UEN00373-01

Shop Manual

HYDRAULIC
EXCAVATOR

GALEO

PC800 -8
PC800LC -8

SERIAL NUMBERS PC800- 50001 and up
PC800LC- 50001

KOMATSU

HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

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Organization list of the shop manual

The contents of this shop manual are shown together with Form No. in a list.

Note 1: Always keep the latest version of this manual in accordance with this list and utilize accordingly.
The marks shown to the right of Form No. denote the following:
○: New issue (to be filed additionally) ●: Revision (to be replaced for each Form No.)

Note 2: This shop manual can be supplied for each Form No.

Note 3: To file this shop manual in the special binder for management, handle it as follows:
- Place a divider on the top of each section in the file after matching the Tub No. with No. indicated next to each Section Name shown in the table below:
- File overview and other materials in sections in the order shown below and utilize them accordingly.

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PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

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Foreword and general information

(Rev. 2005/11)

Safety notice

Important safety notice

Proper service and repair are extremely important for safe machine operation. The service and repair techniques recommended by Komatsu and described in this manual are both effective and safe. Some of these techniques require the use of tools specially designed by Komatsu for the specific 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.

1. General precautions

⚠ **Mistakes in operation are extremely dangerous. Read the Operation and Maintenance Manual carefully before operating the machine.**

1) Before carrying out any greasing or repairs, read all the safety plates stuck to the machine. For the locations of the safety plates and detailed explanation of precautions, see the Operation and Maintenance Manual.
2) 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, water, or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.
3) 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.
4) When carrying out any operation with 2 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 in the operator's compartment.
5) Only qualified workers must carry out work and operation which require license or qualification.
6) Keep all tools in good condition, learn the correct way to use them, and use the proper ones of them. Before starting work, thoroughly check the tools, machine, forklift, service car, etc.
7) If welding repairs are needed, always have a trained and experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, shielding goggles, cap and other clothes suited for welding work.
8) Before starting work, warm up your body thoroughly to start work under good condition.

Safety points

1	Good arrangement
2	Correct work clothes
3	Following work standard
4	Making and checking signs
5	Prohibition of operation and handling by unlicensed workers
6	Safety check before starting work
7	Wearing protective goggles (for cleaning or grinding work)
8	Wearing shielding goggles and protectors (for welding work)
9	Good physical condition and preparation
10	Precautions against work which you are not used to or you are used to too much

2. Preparations for work

1) Before adding oil or making any repairs, park the machine on hard and level ground, and apply the parking brake and block the wheels or tracks to prevent the machine from moving.
2) Before starting work, lower the work equipment (blade, ripper, bucket, etc.) to the ground. If this is not possible, insert the lock 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.

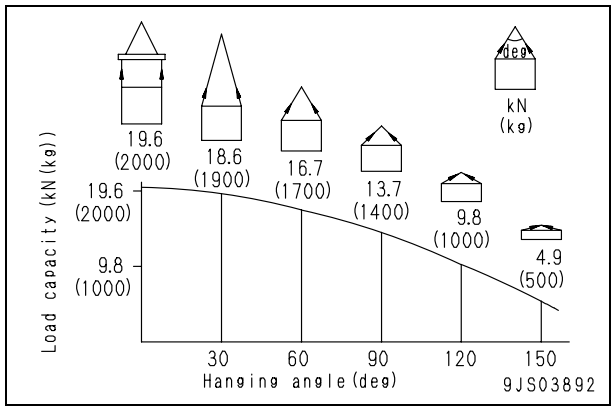
3) When disassembling or assembling, support the machine with blocks, jacks, or stands before starting work.
4) Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

3. Precautions during work

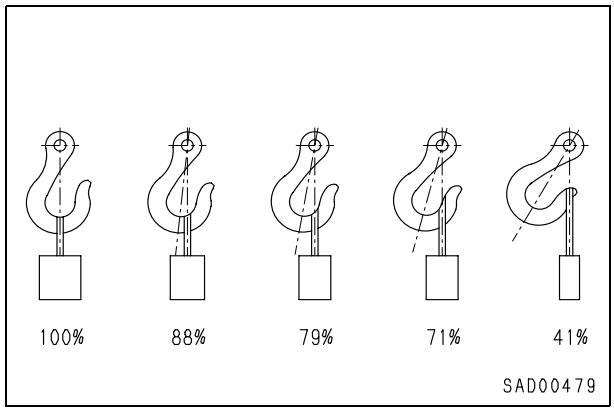
1) Before disconnecting or removing components of the oil, water, or air circuits, first release the pressure completely from the circuit. When removing the oil filler cap, a drain plug, or an oil pressure pickup plug, loosen it slowly to prevent the oil from spurting out.
2) The coolant and oil in the circuits are hot when the engine is stopped, so be careful not to get scalded. Wait for the oil and coolant to cool before carrying out any work on the oil or water circuits.
3) Before starting work, stop the engine. When working on or around a rotating part, in particular, stop the engine. When checking the machine without stopping the engine (measuring oil pressure, revolving speed, temperature, etc.), take extreme care not to get rolled or caught in rotating parts or moving parts.
4) Before starting work, remove the leads from the battery. Always remove the lead from the negative (–) terminal first.
5) When raising a heavy component (heavier than 25 kg), use a hoist or crane. Before starting work, check that the slings (wire ropes, chains, and hooks) are free from damage. Always use slings which have ample capacity and install them to proper places. Operate the hoist or crane slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
6) When removing a cover which is under internal pressure or under pressure from a spring, always leave 2 bolts in diagonal positions. Loosen those bolts gradually and alternately to release the pressure, and then remove the cover.
7) When removing components, be careful not to break or damage the electrical wiring. Damaged wiring may cause electrical fires.
8) When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips onto the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip and can even start fires.
9) As a general rule, do not use gasoline to wash parts. Do not use it to clean electrical parts, in particular.
10) Be sure to assemble all parts again in their original places. Replace any damaged parts and parts which must not be reused 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 operated.
11) 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. In addition, check that connecting parts are correctly installed.
12) When assembling or installing parts, always tighten them to the specified 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.
13) When aligning 2 holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
14) When measuring hydraulic pressure, check that the measuring tools are correctly assembled.
15) 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.
16) If the engine is operated for a long time in a place which is not ventilated well, you may suffer from gas poisoning. Accordingly, open the windows and doors to ventilate well.

4. Precautions for sling work and making signs

1) Only one appointed worker must make signs and co-workers must communicate with each other frequently. The appointed sign maker must make specified signs clearly at a place where he is seen well from the operator's seat and where he can see the working condition easily. The sign maker must always stand in front of the load and guide the operator safely.
   - Do not stand under the load.
   - Do not step on the load.
2) Check the slings before starting sling work.
3) Keep putting on gloves during sling work. (Put on leather gloves, if available.)
4) Measure the weight of the load by the eye and check its center of gravity.
5) Use proper sling according to the weight of the load and method of slinging. If too thick wire ropes are used to sling a light load, the load may slip and fall.
6) Do not sling a load with 1 wire rope alone. If it is slung so, it may rotate and may slip out of the rope. Install 2 or more wire ropes symmetrically.
   ⚠ 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.
7) Limit the hanging angle to 60°, as a rule. Do not sling a heavy load with ropes forming a wide hanging angle from the hook. When hoisting a load with 2 or more ropes, the force subjected to each rope will increase with the hanging angle. The table below shows the variation of allowable load in kN {kg} when hoisting is made with 2 ropes, each of which is allowed to sling up to 9.8 kN {1,000 kg} vertically, at various hanging angles. When the 2 ropes sling a load vertically, up to 19.6 kN {2,000 kg} of total weight can be suspended. This weight is reduced to 9.8 kN {1,000 kg} when the 2 ropes make a hanging angle of 120°. If the 2 ropes sling a 19.6 kN {2,000 kg} load at a lifting angle of 150°, each of them is subjected to a force as large as 39.2 kN {4,000 kg}.



8) When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
9) Use the specified eyebolts and fix wire ropes, chains, etc. to them with shackles, etc.
10) Apply wire ropes to the middle portion of the hook.
    - Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting. The hook has the maximum strength at the middle portion.



11) Do not use twisted or kinked wire ropes.
12) When lifting up a load, observe the following.
    - Wind in the crane slowly until wire ropes are stretched. When settling the wire ropes with the hand, do not grasp them but press them from above. If you grasp them, your fingers may be caught.
    - After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.

- If the load is unstable or the wire rope or chains are twisted, lower the load and lift it up again.
- Do not lift up the load slantingly.

13) When lifting down a load, observe the following.
- When lifting down a load, stop it temporarily at 30 cm above the floor, and then lower it slowly.
- Check that the load is stable, and then remove the sling.
- Remove kinks and dirt from the wire ropes and chains used for the sling work, and put them in the specified place.

5. Precautions for using mobile crane

★ Read the Operation and Maintenance Manual of the crane carefully in advance and operate the crane safely.

6. Precautions for using overhead hoist crane

⚠ **When raising a heavy part (heavier than 25 kg), use a hoist, etc. In Disassembly and assembly, the weight of a part heavier than 25 kg is indicated after the mark of .**

1) Before starting work, inspect the wire ropes, brake, clutch, controller, rails, over wind stop device, electric shock prevention earth leakage breaker, crane collision prevention device, and power application warning lamp, and check safety.
2) Observe the signs for sling work.
3) Operate the hoist at a safe place.
4) Check the direction indicator plates (east, west, south, and north) and the directions of the control buttons without fail.
5) Do not sling a load slantingly. Do not move the crane while the slung load is swinging.
6) Do not raise or lower a load while the crane is moving longitudinally or laterally.
7) Do not drag a sling.
8) When lifting up a load, stop it just after it leaves the ground and check safety, and then lift it up.
9) Consider the travel route in advance and lift up a load to a safe height.
10) Place the control switch on a position where it will not be an obstacle to work and passage.
11) After operating the hoist, do not swing the control switch.
12) Remember the position of the main switch so that you can turn off the power immediately in an emergency.
13) If the hoist stops because of a power failure, turn the power switch OFF. When turning on a switch which was turned OFF by the electric shock prevention earth leakage breaker, check that the devices related to that switch are not in operation state.
14) If you find an obstacle around the hoist, stop the operation.
15) After finishing the work, stop the hoist at the specified position and raise the hook to at least 2 m above the floor. Do not leave the sling installed to the hook.

7. Selecting wire ropes

1) Select adequate ropes depending on the weight of parts to be hoisted, referring to the table below.

Wire ropes
(Standard “Z” twist ropes without galvanizing)
(JIS G3525, No. 6, Type 6X37-A)

Nominal diameter of rope	Allowable load	
mm	kN	ton
10	8.8	0.9
12	12.7	1.3
14	17.3	1.7
16	22.6	2.3
18	28.6	2.9
20	35.3	3.6
25	55.3	5.6
30	79.6	8.1
40	141.6	14.4
50	221.6	22.6
60	318.3	32.4

★ The allowable load is one-sixth of the breaking strength of the rope used (Safety coefficient: 6).

How to read the shop manual

- Some attachments and optional parts in this shop manual may not be delivered to certain areas. If one of them is required, consult KOMATSU distributors.
- Materials and specifications are subject to change without notice.
- Shop manuals are divided into the “Chassis volume” and “Engine volume”. For the engine unit, see the engine volume of the engine model mounted on the machine.

1. Composition of shop manual

This shop manual contains the necessary technical information for services performed in a workshop. For ease of understanding, the manual is divided into the following sections.

00. Index and foreword

This section explains the shop manuals list, table of contents, safety, and basic information.

01. Specification

This section explains the specifications of the machine.

10. Structure, function and maintenance standard

This section explains the structure, function, and maintenance standard values of each component. The structure and function sub-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. The maintenance standard sub-section explains the criteria and remedies for disassembly and service.

20. Standard value table

This section explains the standard values for new machine and judgement criteria for testing, adjusting, and troubleshooting. This standard value table is used to check the standard values in testing and adjusting and to judge parts in troubleshooting.

30. Testing and adjusting

This section explains measuring instruments and measuring methods for testing and adjusting, and method of adjusting each part. The standard values and judgement criteria for testing and adjusting are explained in Testing and adjusting.

40. Troubleshooting

This section explains how to find out failed parts and how to repair them. The troubleshooting is divided by failure modes. The “S mode” of the troubleshooting related to the engine may be also explained in the Chassis volume and Engine volume. In this case, see the Chassis volume.

50. Disassembly and assembly

This section explains the special tools and procedures for removing, installing, disassembling, and assembling each component, as well as precautions for them. In addition, tightening torque and quantity and weight of coating material, oil, grease, and coolant necessary for the work are also explained.

90. Diagrams and drawings (chassis volume)/Repair and replacement of parts (engine volume)

- Chassis volume
  This section gives hydraulic circuit diagrams and electrical circuit diagrams.
- Engine volume
  This section explains the method of reproducing, repairing, and replacing parts.

2. Revision and distribution

Any additions, revisions, or other change of notices will be sent to KOMATSU distributors. Get the most up-to-date information before you start any work.

3. Filing method

File by the brochures in the correct order of the form number printed in the shop manual composition table.

- **Revised edition mark**
  When a manual is revised, the ones and tens digits of the form number of each brochure is increased by 1. (Example: 00, 01, 02 …)

- **Revisions**
  Revised brochures are shown in the shop manual composition table.

4. Symbols

Important safety and quality portions are marked with the following symbols so that the shop manual will be used practically.

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

5. Units

In this shop manual, the units are indicated with International System of units (SI). For reference, conventionally used Gravitational System of units is indicated in parentheses { }.

Explanation of terms for maintenance standard

The maintenance standard values necessary for judgment of products and parts are described by the following terms.

1. Standard size and tolerance

- To be accurate, the finishing size of parts is a little different from one to another.
- To specify a finishing size of a part, a temporary standard size is set and an allowable difference from that size is indicated.
- The above size set temporarily is called the “standard size” and the range of difference from the standard size is called the “tolerance”.
- The tolerance with the symbols of + or – is indicated on the right side of the standard size.

Example:

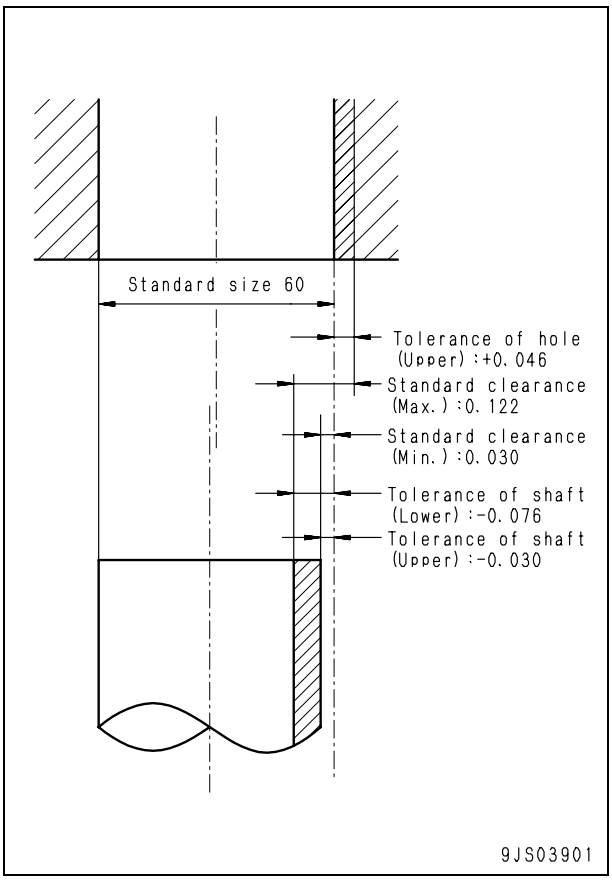
Standard size	Tolerance
120	–0.022 –0.126

★ The tolerance may be indicated in the text and a table as [standard size (upper limit of tolerance/lower limit of tolerance)].
Example) 120 (–0.022/–0.126)

- Usually, the size of a hole and the size of the shaft to be fitted to that hole are indicated by the same standard size and different tolerances of the hole and shaft. The tightness of fit is decided by the tolerance.
- Indication of size of rotating shaft and hole and relationship drawing of them

Example:

Standard size	Tolerance	
	Shaft	Hole
60	–0.030 –0.076	+0.046 0



2. Standard clearance and standard value

- The clearance made when new parts are assembled is called the “standard clearance“, which is indicated by the range from the minimum clearance to the maximum clearance.
- When some parts are repaired, the clearance is generally adjusted to the standard clearance.
- A value of performance and function of new products or equivalent is called the “standard value“, which is indicated by a range or a target value.
- When some parts are repaired, the value of performance/function is set to the standard value.

3. Standard interference

- When the size of a hole is smaller than the size of a shaft because of the standard size and tolerance, the difference between these sizes is called the “interference”.
- The range (A – B) from the difference (A) between the minimum size of the shaft and the maximum size of the hole to the difference (B) between the maximum size of the shaft and the minimum size of the hole is the “standard interference”.
- After repairing or replacing some parts, measure the size of their hole and shaft and check that the interference is in the standard range.

4. Repair limit and allowable value

- The size of a part changes because of wear and deformation while it is used. The limit of changed size is called the “repair limit”.
- If a part is worn to the repair limit must be replaced or repaired.
- The performance and function of a product lowers while it is used. A value below which the product can be used without causing a problem is called the “allowable value”.
- If a product is worn to the allowable value, it must be checked or repaired. Since the permissible value is estimated from various tests or experiences in most cases, however, it must be judged after considering the operating condition and customer's requirement.

5. Clearance limit

- Parts can be used until the clearance between them is increased to a certain limit. The limit at which those parts cannot be used is called the “clearance limit”.
- If the clearance between the parts exceeds the clearance limit, they must be replaced or repaired.

6. Interference limit

- The allowable maximum interference between the hole of a part and the shaft of another part to be assembled is called the “interference limit”.
- The interference limit shows the repair limit of the part of smaller tolerance.
- If the interference between the parts exceeds the interference limit, they must be replaced or repaired.

Handling electric equipment and hydraulic component

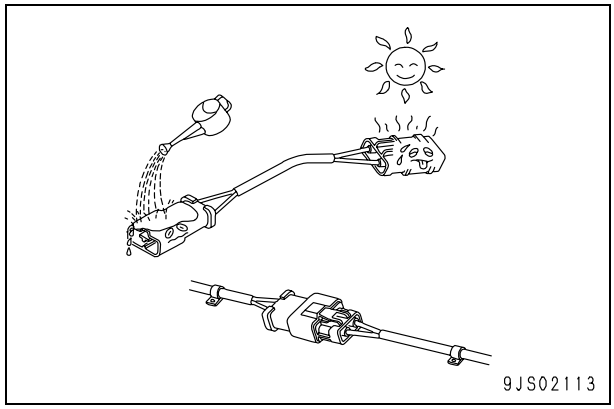
To maintain the performance of the machine over a long period, and to prevent failures or other troubles before they occur, correct “operation“, “maintenance and inspection“, “troubleshooting“, and “repairs” must be carried out. This section deals particularly with correct repair procedures for mechatronics and is aimed at improving the quality of repairs. For this purpose, it gives sections on “Handling electric equipment” and “Handling hydraulic equipment” (particularly gear oil and hydraulic oil).

Points to remember 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 protectors or tubes used for protecting the wiring.

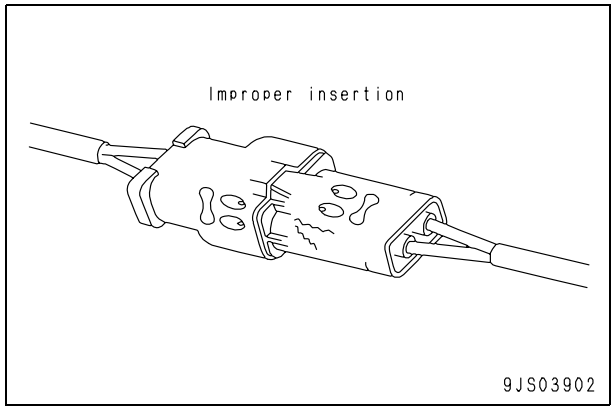
Compared with other electrical components fitted in boxes or cases, wiring harnesses are more likely to be affected by the direct effects of rain, water, heat, or vibration. Furthermore, during inspection and repair operations, they are frequently removed and installed again, so they are likely to suffer deformation or damage. For this reason, it is necessary to be extremely careful when handling wiring harnesses.



2. Main failures occurring in wiring harness

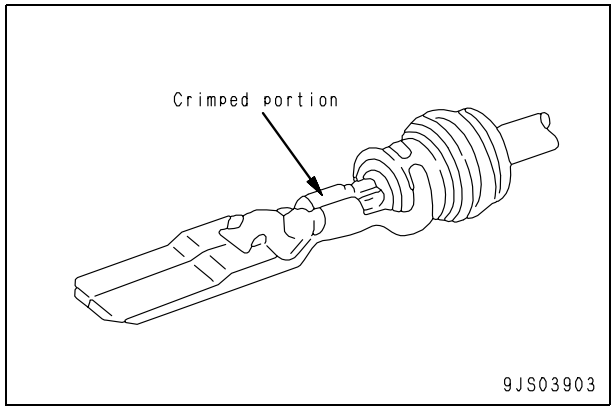
1) Defective contact of connectors (defective contact between male and female)

Problems with defective 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 oxidization of the contact surfaces.

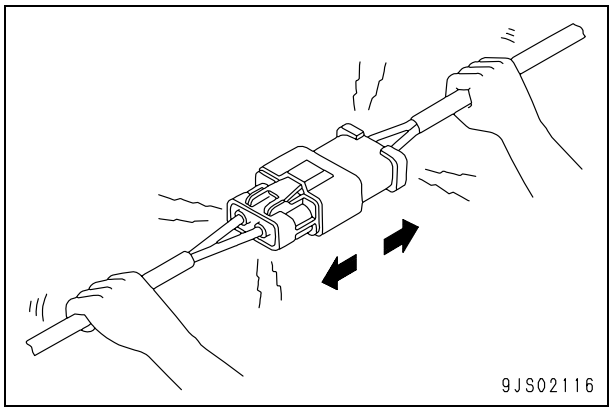


2) Defective crimping or soldering of connectors

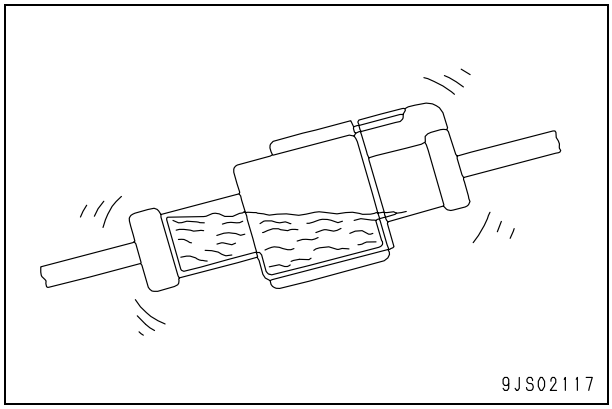
The pins of the male and female connectors are in contact at the crimped terminal or soldered portion, but if there is excessive force brought to bear on the wiring, the plating at the joint will peel and cause improper connection or breakage.



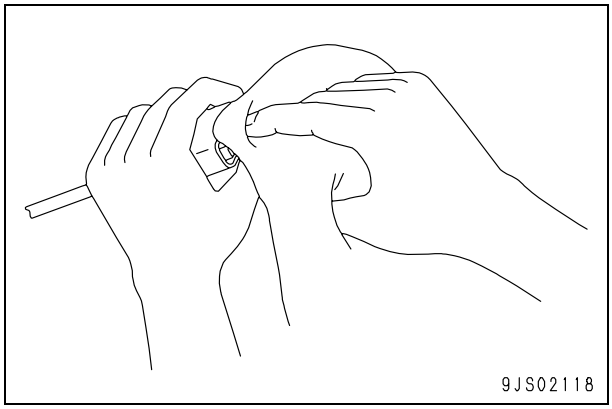
3) Disconnections in wiring
If the wiring is held and the connectors are pulled apart, or components are lifted with a crane with the wiring still connected, or a heavy object hits the wiring, the crimping of the connector may separate, or the soldering may be damaged, or the wiring may be broken.



4) High-pressure water entering 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. Accordingly, take care not splash water over the connector. The connector is designed to prevent water from entering, but at the same time, 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.



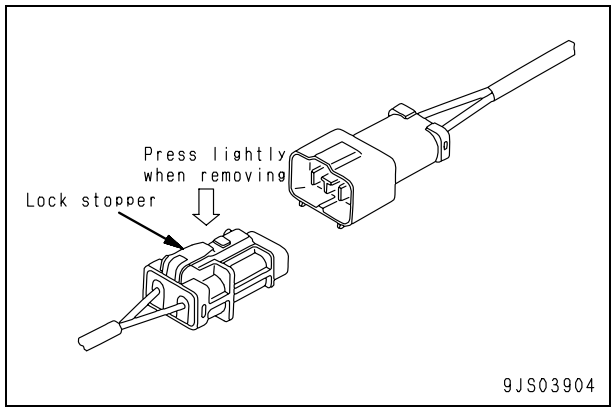
5) Oil or dirt stuck to connector
If oil or grease are stuck to the connector and an oil film is formed on the mating surface between the male and female pins, the oil will not let the electricity pass, so there will be defective contact. If there is oil or grease stuck to the connector, wipe it off with a dry cloth or blow it dry with compressed 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 oil or water in the compressed air, the contacts will become even dirtier, so remove the oil and water from the compressed air completely before cleaning with compressed air.



3. Removing, installing, and drying connectors and wiring harnesses

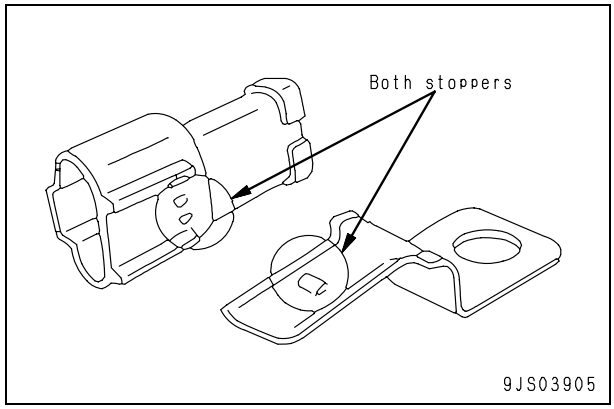
1) Disconnecting connectors

1] Hold the connectors when disconnecting.
When disconnecting the connectors, hold the connectors. 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 pull with one hand.

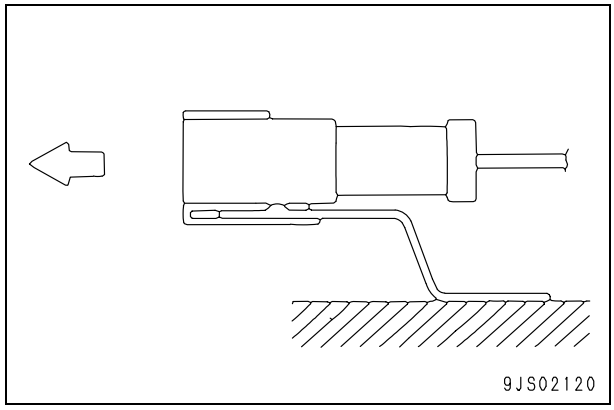


2] When removing from clips

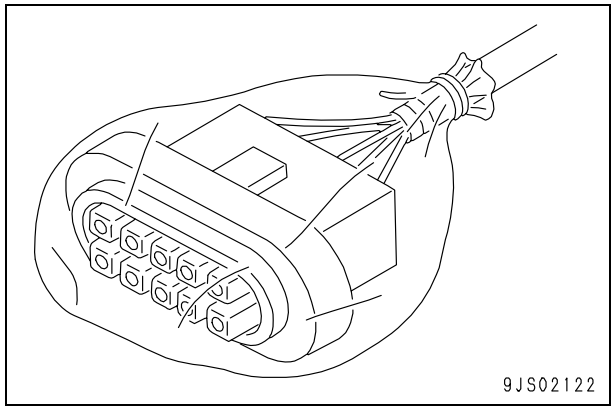
- Both of the connector and clip have stoppers, which are engaged with each other when the connector is installed.



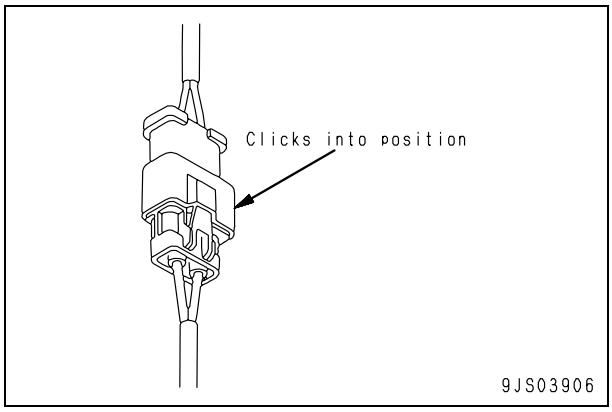
- When removing a connector from a clip, pull the connector in a parallel direction to the clip for removing stoppers.
★ If the connector is twisted up and down or to the left or right, the housing may break.

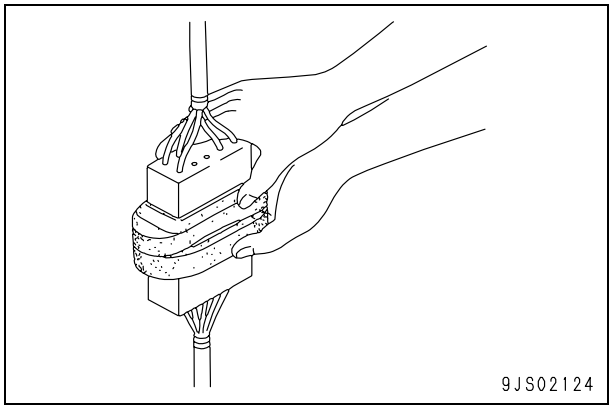


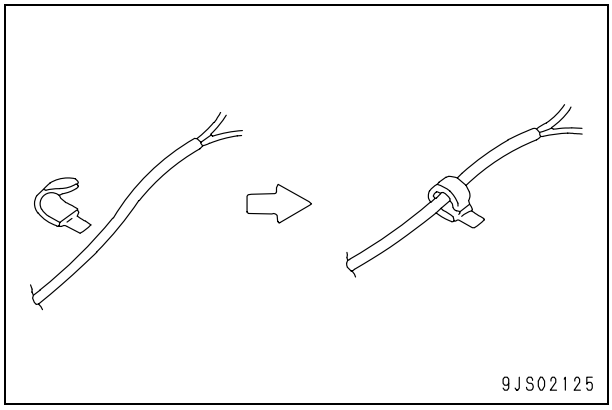
3] Action to take after removing connectors
After removing any connector, cover it with a vinyl bag to prevent any dust, dirt, oil, or water from getting in the connector portion.
★ If the machine is left disassembled for a long time, it is particularly easy for improper contact to occur, so always cover the connector.



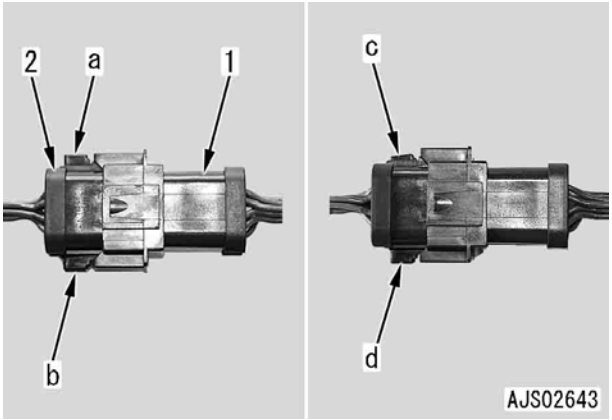
2) Connecting connectors
   1] Check the connector visually.
   Check that there is no oil, dirt, or water stuck to the connector pins (mating portion).
   Check that there is no deformation, defective contact, corrosion, or damage to the connector pins.
   Check that there is no damage or breakage to 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 got 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] Fix the connector securely.
   Align the position of the connector correctly, and then insert it securely. For connectors with 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 of the boot. In addition, if the wiring harness is misaligned, or the clamp is out of position, adjust it to its correct position.
   ★ If the connector cannot be corrected easily, remove the clamp and adjust the position.
   ● If the connector clamp has been removed, be sure to return it to its original position. Check also that there are no loose clamps.







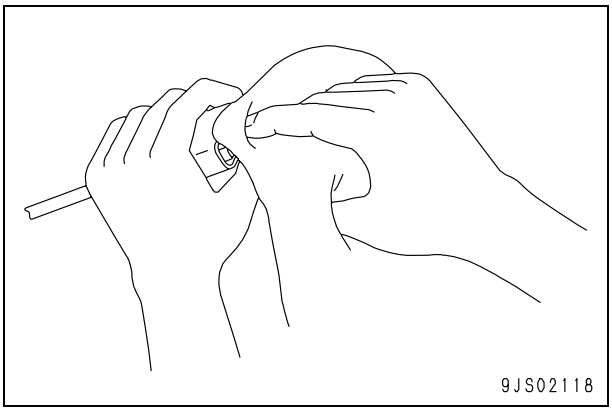
3) Connecting DT connectors
   Since the DT 8-pin and 12-pin heavy duty wire connectors have 2 latches respectively, push them in until they click 2 times.

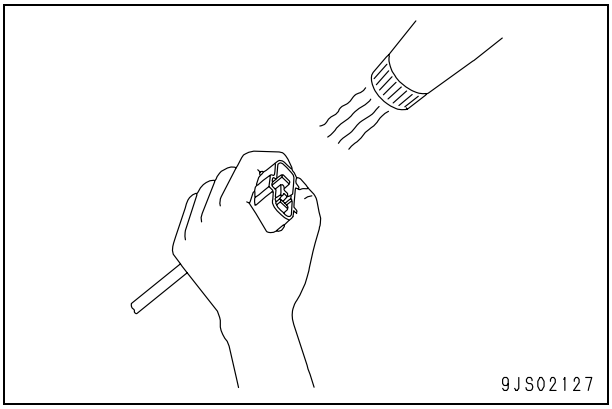


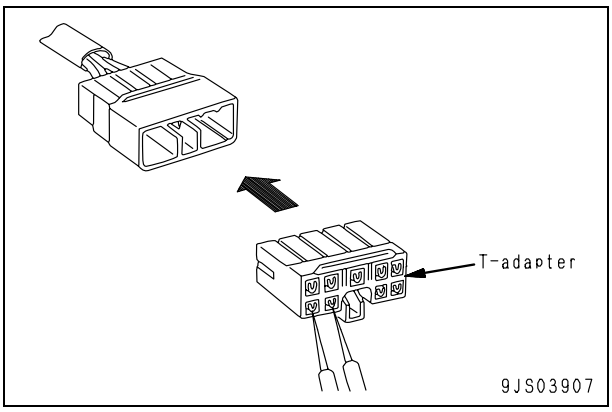
1. Male connector
2. Female connector

● Normal locking state (Horizontal): a, b, d
● Incomplete locking state (Diagonal): c

4) 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 compressed air, there is the risk that oil in the air may cause defective contact, so remove all oil and water from the compressed air before 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 regulate the time that the hot air is used in order 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, blow it with contact restorer and reassemble.

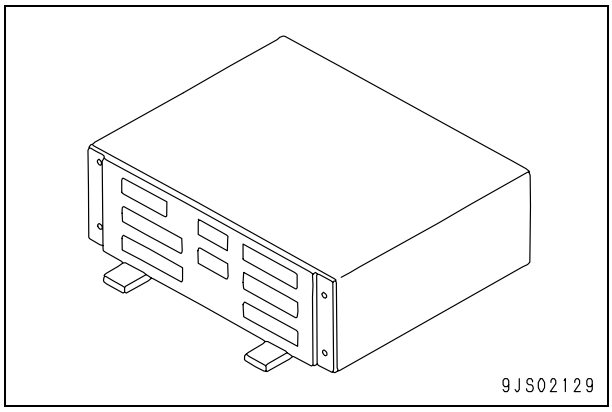


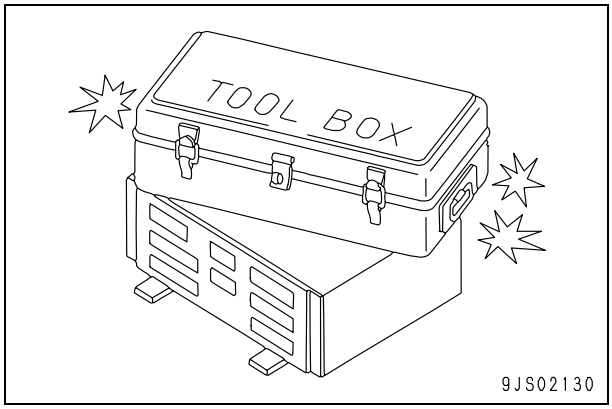




4. Handling controller

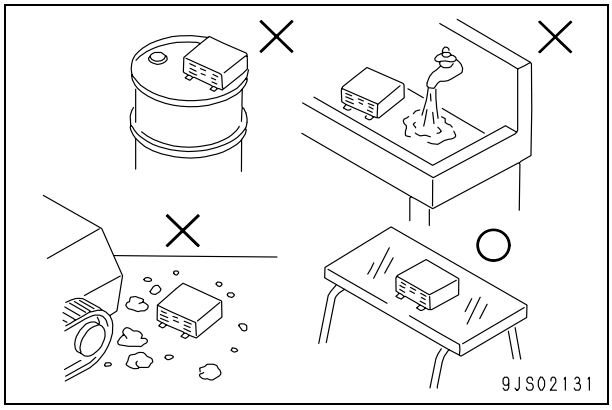
1) The controller contains a microcomputer and electronic control circuits. These control all of the electronic circuits on the machine, so be extremely careful when handling the controller.
2) Do not place objects on top of the controller.
3) Cover the control connectors with tape or a vinyl bag. Never touch the connector contacts with your hand.
4) During rainy weather, do not leave the controller in a place where it is exposed to rain.
5) Do not place the controller on oil, water, or soil, or in any hot place, even for a short time. (Place it on a suitable dry stand).
6) Precautions when carrying out arc welding
When carrying out arc welding on the body, disconnect all wiring harness connectors connected to the controller. Fit an arc welding ground close to the welding point.





5. 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.
4) 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 that circuit.



Points to remember when handling hydraulic equipment

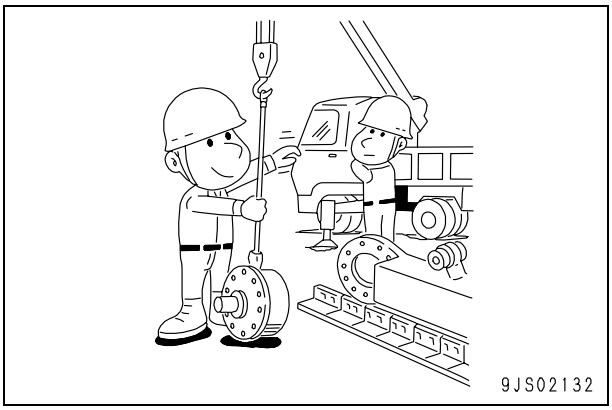
With the increase in pressure and precision of hydraulic equipment, the most common cause of failure is dirt (foreign material) in the hydraulic circuit. When adding hydraulic oil, or when disassembling or assembling hydraulic equipment, it is necessary to be particularly careful.

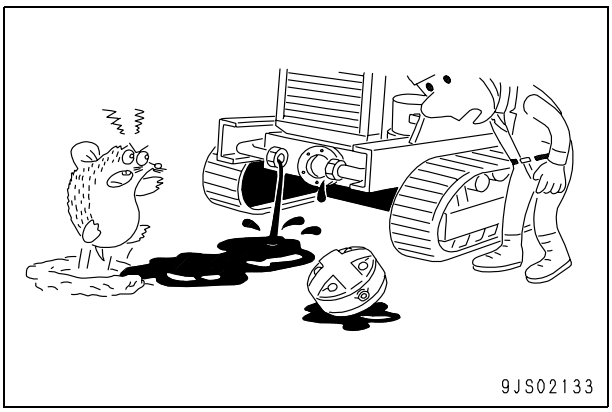
1. **Be careful of the operating environment.**
   Avoid adding hydraulic oil, replacing filters, or repairing the machine in rain or high winds, or places where there is a lot of dust.

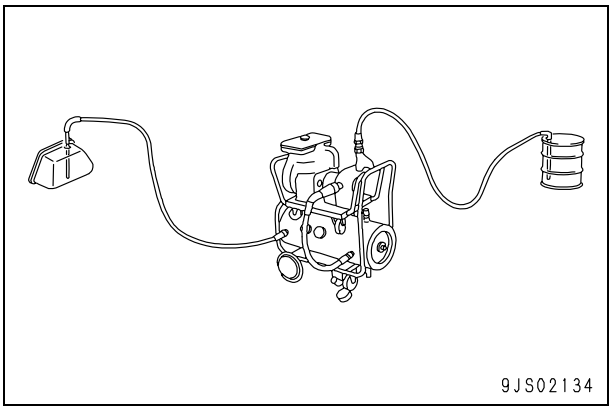
2. **Disassembly and maintenance work in the field**
   If disassembly or maintenance work is carried out on hydraulic equipment in the field, there is danger of dust entering the equipment. It is also difficult to check the performance after repairs, so it is desirable to use unit exchange. Disassembly and maintenance of hydraulic equipment should be carried out in a specially prepared dustproof workshop, and the performance should be checked with special test equipment.

3. **Sealing openings**
   After any piping or equipment is removed, the openings should be sealed with caps, tapes, or vinyl bags to prevent any dirt or dust from entering. If the opening is left open or is blocked with a rag, there is danger of dirt entering or of the surrounding area being made dirty by leaking oil so never do this. Do not simply drain oil out onto the ground, but collect it and ask the customer to dispose of it, or take it back with you for disposal.

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.





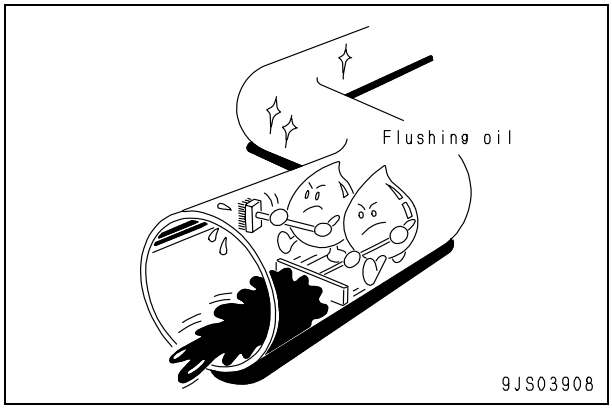


5. Change hydraulic oil when the temperature is high

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. (Drain the oil from the hydraulic tank; also 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.

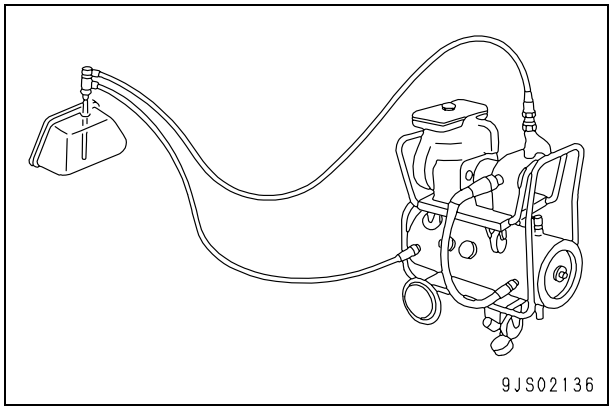
6. Flushing operations

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

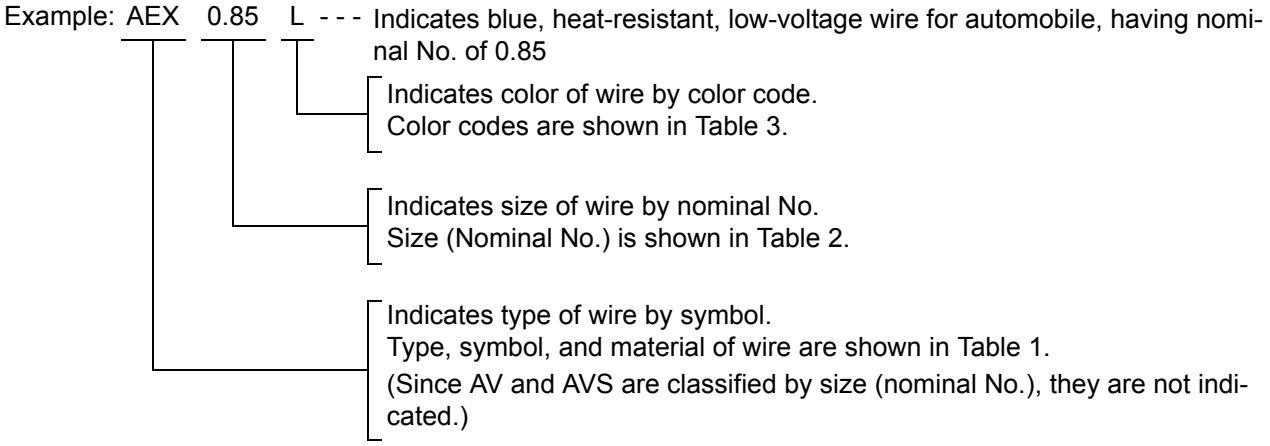
After repairing the hydraulic equipment (pump, control valve, etc.) or when running the machine, carry out oil cleaning to remove the sludge or contaminants in the hydraulic oil circuit. The oil cleaning equipment is used to remove the ultra fine (about 3 μ) particles that the filter built in the hydraulic equipment cannot remove, so it is an extremely effective device.



How to read electric wire code

★ The information about the wires unique to each machine model is described in Troubleshooting section, Relational information of troubleshooting.

In the electric circuit diagram, the material, thickness, and color of each electric wire are indicated by symbols. The electric wire code is helpful in understanding the electric circuit diagram.



1. Type, symbol, and material

AV and AVS are different in only thickness and outside diameter of the cover. AEX is similar to AV in thickness and outside diameter of AEX and different from AV and AVS in material of the cover.

(Table 1)

Type	Symbol	Material		Using temperature range (°C)	Example of use
Low-voltage wire for automobile	AV	Conductor	Annealed copper for electric appliance	–30 to +60	General wiring (Nominal No. 5 and above)
		Insulator	Soft polyvinyl chloride		
Thin-cover low-voltage wire for automobile	AVS	Conductor	Annealed copper for electric appliance		General wiring (Nominal No. 3 and below)
		Insulator	Soft polyvinyl chloride		
Heat-resistant low-voltage wire for automobile	AEX	Conductor	Annealed copper for electric appliance	–50 to +110	General wiring in extremely cold district, wiring at high-temperature place
		Insulator	Heat-resistant crosslinked polyethylene		

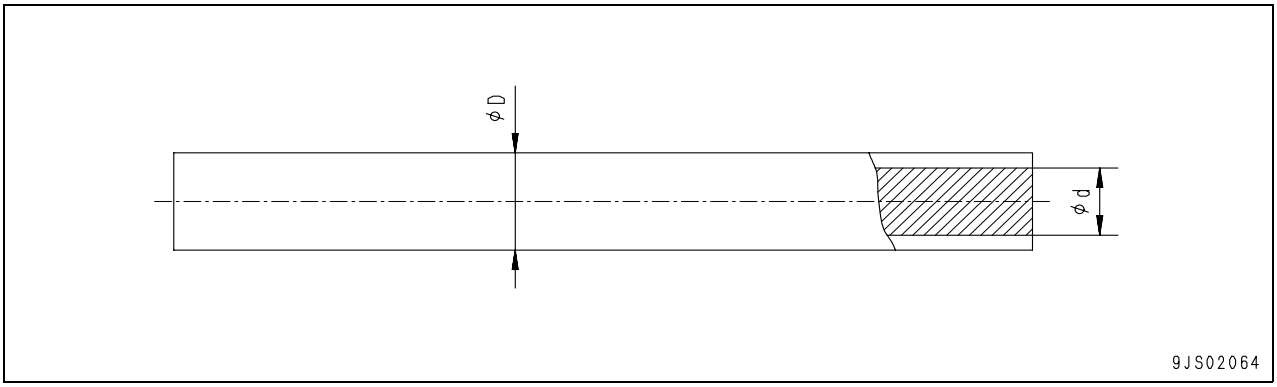
2. Dimensions

(Table 2)

Nominal No.			0.5f	(0.5)	0.75f	(0.85)	1.25f	(1.25)	2f	2	3f	3	5
Conductor		Number of strands/Diameter of strand	20/0.18	7/0.32	30/0.18	11/0.32	50/0.18	16/0.32	37/0.26	26/0.32	58/0.26	41/0.32	65/0.32
		Sectional area (mm^2)	0.51	0.56	0.76	0.88	1.27	1.29	1.96	2.09	3.08	3.30	5.23
		d (approx.)	1.0		1.2		1.5		1.9	1.9	2.3	2.4	3.0
Cover D	AVS	Standard	2.0		2.2		2.5		2.9	2.9	3.5	3.6	–
	AV	Standard	–		–		–		–	–	–	–	4.6
	AEX	Standard	2.0		2.2		2.7		3.0	3.1	–	3.8	4.6

Nominal No.			8	15	20	30	40	50	60	85	100
Conductor		Number of strands/Diameter of strand	50/0.45	84/0.45	41/0.80	70/0.80	85/0.80	108/0.80	127/0.80	169/0.80	217/0.80
		Sectional area (mm^2)	7.95	13.36	20.61	35.19	42.73	54.29	63.84	84.96	109.1
		d (approx.)	3.7	4.8	6.0	8.0	8.6	9.8	10.4	12.0	13.6
Cover D	AVS	Standard	–	–	–	–	–	–	–	–	–
	AV	Standard	5.5	7.0	8.2	10.8	11.4	13.0	13.6	16.0	17.6
	AEX	Standard	5.3	7.0	8.2	10.8	11.4	13.0	13.6	16.0	17.6

"f" of nominal No. denotes flexible".



3. Color codes table

(Table 3)

Color Code	Color of wire
B	Black
Br	Brown
BrB	Brown & Black
BrR	Brown & Red
BrW	Brown & White
BrY	Brown & Yellow
Ch	Charcoal
Dg	Dark green
G	Green
GB	Green & Black
GL	Green & Blue
Gr	Gray
GR	Green & Red
GW	Green & White
GY	Green & Yellow
L	Blue
LB	Blue & Black
Lg	Light green
LgB	Light green & Black
LgR	Light green & Red

Color Code	Color of wire
LgW	Light green & White
LgY	Light green & Yellow
LR	Blue & Red
LW	Blue & White
LY	Blue & Yellow
O	Orange
P	Pink
R	Red
RB	Red & Black
RG	Red & Green
RL	Red & Blue
RW	Red & White
RY	Red & Yellow
Sb	Sky Blue
Y	Yellow
YB	Yellow & Black
YG	Yellow &Green
YL	Yellow & Blue
YR	Yellow & Red
YW	Yellow & White

Remarks: In a color code consisting of 2 colors, the first color is the color of the background and the second color is the color of the marking.
Example: “GW” means that the background is Green and marking is White.

4. Types of circuits and color codes

(Table 4)

Type of wire		AVS or AV						AEX	
Type of circuit	Charge	R	WG	–	–	–	–	R	–
	Ground	B	–	–	–	–	–	B	–
	Start	R	–	–	–	–	–	R	–
	Light	RW	RB	RY	RG	RL	–	D	–
	Instrument	Y	YR	YB	YG	YL	YW	Y	Gr
	Signal	G	GW	GR	GY	GB	GL	G	Br
	Others	L	LW	LR	LY	LB	–	L	–
		Br	BrW	BrR	BrY	BrB	–	–	–
		Lg	LgR	LgY	LgB	LgW	–	–	–
		O	–	–	–	–	–	–	–
		Gr	–	–	–	–	–	–	–
		P	–	–	–	–	–	–	–
		Sb	–	–	–	–	–	–	–
		Dg	–	–	–	–	–	–	–
		Ch	–	–	–	–	–	–	–

Method of disassembling and connecting push-pull type coupler

⚠ Before carrying out the following work, loosen the oil filler cap of the hydraulic tank gradually to release the residual pressure from the hydraulic tank.

⚠ Even if the residual pressure is released from the hydraulic tank, some hydraulic oil flows out when the hose is disconnected. Accordingly, prepare an oil receiving container.

Type 1

1. Disconnection

1) Hold adapter (1) and push hose joint (2) into mating adapter (3). (Fig. 1)
   - ★ The adapter can be pushed in about 3.5 mm.
   - ★ Do not hold rubber cap portion (4).
2) After hose joint (2) is pushed into adapter (3), press rubber cap portion (4) against adapter (3) until it clicks. (Fig. 2)
3) Hold hose adapter (1) or hose (5) and pull it out. (Fig. 3)
   - ★ Since some hydraulic oil flows out, prepare an oil receiving container.

Fig. 1

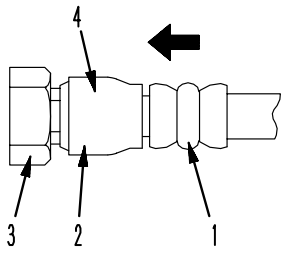


Fig. 2

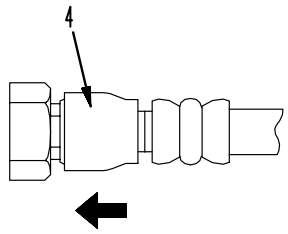
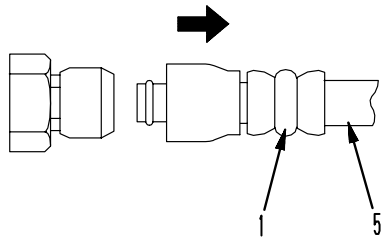


Fig. 3



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2. Connection

1) Hold hose adapter (1) or hose (5) and insert it in mating adapter (3), aligning them with each other. (Fig. 4)
   - ★ Do not hold rubber cap portion (4).
2) After inserting the hose in the mating adapter perfectly, pull it back to check its connecting condition. (Fig. 5)
   - ★ When the hose is pulled back, the rubber cap portion moves toward the hose about 3.5 mm. This does not indicate abnormality, however.

Fig. 4

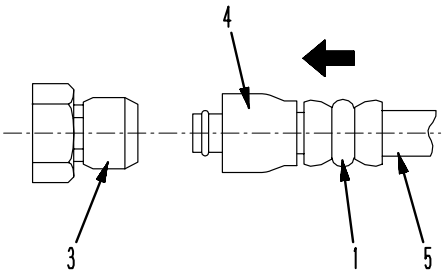
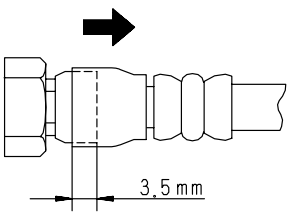


Fig. 5

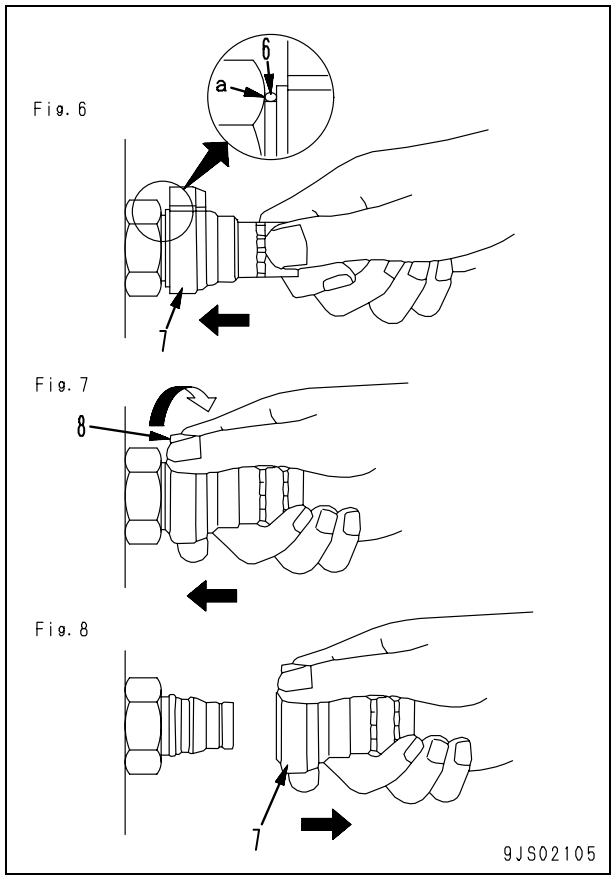


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Type 2

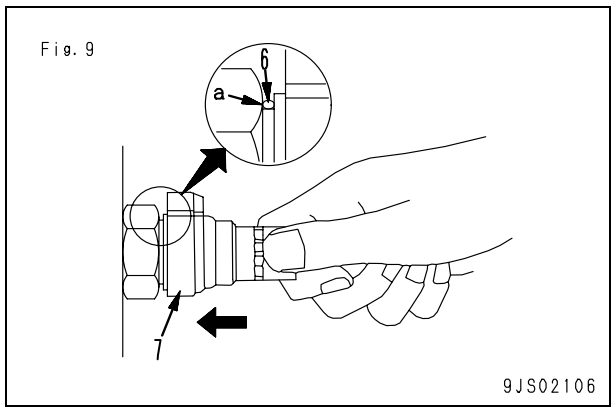
1. Disconnection

1) Hold the tightening portion and push body (7) straight until sliding prevention ring (6) contacts contact surface (a) of the hexagonal portion at the male end. (Fig. 6)
2) While holding the condition of Step 1), turn lever (8) to the right (clockwise). (Fig. 7)
3) While holding the condition of Steps 1) and 2), pull out whole body (7) to disconnect it. (Fig. 8)



2. Connection

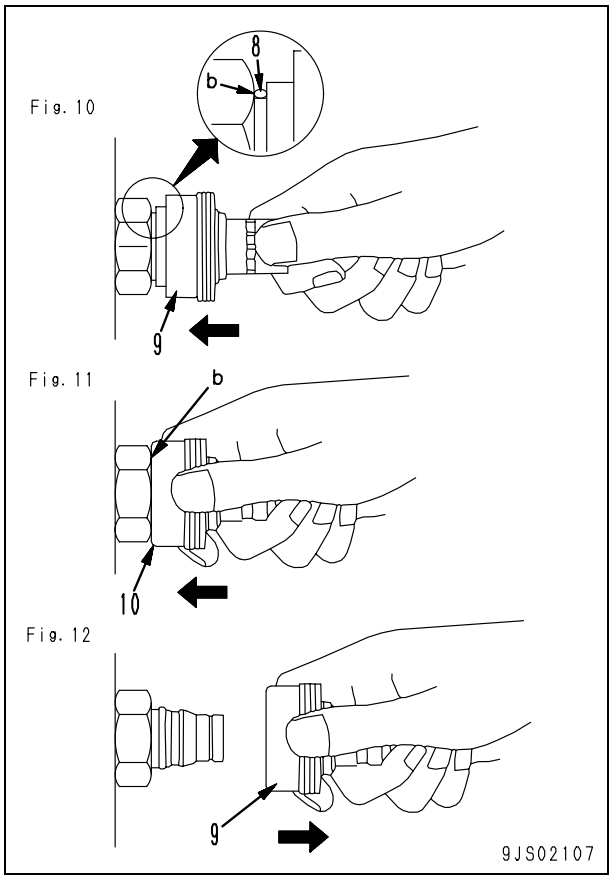
- Hold the tightening portion and push body (7) straight until sliding prevention ring (6) contacts contact surface (a) of the hexagonal portion at the male end. (Fig. 9)



Type 3

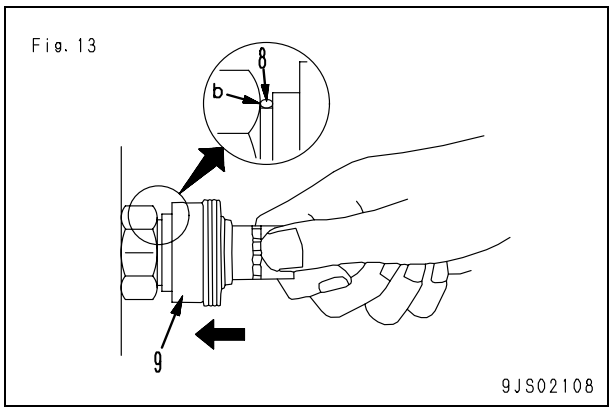
1. Disconnection

1) Hold the tightening portion and push body (9) straight until sliding prevention ring (8) contacts contact surface (b) of the hexagonal portion at the male end. (Fig. 10)
2) While holding the condition of Step 1), push cover (10) straight until it contacts contact surface (b) of the hexagonal portion at the male end. (Fig. 11)
3) While holding the condition of Steps 1) and 2), pull out whole body (9) to disconnect it. (Fig. 12)



2. Connection

- Hold the tightening portion and push body (9) straight until the sliding prevention ring contacts contact surface (b) of the hexagonal portion at the male end. (Fig. 13)



Standard tightening torque table

1. Table of tightening torques for bolts and nuts
   ★ Unless there are special instructions, tighten metric nuts and bolts to the torque below. (When using torque wrench)

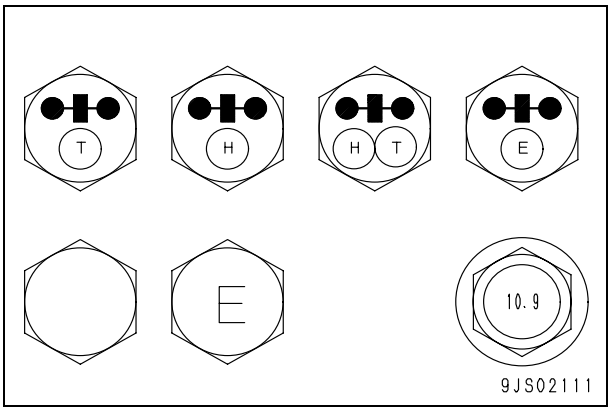
   ★ The following table corresponds to the bolts in Fig. A.

Thread diameter of bolt	Width across flats	Tightening torque	
mm	mm	Nm	kgm
6	10	11.8 – 14.7	1.2 – 1.5
8	13	27 – 34	2.8 – 3.5
10	17	59 – 74	6 – 7.5
12	19	98 – 123	10 – 12.5
14	22	153 – 190	15.5 – 19.5
16	24	235 – 285	23.5 – 29.5
18	27	320 – 400	33 – 41
20	30	455 – 565	46.5 – 58
22	32	610 – 765	62.5 – 78
24	36	785 – 980	80 – 100
27	41	1,150 – 1,440	118 – 147
30	46	1,520 – 1,910	155 – 195
33	50	1,960 – 2,450	200 – 250
36	55	2,450 – 3,040	250 – 310
39	60	2,890 – 3,630	295 – 370

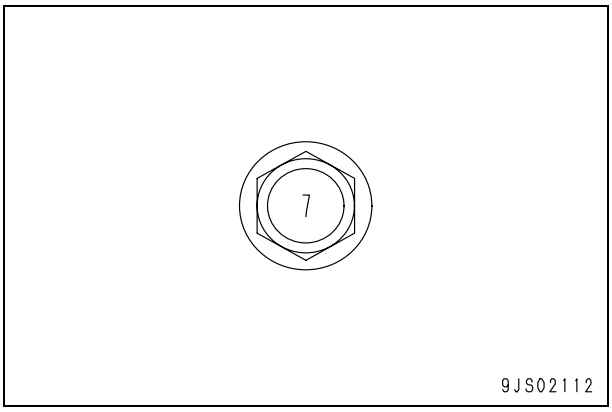
   ★ The following table corresponds to the bolts in Fig. B.

Thread diameter of bolt	Width across flats	Tightening torque	
mm	mm	Nm	kgm
6	10	5.9 – 9.8	0.6 – 1.0
8	13	13.7 – 23.5	1.4 – 2.4
10	14	34.3 – 46.1	3.5 – 4.7
12	27	74.5 – 90.2	7.6 – 9.2

★ Fig. A



★ Fig. B



2. Table of tightening torques for split flange bolts

★ Unless there are special instructions, tighten split flange bolts to the torque below.

Thread diameter of bolt	Width across flats	Tightening torque	
mm	mm	Nm	kgm
10	14	59 – 74	6.0 – 7.5
12	17	98 – 123	10.0 – 12.5
16	22	235 – 285	23.5 – 29.5

3. Table of tightening torques for O-ring boss piping joints

★ Unless there are special instructions, tighten O-ring boss piping joints to the torque below.

Nominal No.	Thread diameter	Width across flats	Tightening torque Nm {kgm}	
	mm	mm	Range	Target
02	14	Varies depending on type of connector.	35 – 63 { 3.5 – 6.5}	44 { 4.5}
03,04	20		84 – 132 { 8.5 – 13.5}	103 {10.5}
05,06	24		128 – 186 {13.0 – 19.0}	157 {16.0}
10,12	33		363 – 480 {37.0 – 49.0}	422 {43.0}
14	42		746 – 1,010 {76.0 – 103}	883 {90.0}

4. Table of tightening torques for O-ring boss plugs

★ Unless there are special instructions, tighten O-ring boss plugs to the torque below.

Nominal No.	Thread diameter	Width across flats	Tightening torque Nm {kgm}	
	mm	mm	Range	Target
08	8	14	5.88 – 8.82 {0.6 – 0.9}	7.35 {0.75}
10	10	17	9.81 – 12.74 {1.0 – 1.3}	11.27 {1.15}
12	12	19	14.7 – 19.6 {1.5 – 2.0}	17.64 {1.8}
14	14	22	19.6 – 24.5 {2.0 – 2.5}	22.54 {2.3}
16	16	24	24.5 – 34.3 {2.5 – 3.5}	29.4 {3.0}
18	18	27	34.3 – 44.1 {3.5 – 4.5}	39.2 {4.0}
20	20	30	44.1 – 53.9 {4.5 – 5.5}	49.0 {5.0}
24	24	32	58.8 – 78.4 {6.0 – 8.0}	68.6 {7.0}
30	30	32	93.1 – 122.5 { 9.5 – 12.5}	107.8 {11.0}
33	33	–	107.8 – 147.0 {11.0 – 15.0}	127.4 {13.0}
36	36	36	127.4 – 176.4 {13.0 – 18.0}	151.9 {15.5}
42	42	–	181.3 – 240.1 {18.5 – 24.5}	210.7 {21.5}
52	52	–	274.4 – 367.5 {28.0 – 37.5}	323.4 {33.0}

5. Table of tightening torques for hoses (taper seal type and face seal type)

★ Unless there are special instructions, tighten the hoses (taper seal type and face seal type) to the torque below.

★ Apply the following torque when the threads are coated (wet) with engine oil.

Nominal No. of hose	Width across flats	Tightening torque Nm {kgm}		Taper seal	Face seal	
		Range	Target	Thread size (mm)	Nominal No. - Number of threads, type of thread	Thread diameter (mm) (Reference)
02	19	34 – 54 { 3.5 – 5.5}	44 { 4.5}	–	9/16-18UN	14.3
		34 – 63 { 3.5 – 6.5}		14	–	–
03	22	54 – 93 { 5.5 – 9.5}	74 { 7.5}	–	11/16-16UN	17.5
	24	59 – 98 { 6.0 – 10.0}	78 { 8.0}	18	–	–
04	27	84 – 132 { 8.5 – 13.5}	103 {10.5}	22	13/16-16UN	20.6
05	32	128 – 186 {13.0 – 19.0}	157 {16.0}	24	1-14UNS	25.4
06	36	177 – 245 {18.0 – 25.0}	216 {22.0}	30	1-3/16-12UN	30.2
(10)	41	177 – 245 {18.0 – 25.0}	216 {22.0}	33	–	–
(12)	46	197 – 294 {20.0 – 30.0}	245 {25.0}	36	–	–
(14)	55	246 – 343 {25.0 – 35.0}	294 {30.0}	42	–	–

6. Table of tightening torques for 102, 107 and 114 engine series (Bolts and nuts)

★ Unless there are special instructions, tighten the metric bolts and nuts of the 102, 107 and 114 engine series to the torque below.

Thread size	Tightening torque			
	Bolt		BANJO bolt	
mm	Nm	kgm	Nm	kgm
6	10 ± 2	1.02 ± 0.20	8 ± 2	0.81 ± 0.20
8	24 ± 4	2.45 ± 0.41	10 ± 2	1.02 ± 0.20
10	43 ± 6	4.38 ± 0.61	12 ± 2	1.22 ± 0.20
12	77 ± 12	7.85 ± 1.22	24 ± 4	2.45 ± 0.41
14	–	–	36 ± 5	3.67 ± 0.51

7. Table of tightening torques for 102, 107 and 114 engine series (Eye joints)

★ Unless there are special instructions, tighten the metric eye joints of the 102, 107 and 114 engine series to the torque below.

Thread size	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

8. Table of tightening torques for 102, 107 and 114 engine series (Taper screws)

★ Unless there are special instructions, tighten the taper screws (unit: inch) of the 102, 107 and 114 engine series to the torque below.

Thread size	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 ± 0.20
1/2	24 ± 4	2.45 ± 0.41
3/4	36 ± 5	3.67 ± 0.51
1	60 ± 9	6.12 ± 0.92

Conversion table

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.

1) Locate the number 50 in the vertical column at the left side, take this as (A), and then draw a horizontal line from (A).
2) Locate the number 5 in the row across the top, take this as (B), then draw a perpendicular line down from (B).
3) Take the point where the two lines cross as (C). This point (C) gives the value when converting from millimeters to inches. Therefore, 55 mm = 2.165 inches.

2. Convert 550 mm into inches.

1) The number 550 does not appear in the table, so divide it by 10 (move the decimal point one place to the left) to convert it to 55 mm.
2) Carry out the same procedure as above to convert 55 mm to 2.165 inches.
3) The original value (550 mm) was divided by 10, so multiply 2.165 inches by 10 (move the decimal point one place to the right) to return to the original value. This gives 550 mm = 21.65 inches.

Millimeters to inches

(B)

1 mm = 0.03937 in

	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
						(C)				
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

(A)

Millimeters to inches

1 mm = 0.03937 in

	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 kg = 2.2046 lb

	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

Liters to U.S. Gallons

1 ℓ = 0.2642 U.S.Gal

	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

Liters to U.K. Gallons

1 ℓ = 0.21997 U.K.Gal

	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

kgm to 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	1352.6	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

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	1,010	1,024	1,038	1,053	1,067	1,081	1,095	1,109	1,124
80	1,138	1,152	1,166	1,181	1,195	1,209	1,223	1,237	1,252	1,266
90	1,280	1,294	1,309	1,323	1,337	1,351	1,365	1,380	1,394	1,408
100	1,422	1,437	1,451	1,465	1,479	1,493	1,508	1,522	1,536	1,550
110	1,565	1,579	1,593	1,607	1,621	1,636	1,650	1,664	1,678	1,693
120	1,707	1,721	1,735	1,749	1,764	1,778	1,792	1,806	1,821	1,835
130	1,849	1,863	1,877	1,892	1,906	1,920	1,934	1,949	1,963	1,977
140	1,991	2,005	2,020	2,034	2,048	2,062	2,077	2,091	2,105	2,119
150	2,134	2,148	2,162	2,176	2,190	2,205	2,219	2,233	2,247	2,262
160	2,276	2,290	2,304	2,318	2,333	2,347	2,361	2,375	2,389	2,404
170	2,418	2,432	2,446	2,460	2,475	2,489	2,503	2,518	2,532	2,546
180	2,560	2,574	2,589	2,603	2,617	2,631	2,646	2,660	2,674	2,688
190	2,702	2,717	2,731	2,745	2,759	2,773	2,788	2,802	2,816	2,830
200	2,845	2,859	2,873	2,887	2,901	2,916	2,930	2,944	2,958	2,973
210	2,987	3,001	3,015	3,030	3,044	3,058	3,072	3,086	3,101	3,115
220	3,129	3,143	3,158	3,172	3,186	3,200	3,214	3,229	3,243	3,257
230	3,271	3,286	3,300	3,314	3,328	3,343	3,357	3,371	3,385	3,399
240	3,414	3,428	3,442	3,456	3,470	3,485	3,499	3,513	3,527	3,542

Temperature

Fahrenheit-Centigrade conversion: A simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vice versa is to enter the accompanying table in the center (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 to be 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 to be a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

1°C = 33.8°F

°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**	177.8
–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

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00376-00

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HYDRAULIC EXCAVATOR

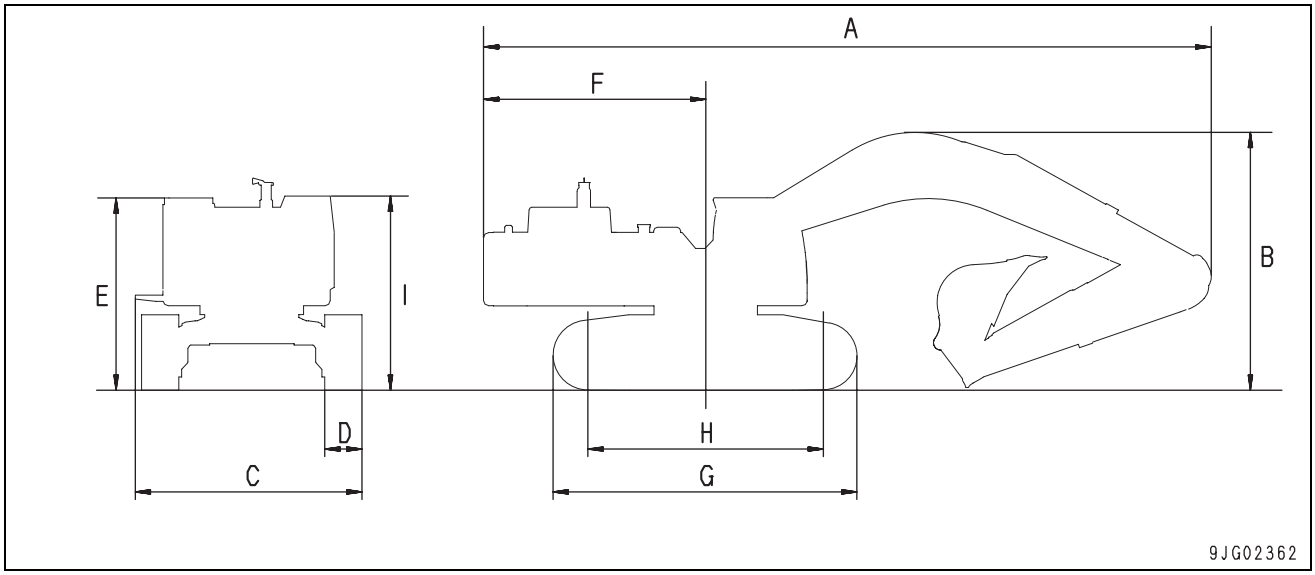
PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

01 Specification
Specification and technical data

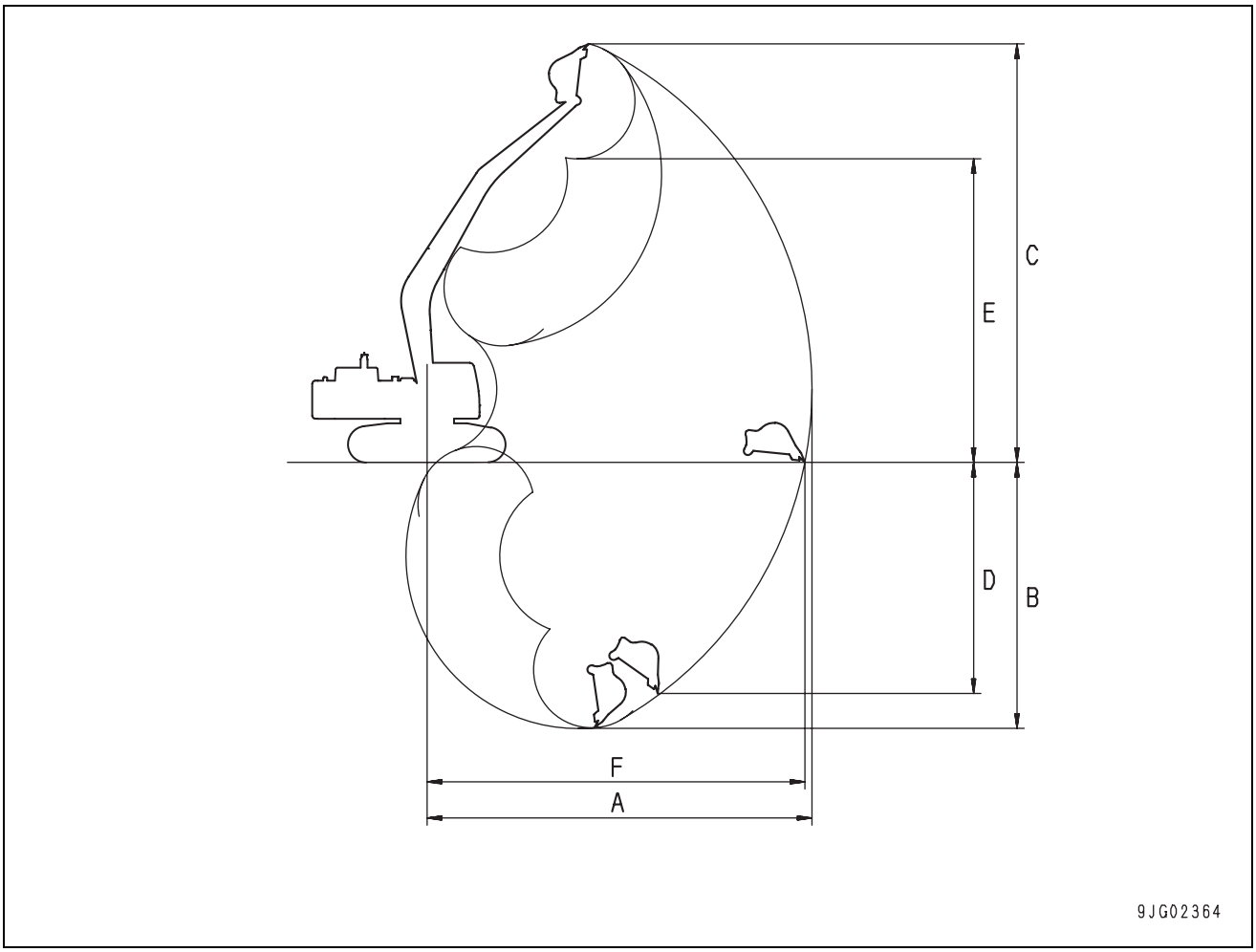
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Specification and technical data
Specification drawings



	Item	Unit	PC800-8		PC800LC-8	
			7.1M Boom 2.9M Arm	8.0M Boom 3.6M Arm	7.1M Boom 2.9M Arm	8.0M Boom 3.6M Arm
A	Overall length	mm	13,130	13,995	13,130	13,995
B	Overall height	mm	4,615	4,850	4,615	4,850
C	Overall width	mm	4,335	4,335	4,335	4,335
D	Track shoe width	mm	610	610	710	710
E	Height of cab	mm	3,720	3,720	3,720	3,720
F	Radius of upper struc-	mm	4,400	4,400	4,400	4,400
G	Overall length of track	mm	5,810	5,810	6,330	6,330
H	Tumbler center distance	mm	4,500	4,500	5,020	5,020
I	Height of machine cab	mm	3,670	3,670	3,670	3,670
	Min. ground clearance	mm	840	840	840	840

Working range drawing



	Item	Unit	PC800-8		PC800LC-8	
			7.1M Boom 2.9M Arm	8.0M Boom 3.6M Arm	7.1M Boom 2.9M Arm	8.0M Boom 3.6M Arm
A	Max. digging reach	mm	12,265	13,660	12,265	13,660
B	Max. digging depth	mm	7,130	8,445	7,130	8,445
C	Max. digging height	mm	11,330	11,995	11,330	11,955
D	Max. vertical wall digging depth	mm	4,080	5,230	4,080	5,230
E	Max. dumping height	mm	7,525	8,235	7,525	8,235
F	Max. digging reach at ground level	mm	11,945	13,400	11,945	13,400

Specifications

PC800-8

Machine model				PC800-8
Serial number				50001 and up
Bucket capacity			m^3	4.0
Weight of machine			kg	78,400
Performance	Working ranges	Max. digging depth	mm	7,130
		Max. vertical wall depth	mm	4,080
		Max. digging reach	mm	12,265
		Max. reach at ground level	mm	11,945
		Max. digging height	mm	11,330
		Max. dumping height	mm	7,525
	Max. digging force		kN {kg}	430.5 {43,900}
	Swing speed		rpm	6.8
	Swing max. slope angle		deg.	16
	Travel speed		km/h	Lo : 2.8, Hi : 4.2
	Gradeability		deg.	35
	Ground pressure (standard triple grouser shoe width: 610 mm)		kPa {kg/cm^2}	127.5 {1.3}
Dimensions	Overall length		mm	13,130
	Overall width		mm	4,335
	Overall width of track (when increasing)		mm	3,390 (4,110)
	Overall height		mm	4,615
	Overall height to top of cab		mm	3,720
	Ground clearance of counterweight		mm	1,560
	Min. ground clearance		mm	840
	Tail swing radius		mm	4,400
	Min. swing radius of work equipment		mm	5,645
	Height of work equipment at min. swing radius		mm	9,750
	Length of track on ground		mm	4,500
	Track gauge (when increasing)		mm	2,780 (3,500)
	Height of machine cab		mm	3,670

Machine model				PC800-8
Serial number				and up
Engine		Model Type No. of cylinders – bore × stroke Piston displacement	mm ℓ {cc}	KOMATSU SAA6D140E-5 4-cycle, water-cooled, in-line, vertical, direct injection, with turbocharger and aftercooler (air cooled) 6 – 140 × 165 15,24 {15,240}
	Performance	Flywheel horsepower Max. torque Max. speed at no load Min. speed at no load Min. fuel consumption	kW/rpm {HP/rpm} Nm/rpm {kgm/rpm} rpm rpm g/kW•h {g/HP•h}	363/1,800 {486/1,800} 2,169/1,350 {221/1,350} 1,980 825 215 {158}
		Starting motor Alternator Battery		24V, 11 kW 24V, 75A 12V, 240 Ah × 2
		Radiator core type		CF68-4
Undercarriage		Carrier roller Track roller Track shoe		3 on each side 8 on each side Assembly-type double grouser, 47 on each side
Fan system		Fan pump: Type		Variable swash plate type: LPV90
		Fan pump: Operating pressure	MPa {kg/cm^2}	16.2 {165}
		Fan motor: Type		Fixed swash plate type: LMF110
		Fan motor: Set pressure	MPa {kg/cm^2}	24.5 {250}
Hydraulic system	Hydraulic pump	Type × No. Delivery Set pressure	 ℓ /min MPa {kg/cm^2}	Main pump variable displacement piston type: HPV375+375 Fan pump variable displacement piston type: LPV90 Gear type: FBR00-2.5 Main pump: 490 + 490, Fan pump: 120, Gear type: 6 Main pump: 31.4 {320}, Fan pump: 24.5 {250}
	Control valve	Type × No. Control method		4-spool + 5-spool type × 1 Hydraulic
	Hydraulic motor	Travel motor Swing motor		MSF-340VP-EH11, Piston type (with brake valve, shaft brake): × 2 KMF125AB-5, Piston type (with safety valve, shaft brake) × 2

Machine model				PC800-8			
Serial number				and up			
Hydraulic system	Hydraulic cylinder			Boom	Arm	Bucket 2.9M Arm	Bucket 3.6M Arm
		Type		Double-acting piston	Double-acting piston	Double-acting piston	Double-acting piston
		Inside diameter of cylinder	mm	200	185	225	185
		Diameter of piston rod	mm	140	120	160	130
		Stroke	mm	1,950	1,610	1,420	1,820
		Max. distance between pins	mm	4,880	3,990	3,910	4,410
		Min. distance between pins	mm	2,930	2,380	2,490	2,590
	Hydraulic tank Hydraulic filter Hydraulic cooler			Box-shaped, with breather Tank return side CF42-1 (Air cooled)			

PC800LC-8

Machine model				PC800LC-8
Serial number				and up
		Bucket capacity	m^3	3.6
		Weight of machine	kg	81,570
Performance	Working ranges	Max. digging depth	mm	8,445
		Max. vertical wall depth	mm	5,230
		Max. digging reach	mm	13,660
		Max. reach at ground level	mm	13,400
		Max. digging height	mm	11,955
		Max. dumping height	mm	8,235
		Max. digging force	kN {kg}	362.8 {37,000}
		Swing speed	rpm	6.8
		Swing max. slope angle	deg.	16
		Travel speed	km/h	Lo : 2.8, Hi : 4.2
		Gradeability	deg.	35
		Ground pressure (standard triple grouser shoe width: 710 mm)	kPa {kg/cm^2}	102 {1.04}
Dimensions		Overall length	mm	13,995
		Overall width	mm	4,335
		Overall width of track (when increasing)	mm	3,490 (4,210)
		Overall height	mm	4,850
		Overall height to top of cab	mm	3,720
		Ground clearance of counterweight	mm	1,560
		Min. ground clearance	mm	840
		Tail swing radius	mm	4,400
		Min. swing radius of work equipment	mm	5,985
		Height of work equipment at min. swing radius	mm	10,430
		Length of track on ground	mm	5,020
		Track gauge (when increasing)	mm	2,780 (3,500)
		Height of machine cab	mm	3,670

Machine model				PC800LC-8
Serial number				50001 and up
Engine	Model Type No. of cylinders – bore × stroke Piston displacement		mm ℓ {cc}	KOMATSU SAA6D140E-5 4-cycle, water-cooled, in-line, vertical, direct injection, with turbocharger and aftercooler (air cooled) 6 – 140 × 165 15,24 {15,240}
	Performance: Flywheel horsepower Max. torque Max. speed at no load Min. speed at no load Min. fuel consumption		kW/rpm {HP/rpm} Nm/rpm {kgm/rpm} rpm rpm g/kW•h {g/HP•h}	363/1,800 {486/1,800} 2,169/1,350 {221/1,350} 1,980 825 215 {158}
	Starting motor Alternator Battery			24V, 11 kW 24V, 75A 12V, 240 Ah × 2
	Radiator core type			CF68-4
Undercarriage	Carrier roller Track roller Track shoe			3 on each side 9 on each side Assembly-type double grouser, 47 on each side
Fan system	Fan pump	Type		Variable swash plate type: LPV90
		Operating pressure	MPa {kg/cm²}	16.2 {165}
	Fan motor	Type		Fixed swash plate type: LMF110
		Set pressure	MPa {kg/cm²}	24.5 {250}
Hydraulic system	Hydraulic pump: Type × No.			Main pump variable displacement piston type: HPV375+375 Fan pump variable displacement piston type: LPV90 Gear type: FBR00-2.5
	Hydraulic pump: Delivery		ℓ /min	Main pump: 490 + 490, Fan pump: 120, Gear type: 6
	Hydraulic pump: Set pressure		MPa {kg/cm²}	Main pump: 31.4 {320}, Fan pump: 24.5 {250}
	Control valve: Type × No.			4-spool + 5-spool type × 1
	Control valve: Control method			Hydraulic
	Hydraulic motor: Travel motor			MSF-340VP-EH11, Piston type (with brake valve, shaft brake): × 2
	Hydraulic motor: Swing motor			KMF125AB-5, Piston type (with safety valve, shaft brake) × 2

Machine model				PC800LC-8			
Serial number				50001 and up			
Hydraulic system	Hydraulic cylinder			Boom	Arm	Bucket 2.9M Arm	Bucket 3.6M Arm
		Type		Double-acting piston	Double-acting piston	Double-acting piston	Double-acting piston
		Inside diameter of cylinder	mm	200	185	225	185
		Diameter of piston rod	mm	140	120	160	130
		Stroke	mm	1,950	1,610	1,420	1,820
		Max. distance between pins	mm	4,880	3,990	3,910	4,410
		Min. distance between pins	mm	2,930	2,380	2,490	2,590
	Hydraulic tank Hydraulic filter Hydraulic cooler			Box-shaped, with breather Tank return side CF42-1 (Air cooled)			

Weight table

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

PC800, 800LC-8

Unit: kg

Machine model	PC800-8	PC800LC-8
Serial number	50001 and up	50001 and up
Engine assembly	2,950	2,950
• Engine	1,920	1,920
• Coupling (incl. lubricating piping)	268	268
• Hydraulic pump (incl. fan pump, lubricating pump)	555	555
Cooling assembly (incl. fan, fan motor, shroud)	1,020	1,020
Radiator assembly • Radiator	260 25 × 3	260 25 × 3
Aftercooler	45	45
Oil cooler	23 × 2	23 × 2
Hydraulic tank, filter assembly (excl. hydraulic oil)	656	656
Fuel tank (excl. fuel)	640	640
Revolving frame	7,090	7,090
Operator's cab	280	280
Operator's seat	35	35
Counterweight	11,850	11,850
Swing machinery	490 × 2	490 × 2
L. H. 5-spool control valve	245	245
R. H. 4-spool control valve	240	240
Swing motor	68 × 2	68 × 2
Travel motor	130 × 2	130 × 2
Fan motor	25	25
Center swivel joint	69	69

Unit: kg

Track frame assembly (Excluding step, roller guard, shoe assembly, and lower piping)	21,565	22,340
• Center frame	5,945	5,945
• Track frame	2,660 × 2	2,910 × 2
• Swing circle	1,405	1,405
• Idler	566 × 2	566 × 2
• Idler cushion	628 × 2	628 × 2
• Carrier roller	52.7 × 6	52.7 × 6
• Track roller	136 × 16	136 × 16
• Final drive (incl. travel motor)	1,372 × 2	1,372 × 2

Unit: kg

Machine model	PC800-8	PC800LC-8
Serial number	50001 and up	50001 and up
Track shoe assembly		
• Narrow double grouser shoe (610 mm)	7,758	8,434
• Standard double grouser shoe (710 mm)	8,444	9,164
• Wide triple grouser shoe (810 mm)	9,121	9,894
• Wide triple grouser shoe (910 mm)	9,797	10,629
• Wide triple grouser shoe (1,010 mm)	—	11,366
• Wide triple grouser shoe (1,110 mm)	—	12,108
Boom assembly	7,300	8,200
Arm assembly	4,900	4,500
Bucket assembly	3,700	3,575
Boom cylinder assembly	765 × 2	765 × 2
Arm cylinder assembly	485 × 2	485 × 2
Bucket cylinder assembly	936	550
Boom foot pin	45.2 × 2	45.2 × 2
Boom cylinder foot pin	33.8 × 2	33.8 × 2
Boom cylinder top pin	32.5 × 2	32.5 × 2
Boom-arm connecting pin	105	105
Arm cylinder foot pin	53.6	24 × 2
Arm cylinder top pin	30	24 × 2
Link-arm connecting pin	56.1	56.1
Link-bucket connecting pin	62.2	62.2
Bucket cylinder top pin	49.3	84.5
Bucket cylinder foot pin	25.3	43.8
Arm-bucket connecting pin	91.4	91.4
Link assembly	715	793

Table of fuel, coolant and lubricants

★ For details of the notes (Note 1, Note 2, ---) in the table, see the Operation and Maintenance Manual.

Reservoir	Fluid Type	Ambient Temperature, degrees Celsius -22 -4 14 32 50 68 86 104 122 °F -30 -20 -10 0 10 20 30 40 50 °C	Recommended Komatsu Fluids
Engine oil pan	Engine oil	(Note.1)	Komatsu EOS0W30
		(Note.1)	Komatsu EOS5W40
			Komatsu EO10W30-DH
			Komatsu EO15W40-DH
			Komatsu EO30-DH
Swing machinery case Final drive case	Powertrain oil (Note.2)		TO30
Coupling case	Powertrain oil		TO10
			TO30
Hydraulic system	Powertrain oil		TO10
	Hydraulic oil		HO46-HM
Grease fitting	Hyper grease (Note.3)		G2-T, G2-TE
	Lithium EP grease		G2-LI
Cooling system	Supercoolant AF-NAC (Note.4)		AF-NAC
Fuel tank	Diesel fuel		ASTM Grade No.1-D S15 ASTM Grade No.1-D S500
			ASTM Grade No.2-D S15 ASTM Grade No.2-D S500

Unit: ℓ

Supply point	PC800, PC800LC-8	
	Specified capacity	Refill capacity
Engine oil pan	58	53
Coupling case	7	7
Swing machinery case (each)	24.5	24.5
Final drive case (each)	20	20
Hydraulic system	800	470
Fuel tank	980	—
Cooling system	104	—

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00378-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

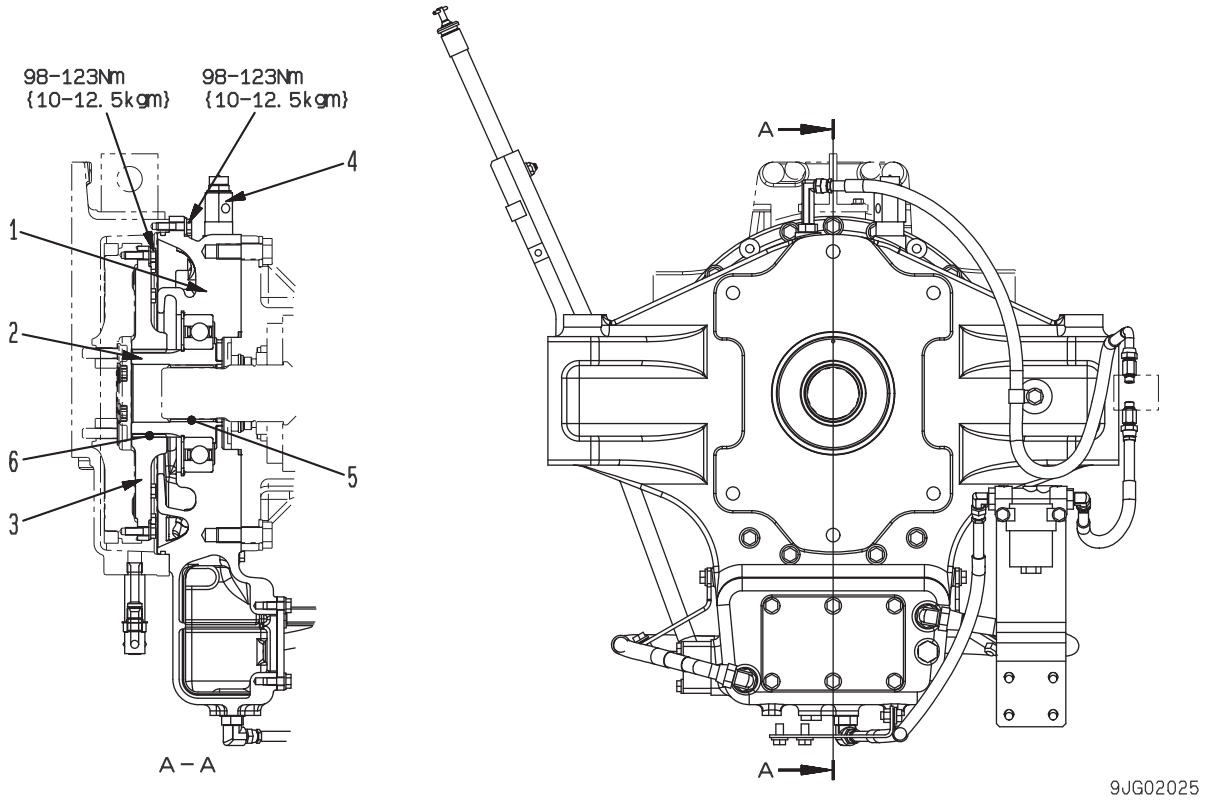
Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

10 Structure, function and maintenance standard
Engine and cooling system

Engine and cooling system
Coupling 2
Coupling lubrication system 3

Engine and cooling system

Coupling



1. Coupling case
2. Shaft
3. Hub
4. Breather

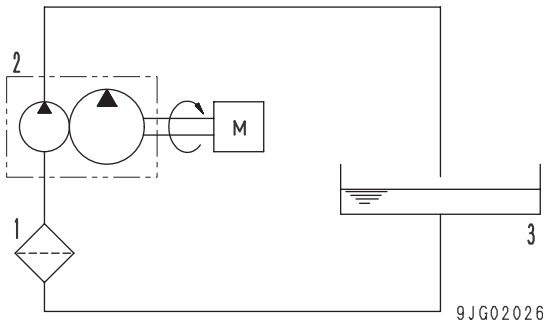
Specifications
Lubricating oil: 6.0 ℓ (TO30)

Unit: mm

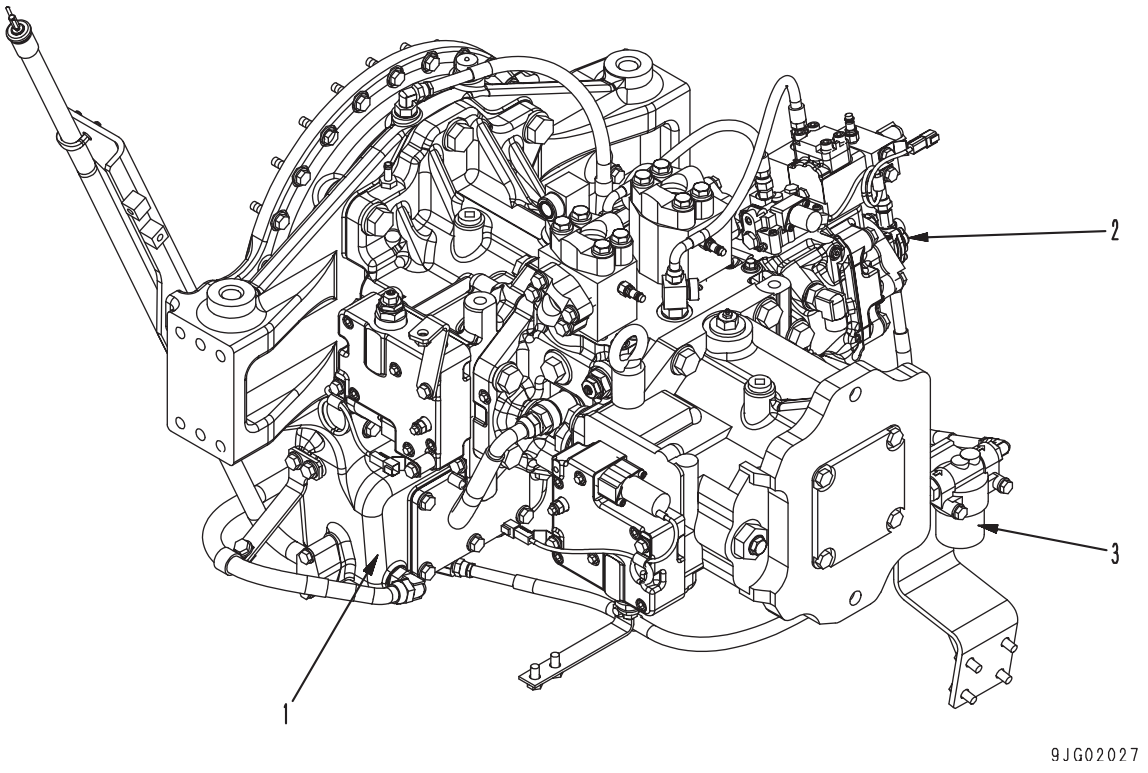
No.	Check item	Criteria		Remedy
5	Backlash of gear pump spline (for SAR375 + 375)	Standard size	Repair limit	Adjust or replace
		0.074 – 0.226	—	
6	Backlash of hub	0.087 – 0.258	—	

Coupling lubrication system

Hydraulic circuit diagram



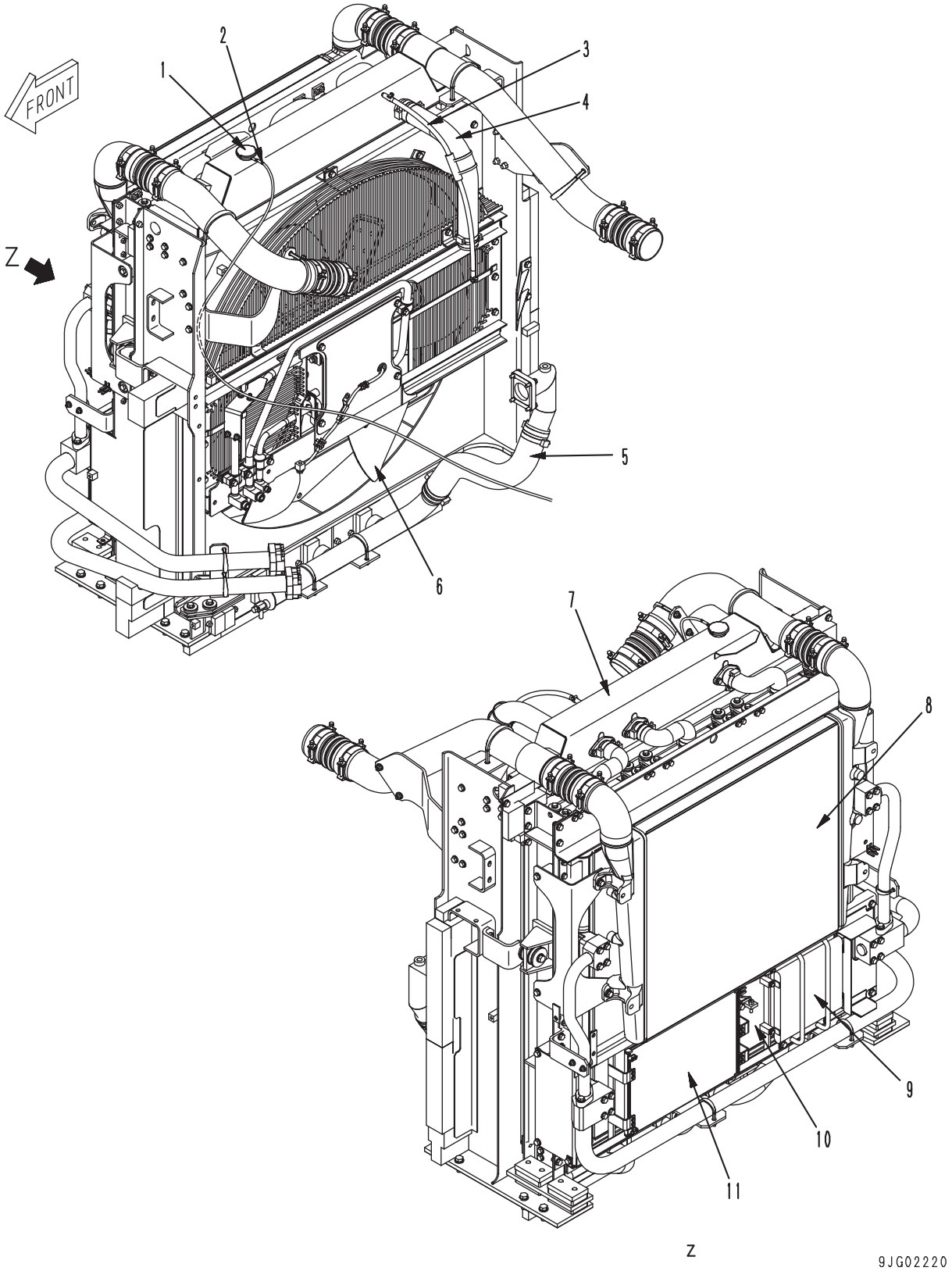
Hydraulic piping diagram



1. Coupling
2. Coupling lubricating pump (FBR002-2.5)
3. Oil strainer

Outline
Coupling lubricating pump (2) sends lubricating oil from the oil sump under coupling case (1) through oil strainer (3) into the coupling case to lubricate and cool the bearings and splines.

Radiator, oil cooler



1. Radiator cap
2. Overflow hose
3. Fan
4. Air breather hose
5. Inlet hose
6. Outlet hose
7. Radiator
8. Aftercooler
9. Fuel cooler
10. Oil cooler
11. Condenser

Outline

- The reservoir tank is provided for radiator.
- The power train oil cooler is built in the lower tank of the radiator.

