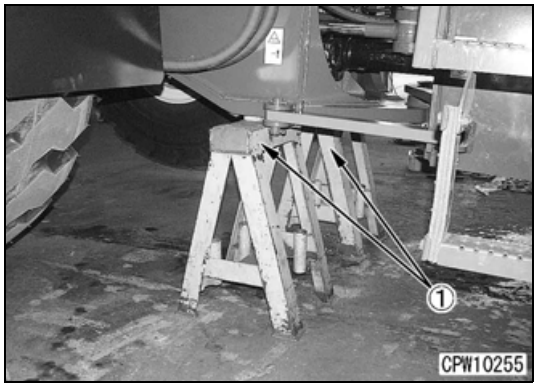


1. Jack up

   a. Slowly lift the machine with the bucket set in the dump state until the front wheels are about 5 cm above the ground.



   b. Set jack ① under the front frame.



Apply the parking brake and put blocks under the rear wheels.

2. Front wheel assembly

   Be sure to tightly fasten the wheel periphery in a nylon sling and dismount the front wheel assembly (2). ※ 1

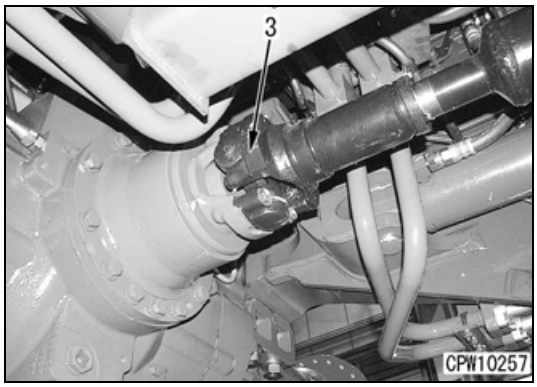


   kg Front wheel assembly: **700 kg**

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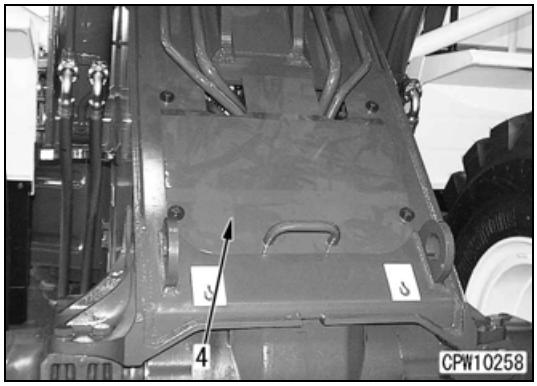
3. Front drive shaft

   Dismount front drive shaft (3). ※ 2

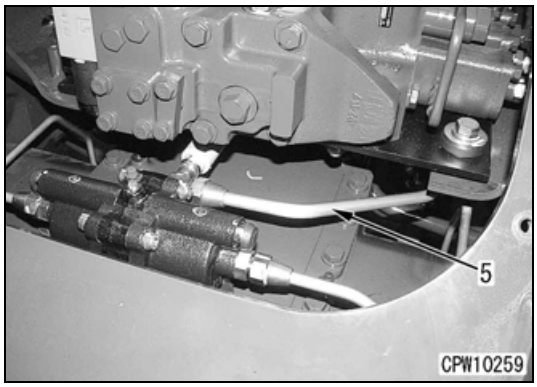


4. Brake cube

   a. Dismount cover (4).



   b. Dismount tube (5).



5. Front axle assembly

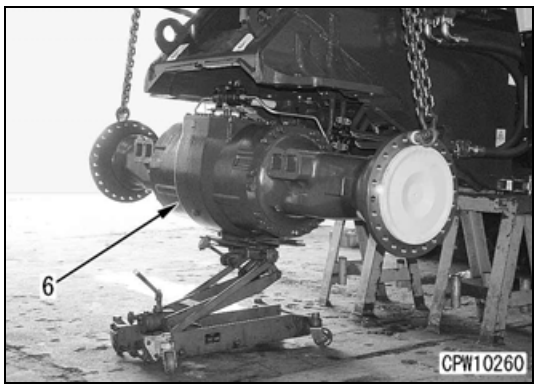
   a. Raise the front axle assembly with a sling and support it with a jack.

   b. Remove the mounting bolts and dismount front axle assembly (6) while lowering the jack and hoist slowly. ※ 3

      kg Front axle assembly: **1,350 kg**

   c. Firmly set the front axle assembly on blocks or the like.

   d. Again raise the left hand (right hand) axle housing with a hoist and support the another hand axle housing with a jack or fork lift, then pull the front axle assembly out to the next of the machine.



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Assembly

- Perform assembly in the reverse procedure of disassembly.

※ 1

kgm Front tire mounting bolts:
823 ~ 1,029 Nm {84 ~ 105 kgm}

※ 2

kgm Drive shaft mounting bolts:
98.1 ~ 122.6 Nm {10 ~ 12.5 kgm}

※ 3

kgm Front axle mounting bolts:
1,451 ~ 1,785 Nm {148 ~ 182 kgm}

- Air bleeding of brake circuit

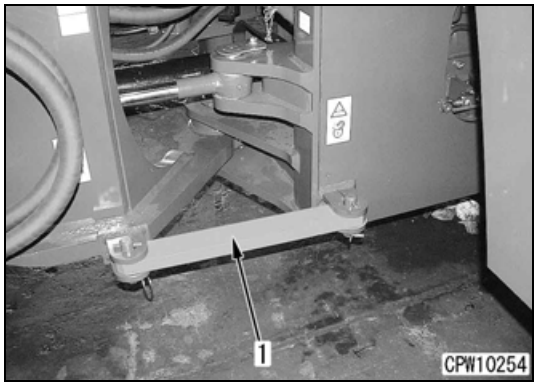
★ Refer to “Air bleeding of brake circuit” in the inspection and adjustment manual for how to bleed the air.

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Rear axle assembly

Removal

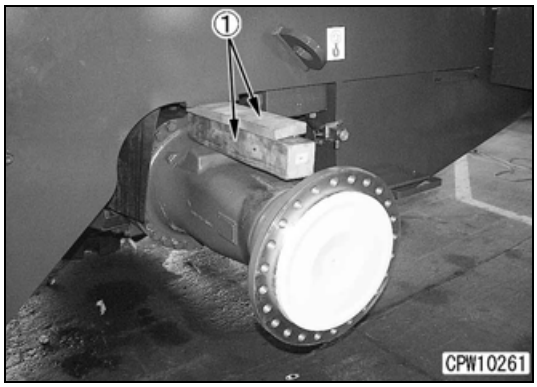
• Park the machine on lever ground and lower the bucket onto the ground.
• Mount safety bar (1) on the frame.



1. Jack up

   a. Set the block ① in between right and left rear axles and the rear frame.

      ★ The picture on the right is shown with the rear tire off for explanation purpose.

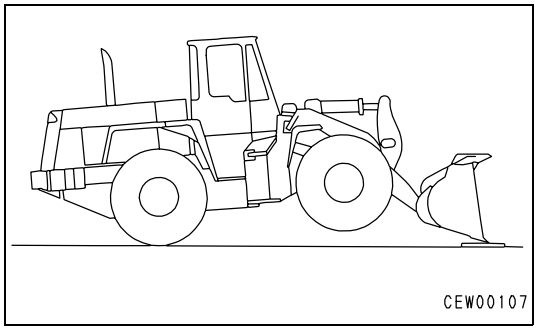


   b. Slowly lift the machine keeping the bucket in a dumping condition.

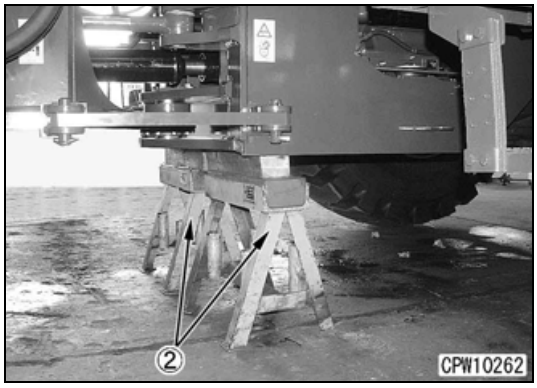
   c. Set the jack ② under the anterior end of the rear frame.

   d. Gradually tilt the bucket, completely ground the front tire and hold the rear tire floating from the ground.

   e. Support the rear frame posterior end on the forehand of the rear axle with the jack.



Apply parking brake and lock the rotation of the front tire.

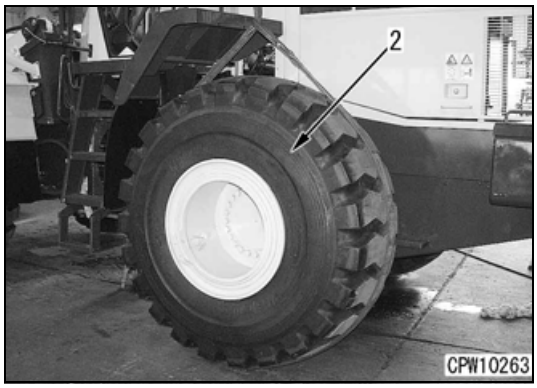


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2. Rear tire wheel assembly

   Securely wrap the tire periphery with nylon sling and remove the rear tire wheel assembly (2). ※1

   kg Rear tire wheel assembly: **700 kg**

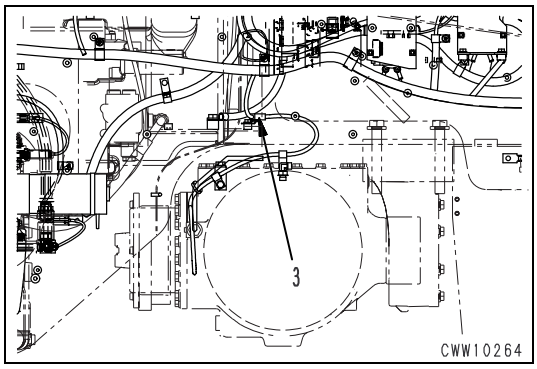


3. Fuel tank assembly

   Refer to the "Removal and mounting of fuel tank assembly" page and remove the fuel tank assembly.

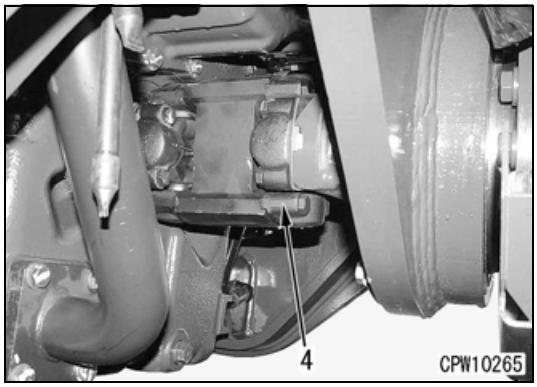
4. Harness connector

   Cut off the connector (3) (CN-R56) of the rear brake oil temperature sensor on the rear axle.



5. Rear drive shaft

   Cut off the rear drive shaft (4). ※2

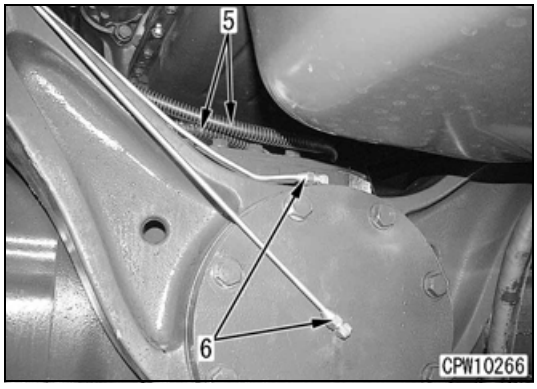


6. Brake hose and grease tube

   Cut off brake hose (5) and grease tube (6).

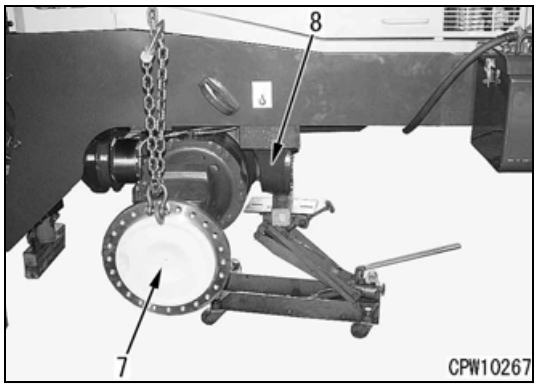
   ★ Cut off the brake hose on the slack adjuster side.

   ★ After separating, hold the grease tube to the machine side with a rope in an area where it will not get strained.



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7. Rear axle assembly



   a. Temporarily suspend the rear axle assembly (7) and support the rear support (8) with the jack.

   b. Remove the mounting nut and pull out the rear axle assembly along with the rear support from the rear side of the machine. ✻ 3

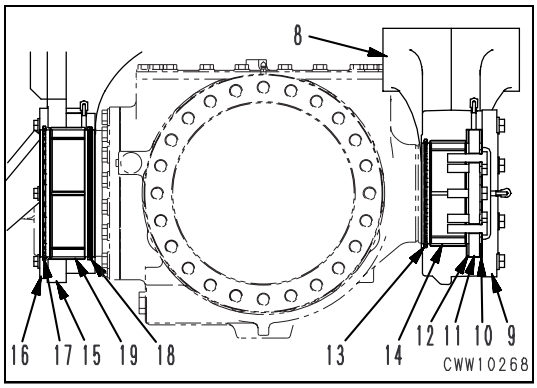
   c. Remove the rear axle support assembly while slowly lowering the jack and the hoist. ✻ 4

      kg Rear axle support assembly: **1,450 kg**

   d. Place the rear axle support assembly on a block with assured stability.

   e. Re-suspend the left side (right side) of the axle housing with the hoist, support the other side with jack or fork lift and pull out the rear axle support assembly to the side of the machine.

8. Rear support



   a. Temporarily suspend the rear support (8) and remove the thrust cap (9). ✻ 5

   b. Remove the thrust washer (10), thrust plate (11) and thrust washer (12). ✻ 6

   c. Remove the rear support (8).

      kg Rear support: **150 kg**

   d. Remove the packing (13) and bushing (14) from the rear support. ✻ 7

9. Front support

   a. Remove the packing (17) after removing the retainer (16) of the front support (15). ✻ 8

   b. Remove the packing (18) and bushing (19) from the front support. ✻ 9

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Installation

- Carry out installation in the reverse order to removal.

※ 1

kgm Rear tire mounting bolt:
823 ~ 1,029 Nm {84 ~ 105 kgm}

※ 2

kgm Rear propeller shaft mounting bolt:
98.1 ~ 122.6 Nm {10 ~ 12.5 kgm}

※ 3

Rear axle coupling part:
Grease (G2-LI)

※ 4

Bolt side:
Engine oil (EO-10)

kgm Axle (pivot) mounting nut:
1,180 ~ 1,470 Nm {148 ~ 182 kgm}

※ 5

Thrust cap mounting bolt:
Adhesive (LT-2)

kgm Thrust cap mounting bolt:
245 ~ 308 Nm {25 ~ 31.5 kgm}

※ 6

Thrust plate mounting bolt:
Adhesive (LT-2)

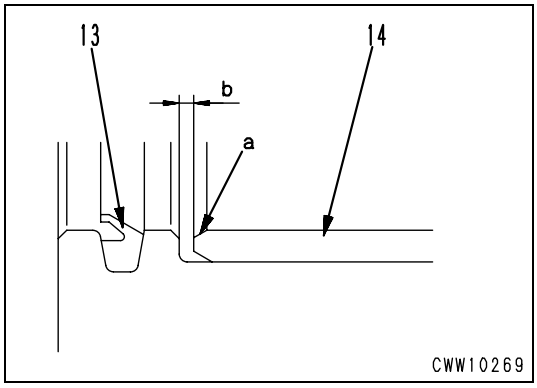
kgm Thrust plate mounting bolt:
245 ~ 308 Nm {25 ~ 31.5 kgm

※ 7

★ Orient the lip part of the packing (13) to the axle housing side and insert securely into the groove.

★ Orient the chamfer (a) of the bushing (14) to the axle housing side and mount so that clearance **b** is as illustrated.
Clearance **b**: 0.5mm

Bushing (14) rear axle working face:
Grease (G2-LI)



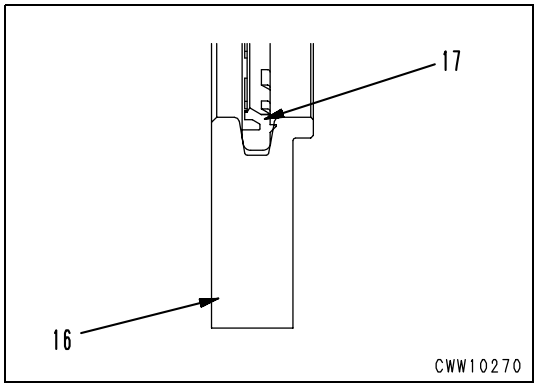
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※ 8

Orient the lip part of the packing (17) to the anterior of the machine and securely insert into the groove.

Retainer (16) mounting bolt:
Adhesive (LT-2)

Retainer (16) mounting bolt:
1,180 ~ 1,470 Nm {120 ~ 150 kgm}



※ 9

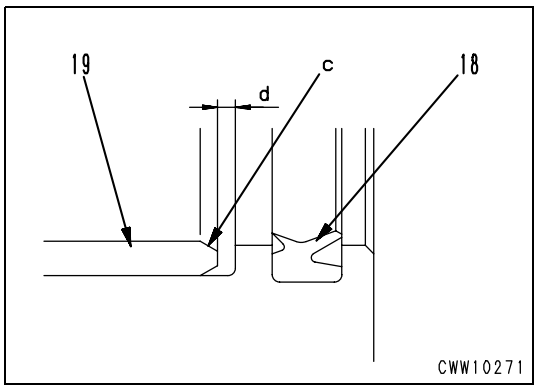
★ Orient the lip part of the packing (18) to the axle housing side and securely insert into the groove.

★ Orient the chamfer (c) of the bushing (19) to the axle housing side and mount so that clearance **d** is as illustrated.
Clearance **d**: 0.5mm

Bushing (19) rear axle working face:
Grease (G2-LI)

• Air bleeding the break circuit

★ Bleed the air by referring to the "Air bleeding of break circuit" page for inspection/adjustment.



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Axle housing assembly

Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
D7	1	793T-622-1330	Push tool	■	1	N	❍
	2	793T-622-1340	Spacer	■	1	N	❍
	3	793T-622-1350	Push tool	■	1	N	❍
D8	1	790-201-2320	Plate	■	1		
	2	790-201-2770	Spacer	■	1		
	3	790-201-2760	Spacer	■	1		
D9	1	793T-622-1370	Support	■	2	N	❍
	2	793T-622-1380	Support	■	2	N	❍
	3	01016-30860	Bolt	■	6		

Disassembly

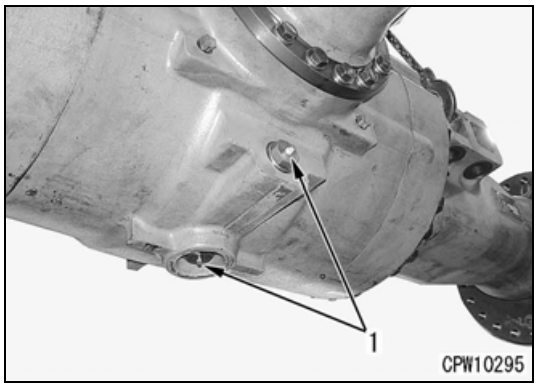
★ The front axle housing is illustrated for example in the following photographs and drawings.

★ The internal structure of the front axle housing and rear axle housing are identical but different in appearance.

1. Drain oil

   Remove the plug (1) and drain the oil.

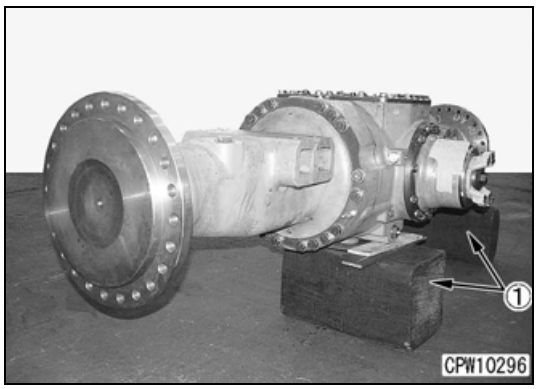
   Axle oil (front/rear):
   52 l (WA470-5)
   55 l (WA480-5)



2. Axle assembly

   Place block ① on the axle assembly.

   ★ Place block ① to prevent the housing assembly of one side from tilting at removal.



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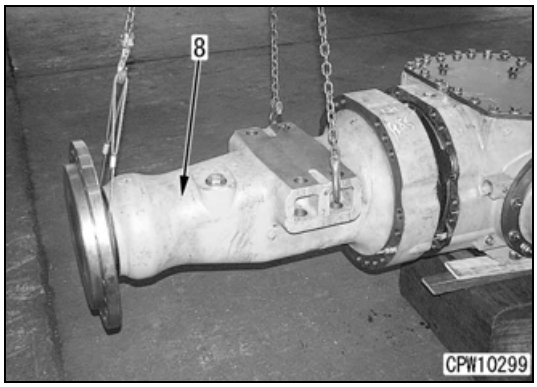
3. Axle housing assembly

   a. Temporarily suspend the axle housing assembly (8) and remove the housing mounting bolt.

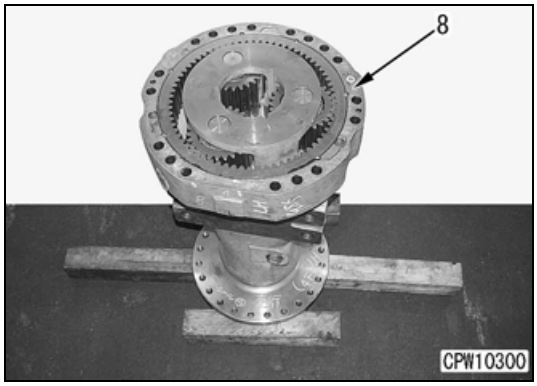
      ★ When removing axle housing assembly on both sides, place an identification mark on the housing and the differential case to avoid confusion.

   b. Remove the axle housing assembly.

      kg Axle housing assembly: **280 kg**



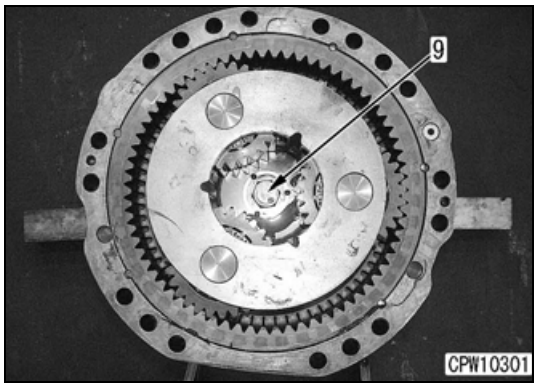
   c. Change the suspension point and place the axle housing (8) apeak.

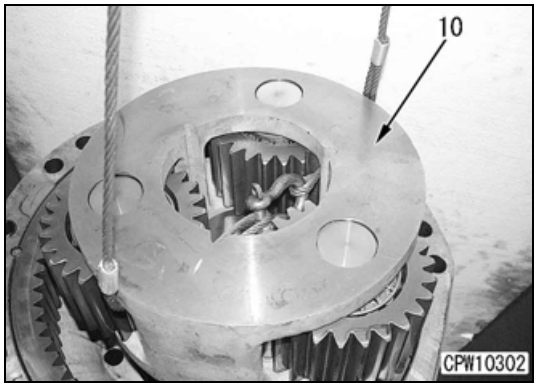


4. Planetary carrier assembly

   a. Remove the axle shaft mounting bolt (9) and remove the planetary carrier assembly (10) by suspending.

      kg Planetary carrier assembly: **65 kg**

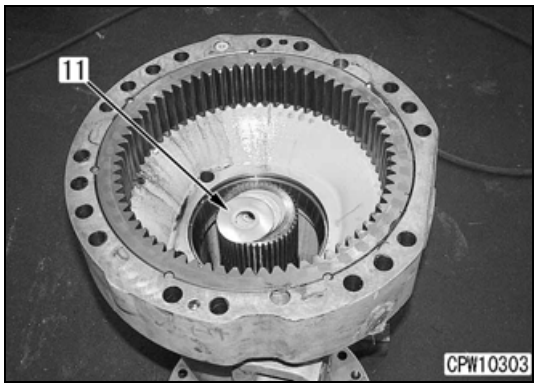




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b. Remove shim (11).

★ Record the thickness of the shim and use for reference when assembling.

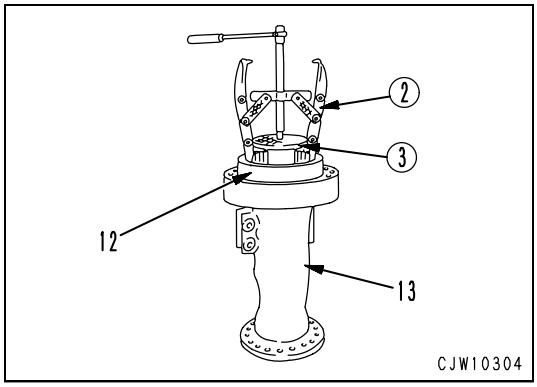


5. Ring gear

Pull up the ring gear (12) in balance using the puller ② from the axle housing (13).

★ Adjust the height by setting the spacer ③ at the tip of the puller bolt.

★ Be careful not to let the puller nail come off from the ring gear.

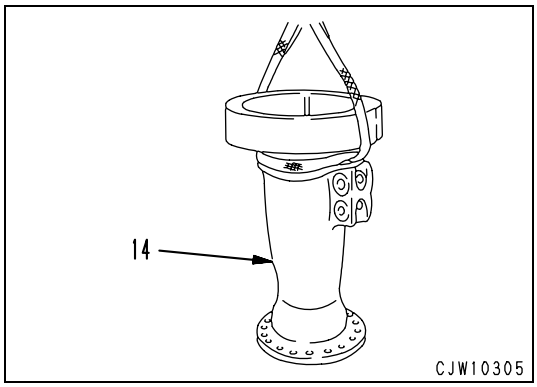


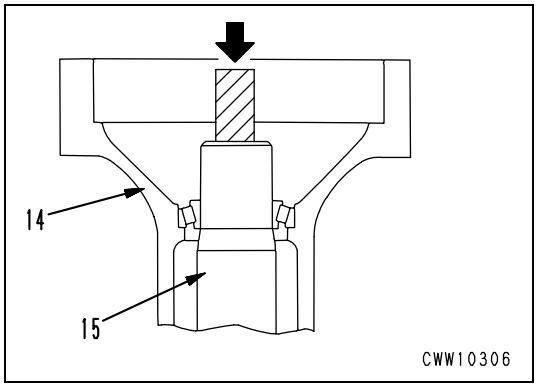
6. Axle shaft

a. Suspend the axle housing (14).

b. Hit the edge of the axle shaft (15) with a copper hammer and pull it out.

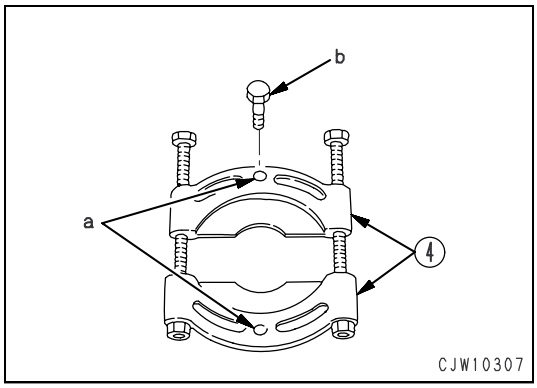
kg Axle housing: **160 kg**





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7. Axle shaft bearing



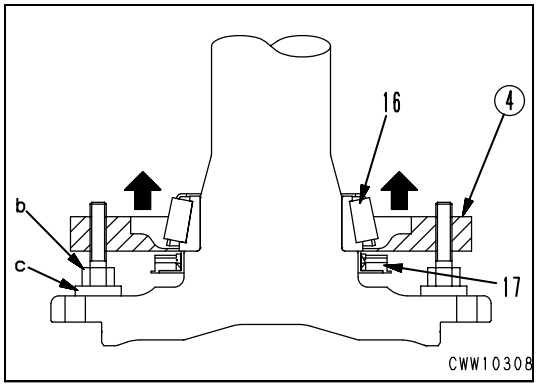
Do not pull out the bearing by applying heat or remove by fusing.

a. Mount bolt b to the bolt hole **a** of the bearing puller ④.

b. Mount the bearing puller ④ to the lower part of the bearing (16) and fix securely.

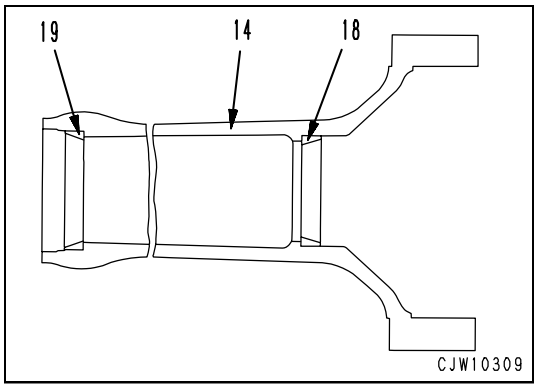
c. Insert washer **c** in between bolt **b** and flange face and remove the bearing (16) by turning bolt **b** in the slackening direction.

d. Remove the oil seal (17).



8. Axle housing

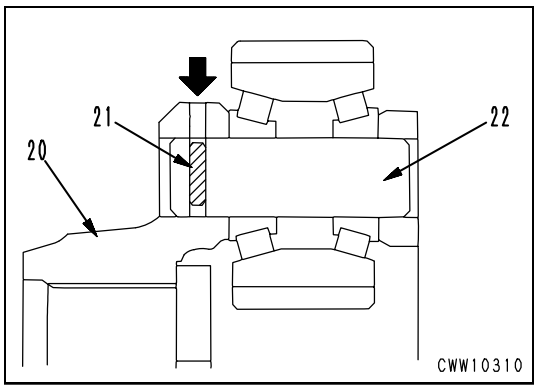
Remove the bearing outer races (18) and (19) from the axle housing (14).



9. Planetary carrier

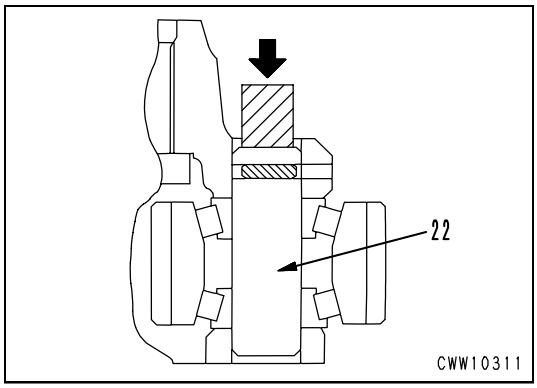
a. Hit in the spring pin (21) of the planetary carrier (20) into the shaft (22).

★ Be careful not to hit in the spring pin too much.



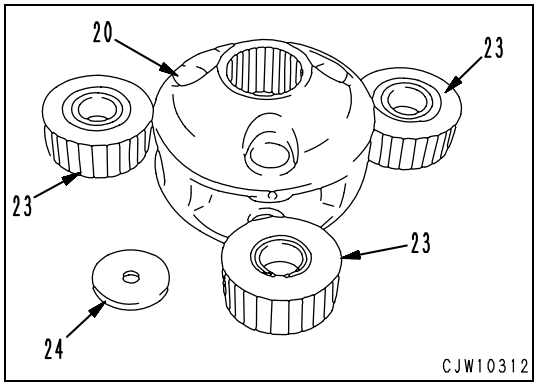
https://truckmanualshub.com/

b. Pull out the shaft (22) using the press.

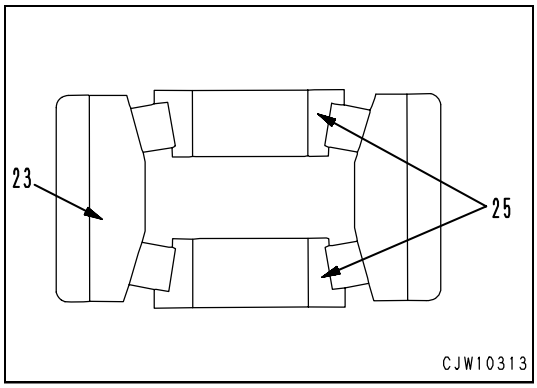


c. Pull out the spring pin (21) from the shaft (22).

d. Remove the pinion gear (23) and spacer (24) from the planetary carrier (20).



e. Remove the bearing (25) from the pinion gear (23).

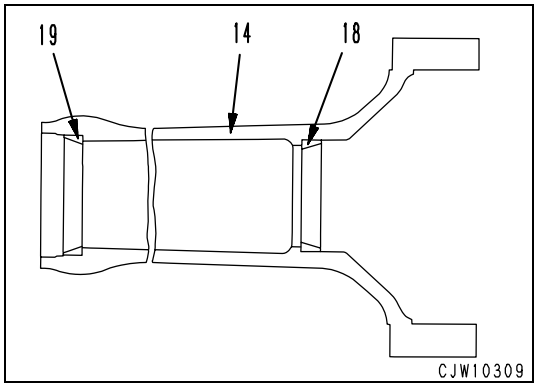


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Assembly

1. Axle housing

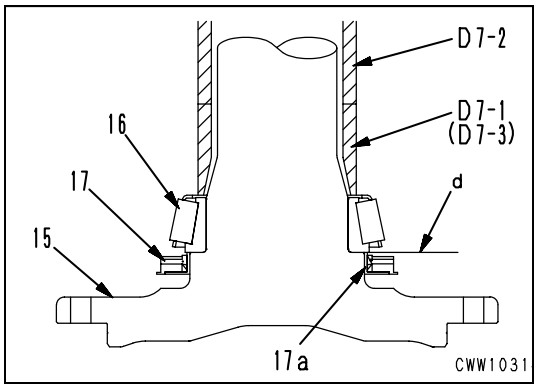
   Press in the bearing outer races (18) and (19) into the axle housing (14).



2. Axle shaft

   Press in the oil seal (17) and bearing (16) into the axle shaft (15) at the same time using tools **D7-1** (**D7-3** for WA480-5) and **D7-2**.

   ★ Press in the oil seal sleeve (17a) until it is flush with the d surface of the axle shaft and make sure that it leaves no space between the bearing (16).



3. Axle housing, shaft

   a. Mount tool **D9-1** (**D9-2** for WA480-5) under oil seal (17).

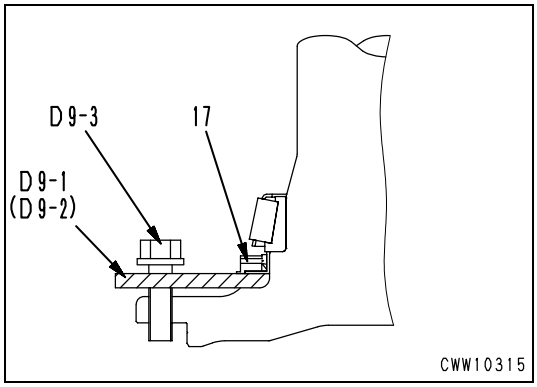
      ★ Adjust with tool **D9-3** so that the upper face of tool **D9-1** (**D9-2**) and the oil seal (17) touches each other lightly and its clearance is even.

   b. Suspend the axle housing (14) horizontally and slowly lower by aligning its position to the oil seal (17).

      ★ Insert the axle housing using its weight.

      Insertion part of the oil seal, bearing: **Axle oil**

      ★ Keep tool **D9** mounted until step c.).
      Do not dismount after mounting the housing.



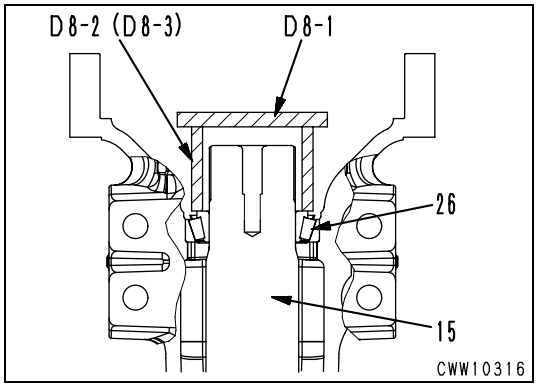
   c. Insert the axle shaft (15) to the bearing (26) using tool **D8-1** and **D8-2** (**D8-3** for WA470-5 rear axle).

      ★ Insert until the end-play reaches 0.1 mm by turning the axle housing with hand.

      Bearing periphery: **Axle oil**

   d. Pull out tool **D9** horizontally.

      ★ Check to see if oil seal (17) is not tilting.



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4. Adjustment of the end-play

   a. Place the axle shaft housing assembly (8) speak

      ★ Fix the flange in **f** part to avoid the axle shaft housing assembly from falling.

   b. Mount the planetary carrier (20) in the spline part of the axle shaft (15) and set in the spacer (24). Then mount the mounting bolt (9).

      ★ Mount the planetary carrier (20) without gear.

      ★ Use after completely removing the adhesives from the axle shaft bolt mounting hole and mounting bolt.

   c. Tighten the retainer mounting bolt (9) by turning the axle housing (14).

      kgm Bolt:
      WA470-5 for front, WA480-5 for front/rear:
      823 ~ 1,029 Nm {84 ~ 105 kgm}
      WA470-5 for rear:
      610 ~ 765 Nm {62 ~ 78 kgm}

   d. After checking that the bearings (16) and (26) work properly, measure the startup torque “X” at the drilled hole of the axle housing (14).

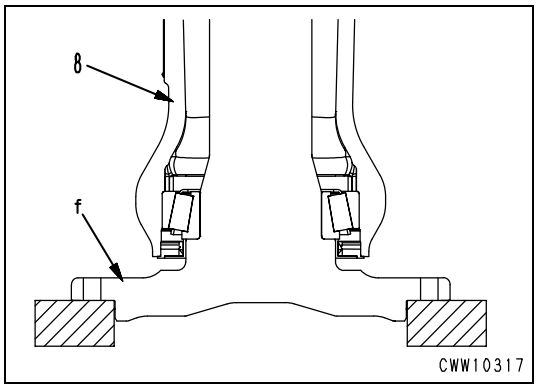
      • Startup torque “X”:

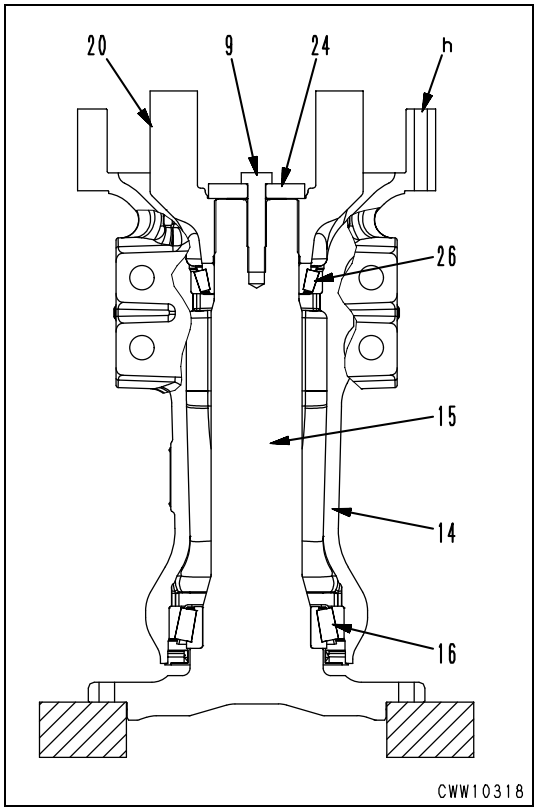
      WA470-5 for front:
      21.6 ~ 57.8 N {2.2 ~ 5.9 kg}

      WA470-5 for rear:
      21.6 ~ 54.9 N {2.2 ~ 5.6 kg}

      WA480-5 for front/rear:
      63.7 ~ 122.5 N {6.5 ~ 12.5 kg}

★ When the startup torque is below the standard value, reinsert the bearing and repeat the procedure from step b.





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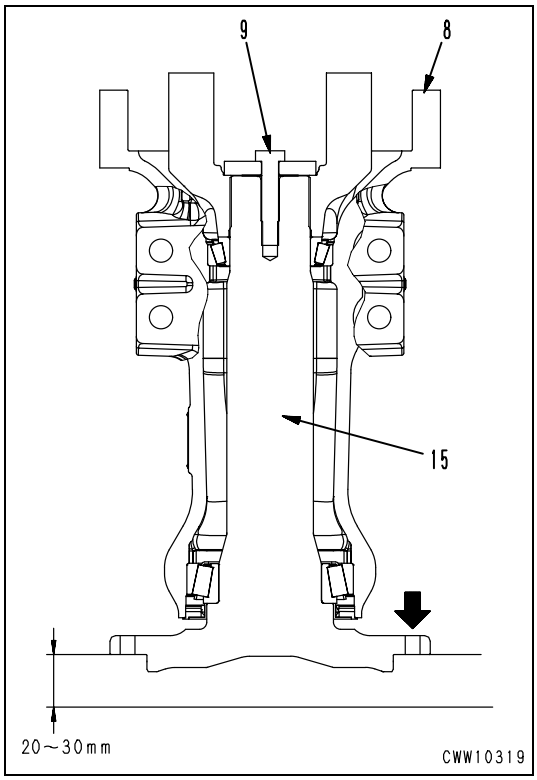
★ When the startup torque exceeds the standard value, readjust as follows:

I. Slacken bolt (9) by turning 1 ~ 2 times.

II. Hang up the axle shaft housing assembly (8) at 2 points for 20 ~ 30 mm just as mounting the axle housing.

III. Pull out the axle shaft (15) by turning the axle shaft (15) while hitting the flange part with a copper hammer in the arrow direction.

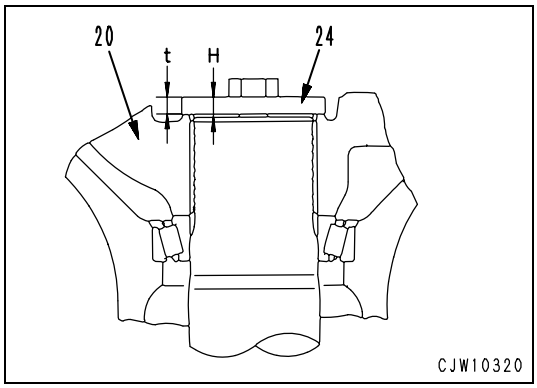
IV. Repeat steps b. and c. so that the startup torque falls within the standard value.



e. Measure distance **H** from the edge of the spacer (24) to the edge of the axle shaft using the depth micrometer. (H-t) indicates a value subtracting the spacer (24) thickness **t** from **H**.

- Shim width = (H-t) $^{+0.05}_{0}$

f. Remove the planetary carrier (20) after determining the shim.

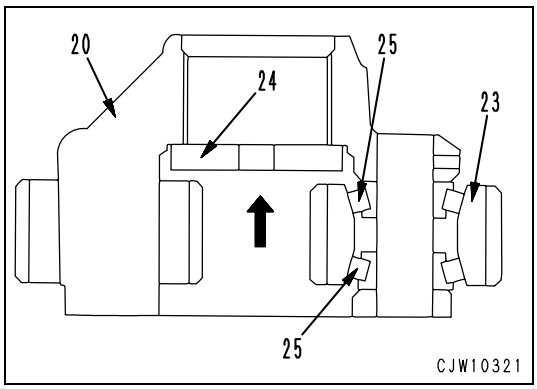


5. Planetary carrier

a. Mount the spacer (24) in the planetary carrier (20) in advance.

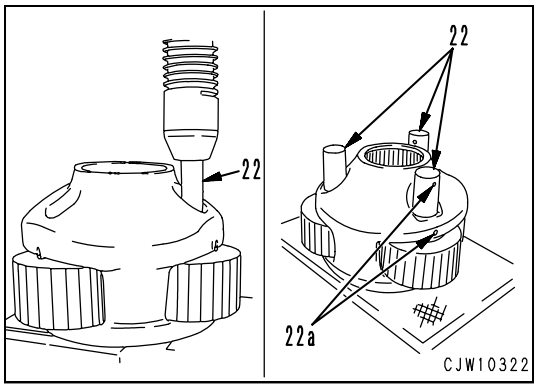
★ Set the spacer from the break housing side.

b. Set the bearing (25) to the gear (23) and place the gear (23) while holding up the spacer (24).

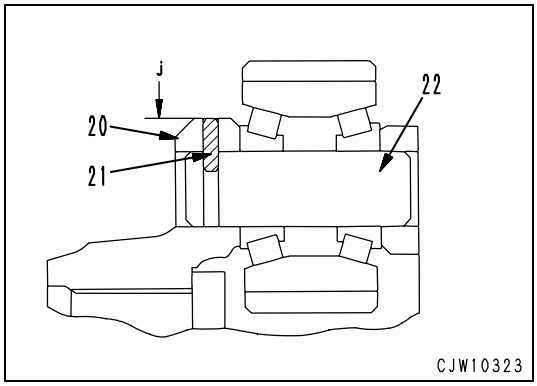


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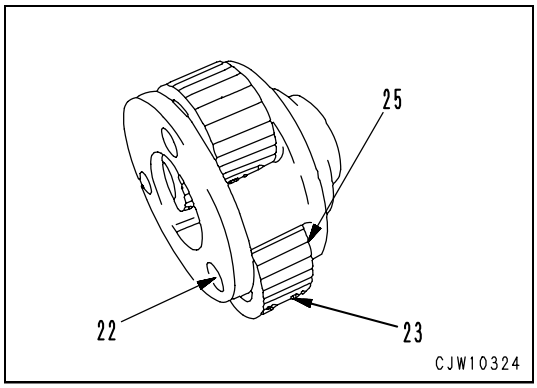
c. Insert the shaft while aligning the shaft (22) and spring pin (22a).



★ Align the shaft (22) and the hole of the spring pin (21) and hit in the spring pin (21) until it is flush (j) with the carrier (20).



d. Make sure the gear slightly revolves, by pushing back the bearing (25) hitting the edge of the shaft (22) and the side of the gear (23).

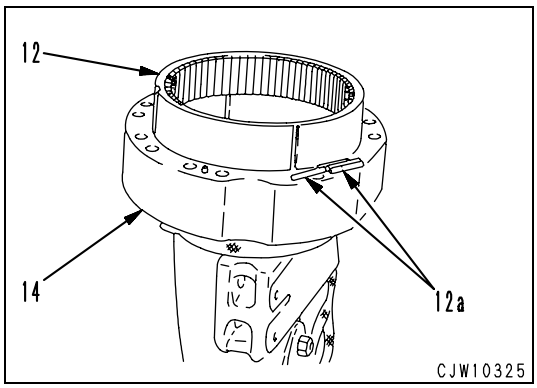


6. Ring gear

Insert the ring gear (12) into the axle housing (14) and then insert pin (12a).

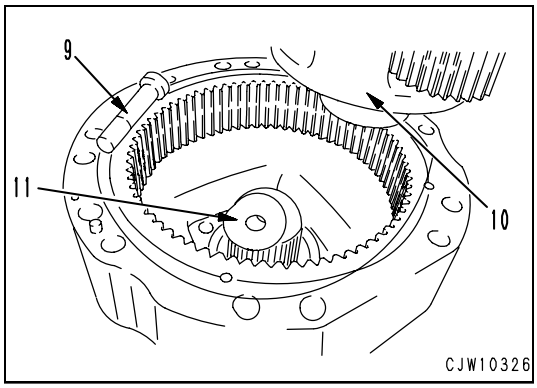
★ Set by aligning the housing and the pin hole of the ring gear (12).

★ Carefully and horizontally insert the ring gear to avoid tilting.



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7. Planetary carrier assembly



   a. Set the shim (11) selected in step 4.e. to the edge of the axle shaft.

   b. Mount the planetary carrier assembly (10) and tighten the mounting bolt (9).