		Radiator	Oil cooler
Core type		CF68-4	CF42-1
Pressure valve	Relief pressure (MPa {kg/cm^2})	0.09 {0.9}	—
	Vacuum pressure (MPa {kg/cm^2})	0.005 {0.05}	—

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00380-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

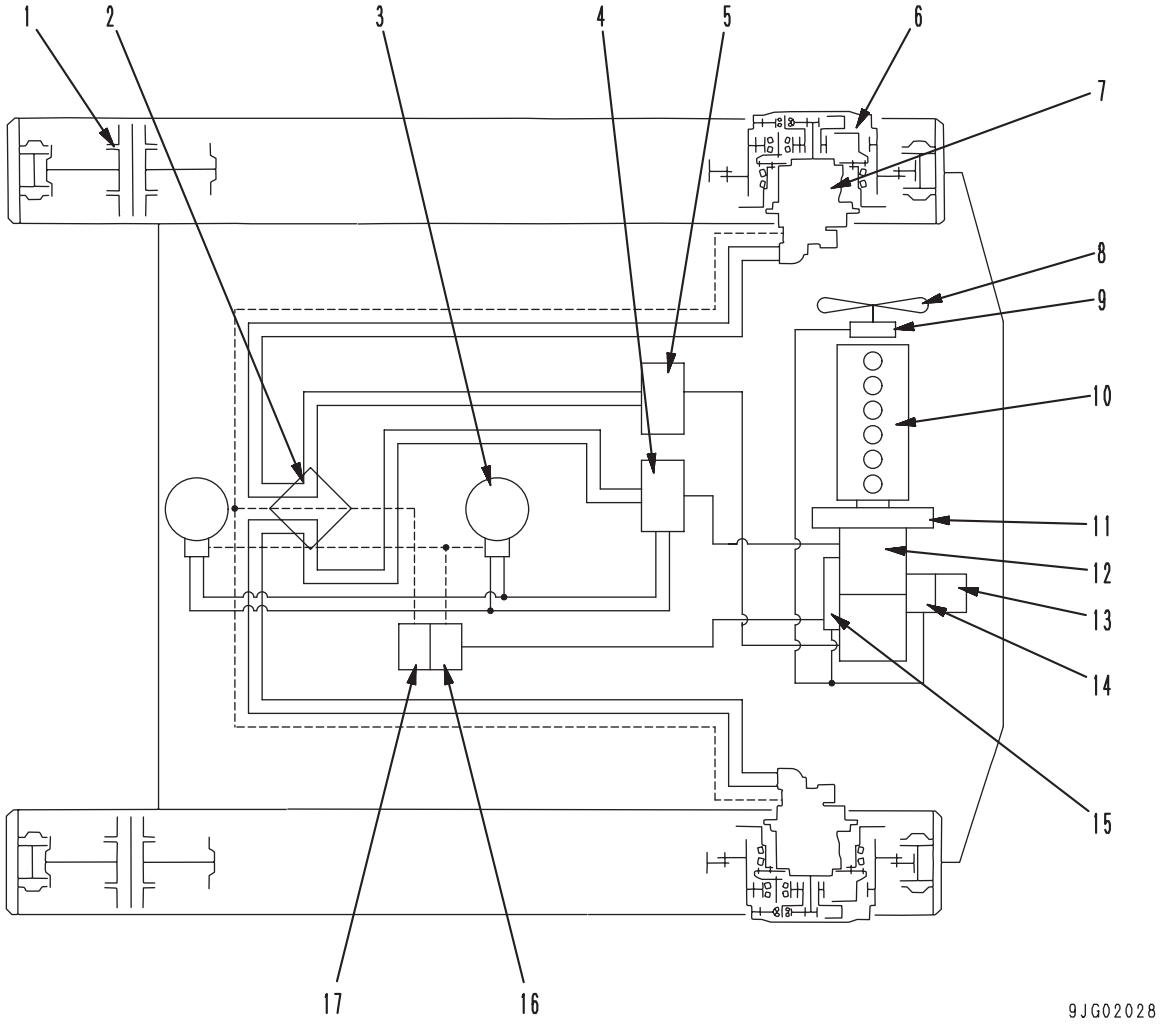
10 Structure, function and maintenance standard
Power train

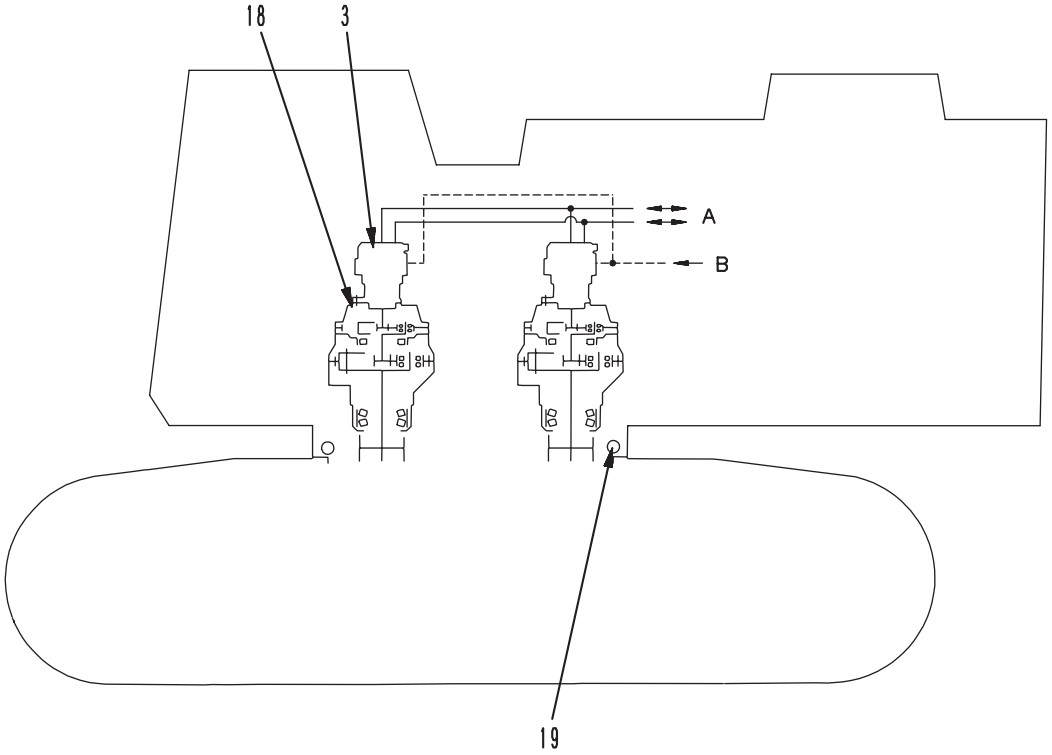
Power train

- Power train 2
- Swing machinery 4
- Swing circle 6
- Final drive 8
- Sprocket 10

Power train

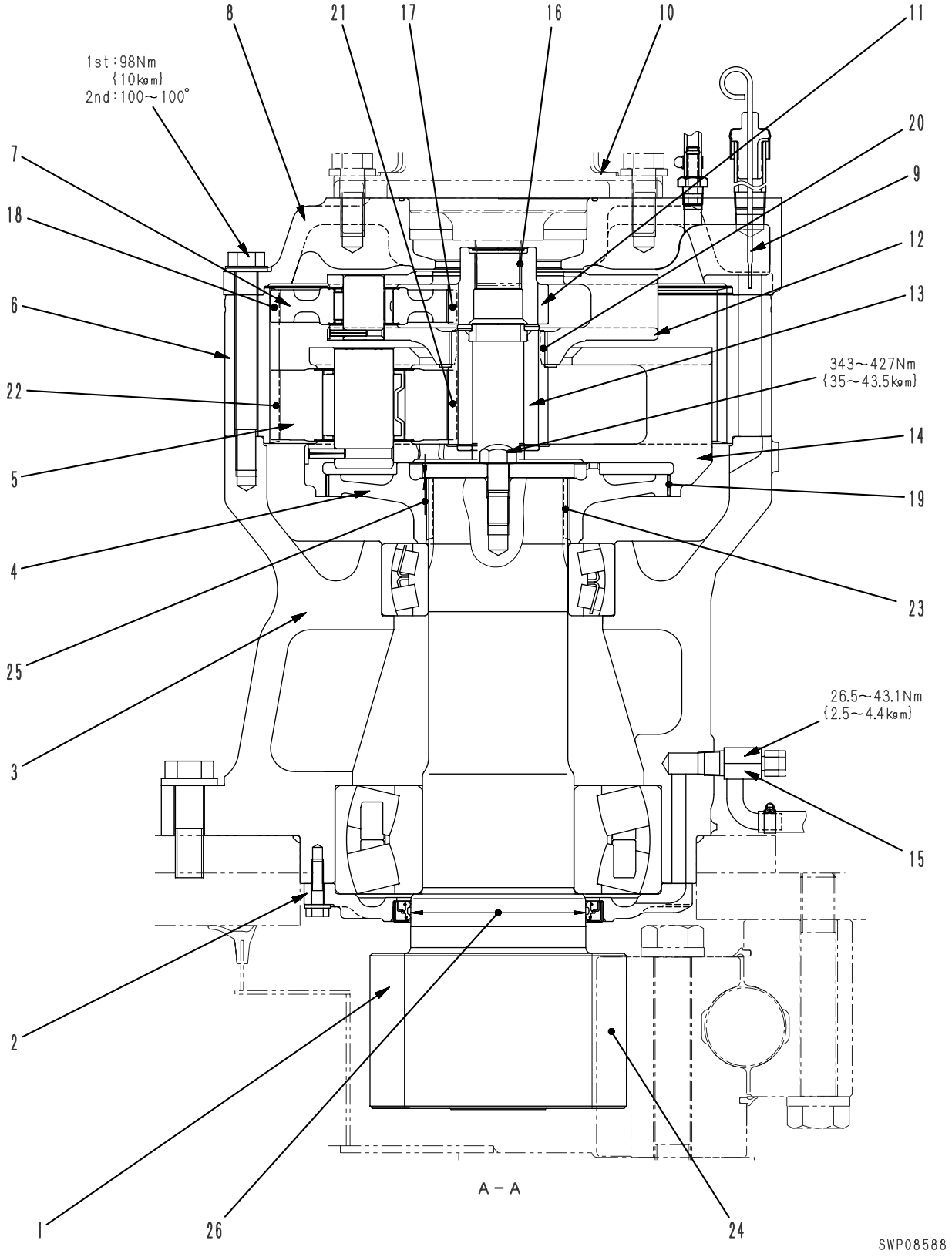
Power train

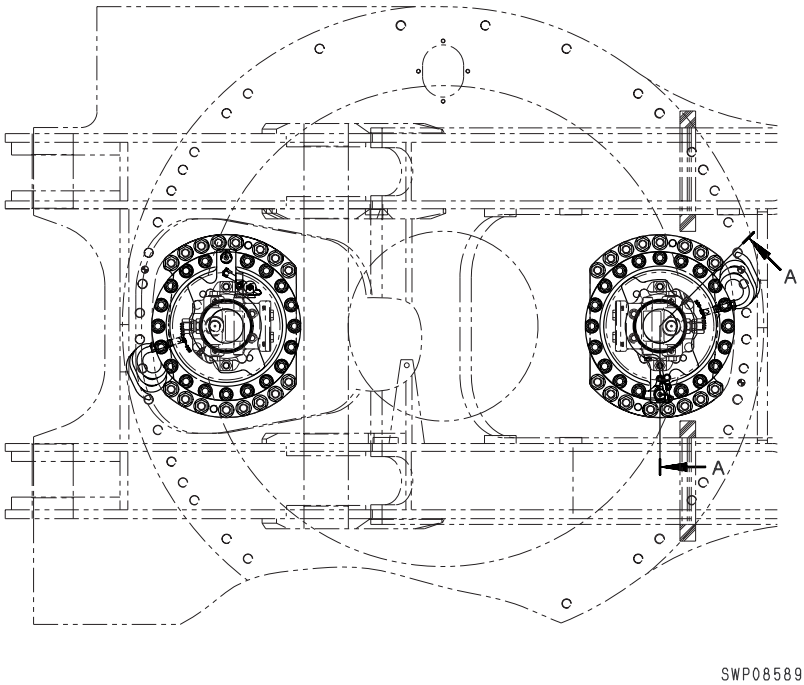




1. Idler
2. Center swivel joint
3. Swing motor (KMF125AB-5)
4. L.H. 5-spool control valve
5. R.H. 4-spool control valve
6. Final drive, sprocket
7. Travel motor
8. Fan
9. Cooling fan motor (LMF110)
10. Engine (SAA6D140E-5)
11. Coupling
12. Hydraulic pump (HPV375 + 375)
13. Coupling lubricating pump (FBR00-2.5)
14. Cooling fan pump (LPV90)
15. Self pressure reducing valve
16. Swing brake solenoid valve
17. Travel speed solenoid valve
18. Swing machinery
19. Swing circle

Swing machinery





1. Swing pinion (No. of teeth: 13)
2. Cover
3. Case
4. Coupling
5. No. 2 planetary gear (No. of teeth: 38)
6. Ring gear (No. of teeth: 97)
7. No. 1 planetary gear (No. of teeth: 38)
8. Cover
9. Dipstick
10. Swing motor
11. No. 1 sun gear (No. of teeth: 20)
12. No. 1 planetary carrier
13. No. 2 sun gear (No. of teeth: 19)
14. No. 2 planetary carrier
15. Drain plug

Specification

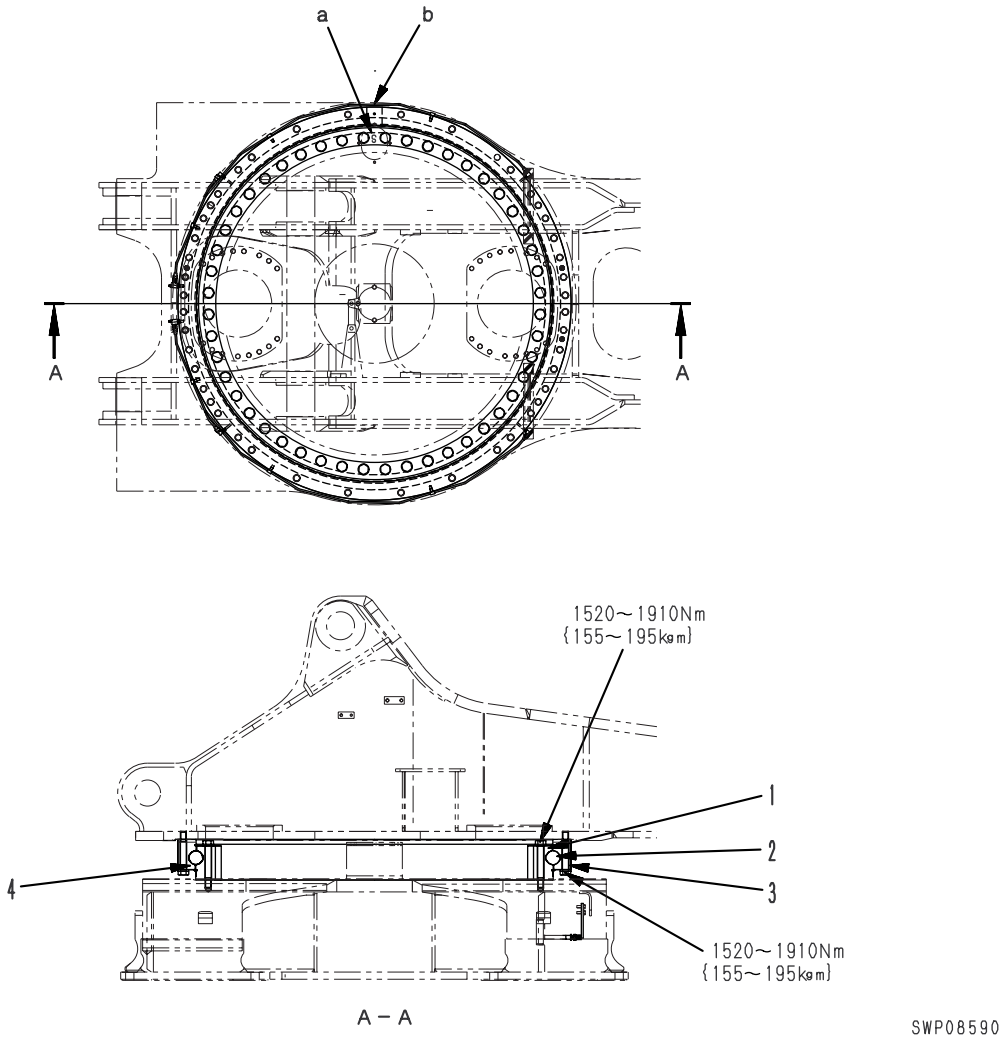
Reduction ratio:

$$\frac{20 + 97}{20} \times \frac{19 + 97}{19} = 35.716$$

Unit: mm

No.	Check item	Criteria		Remedy
16	Backlash between swing motor shaft and No. 1 sun gear	Standard clearance	Clearance limit	Replace
		0.19 – 0.29	—	
17	Backlash between No. 1 sun gear and No. 1 planet gear	0.19 – 0.51	0.90	
18	Backlash between No. 1 planet gear and ring gear	0.24 – 0.70	0.90	
19	Backlash between No. 2 planet carrier and coupling	0.06 – 0.24	—	
20	Backlash between No. 1 planet carrier and No. 2 sun gear	0.38 – 0.78	1.10	
21	Backlash between No. 2 sun gear and No. 2 planet gear	0.17 – 0.52	1.00	
22	Backlash between No. 2 planet gear and ring gear	0.21 – 0.64	1.10	
23	Backlash between coupling and swing pinion	0.08 – 0.25	—	
24	Backlash between swing pinion and swing circle	0 – 1.5	2.00	
25	Clearance between plate and coupling	0.06 – 0.86	—	
26	Wear of swing pinion oil seal contact surface	Standard size	Repair limit	Repair hard chrome plating or replace
		$150^{0}_{-0.100}$	—	

Swing circle



1. Swing circle inner race (No. of teeth: 112)
2. Ball
3. Swing circle outer race

a. Inner race soft zone "S" position
b. Outer race soft zone "plug" position

Specifications

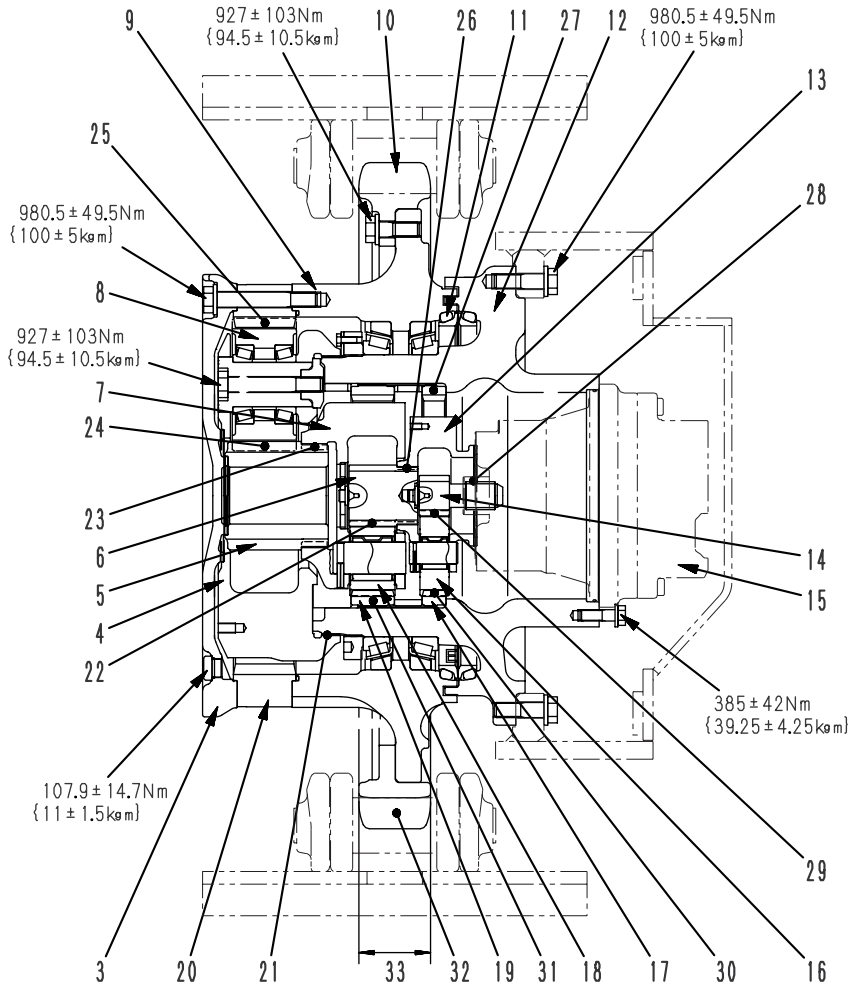
Reduction ratio: $-\frac{112}{13} = -8.615$

Amount of grease: 65 ℓ (G2-LI)

Unit: mm

No.	Check item	Criteria		Remedy
4	Clearance of bearing in axial direction (when mounted on machine)	Standard clearance	Repair limit	Replace
		0.5 – 1.6	3.2	

Final drive

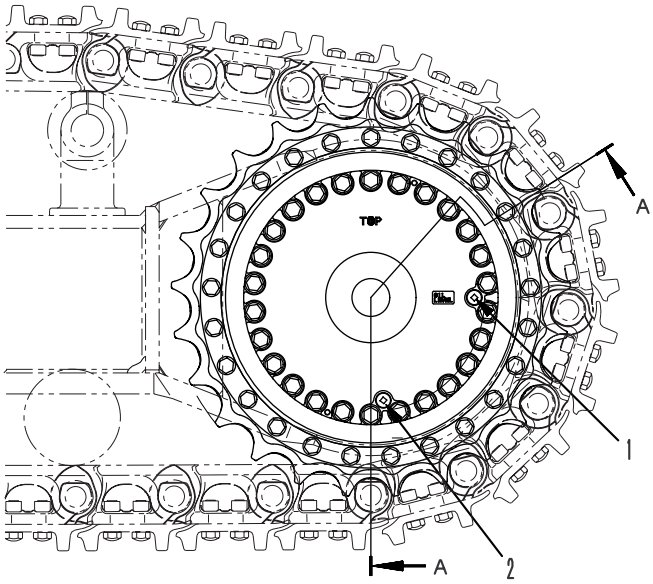


1. Level plug
2. Drain plug
3. Cover
4. No. 2 planetary carrier
5. No. 2 sun gear (No. of teeth: 19)
6. Drive gear (No. of teeth: 19)
7. No. 1 planetary carrier
8. No. 2 planet gear (No. of teeth: 24)
9. Hub
10. Sprocket
11. Floating seal
12. Case
13. Coupling
14. No. 1 sun gear (No. of teeth: 13)
15. Travel motor
16. Idler gear (No. of teeth: 27)
17. No. 1 ring gear (No. of teeth: 68)
18. No. 1 planet gear (No. of teeth: 24)
19. Driven gear (No. of teeth: 69)
20. No. 2 ring gear (No. of teeth: 69)

Specifications

Reduction ratio: $-\left(\frac{13+68}{13}\right) \times \left(\frac{19+69}{19}\right) \times \frac{69}{19}$

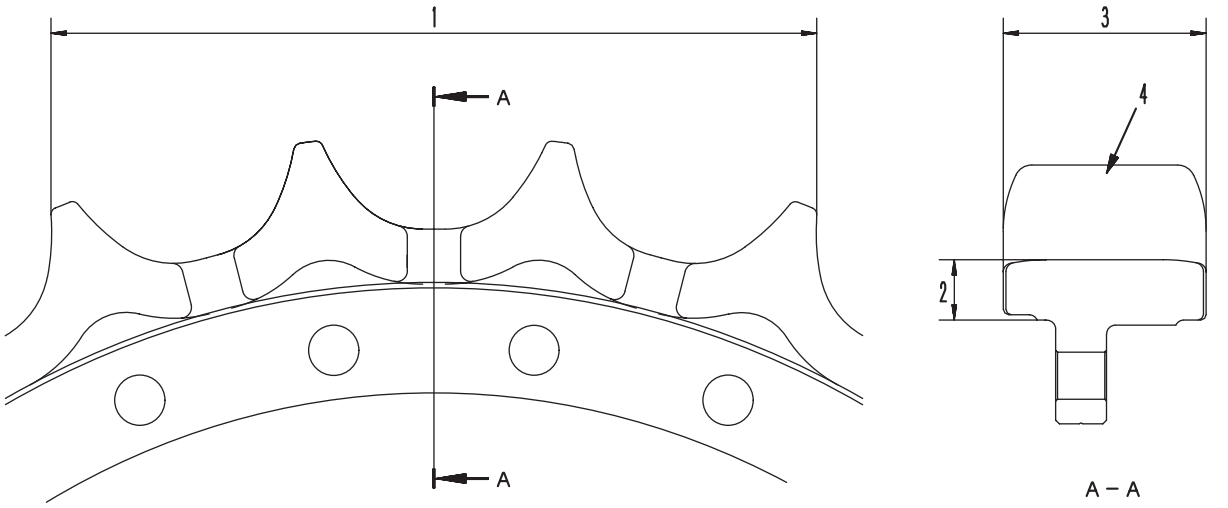
$= -104.802$



Unit: mm

No.	Check item	Criteria		Remedy
21	Backlash between No. 2 planetary carrier and case	Standard clearance	Clearance limit	Replace
		0.08 – 0.27	—	
22	Backlash between drive gear and No. 1 planetary carrier	0.21 – 0.57	—	
23	Backlash between No. 2 sun gear and No. 1 planetary carrier	0.24 – 0.91	—	
24	Backlash between No. 2 sun gear and No. 2 planet gear	0.23 – 0.68	—	
25	Backlash between No. 2 planetary carrier and No. 2 ring gear	0.28 – 0.87	—	
26	Backlash between coupling and drive gear	0.38 – 0.72	—	
27	Backlash between No. 1 ring gear and case	0.08 – 0.26	—	
28	Backlash between No. 1 sun gear and travel motor coupling	0.07 – 0.18	—	
29	Backlash between No. 1 sun gear and idler gear	0.15 – 0.62	—	
30	Backlash between No. 1 ring gear and idler gear	0.19 – 0.62	—	
31	Backlash between driven gear and No. 1 planet gear	0.19 – 0.62	—	
32	Wear of sprocket tooth shape	Repair limit: 6		Rebuild or replace
33	Sprocket tooth width	Standard size	Repair limit	
		114	108	

Sprocket

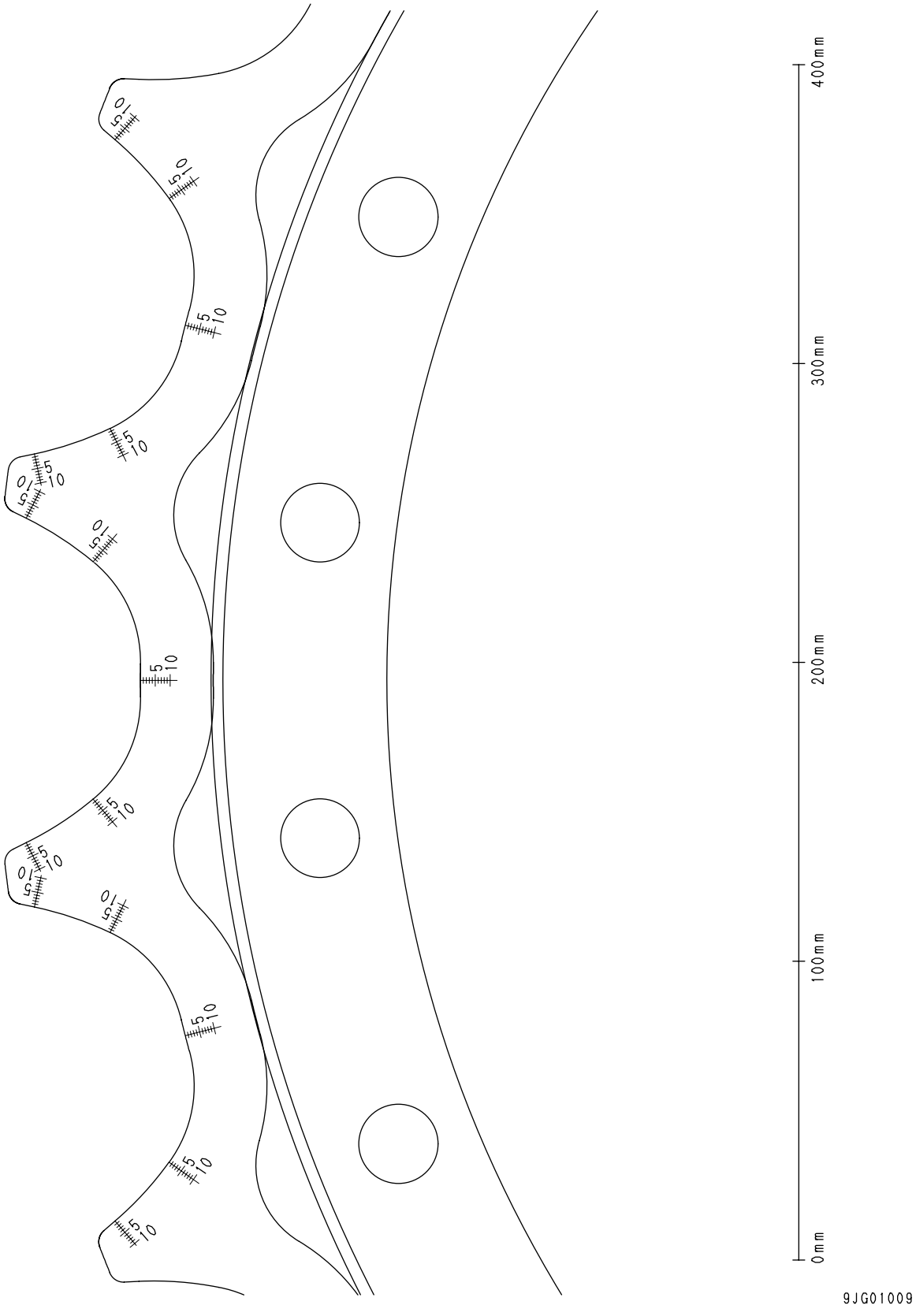


9JG01006

Unit: mm

No.	Check item	Criteria		Remedy
1	Wear of tooth tip	Standard size	Repair limit	Build-up welding or replace
		403.6	391.6	
2	Thickness of tooth root	28.4	22.4	
3	Width of tooth	114	108	
4	Wear of tooth shape	Repair limit: 6 (measure with sprocket tooth shape)		

Sprocket tooth shape of full scale



★ The above drawing is reduced to 50%. Enlarge it to 200% to return it to the full scale and make a copy on an OHP sheet.

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00381-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

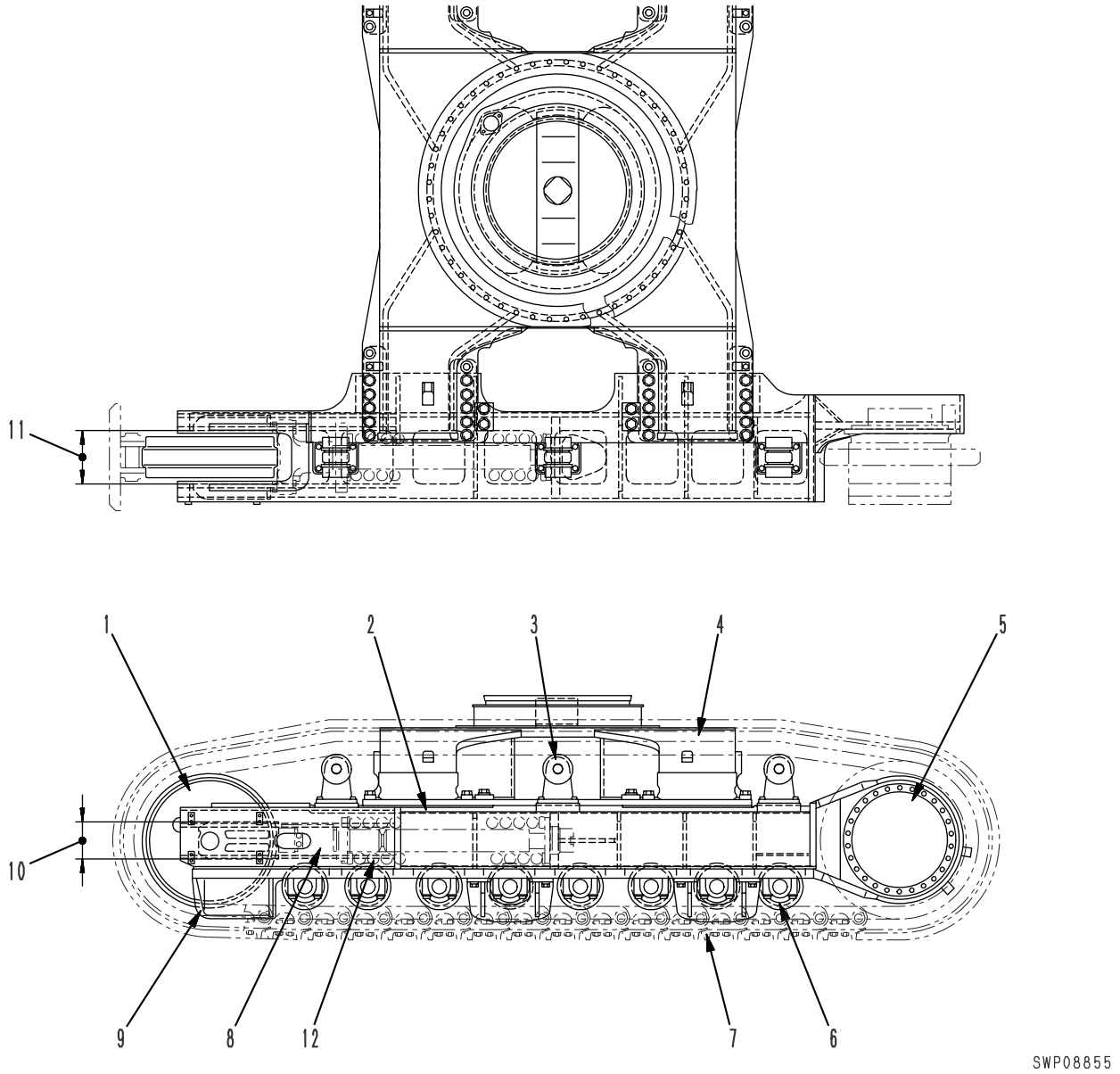
10 Structure, function and maintenance standard
Undercarriage and frame

Undercarriage and frame
- Track frame and recoil spring 2
- Idler 4
- Carrier roller 6
- Track roller 8
- Track shoe 10

Undercarriage and frame

Track frame and recoil spring

★ The diagram shows the PC800-8.



1. Idler
2. Track frame
3. Carrier roller
4. Center frame
5. Final drive
6. Track roller
7. Track shoe
8. Idler cushion
9. Front guard

- The dimensions and number of track rollers may differ according to the model, but the basic structure is the same.
- No. of track rollers

Model	No. of rollers (each side)
PC800-8	8
PC800LC-8	9

Standard shoe

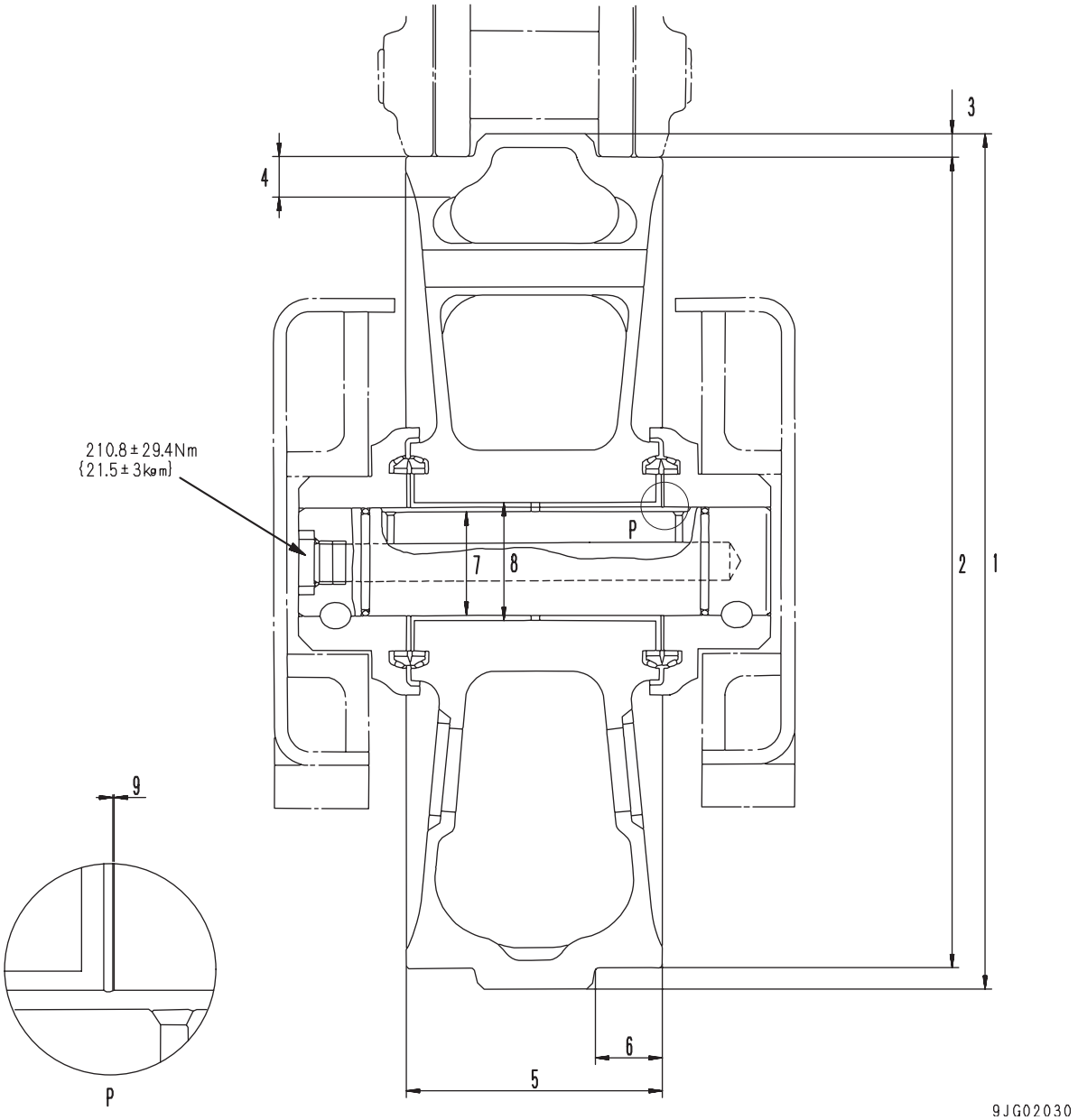
Unit: mm

Model Item	PC800-8	PC800LC-8
Shoe width (double shoe)	610	710
Link pitch	260.6	260.6
No. of shoes (each side)	47	51

Unit: mm

<table>
<tr><th>No.</th><th>Check item</th><th colspan="5">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Top-to-bottom width of idler guide</td><td colspan="2"></td><td>Standard size</td><td>Tolerance</td><td>Repair limit</td><td rowspan="2">Rebuild or replace</td></tr>
<tr><td colspan="2">Track frame</td><td>185</td><td>185 $^{+3}_{-2}$</td><td>190</td></tr>
<tr><td colspan="2">Idler support</td><td>180</td><td>185 ± 0.5</td><td>175</td><td>Replace</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Left-to-right width of idler guide</td><td colspan="2">Track frame</td><td>345</td><td>345 $^{+3}_{-2}$</td><td>355</td><td>Rebuild or replace</td></tr>
<tr><td colspan="2">Idler support</td><td>340</td><td>—</td><td>332</td><td rowspan="3">Replace</td></tr>
<tr><td rowspan="3">12</td><td rowspan="3">Recoil spring</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td></tr>
<tr><td>Free length × OD</td><td>Installation length</td><td>Installation load</td><td>Free length</td><td>Installation load</td></tr>
<tr><td>1,553 × 308</td><td>1,290</td><td>489.8 kN {49,986 kg}</td><td>—</td><td>392 kN {40,000 kg}</td></tr>
</table>

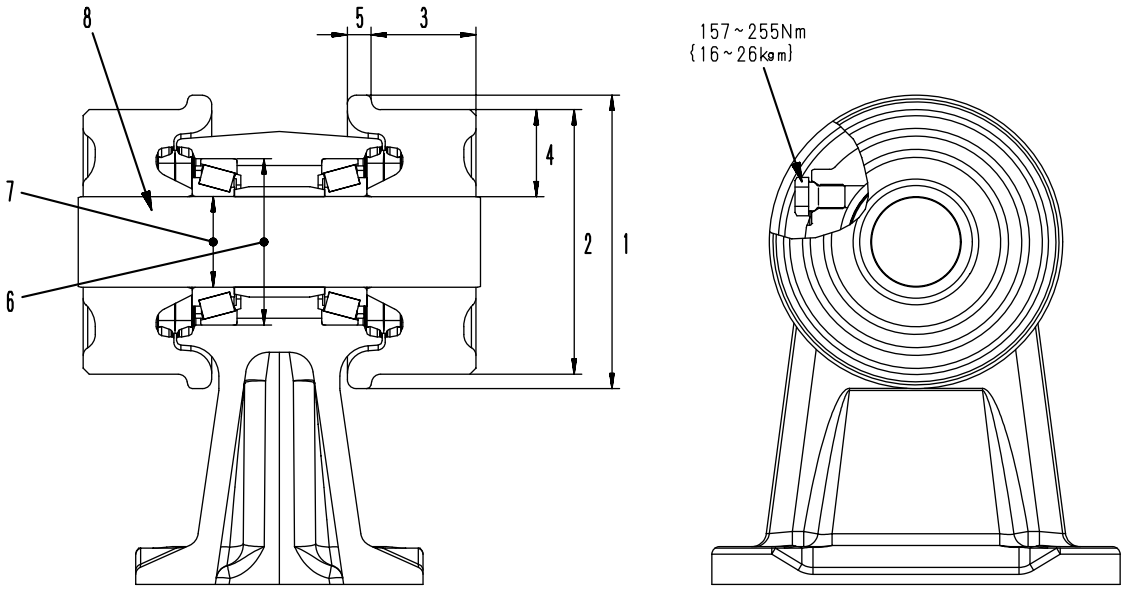
Idler



Unit: mm

No.	Check item	Criteria					Remedy
1	Outside diameter of protruding part	Standard size			Repair limit		Rebuild or replace
		875			—		
2	Outside diameter of tread surface	830			818		
3	Height of tread	22.5			28.5		
4	Thickness of tread	—			—		
5	Overall width	266			—		
6	Width of tread	69.5			—		
7	Clearance between shaft and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace bushing
			Shaft	Hole			
		110	–0.120 –0.207	+0.361 +0.281	0.401 – 0.568	1.5	
8	Interference between idler and bushing	Standard size	Tolerance		Standard interference	Interference limit	
			Shaft	Hole			
		120	+0.087 +0.037	–0.036 –0.136	0.073 – 0.223	—	
9	Plug of axial direction	Standard clearance			Clearance limit		Replace
		0.32 – 0.54			—		

Carrier roller

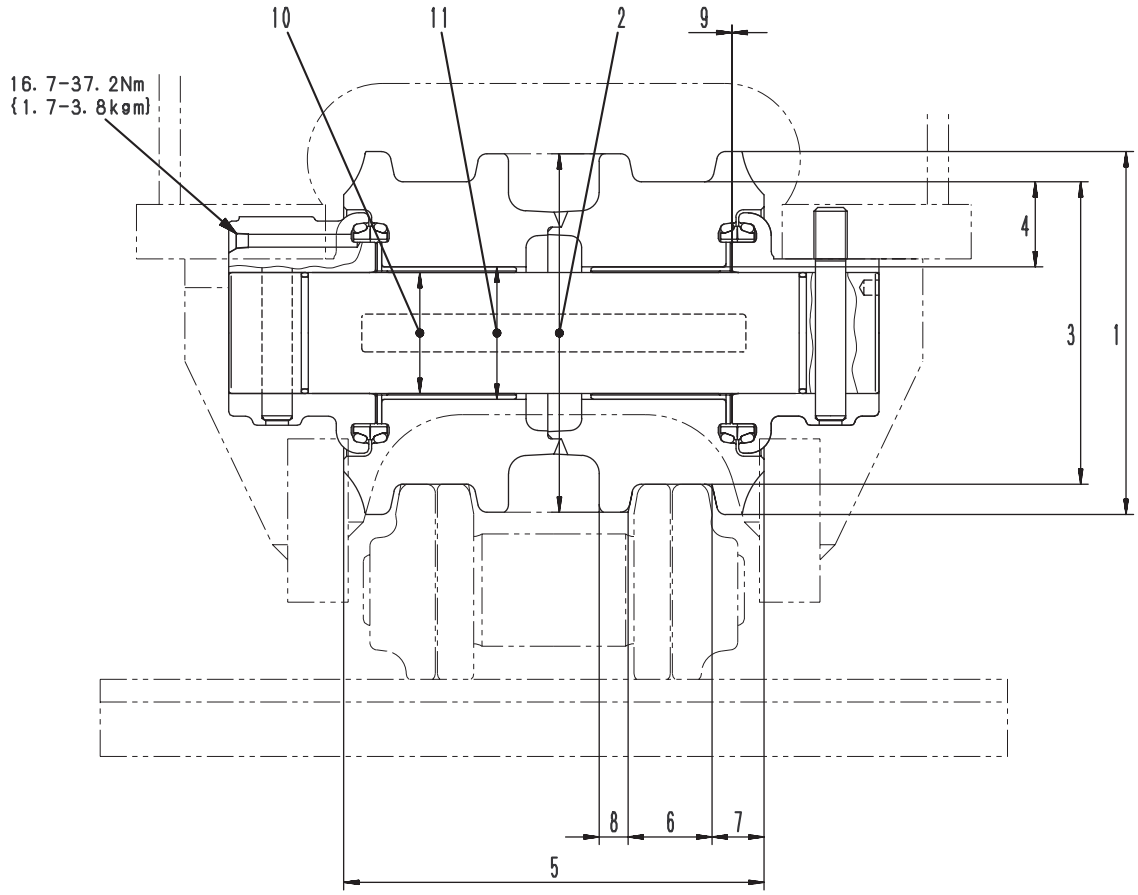


SWP08594

Unit: mm

No.	Check item	Criteria					Remedy
1	Outside diameter of flange	Standard size			Repair limit		Rebuild or replace
		194			—		
2	Outside diameter of tread	175			155		
3	Width of tread	68			—		
4	Thickness of tread	57.6			47.6		
5	Width of flange	17			—		
6	Interference between bearing and support	Standard size	Tolerance		Standard interference	Interference limit	Replace
			Shaft	Hole			
		110	0 –0.015	0 –0.035	–0.015 – 0.035	—	
7	Interference between bearing and shaft	60	+0.039 +0.020	0 –0.015	0.020 – 0.054	—	
8	Play of roller in axial direction	Standard clearance			Clearance limit		
		0 – 0.301			—		

Track roller

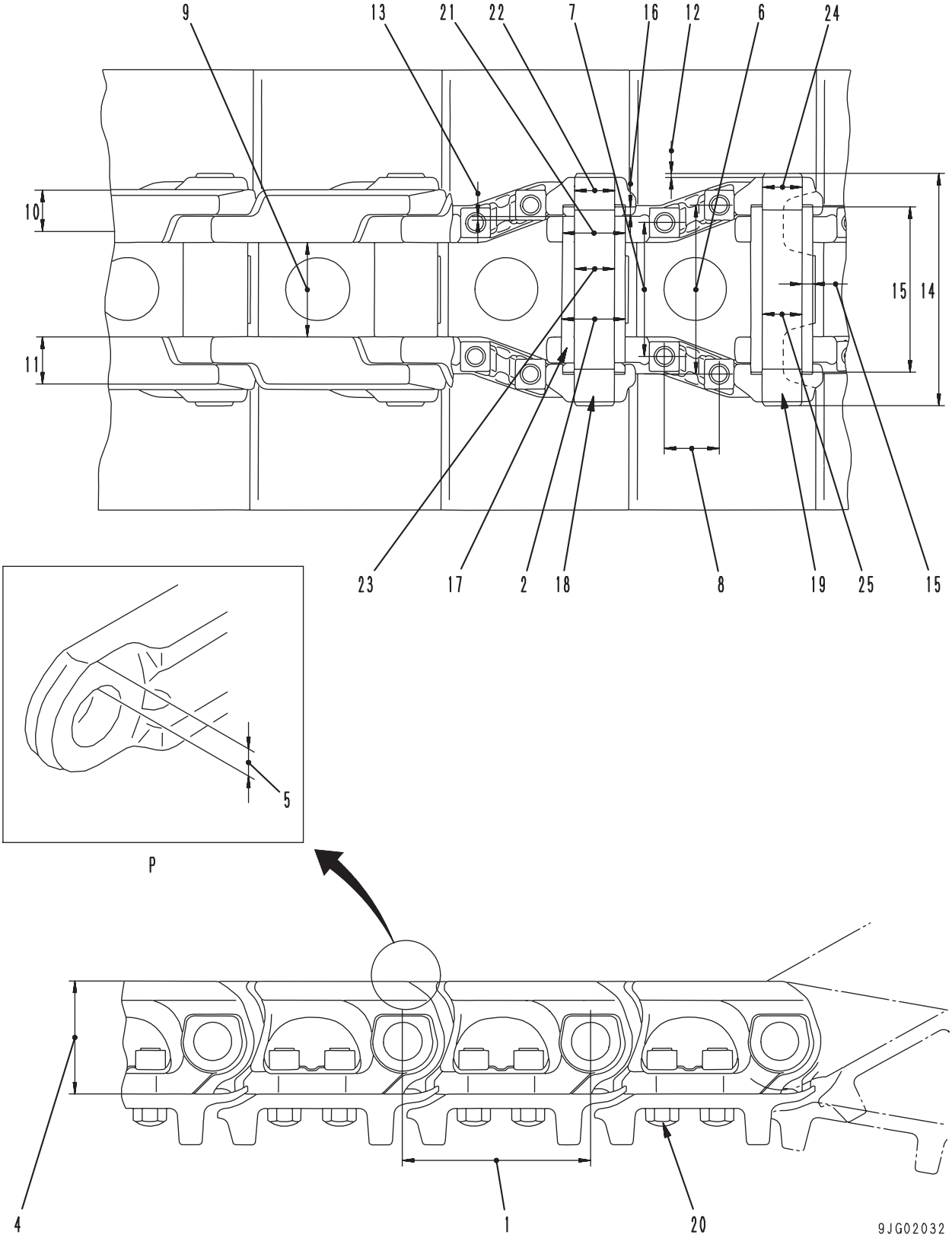


9JG02031

Unit: mm

No.	Check item		Criteria				Remedy
1	Outside diameter of outer flange		Standard size		Repair limit		Rebuild or replace
			298		—		
2	Outside diameter of inner flange (double flange)		295		—		
3	Outside diameter of tread		255		243		
4	Thickness of tread		73.7		67.7		
5	Overall width		328		—		
6	Width of tread	Single flange	72		—		
		Double flange	72				
7	Width of flange	Single flange	29		—		
		Double flange	29				
8	Width of inner flange (Double flange)		126		—		
9	Axial play		0.42 – 0.99		—		
10	Clearance between shaft and bushing		Standard size	Tolerance		Standard clearance	Clearance limit	Replace bushing
				Shaft	Hole		
			100	–0.140 –0.207	+0.375 +0.235	0.375 – 0.582	—
11	Interference between roller and bushing		Standard size	Tolerance		Standard interference	Interference limit	
				Shaft	Hole		
			107.6	+0.087 +0.037	+0.020 –0.015	0.017 – 0.102	—

Track shoe



★ P portion shows the link of bushing press-fitting end.

Unit: mm

No.	Check item		Criteria		Remedy
1	Link pitch		Standard size	Repair limit	Reverse or replace
			260.6	263.6	
2	Bushing outside diameter		Standard size	When turned	
			87.9	82.9	
3	Thickness of bushing metal		Standard size	Repair limit	Repair or replace
			15.8	10.3	
4	Link height		156	143	
5	Thickness of link metal (bushing press-fitting portion)		39.3	26.3	Replace
6	Shoe bolt pitch		234.95		
7			184.2		
8			76.2		
9	Link	Inside width	133.6		Repair or replace
10		Overall width	73		
11		Tread width	65		
12	Protrusion of pin		4.5		Adjust or replace
13	Protrusion of regular bushing		10.8		
14	Overall length of pin		320.4		
15	Overall length of bushing		225.8		
16	Thickness of spacer		12.45		
17	Press-fitting force	Bushing	137 – 431 kN {14 – 44 ton}		—
18		Regular pin	294 – 641 kN {30 – 66 ton}		
※ 19		Master pin	255 – 608 kN {26 – 62 ton}		

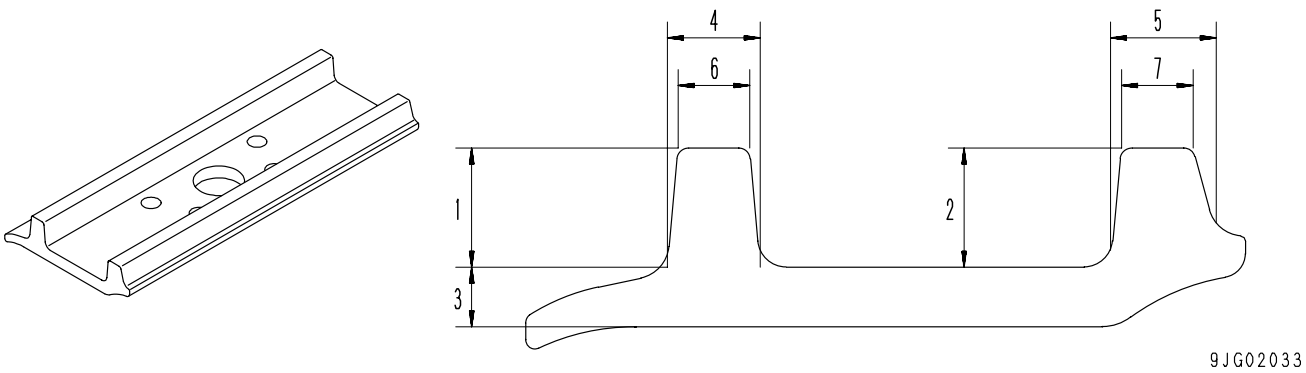
※ : Dry type track link

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="5">20</td><td rowspan="5">Shoe bolt</td><td rowspan="2">a. Regular link</td><td colspan="3">Tightening torque (Nm {kgm})</td><td colspan="2">Additional tightening angle (deg.)</td><td rowspan="5">Retighten</td></tr>
<tr><td colspan="3">784±78 {80±8}</td><td colspan="2">120±10</td></tr>
<tr><td rowspan="3">b. Master link</td><td colspan="2">Tightening torque (Nm {kgm})</td><td colspan="2">Additional tightening angle (deg.)</td><td>Lower limit torque (Nm {kgm})</td></tr>
<tr><td colspan="2">—</td><td colspan="2">—</td><td>—</td></tr>
<tr><td></td></tr>
<tr><td rowspan="2">21</td><td colspan="2" rowspan="2">Interference between bushing and link</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard interference</td><td rowspan="11">Adjust or replace</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>87.5</td><td>+0.472
+0.372</td><td>+0.087
0</td><td>0.285 – 0.472</td></tr>
<tr><td>22</td><td colspan="2">Interference between regular pin and link</td><td>55.2</td><td>+0.596
+0.496</td><td>+0.074
0</td><td>0.422 – 0.596</td></tr>
<tr><td rowspan="2">23</td><td colspan="2" rowspan="2">Clearance between regular pin and bushing</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard clearance</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>55.5</td><td>+0.296
+0.196</td><td>+1.036
+0.536</td><td>0.24 – 0.84</td></tr>
<tr><td rowspan="2">※
24</td><td colspan="2" rowspan="2">Interference between master pin and link</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard interference</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>55.2</td><td>+0.442
+0.412</td><td>+0.074
0</td><td>0.338 – 0.442</td></tr>
<tr><td rowspan="2">※
25</td><td colspan="2" rowspan="2">Clearance between master pin and bushing</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard clearance</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>55.5</td><td>–0.200
–0.300</td><td>+1.036
+0.536</td><td>0.736 – 1.336</td></tr>
</table>

※ : Dry type track link

Double shoe



Unit: mm

No.	Check item	Criteria		Remedy
1	Height	Standard size	Repair limit	Rebuild or replace
		50	25	
2	Height	50		
3	Thickness	20		
4	Length at bottom	39		
5		—		
6	Length at top	30		
7		30		
8	Thickness	Standard size	Repair limit	
		70	45	

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00382-00

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Printed in Belgium 04-06 (01)

HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

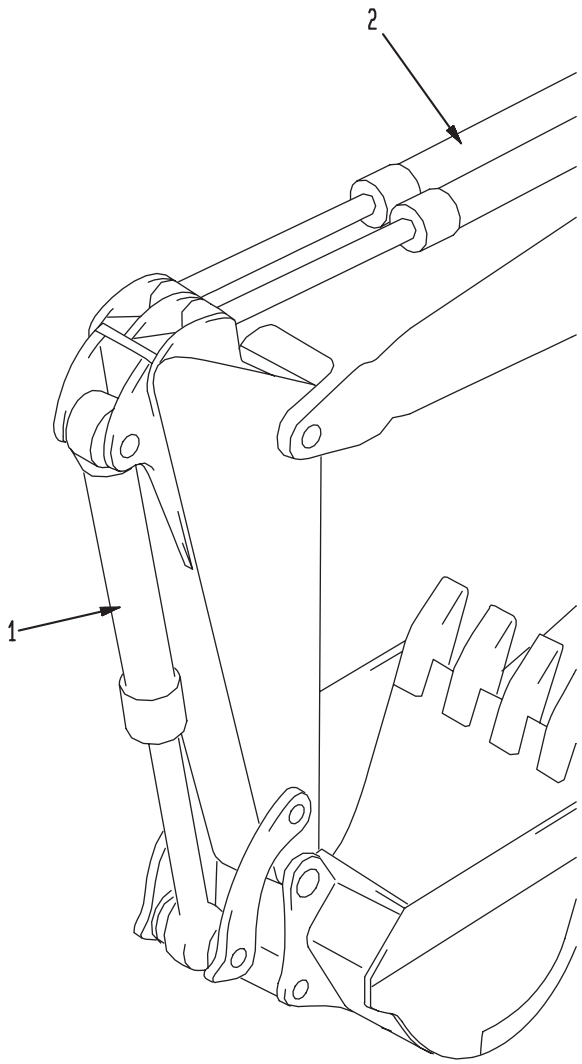
10 Structure, function and maintenance standard

Hydraulic system, Part 1

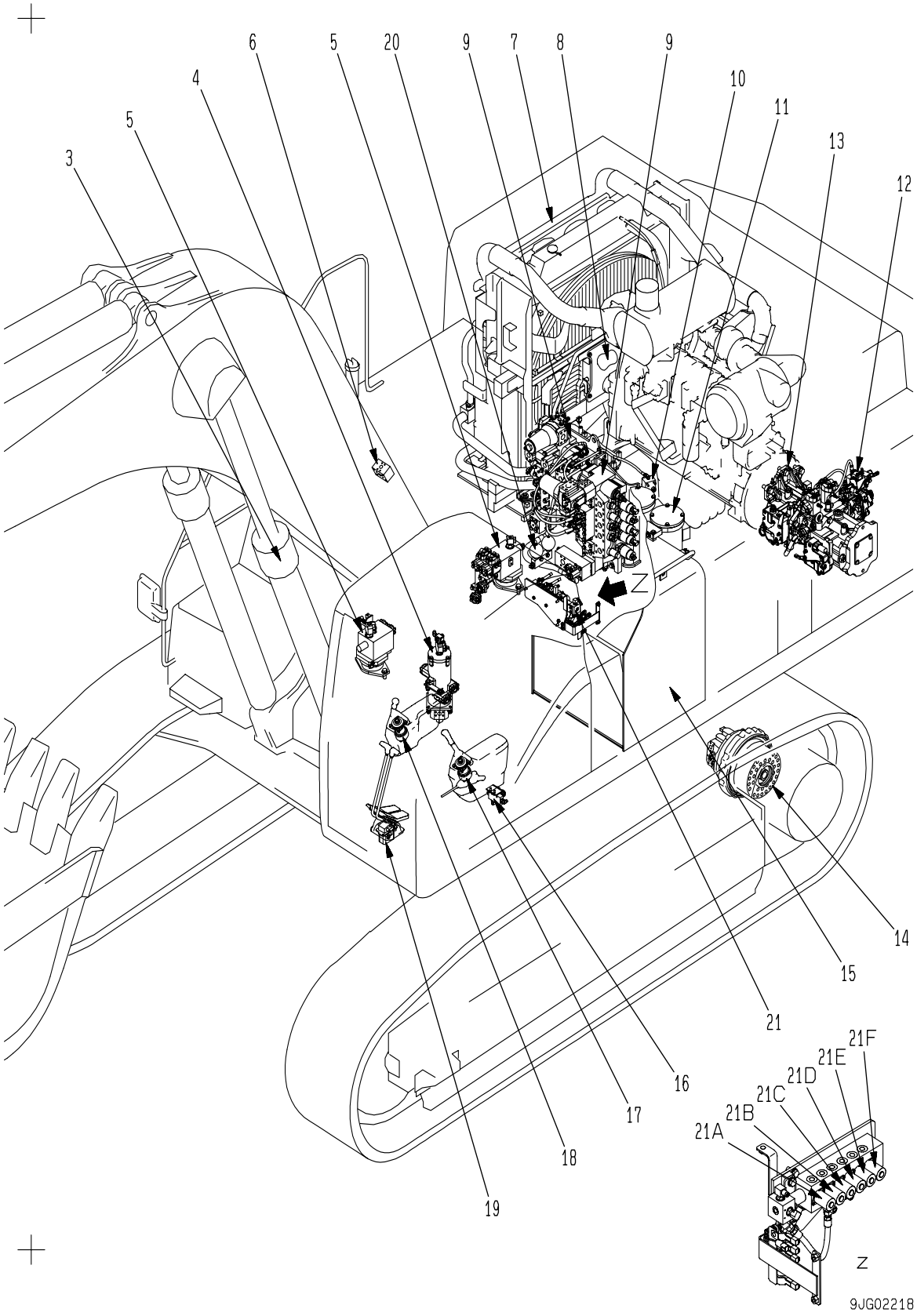
Hydraulic system, Part 1
- Hydraulic tank, hydraulic filter ... 4
- Hydraulic pump ... 6
- Operation of pump control mechanism ... 12
- EPC valve ... 14
- Self pressure reducing valve ... 17
- Cooling fan pump ... 21
- Cooling fan motor ... 30

Hydraulic system, Part 1
Hydraulic piping drawing

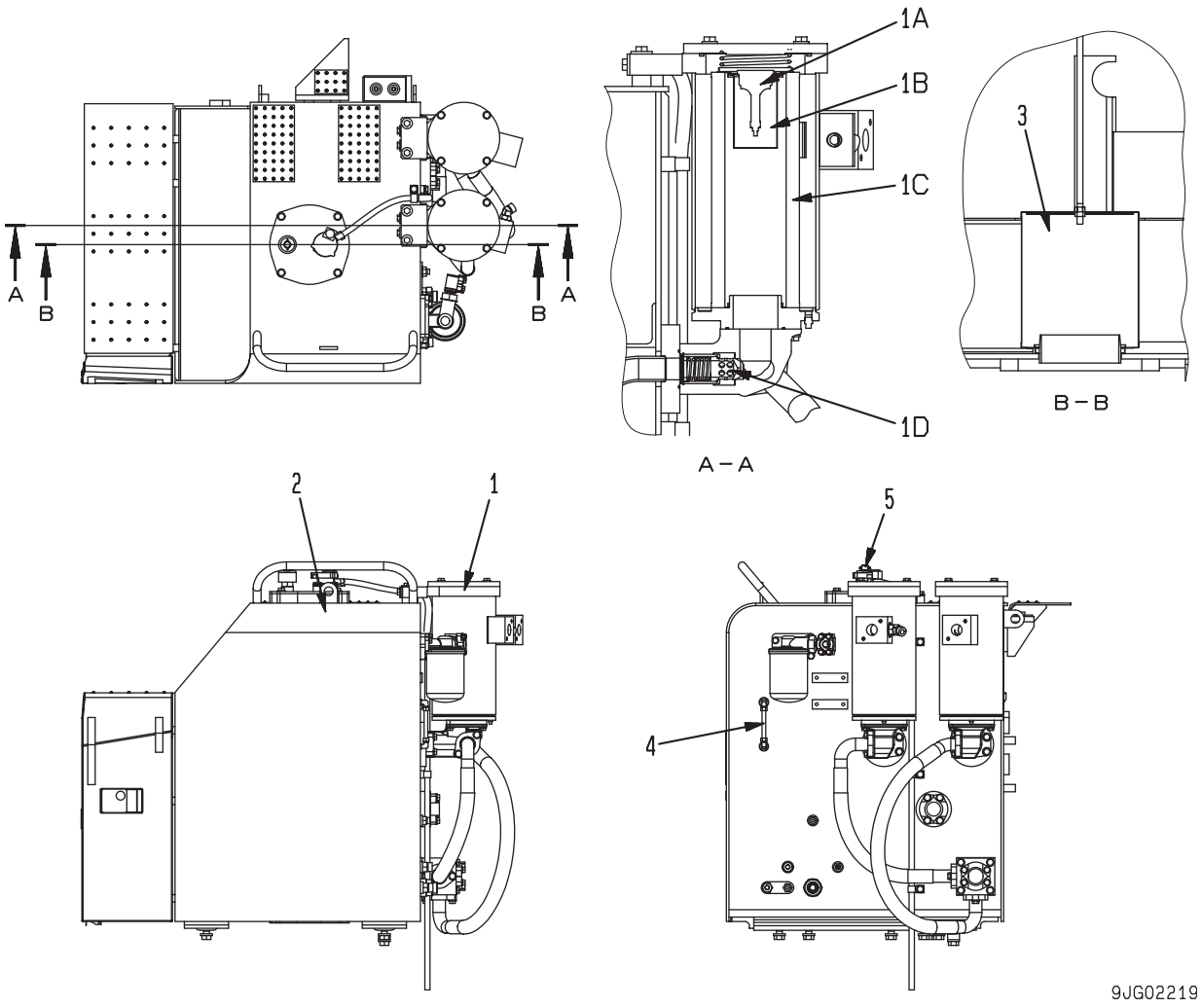
1. Bucket cylinder
2. Arm cylinder
3. Boom cylinder
4. Center swivel joint
5. Swing motor
6. Quick return valve (Arm)
7. Oil cooler
8. Cooling fan motor
9. Control valve
10. PPC shuttle valve
11. Hydraulic filter
12. Cooling fan pump
13. Hydraulic pump
14. L.H. travel motor
15. Hydraulic tank
16. PPC lock valve
17. L.H. PPC valve
18. R.H. PPC valve
19. Travel PPC valve
20. Accumulator
21. Solenoid valve assembly
    - 21A. Swing brake solenoid valve (F)
    - 21B. Travel speed solenoid valve
    - 21C. Swing brake solenoid valve
    - 21D. Machine push-up solenoid valve
    - 21E. Heavy lift solenoid valve
    - 21F. Straight travel solenoid valve



9JG02217


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21A
21B
21C
21D
21E
21F
Z
9JG02218

Hydraulic tank, hydraulic filter



1. Hydraulic filter
   1A. Bypass valve
   1B. Strainer
   1C. Element
   1D. Cooler check valve
2. Hydraulic tank
3. Suction strainer
4. Sight gauge
5. Oil filler cap

Specifications

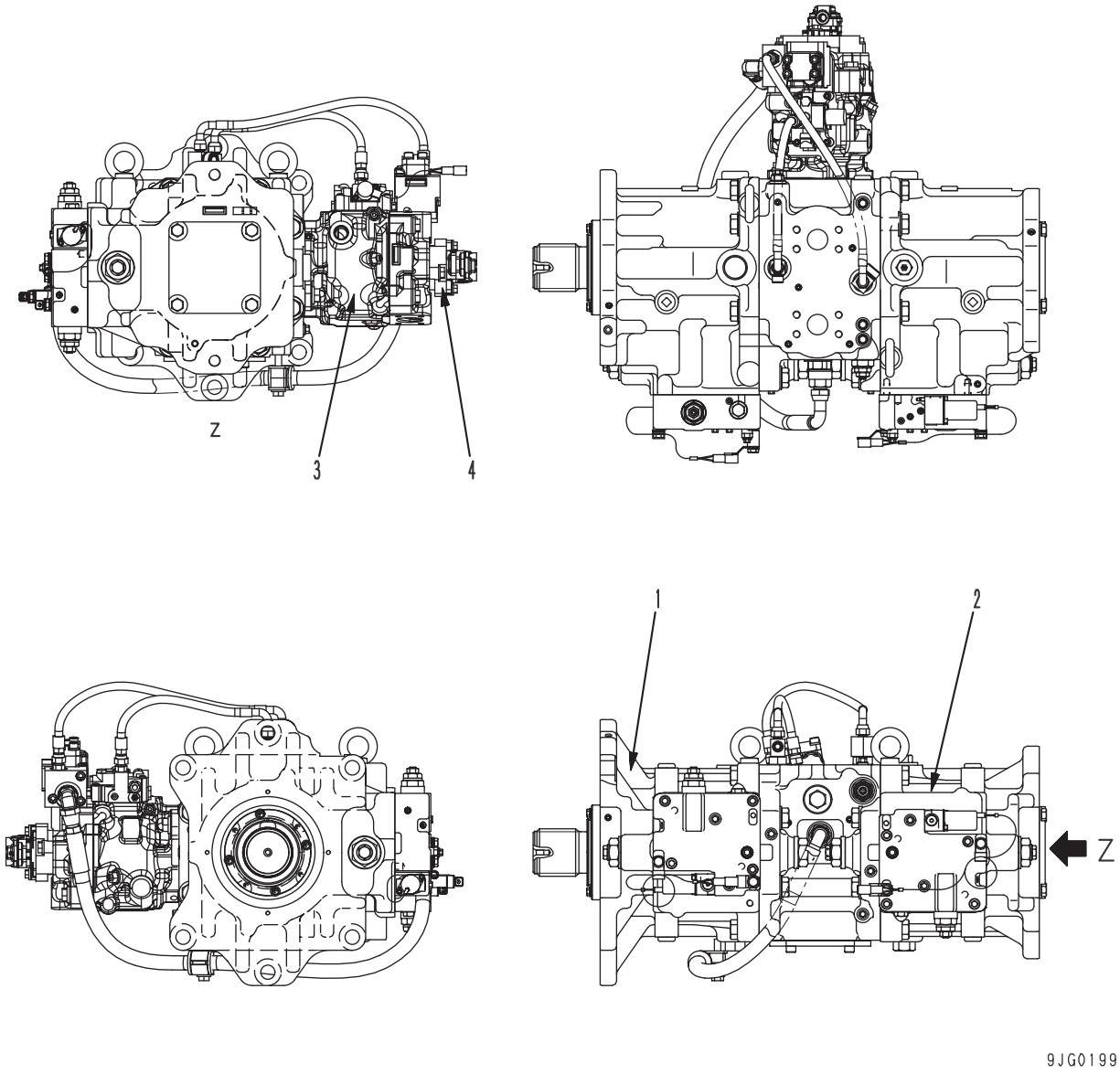
Tank capacity : 729 ℓ
Amount of oil inside tank : 482 ℓ (at H level)

Pressure valve

Relief cracking pressure : 16.7 ± 6.9 kPa
{0.17 ± 0.07 kg/cm^2}
Suction cracking pressure: 0 – 0.49 kPa
{0 – 0.005 kg/cm^2}
Bypass valve set pressure: 0.15 ± 0.03 MPa
{1.5 ± 0.3 kg/cm^2}

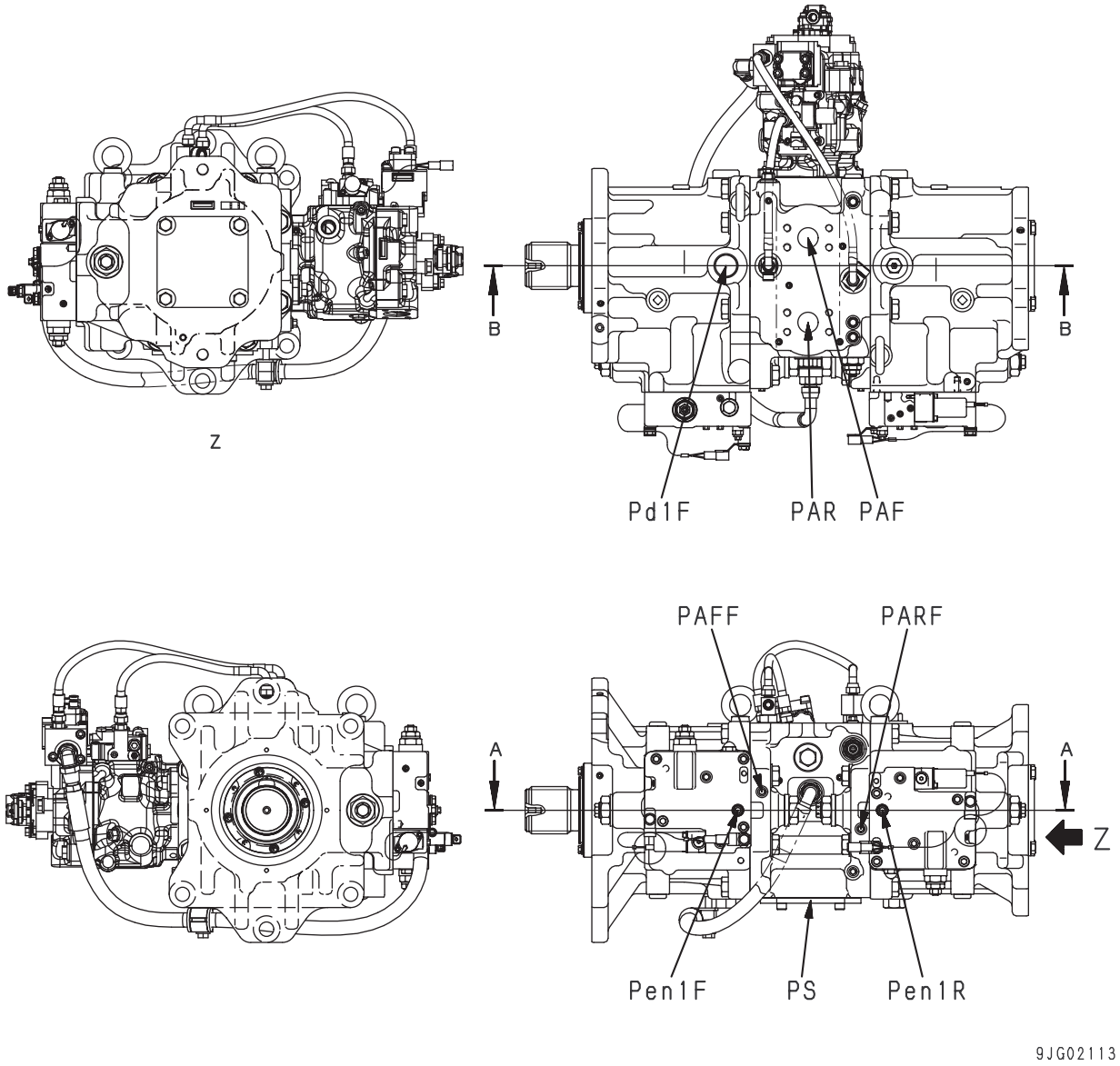
Hydraulic pump

Model: HPV375+375+LPV90+FBR00-2.5



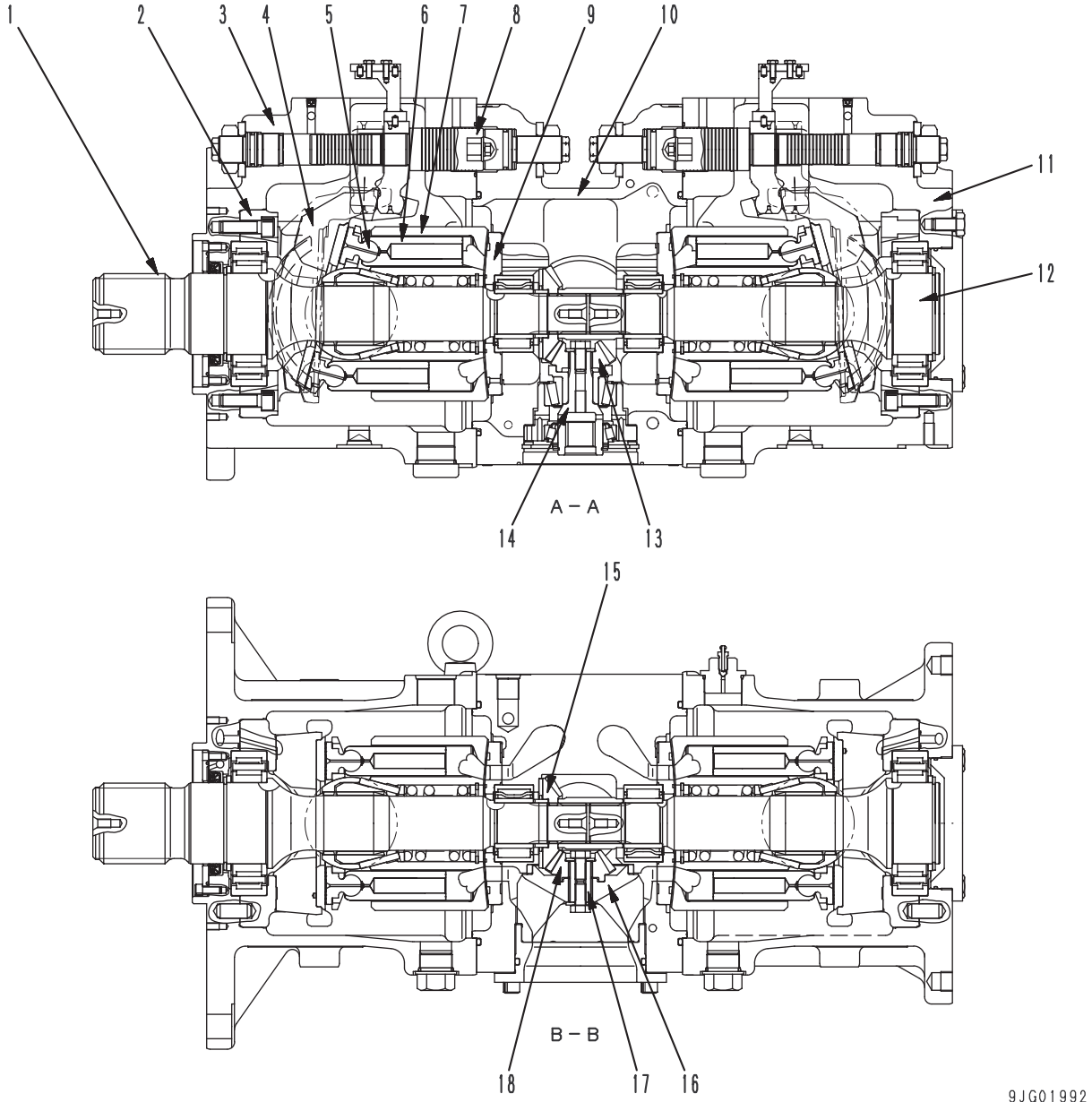
1. Front main pump (HPV375)
2. Rear main pump (HPV375)
3. Cooling fan pump (LPV90)
4. Coupling lubrication pump (FBR00-2.5)

1. Main pump
HPV375 + 375

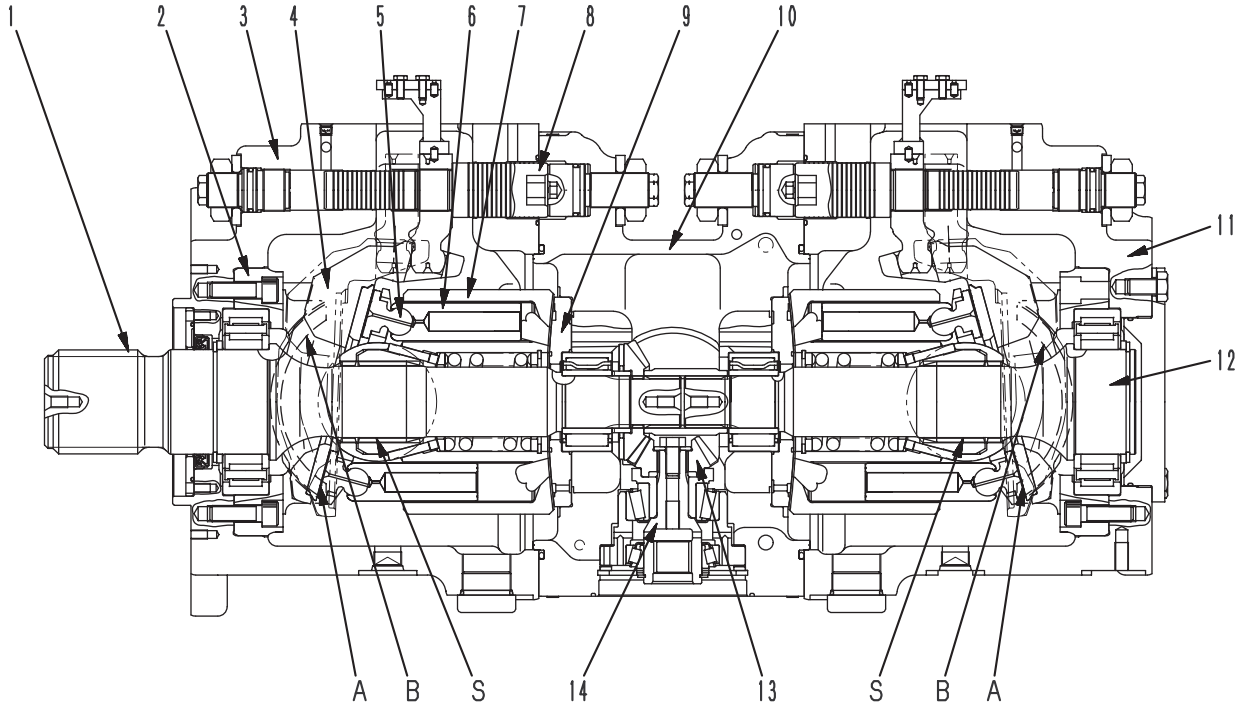


PS : Suction
PAF : Front pump delivery
PAR : Rear pump delivery
PAFF: Front delivery pressure
PARF: Rear delivery pressure

Pd1F : Pump drain
Pen1F : Front control pressure
Pen1R: Rear control pressure



1. Shaft (front)
2. Cradle
3. Case (front)
4. Rocker cam
5. Shoe
6. Piston
7. Cylinder block
8. Servo piston
9. Valve plate
10. End cap
11. Case (rear)
12. Shaft (rear)
13. Pinion (fan cooling pump)
14. Shaft (fan cooling pump)
15. Bevel gear
16. Impeller pump
17. Shaft (impeller)
18. Pinion (impeller)



Function

- The rotation and torque transmitted to the pump shaft is converted into hydraulic energy, and pressurized oil is discharged according to the load.
- It is possible to change the delivery amount by changing the swash plate angle.

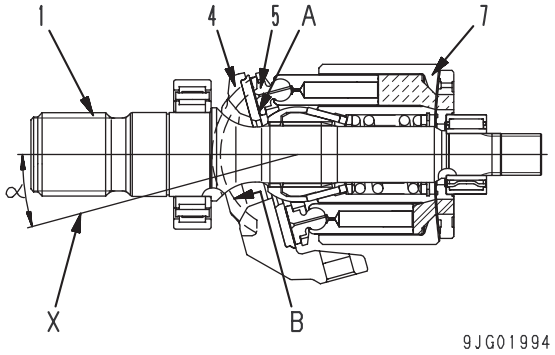
Structure

- Cylinder block (7) is supported to shaft (1) by spline **S**, and shaft (1) is supported by the front and rear bearings.
- The tip of piston (6) is a concave ball, and shoe (5) is caulked to it to form one unit. Piston (6) and shoe (5) form a spherical bearing.
- Rocker cam (4) has flat surface **A**, and shoe (5) is always pressed against this surface while sliding in a circular movement.
  Rocker cam (4) brings high pressure oil at cylindrical surface **B** with cradle (2), which is secured to the case, and forms a static pressure bearing when it slides.
- Piston (6) carries out relative movement in the axial direction inside each cylinder chamber of cylinder block (7).
- The cylinder block seals the pressure oil to valve plate (9) and carries out relative rotation. This surface is designed so that the oil pressure balance is maintained at a suitable level. The oil inside each cylinder chamber of cylinder block (7) is sucked in and discharged through valve plate (9).
- Impeller pump (16) and pinion (18) are connected with shaft (17) through bevel gear (15) and rotates together with the shaft. The oil sucked in from the suction port is sent into the cylinder chamber by centrifugal force to make it easier to suck in.

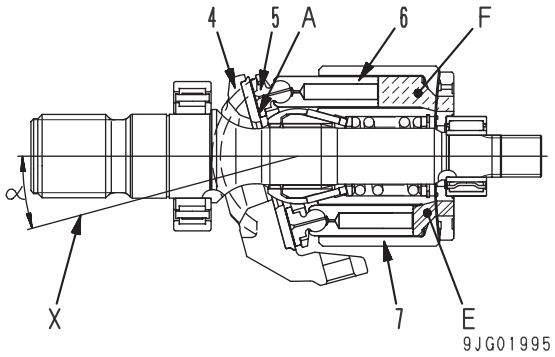
Operation

1. Operation of pump

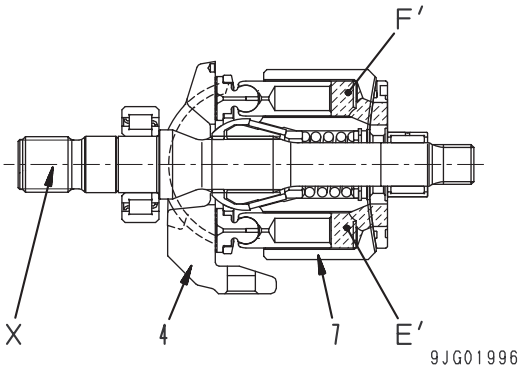
- Cylinder block (7) rotates together with shaft (1), and shoe (5) slides on flat surface **A**.
  When this happens, rocker cam (4) moves along cylindrical surface **B**, so angle α between center line **X** of rocker cam (4) and the axial direction of cylinder block (7) changes. (Angle α is called the swash plate angle.)



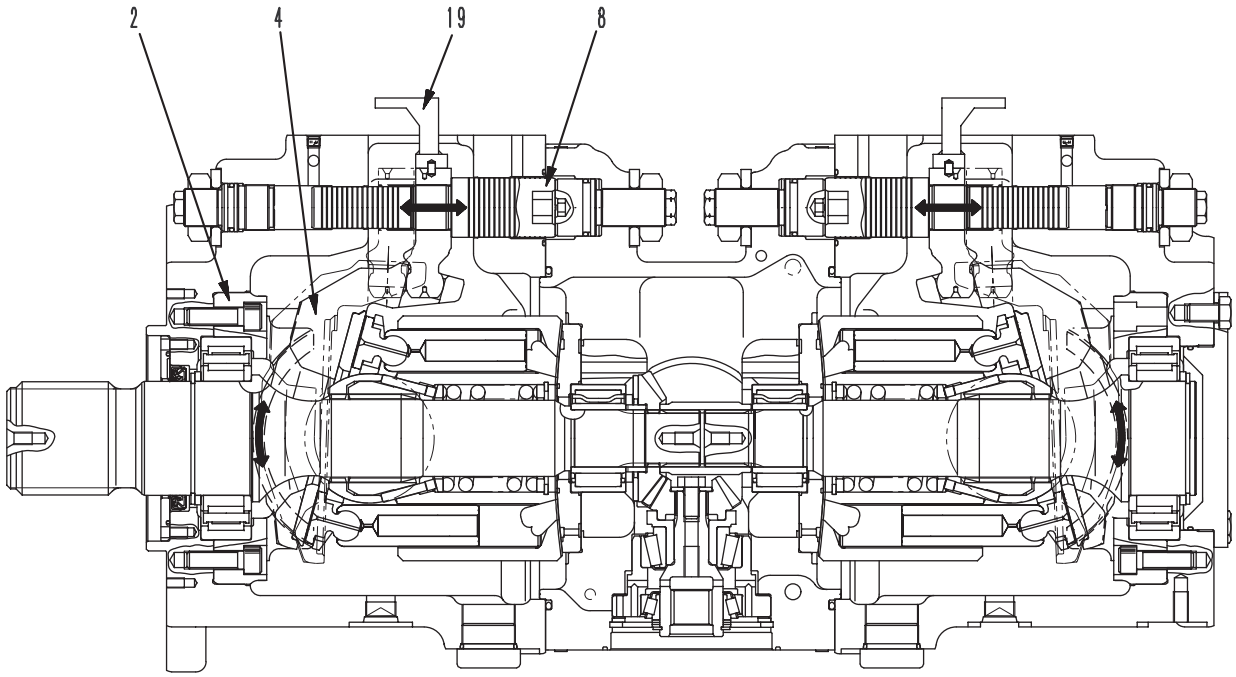
1) Center line **X** of rocker cam (4) maintains swash plate angle α in relation to the axial direction of cylinder block (7), and flat surface **A** moves as a cam in relation to shoe (5). In this way, piston (6) slides on the inside of cylinder block (7), so a difference between volume **E** and **F** is created inside cylinder block (7). The suction and discharge is equal to this difference **F** – **E**.
   In other words, when cylinder block (7) rotates and the volume of chamber **E** becomes smaller, the oil is discharged during that stroke. On the other hand, the volume of chamber **F** becomes larger, and as the volume becomes bigger, the oil is sucked in.



2) If center line **X** of rocker cam (4) is in line with the axial direction of cylinder block (7) (swash plate angle = 0), the difference between volumes E' and F' inside cylinder block (7) becomes 0, so the pump does not carry out any suction or discharge of oil.



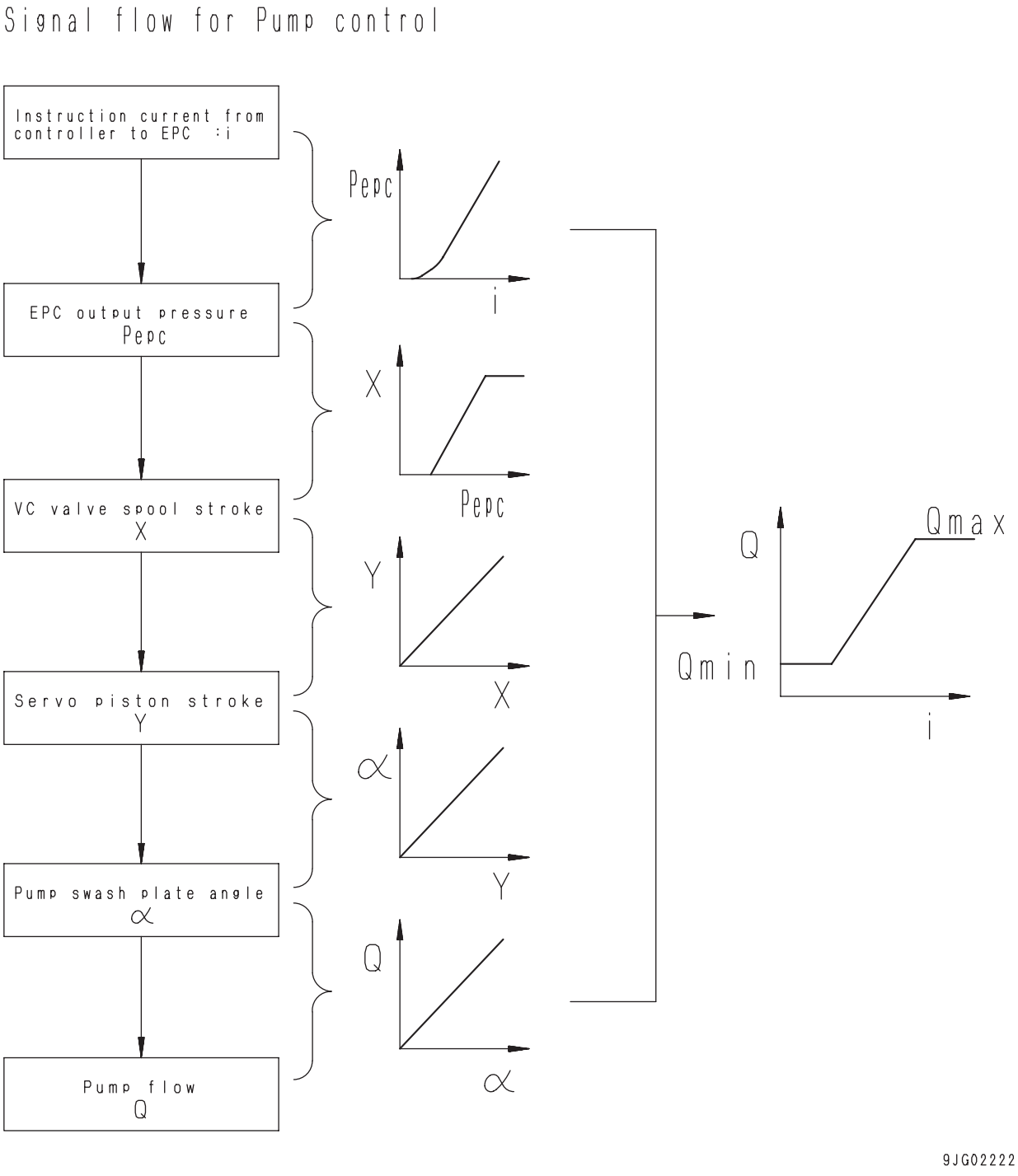
2. Control of discharge amount



- If swash plate angle α becomes larger, the difference in volumes **E** and **F** becomes larger and discharge volume **Q** increases.
- Swash plate angle α is changed by servo piston (8).
- Servo piston (8) moves in a reciprocal movement ($\leftrightarrow$) according to the command from the control valve.
- This straight line movement is transmitted through rod (19) to rocker cam (4), and rocker cam (4), which is supported by the cylindrical surface to cradle (2), moves in a rocking movement on the cylindrical surface in ($\updownarrow$ direction).
- With servo piston (8), the area receiving the pressure is different on the left and right, so main pump discharge pressure (self pressure) **Ph** is always connected to the chamber receiving the pressure on the small diameter piston side (the self-pressure is brought in). Output pressure **PS** of the VC valve is brought to the chamber receiving the pressure at the large diameter piston end. The relationship in the size of self-pressure **Ph** and the pressure at the small diameter piston end, and the ratio between the area receiving the pressure at the small diameter piston end and the large diameter piston end controls the movement of servo piston (8).

Operation of pump control mechanism

Signal flow for pump control



Operation of pump control mechanism

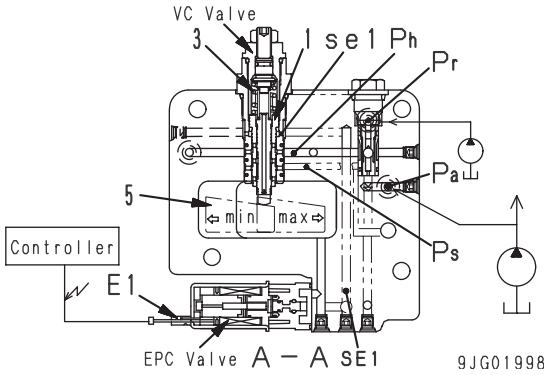
- Higher pressure of either the **Pa*** or the **Pr**** is introduced into the port **Ph** by the shuttle valve.
- Receiving pressure area **A** of chamber **a** and receiving pressure area **B** of chamber **b** are the relations of **A** ≒ **2B**.
- The **Ph***** pressure is always introduced into chamber **b**.

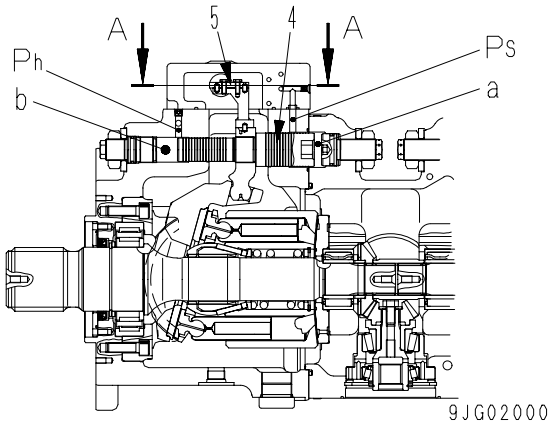
* **Pa**: Main pump pressure port
** **Pr**: Pilot pump pressure port
*** **Ph**: Pressure in high one either **Pa** or **Pr**

(1) When the EPC valve is operating

1) Operation of VC valve
- The instruction current from the pump controller flows to EPC solenoid (**E1**).
- This instruction current acts on the EPC valve, and the EPC valve puts out the signal pressure.
  The signal pressure is introduced into chamber **se1** through port **SE1**.
  Power to push VC valve spool (1) is changed according to the signal pressure.
- VC valve spool (1) is set at the position in which this power to push VC valve spool (1) and the spring power in spring (3) do the balance.
- The size of the instruction current to the EPC valve is decided by the controller based on information on the pump pressure etc.

2) Operation of servo piston
- Port **Ph** and port **Ps** are intercepted when VC valve spool (1) moves up, and port **Ps** is connected with port **Td** at the same time.
  And, servo piston (4) moves right because chamber **a** is connected with the drain port.
- VC valve spool (2) moves up, when servo piston (4) moves right and connecting cam (5) moves right.
  The movement of servo piston (4) stops when VC valve spool (2) moves up, and port **Ps** and port **Td** are intercepted.
  In other words, servo piston (4) moves in proportion to the amount of the movement of VC spool (1).

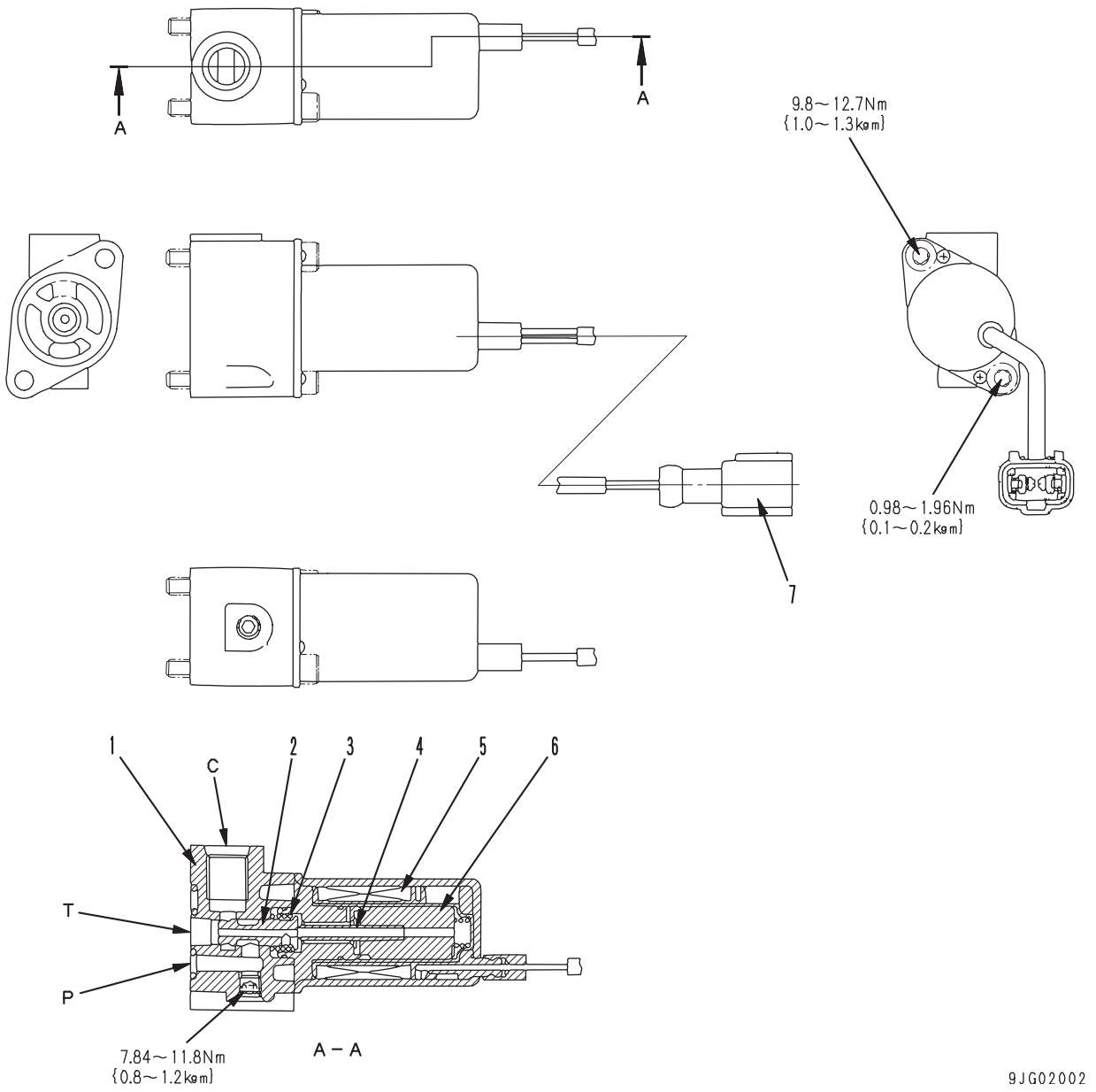




(2) When the EPC valve is not operating

- VC valve spool (1) doesn't operate when the pressure oil doesn't enter from the EPC valve.
- At this time, chamber is pressurized, because port **Ph** and port **Ps** are connected, and port **Ps** and port **Td** are shut.
  As a result, servo piston (4) moves left, and the pump becomes minimum discharge.

EPC valve



1. Body
2. Spool
3. Spring
4. Push pin
5. Coil
6. Plunger
7. Connector

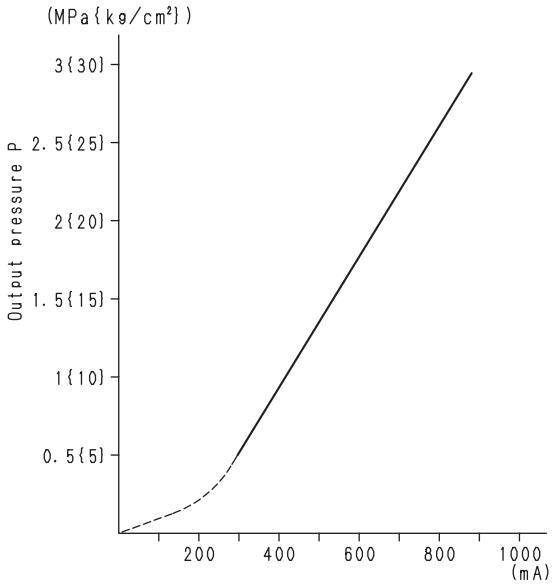
C. To VC valve
P. From pump
T. To hydraulic tank

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
		Free length	Installed length	Installed load	Free length	Installed load	
3	Spool return spring	9.0	8.4	3.14 N {0.32 kg}	—	—	Replace spring if there is damage or deformation

Function

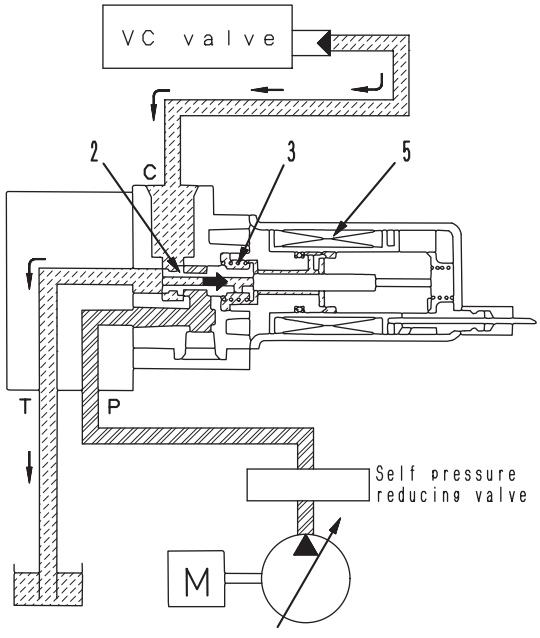
- The EPC valve consists of the proportional solenoid portion and the hydraulic valve portion.
- When it receives signal current **i** from the controller, it generates the EPC output pressure in proportion to the size of the signal, and outputs it to VC valve.



SUZ01205

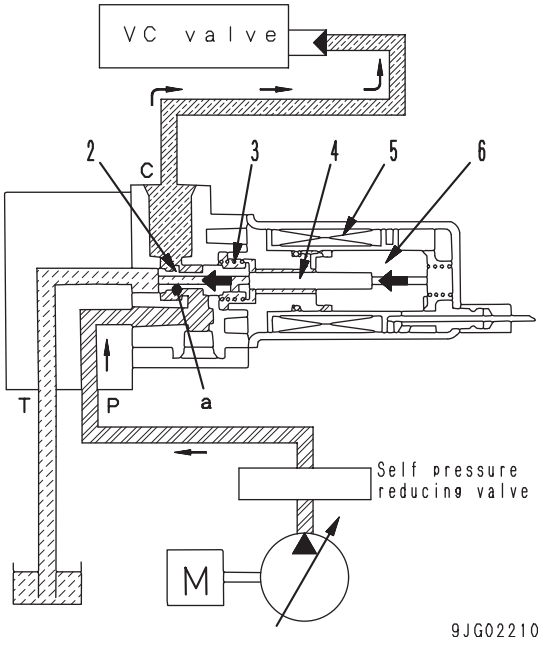
Operation

1. When signal current is 0 (coil de-energized)
   - There is no signal current flowing from the controller to coil (5), coil (5) is de-energized. For this reason, spool (2) is pushed to the right by spring (3).
   - As a result, port **P** closes and the pressurized oil from the self pressure reducing valve does not flow to VC valve. At the same time, the pressurized oil from VC valve passes from port **C** through port **T** and is drained to the tank.

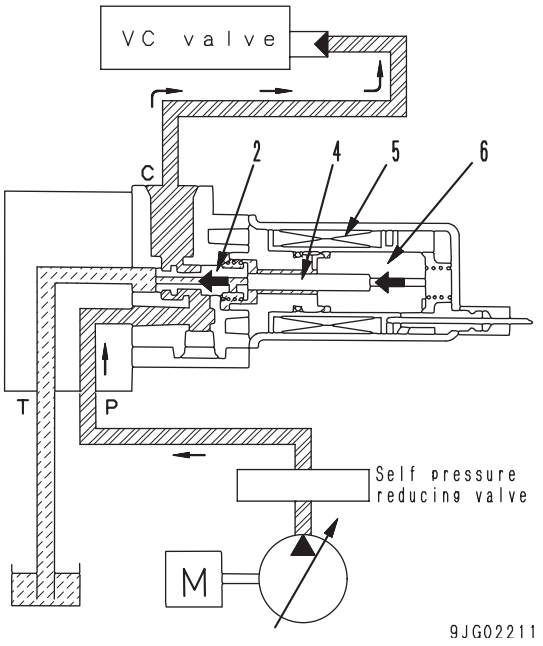


9JG02209

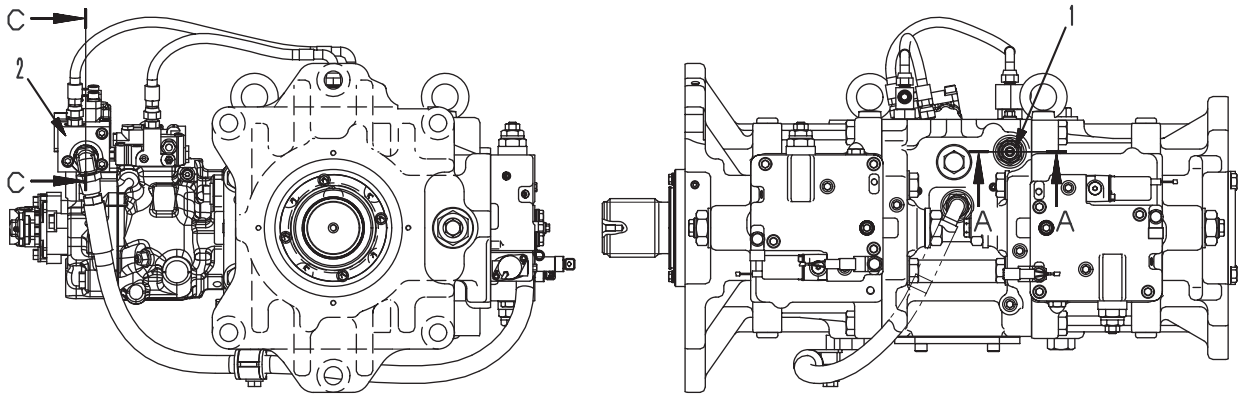
2. When signal current is very small (coil energized)
   - When a very small signal current flows to coil (5), coil (5) is energized, a propulsion force is generated, and this pushes plunger (6) to the left.
   - Push pin (4) pushes spool (2) to the left, and pressurized oil flows from port **P** to port **C**. When the pressure at port **C** rises and the load of spring (3) + the force acting on surface **a** of spool (2) become greater than the propulsion force of plunger (6), spool (2) is pushed to the right. The circuit between port **P** and port **C** is shut off, and at the same time, port **C** and port **T** are connected.
   - As a result, spool (2) moves up and down so that the propulsion force of plunger (6) is balanced with the load of spring (3) + pressure of port **C**. Therefore, the circuit pressure between the EPC valve and VC valve is controlled in propulsion to the size of the signal current.



3. When signal current is maximum (coil energized)
   - When the signal current flows to coil (5), coil (5) is energized. When this happens, the signal current is at its maximum, so the propulsion force of plunger (6) is also at its maximum. For this reason, spool (2) is pushed fully to the left by push pin (4).
   - As a result, the flow of pressurized oil from port **P** flows at its maximum to port **C**, and the circuit pressure between the EPC valve and VC valve becomes the maximum. At the same time, port **T** closes and stops the oil from flowing to the tank.

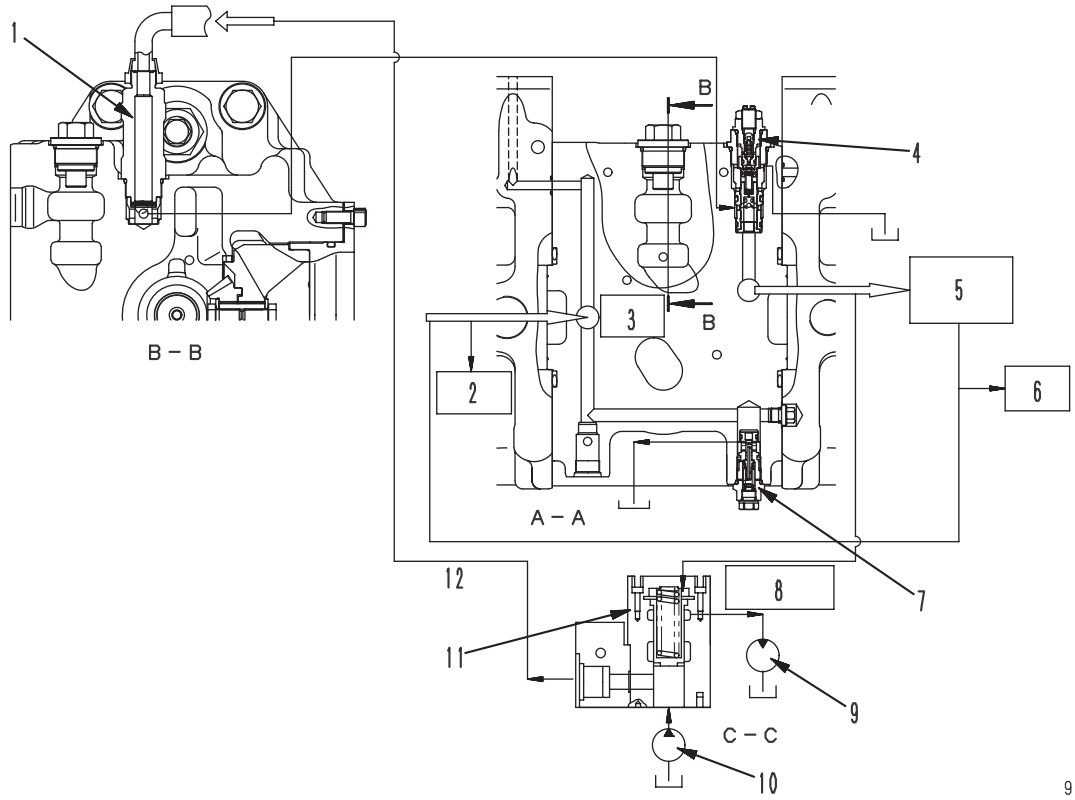


Self pressure reducing valve



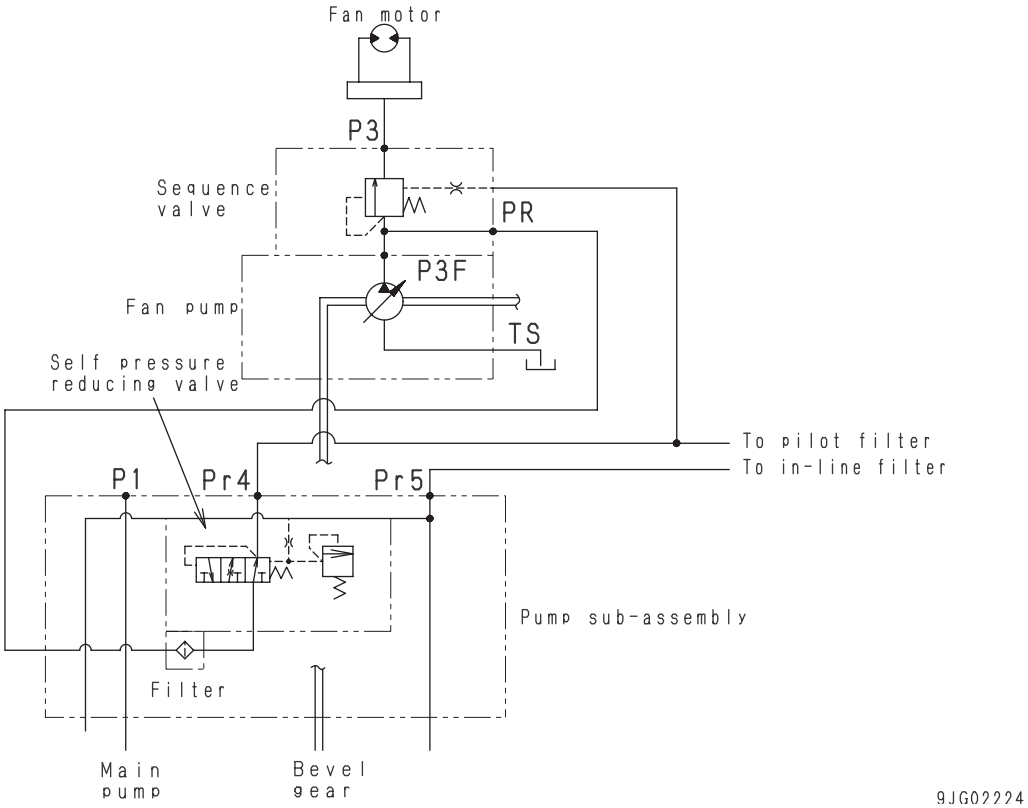
9JG02003

1. Self pressure reducing valve
2. Sequence valve



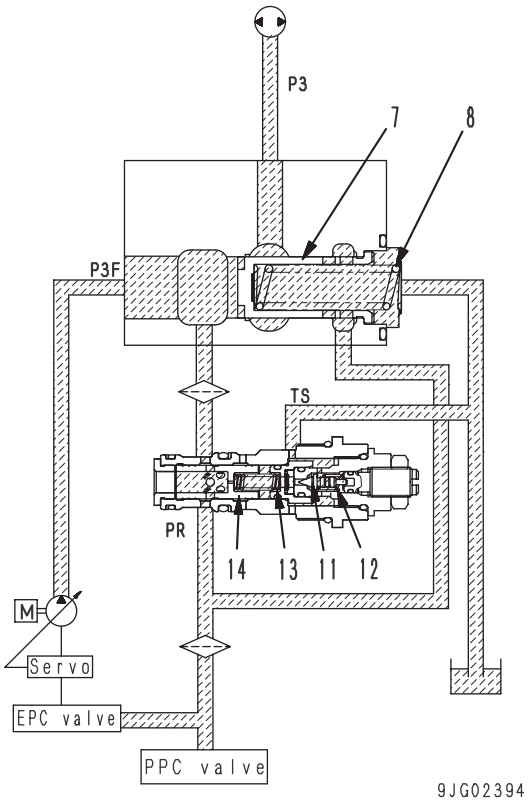
9JG02004

1. Filter
2. Cooling fan pump EPC valve
3. Main pump EPC valve
4. Self pressure reducing valve
5. Machine in-line filter
6. PPC valve
7. Relief valve
8. Sequence valve back pressure
9. Cooling fan motor
10. Cooling fan pump
11. Sequence valve
12. To filter



Function

- This valve reduces the discharge pressure of the main pump and supplies it as control pressure for the solenoid valves, PPC valves, etc.



Operation

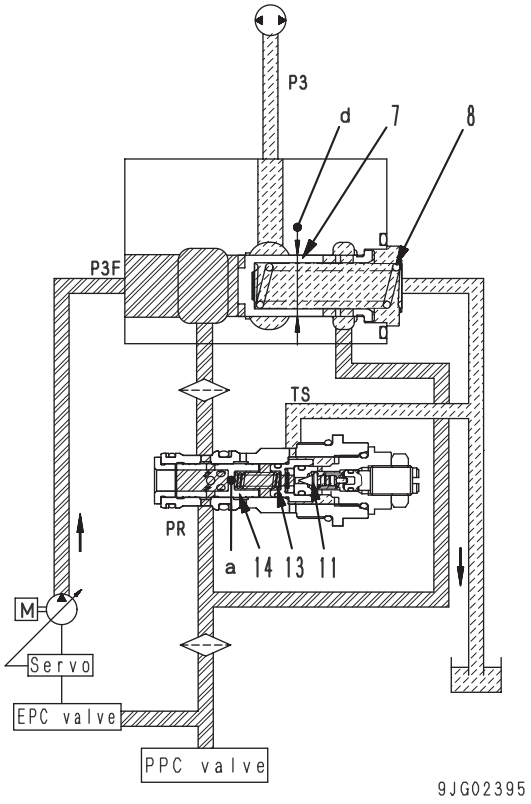
1. When engine is stopped

- Poppet (11) is pressed by spring (12) against the seat and port **PR** is not connected to **TS**.
- Valve (14) is pressed by spring (13) against the left side and port **P3F** is connected to **PR**.
- Valve (7) is pressed by spring (8) against the left side and port **P3F** is not connected to **P3**.

2. When in neutral or load pressure P3 is low
(When boom is lowered and arm is in IN position and they are moving down under own weight)

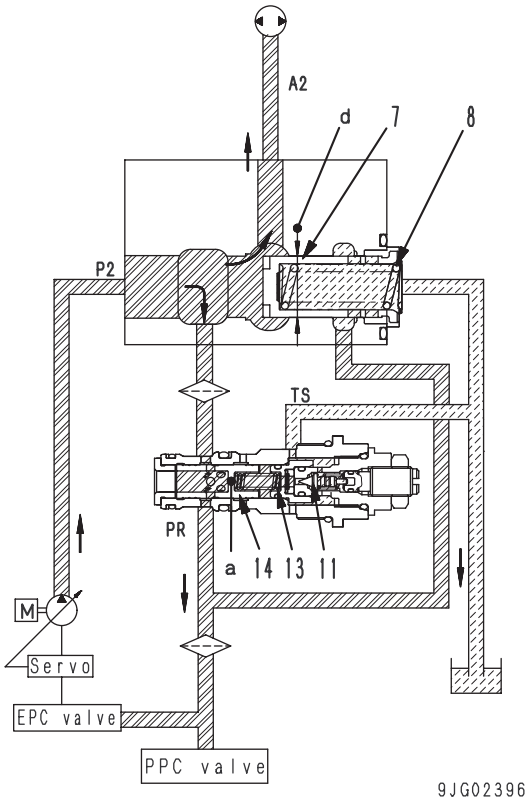
Note: When load pressure **P3** is lower than self pressure reducing valve output pressure **PR**.

- Valve (7) receives the force of spring (8) and **PR** pressure (which is 0 MPa {0 kg/cm²} when the engine is stopped) in the direction to close the circuit between ports **P3F** and **P3**. If the hydraulic oil flows in port **P3F**, the Ø**d** x **P3** pressure becomes equal to the total of the force of spring (8) and the value of area of Ø**d** x **PR** pressure, then the area of the pass between ports **P3F** and **P3** is so adjusted that **P3F** pressure will be kept constant above the **PR** pressure.
- If **PR** pressure rises above the set level, poppet (11) opens and the hydraulic oil flows from **PR** port through orifice **a** in spool (14) and open part of poppet (11) to seal drain port **TS**.
  Accordingly, differential pressure is generated between before and after orifice **a** in spool (14) and then spool (14) moves to close the pass between port **P3F** and **PR**. **P3** pressure is controlled constant (at the set pressure) by the area of the oil pass at this time and supplied as **PR** pressure.



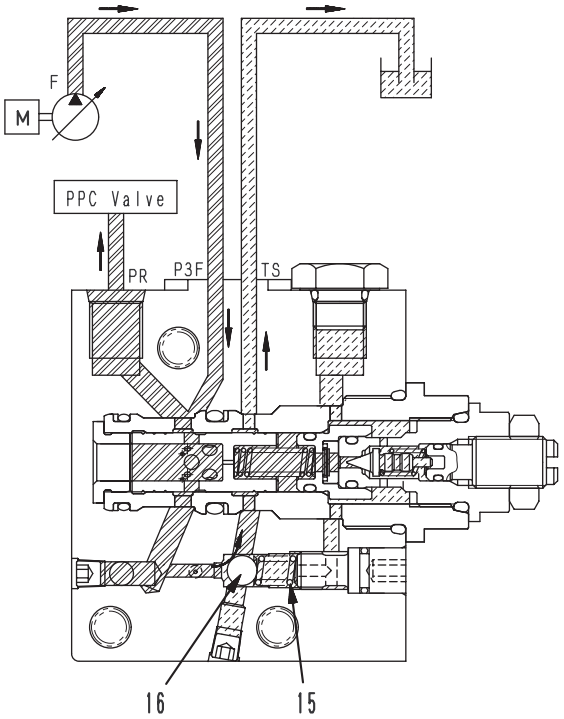
3. When load pressure P3 is high

- If load pressure **P3** rises and the pump discharge increases because of operation of the work equipment, Ø**d**x **P3F** pressure rises higher than the total of the force of spring (8) and the value of Ø**d** x **PR** pressure, and then valve (7) moves to the right stroke end.
- As a result, the area of the pass between ports **P3F** and **P3** increases and the pass resistance lowers and the loss of the engine power is reduced.
- If **PR** pressure rises above the set pressure, poppet (11) opens and the hydraulic oil flows from **PR** port through orifice **a** in spool (14) and open part of poppet (11) to seal drain port **TS**.
- Accordingly, differential pressure is generated between before and after orifice **a** in spool (14) and then spool (14) moves to close the pass between port **P3F** and **PR**. **P3** pressure is controlled constant (at the set pressure) by the area of the oil pass at this time and supplied as **PR** pressure.



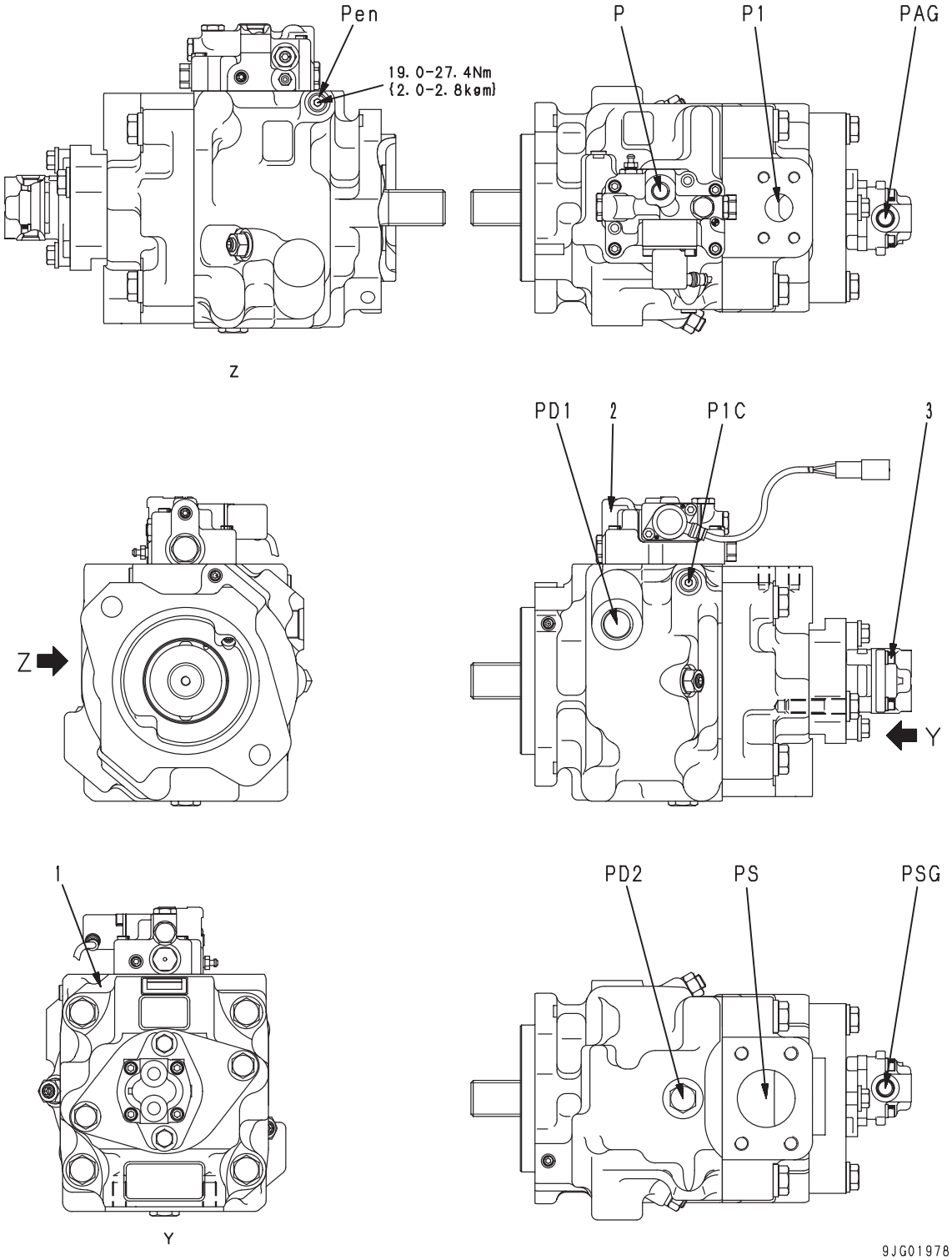
4. When abnormally high pressure is generated

- If the **PR** pressure on the self pressure reducing valve rises high abnormally, ball (16) separates from the seat against the force of spring (15) and the hydraulic oil flows from output port **PR** to **TS**. Accordingly, **PR** pressure lowers. By this operation, the hydraulic devices (PPC valves, solenoid valves, etc.) are protected from abnormal pressure.



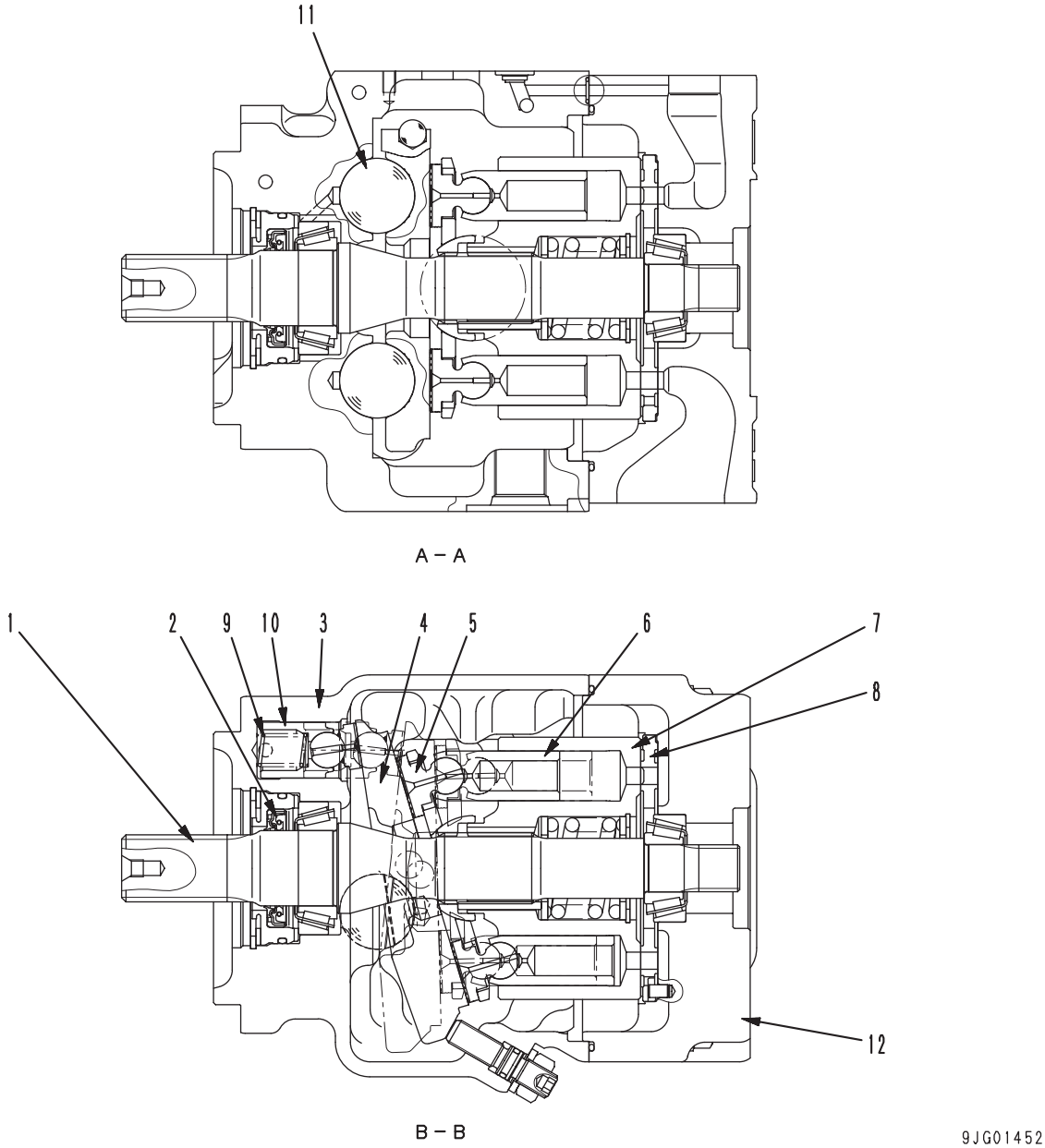
Cooling fan pump

LPV90

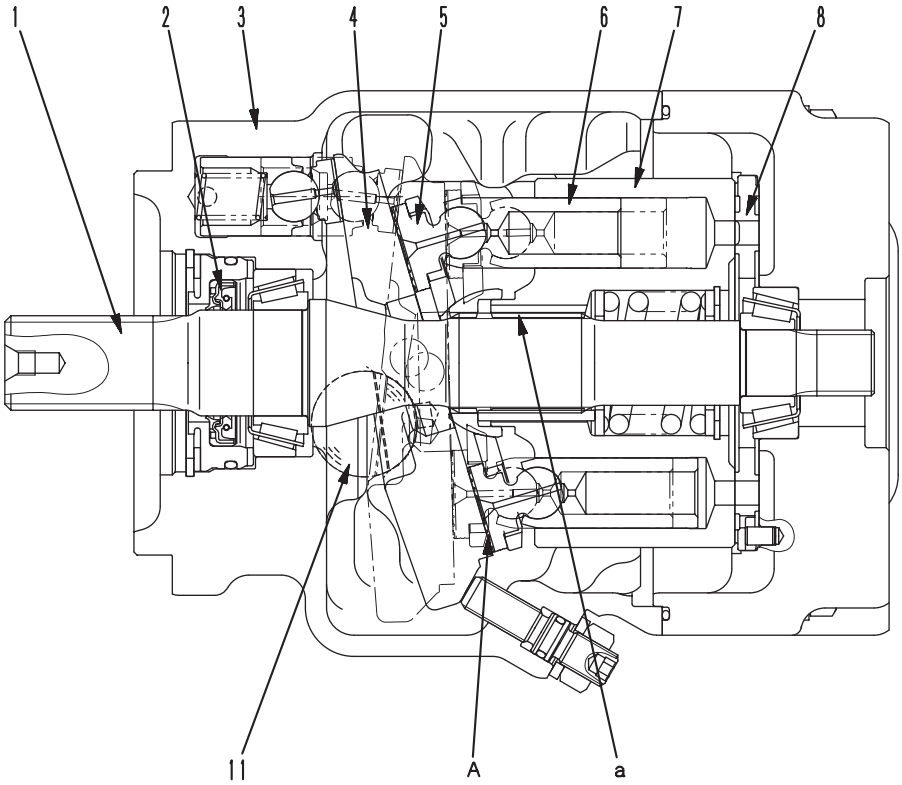


1. Piston pump
2. Servo valve
3. Gear pump (coupling lubrication)

P1 : Pump discharge port
PS : Pump suction port
P : EPC valve basic pressure
P1C : Pump pressure detection port
Pen : Pump control pressure detection port
PD1 : Pump drain port
PD2 : Pump drain port
PAG : Gear pump discharge (coupling lubrication)
PSG : Gear pump suction (coupling lubrication)



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
11. Ball
12. End cap



Function

- The rotation and torque of the engine are transmitted to the shaft of this pump and converted into hydraulic energy in this pump. This pump discharges the pressurized oil according to the load.
- The discharge of this pump can be changed by changing the swash plate angle in it.

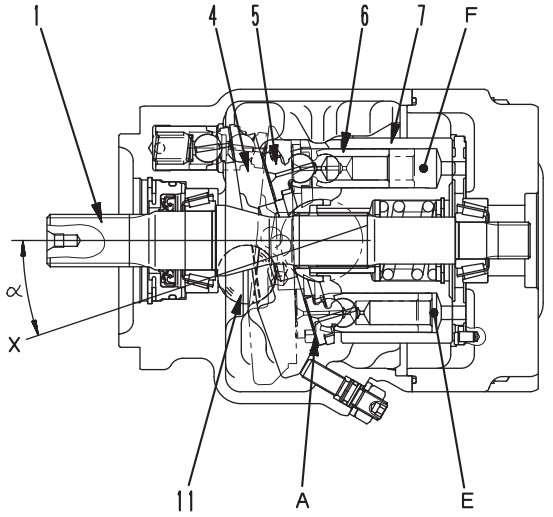
Structure

- Cylinder block (7) is supported on shaft (1) through spline **a**. Shaft (1) is supported by the front and rear bearings.
- The end of piston (6) has a spherical hollow which is combined with shoe (5). Piston (6) and shoe (5) form a spherical bearing.
- Rocker cam (4) has plane **A**. Shoe (5) is kept pressed against plane **A** and slid circularly. Rocker cam (4) slides around ball (11).
- Piston (6) in each cylinder of cylinder block (7) moves relatively in the axial direction.
- Cylinder block (7) rotates relatively against valve plate (8), sealing the pressurized oil, and the hydraulic balance is maintained properly.
- The oil in each cylinder of cylinder block (7) can be sucked and discharged through valve plate (8).

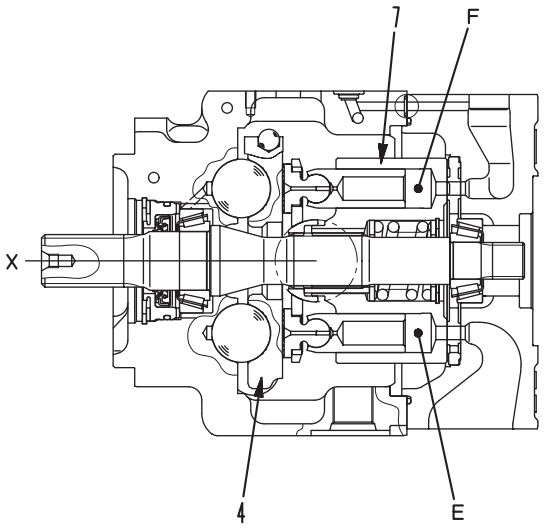
Operation

1. Operation of pump

- Cylinder block (7) rotates together with shaft (1) and shoe (5) slides on plane **A**. At this time, rocker cam (4) tilts around ball (11). As a result, angle α between center line **X** of rocker cam (4) and the axis of cylinder block (7) changes. Angle α is called the swash plate angle.
- If angle α is made between center line **X** of rocker cam (7) and the axis of cylinder block (7), plane **A** works as a cam for shoe (5).
- Accordingly, piston (6) slides inside cylinder block (7) and a difference is made between volumes **E** and **F** in cylinder block (7). As a result, each piston (6) sucks and discharges oil by **F – E**.
- In other words, if cylinder block (7) rotates and the volume of chamber **E** is decreased, the oil is discharged from chamber **E**. On the other hand, the volume of chamber **F** is increased and the oil is sucked in chamber **F**. (In the figure, chamber **F** is at the end of the suction stroke and chamber **E** is at the end of the discharge stroke.)
- If center line **X** of rocker cam (4) is equal to the axis of cylinder block (7) (the swash plate angle is 0), there is not a difference between volumes **E** and **F** in cylinder block (7) and oil is not sucked or discharged. (The swash plate angle is not set to 0 actually, however.)
- In short, swash plate angle α is in proportion to the pump discharge.



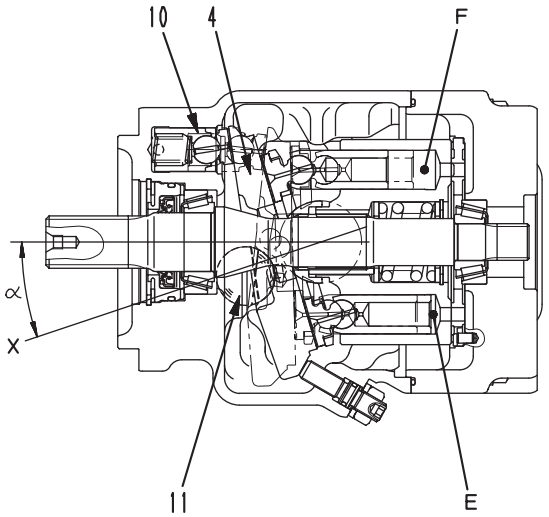
9JG01454



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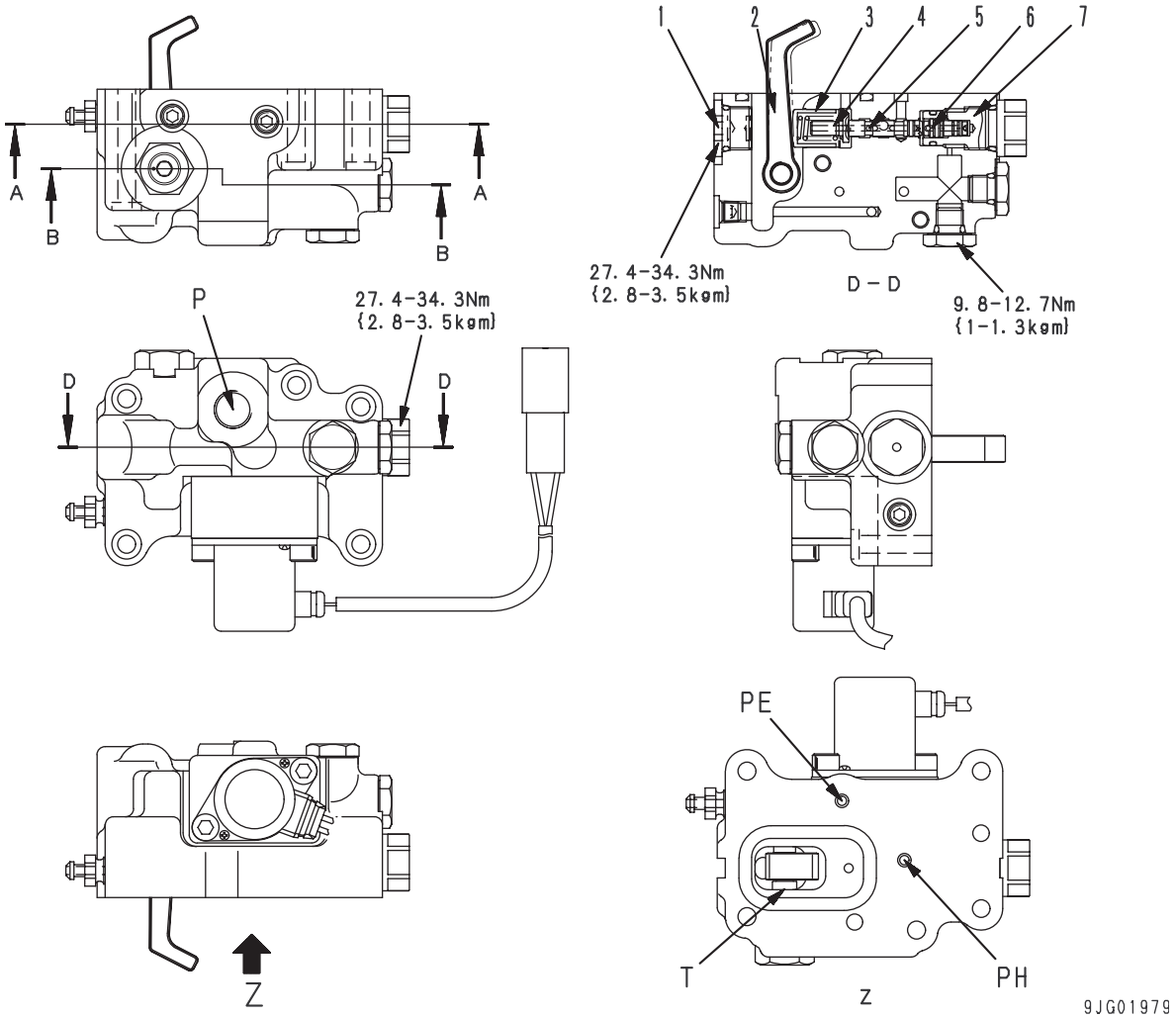
2. Control of discharge

- If swash plate angle α is increased, the difference between volumes **E** and **F** is increased, and so discharge **Q** is increased. Swash plate angle α is changed with servo piston (10).
- Servo piston (10) reciprocates straight according to the signal pressure of the servo valve. This straight motion is transmitted to rocker cam (4). Then, rocker cam (4) supported on ball (11) slides around ball (11).



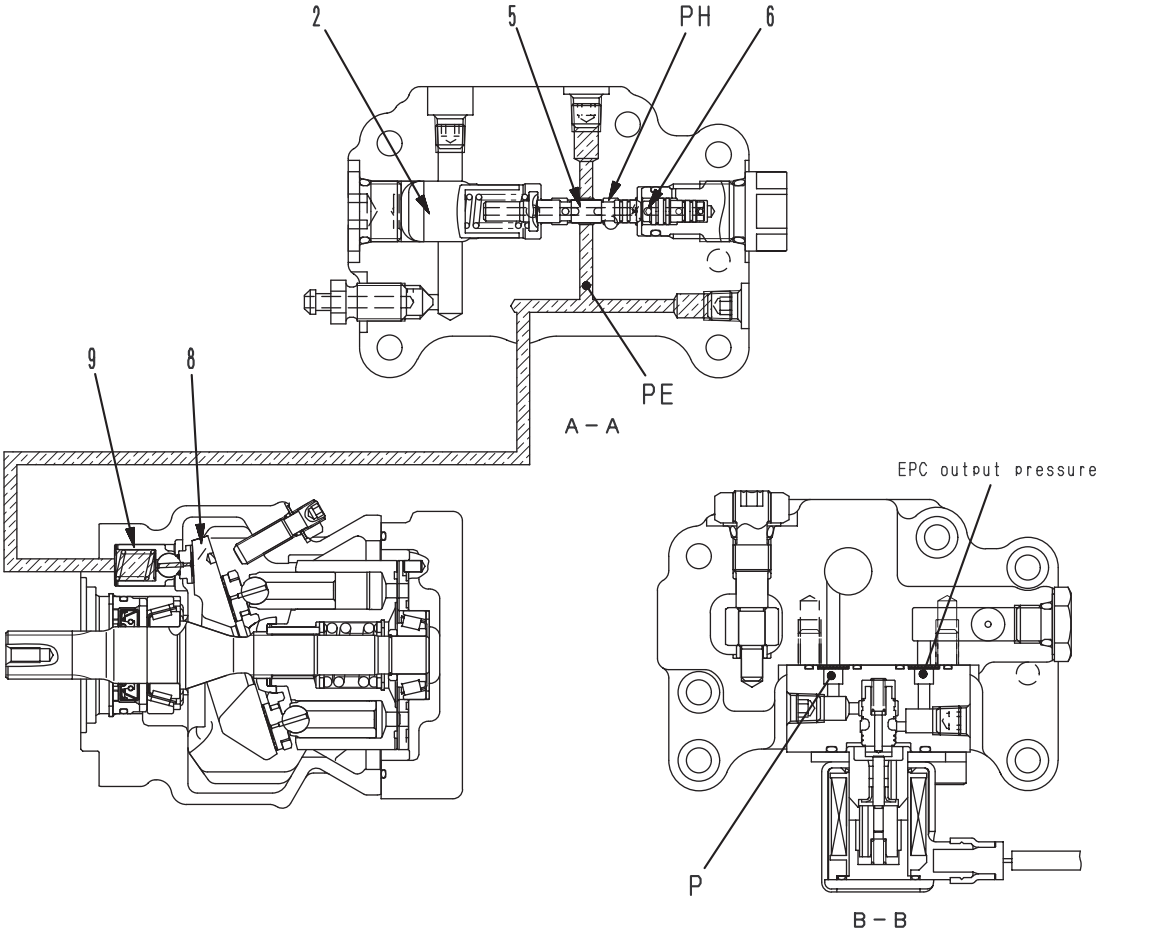
9JG01456

Servo valve



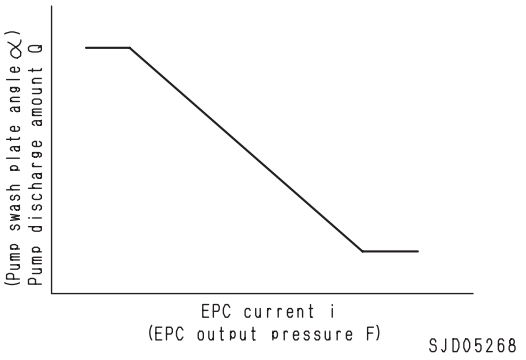
P : EPC valve basic pressure
T : Drain
PE : Control piston pressure
PH : Pump discharge pressure

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

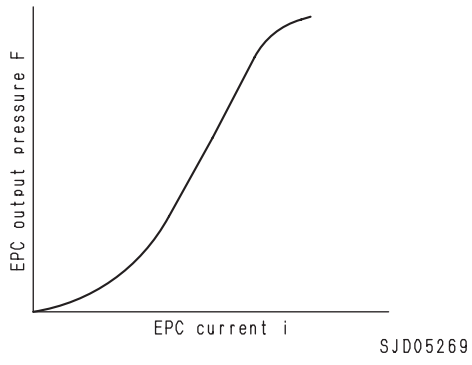


Function

- The servo valve controls the current input to the EPC valve and the swash plate angle of the pump so that they will be related as shown in the figure below.



- The relationship between the input current to the EPC valve and the output pressure of EPC valve **F** is as follows.

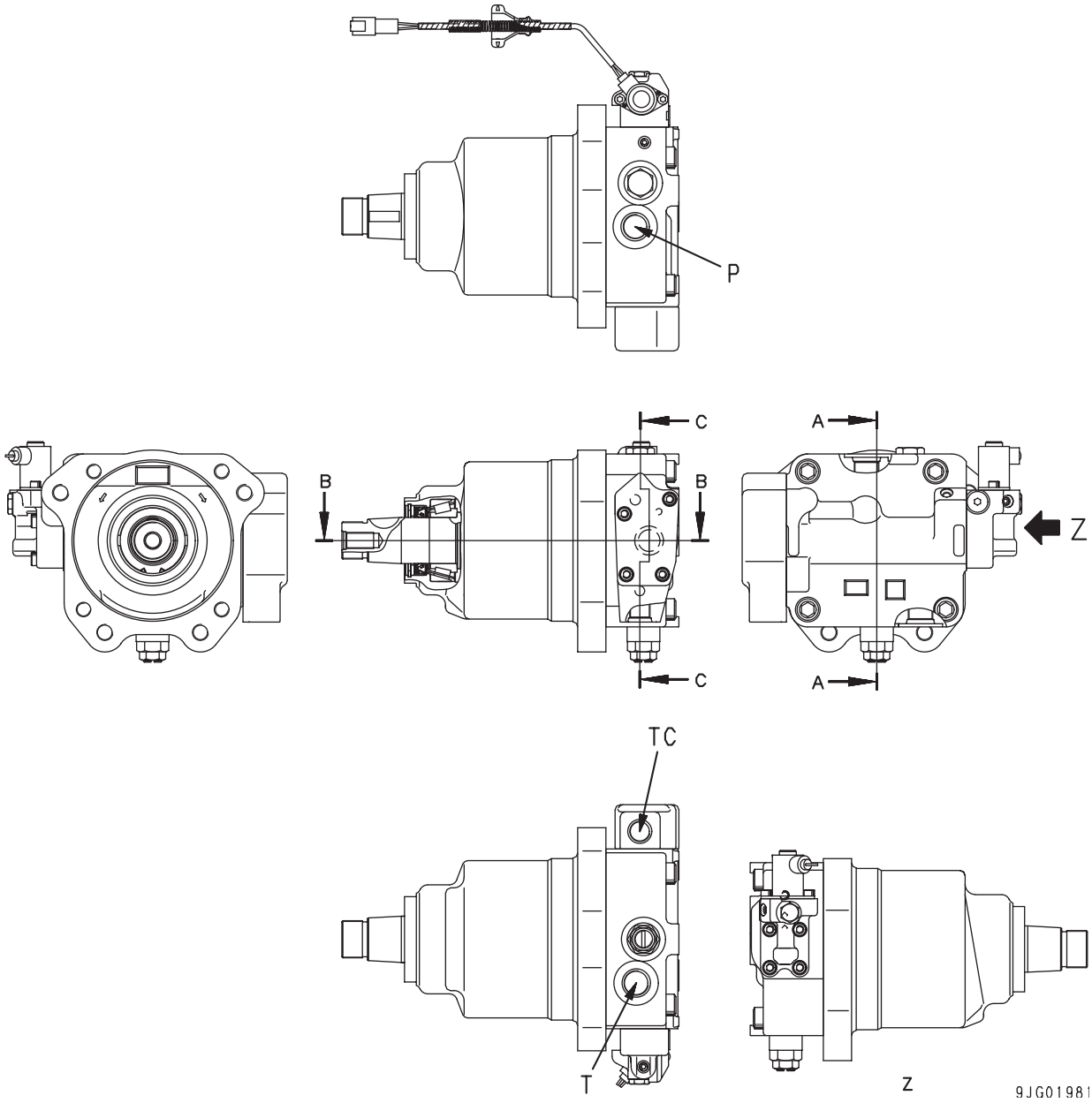


Operation

- The output pressure of the EPC valve is applied to the piston chamber to push piston (6). Piston (6) pushes spool (5) until it is balanced with the spring.
- Then, the land of the servo piston pressure passage is connected to the pump discharge passages by the cut of spool (5) and the discharge pressure is led to the servo piston.
- The servo piston is raised by the rocker cam. The position feedback is applied and the lever moves to compress the spring.
- If spool (5) is pushed back, the pump discharge circuit and the servo piston circuit are shut off.
- The pressure in the servo piston chamber lowers and the rocker cam returns toward the maximum swash plate angle.
- These processes are repeated until the swash plate is fixed to a position where the EPC output pressure is balanced with the spring force.
- Accordingly as the EPC output pressure is heightened, the swash plate angle is decreased. As the EPC output pressure is lowered, the swash plate angle is increased.

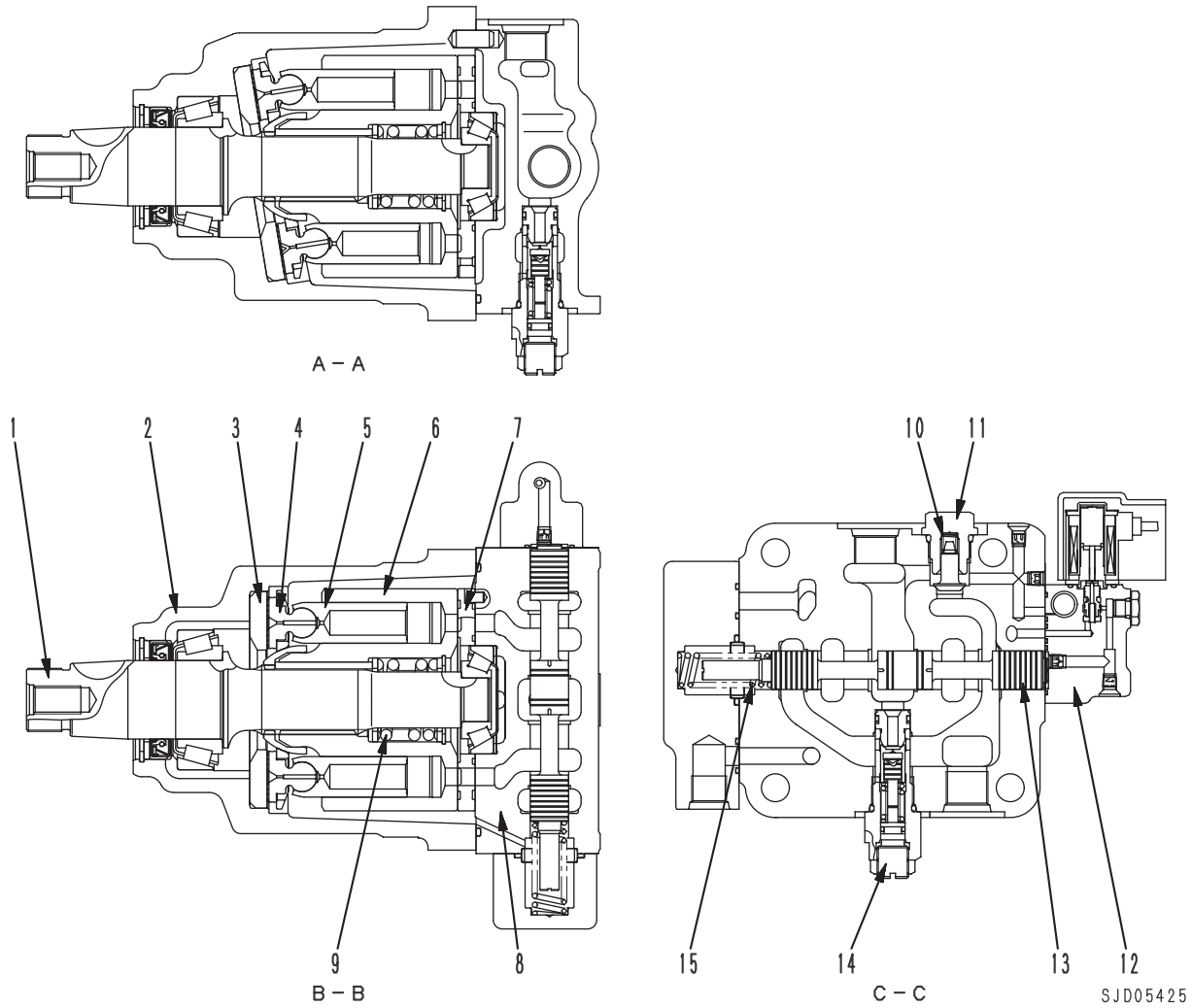
Cooling fan motor

Type: LMF110



P : From fan pump
TC : To tank
T : From oil cooler to tank

Specifications
Type: LMF110
Capacity: 110.7 cm^3/rev
Rated speed: 1,050 rpm
Rated flow rate: 120 ℓ/min
Cracking pressure of check valve:
76.5 kPa {0.78 kg/cm^2}
Cracking pressure of safety valve:
24.5 MPa {250 kg/cm^2}



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. Reversible valve spool
14. Safety valve
15. Reversible valve spring

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
10	Check valve spring	Free length × OD	Installed length	Installed load	Free length	Installed load	Replace spring if there is damage or deformation
		16.4 × 8.9	11.5	13.72 N {1.4 kg}	—	10.29 N {1.05 kg}	

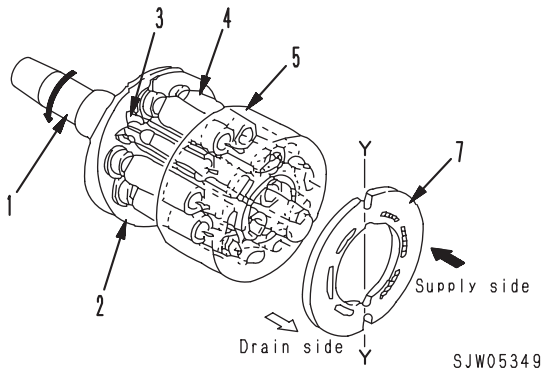
1. Hydraulic motor unit

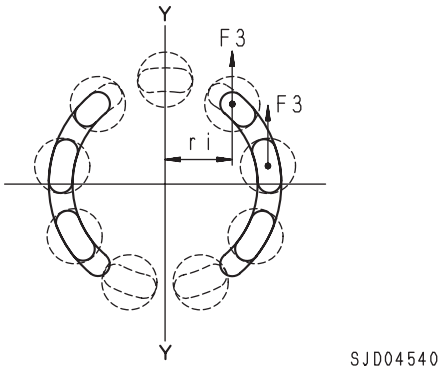
Function

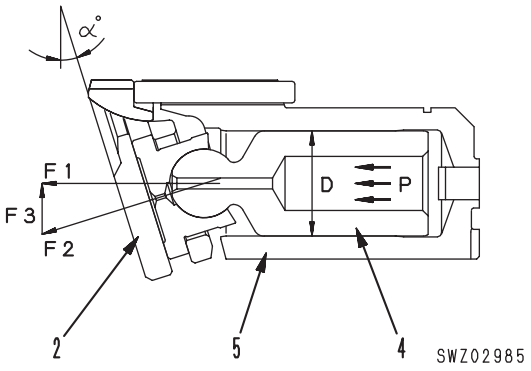
- This hydraulic motor is called a swash plate type axial piston motor. It converts the energy of the pressurized oil sent from the hydraulic pump into rotary motion.

Principle of operation

- The oil sent from the hydraulic pump flows through valve plate (7) into cylinder block (5). This oil can flow on supply 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 supply side of cylinder block (5) presses pistons (4) (4 or 5 pieces) and generates force **F1**(**F1** kg **= P** kg/cm^2 x π/4**D2** cm^2).
- This force is applied to thrust plate (2).
- Since thrust plate (2) is fixed to the angle of α degrees to 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 cylinder block (5) through the piston.
- Since cylinder block (5) is coupled with the output shaft by means of spline, the output shaft revolves to transmit the torque.







2. Suction valve

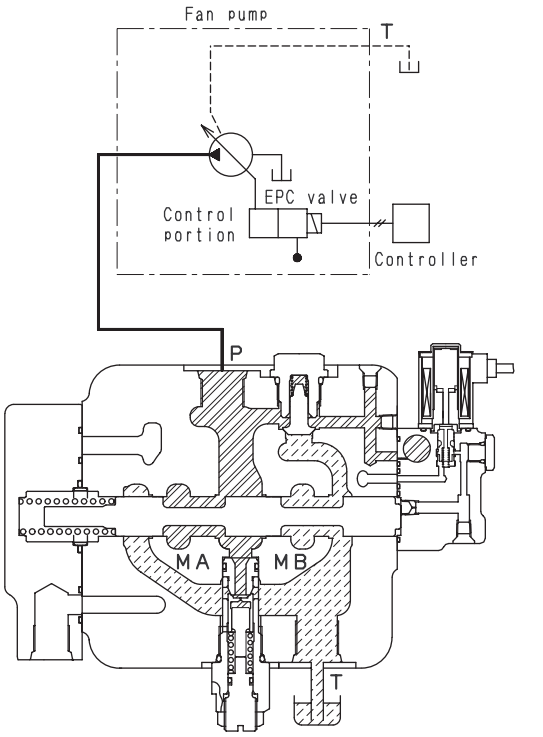
Function

- 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

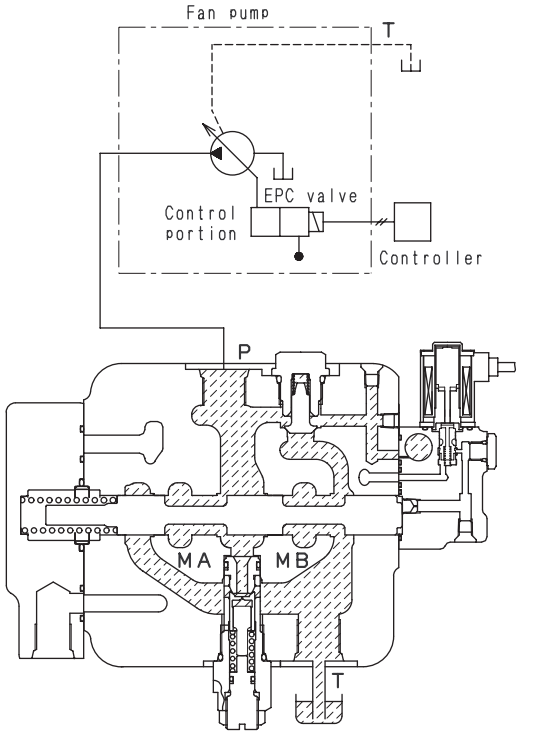
- If the hydraulic oil from the pump is supplied to port **P** and the pressure on **MA** side rises and starting torque is generated in the motor, the motor starts revolution. The oil on outlet **MB** side of the motor returns through port **T** to the tank.



SJD05426

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** anymore. As the hydraulic oil is not supplied to **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 port **P** is reducing, the oil in port **T** on the outlet side is sent by the suction valve to **MA** side to prevent cavitation.

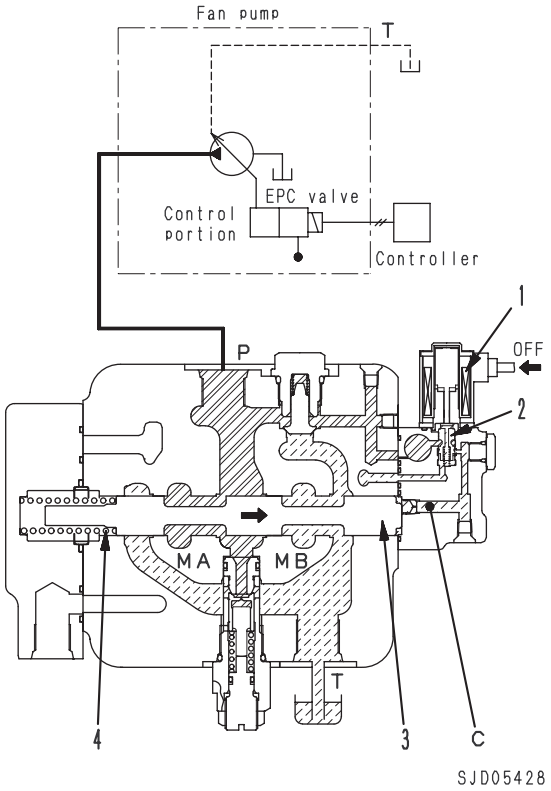


SJD05427

3. Operation of reversible valve

1) When ON-OFF solenoid for reversible valve is turned OFF

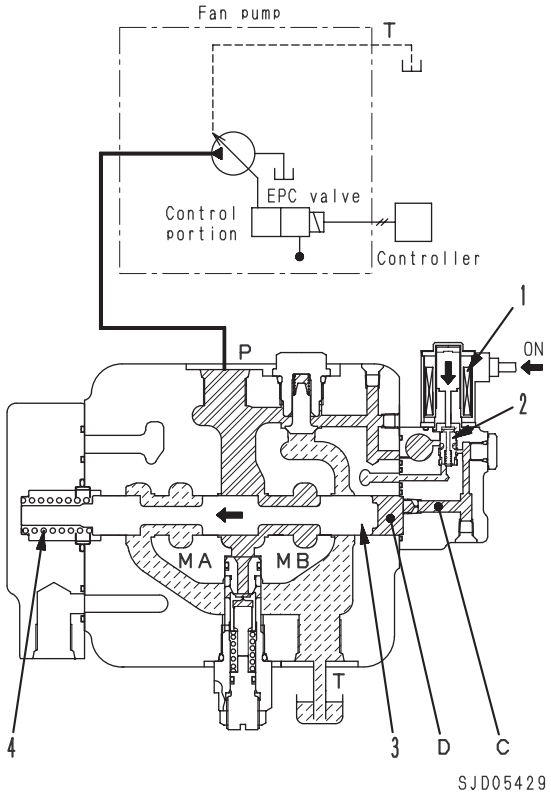
- If ON-OFF solenoid (1) for reversible valve is turned "OFF", the hydraulic oil from the pump is blocked by ON-OFF reversible valve (2) and port **C** is connected to the tank circuit.
- Accordingly, reversible valve spool (3) is pushed by reversible valve spool spring (4) to the right to open motor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



SJD05428

2) When ON-OFF solenoid for reversible valve is turned ON

- If ON-OFF solenoid (1) for reversible valve is turned "ON", ON-OFF reversible 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 reversible valve spool (3) to the left against reversible valve spool spring (4).
  As a result, motor port **MB** opens and the hydraulic oil flows in to revolve the motor in reverse (counterclockwise).

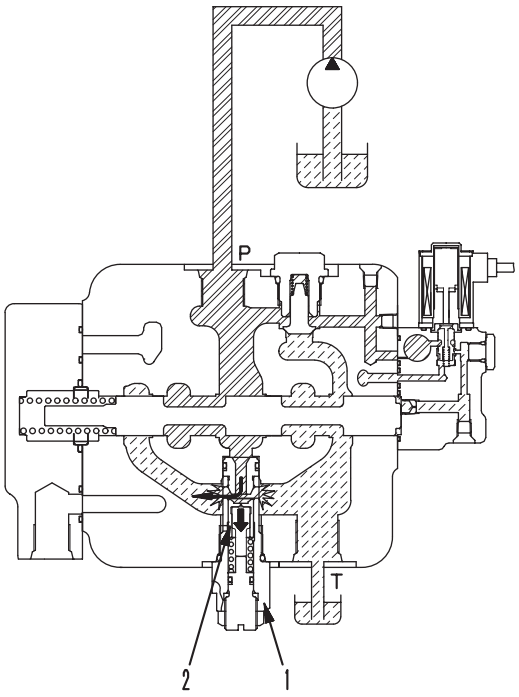


SJD05429

4. Safety valve

Function
- When the engine is started, the pressure in port **P** of the fan motor is heightened in some cases.
- Safety valve (1) is installed to protect the fan system circuit.

Operation
- If the pressure in port **P** rises above the cracking pressure of safety valve (1), valve (2) of safety valve (1) opens to release the hydraulic oil into port **T**.
- By this operation, generation of abnormal pressure in port **P** is prevented.



SJD05430

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00383-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

10 Structure, function and maintenance standard

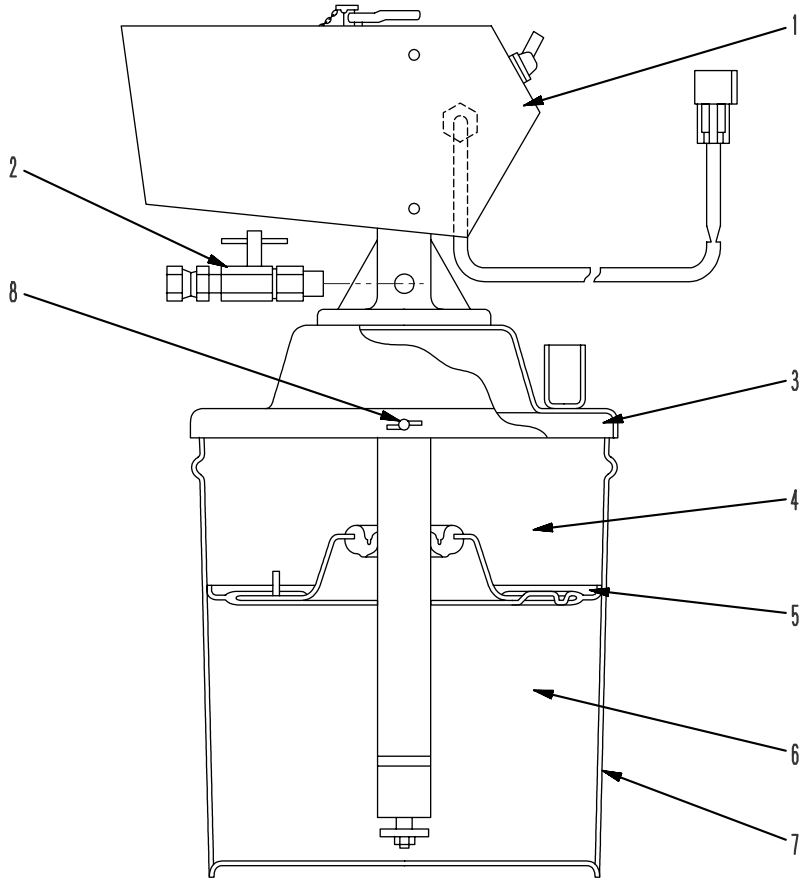
Hydraulic system, Part 2

Hydraulic system, Part 2
- Motor grease pump ... 3
- Return oil filter ... 4
- Line oil filter ... 5
- Drain oil filter ... 6
- L.H. 5-Spool control valve ... 8
- R.H. 4-Spool control valve ... 14
- Straight-travel valve ... 21
- Swing motor ... 24
- Center swivel joint ... 29
- Travel motor ... 30
- PPC accumulator ... 40
- Work equipment, swing PPC valve ... 41
- Travel PPC valve ... 46

Solenoid valve 50
Hydraulic cylinder 56

Hydraulic system, Part 2

Motor grease pump



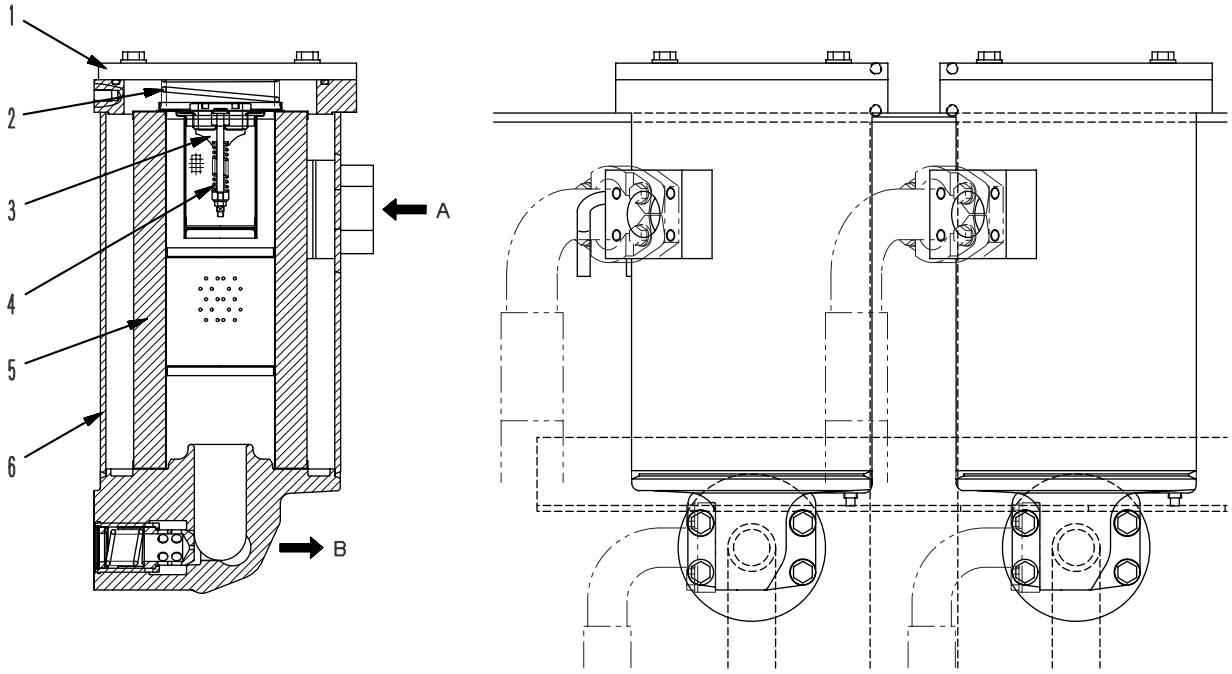
SWP08596

1. Motor grease pump unit
2. Valve
3. Cover
4. Air chamber
5. Follower plate
6. Grease chamber
7. Grease tank
8. Wing nut

Function

- The pump unit is divided into air chamber (4) and grease chamber (6). As the grease level in grease chamber (6) lowers, follower plate (5) is pulled down to push down the grease sticking to the rim of grease chamber (6).

Return oil filter



9JG00319

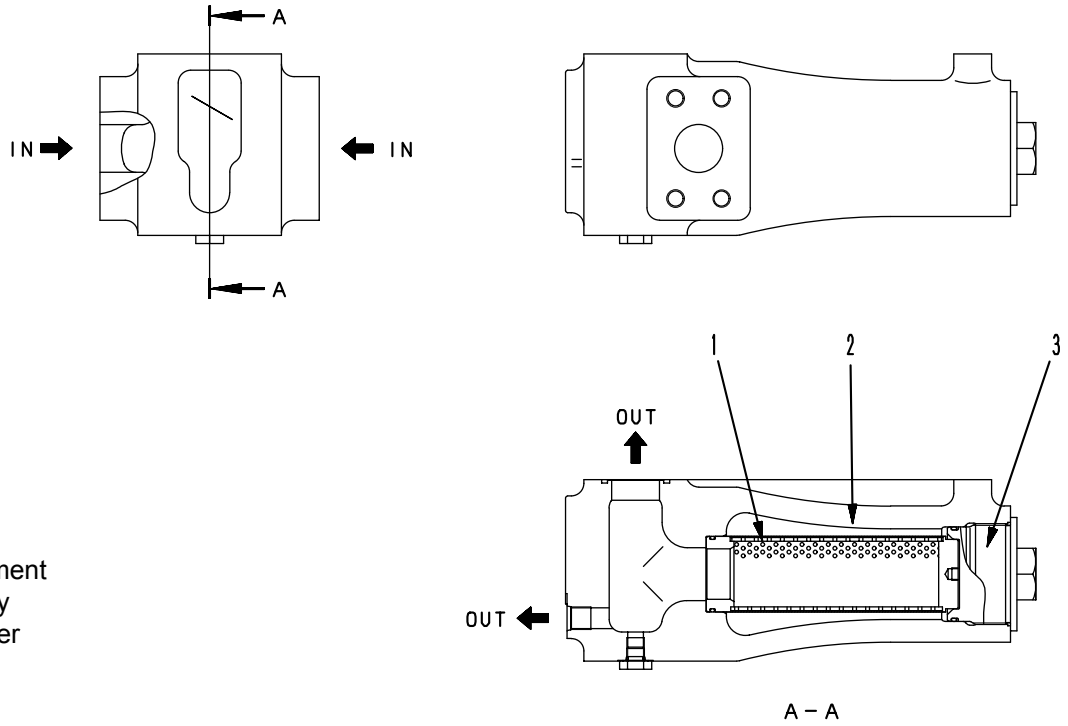
1. Cover
2. Spring
3. Bypass valve
4. Bypass valve spring
5. Element
6. Housing

A. From control valve
B. To hydraulic tank

Outline
There are two return oil filters installed to the rear face of the hydraulic tank. They remove the dirt and dust in the return oil.

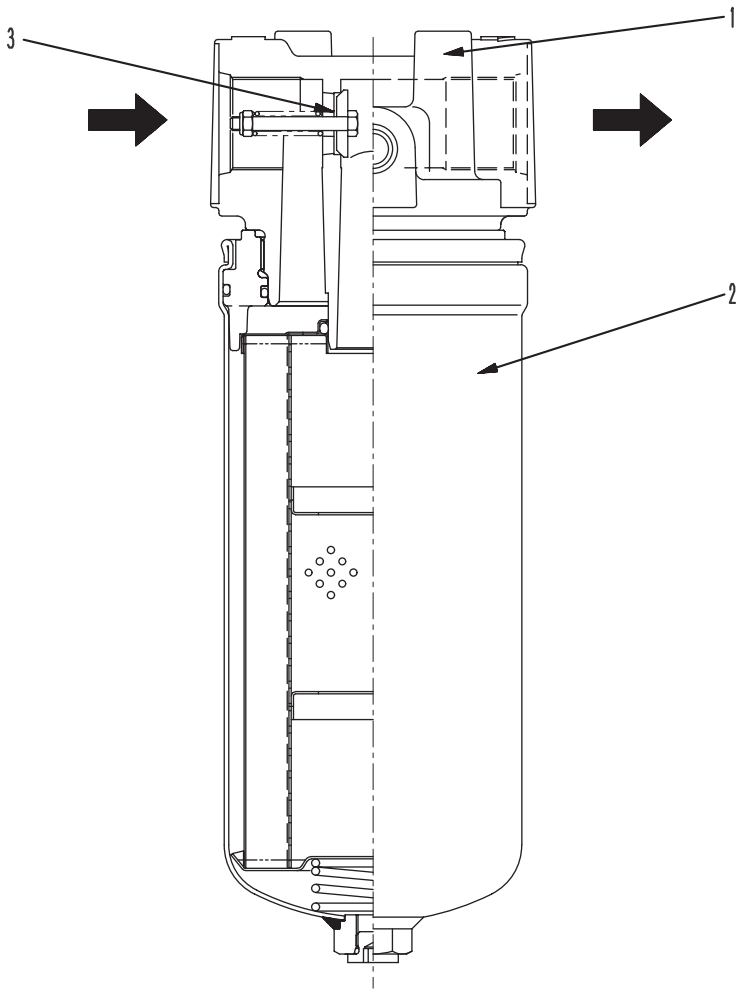
Specifications
- Bypass valve set pressure:
  0.15 ± 0.03 MPa {1.5 ± 0.3 kg/cm^2}

Line oil filter



1. Element
2. Body
3. Cover

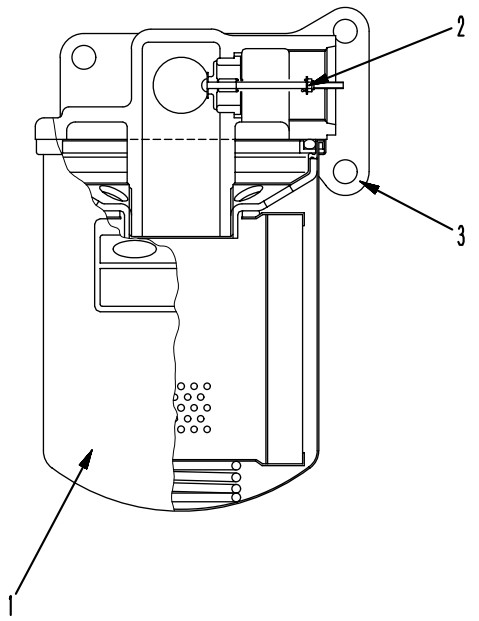
9JG00320



1. Bracket
2. Cartridge
3. Safety valve

9JG02172

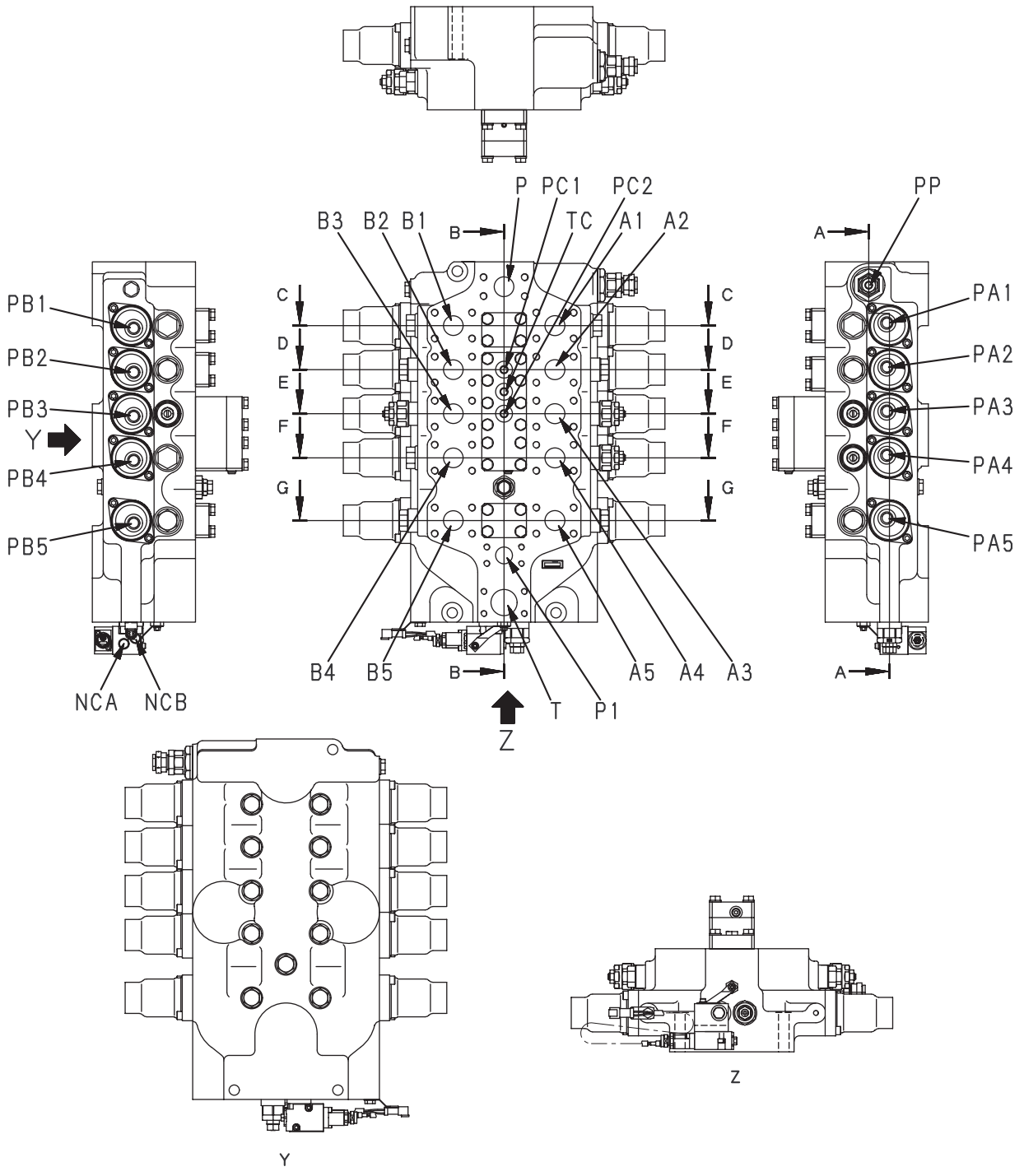
Drain oil filter

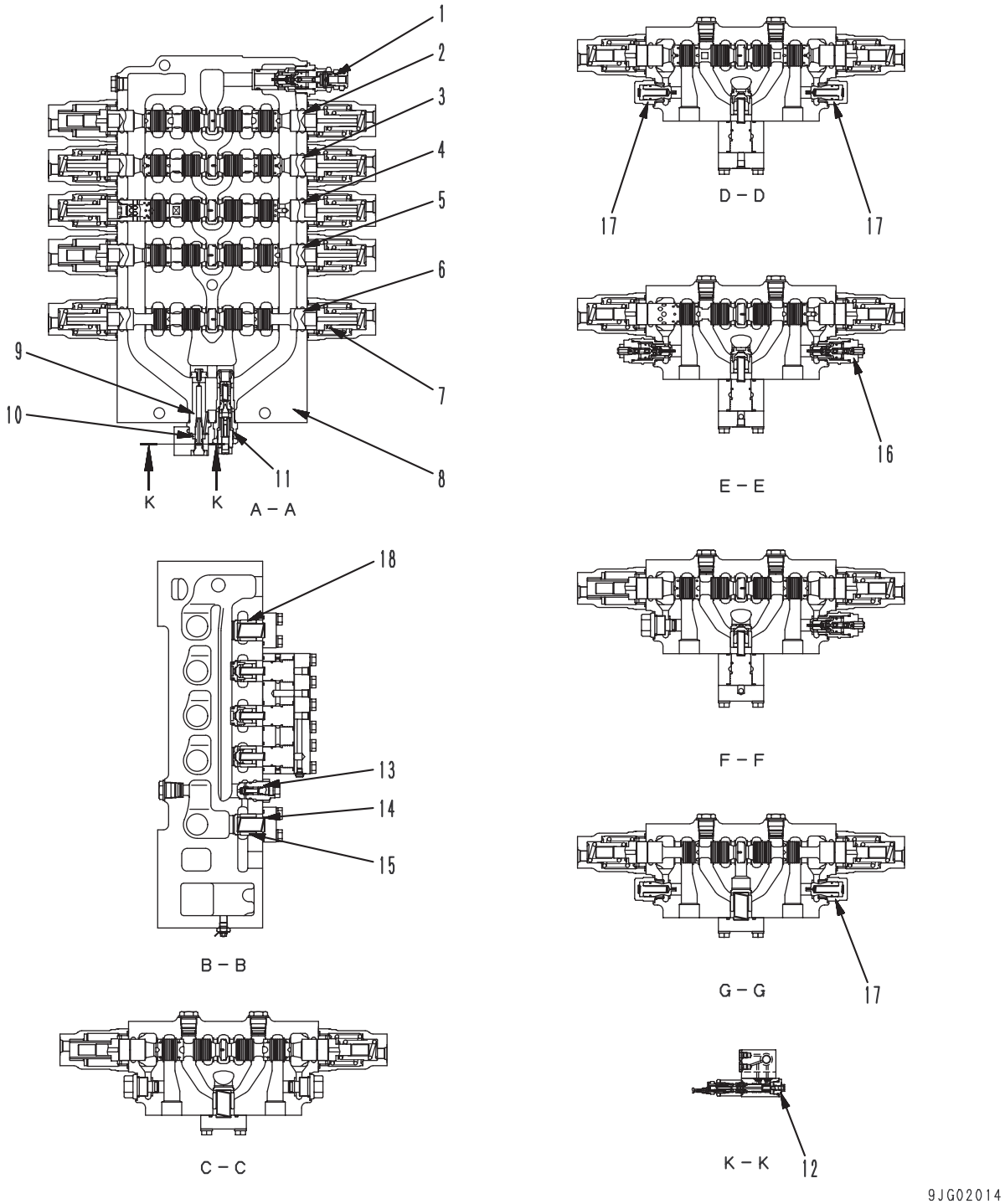


1. Cartridge
2. Safety valve
3. Bracket

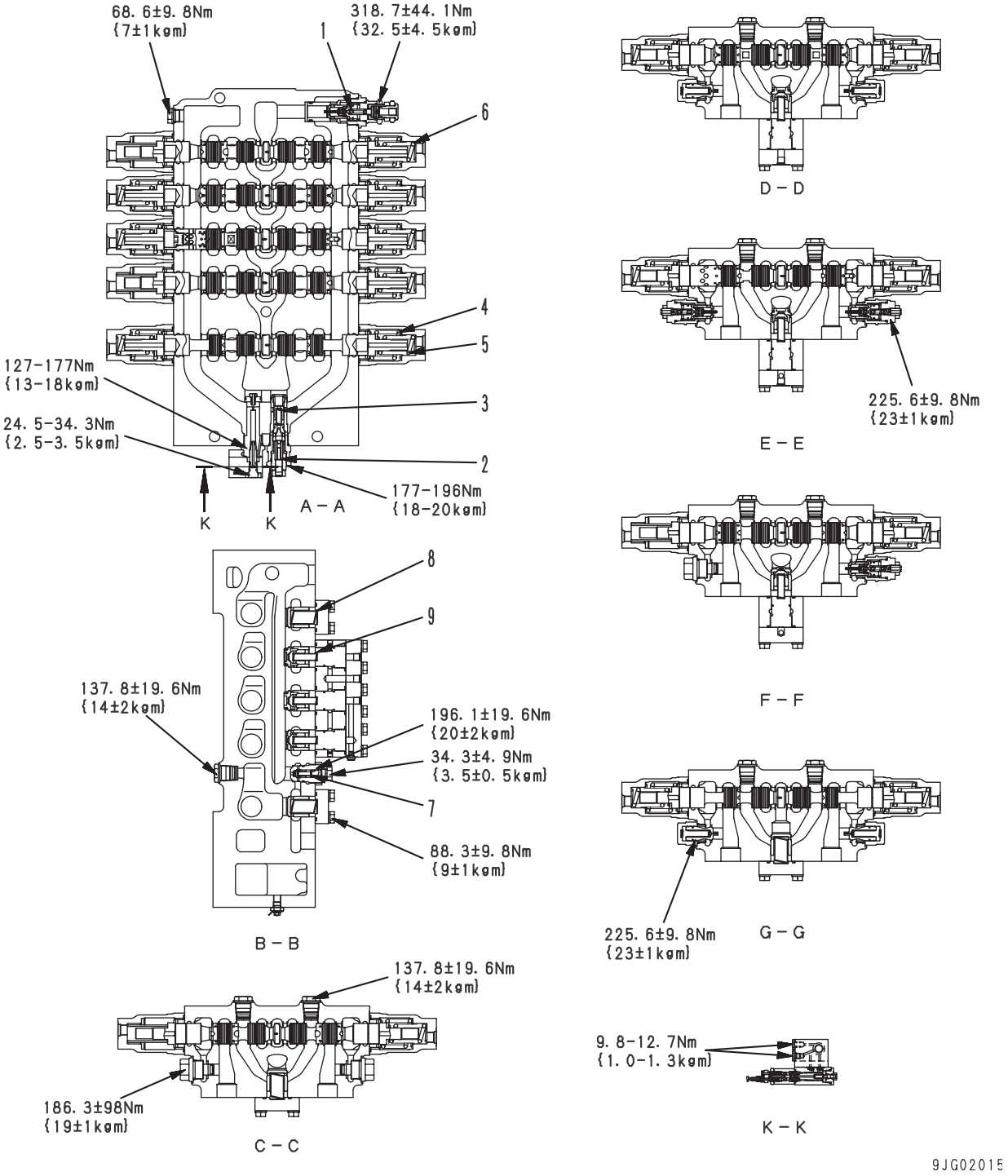
L.H. 5-Spool control valve

P : From front pump
T : To tank (Main drain)
A1 : To boom cylinder bottom
A2 : To swing motor port MA (Swing RIGHT)
A3 : To arm cylinder bottom
A4 : To bucket cylinder bottom
A5 : To travel motor (Left travel port P2)
B1 : Plug
B2 : To swing motor (Port MB)
B3 : To arm cylinder head
B4 : Plug (Standard machine)
B5 : To travel motor (Left travel port P1)
P1 : Valve (From straight travel valve port P2 of right 4-spool valve)
PP : From straight travel changeover solenoid valve
TC : Drain
PA1 : From PPC valve (Boom LOWER)
PA2 : From PPC valve (Swing LEFT)
PA3 : From PPC valve (Arm OUT)
PA4 : Standard; Bucket DUMP PPC valve or drain
Optional: Optional PPC valve (via shuttle valve)
PA5 : From PPC valve (Left travel FORWARD)
PB1 : From PPC valve (Boom RAISE)
PB2 : From PPC valve (Swing RIGHT)
PB3 : From PPC valve (Arm IN)
PB4 : From PPC valve (Bucket CURL)
PB5 : From PPC valve (Left travel REVERSE)
PC1 : From pilot valve (Port A2)
PC2 : From pilot valve (Port A1)
NCA : J/S upstream pressure pick-up port
NCB : J/S downstream pressure pick-up port


P PC1 PC2
B3 B2 B1
TC A1 A2
B
PP
A
PA1
PA2
PA3
PA4
PA5
PB1
PB2
PB3
Y
PB4
PB5
C
D
E
F
G
B4 B5
A5 A4 A3
T P1
Z
NCA NCB
Y
Z
9JG02013



1. Main relief valve
2. Spool (boom Hi)
3. Spool (swing)
4. Spool (arm Lo)
5. Spool (bucket Hi)
6. Spool (L.H. travel)
7. Spool return spring
8. Valve body
9. Jet sensor orifice
10. Jet sensor mounting bracket
11. Jet sensor relief valve
12. Jet sensor differential pressure sensor
13. Throttle valve
14. Check valve spring
15. Check valve
16. Suction-safety valve
17. Suction valve
18. Check valve with orifice

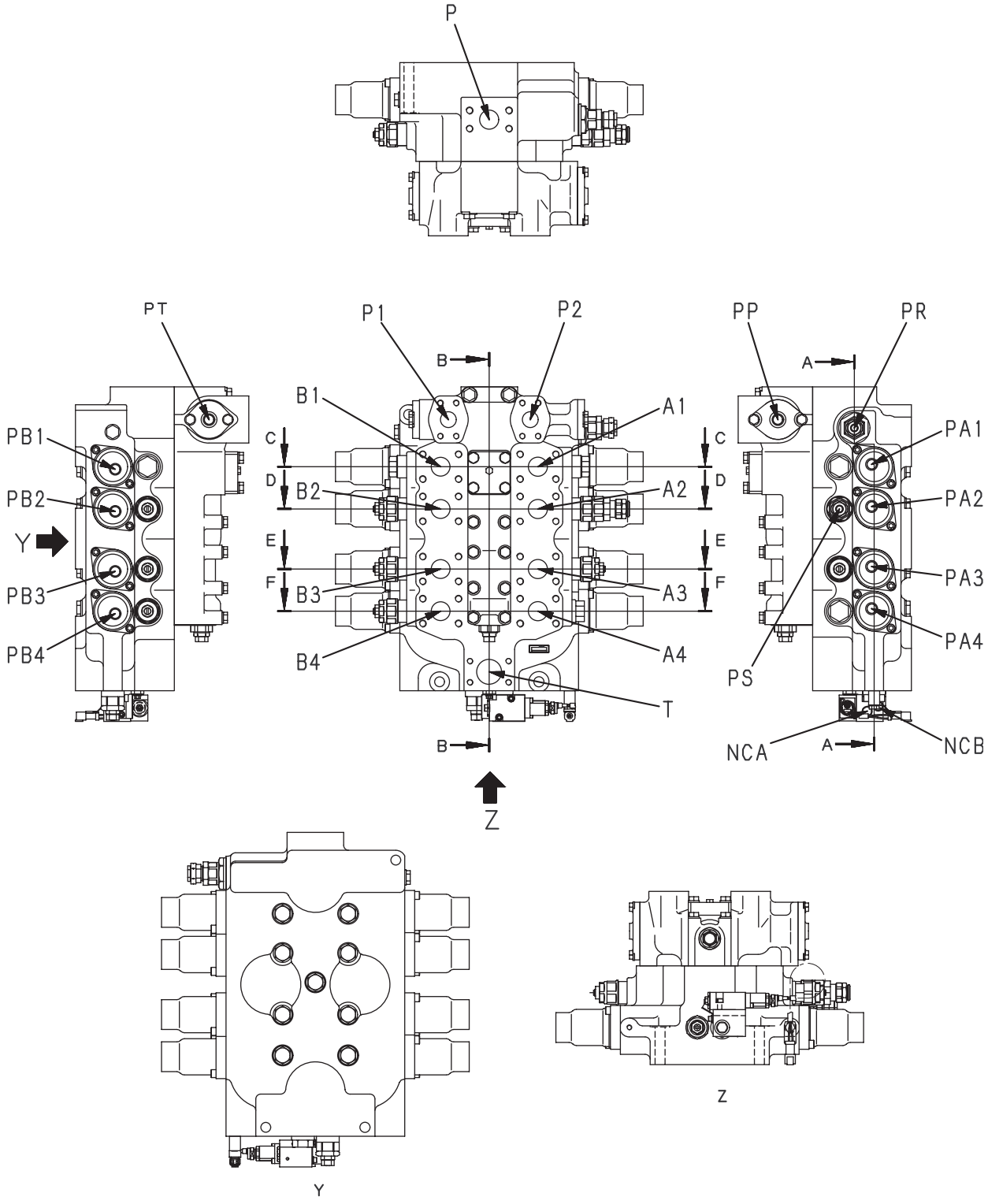

68. 6±9. 8Nm
{7±1kgm}
318. 7±44. 1Nm
{32. 5±4. 5kgm}
1
6
4
5
3
2
127-177Nm
{13-18kgm}
24. 5-34. 3Nm
{2. 5-3. 5kgm}
177-196Nm
{18-20kgm}
K
K
A - A
8
9
137. 8±19. 6Nm
{14±2kgm}
196. 1±19. 6Nm
{20±2kgm}
34. 3±4. 9Nm
{3. 5±0. 5kgm}
7
88. 3±9. 8Nm
{9±1kgm}
B - B
137. 8±19. 6Nm
{14±2kgm}
186. 3±98Nm
{19±1kgm}
C - C
D - D
225. 6±9. 8Nm
{23±1kgm}
E - E
F - F
225. 6±9. 8Nm
{23±1kgm}
G - G
9. 8-12. 7Nm
{1. 0-1. 3kgm}
K - K
9JG02015

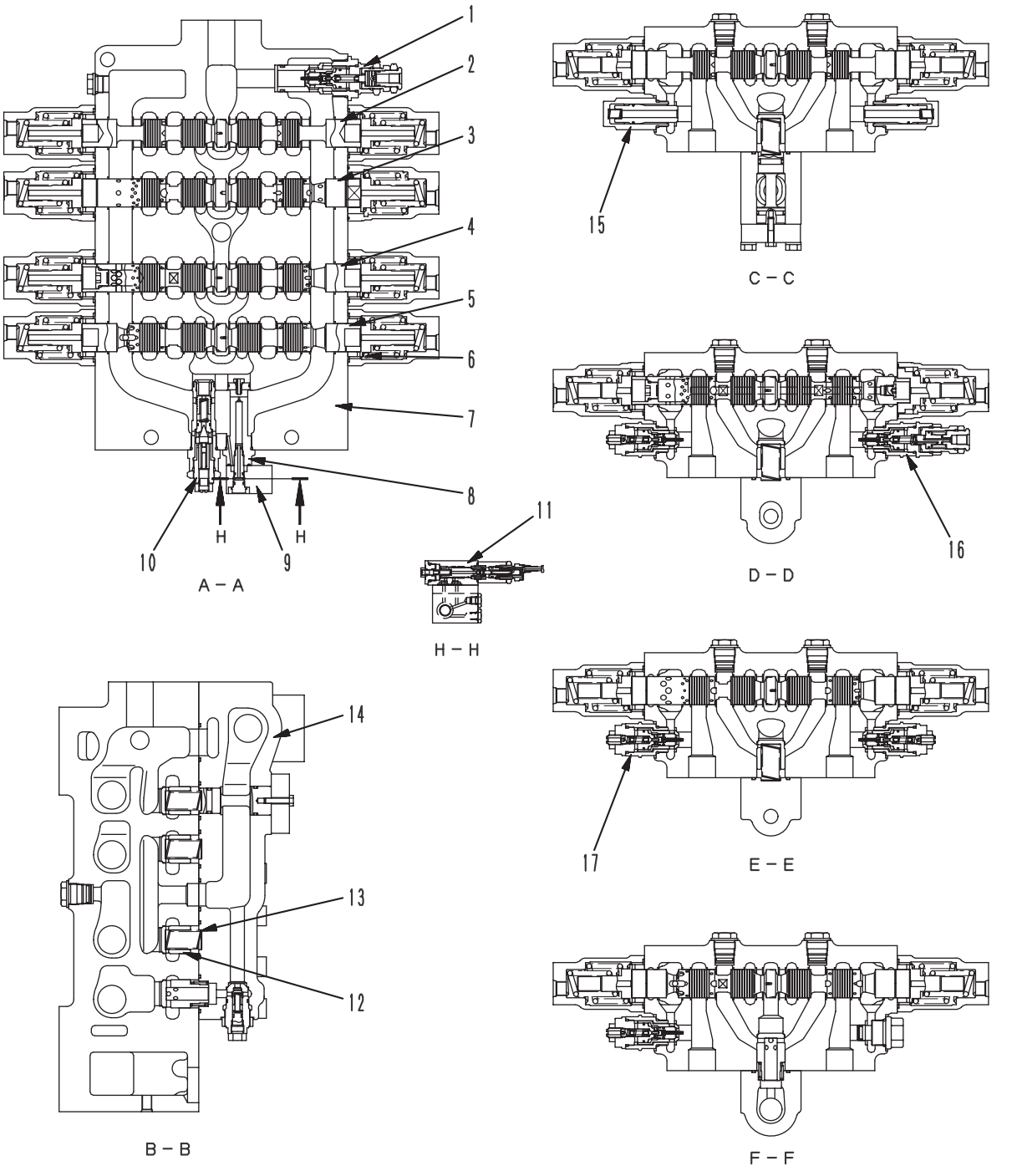
Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
1	Main relief valve, main valve spring	Free length × OD	Installation length	Installation load	Free length	Installation load	
		34.7 × 10.1	32.5	394.2 N {40.2 kg}	—	315.2 N {32.2 kg}	
2	Jet sensor relief valve, pilot poppet spring	34.5 × 8.8	29.4	30 N {3.1 kg}	—	24.3 N {2.5 kg}	
3	Jet sensor relief valve, main valve spring	37.4 × 11.4	33	49 N {5.0 kg}	—	39.2 N {4.0 kg}	
4	Spool return spring	69.9 × 57	63	431 N {44 kg}	—	345 N {35.2 kg}	Replace spring if damaged or deformed
5	Spool return spring (travel)	75 × 37	74.5	0 N {0 kg}	—	0 N {0 kg}	
6	Spool return spring (excl. travel)	74.5 × 38.1	74.5	0 N {0 kg}	—	0 N {0 kg}	
7	Throttle valve spring	31.8 × 7.6	26.5	1 N {0.1 kg}	—	0.78 N {0.08 kg}	
8	Check valve spring	78.2 × 26.6	52	18.8 N {1.92 kg}	—	15.1 N {1.54 kg}	
9	Check valve spring (throttle valve)	65.3 × 14	46	18.8 N {1.92 kg}	—	15.1 N {1.54 kg}	

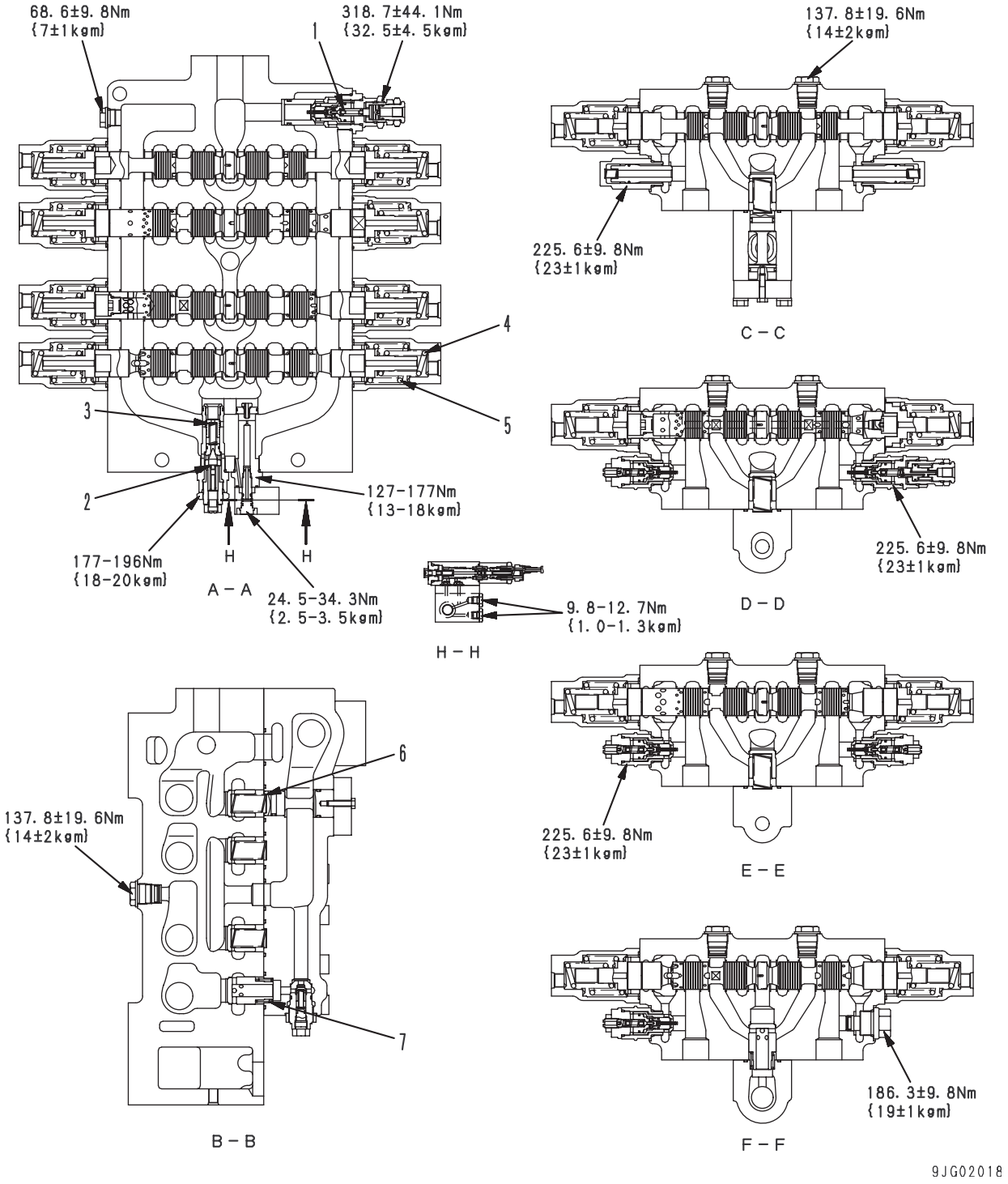
R.H. 4-Spool control valve

P : From rear pump
T : To tank
A1 : To travel motor (Right travel port P1)
A2 : To boom cylinder head
A3 : To bucket cylinder bottom
A4 : To arm cylinder head
B1 : To travel motor (Right travel port P2)
B2 : To boom cylinder bottom
B3 : To bucket cylinder head
B4 : To arm cylinder bottom
P1 : From front pump
P2 : To left 5-spool valve port P1
PP : From straight travel changeover solenoid valve
PR : From 2-stage main relief valve changeover solenoid valve
PS : From 2-stage safety valve changeover solenoid valve
PT : Drain
PA1 : From PPC valve (Right travel FORWARD)
PA2 : From PPC valve (Boom RAISE)
PA3 : From PPC valve (Bucket DUMP)
PA4 : From PPC valve (Arm IN)
PB1 : From PPC valve (Right travel REVERSE)
PB2 : From PPC valve (Boom LOWER)
PB3 : From PPC valve (Bucket CURL)
PB4 : From PPC valve (Arm OUT)
NCA : J/S upstream pressure pick-up port
NCB : J/S downstream pressure pick-up port


P
PT
P1
P2
PP
PR
B
A
B1
A1
PB1
C
C
PA1
D
B2
A2
D
PB2
PA2
Y
E
E
PA3
F
B3
A3
F
PB3
PA4
B4
A4
PS
PB4
T
B
A
NCA
NCB
Z
Y
Z
9JG02016



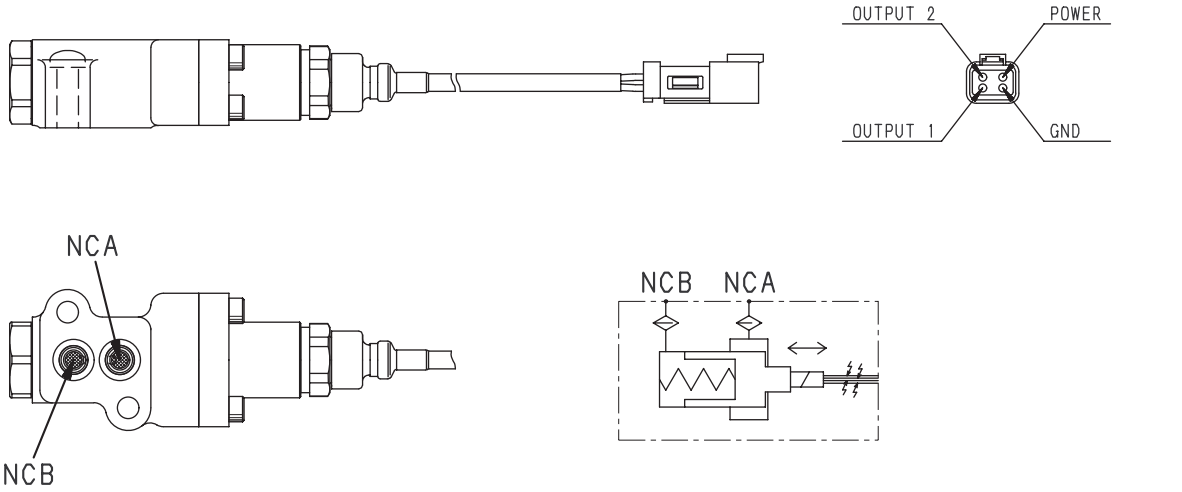
1. Main relief valve
2. Spool (R.H. travel)
3. Spool (boom Lo)
4. Spool (bucket Lo)
5. Spool (arm Hi)
6. Spool return spring
7. Valve body
8. Jet sensor orifice
9. Jet sensor mounting bracket
10. Jet sensor relief valve
11. Jet sensor differential pressure sensor
12. Check valve
13. Check valve spring
14. Straight-travel valve
15. Suction valve
16. Suction-safety valve
17. Suction-safety valve


68. 6±9. 8Nm
{7±1kgm}
318. 7±44. 1Nm
{32. 5±4. 5kgm}
1
4
5
3
2
127-177Nm
{13-18kgm}
177-196Nm
{18-20kgm}
H
H
A – A
24. 5-34. 3Nm
{2. 5-3. 5kgm}
137. 8±19. 6Nm
{14±2kgm}
225. 6±9. 8Nm
{23±1kgm}
C – C
225. 6±9. 8Nm
{23±1kgm}
D – D
9. 8-12. 7Nm
{1. 0-1. 3kgm}
H – H
6
137. 8±19. 6Nm
{14±2kgm}
7
B – B
225. 6±9. 8Nm
{23±1kgm}
E – E
186. 3±9. 8Nm
{19±1kgm}
F – F
9JG02018

Unit: mm

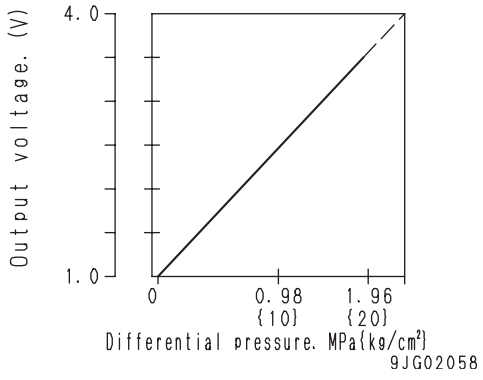
No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
1	Main relief valve, main valve spring	Free length × OD	Installation length	Installation load	Free length	Installation load	
		34.7 × 10.1	32.5	394.2 N {40.2 kg}	—	315.2 N {32.2 kg}	
2	Jet sensor relief valve, pilot poppet spring	34.5 × 8.8	29.4	30 N {3.1 kg}	—	24.3 N {2.5 kg}	
3	Jet sensor relief valve, main valve spring	37.4 × 11.4	33	49 N {5.0 kg}	—	39.2 N {4.0 kg}	Replace spring if damaged or deformed
4	Spool return spring	69.9 × 57	63	431 N {44 kg}	—	345 N {35.2 kg}	
5	Spool return spring (travel)	75 × 37	74.5	0 N {0 kg}	—	0 N {0 kg}	
6	Spool return spring (excl.travel)	74.5 × 38.1	74.5	0 N {0 kg}	—	0 N {0 kg}	
7	Check valve spring	78.2 × 26.6	52	18.8 N {1.92 kg}	—	15.1 N {1.54 kg}	
8	Check valve spring	41.3 × 35.5	25.5	18.8 N {1.92 kg}	—	15.1 N {1.54 kg}	

J/S differential pressure sensor



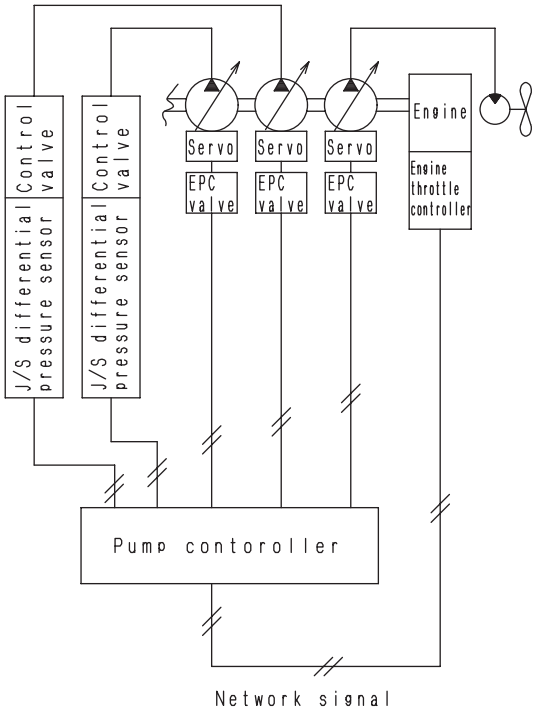
9JG02057

- The J/S differential pressure sensor is installed to the each control valve on right and left sides.
- This sensor senses differential pressure between ports (NCA) and (NCB) and outputs it as a voltage.
- Output is characterized as in the following diagram.



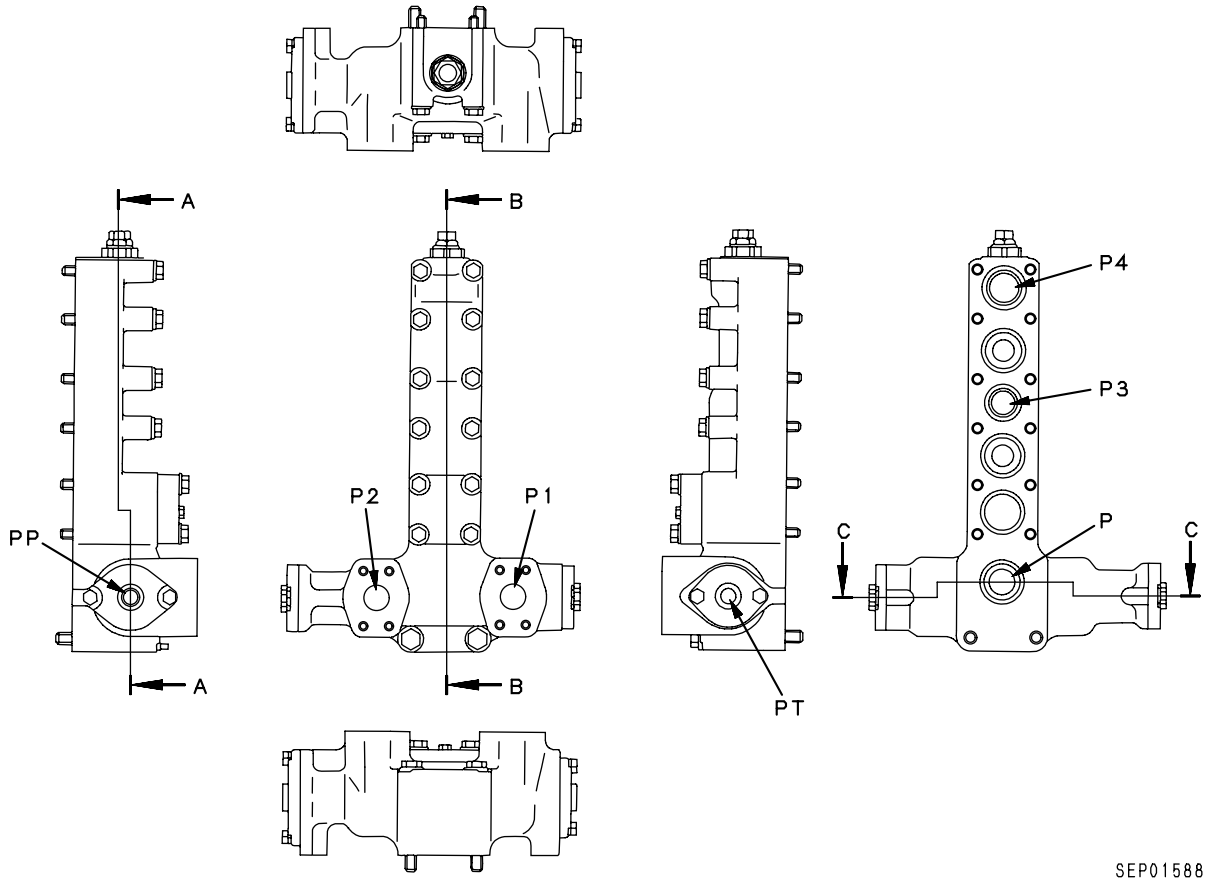
9JG02058

- The pump controller outputs commands to the EPC valve to control the servo piston of the pump according to the outputs of this sensor and other sensors.

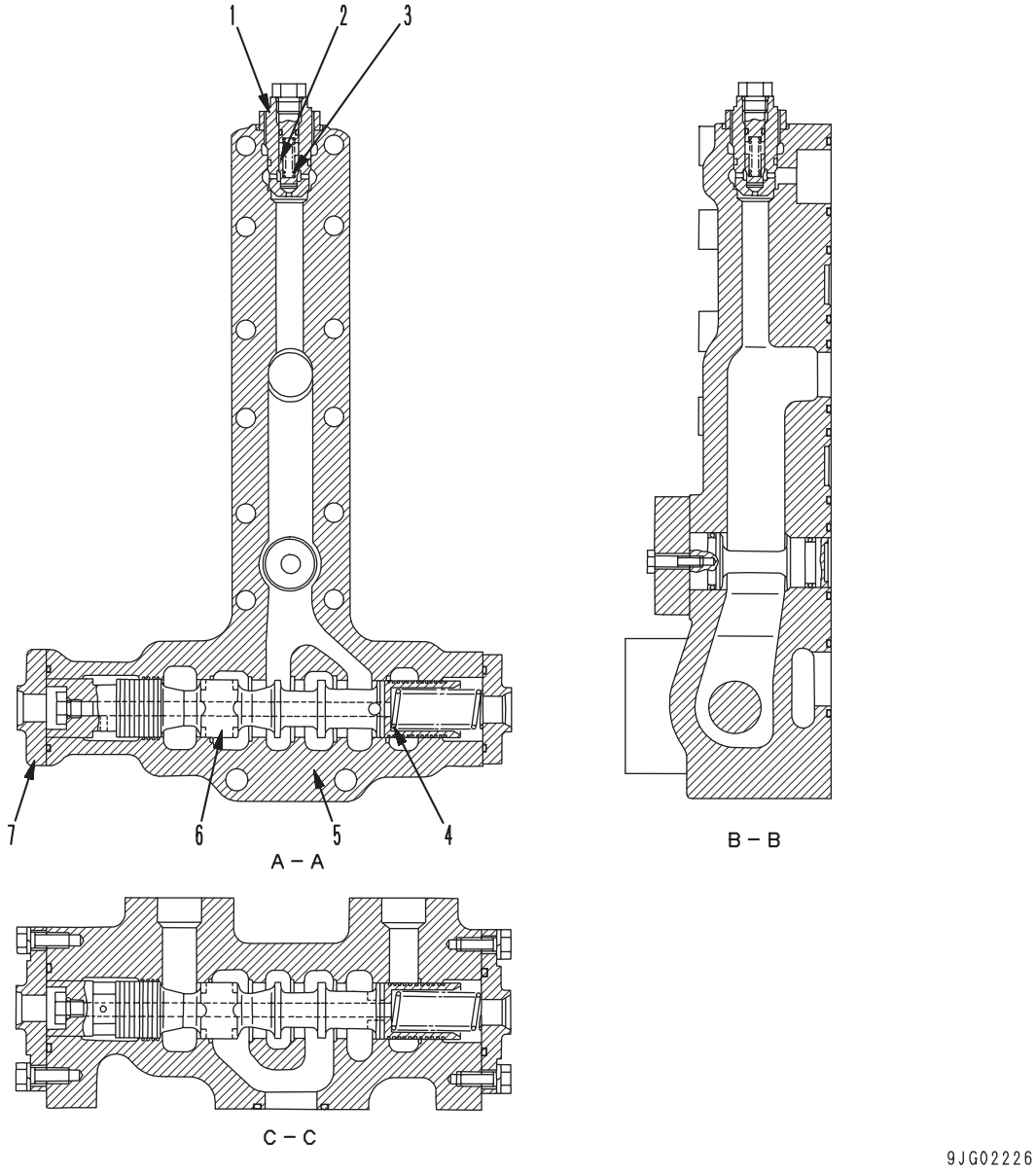


9JG02225

Straight-travel valve



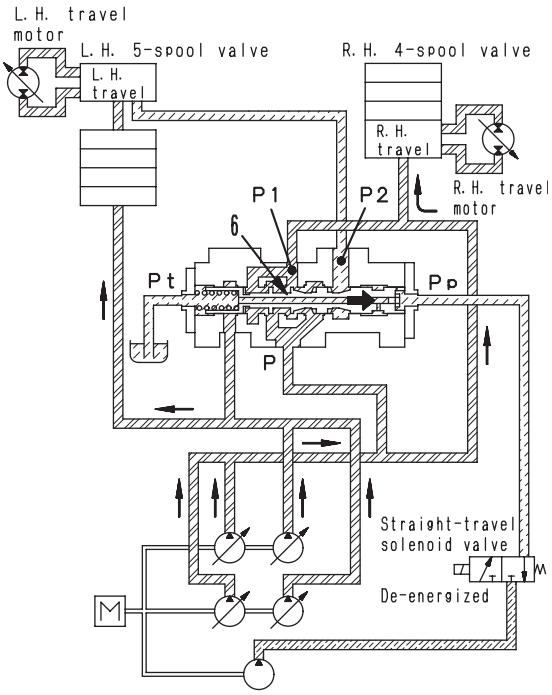
P : From pump (Rear)
PP: From straight travel changeover solenoid valve
PT: Drain
P1: From pump (Front)
P2: To left travel (Left 5-spool control valve)
P3: To bucket and boom
P4: To arm



1. Orifice
2. Check valve
3. Spring
4. Spool return spring
5. Body
6. Spool
7. Cover

Function

- When the travel is operated at the same time as the boom, arm, or bucket, the pressure oil flowing to the left and right travel circuits is divided and sent to the boom, arm, or bucket circuit. If the oil in one travel circuit is divided off, the amount of oil supplied to the travel motor will be less than in the travel circuit which is not divided, so the drop in the supply of oil to the travel motor will cause the machine to deviate.
- To prevent this, the straight-travel valve is switched to interconnect the left and right travel circuits. This ensures that the amount of oil supplied to the left and right travel motors is equal, so the left and right travel motors both rotate at the same speed, and this prevents any travel deviation.