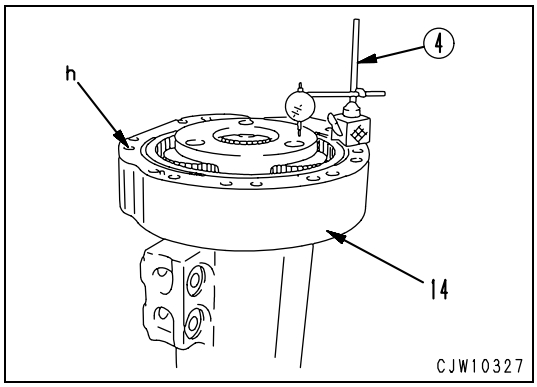
   ★ Wash and completely degrease the bolt mounting hole of the axle shaft and mounting bolt

Be fully careful not to get your finger in between the gears when setting the planetary carrier.

Mounting bolt: **Adhesive (LT-2)**

Mounting bolt:
WA470-5 for front, WA480-5 for front/rear:
823 ~ 1,029 Nm {84 ~ 105 kgm}
WA470-5 for rear:
610 ~ 765 Nm {62 ~ 78 kgm}

   ★ Clean the edge of the shaft and the planetary carrier spline part before setting them.



   c. After checking that the bearing is properly working, check the startup torque “X” at the drilled hole (h) of the axle housing (14).

      ★ Refer to procedure 4. Adjustment of the endplay page.

   d. Mount the dial gauge stand ④ to the axle housing (14) and measure the planetary carrier endplay on the edge of the planetary carrier.

      ★ Reference value
      Planetary carrier endplay: 0 ~ 0.1mm

8. Axle housing assembly

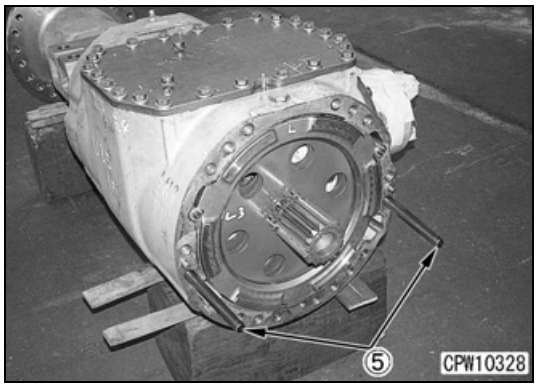
   a. Wash and degrease the axle housing (14) and mounting surface of the differential housing, and wholly apply the gasket sealant.

      Mating face of the housing:
      Gasket sealant LG-6 (Loctite 515)

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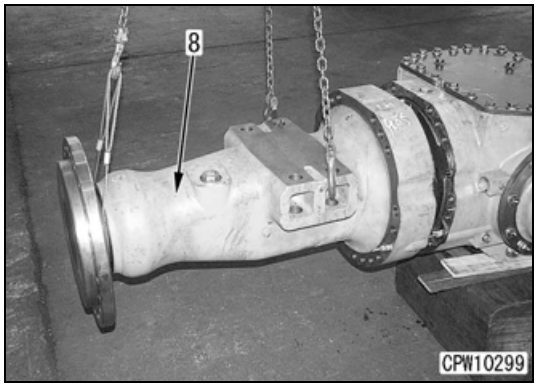
b. Suspend the axle housing assembly (8) horizontally and gently set by aligning to the spline groove and guide bolt ⑤.

★ Set the break piston surface and plate surface to avoid damage.



c. Mount the mounting bolt diagonally and fix.

kgm Housing mounting bolt:
490 ~ 608 Nm {50 ~ 62 kgm}



9. Oiling

a. Tighten the drain plug and fill from the fill opening until the standard level is reached.

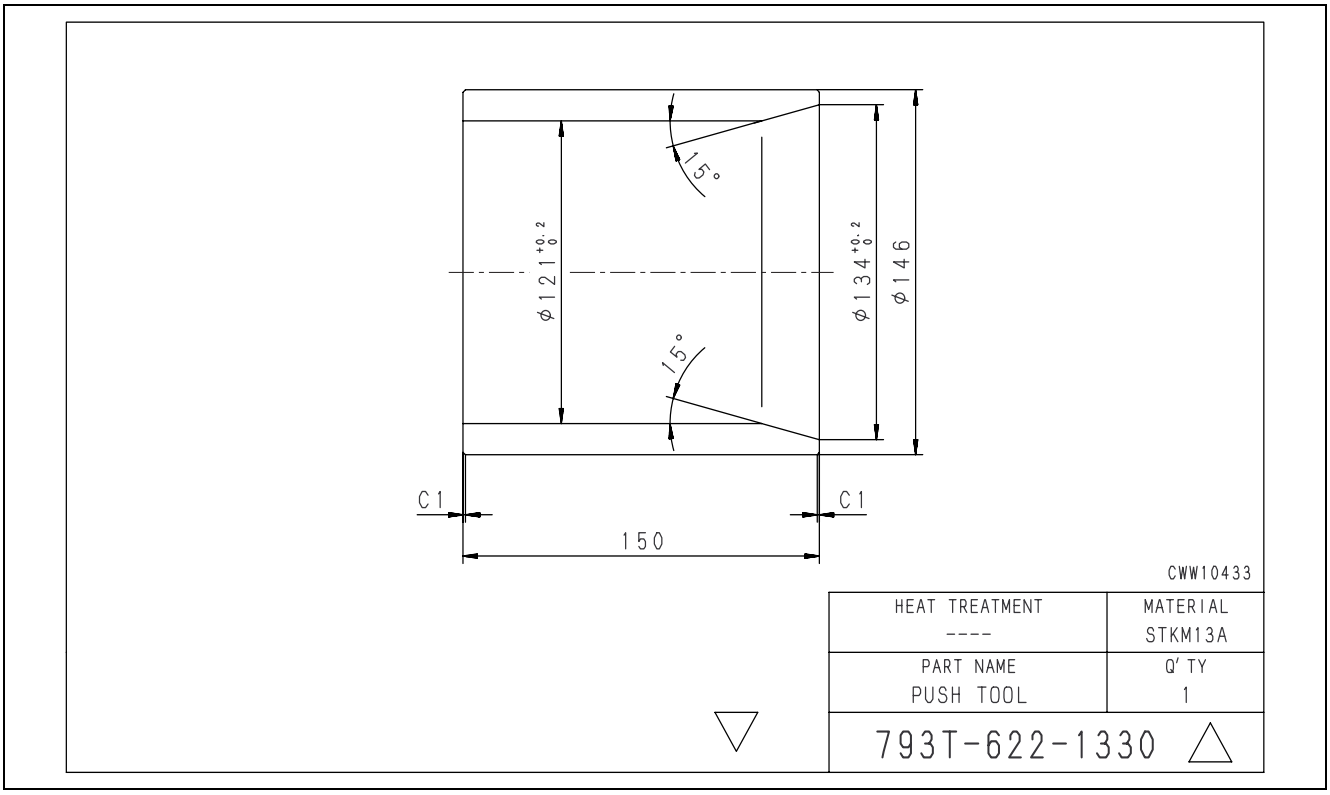
Axle oil (front/rear):
52 l (WA470-5)
55 l (WA480-5)

b. Remove the plug of the oil level and check if the oil is filled up close to the lower edge of the plughole.

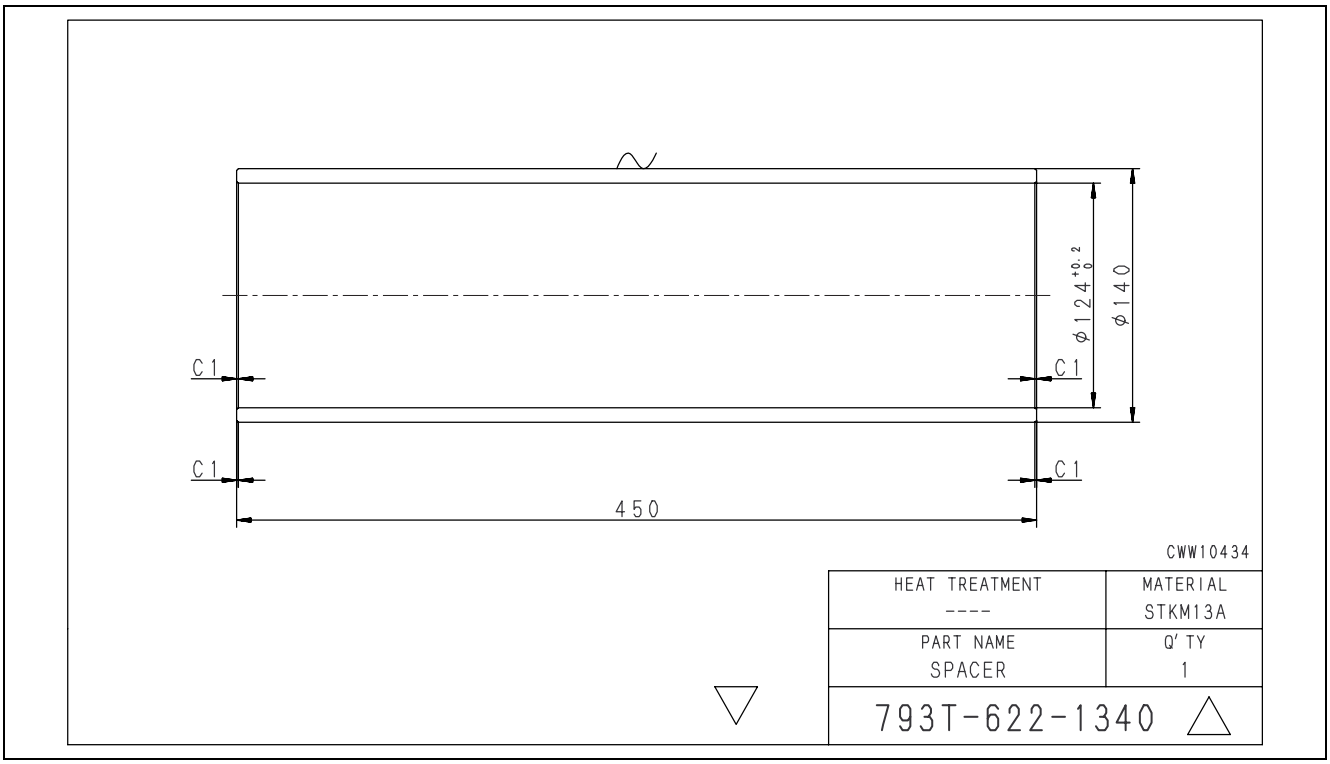
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Schematic drawing of special tools

D7 Pushing tool

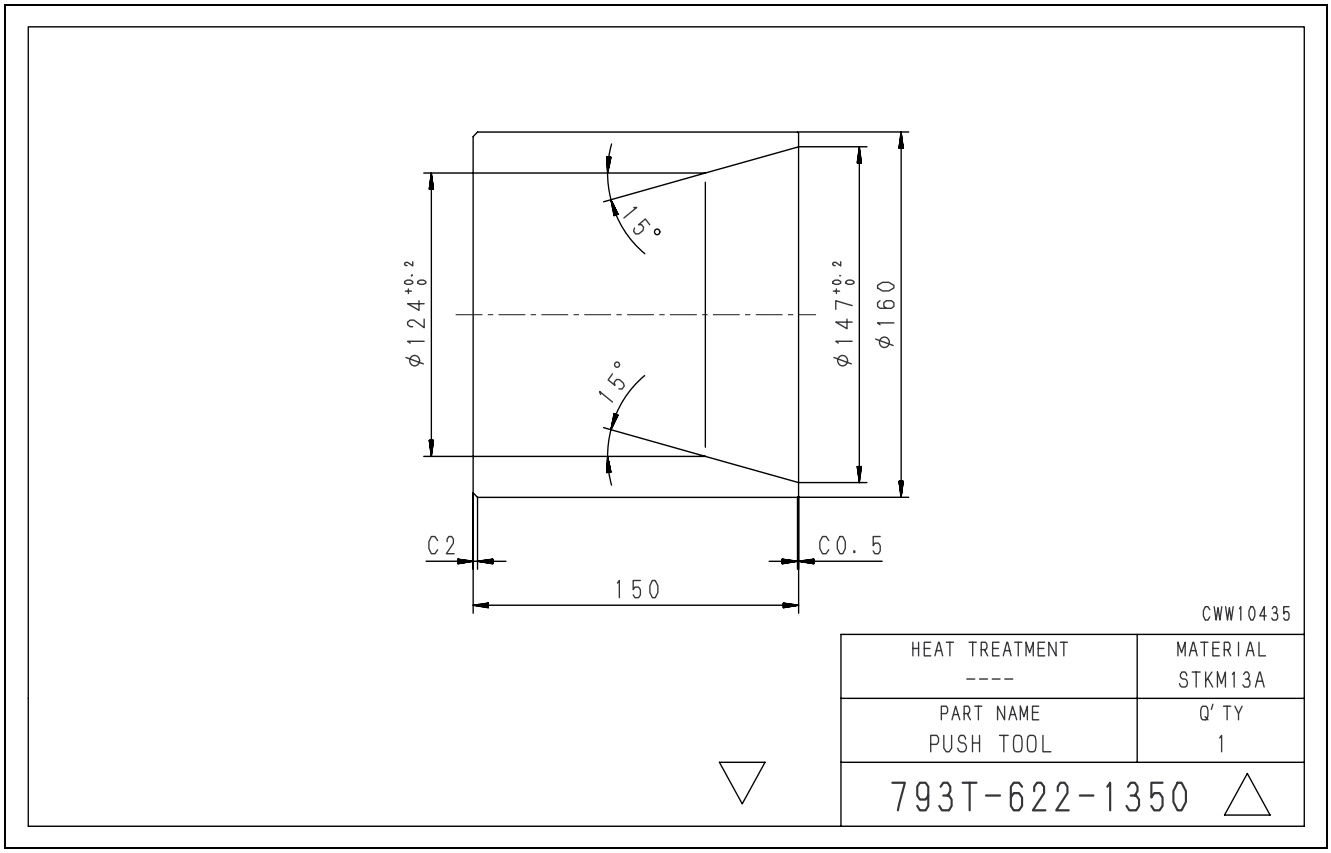


D7 Spacer

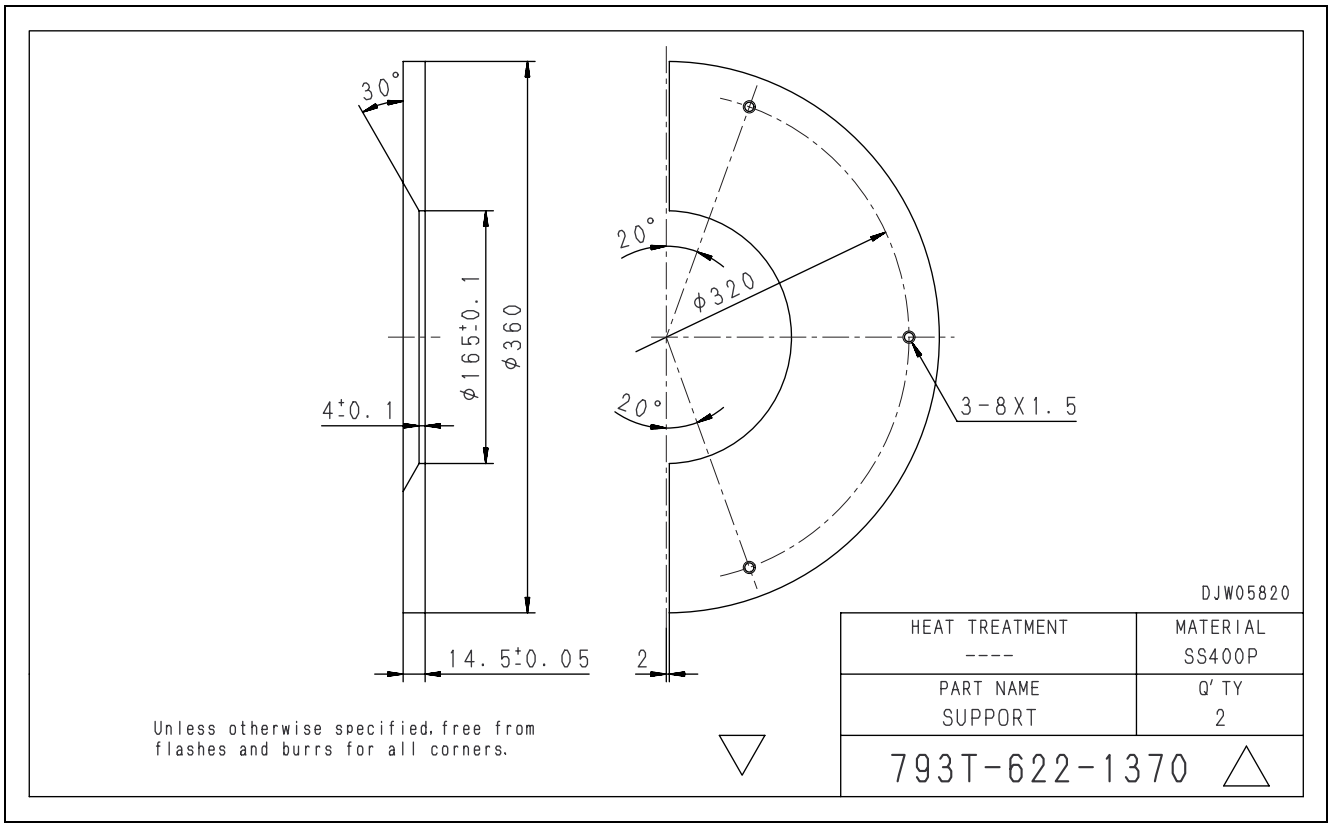


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D7 Pushing tool

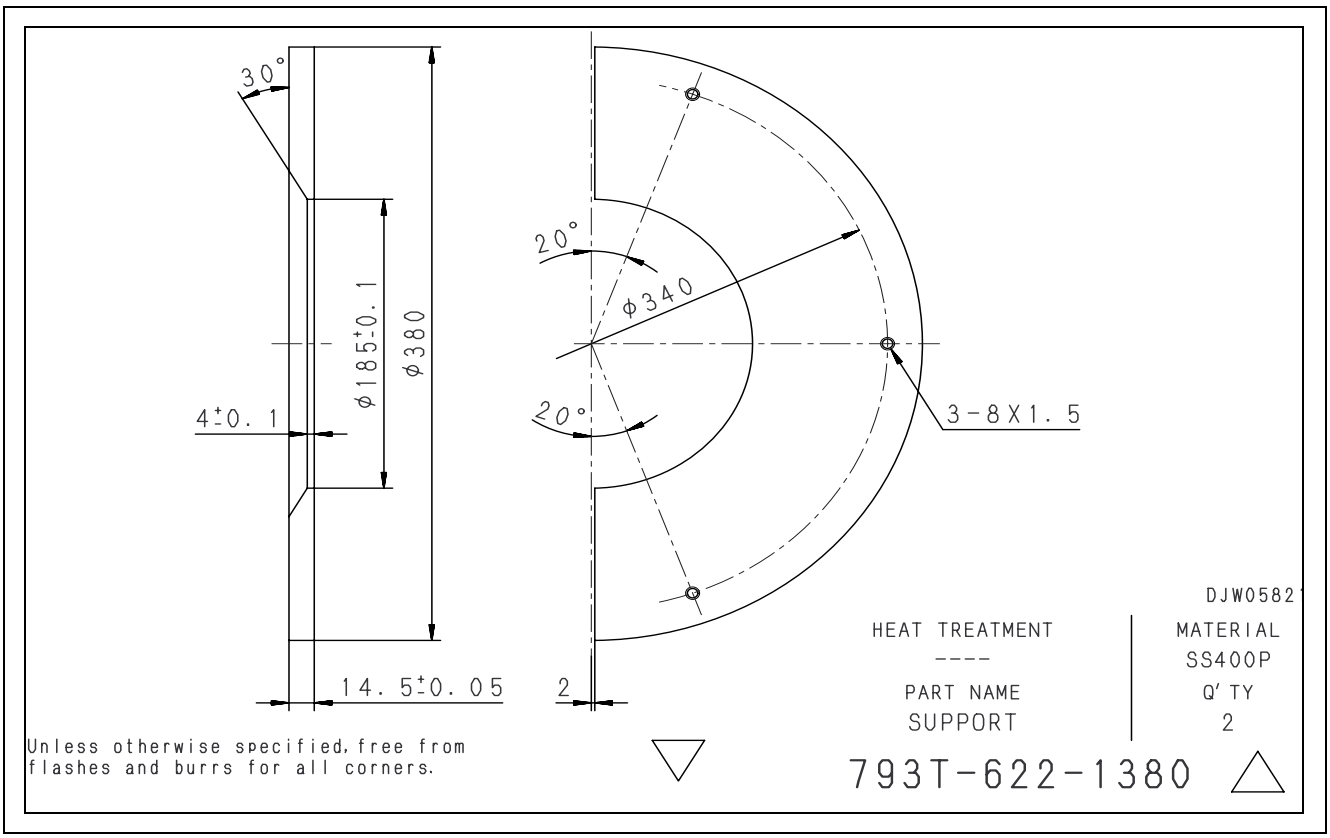


D9 Support



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D9 Support



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Differential assembly

Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
D1	1	790-501-5000	Unit repair stand	●	1		
	2	790-901-2110	Bracket	●	1		
	3	790T-901-3440	Plate	●	1	N	❍
D2	1	793T-622-1310	Push tool	■	1	N	❍
	2	790-101-5421	Grip	■	1		
	3	01010-51240	Bolt	■	1		
D3	1	793T-622-1310	Push tool	■	1	N	❍
	2	793T-622-1320	Spacer	■	1	N	❍
	3	790-101-5421	Grip	■	1		
	4	01010-51240	Bolt	■	1		
D4		793T-622-1360	Push tool	■	1	N	❍
D5	1	796-765-1110	Push tool	■	1		❍
	2	790-201-2750	Spacer	■	1		
D6	1	790-301-1720	Adapter	■	1		
	2	799-101-5002	Hydraulic kit	■	1		
	3	793-605-1001	Brake tester	■	1		
	4	790-101-1102	Hydraulic pump	■	1		

Disassembly

★ Description of a differential in the subsequent photos and illustrations in this manual refers to a front differential unless a distinction is made between front and rear differentials.

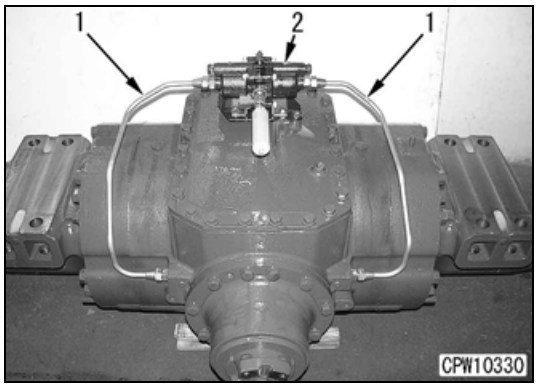
★ The internal structure of front and rear differentials is identical, excluding the shape in appearance.

1. Brake pipe

   a. Disconnect the tube (1).

   b. Remove the slack adjuster (2). (Front differential)

      ★ The slack adjuster of the rear differential is installed on the rear frame.



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2. Oil temperature sensor (Rear differential)

   a. Remove the cover (3).

   b. Separate the connector (4) and remove the oil temperature sensor (5).

3. Rear support (Rear differential)

   Remove the rear support (6) by referring to “Removal and Installation of Rear Axle Assembly” section

4. Axle housing assemblies

   Remove right and left housing assemblies by referring to “Disassmbly of axle housing assembly” section.

5. Differential assembly

   Place the differential assembly (8) on the block ① and ensure stability (or install on Tool **D1)**.

   ★ When Tool **D1** is used, remove the cage assembly by referring to procedure 8.

6. Cover

   Remove the cover (8).

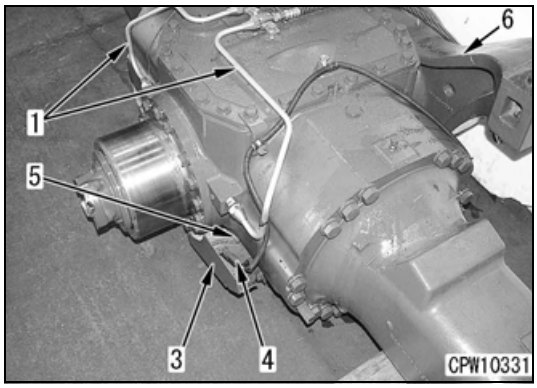
7. Brake

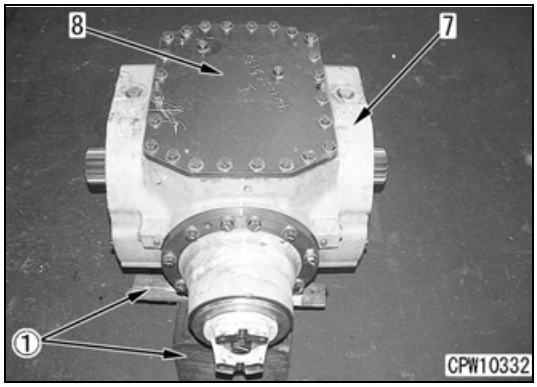
   a. Remove the shaft (9).

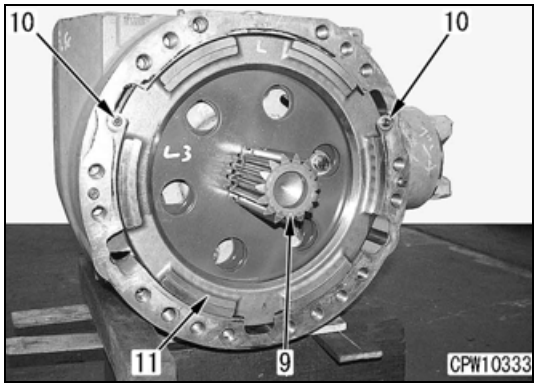
   b. Remove the bolt (10) and then detach the outer plate (11).

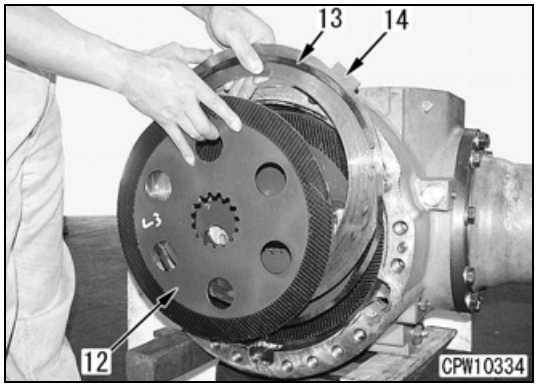
   c. Remove the disk (12), spring (13), and plate (14).

      ★ Mark each part or do in similar manner in order to avoid confusion with right and left parts.



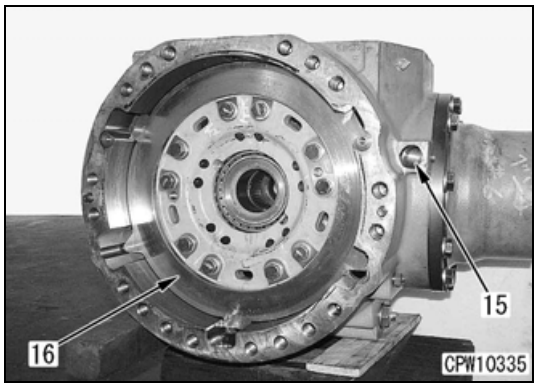






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d. Blow air into the brake tube joint (15) and remove the piston (16).

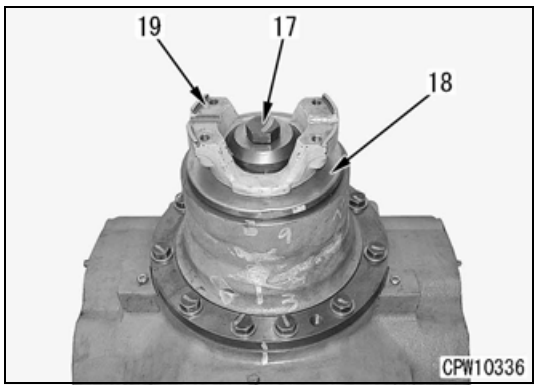


8. Cage assembly

a. Lift the differential and bring the cage assembly to the top.

b. Remove the bolt (17) and detach the coupling (19) together with the protector (18).

★ The protector must not be removed from the coupling except when the need arises.



c. Install the eyebolt ② and temporarily lift the cage assembly (20).

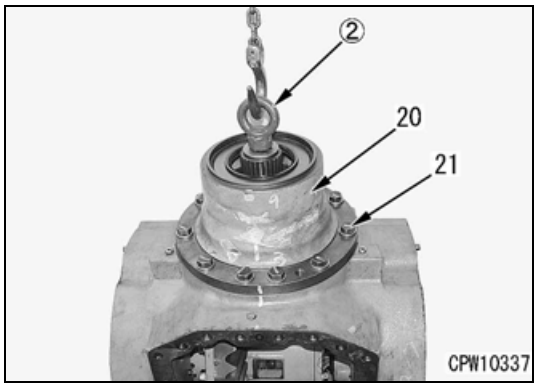
★ Put mating marks on cage and differential case.

d. Remove the bolt (21).

e. Screw in the forcing screw and lift the cage assembly until O-ring appears.

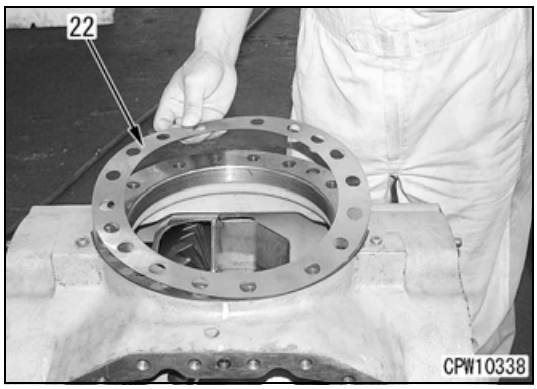
f. Lift the cage assembly and remove it.

kg Cage assembly: **55 kg**



g. Remove shims (22).

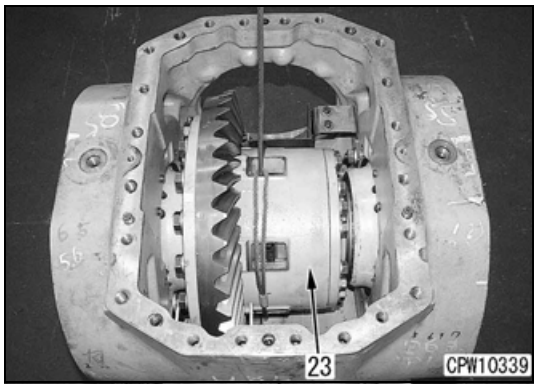
★ Record the number of shims for the reference purpose when re-assembling.



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9. Bearing carrier

   a. Temporarily lift the differential bearing carrier assembly (23).

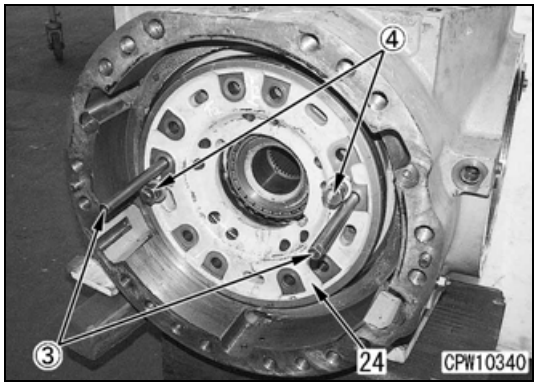


   b. Remove all bearing carrier mounting bolts and attach the guide bolt ③.

   c. Screw in the forcing screw ④ and remove the bearing carrier (24).

      ★ Identify the right and left bearing carriers to avoid confusion.

      ★ Check the thickness and the number of shims to refer to them when re-assembling.

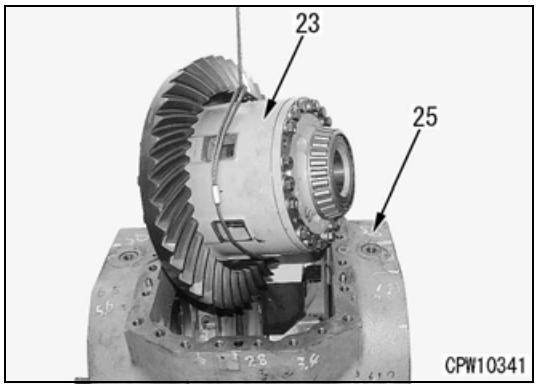


10. Differential carrier assembly

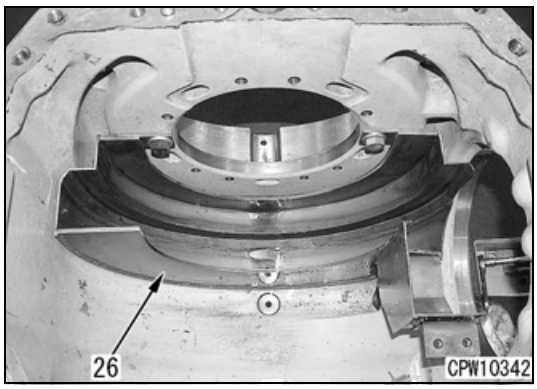
   a. Remove the differential carrier assembly (23) from the differential case (25).

      ★ Care should be taken to prevent the sling from coming off.

      kg Differential carrier assembly: **110 kg**



   b. Remove the gear cover (26) from the differential case.



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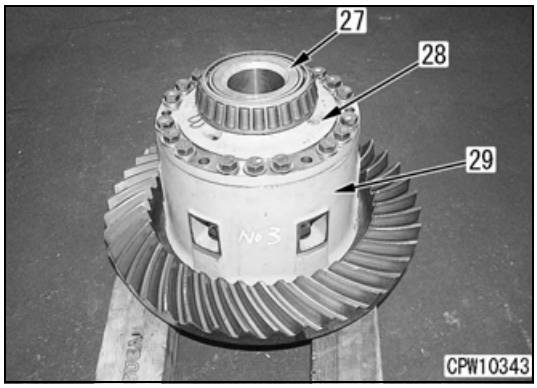
11. Re-assembly of differential carrier assembly

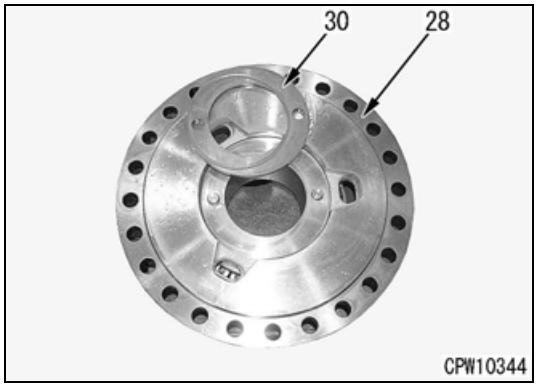
★ Identify right and left parts to avoid confusion.

a. Remove the cover (28) together with the bearing (27).

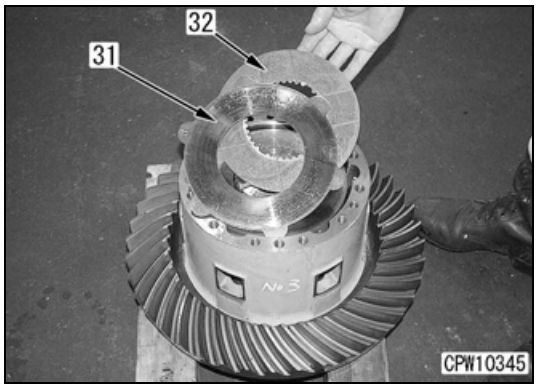
★ Put mating marks on the cover (28) and case (29) for reference purposes when re-assembling.

★ When removing the cover (28), it is detached with the washer (30) fitted in a groove at the back.

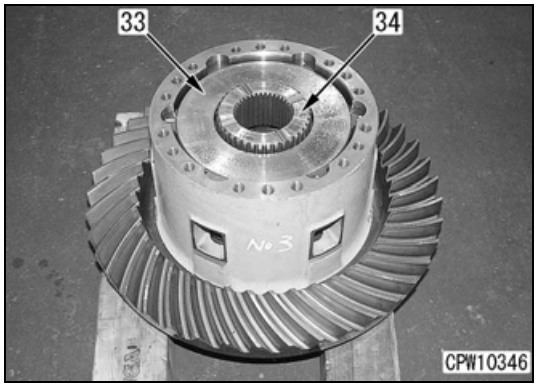




b. Remove the plate (31) and disk (32).

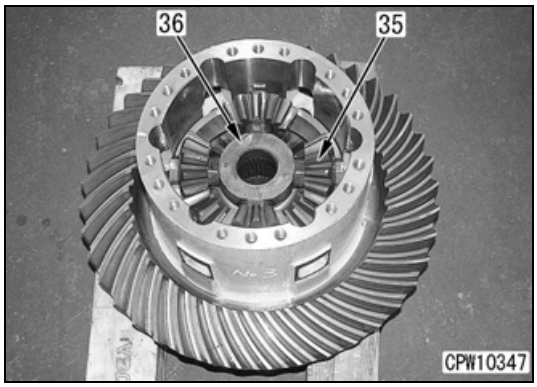


c. Remove the pressure ring (33) and side gear (34).

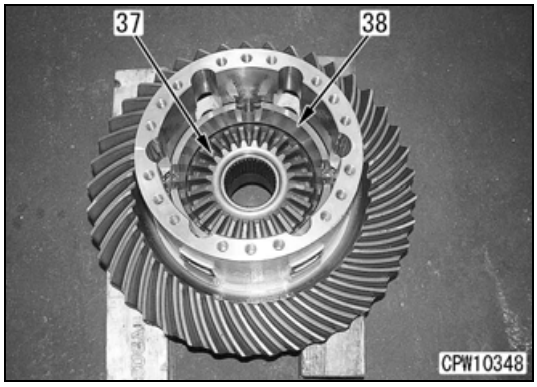


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d. Remove the pinion gear (35) and spider shaft (36).

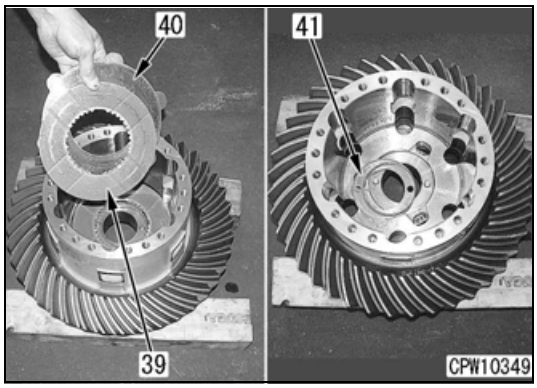


e. Remove the side gear (37) and pressure ring (38).

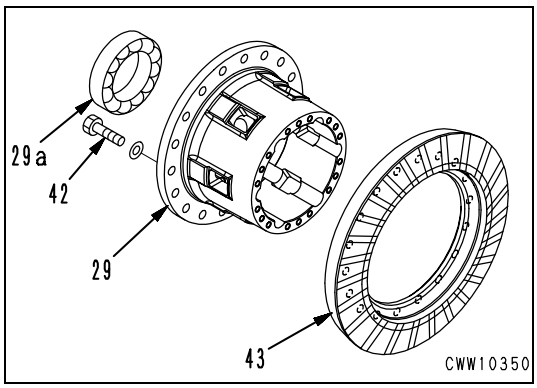


f. Remove the disk (39) and plate (40).

g. Remove the washer (41).



h. Reverse the case (29) and remove the bolt (42) to detach the bevel gear (43) and bearing (29a).

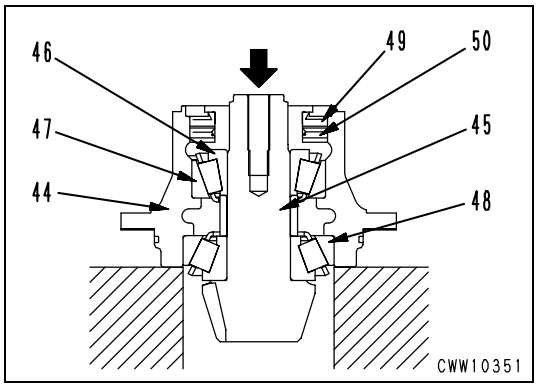


https://truckmanualshub.com/

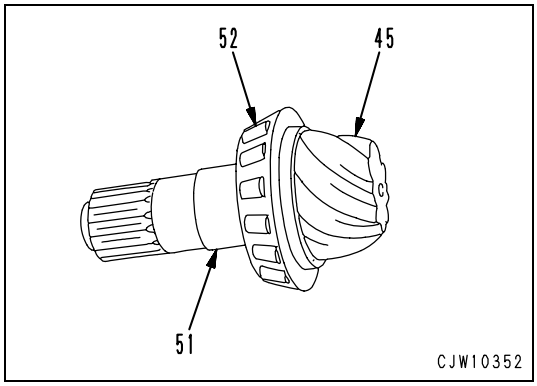
12. Pinion gear and cage

    a. Remove the pinion gear (45) from the cage (44) using a press.

    b. Remove the bearing inner race (46), outer races (47) and (48), dust seal (49), and oil seal (50) from the cage (44).



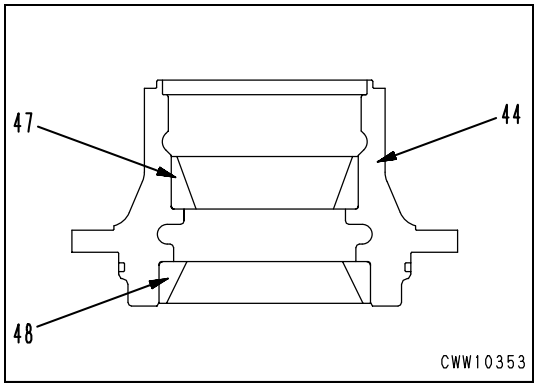
    c. Remove the spacer (51) and bearing inner race (52) from the pinion gear (45).



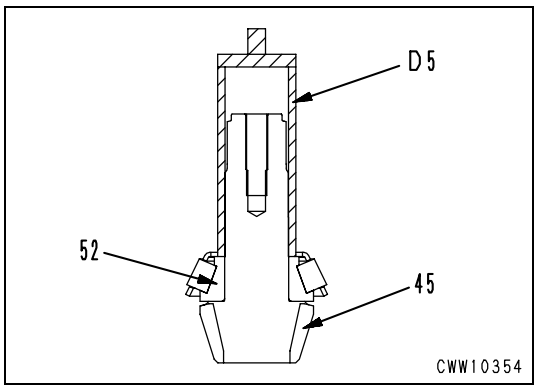
Assembly

1. Pinion gear and cage

    a. Install the bearing outer races (47) and (48) in the cage (44).

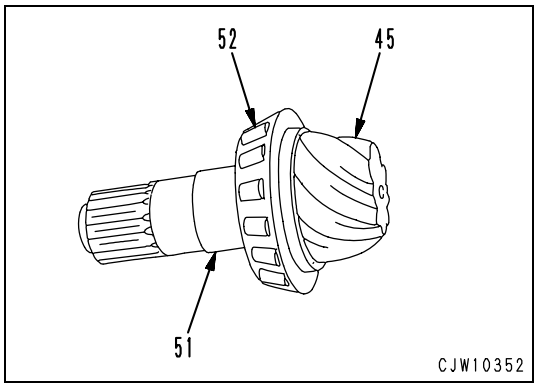


    b. Press fit the bearing inner race (52) into pinion gear (45) using Tool **D5**.



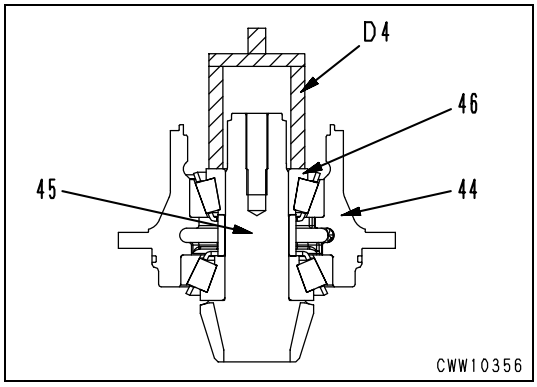
https://truckmanualshub.com/

c. Install the spacer (51).



d. Make the pinion gear (45) upright and install it in the cage (44).

e. Press the bearing inner race (46) into pinion gear while turning the cage (44) by using Tool **D4**.



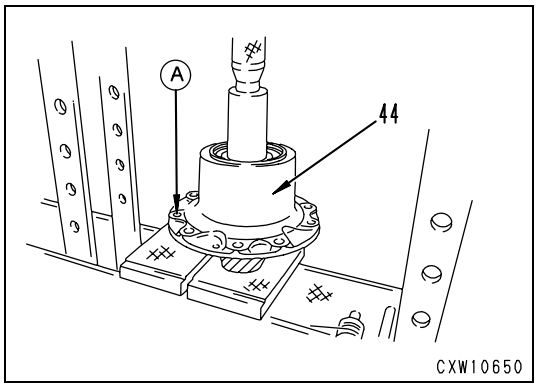
f. To measure starting turning force, install a push-pull gauge at the point marked as Ⓐ in the following illustration and turn the cage (44).

★ Push-pull gauge

WA470-5 front, WA480-5 front and rear:
73.5 N (7.5 kg) or less

WA470-5 rear:
49.0 N (5kg) or less

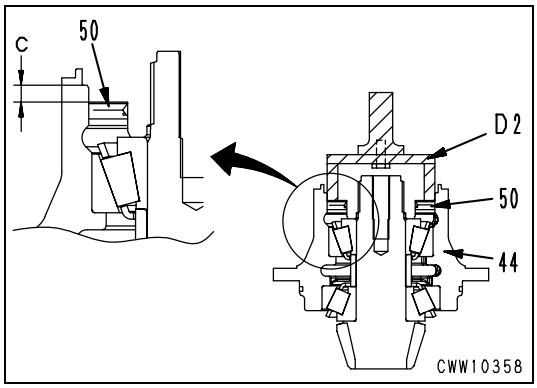
★ If the starting turning forces exceeds the reference value or the cage is not turned by hand easily (heavy rotation), replace the bearing and spacer and recheck it.



g. Press fit the oil seal (50) into cage (44) using Tool **D2**.

★ Press it into the cage, so that dimension **C** becomes 14±0.5 mm.

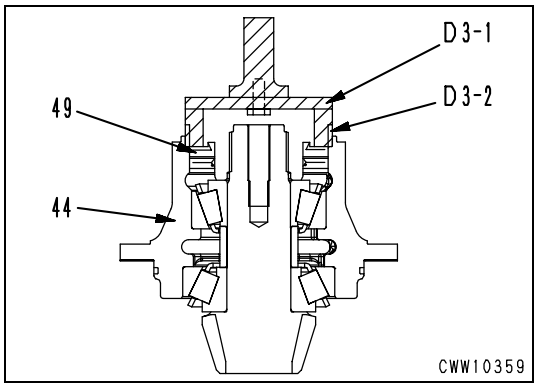
Oil seal lip: **Grease (G2-LI)**



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h. Press fit the dust seal (49) into cage (44) using Tool **D3**.

Dust seal lip: **Grease (G2-LI)**

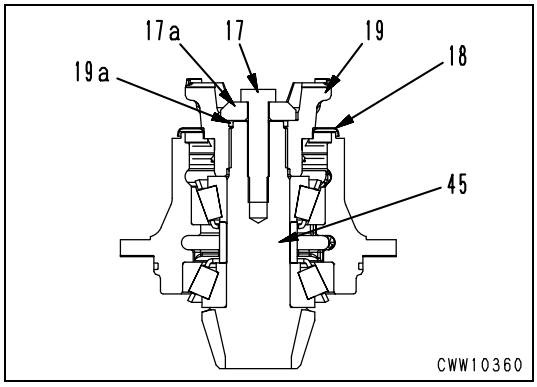


2. Coupling

Install the coupling (19), O-ring (19a), and holder (17a) in the pinion gear (45) and tighten the mounting bolts (17).

★ Temporarily tighten the mounting bolts (17) and retighten it after assembling the differential case.

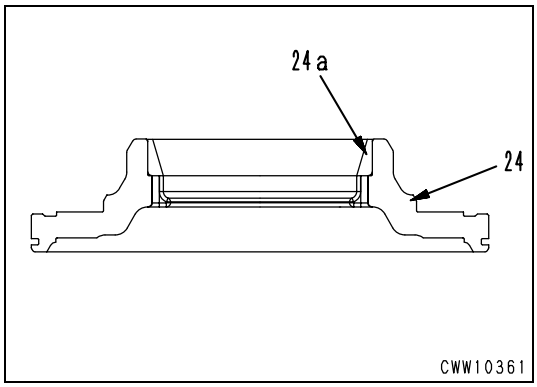
★ When inserting the coupling (19), great care should be taken not to damage the seal.



3. Assembly of differential carrier assembly

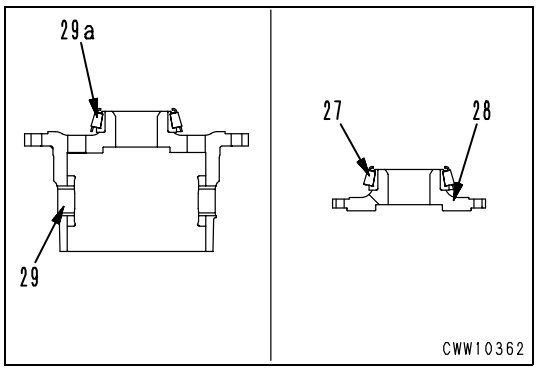
★ Assemble right and left parts according to identifications made at the time of taking them apart.

a. Press the bearing outer race (24a) until it comes into contact with the right and left bearing carriers (24).



b. Press fit the bearing (29a) into the case (29).

c. Press fit the bearing (27) into the cover (28).



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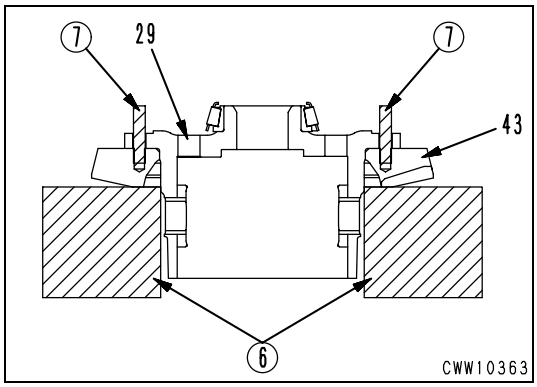
d. Place the bevel gear (43) on the block ⑥ with the gear side down.

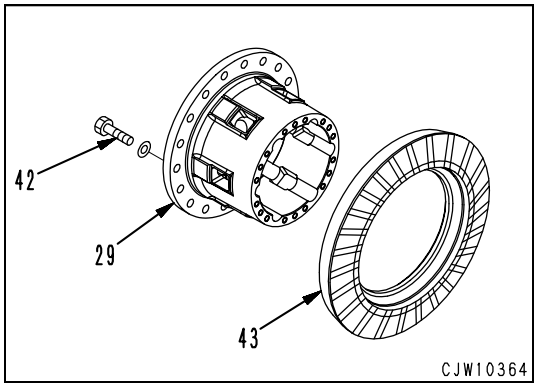
e. Install guide bolt ⑦ to bevel gear (43).

f. Lower the case (29) and install it in the bevel gear (43) and tighten the bevel gear mounting bolts (42).

Mounting bolt: **Adhesive agent (LT-2)**

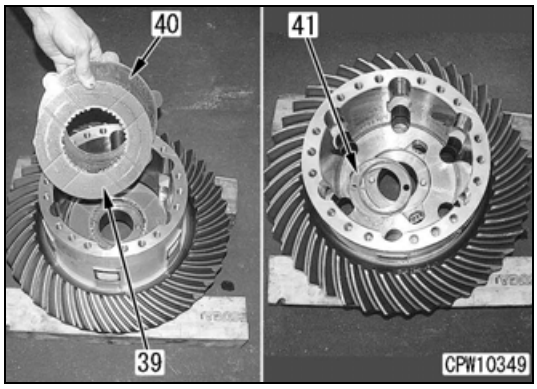
Mounting bolt: **245 ~ 309 Nm {25 ~ 31.5 kgm}**



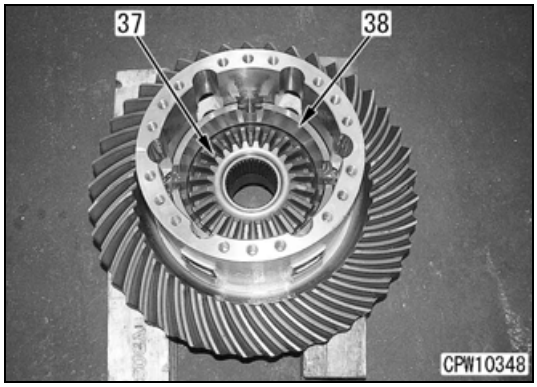


g. Reverse the case (29) and install the washer (41), plate (40), and disk (39) in this order.

Sliding surfaces of washer, plate, and disk: **Axle oil**

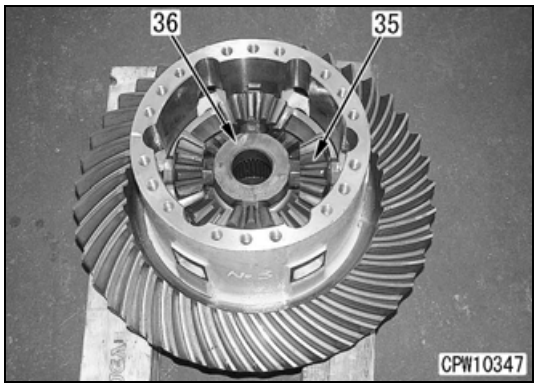


h. Install the pressure ring (38) and side gear (37).

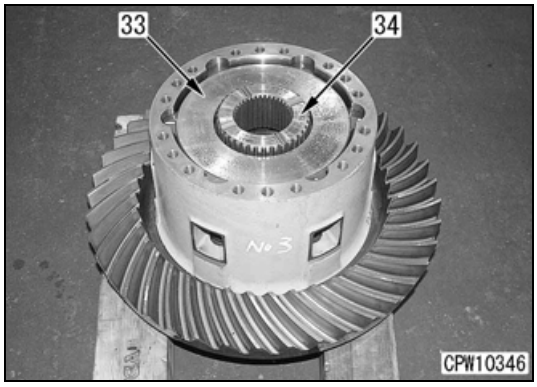


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i. Install the pinion gear (35) and spider shaft (36).

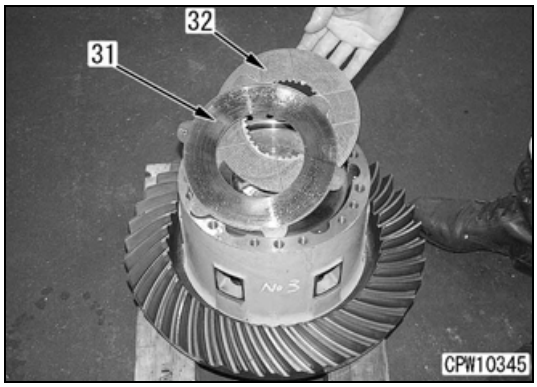


j. Install the side gear (34) and pressure ring (33).



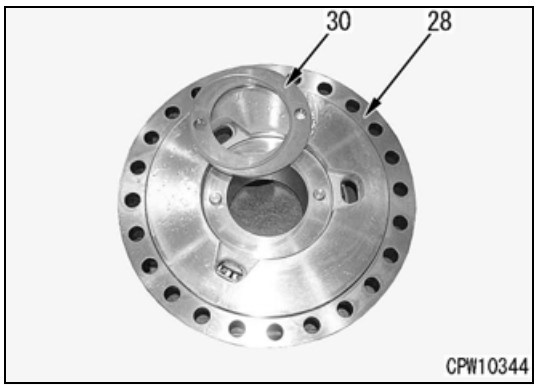
k. Install the disk (32) and plate (31) in this order.

Plate and disk: **Axle oil**



l. Install the washer (30) on the cover (28)

Sliding surfaces of washer: **Axle oil**

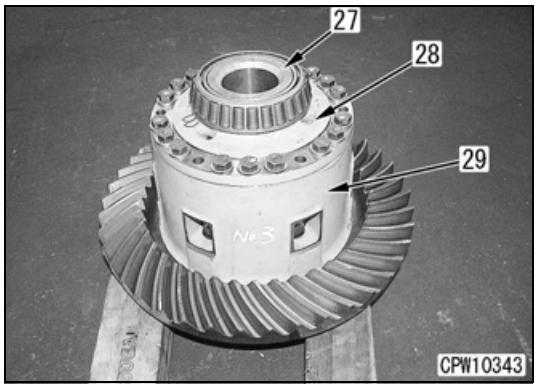


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m. Install the cover (28) with the bearing (27) on the case (29).

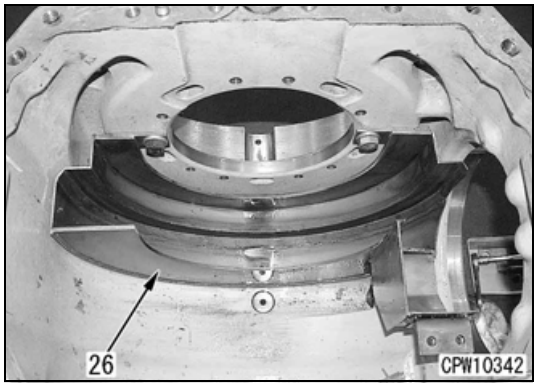
★ Install them by aligning the mating marks put when disassembling.

kgm Mounting bolt: **98 ~ 123 Nm {10 ~ 12.5 kgm}**



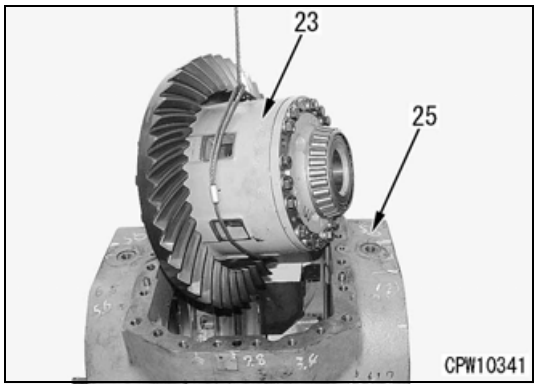
4. Gear cover

Install the gear cover (26) on differential case.

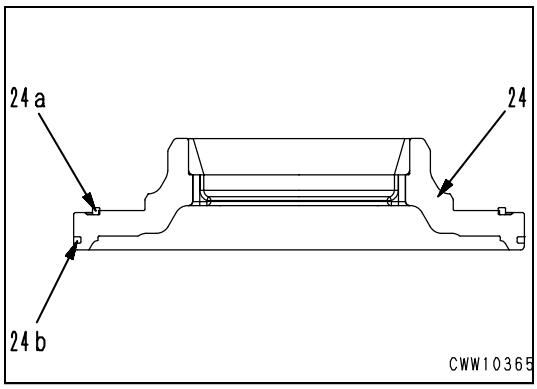


5. Bearing carrier shim adjustment

a. Lift the differential carrier assembly (23) and set the differential case (25) in the installation section.

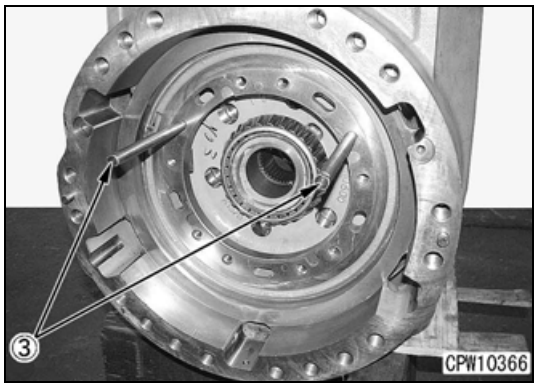


b. Install O-rings (24a) and seals (24b) in right and left bearing carriers (24).



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c. Fit the guide bolts ③ into the mounting holes of right and left bearing carriers in the differential case.



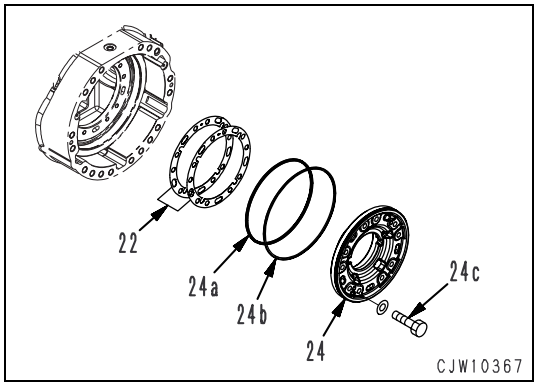
d. Install any shims (22) in right and left bearing carriers (24) and tighten the bearing carrier mounting bolts (24C).

★ Select shims with reference to the thickness and the number of right and left shims at the time of disassembly.

★ Tighten the bevel gear while turning it

Bearing: **Axle oil**

Mounting bolt: **157 ~ 196 Nm {16 ~ 20 kgm}**



e. Measure the pre-load of the bevel gear using push-pull gauge ⑤.

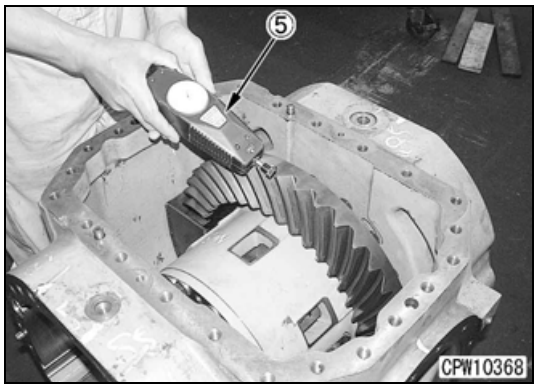
★ Starting turning force:

WA4701-5 front, WA480-5 front and rear:
34.3 ~ 51.0 N {3.5 ~ 5.2 kg}

WA470-5 rear:
35.3 ~ 53.0 N {3.6 ~ 5.4 kg}

★ If the starting turning force is outside the reference value, adjust it by increasing or reducing the thickness of shims.

★ The thickness of shims on one side is 0.3 ~ 1.25 mm (reference value).

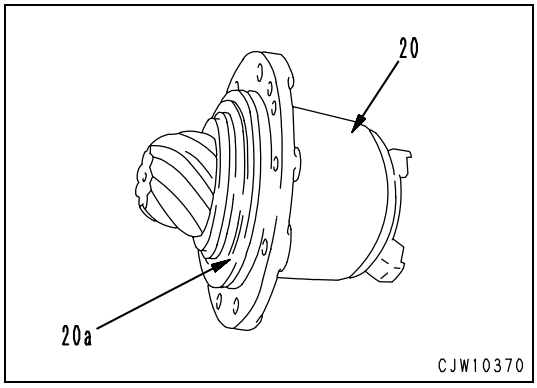


6. Cage assembly

a. Fit the O-ring (20a) into groove of the cage assembly (20).

★ Apply oil lightly.

O-ring: **Oil (axle oil)**



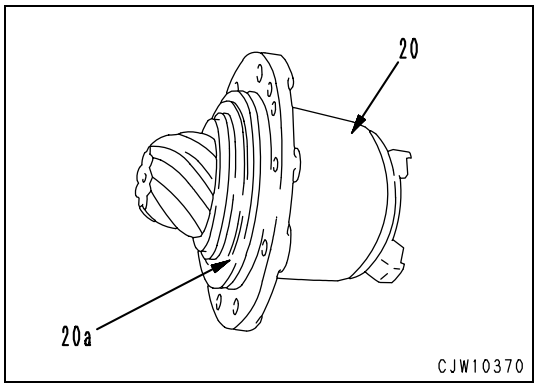
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b. Install the guide bolts ⑥ in the differential carrier assembly (7), insert standard shims (22) (the number and thickness of shims checked at the time of disassembly), and install the cage assembly (20)

★ Insert the shims with thinner ones on the side of the cage.

★ After carrying out Procedure 7.) “Adjusting backlash” and Procedure 8.) “Adjusting tooth contact”, determine the number and thickness of shims.

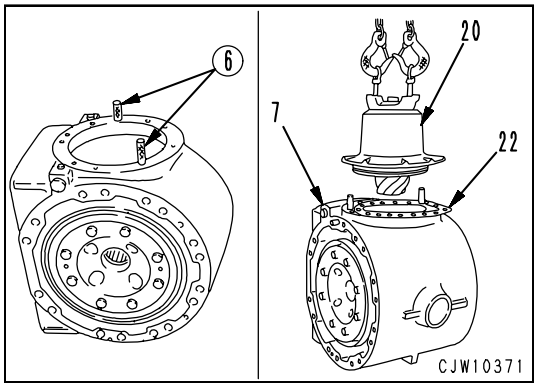
kgm Mounting bolt: **245 ~ 309 Nm {25 ~ 31.5 kgm}**



c. Retighten the coupling mounting bolts that were temporarily tightened in Procedure 2.

Mounting bolt: **Adhesive agent (LT-2)**

kgm Mounting bolt: **823 ~ 1,029 Nm {84 ~ 105 kgm}**

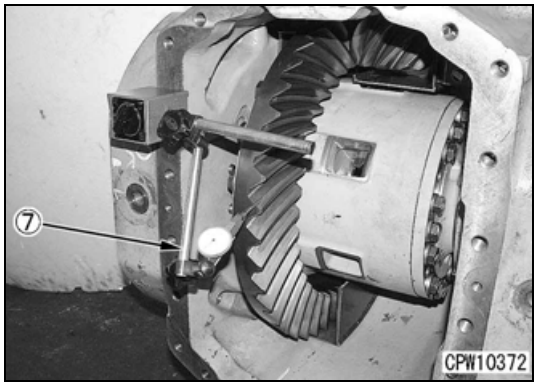


7. Adjusting backlash

a. Measure the backlash of bevel gear using dial gauge ⑦.

★ Reference value of backlash: 0.30 ~ 0.41 mm

★ Test the backlash at three points on the circumference of the bevel gear and check that variations in measurement values are at 0.1 mm or less.

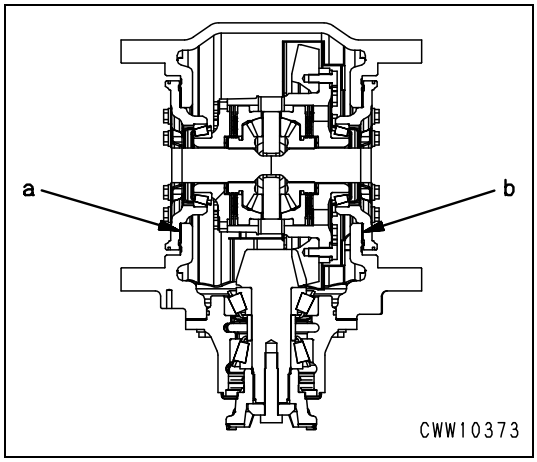


b. To obtain the backlash within the reference value, move some shims on the side of the bevel gear to the other side.

★ Moving shims must not change the total thickness of right and left shims.

★ If backlash is excessively large:
Move some shims **b** to shims **a**.

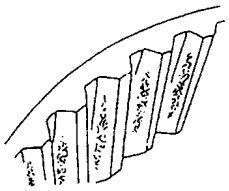
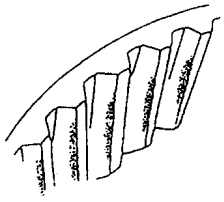
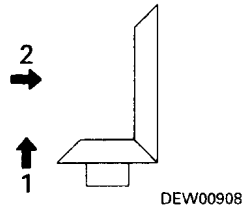
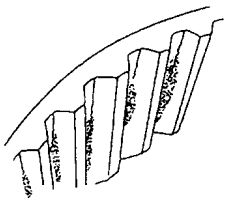
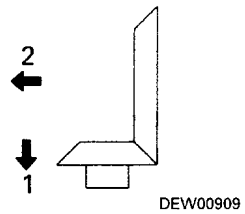
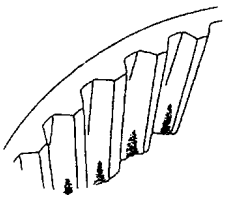
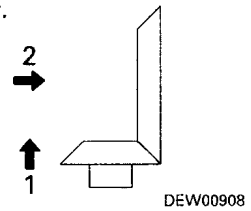
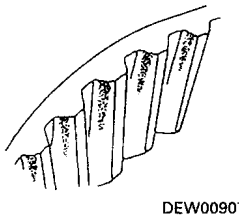
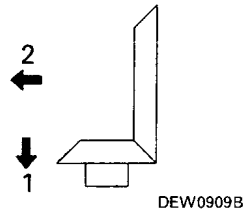
★ If backlash is excessively small:
Move some shims **a** to shims **b**.



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8. Adjusting tooth contact

Coat face of 7 or 8 teeth of bevel gear lightly with red lead (minimum). Hold the bevel gear by hand to act as a brake, rotate the pinion gear forward and backward and inspect the pattern left on the teeth.

Tooth contact	Cause	Procedure for adjustment
 DEW00910	The tooth contact pattern should start from about 5 mm from the toe of the bevel gear and cover about 50% of the length of the tooth. It should be in the center of the tooth height.	Adjust the pinion gear by adjusting the shims at the cage. Adjust the bevel gear in the same way as when adjusting backlash.
 DEW00904	Bevel pinion gear is too far from bevel gear.	1. Reduce shims at pinion gear to bring closer to bevel gear. 2. Move bevel gear further away from pinion gear and adjust backlash correctly.  DEW00908
 DEW00905	Bevel pinion gear is too close to bevel gear.	1. Increase shims at pinion gear to move away from bevel gear. 2. Move bevel gear closer to pinion gear and adjust backlash correctly.  DEW00909
 DEW00906	Bevel gear is too close to pinion gear.	1. Reduce shims at pinion gear to bring closer to bevel gear. 2. Move bevel gear further away from pinion gear and adjust backlash correctly.  DEW00908
 DEW00907	Bevel gear is too far from pinion gear.	1. Increase shims at pinion gear to move away from bevel gear. 2. Move bevel gear closer to pinion gear and adjust backlash correctly.  DEW0909B

★ When adjusting the driven gear, do not change the pre-load of the bearing. Turn the left and right adjusting nut, the same amount each (check the number of notches), in the same direction.

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9. Brake

a. Install the seal in the piston (16) and install it in the differential carrier assembly.

★ The number (15) denotes brake tube joint.

b. Bleed the inside of the cylinder by installing Tools **D6-1** and **2** in the mounting slot of the brake tube (A) in the differential case (7).

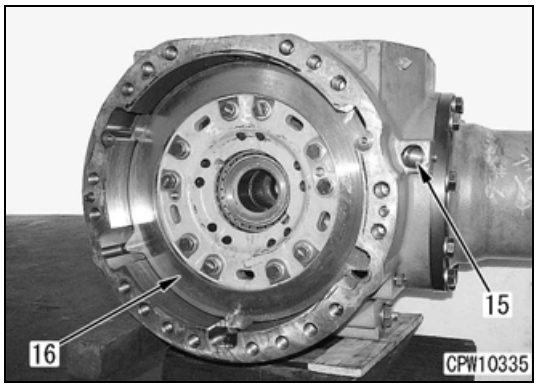
c. Increase the pressure to 1.4 MPa (14 kg/cm²) by operating Tool **D6-4**.

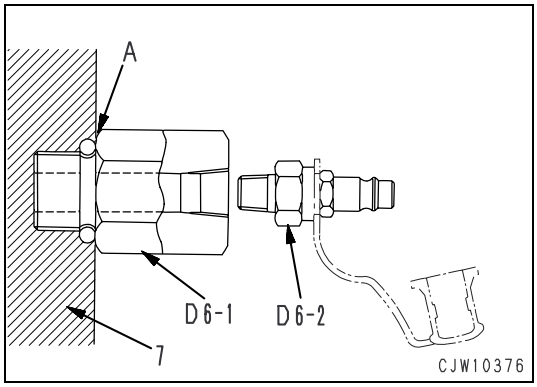
★ Leave the pressure at 1.4 MPa (14 kg/cm²) for five minutes and check that a drop in pressure is 0.3 MPa (3.5 kg/cm²) or less.

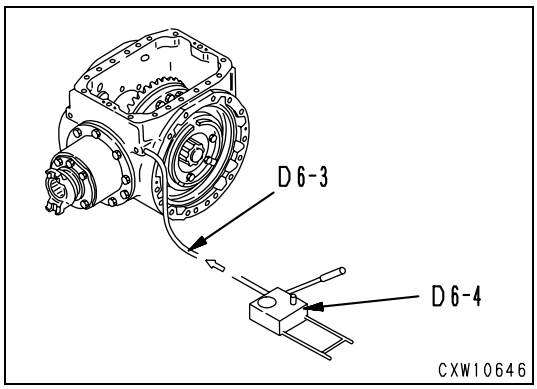
d. If there is no leakage of oil as a result of checking as above, further increase the pressure to 4.9 MPa (50 kg/cm²).

★ Leave the pressure at 4.9 MPa (50 kg/cm²) for five minutes and check that a drop in pressure is 0.1 MPa (1.0 kg/cm²) or less.

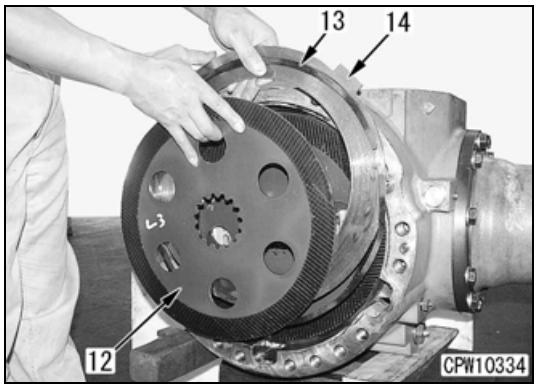
★ If there is leakage of oil, remove the brake piston and check the O-ring, seal, etc. for damage before reinstalling it.





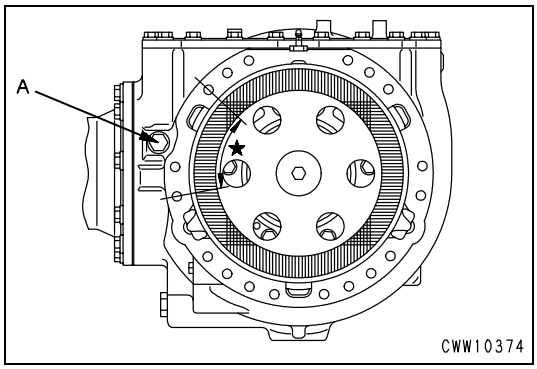


e. Install the disk (12), springs (13), and plate (14) in this order.

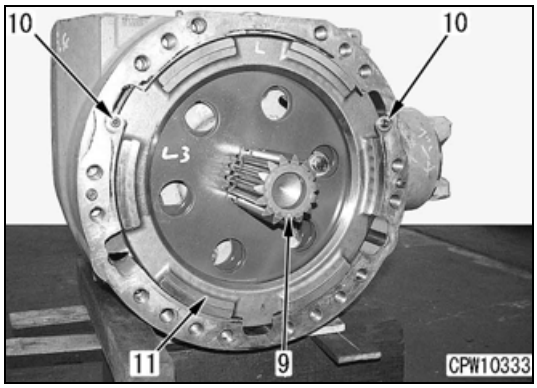


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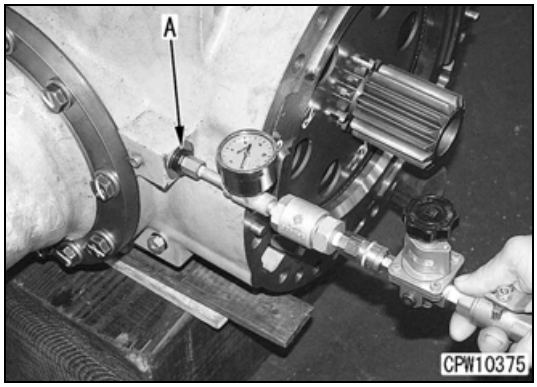
★ Overlay one spring on another and match notches, so that the notches are in the range marked with ★. (**A** signifies brake oil port.)



f. Install the outer plate (11) and shaft (9) and tighten bolts (10).



g. Blow air into the brake oil port **A** to conform to the movement of the piston.

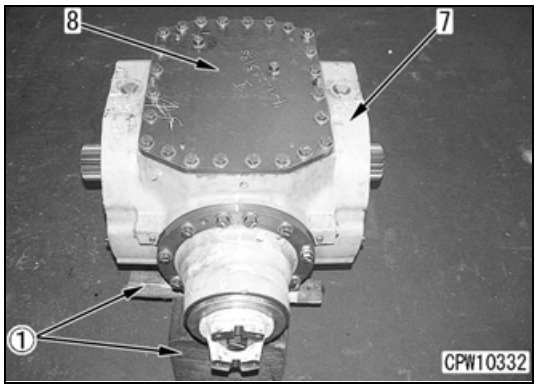


10. Coupling

Retighten coupling mounting bolts that were temporarily tightened in Procedure 2.

Mounting bolt:
Adhesive agent (LT-2)

kgm Mounting bolt:
823 ~ 1,029 Nm {84 ~ 105 kgm}



11. Cover

Install the cover (8) on the differential case (7).

Cover mounting surface:
Liquefied gasket (Loctite 515)

kgm Mounting bolt:
157 ~ 196 Nm {16 ~ 20 kgm}

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12. Axle housing

    Install the right and left axles housing assemblies by referring to “Disassembly and assembly of axle housing assembly” section.

13. Rear support (Rear differential)

    Install the rear support (6) by referring to “Removal and installaiton of rear axle assembly” section.

14. Oil temperature sensor (Rear differential)

    a. Install the oil temperature sensor (5) and connect the connector (4).

       Oil temperature screw: **LG-5**

       Oil temperature sensor:
       29.4 ~ 49.0 Nm {3 ~ 5 kgm}

    b. Install the cover (3).

15. Brake pipe

    a. Install the slack adjuster (2). (Front differential)

       ★ For the rear differential, install the slack adjuster of on the rear frame.

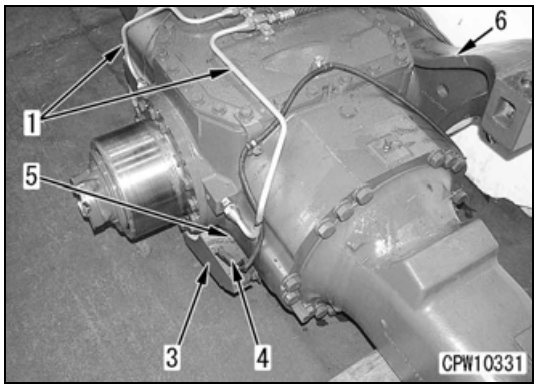
    b. Install the tube (1).

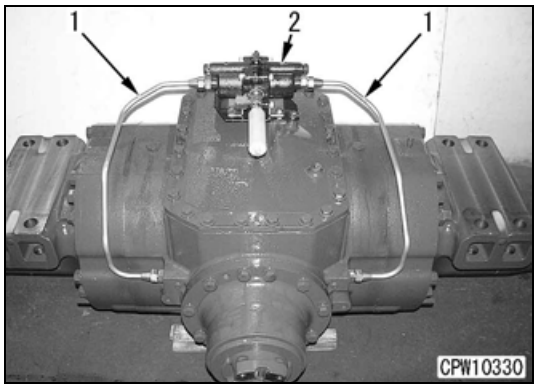
16. Lubrication

    a. Feed oil to the specified level through filler opening with the drain plug tightened.

       Axle oil (Front and rear):
       52 l (WA470-5)
       55 l (WA480-5)

    b. Remove the oil level plug and check that the oil level is close to the lower edge of the plughole.

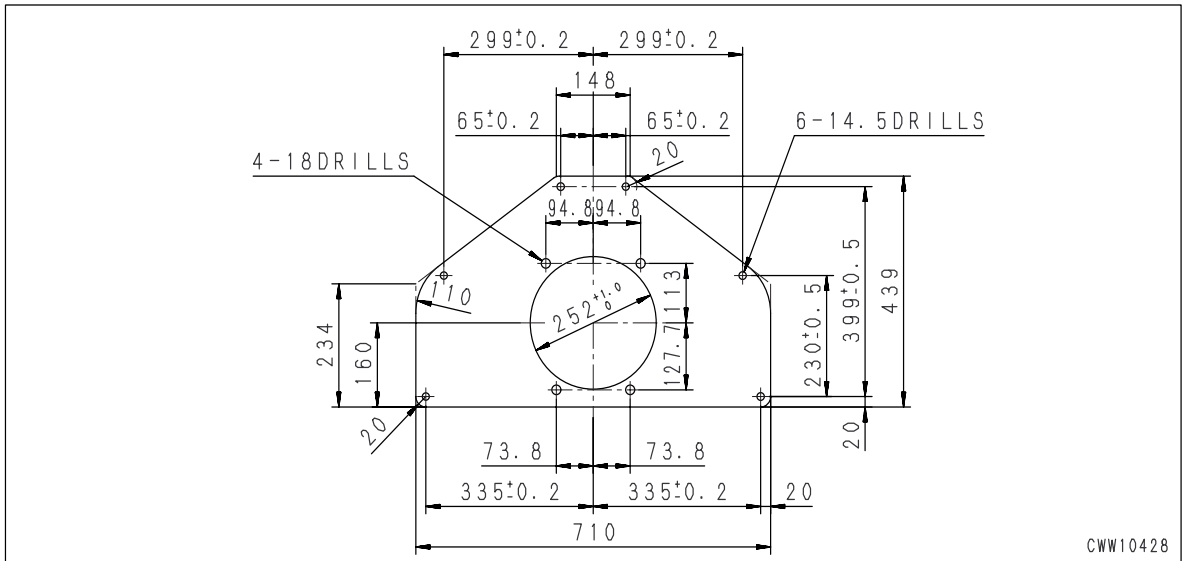




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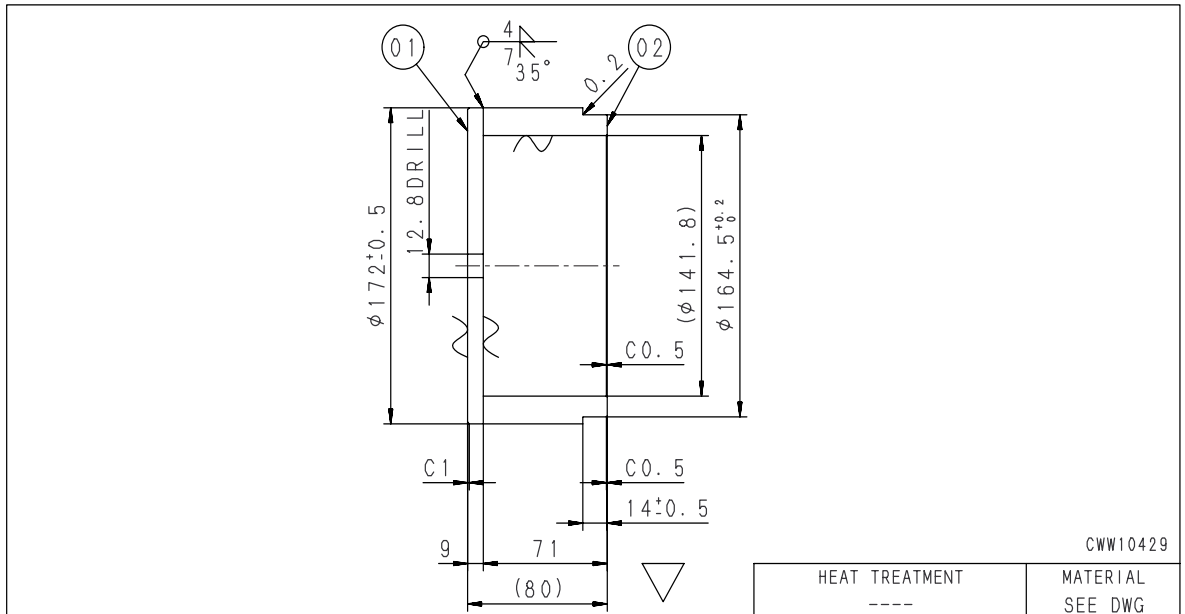
Schematic drawing of special tools

D1 Plate



HEAT TREATMENT	MATERIAL
----	SS400P
PART NAME	Q'TY
PLATE	1
790T-901-3440 △	

D2, D3 Push tool

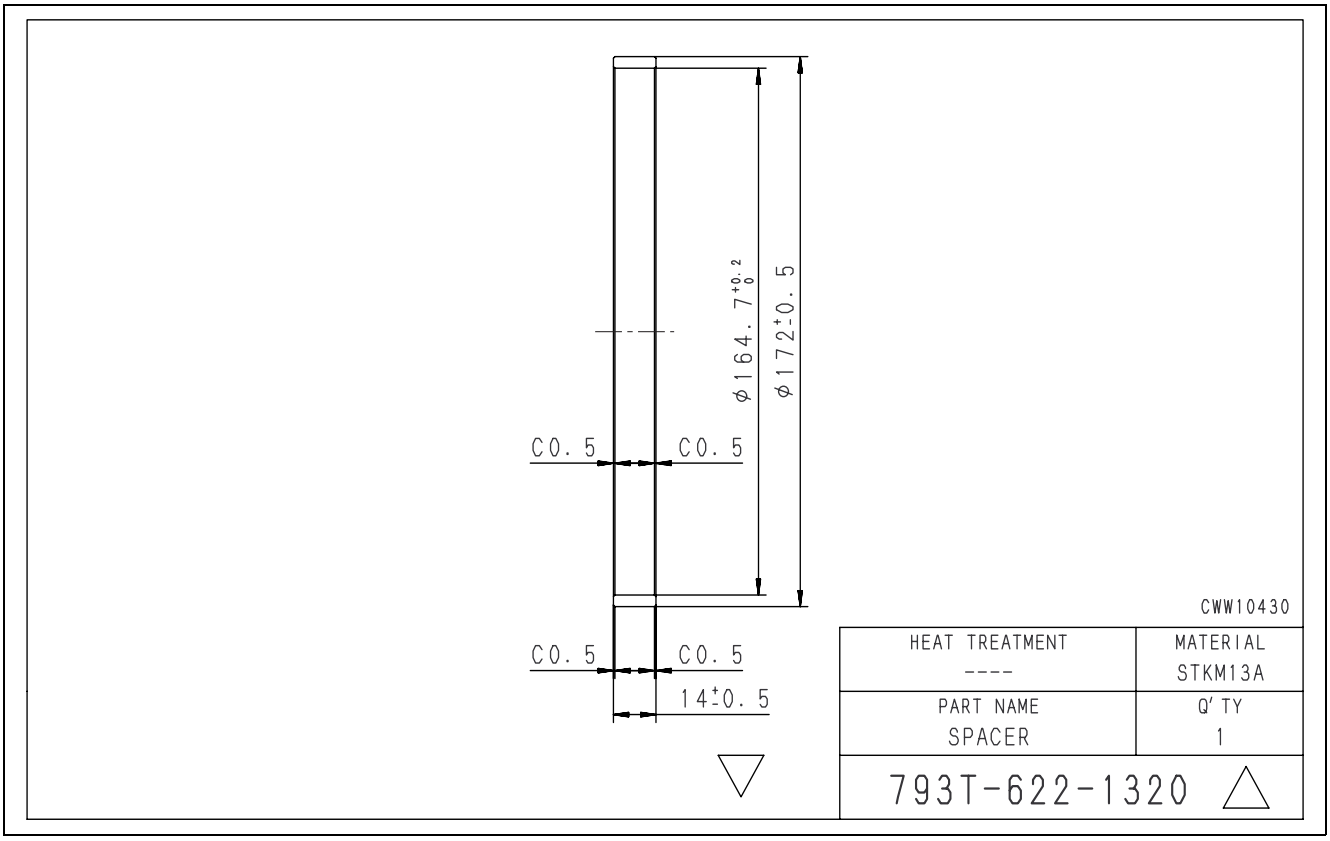


SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
02	TUBE	STKM13A	1	3.9	φ177.8Xt18
01	PLATE	SS400P	1	1.63	t9

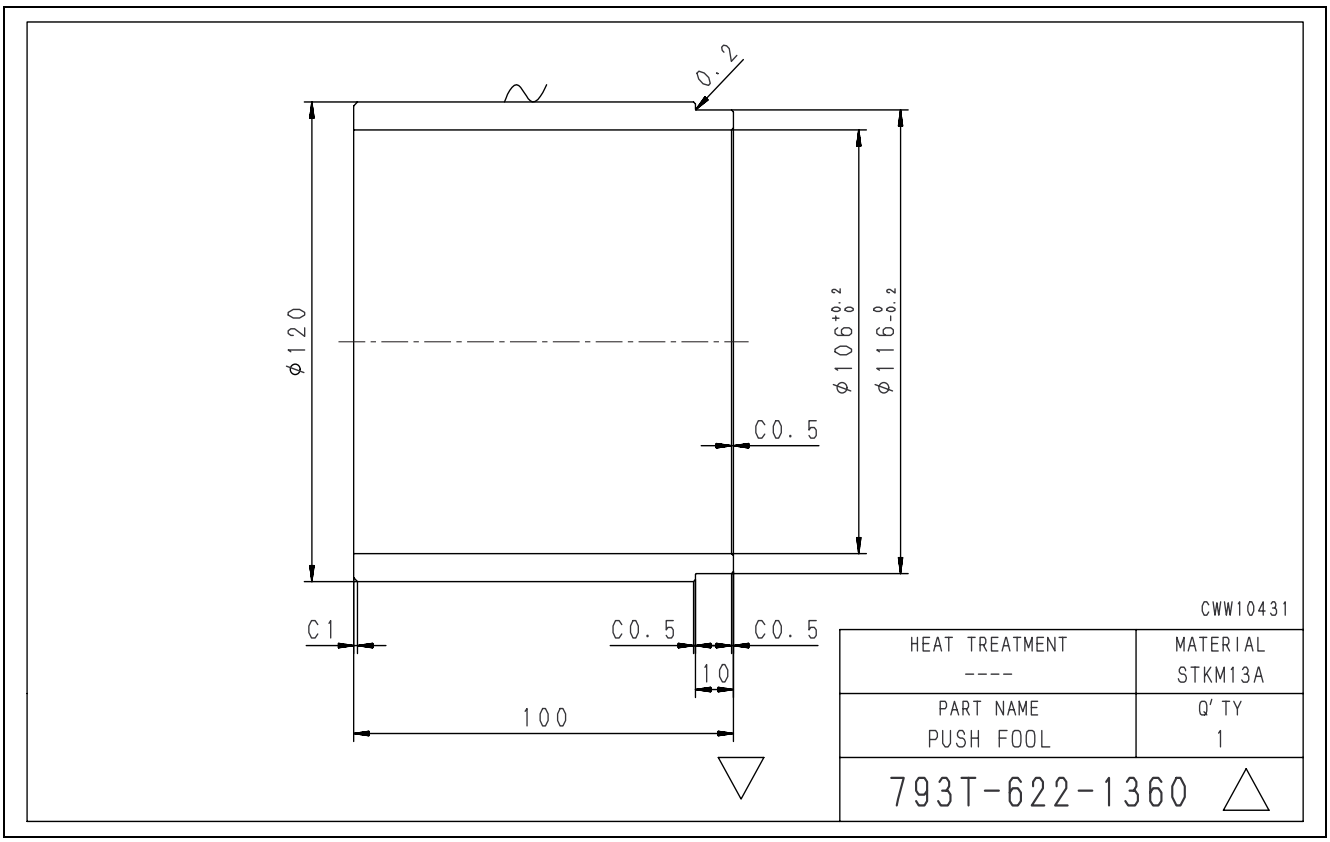
HEAT TREATMENT	MATERIAL
----	SEE DWG
PART NAME	Q'TY
PUSH TOOL	1
793T-622-1310 △	

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D3 Spacer

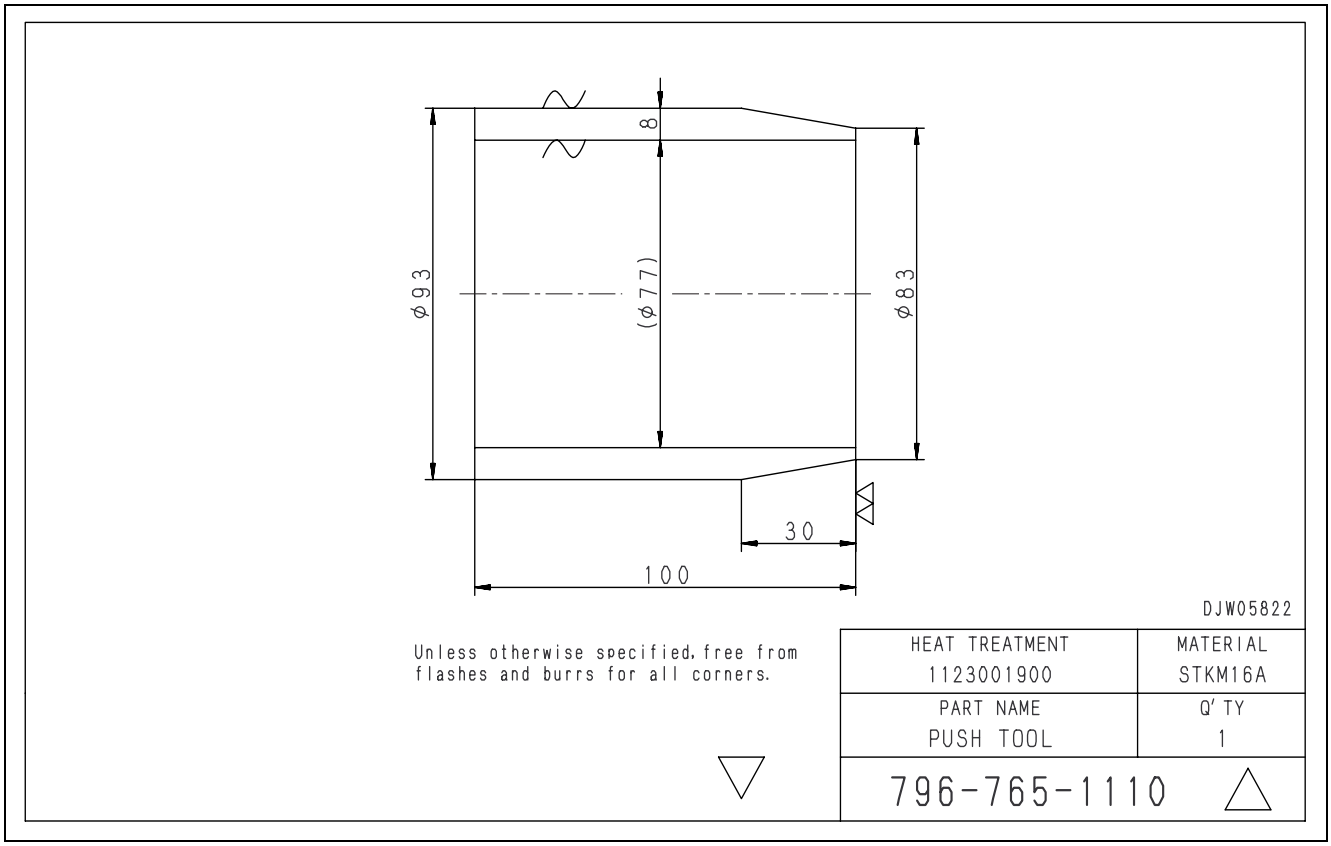


D4 Push tool



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D5 Push tool



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Center hinge pin

Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
E1	1	790-101-2300	Push puller	■	1		
	2	793-520-2370	Push tool	■	1		
	3	793-520-2350	Push tool	■	1		
	4	793-520-2540	Guide	■	1		
	5	793-520-2360	Bar	■	2		
	6	790-101-1102	Hydraulic pump	■	1		
	7	790-101-2102	Puller (30 ton)	■	1		

Removal

- **Park the machine on a level place and lower the bucket onto the ground.**
- **Disconnect the negative (-) terminal of the battery.**

1. Machine assembly

   Remove the machine by referring to “Machine Assembly” section.

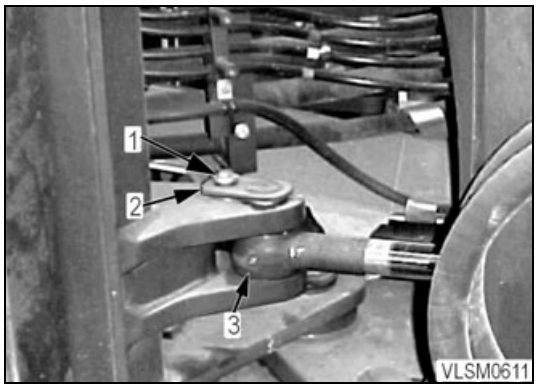
2. Cab floor frame assembly

   Remove the cab floor frame assembly by referring to “Cab Floor Frame Assembly” section.