9JG02227

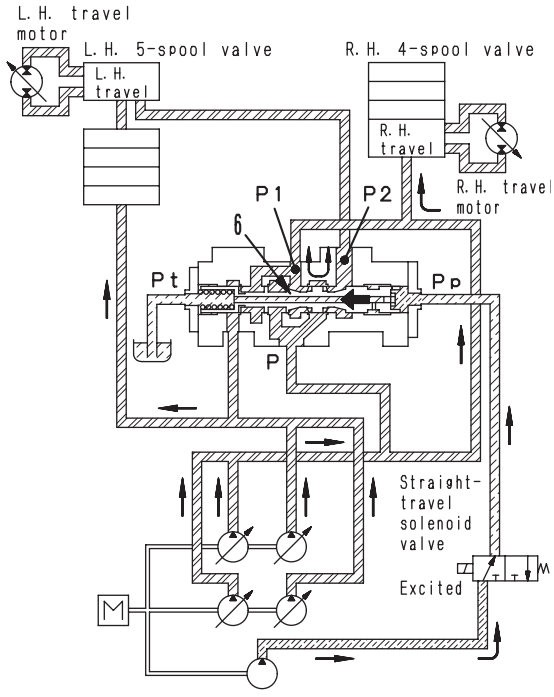
Operation

When travel is operated independently (straight-travel solenoid valve de-energized)

- The straight-travel solenoid valve is de-energized, so no pilot pressure flows, and spool (6) remains pushed to the right.
- Because of this, port **P2** (left travel circuit) and port **P1** (right travel circuit) are not interconnected, and each circuit remains independent.

When travel and work equipment are operated at same time (straight-travel solenoid valve excited)

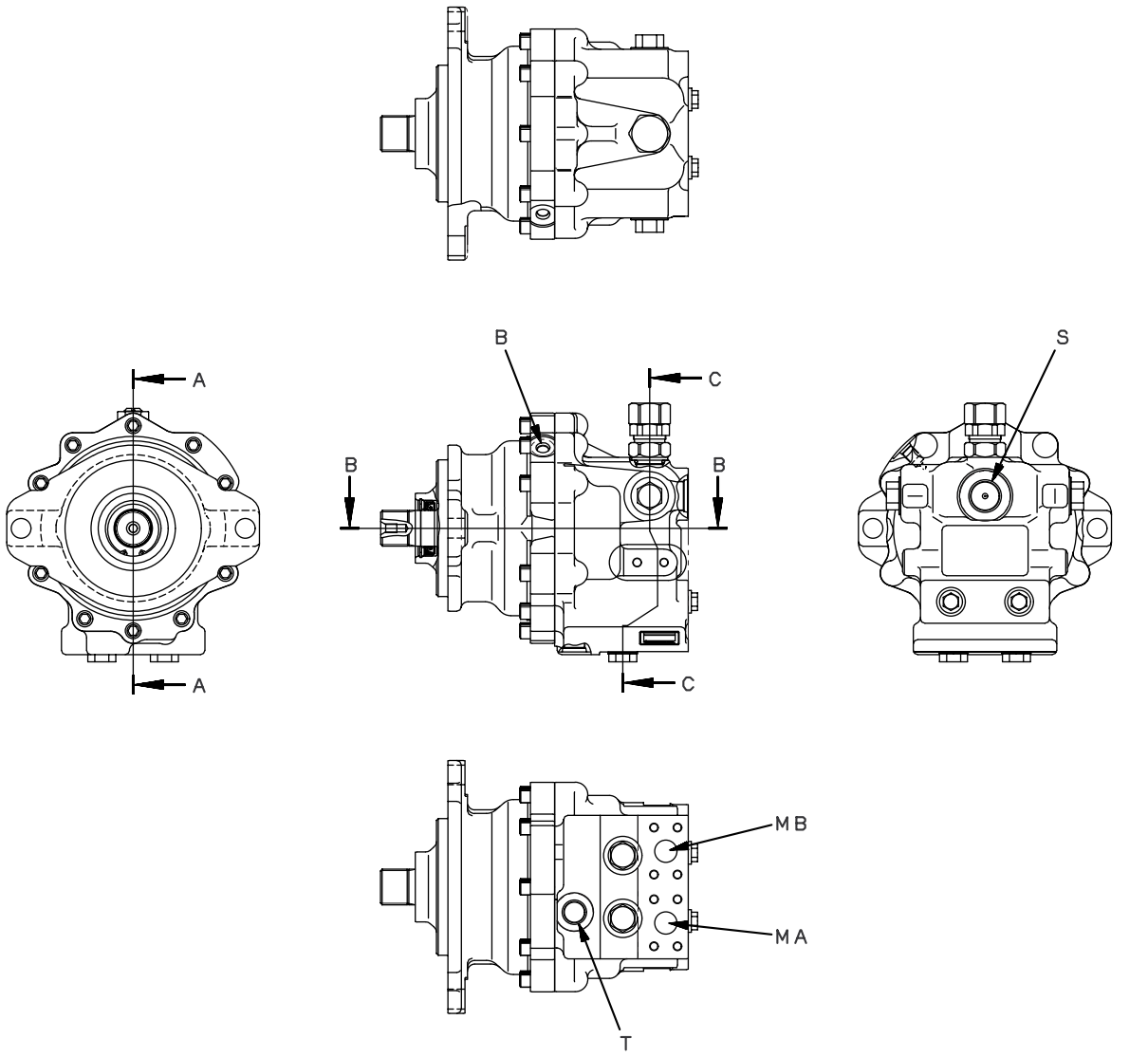
- The straight-travel solenoid valve is excited, so the pilot pressure flows and spool (6) is pushed to the left.
- Because of this, port **P2** and port **P1** are interconnected, so the amount of oil supplied to the left and right travel motors is the same. As a result, the left and right travel motors both rotate at the same speed, so there is no travel deviation.



9JG02228

Swing motor

KMF125AB-5

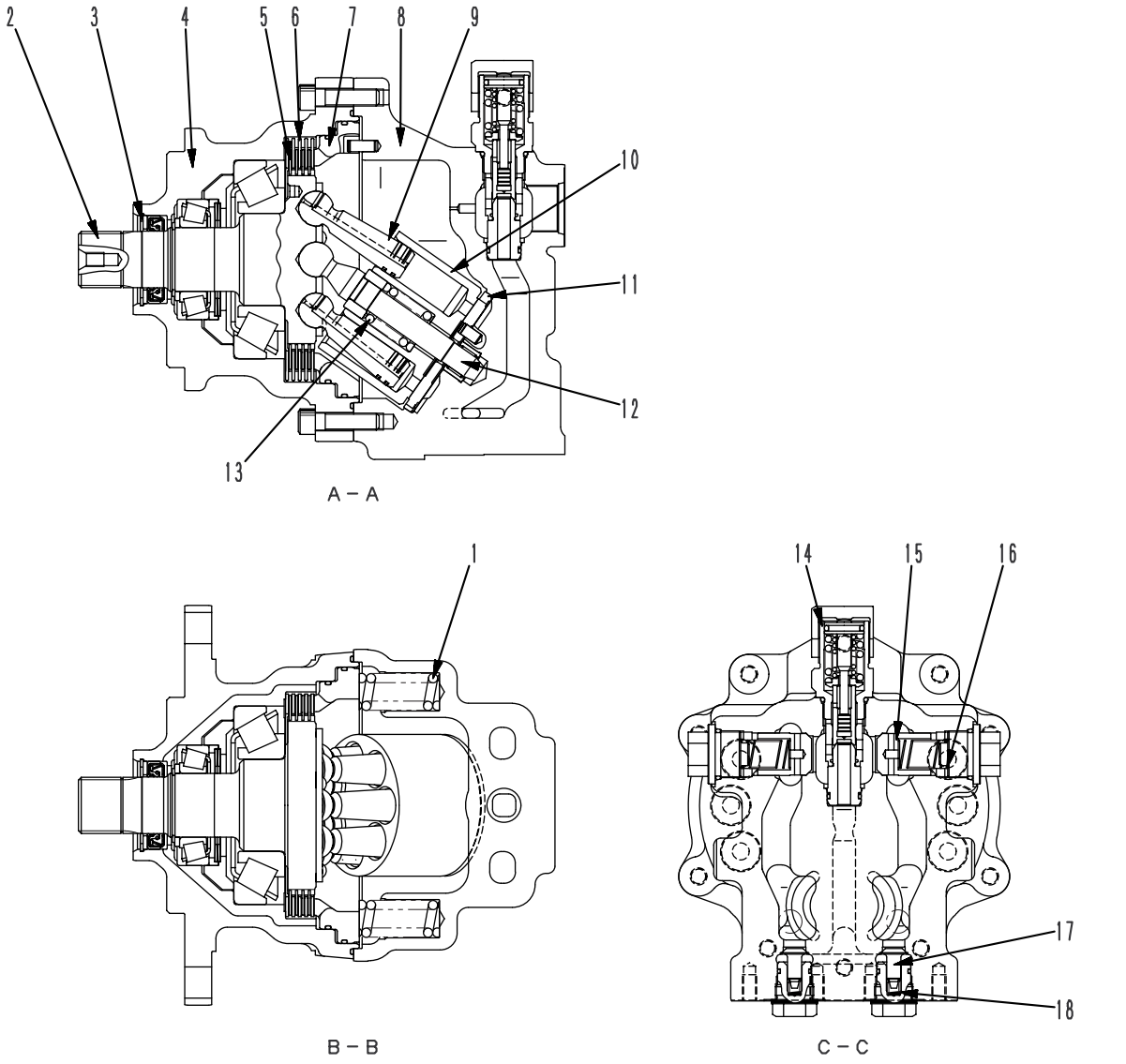


SJP08536

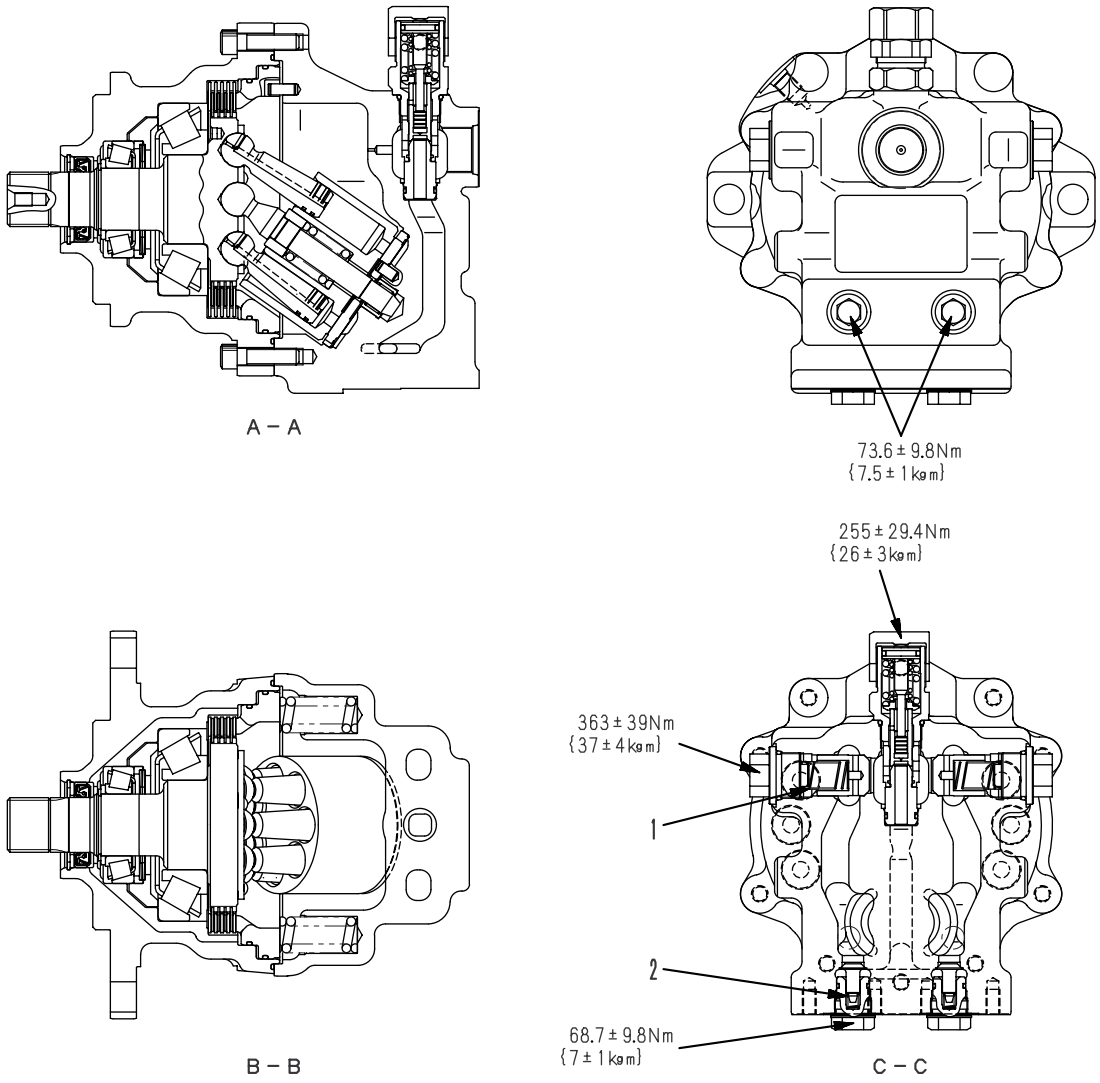
B : From swing brake solenoid valve
S : From back pressure compensation valve
T : To tank
MA : From control valve
MB : From control valve

Specifications

Model	: KMF125AB-5
Theoretical displacement	: 125.0 cm^3/rev
Safety valve set pressure	: 27.9 MPa {285 kg/cm^2}
Rated revolving speed	: 1,936 rpm
Brake release pressure	: 1.9 MPa {19 kg/cm^2}



1. Brake spring
2. Drive shaft
3. Spacer
4. Case
5. Disc
6. Plate
7. Brake piston
8. Housing
9. Piston
10. Cylinder block
11. Valve plate
12. Center shaft
13. Center spring
14. Safety valve
15. Check valve
16. Check valve spring
17. Shuttle valve
18. Shuttle valve spring



Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
1	Check valve spring	Free length × Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring
		62.5 × 20.0	35	3.5 N {0.36 kg}	—	2.8 N {0.29 kg}	
2	Shuttle valve spring	16.4 × 8.9	11.5	13.7 N {1.4 kg}	—	10.8 N {1.1 kg}	

Relief valve portion

1. Outline

The relief portion consists of check valves (2) and (3), shuttle valves (4) and (5), and relief valve (1).

2. Function

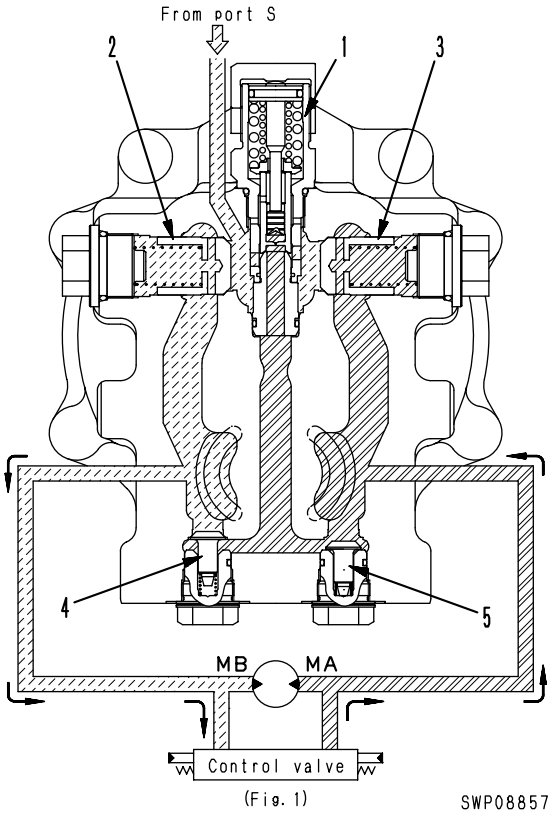
When the swing is stopped, the outlet port circuit of the motor from the control valve is closed, but the motor continues to rotate under inertia, so the pressure at the output side of the motor becomes abnormally high, and this may damage the motor.

To prevent this, the abnormally high pressure oil is relieved to port **S** from the outlet port of the motor (high-pressure side) to prevent any damage.

3. Operation

1) When starting swing

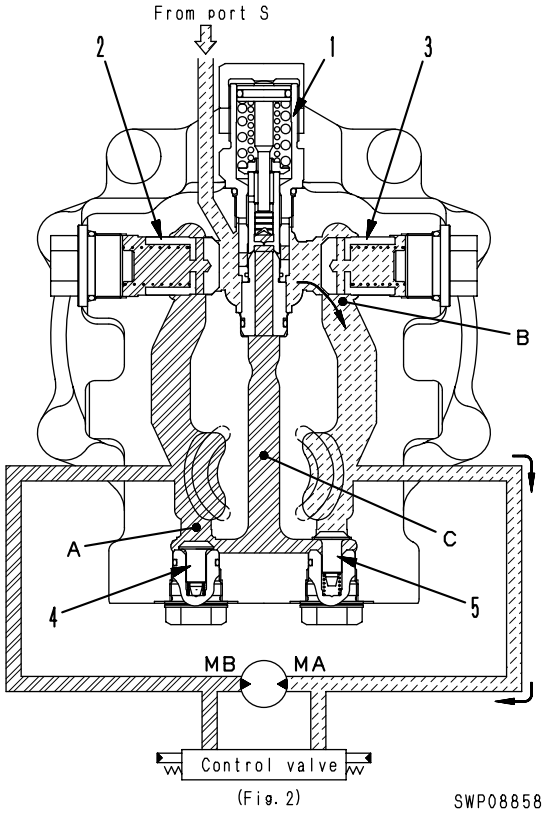
- When the swing control lever is operated to swing right, the pressure oil from the pump passes through the control valve and is supplied to port **MA**. As a result, the pressure at port **MA** rises, the starting torque is generated in the motor, and the motor starts to rotate. The oil from the outlet port of the motor passes from port **MB** thought the control valve and returns to the tank. (Fig. 1)



(Fig. 1) SWP08857

2) When stopping swing

- When the swing control lever is returned to neutral, the supply of pressure oil from the pump to port **MA** is stopped. When the return circuit to the tank is closed by the control valve, the pressure at port **MB** rises with the oil from the outlet port of the motor. As a result, rotation resistance is generated in the motor, so the braking effect starts.
- If the pressure at port **MB** becomes higher than the pressure port **MA**, it pushes shuttle valve **A** (4) and chamber **C** becomes the same pressure as port **MB**. The oil pressure rises further until it reaches the set pressure of relief valve (1). As a result, a high braking torque acts on the motor and stops the motor. (Fig. 2)
- When relief valve (1) is being actuated, the relief oil and the oil from port **S** passes through check valve **B** (3) and is supplied to port **MA**. This prevents cavitation at port **MA**.



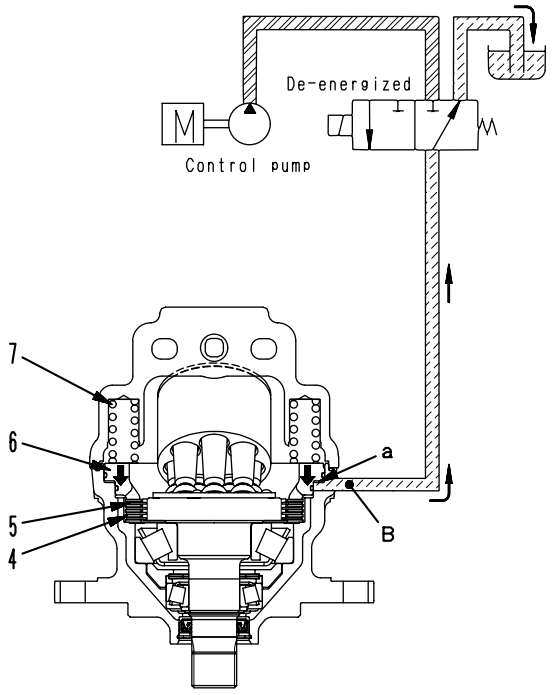
(Fig. 2) SWP08858

Operation of swing brake

1) When swing brake solenoid valve is de-energized

If the swing brake solenoid valve is de-energized, the flow of pressurized oil from the control pump is shut off, and port **B** is connected to the tank circuit.

As a result, brake piston (6) is pushed down by brake spring (7), pushes disc (5) and plate (4) together, and the brake is applied.

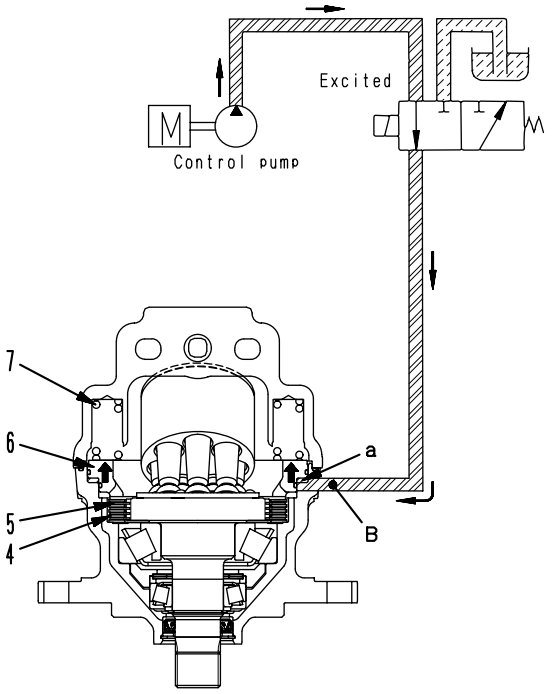


SWP08859

2) When swing brake solenoid valve is excited

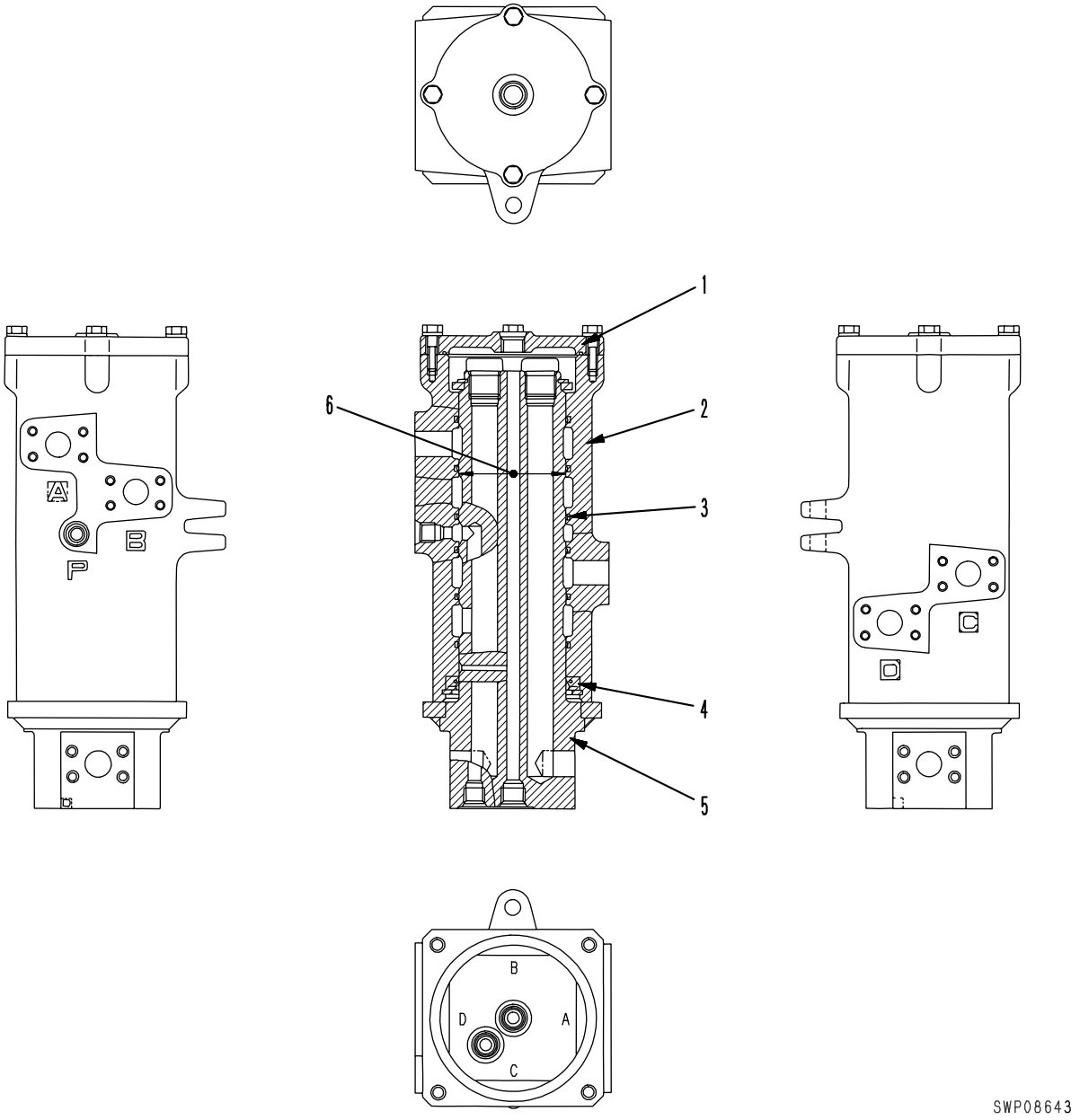
When the swing brake solenoid valve is energized, the valve is switched, and pressurized oil from the control valve enters port **B** and flows to brake chamber **a**.

The pressurized oil entering chamber **a** overcomes brake spring (7) and pushes brake piston (6) up. As a result, disc (5) and plate (4) are separated and the brake is released.



SWP08860

Center swivel joint



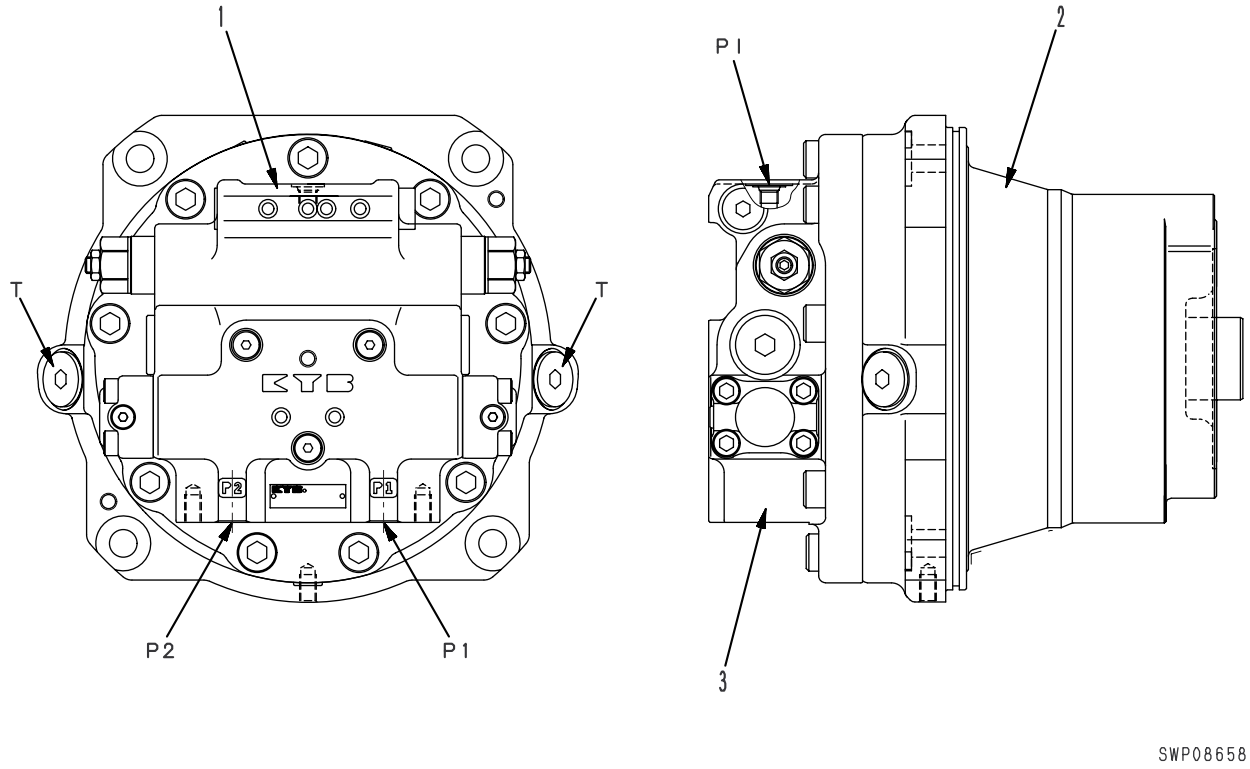
1. Cover
2. Body
3. Slipper seal
4. Oil seal
5. Shaft

Unit: mm

No.	Check item	Criteria			Remedy
6	Clearance between rotor and shaft	Standard size	Standard clearance	Clearance limit	Replace
		110	0.056 – 0.105	0.111	

Travel motor

MSF-340VP-EH



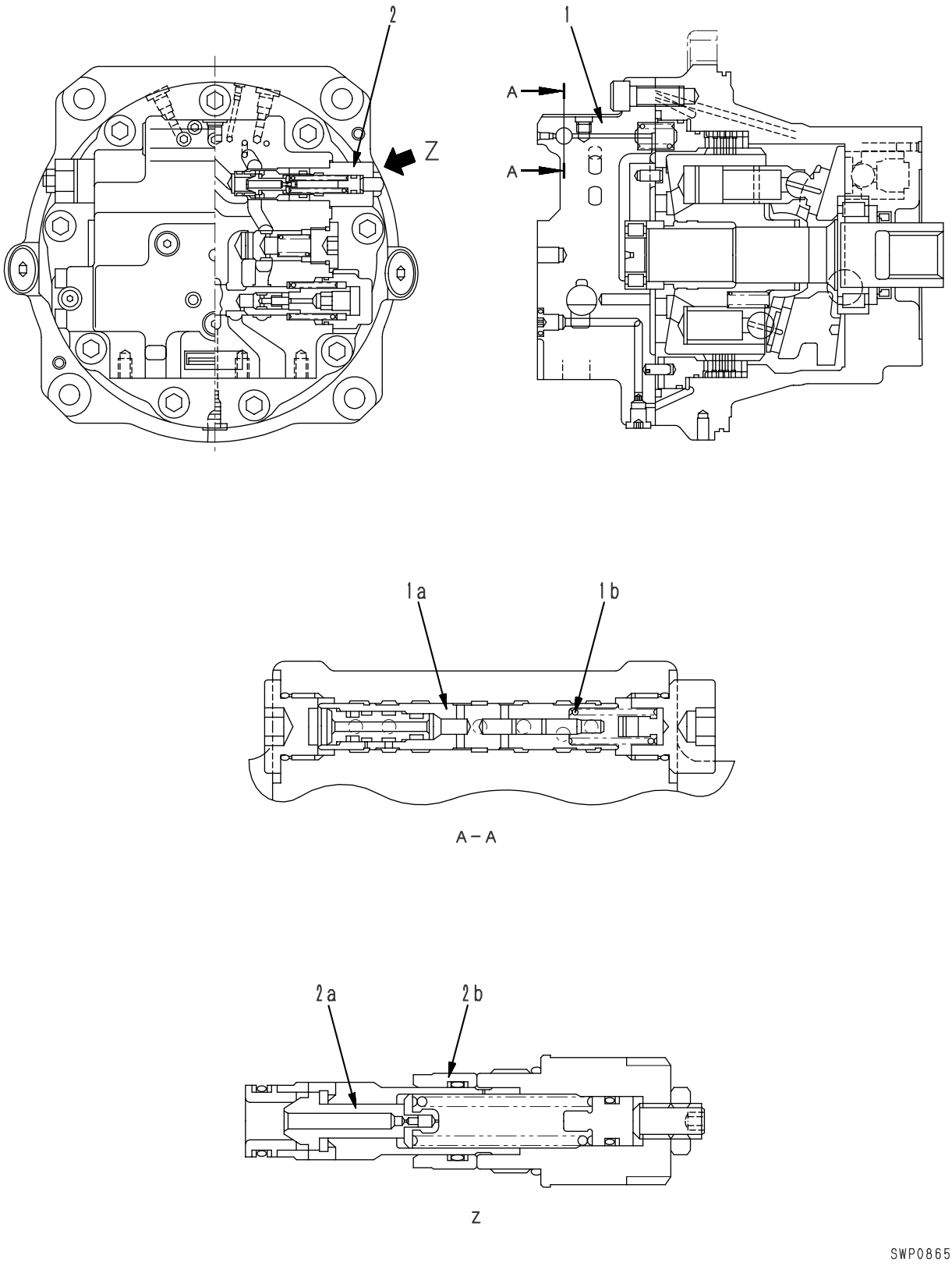
1. Travel selector valve
2. Motor
3. Travel brake valve

P1: From control valve
P2: From control valve
PI : From travel speed solenoid valve
T : To hydraulic tank

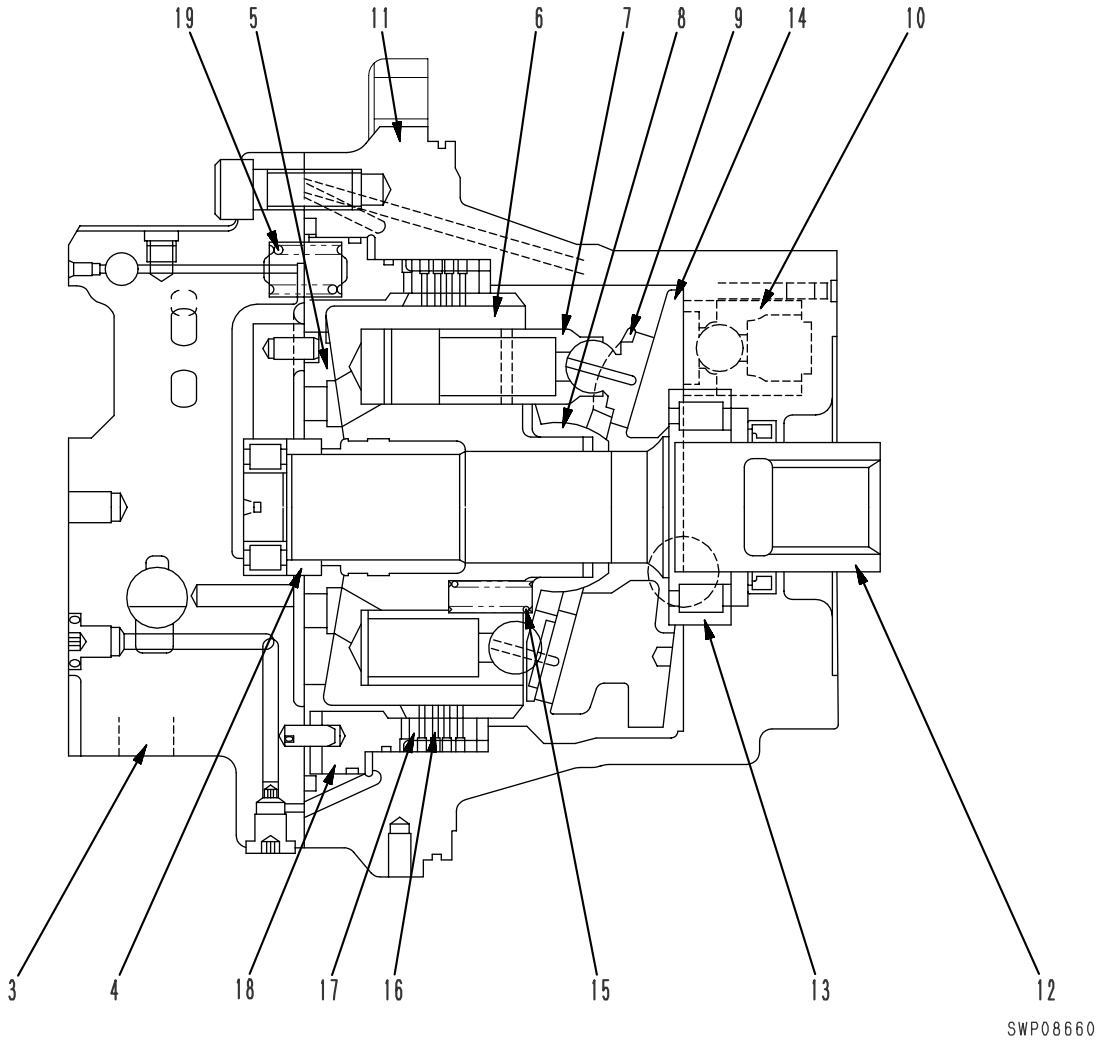
Specifications

Model	: MSF-340VP-EH
Theoretical delivery	: 1st 337.2 cc/rev
	: 2nd 12.6 cc/rev
Rated pressure	: 31.4 MPa {320 kg/cm^2}
Rated speed	: 1st 1,423 rpm (at 500 ℓ /min.)
	: 2nd 2,258 rpm (at 500 ℓ /min.)
Brake release pressure	: 1.8 MPa {18.4 kg/cm^2}

1. Travel motor, travel speed selector valve, relief valve

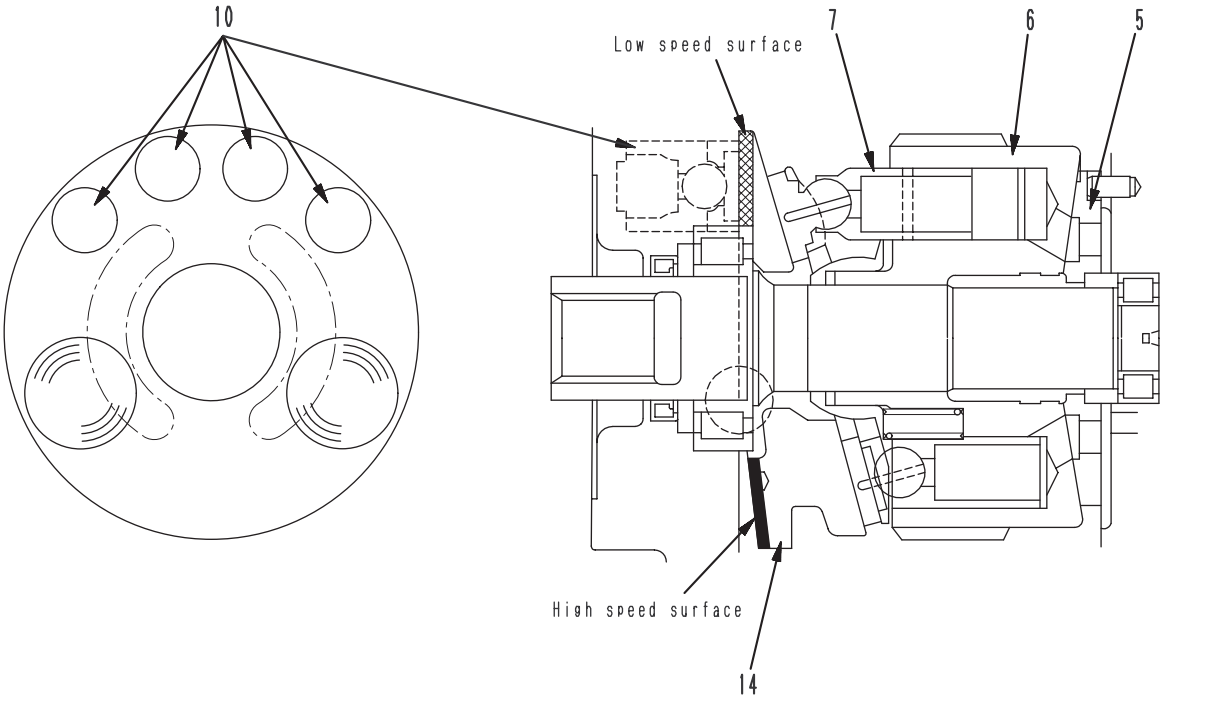


1. Travel speed selector valve
   1a. Spool
   1b. Spring
2. Relief valve
   2a. Shockless piston
   2b. Poppet



3. Rear cover
4. Collar
5. Valve plate
6. Cylinder block assembly
7. Piston assembly
8. Holder
9. Retainer
10. Piston assembly
11. Case
12. Shaft
13. Bearing collar
14. Rocker cam
15. Preload spring
16. Disc
17. Plate
18. Brake piston
19. Spring

1-1 Motor



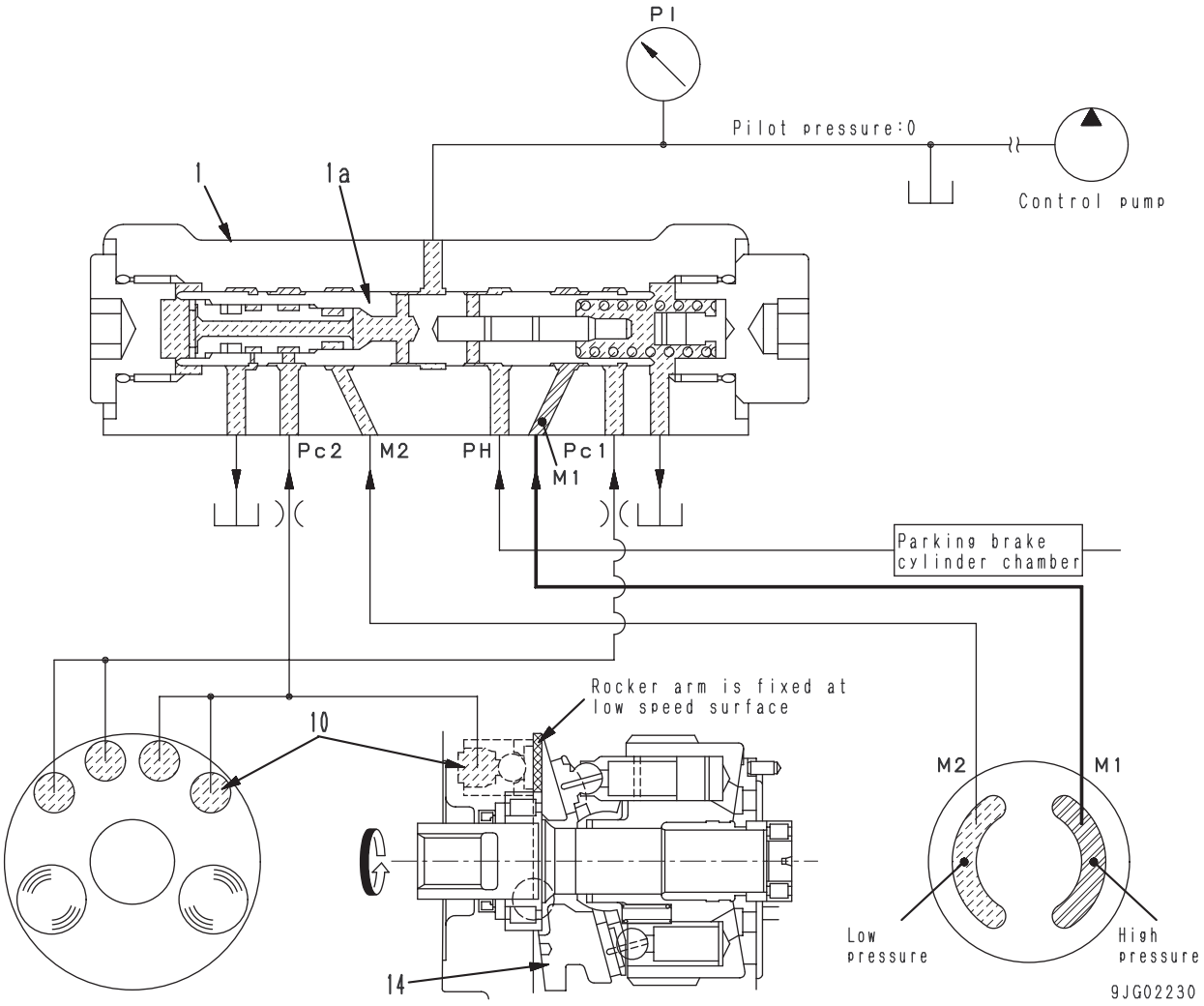
- There are 9 pistons (7) assembled in cylinder block (6). The end face of the cylinder block has a spherical surface and is in contact with valve plate (5), which has two half-moon shaped ports (divider valve for high/low speed selector).

- The fixed surface (contact surface with the motor case) forming the non-sliding surface of rocker cam (14) has two faces. The high/low speed volume selection for this motor is carried out by fixing each face to provide large capacity (low speed) or small capacity (high speed).
  The angling operation of rocker cam (14) is carried out by actuating control piston (10) with the self-pressure through the speed selector valve when the motor is being driven, and this angles the rocker cam.
  There are two control pistons each for the high/low pressure divider ports of valve plate (5), and these provide propulsion force to the rocker cam.

1-2 Speed selector valve

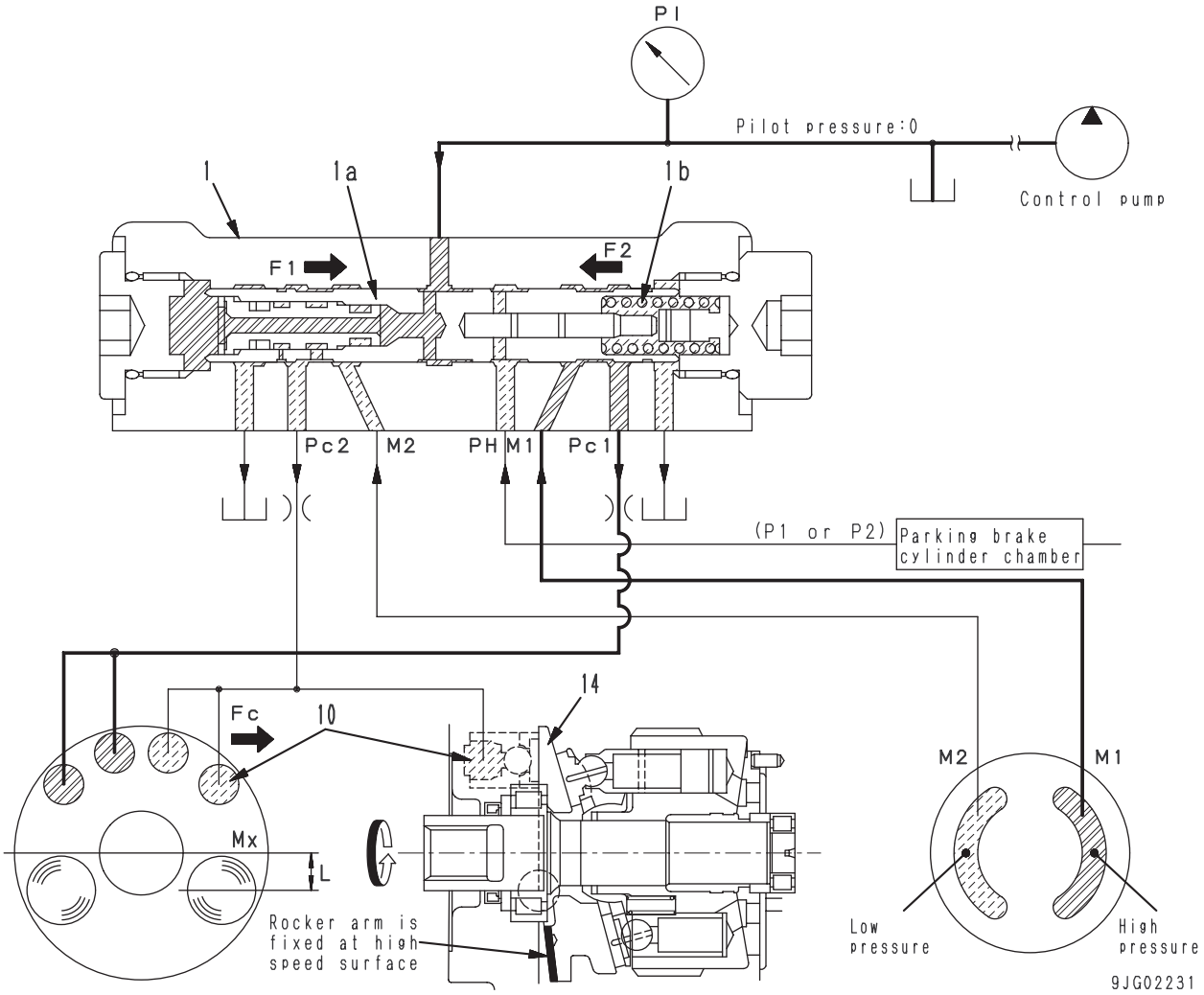
Operation

1) At low speed (pilot pressure PI = 0)



- When pilot pressure **PI** from the control pump is 0, spool (1a) of travel speed selector valve (1) is not switched.
  In this condition, the oil from the chamber of control piston (10) passes through spool (1a) and is drained into the motor case. There is no angle propulsion force acting on rocker cam (14), so the low-speed surface is kept in a static condition.

2) At high speed (automatic 2nd)



- When the pilot signal is ON, pilot pressure **PI** from the control pump acts on travel speed selector valve (1) and the capacity is automatically changed by the drive pressure of the travel motor.

  Balance of force for travel speed selector valve
  F1 [Force pushing spool (1a) to right (high-speed side)] = **A** (area of spool (1a) receiving pressure) × **PI**
  F2 [Force pushing spool (1a) to left (low-speed side)] = **A** (area of spool (1a) receiving pressure) × **PH** (motor drive pressure) + force of spring (1b)

  i) When traveling on level ground, if the travel motor drive pressure is low, the condition becomes **F1** > **F2**, and spool (1a) is pushed to the right.
  When this happens, the main oil pressure (**M1**, **M2**) passes through spool (1a) and goes to the control piston chamber. Rocker cam (14) overcomes moment **Mx** with hydraulic force from propulsion force **Fc** of control piston (10). It rotates and holds the moment balance at the high speed surface and is held in position (**Mx** < **Fc**, **L**).

  ii) When operating the steering or traveling uphill, if the motor drive pressure is high, and it goes above the set pressure, the condition becomes **F1** < **F2**, and spool (1a) is pushed to the left.
  When this happens, the main oil pressure (**M1**, **M2**) passes through spool (1a) and is drained to the motor case. This creates the low-speed condition in the same way as when **PI** = 0.

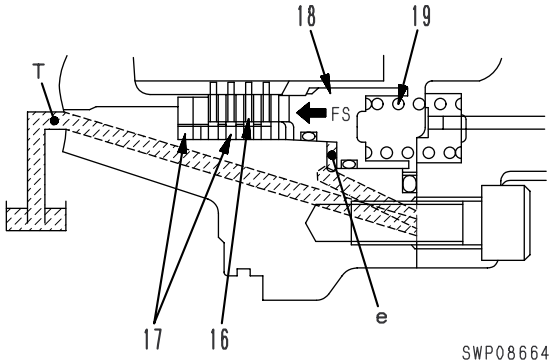
1-3 Parking brake

The parking brake is a hydraulic release, wet type, multiple disc negative brake. The release pressure employs a self-pressure release method using the travel motor drive pressure through the oil passage in the counterbalance valve spool of the travel brake valve.

When the machine is traveling, the drive pressure is sent to port **P** of the parking brake circuit, acts on the piston in the brake cylinder chamber, overcomes the force of the spring and releases the brake.
When the machine is parked or stopped, the counterbalance valve spool returns to neutral, and the oil in the cylinder chamber is released to the tank through the counterbalance valve spool, so the brake is applied by the force of the spring to mechanically lock the motor shaft and hold the machine in position.

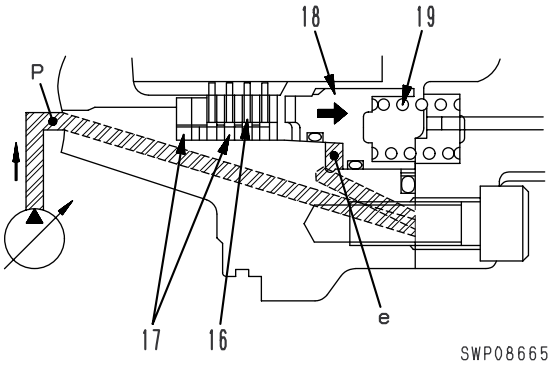
When parking brake is ON

When the travel lever is placed in neutral, the counterbalance valve spool returns to the neutral position and parking brake circuit **P** is closed.
The pressurized oil in chamber **e** of the brake piston passes through the counterbalance valve spool, is drained to the tank, and brake piston (18) is pushed fully to the left by force **Fs** of spring (19), and the brake is applied.

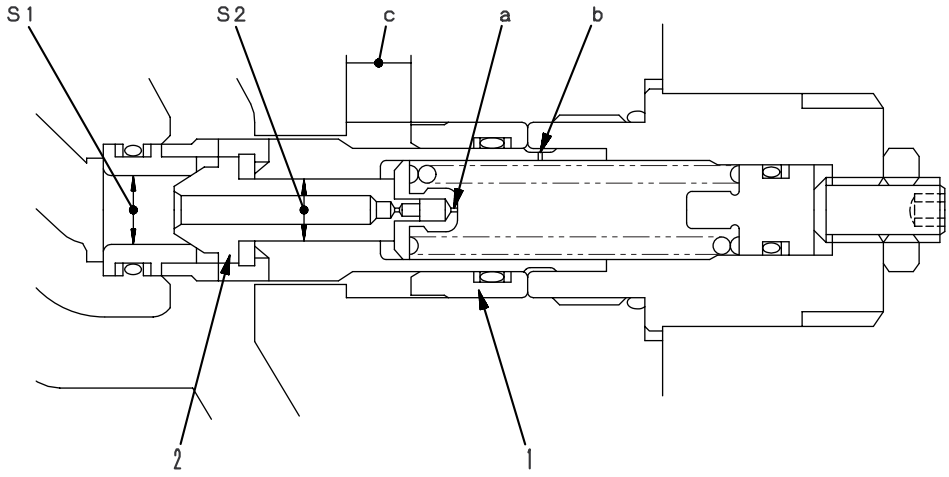


When parking brake is OFF

When the travel lever is operated, the pressurized oil from the pump actuates the counterbalance valve spool, opens the circuit to the parking brake, and flows into chamber **e** of brake piston (18). It overcomes the force of spring (19), and pushes brake piston (18) to the right.
When this happens, the force pushing plate (17) and disc (16) together is lost, so the plate and disc separate and the brake is released.



1-4 Relief valve



SWP08666

1. Shockless piston
2. Poppet
3. Poppet orifice
4. Relief housing orifice
5. Piston stroke

Function

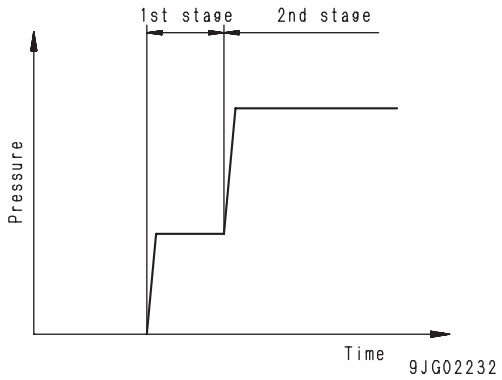
In addition to the pressure control function, this relief valve has a shockless function (2-stage pressure increase function). This acts to reduce the shock generated at the beginning when the speed is reduced (when the machine is stopped).

Operation

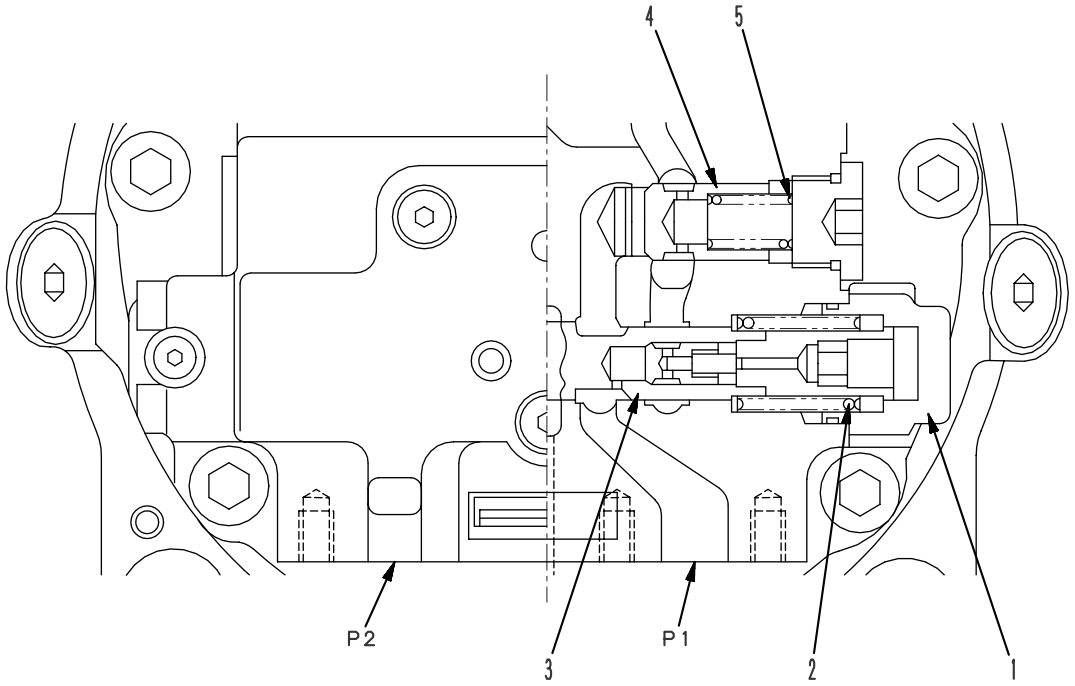
1) When relief valve starts to be actuated (1st stage)
   The area receiving the pressure which lifts poppet (2) becomes area **S1** of the poppet seat.
   For this reason, it has a much larger pressure-receiving area than the pressure-receiving area when it is set (**S1** – **S2**), so the relief actuating pressure becomes a low pressure of approx. 15.7 MPa {160 kg/cm^2}.
   This condition is maintained until the movement of shockless piston (1) is completed (approx. 0.25 sec).

2) When movement of shockless piston is completed (2nd stage)
   The pressure in the relief valve spring chamber rises, the pressure on both sides of poppet (2) becomes the same, and it becomes the specified set pressure.

   ★ Set pressure and amount of adjustment
   Amount of adjustment for one turn:
   Approx. 7.8 MPa {80 kg/cm^2}



1-5 Travel brake valve



SWP08667

Function

- The brake valve consists of counterbalance valve (3) and check valve (4).
- The counterbalance valve acts to prevent the piston motor from stopping or overrunning.
- When traveling downhill, the weight of the machine makes it try to travel at a speed faster than the rotation of the motor.
  For this reason, if the machine is traveling with the engine running at low speed, the motor will rotate under no load or may run away, which is extremely dangerous.
  To prevent this, this valve controls the amount of oil on the return side in order to keep the valve pressure constant, and makes it possible to carry out travel operations which match the oil delivery from the motor.

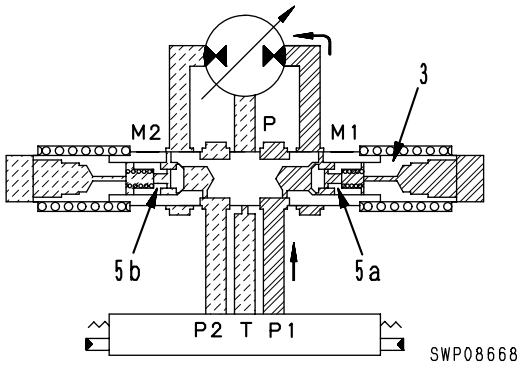
1. Cap assembly
2. Return spring
3. Counterbalance valve
4. Check valve
5. Check valve spring

Specification

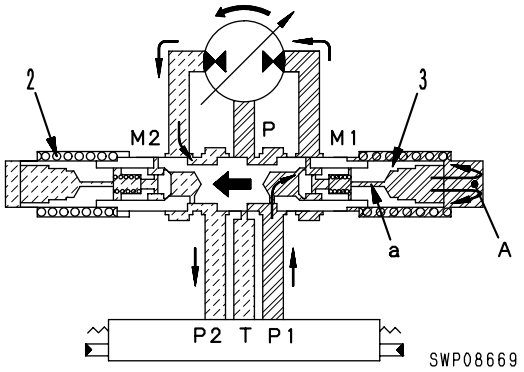
Safety valve set pressure: 34 MPa {350 kg/cm^2}
Counterbalance switching pressure:
1.0 ± 0.1 MPa {10 ± 1 kg/cm^2}
Check valve switching pressure:
0.02 ± 0.01 MPa {0.2 ± 0.1 kg/cm^2}

Operation when oil is supplied

- When the travel lever is operated, the pressurized oil from the control valve is supplied to port **P1**. It pushes open check valve (5a) and flows from motor inlet port **M1** to motor outlet port **M2**. However, the motor outlet port is closed by check valve (5b) and spool (3), so the pressure at the supply side rises.

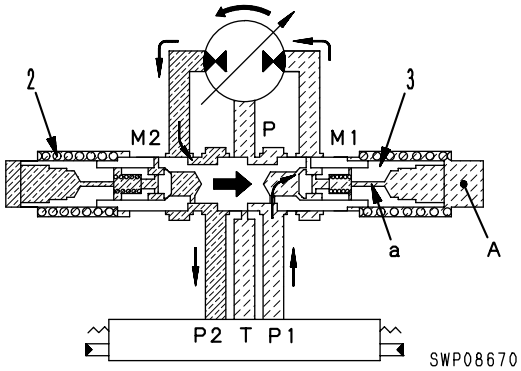


- The pressurized oil at the supply side flows from orifice **a** in spool (3) to chamber **A**. When the pressure in chamber **A** goes above the spool switching pressure, spool (3) is pushed to the left.
  As a result, port **M2** and port **P2** are connected, the outlet port side of the motor is opened, and the motor starts to rotate.

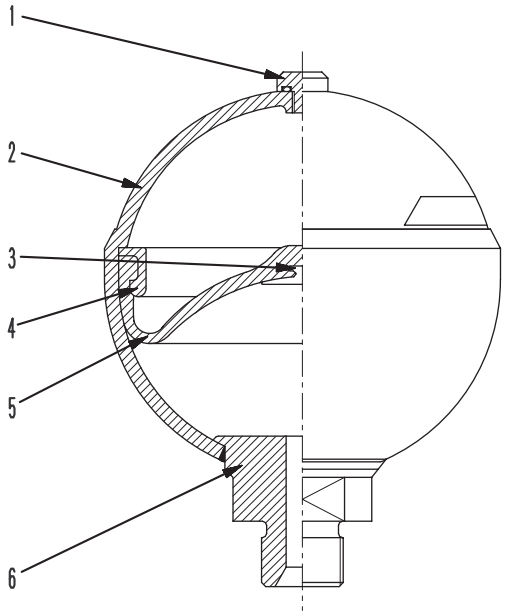


Operation of brake when traveling downhill

- If the machine tries to run away when traveling downhill, the motor will turn under no load, so the pressure at the motor inlet port will drop, and the pressure in chamber **A** through orifice **a** will also drop.
  When the pressure in chamber **A** drops below the spool switching pressure, spool (3) is returned to the right by spring (2), and outlet port **M2** is throttled.
  As a result, the pressure at the outlet port side rises, resistance is generated to the rotation of the motor, and this prevents the machine from running away.
  In other words, spool (3) moves to a position where the pressure at outlet port **M2** balances the pressure at the inlet port and the force generated by the weight of the machine. It throttles the outlet port circuit and controls the travel speed according to the amount of oil discharged from the pump.



PPC accumulator



9JG02173

1. Gas plug
2. Shell
3. Poppet
4. Holder
5. Bladder
6. Oil port

Specifications

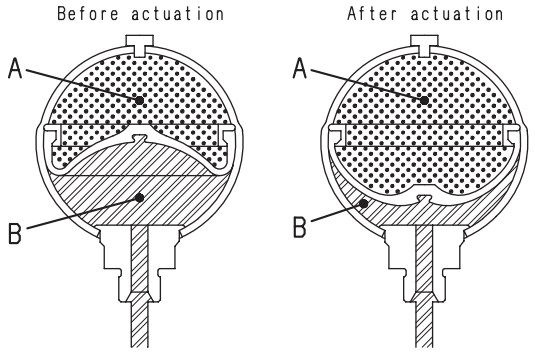
Type of gas	:	Nitrogen gas
Gas volume	:	300 cc
Max. actuating pressure	:	3.1 MPa {32 kg/cm^2}
Min. actuating pressure	:	1.2 MPa {12 kg/cm^2}

Function

- The accumulator is installed between the PPC control pump and the PPC valve. Even if the engine is stopped with the work equipment raised, pilot oil pressure is sent to the main control valve by the pressure of the nitrogen gas compressed inside the accumulator, so it is possible to lower the work equipment under its own weight.

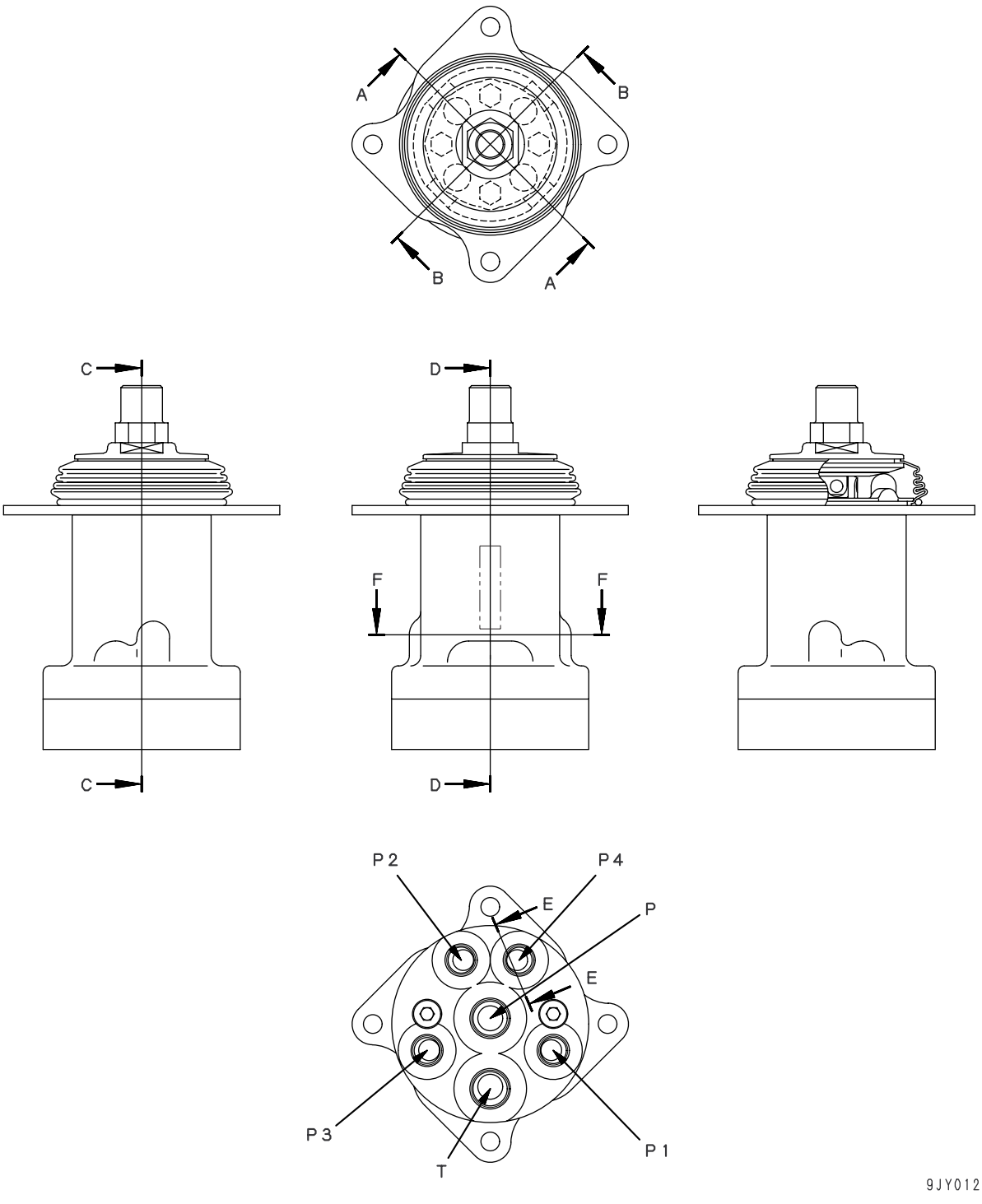
Operation

- After the engine stops, when the PPC valve is at neutral, chamber **A** inside the bladder is compressed by the oil pressure in chamber **B**.
- If the PPC valve is operated, the oil pressure in chamber **B** becomes less than 2.9 MPa {30 kg/cm^2}, so the bladder expands under the pressure of the nitrogen gas in chamber **A**. The oil entering chamber **B** is sent as the pilot pressure to actuate the main control valve.

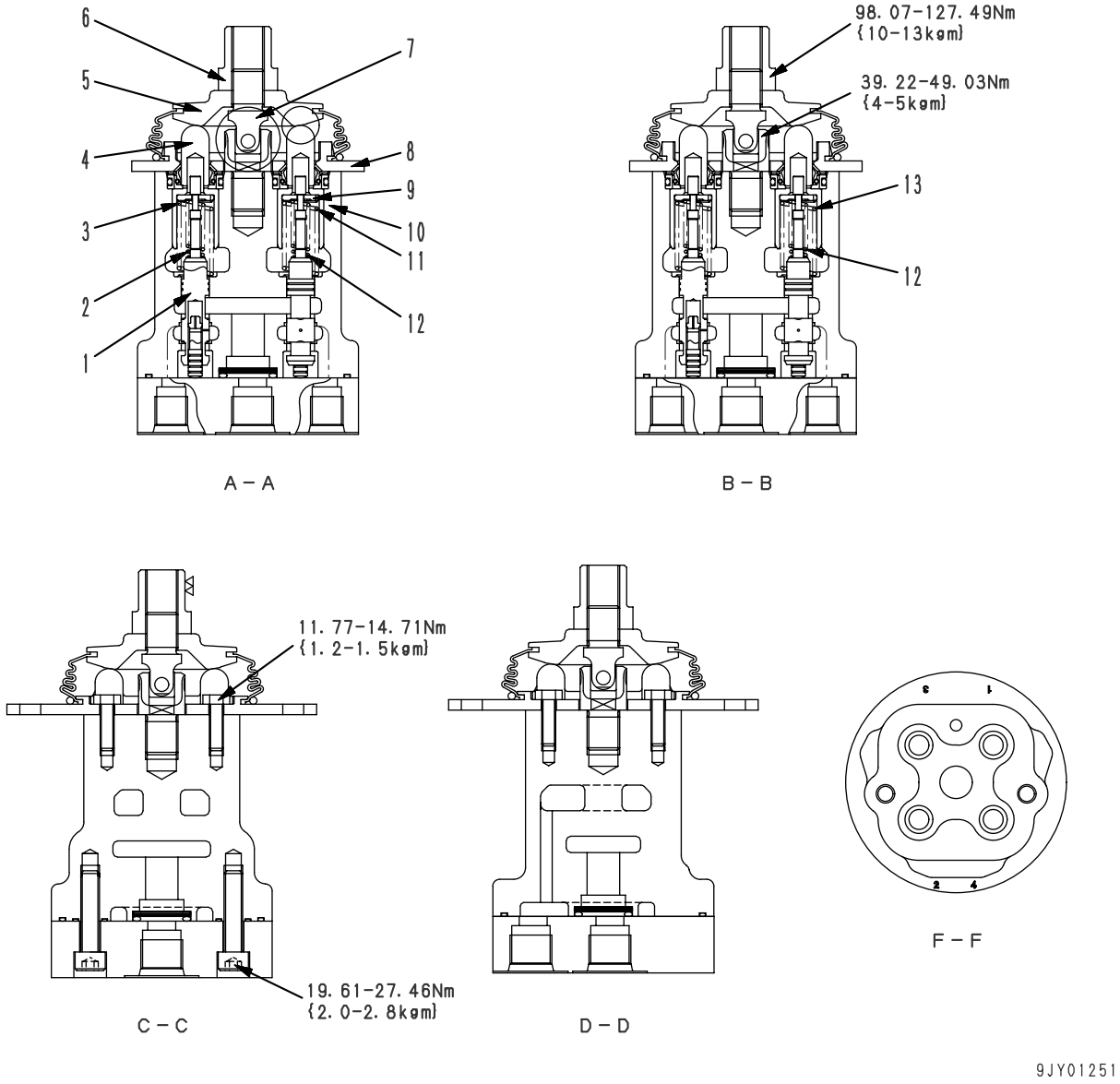


9JG02174

Work equipment, swing PPC valve



P. From control pump
T. To hydraulic tank
P1. Left: Arm IN, Right: Boom RAISE
P2. Left: Arm OUT, Right: Boom LOWER
P3. Left: Swing LEFT, Right: Bucket DUMP
P4. Left: Swing RIGHT, Right: Bucket CURL



1. Spool
2. Metering spring
3. Centering spring
4. Piston
5. Disc
6. Nut (for connecting lever)
7. Joint
8. Plate
9. Retainer
10. Body

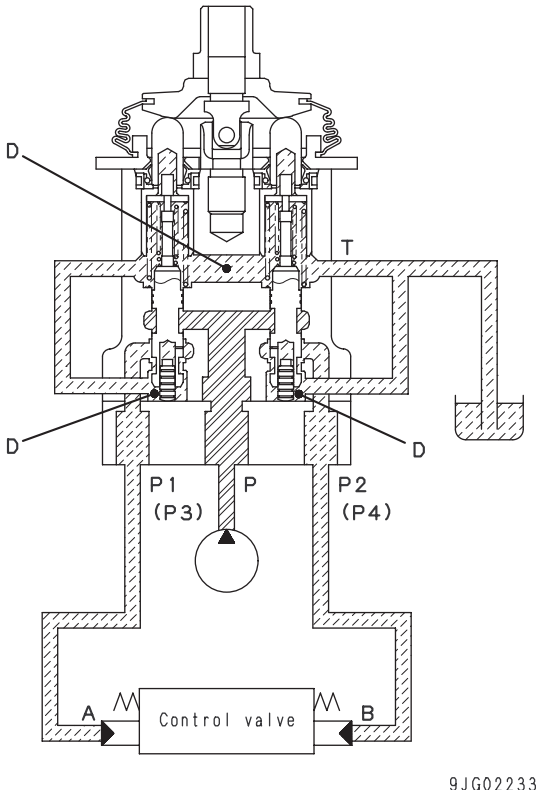
Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
11	Centering spring (for P3, P4)	Free length × OD	Installation length	Installation load	Free length	Installation load	Replace spring if damaged or deformed
		42.48 × 15.5	34	17.6 N {1.8 kg}	—	13.7 N {1.4 kg}	
12	Metering spring	26.7 × 8.14	24.9	16.6 N {1.69 kg}	—	13.2 N {1.35 kg}	
13	Centering spring (for P1, P2)	38.71 × 15.5	34	9.8 N {1 kg}	—	7.8 N {0.8 kg}	

Operation

1) At neutral

Ports **A** and **B** of the control valve and ports **P1**, **P2**, **P3**, and **P4** of the PPC valve are connected to drain chamber **D** at the bottom.



2) Fine control (neutral → fine control)

When piston (4) starts to be pushed by disc (5), retainer (9) is pushed. Spool (1) is also pushed by metering spring (2) and moves down.

When this happens, port **P1** is shut off from drain chamber **D**. At almost the same time, it is connected to pump pressure chamber **PP**, and the pilot pressure of the control pump is sent from port **P1** to port **A**.

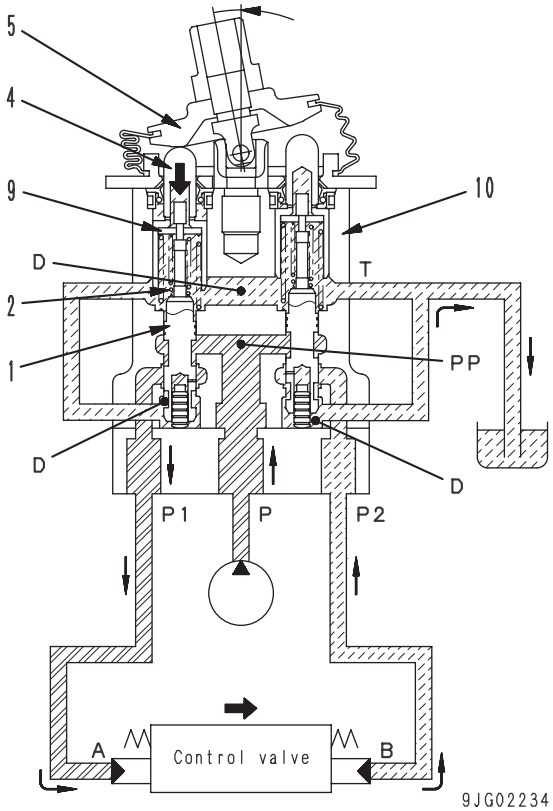
When the pressure at port **P1** rises, spool (1) is pushed back. Port **P1** is shut off from pump pressure chamber **PP**. At almost the same time, it is connected to drain chamber **D**, so the pressure at port **P1** escapes.

As a result, spool (1) moves up and down until the force of metering spool (2) is balanced with the pressure of port **P1**.

The relationship of the positions of spool (1) and body (10) does not change until retainer (9) contacts spool (1).

Therefore, metering spring (2) is compressed in proportion to the travel of the control lever, so the pressure at port **P1** also rises in proportion to the travel of the control lever.

In this way, the spool of the control valve moves to a position where the pressure of chamber **A** (same as pressure at port **P1**) and the force of the return spring of the control valve spool are balanced.



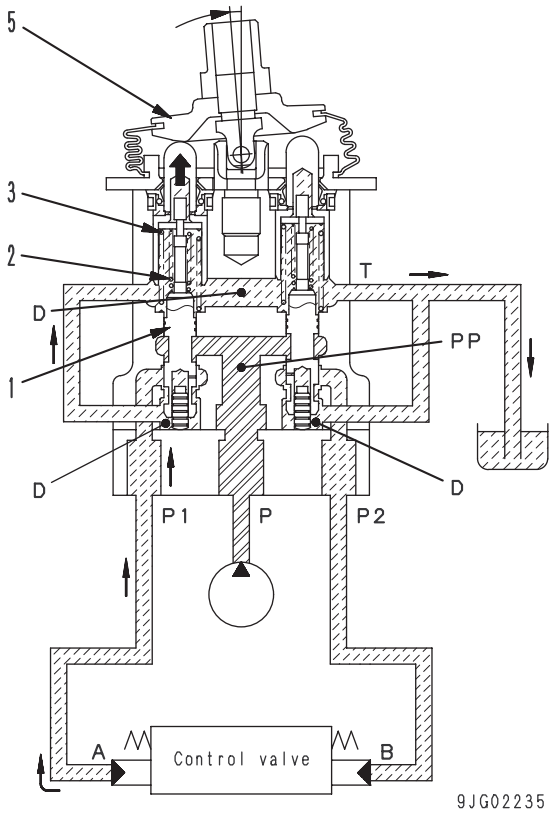
3) Fine control (control lever returned)

When disc (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and the pressure at port **P1**.

Because of this, port **P1** is connected to drain chamber **D**, and the pressurized oil at port **P1** is released.

If the pressure at port **P1** drops too much, spool (1) is pushed down by metering spring (2), so port **P1** is shut off from drain chamber **D**. At almost the same time, it is connected to pump pressure chamber **PP**, so the pressure at port **P1** supplies the pump pressure until the pressure recovers to a pressure equivalent to the position of the lever.

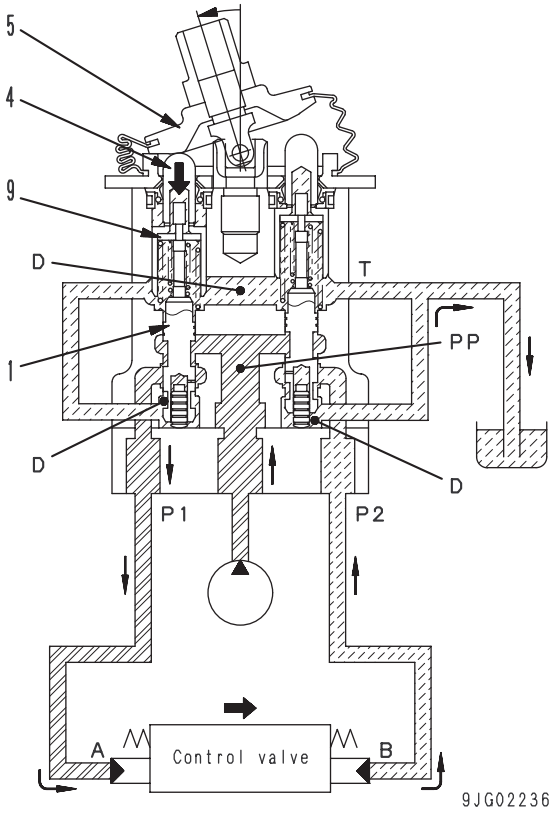
When the control valve returns, oil in drain chamber **D** flows in from the valve on the side that is not moving. It passes through port **P2** and goes to chamber **B** to charge the oil.



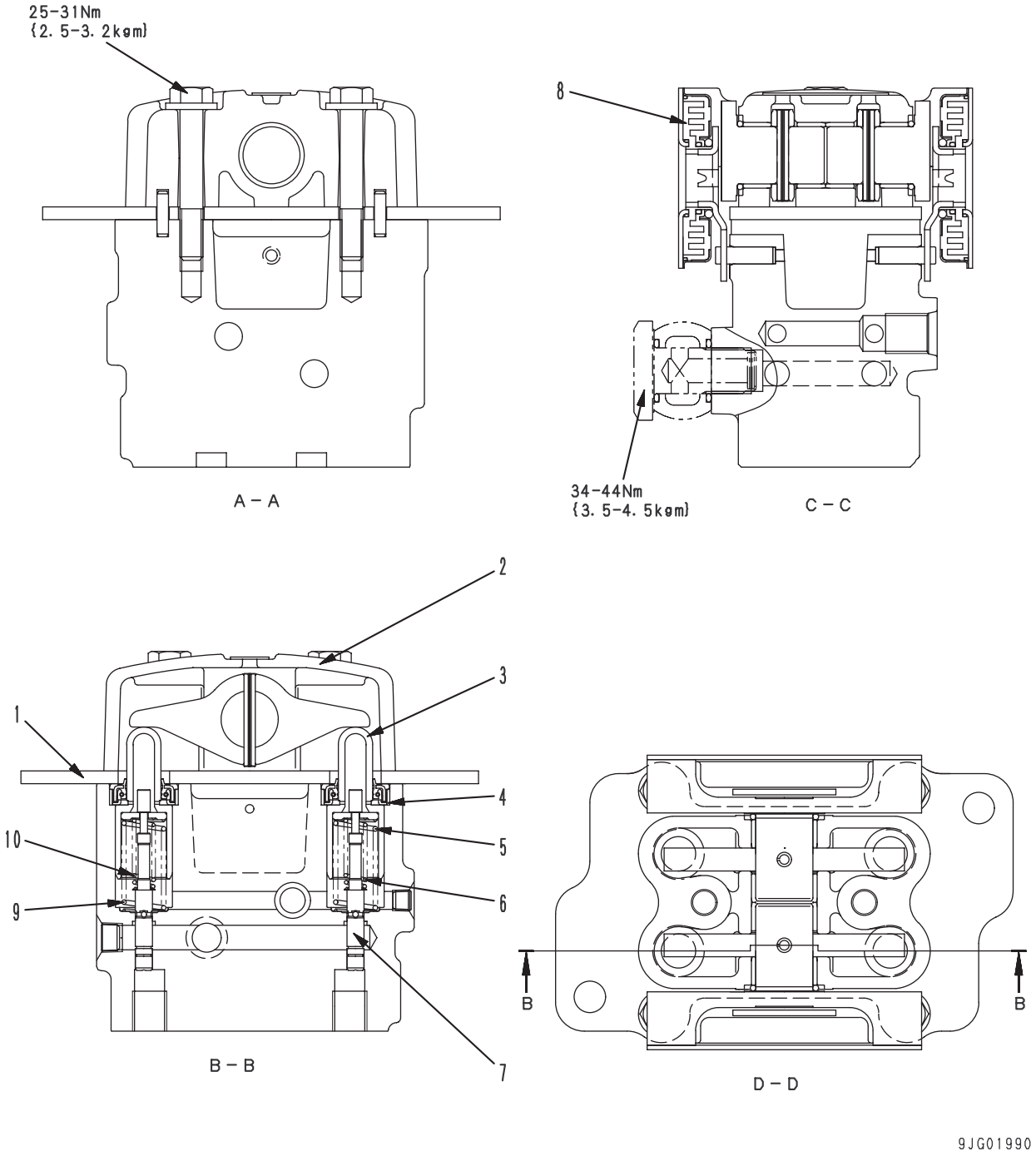
4) At full stroke

When disc (5) pushes down piston (4), and retainer (9) pushes down spool (1), port **P1** is shut off from drain chamber **D**, and is connected to pump pressure chamber **PP**. Therefore, the pilot pressure oil from the control pump flows to chamber **A** from port **P1** to push the control valve spool.

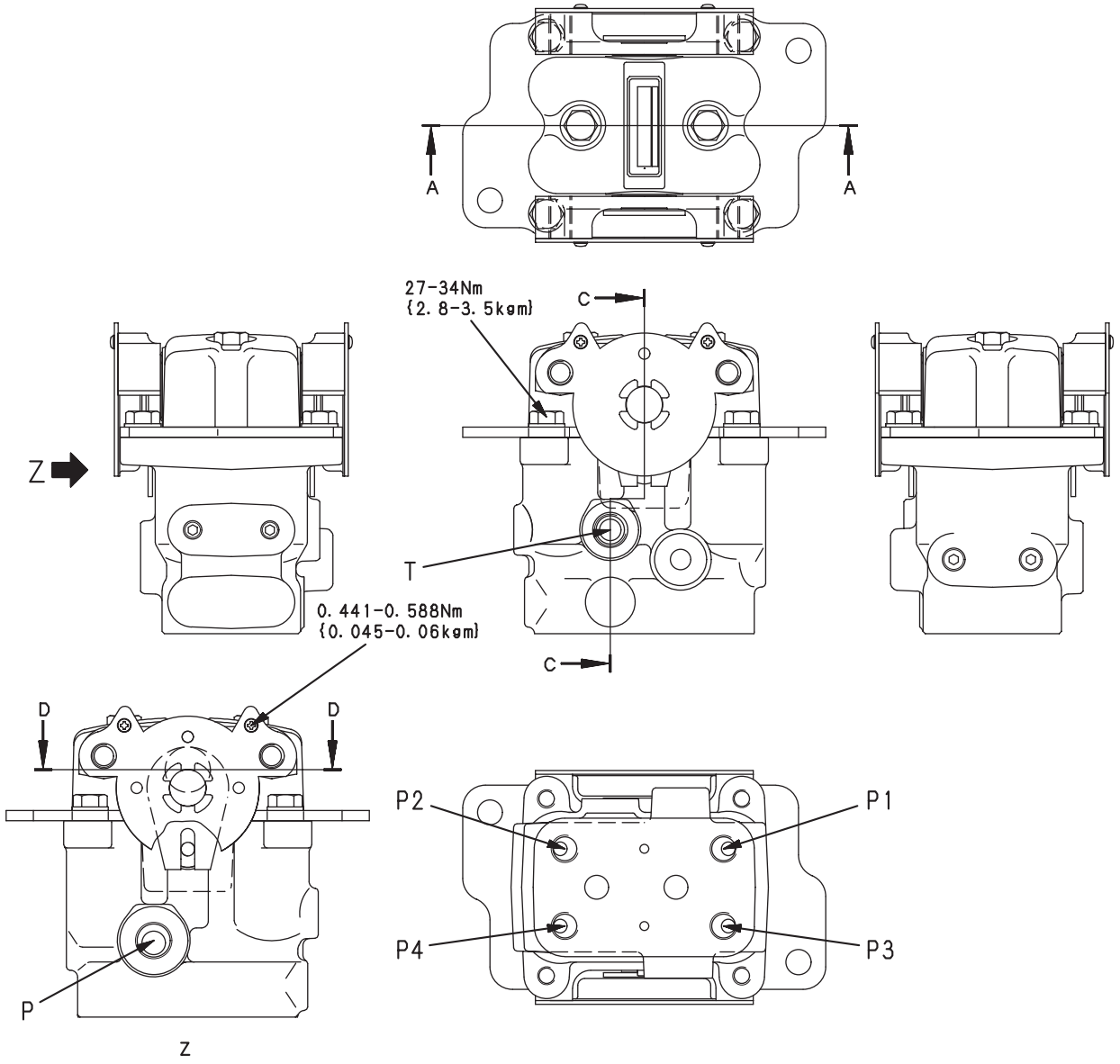
The return oil from chamber **B** passes from port **P2** and flows to drain chamber **D**.



Travel PPC valve



1. Plate
2. Body
3. Piston
4. Collar
5. Centering spring
6. Metering spring
7. Valve
8. Bolt



P : From control pump
T : To tank
P1: Left travel forward
P2: Left travel reverse
P3: Right travel forward
P4: Right travel reverse

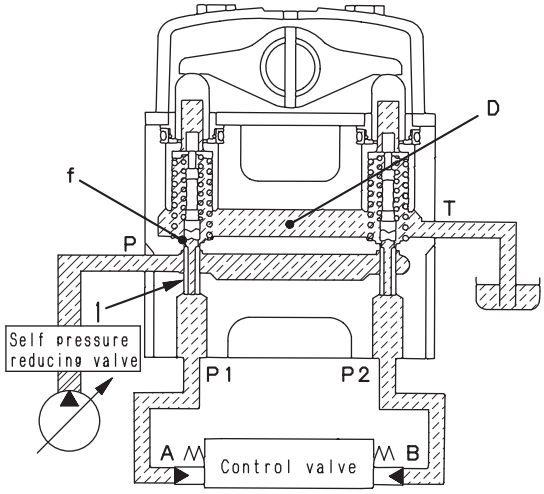
Unit: mm

No.	Check item	Criteria					Remedy
		Basic dimension			Allowable limit		
9	Metering spring	Free length × Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring
		26.7 × 8.14	24.9	16.6 N {1.69 kg}	—	13.7 N {1.40 kg}	
10	Centering spring	48.57 × 15.5	32.5	107.9 N {11 kg}	—	86.3 N {8.8 kg}	

Operation

1. At neutral

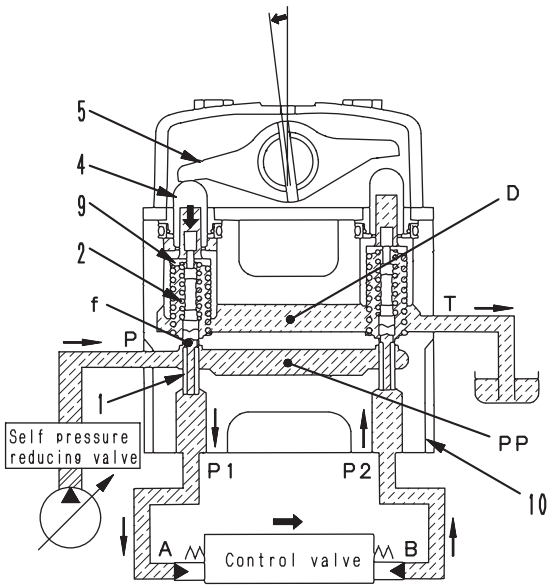
- Ports **A** and **B** of the control valve and ports **P1** and **P2** of the PPC valve are connected to drain chamber **D** through fine control hole **f** in spool (1).



9JS03337

2. During fine control (neutral → fine control)

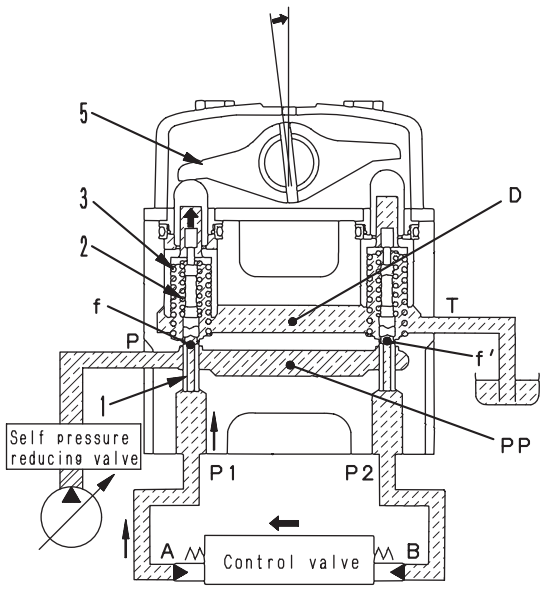
- When piston (4) starts to be pushed by disc (5), retainer (9) is pushed; spool (1) is also pushed by metering spring (2) and moves down.
- When this happens, fine control hole **f** is shut off from drain chamber **D**. At almost the same time, it is connected to pump pressure chamber **PP**, and the pilot pressure of the control pump is sent from port **A** through fine control hole **f** to port **P1**.
- When the pressure at port **P1** rises, spool (1) is pushed back. Fine control hole **f** is shut off from pump pressure chamber **PP**. At almost the same time, it is connected to drain chamber **D** to release the pressure at port **P1**.
- As a result, spool (1) moves up and down until the force of metering spool (2) is balanced with the pressure of port **P1**.
- The relationship in the position of spool (1) and body (10) (fine control hole **f** is in the middle between drain hole **D** and pump pressure chamber **PP**) does not change until retainer (9) contacts spool (1).
- Therefore, metering spring (2) is compressed in proportion to the travel of the control lever, so the pressure at port **P1** also rises in proportion to the travel of the control lever.
- In this way, the control valve spool moves to a position where the pressure of chamber **A** (same as pressure at port **P1**) and the force of the return spring of the control valve spool are balanced.



9JS03338

3. Fine control (control lever returned)

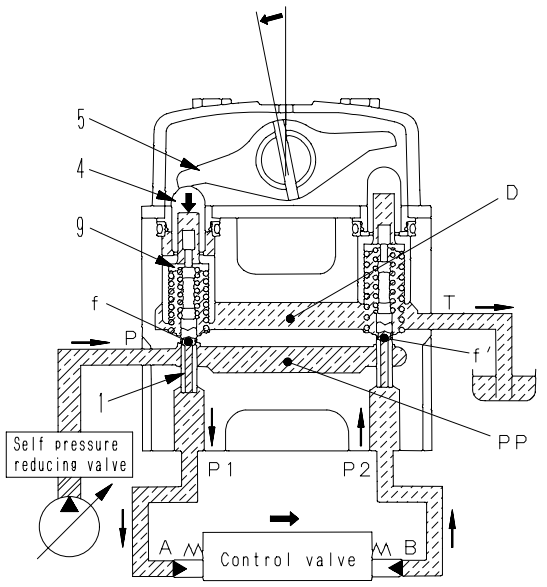
- When disc (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and the pressure at port **P1**.
  Because of this, fine control hole **f** is connected to drain chamber **D**, and the pressurized oil at port **P1** is released.
- If the pressure at port **P1** drops too much, spool (1) is pushed up by metering spring (2), so fine control hole **f** is shut off from drain chamber **D**. At almost the same time, it is connected to pump pressure chamber **PP**, so the pressure at port **P1** supplies the pump pressure until the pressure recovers to a pressure equivalent to the position of the lever.
- When the control valve returns, oil in drain chamber **D** flows in from fine control hole **f'** of the valve on the side that is not moving. It passes through port **P2** and enters chamber **B** to fill the chamber with oil.



9JS03339

4. At full stroke

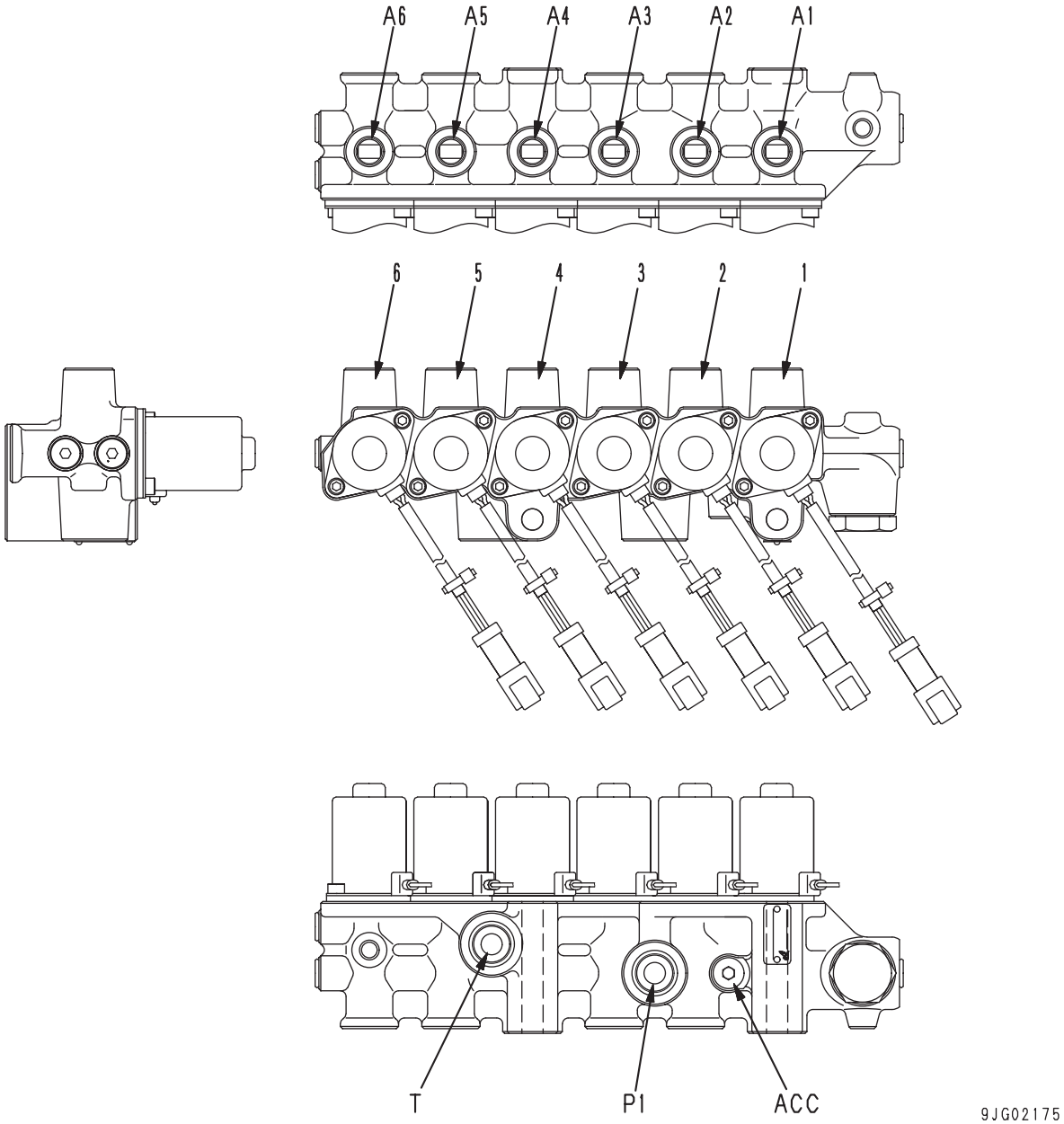
- Disc (5) pushes down piston (4), and retainer (9) pushes down spool (1). Fine control hole **f** is shut off from drain chamber **D**, and is connected to pump pressure chamber **PP**.
- Therefore, the pilot pressure oil from the main pump passes through fine control hole **f** and flows to chamber **A** from port **P1** to push the control valve spool.
- The return oil chamber **B** passes from port **P2** through fine control hole **f'** and flows to drain chamber **D**.



9JS03340

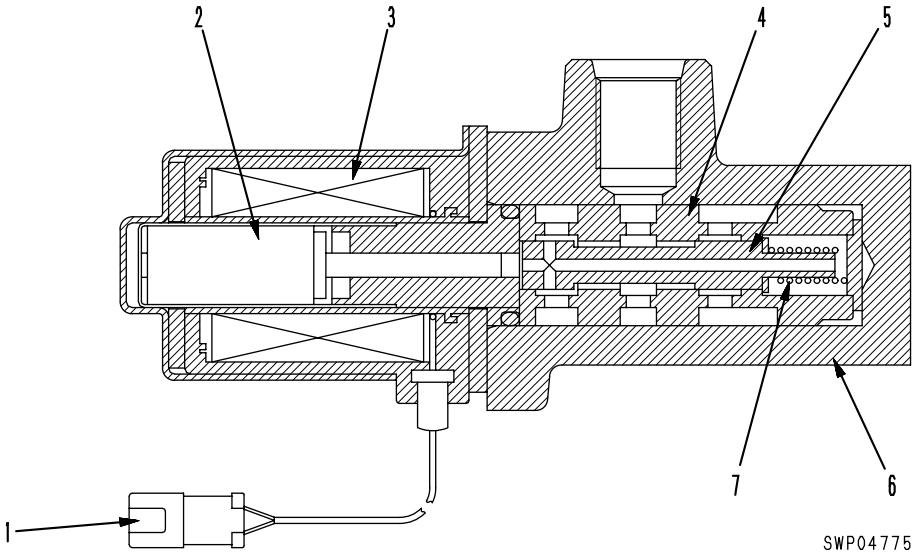
Solenoid valve

For swing brake, travel speed, machine push-up, heavy lift, straight travel



1. Swing brake solenoid valve (Front)
2. Travel speed solenoid valve
3. Swing brake solenoid valve (Rear)
4. Machine push-up solenoid valve
5. Heavy lift solenoid valve
6. Straight travel solenoid valve

T : To tank
A1 : To front swing motor
A2 : To left and right travel motor
A3 : To rear swing motor
A4 : To main valve (Safety valve)
A5 : To main valve (Relief valve)
A6 : To main valve (Straight travel valve)
P1 : From self pressure reducing valve
ACC: Plug

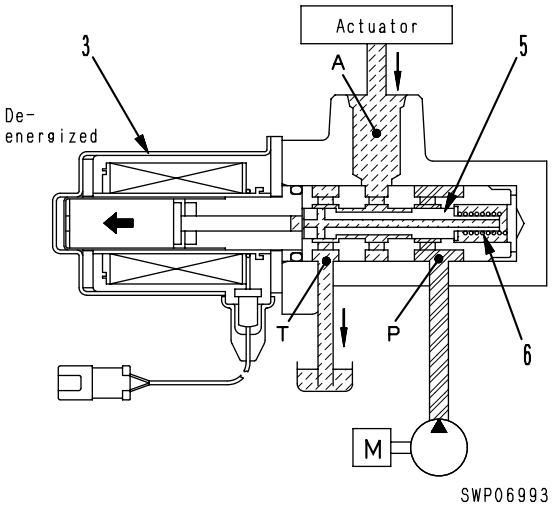


1. Connector
2. Movable core
3. Coil
4. Cage
5. Spool
6. Block
7. Spring

Operation

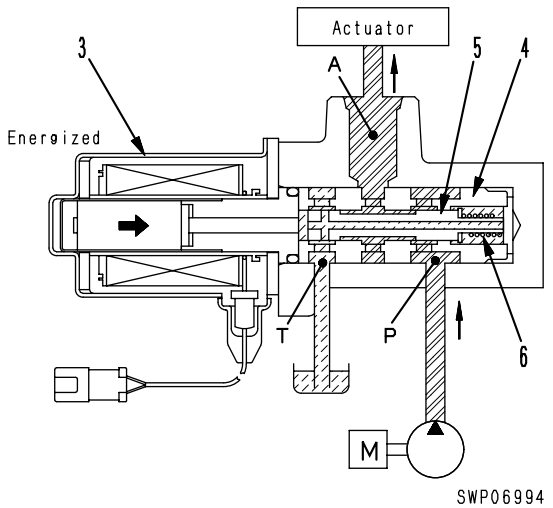
When solenoid is de-energized

- When the signal current does not flow from the PPC lock switch or swing lock switch, solenoid (3) is de-energized.
- For this reason, spool (5) is pushed fully to the left by spring (6).
- As a result, the circuit between ports **P** and **A** closes and the pressurized oil from the control pump does not flow to the actuator.
- At the same time, the pressurized oil from the actuator flows from port **A** to port **T**, and is then drained to the tank.

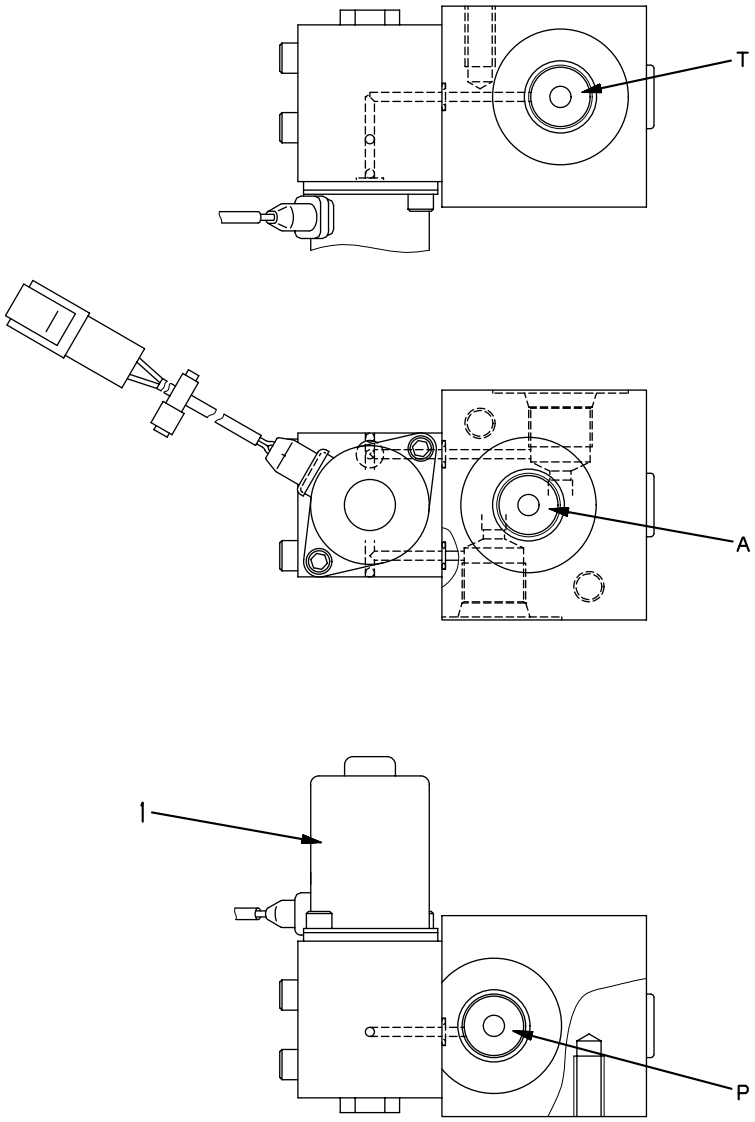


When solenoid is energized

- When the signal current flows from the PPC lock switch or swing lock switch to solenoid (3), solenoid (3) is energized.
  For this reason, spool (5) is pushed to the right in the direction of the arrow.
  As a result, the pressurized oil from the control pump flows from port **P** through the inside of spool (5) to port **A**, and then flows to the actuator. At the same time, port **T** is closed, and this stops the oil from flowing to the tank.



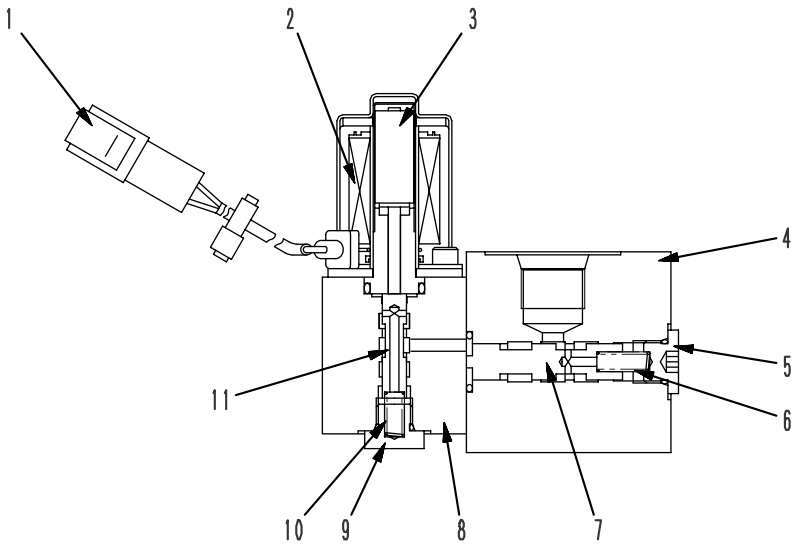
For PPC lock (under cab)



SWP08602

For PPC lock
1. PPC lock solenoid valve

T : To tank
A : To port P of work equipment PPC valve
To port P of travel PPC valve
P : From control pump



9JG00079

1. Connector
2. Solenoid
3. Variable iron core
4. Body
5. Plug
6. Spring
7. Spool
8. Body
9. Plug
10. Spring
11. Spool

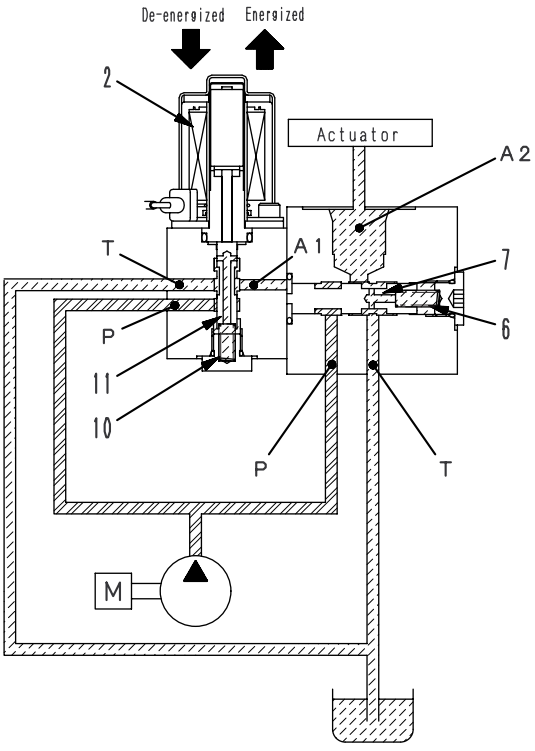
Operation

When solenoid is de-energized

- No signal current flows from the controller, so solenoid (2) is de-energized.
- Accordingly, spool (11) is pushed up and spool (7) is pushed to the left by spring (6).
- As a result, port **P** is closed, so pressure oil from the control pump does not flow to the actuator. At the same time, the oil from the actuator flows from port **A2** to port **T** and is drained to the tank.