3. Steering cylinder pin bracket

   a. Remove the bolt (1) and the pin (2) on the side of the rod of the right and left steering cylinders.

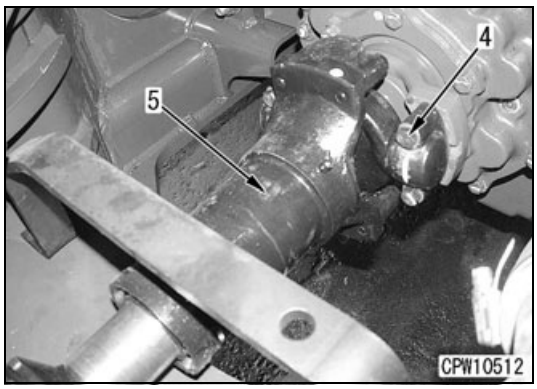
   b. Remove the steering linkage bracket (3).



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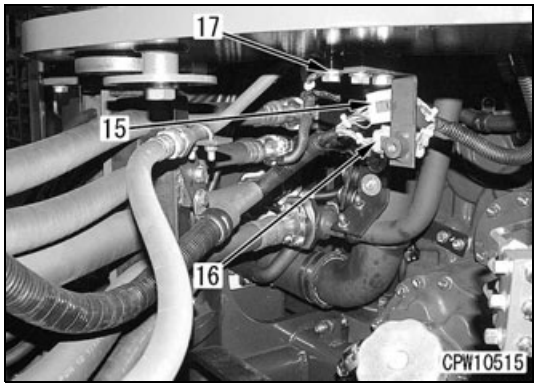
4. Center propeller shaft

   Remove the bolt (4) and disconnect the center propeller shaft (5).



5. Harness connector

   Disconnect the connectors (15) (CN-FF1) and (16) (CN-FF2) and grounding wire (17).

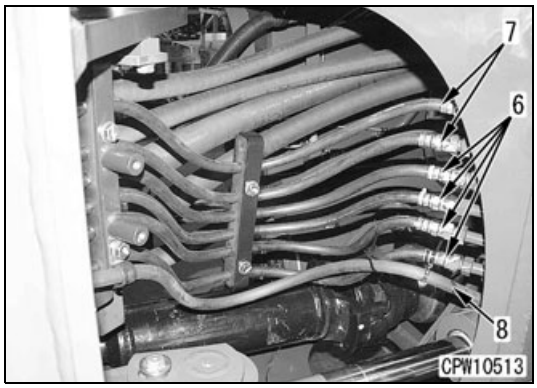


6. Hydraulic piping

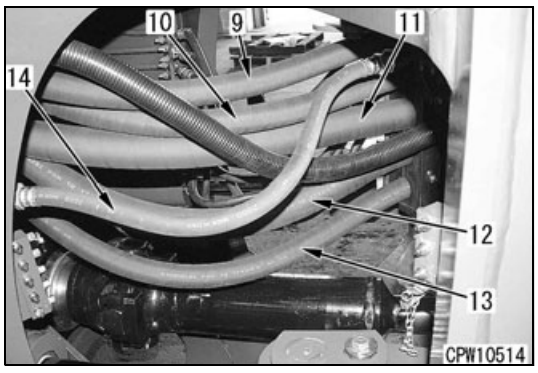
   ★ Attach a tag or similar means to identify the hoses disconnected.

   a. Disconnect hoses (6), (7), and (8).

      ★ The hose (7) is used for attachment.



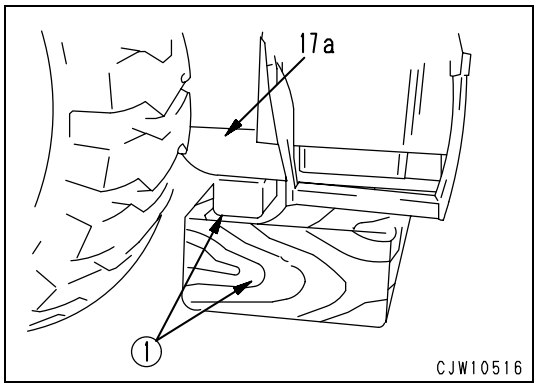
   b. Disconnect hoses (9), (19), (119, (13), and (14) from the side of the front frame.



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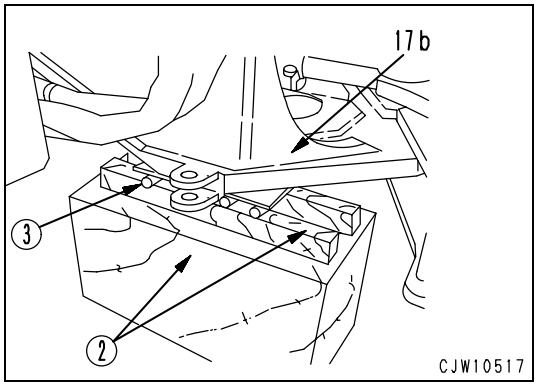
7. Frame support

   a. Jack up the rear frame (17a) and insert blocks ① on the right and left of the rear frame while adjusting the height.



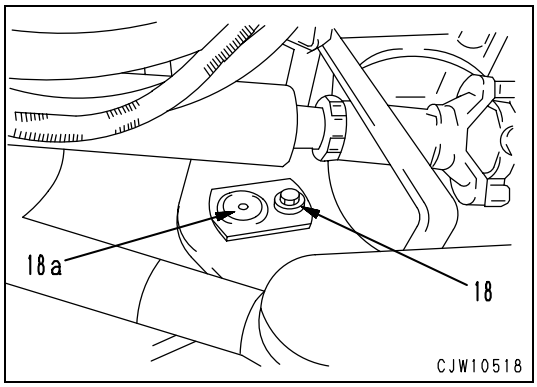
   b. Jack up the front frame (17b) and insert blocks ② on the right and left of the front frame while adjusting the height.

   c. Insert a roller ③ between the block ② and the frame, so that the front frame can be pulled out.



8. Lower hinge pin

   Remove the lock bolt (18) and take off the lower hinge pin (18a).



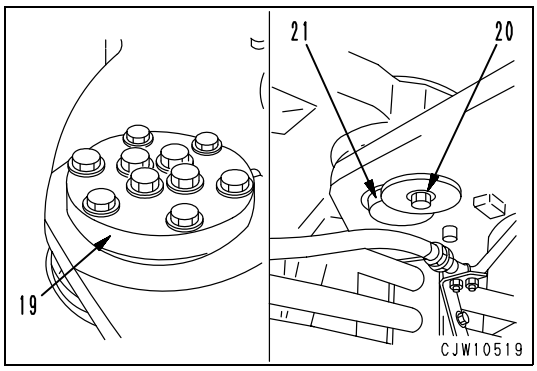
9. Upper hinge pin

   a. Remove the mounting bolts and take off the retainer (19).

      ★ Check the number and thickness of shims inserted between the retainer and the frame.

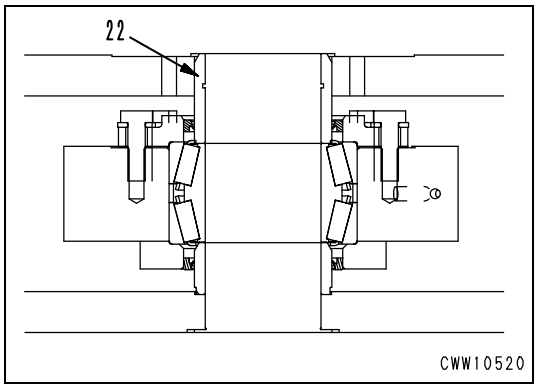
   b. Remove the lock bolt (20) and pull out the upper hinge pin (21) while adjusting the height.

      ★ Carefully perform the height adjustment, so that the pin can be extracted out by hand.



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c. Remove spacer (22).



10. Separation of frame

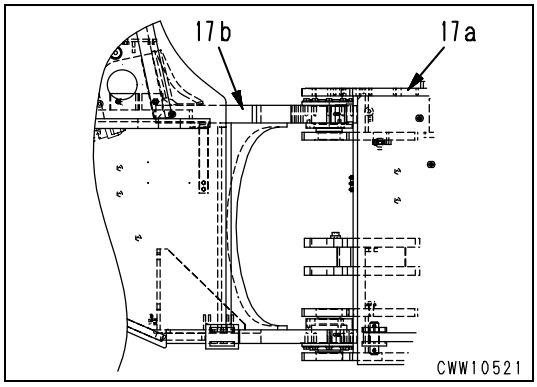
Slowly extract the front frame (17b) toward the front and separate it from the rear frame (17a).

★ Care should be taken to avoid pinching of the lower spacer of the upper hinge into the rear frame.

★ When separating, attention should be paid to the balance.

★ Check that no point was missed when separating.

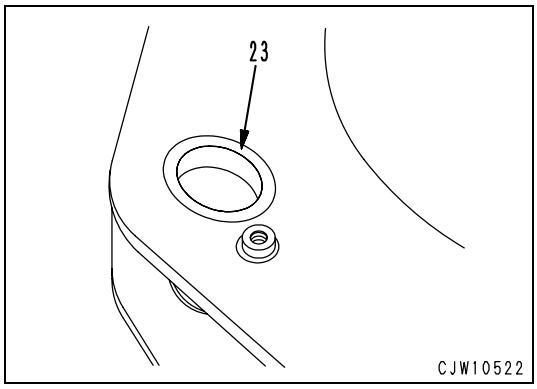
★ Remove the safety lever.



11. Lower hinge

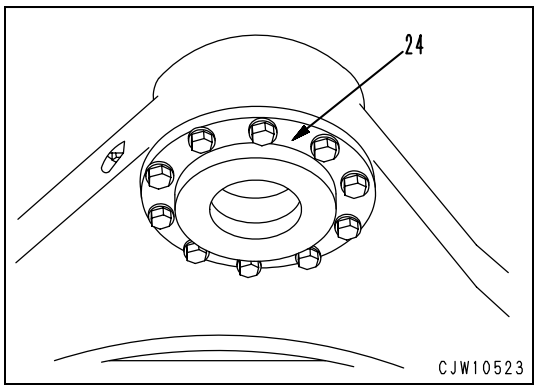
a. Extract bushings (23) from the rear frame.

★ Extract both upper and lower bushings of the lower hinge.



b. Remove the retainer (24) from the front frame.

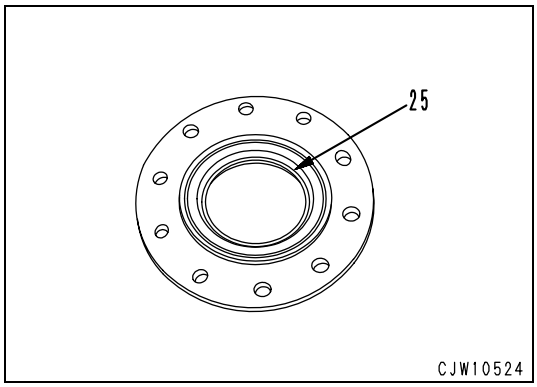
★ Check the number and thickness of shims inserted between the retainer and the frame.



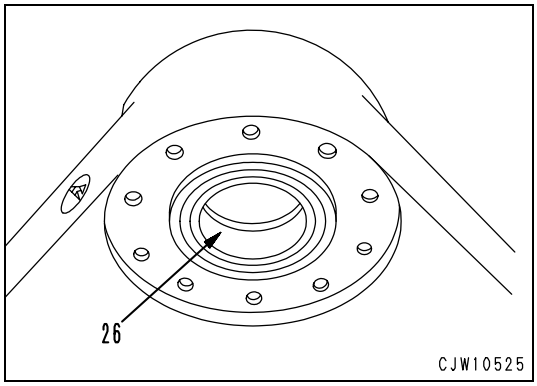
https://truckmanualshub.com/

c. Remove the dust seal (25) from the retainer.

★ The dust seal on the side of the frame should also be removed.



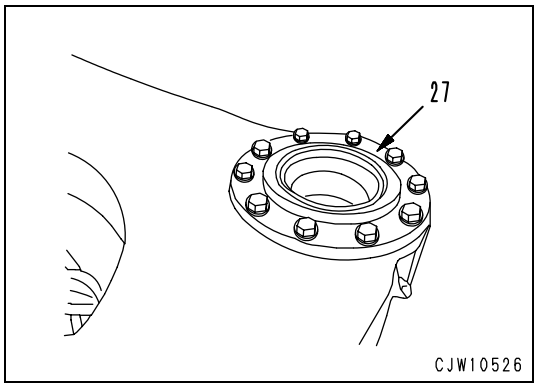
d. Remove the bearing (26).



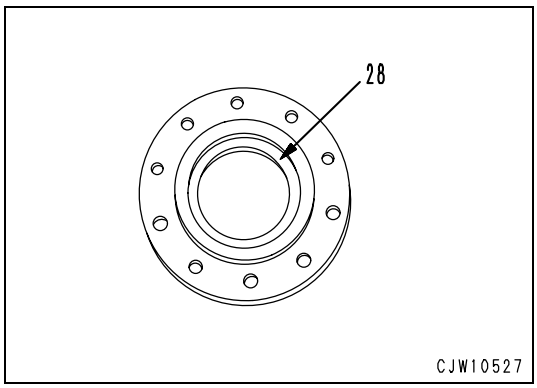
12. Upper hinge

a. Remove the mounting bolt and detach the retainer (27).

★ Check the number and thickness of shims inserted between the retainer and the frame.

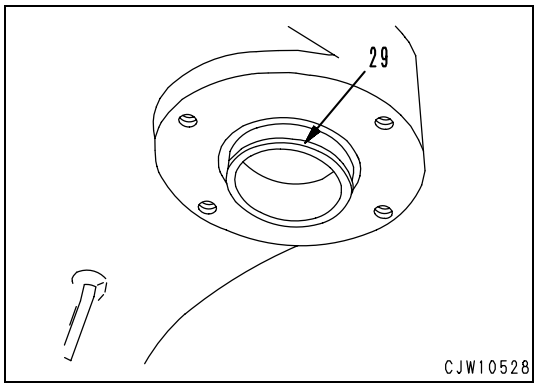


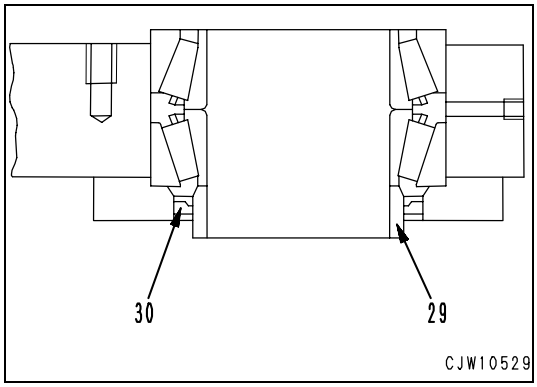
b. Remove the dust seal (28) from the retainer (27).



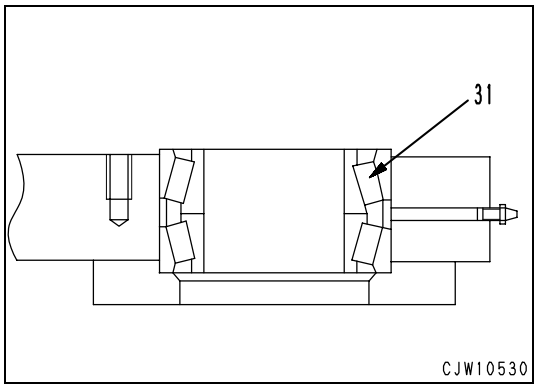
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c. Remove the spacer (29) and dust seal (30) from the front frame.





d. Remove the bearing (31).



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Installation

1. Upper hinge

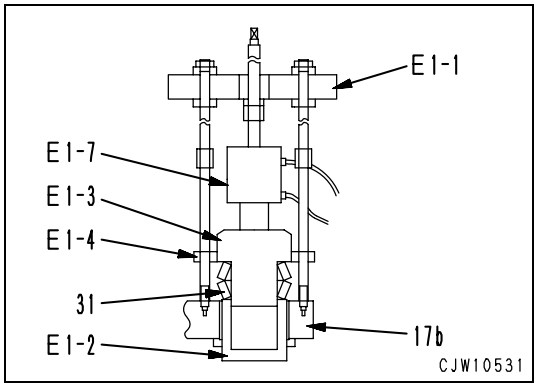
   a. Locate Tool **E1-1** at the top of the upper hinge of the front frame (17b) and set the bearing (31) in Tool **E1-4** and then place it into the press fitting from the upper side and press fit it.

      ★ Use Tool **E1-4** as a guide when press fitting.

      ★ Care should be taken to avoid inclination of the bearing.

      ★ Pack the bearing with sufficient grease.

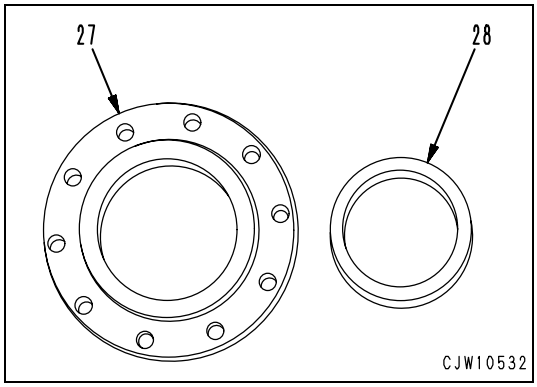
      ★ When replacing the bearing (31), replace the spacers (22) and (29) together in a set.



   b. Press fit the dust seal (28) into the retainer (27).

      ★ Press fit the dust seal with its lip surface turning outward.

      Seal lip: **Grease (G2-LI)**



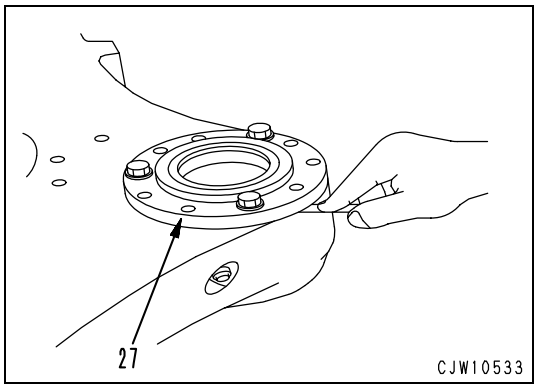
   c. Install the retainer (27) and tighten it evenly with three mounting bolts and then select and install shims, so that the maximum clearance of clearance **a** between the retainer and the hinge becomes 0.1 mm or less.

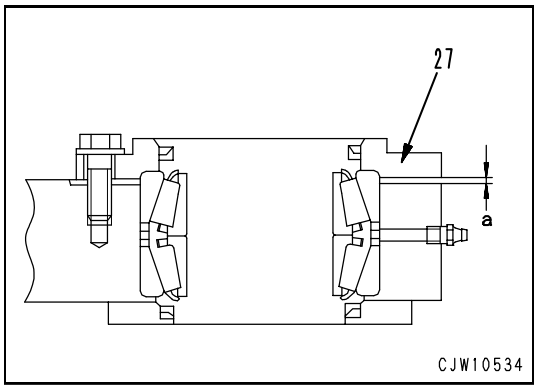
      kgm Mounting bolt:
      19.6 ± 2.0 Nm {2.0 ± 0.2 kgm}
      (when adjusting shims)

   d. After adjusting shims, tighten all retainer mounting bolts to the specified torque

      Mounting bolt: **Adhesive agent (Loctite 262)**

      kgm Mounting bolt: **98 ~ 123 Nm {10 ~ 12.5 kgm}**



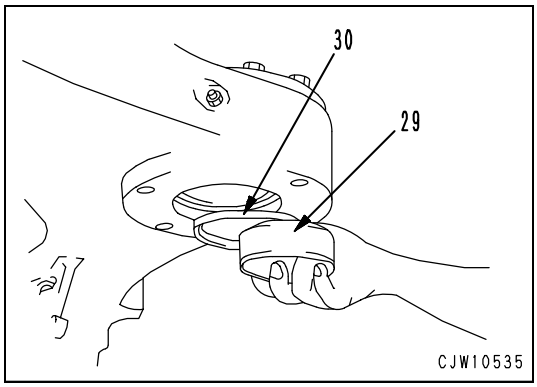


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e. Install the dust seal (66) and spacer (29) from the downside of the front frame.

★ Press fit the dust seal with its lip surface turning outward.

★ Install the spacer (29) from the downside, so that the side with larger chamfer is on the bearing side.



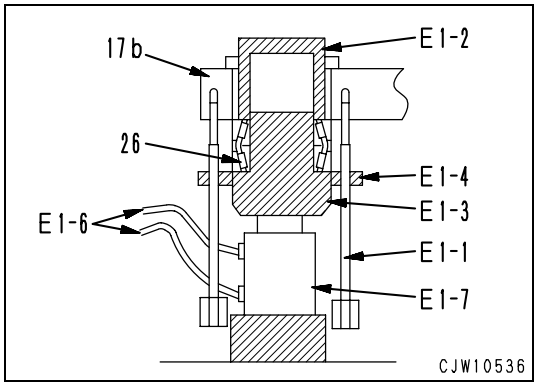
2. Lower hinge

a. Press fit the bearing (26) into front frame (17b) using Tool **E1**.

★ Use Tool **E1-4** as a guide when press fitting.

★ Care should be taken to avoid inclination of the bearing.

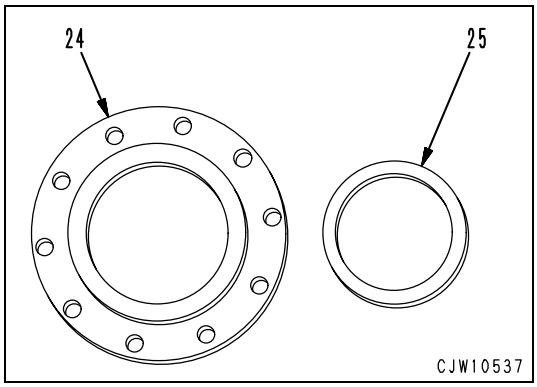
★ Pack the bearing with sufficient grease.



b. Press fit the dust seal (25) into the retainer (24).

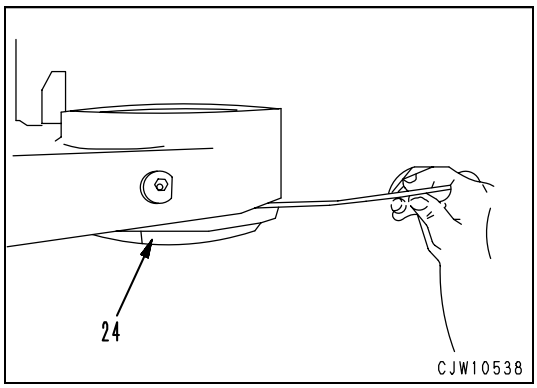
★ Press fit the dust seal with its lip surface turning outward.

Seal lip: **Grease (G2-LI)**



c. Install the retainer (24) and tighten it evenly with three mounting bolts and then select and install shims, so that the maximum clearance of clearance **b** between the retainer and the hinge becomes 0.1 mm or less.

Mounting bolt:
19.6 ± 2.0 Nm {2.0 ± 0.2 kgm}
(when adjusting shims)

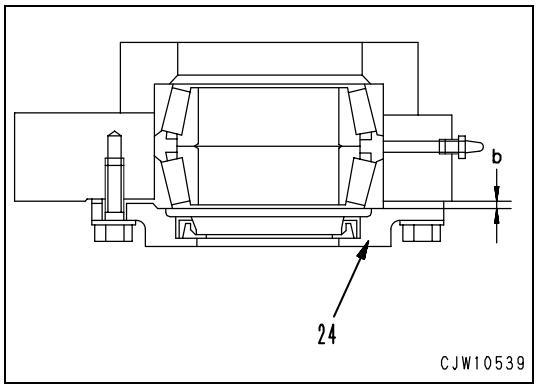


https://truckmanualshub.com/

d. After adjusting shims, tighten all retainer mounting bolts to the specified torque

   Mounting bolt: **Adhesive agent (Loctite 262)**

   Mounting bolt: **98 ~ 123 Nm {10 ~ 12.5 kgm}**

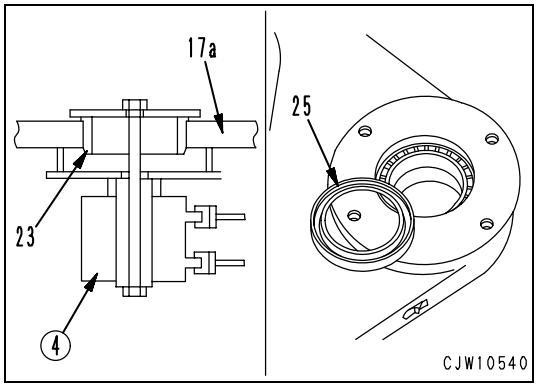


e. Press fit the dust seal (25) and spacer (29) from the upper side of the front frame.

   ★ Press fit the dust seal with its lip surface turning outward.

   Seal lip: **Grease (G2-LI)**

f. Bushing
   Press fit the bushing (23) to the lower hinge of the rear frame using a press or similar device.



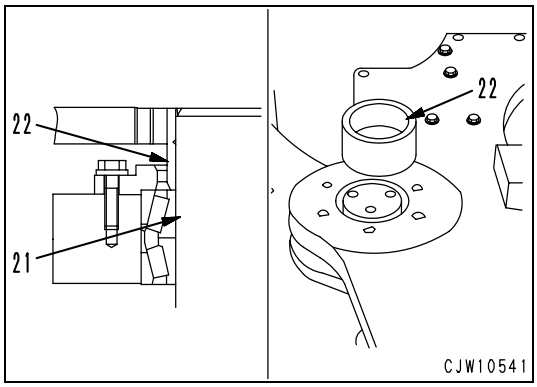
3. Frame attachment

Use a rod or similar means for hole alignment. Never insert your fingers.

★ Ensure to align pinholes.

a. Insert the upper hinge pin (21) and install the spacer (22).

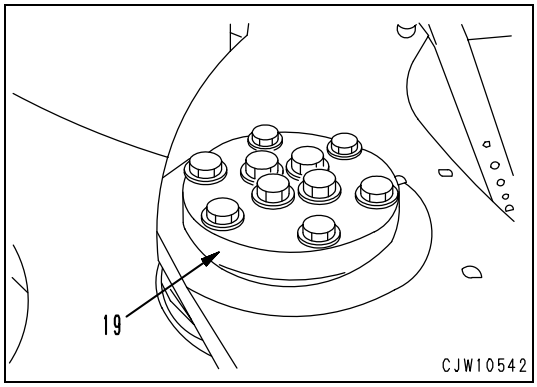
   Rim of hinge pin: **Grease (G2-LI)**



b. Install the retainer (19) on the upper hinge pin and tighten it evenly with three bolts and then select and install shims, so that clearance **c** between the hinge and the retainer becomes 0.2 mm or less.

   ★ Temporarily tighten the retainer mounting bolts for detent when adjusting shims.

   Pin mounting bolt:
   205.9 ± 19.6 Nm {21.0 ± 2.0 kgm}
   (when adjusting shims)



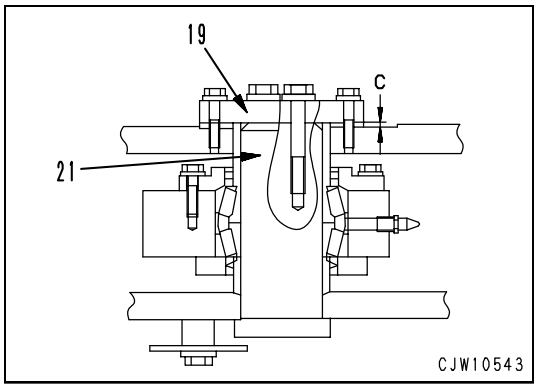
https://truckmanualshub.com/

c. Tighten all pin and retainer mounting bolts to the specified torque

   Pin and retainer mounting bolts:
   Adhesive agent (Loctite 262)

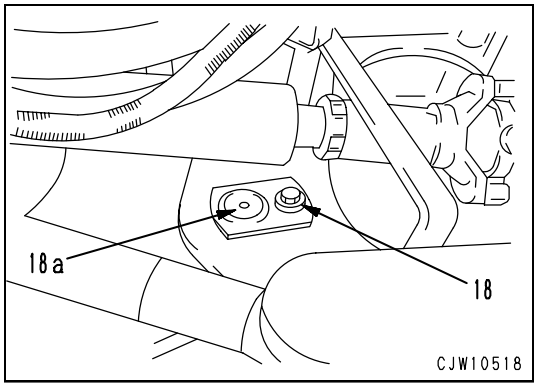
   Pin mounting bolt:
   205.9 ± 19.6 Nm {21.0±2.0 kgm}

   Retainer mounting bolt:
   98 ~ 123 Nm {10 ~ 12.5 kgm}



d. Insert the lower hinge pin (18a) and tighten the lock bolt (18).

e. Perform procedures that follow in the reverse of removal.

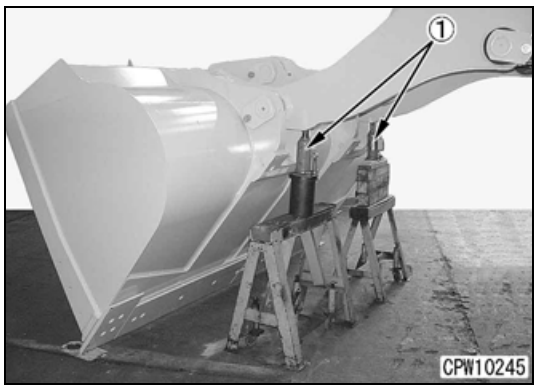


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Steering valve assembly

Removal

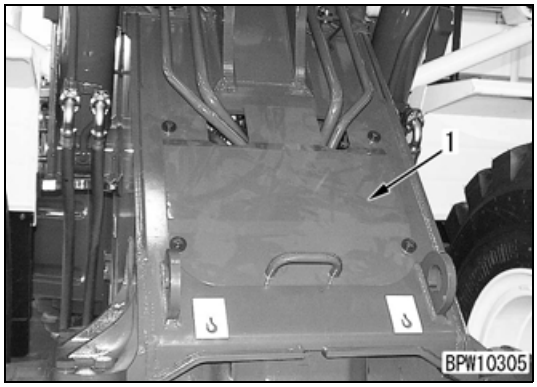
1. Fully turn the steering counter-clockwise and provide space for removal work.
2. Lift the lift arm and support it with the jack ①.

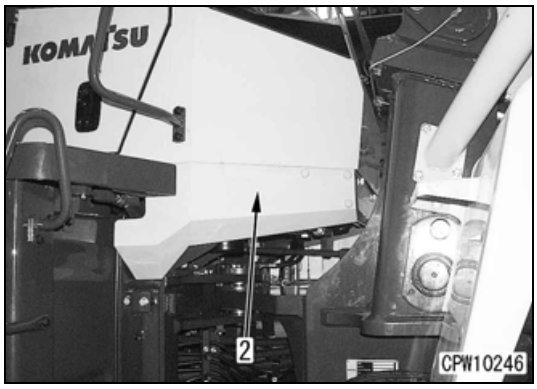


- **Ensure to support it.**
- **Apply parking brake and put blocks under the tires.**
- **Loosen the filler cap of the hydraulic oil tank and release the internal pressure.**

3. Cover

   Remove the covers (1) and (2).

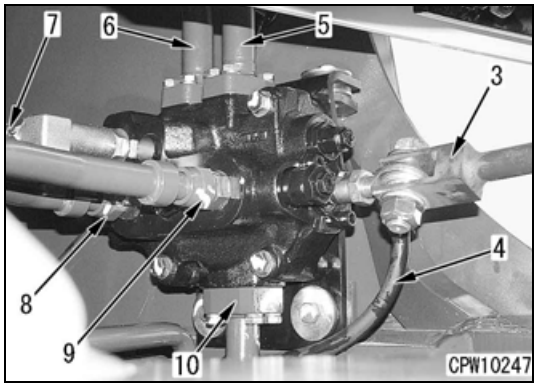




4. Steering linkage, each pipe
   a. Separate the steering linkage (3) from the steering valve. ✻1
   b. Disconnect the drain hose (4) from the steering valve.
   c. Disconnect pipes (5), (6), (7), (8), (9), and (10).
5. Steering valve assembly

   Lift the steering valve assembly (11) to remove.

   kg Steering valve assembly: **30 kg**



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Installation

- Installation of the assembly is the reverse of removal.

※ 1

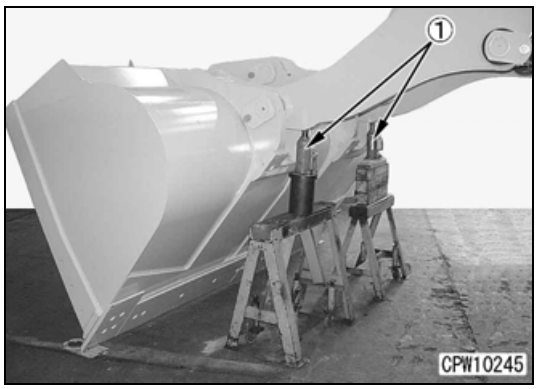
kgm Steering linkage: **168 ~ 226 Nm (17 ~ 23 kgm)**

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Travel damper assembly

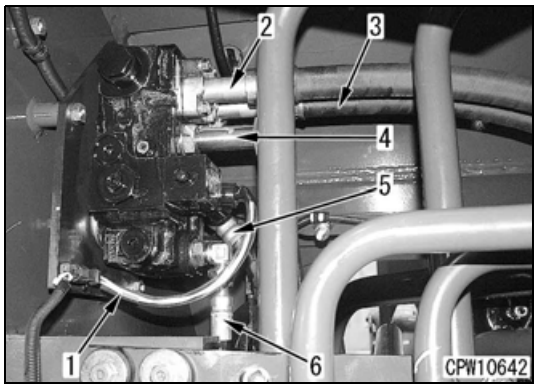
Removal

1. Fully turn the steering clockwise and provide space for removal work.
2. Lift the lift arm and support it with the jack ①.

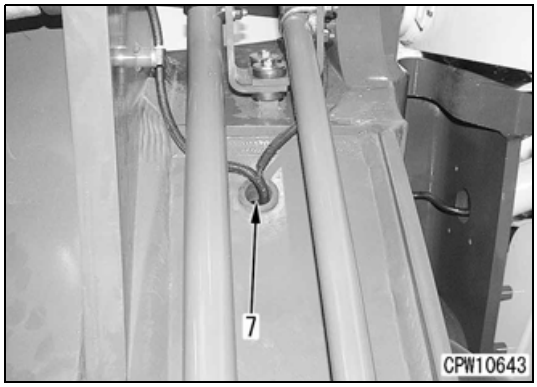


- **Ensure to support it.**
- **Apply parking brake and put blocks under the tires.**
- **Loosen the filler cap of the hydraulic oil tank and release the internal pressure.**

3. Harness connector, hydraulic piping
   a. Separate the connector (1)(CN-F13).
   b. Disconnect pipes (2), (3), (4), (5), and (6).



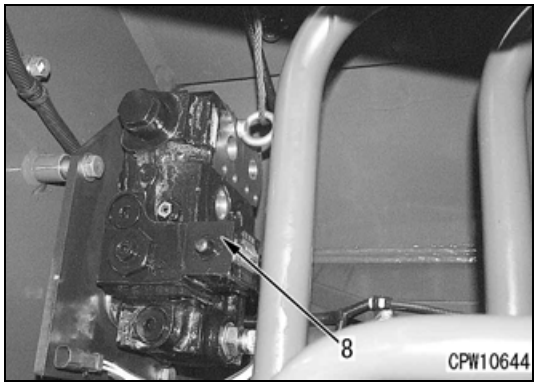
   c. Draw wires through harness eyehole (7) on the front frame and temporarily lift the travelling damper valve assembly (8).



   d. Remove the bracket mounting bolts and draw the travelling damper valve assembly (8) frontward together with the bracket and take them out.

      ★ Two persons should conduct work.

      kg Travelling damper valve bracket assembly: **30 kg**



Installation

- Installation of the assembly is the reverse of removal.

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Parking brake disc

Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
C13	1	793T-607-1190	Bracket	■	1	N	❍
	2	425-15-13320	Plate	■	1		
	3	01051-62220	Bolt	■	1		

Removal

- **Park the machine on a level place and lower the bucket onto the ground.**
- **Install the safety bar on the frame and put blocks under the tires.**

1. Oil drain

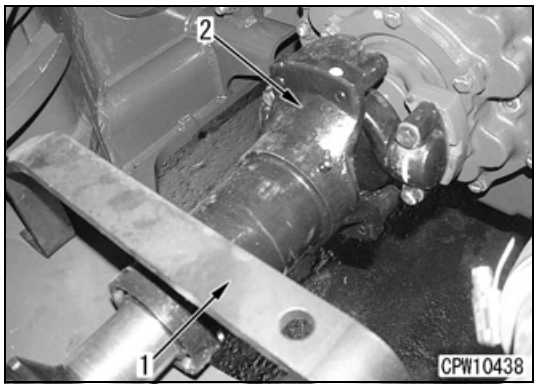
   Drain transmission oil.

   Transmission oil: **65 l**

2. Center propeller shaft

   Remove the guard (1) and separate the center drive shaft (2) from the transmission. ※1

   ★ The center drive shaft separated should be kept clear of the work area.



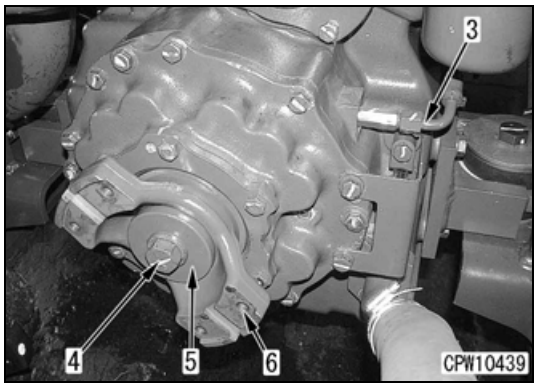
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3. Disconnect the tube (3).

4. Coupling

   Remove the bolt (4), washer (5), and coupling (6). ✳2

   ★ Put mating marks on the coupling and cover for the reference purpose when reinstalling.



5. Cover

   a. Remove the cover mounting bolts (8) and parking brake case through-bolts (9).

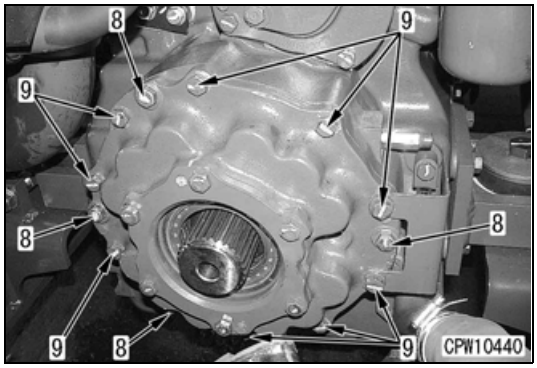
      ★ Install the guide bolts ① and ② with two each of bolts (8) and (9) left on the cover.

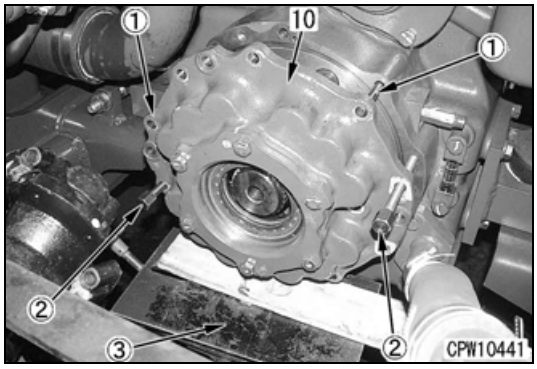
   b. Remove the remaining through-bolts (9).

   c. Set the jack ③ under the cover (10).

   d. Slowly loosen the remaining cover mounting bolts (8) and remove the cover (10).

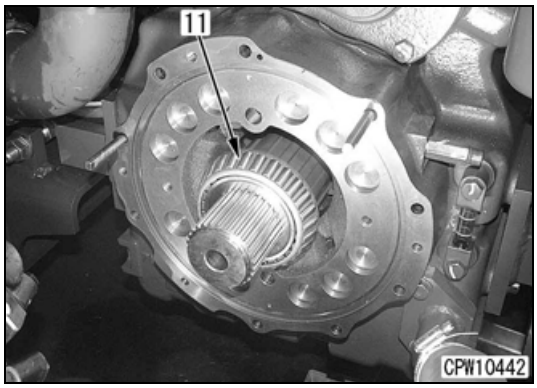
      ★ Caution should be exercised as a spring in the cover could fall.





6. Bearing, piston

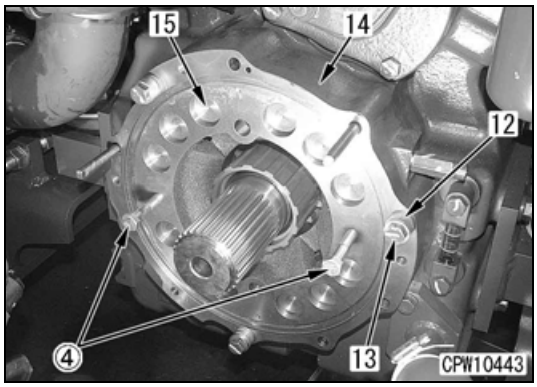
   a. Remove the bearing (11).



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b. Temporarily tighten the bolt (13) by pinching the washer (12) and secure the parking brake case (14) in the transmission case.

c. Install the bolt ④ in the piston (15) and pull the piston frontward to remove.

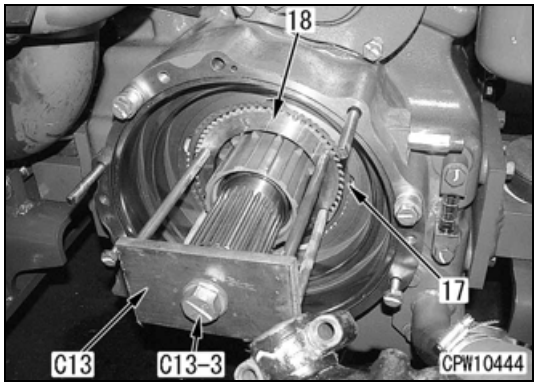


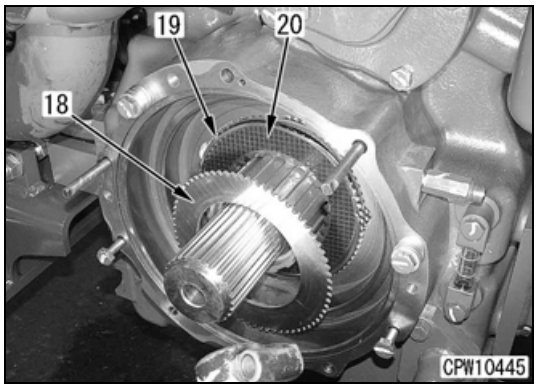
7. Parking brake disc

a. Install Tool **C13** on the output shaft, tighten the coupling mounting bolts (Tool **C13-3**), and press the plate (18).

b. Remove the snap ring (17). ※ 3

c. Remove the plate (18), spring (19), and disk (20).





Installation

- Installation is the reverse of removal.

※ 1

kgm Center drive shaft:
98.1 ~ 122.6 Nm {10 ~ 12.5 kgm}

※ 2

★ Install by aligning mating marks put when removing.

Coupling mounting bolt:
Adhesive agent (LT-2)

kgm Coupling mounting bolt:
662 ~ 829 Nm {67.5 ~ 84.5 kgm}

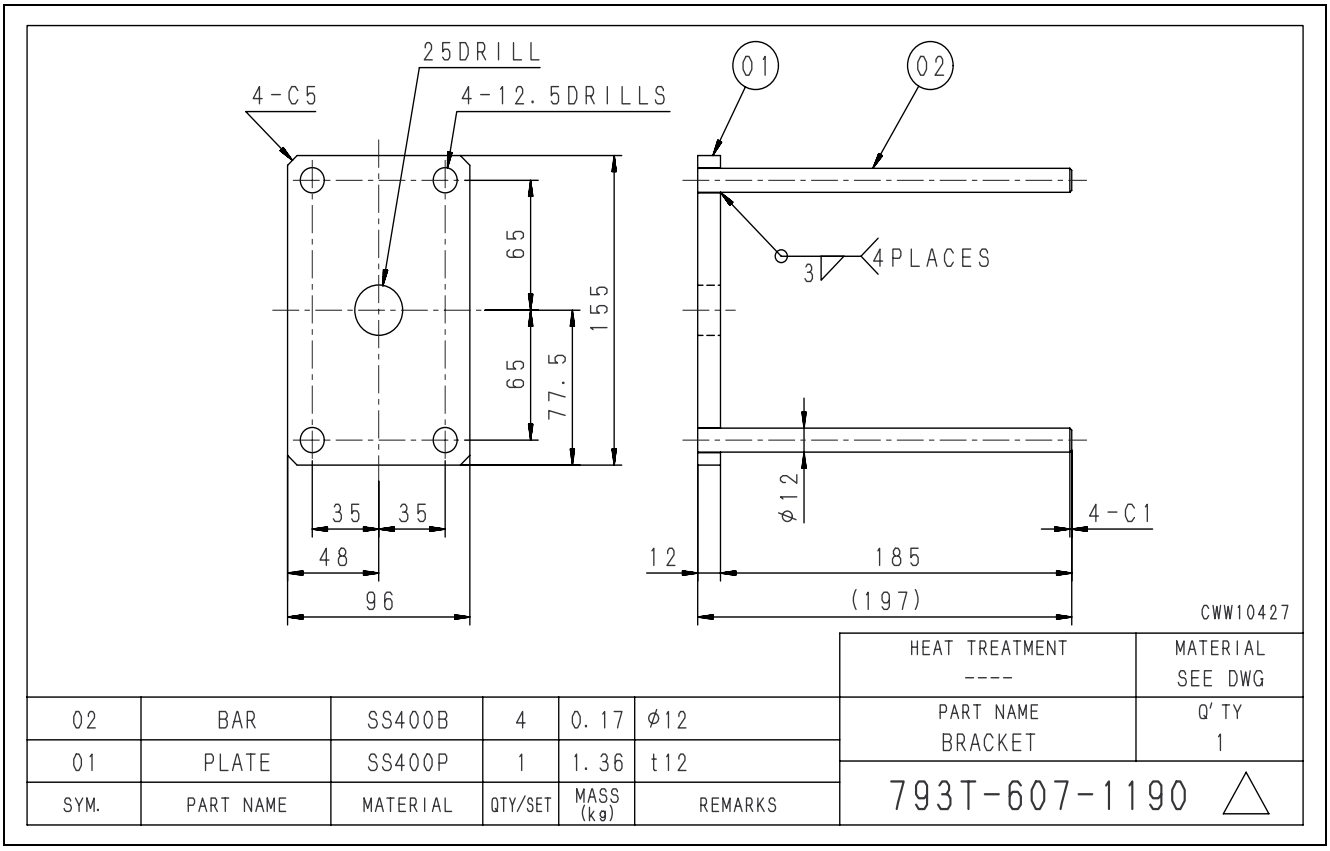
※ 3

★ Be sure to install the snap ring in groove.

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Schematic drawing of special tools

C13 Bracket



HEAT TREATMENT	MATERIAL
----	SEE DWG

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
02	BAR	SS400B	4	0.17	φ12
01	PLATE	SS400P	1	1.36	t12

PART NAME	Q'TY
BRACKET	1
793T-607-1190 △	

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Hydraulic tank

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.**
- **Tighten the oil filler cap of the hydraulic oil tank and remove the internal pressure.**

1. Right rear fender

   Hand and remove the right rear fender (1).