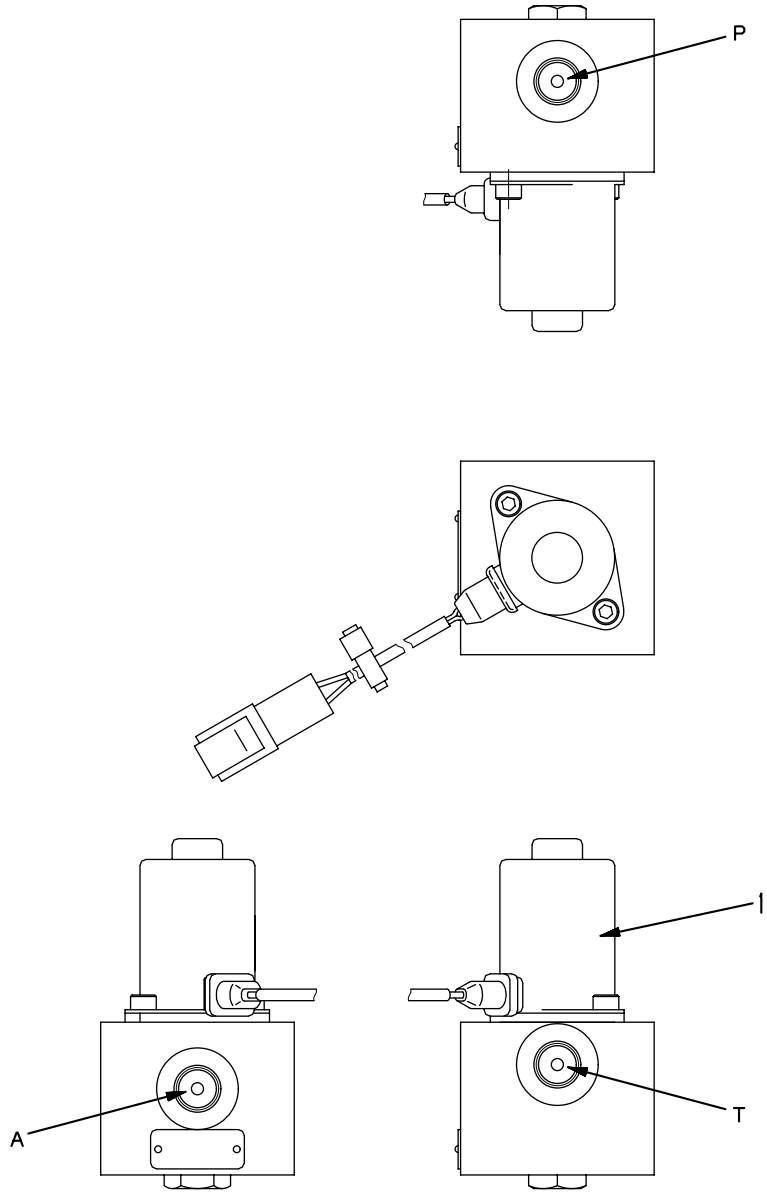
When solenoid is energized

- When the signal current flows from the controller to solenoid (2), solenoid (2) is energized.
- Accordingly, spool (11) is pushed down and the pressure oil from the control pump flows through port **P** to port **A1** and spool (7) is pushed to the right.
- As a result, pressure oil from the control pump flows from port **P** to port **A2**, and then flows to the actuator. At the same time, port **T** is closed, so the oil does not flow to the tank.



SJP09436

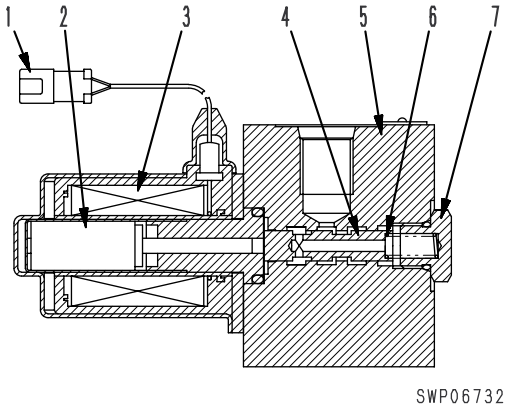
For swing priority (On left side of machine body)



SWP08642

1. Swing priority solenoid valve

T : To tank
A : To 5-spool control valve
P : From control pump

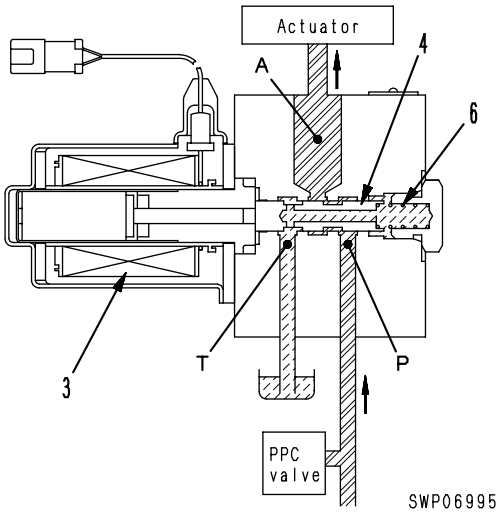


1. Connector
2. Movable iron core
3. Coil
4. Spool
5. Body
6. Spring
7. Plug

Operation

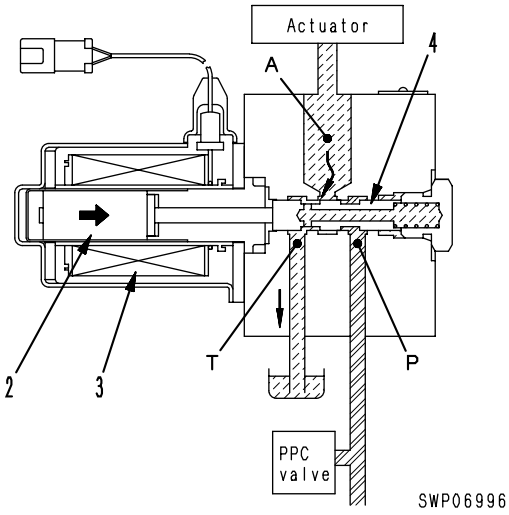
When solenoid is de-energized

- The signal current does not flow from the controller, so coil (3) is de-energized.
  For this reason, spool (4) is returned to the neutral position by spring (6).
  As a result, the circuit between ports **P** and **A** is connected, and the pressurized oil from the PPC valve flows to the control valve.



When solenoid is energized

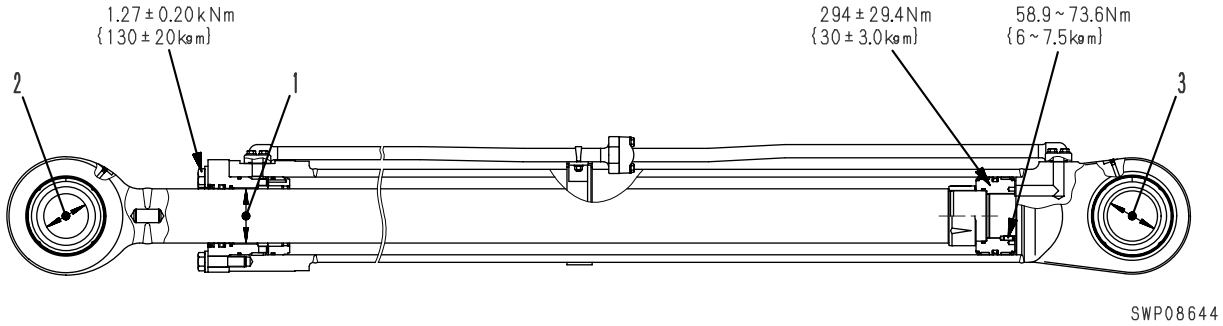
- When the signal current flows from the controller to coil (3), coil (3) is energized and movable iron core (2) is pushed to the right in the direction of the arrow.
- For this reason, spool (4) is also pushed to the right in the direction of the arrow.
  As a result, port **P** is closed, and the pressure oil from the control pump does not flow to the control valve.
  At the same time, port **A** and port **T** are interconnected, and the oil from the control valve is drained to the tank.



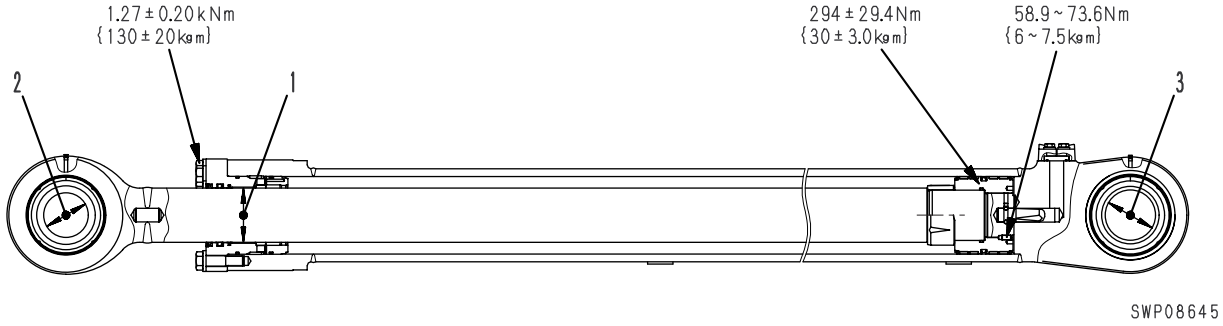
Hydraulic cylinder

Backhoe specification
PC800, 800LC

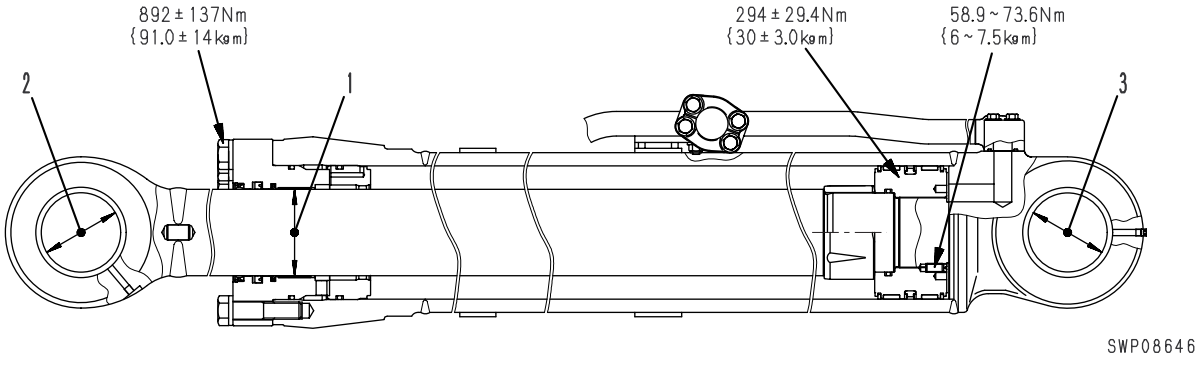
Boom cylinder



Arm cylinder



Bucket cylinder



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	140	–0.043 –0.106	+0.256 +0.039	0.082 – 0.362	0.062	Replace bushing
		Arm	120	–0.036 –0.090	+0.263 +0.048	0.084 – 0.353	0.062	
		Bucket	130	–0.036 –0.090	+0.263 +0.048	0.084 – 0.353	0.062	
2	Clearance between piston rod support shaft and bushing	Boom	115	–0.036 –0.090	+0.025 0	0.036 – 0.115	1.5	Replace pin, bushing
		Arm	110	–0.036 –0.090	+0.457 +0.370	0.406 – 0.547	1.5	
		Bucket	110	–0.036 –0.090	+0.457 +0.370	0.406 – 0.547	1.5	
3	Clearance between cylinder bottom support shaft and bushing	Boom	130	–0.043 –0.106	+0.025 0	0.043 – 0.131	1.5	
		Arm	110	–0.036 –0.090	+0.457 +0.370	0.406 – 0.547	1.5	
		Bucket	110	–0.036 –0.090	+0.457 +0.370	0.406 – 0.547	1.5	

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00384-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

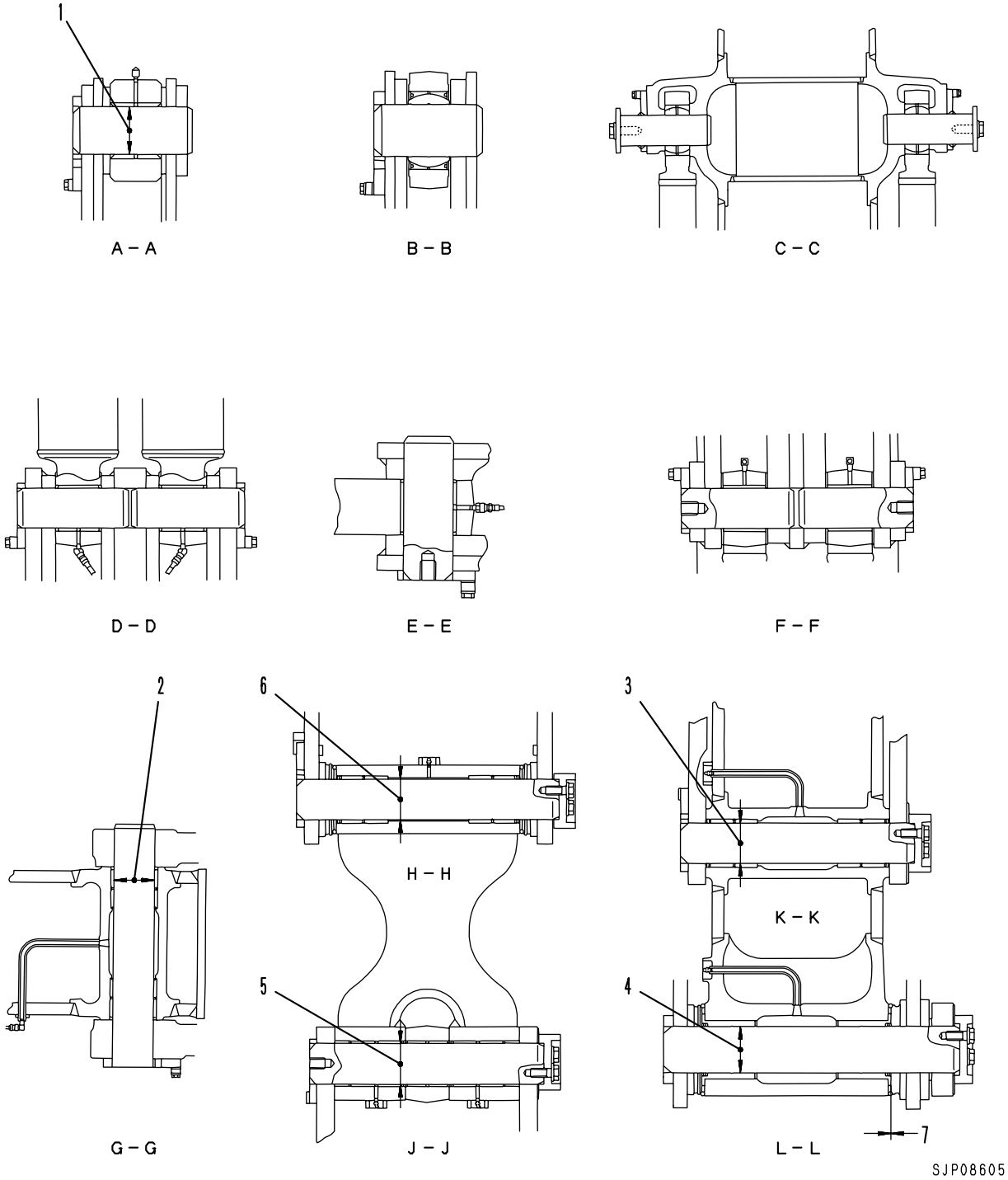
10 Structure, function and maintenance standard

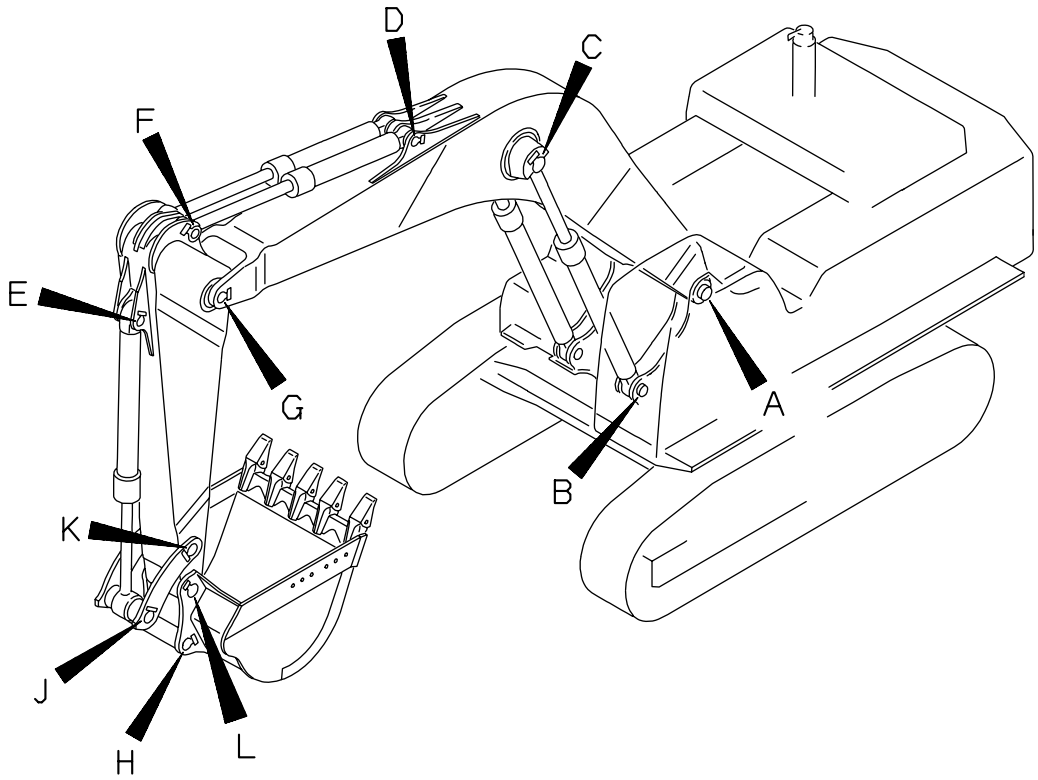
Work equipment

Work equipment
Work equipment 2
Dimensions of work equipment 4

Work equipment

Work equipment
PC800, 800LC-8



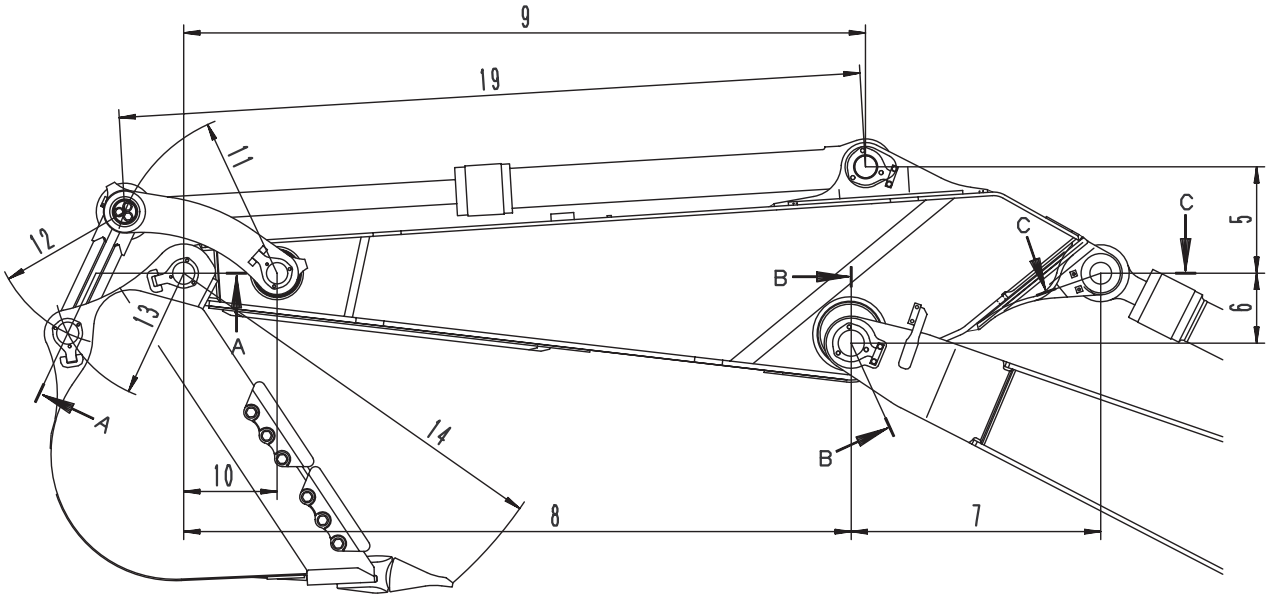


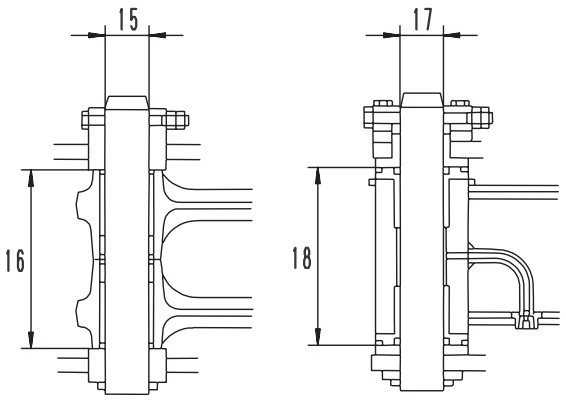
Unit: mm

No.	Check item		Criteria					Remedy
			Standard size	Tolerance		Standard clearance	Clearance limit	
				Shaft	Hole			
1	Clearance between bushing and mounting pin of boom and revolving frame		140	–0.043 –0.106	+0.542 +0.442	0.485 – 0.648	1.5	Replace
2	Clearance between bushing and mounting pin of boom and arm		140	–0.043 –0.106	+0.542 +0.442	0.485 – 0.648	1.5	
3	Clearance between bushing and mounting pin of arm and link		115	–0.036 –0.090	+0.351 +0.271	0.307 – 0.441	1.5	
4	Clearance between bushing and mounting pin of arm and bucket		130	–0.043 –0.106	+0.482 +0.392	0.435 – 0.588	1.5	
5	Clearance between bushing and mounting pin of link and link	3.6M Arm	110	–0.036 –0.090	+0.351 +0.271	0.307 – 0.441	1.5	
		2.9M Arm	140	–0.043 –0.106	+0.397 +0.312	0.313 – 0.467	1.5	
6	Clearance between bushing and mounting pin of link and bucket		115	–0.036 –0.090	+0.351 +0.271	0.307 – 0.441	1.5	
7	Bucket clearance		0.5 – 1.0					Adjust shims

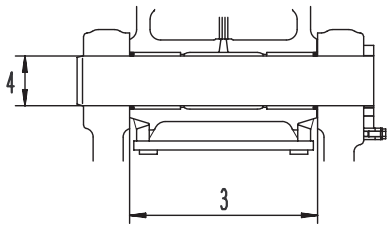
Dimensions of work equipment

1. Arm

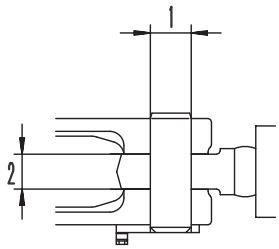




A – A



B – B



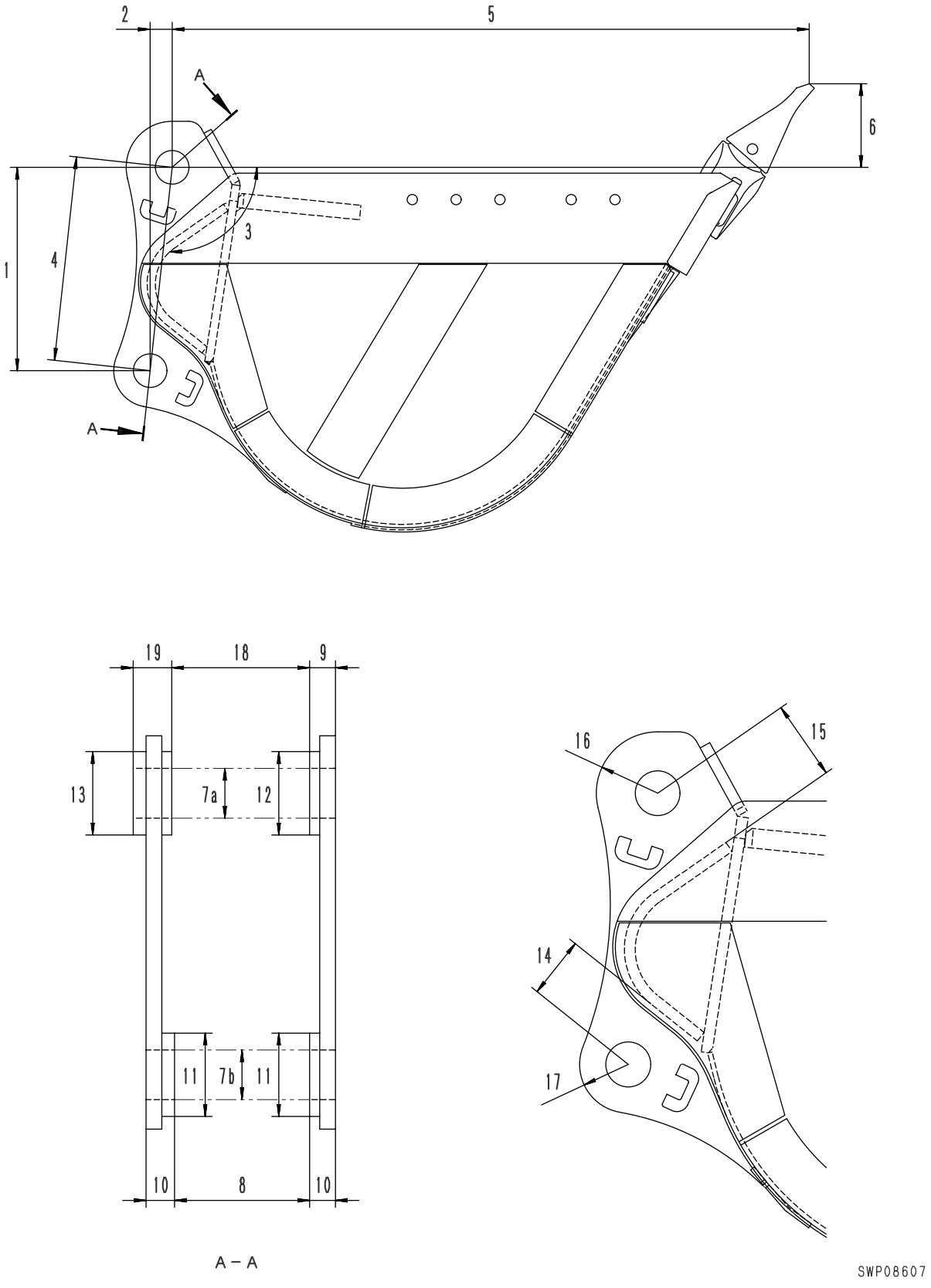
C – C

9JG02240A

Unit: mm

No.	Model	PC800-8, 800LC-8	
		with 3.6 m arm	with 2.9 m short arm
1		ø110	ø110
2		129	129
3		531	531
4		ø140	ø140
5		663	750
6		329	401
7		925	916
8		3,585	2,917
9		4,011	3,580
10		585	500
11		1,035	840
12		865	640
13		756	670
14		2,237	2,233
15		ø115	ø115
16		519	519
17		ø130	ø130
18	Arm as one part	519	519
	When press-fitting bushing	535	535
19	Min.	2,590	2,490
	Max.	4,410	3,910

2. Bucket



Unit: mm

Model / No.		PC800-8 8.0M Boom / 3.6M Arm		PC800-8, 800LC-8 7.1M Boom / 2.9M Arm		
		with 2.8 m^3 bucket	with 3.1 m^3 bucket	with 4.0 m^3 bucket	with 4.3 m^3 bucket	with 4.5 m^3 bucket
1		749	749	667	667	667
2		104	104	61	61	61
3		98°	98°	95°	95°	95°
4		756	756	670	670	670
5		2,218	2,218	2,211	2,211	2,211
6		292	292	315	315	315
7	a	ø130	ø130	ø130	ø130	ø130
	b	ø115	ø115	ø115	ø115	ø115
8		520	520	520	520	520
9		80.5	80.5	80.5	80.5	80.5
10		88.5	88.5	88.5	88.5	88.5
11		ø208	ø208	ø208	ø208	ø208
12		ø255	ø255	ø255	ø255	ø255
13		ø275	ø275	ø275	ø275	ø275
14		217	217	135	135	135
15		175	175	181	181	181
16		157.5	157.5	157.5	157.5	157.5
17		125	125	125	125	125
18		559.5	559.5	559.5	559.5	559.5
19		79	79	79	79	79

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00385-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

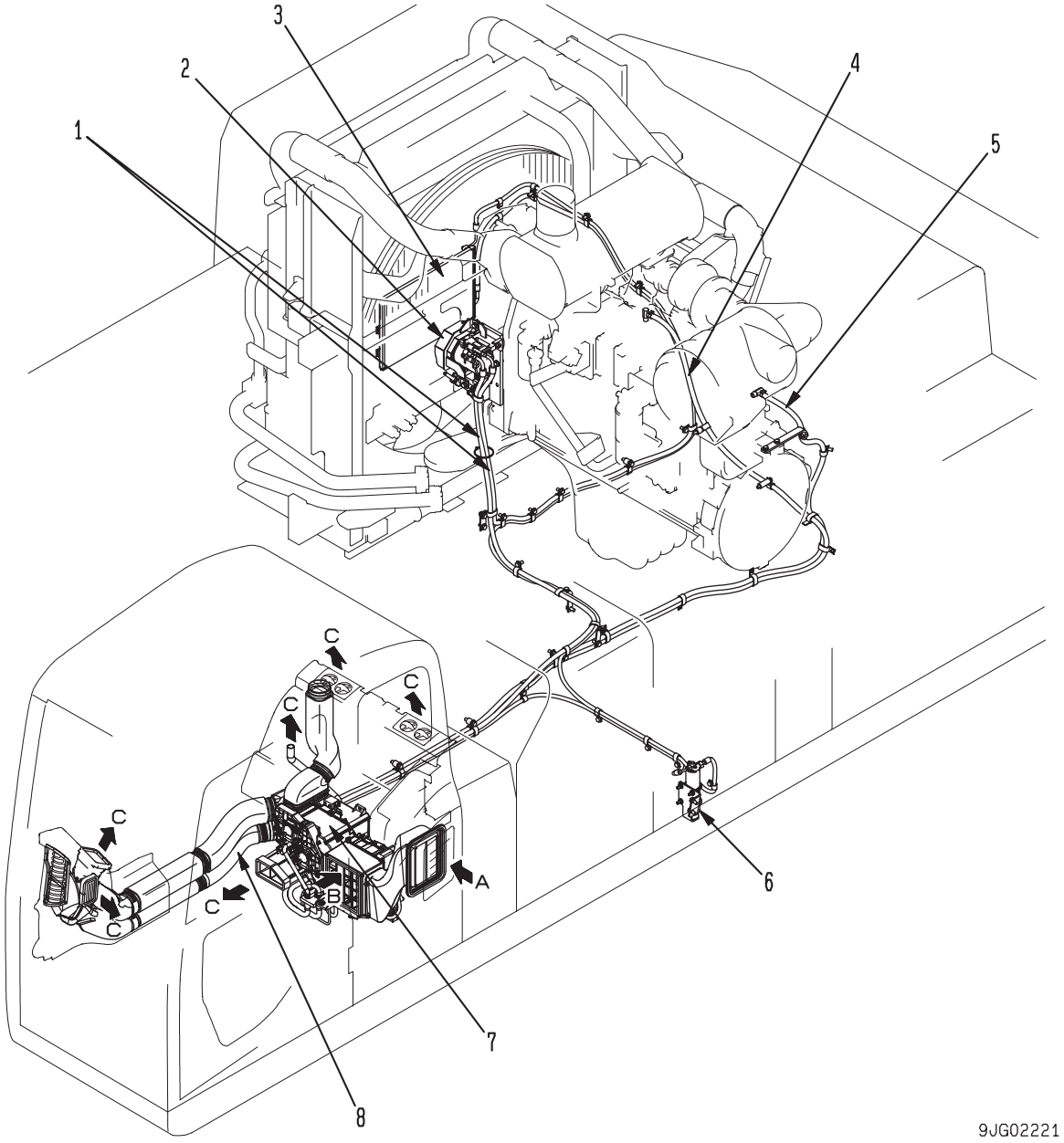
Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

10 Structure, function and maintenance standard
Cab and its attachments

Cab and its attachments
Air conditioner piping 2

Cab and its attachments
Air conditioner piping

For the electric circuit diagram of the air conditioner, see “Others”.



1. Air conditioner unit
2. Duct
3. Refrigerant piping
4. Air conditioner compressor
5. Condenser
6. Receiver tank
7. Hot water return piping
8. Hot water pickup piping

A : Fresh air
B : Recirculated air
C : Hot air/cold air

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00396-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

10 Structure, function and maintenance standard
Electrical system

Electrical system
Engine control 2
Electric control system 11
Monitor system 45
Sensors 63

Electrical system

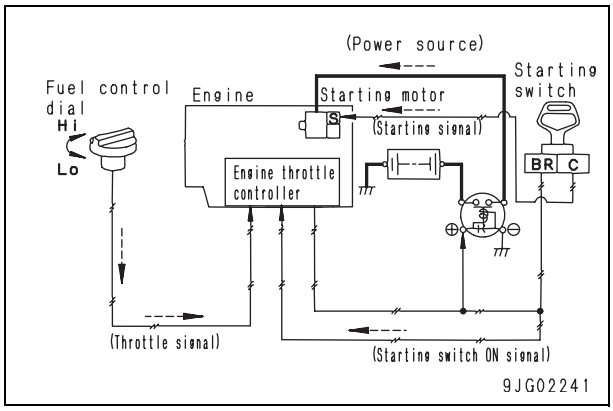
Engine control

Operation of system

Starting engine

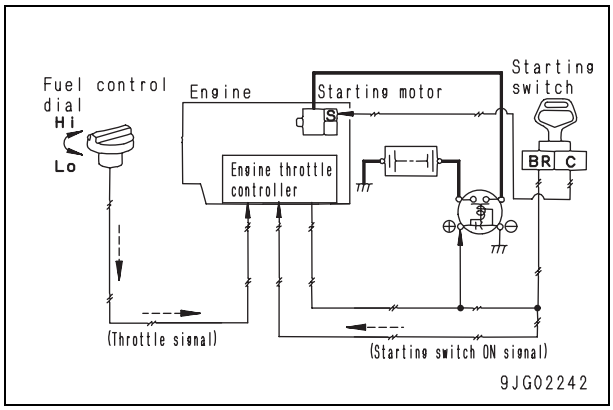
- When the starting switch is turned to the “START” position, the starting signal flows to the starting motor. Then, the starting motor turns to start the engine.

  When it happens, the engine controller checks the signal voltage from the fuel control dial and sets the engine speed to the speed set by the fuel control dial.



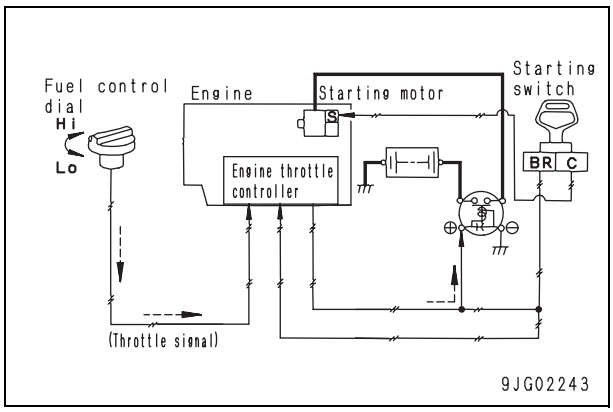
Engine speed control

- The fuel control dial sends a signal voltage corresponding to the rotation angle to the engine controller.
- The pump controller receives the fuel dial position information from the engine controller through the network.
- The pump controller calculates the engine speed in accordance with the working mode, the deceleration, and the like, and sends an instruction to the engine controller.
- The engine controller determines the fuel injection quantity based on the instruction received from the pump controller.



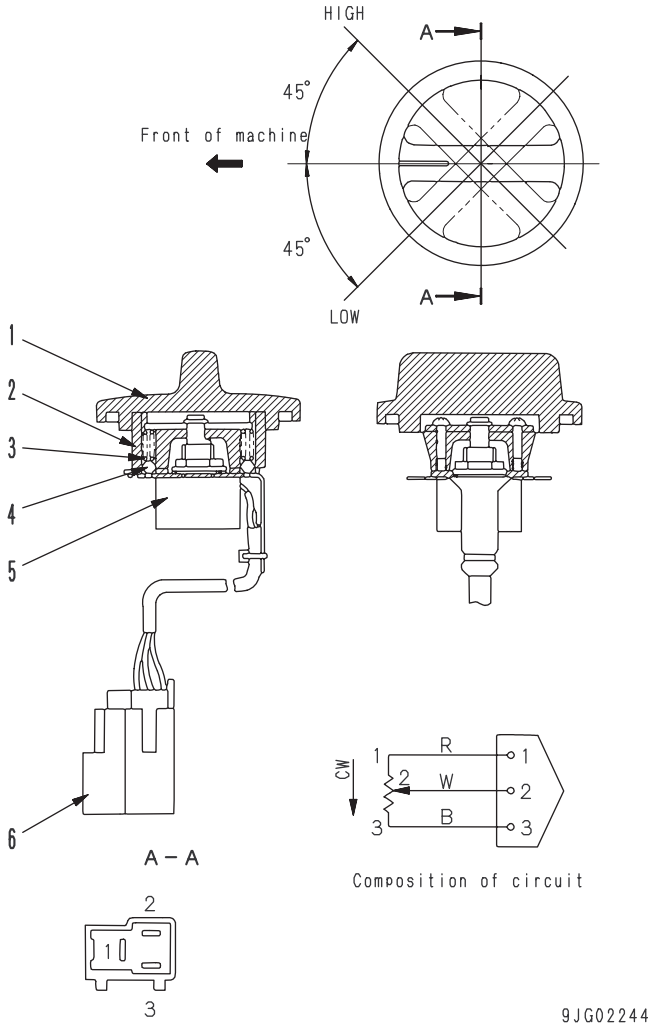
Stopping engine

- When detecting that the starting switch is set to the “STOP” position, the engine controller cuts the fuel injection to stop the engine.



Component

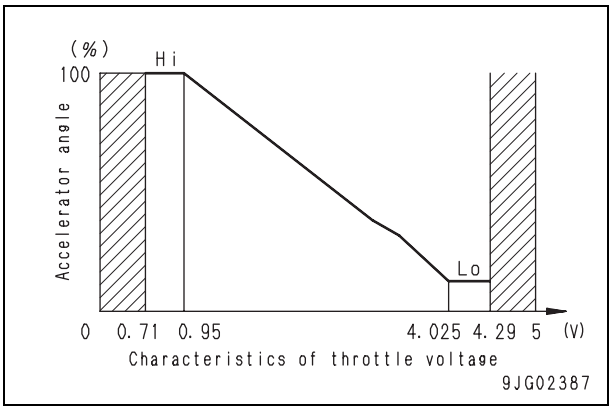
Fuel control dial



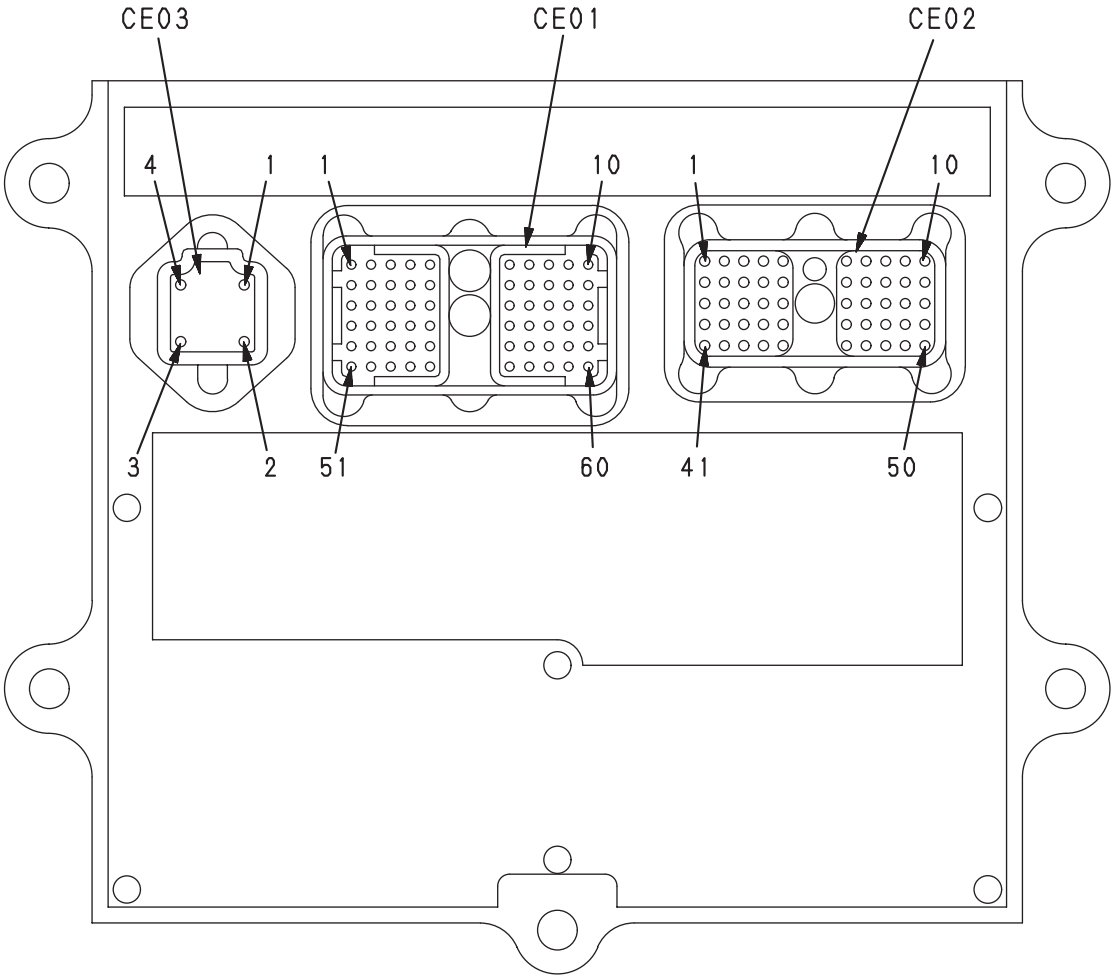
1. Knob
2. Dial
3. Spring
4. Ball
5. Potentiometer
6. Connector

Function

- A potentiometer is installed under the knob. As the knob is turned, the potentiometer shaft is turned.
- As the potentiometer shaft is turned, the resistance of the variable resistor in potentiometer (5) changes and a throttle signal is sent to the engine controller.
- The hatched area in the graph shown at right is the abnormality detection area.



Engine controller



- Meanings of signal classes in the terminal table shown below are as follows.
  A : Power Supply
  B : Input
  C : Ground/Shield/Return
  D : Output
  E : Communication

CN-CE01

Pin No.	Signal name	Input/ output
1	NC(*)	—
2	NC(*)	—
3	Atmosphere sensor	B
4	Supply pump #1 (+)	D
5	Supply pump #1 (–)	C
6	CAN(+)	E
7	NC(*)	—
8	CAN(+)	E
9	Supply pump #2 (+)	D
10	Supply pump #2 (–)	C

*: Never connect to NC or malfunctions or failures will occur.

CN-CE01

Pin No.	Signal name	Input/ output
11	EGR valve	D
12	NC(*)	—
13	Engine oil pressure sensor	B
14	NC(*)	—
15	Coolant temperature sensor	B
16	5V electric power supply for sensor	A
17	NC(*)	—
18	NC(*)	—
19	EGR valve position sensor	B
20	EGR valve inlet pressure sensor	B
21	NC(*)	—
22	EGR valve (+)	D
23	Boost temperature sensor	B
24	NC(*)	—
25	Common rail pressure sensor	B
26	Bkup sensor	B
27	NE sensor (+)	B

*: Never connect to NC or malfunctions or failures will occur.

CN-CE01

Pin No.	Signal name	Input/ output
28	NC(*)	—
29	Bypass valve position sensor	B
30	Fuel temperature sensor	B
31	Bypass valve (+)	D
32	NC(*)	—
33	5 V electric power supply for sensor	A
34	NC(*)	—
35	NC(*)	—
36	NC(*)	—
37	5 V electric power supply for sensor	A
38	GND	C
39	NC(*)	—
40	NC(*)	—
41	NC(*)	—
42	NC(*)	—
43	NC(*)	—
44	Boost pressure sensor	B
45	Injector #1 (+)	D
46	Injector #5 (+)	D
47	Sensor GND	C
48	Ne sensor (–)	C
49	NC(*)	—
50	NC(*)	—
51	Injector #2 (–)	C
52	Injector #3 (–)	C
53	Injector #1 (–)	C
54	Injector #2 (+)	D
55	Injector #3 (+)	D
56	Injector #4 (+)	D
57	Injector #6 (+)	D
58	Injector #4 (–)	C
59	Injector #6 (–)	C
60	Injector #5 (–)	C

*: Never connect to NC or malfunctions or failures will occur.

CN-CE02

Pin No.	Signal name	Input/ output
1	NC(*)	B
2	NC(*)	B
3	NC(*)	B
4	NC(*)	B
5	NC(*)	B
6	NC(*)	B
7	NC(*)	B
8	NC(*)	B
9	Fuel control dial (+)	B
10	NC(*)	E
11	NC(*)	B
12	NC(*)	B

*: Never connect to NC or malfunctions or failures will occur.

CN-CE02

Pin No.	Signal name	Input/ output
13	NC(*)	B
14	NC(*)	B
15	NC(*)	B
16	NC(*)	B
17	NC(*)	B
18	NC(*)	B
19	NC(*)	B
20	NC(*)	E
21	NC(*)	A
22	Fuel control dial (+5V)	A
23	Fuel control dial (–)	C
24	NC(*)	B
25	NC(*)	B
26	NC(*)	B
27	NC(*)	B
28	NC(*)	B
29	NC(*)	C
30	NC(*)	B
31	NC(*)	B
32	NC(*)	C
33	NC(*)	C
34	NC(*)	C
35	NC(*)	B
36	NC(*)	B
37	NC(*)	C
38	NC(*)	D
39	Key switch (ACC)	B
40	Electrical intake air heater relay drive	D
41	NC(*)	D
42	Electrical intake air heater relay GND	C
43	NC(*)	D
44	NC(*)	D
45	NC(*)	—
46	CAN(+)	E
47	CAN(–)	E
48	NC(*)	D
49	NC(*)	—
50	NC(*)	D

*: Never connect to NC or malfunctions or failures will occur.

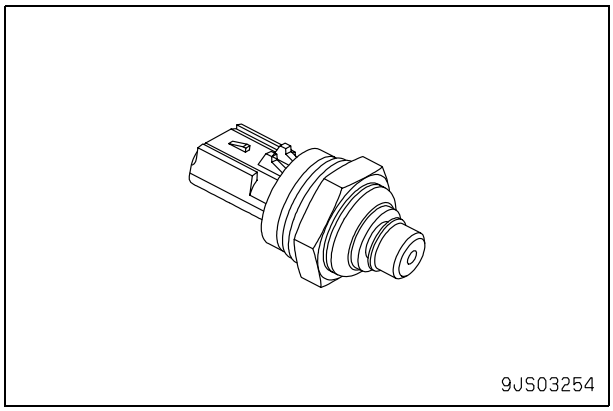
CN-CE03

Pin No.	Signal name	Input/ output
1	GND	C
2	NC(*)	C
3	Electric power supply (+24V constantly)	A
4	NC(*)	A

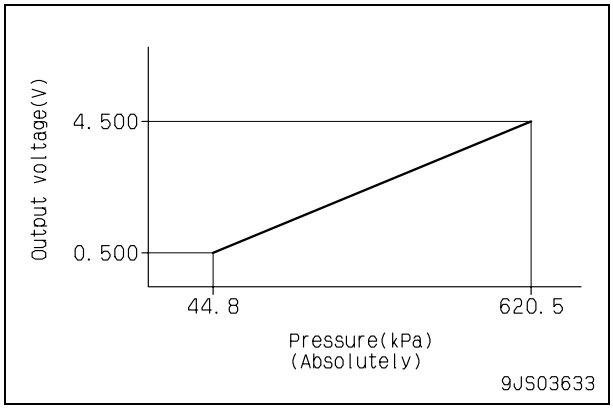
*: Never connect to NC or malfunctions or failures will occur.

EGR valve inlet pressure sensor

- This sensor is used to sense the EGR pressure.

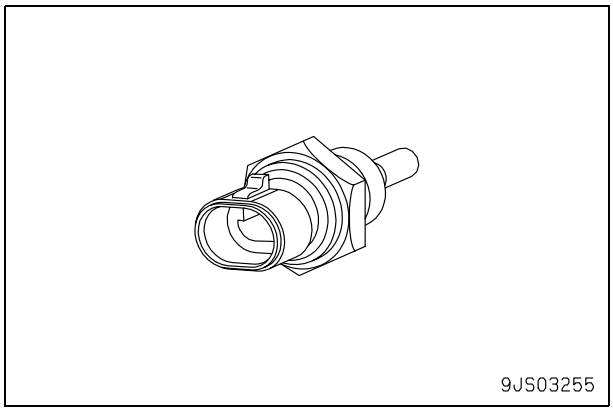


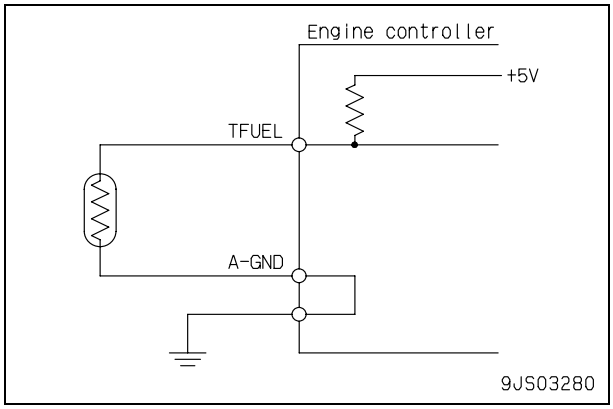
- The following graph shows the output characteristics of the EGR inlet pressure sensor.



Fuel temperature sensor

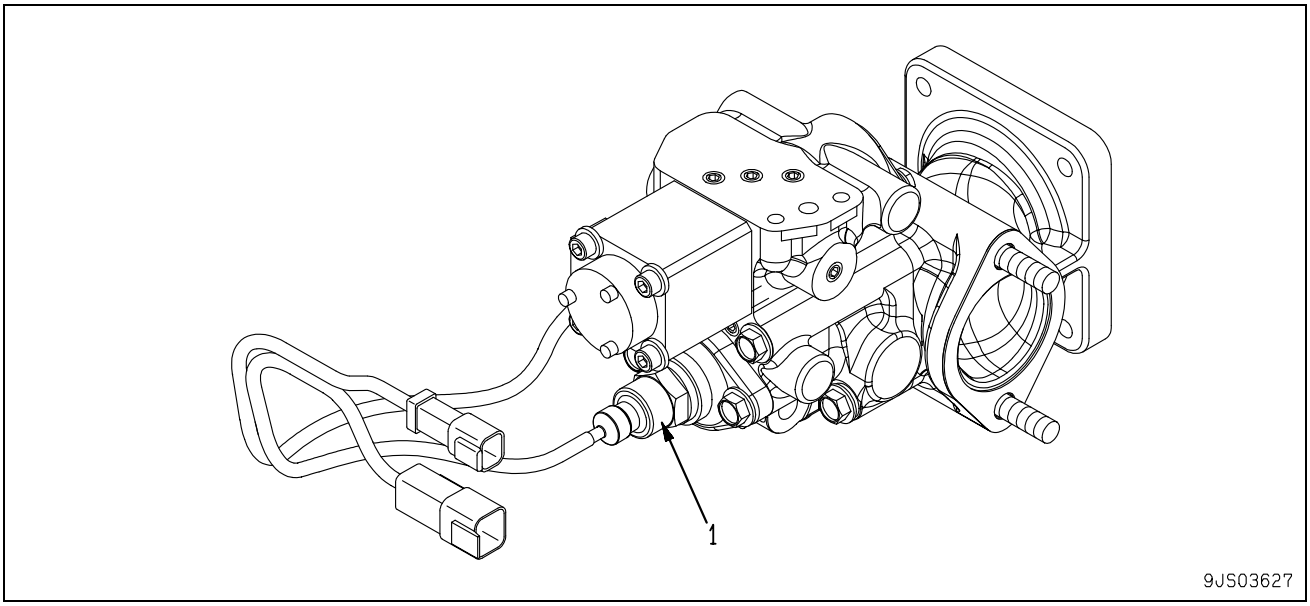
- The fuel temperature sensor senses the fuel temperature and sends it to the engine controller. The sensor unit is a thermistor the resistance of which changes according to the temperature.
- The engine throttle controller applies voltage to the thermistor and senses the temperature by the voltage divided by the resistance in the computer and the resistance of the thermistor.





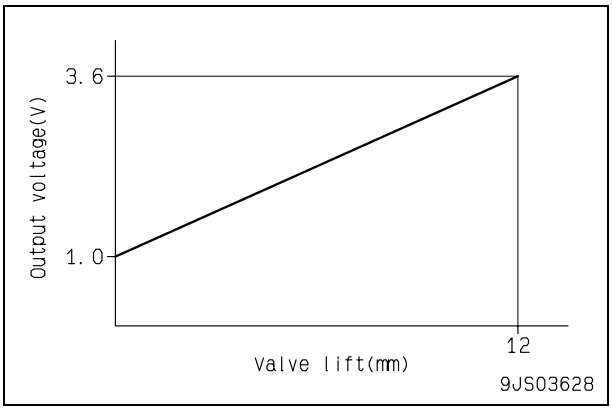
EGR valve position sensor, bypass valve position sensor

- These sensors sense the opening and closing positions of the EGR valve and bypass valve.



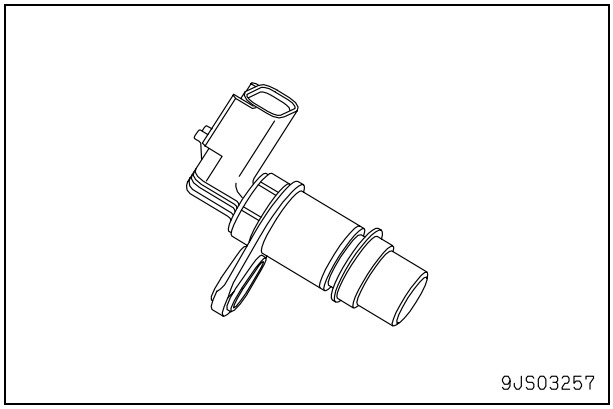
1. EGR valve position sensor, bypass valve position sensor

- The following graph shows the output characteristics of the position sensor.



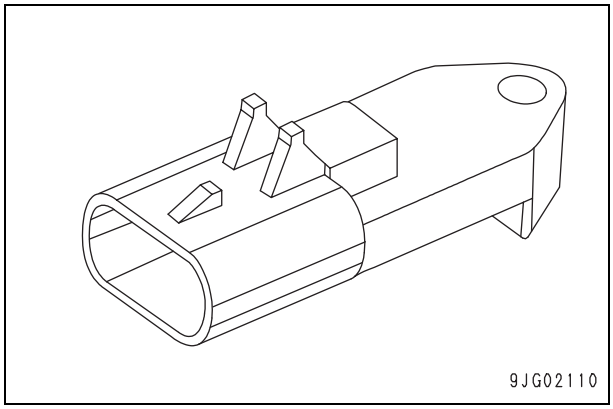
NE speed sensor (Crank angle sensor)

- If the signal hole made on the flywheel passes the sensor, the magnetic line of force changes.
- If the magnetic line of force changes, the output of the Hall element sensor changes linearly and it is converted into pulse of 0 – 5 V by the wave form shaping circuit in the sensor, and then output.

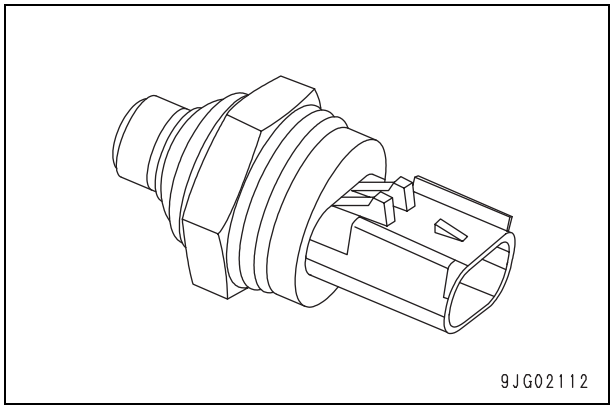


Atmospheric pressure sensor

- This sensor is used to correct altitude.

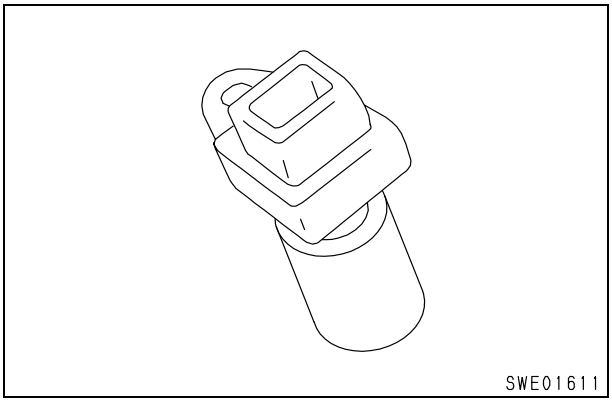


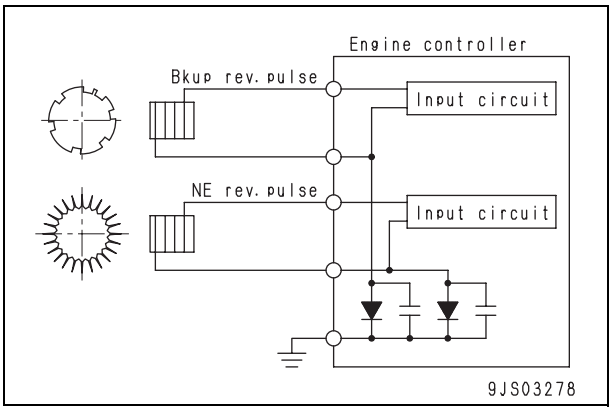
Common rail pressure sensor, oil pressure sensor



Bkup speed sensor (G sensor) (Cylinder No. sensor)

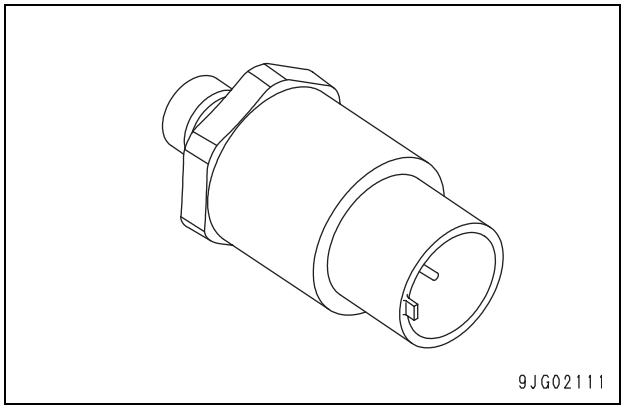
- Similarly to the NE speed sensor, this sensor utilizes the pulses of 0 – 5 V generated by the change of the magnetic line of force crossing the sensor unit.
- The disc gear installed to the central part of the camshaft of the high-pressure pump has teeth (cut parts) around it at intervals of 120°.
- In addition to the above teeth, one more tooth is installed. Accordingly, 7 pulses are generated every 2 revolutions of the engine.
- The standard pulse of the No. 1 cylinder is recognized by the combination of the NE speed sensor pulse and Bkup speed sensor pulse.


SWE01611



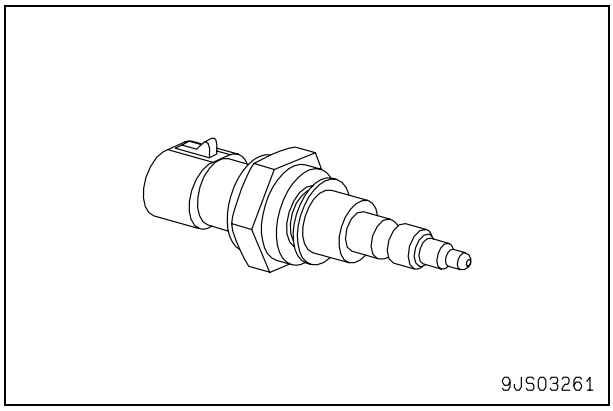
Boost pressure sensor

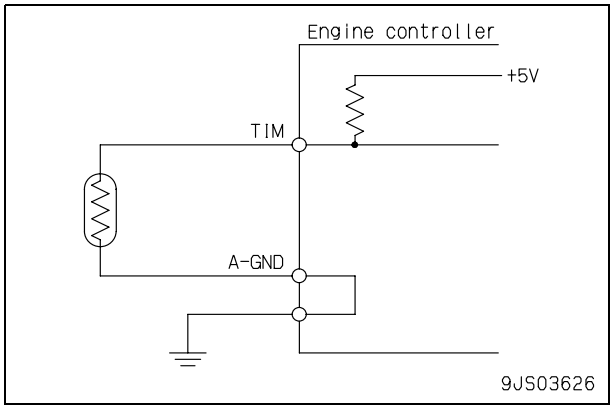
- This sensor is used to sense the boost pressure (charge pressure).


9JG02111

Boost temperature sensor

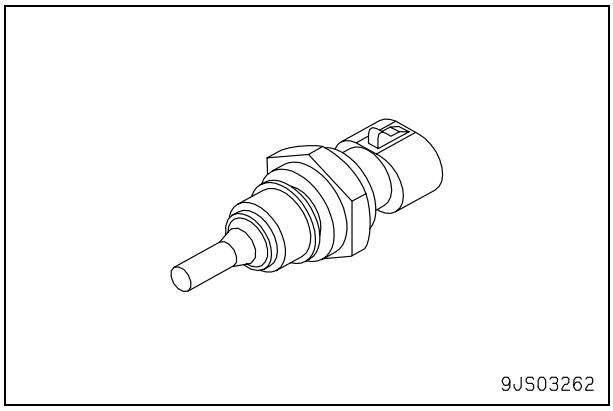
- The boost temperature sensor senses the intake air temperature (charge temperature) and sends it to the engine controller.
- The sensor unit is a thermistor the resistance of which changes according to the temperature. The engine controller applies voltage to the thermistor and senses the temperature by the voltage divided by the resistance in the computer and the resistance of the thermistor.

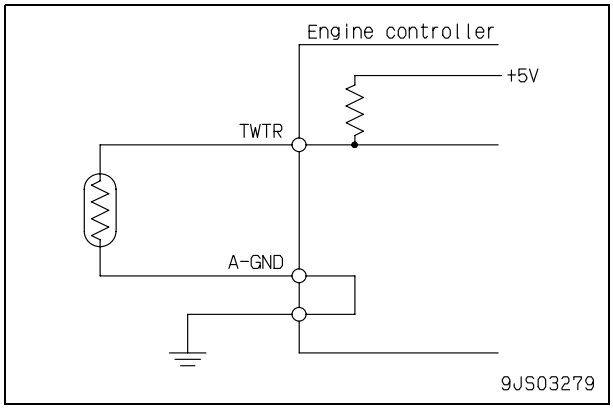




Coolant temperature sensor

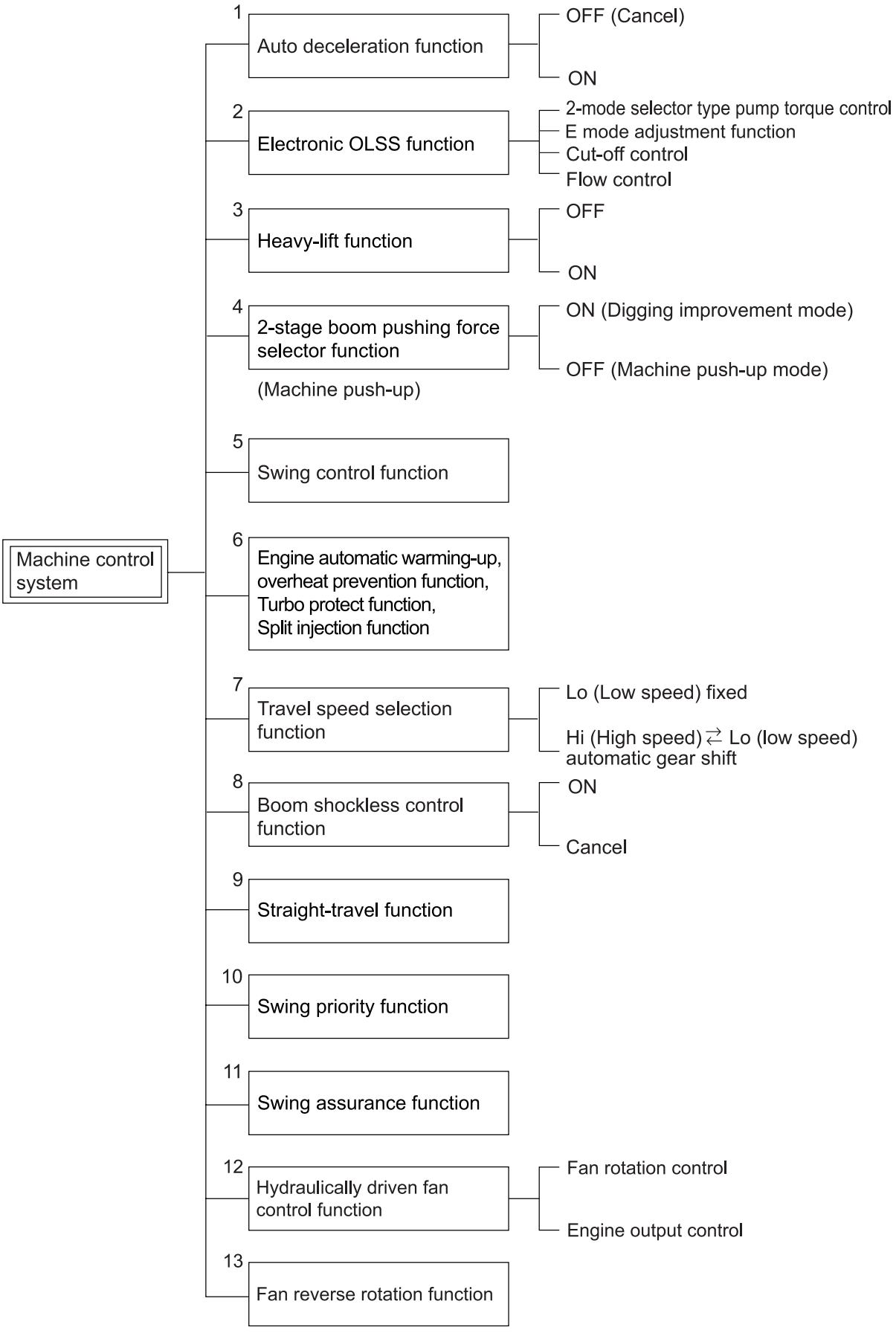
- The coolant temperature sensor senses the coolant temperature and sends it to the engine controller.
- The sensor unit is a thermistor the resistance of which changes according to the temperature. The engine controller applies voltage to the thermistor and senses the temperature by the voltage divided by the resistance in the computer and the resistance of the thermistor.



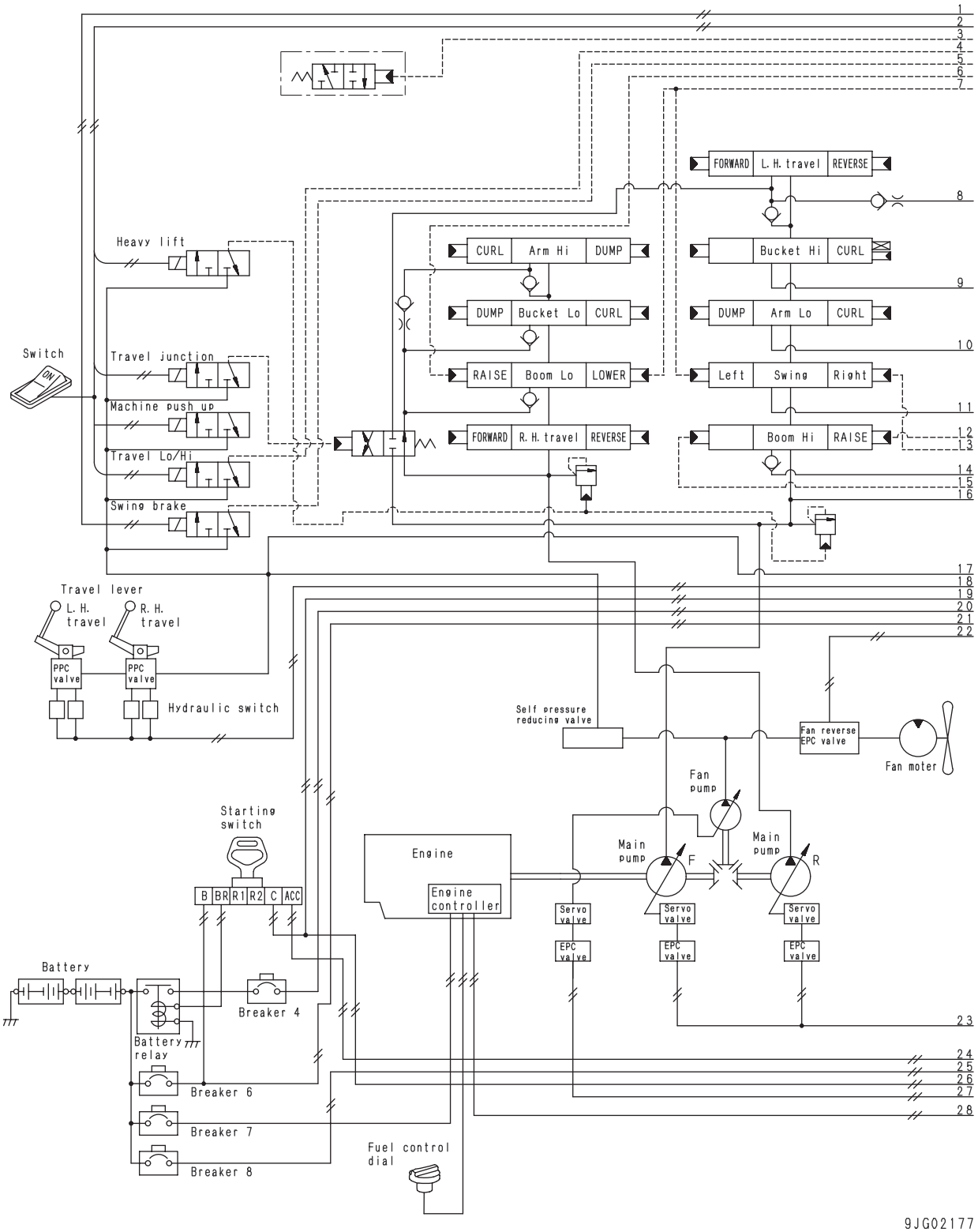


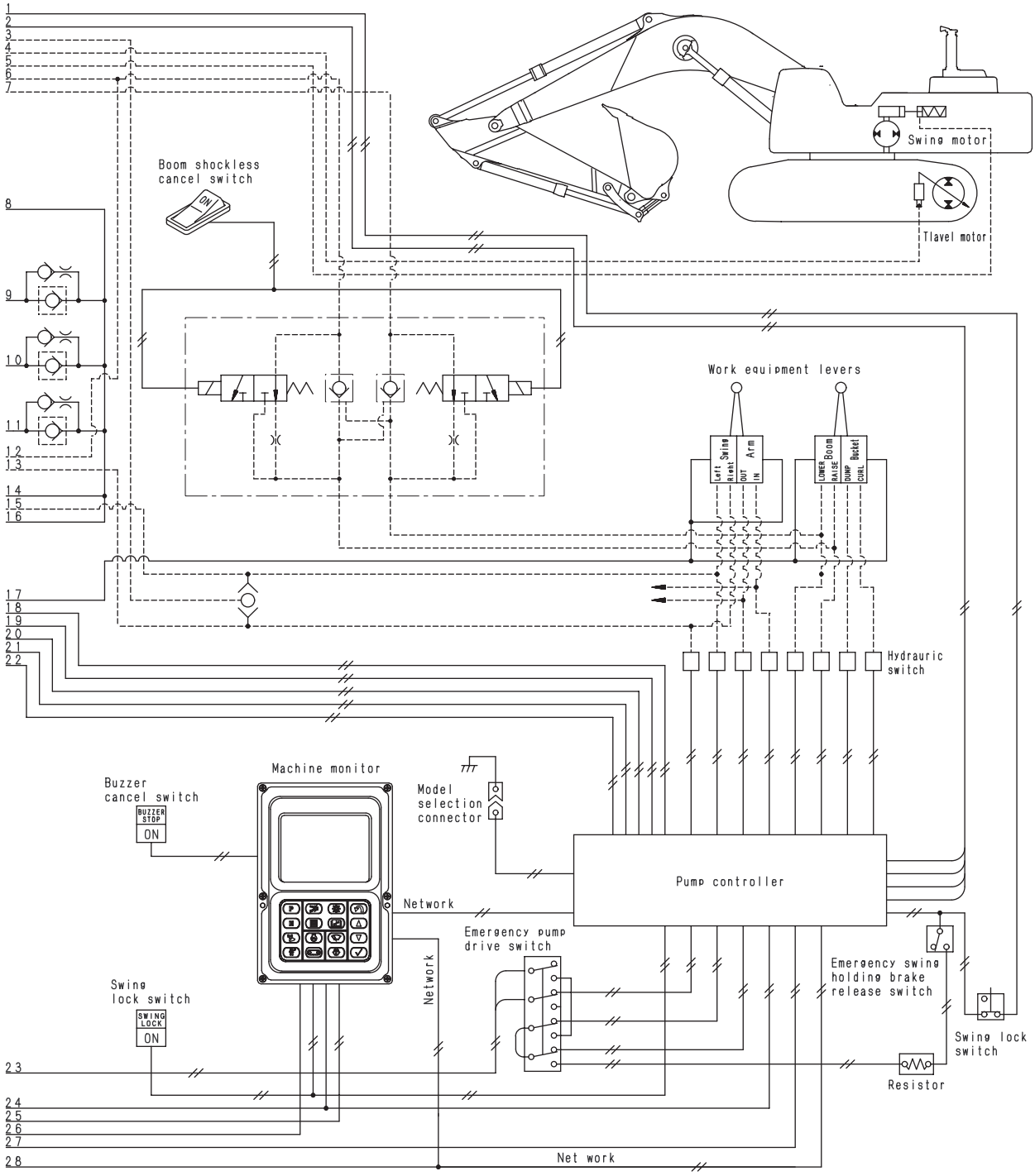
Electric control system

Control functions



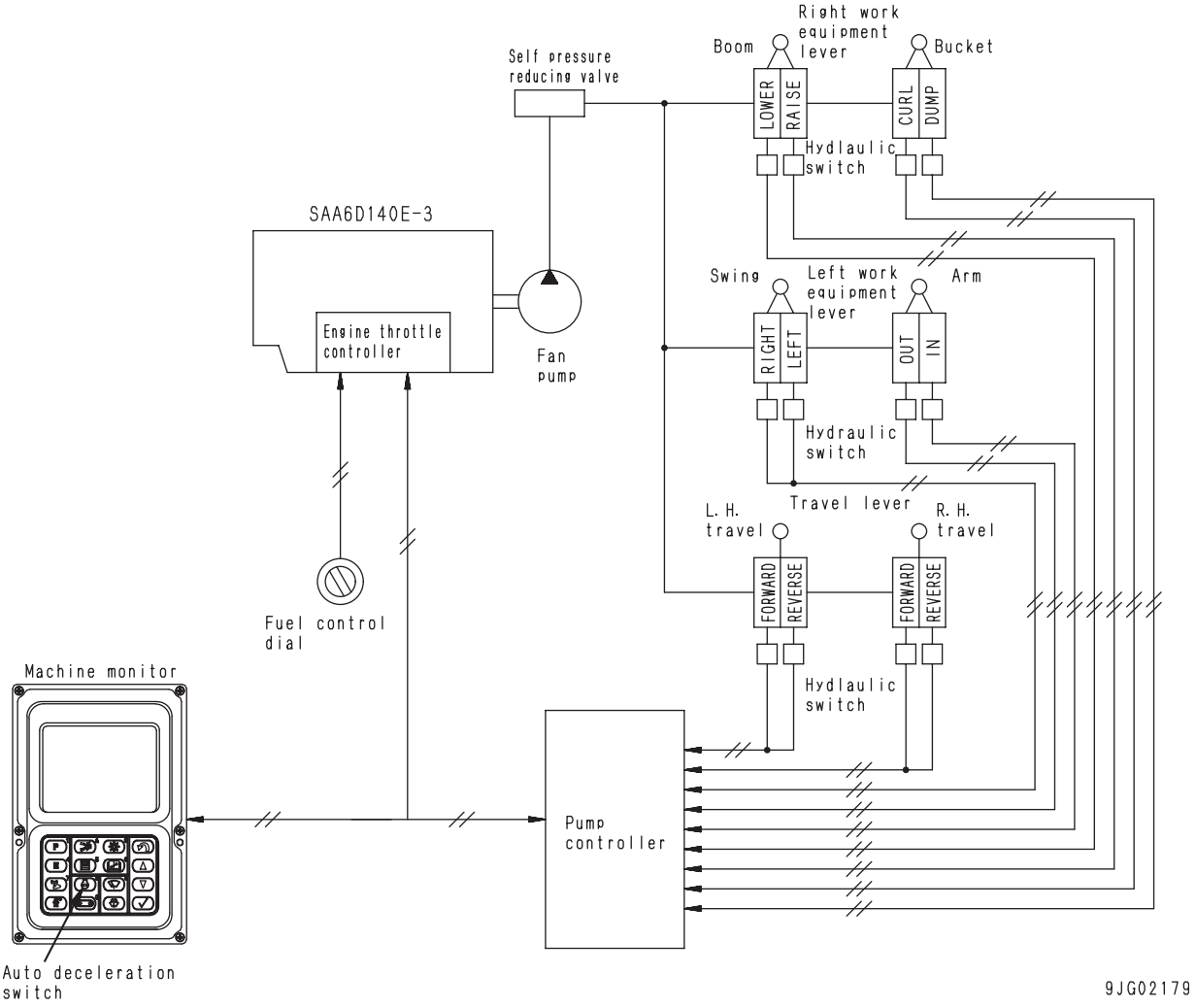
Machine control system diagram




Swing motor
Tlavel motor
Boom shockless cancel switch
ON
Work equipment levers
Left Swing
Right
OUT
IN
Arm
LOWER
RAISE
Boom
DUMP
CURL
Bucket
Hydrauric switch
Machine monitor
Buzzer cancel switch
BUZZER STOP
ON
Model selection connector
Pump controller
Network
Emergency pump drive switch
Emergency swing holding brake release switch
Swing lock switch
SWING LOCK
ON
Swing lock switch
Resistor
Net work
1
2
3
4
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9JG02178

1. Auto deceleration system



Function

- If all the control levers are at neutral when waiting for work or waiting for a dump truck, the engine speed is automatically reduced to a midrange speed to reduce fuel consumption and noise.
- If any lever is operated, the engine speed returns immediately to the set speed.

Operation

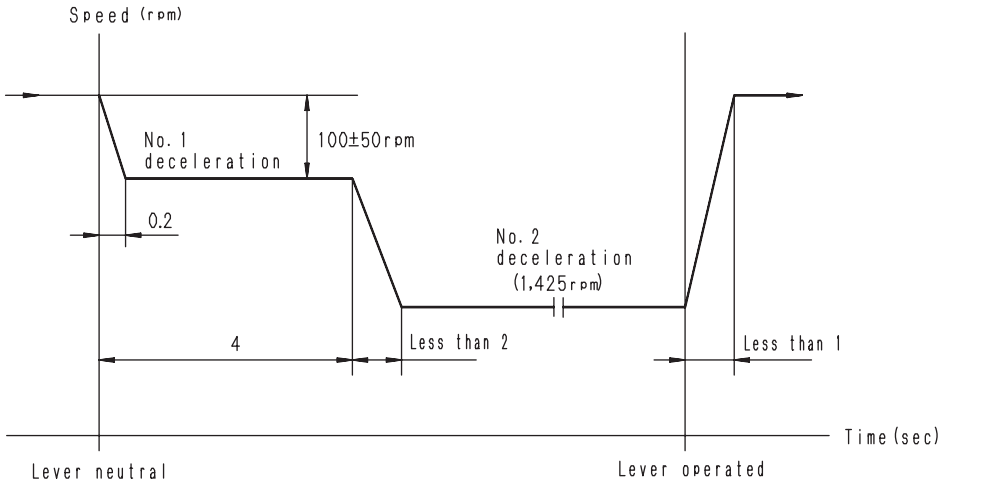
When auto-deceleration switch is turned ON

Control levers at neutral

- If the engine is running at above the deceleration actuation speed (approx. 1425 rpm), and all the control levers are returned to neutral, the engine speed drops immediately to approx. 100 rpm below the set speed relevant to the No. 1 deceleration position.
- If another 4 seconds passes, the engine speed is reduced to the No. 2 deceleration position (approx. 1425 rpm), and is kept at that speed until a lever is operated.

When control lever is operated

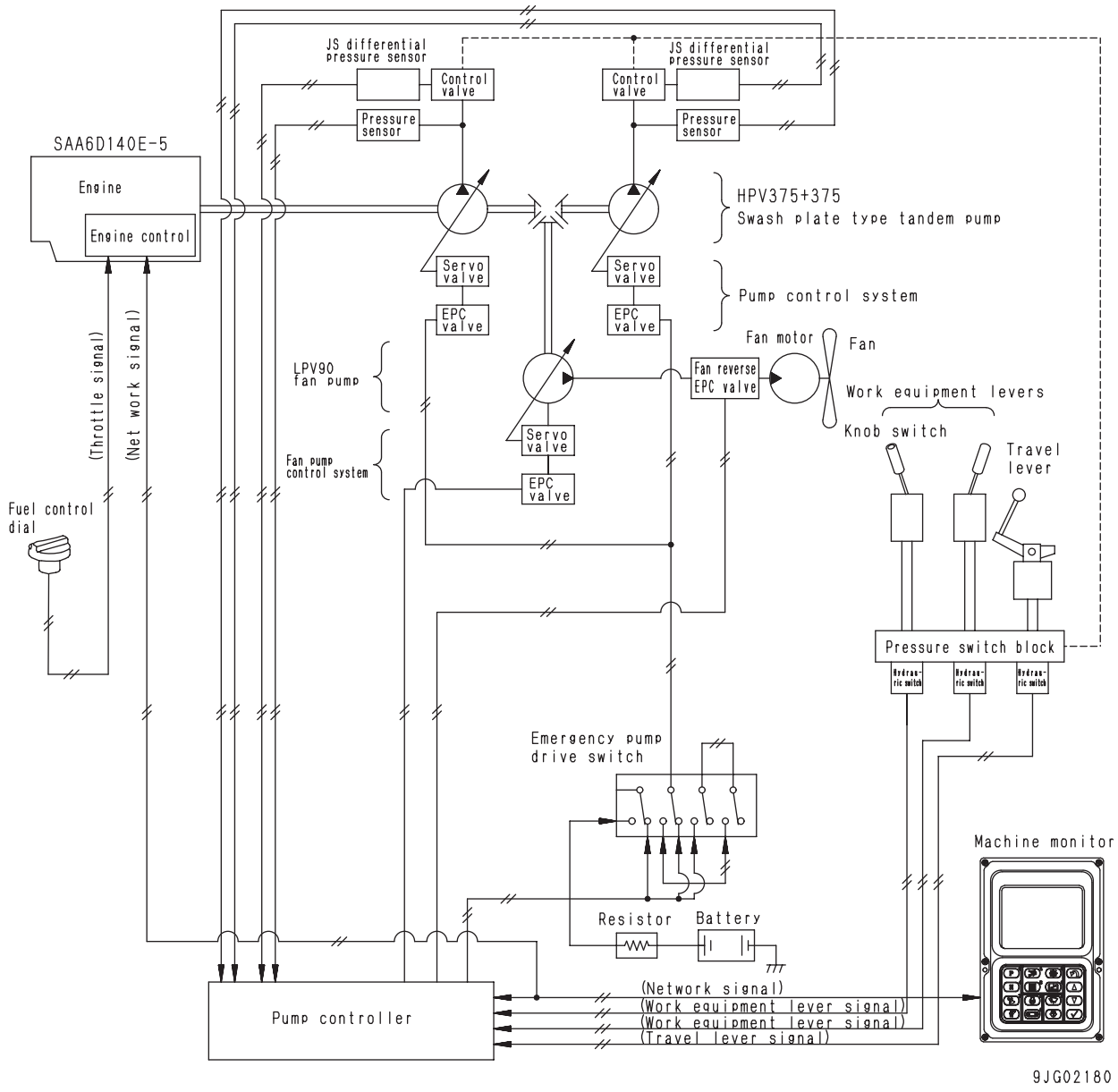
- If any control lever is operated when the engine speed is at No. 2 deceleration, the engine speed will immediately rise to the speed set by the fuel control dial.



9JG02245

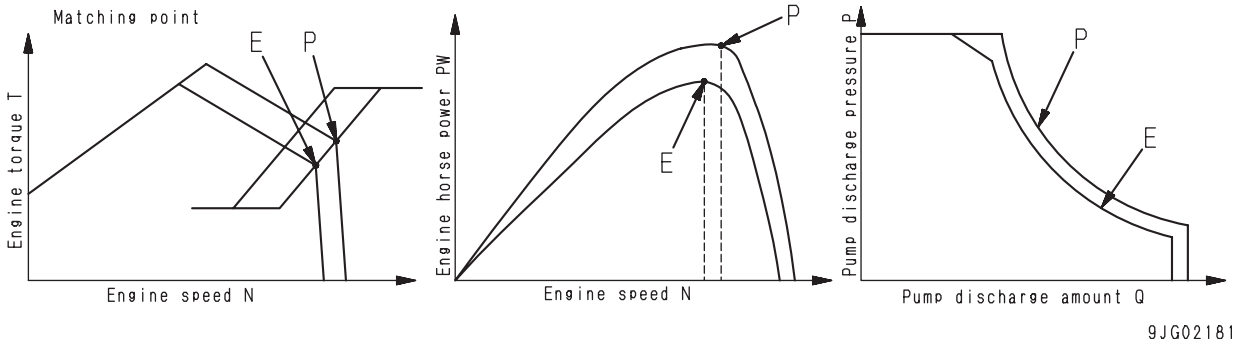
2. Electronic OLSS function

Pump control system



- Interconnected control of all pumps is carried out by one TVC valve.
- **P** mode: Total horsepower control by sensing engine speed
- E mode: Total horsepower control by sensing engine speed
- Emergency pump drive circuit: Constant delivery control
- The pump controller calculates each pump pressure and each J/S differential pressure and sends the capacity command value to the EPC valve of each pump to control the delivery of each pump.

1) Control method in each mode
P, E mode



- Matching point in **P**, **E** mode: Rated output point (Including fan pump absorption horsepower at fan max. speed)

Model / Mode	PC800, 800LC-8
P	370 kW/1,800 rpm {496 HP/1,800 rpm}
E	316 kW/1,650 rpm {423 HP/1,650 rpm}

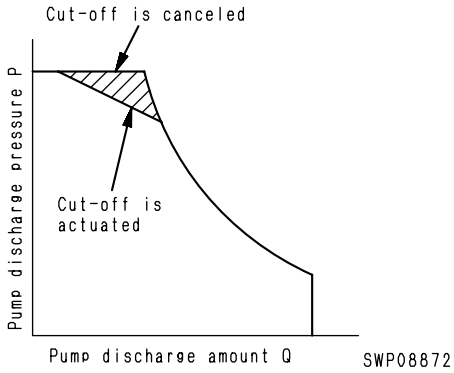
- When the load on the pump rises and the pressure rises, the engine speed goes down.
  At this time, the pump discharge (Q) is reduced and the engine speed (N) is set about the rated output point. If the pressure lowers, the pump discharge (Q) is increased until the engine speed is set about the rated output point.
  By repeating this control, the engine can always be used at near the rated output point.
- Compared with the **P** mode, which provides the maximum output, the **E** mode lowers the engine output to provide matching at a point which gives better fuel consumption efficiency than the **P** mode.
- The **P** mode uses the CO cancel so it can generate a greater discharge (Q) of oil than in the **E** mode at high pressure.

2) Cut-off function

- If the load during operation increases and the pump discharge pressure (P) rises to near the relief pressure, pump controller lowers pump discharge volume, to reduce the relief loss.

3) Cut-off cancel function

- The cut-off cancel function acts to stop the operation of the cut-off function in order to ensure the pump flow when close to the relief pressure, thereby preventing any drop in speed.

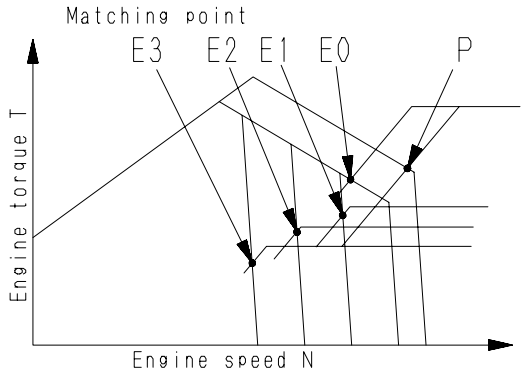


- Cut-off function and actuation of each switch

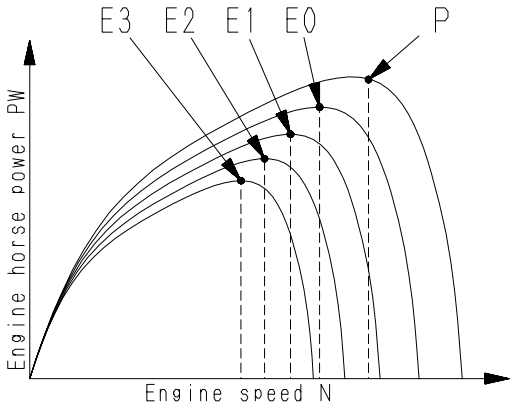
Switch / Function	Working mode switch		Travel lever		Heavy lift	
	P	E	ON	OFF	ON	OFF
Cut-off function	Cancel	Actuated	Cancel	Actuated	Cancel	Actuated

4) E mode adjustment function

- The matching point in control of engine speed (N) and pump absorption torque (T) in E mode can be adjusted by operating the machine monitor.
- The matching point can be set to 4 levels of E0 – E3. As the number is increased, fuel efficiency is improved but production in unit time is decreased.

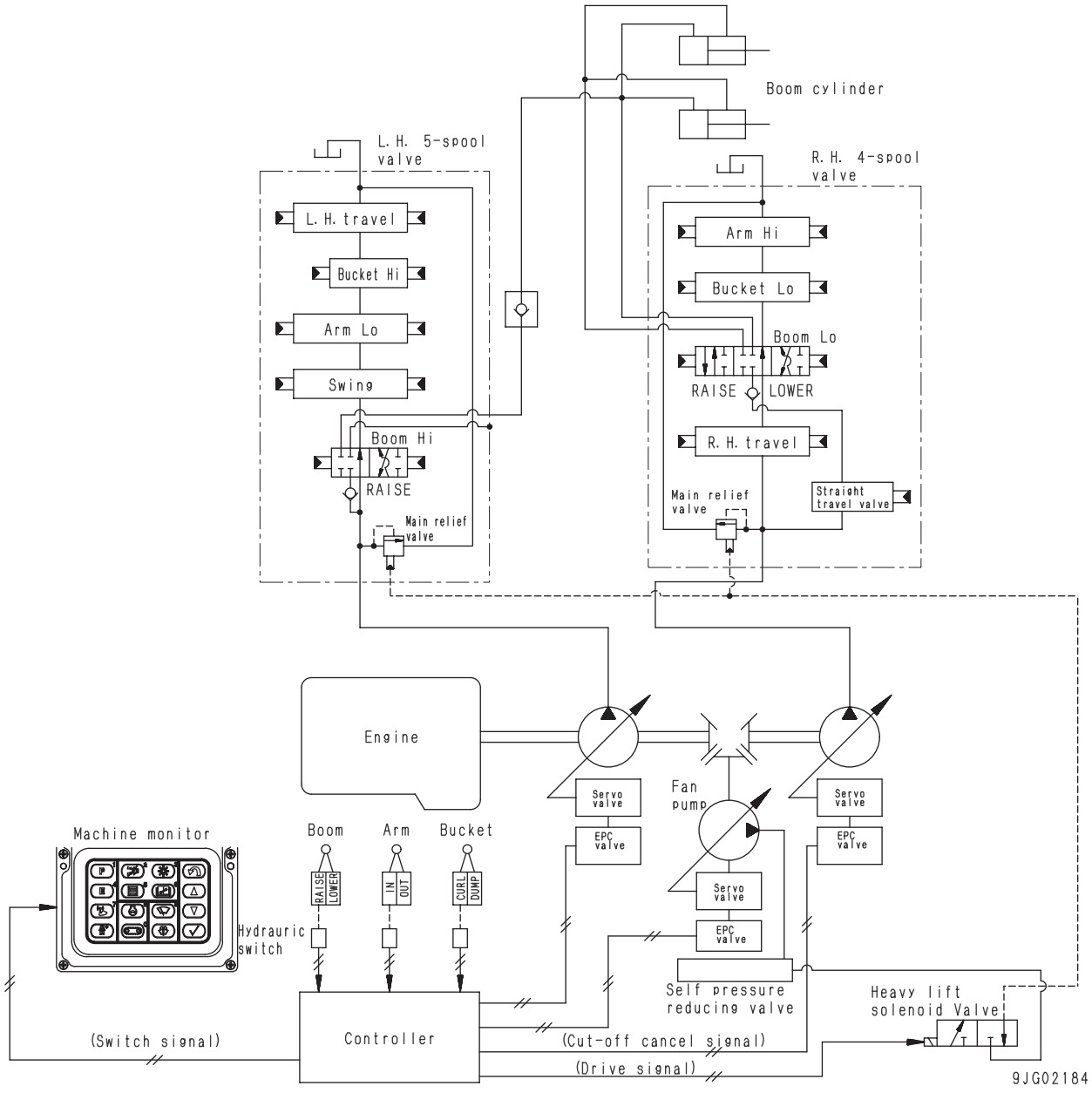


9JG02182



9JG02183

3. Heavy lift function



Outline

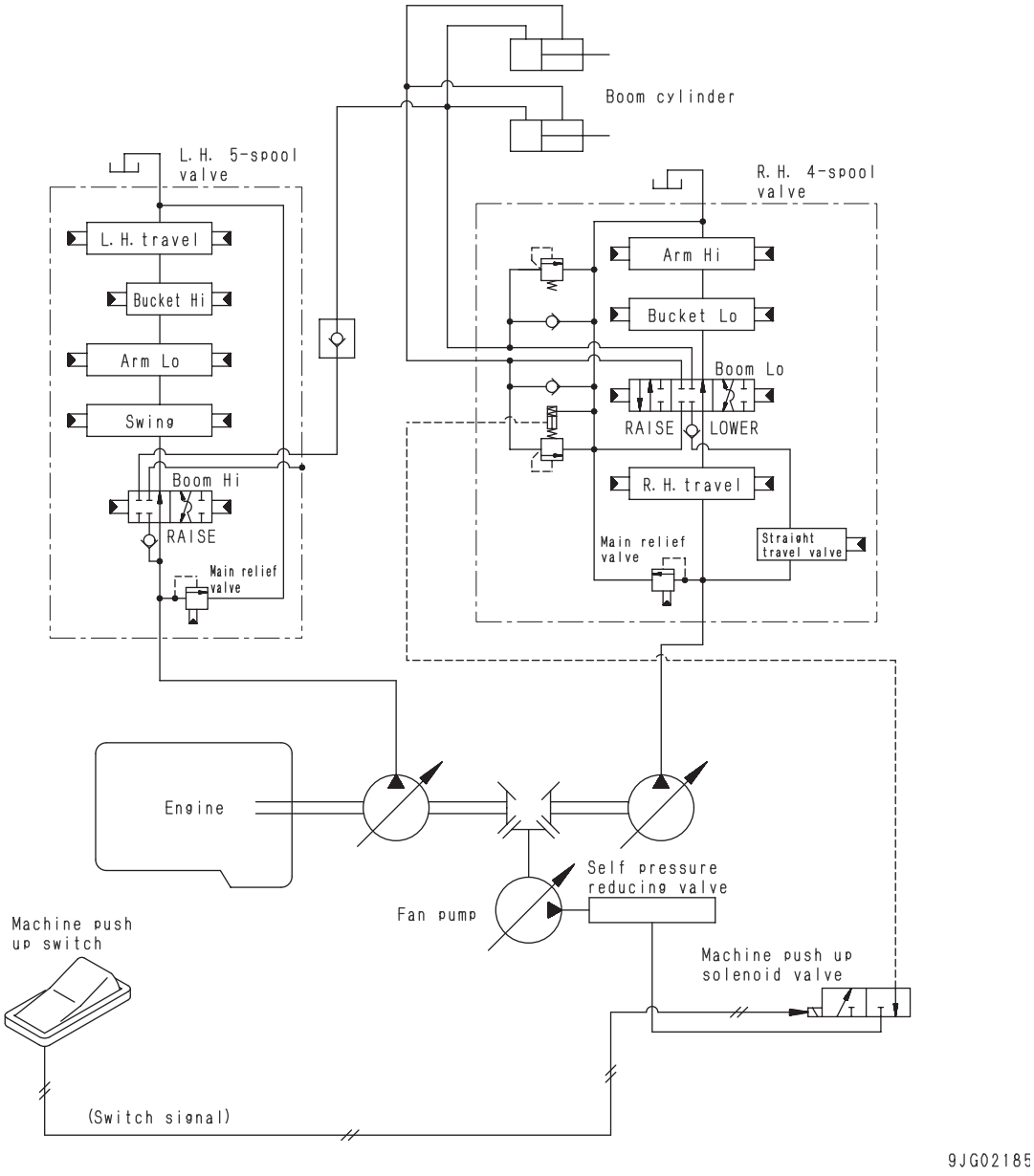
- This function increases the boom lifting power by approx. 10%.
- It can be actuated only when the boom RAISE is being actuated independently. If the arm IN or bucket CURL are operated at the same time, the heavy-lift function is automatically canceled. Heavy lift function and Cut-off function will act at the same time.

Operation

Heavy-lift switch	Lever operation		Heavy-lift solenoid valve	Main relief valve set pressure	CO control	Boom lifting force
	Boom RAISE	Arm IN or bucket CURL				
OFF	Operated	—	De-energized	31.4 MPa {320 kg/cm^2}	Actuated	Normal
ON	Operated	Neutral	Energized	34.3 MPa {350 kg/cm^2}	Canceled	10% up
		Operated	If the arm IN or bucket CURL are operated during boom RAISE operations, this function is automatically canceled, and the condition becomes the same as when the switch is turned OFF.			Normal

★ Heavy-lift solenoid valve
For details of the structure and function, see Solenoid valve.
★ Main relief valve
For details of the structure and function, see L.H. 5-spool control valve.

4. 2-stage boom pushing force selector function



Outline

- This function switches the pushing force of the boom. It is aimed to provide both increased digging efficiency by reducing the digging resistance of the boom, and increased ease of operation by increasing the thrusting force for excavation, digging square holes, carrying out twist turns, or escaping from soft ground.

Operation

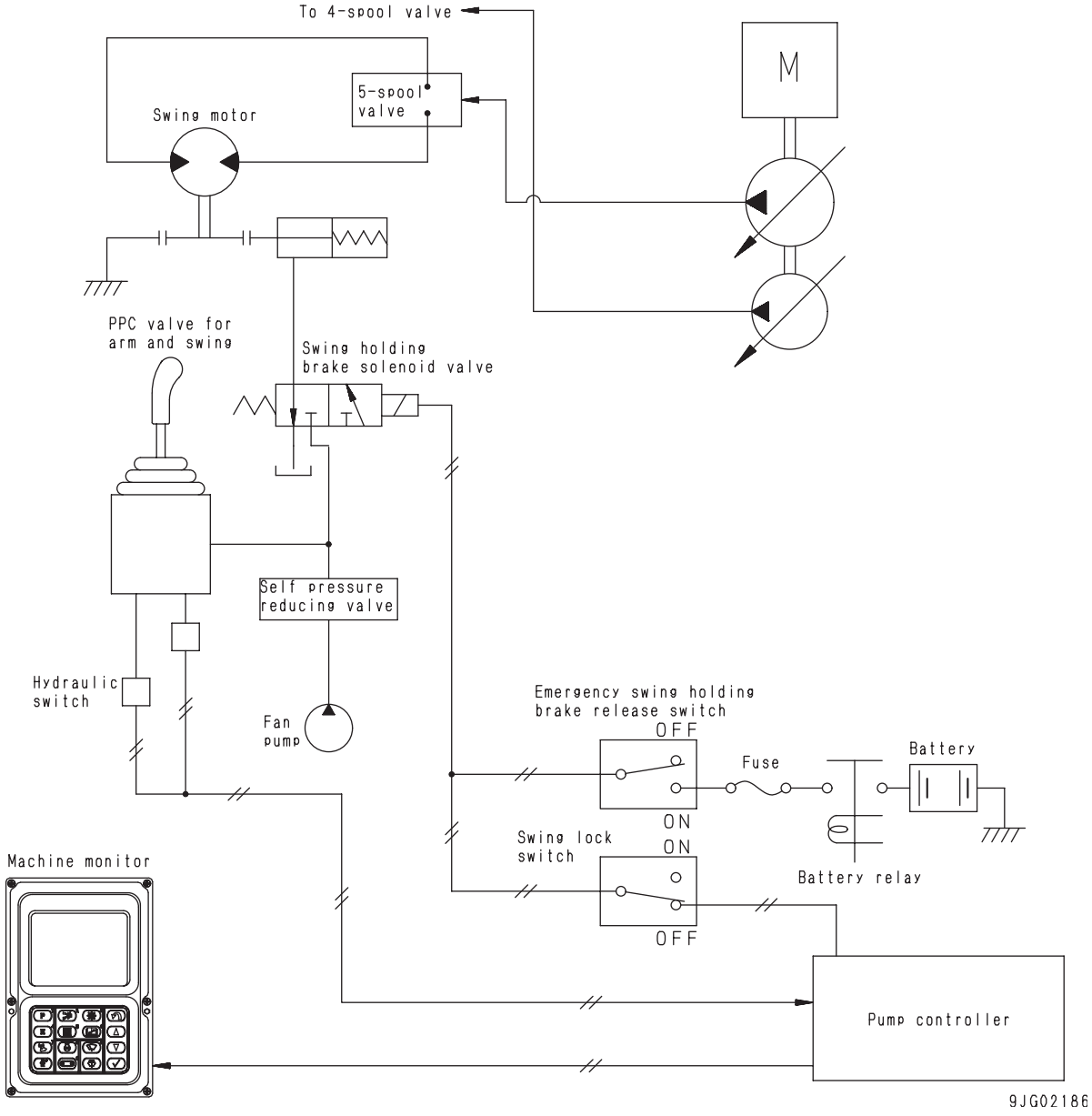
- This function acts to change the set pressure of the safety valve at the boom cylinder end of the R.H. 4-spool control valve boom Lo in 2 ways: to low pressure (14.7 MPa {150 kg/cm^2}) and high pressure (33.3 MPa {340 kg/cm^2}.

Mode	Machine push-up switch	Machine push-up solenoid valve	Safety valve set pressure	Effect
Boom pushing force (low mode)	 9JG02246	Energized	14.7 MPa {150 kg/cm^2}	By reducing the boom pushing force, it is made easier for the boom to escape automatically in the RAISE direction and to reduce the number of times that the boom is operated. At the same time it also makes the digging operation smoother.
Boom pushing force (high mode)	 9JG02247	De-energized	33.3 MPa {340 kg/cm^2}	By increasing the thrust force for boom LOWER, the ease of operation is improved for excavation, digging square holes, carrying out twist turns, or escaping from soft ground.

★ Machine push-up solenoid valve
For details of the structure and function, see Solenoid valve.

★ Boom safety valve
For details of the structure and function, see R.H. 4-spool control valve.

5. Swing control system



Function

- The system is provided with a swing lock and swing holding brake function.

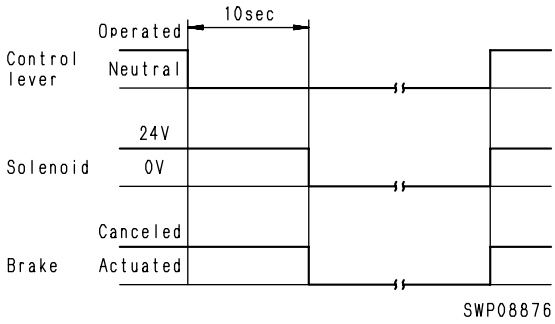
Swing lock, swing holding brake function

- The swing lock (manual) can be locked at any desired position, and the swing lock and swing holding brake (automatic) are interconnected with the swing, so they prevent any hydraulic drift after the swing is stopped.

★ Swing brake solenoid valve
For details of the structure and function, see Solenoid valve.

★ Swing motor
For details of the structure and function, see Swing motor.

Actuation

Mode	Swing lock switch	Swing lock monitor	Swing brake solenoid valve	Actuation
Swing holding brake	OFF	OFF	See diagram on right	When swing and work equipment levers are placed at neutral, swing brake is applied after approx. 10 sec; when any swing or work equipment lever is operated, brake is canceled and swing can be operated freely. • Time chart 
Swing brake	ON	ON	De-energized	Swing lock is actuated and swing is held in position. Even when swing lever is operated, swing lock is not canceled and swing does not run.

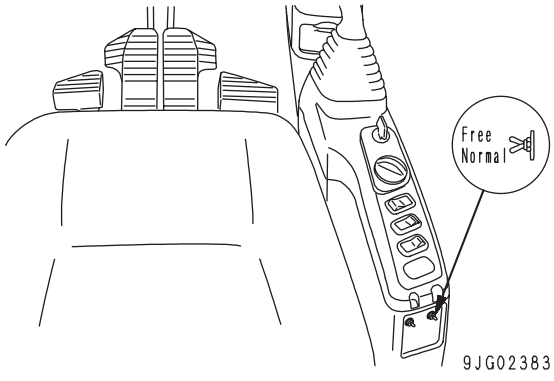
Operation of swing holding brake release switch

- If any abnormality should occur in the controller, and the swing holding brake is not actuated normally and the swing cannot be operated, the swing holding brake release switch can be operated to cancel the swing lock and allow the swing to be operated.

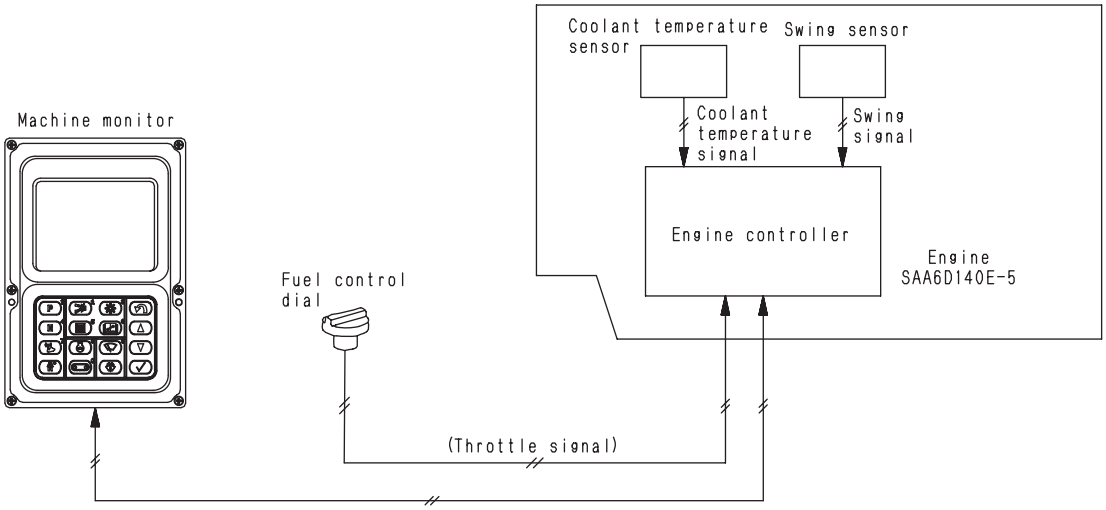
★ Even when the swing holding brake release switch is turned ON, the swing lock switch stays ON and the swing brake is not canceled.

★ When the swing brake is canceled, the swing has only a hydraulic brake operated by the safety valve, so if the swing is stopped on a slope, there may be hydraulic drift.

Swing holding brake release switch	ON (when controller is abnormal)		OFF (when controller is normal)	
Swing lock switch	ON	OFF	ON	OFF
Swing brake	Swing lock applied	Swing lock canceled	Swing lock applied	Swing holding brake applied



6. Engine automatic warming-up, overheat prevention function, turbo protect function, split injection function



9JG02187

Function

- If the coolant temperature is low, this automatically raises the engine speed to warm up the engine after it is started. In addition, if the coolant temperature rises too high during operations, it reduces the load of the pump to prevent overheating.
- To protect the turbocharger bearing during cold weather, the engine speed is kept below the fixed speed when the engine is started. In addition, to improve the starting ability, a small amount of fuel is injected two or more times before the main injection.

1) Engine automatic warming-up function
- After the engine is started, if the engine coolant temperature is low, the engine speed is automatically raised to warm up the engine.

Conditions for actuation (both are necessary)		Actuation
Coolant temperature: Less than 30°C Engine speed: Less than 1,200 rpm	⇨	Engine speed: 1,200 rpm

Conditions for cancellation (any one)		Cancellation
Automatic	Coolant temperature: 30°C or above	Engine speed: As desired
	Automatic warming-up time: 10 minutes or more	
Manual	Fuel control dial: Held at more than 70% of full throttle for more than 3 seconds	

2) Engine overheat prevention function
- This function protects the engine by lowering the pump load and engine speed to prevent overheating when the engine coolant temperature has risen too high.
- This system is actuated at 95°C and above.

Operating condition	Operation/Remedy	Resetting condition
Coolant temperature: Above 105°C	Work mode: Any mode Engine speed: Low idle Monitor alarm lamp: Lights up Alarm buzzer: Sounds	Coolant temperature: Below 105°C Fuel control dial: Return to low idle position once. • Under above condition, controller is set to condition before operation of function. (Manual reset)

Operating condition	Operation/Remedy	Resetting condition
Coolant temperature: Above 102°C	Work mode: Any mode Engine speed: Keep as is. Monitor alarm lamp: Lights up. Lower pump discharge.	Coolant temperature: Below 102°C • Under above condition, controller is set to condition before operation of function. (Automatic reset)

Operating condition	Operation/Remedy	Resetting condition
Hydraulic oil temperature: Above 95°C or Coolant temperature: Above 100°C	Work mode: Any mode Engine speed: Keep as is. Lower pump discharge.	Coolant temperature: below 100°C and hydraulic oil temperature: below 95°C • Under above condition, controller is set to condition before operation of function. (Automatic reset)

Operating condition	Operation/Remedy	Resetting condition
Hydraulic oil or coolant temperature: Above 95°C	Work mode: Travel Engine speed: Keep as is. Lower travel speed.	Coolant temperature below 95°C and hydraulic oil temperature below 95°C • Under above condition, controller is set to condition before operation of function. (Automatic reset)

3) Turbo protection function
Function to protect turbocharger bearing during cold weather by keeping engine speed below fixed speed when engine is started.

Actuation condition

Engine coolant temperature	Turbo protect time (sec)
More than +10°C	0
+10°C to –10°C	Gradually changes between 0 and 5
Less than –10°C	5

Engine speed: 1000 rpm

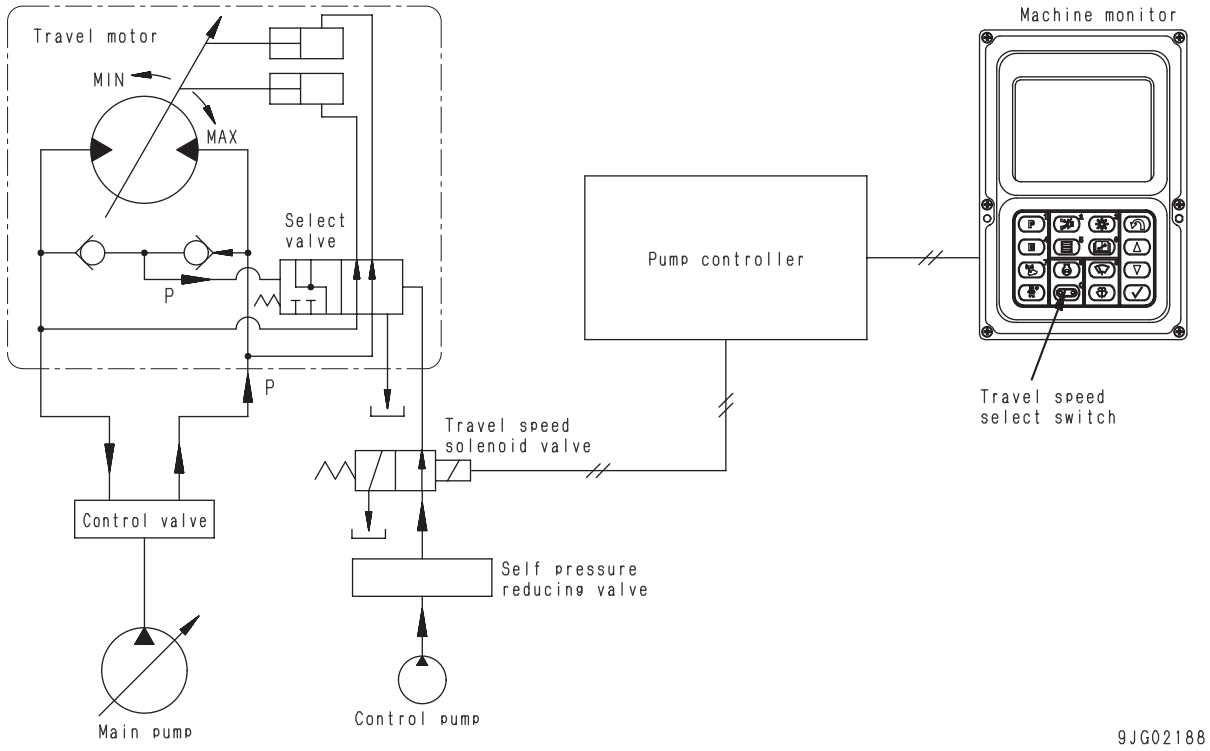
Even if the fuel control dial is operated during the above time, the engine speed will not change. After the set time passes, the operation moves to the automatic warming up function in Step 1).

4) Split injection function
To improve the ease of starting in cold weather, a small amount of fuel is injected two or more times within the set time after calculating in the table below before starting the main injection.
As a result, the lower idle speed during this time becomes slightly higher.

Actuation condition

Coolant temperature	Split injection time (sec)
More than 20°C	0
20°C to –30°C	0 – 15
Less than –30°C	15

7. Travel speed selection function



This is an automatic gear shift function in which the travel pressure (self pressure) switches the swash plate angle of the travel motor.

- If the machine is traveling at high speed with the travel speed switch at Hi and the load increases, such as when traveling up a steep hill, if the travel pressure goes above 22.6 MPa {230 kg/cm²}, the self pressure switches to low speed.
  The machine continues to travel at low speed and when it comes to flat ground and the load is reduced, if the travel pressure goes below 22.6 MPa {230 kg/cm²}, the travel speed is automatically switched to high speed.

Travel speed switch	Travel speed solenoid valve	Travel motor swash plate angle	Travel speed	Remarks
Lo	De-energized	Max.	Low speed (max 2.8 km/h)	Suitable for traveling downhill or on rough ground
Hi	Energized	Max. ↕ Min	Low speed (2.8 km/h) ↔High speed (4.2 km/h)	Suitable for use when moving long distances

Outline

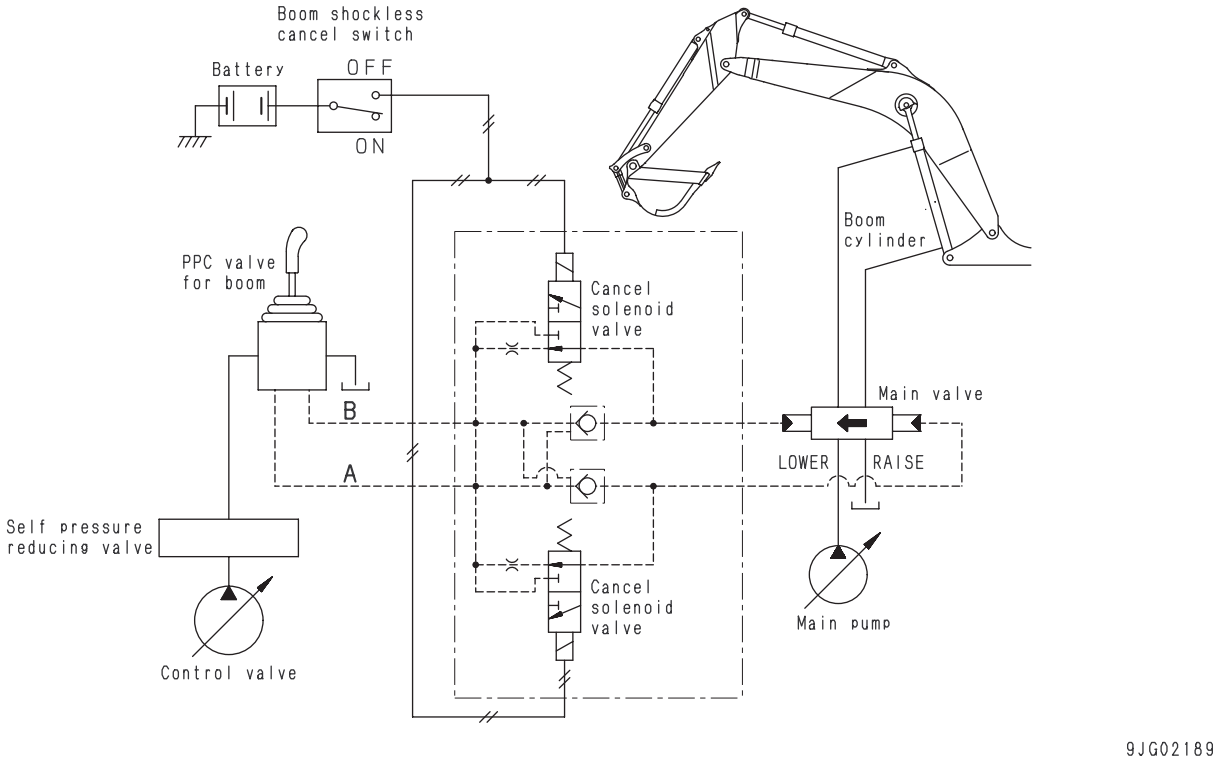
- To maintain the drawbar pull when traveling, the cut-off is canceled and the main relief pressure is raised from 31.4 MPa {320 kg/cm^2} to 34.3 MPa {350 kg/cm^2}.

Operation

	Pressure increase solenoid valve	Main relief valve set pressure	CO valve
When traveling	Energized	34.3 MPa {350 kg/cm^2}	Canceled
When not traveling	De-energized	31.4 MPa {320 kg/cm^2}	Actuated

8. Boom shockless control function

This function improves safety by preventing spillage of the load from the bucket and by reducing the shock when the boom is stopped, thereby reducing operator fatigue.

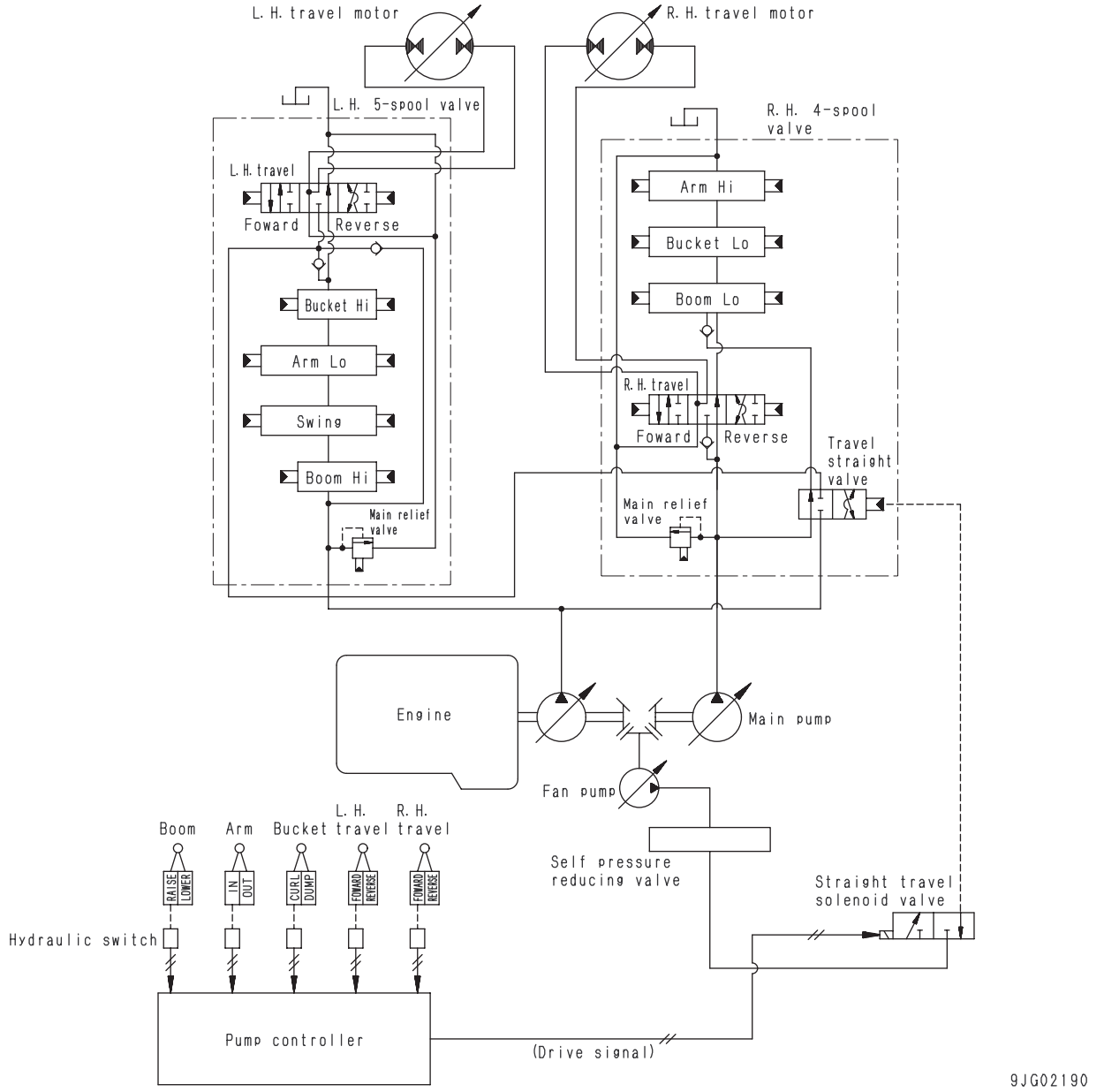


Actuation

Boom shockless switch	Cancel solenoid valve	Boom shockless control	Remarks
ON (Contacts open)	De-energized	ON	Suitable for normal operations
OFF (Contacts closed)	Energized	Canceled	Suitable for compacting or skeleton work

- If the boom is raised, the pilot pressure from the PPC valve is generated in line A. When this happens, the pressure in line A passes through check valve (2) and pushes the spool of the main valve in the direction of the arrow. The pilot oil at the left end of the spool passes through line B and the PPC valve, and returns to the tank. However, when this happens, check valve (4) is being pushed open by the pressure in line A, so it also allows the oil to pass in the opposite direction. For this reason, the boom can be raised without any delay in response.
- In this condition, if the boom RAISE operation is stopped, the spool of the main valve moves in the opposite direction to the arrow and drains the oil from line A. However, the action of check valve (2) means that the oil must pass through orifice (1). As a result, the spool returns slowly to the neutral position to prevent any shock.

9. Straight-travel function



Outline

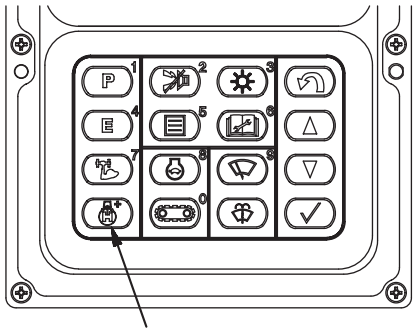
- When the travel is operated at the same time as the boom, arm, or bucket, the pressure oil flowing to the left and right travel circuits is divided and sent to the boom, arm, or bucket circuit.
  If the oil in one travel circuit is divided off, the amount of oil supplied to the travel motor will be less than in the travel circuit which is not divided, so the drop in the supply of oil to the travel motor will cause the machine to deviate.
- To prevent this, the straight-travel valve is switched to interconnect the left and right travel circuits. This ensures that the amount of oil supplied to the left and right travel motors is equal, so the left and right travel motors both rotate at the same speed, and this prevents any travel deviation.

Operation

Left and right travel levers	Work equipment control lever, swing lever	Straight-travel solenoid valve	Straight-travel valve	Remarks
Operation	Neutral	De-energized	Not actuated	Left and right travel motor circuits independent
	Operated	Energized	Actuated	Left and right travel motor circuits assist

10. Swing priority function

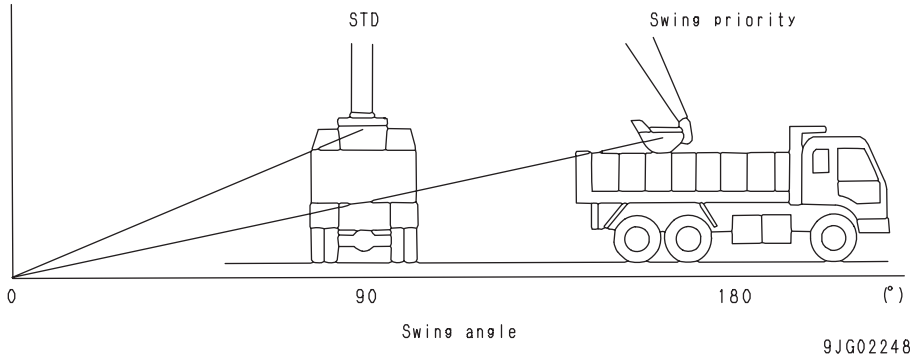
- There is a swing priority mode switch on the monitor panel. By turning this switch ON/OFF it is possible to change the matching of the boom RAISE and swing. This divides the flow to provide a swing speed which matches the swing angle, thereby enabling the operator to carry out compound operations easily.



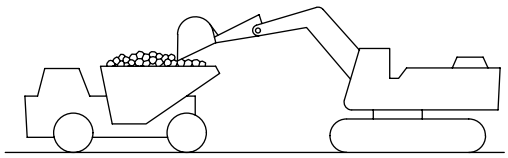
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Swing priority mode OFF: { Loading a dump truck on the same ground
Swinging by 90º and loading a dump truck

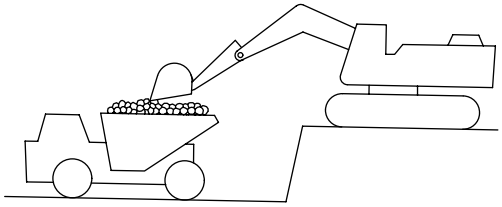
Swing priority mode ON: { Swinging by 180º and loading a dump truck
Loading a dump truck from a bench



9JG02248



SWP08626



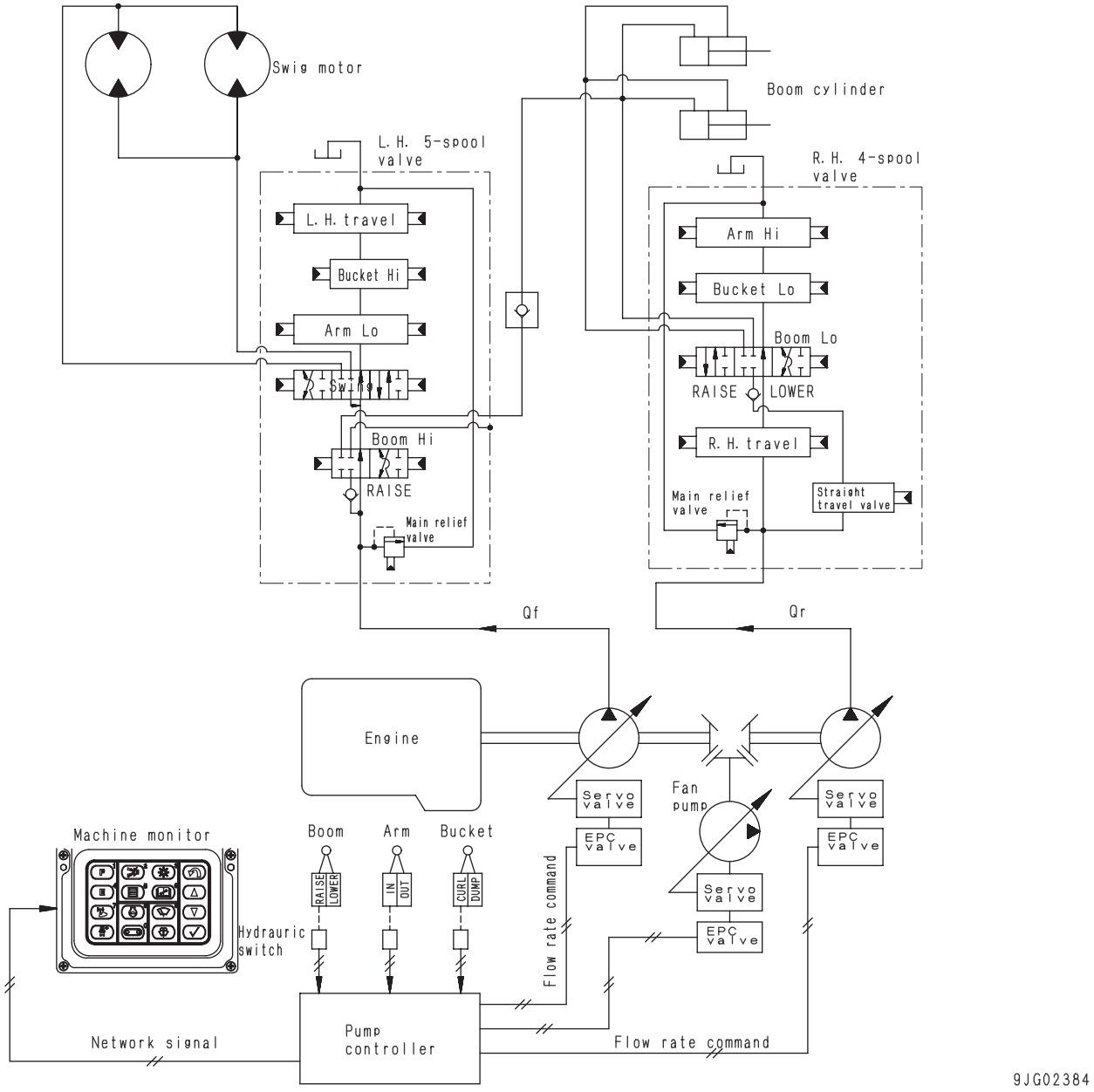
SWP08627

- The boom raise operation and swing operation are matched to each other by changing the signal for the swing circuit throttle valve and controlling the delivery of the front pump and rear pump.

1. Swing throttle valve

	Solenoid	Swing throttle valve
Swing priority mode OFF (normal mode)	OFF (De-energized)	ON
Swing priority mode ON (swing priority)	ON (energized)	OFF

2. Front and rear pump flow control

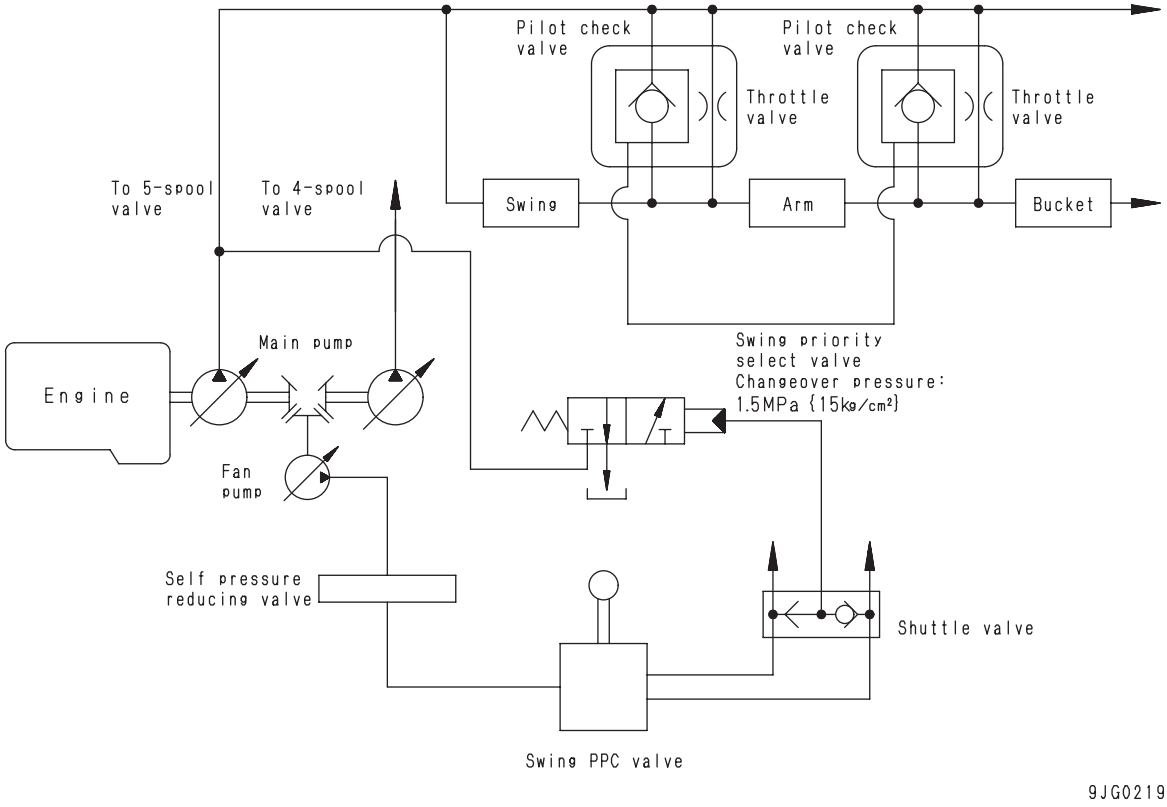


	Front and rear pump flow	Effect
Swing priority mode OFF (normal mode)	*$Q_F < Q_R$	In compound operation of swing and boom raise, more oil flows to boom raise side to secure boom raise speed.
Swing priority mode ON (swing priority)	$Q_F = Q_R$	In compound operation of swing and boom raise, more oil flows to swing side to increase swing speed.

*Q_F: Delivery of front pump, QR: Delivery of rear pump

11. Swing assurance function

- During compound operations with the arm and swing or with the bucket and swing, the throttle valves in the arm and bucket circuit ensure the flow of oil to the swing circuit in order to assure ease of compound operations.



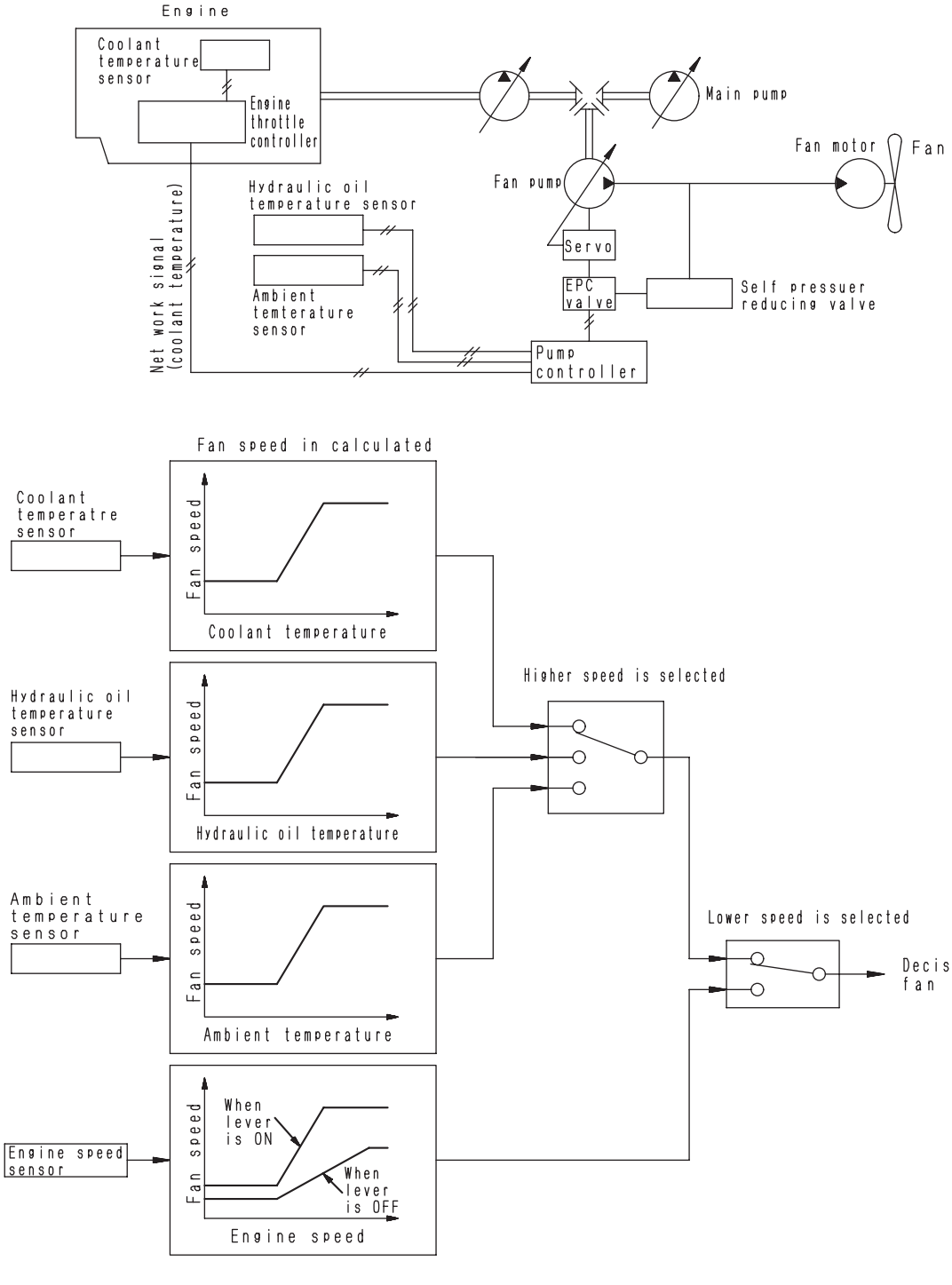
Operation

- If the swing PPC pressure goes above 1.5 MPa {15 kg/cm²} (the control lever is operated approximately half or more), the swing assurance selector valve is actuated and the swing drive pressure locks the pilot check valve of the 5-spool valve arm and bucket throttle valves.
- In this condition, the circuits are in parallel, so the oil from the 5-spool valve flowing to the arm or bucket is throttled by the throttle valve, so the swing drive pressure rises. In this way, the swing drive is assured.

12. Hydraulic fan control function

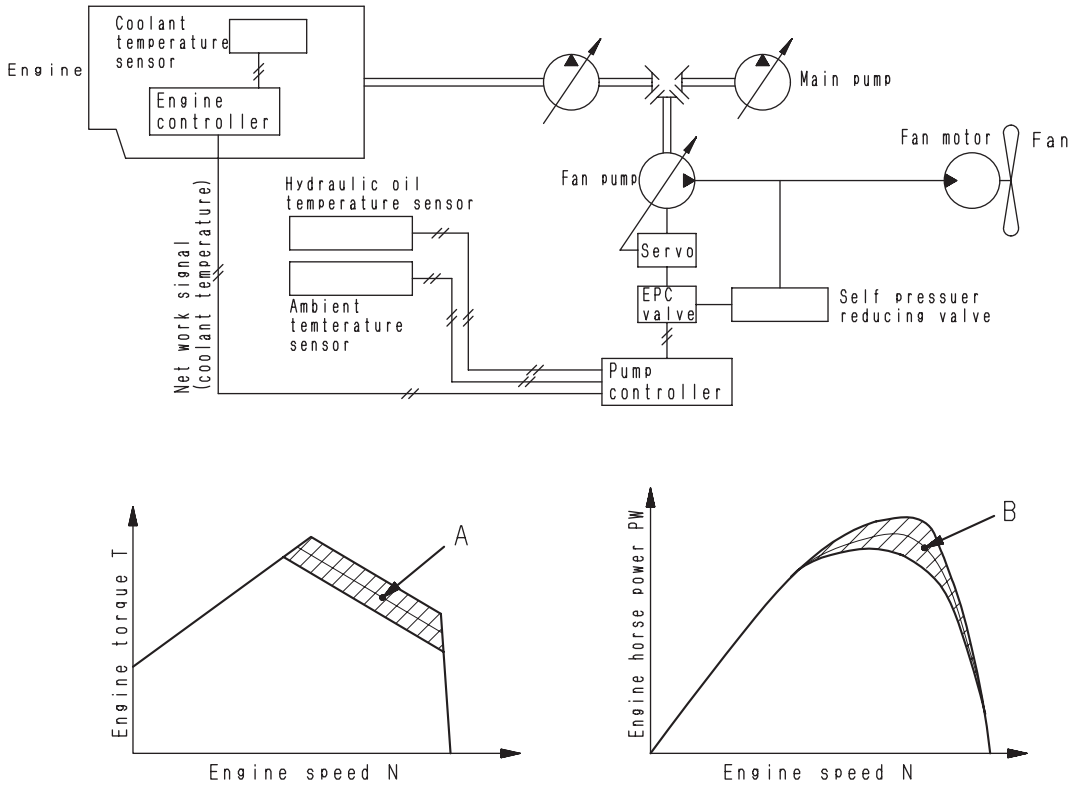
1) Fan speed control

- The fan speed is controlled according to the engine speed, ambient temperature, hydraulic oil temperature, and coolant temperature. While these temperatures are low, the fan speed is lowered to reduce the noise and fuel consumption.
- While the work equipment control lever is in neutral, the fan speed is lowered, too. While the hydraulic oil temperature and coolant temperature are high, however, fan speed is not lowered.



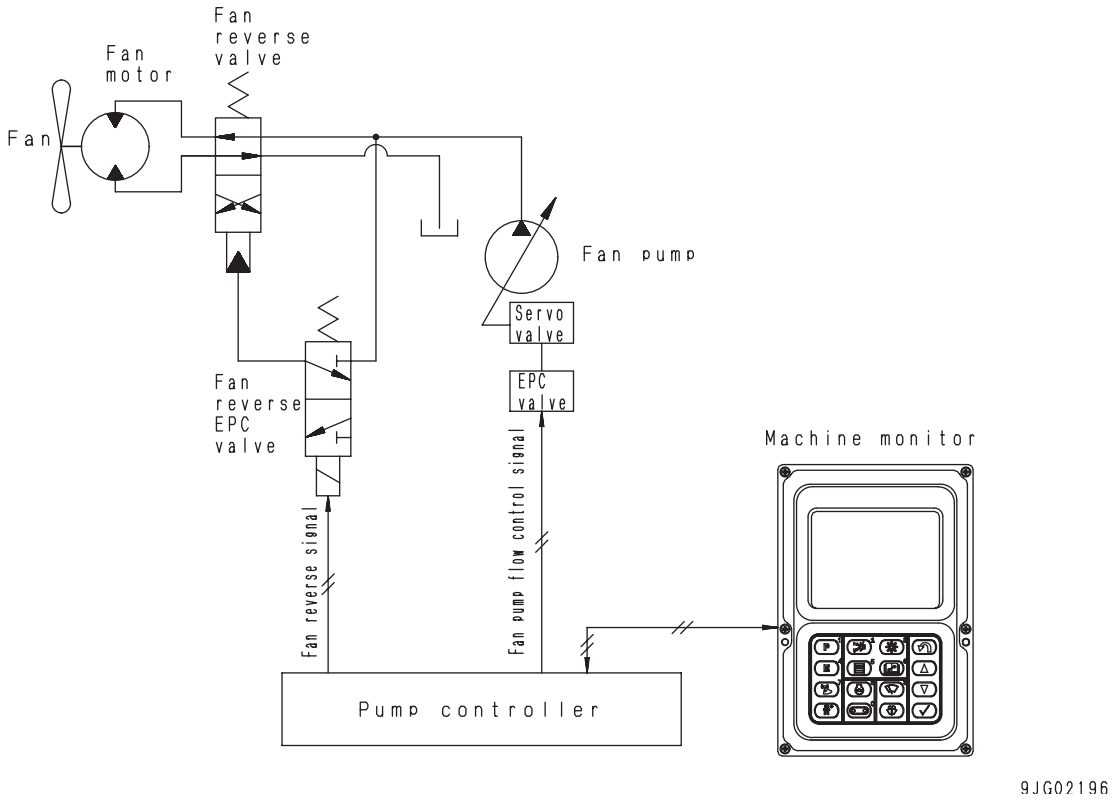
2) Engine output control

• The pump controller calculates the output consumed by the fan and controls engine output curves (A) and (B) according to the speed to reduce loss fuel.

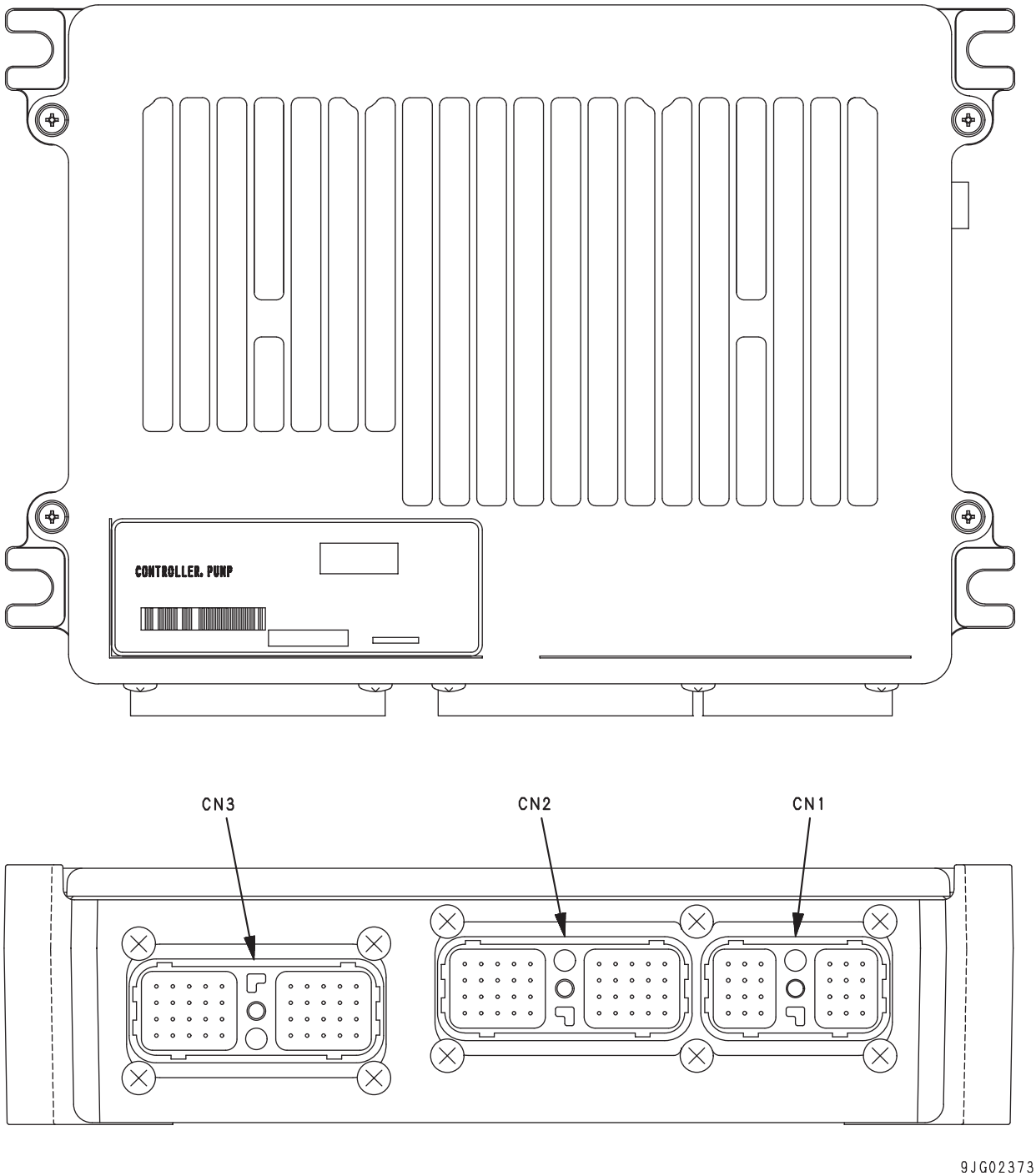


13. Fan reverse function

- The cooling devices can be cleaned easily by rotating the fan in reverse.
- The fan rotation direction is reversed by operating the machine monitor.
- Upon receiving the fan reverse signal from the machine monitor, the pump controller drives the fan reverse EPC valve of the fan motor to change the fan reverse valve. By this operation, the fan rotation direction is reversed.
- The fan speed in reverse direction is controlled by only the engine speed, regardless of the ambient temperature, hydraulic oil temperature, and coolant temperature.



Pump controller



Input and output signals

CN1 [CN-C01]

Pin No.	Signal name	Input/ Output
CN1-1	NC (*)	Input
CN1-2	R pump pressure sensor	Input
CN1-3	F.J/S diff. pressure sensor	Input
CN1-4	Signal (GND)	
CN1-5	NC (*)	Input
CN1-6	NC (*)	Input
CN1-7	NC (*)	Input
CN1-8	F pump pressure sensor	Input
CN1-9	Ambient temperature sensor	Input
CN1-10	GND (SIG)	
CN1-11	NC (*)	Input
CN1-12	NC (*)	Input
CN1-13	NC (*)	Input
CN1-14	NC (*)	Input
CN1-15	NC (*)	Input
CN1-16	NC (*)	Output
CN1-17	Key switch (Terminal C)	Input
CN1-18	NC (*)	Input
CN1-19	NC (*)	Input
CN1-20	R.J/S diff. pressure sensor	Input
CN1-21	GND (Analog)	
CN1-22	Sensor power supply (+5V)	Output
CN1-23	Key switch (Terminal Acc)	Input
CN1-24	Step light switch	Input

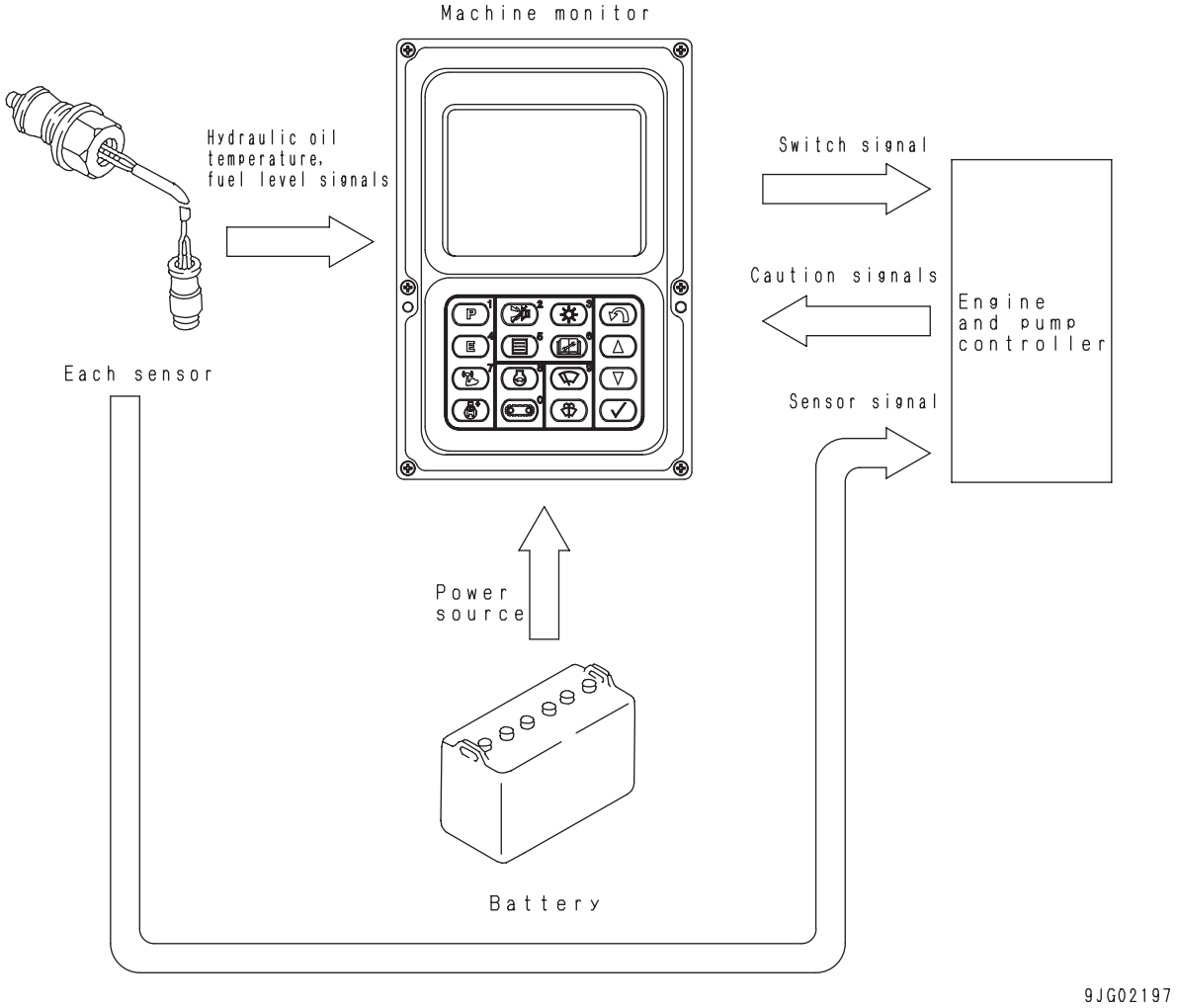
CN2 [CN-C02]

Pin No.	Signal name	Input/ Output
CN2-1	NC (*)	Output
CN2-2	Swing prolix switch	Input
CN2-3	NC (*)	Input
CN2-4	RS232C-R × D	Input
CN2-5	Overload sensor (ON/OFF)	Input
CN2-6	Overload caution switch	Input
CN2-7	Model selection 4 (ATT)	Input
CN2-8	ATT circuit selector SOL signal	Output
CN2-9	NC (*)	Output
CN2-10	NC (*)	Input
CN2-11	NC (*)	Output
CN2-12	NC (*)	
CN2-13	Model selection 5	Input
CN2-14	RS232C-T × D	Output
CN2-15	NC (*)	Input
CN2-16	Left travel pressure switch	Input
CN2-17	Model selection 3	Input
CN2-18	NC (*)	Output
CN2-19	Step light driver relay	Output
CN2-20	NC (*)	Input
CN2-21	NC (*)	Input/ Output
CN2-22	CAN0_L	Input/ Output
CN2-23	NC (*)	Input/ Output
CN2-24	Boot program switch	Input
CN2-25	Horn switch	Input
CN2-26	NC (*)	Input
CN2-27	Model selection 2	Input
CN2-28	NC (*)	Input
CN2-29	NC (*)	
CN2-30	NC (*)	Input
CN2-31	NC (*)	
CN2-32	CAN0_H	Input/ Output
CN2-33	NC (*)	Input/ Output
CN2-34	GND (RS232C)	
CN2-35	Service valve pressure switch	Input
CN2-36	NC (*)	Input
CN2-37	Model selection 1	Input
CN2-38	Swing lock switch	Input
CN2-39	NC (*)	
CN2-40	NC (*)	Input

CN3 [CN-C03]

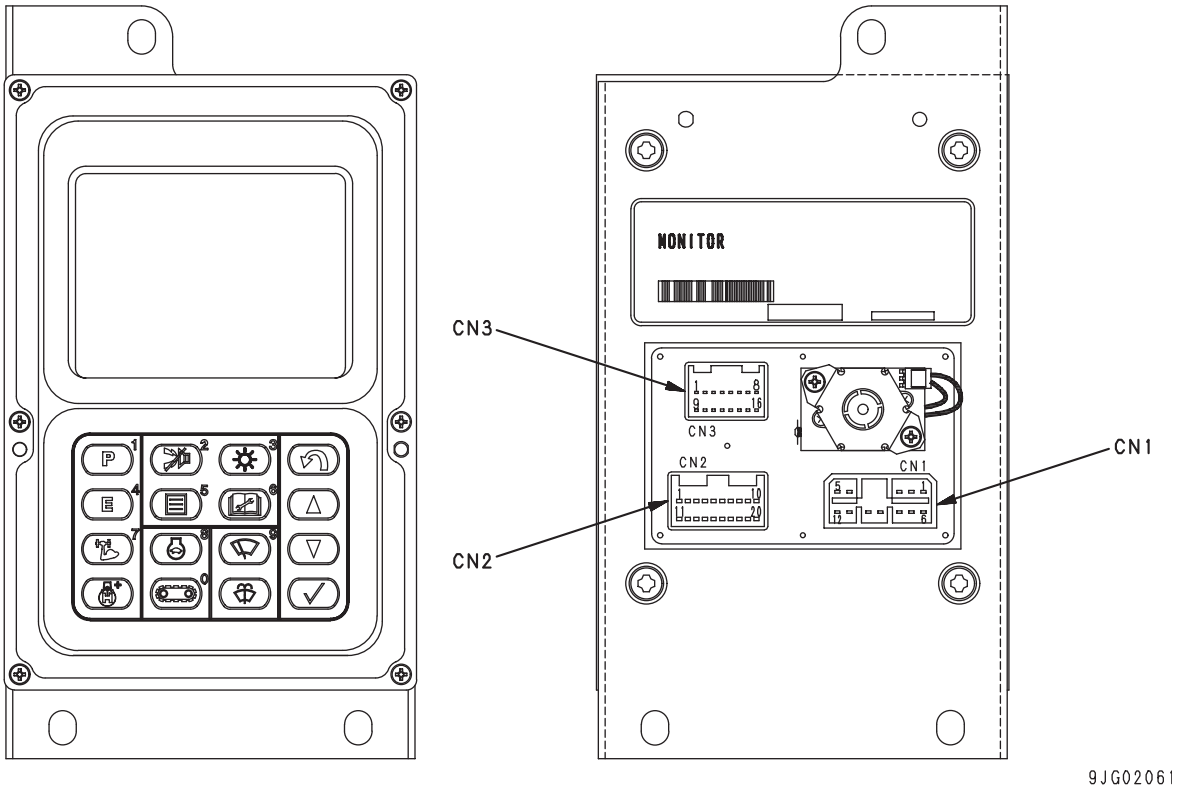
Pin No.	Signal name	Input/ Output
CN3-1	VB (Controller PWR)	Input
CN3-2	VIS (Solenoid PWR)	Input
CN3-3	SOL_COM (solenoid GND)	Input
CN3-4	Battery relay hold	Output
CN3-5	NC (*)	Output
CN3-6	Fan pump EPC solenoid	Output
CN3-7	Straight travel solenoid	Output
CN3-8	Travel alarm	Output
CN3-9	Bucket CURL pressure switch	Input
CN3-10	Boom RAISE pressure switch	Input
CN3-11	VB (Controller PWR)	Input
CN3-12	VIS (Solenoid PWR)	Input
CN3-13	SOL_COM (solenoid GND)	Input
CN3-14	KEY_SIG (ACC terminal)	Input
CN3-15	Step light drive relay	Output
CN3-16	R pump EPC solenoid	Output
CN3-17	2-stage relief solenoid	Output
CN3-18	Flash light driver relay	Output
CN3-19	Bucket DUMP pressure switch	Input
CN3-20	Boom LOWER pressure switch	Input
CN3-21	GND (Controller GND)	Input
CN3-22	VIS (Solenoid PWR)	Input
CN3-23	SOL_COM (solenoid GND)	Input
CN3-24	KEY_SIG (ACC terminal)	Input
CN3-25	Fan reverse rotation solenoid	Output
CN3-26	NC (*)	Output
CN3-27	Travel Hi/Lo selector solenoid	Output
CN3-28	NC (*)	Output
CN3-29	Swing pressure switch	Input
CN3-30	Arm IN pressure switch	Input
CN3-31	GND (Controller GND)	
CN3-32	GND (Controller GND)	
CN3-33	GND (Controller GND)	
CN3-34	NC (*)	
CN3-35	Fan pump EPC solenoid	Output
CN3-36	NC (*)	Output
CN3-37	Swing holding brake solenoid	Output
CN3-38	Swing priority solenoid	Output
CN3-39	Right travel pressure switch	Input
CN3-40	Arm OUT pressure switch	Input

Monitor system



- The monitor system monitors the condition of the machine with sensors installed on various parts of the machine. It processes and immediately displays the obtained information on the panel notifying the operator of the condition of the machine.
  The panel is roughly divided as follows.
  1. Monitor section to output alarms when the machine has troubles
  2. Gauge section to display the condition constantly (Coolant temperature, hydraulic oil temperature, fuel level, etc.)
- The monitor panel also has various mode selector switches and functions to operate the machine control system.

1. Monitor panel



Outline

- The monitor panel has the functions to display various items and the functions to select modes and electric parts.
  The monitor panel has a CPU (Central Processing Unit) in it to process, display, and output the information.
  The monitor display unit consists of LCD (Liquid Crystal Display). The switches are flat sheet switches.

Input and output signals

CN1

Pin No.	Signal name	Input/ output
1	Key switch (Battery)	Input
2	Key switch (Battery)	Input
3	Washer motor output	Output
4	Key switch (Terminal C)	Input
5	Wiper contact W (Lower wiper contact P)	Input
6	GND	
7	GND	
8	VB + (24 V)	Input
9	Wiper motor (+) <Upper wiper motor (+)>	Output
10	Wiper motor (–) <Lower wiper motor (–)>	Output
11	NC	Input
12	Wiper contact P (Upper wiper contact P)	Input

CN2

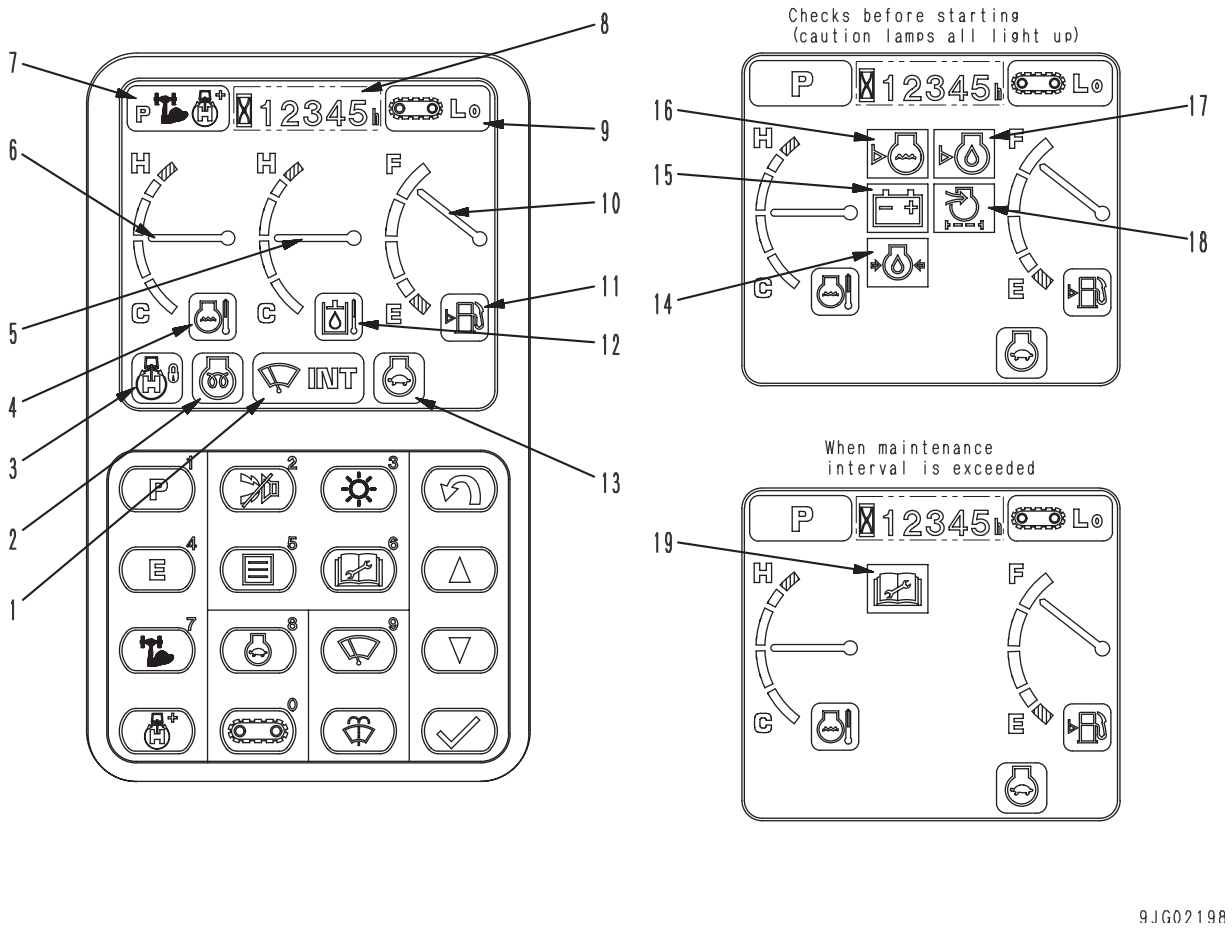
Pin No.	Signal name	Input/ output
1	NC	Input
2	Fuel	Input
3	Radiator coolant level	Input
4	NC	Input
5	Air cleaner clogging sensor	Input
6	NC	Input
7	NC	Input
8	Engine oil level sensor	Input
9	Network (S-NET signal)	Input/ output
10	Network (S-NET signal)	Input/ output
11	Charge level	Input
12	Hydraulic oil temperature (Analog)	Input
13	GND (For analog signal)	
14	Personal code relay (Lo)	Input
15	Window limit switch <Lower wiper switch>	Input
16	Buzzer cancel	Input
17	Swing lock	Input
18	Preheating	Input
19	Light switch	Input
20	Network (S-NET GND)	

CN3

Pin No.	Signal name	Input/ output
1	NC	Input
2	NC	Input
3	NC	Input
4	NC	Input
5	NC	Input
6	NC	Input
7	NC	Input
8	NC	Input
9	NC	Input/ output
10	NC	Input/ output
11	NC	Input
12	NC	Input
13	NC	
14	CAN (Shield)	Input
15	CAN (+)	Input
16	CAN (–)	Input

Monitor control, display portion

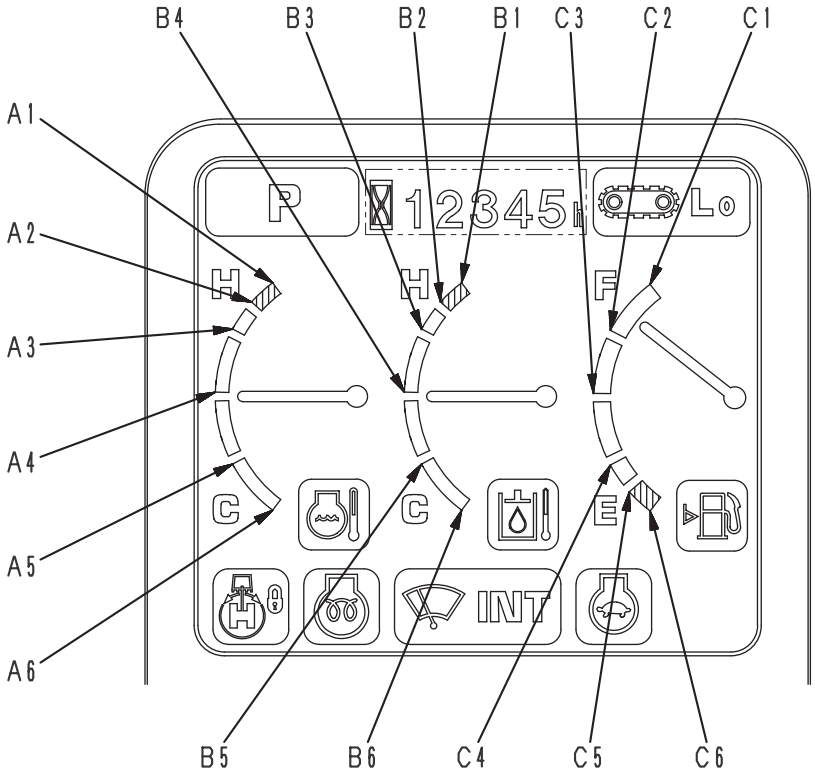
Monitor portion



1. Wiper motor
2. Preheating monitor
3. Swing lock monitor
4. Engine coolant temperature monitor
5. Hydraulic oil temperature gauge
6. Engine coolant temperature gauge
7. Working mode monitor
8. Service meter
9. Travel speed monitor
10. Fuel gauge
11. Fuel level monitor
12. Hydraulic oil temperature monitor
13. Auto-deceleration monitor
14. Engine oil pressure caution
15. Battery charge caution
16. Radiator coolant level caution
17. Engine oil level caution
18. Air cleaner clogging
19. Maintenance time warning caution

Monitor items and display

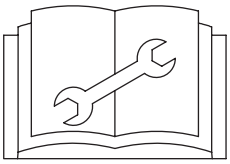
<table>
<tr><th>Symbol</th><th>Display item</th><th>Display method</th></tr>
<tr><td> 
SAT00098</td><td>Swing lock</td><td>
<table>
<tr><th>Swing lock switch</th><th>Swing holding brake release switch</th><th>Swing lock monitor</th></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>OFF</td><td>ON</td><td>Flashes</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td></tr>
</table>
</td></tr>
<tr><td> 
SAP00526</td><td>Preheating</td><td>
<table>
<tr><th>Continuous set time</th><th>Preheating monitor status</th></tr>
<tr><td>Up to 30 sec.</td><td>ON</td></tr>
<tr><td>From 30 sec. to 40 sec.</td><td>Flashes</td></tr>
<tr><td>More than 40 sec.</td><td>OFF</td></tr>
</table>
</td></tr>
<tr><td rowspan="3"></td><td>Engine coolant temperature</td><td rowspan="3">See gauge display on the next page</td></tr>
<tr><td>Hydraulic oil temperature</td></tr>
<tr><td>Fuel level</td></tr>
</table>



9JG02063

Gauge	Range	Temperature, volume	Indicator	Buzzer sound
Engine coolant temperature (°C)	A1	105	Red	○
	A2	102	Red	
	A3	100	Green	
	A4	80	Green	
	A5	60	Green	
	A6	30	White	
Hydraulic oil temperature (°C)	B1	105	Red	○
	B2	102	Red	
	B3	100	Green	
	B4	80	Green	
	B5	40	Green	
	B6	20	White	
Fuel level (ℓ)	C1	524	Green	
	C2	382	Green	
	C3	249	Green	
	C4	138	Green	
	C5	101	Green	
	C6	84	Red	

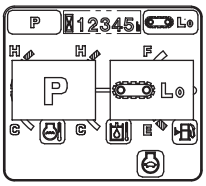
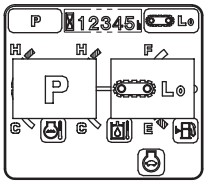
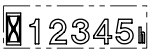
Checks before starting (caution lamps all light up), when maintenance interval is exceeded.
If the checks before starting or maintenance interval is exceeded items light up, the display of the hydraulic oil temperature gauge and the hydraulic oil temperature monitor are stopped, and the following cautions are displayed.

Symbol	Display item	Check before starting item	When engine is stopped	When engine is running
 9JG02200	Engine oil pressure	●	—	When abnormal, lights up and buzzer sounds
 9JG02201	Battery charge	●	—	Lights up when abnormal
 SAP00519	Radiator coolant level	●	Lights up when abnormal	When abnormal, lights up and buzzer sounds
 SAP00523	Engine oil level	●	Lights up when abnormal	—
 SAP00521	Air cleaner clogging	●	—	Lights up when abnormal
 SJP08780	Maintenance		Lights up when there is a warning. Lights up for only 30 sec. after key is turned ON, then goes out.	

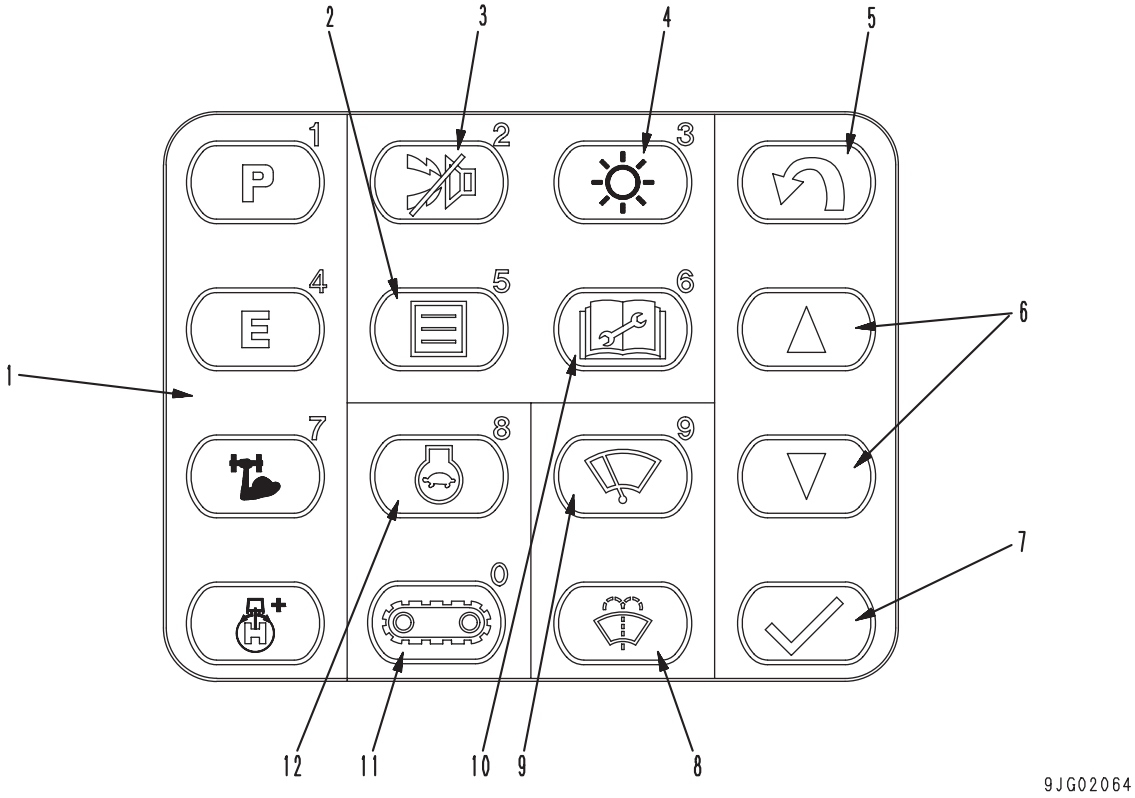
The problems that have occurred are displayed in order from the left.

When the above cautions are displayed, if the hydraulic oil temperature is high or low, only the symbol is displayed.

Condition of hydraulic oil	Color of symbol
Low temperature (below B6)	Black on white background
Normal (B6 – B2)	No display
High temperature (above B2)	White on red background

Display category	Symbol	Display item	Display range	Display method
Monitor	 SJP08781	Wiper	ON → INT → OFF	Displays set condition
	 9JG01601	Working mode	 P, E,	Displays set mode
	 SJP08783	Travel speed	 Lo, Hi	Displays set speed
	 SJP08784	Auto-decelera-tion	ON ⇔ OFF	Displays actuation status
Service meter	 SJP08785	Service meter indicator	When service meter is working	Lights up when service meter is working

Switches



1. Working mode selector switch
2. Select switch
3. Buzzer cancel switch
4. Display brightness, contrast adjustment switch
5. Return switch
6. Control switch
7. Input confirmation switch
8. Window washer switch
9. Wiper switch
10. Maintenance switch
11. Travel speed selector switch
12. Auto-deceleration switch

- Working mode selector switch
  The condition of the machine changes according to the switch that is pressed (Shown in the figure at right). It is possible to check the condition on the working mode monitor display. The relationship between each working mode and the monitor display is shown in the table on the right.

Switch that is pressed	Display	Working mode status after setting
[P]	P	P mode (default)
[E]	E	E mode
 SJP09461	 SJP09461	Heavy-lift mode
 SJP09462	 SJP09462	Swing priority mode

- Maintenance switch
  Check the condition of the maintenance items. (For details, see MAINTENANCE FUNCTION.)

- Auto-deceleration switch
  Each time the auto-deceleration switch is pressed, the auto-deceleration function is switched ON/OFF.
  Use the auto-deceleration monitor display to check the present condition.
  When the working mode switch is operated to switch the working mode, it is automatically set to ON.

- Travel speed selector switch
  Each time the travel speed selector switch is pressed, the travel speed changes.
  Lo → Hi → Lo ……
  Use the travel speed monitor display to check the present condition.
  The relationship between the set speed and the monitor display in the table on the right.

Display	Setting
Crawler symbol + Lo	Low speed (default)
Crawler symbol + Hi	High speed

- Wiper switch
  Each time the wiper switch is pressed, the wiper setting changes OFF → INT → ON → OFF → ……
  Use the wiper monitor display to check the present condition.
  The relationship between the wiper setting and the monitor display is as shown in the table on the right.

Display	Setting	Wiper actuation status
None	OFF	Stowing stopped or now stowing
Wiper symbol + INT	INT	Intermittent actuation
Wiper symbol + ON	ON	Continuous actuation

- Window washer switch
  While the switch is being pressed, window washer liquid is sprayed out. There is a time delay before the wiper starts.

- Control switch
  This is used for control when using the maintenance function or select function.
  (For details, see each function.)

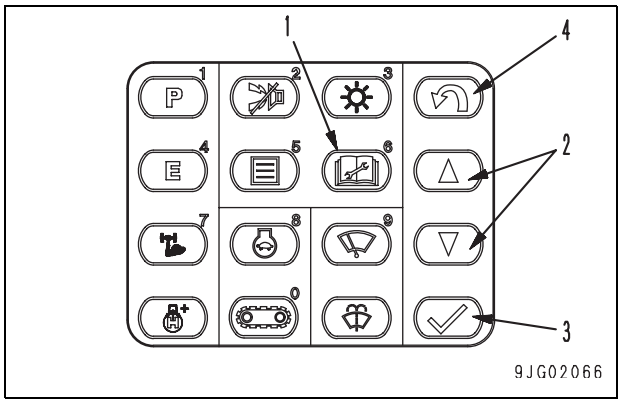
- Display brightness, contrast adjustment switch
  Use this switch when adjusting the display brightness and contrast.
  (For details, see each function.)

- Selector switch
  This is used when making detailed settings in each working mode. For details, See “Attachment flow control function”.

- Buzzer cancel switch
  Pressing this switch when the alarm buzzer is making sound stops the alarm buzzer.
  If a new abnormality is detected, the alarm buzzer sounds.
  Depending on the alarm buzzer type, it does not stop even if you press the buzzer cancel switch.

Maintenance function

When the maintenance time for replacement, inspection, or filling has approached for the 10 maintenance items, press maintenance switch (1) and the caution display (yellow or red) appears on the monitor display for 30 seconds after the key is turned ON to remind the operator to carry out lubrication maintenance.



★ Maintenance items

No.	Item	Replacement interval (hours)
01	Engine oil	500
02	Engine oil filter	500
03	Fuel main filter	1,000
41	Fuel pre-filter	500
04	Hydraulic filter	1,000
05	Hydraulic tank breather	1,000
06	Corrosion resistor	1,000
07	Damper case oil	1,000
08	Final case oil	2,000
09	Machinery case oil	1,000
10	Hydraulic oil	5,000
30	Pilot filter	500
31	Drain filter	500

★ The above replacement intervals are set for each item, and the time remaining to maintenance is reduced as the machine is operated. The content of the caution display differs according to the remaining time. The relationship is as shown in the table below.

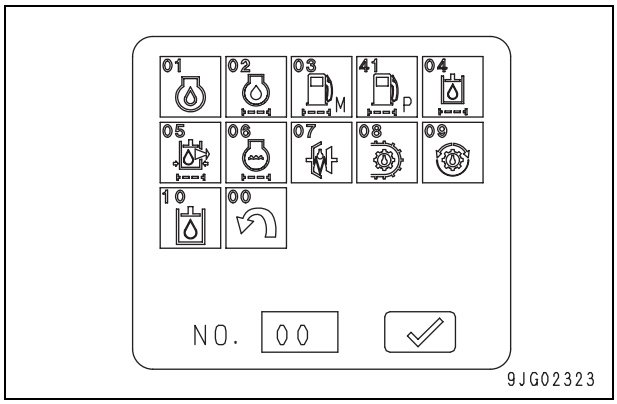
Display	Condition
None	Remaining time for maintenance for all items is more than 30 hours
Notice display (black symbol displayed on yellow background)	There is one or more items with less than 30 hours remaining time for maintenance
Warning display (wiper symbol displayed on red background)	There is one or more items with not more than 0 hours remaining time for maintenance

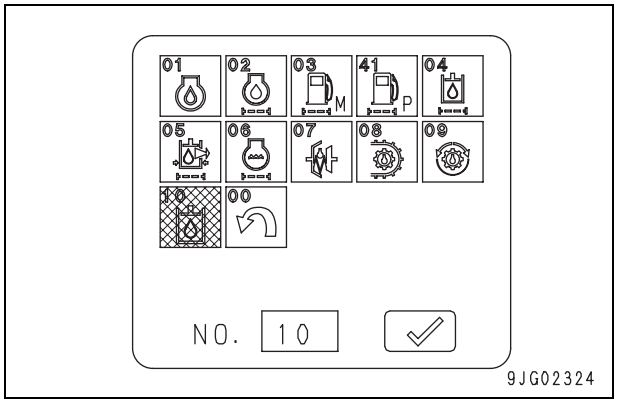
Method of checking status

Maintenance items

★ Operate as follows when on the operator screen.

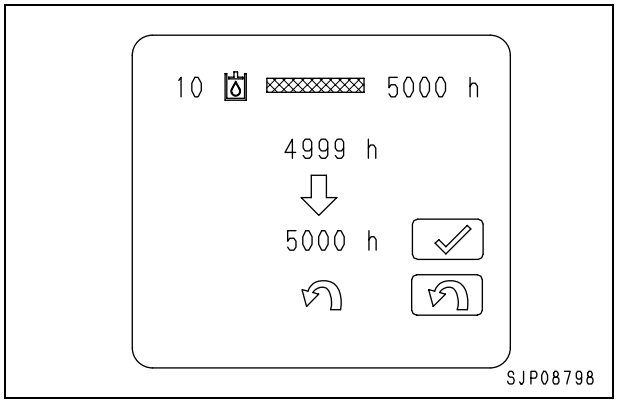
1. Press maintenance switch (1) and switch to the maintenance list display screen.
   ★ The maintenance items are displayed as symbols on the screen.
2. Press control switch (2), or use the 10-key pad to input the number (01 – 10, 30, 31, 41) of the maintenance item to select the item.
   ★ The cursor moves and the item is highlighted.
   ★ The display method is the same as described on the previous page (relationship between remaining time and caution display). If the remaining time is less than 30 hours, the item is displayed in yellow, and if it is less than 0 hours, it is displayed in red.

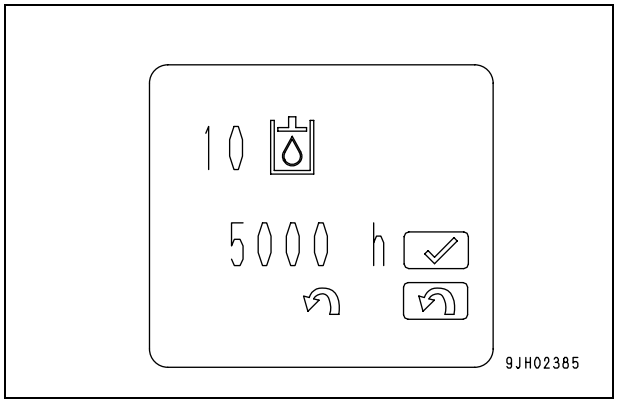




Maintenance operation

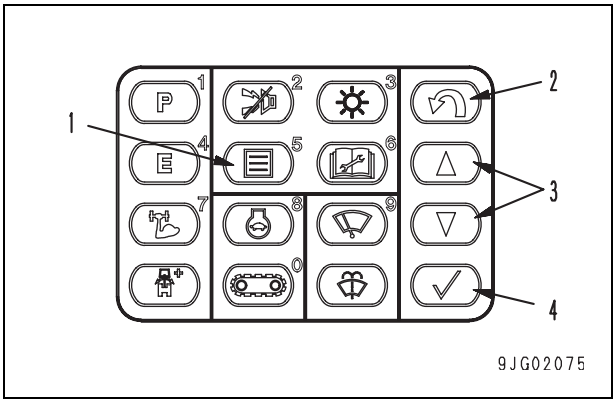
1. After completing the selection, press input confirmation switch (3).
   The screen will change to the maintenance reset screen.
2. Use the maintenance reset screen to check the content, and if there is any problem, press input confirmation switch (3) to move to the check screen.
   If the wrong item is selected, press return switch (4) to return to the maintenance list screen.
3. Check the content on the check screen, and if there is no problem, press input confirmation switch (3) to reset the maintenance time.
   After the reset is completed, the screen returns to the maintenance list display screen. To check the remaining time, or if the wrong item is selected, press return switch (4) to return to the maintenance list screen.
   ★ The check screen shows the symbol for the maintenance item and the set time in large letters.
   ★ The background color of the symbol for the item where the maintenance item was reset is the same as the background of the screen, so it is possible to check that it has been reset.

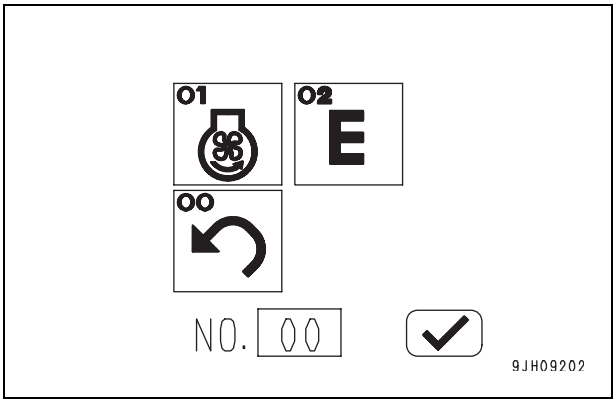




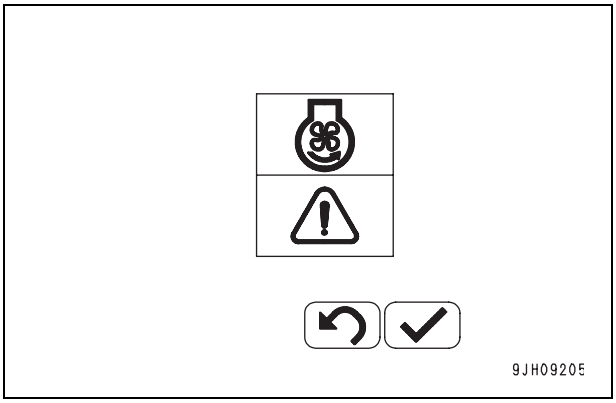
User mode function

- In the user mode, you can rotate the fan in reverse and change the set value in the E mode.
- On the ordinary screen, if you press selector switch (1), the user mode menu is displayed.
- With this menu, you can select the fan rotation setting screen or E mode adjustment screen.
- If you move the inverted part with operation switch (3) or input “00” – “02” with the numeral keys and press input confirm switch (4), the next screen is displayed.
- If you press return switch (2), the ordinary screen is displayed again.
- If you select “01”, the reverse confirm screen is displayed.
- If you select “02”, the E mode adjustment screen is displayed.

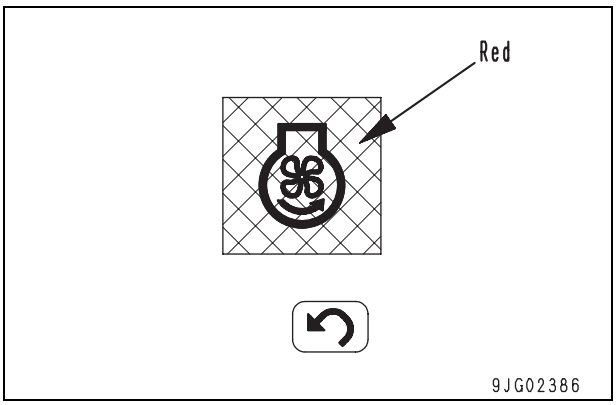




1. Setting fan rotation
- With this menu, you can rotate the fan in reverse. You can clean the cooling equipment easily by rotating the fan in reverse.



★ If any of the following conditions is satisfied, the reverse prohibition screen shown at right is displayed and the fan does not rotate in reverse.
Coolant temperature > 90°C
Hydraulic oil temperature < 15°C
Hydraulic oil temperature > 95°C
- If you press return switch (2), the user mode menu is displayed again.

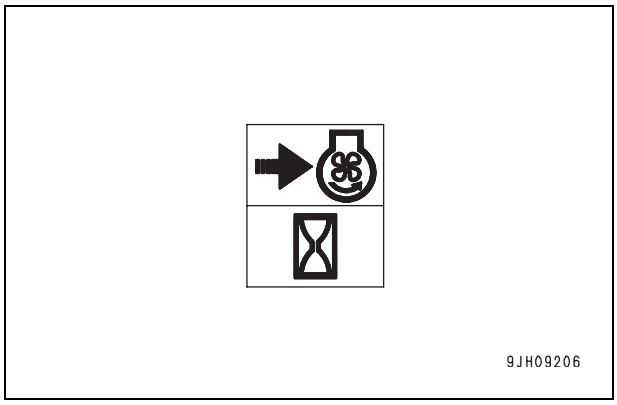


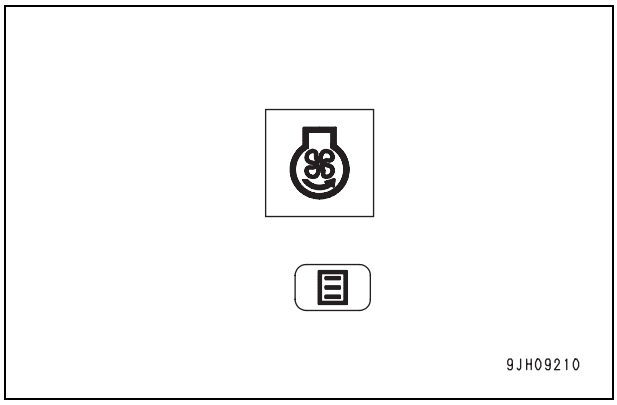
- If you press input confirm switch (4), the fan rotates in reverse.
- If you press return switch (2), the previous screen is displayed again.

★ While the rotation direction of the fan is being changed, the engine speed is automatically set to low idle for 15 seconds.

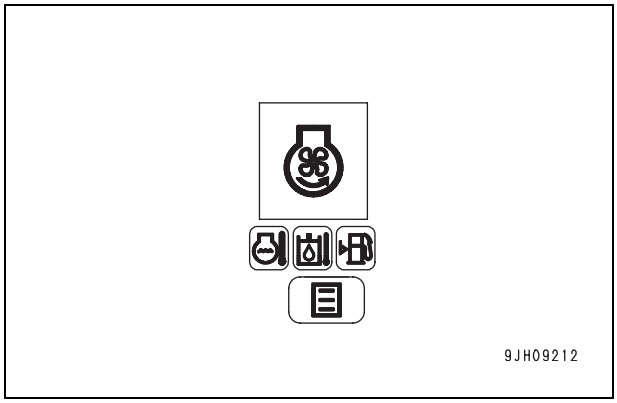
★ While the fan is rotating in reverse, the swash plate angle of the main pump is minimized.

★ If the engine is stopped while the fan is rotating in reverse and then started again, the fan rotates forward.

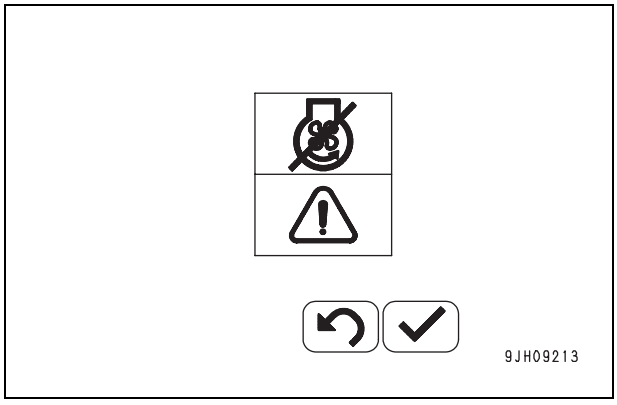




★ If any error occurs while the fan is rotating in reverse, the caution mark is displayed.

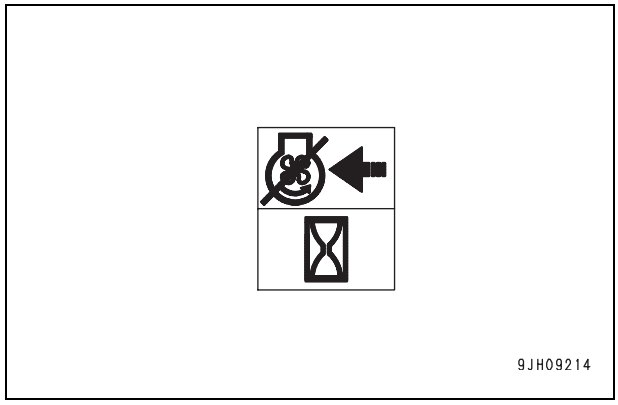


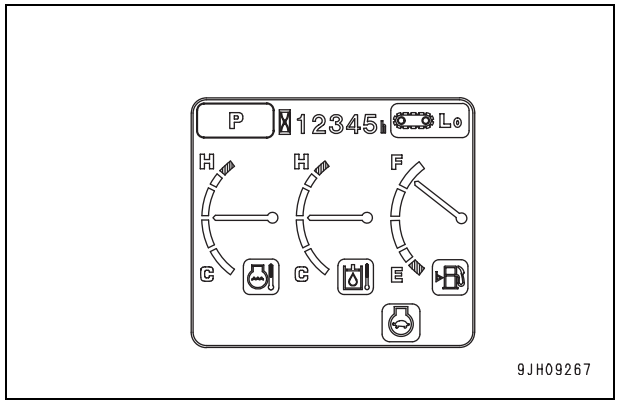
★ If selector switch (1) is pressed while the fan is rotating in reverse, the reverse rotation confirm screen shown at right is displayed.



- If input confirm switch (4) is pressed, the screen at right is displayed and the fan rotation direction is returned to forward.
- If the return switch is pressed, the previous screen is displayed again.

★ While the rotation direction of the fan is being changed, the engine speed is automatically set to low idle for 15 seconds.

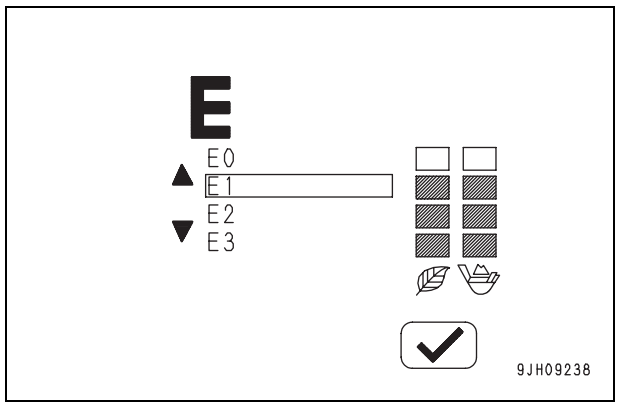




2. E mode adjustment

- With this menu, you can change the balance of the fuel consumption and production per hour by changing the engine speed and target pump absorption torque in the E mode.
- Select the target value with operation switch (3). Press input confirm switch (4), and the target value is confirmed and the ordinary screen is displayed again.
- You can select a target value from the 4 levels of “E0” – “E3”. As the number is increased, the fuel consumption is reduced and the production per hour is also reduced.

★ The initial target value is “E0”.



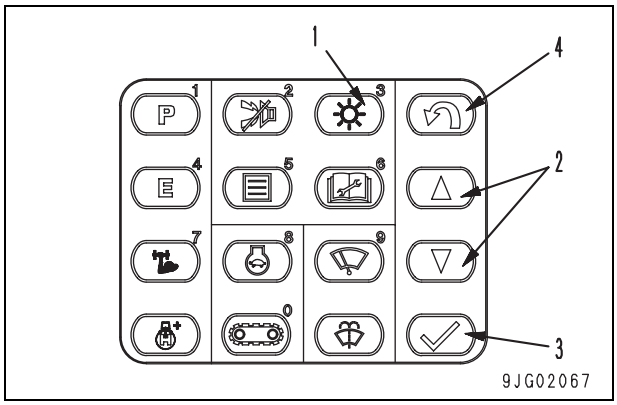
Brightness, contrast adjustment function

This function is used to adjust the brightness and contrast of the display.

Adjustment method

★ Operate as follows when on the operator screen.

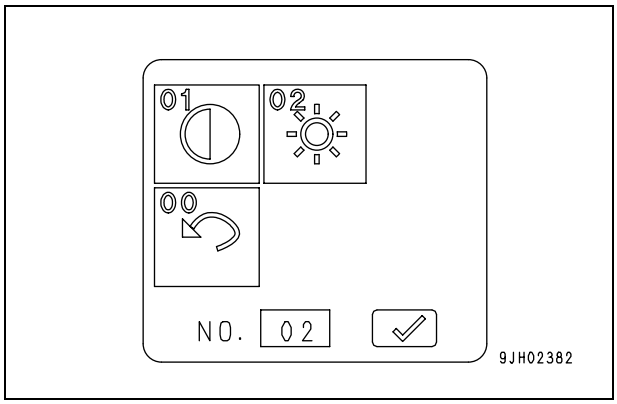
1. Press display brightness/contrast adjustment switch (1) and switch to the adjustment screen.



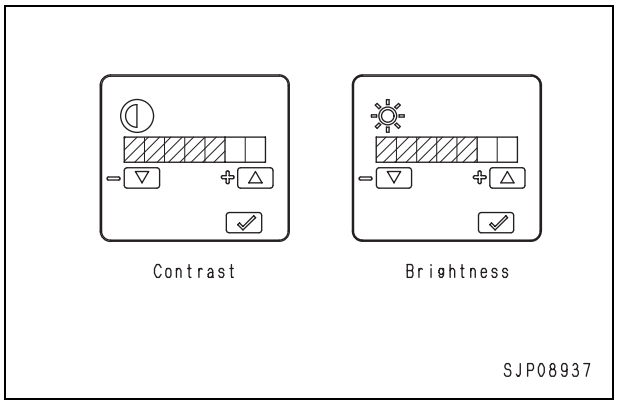
★ Relationship between menu symbol and content.

No.	Symbol	Content
00	Return mark	Return
01	 SJP08935	Contrast
02	 SJP08936	Brightness

2. Press control switch (2), or use the 10-key pad to input the number (00 – 02) to select either contrast or brightness.
   After completing the selection, press input confirmation switch (3) and return to the adjustment screen.
   Then press return switch (4) or use the 10-key pad to set to [00] and press input confirmation switch (3) to return to the normal screen.
3. Press control switch (2) and adjust the brightness and contrast as desired.

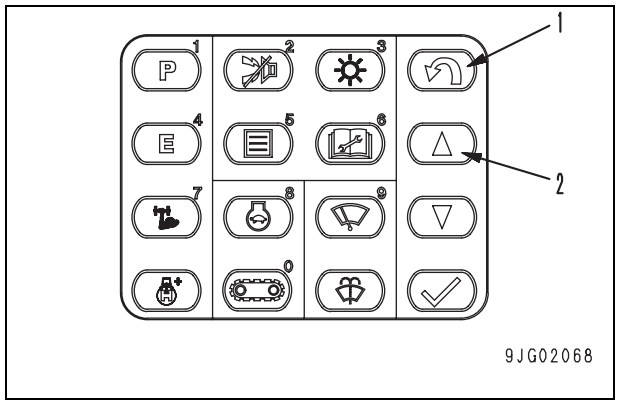


Control switch	Actuation
 SJP08933	Flow level bar graph extends to the right
 SJP08934	Flow level bar graph retracts to the left



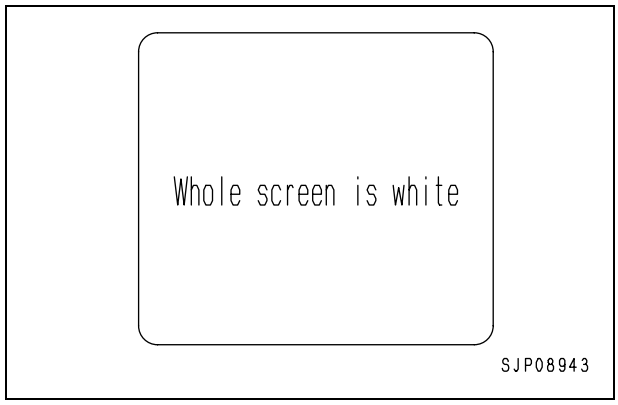
Service meter check function

- When the starting switch is at the OFF position, keep return switch (1) and control switch (2) of the monitor pressed at the same time, and the service meter is shown on the display.
- This display is shown only while the two switches are being pressed. When the switches are released, the display goes out.
  Note that it takes 3 – 5 seconds after the switches are pressed for the service meter display to appear.



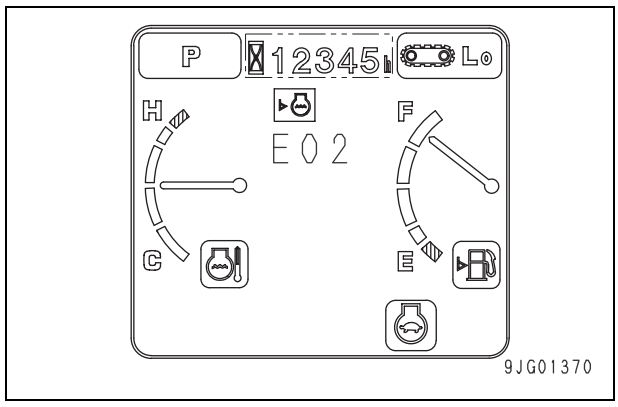
Display LCD check function

- On the password input screen or on the normal screen, if monitor return switch (1) and working mode (A) switch are kept pressed at the same time, all the LCD display will light up and the whole screen will become white, so the display can be checked.
  If any part of the display is black, the LCD is broken.

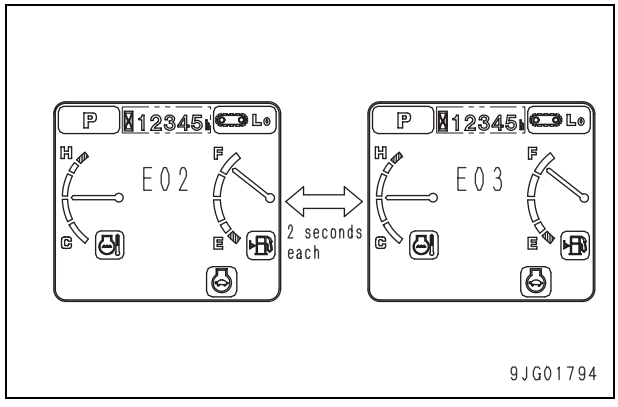


User code display function

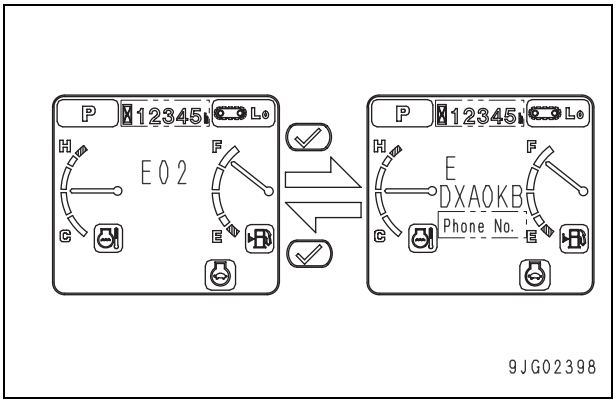
- If there is any problem in operating the machine, the user code is displayed on the monitor to advise the operator of the steps to take.
  This code display appears on the operator screen.
- On the operator screen, the user code is displayed on the portion for the hydraulic oil temperature gauge.



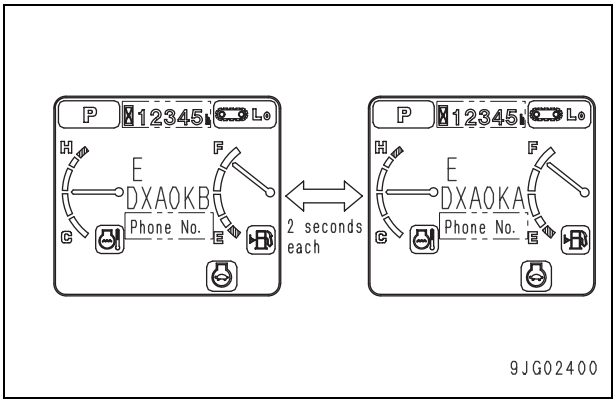
- If more than one user code is generated at the same time, the user codes are displayed in turn for 2 seconds each to display all the user codes.



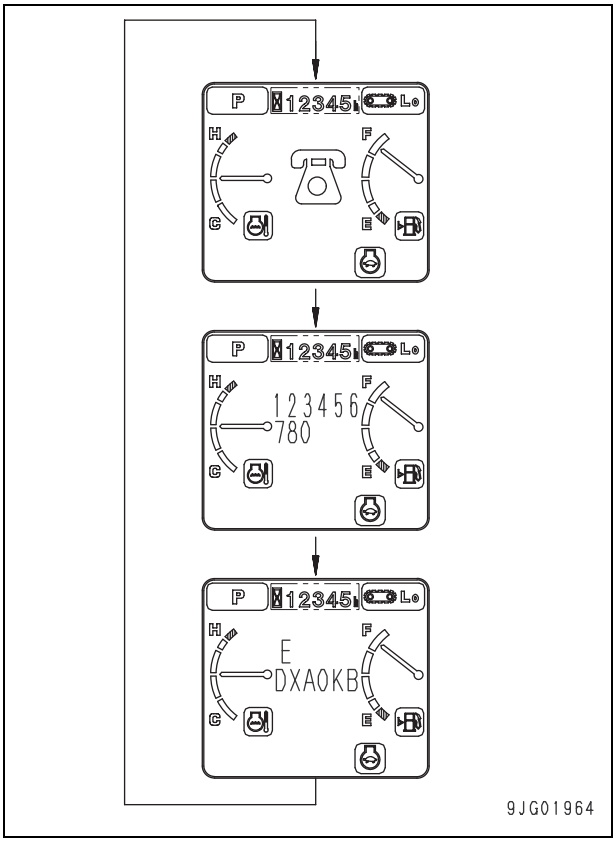
- While the user code is being displayed, if the input confirmation switch is pressed, the service code and failure code can be displayed.



- If there is more than one service code or failure code, the display switches every 2 seconds and displays all the service codes/failure codes that caused the user code to be displayed.
  Even if service codes/failure codes have occurred, if they did not cause the user code to be displayed, this function does not display them.



- If the telephone number has been set using the telephone number input on the service menu, it is possible to switch on the service code/failure code and display the telephone symbol and telephone number.
  For details of inputting and setting the telephone number, see “Special functions of monitor panel” in the Testing and adjusting section.



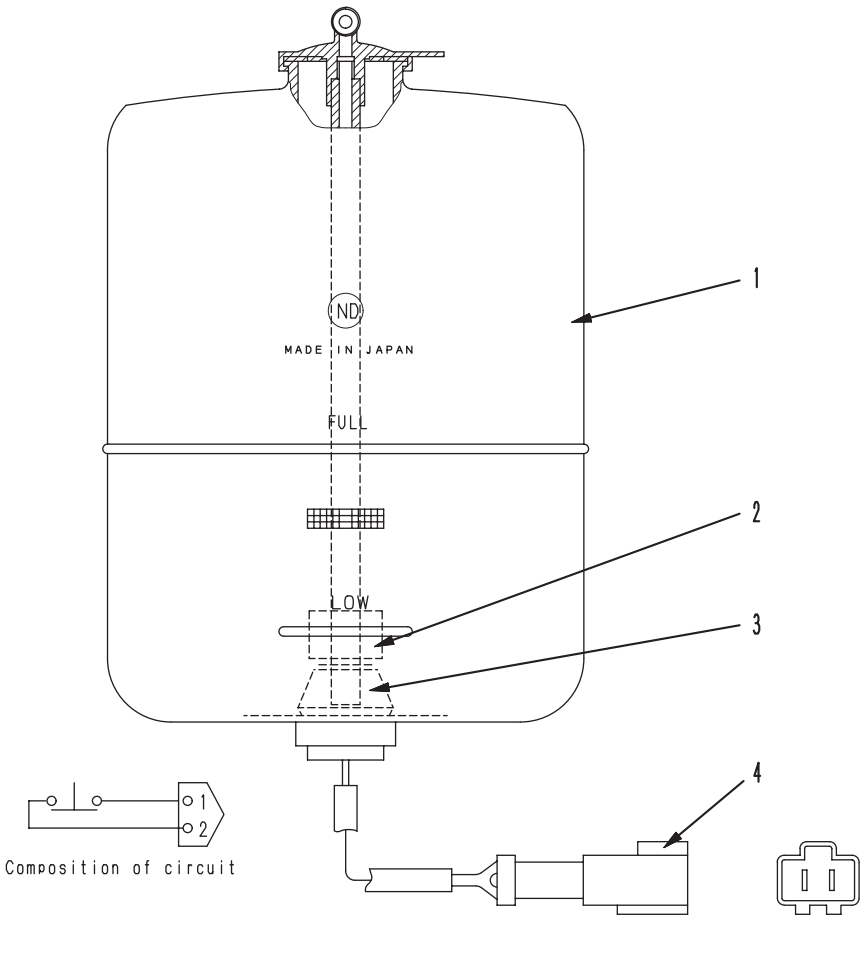
Sensors

- The signals from the sensors are input directly to the engine controller and the pump controller monitor.

The contact type sensors are always connected at one end to the chassis GND.