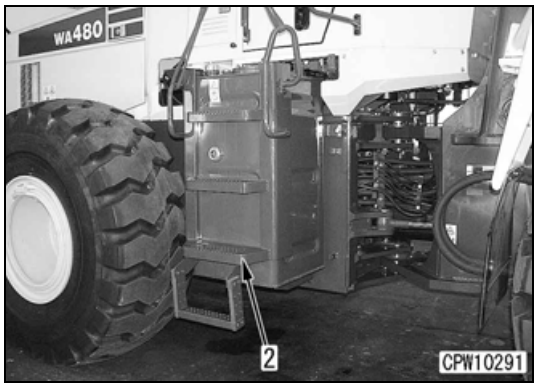
   kg Right rear fender: **40 kg**



2. Ladder

   Hang and remove the ladder (2).

   kg Ladder: **20 kg**

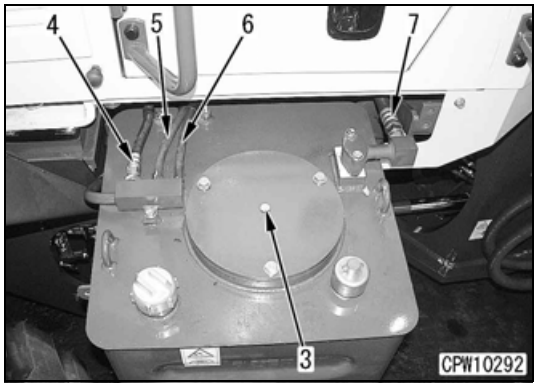


3. Oil drain

   a. Tighten the plug (3) on the filter top of the hydraulic oil tank and drain the oil of the filter. ※1

   b. Remove the hydraulic oil from the hydraulic oil tank.

      Hydraulic oil: **190 l**



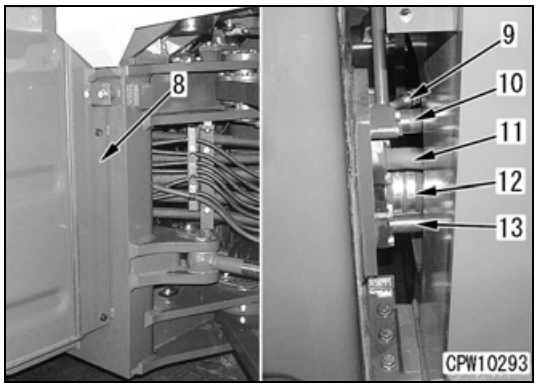
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4. Hydraulic piping

   a. Disconnect the hoses (4), (5), (6), and (7).

   b. Remove the cover (8) at the front side of the hydraulic oil tank machine.

   c. Disconnect piping (9), (10), (11), (12), and (13).



5. Hydraulic tank association

   Hand and remove the hydraulic oil tank assembly (14).

   kg Hydraulic oil tank association: **240 kg**



Installation

- Installation is the reverse of removal.

※ 1

kgm Filter top plug: **9.8 ~ 12.7 Nm {1.0 ~ 1.3 kgm}**

★ Refill hydraulic oil to the specified level.

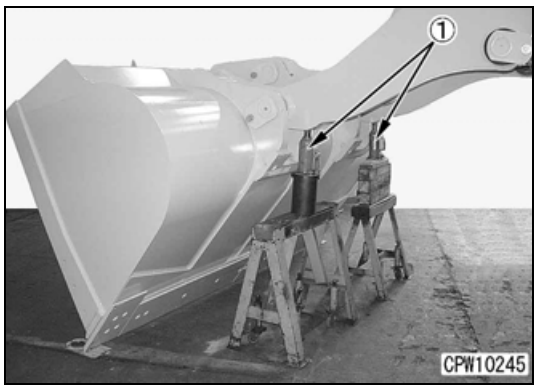
★ Start the engine and circulate hydraulic oil, then recheck the level.

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Work equipment valve assembly

Removal

1. Raise the lift arm and support it by the jack ①.



- **Apply parking brake and put blocks under the tires.**
- **Loosen the filler cap of the hydraulic oil tank and release the internal pressure.**

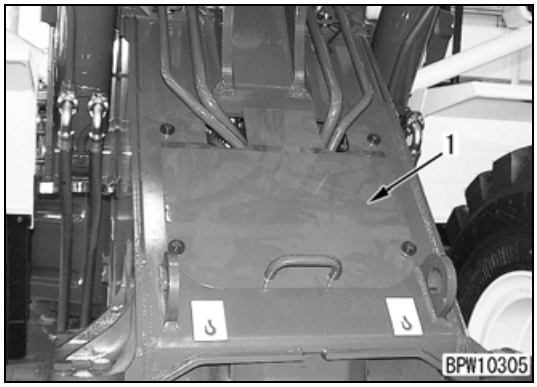
2. Oil drain

   Remove hydraulic oil.

   Hydraulic oil: **190 l**

3. Cover

   Remove the cover (1).



4. Hydraulic piping and harness connector

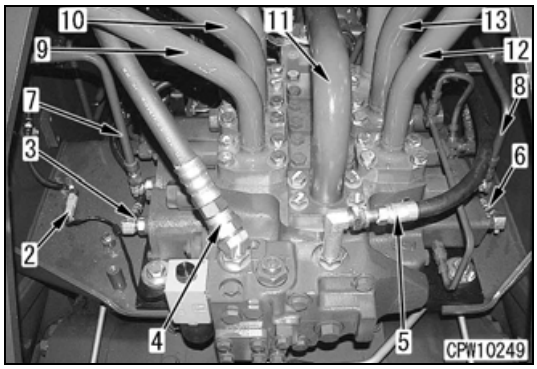
   a. Disconnect the connector (2): (CN-F07).

   b. Disconnect the hoses (3), (4), (5), and (6).

   c. Disconnect the tubes (7) and (8).

   d. Remove the tubes (9), (10), (11), (12), and (13).

      ★ The picture shows the 3-spool specifications (for mounting an attachment) as an example.

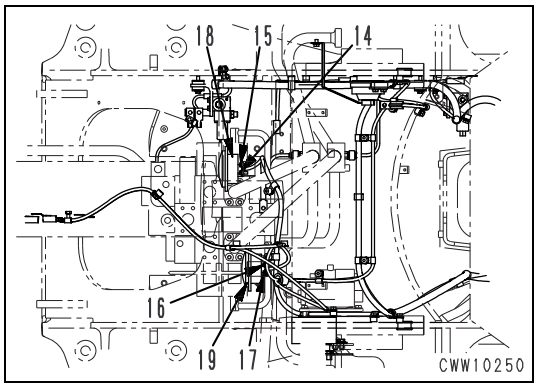


   e. Disconnect the connector at four locations.

      - (14): CN-F03
      - (15): CN-F04
      - (16): CN-F05
      - (17): CN-F06

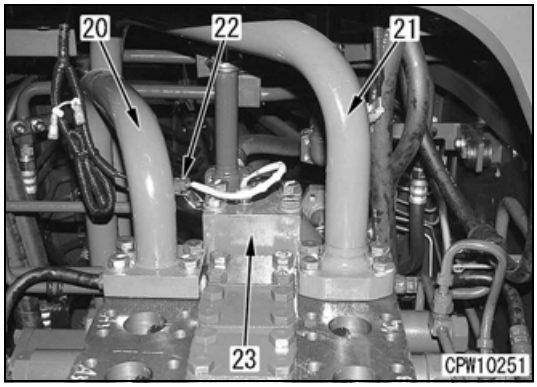
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f. Remove the horns (18) and (19).

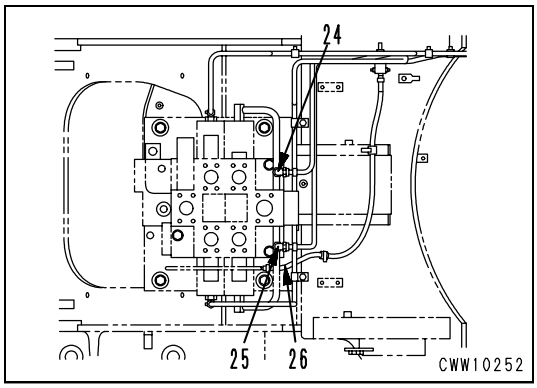


g. Remove the mounting bolts of the tubes (20) and (21).

h. Disconnect the connector (22) (CN-F28) and remove the oil temperature sensor (23).



i. Disconnect the tubes (24) and (25) and the hose (26).

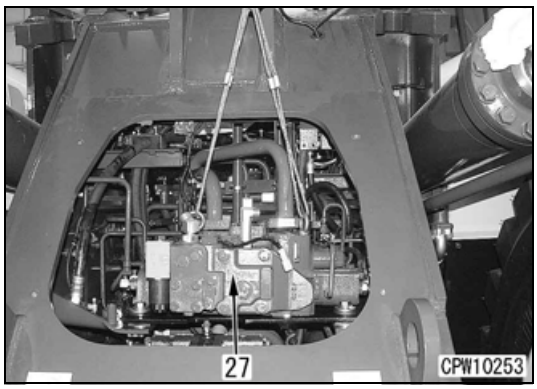


5. Work equipment valve assembly

Slide the work equipment valve assembly (27) to the front once and lift and remove it.

★ Remove the work equipment valve assembly paying attention so that it cannot interfere with peripheral piping.

kg Work equipment valve assembly: **150 kg**



Installation

- Installation is the reverse of removal.

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Hydraulic cylinder assembly (steering, lift, and bucket cylinder assemblies)

Special tools

Symbol		Part Number	Item Name	Level of need	Qty	New or Revised	Schematic Drawing
F1	1	790-502-1003	Cylinder repair stand	■	1		
	2	790-101-1102	Hydraulic pump	■	1		
F2		790-302-1280	Socket	■	1		
F3	1	790-330-1100	Wrench ass'y	■	1		
	2	790-102-2303	Wrench ass'y	■	1		
F4	1	790-102-4300	Wrench ass'y	■	1		
	2	790-102-4310	Pin	■	1		
F5	1	790-720-1000	Expander	■	1		
	2	796-720-1660	Ring	■	1		
	3	07281-01159	Clamp	■	1		
	4	796-720-1690	Ring	■	1		
	5	07281-01919	Clamp	■	1		
	6	07281-02169	Clamp	■	1		
	7	796-720-1720	Ring	■	1		
	8	07281-02429	Clamp	■	1		
F6	1	790-201-1500	Pushing tool kit	■	1		
	2	790-101-5021	• Grip		1		
	3	01010-50816	• Bolt		1		
	4	790-201-1570	• Plate		1		
	5	790-201-1990	• Plate		1		
	6	790-201-1660	• Plate		1		
	7	790-201-1680	• Plate		1		
F7	1	790-201-1702	Pushing tool kit	■	1		
	2	790-101-5021	• Grip		1		
	3	01010-50816	• Bolt		1		
	4	790-201-1761	• Pushing tool		1		
	5	790-201-1930	• Pushing tool		1		
	6	790-201-1851	• Pushing tool		1		
	7	790-201-1871	• Pushing tool		1		

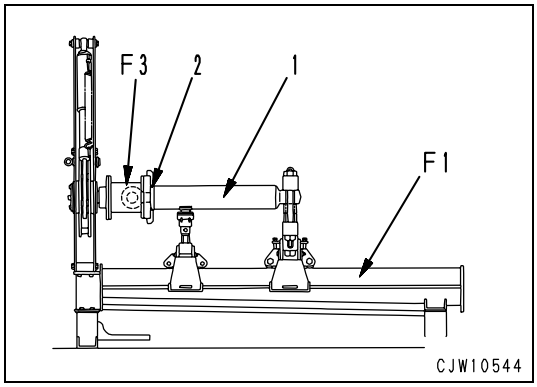
https://truckmanualshub.com/

Disassembly

1. Disassembly of cylinder head/piston assembly for steering cylinders

   a. Set the cylinder assembly (1) for the tool **F1**.

   b. Use the tool **F3-1** or **F3-2** to remove the cylinder head (2) from the cylinder.



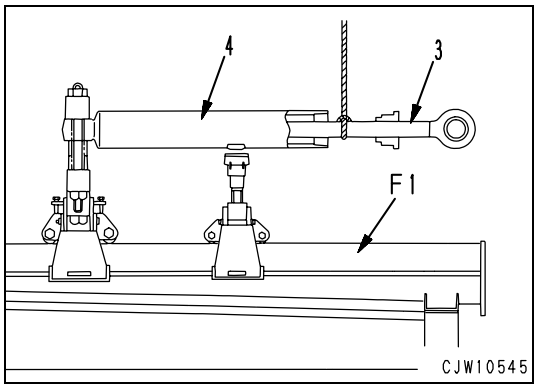
   c. Extract the cylinder head/piston rod assembly (3) from the cylinder (4) and hang and remove it.

      ★ Because oil flows out when the piston rod assembly (3) is extracted from the cylinder, prepare an oil receiver.

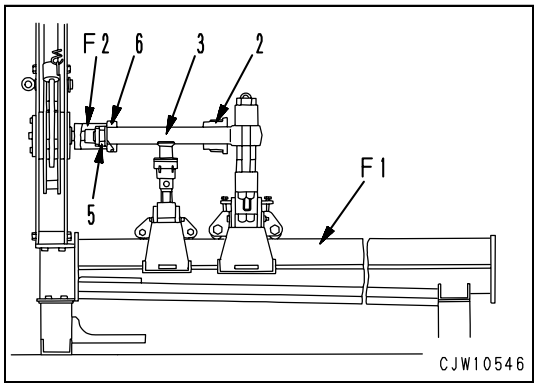
   d. Set the cylinder head/piston rod assembly (3) for the tool **F1**.

   e. Use the tool **F2** to remove the nut (5).

      ★ Nut width across flats: 55 mm



   f. Remove the piston (6) and remove the cylinder head (2).

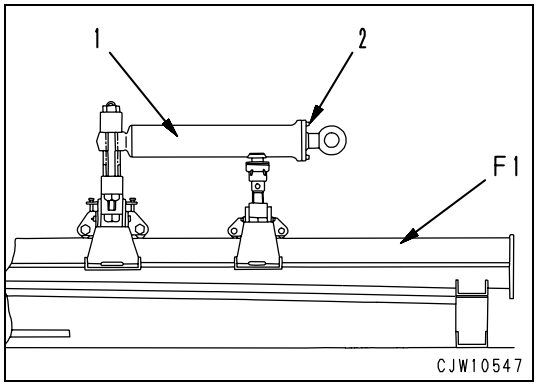


2. Disassembly of cylinder head/piston rod assembly for lift and bucket cylinders

   a. Set the cylinder assembly (1) for the tool **F1**.

   b. Remove the mounting bolt of the cylinder head (2).

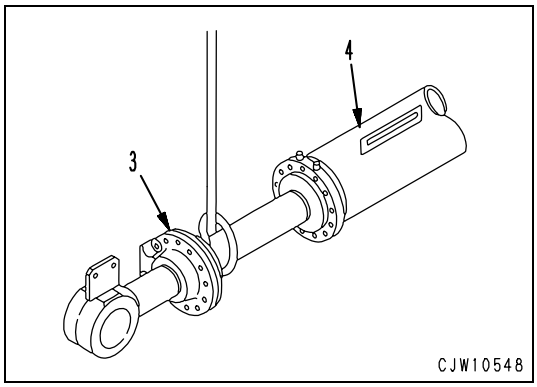
Cylinder		Bolt width across flats (mm)
Lift cylinder		27
Bucket cylinder	WA470-5	30
	WA480-5	32



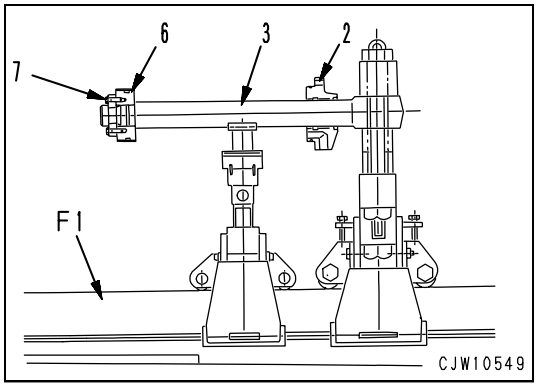
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c. Extract the cylinder head/piston rod assembly (3) from the cylinder (4) and hang and remove it.

★ Because oil flows out when the piston rod assembly is extracted from the cylinder, prepare an oil receiver.

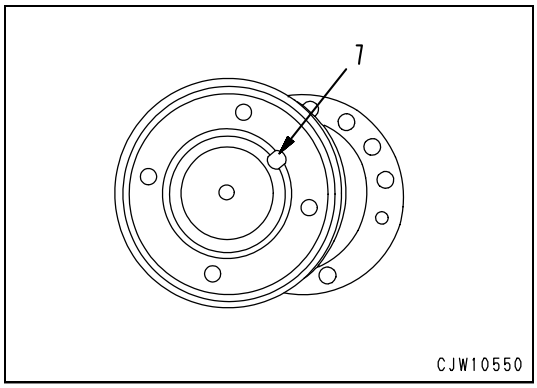


d. Set the cylinder head/piston rod assembly (3) for the tool **F1**.

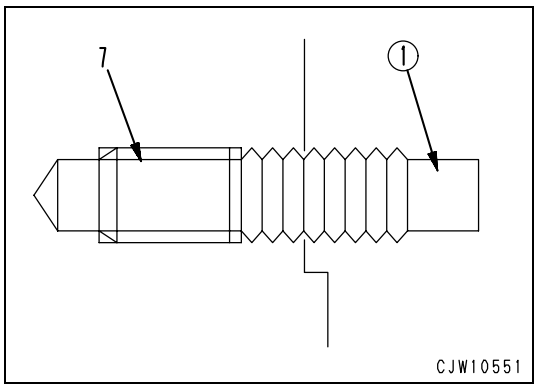


e. Remove the lock screw (7) of the piston rod assembly.

★ Screw size common to the lift and bucket cylinders: M12 x pitch 1.75



★ When the caulking of the screw (7) is strong and the screw is not removed, thrust the screw into the depth once and apply the tap ① to the threaded portion, then remove the screw.

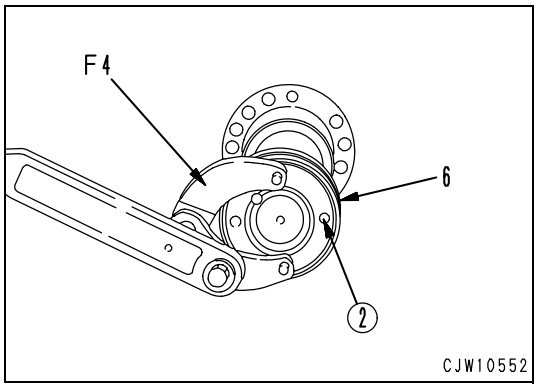


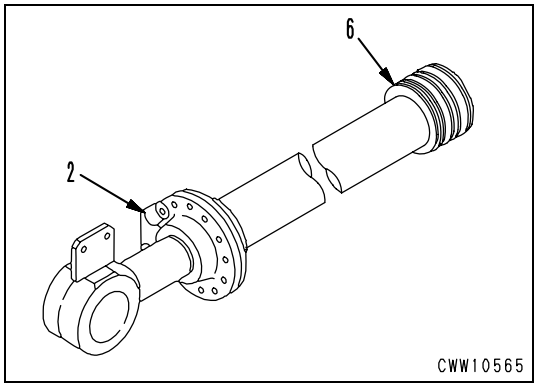
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f. Use the tool **F4** to remove the piston rod assembly (6).

★ When the tool **F4** is not used, use the drill hole ② (10 in diameter: two locations) to loosen the piston rod assembly.

g. Remove the head assembly (2).

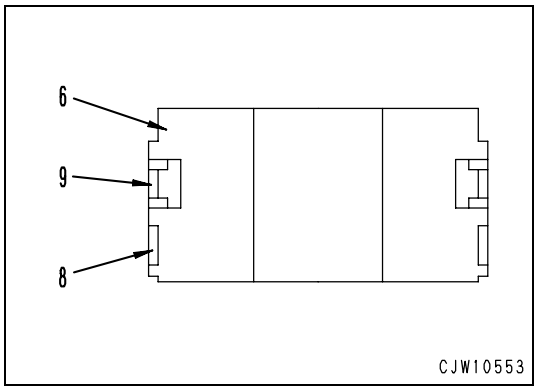


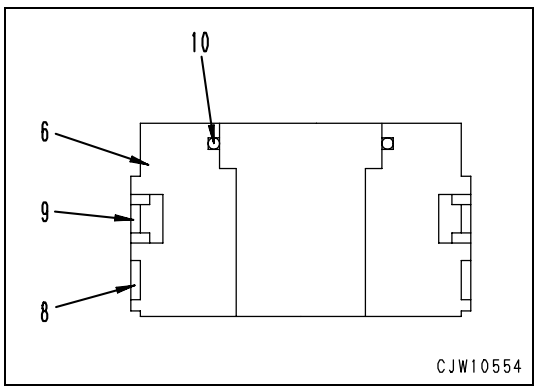


3. Fine disassembly of piston rod assembly

a. Remove the wear ring (8) and the piston ring (9) from the piston (6).

b. Remove the O-ring/backup ring (10) from the piston (6) (lift and bucket cylinders).





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4. Fine disassembly of cylinder head assembly

   a. Remove the O-ring/backup ring (11).

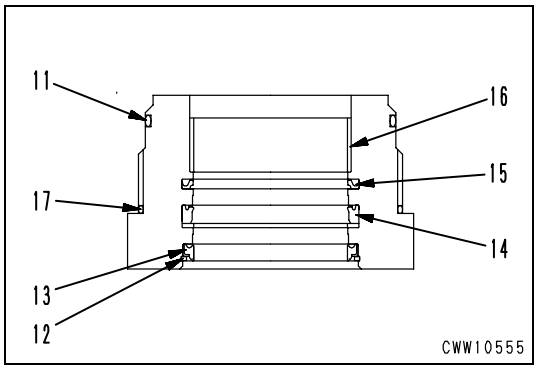
   b. Remove the snap ring (12) and remove the dust seal (13).

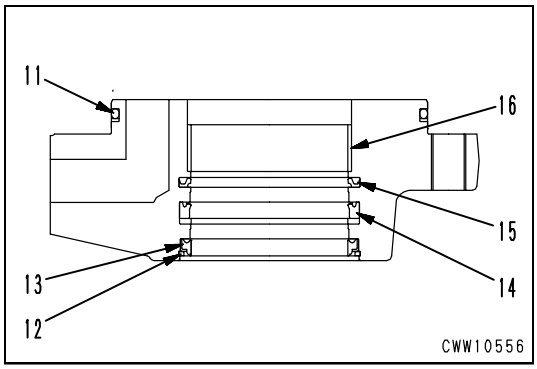
   c. Remove the rod packing (14).

   d. Remove the buffer ring (15).

   e. Remove the bushing (20).

   f. Remove the O-ring (17). (Steering cylinder)





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Assembly

★ Pay attention not to damage the packing, dust seal, and O-ring.

★ Insert the backup ring after having heated it using warm water of about 50 ~ 60°C instead of forcibly fitting it in.

1. Fine assembly of cylinder head assembly

   ★ Use the tool **F6** plate and the **F7** push tool referring to the following items.

   - **F6-4, F7-4**: Steering cylinder
   - **F6-5, F7-5**: Lift cylinder
   - **F6-6, F7-6**: Bucket cylinder (WA470-5)
   - **F6-7, F7-7**: Bucket cylinder (WA480-5)

   a. Use the tool **F7** to press-fit the busing (20).

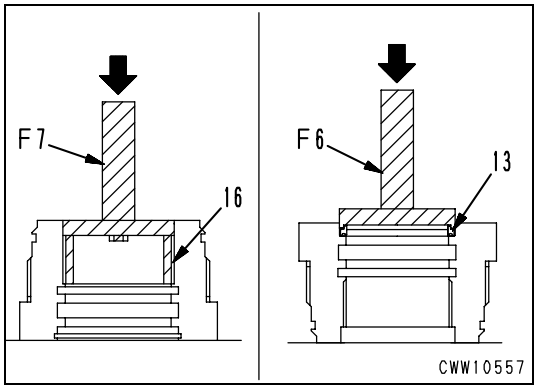
   b. Build in the buffer ring (19).

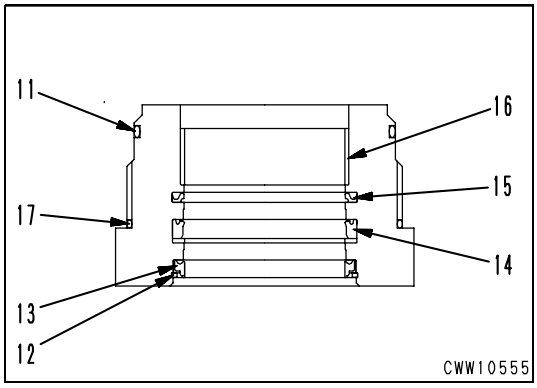
   c. Build in the rod packing (18).

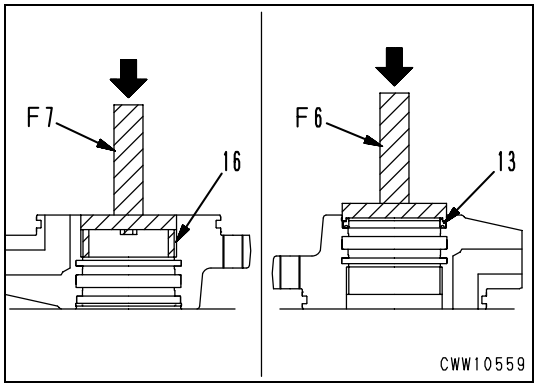
   d. Use the tool **F6** to mount the dust seal (17) and secure it with the snap ring (16).

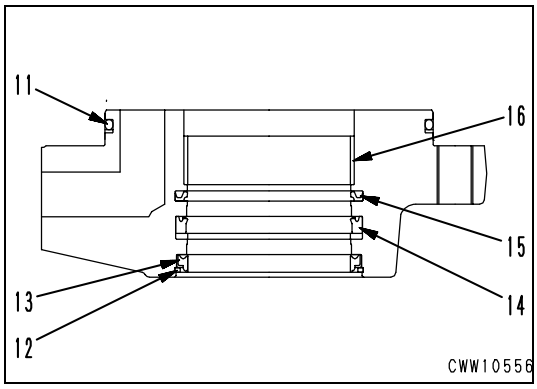
   e. Mount the buffer ring/O-ring (15).

   f. Mount the O-ring (17). (Steering cylinder)









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2. Fine assembly of piston assembly

   a. Use the tool **F5-1** to widen the piston ring (9).

      ★ Rotate the handle eight to ten times to widen the piston ring.

   b. Remove the piston ring (9) from the tool **F5-1** and build it in the piston (6).

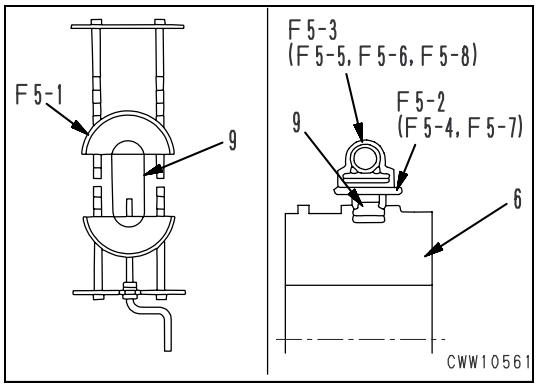
   c. Set the tool **F5** and shorten the piston ring (9).

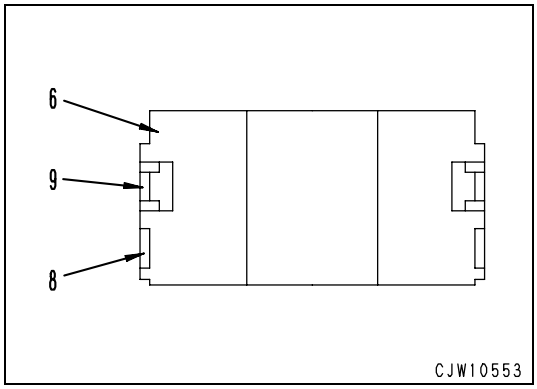
      ★ Use the tool **F5** ring and clamp referring to and combining the following items.

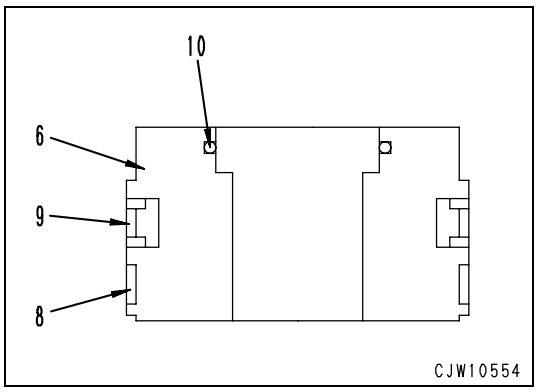
      - **F5-2, 3**: Steering cylinder
      - **F5-4, 6:** Bucket cylinder (WA470-5)
      - **F5-4, 5**: Lift cylinder
      - **F5-7, 8**: Bucket cylinder (WA480-5)

   d. Build in the wear ring (8).

   e. Mount the backup ring/O-ring (10).
      (Lift and bucket cylinders)







3. Assembly of cylinder head/piston rod assembly for steering cylinders

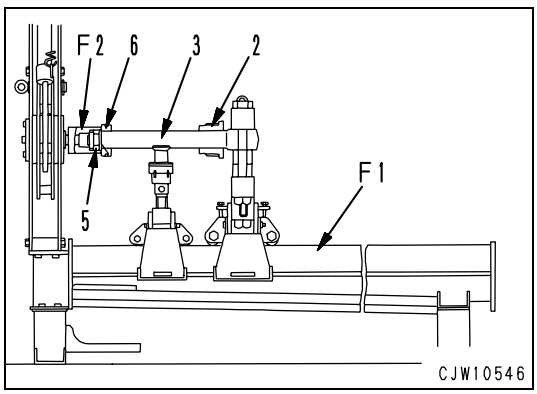
   a. Set the piston rod assembly (3) for the tool **F1**.

   b. Build the cylinder rod (2) and the piston (6) in the piston rod.

   c. Build in the nut (5) and use the tool **F2** to tighten the nut (5).

      Piston rod threaded portion: **Adhesive (LT-2)**

      kgm Nut: **1.42 ± 0.14 kN {145 ± 14.5 kgm}**
      (Width across flats 55 mm)



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d. Set the cylinder (4) for the tool **F1**.

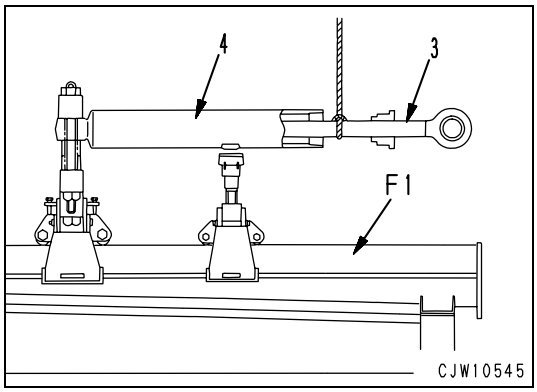
e. Hang the cylinder head/piston rod assembly (3) and build it in the cylinder (4).

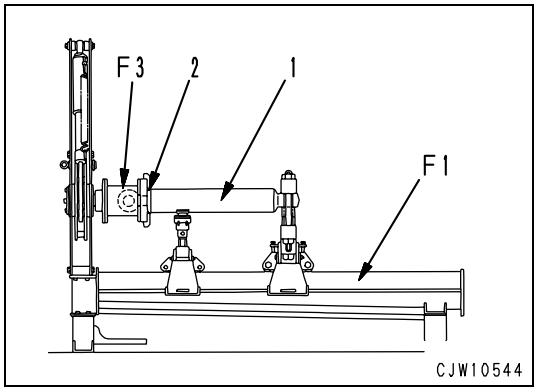
f. Use the tool **F3-1** or **F3-2** to mount the cylinder head (2) on the cylinder (4).

kgm Cylinder head: **785 ± 78.5 Nm {80.0 ± 8.0 kgm}**

g. Bend the lock of the cylinder head (2) to the cut-out portion of the cylinder side.

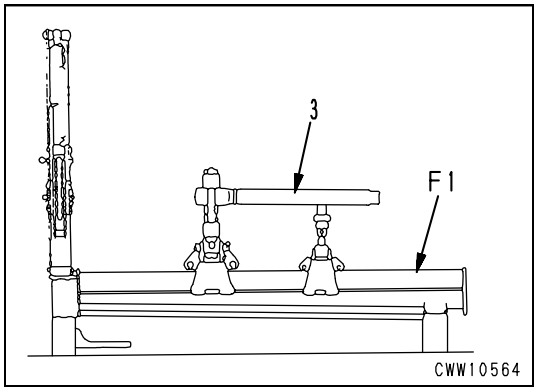
h. Remove the cylinder assembly (1) from the tool **F1**.



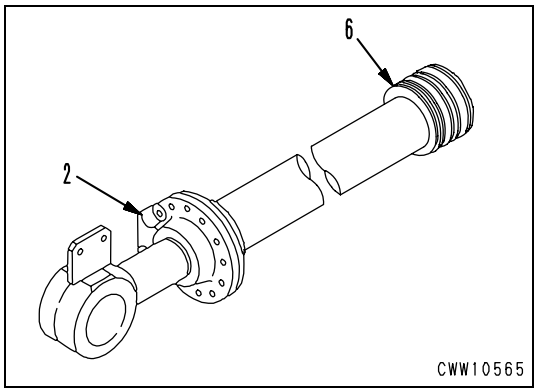


4. Assembly of cylinder head/piston rod assembly for lift and bucket cylinders

a. Set the piston rod assembly (3) for the tool F4.

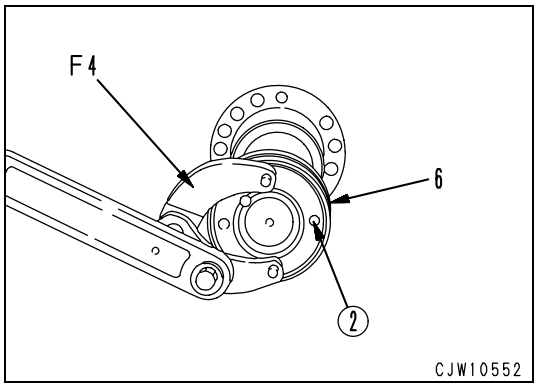


b. Build in the head assembly (2).



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c. Assemble the piston assembly (6) in the following procedures.



- When reusing the rod and piston assembly (6):

  ★ Fully clean them and remove chips and dust.

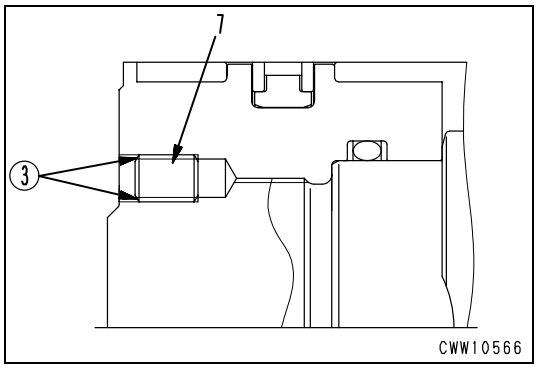
  I. Screw the piston assembly (6) and use the tool **F4** to tighten the piston assembly (6) until the position of the screw tapped hole is aligned.

  ★ Remove burrs of the threaded portion with a file, etc.

  II. Tighten the screw (7).

  kgm Screw (7): **66.2 ± 7.35 Nm {6.75 ± 0.75 kgm}**

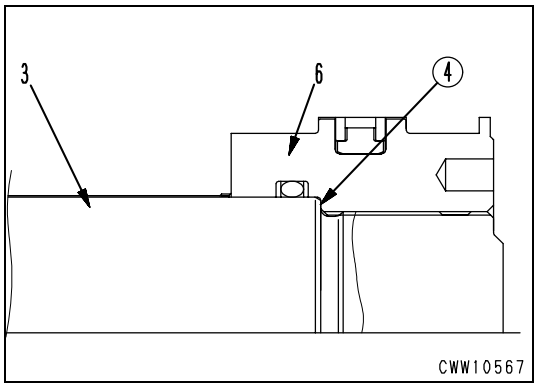
  III. Caulk the threaded portion with the punch ③ in four locations.



- When using a new product on one side or both sides of the rod and the piston assembly (6):

  I. Screw the piston assembly (6) until it touches both ends ④ of the rod and use the tool **F4** to tighten it.

  kgm Piston assembly (6):
  294 ± 29.4 Nm {30 ± 3.0 kgm}

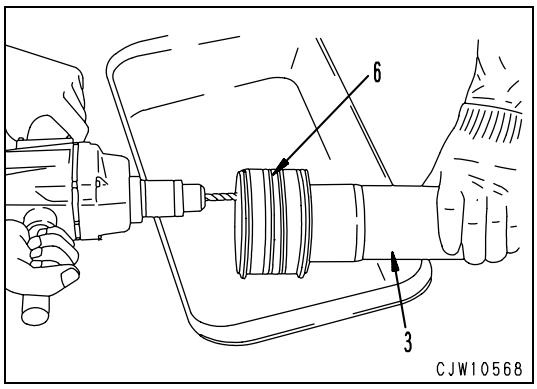


  II. Work one location of the tapped hole at which the screw (7) is bonded.

  ★ Horizontally work the tapped hole by aligning a drill to the V-groove of the threaded portion in the piston (6) and the rod (3).

  - Screw work dimensions (mm)

Tap drill diameter	Tap drill depth	Tap used	Tap depth
10.3	27	12 x 1.75	20



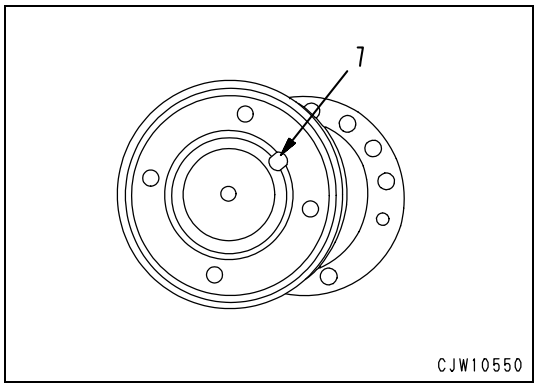
https://truckmanualshub.com/

III. After having worked the tapped hole, remove chips and dust and fully clean it.

IV. Tighten the screw (7).

kgm Screw (7): **66.2 ± 7.35 Nm {6.75 ± 0.75 kgm}**

V. The two locations of the threaded portion are caulked by a punch.



d. Set the cylinder (4) for the tool **F1**.

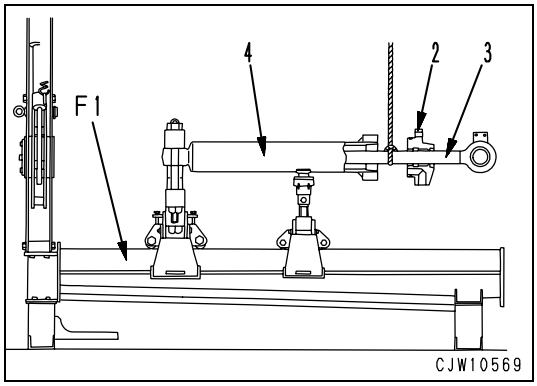
e. Hang the cylinder head/piston rod assembly (3) and build it in the cylinder (4).

f. Mount the cylinder head (2) on the cylinder (4).

kgm Mounting bolt:
343 ± 34.3 Nm {35 ± 3.5 kgm} (
Lift cylinder)

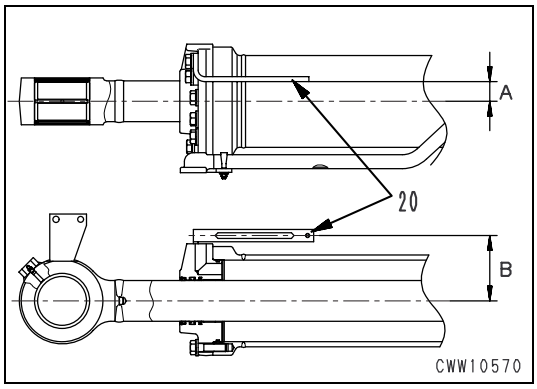
490 ± 49.0 Nm {50 ± 5 kmg}
(WA470-5 bucket cylinder)

622 ± 73.5 Nm {67.5 ± 7.5 kgm}
(WA480-5 bucket cylinder)



★ For the leveler plate (20) of the bucket cylinder, tighten the bolt to the following dimensions.

- Dimensions **A:** 48.5 ± 1 mm
  B: 160 ± 2 mm (WA470-5)
  177 ± 2 mm (WA480-5)



g. Remove the cylinder assembly (1) from the tool **F1**.

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Work equipment assembly

Removal

• Park the machine on level ground and lower the bucket onto the ground.
• Mount the safety bar on the frame, apply the parking brake and put blocks under the wheels.

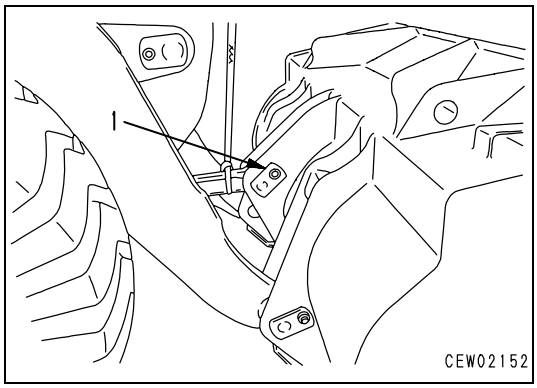
1. Bucket link

   a. Mount the bucket link and remove the pin (1). ※1

   ★ Use the lever block to secure the bucket link to the bell crank.

   ★ If a shim is contained, previously check the number of shims.

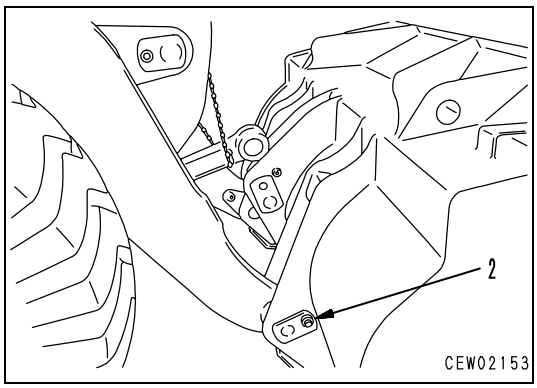
   b. Remove the bucket hinge mounting pin (2). ※2



Never insert your fingers into the pin hole.

   ★ If a shim is contained, previously check the number of shims.

   c. Move the machine to the rear and disconnect the bucket.



2. Bucket cylinder mounting pin

   a. Temporarily hang the bucket cylinder (3) and extract the pin (4), then disconnect the cylinder rod and the bell crank. ※3

   kg Bucket cylinder:
   220 kg (WA470-5)
   300 kg (WA480-5)

   b. Secure the bucket cylinder to the machine side with the lever block.



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3. Lift cylinder pin

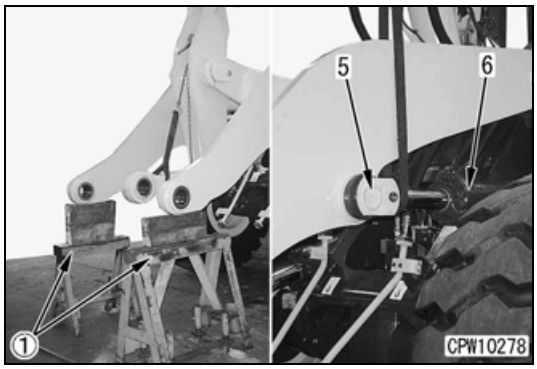
   a. Install the support stand ① at the tip of the lift arm and remove the residual pressure of the hydraulic piping.

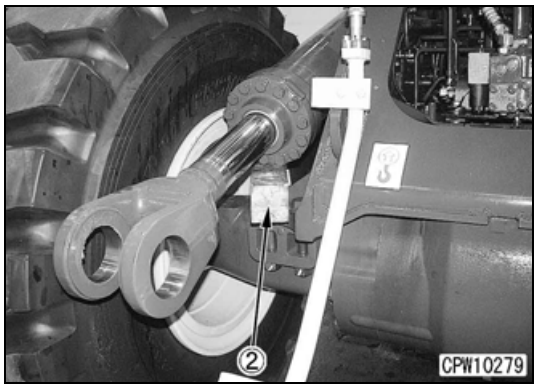
   b. Temporarily hang the lift cylinder (6) and remove the mounting pin (5). ※ 4

      ★ If a shim is contained, previously check the number of shims.

      ★ Unload the cylinder containing the block ② at the axle top.

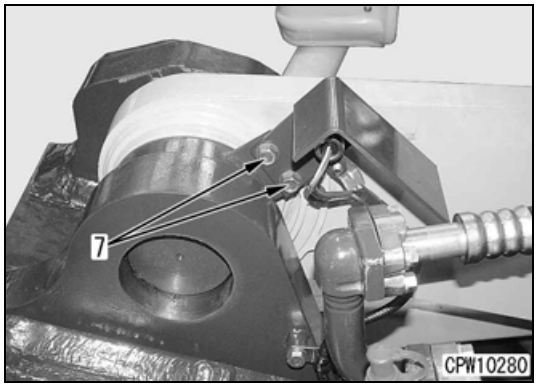
      kg Lift cylinder:
      200 kg (WA470-5)
      220 kg (WA480-5)





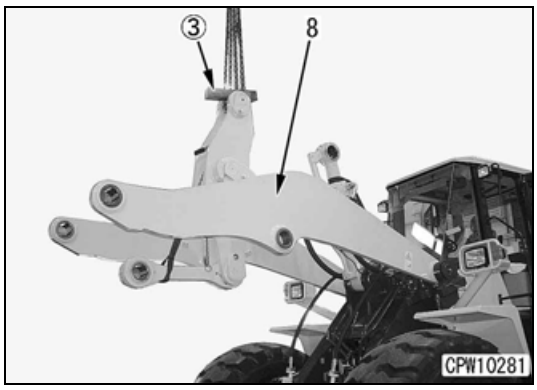
4. Lift arm/bell crank/bucket link

   a. Remove the bolt (7) and remove the lift arm kick-out switch. ※ 5



   b. Temporarily hang the lift arm/bell crank/bucket link (8).

      ★ Lift up the lift arm/bell crank/bucket link sandwiching the block ③.

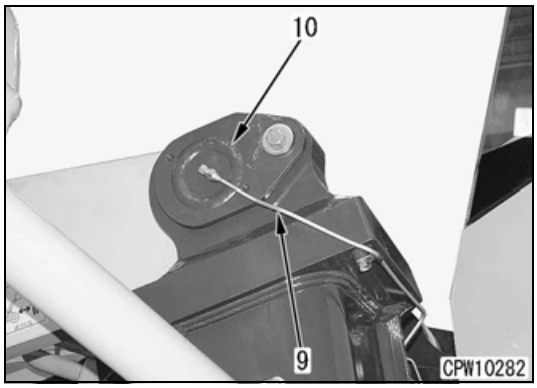


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c. Disconnect the grease tube (9) and cut off the lift arm mounting pin (10), then hang and remove the lift arm. ✻ 6

kg Lift arm/bell crank/bucket link:
1,950 kg (WA470-5)
2,100 kg (WA480-5)

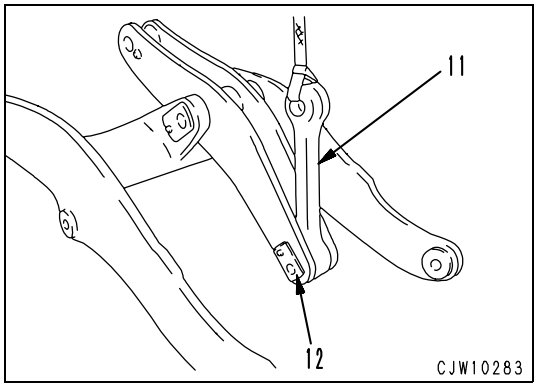
★ If a shim is contained, previously check the number of shims.