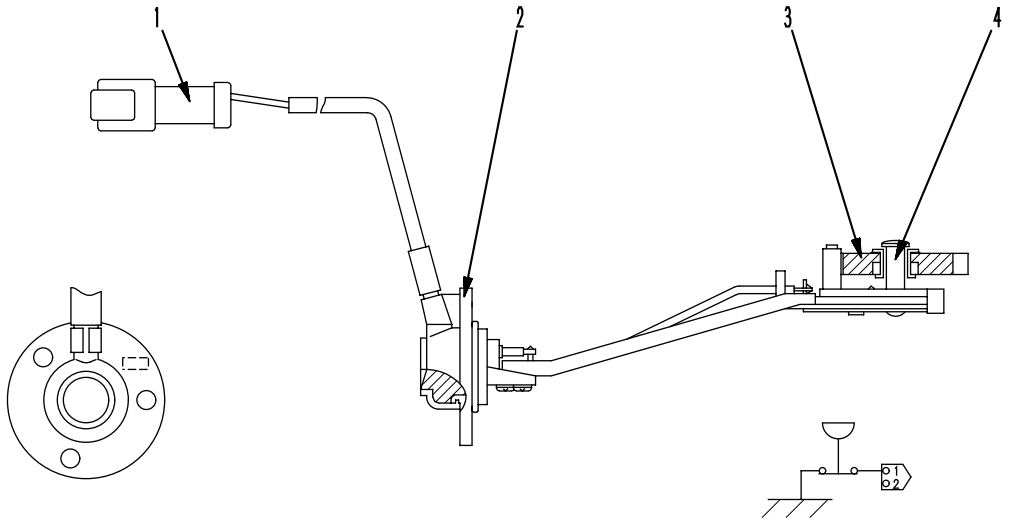
Name of sensor	Type of sensor	When normal	When abnormal	Input controller
Coolant level	Contact type	ON (closed)	OFF (open)	Monitor
Engine oil level	Contact type	ON (closed)	OFF (open)	Monitor
Engine oil pressure	Analog	—	—	Engine controller
Coolant temperature	Resistance type	—	—	Engine controller
Fuel level	Resistance type	—	—	Monitor
Air cleaner clogging	Contact type	OFF (open)	ON (closed)	Monitor
Hydraulic oil temperature	Contact type	—	—	Monitor
Main pump oil pressure	Analog	—	—	Pump controller

Coolant level sensor



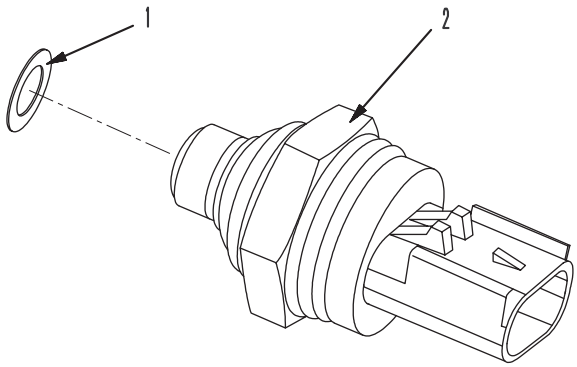
1. Sub-tank
2. Float
3. Sensor
4. Connector

Engine oil level sensor



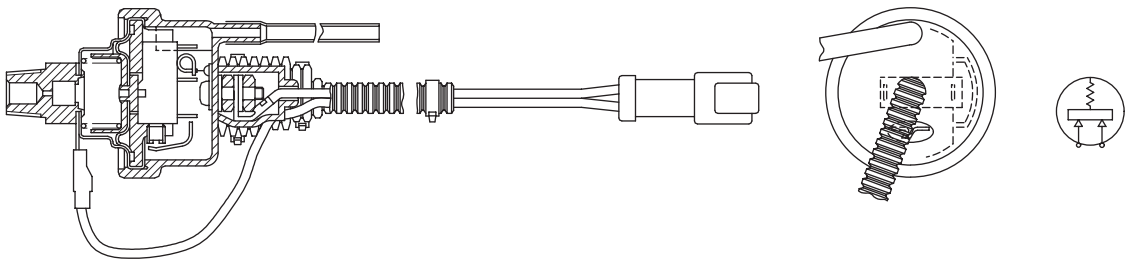
1. Connector
2. Bracket
3. Float
4. Switch

Engine oil pressure sensor

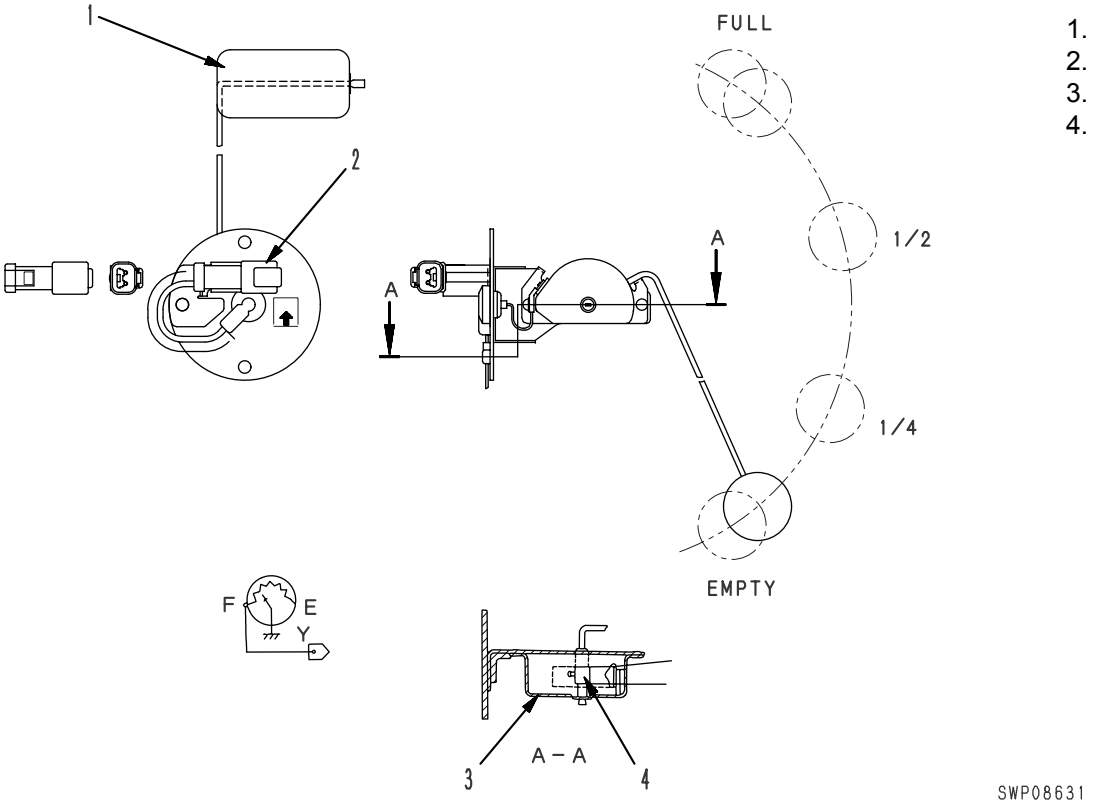


1. Seal
2. Sensor

Air cleaner clogging sensor

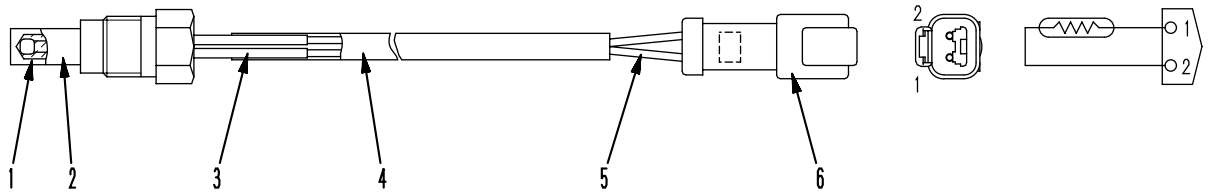


Fuel level sensor



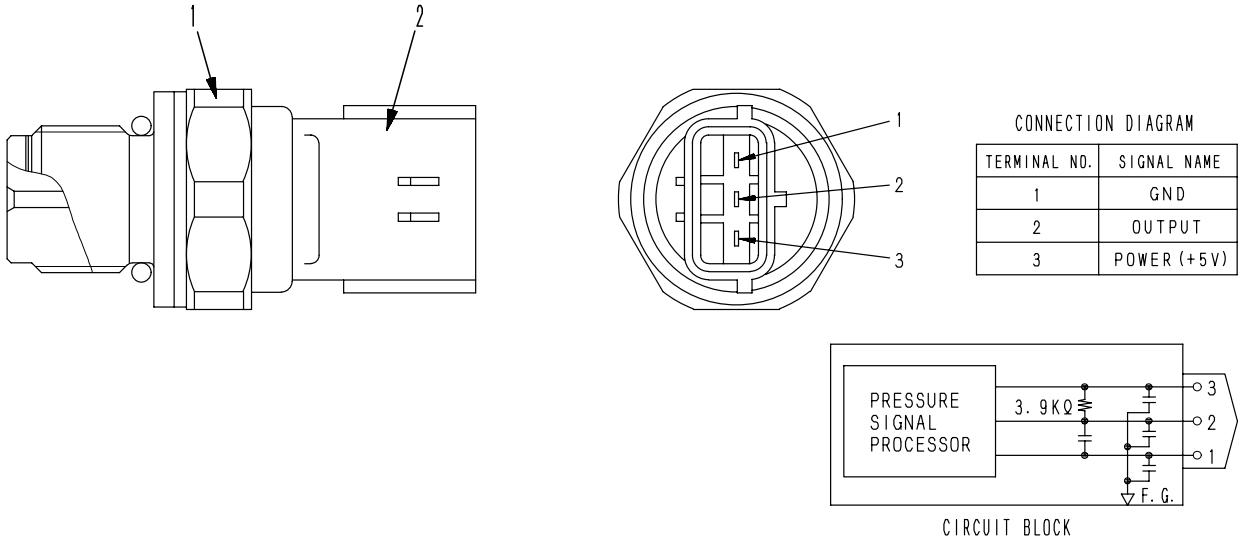
1. Float
2. Connector
3. Cover
4. Variable resistor

Coolant temperature sensor
Hydraulic oil temperature sensor



1. Thermistor
2. Body
3. Tube
4. Tube
5. Wire
6. Connector

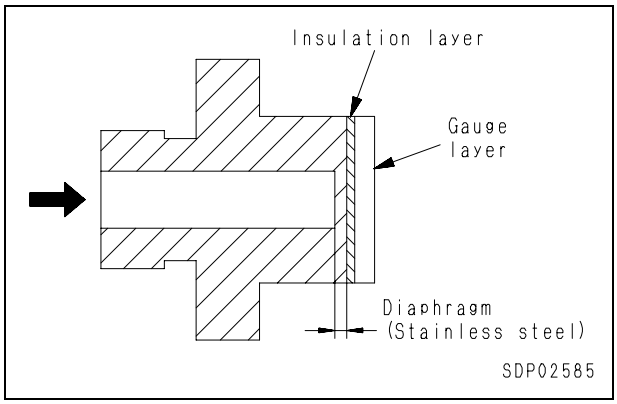
Main pump oil pressure sensor (0 – 49.0 MPa {0 – 500 kg/cm²})



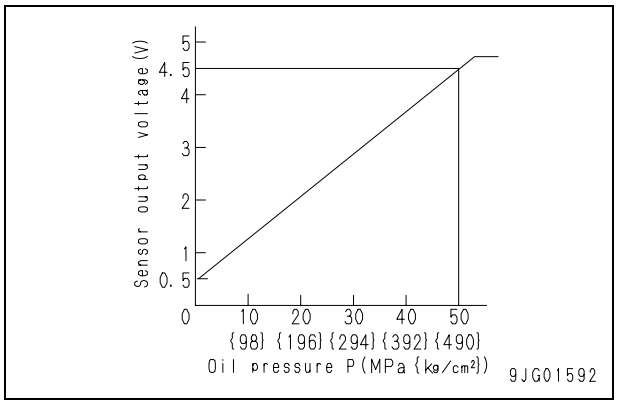
1. Sensor
2. Connector

Operation

- The oil pressure applied from the pressure intake part presses the diaphragm of the oil pressure sensor, the diaphragm is deformed.
- The gauge layer facing the diaphragm measures the deformation of the diaphragm by the change of its resistance, then converts the change of the resistance into a voltage and transmits it to the amplifier (voltage amplifier).



- Relationship between pressure **P** (MPa {kg/cm²} and output voltage (E) is as follows.



PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00386-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

20 Standard value table
Standard service value table

Standard service value table 2
Standard service value table for engine 2
Standard service value table for chassis 3

Standard service value table

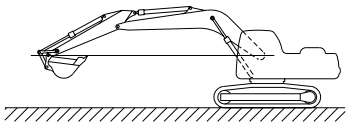
Standard service value table for engine

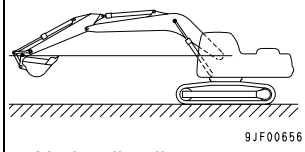
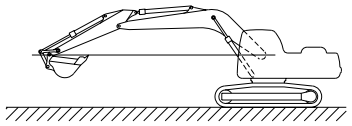
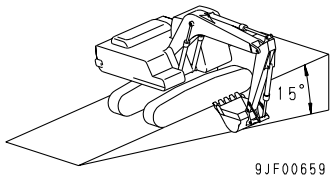
Machine model			PC800, 800LC-8	
Engine			SAA6D140E-5	
Item	Measurement condition	Unit	Standard value	Permissible value
Engine speed	High idle	rpm	1,980 ± 50	1,980 ± 50
	Low idle		825 ± 25	825 ± 25
	Rated speed		1,800	1,800
Intake air pressure	At rated output	kPa {mmHg}	Min 184 {Min. 1,380}	157 {1,180}
Exhaust gas pressure	All speed range (intake air temp: 20°C)	°C	Max. 650	Max. 700
Exhaust gas color	At sudden acceleration	Bosch index	Max. 2.5	3.5
	At high idle		Max. 1.0	2.0
Valve clearance (normal temperature)	Intake valve	mm	0.35	—
	Exhaust valve		0.57	—
Compression pressure	Oil temperature: 40 – 60°C (Engine speed: 200 – 250 rpm)	MPa {kg/cm^2}	Min. 4.1 {Min. 42}	2.8 {29}
Blow-by pressure	(Coolant temperature: within operating range) At rated output	kPa {mmH_2O}	Max. 2.94 {Max. 300}	3.92 {400}
Oil pressure	(Coolant temperature: within operating range) Oil temperature: 80°C	MPa {kg/cm^2}		
	At high idle (SAE30E0S, SAE5W40E0S, SAE10W30HD, SAE15W40HD, SAE30HD)		Min. 0.34 {Min. 3.5}	0.21 {2.1}
	At low idle (SAE30E0S, SAE5W40E0S, SAE10W30HD, SAE15W40HD, SAE30HD)		Min. 0.10 {Min. 1.0}	0.08 {0.8}
Oil temperature	All speed range (inside oil pan)	°C	90 – 110	120
Alternator belt tension	Deflection when pressed with finger force of approx. 58.8 N {6 kg}	mm	13 – 16	13 – 16
Air conditioner compressor belt tension	Deflection when pressed with finger force of approx. 58.8 N {6 kg}	mm	10 – 15	10 – 15

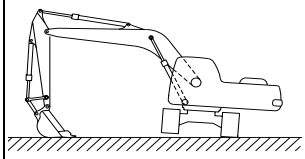
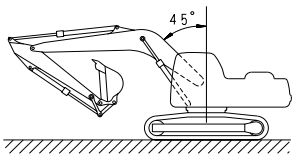
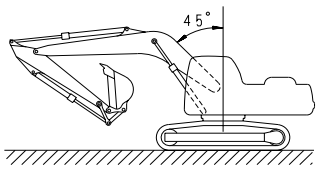
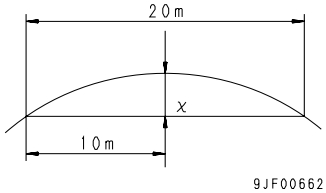
Standard service value table for chassis

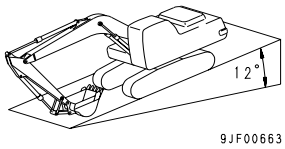
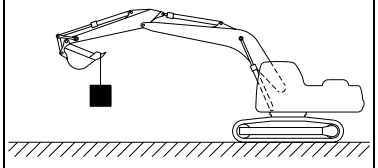
Applicable model					PC800, 800LC-8	
Cate-gory	Item	Measurement conditions		Unit	Standard value for new machine	Service limit value
Engine speed	All pumps at relief	• Engine coolant temperature: Within operating range • Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: A • Boom up relief		rpm	Min. 1,700	Min. 1,700
	Heavy lift ON + All pumps at relief	• Engine coolant temperature: Within operating range • Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: A & heavy lift • Boom up relief			Min. 1,700	Min. 1,700
	Auto-deceleration actuated	• Engine at high idle • Auto-deceleration switch ON • All control levers at neutral			1,425 ± 100	1,400 ± 100
Spool stroke	Boom Lo control valve	• Stroke of each side		mm	16 ± 0.5	16 ± 0.5
	Boom Hi control valve					
	Arm Lo control valve					
	Arm Hi control valve					
	Bucket Lo control valve					
	Bucket Hi control valve					
	Swing control valve					
	Travel control valve					
Travel of control levers	Boom control lever	• Center of lever knob • Read max. value to end of travel (Exclude play at neutral.) • Engine stopped	N → Raise, Lower		85 ± 10	85 ± 10
	Arm control lever		N → In, Out		85 ± 10	85 ± 10
	Bucket control lever		N → Curl, Dump		85 ± 10	85 ± 10
	Swing control lever		N → R.H., L.H.		85 ± 10	85 ± 10
	Travel control lever		N → F, R (L.H., R.H.)		115 ± 12	115 ± 12
	Play of control levers		Work equipment, swing, travel		Max. 10	Max. 15

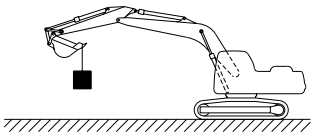
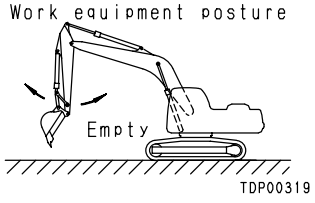
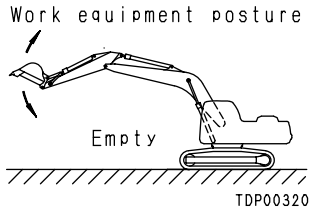
Applicable model					PC800, 800LC-8	
Category	Item	Measurement conditions		Unit	Standard value for new machine	Service limit value
Operating effort of control levers	Boom control lever	• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Center of lever knob • Measure max. value to end of travel		N {kg}	15.7 ± 4.9 {1.6 ± 0.5}	15.7 ± 4.9 {1.6 ± 0.5}
	Arm control lever				15.7 ± 4.9 {1.6 ± 0.5}	15.7 ± 4.9 {1.6 ± 0.5}
	Bucket control lever				12.7 ± 3.9 {1.3 ± 0.4}	12.7 ± 3.9 {1.3 ± 0.4}
	Swing control lever				12.7 ± 3.9 {1.3 ± 0.4}	12.7 ± 3.9 {1.3 ± 0.4}
	Travel control lever, pedal		Lever		24.5 ± 5.9 {2.5 ± 0.6}	Max. 39.2 {Max. 4.0}
			Pedal		74.5 ± 18.6 {7.6 ± 1.9}	Max. 107.6 {Max. 11}
Hydraulic pressure	Boom relief pressure	• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Working mode: P • Pump outlet pressure when measured circuit is relieved • Relieve either travel circuit.	RAISE Normal	MPa {kg/cm²}	32.4 ± 1.0 {330 ± 10}	32.4 $^{+1.0}_{-2.0}$ {330 $^{+10}_{-20}$}
			RAISE At heavy lift		33.8 ± 1.0 {345 ± 10}	33.8 $^{+1.0}_{-2.0}$ {345 $^{+10}_{-20}$}
			LOWER Normal		18.6 ± 1.9 {190 ± 20}	18.6 ± 1.9 {190 ± 20}
			LOWER At machine push-up		31.4 ± 1.0 {320 ± 10}	31.4 $^{+1.0}_{-2.0}$ {320 $^{+10}_{-20}$}
	Arm relief pressure				31.4 ± 1.0 {320 ± 10}	31.4 $^{+1.0}_{-2.0}$ {320 $^{+10}_{-20}$}
	Bucket relief pressure		Curl		31.4 ± 1.0 {320 ± 10}	31.4 $^{+1.0}_{-2.0}$ {320 $^{+10}_{-20}$}
			Dump		32.4 ± 1.0 {330 ± 10}	32.4 $^{+1.0}_{-2.0}$ {330 $^{+10}_{-20}$}
	Swing relief pressure				28.9 $^{+2.5}_{-0.5}$ {295 $^{+25}_{-5}$}	28.9 $^{+2.5}_{-0.5}$ {295 $^{+25}_{-5}$}
	Travel relief pressure				34.8 ± 1.0 {355 ± 10}	34.8 $^{+1.0}_{-2.0}$ {355 $^{+10}_{-20}$}
	Control pressure	• Hydraulic oil temperature: 45 – 55°C • Engine at high idle			3.24 $^{+0.49}_{0}$ {33 $^{+5}_{0}$}	3.24 $^{+0.49}_{-0.20}$ {33 $^{+5}_{-2}$}
	Pump EPC solenoid valve output pressure	• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Working mode: P	All control levers at neutral		Max. 0.78 {Max. 8}	Max. 0.78 {Max. 8}
			Boom RAISE relief (Normal)		Min. 1.23 {Min. 12.5}	Min. 1.23 {Min. 12.5}

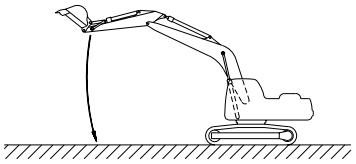
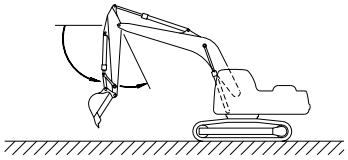
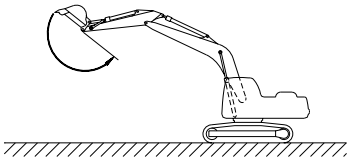
Applicable model				PC800, 800LC-8	
Category	Item	Measurement conditions	Unit	Standard value for new machine	Service limit value
Hydraulic pressure	Jet sensor output negative pressure	• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Working mode: P All control levers at neutral	MPa {kg/cm²}	Min. 1.14 {Min. 11.6}	Min. 1.14 {Min. 11.6}
		• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Working mode: P Track running idle (Lever at stroke end)		Max. 0.15 {Max. 1.5}	Max. 0.15 {Max. 1.5}
	PPC valve output pressure	• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Control lever at stroke end		$2.9\ ^{+0.8}_{-0.2}$ $\{30\ ^{+8}_{-2}\}$	$2.9\ ^{+0.8}_{-0.2}$ $\{30\ ^{+8}_{-2}\}$
	Oil pressure drop	• Hydraulic oil temperature: 45 – 55°C • Difference between relief pressure at high idle and that at low idle		Max. 2.0 {Max. 20}	Max. 2.9 {Max. 30}
Fan	Fan speed	• Hydraulic oil temperature: 45 – 55°C • Engine: High idle • Fan: 100% speed mode	rpm	1,050 ± 50	1,050 ± 50
	Fan circuit oil pressure	• Hydraulic oil temperature: 45 – 55°C • Engine: High idle • Fan: 100% speed mode	MPa {kg/cm²}	13.2 – 19.1 {135 – 195}	13.2 – 19.1 {135 – 195}
	Fan pump EPC solenoid valve output pressure	• Hydraulic oil temperature: 45 – 55°C • Engine: High idle • Fan: 100% speed mode		1.72 ± 0.49 {17.5 ± 0.5}	1.72 ± 0.49 {17.5 ± 0.5}
Swing	Overrun when stopping swing	 9JF00656 • Hydraulic oil temperature: 45 – 55°C • Bucket: No load • Engine at high idle • Working mode: P • Stop after swinging one turn and measure distance that swing circle moves	deg. (mm)	Max. 71 (Max. 1,225)	Max. 80 (Max. 1,380)

Applicable model					PC800, 800LC-8	
Category	Item	Measurement conditions		Unit	Standard value for new machine	Service limit value
Swing	Time taken to start swing	 9JF00656 • Hydraulic oil temperature: 45 – 55°C • Bucket: No load • Engine at high idle • Working mode: P • Time taken to swing 90° and 180° from starting position	90°	sec.	4.2 ± 0.5	Max. 5.3
			180°		6.8 ± 0.7	Max. 8.2
	Time taken to swing	 9JF00656 • Hydraulic oil temperature: 45 – 55°C • Bucket: No load • Engine at high idle • Working mode: P • Swing one turn, then measure time taken to swing next 5 turns		sec.	41 – 47	Max. 50
	Hydraulic drift of swing	 9JF00659 • Hydraulic oil temperature: 45 – 55°C • Engine stopped • Set machine on 15° slope, and set upper structure at 90° to the side. • Make match marks on inner race and outer race of circle. • Measure distance that match marks move apart after 5 minutes.		mm	0	0
	Leakage from swing motor	• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Swing lock switch: ON • Leakage in 1 minute during swing relief		ℓ/min	Max. 5	Max. 10

Applicable model					PC800, 800LC-8	
Category	Item	Measurement conditions		Unit	Standard value for new machine	Service limit value
Travel	Travel speed (Idle travel)	 9JF00660 • Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Working mode: P • Raise track on one side at a time, rotate one turn, then measure time taken for next 5 turns with no load.	Lo	sec.	74 – 90 (PC800LC-8: 80 – 98)	74 –90 (PC800LC-8: 80 – 98)
			Hi		48 – 59 (PC800LC-8: 52 – 64)	48 – 59 (PC800LC-8: 52 – 64)
	Travel speed (Actual travel)	 9JF00661 • Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Working mode: P • On level ground • Run up for at least 10 m, and measure time taken to travel next 20 m on flat ground.	Lo	sec.	22 – 29	22 – 29
			Hi		15 – 19	15 – 19
	Travel deviation	 9JF00661 • Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Working mode: P • Travel speed: Lo • On hard and level ground • Measure travel deviation (x) in travel of 20 m after running up 10 m.  9JF00662		mm	Max. 200	Max. 220

Applicable model					PC800, 800LC-8	
Category	Item		Measurement conditions	Unit	Standard value for new machine	Service limit value
Travel	Hydraulic drift of travel		 9JF00663 • Hydraulic oil temperature: 45 – 55°C • Engine stopped • Stop machine on 12° slope with sprocket at uphill end of machine. • Measure the distance the machine moves in 5 minutes.	mm	0	0
	Leakage of travel motor		• Hydraulic oil temperature: 45 – 55°C • Engine at high idle • Travel: Lock sprocket. • Measure leakage in 1 minute during travel relief.	ℓ/min	Max. 20	Max. 40
Work equipment	Hydraulic drift of work equipment	Total work equipment (hydraulic drift at tip of bucket teeth)	Posture of work equipment  9JF00664 • Measure extraction or retraction distance of each cylinder and lowering distance of bucket tooth tip from above posture. Rated load on work equipment: 49 kN {5,000 kg} 64 kN {6,500 kg} • Measure on level and flat ground. • Set lever in neutral. • Stop engine. • Hydraulic oil temperature: 45 – 55°C • Measure just after setting. • Measure lowering distance every 5 minutes. Judge by lowering distance in 15 minutes. • Values in ( ) are standard values when no load is applied to work equipment.	mm	Max. 1,400 (Max. 900)	Max. 1,800 (Max. 1,000)
		Boom cylinder (amount of retraction of cylinder)			Max. 60 (Max. 35)	Max. 90 (Max. 50)
		Arm cylinder (amount of extension of cylinder)			Max. 165 (Max. 70)	Max. 250 (Max. 105)
		Bucket cylinder (amount of retraction of cylinder)			Max. 50 (Max. 15)	Max. 75 (Max. 25)

Applicable model						PC800, 800LC-8	
Cate-gory	Item		Measurement conditions		Unit	Standard value for new machine	Service limit value
Work equipment	Work equipment speed	Boom Lower bucket tooth to ground. ↕ Extract cylinder to stroke end.	Posture of work equipment  9JF00664 • Run engine at full throttle. • Set in mode P • Hydraulic oil temperature: 45 – 55°C	*RAISE	sec.	7.1M / 2.9M 5.6 ± 0.6 8.0M / 3.6M 5.3 ± 0.5	7.1M / 2.9M Max. 7.2 8.0M / 3.6M Max. 6.7
				LOWER		7.1M / 2.9M 4.4 ± 0.4 8.0M / 3.6M 4.2 ± 0.4	7.1M / 2.9M Max. 5.2 8.0M / 3.6M Max. 5.0
		Arm Retract cylinder to stroke end. ↕ Extract cylinder to stroke end.	 TDP00319 • Run engine at full throttle. • Set in mode P • Hydraulic oil temperature: 45 – 55°C	*IN		7.1M / 2.9M 5.6 ± 0.5 8.0M / 3.6M 5.6 ± 0.5	7.1M / 2.9M Max. 6.8 8.0M / 3.6M Max. 6.8
				*OUT		7.1M / 2.9M 3.8 ± 0.4 8.0M / 3.6M 3.8 ± 0.4	7.1M / 2.9M Max. 4.9 8.0M / 3.6M Max. 4.9
		Bucket Retract cylinder to stroke end. ↕ Extract cylinder to stroke end.	 TDP00320 Run engine at full throttle. • Set in mode P • Hydraulic oil temperature: 45 – 55°C	*IN		7.1M / 2.9M 4.6 ± 0.5 8.0M / 3.6M 3.6 ± 0.4	7.1M / 2.9M Max. 5.6 8.0M / 3.6M Max. 4.4
				OUT		7.1M / 2.9M 4.2 ± 0.4 8.0M / 3.6M 3.4 ± 0.3	7.1M / 2.9M Max. 5.0 8.0M / 3.6M Max. 6.0

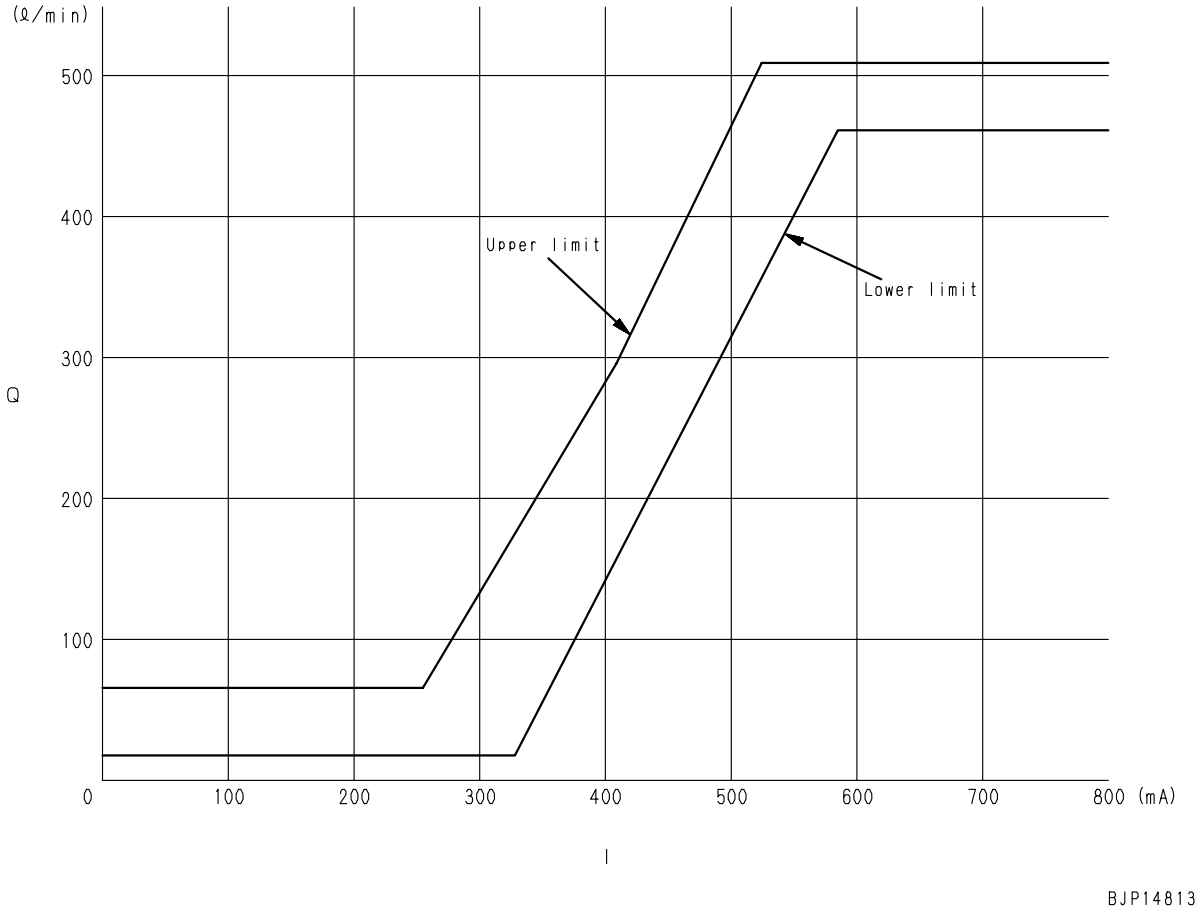
Applicable model					PC800, 800LC-8	
Category		Item	Measurement conditions	Unit	Standard value for new machine	Service limit value
Work equipment	Time lag	Boom	 9JF00668 • Time required to raise chassis after bucket reaches ground • Run engine at slow speed. • Hydraulic oil temperature: 45 – 55°C	sec.	Max. 6	Max. 6
		Arm	 9JF00669 • Time from stop of arm to start. • Run engine at slow speed. • Hydraulic oil temperature: 45 – 55°C		Max. 5	Max. 5
		Bucket	 9JF00670 • Time from stop of bucket to start. • Run engine at slow speed. • Hydraulic oil temperature: 45 – 55°C		Max. 4	Max. 4
Work equipment	Oil leakage	Cylinder	• Hydraulic oil temperature: 45 - 55°C • Hydraulic pressure: 31.4 ± 1.0 MPa {320 ±10 kg/cm^2}	cc/min	Max. 5	Max. 20
		Center swivel joint			Max. 10	Max. 100
Pump performance	Hydraulic pump discharge amount		• See following page.	ℓ/min	See following page.	

* Includes the operating time of the cylinder cushion.

Cate-gory

Performance of hydraulic pump

Discharge amount of one hydraulic pump



- Pump speed: At rpm
- Pump discharge pressure: 9.8 MPa {100 kg/cm^2}

Check point	Test pump Test pump EPC current (mA)	Standard value for discharge amount Q (ℓ/min)	Judgement standard lower limit Q (ℓ/min)
As desired	I	See graph	See graph

PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

30 Testing and adjusting
Testing and adjusting, Part 1

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Testing and adjusting, Part 1

Tools for testing, adjusting and troubleshooting

Testing and adjusting item	symbol		Part No.	Part name	Q'ty	Remarks
Measuring intake air pressure (boost pressure)	A		799-201-2202	Boost gauge kit	1	–101 to 200 kPa {–760 to 1,500 Hg}
Measuring exhaust temperature	B		799-101-1502	Digital thermometer	1	–99.9 to 1,299 ºC
Measuring exhaust gas color	C	1	799-201-9001	Handy smoke checker	1	Bosch index: 0 to 9 (With standard color)
		2	Purchased	Smoke meter	1	
Adjusting valve clearance	D		Purchased	Feeler gauge	1	(Intake: 0.35 mm, Exhaust: 0.57 mm)
Measuring compression pressure	E	1	795-502-1590	Compression gauge	1	0 to 6.9 MPa {0 to 70 kg/cm^2}
		2	795-471-1310	Adapter	1	For 140E-5 engine
			6217-71-6110	Gasket	1	For 140E-5 engine
Measuring blow-by pressure	F		799-201-1504	Blow-by checker	1	
Measuring engine oil pressure	G	1	799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-2320	Hydraulic tester	1	Pressure gauge: 0.98 MPa {10 kg/cm^2}
Testing fuel pressure	H	1	799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-2320	Hydraulic tester	1	Pressure gauge: 0.98 MPa {10 kg/cm^2}
		3	Not set yet	Adapter	1	8 x 1.25 mm → R1/8
Testing fuel return rate and leakage	J	1	6151-51-8490	Spacer	1	Inside diameter: 14 mm
		2	6206-71-1770	Joint	1	Joint diameter: 10 mm
		3	6217-71-8820	Joint	1	Joint diameter: 14 mm
		4	Purchased	Hose	1	Size x Length: Ø 5 mm x (2 to 3 m)
		5	Purchased	Hose	1	Size x Length: Ø 15 mm x (2 to 3 m)
		6	Purchased	Measuring cylinder	1	Capacity: 1 ℓ
		7	Purchased	Stopwatch	1	
Measuring clearance of swing circle bearing	N		Purchased	Dial gauge	1	With magnet
Testing and adjusting in work equipment, swing, and travel circuit oil pressures	K		799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
Testing and adjusting control circuit oil pressure	L		799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}

Testing and adjusting item	symbol		Part No.	Part name	Q'ty	Remarks
Testing and adjusting control oil pressure of piston pump	M	1	799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-2701	Differential pressure gauge	1	
		3	799-101-5220	Nipple	2	Size: 10 × 1.25 mm
			07002-11023	O-ring	2	
Measuring PPC valve output pressure	P	1	799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-3200	Adapter	1	Size: 03
Measuring outlet pressure of solenoid valve, swing PPC shuttle valve, and swing priority selector valve	Q	1	799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-3200	Adapter	1	Size: 03
		3	799-401-3300	Adapter	1	Size: 04
		4	799-101-5220	Nipple	2	Size: 10 × 1.25 mm
			07002-11023	O-ring	2	
Measuring fan speed	R		799-203-8001	Multiple tachometer	1	L: 60 – 2000 rpm, H:60 – 19.999 rpm
Measuring fan circuit oil pressure	S		799-101-5002	Hydraulic tester	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Digital hydraulic tester	1	
Measuring oil leakage	T		Purchased	Measuring cylinder	1	
Measuring fan pump EPC solenoid output pressure	U	1	799-101-5002	Hydraulic tester	1	
			790-261-1204	Digital hydraulic tester	1	
		2	799-101-5220	Nipple		Size: 10 x 1.5 mm
			07002-11023	O-ring		
Measuring wear of sprocket	—		796-627-1110	Wear gauge	1	
Measuring coolant temperature and oil temperature	—		799-101-1502	Digital thermometer	1	–99.9 to 1,299 ºC
Measuring operating effort and pressing force	—		79A-264-0021	Push-pull scale	1	0 to 294 N {0 to 30 kg}
			79A-264-0091	Push-pull scale	1	0 to 490 N {0 to 50 kg}
Measuring stroke and hydraulic drift	—		Purchased	Scale	1	
Measuring work equipment speed	—		Purchased	Stopwatch	1	
Measuring voltage and resistance	—		Purchased	Multimeter	1	

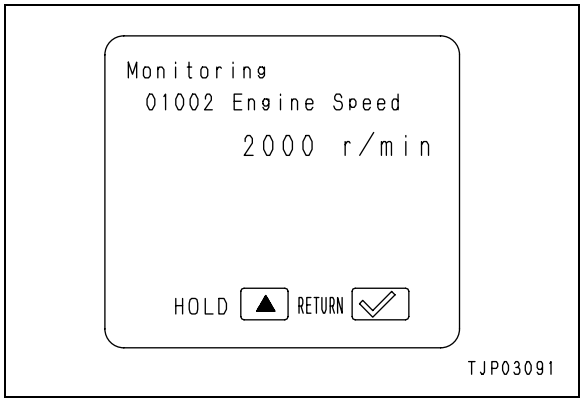
★ For the model names and part Nos. of the T-adapters and boxes used for troubleshooting for the machine monitor, controllers, sensors, actuators, and wiring harnesses, see TROUBLESHOOTING, Connector arrangement drawing and electric circuit diagram of each system.

Measuring engine speed

★ Measure the engine speed under the following condition.
- Engine coolant temperature: Within operating range
- Hydraulic oil temperature: Within operating range

1. Preparation work

Turn the starting switch ON and set the monitor panel to "Monitoring".
- ★ For the operating method, see "Special functions of monitor panel".
- ★ Monitoring code: 01002 Engine speed
  01006 Engine speed
- ★ Code 01002 is information of the engine controller and code 01006 is information of the pump controller. The engine speed can be measured with either of those codes.
- ★ The engine speed is displayed in rpm.



2. Measuring low idle speed
1) Start the engine and set the fuel control dial in the low idle position (MIN).
2) Set the work equipment control, swing control, and travel levers in neutral and measure the engine speed.

3. Measuring high idle speed
1) Start the engine and set the fuel control dial in the high idle position (MAX).
2) Set the working mode switch to the P-mode position.
3) Turn the auto-decelerator switch OFF.

4. Measuring all-pump relief speed
1) Start the engine and set the fuel control dial in the high idle position (MAX).
2) Set the working mode switch in the P-mode position.
3) Turn the heavy lift switch OFF.
4) Relieve the boom circuit by raising the boom and measure the engine speed.

5. Measuring heavy-lift ON + all-pump relief speed
1) Start the engine and set the fuel control dial in the high idle position (MAX).
2) Set the working mode switch in the P-mode position.
3) Turn the heavy lift switch ON.
4) Relieve the boom circuit by raising the boom and measure the engine speed.
   ★

6. Measuring auto-deceleration ON speed
1) Start the engine and set the fuel control dial in the high idle position (MAX).
2) Turn the auto-deceleration switch ON.
3) Set the work equipment control, swing control, and travel control levers in neutral. When the auto-decelerator operates, measure the engine speed.
   ★ The engine speed lowers to a certain level about 6 seconds after all the levers are set in neutral. This level is the auto-deceleration speed.

Measuring intake air pressure (Boost pressure)

★ Measuring instruments for intake air pressure (boost pressure)

Symbol	Part No.	Part Name
A	799-201-2202	Boost gauge kit

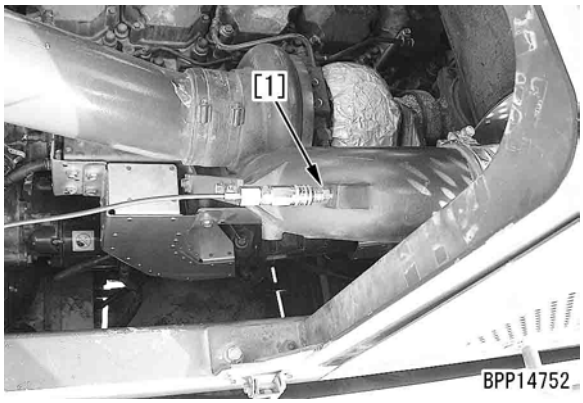
★ When installing and removing the measuring instruments, take care not to touch a hot part of the engine.
★ Measure the intake air pressure (boost pressure) under the following condition.
  • Engine coolant temperature: Within operating range
  • Hydraulic oil temperature: Within operating range

1. Open the engine compartment cover on the counterweight side.

2. Remove intake air pressure pickup plug (1).



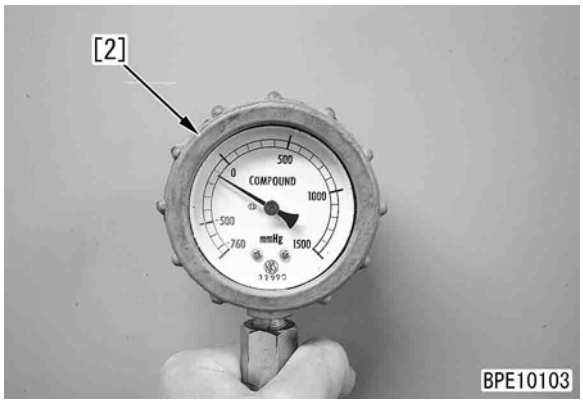
3. Install nipple [1] of boost gauge kit **A** and connect gauge [2].



4. Run the engine at a medium or higher speed and drain the oil from the hose.
  ★ Insert the connecting parts of the gauge and hose about a half and open the self-seal on the hose side repeatedly, and the oil will be drained.
  ★ If Pm kit is available, the air bleed coupling (790-261-1130) inside the kit can also be used.
  ★ If oil is left in the hose, the gauge does not work. Accordingly, be sure to drain the oil.

5. Set the working mode switch to P mode and turn the heavy lift switch ON.

6. Run the engine at high idle and measure the air supply pressure (boost pressure) when the boom RAISE circuit is relieved.



7. After completing the measurement, remove the measuring equipment and set to the original condition.

Measuring exhaust gas temperature

★ Measuring instrument of exhaust gas temperature

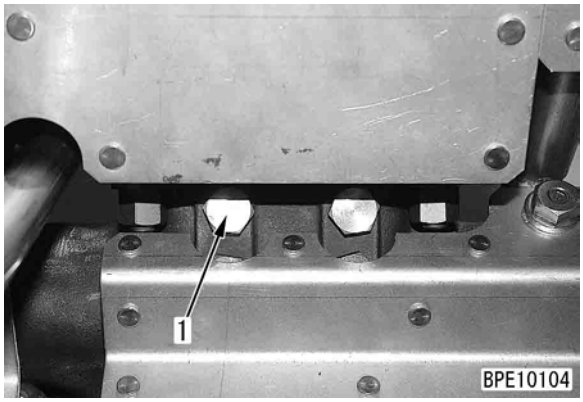
Symbol	Part No.	Part Name
B	799-101-1502	Digital thermometer

⚠ Wait for the temperature of the exhaust manifold to go down before removing or installing the measuring equipment.

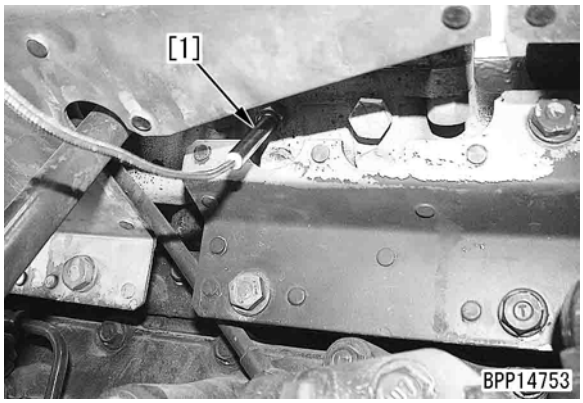
★ Measure the exhaust temperature under the following conditions.
- Coolant temperature: Within operating range
- Hydraulic oil temperature: Within operating range

1. Open the engine compartment cover on the counterweight side.

2. Remove exhaust temperature pickup plug (2).
   ★ You may remove either of 2 plugs.

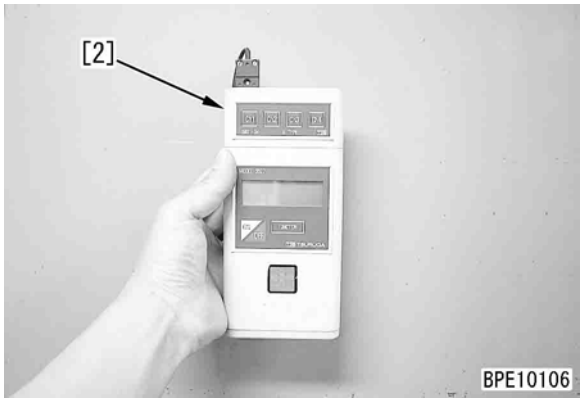


3. Install sensor [1] of digital thermometer **B** and connect them to meter [2].
   ★ Clamp the wiring harness of the digital temperature gauge so that it does not touch any high temperature part during the measurement.



4. Procedure for measuring maximum exhaust temperature for troubleshooting
   Operate the machine actually and measure the maximum exhaust temperature.
   ★ Set the digital thermometer in the PEAK mode.

5. Procedure for measuring exhaust temperature periodically for preventive maintenance (Pm Clinic), etc.
   1) Set the working mode switch in the P-mode position and turn the heavy lift switch ON.
   2) Run the engine at high idle, relieve the boom circuit by raising the boom, and measure the exhaust temperature.
      ★ Measure the exhaust temperature after it is stabilized.



6. After completing the measurement, remove the measuring equipment and set to the original condition.

Measuring exhaust gas color

★ Measuring instrument of exhaust gas color

Symbol		Part Number	Part Name
C	1	799-201-9001	Handy smoke checker
	2	Purchased	Smoke meter

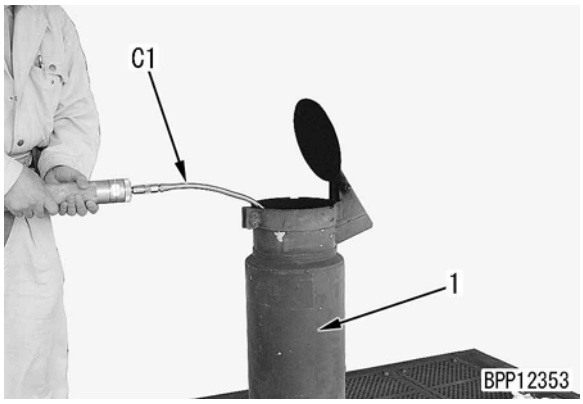
⚠ Be careful not to touch hot areas when mounting and removing the measuring instrument.

★ When air source or electric power supply is not available in field, use **C1** Handy Smoke Checker, but use **C2** Smoke Meter, when recording official data.

★ Measure exhaust gas color under the following conditions:
- Engine coolant temperature: Within the operating temperature range.

1. Measurement with C1, Handy Smoke Checker

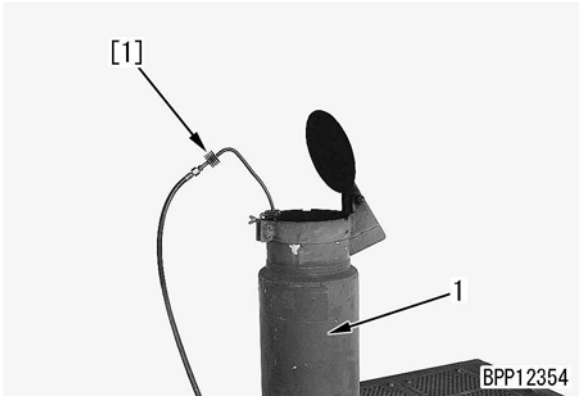
1) Set a filter paper in the handy smoke checker **C1**.
2) Insert the exhaust gas suction port in the exhaust pipe (1).
3) Start the engine.
4) Operate the handle of the smoke checker **C1**, and adhere exhaust gas to the filter paper when accelerating the engine quickly or at a high idle.



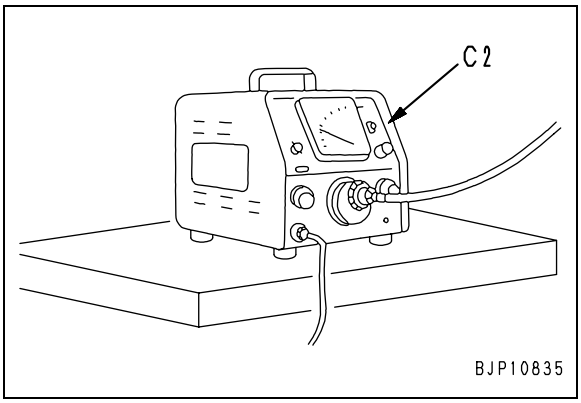
5) Remove the filter paper and compare the color on the filter paper with the accessory scale.
6) After the measurement, remove the measuring instrument and return the engine to the original state.

2. Measurement with Smoke Meter C2

1) Insert the probe [1] of the smoke meter **C2**, in the outlet of the exhaust pipe (1) and fix it to the exhaust pipe with clip.



2) Connect the prove hose, the receptacle of the accelerator switch and the air hose to the smoke meter **C2**.
   ★ The supply air pressure shall be less than 1.5 MPa {15 kg/cm^2}
3) Connect the power cord to an AC100V receptacle.
   ★ Before connecting the power cord, make sure that the power switch of the smoke meter is turned off.
4) Loosen the cap nut of the suction pump and set a filter paper there.
   ★ Set the filter paper accurately so that exhaust gas does not leak out.
5) Turn on the power switch of the smoke meter **C2**.



6) Start the engine.
7) When accelerating the engine quickly or at a high idle, step down the accelerator pedal of the smoke meter **C2**, and collect exhaust gas in the filter paper.
8) Place the filter paper contaminated with exhaust gas on new filter papers (more than 10 sheets) in the filter paper holder and read the indicated value.
9) After the measurement, remove the measuring instrument and return the engine to the original state.

Adjusting valve clearance

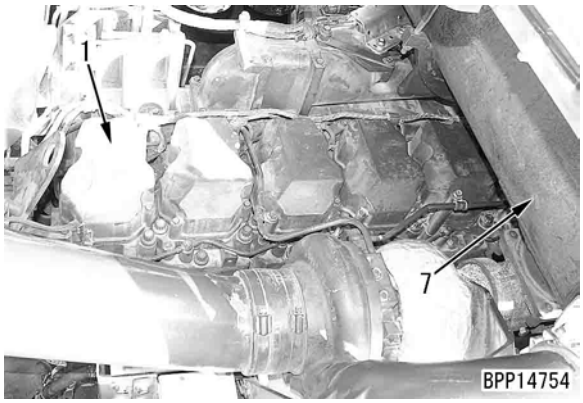
★ Adjusting tools for valve clearance

Symbol	Part No.	Part Name
D	Purchased	Feeler gauge

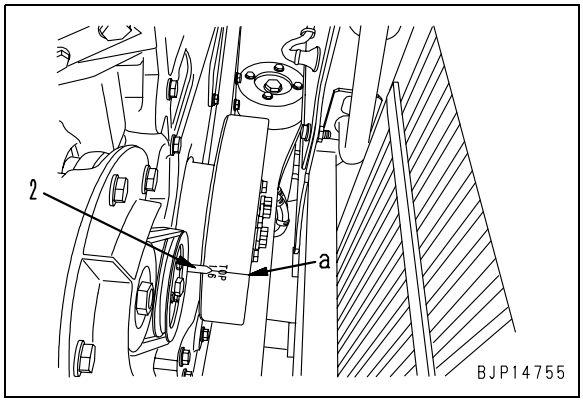
1. Remove the engine hood assembly and muffler (7).

   Engine hood assembly: **340 kg**

2. Remove all cylinder head covers (1).

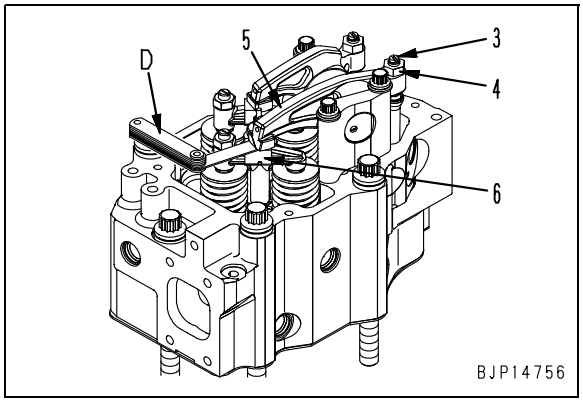


3. Rotate the crankshaft in the normal direction to align [1.6 TOP] line (**a**) on the damper with pointer (2), and set the No.1 cylinder compression to top dead center.
   ★ Check the pointer from the alternator side.
   ★ Crank the engine with the hexagonal part at the water pump drive shaft on the alternator side.
   ★ At the compression top dead center, the rocker arm of the No. 1 cylinder can be moved by hand an amount equal to the valve clearance. If the rocker arm does not move, it is not at the compression top dead center, so rotate the crankshaft one more turn.



4. Insert feeler gauge **D** in clearance (**b**) between rocker arm (5) and crosshead (6), and turn adjustment screw (3) to adjust the valve clearance.
   ★ With feeler gauge **D** inserted, turn the adjustment screw and adjust until the clearance is a sliding fit.
   ★ Valve clearance:
   Intake valve: 0.35 mm, Exhaust valve: 0.57 mm

5. Tighten locknut (4) to hold adjustment screw (3) in position.
   Locknut:
   45.1 – 51.0 Nm {4.6 – 5.2 kgm}
   ★ After tightening the locknut, check the valve clearance again.



6. Rotate the crankshaft 120° each time in the normal direction and repeat Steps 2 - 4 to adjust the valve clearance of each cylinder according to the firing order.
   ★ Firing order: 1-5-3-6-2-4

7. After completing the adjustment, set to the original condition.
   Mounting bolt of cylinder head cover:
   29.4 – 34.3 Nm {3.0 – 3.5 kgm}

Measuring compression pressure

★ Measuring instruments for compression pressure

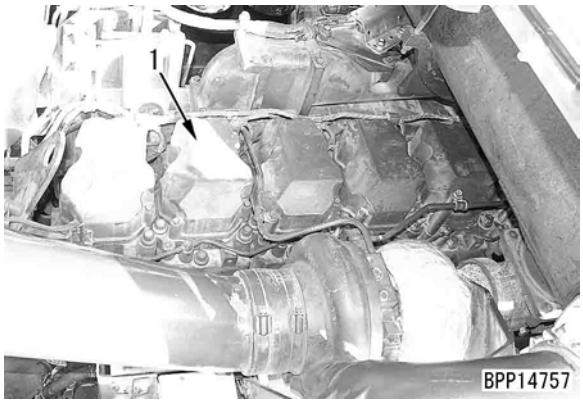
Symbol		Part No.	Part Name
E	1	795-502-1590	Compression gauge
	2	795-471-1310	Adapter
		6217-71-6110	Gasket

★ When measuring the compression pressure, take care not to burn yourself on the exhaust manifold, muffler, etc. or get caught in a rotating part.
★ Measure the compression pressure under the following condition.
- Engine oil temperature: 40 – 60°C

1. Remove the engine hood assembly and muffler.

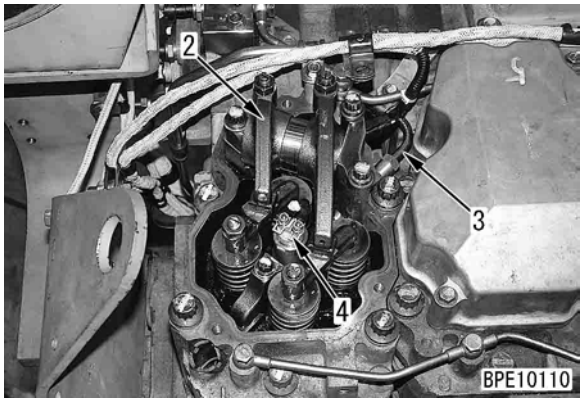
Engine hood assembly:
Approx. 340 kg

2. Remove head cover (1) of the cylinder to measure the compression pressure.



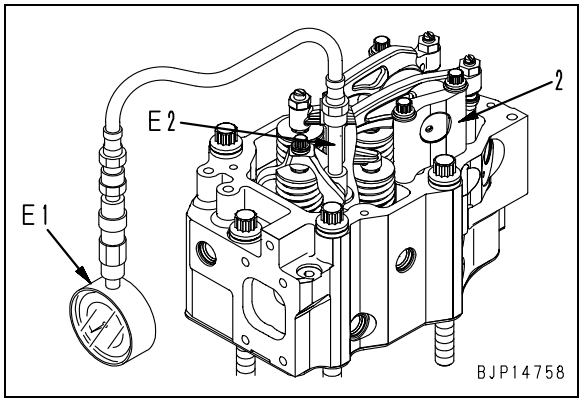
3. Bring the cylinder to be tested to the compression top dead center and remove rocker arm assembly (2).
★ See “Adjusting valve clearance.”

4. Disconnect fuel high-pressure tube (3) and injector wiring harness and remove injector (4).
★ Disconnect the terminal of the injector wiring harness on the injector side and the bracket on the rocker housing side and remove the injector wiring harness (Loosen the 2 terminal nuts alternately).
★ Pass a wire, etc. under the fuel path projected sideways and pull up the injector (Do not pry the injector top up).



5. Install adapter **D2** to the mounting hole on the injector and the compression gauge **D1**.
★ Fit the gasket to the injector end without fail
★ Fix the adapter with the injector holder.
Holder mounting bolt:
58.8 – 73.5 Nm {6.0 – 7.5 kgm}
★ Apply a little amount of engine oil to the connecting parts of the adapter and gauge so that air will not leak easily.

6. Install rocker arm assembly (2) and adjust the valve clearance.
Rocker arm mounting bolt:
93 – 103 Nm {9.5 – 10.5 kgm}
★ See “Adjusting valve clearance.”

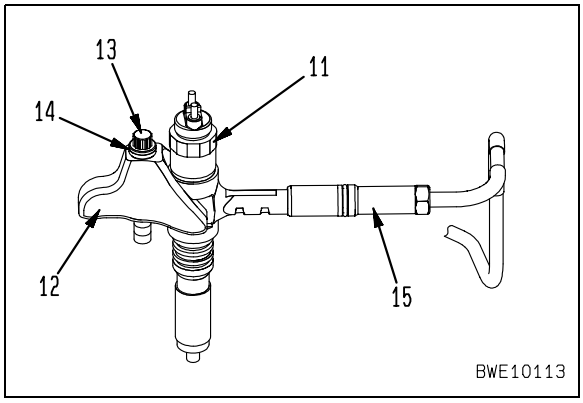


7. Set the engine in the no-injection cranking mode with the machine monitor.

If the engine is not set in the no-injection cranking mode, it will start and will be dangerous. Accordingly, be sure to set the engine in this mode.

8. Rotate the engine with the starting motor and measure the compression pressure.
   ★ Read the pressure gauge pointer when it is stabilized.

9. After finishing testing, remove the testing tools and return the removed parts.
   ★ Install the injector and fuel high-pressure tube according to the following procedure.
   1) Push in injector (11) with the hand to assemble holder (12) temporarily.
   2) Tighten bolt (13) and washer (14) temporarily.
      Spherical part of washer: **Engine oil**
   3) Tighten sleeve nut (15) of the fuel high-pressure tube temporarily.
   4) Tighten bolt (13) permanently.
      Bolt: **58.8 – 73.5 Nm {6.0 – 7.5 kgm}**
   5) Tighten sleeve nut (15) permanently.
      Sleeve nut: **39.2 – 49.0 Nm {4 – 5 kgm}**



   ★ Install the injector wiring harness according to the following procedure.
   1) Install the injector wiring harness to the rocker arm housing and fix the connector side with the plate.
   2) Fix the intermediate clamp with the clip.
   3) Tighten the nut on the injector side.
      Nut: **2 ± 0.2 Nm {0.2 ± 0.02 kgm}**
   4) Secure the clamp and spacer with the bolt.

      Rocker arm assembly mounting bolt:
      93 – 103 Nm {9.5 – 10.5 kgm}

   ★ Adjust the valve clearance. For details, see “Adjusting valve clearance.”

      Cylinder head cover mounting bolt:
      29.4 – 34.3 Nm {3.0 – 3.5 kgm}

Measuring blow-by pressure

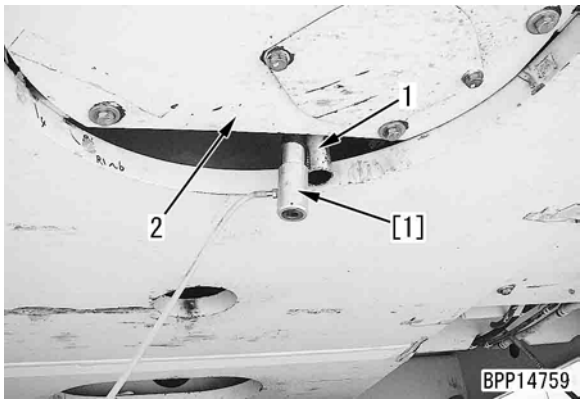
★ Measuring instruments for blow-by pressure

Symbol	Part No.	Part Name
F	799-201-1504	Blow-by checker

★ Measure the blow-by pressure under the following conditions.
- Coolant temperature: Within operating range
- Hydraulic oil temperature: Within operating range

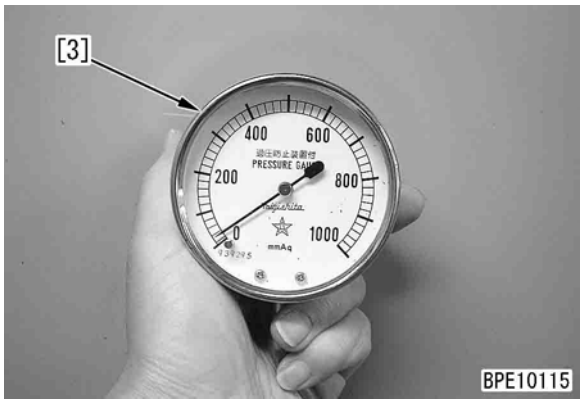
1. Pull the blow-by hose out of cover (1) and install nozzle [1] of blow-by checker **F**.
   ★ The hose is too short to take it out from under cover (2).

2. Connect nozzle [1] and gauge [2] with the hose.



3. Start the engine and set the working mode switch to the P-mode position.

4. Run the engine at high idle, relieve the arm circuit by moving the arm IN, and measure the brake oil pressure.



5. After finishing measurement, remove the measuring instruments and return the removed parts.

Measuring engine oil pressure

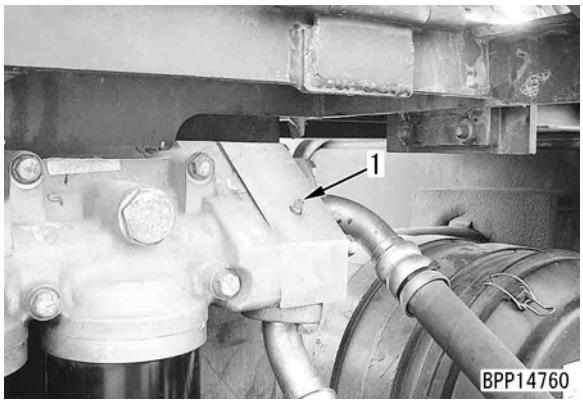
★ Measuring instruments for engine oil pressure

Symbol		Part No.	Part Name
G	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-401-2320	Hydraulic tester

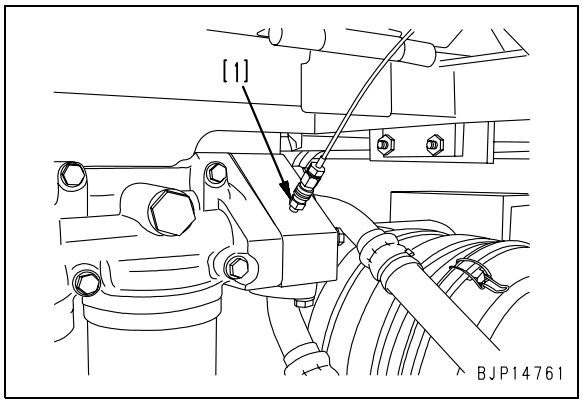
★ Measure the engine oil pressure under the following conditions.
- Coolant temperature: Within operating range

1. Open the engine compartment cover on the control valve side.

2. Remove plug (1) (R1/8) from the oil filter head.



3. Install nipple [1] of hydraulic tester **G1** and connect them to hydraulic tester **G2**.



4. Start the engine and measure the oil pressure with the engine at low idle and high idle.



5. After completing the measurement, remove the measuring equipment and set to the original condition.
   Oil pressure switch:
   2.9 – 5.9 Nm {0.3 – 0.6 kgm}

Handling of fuel system equipment

★ Precautions in Inspection and Maintenance of Fuel System Equipment
The common rail type fuel injection system (CRI) is composed of more precise components than the usual fuel injection pump and nozzle and will probably get out of order when foreign matters enters the system.
During inspection and maintenance of the fuel system, pay more attention to foreign matters than in case of usual fuel injection pumps and wash the system carefully with clean fuel if dusts enter the system.

★ Precautions in Replacement of Fuel Filter Cartridge
Be sure to use genuine fuel filter cartridge of Komatsu.
The common rail type fuel injection system (CRI) is composed of more precise components than the usual fuel injection pump and nozzle and is equipped with special filter with highly efficient filtration performance to prevent foreign matters from entering the system.
Therefore, be sure to use genuine filters only.
Otherwise, the fuel system will possibly get out of order.

Remaining pressure relief from fuel system equipment

★ While the engine is rotating, pressures occur in the low pressure circuit and the high pressure circuit of the fuel system.
Low pressure circuit : Among Feed pump – Fuel filter – Fuel supply pump
High pressure circuit : Among Fuel supply pump – Common rail – Fuel injector

★ When 30 seconds elapse after the engine stopped, pressures in both the low pressure circuit and the high pressure circuit drop to the safe level automatically.

★ Since pressure remaining in the fuel system should be relieved certainly before inspection of the fuel system and mounting and removing of equipment, be sure to observe the following precautions:

⚠ Inspect the fuel system or mount or remove equipment more than 30 seconds later after the engine stopped and after pressure remaining in the fuel system is relieved. (Pressure remains in the fuel system right after the engine stopped, so do not start any work until 30 seconds elapse.)

Measuring fuel pressure

★ Measuring Instrument of Fuel Pressure

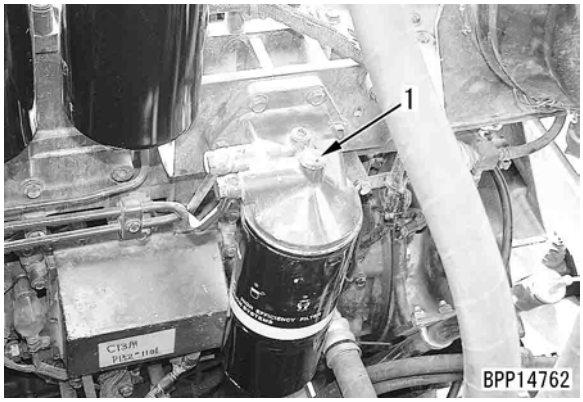
Symbol		Part Number	Part Name
H	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital type hydraulic tester
	2	799-401-2320	Hydraulic tester
	3	Not set yet	Adapter (8 x 1.25 → R1/8)

★ Measure fuel pressure in the low pressure circuit among the feed pump – the fuel filter – the fuel supply pump.

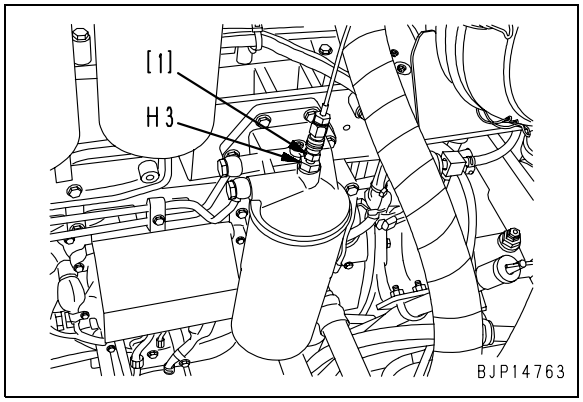
⚠ Since very high pressure are generated in the high pressure circuit among the fuel supply pump – the common rail – the fuel injector, they cannot be measured in the circuit.

1. Open the engine compartment cover on the control valve side.

2. Remove the fuel pressure measurement plug (1).



3. Attach the nipple [1] of the adapter **H3** and hydraulic tester **H1**, and connect the hydraulic tester **H2**.

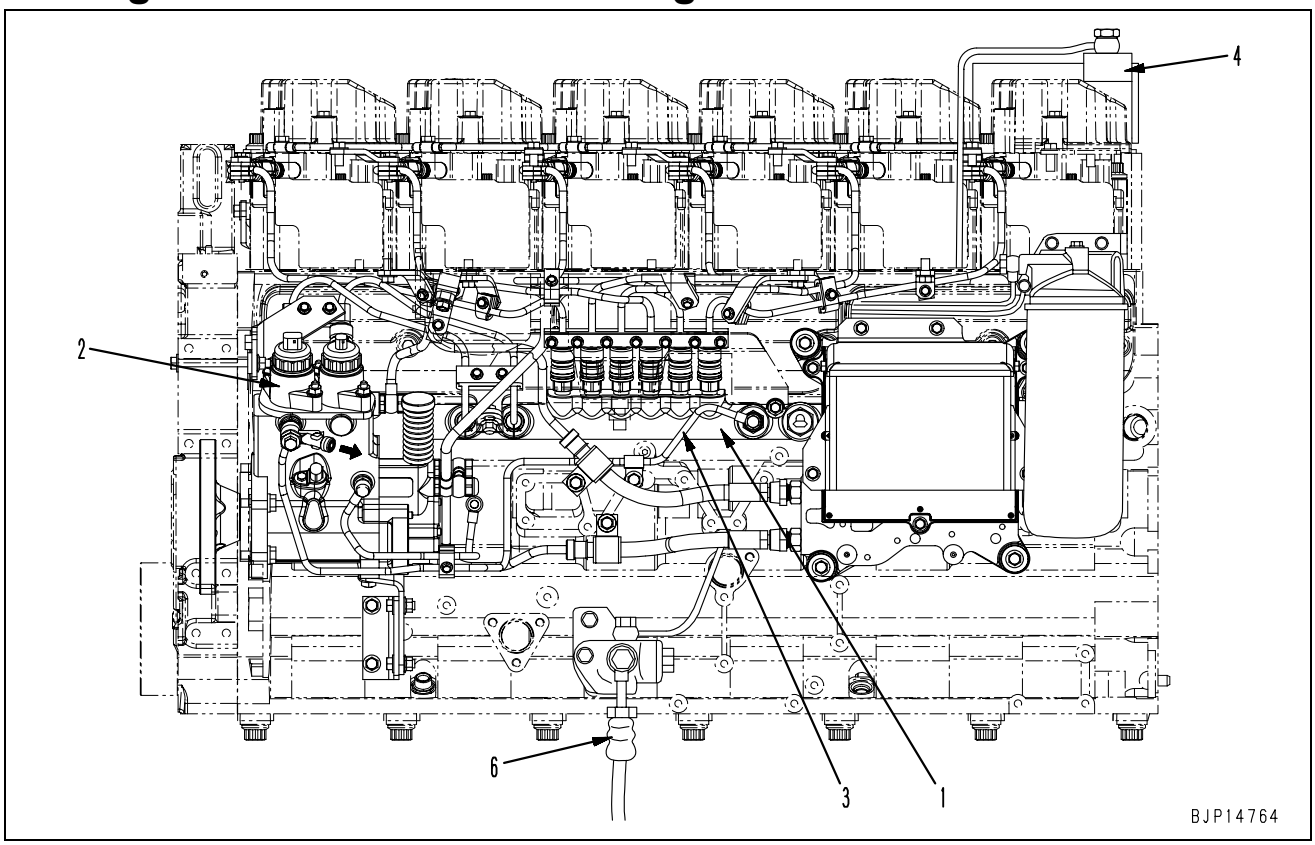


4. Start the engine and measure fuel pressure at the time of high idle.
   ★ If the fuel pressure is in the following range, it is normal.
   Fuel pressure: 0.15 – 0.3 MPa {1.5 – 3 kg/cm^2} (High idle)



5. After the measurement, return the circuit to the original state.

Testing fuel return rate and leakage



★ If the engine has the intake manifold equipped with the return block on it to return the fuel spilling from the injector to the fuel tank, test the fuel return rate and fuel leakage according to the following procedure.

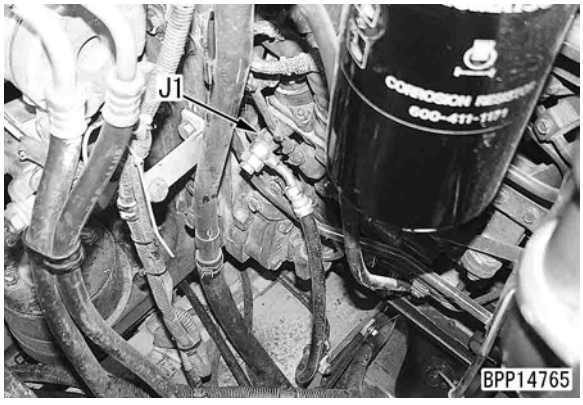
★ Testing tools for fuel return rate and leakage

Symbol		Part No.	Part name
J	1	6151-51-8490	Spacer
	2	6206-71-1770	Joint
	3	6217-71-8820	Joint
	4	Commercially available	Hose
	5	Commercially available	Hose
	6	Commercially available	Measuring cylinder
	7	Commercially available	Stopwatch

★ Prepare an oil pan of about 20 l to receive the fuel flowing out during the test.

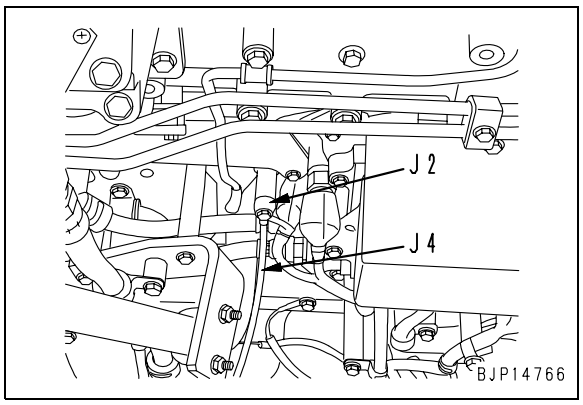
1. Preparation work

1) Remove tube (3) between common rail (1) and supply pump (2).
2) Insert spacer **J1** on supply pump (2) side and tighten the removed joint bolt again.
   ★ Connect the return pipe to the fuel tank again, too.
   ★ Be sure to fit the gaskets to both ends of the spacer.



3) Insert joint **J2** on common rail (1) side and tighten the removed joint bolt again.
   ★ Be sure to fit the gaskets to both ends of the joint.

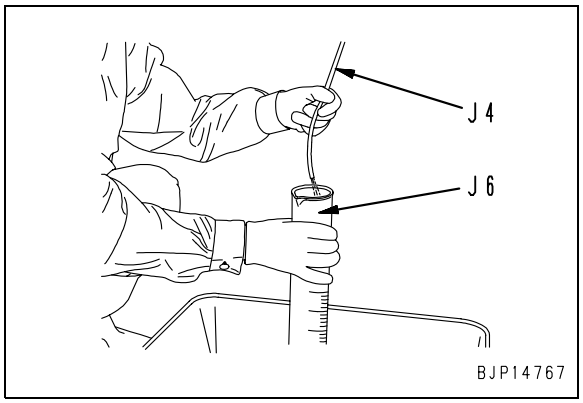
4) Connect test hose **J4** to the end of joint **J2**.
   ★ Bind the connecting part of the test hose with a wire, etc. to prevent it from coming off.
   ★ The above is the preparation work for testing the leakage from the pressure limiter.



2. Testing leakage from pressure limiter

1) Lay test hose **J4** so that it will not slacken and put its end in the oil pan.
2) Set the machine monitor so that it can measure the engine speed.
3) Start the engine and keep its speed to 1,600 rpm with no load.
4) After the engine speed is stabilized, test the leakage in 1 minute with measuring cylinder **J6**.
   ★ You may test for 20 seconds and judge by multiplying the result by 3.
   ★ If the leakage from the pressure limiter is in the following range, it is normal.

Engine speed (rpm)	Leakage (cc/min)
1,600	Max. 10

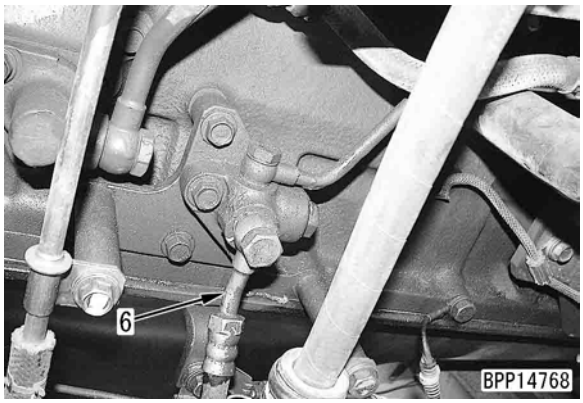


5) After finishing testing, stop the engine.

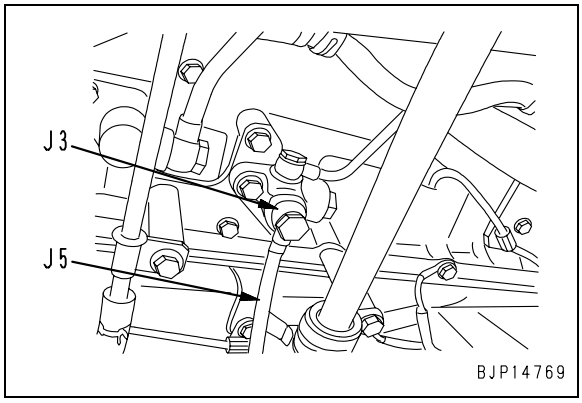
3. Testing return rate from injector

★ Keep the hose on the pressure limiter side connected and keep its end in the oil pan while testing the return rate from the injector.

1) Install joint **J3** and connect return hose (6) for the fuel tank to test hose **J5**.



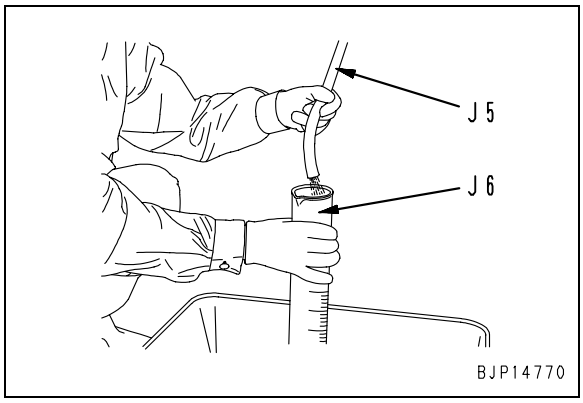
   ★ Bind the connecting part of the test hose with a wire, etc. to prevent it from coming off.
2) Lay test hose **H4** so that it will not slacken and put its end in the oil pan.



3) Set the machine monitor so that it can measure the engine speed.
4) Start the engine, select working mode P, turn the heavy lift switch ON, and relieve the boom raise circuit.

5) After the engine speed is stabilized, test the return rate in 1 minute with measuring cylinder **J6**.
   - ★ You may test for 20 seconds and judge by multiplying the result by 3.
   - ★ If the supply pump is not supplying fuel, the engine speed may not rise. In this case, record the engine speed, too, during the test.
   - ★ If the return rate (spill) from the injector is in the following range, it is normal.

Rated output speed (rpm)	Limit of return rate (spill) (cc/min)
1,600	960
1,700	1,020
1,800	1,080
1,900	1,140
2,000	1,200



6) After finishing testing, stop the engine.

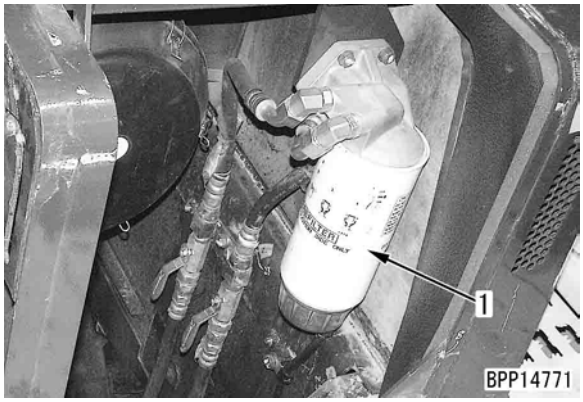
4. Work after finishing testing

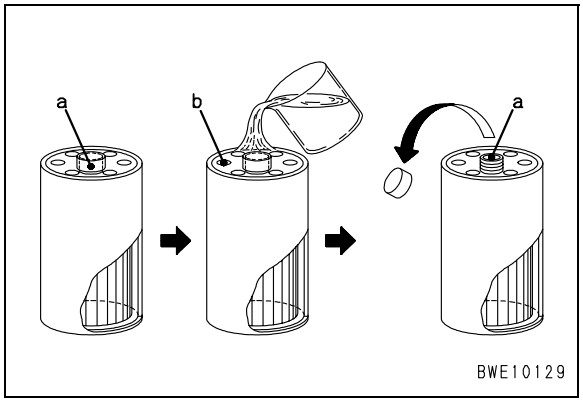
After finishing all testing, remove the testing tools and return the removed parts.

Bleeding air from fuel circuit

★ If fuel is used up or if a fuel circuit part is removed and installed, bleed air from the fuel circuit according to the following procedure.

1. Remove fuel prefilter (1) and fill it with fuel.
   - ★ Fill the fuel prefilter with clean fuel and take care that dirt will not enter it.
   - ★ Check that the cap is fitted to part (a) (central hole) of the fuel prefilter, and then add fuel through part (b) (holes around the central hole).
   - ★ After filling the fuel prefilter with fuel, remove the cap from part (a).
   - ★ If clean fuel is not available, do not remove the prefilter but fill it with the fuel by operating priming pump (4).
   - ★ Do not add fuel to fuel main filter (2) from outside.





2. Install fuel prefilter (1) to the filter head.
   - ★ Apply engine oil thinly over the packing on the fuel prefilter side.

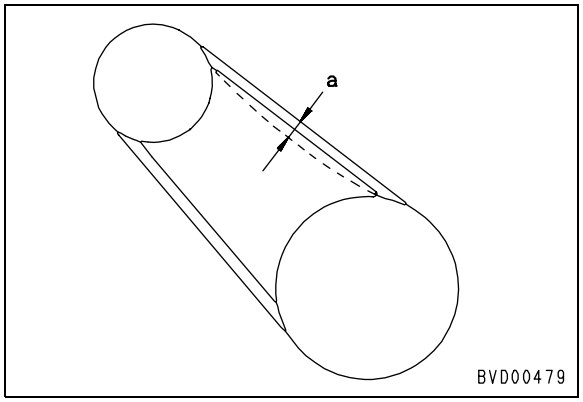
Testing and adjusting alternator belt tension

Testing procedure

1. Open the engine compartment cover on the counterweight side.

2. Measure the belt deflection (a) when pushing a point midway between the alternator pulley and the drive pulley with the finger.

   ★ Deflection (a) when pressing force is approx. 58.8 N {approx. 6 kg}: 13 – 16 mm



Adjustment procedure

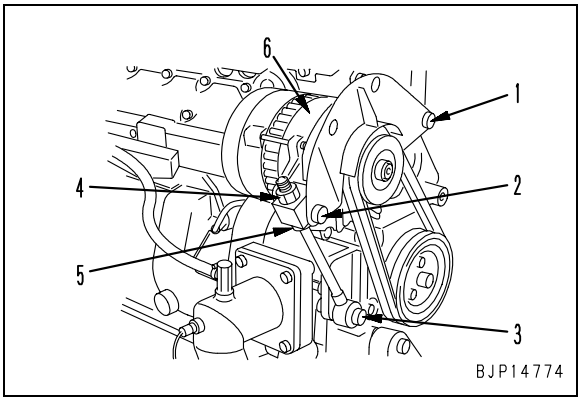
★ Adjust the belt according to the following procedure when the belt deflection is not normal.

1. Loosen nuts and bolts (1), (2), (3) and (4) in this order.

2. Turn nut (5) to move alternator (6), and adjust the belt tension.
   ★ Nut (5):
   - It is moved to the side that belt is loosened when fastening it clockwise.
   - It is moved to the side that belt is tensioned when loosening it counterclockwise.

   ★ Test for breakage of each pulley, friction of V-ditch, friction of belt, and contact between belt and V-ditch.
   ★ Replace it with new belt if it was too stretched so that adjustability was lost, or cut and crack occurred.

3. Tighten nuts and bolts (4), (3), (2) and (1) in this order.
   ★ When the belt was replaced, readjust it after one-hour operation.

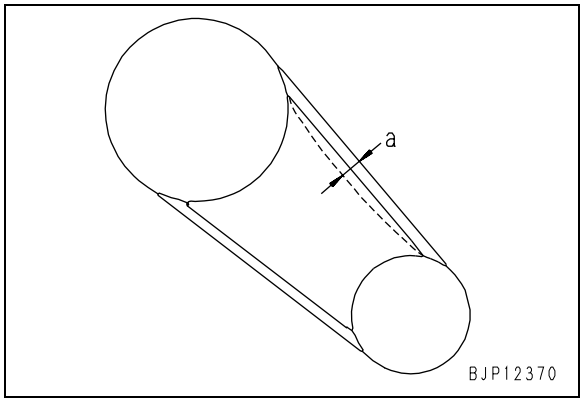


Testing and adjusting air conditioner compressor belt

Testing

1. Open the engine compartment cover on the control valve side and remove the cover of the air conditioner compressor belt.

2. Press the intermediate point between the air conditioner compressor pulley and drive pulley with a finger and measure deflection (a).
   ★ Deflection (a) when pressing force is approx. 58.8 N {approx. 6 kg}: 10 – 15 mm



Adjusting

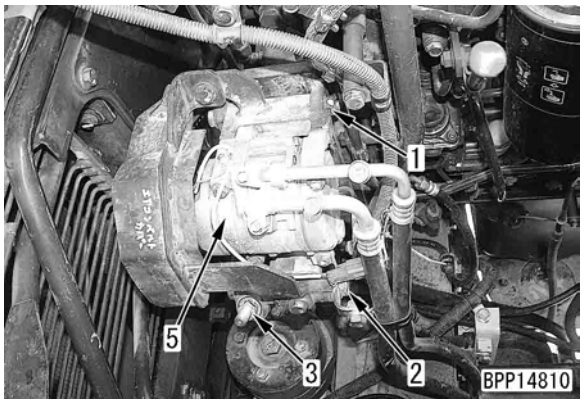
★ If the deflection is abnormal, adjust it according to the following procedure.

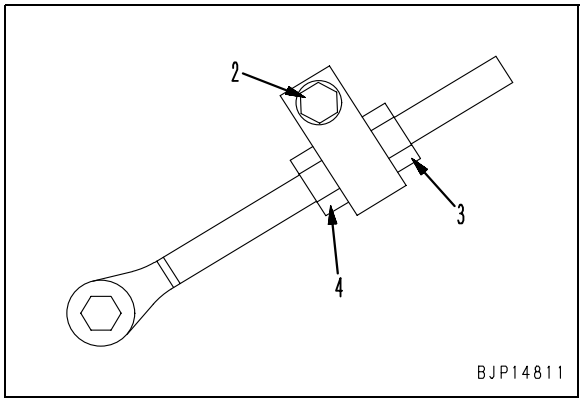
1. Loosen the bolts and nuts in the order of (1), (2), and (3).

2. Rotate nut (4) to move compressor (5) and adjust the belt tension.
   ★ If nut (4) is
   - tightened clockwise, the belt is loosened.
   - loosened counterclockwise, the belt is tensed.

   ★ Check each pulley for breakage, check the V-grooves and V-belts for wear, and check that the V-grooves and V-belts are in good contact with each other.
   ★ If the belts are so lengthened that their tension cannot be adjusted any more or they have a cut or a crack, replace them.

3. Tighten nuts and bolts in the order of (3), (2), and (1).
   ★ If the belts were replaced, adjust their tension again after operating the machine for 1 hour.





PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00786-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

30 Testing and adjusting
Testing and adjusting, Part 2

Testing and adjusting, Part 2 2
Inspection of swing circle bearing clearance 2
Testing and adjusting track shoe tension 3
Testing and adjusting work equipment, swing, and travel circuit oil pressures 4
Testing and adjusting control circuit oil pressure (self pressure reducing valve) 9
Testing and adjusting main pump control pressure 10

Testing and adjusting, Part 2

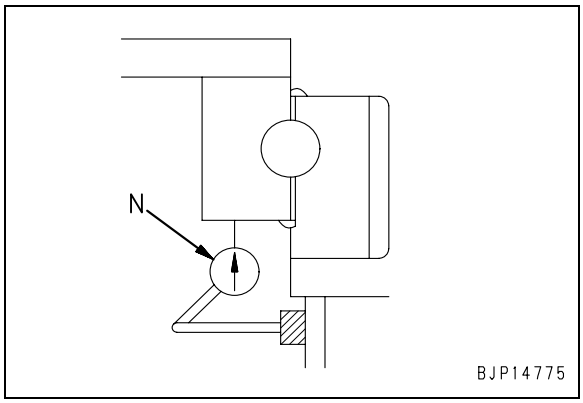
Inspection of swing circle bearing clearance

★ Inspection Device of Swing Circle Bearing Clearance

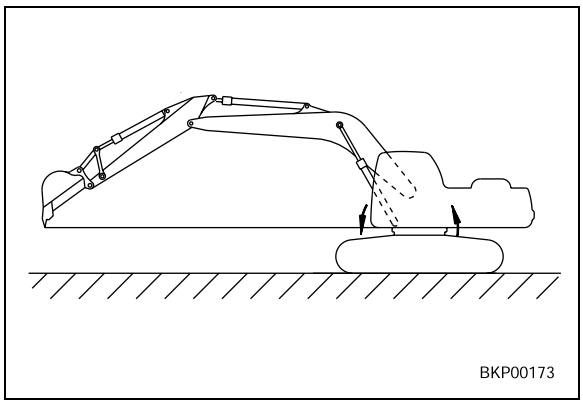
Symbol	Part Number	Part Name
N	Purchased	Dial gauge (with magnet)

★ When measuring swing circle bearing clearance on a machine, follow the procedures below:
★ For the standard values, see Structure, function and maintenance standard, “Swing circle”.

1. Fix the dial gauge **N** to the track frame (center frame) and bring the stylus to the outer race end face.
   ★ Set the dial gauge to the front or to the rear.

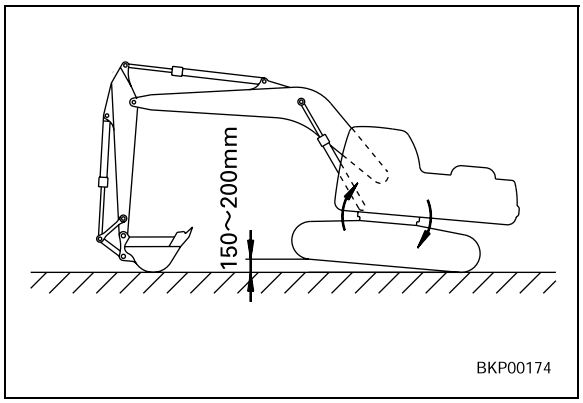


2. Set the work equipment to the maximum reach and set the bucket tip to the height of the revolving frame lower face.
   ★ At the time, the front of the upper structure lowers and its rear rises.



3. Set the dial gauge **N** to the zero point.

4. Arrange the arm almost at right angles to the ground and lower the boom until the front leg of the machine body rises.
   ★ At the time, the front of the upper structure rises and its rear lowers.



5. At the time, read the value on the dial gauge **N**. This value on the dial gauge indicates the swing circle bearing clearance.

   ⚠ During the measurement, never place hands and legs below the undercarriage.

6. Return the work equipment to the state in Paragraph 2 and make sure that the dial gauge **N** has returned to the zero point. If not, repeat Steps 2 to 5.

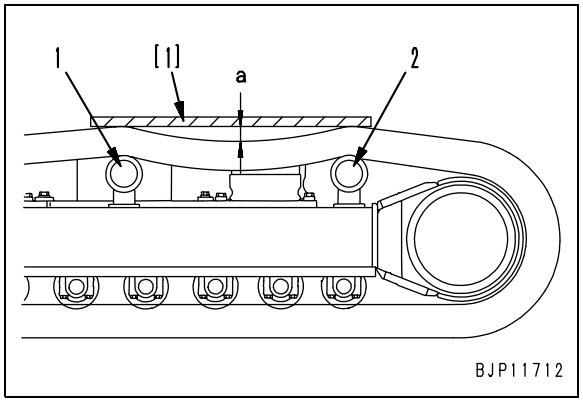
Testing and adjusting track shoe tension

Testing

1. Travel the machine forward by the length of track on ground, keeping the engine at low idle, and stop the machine slowly.

2. Place wood bar [1] on the track shoe between second carrier roller (1) and third carrier roller (2).
   ★ L beam is recommended for bar [1], because of its deflection-free nature.

3. Measure max. clearance (a) between bar [1] and the track shoe.
   • Max. standard clearance (a): 10 – 30 mm



Adjusting

★ If the track shoe tension is not proper, adjust it in the following manner.

1. When the tension is too strong

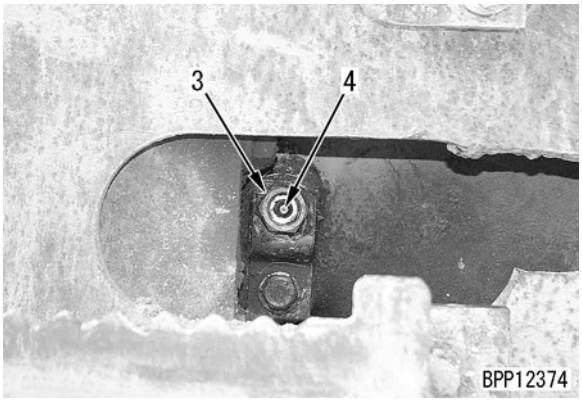
Discharge grease by loosening valve (3).

⚠ Do not loosen valve (3) by more than one turn, because grease will spurt due to its internal high pressure.

2. When the tension is too weak

Add grease through grease fitting (4).

★ If the normal track shoe tension is not restored even after greasing, move the machine slowly back and forth.



Testing and adjusting work equipment, swing, and travel circuit oil pressures

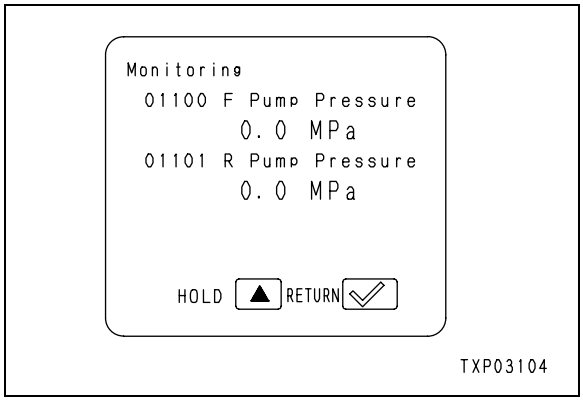
★ Testing and adjusting instruments for work equipment, swing, and travel circuit oil pressures

Symbol	Part Number	Part Name
K	799-101-5002	Hydraulic tester
	790-261-1204	Digital hydraulic tester

Measurement

★ Measure the work equipment, swing and travel circuit oil pressures under the following conditions:
- Hydraulic oil temperature: 45 – 55°C

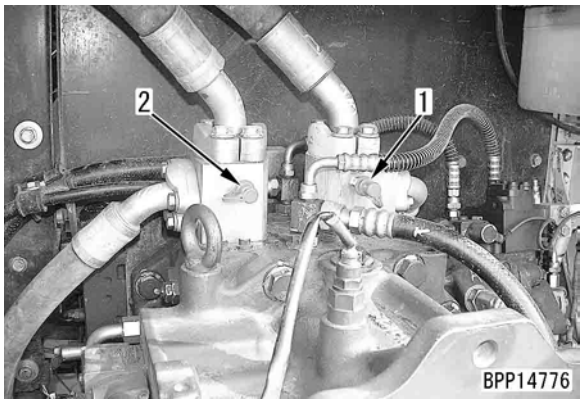
★ The work equipment, swing, and travel circuit oil pressures can be checked in the monitoring function of the machine monitor, too. (For the operating method, see “Special functions of machine monitor”.)
- Monitoring code: 01100 F pump pressure
  01101 R pump pressure
- The pump oil pressure is displayed in MPa {kg/cm², PSI).



1. Preparation work

⚠ Lower the work equipment to the ground and stop the engine. Operate the control levers several times to release the residual pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the hydraulic tank.

1) Open the pump compartment cover.
2) Connect oil pressure gauges [1] of hydraulic tester **K** to quick couplers (1) – (2) installed to the outlet of each pump of the circuit to be measured.
   ★ (1): Front pump side, (2): Rear pump side
   ★ The relief pressure of the boom LOWER circuit can be measured only in the front pump circuit.
   ★ The relief pressure of the bucket DUMP circuit can be measured only in the rear pump circuit.
   ★ The relief pressure of the swing circuit can be measured only in the front pump circuit.
   ★ Use the oil pressure gauges of 58.8 MPa {600 kg/cm²}.



2. Measuring work equipment circuit oil pressure

1) Measuring normal relief pressure
   i) Start the engine and set the working mode switch to the P-mode position.
   ii) Run the engine at high idle, relieve each cylinder singly at the stroke end, and measure the oil pressure.
   ★ The main relief valves of the right and left control valves relieve on the low-pressure setting side.
   ★ If the boom cylinder is relieved at the LOWER stroke end, the safety-suction valve on the boom head side of the right 4-spool control valve relieves on the low-pressure setting side (The set pressure of the safety-suction valve is lower than that of the main relief valve).
2) Measuring relief pressure during heavy lift operation
   i) Start the engine and set the working mode switch in the P-mode position.
   ii) Turn the heavy lift switch ON.
   iii) Run the engine at high idle, relieve the boom cylinder singly at the RAISE stroke end, and measure the oil pressure.
   ★ The heavy lift function operates only when the boom RAISE operation is performed singly.
   ★ The main relief valves of the right and left control valves relieve on the high-pressure setting side.
3) Measuring relief pressure during machine push-up operation
   i) Start the engine and set the working mode switch in the P-mode position.
   ii) Turn the machine push-up switch ON.
   iii) Run the engine at high idle, relieve the boom cylinder singly at the LOWER stroke end, and measure the oil pressure.
   ★ Since the set pressure of the safety-suction valve on the boom head side of the right 4-spool valve rises higher than the set pressure of the main relief valve, the main relief valve relieves on the low-pressure setting side.



3. Measuring swing circuit oil pressure

1) Start the engine and set the working mode switch in the P-mode position.
2) Turn the swing lock switch ON.
3) Run the engine at high idle, relieve the swing motor, and measure the oil pressure.

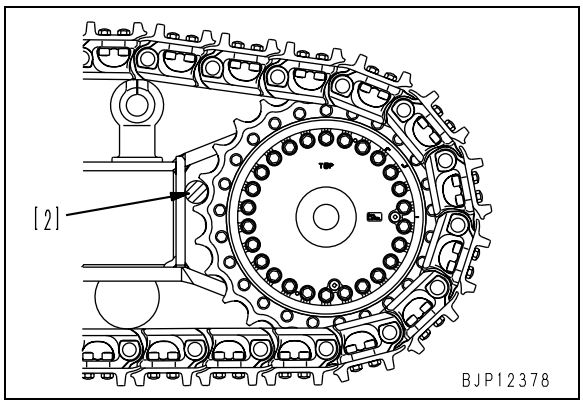
★ The safety valves of the front and rear swing motors relieve. (The set pressure of the safety valves is lower than that of the main relief valve.)



4. Measuring travel circuit oil pressure

1) Start the engine and lock the travel mechanism.

⚠ Put pin [2] between the sprocket and track frame to lock the travel mechanism securely.



2) Run the engine at high idle, relieve the travel motor, and measure the oil pressure.

★ The main relief valves of the right and left control valves relieve on the high-pressure setting side.



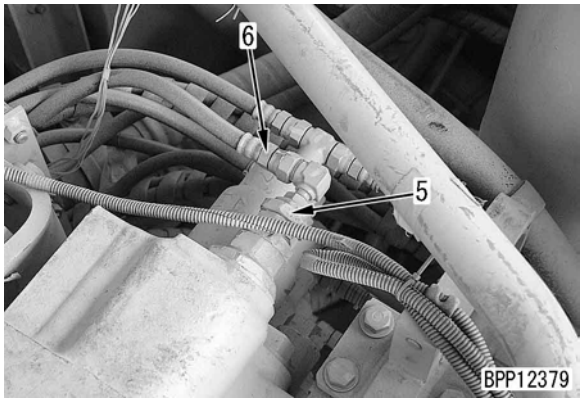
Adjusting

★ Do not adjust any safety valve other than the swing motor safety valve.

★ When adjusting the main relief valves of the left 5-spool valve and right 4-spool valve, remove the control valve top cover.

1. Adjusting main relief valve (high-pressure setting) of left 5-spool control valve

★ If the work equipment oil pressure in the front pump circuit (during heavy lift operation) and the left travel oil pressure are abnormal, adjust the high-pressure setting side of main relief valve (5) of the left 5-spool control valve according to the following procedure.

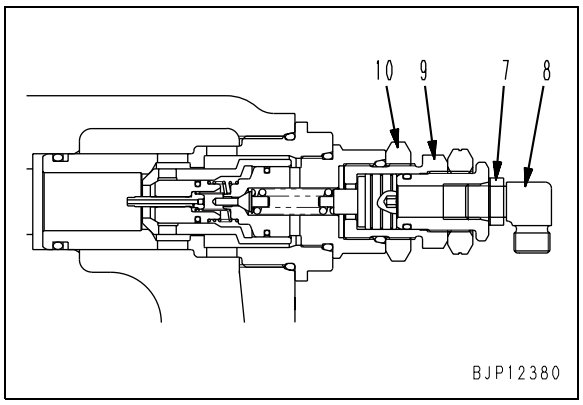


★ The high pressure setting is the state in which the 2-stage relief solenoid valve is turned ON and the pilot pressure is applied to the changeover port.

1) Disconnect hose (6).
2) Loosen locknut (7) and set elbow (8) free.
3) Fix holder (9) and loosen locknut (10).
4) Turn holder (9) to adjust the pressure.
   ★ If the holder is
   - turned to the right, the pressure rises.
   - turned to the left, the pressure lowers.

   ★ Pressure changed by 1 turn of holder:
   21.8 MPa {209 kg/cm^2}

5) Fix holder (9) and tighten locknut (10).
   Locknut:
   93 – 123 Nm {9.5 – 12.5 kgm}
   ★ If the high-pressure setting side is adjusted, the low-pressure setting side changes. Accordingly, adjust the low-pressure setting side, too.



6) Fix elbow (8) and tighten locknut (7).
7) Connect hose (6).
8) After finishing adjustment, check the oil pressure again according to the above described measurement procedure.

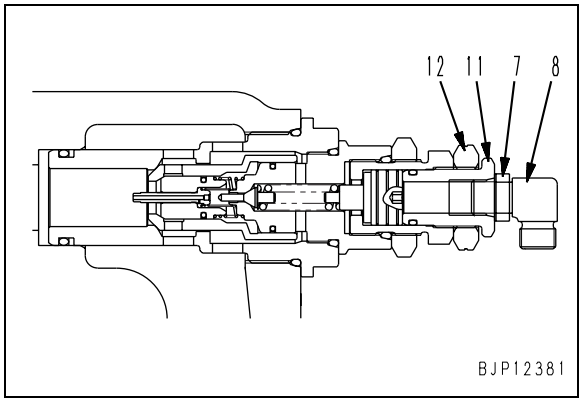
2. Adjusting main relief valve (low-pressure setting) of left 5-spool control valve

★ If the work equipment oil pressure in the front pump circuit (during normal relief operation) is abnormal or the high-pressure setting side was adjusted, adjust the low-pressure setting side of main relief valve (5) of the left 5-spool control valve according to the following procedure.
★ The low-pressure setting is the state in which the 2-stage relief solenoid valve is turned OFF and the pilot pressure is not applied to the changeover port.

1) Disconnect hose (6).
2) Loosen locknut (7) and set elbow (8) free.
3) Fix union (11) and loosen locknut (12).
4) Turn union (11) to adjust the pressure.
   ★ If the union is
   - turned to the right, the pressure rises.
   - turned to the left, the pressure lowers.

   ★ Pressure changed by 1 turn of union:
   21.8 MPa {209 kg/cm^2}

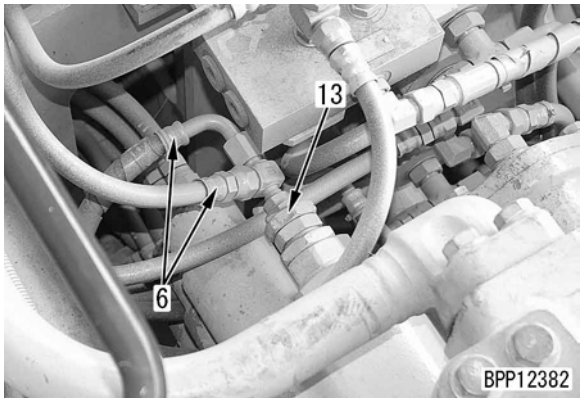
5) Fix union (11) and tighten locknut (12).
   Locknut:
   78 – 93 Nm {8.0 – 9.5 kgm}



6) Fix elbow (8) and tighten locknut (7).
7) Connect hose (6).
8) After finishing adjustment, check the oil pressure again according to the above described measurement procedure.

3. Adjusting main relief valve (high-pressure setting) of right 4-spool control valve

★ If the work equipment oil pressure in the rear pump circuit (during heavy lift operation) and the right travel oil pressure are abnormal, adjust the high-pressure setting side of main relief valve (13) of the right 4-spool control valve according to the following procedure.



★ Adjust the right 4-spool control valve similarly to the left 5-spool control valve.

4. Adjusting main relief valve (low-pressure setting) of right 4-spool control valve

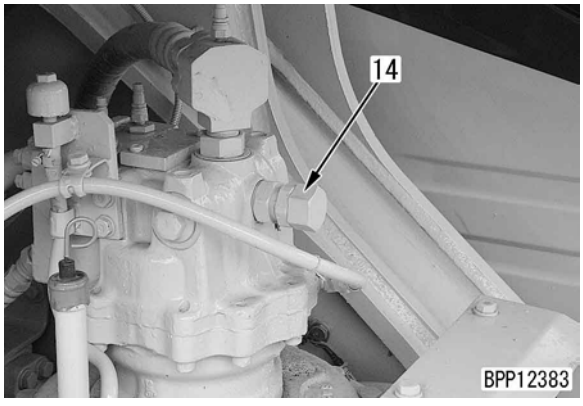
★ If the work equipment oil pressure in the rear pump circuit (during normal relief operation) is abnormal or the high-pressure setting side was adjusted, adjust the low-pressure setting side of main relief valve (13) of the right 4-spool control valve according to the following procedure.

★ Adjust the right 4-spool control valve similarly to the left 5-spool control valve.

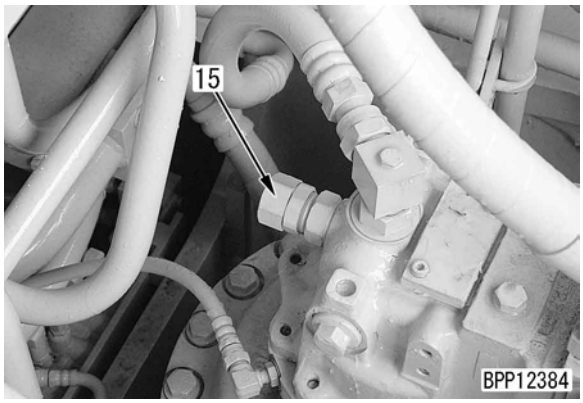
5. Adjusting swing motor safety valve

★ If the relief pressure of the swing motor is abnormal, adjust safety valves (14) and (15) of the swing motor according to the following procedure.

• (14): Safety valve of front swing motor



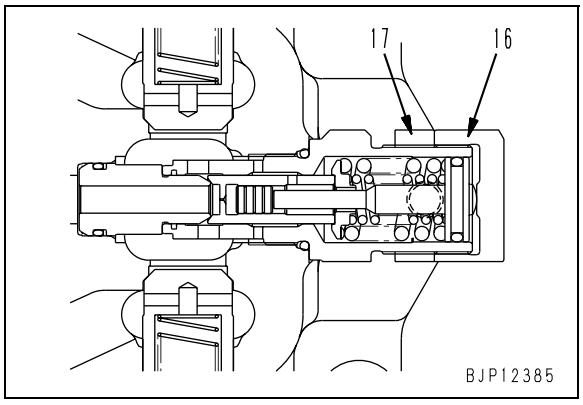
• (15): Safety valve of rear swing motor



1) Fix adjustment nut (16) and loosen locknut (17).

⚠ Do not remove the adjustment nut. If it is removed, the internal parts may come off.

2) Turn adjustment nut (16) to adjust the pressure.
   ★ If the adjustment nut is
   • turned to the right, the pressure rises.
   • turned to the left, the pressure lowers.
   ★ Pressure changed by 1 turn of adjustment nut: 3.6 MPa {37 kg/cm²}
3) Fix adjustment nut (16) and tighten locknut (17).
   Locknut:
   147 –186 Nm {15 – 19 kgm}



4) After finishing adjustment, check the oil pressure again according to the above described measurement procedure.

Testing and adjusting control circuit oil pressure (self pressure reducing valve)

★ Instruments for testing and adjusting control circuit oil pressure

Symbol		Part Number	Part Name
L	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5220	Nipple (10 x 1.5 mm)
		07002-11023	O-ring

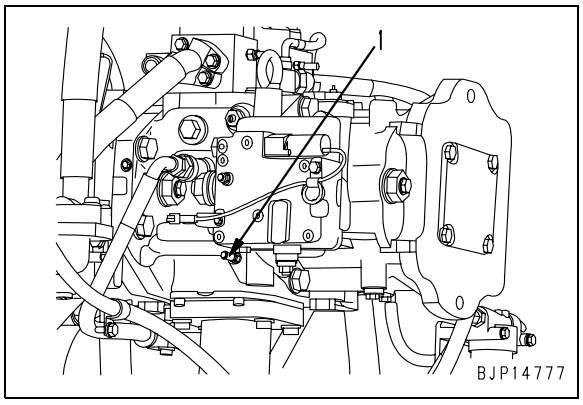
Measuring

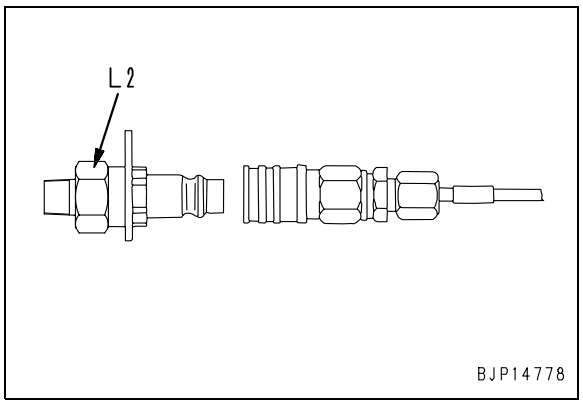
★ Measure the control circuit oil pressure under the following condition.
- Hydraulic oil temperature: 45 – 55°C

⚠ Lower the work equipment to the ground and stop the engine. Operate the control levers several times to release the residual pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the hydraulic tank.

1. Open the pump compartment cover.

2. Connect oil pressure gauge [1] of hydraulic tester **L1** to oil pressure pickup nipple of the main pump.





3. Run the engine at high idle, set the work equipment/swing lever and travel lever in neutral, and measure the oil pressure.



Adjusting

★ Self pressure reducing valve cannot be adjusted.