5. Bell crank/bucket link

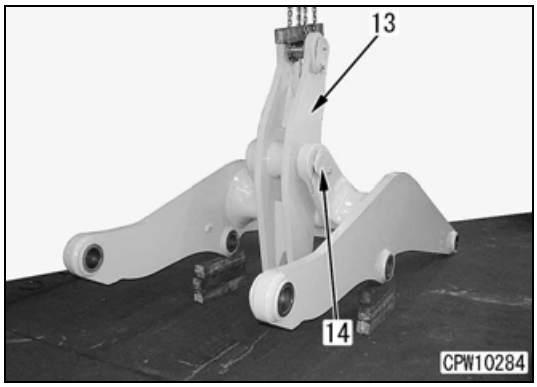
a. Temporarily hang the bucket link (11) and extract the mounting pin (12), then remove it from the bell crank. ✻ 7

kg Bucket link:
90 kg (WA470-5)
110 kg (WA480-5)



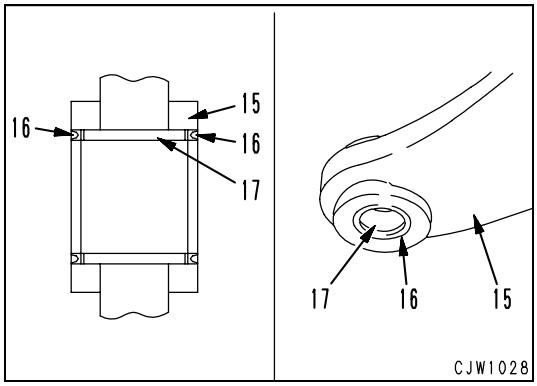
b. Temporarily the bell crank (13) and extract the mounting pin (14), then hang and remove it from the lift arm.

kg Bell crank:
390 kg (WA470-5)
410 kg (WA480-5)



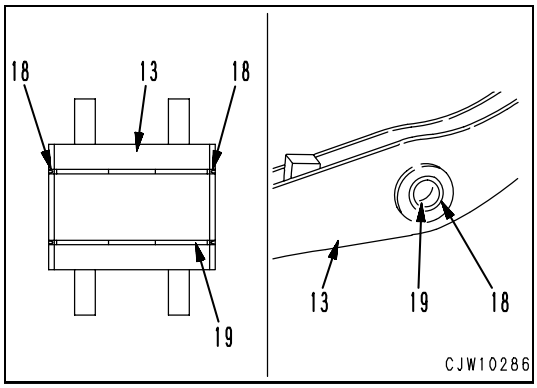
6. Dust seal and bushing

a. Remove the dust seal (16) and the bushing (17) from the lift arm (15). ✻ 8

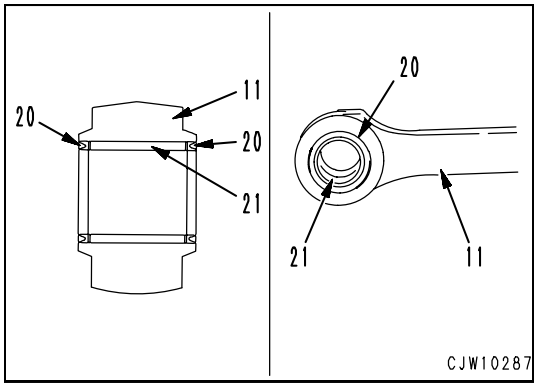


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b. Remove the dust seal (18) and the bushing (19) from the bell crank (13).



c. Remove the dust seal (20) and the bushing (21) from the bell crank (11).



Installation

- For the mounting, reverse the removal procedures

• Use a bar to align a pin hole and never insert the fingers.
• To start the engine, check that the forward-reverse lever is at the neutral position and the parking brakes are applied.

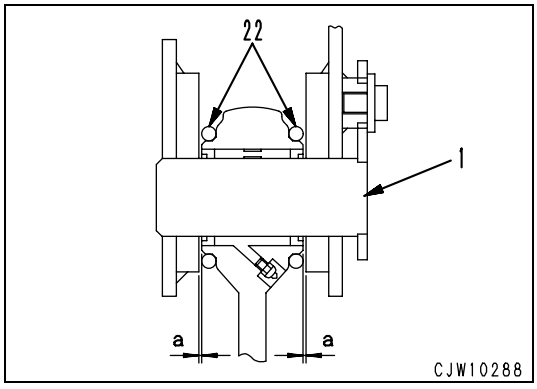
※ 1

- Bucket link

a. Hang the bucket link (11) and align the hole of the mounting pin (1). Mount the cord ring (22) and contain a shim so that the gap a can be made uniform at the left and right. Assemble the mounting pin and lock it with a bolt.

★ Pay attention so that the cord ring cannot be pinched.

★ Gap **a**: Less than 1.5 mm



To align the hole position of the pin, never insert your fingers into the pin hole.

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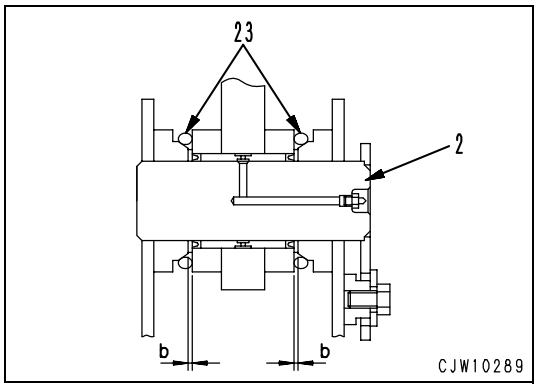
※ 2

- Bucket

a. Operate the control lever and align the hole of the bucket mounting pin (2). Mount the cord ring (23) and contain a shim so that the gap **b** can be made uniform at the left and right. Assemble the mounting pin and lock it with a bolt.

★ Pay attention so that the cord ring cannot be pinched.

★ Gap **b**: Less than 1.5 mm



To align the hole position of the pin, never insert your fingers into the pin hole.

※ 3 ※ 4

- Bucket cylinder/lift cylinder

To align the hole position of the pin, never insert your fingers into the pin hole.

※ 5

Make adjustment referring to the “Inspection and Adjustment of Lift Arm Kick-out” of the Inspection and Adjustment Volume and check the operation.

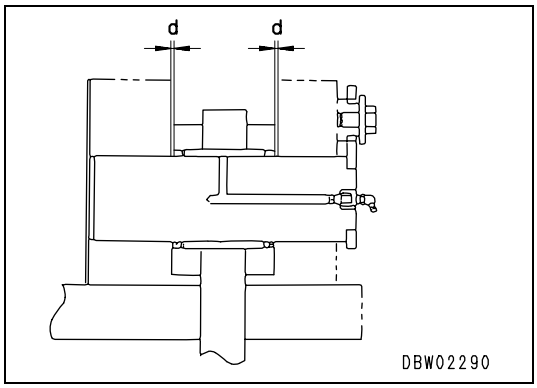
※ 6

To align the hole position of the pin, never insert your fingers into the pin hole.

★ Hang the lift arm/bell crank/bucket link and align the front frame and the lift arm mounting portion hole. Contain a shim so that the gap **d** can be made uniform at the left and right and assemble the mounting pin, then lock it with a bolt.

★ Gap **d**: Less than 1.5 mm

★ After having assembled the pin, install the support stand at the tip of the lift arm.



※ 7

★ Secure the bucket link to the bell crank with the lever block.

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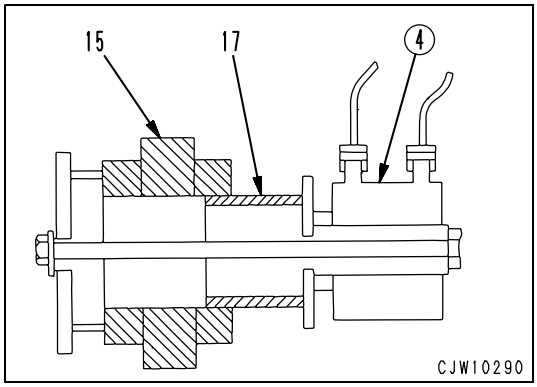
✻ 8

- Dust seal and bushing

  Press-fit a bushing in the bucket link/bell crank/lift arm respectively by the hydraulic cylinder ④ and build in the dust seal.

  Bushing: **Grease (G2-LI)**

  ★ The drawing shows the lift arm as an example.



- Lubrication

  ★ Put a lubricant on each pin.

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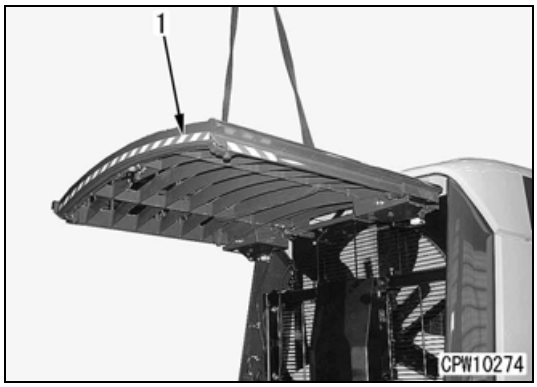
Counterweight

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Attach the safety bar to the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the battery (-) terminal.**

1. Fan Cover

   a. Open the fan cover (1) for sling.

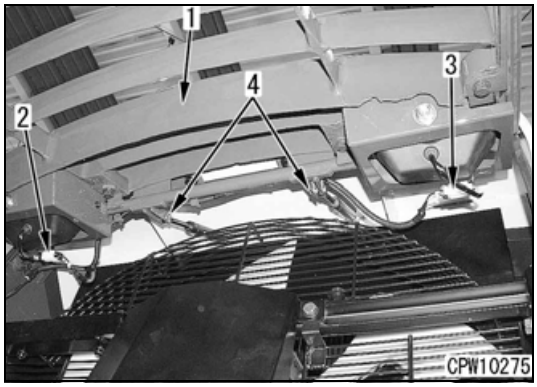


   b. Disconnect the connectors (2) (CN-G04) and (3) (CN-G05).

   c. Remove the pin (4).

   d. Remove the mounting bolt and then remove the fan cover (1).

      ★ Be careful not to lose the spacer between the cover and the hood.



2. Counterweight

   Sling the counterweight (5) and remove the mounting bolt to remove the counterweight. ※1

   kg Counterweight :
   1,950 kg (WA470)
   3,000 kg (WA480)



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Installation

- For installation, reverse the removing procedures.

※1

★ When installing the counterweight, be careful not interfere it with the battery box.

kgm Counterweight mounting bolt:
824 ~ 1,030 Nm {84 ~ 105 kgm}

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Fuel tank assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Attach the safety bar to the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the battery (-) terminal.**

1. Fuel Drain

   Loosen the drain valve and drain fuel.

   When the tank is full with fuel:
   391.1 l (WA470-5)
   413.0 l (WA480-5)

2. Harness Connector and Piping

   a. Disconnect the connector (1) (CN-R33).

   b. Remove all the bolts from the harness clamp fixing the fuel tank.

   c. Remove the mounting bolt of the radiator drain valve (2) and remove the clamp mounting bolts (3) and (4).

   d. Remove the mounting bolt of the engine oil drain valve (5).

   e. Disconnect the hoses (6), (7), (8) and (9) from the fuel tank.

3. Fuel Tank Assembly

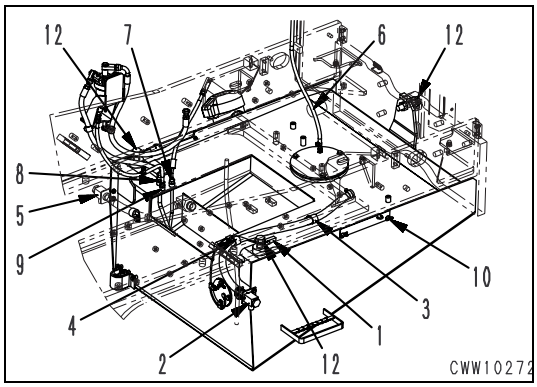
   a. Remove the bolt (10) and attach the eyebolt (11).

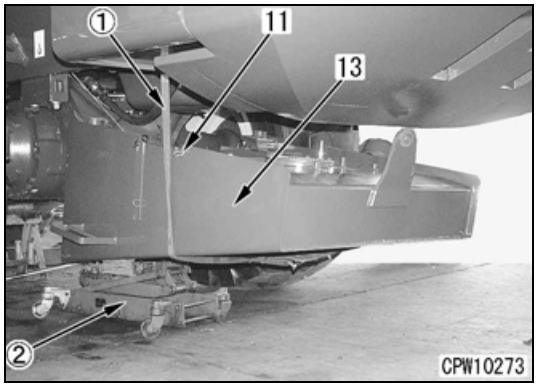
      ★ For prevention of dislocation of lifting tool at the time of lifting the fuel tank assembly. (On the right side, the oil filler port prevents the dislocation.)

   b. Use the nylon sling ① to sling the fuel tank assembly in front of the machine from the above eyebolt.

   c. Support the fuel tank with the jack ② on the machine front side.

   d. Remove the mounting bolt (12) of the fuel tank. ※1





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e. Lower the hoist slowly while adjusting the jack height so that the bottom surface of the fuel tank assembly (13) becomes parallel with the ground.

★ Check if wires are connected to the machine.

kg Fuel tank assembly (when the tank is empty):
220 kg

f. Support the bottom surface of the fuel tank and pull it outside the machine.

Installation

- For the installation, reverse the removing procedures.

※ 1

kgm Fuel tank mounting bolt:
824 ~ 1,030 Nm {84 ~ 105 kgm}

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Cab assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Attach the safety bar to the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the battery (-) terminal.**

1. Right Rear Fender

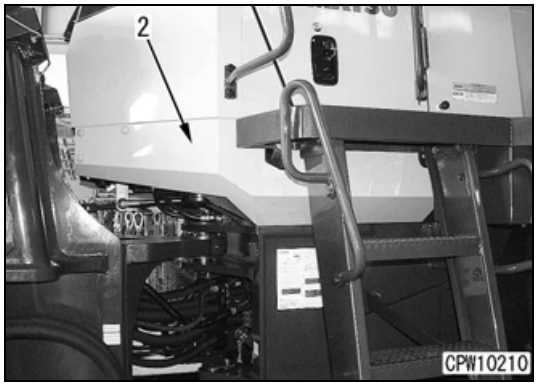
   Remove the right rear fender (1).

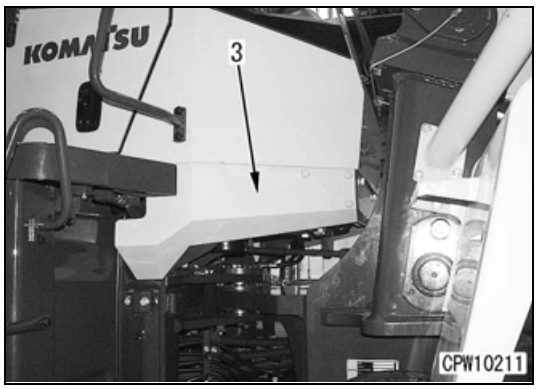
   kg Right rear fender: **40 kg**



2. Cover

   Remove the covers (2) and (3).

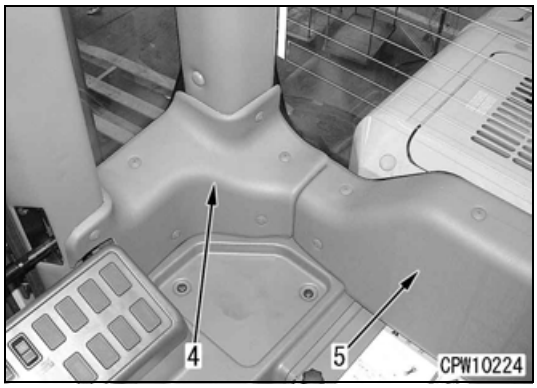


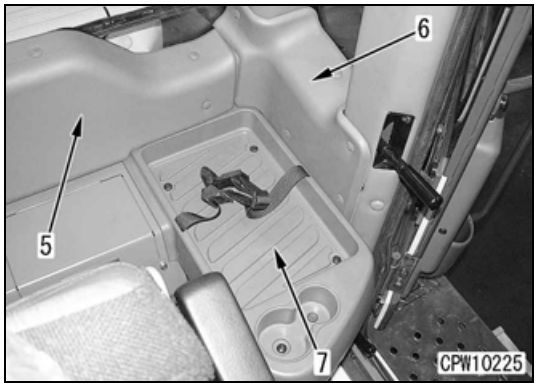


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3. Trim and Tray

   Remove the trims (4), (5) and (6) and the tray (7).

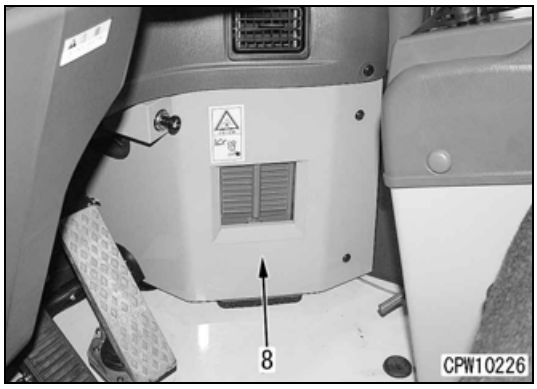




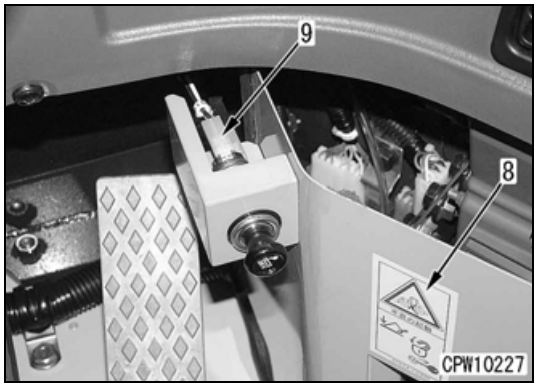
4. Harness Connector

   a. Remove the floor mat.

   b. Remove the mounting bolt and pull out the cover (8) toward you.

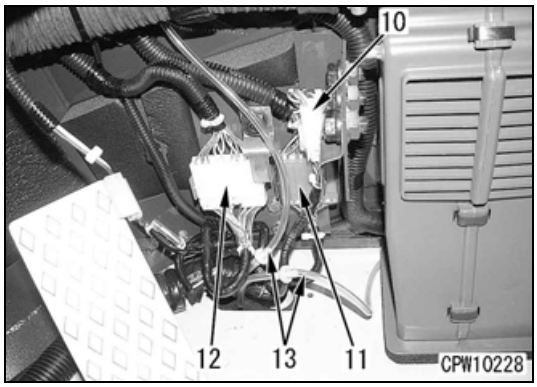


   c. Disconnect the connector (9) (CN-C10) and remove the cover (8).



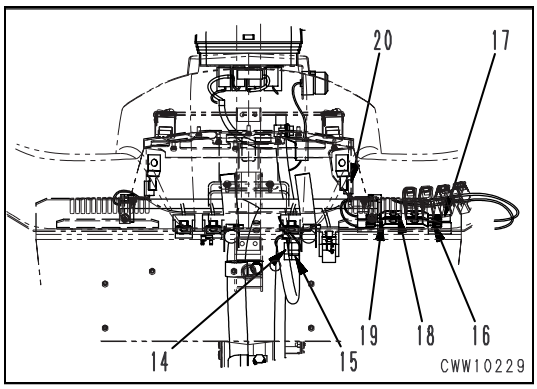
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d. Disconnect the connectors (10) (CN-CL1), (11) (CN-CL2) and (12) (CN-CL5) and the hose (13).



e. Disconnect the 7 connectors on the left side of the steering column. (The figure shows the top view of the machine.)

- (14): CN-CL-9
- (15): CN-CL10
- (16): CN-L07
- (17): CN-L08
- (18): CN-S01
- (19): CN-S02
- (20): CN-S07

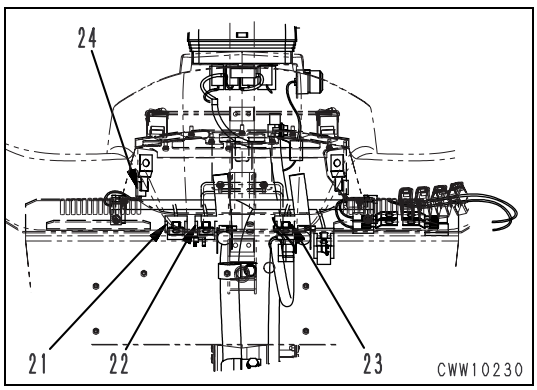


5. Cab Assembly

a. Sling the cab assembly and remove the mounting bolt.

b. Lift the cab assembly about 5 cm high.

c. Disconnect the connectors (21) (CN-CL6), (22) (CN-CL7), (23) (CN-CL8) and (24) (CN-SO3) from the top or the right side of the steering column. (The figure shows the top view of the machine.)



d. Lift and remove the cab assembly (25).

kg Cab assembly: **680 kg**



Installation

- For the installation, reverse the removing procedures.

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Cab, floor frame assembly

Removal

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Attach the safety bar to the frame, apply the parking brake and put blocks under the wheels.**
- **Loosen the oil filler cap of the hydraulic tank to relieve the internal pressure.**
- **Disconnect the battery (-) terminal.**

1. Escape gas from the air conditioner. ✳ 1

2. Right and left rear fenders

   Remove the both right and left rear fenders (1).

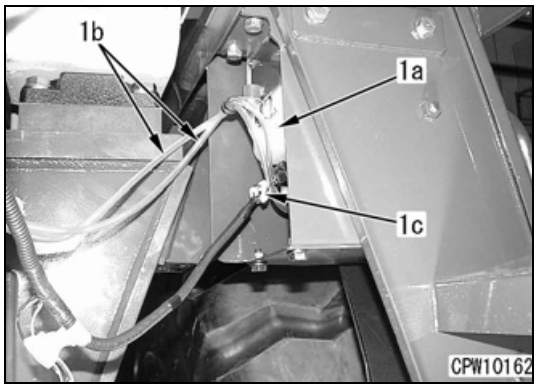
   ★ Remove the left rear fender with the rear fender ladder assembly.

   ★ For the left rear fender, remove the hose (1b) and the harness connector (1c) (CN-R43, 45) from window washer tank (1a) and them remove the left rear fender together with the window washer tank ladder.

   kg Rear fender, ladder assembly (left side): **65 kg**

   kg Rear fender (right side): **40 kg**



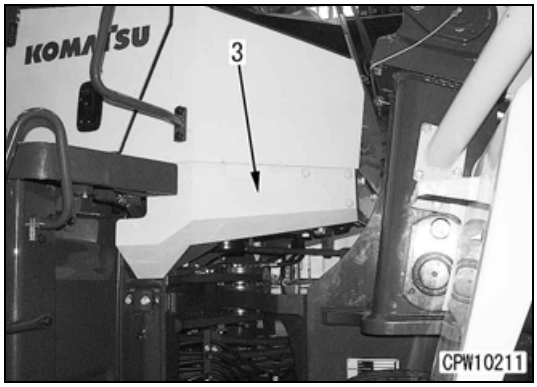


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3. Cover

   Remove the covers (2) and (3).



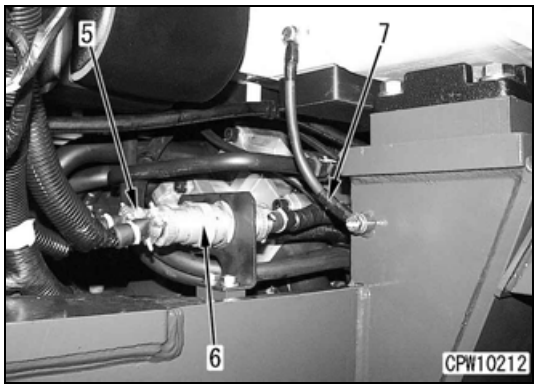


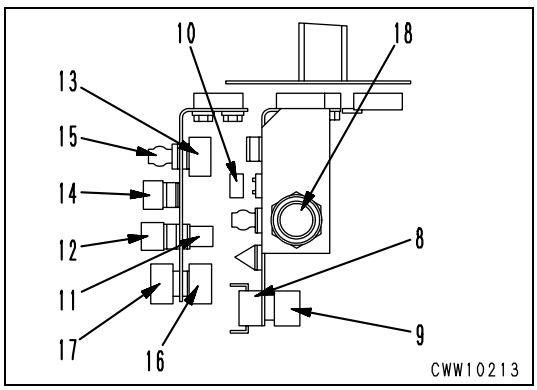
4. Harness Connector, Ground cable

   a. Disconnect the connectors (5) (CN-ER2) and (6) (CN-ER3) and the ground cable (7) from the left lower rear side of the floor frame.

   b. Disconnect the 11 connectors from the left lower section of the floor frame. (The figure shows the rear view of the machine.)

      - (8): CN-FL1
      - (9): CN-FL2
      - (10): CN-FL3
      - (11): CN-LR1
      - (12): CN-LR4
      - (13): CN-LR5
      - (14): CN-LR6
      - (15): CN-LR8
      - (16): CN-LR9
      - (18): CN-LT1
      - (17): CN-LR10

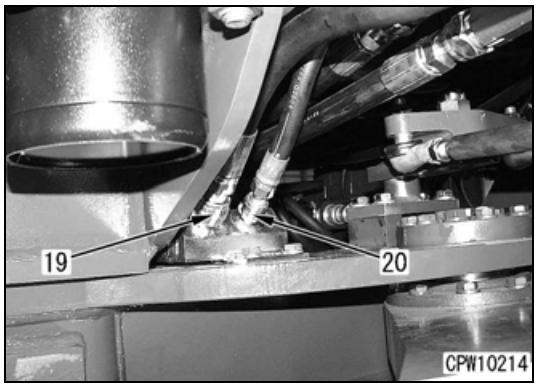


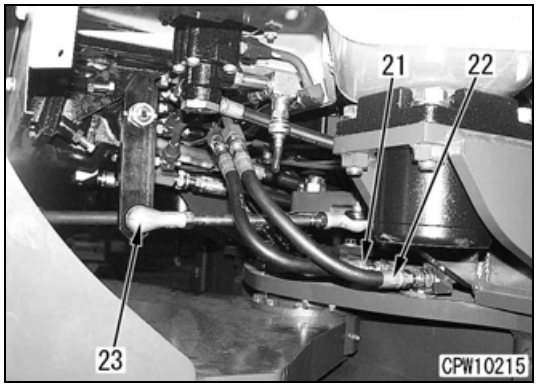


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5. Hose and Steering Rod

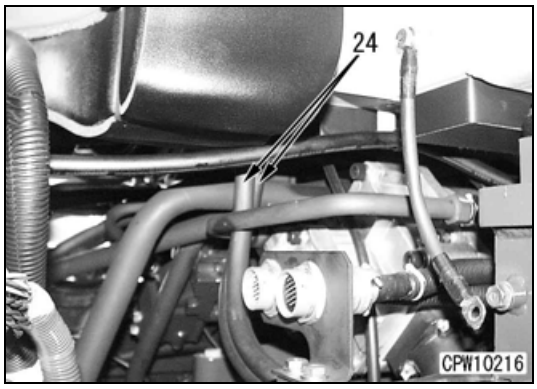
   a. Disconnect the brake hoses (19), (20), (21) and (22) and the steering rod (23).



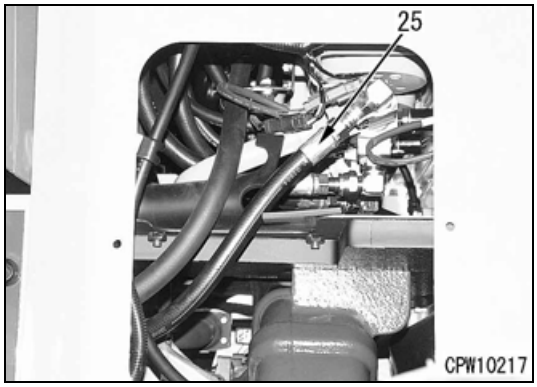


   b. Disconnect the air conditioner hose (24) from the floor frame.

   c. Remove the right and left covers of the bulkhead.

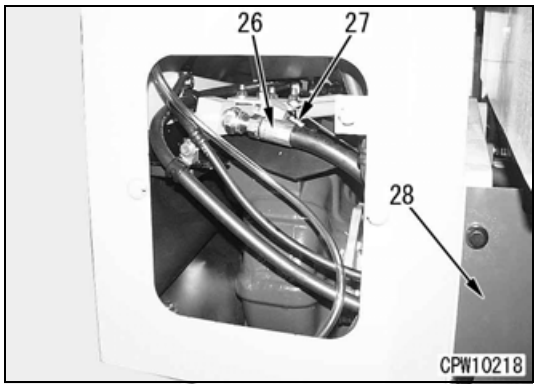


   d. Disconnect the left brake hose (25) and the right ones (26) and (27).

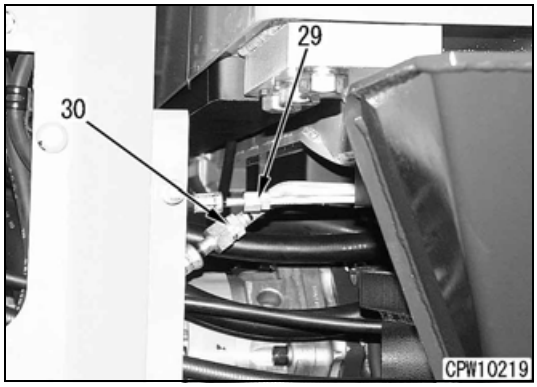


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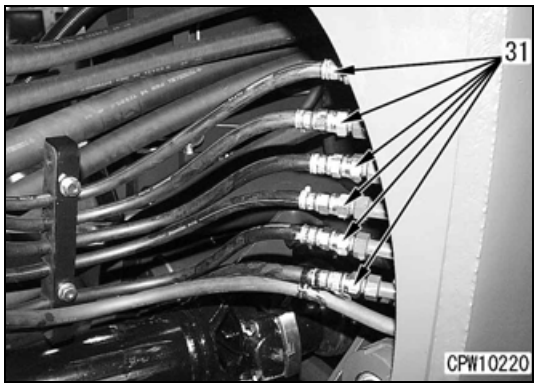
e. Remove the cover (28).



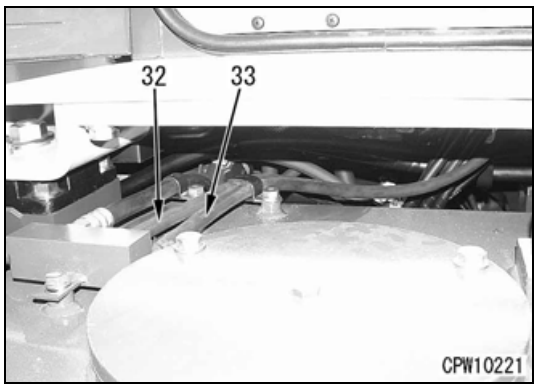
f. Disconnect the hoses (29) and (30) from the air conditioner.



g. Remove the clamp and disconnect the 6 PPC hoses (31).



h. Disconnect the hoses (32) and (33) from the hydraulic tank.

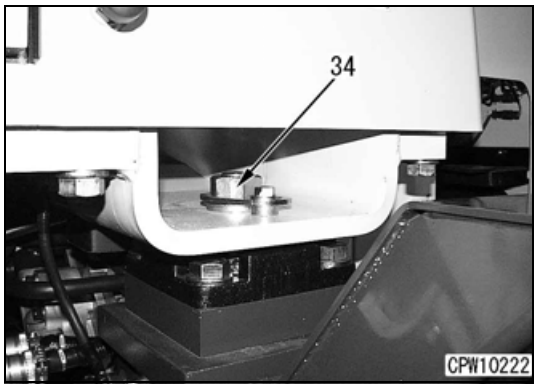


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6. Cab, Floor Frame Assembly

   a. Sling the cab, floor frame assembly.

   b. Remove the 4 mounting nuts (34) from the floor frame. ✳ 2



   c. Lift and remove the cab, floor frame assembly (35).

      kg Cab, floor frame assembly: **1,280 kg**



Installation

- For the installation, reverse the removing procedures.

✳ 1

★ Fill the air conditioner with gas (R134a) referring to the paragraph of “Removal and Installation of Air Conditioner Compressor Assembly.”

✳ 2

kgm Floor frame mounting bolt:
1,175 ~ 1,470 Nm {120 ~ 150 kgm}

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Air conditioner unit assembly

Removal

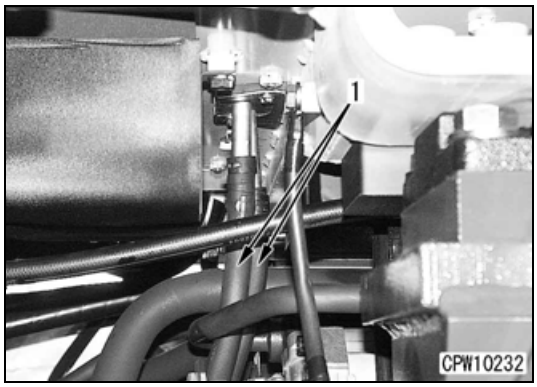
- **Park the machine on level ground and lower the bucket onto the ground.**
- **Attach the safety bar to the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the battery (-) terminal.**

1. Escape gas from the air conditioner referring to the paragraph of “Removal and Installation of Air Conditioner Compressor Assembly.” ※1

2. Remove the cab assembly referring to the paragraph of “Removal and Installation of Cab Assembly.”

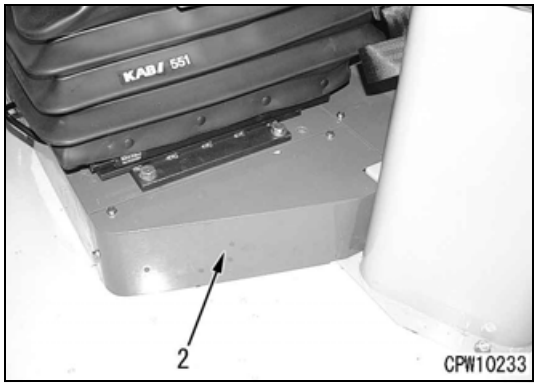
3. Air Conditioner Hose

   Disconnect the hose (1) from the air conditioner below the floor.

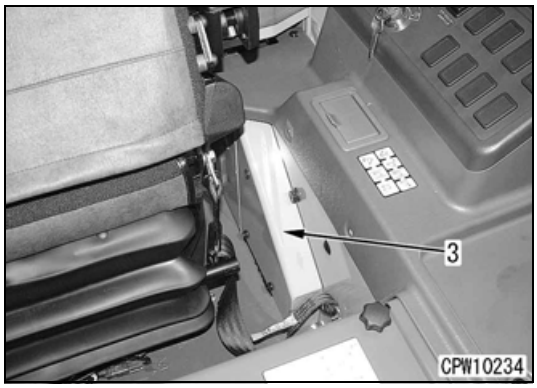


4. Cover

   a. Remove the cover (2) from the left lower section of the operator seat.

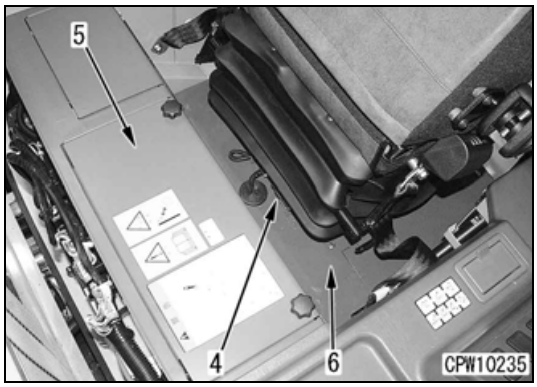


   b. Remove the cover (3) from the right lower rear section of the operator seat.



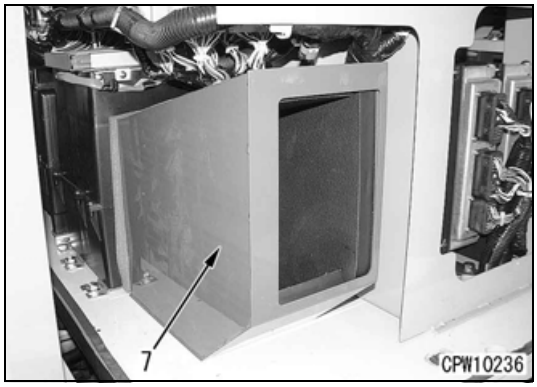
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c. Disconnect the connector (4) (CN-L11) behind the operator seat and remove the covers (5) and (6).



5. Duct

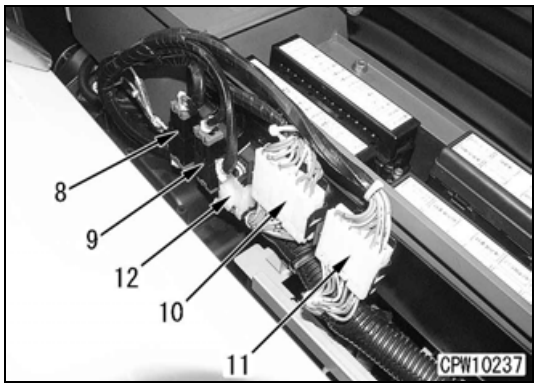
   Remove the duct (7).



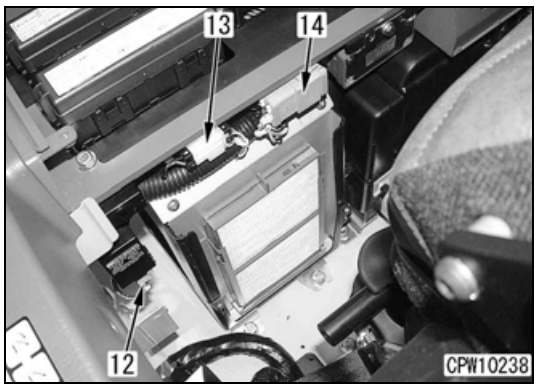
6. Cool Heat Box Assembly

   a. Disconnect the 5 connectors from the fuse box

      - (8): CN-FS1
      - (9): CN-FS2
      - (10): CN-FS3
      - (11): CN-FS4
      - (12): CN-FS5



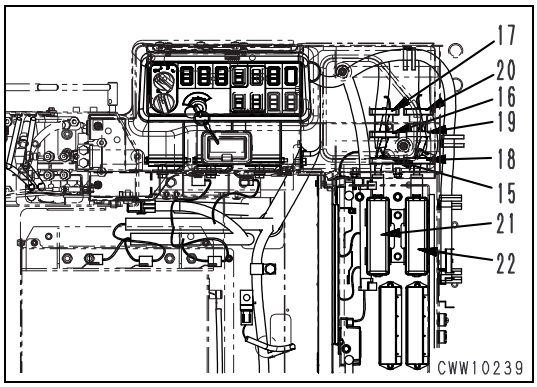
   b. Disconnect the connectors (12) (CN-L19), (13) (CN-L20) and (14) (CN-DL) behind the operator seat.



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c. Disconnect the 6 connectors from the relay case.

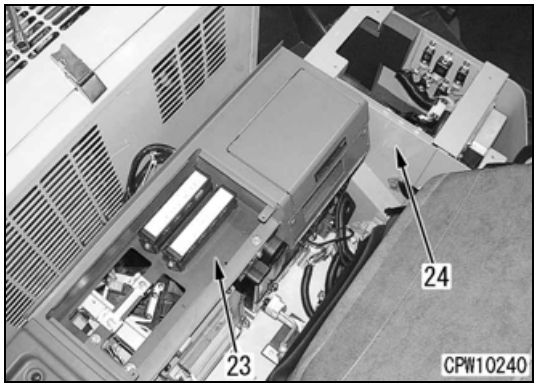
- (15): CN-L101
- (16): CN-L102
- (17): CN-L103
- (18): CN-L104
- (19): CN-L105
- (20): CN-L106



d. Remove the relay cases (21) and (22).

e. Remove the cool heat box assembly (23).

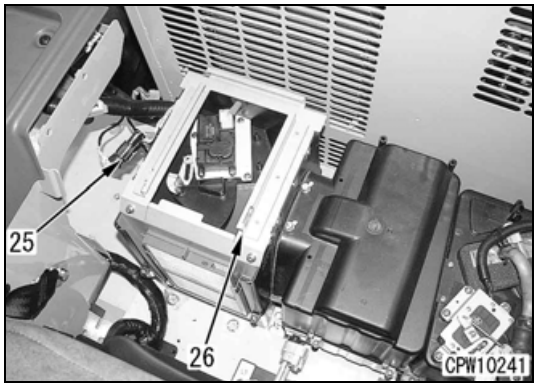
f. Remove the box (24).



7. External/Internal Air Changeover Damper

a. Disconnect the connector (25) (CN-A4).

b. Remove the mounting bolt and slide the external/internal air changeover damper (26) aside.



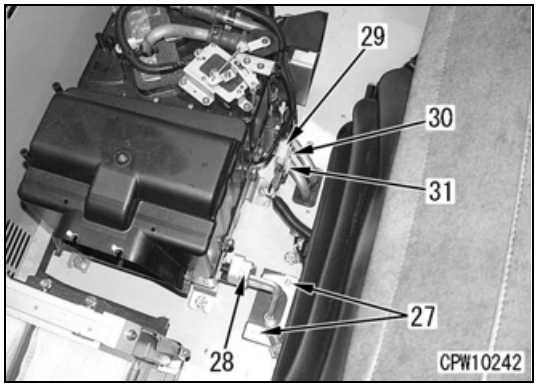
8. Air Conditioner Unit Assembly

a. Loosen the bolt (27) and disconnect the pipe (28) from the air conditioner. ※2

★ After disconnecting the pipe, plug the openings on the unit side and on the pipe side to prevent foreign matters from entering the openings.

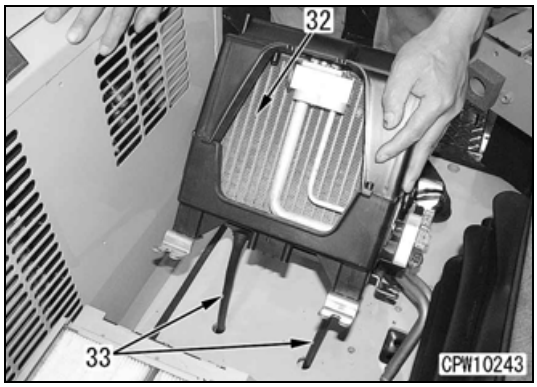
b. Disconnect the connectors (29) (CN-A3), (30) (CN-A1) and (31) (CN-A2).

c. Remove the mounting bolt of the air conditioner unit assembly.



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d. Lift the air conditioner unit assembly (32), disconnect the hose (33) and remove the air conditioner unit assembly.



Installation

- For the installation, reverse the removing procedures.

※ 1

★ Fill the air conditioner with gas (R134a) referring to the paragraph of “Removal and Installation of Air Conditioner Compressor Assembly.”

※ 2

★ Keep the openings plugged until right before the pipe is connected.

O-ring and threads:
Compressor oil for new refrigerant **(ND-OIL8)**

kgm Pipe mounting bolt:
8 ~ 12 Nm {0.8 ~ 1.2 kgm}

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Air conditioner compressor assembly

Special tools

Sym-bol	Part No.	Part Name	Neces sity	Qty	New, rev	Sketch
G1	799-703-1200	Service tool kit	■	1		
	799-703-1100	Vacuum pump	■	1		
	799-703-1400	Gas leak tester	■	1		

- **Park the machine on level ground and lower the bucket onto the ground.**
- **Attach the safety bar to the frame, apply the parking brake and put blocks under the wheels.**
- **Disconnect the battery (-) terminal.**

Removal

1. Escape of Gas from Air Conditioner.

- **Be sure to escape gas from the air conditioner because it is very dangerous to disconnect the pipe without reducing pressure in the cooling system.**
- **Be sure to put on safety glasses in advance, and avoid escaping gas in a dusty and humid place.**

   a. Set the fan switch to the maximum, idle the engine at a low speed and operate the air conditioner for 5 minutes.

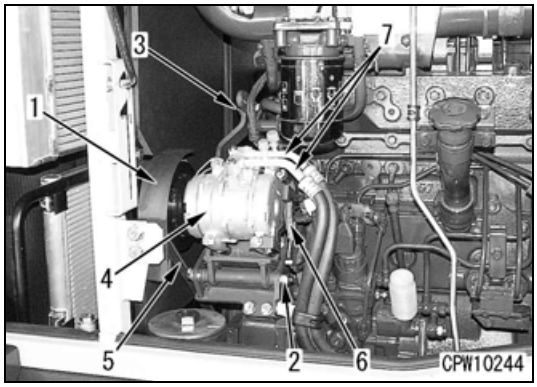
   b. Use the tool **G1** to escape refrigerant gradually from the worm valves of the high and low pressure valves of the compressor.

2. V Belt

   a. Remove the cover (1).

   b. Loosen the nut (2).

   c. Loosen the nut (3), lower the air conditioner compressor (4) to the engine side and remove the V belt (5).



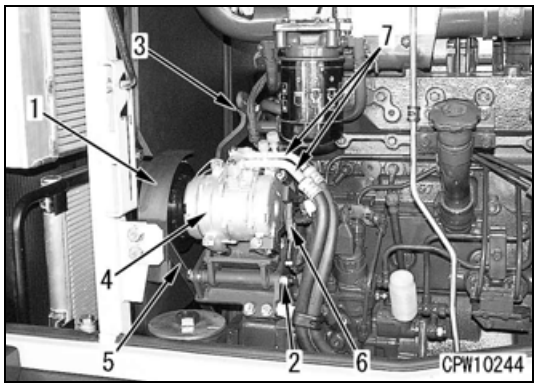
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3. Air Conditioner Compressor Assembly

   a. Disconnect the connector (6).

   b. Disconnect the pipe (7) and remove the air conditioner compressor (4). ※ 1

   ★ After disconnecting the pipe, plug the openings on the compressor side and on the pipe side to prevent foreign matters from entering the openings.



Installation

- For the installation, reverse the removing procedures.

※ 1

★ Keep the openings plugged until right before the pipe is connected

   O-ring and threads:
   Compressor oil for new refrigerant **(ND-OIL8)**.

   kgm Pipe mounting bolt:
   8 ~ 12 Nm {0.8 ~ 1.2 kgm}

- Filling air conditioner with gas

   ★ Keep the room temperature over 3°C when filling gas.

   ★ Use the refrigerant R134a.

   ★ Before filling gas, be sure to fully evacuate the air conditioner by the repeated high vacuum method.
   (Ultimate vacuum pressure: 750 mm Hg min.)

   ★ Amount of refrigerant to be filled: **1,000 ~ 1,100 g**

      ★ Be careful not to let liquid Freon enter the refrigerant system by turning the refrigerant can upside down by mistake.

      ★ Before filling gas, never operate the compressor.

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90 APPENDIX

Work equipment hydraulic circuit diagram 90-3
Work equipment hydraulic circuit diagram (for electric work equipment lever) 90-3.2

Power train oil circuit diagram (without torque converter lockup clutch) 90-5
Power train oil circuit diagram (with torque converter lockup clutch) 90-7
Brake oil circuit diagram 90-7.2

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Electric circuit diagram (1/8) 90-11
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Electric circuit diagram (1/8) 90-15
Electric circuit diagram (2/8) 90-17
Electric circuit diagram (2/8) 90-19
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Electric circuit diagram (3/8) 90-25
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Electric circuit diagram (5/8) 90-29
Electric circuit diagram (6/8) 90-31
Electric circuit diagram (7/8) 90-33
Electric circuit diagram (8/8) 90-35
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Transmission control system diagram – zoom of pages 20-418 / 20-419 90-39
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Electrical system diagram – zoom of page 20-1018 / Related circuit diagram – zoom of page 20-1029 . . . 90-51

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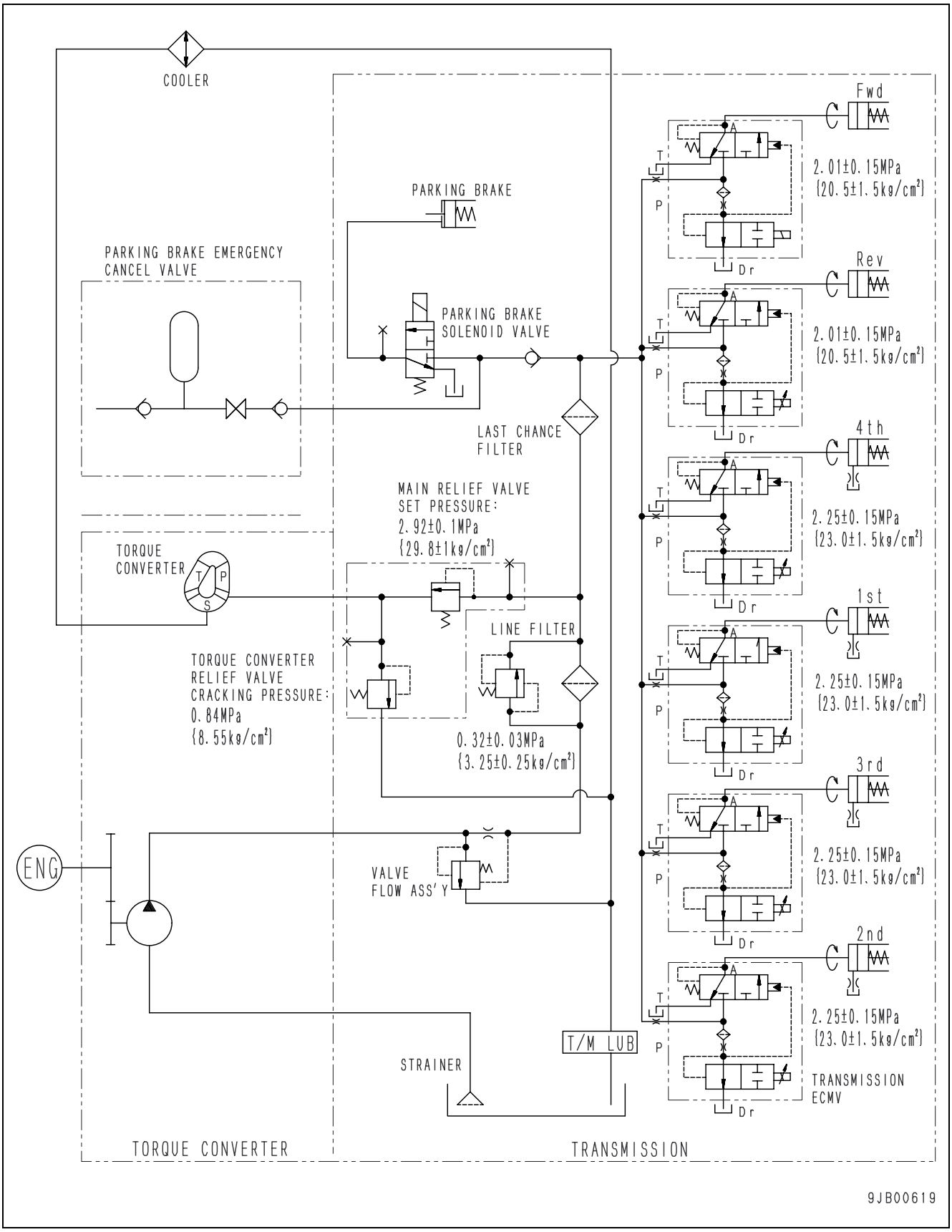
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Power train oil circuit diagram

(without torque converter lockup clutch)



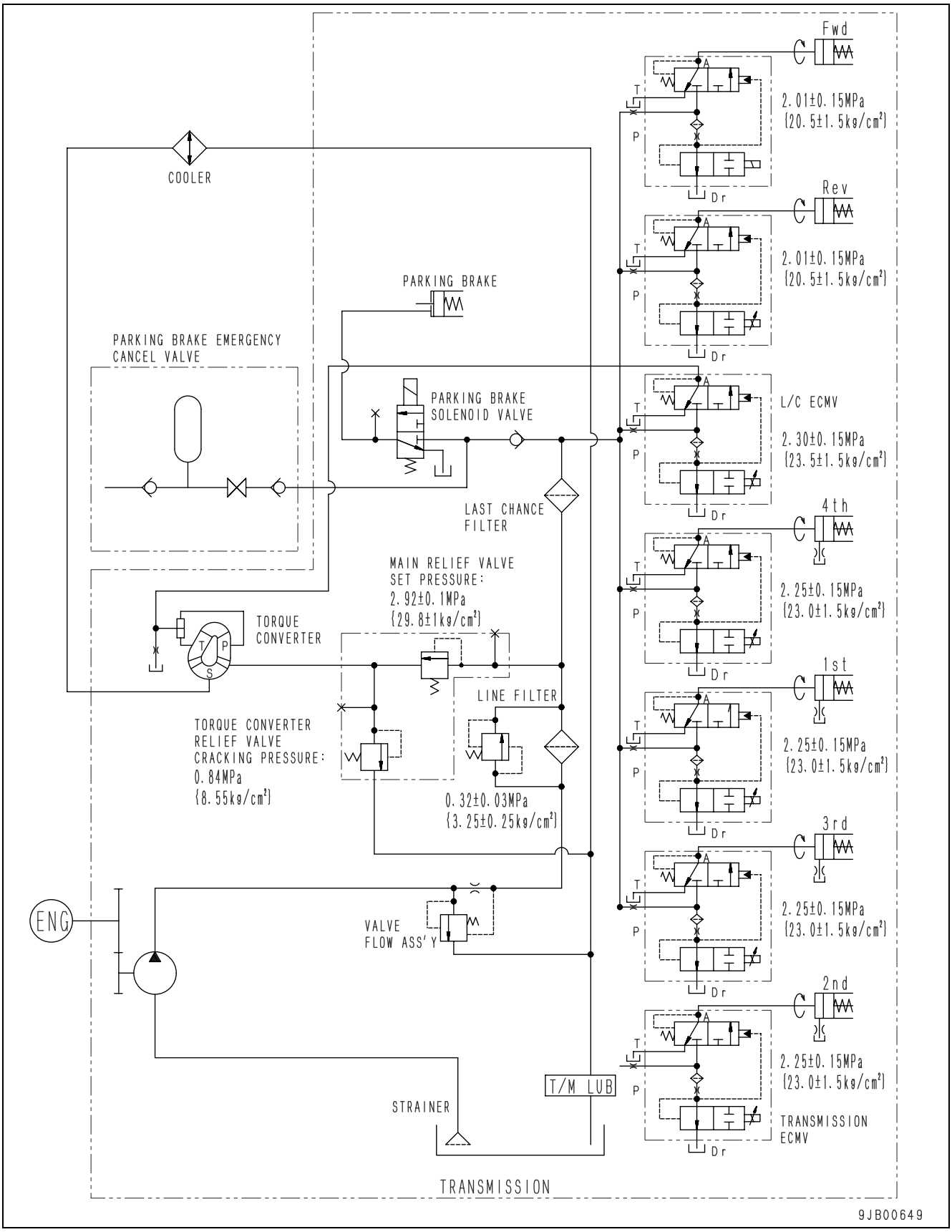
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Power train oil circuit diagram

(with torque converter lockup clutch)

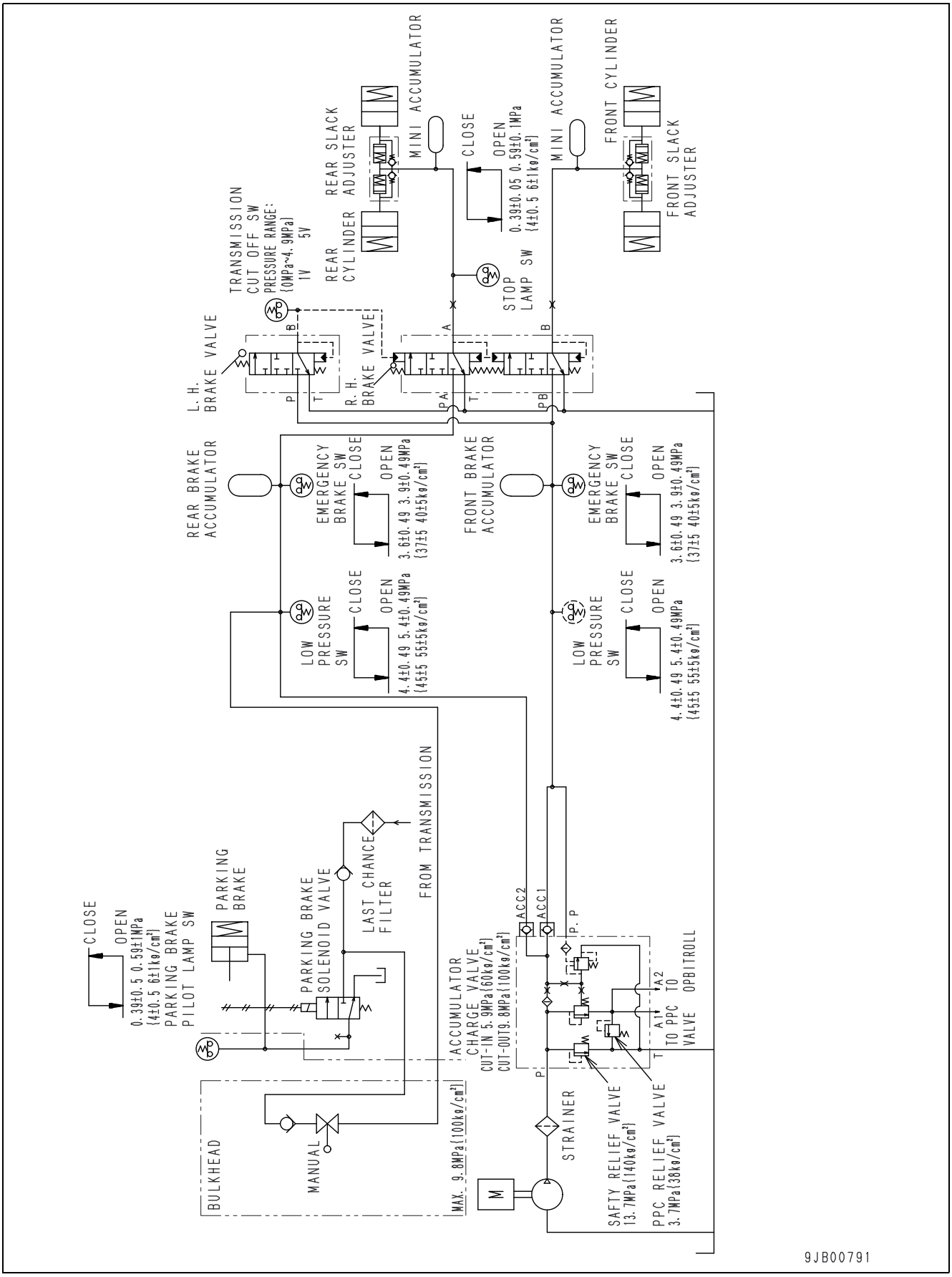


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Brake oil circuit diagram

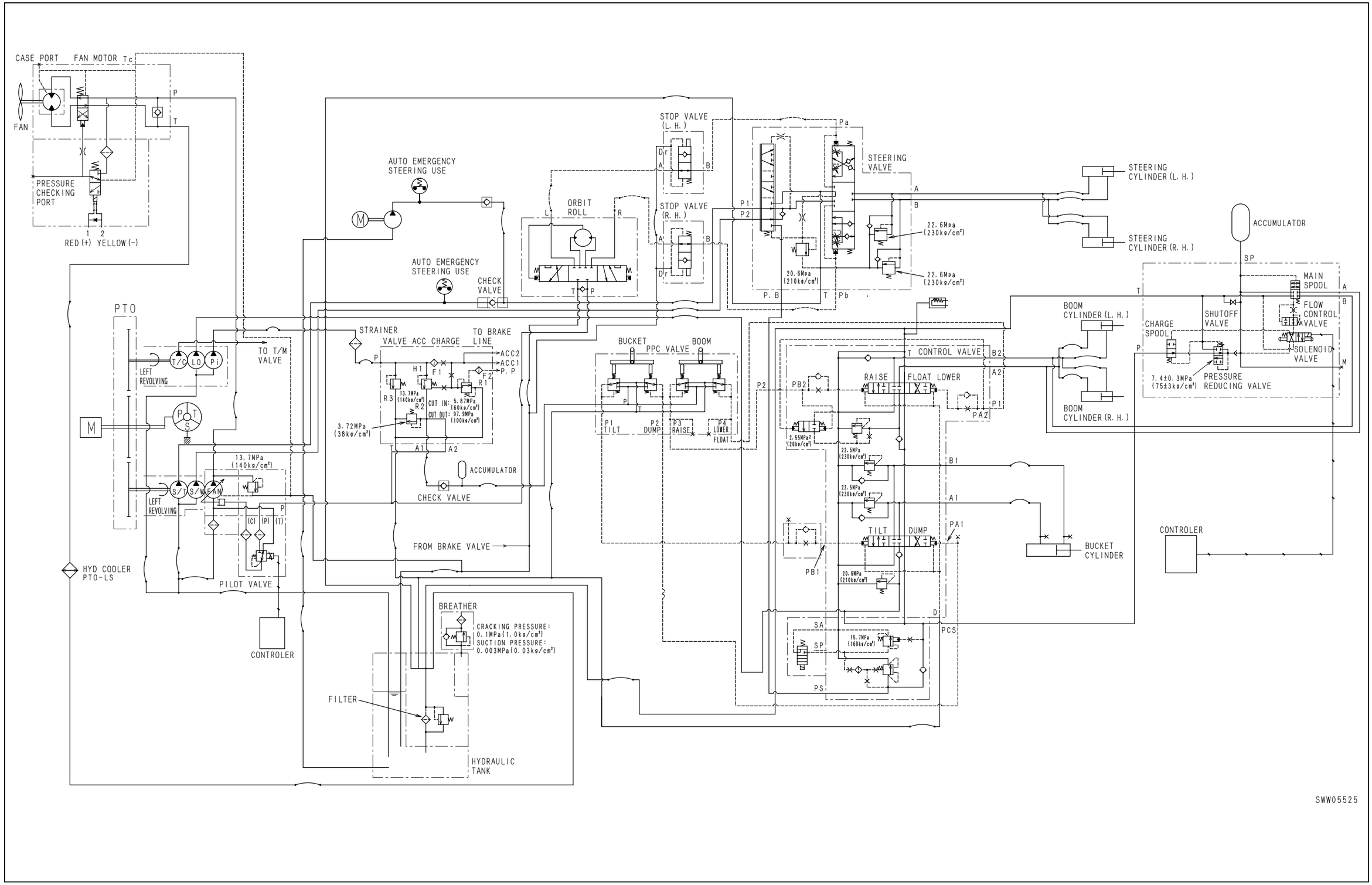


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Work equipment hydraulic circuit diagram



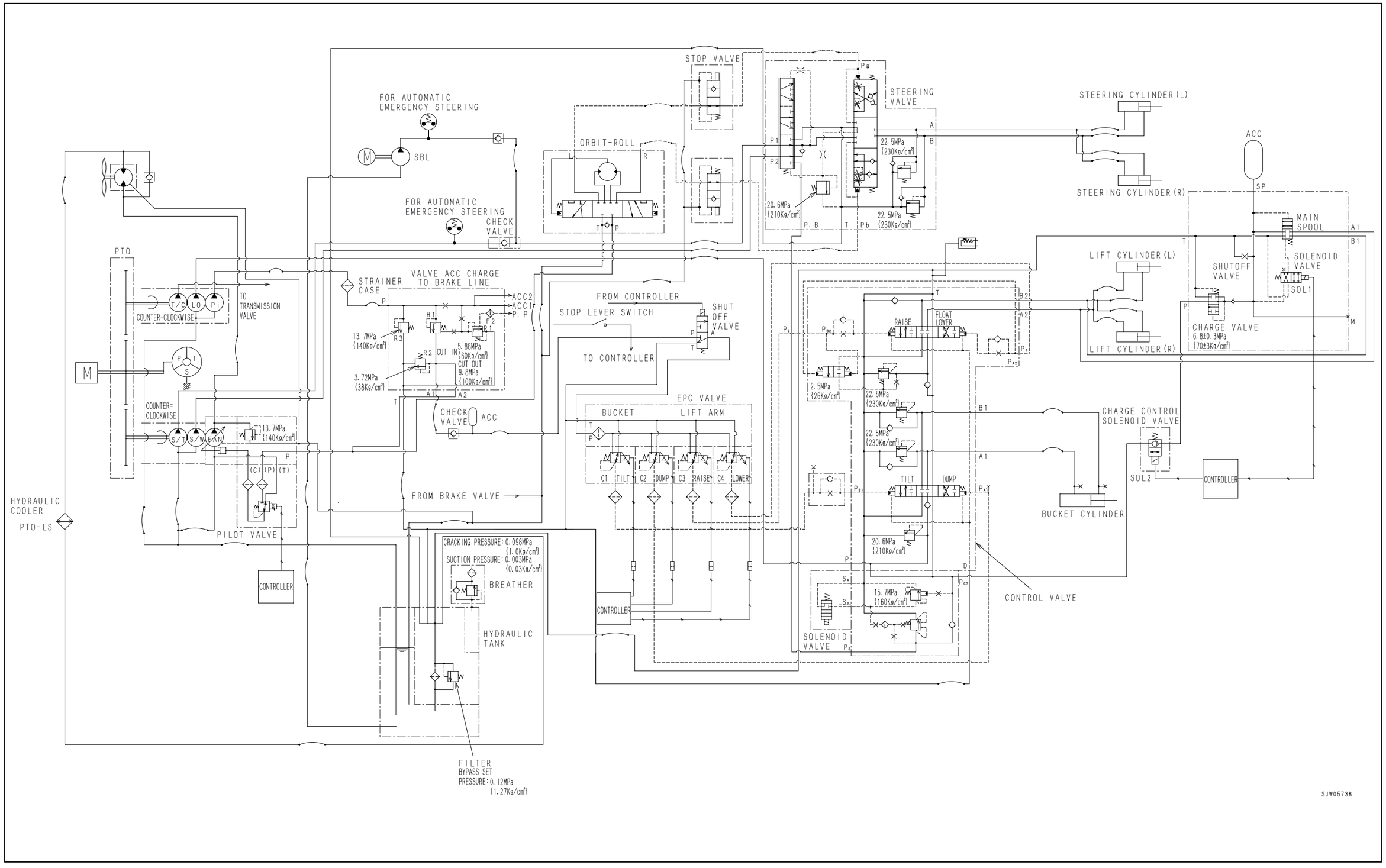
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Work equipment hydraulic circuit diagram

(For electric work equipment lever)

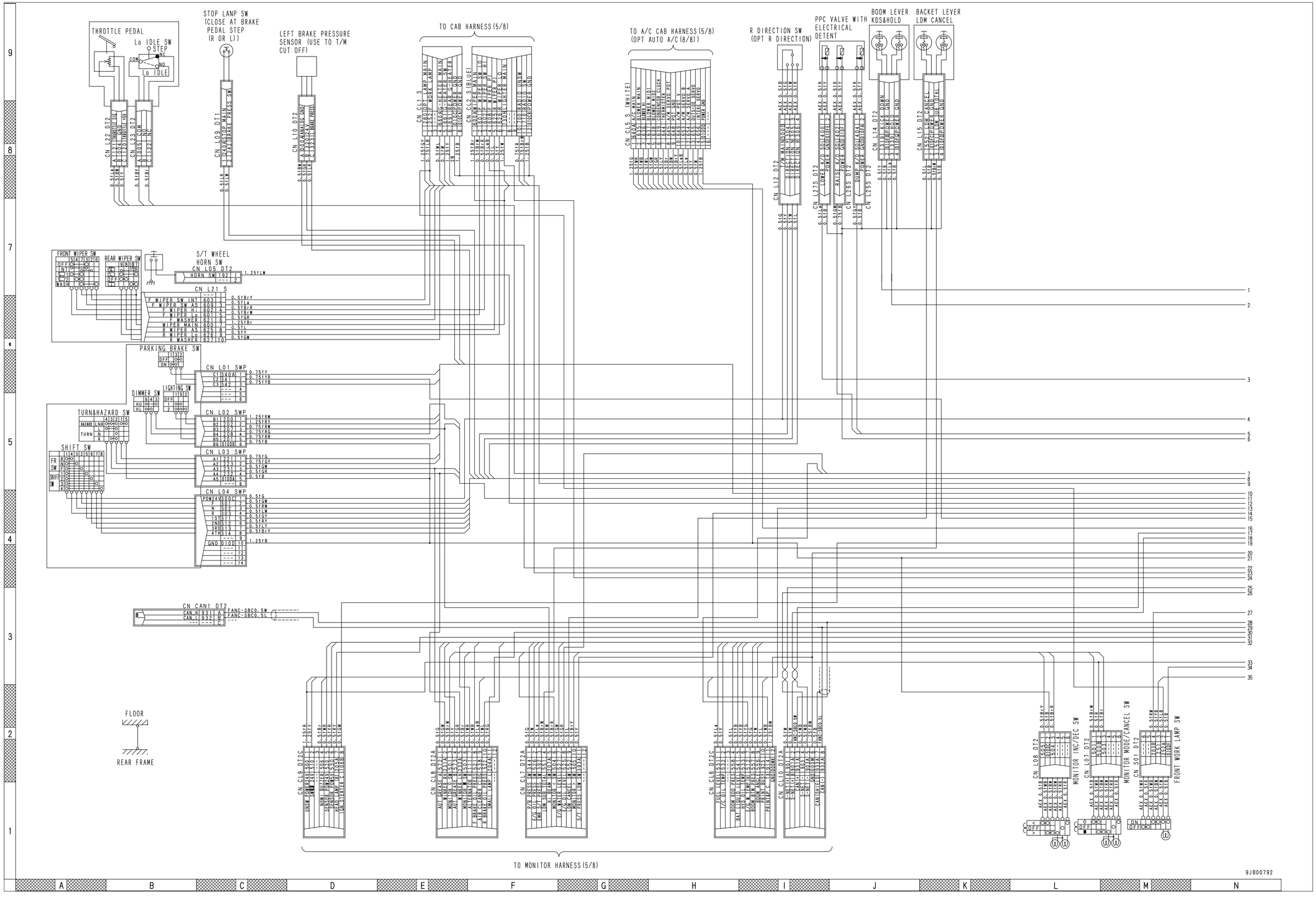


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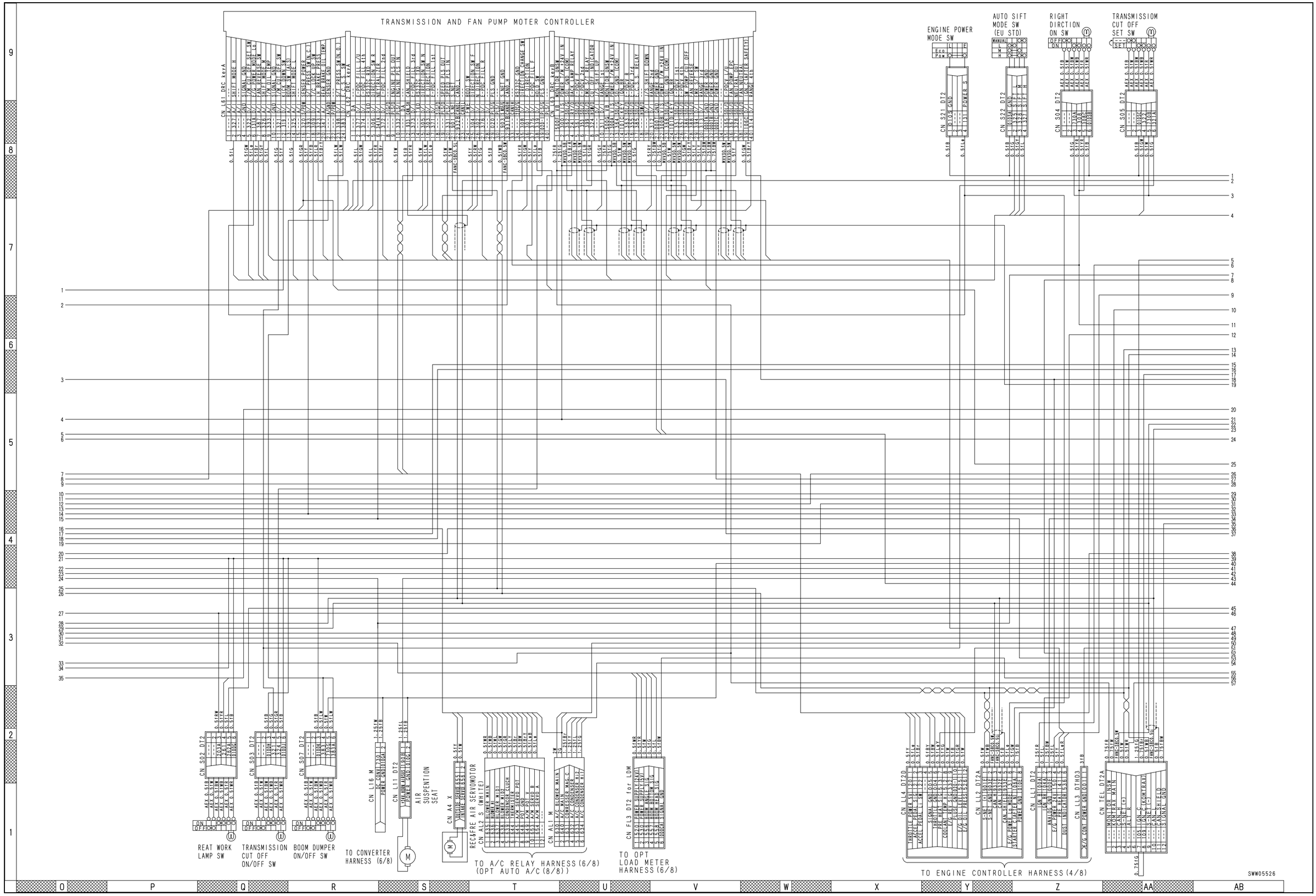
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Electric circuit diagram (1/8)



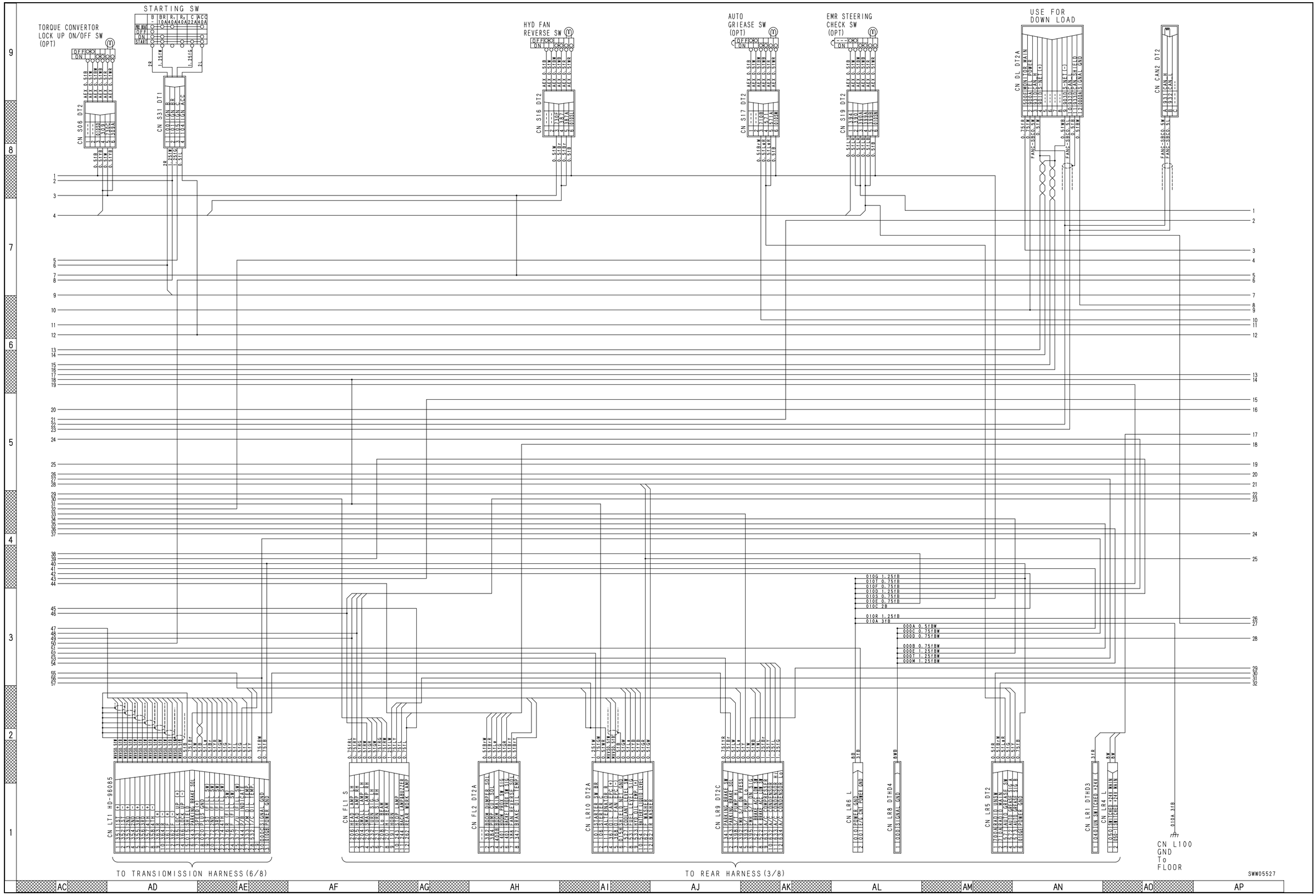
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Electric circuit diagram (1/8)



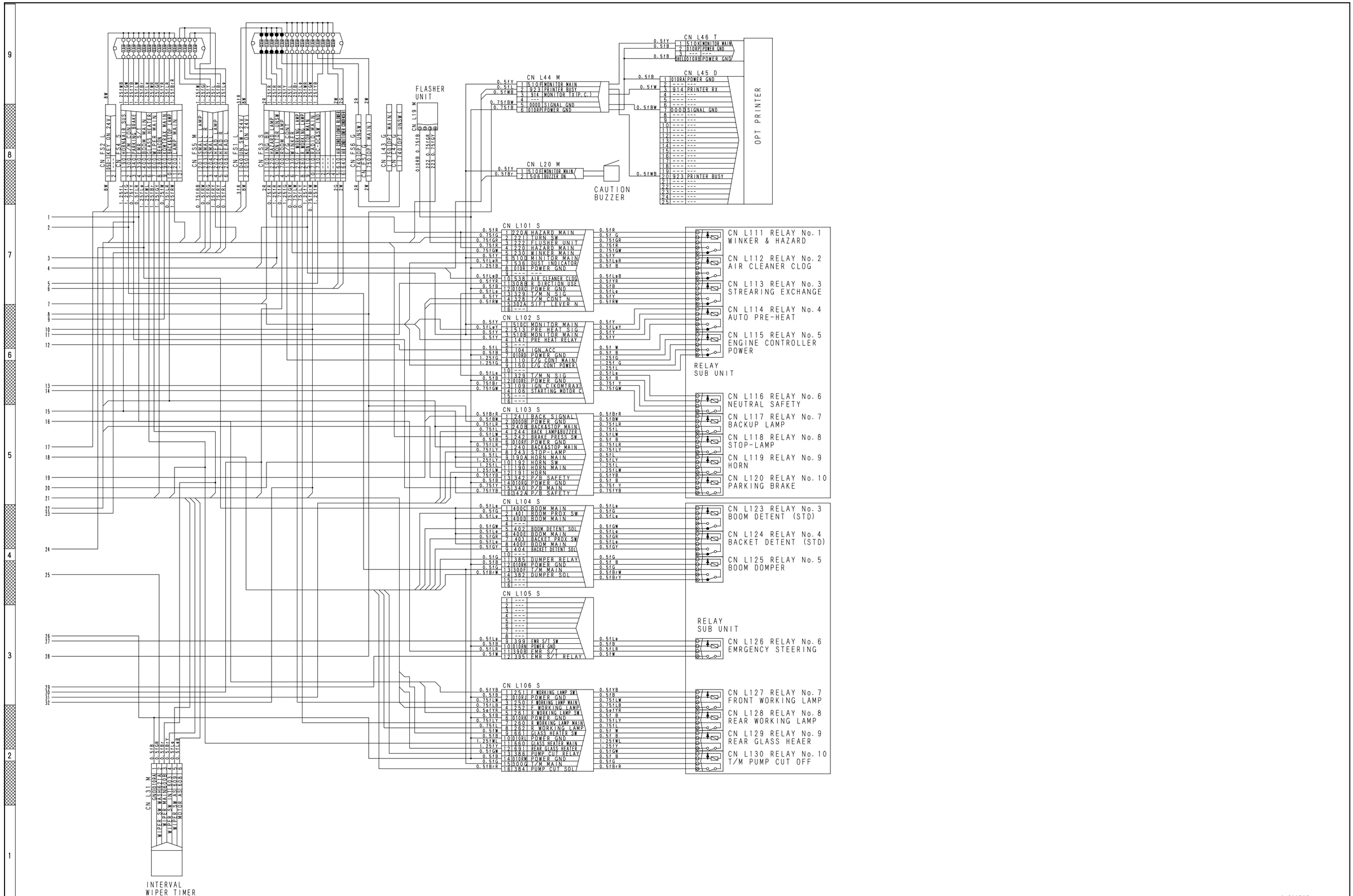
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Electric circuit diagram (1/8)



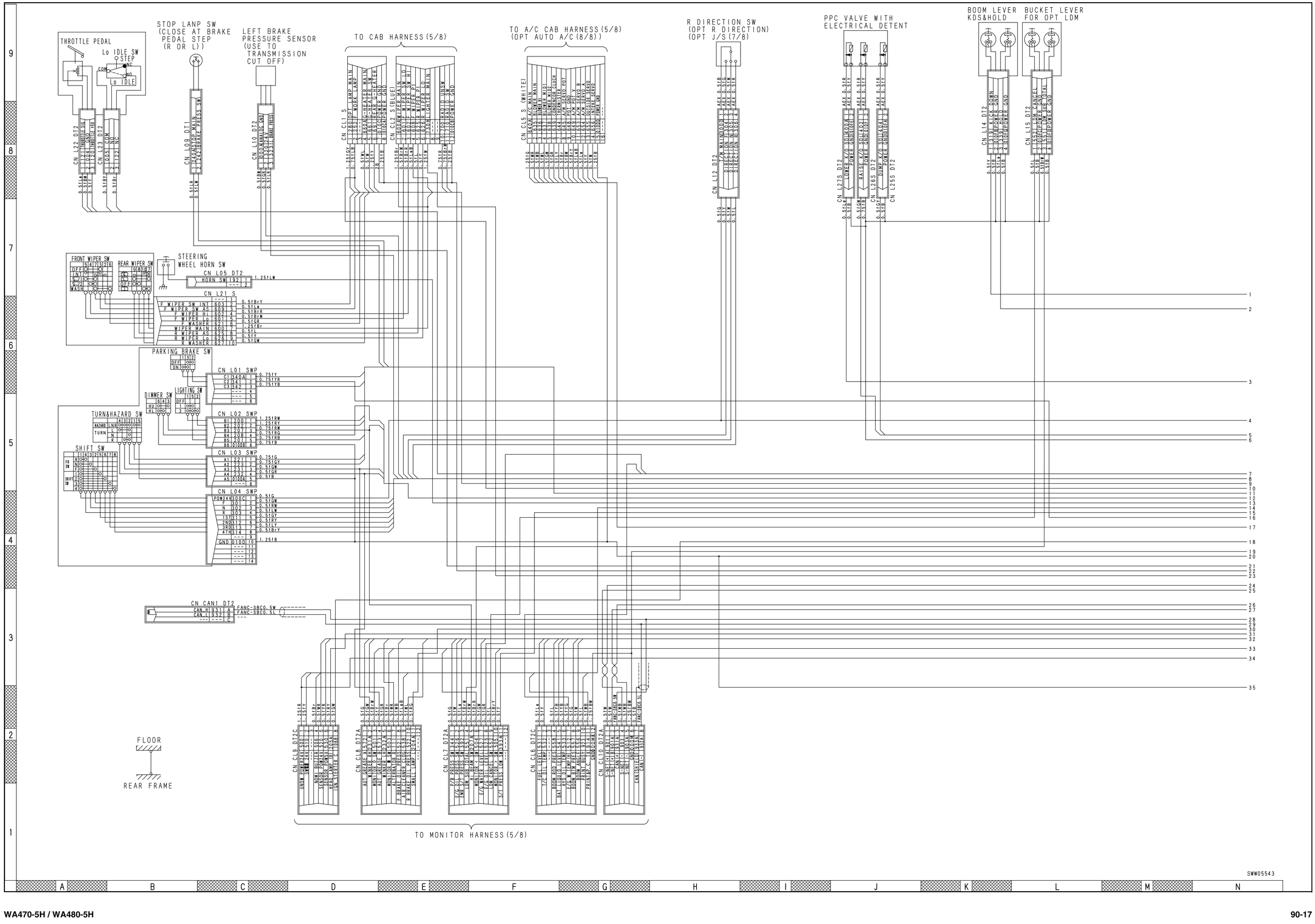
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Electric circuit diagram (1/8)



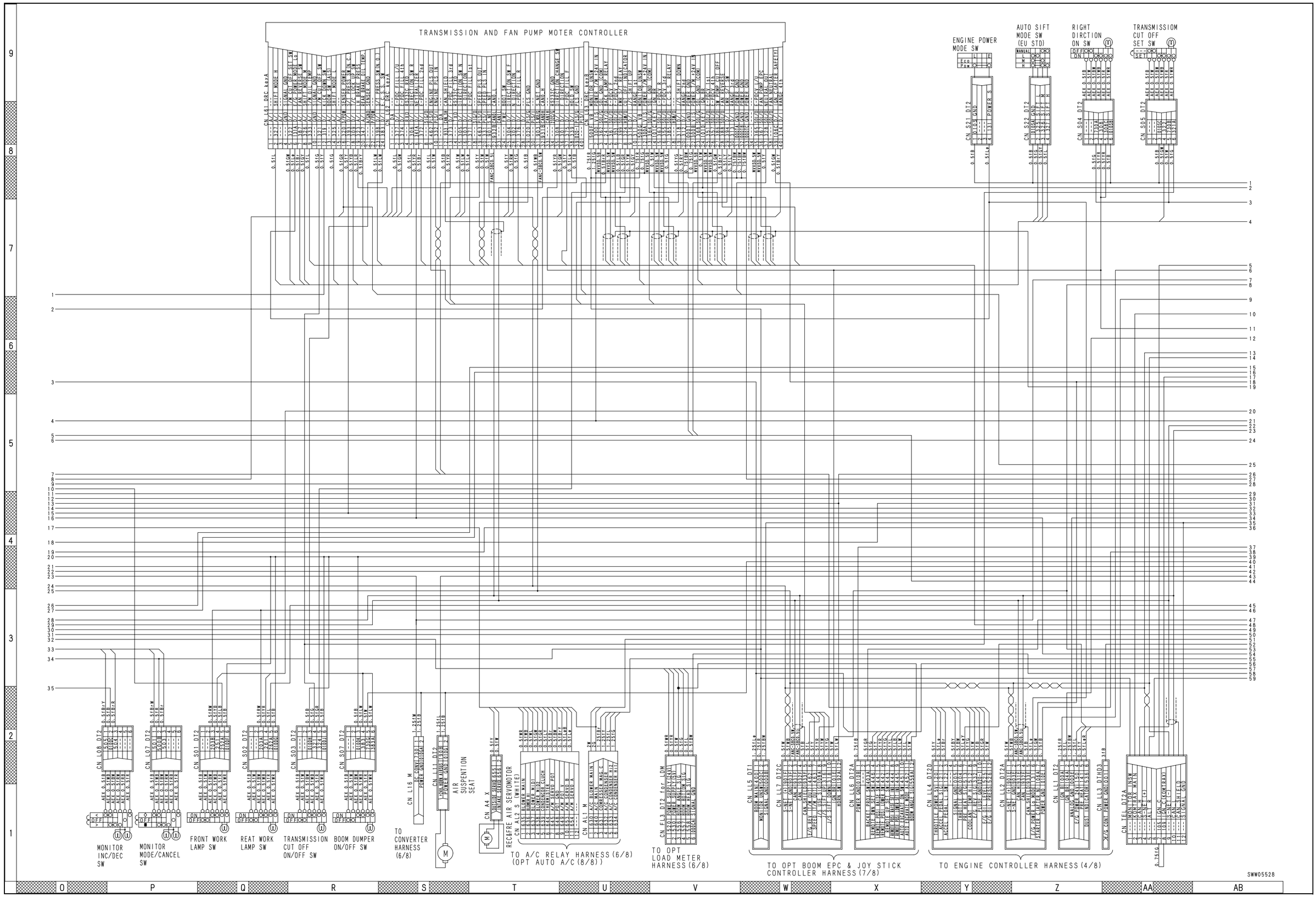
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Electric circuit diagram (2/8)



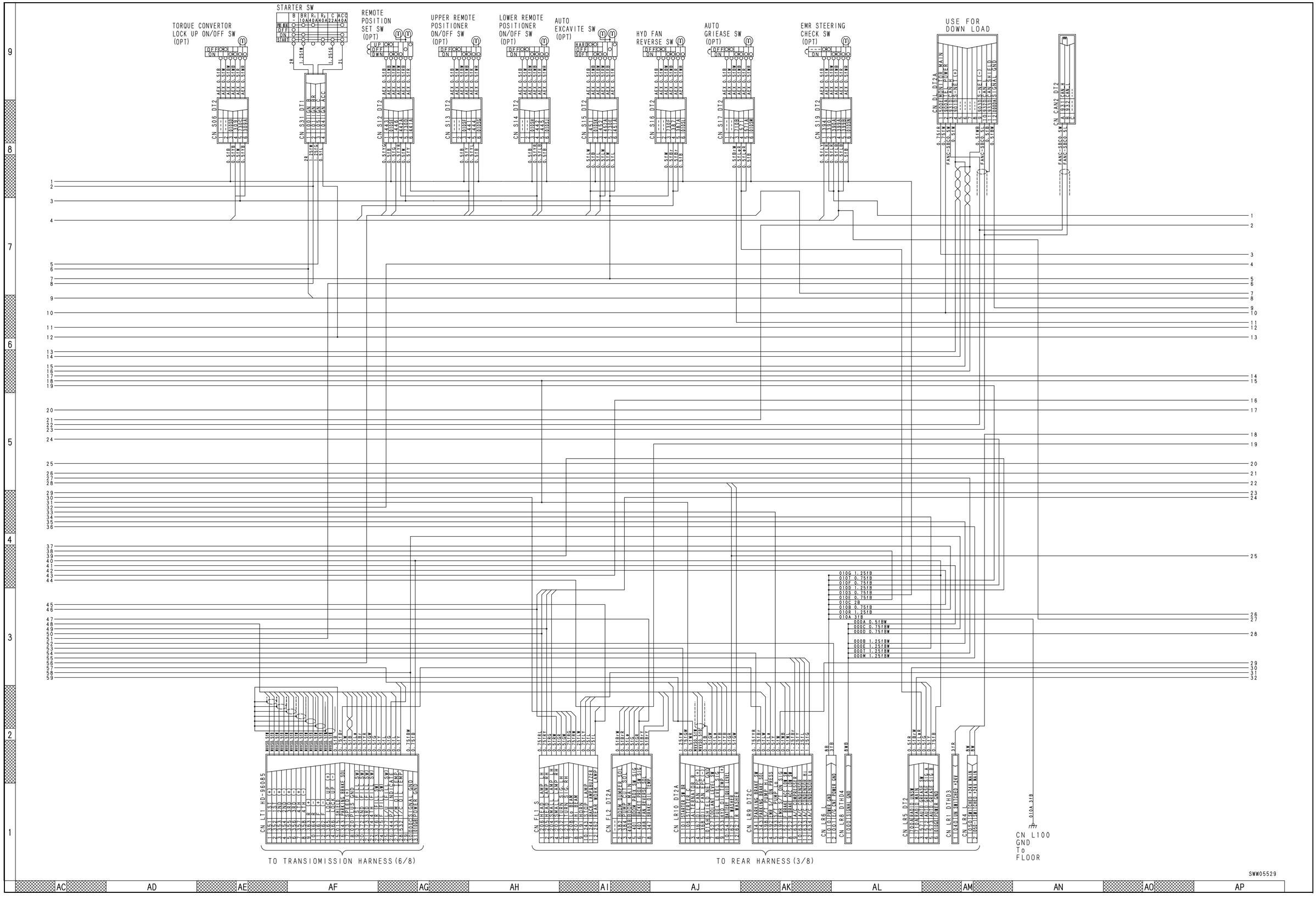
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Electric circuit diagram (2/8)



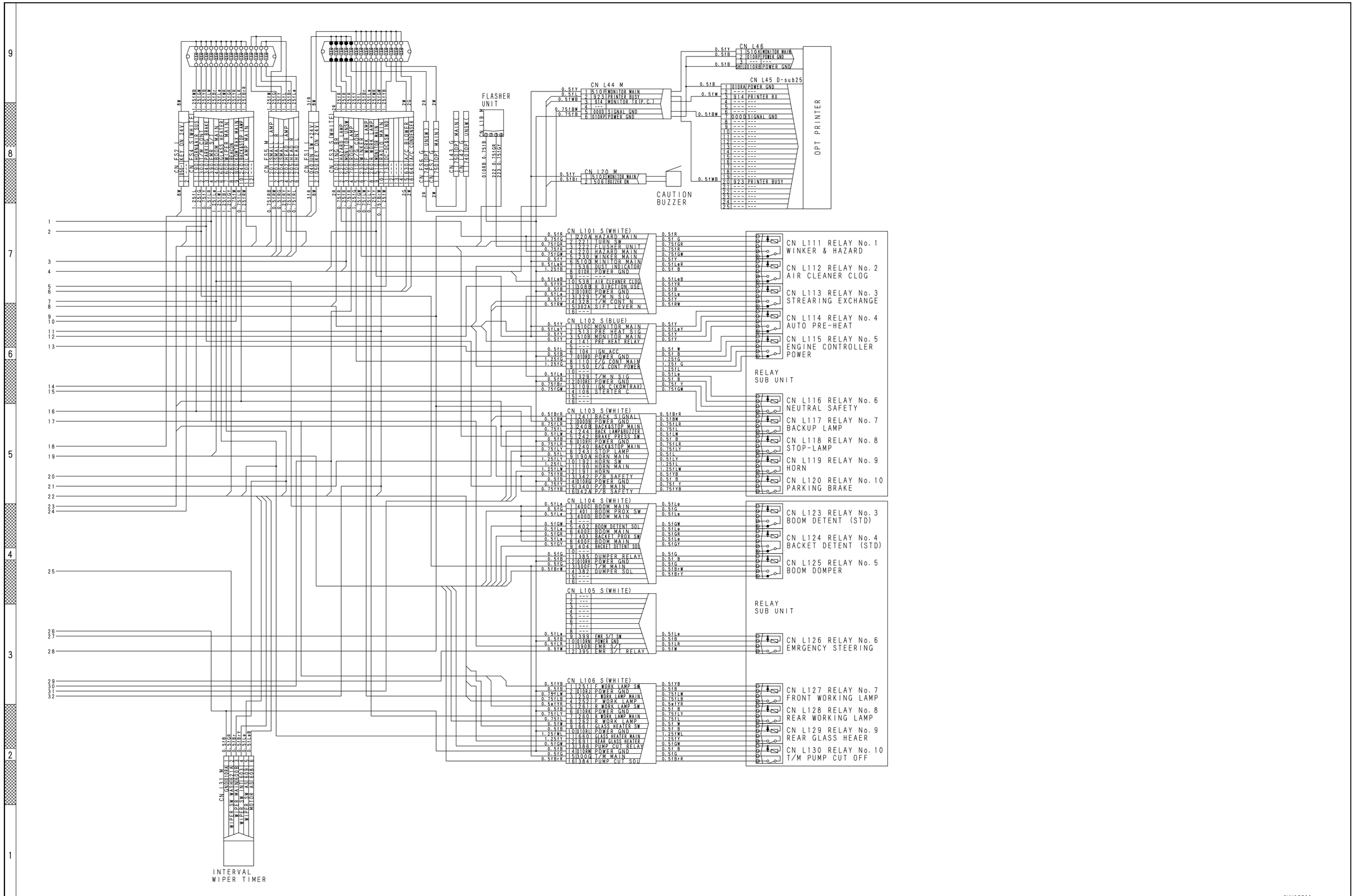
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Electric circuit diagram (2/8)



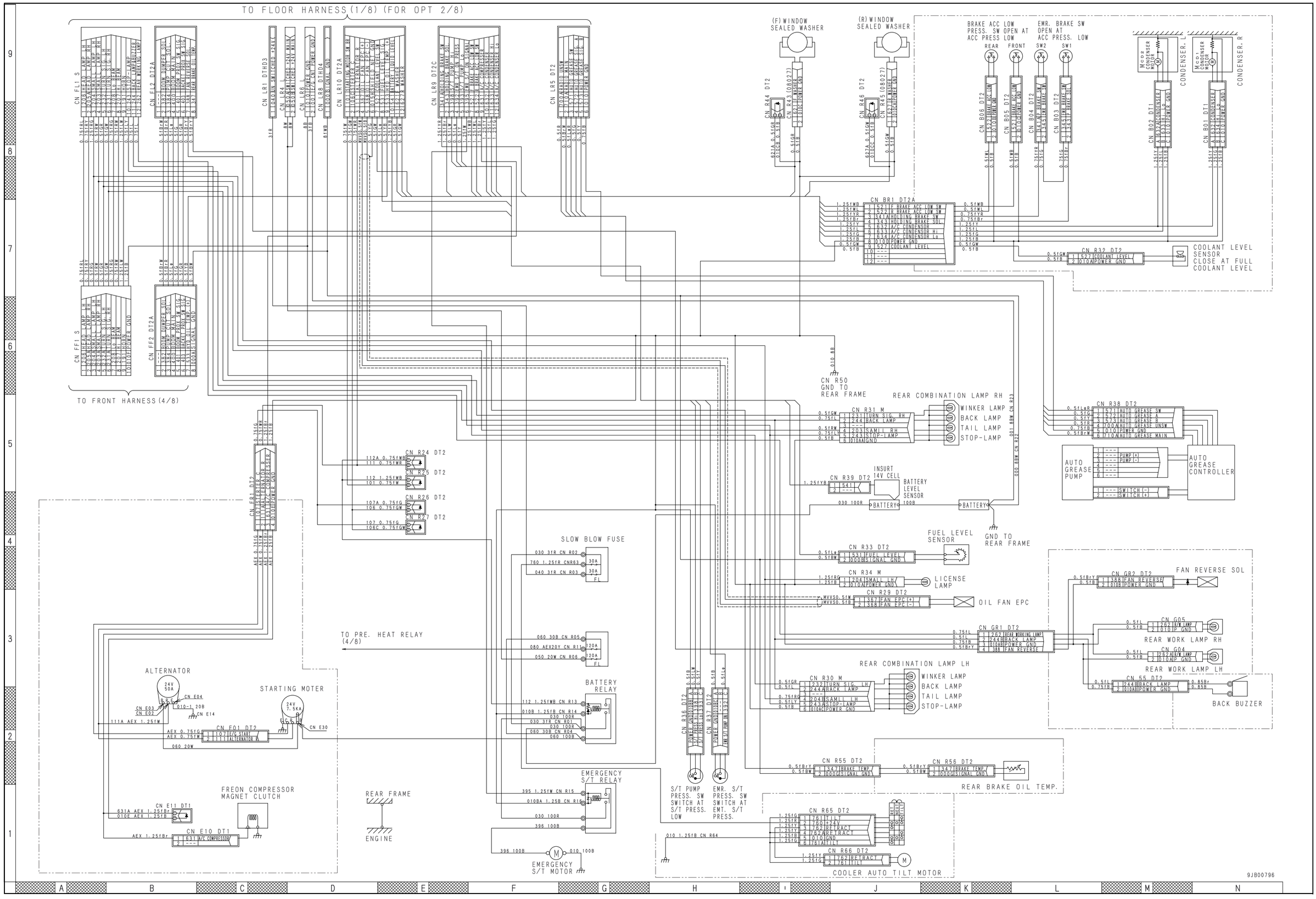
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Electric circuit diagram (2/8)



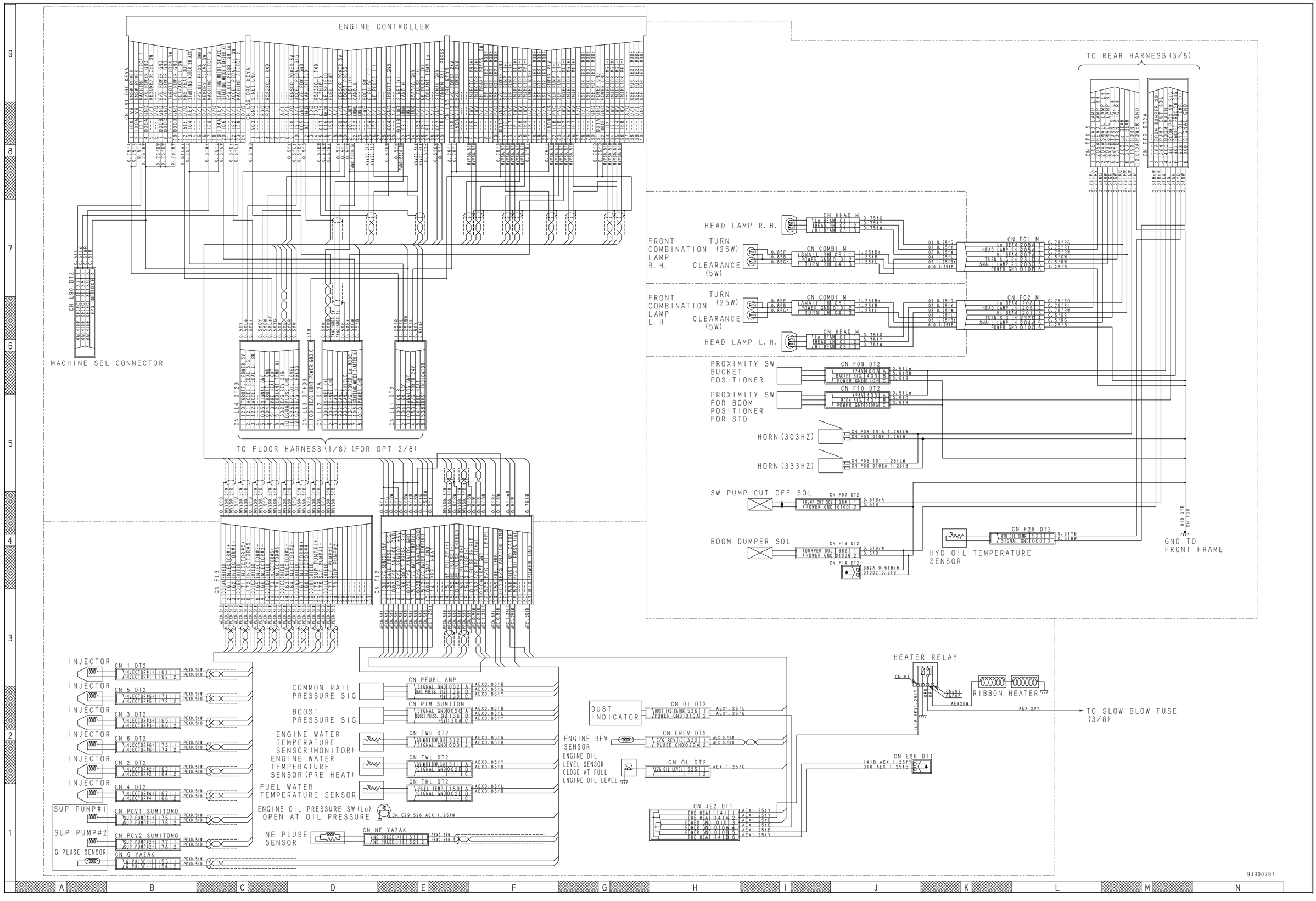
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Electric circuit diagram (3/8)



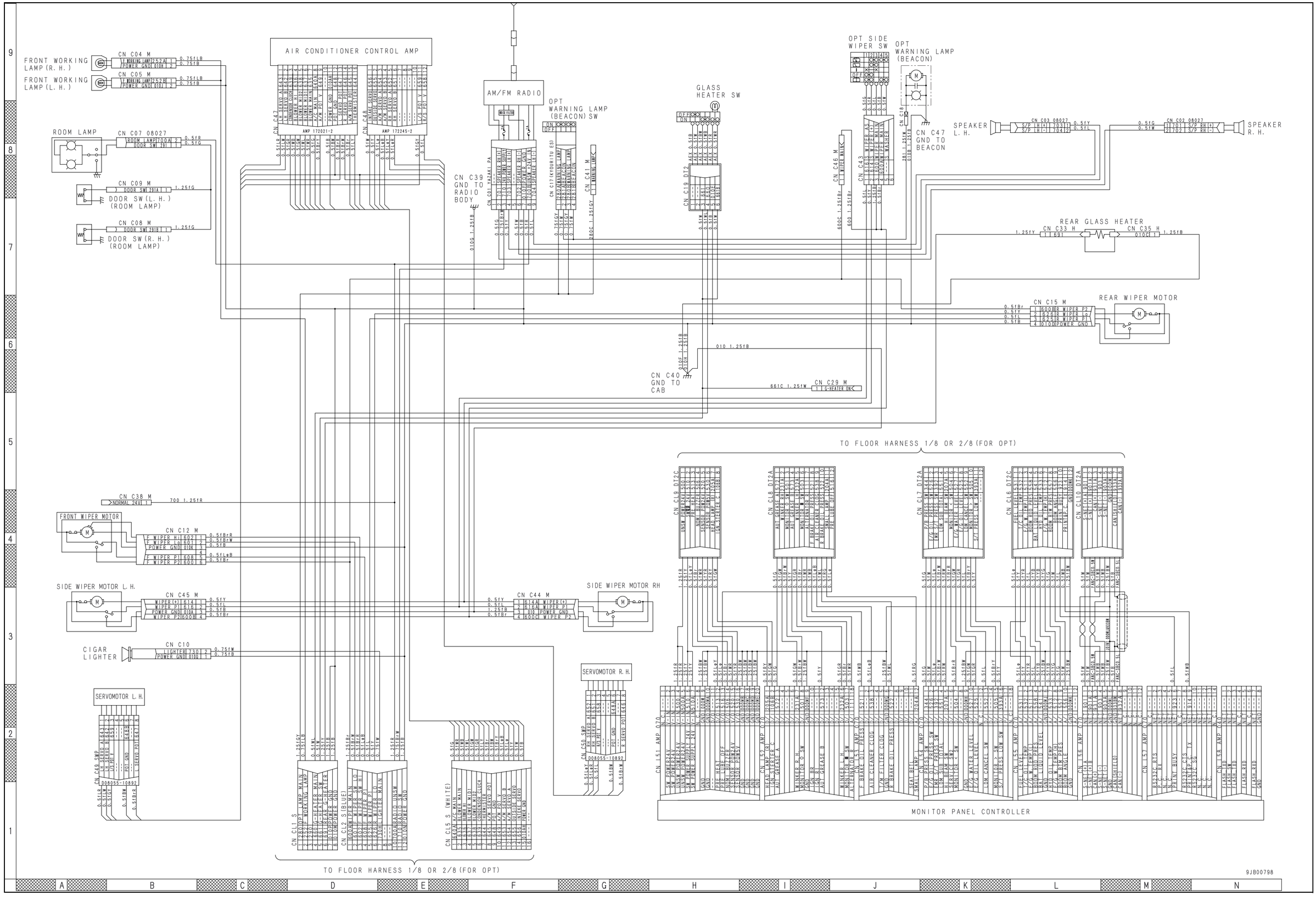
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Electric circuit diagram (4/8)



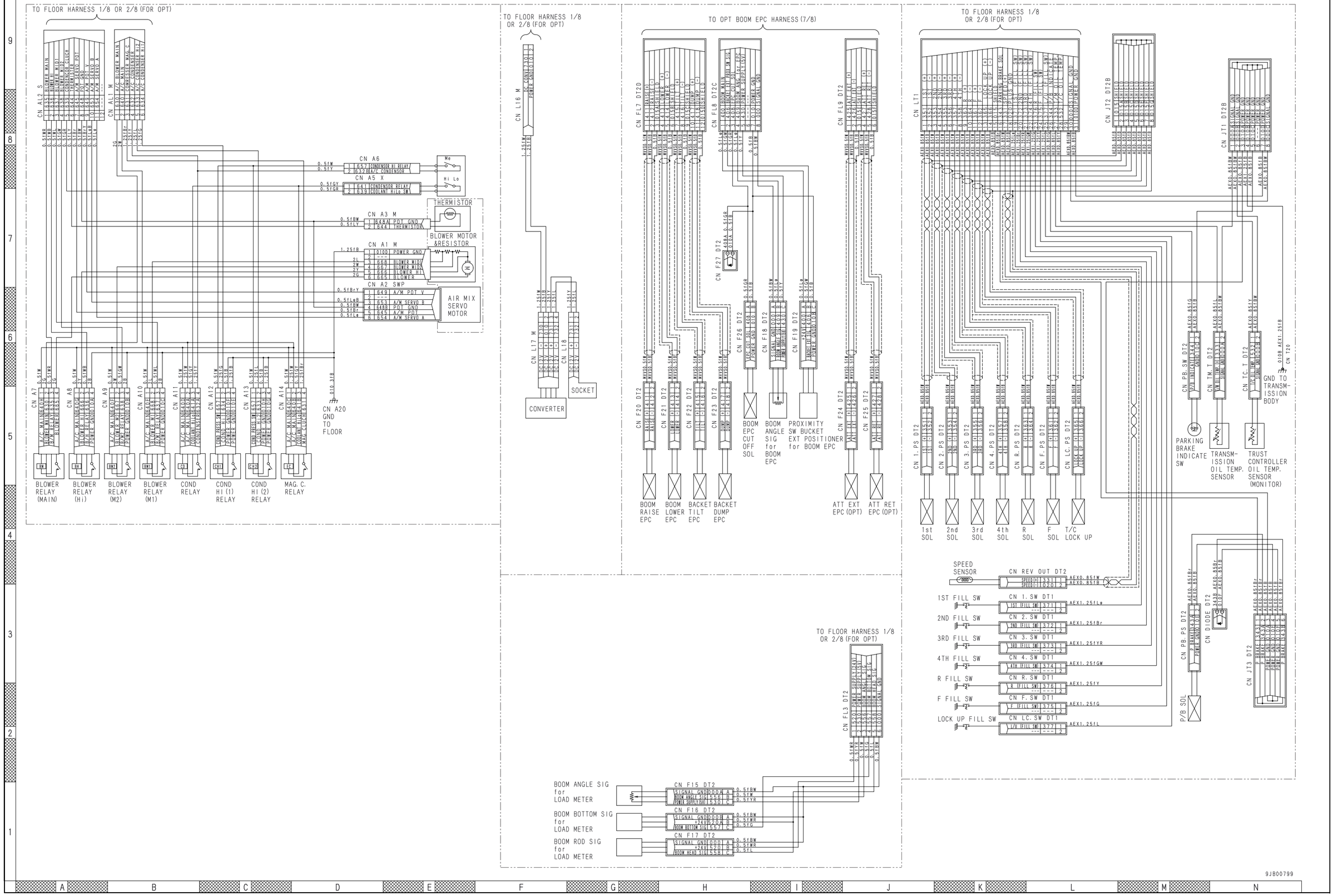
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Electric circuit diagram (5/8)



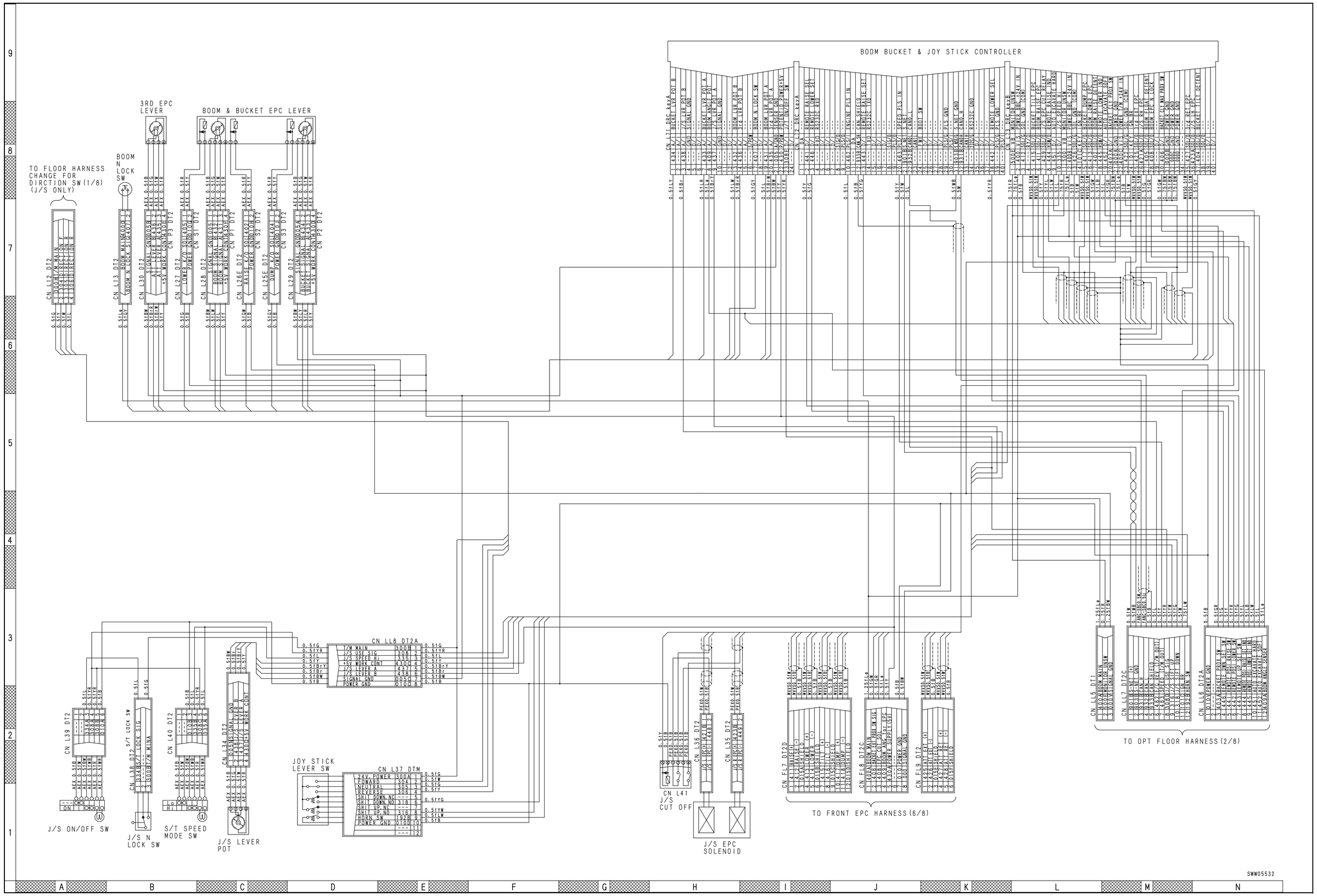
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Electric circuit diagram (6/8)



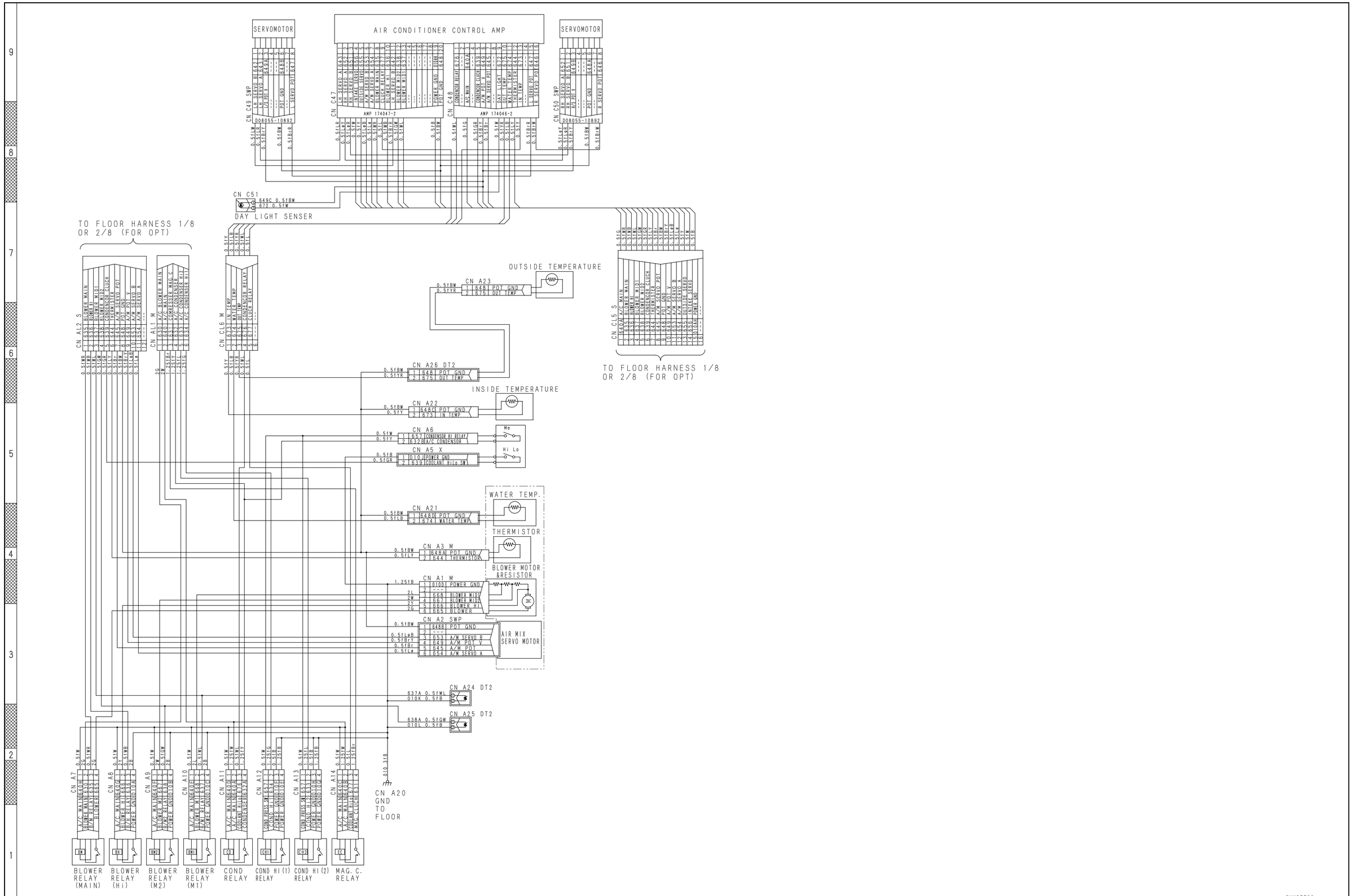
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Electric circuit diagram (7/8)



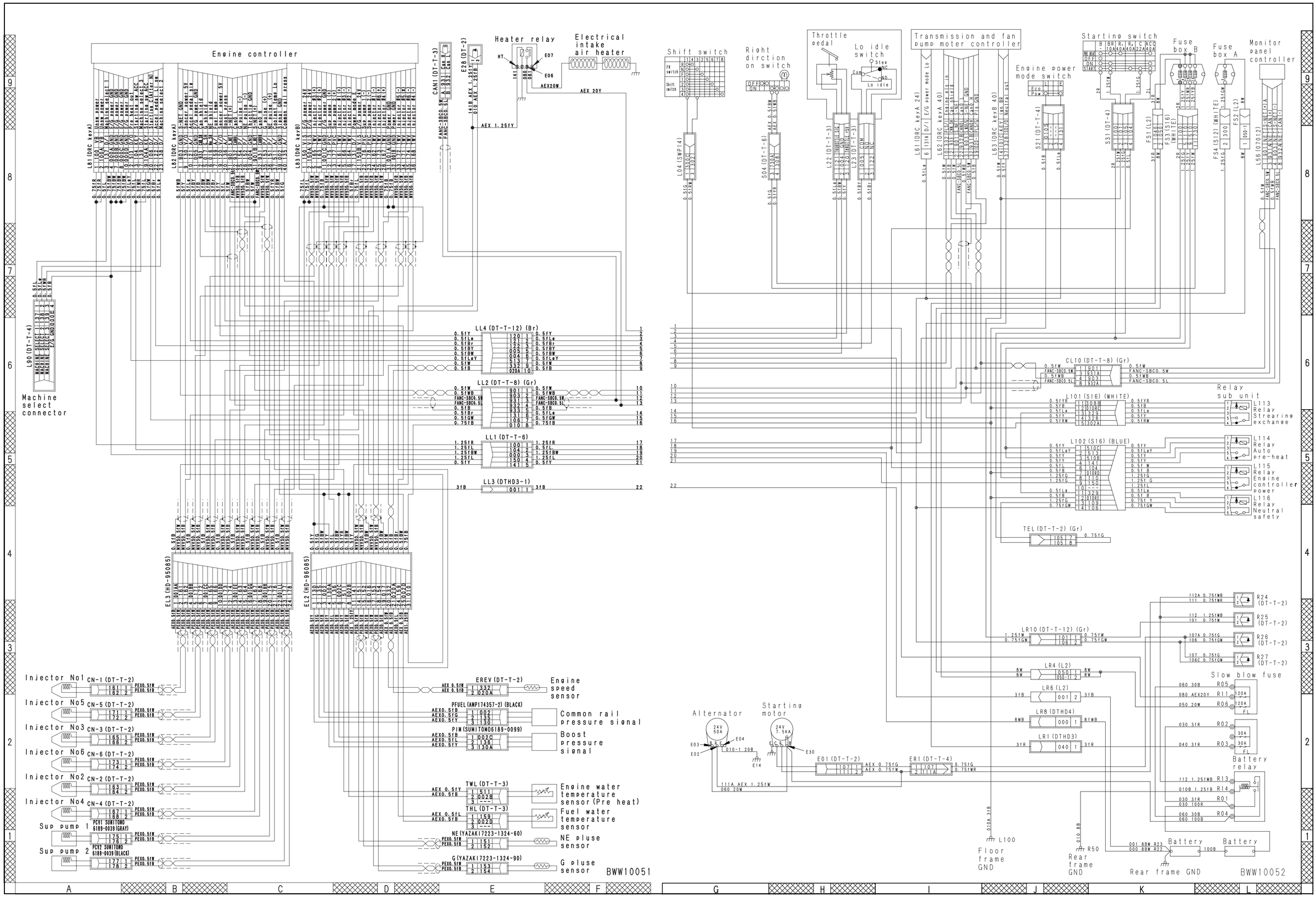
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Electric circuit diagram (8/8)



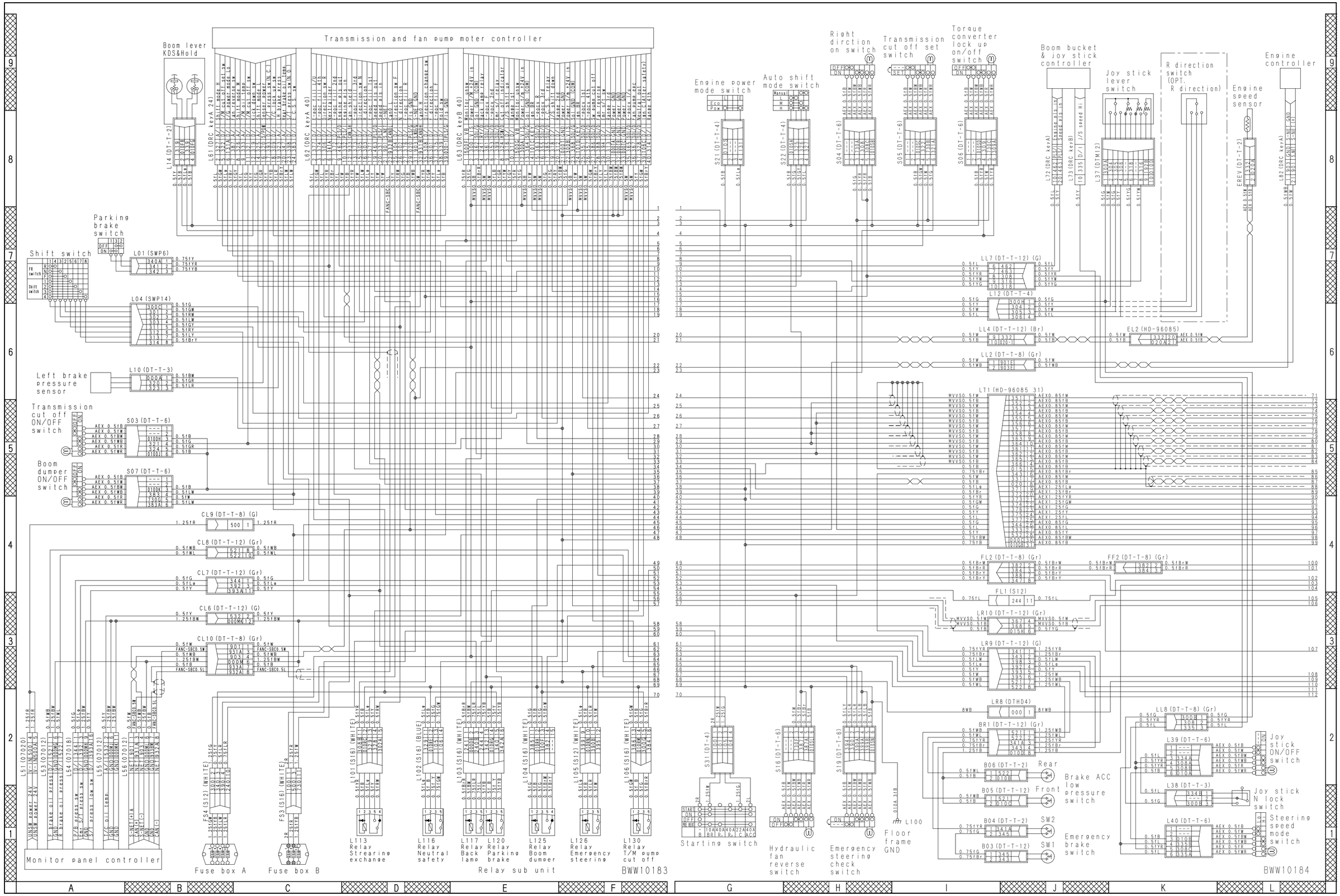
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Engine control system diagram – zoom of pages 20-318 / 20-319



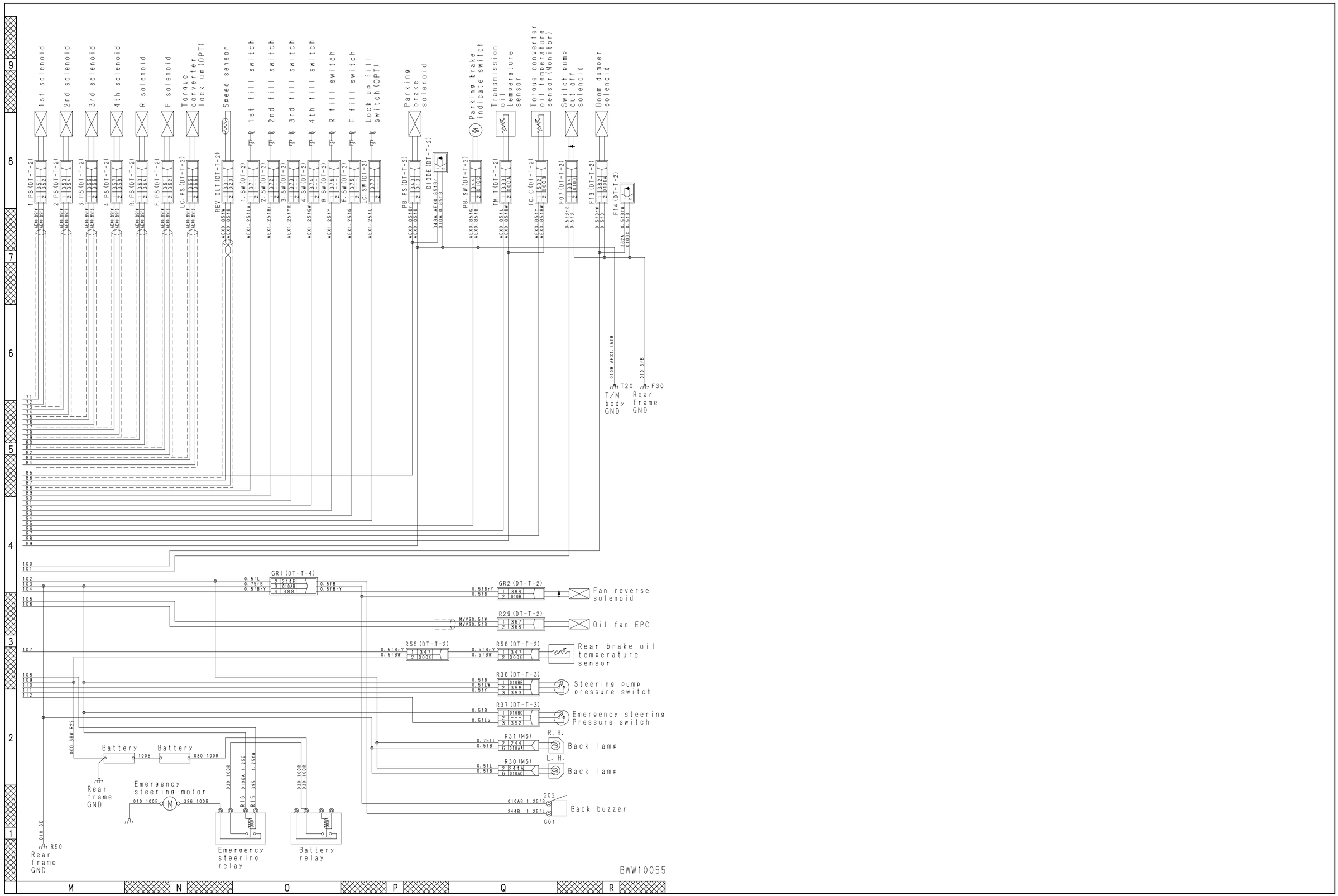
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Transmission control system diagram – zoom of pages 20-418 / 20-419



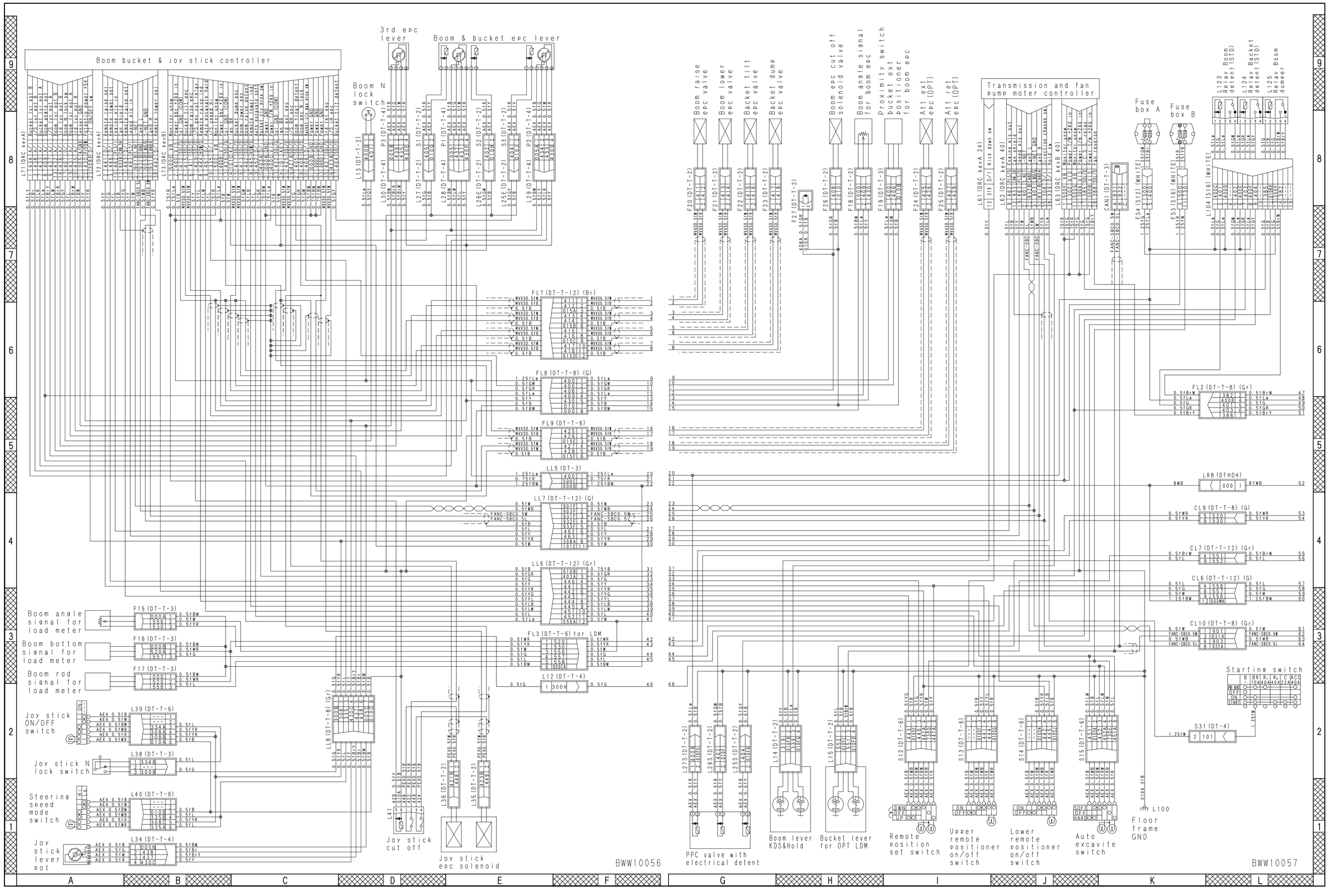
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Transmission control system diagram – zoom of page 20-420



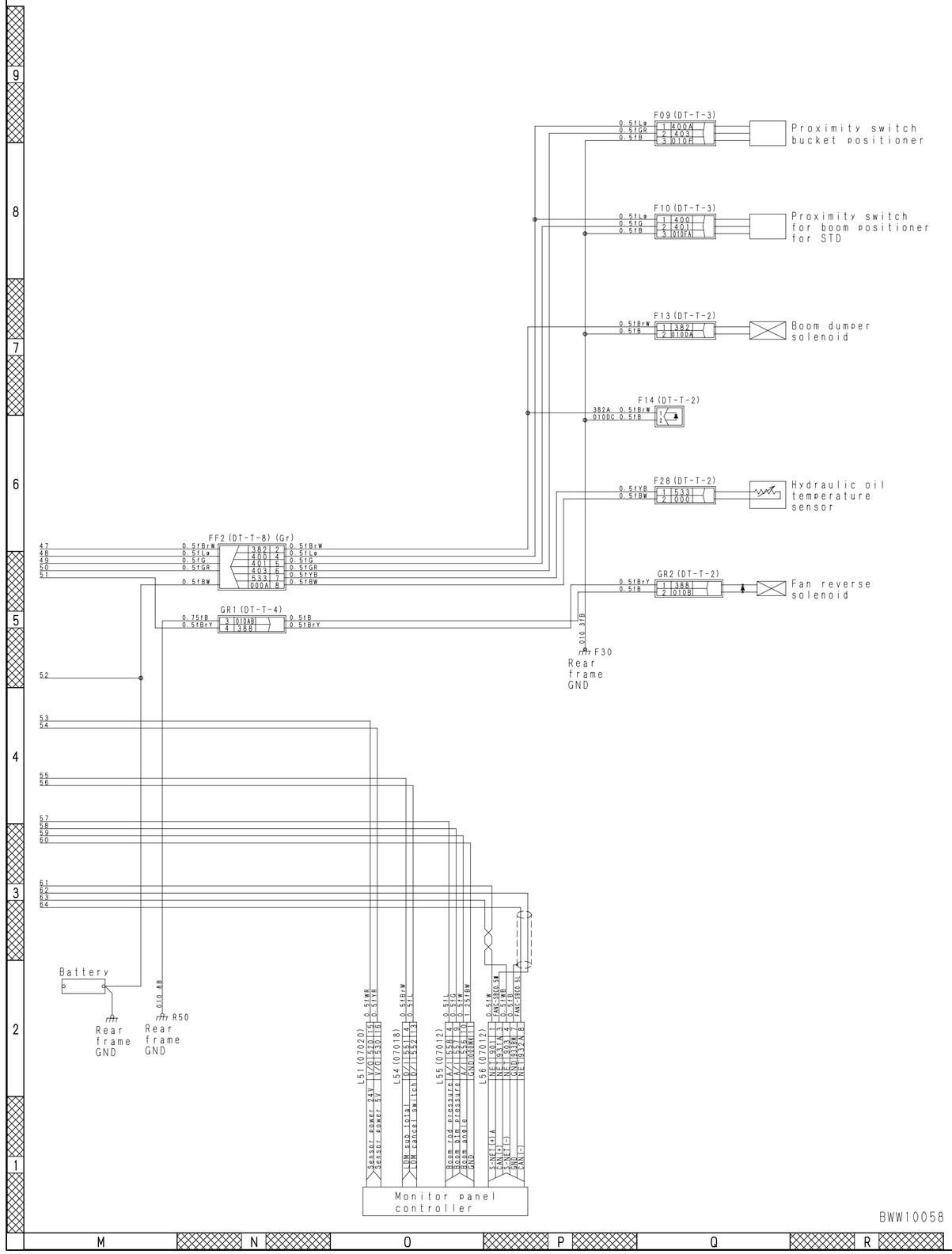
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Work equipment control system diagram – zoom of pages 20-618 / 20-619



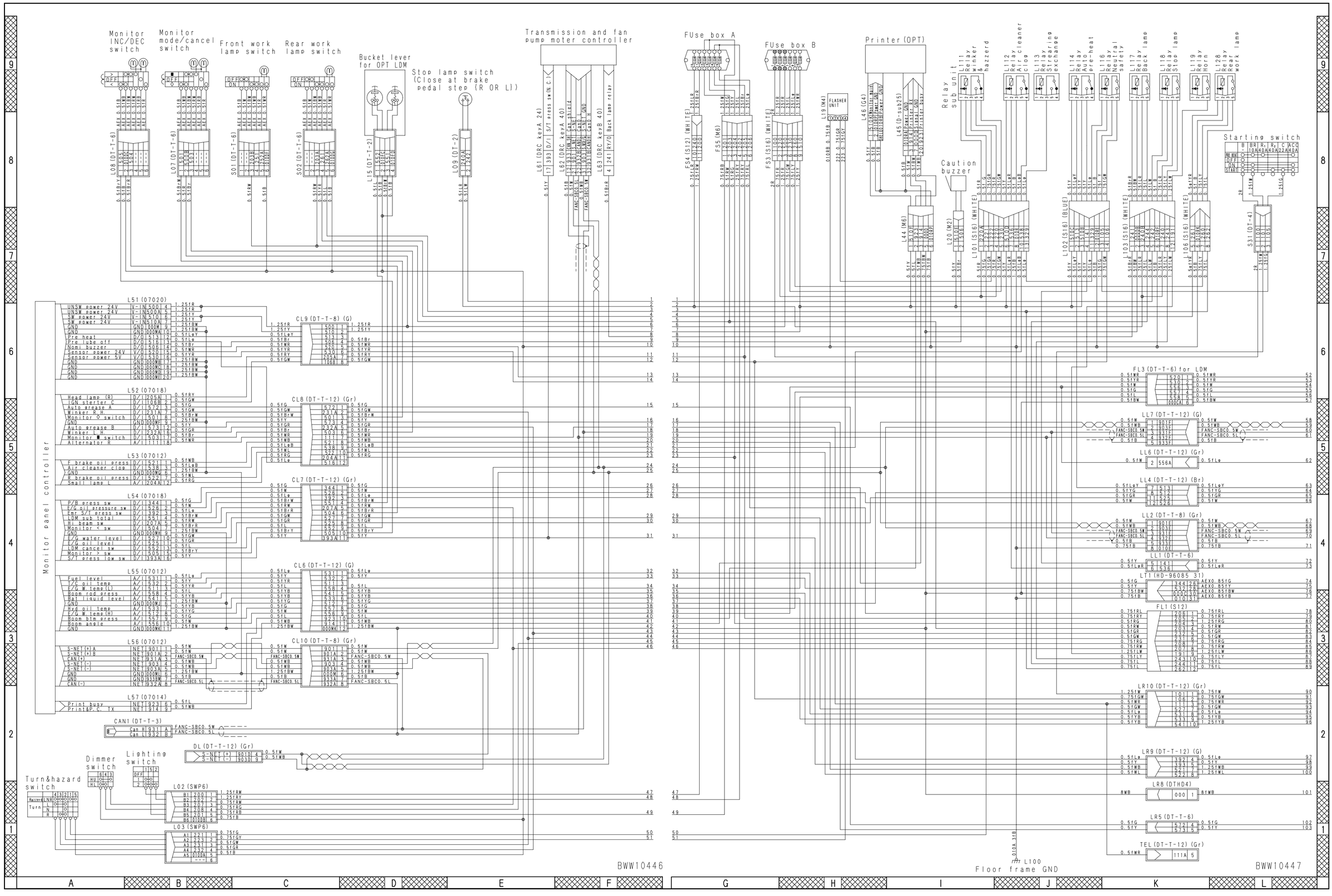
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Work equipment control system diagram – zoom of page 20-620



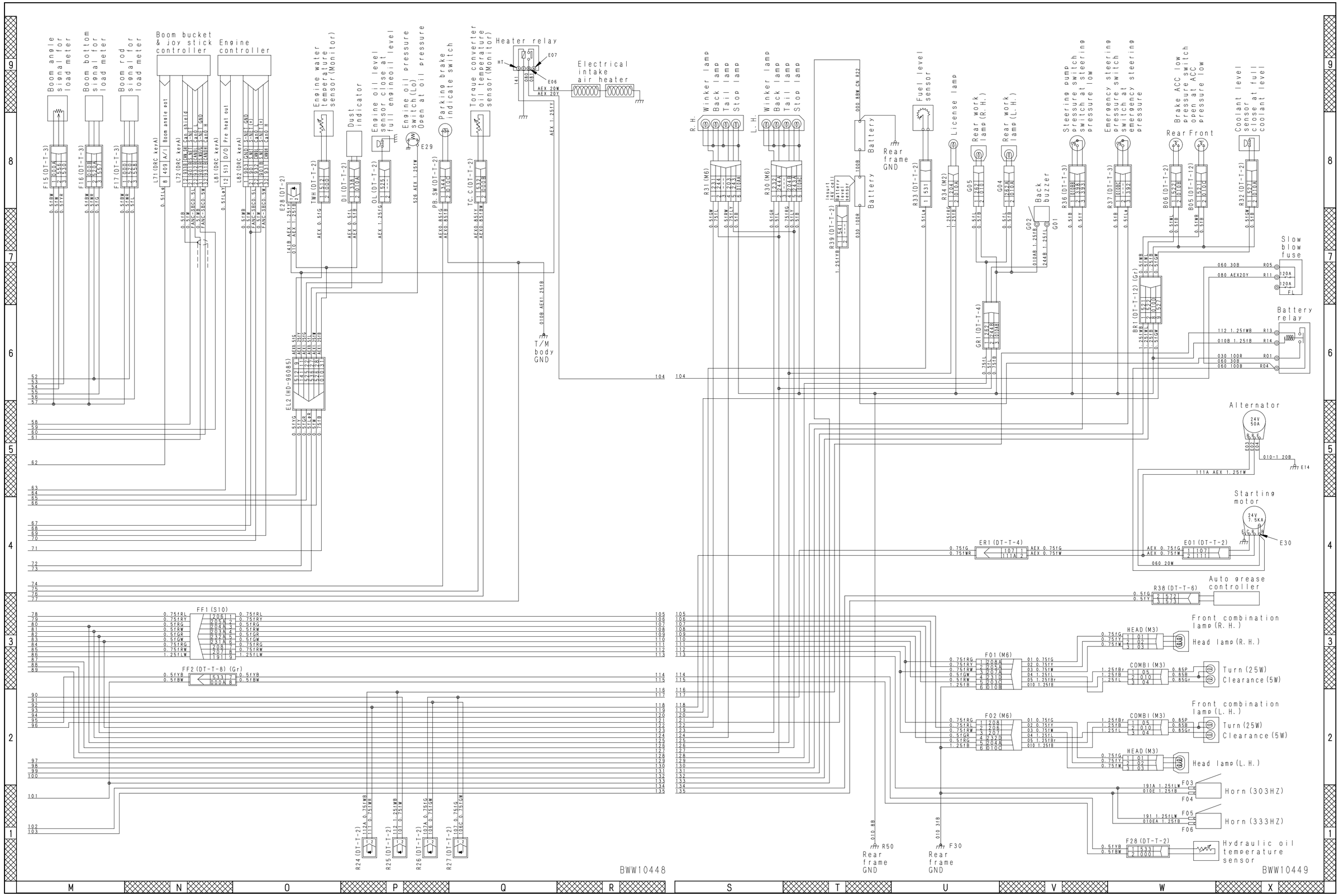
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Monitor system diagram – zoom of pages 20-816 / 20-817



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Monitor system diagram – zoom of pages 20-818 / 20-819



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Electrical system diagram – zoom of page 20-1018 / Related circuit diagram – zoom of page 20-1029