Testing and adjusting main pump control pressure

★ Devices for inspecting and measuring main pump control oil pressure

Symbol		Part Number	Part Name
M	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-401-2701	Differential pressure gauge
	3	799-101-5220	Nipple (10 × 1.5 mm)
		07002-11023	O-ring

Measurement

★ Measure the piston pump control oil pressure under the following conditions:
- Hydraulic oil temperature: Within the operating range

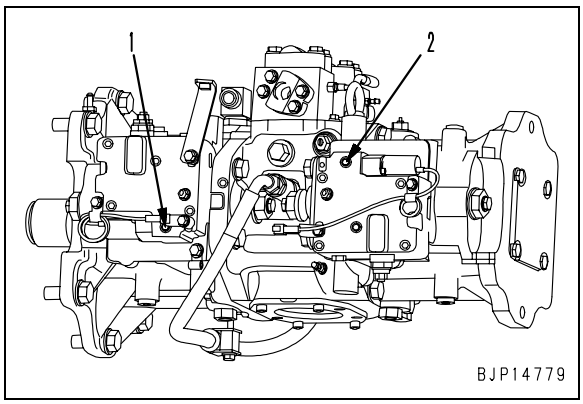
⚠ Lower the work equipment to the ground and stop the engine. Operate the control levers several times to release the residual pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the hydraulic tank.

1. Measuring EPC valve output pressure

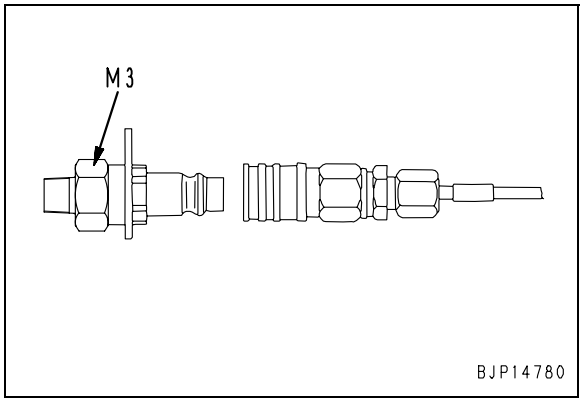
★ Since the basic pressure of the EPC valve is the control circuit pressure, check that the control circuit pressure (self pressure reducing valve) is normal before measuring the EPC valve output pressure.

★ The EPC valve is controlled with the command current from the pump controller. (For details, see Structure, function and maintenance standard.)

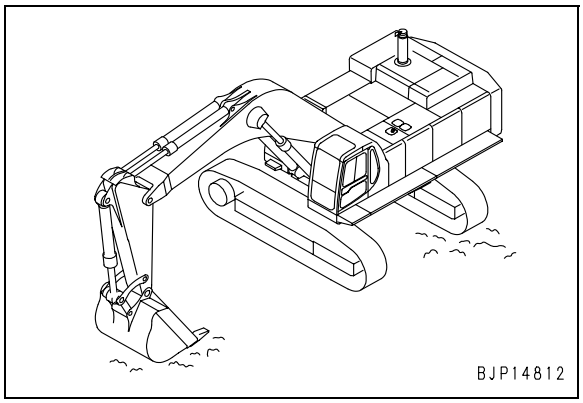
1) Open the pump room cover.
2) Remove oil pressure pickup plug (1) or (2).
   ★ Plug (1) is on the front pump side and plug (2) is on the rear pump side.



3) Install nipple **M3** and connect oil pressure gauge [1] of hydraulic tester **M1**.
   ★ Use the oil pressure gauges of 5.9 MPa {60 kg/cm²}.



4) Start the engine and set the working mode switch in the P-mode position.
5) Set all the control levers in neutral and measure the EPC valve output pressure under the following condition.
   i) Set all the control levers in neutral.
   ii) Run the engine at high idle and measure the output pressure.
6) Drive the travel motor idle and measure the EPC valve output pressure under the following condition.
   i) Raise the track shoe to be measured by using the boom and arm
   ii) Run the engine at high idle, drive the travel motor idle and measure the output pressure.





2. Measuring EPC valve current

★ The EPC current can be checked with the monitoring function of the machine monitor, too. (For the operating method, see “Special functions of machine monitor”.)
- Monitoring code:
  01300 F pump EPC solenoid current
  01302 R pump EPC solenoid current

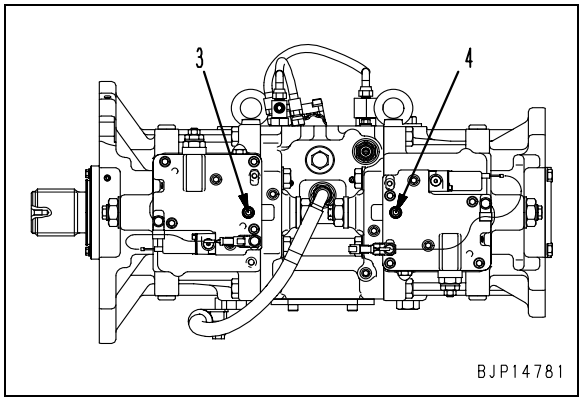
1) Start the engine and set the working mode switch in the P-mode position.
2) Set all the control levers in neutral and measure the EPC current under the following condition.
   i) Set all the control levers in neutral.
   ii) Run the engine at high idle and measure the current.
3) Drive the travel motor idle and measure the EPC current under the following condition.
   i) Raise the track shoe to be measured by using the boom and arm.
   ii) Run the engine at high idle, drive the travel motor idle and measure the current.

3. Measuring VC valve output pressure

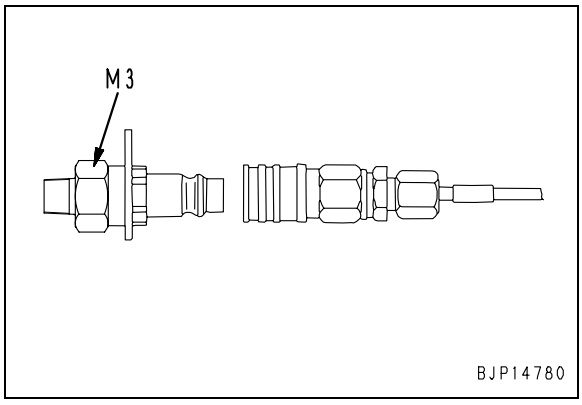
★ Since the VC valve output pressure varies with the discharge pressure of the EPC valve, check that the EPC valve output pressure is normal in advance.

★ Since the basic pressure of the VC valve is the control circuit pressure and main pump discharge pressure, check that the control circuit pressure and main pump discharge pressure are normal before measuring the VC valve output pressure.

1) Open the pump room cover.
2) Remove oil pressure pickup plug (3) or (4).
   ★ Plug (3) is on the front pump side and plug (4) is on the rear pump side.



3) Install nipple **M3** and connect oil pressure gauge [1] of hydraulic tester **M1**.
   ★ Use the oil pressure gauges of 5.9 MPa {60 kg/cm²}.



4) Start the engine and set the working mode switch in the P-mode position.
5) Set all the control levers in neutral and measure the VC valve output pressure under the following condition.
   i) Set all the control levers in neutral.
   ii) Run the engine at high idle and measure the output pressure.
6) Relieve the boom circuit by raising the boom (normally), and measure the VC valve output pressure under the following condition.
   i) Turn the heavy lift switch OFF.
   ii) Run the engine at high idle, relieve the boom circuit by raising the boom, and measure the output pressure.
7) Turn the heavy lift switch ON, relieve the boom circuit by raising the boom, and measure the VC valve output pressure under the following condition.
   i) Turn the heavy lift switch ON.
   ii) Run the engine at high idle, relieve the boom circuit by raising the boom, and measure the output pressure.



8) After finishing measurement, remove the measuring instruments and return the removed parts.

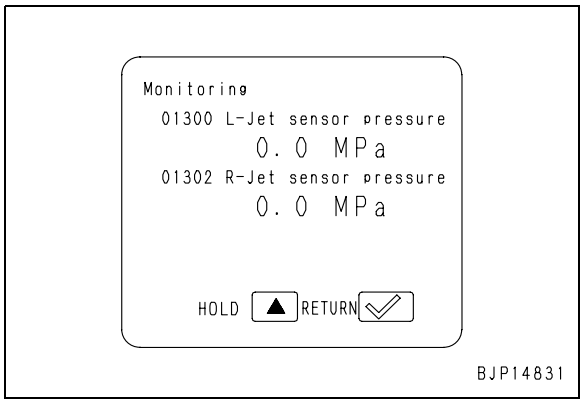
4. Measuring jet sensor output differential pressure

When measuring output differential pressure with machine monitor

★ The jet sensor output differential pressure can be checked with the monitoring function of the machine monitor, too.
(For the operating method, see "Special functions of machine monitor".)

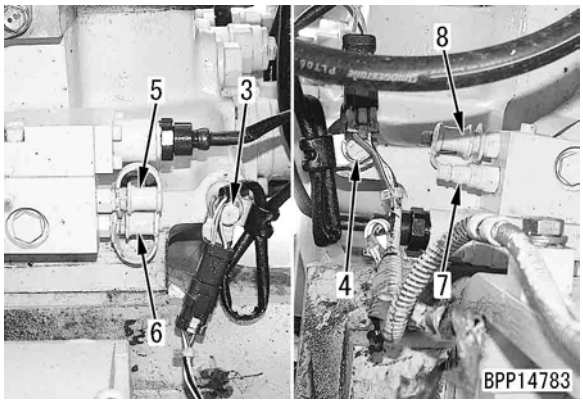
★ Monitoring code:
13800 (L-jet sensor differential pressure)
13801 (R-jet sensor differential pressure)

★ For the measurement conditions, see 3), 4), and 5).

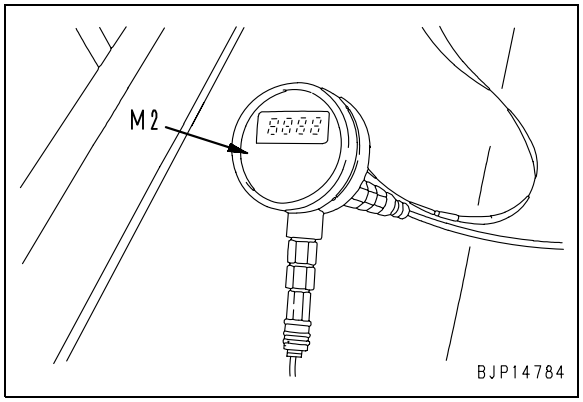


When removing oil pressure pickup plugs from machine and measuring output differential pressure

1) Remove clamping bolts (3) and (4) of the differential pressure sensor wiring harness and remove oil pressure pickup plugs (5) and (6) under the left 5-spool control valve and oil pressure pickup plugs (7) and (8) under the right 4-spool control valve.
   - (5): High pressure side (NCAI) of left 5-spool control valve (F pump)
   - (6): Low pressure side (NCBI) of left 5-spool control valve (F pump)
   - (7): High pressure side (NCA) of right 4-spool control valve (R pump)
   - (6): Low pressure side (NCB) of right 4-spool control valve (R pump)

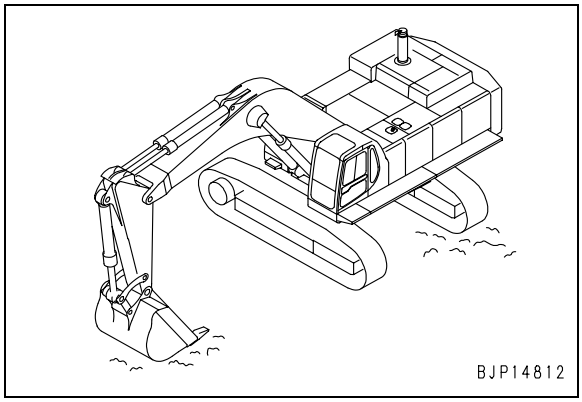


2) Install measuring hose [2] of hydraulic tester **M1** and connect it to differential pressure gauge **M2** or oil pressure gauge [1].
   ★ When using differential pressure gauge: Connect the high pressure (5) or (7) to the high pressure side (back side) of the differential pressure gauge and connect the low pressure (6) or (8) to the low pressure side (lower side). Since the differential pressure gauge needs DC 12 V, connect 1 battery to it.
   ★ When using pressure gauge: Connect the pressure gauge of 5.9 MPa {60 kg/cm^2} to the high pressure side (Pt) and connect the pressure gauge of 2.5 MPa {25 kg/cm^2} to the low pressure side (Pd).



3) Start the engine and set the working mode switch in the P-mode position.
4) Set all the control levers in neutral and measure the jet sensor output differential pressure under the following condition.
   i) Set all the control levers in neutral.
   ii) Run the engine at high idle and measure the output differential pressure.
   ★ Jet sensor output differential pressure = High pressure (NCA) – Low pressure (NCB)
5) Drive the travel motor idle and measure the jet sensor output differential pressure under the following condition.
   i) Raise the track shoe to be measured by using the boom and arm.
   ii) Run the engine at high idle, drive the travel motor idle, and measure the output differential pressure.
   ★ Jet sensor output differential pressure = High pressure (NCA) – Low pressure (NCB)





6) After finishing measurement, remove the measuring instruments and return the removed parts.

5. Measuring differential pressure sensor output voltage

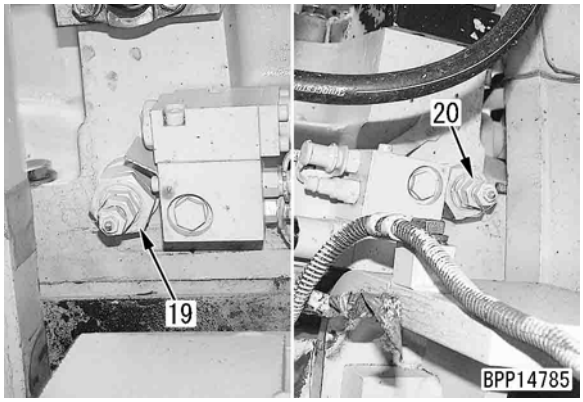
- The differential pressure sensor output voltage can be checked with the monitoring function of the machine monitor.
  (For the operating method, see "Special functions of machine monitor".)
- Monitoring code:
  13802 (L-jet sensor differential pressure sensor voltage)
  13803 (R-jet sensor differential pressure sensor voltage)
  1) Start the engine and set the working mode switch in the P-mode position.
  2) Set all the control levers in neutral and measure the voltage under the following condition.
     i) Set all the control levers in neutral.
     ii) Run the engine at high idle and measure the voltage.
  3) Drive the travel motor idle and measure the voltage under the following condition.
     i) Raise the track shoe to be measured by using the boom and arm.
     ii) Run the engine at high idle, drive the travel motor idle, and measure the voltage.

Adjusting

1. Adjusting jet sensors of left 5-spool control valve and right 4-spool control valve

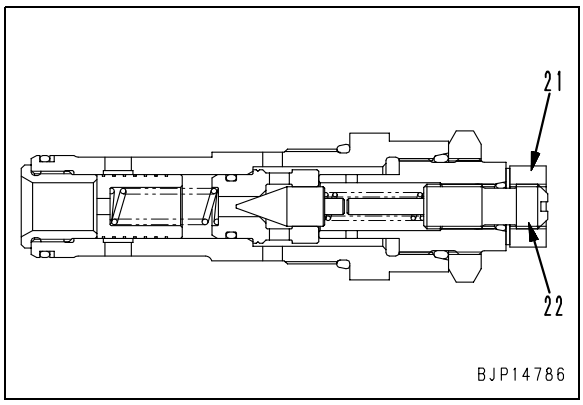
★ If the jet sensor output differential pressure of the left 5-spool control valve or right 4-spool control valve is abnormal, adjust jet sensor relief valves (19) and (20) according to the following procedure.

- (19): Jet sensor relief valve of left 5-spool control valve
- (20): Jet sensor relief valve of right 4-spool control valve



1) Fix adjustment screw (21) and loosen locknut (22).
2) Turn adjustment screw (21) to adjust the pressure.
   ★ If the adjustment screw is
   - turned to the right, the pressure rises.
   - turned to the left, the pressure lowers.

   ★ Pressure changed by 1 turn of adjustment screw: 0.288 MPa {2.94 kg/cm²}
3) Fix adjustment screw (21) and tighten locknut (22).
   Locknut: **59 – 78 Nm {6 – 8 kgm}**



4) After finishing adjustment, check the oil pressure again according to the above described measurement procedure.

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00788-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

30 Testing and adjusting
Testing and adjusting, Part 3

Testing and adjusting, Part 3 2
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Testing and adjusting travel deviation 11
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Measuring fan speed 14
Measuring fan circuit oil pressure 14
Measuring fan pump EPC current 15
Measuring fan pump EPC solenoid valve output pressure 15
Measuring oil leakage 16
Release of residual pressure from hydraulic circuit 20
Bleeding air from each part 21
Inspection procedures for diode 24

Testing and adjusting, Part 3

Measuring PPC valve output pressure

★ Devices for measuring PPC valve output pressure

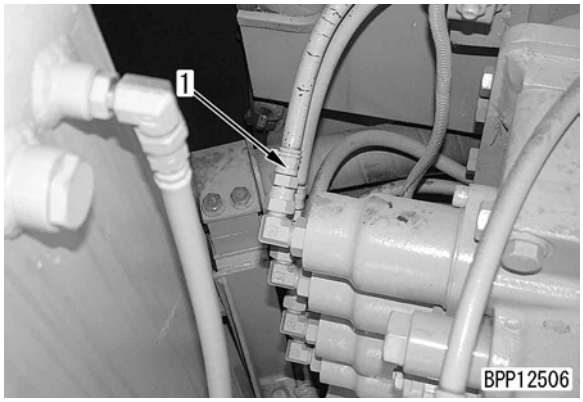
Symbol		Part Number	Part Name
P	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-401-3200	Adapter (Size: 03)

★ Measure the PPC valve output pressure under the following conditions:
- Hydraulic oil temperature: Within operating range

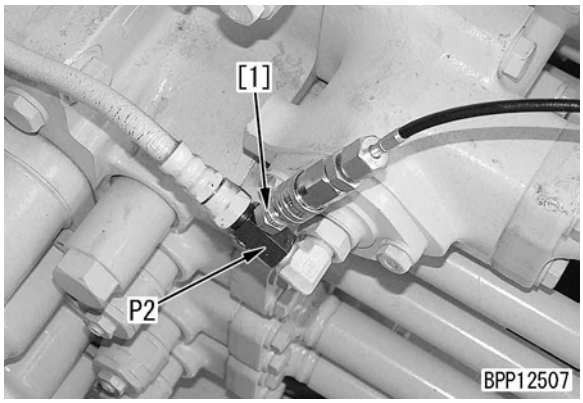
⚠ Lower the work equipment to the ground and stop the engine. Operate the control levers several times to release the residual pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the hydraulic tank.

1. Remove the control valve top cover.

2. Disconnect hose (1) of the PPC circuit to be measured. Install adapter **P2** and connect the hose again.
   ★ For the hose to be disconnected, see the connection diagram on the next page.

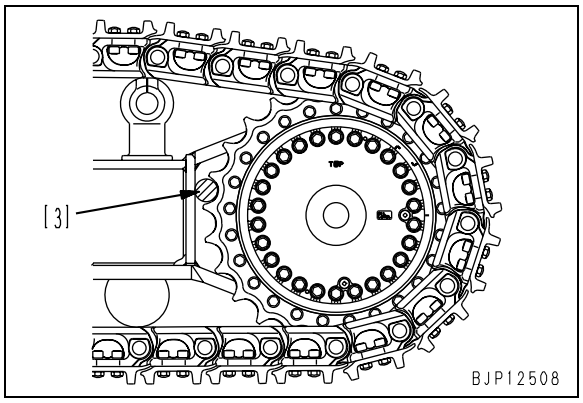


3. Install nipple [1] of hydraulic tester **P1** and connect it to oil pressure gauge [2].
   ★ Use a pressure gauge of 5.9 MPa {60 kg/cm²}
   ★ The figure shows the measuring instruments installed to the right travel (reverse) circuit of the left 5-spool control valve.



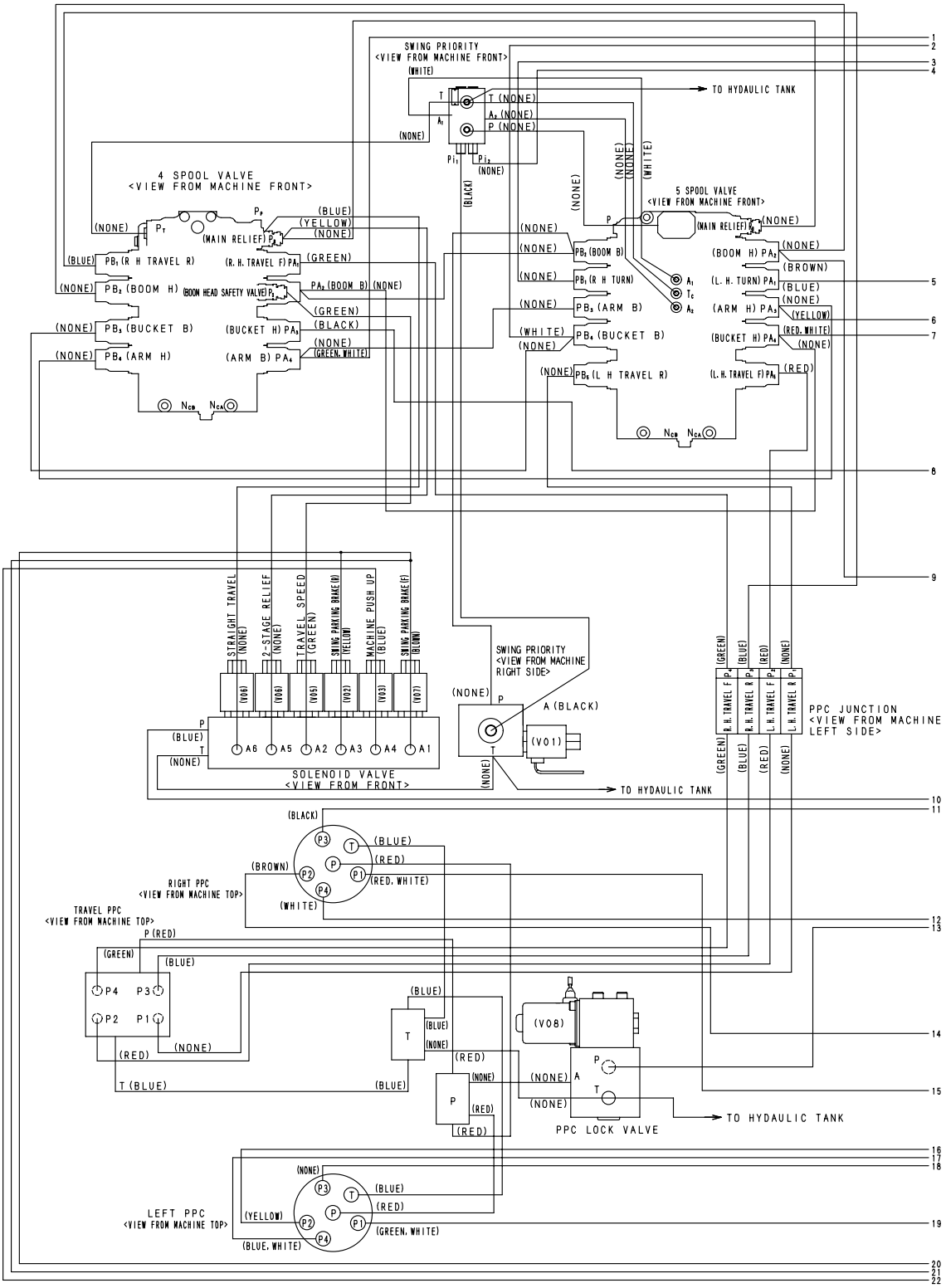
4. Run the engine at high idle, operate the control lever of the PPC circuit to be measured, and measure the oil pressure.
   ★ Move the control lever to the stroke end.
   ★ Condition of actuator to be measured
   - When measuring the pressure for the work equipment, move each cylinder to the stroke end.
   - When measuring the pressure for swing, turn the swing lock switch ON.
   - When measuring the pressure for travel, put pin [3] between the sprocket and track frame to lock the track shoe.





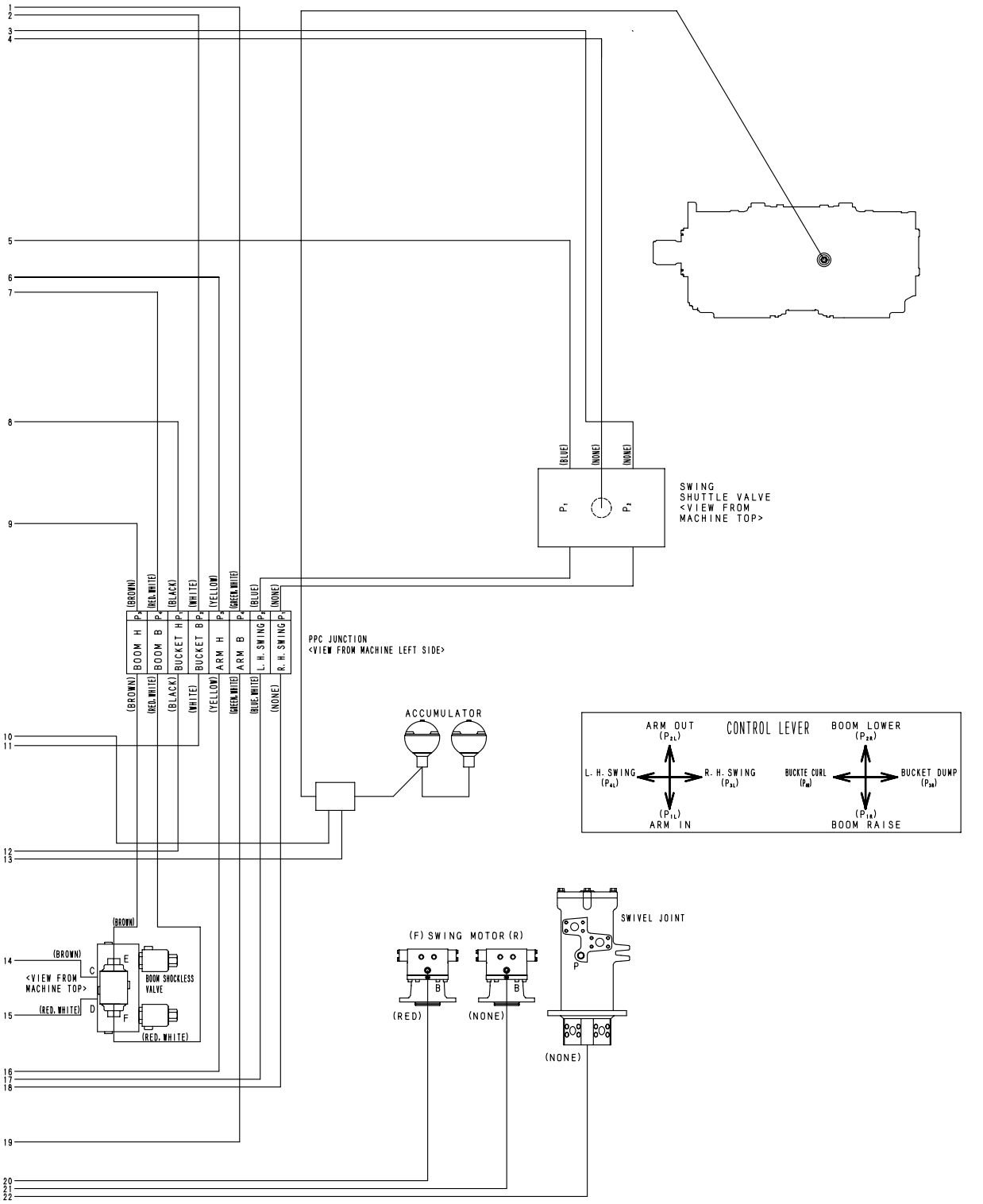
5. After the measurement, remove the measuring devices and return the valve to the original state.

Connection diagram of pilot piping (PPC-Solenoid circuit)



BJP14787

★ The colors in ( ) in the figure are the colors of the tapes wound onto the hoses.



BJP14788

Measuring outlet pressures of solenoid valve, swing PPC shuttle valve, and swing priority selector valve

★ Devices for measuring outlet pressures of solenoid valve, swing PPC shuttle valve, and swing priority selector valve

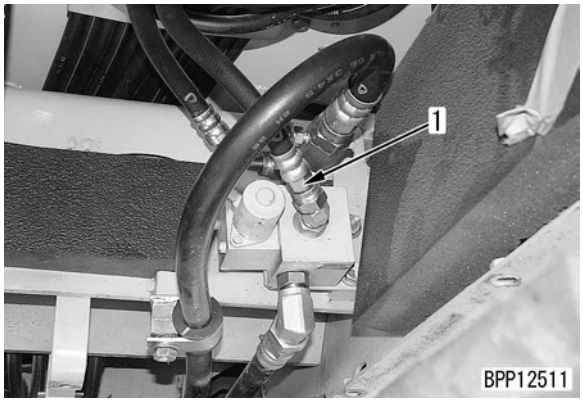
Symbol		Part Number	Part Name
Q	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-401-3200	Adapter (Size: 03)
	3	799-401-3300	Adapter (Size: 04)
	4	799-101-5220	Nipple (10 × 1.25 mm)
		07002-11023	O-ring

★ Measure the outlet pressures of solenoid valve, swing PPC shuttle valve, and swing priority selector valve under the following condition.
- Hydraulic oil temperature: Within operating range

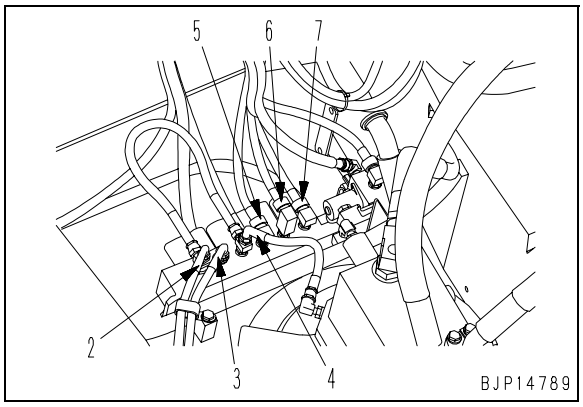
⚠ Lower the work equipment to the ground and stop the engine. Operate the control levers several times to release the residual pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the hydraulic tank.

1. Measuring outlet pressure of solenoid valve

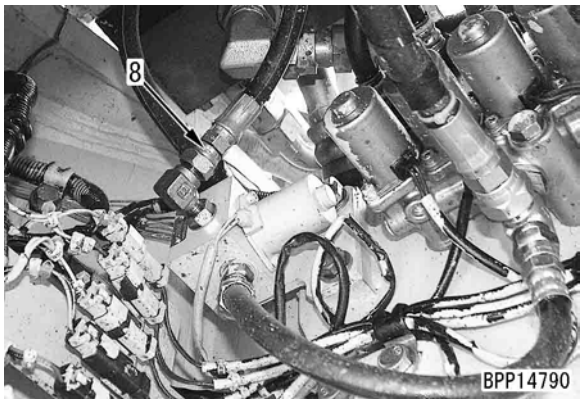
1) Disconnect outlet hoses (1) – (8) of the solenoid valves to be measured. Install adapter **Q2** and connect the hoses again.
   - ★ When measuring the PPC lock solenoid valve, remove the operator's cab undercover (the 2nd piece on the front side).
   - ★ If the solenoid valve side of a hose is connected by a quick coupler, disconnect the other end of the hose (See the connection diagram in “Measuring PPC valve output pressure”).
   - (1): PPC lock solenoid valve



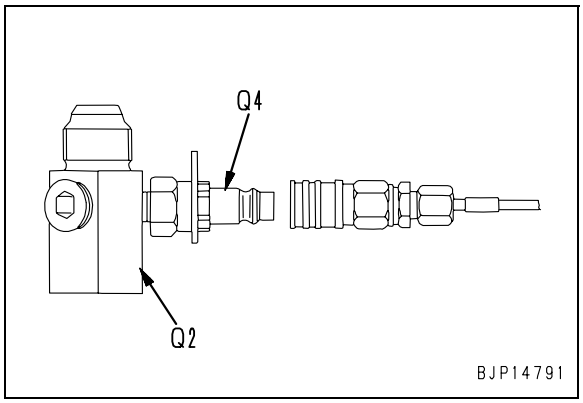
- (2): Swing holding brake solenoid valve (F)
- (3): Travel speed shifting solenoid valve
- (4): Swing holding brake solenoid valve (R)
- (5): Machine push-up solenoid valve
- (6): 2-stage relief solenoid valve
- (7): Travel junction solenoid valve



- (8): Swing priority solenoid valve



2) Install the nipple (R1/8) of hydraulic tester **Q1** or nipple **Q4** (10 × 1.25 mm) and connect it to oil pressure gauge [1].
   - ★ Use a pressure gauge of 5.9 MPa {60 kg/cm^2}
   - ★ The following figure shows the measuring devices installed to the outlet hose of the PPC lock solenoid valve.



3) Run the engine at high idle, set the condition or operate the control levers as shown in the table, and measure the output pressure.
   ★ When operating the work equipment-swing or travel control lever, operate it finely to a degree that the PPC oil pressure switch is turned ON.
   ★ If the solenoid valve outlet pressure is as shown in the table, the solenoid valve is normal.



4) After finishing measurement, remove the measuring instruments and return the removed parts.

Measurement conditions for solenoid valve

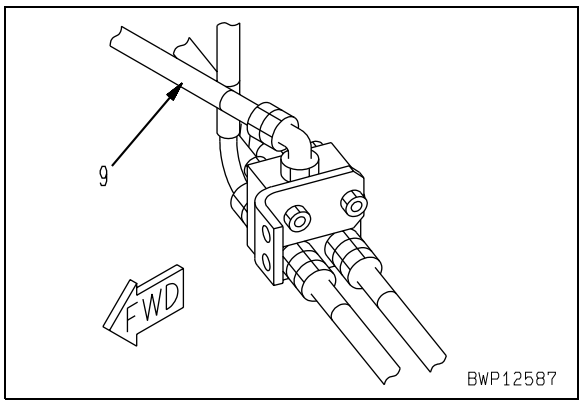
★ The measurement conditions in the following table are for measuring the solenoid valve outlet pressure and they are a part of the operating condition of each solenoid valve.

No.	Solenoid valve	Measurement condition	Operation of machine	Operation of solenoid	Oil pressure (MPa {kg/cm^2})
1	PPC lock	• Set lock lever in LOCK position.	Basic pressure circuit to PPC valve is closed.	OFF	0 {0}
		• Set lock lever in FREE position.	Basic pressure circuit to PPC valve is opened.	ON	Min. 2.74 {Min. 28}
2	Swing holding brake (F)	• Turn swing lock switch ON. • Measure about 10 seconds after work equipment-swing control lever is set in NEUTRAL position.	Swing holding brake is applied.	OFF	0 {0}
		• Turn swing lock switch OFF and operate work equipment-swing control lever.	Swing holding brake is released.	ON	Min. 2.74 {Min. 28}
3	Travel speed shifting	• Set travel speed switch in Lo position.	Swash plate angle of travel motor is set to maximum.	OFF	0 {0}
		• Set travel speed switch in Hi position.	Swash plate angle of travel motor is set to minimum.	ON	Min. 2.74 {Min. 28}
4	Swing holding brake (R)	• Turn swing lock switch ON. • Measure about 10 seconds after work equipment-swing control lever is set in NEUTRAL position.	Swing holding brake is applied.	OFF	0 {0}
		• Turn swing lock switch OFF and operate work equipment-swing control lever.	Swing holding brake is released.	ON	Min. 2.74 {Min. 28}
5	Machine push-up	• Turn machine push-up switch ON.	Boom LOWER safety valve is set to high pressure.	OFF	0 {0}
		• Turn machine push-up switch OFF.	Boom LOWER safety valve is set to low pressure.	ON	Min. 2.74 {Min. 28}
6	2-stage relief	• Turn heavy lift switch OFF.	Main relief valve is set to low pressure.	OFF	0 {0}
		• Turn heavy lift switch ON and raise boom singly. • Operate travel lever.	Main relief valve is set to high pressure.	ON	Min. 2.74 {Min. 28}
7	Travel junction	• Set all control levers in NEUTRAL position.	F pump circuit and R pump circuit are separated.	OFF	0 {0}
		• Operate right and left travel levers and work equipment-swing lever simultaneously.	F pump circuit and R pump circuit are merged.	ON	Min. 2.74 {Min. 28}
8	Swing priority (See note)	• Turn swing priority switch OFF and raise boom.	Swing priority function is turned OFF.	OFF	Min. 2.35 {Min. 24}
		• Turn swing priority switch ON and raise boom.	Swing priority function is turned ON.	ON	0 {0}

Note: The inlet pressure of the swing priority solenoid valve is the boom RAISE PPC circuit pressure. Accordingly, when measuring the outlet pressure, move the boom control lever to the RAISE stroke end (The boom cylinder may be at the RAISE stroke end).

2. Measuring outlet pressure of swing PPC shuttle valve

1) Disconnect outlet hose (9) of the swing PPC shuttle valve. Install adapter **Q2** and connect the hose again.
   ★ When measuring the swing PPC shuttle valve, remove the control valve top cover.



2) Install the nipple (R1/8) of hydraulic tester **Q1** and connect it to oil pressure gauge [1].
   ★ Use a pressure gauge of 5.9 MPa {60 kg/cm²}
3) Run the engine at high idle, set the condition or operate the control levers as shown in the table, and measure the output pressure.
   ★ If the swing PPC shuttle valve outlet pressure is as shown in the table, the PPC shuttle valve is normal.

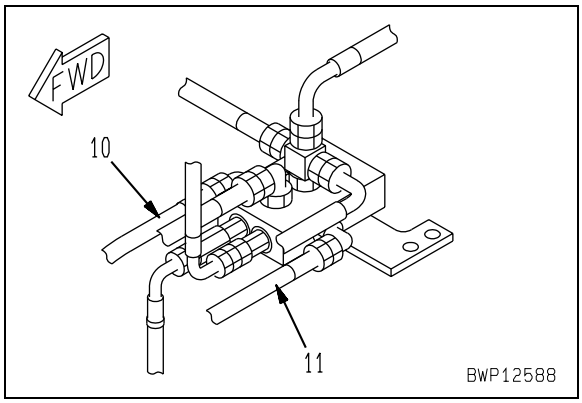
Measurement condition		Oil pressure (MPa {kg/cm²})
Left work equipment control lever	Neutral	0 {0}
	Position for swinging to left	Min. 2.35 {Min. 24}
	Position for swinging to right	Min. 2.35 {Min. 24}



4) After finishing measurement, remove the measuring instruments and return the removed parts.

3. Measuring outlet pressure of swing priority selector valve

1) Disconnect outlet hoses (10) and (11) of the swing priority selector valve. Install adapters **Q2** and connect the hoses again.
   ★ When measuring the swing priority selector valve, remove the control valve top cover.
   • (10): Port A1 (For swing)
   • (11): Port A2 (For arm Lo and bucket Hi)



2) Install the nipple (R1/8) of hydraulic tester **Q1** and connect it to oil pressure gauge [1].
   ★ Use a pressure gauge of 58.8 MPa {600 kg/cm²}

⚠ Since the outlet pressure of the swing priority selector valve is the same as the main pump pressure, take care not to connect the oil pressure gauge for low pressure.

3) Run the engine at high idle, set the condition or operate the control levers as shown in the table, and measure the output pressure.
   ★ If the swing priority selector valve outlet pressure is as shown in the table, the swing priority selector valve is normal.
   • Port A1 (For swing)

Measurement conditions		Oil pressure (MPa {kg/cm²})
Swing priority switch: OFF		
Right work equipment control lever	Neutral	0 {0}
	Position for raising boom	Same as main pump pressure
Swing priority switch: ON		
Right work equipment control lever	Neutral	0 {0}
	Position for raising boom	0 {0}

   • Port A2 (For arm Hi and bucket Lo)

Measurement conditions		Oil pressure (MPa {kg/cm²})
Left work equipment control lever	Neutral	0 {0}
	Position for swinging to left	Same as main pump pressure
	Position for swinging to right	Same as main pump pressure



4) After finishing measurement, remove the measuring instruments and return the removed parts.

Adjusting work equipment, swing PPC valve

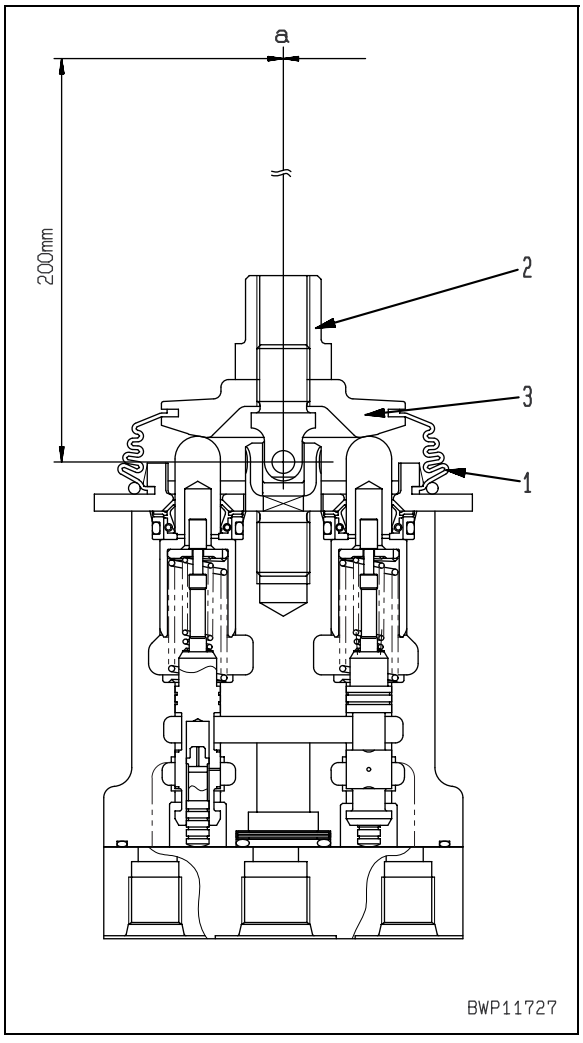
★ If there is excessive play at the tip of the work equipment or swing lever, adjust at the PPC valve end as follows.
• Standard lever play (a): 0.5 – 3 mm at point 200 mm from rotating center of lever (forward and reverse, and left and right)

1. Remove boot (1).

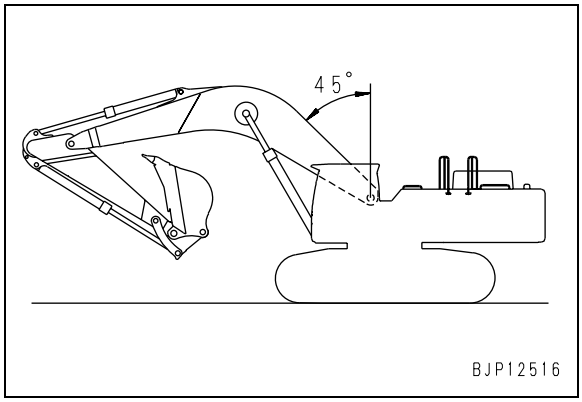
2. Loosen locknut (2), then turn disc (3) to adjust the play of the lever.
   ★ When doing this, do not move the piston.

3. Secure disc (3) in position, then tighten locknut (2) to the specified torque.
   Locknut : **98.07 – 127.49 Nm {10 – 13 kgm}**

4. Install boot (1).



Testing and adjusting travel deviation



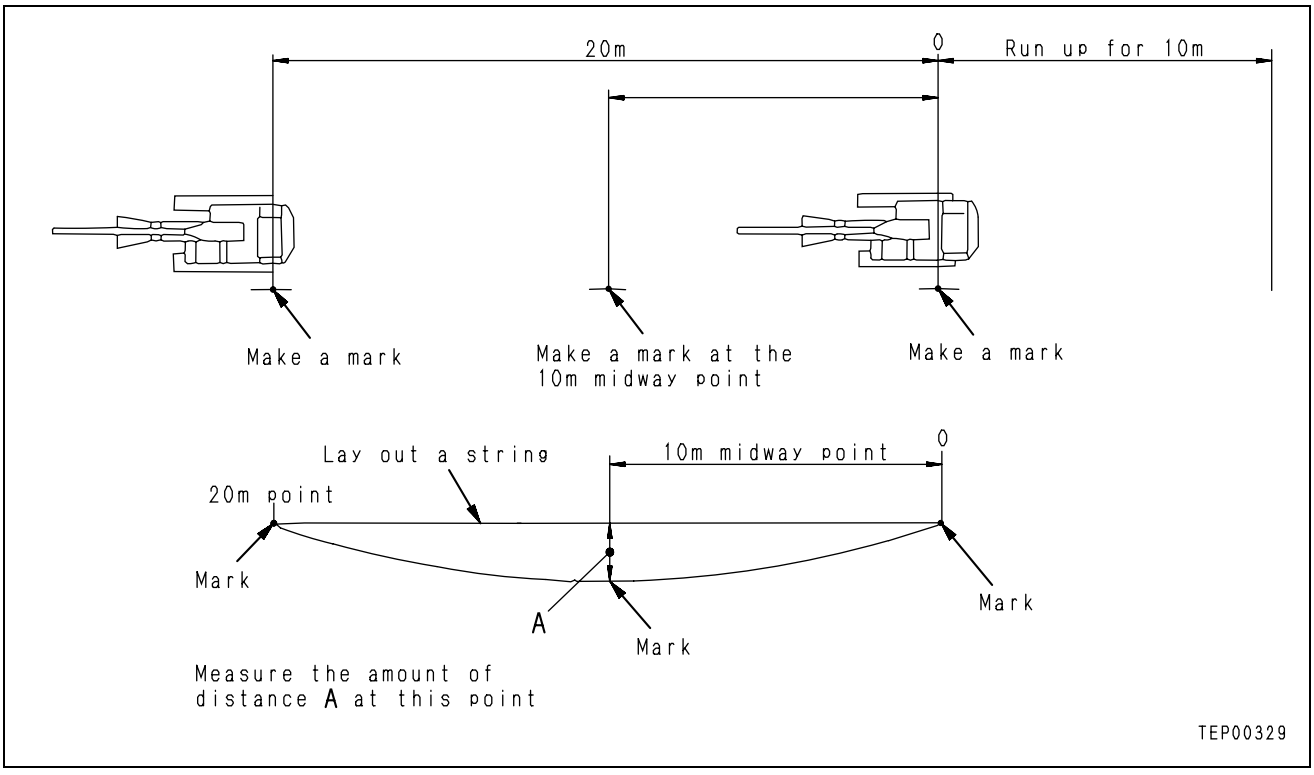
Measuring

★ Measure on a hard and level ground.

1. Start the engine and set the work equipment in the travel position.
   ★ To set the work equipment in the travel position, extend the bucket and arm cylinders fully and set the boom angle to 45°.

2. Set the working mode switch to the P-mode position and set the travel speed switch to the Lo position.

3. Run up for 10 m with the engine speed at high idle and continue travel under the same condition for 20 m and measure the deviation (A).
   ★ At this time, install an oil pressure gauge and measure the pump discharge pressure, too, (or monitor the pump discharge pressure with the monitor panel).



Adjusting

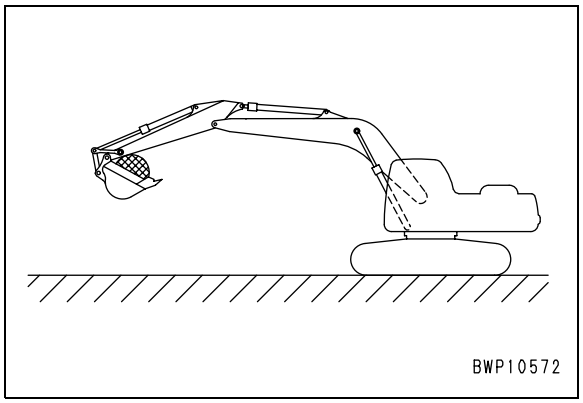
★ Carry out troubleshooting for “H-16 Machine deviates by itself during travel” to find out the causal part in advance.

Inspection of locations of hydraulic drift of work equipment

★ If there is any hydraulic drift in the work equipment (cylinders), check in the following manner to determine if the cause is in the cylinder packing or in the control valve.

1. Inspection of boom and bucket cylinders

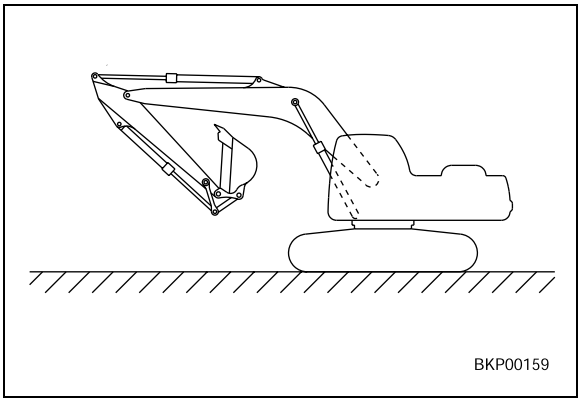
1) Set the work equipment in the same posture as when measuring hydraulic drift, and stop the engine.
   ★ Fill the bucket with earth or apply the rated load to the bucket.



2) Operate the control lever to the RAISE position or the bucket control lever to the CURL position.
   - If the lowering speed increases, the cylinder packing is defective.
   - If there is no change, the control valve is defective.
   ★ Operate the control lever with the engine starting switch in the ON position.
   ★ If pressure in the accumulator has dropped, run the engine for approx. 10 seconds to charge the accumulator again.

2. Inspection of arm cylinder

1) Operate the arm cylinder to move the arm to the position 100 mm before the digging stroke end, and stop the engine.



2) Operate the arm control lever to move the arm to the digging side.
   - If the lowering speed increases, the cylinder packing is defective.
   - If there is no change, the control valve is defective.
   ★ Operate the control lever with the engine starting switch in the ON position.
   ★ If pressure in the accumulator has dropped, run the engine for approx. 10 seconds to charge the accumulator again.

[Reference] If the cause of the hydraulic drift is in the defective packing, and the above operation is carried out, downward movement is accelerated for the following reasons.

1) If the work equipment is set to the above posture (holding pressure applied to the bottom end), the oil at the bottom end leaks to the head end. However, the volume at the head end is small than the volume at the bottom end by the volume of the rod end, so the internal pressure at the head end increases because of the oil flowing in from the bottom end.
2) As the internal pressure on the head side is increased, the pressure on the bottom side is also increased and they are balanced at a certain level (which depends on the leakage), then the lowering speed is lowered.
3) When the pressure is balanced, the downward movement becomes slower. If the lever is then operated according to the procedure given above, the circuit at the head end is opened to the drain circuit (the bottom end is closed by the check valve), so the oil at the head end flows to the drain circuit and the downward movement becomes faster.

Measuring fan speed

★ Tools for measuring fan speed

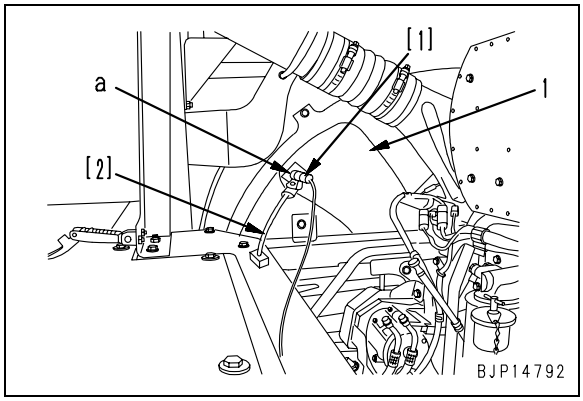
Symbol	Part Number	Part Name
R	799-203-8001	Multitachometer

1. Open the inspection cover of the engine hood and remove the fan guard.

2. Stick a reflection tape to the fan (1).

3. Set probe [1] of multitachometer **R** with stand [2], match it to the reflection tape, and connect it to meter [3].
   ★ Take care that the probe will not interfere with the fan.

4. Close the cover of the engine hood.
   ★ Do not start the engine without closing the cover.



5. Run the engine at low idle and high idle and measure the fan speed.
   ★ If the fan is rotated in reverse, the measuring instruments can be sucked in. Accordingly, be sure to rotate the fan forward when measuring.



6. After finishing measurement, remove the measuring instruments and return the removed parts.

Measuring fan circuit oil pressure

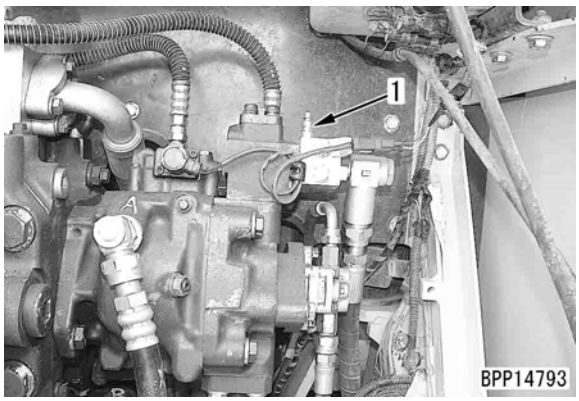
★ Tools for measuring fan circuit oil pressure

Symbol	Part Number	Part Name
S	799-101-5002	Multitachometer
	790-261-1203	Digital hydraulic tester

★ Measure the fan circuit oil pressure under the following condition.
- Hydraulic oil temperature: Within operating range

⚠ Lower the work equipment to the ground and stop the engine. Operate the control levers several times to release the residual pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the hydraulic tank.

1. Connect gauge [1] of hydraulic tester **S** to oil pressure pickup nipple (1) of the fan pump.
   ★ Use the gauge of 39.2 MPa {400 kg/cm^2}.



2. While running the engine at high idle, measure the fan circuit oil pressure.



3. After finishing measurement, remove the measuring instruments and return the removed parts.

Measuring fan pump EPC current

★ The fuel pump EPC current can be checked with the monitoring function of the machine monitor. (For the operating method, see “Special functions of machine monitor”.)
- Monitoring code:
  31623 Fan pump EPC solenoid current
- The current is displayed in mA.

★ Measure the fan pump EPC current under the following condition.
- Hydraulic oil temperature: 45 – 55°C

1) Run the engine at high idle and measure the EPC current.

Measuring fan pump EPC solenoid valve output pressure

★ Measuring instruments for fan pump EPC solenoid valve output pressure

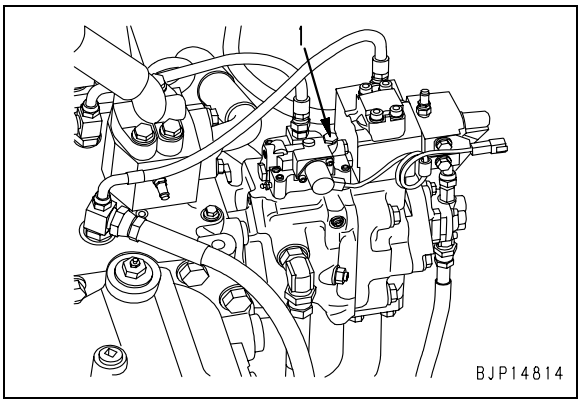
Symbol		Part Number	Part Name
U	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5220	Nipple (Max. 1.5 mm)
		07002-11023	O-ring

★ Measure the fan pump EPC solenoid valve output pressure
- Hydraulic oil temperature: 45 – 55°C

★ Since the basic pressure of the EPC solenoid valve output pressure is the control circuit pressure, check that the control circuit pressure is normal before measuring the EPC solenoid valve output pressure.

⚠ Lower the work equipment to the ground and stop the engine. Then, operate the control levers several times to release the residual pressure in the piping and loosen the hydraulic tank cap gradually to release the internal pressure of the hydraulic tank.

1) Remove oil pressure pickup plug (1) from the top of the fan pump.



2) Install nipple **U2** and connect it to oil pressure gauge [1] of hydraulic tester **U1**.
   - Use the oil pressure gauge of 5.9 MPa {60 kg/cm^2}.
3) Run the engine at high idle and measure the solenoid output pressure.
4) After finishing measurement, remove the measuring instruments and return the removed parts.

Measuring oil leakage

★ Measuring device for oil leakage

Symbol	Part Number	Part Name
T	Purchased	Measuring cylinder

★ Measure the oil leakage under the following condition.
- Hydraulic oil temperature: Within operating range

1. Measuring leakage from boom cylinder

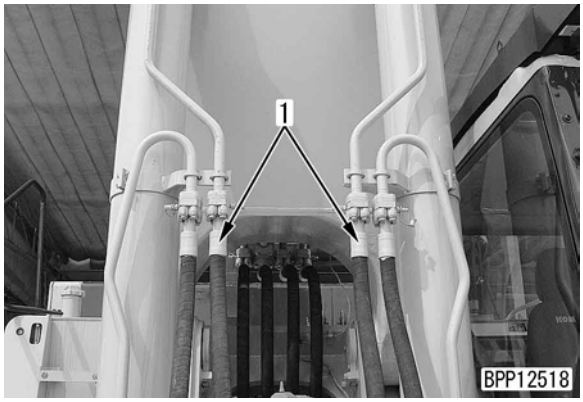
1) Run the engine and raise the boom to the stroke end.

⚠ Referring to “Release of residual pressure from hydraulic circuit”, release the residual pressure from the piping on the boom cylinder head side (Operate the lever only in the RAISE direction, however).

2) Disconnect hoses (1) on the cylinder head side and block it with a flange.

⚠ Take care not to disconnect the hose on the cylinder bottom side.

★ Use the following part to block the hose.
07379-01260 (Flange #12)



3) Run the engine at high idle and relieve the boom cylinder by operating the boom control lever in the RAISE direction.

⚠ Take care not to operate the boom control lever in the LOWER direction.

4) Start measuring the oil leakage 30 seconds after the boom cylinder is relieved and measure for 1 minute.
5) After finishing measurement, return the parts.

2. Measuring leakage from arm cylinder

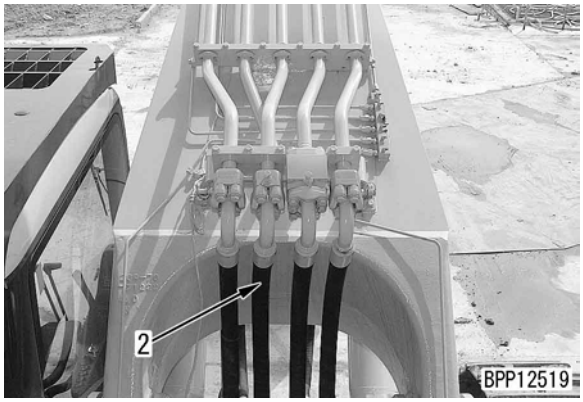
1) Run the engine and move in the arm to the stroke end.

⚠ Referring to “Release of residual pressure from hydraulic circuit”, release the residual pressure from the piping on the arm cylinder head side (Operate the lever only in the IN direction, however).

2) Disconnect hose (2) on the cylinder head side and block it with a flange.

⚠ Take care not to disconnect the hose on the cylinder bottom side.

★ Use the following part to block the hose.
07379-01470 (Flange #14)



3) Run the engine at high idle and relieve the arm cylinder by operating the arm control lever in the IN direction.

⚠ Take care not to operate the arm control lever in the OUT direction.

4) Start measuring the oil leakage 30 seconds after the arm cylinder is relieved and measure for 1 minute.
5) After finishing measurement, return the parts.

3. Measuring leakage from bucket cylinder

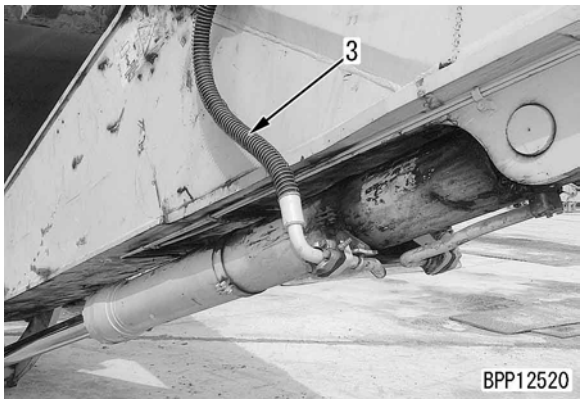
1) Run the engine and curl the bucket to the stroke end.

⚠ Referring to “Release of residual pressure from hydraulic circuit”, release the residual pressure from the piping on the bucket cylinder head side (Operate the lever only in the CURL direction, however).

2) Disconnect hose (3) on the cylinder head side and block it with a flange.

⚠ Take care not to disconnect the hose on the cylinder bottom side.

★ Use the following part to block the hose.
07379-01470 (Flange #14)



3) Run the engine at high idle and relieve the bucket cylinder by operating the bucket control lever in the CURL direction.

⚠ Take care not to operate the bucket control lever in the DUMP direction.

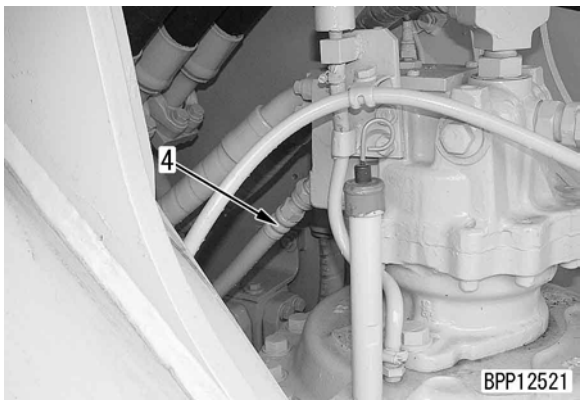
4) Start measuring the oil leakage 30 seconds after the bucket cylinder is relieved and measure for 1 minute.
5) After finishing measurement, return the parts.

4. Measuring leakage from swing motor

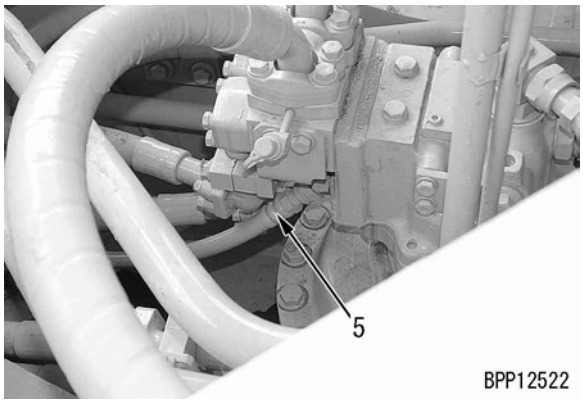
1) Disconnect drain hoses (4) and (5) and plug them.

★ Use the following parts to block the hoses.
07376-70522 (Plug #05)

• (4): Drain hose of front swing motor



• (5): Drain hose of rear swing motor



2) Turn the swing lock switch ON.
3) Run the engine at high idle and relieve the swing circuit and measure the oil leakage.

★ Start measuring the oil leakage 30 seconds after the swing motor circuit is relieved and measure for 1 minute.

★ After measuring 1 time, swing the upper structure 180° and measure again.

4) After finishing measurement, return the parts.

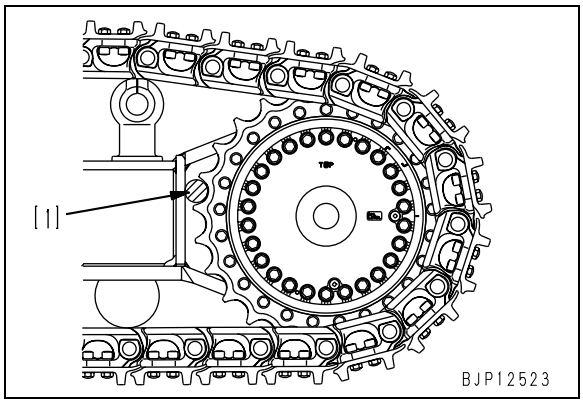
5. Measuring leakage from travel motor

1) Remove the travel motor cover.

Travel motor cover: **130 kg**

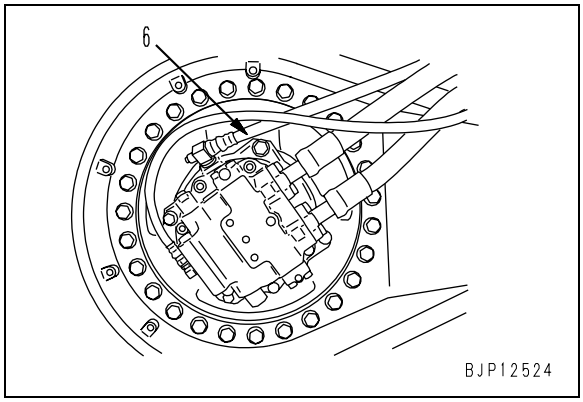
2) Start the engine and lock the travel mechanism.

⚠ Set pin [1] between the sprocket and track frame to lock the travel mechanism securely.



3) Disconnect drain hose (6) of the travel motor and plug it.

★ Use the following part to block the hose.
07376-70522 (Plug #05)



4) Run the engine at high idle and relieve the travel circuit and measure the oil leakage.

⚠ Since wrong operation of the levers can cause an accident, make signs and confirmation securely.

★ Start measuring the oil leakage 30 seconds after the travel motor circuit is relieved and measure for 1 minute.

★ Measure the oil leakage several times, moving the motor little by little (changing the positions of the valve plate and cylinder and those of the cylinder and piston).

5) After finishing measurement, return the parts.

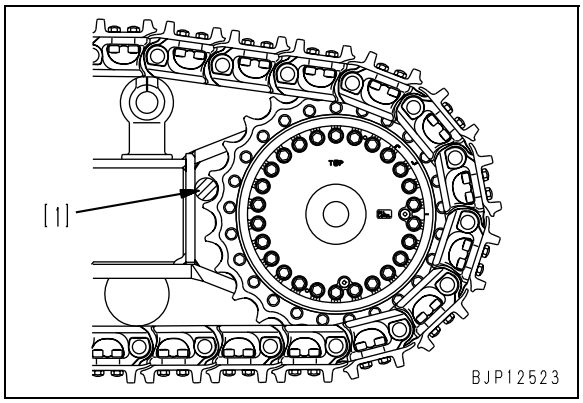
6. Measuring leakage from center swivel joint

1) Put block [1] between the sprocket and frame to lock the travel motor of the port to be inspected, and then stop the engine.

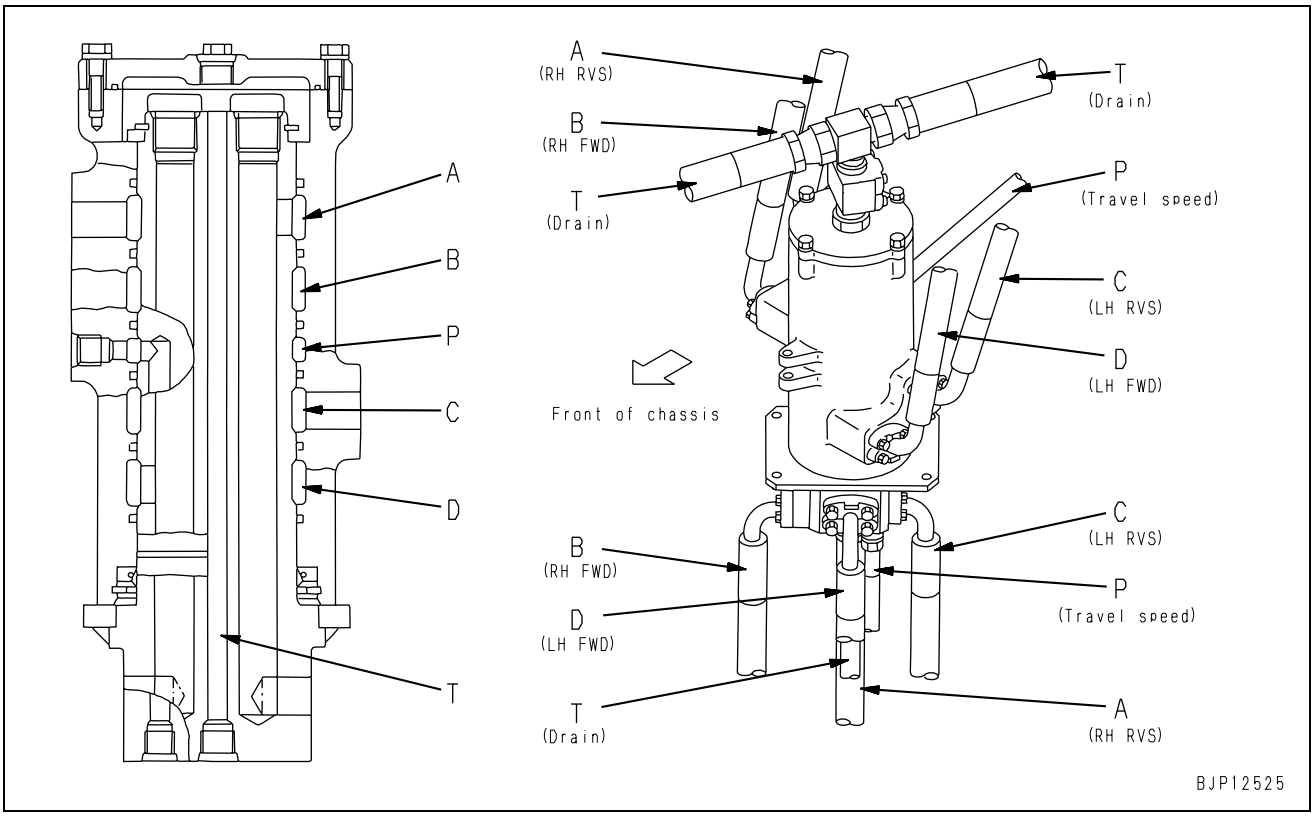
⚠ Loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the tank.

★ Inspection ports, travel directions, and measurement ports (See figure on following parts)

Inspection port	Travel direction	Measurement ports
A	Right reverse	T and B
B	Right forward	A and P
P	Change of speed	B and C
C	Left reverse	P and D
D	Left forward	C and T
T	Drain	



2) Disconnect the hoses of the upper and lower measurement ports of the inspection port from the top of the swivel joint and block them.
   ★ For combination of the inspection port and measurement ports, see the above table.
   ★ Use the following parts to block the hoses.
   • Ports A, B, C, and D: 07379-01044 (Flange #10)
   • Port P: 07376-70315 (Plug #03)
   • Port T: 07376-70522 (Plug #05)
3) Run the engine at high idle and measure the oil leakage through the measurement ports.
   ★ When measuring ports A, B, C, and D, relieve the travel motor slowly in the revolving direction (See the table on the last page).
   ★ When measuring port P, set the travel speed shifting switch in the Hi position.
4) Start measuring the oil leakage 1 minute after the center swivel joint is relieved and measure for 1 minute.

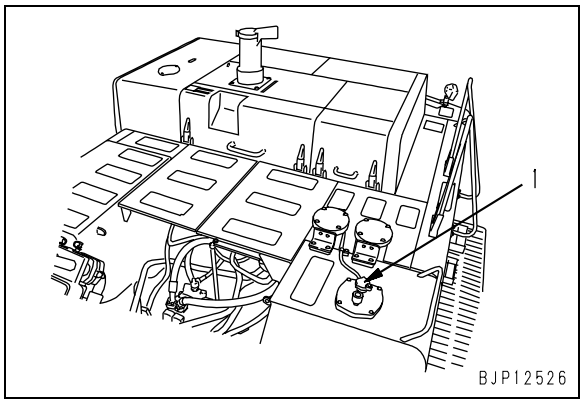


Release of residual pressure from hydraulic circuit

1. Release of residual pressure from hydraulic tank

⚠ The hydraulic tank is enclosed and pressurized. When removing a hose or a plug connected to the hydraulic tank, release the residual pressure from the hydraulic tank according to the following procedure.

1) Lower the work equipment to the ground in a stable posture and stop the engine.
2) Slowly loosen oil filler cap (1) of the hydraulic tank to release the air from the tank.



2. Release of residual pressure from hydraulic cylinder circuit

⚠ When disconnecting the piping between a hydraulic cylinder and the control valve, release the residual pressure from the piping according to the following procedure.

1) Referring to 1. Release of residual pressure from hydraulic tank, release the residual pressure from the hydraulic tank.
   ★ Leave the oil filler cap of the hydraulic tank removed.
2) Turn the starting switch to the ON position and set the lock lever in the FREE position, and then operate the work equipment control levers on both sides forward, backward, to the right, and to the left.
   ★ The control valve is driven with the pressure in the accumulator. If it is operated 2 – 3 times, the pressure lowers.
3) Start the engine and run it at low idle for 5 seconds to heighten the pressure in the accumulator.
4) Repeat above steps 2) and 3) 2 – 3 times, and all residual pressure is released from the piping.

3. Release of residual pressure from swing motor circuit

★ Release the residual pressure from the swing motor circuit by performing the procedure for 2. Release of residual pressure from hydraulic cylinder circuit.

4. Release of residual pressure from travel motor circuit

★ Since the control valve spool of the travel motor is open, release the residual pressure from the travel motor circuit by performing the procedure for 1. Release of residual pressure from hydraulic tank.

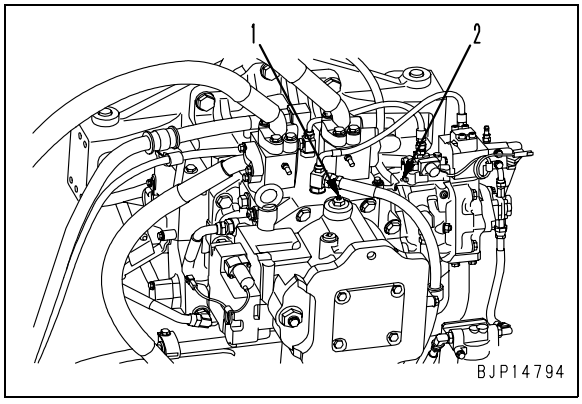
Bleeding air from each part

Air bleeding item / Contents of work	Air bleeding procedure					
	1	2	3	4	5	6
	Bleeding air from hydraulic pump	Starting engine	Bleeding air from cylinder	Bleeding air from swing motor	Bleeding air from travel motor	Checking oil level and starting work
• Replacement of hydraulic oil • Cleaning of strainer	●	●	●	● (See note)	● (See note)	●
• Replacement of return filter element		●	→	→	→	●
• Replacement or repair of hydraulic pump • Removal of suction piping	●	●	●	→	→	●
• Replacement or repair of control valve • Removal of control valve piping		●	●	→	→	●
• Replacement or repair of cylinder • Removal of cylinder piping		●	●	→	→	●
• Replacement or repair of swing motor • Removal of swing motor piping		●	→	●	→	●
• Replacement or repair of travel motor • Removal of travel motor piping		●	→	→	●	●
• Replacement or repair of swivel joint • Removal of swivel joint piping		●	→	→	→	●

Note: Bleed air from the swing motor and travel motor only when the oil was drained from the motor cases.

1. Bleeding air from work equipment pump and fan pump

1) Loosen work equipment pump bleeder (1) and fan pump bleeder (2) by 4 turns and remove the oil filler cap of the hydraulic tank.
   ★ Leave the machine under the above condition for 10 minutes or more.
2) After oil flows out of bleeders (1) and (2), run the engine at low idle.
   ★ If the engine coolant temperature is low and the automatic warm-up operation is started, stop the engine temporarily and reset the automatic warm-up operation with the fuel control dial (Set the starting switch in the ON position and hold the fuel control dial in the MAX position for 3 seconds, and the automatic warm-up operation is reset).
   ★ Set the lock lever in the LOCK position so that you will not operate a lever by mistake.
3) After clear oil flows out of bleeders (1) and (2), tighten the bleeders.
   Bleeder:
   7.8 – 9.8 Nm {0.8 – 1.0 kgm}



2. Starting engine

When running the engine after performing step 1, keep its speed at low idle for 10 minutes.

3. Bleeding air from cylinder

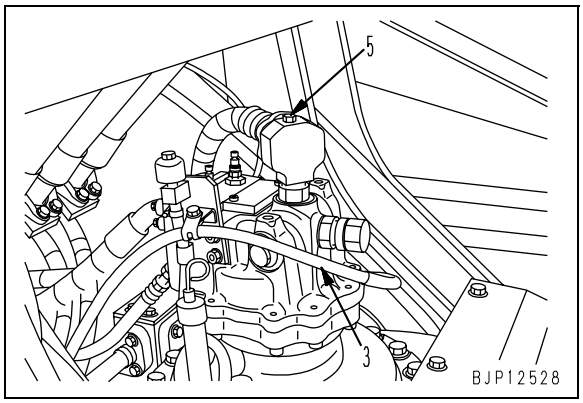
★ If a cylinder was replaced, bleed air from it before connecting the work equipment. In particular, the boom cylinder does not move to the lowering stroke end, if it is installed to the work equipment.

1) Run the engine at low idle for about 5 minutes.
2) Running the engine at low idle, raise and lower the boom 4 - 5 times.
   ★ Stop the piston rod about 100 mm before each stroke end. Do not relieve the oil.
3) Running the engine at high idle, perform step 2).
4) Running the engine at low idle, move the piston rod to the stroke end and relieve the oil.
5) Bleed air from the arm cylinder and bucket cylinder according to steps 2) – 4).

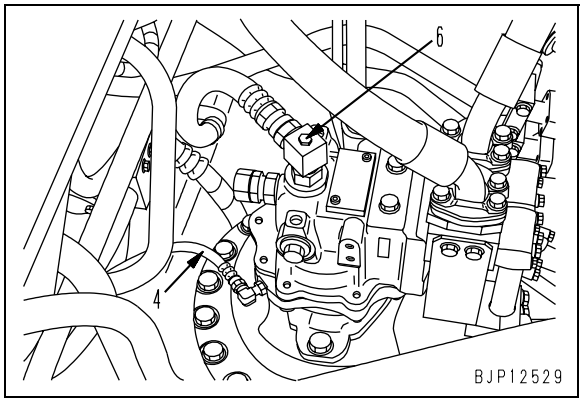
4. Bleeding air from swing motor

1) Motor unit
   ★ Bleed air from the motor unit according to the following procedure.
   i) Run the engine at low idle.
   ii) Swing to the right and left slowly to bleed air.
2) Parking brake circuit
   ★ Normally, air in the parking brake circuit is bled by swinging the machine in step 1). If you feel dragging of the brake during swinging operation, however, bleed air from the parking brake circuit according to the following procedure.
   i) Loosen the adapters of brake hoses (3) and (4) and start the engine.
   ii) Run the engine at low idle and set the swing holding brake release switch to the RELEASE and NORMAL positions repeatedly. After clear oil oozes out, tighten the adapters.

• Front swing motor



• Rear swing motor



3) Safety valve circuit
   ★ Normally, air in the safety valve circuit is bled by swinging the machine in step 1). If abnormal sound comes out from around the safety valve during swinging operation, however, bleed air from the safety valve circuit according to the following procedure.
   i) Loosen plugs (5) and (6) and start the engine.
   ii) Run the engine at low idle. After clear oil oozes out, tighten the plugs.
   Plug:
   9.8 – 12.74 Nm {1.0 – 1.3 kgm}

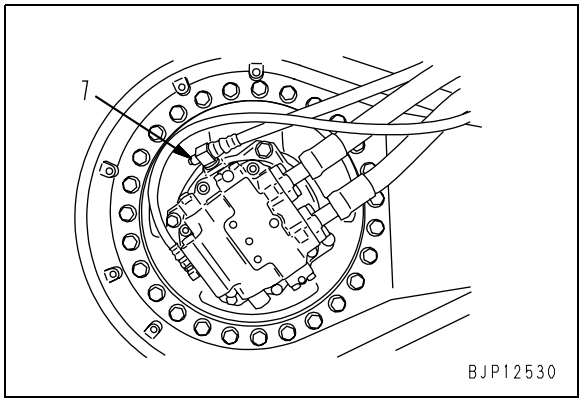
5. Bleeding air from travel motor

1) Remove the travel motor cover.

Travel motor cover: **130 kg**

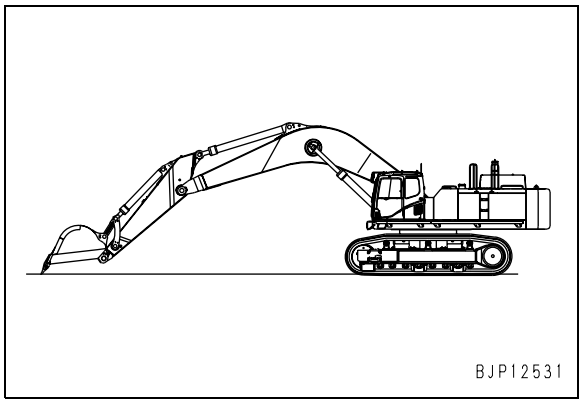
2) Loosen bleeder (7) by 1 turn and start the engine.
   ★ Do not loosen the bleeder more than 1 turn.
3) Run the engine at low idle and repeat the forward and reverse travel operations 4 - 5 times. After clear oil flows out, tighten the bleeder.
   ★ Limit the operation of the lever to a degree that the machine starts traveling.

Bleeder:
9.8 – 12.74 Nm {1.0 – 1.3 kgm}



6. Checking oil level and starting work

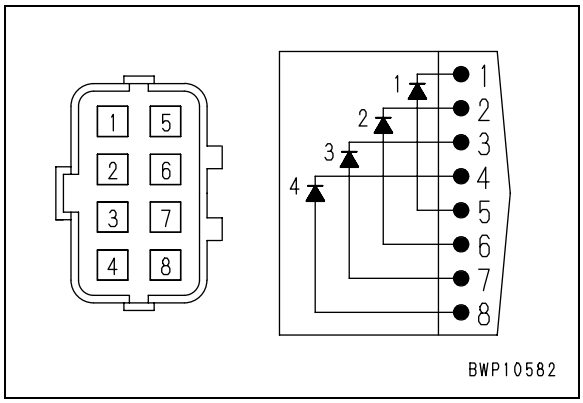
1) Run the engine, retract the arm cylinder and bucket cylinder to the stroke ends, lower the work equipment to the ground, and stop the engine.



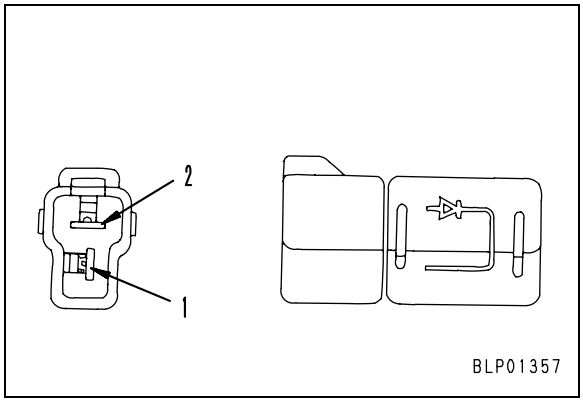
2) Check the oil level by the sight gauge at the back of the hydraulic tank.
   ★ If the oil level is between lines H and L, it is normal.
   ★ If the oil level is below line L, add new oil.

Inspection procedures for diode

★ Check an assembled-type diode (8 pins) and single diode (2 pins) in the following manner.
★ The continuity direction of an assembled-type diode is as shown in the diagram below.



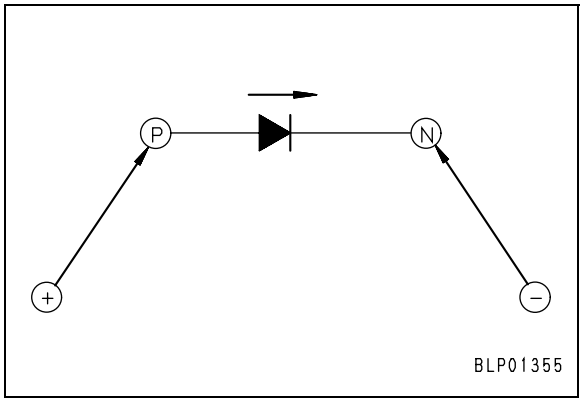
★ The continuity direction of a single diode is shown on the diode surface.



1. When using digital type circuit tester

1) Switch the testing mode to diode range and confirm the indicated value.
   ★ Voltage of the battery inside is displayed with conventional circuit testers.
2) Put the red probe (+) of the test lead to the anode (P) and the black probe (–) to the cathode (N) of diode, and confirm the displayed value.
3) Determine if a specific diode is good or no good with the indicated value.
   • No change in the indicated value: No continuity (defective).
   • Change in the indicated value: Continuity established (normal) (Note)

   Note: A silicon diode shows a value between 400 and 600.



2. When using analog type circuit tester

1) Switch the testing mode to resistance range.
2) Check the needle swing in case of the following connections.
   i) Put the red probe (+) of the test lead to the anode (P) and the black probe (–) to the cathode (N) of diode.
   ii) Put the red probe (+) of the test lead to the cathode (N) and the black probe (–) to the anode (P) of diode.
3) Determine if a specific diode is good or no good by the way the needle swings.
   • If the needle does not swing in Case i), but swings in Case ii): Normal (but the breadth of swing (i.e. resistance value) will differ depending on a circuit tester type or a selected measurement range)
   • If the needle swings in either case of i) and ii): Defective (short-circuited internally)
   • If the needle does not swing in any case of i) and ii): Defective (short-circuited internally)

PC800-8, PC800LC-8 Hydraulic excavator

Form No. UEN00912-00

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

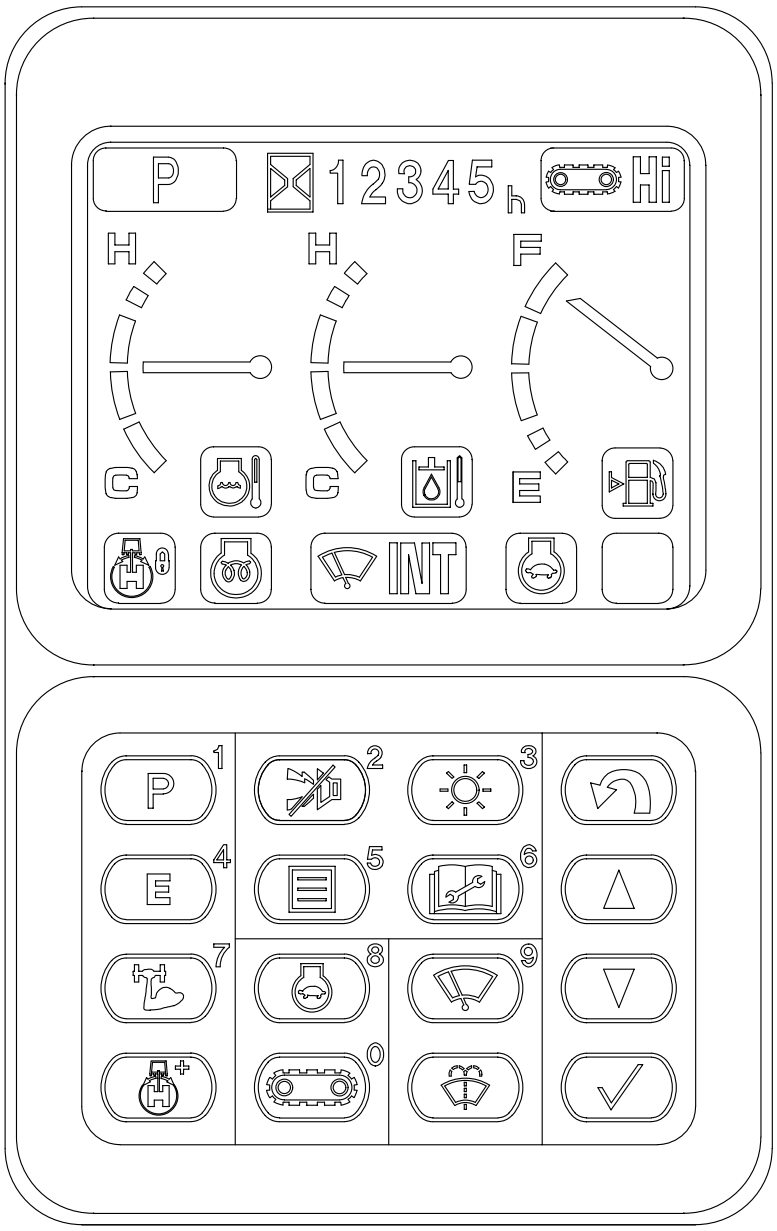
Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

30 Testing and adjusting
Testing and adjusting, Part 4

Testing and adjusting, Part 4 2
Special function of machine monitor 2
Handling engine controller high voltage circuit 33

Testing and adjusting, Part 4

Special function of machine monitor



[1] Figure input switch 1
[2] Figure input switch 2
[3] Figure input switch 3
[4] Figure input switch 4
[5] Figure input switch 5
[6] Figure input switch 6
[7] Figure input switch 7
[8] Figure input switch 8
[9] Figure input switch 9
[0] Figure input switch 0
[↩] Return switch
[△] Upward move switch
[▽] Downward move switch
[✓] Input confirmation switch

Machine monitor functions - conventional and special

The machine monitor is provided with conventional and special functions, and various kind of information are shown in the display. Display items consists of automatic display items that are preset in the machine monitor and others that are shown by switch operations.

1. **Conventional function: Operator's Menu**
   This is a function by which an operator can set or show displays by switch operations. The display contents are those which are normally shown.

2. **Special function: Service Menu**
   This is a function by which a service mechanic can set or show displays by special switch operations. The display contents are those which are not normally shown. It is mainly used for inspection, adjustment, troubleshooting or special setting of machines.

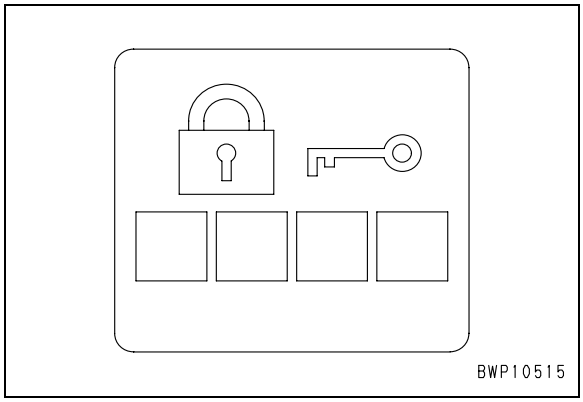
Operator's Menu	
1	Password input and setting function
2	Function for showing KOMATSU logo
3	Function for check before starting
4	Function for showing machine maintenance
5	Function for showing caution items
6	Function for confirming working mode and travel speed
7	Function for display of ordinary items
8	Function for adjusting display luminance and contrast
9	Function for confirming maintenance information
10	Function for showing service meter reading
11	Function for checking display LCD
12	Function for showing occurrence of caution item
13	Function for showing action code No.
14	Function for showing failure code No.
15	Function of reversing fan rotation and adjusting economy mode value

Service Menu		
16	Function for monitoring [01]	
17	Function for failure history [02]	Electrical system
		Mechanical system
18	Function for maintenance history [03]	
19	Function for maintenance mode change [04]	
20	Function for recording phone No. [05]	
21	Function for initial value setting and default [06]	Mode with key on
		Language
		Unit
		Wiper select
22	Function for adjustment [07]	
23	Function for reduced cylinder mode operation [08]	
24	Function of no injection cranking [09]	

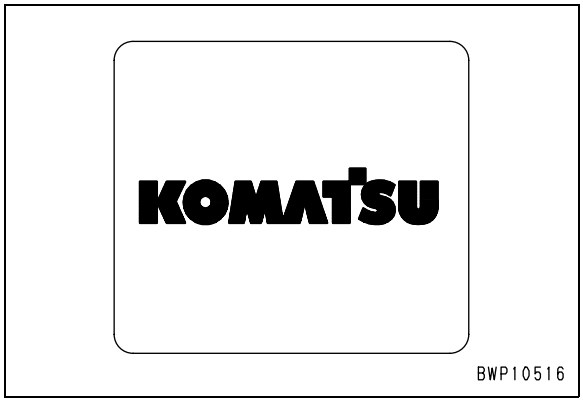
Operation of operator's menu and display (outline)

★ This section introduces only the outline of the operator's menu. For details on the contents and operation steps of each menu, refer to the operation and maintenance manual or the chapter of “Structure and function” in this shop manual.

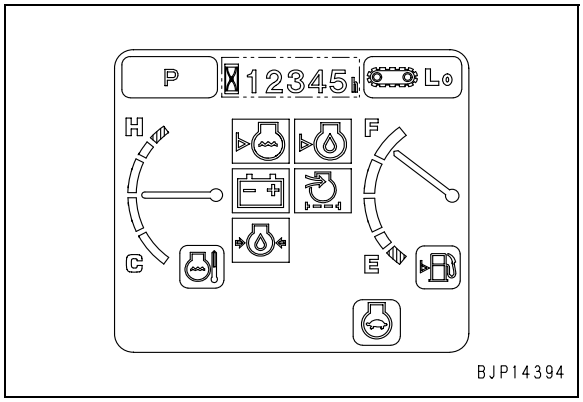
1. Password input and setting function
Displays the password input screen as the starting switch is turned ON.
★ Above display is available only when the password function is selected.



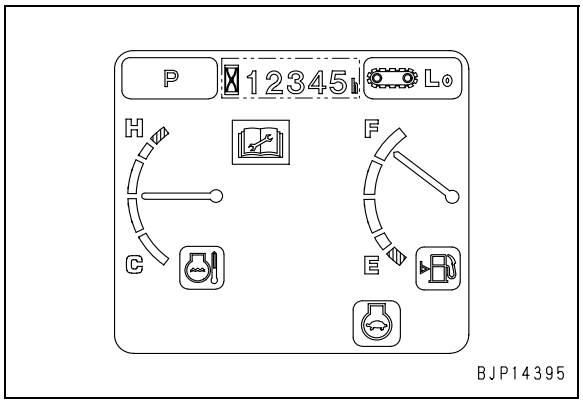
2. Function for showing KOMATSU logo
When the engine starting switch is turned ON, KOMATSU logo is shown for 2 seconds.



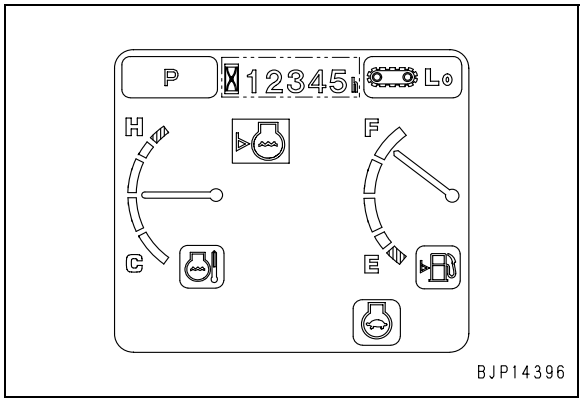
3. Function for check before starting
Following the KOMATSU logo, the display of machine inspection before starting day's work is shown for 2 seconds.



4. Function for showing machine maintenance
Following the display of machine inspection before starting day's work, the maintenance mark appears for 30 seconds, if there is an oil filter whose maintenance time is approaching or has just passed.
★ This display appears only when the maintenance function is set.

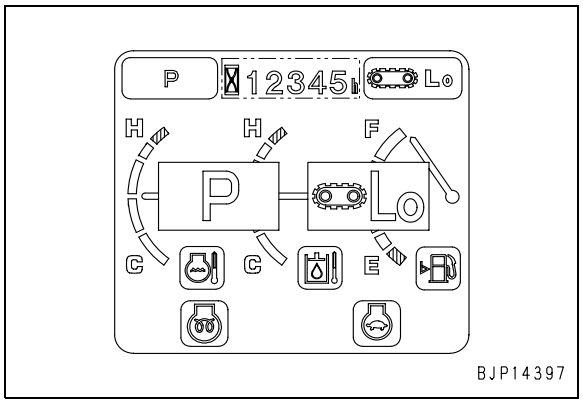


5. Function for showing caution items
If there is any item of machine inspection before starting day's work that indicates some abnormality, a corresponding symbol mark is shown after the display of machine inspection before starting day's work.



6. Function for confirming working mode and travel speed

After the display of machine inspection before day's work, amplified symbol marks for working mode and travel speed are shown for 2 seconds to urge an operator to confirm the setting.



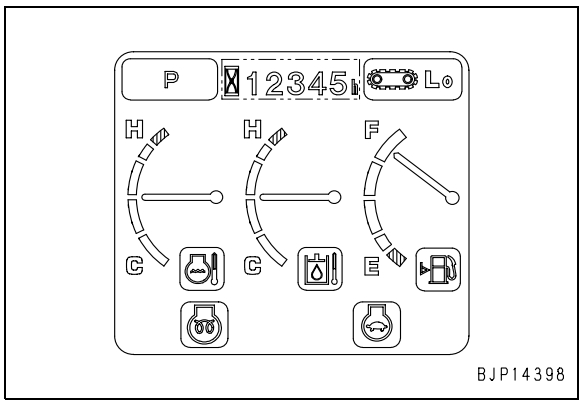
BJP14397

7. Function for display of ordinary items

The display of confirming working mode and travel speed is switched to this display of ordinary items.

★ If the working mode setting or travel speed setting is changed, or auto-deceleration or windshield wiper setting is activated while this is in display, an amplified corresponding symbol mark is shown for 2 seconds.

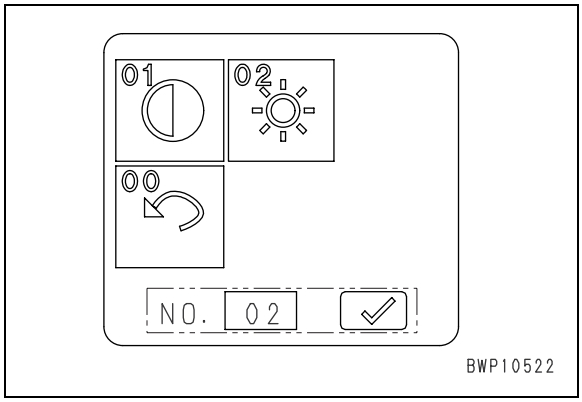
★ In this display, a symbol mark for preheat monitor is shown only when preheating is carried out.



BJP14398

8. Function for adjusting display luminance and contrast

Luminance as well as contrast of the display can be adjusted by operating the display adjusting switch.

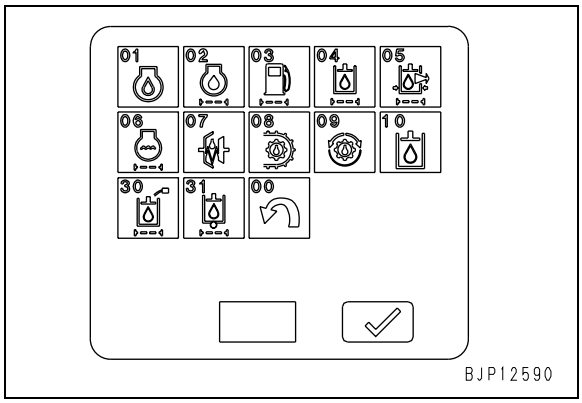


BWP10522

9. Function for confirming maintenance information

Detailed information on maintenance items (set time and elapse of time) can be confirmed and resetting after the confirmation is feasible by operating the maintenance switch.

★ Use Service Menu for setting or releasing maintenance items and setting maintenance time.

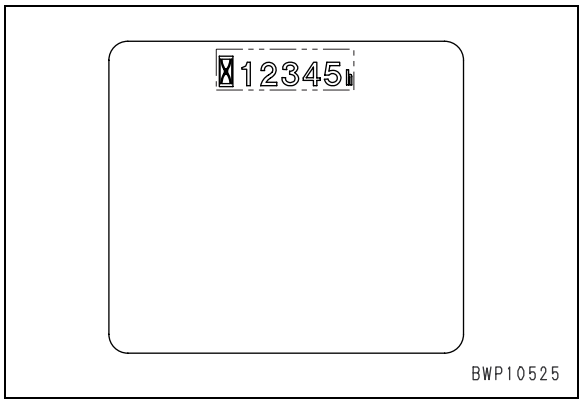


BJP12590

10. Function for showing service meter reading

Only the service meter reading can be shown by the following switching operation, when the engine starting switch is turned OFF.

• Switching operation: [↶] + [△] (synchronized switching operation)



BWP10525

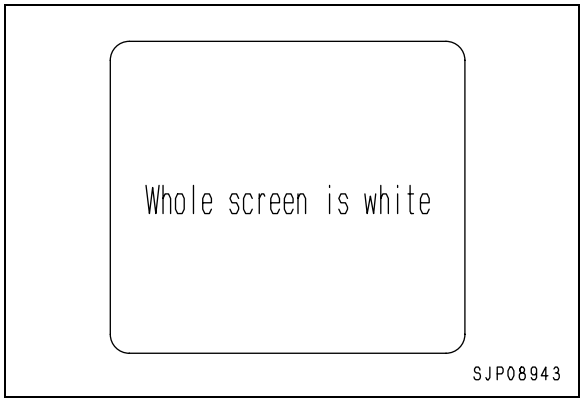
11. Function for checking display LCD

Display of the Display LCD can be confirmed by the following switching operation in the display of ordinary items

- Switching operation: [↶] + [A] (synchronized switching operation)

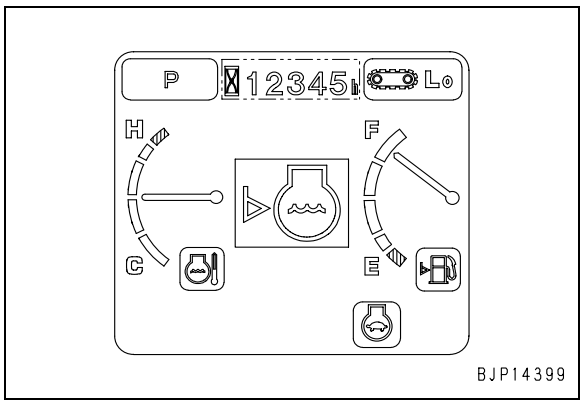
★ All the LCD light up, turning the entire screen white. If there is no showing in black, the display is normal.

★ This display returns to the immediately preceding one, if making any other switching operation.



12. Function for showing occurrence of caution item

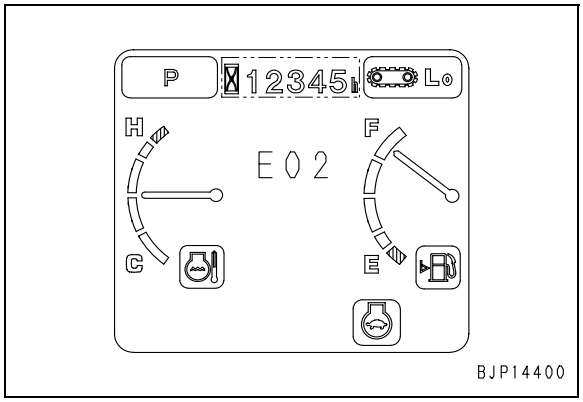
If any of the caution items occurs, the magnified corresponding symbol mark is shown for 2 seconds and thereafter stays on the display as a small symbol mark until it is dissolved.



13. Function for showing action code No.

When a trouble occurs on the machine, the user's code is automatically displayed depending on the magnitude of the trouble to call attention of the operator for a proper action.

★ Operating any switch while an action code is on the screen, switch the failure code display screen (See Item 14).



★ Action codes and instructions given to operator

Action code	Failure mode	Instructions given to operator
E03	Error in swing brake system	Set the swing holding brake release switch to the upper (release) position to release the brake. When applying the swing brake, use the swing lock switch. The error may not be reset, depending on the cause of the failure. In any case, have the machine inspected immediately.
E07	Error in pump control system (Emergency escape system is in operation)	There is abnormality in electronically controlled pump system. Emergency escape system is in operation and machine performance is partially lost. Machine can operate normally. Have it inspected immediately, however.
E10	Error in engine controller power supply system Abnormality in engine controller drive system circuit (engine stop)	Have the machine inspected immediately.
E11	Error in engine controller system (Engine protection output down)	Set the machine in a safe position and have the machine inspected immediately.
E14	Error is throttle system	Set the machine in a safe position and have the machine inspected immediately.
E15	Error in engine sensor (coolant temperature, fuel temperature and oil pressure)	Ordinary operation is possible. Have the machine inspected immediately, however.
E0E	Error in network	Set the machine in a safe position and have the machine inspected immediately.

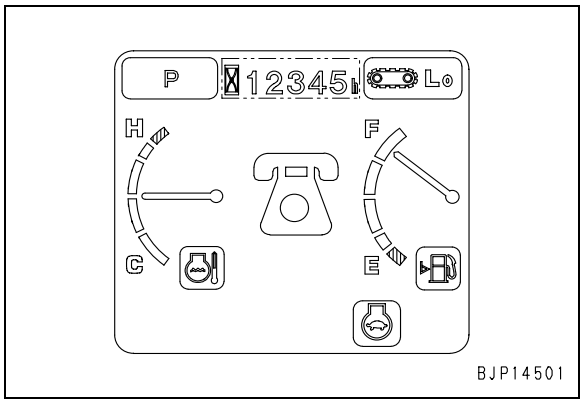
14. Function for showing failure code No.

If the following switching operation is made while the action code No. is shown, a phone symbol (if registered), phone numbers (if registered), failure code No. are shown in turn.

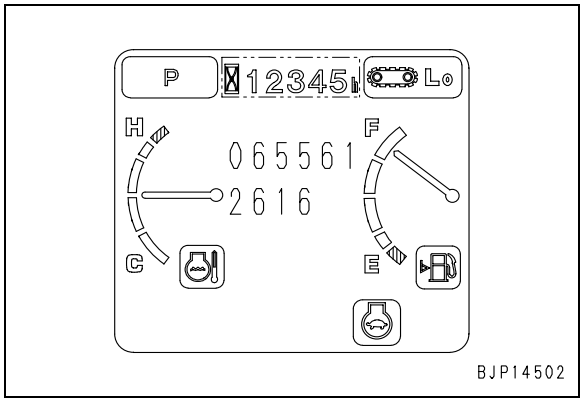
- Switching operation: [✓]

★ The following display is repeated in order according to the operation of the switch.

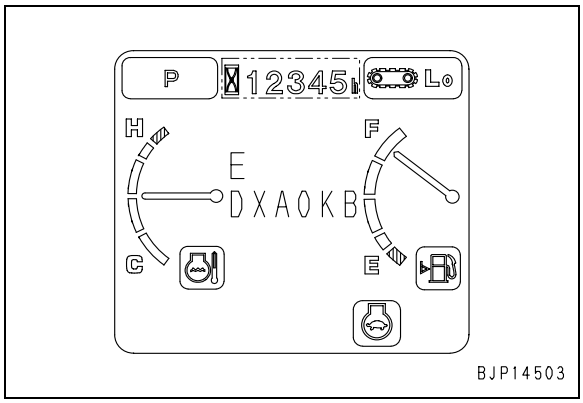
(1) Telephone symbol mark



(2) Telephone No.



(3) Failure code No.



★ The telephone symbol mark and telephone No. are shown only when they are registered in the machine monitor.
For registration, correction and deletion of telephone No., use Service Menu.

★ For detailed information of failure code, see the failure codes table.

Failure codes table

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
—	A000N1	Eng. Hi Out of Std	MON	Mechanical system
—	AA10NX	Aircleaner Clogging	MON	Mechanical system
—	AB00KE	Charge Voltage Low	MON	Mechanical system
—	B@BAZG	Eng. Oil Press. Low	MON	Mechanical system
—	B@BAZK	Eng. Oil Level Low	MON	Mechanical system
—	B@BCNS	Eng. Water Overheat	MON	Mechanical system
—	B@BCZK	Eng. Water Lvl Low	MON	Mechanical system
—	B@HANS	Hydr. Oil Overheat	MON	Mechanical system
E10	CA111	ECM Critical Internal Failure	ENG	Electrical system
E10	CA115	Eng Ne and Bkup Speed Sens Error	ENG	Electrical system
E11	CA122	Chg Air Press Sensor High Error	ENG	Electrical system
E11	CA123	Chg Air Press Sensor Low Error	ENG	Electrical system
E14	CA131	Throttle Sensor High Error	ENG	Electrical system
E14	CA132	Throttle Sensor Low Error	ENG	Electrical system
E15	CA135	Eng Oil Press Sensor High Error	ENG	Electrical system
E15	CA141	Eng Oil Press Sensor Low Error	ENG	Electrical system
E15	CA144	Coolant Temp Sens High Error	ENG	Electrical system
E15	CA145	Coolant Temp Sens Low Error	ENG	Electrical system
E15	CA153	Chg Air Temp Sensor High Error	ENG	Electrical system
E15	CA154	Chg Air Temp Sensor Low Error	ENG	Electrical system
E15	CA187	Sens Supply 2 Volt Low Error	ENG	Electrical system
E15	CA221	Ambient Press Sens High Error	ENG	Electrical system
E15	CA222	Ambient Press Sens Low Error	ENG	Electrical system
E15	CA227	Sens Supply 2 Volt High Error	ENG	Electrical system
—	CA234	Eng Overspeed	ENG	Mechanical system
E15	CA238	Ne Speed Sens Supply Volt Error	ENG	Electrical system
E15	CA263	Fuel Temp Sensor High Error	ENG	Electrical system
E15	CA265	Fuel Temp Sensor Low Error	ENG	Electrical system
E11	CA271	IMV/PCV1 Short Error	ENG	Electrical system
E11	CA272	IMV/PCV1 Open Error	ENG	Electrical system
E11	CA273	PCV2 Short Error	ENG	Electrical system
E11	CA274	PCV2 Open Error	ENG	Electrical system
E11	CA322	Inj #1 (L#1) Open/Short Error	ENG	Electrical system
E11	CA323	Inj #5 (L#5) Open/Short Error	ENG	Electrical system
E11	CA324	Inj #3 (L#3) Open/Short Error	ENG	Electrical system
E11	CA325	Inj #6 (L#6) Open/Short Error	ENG	Electrical system
E11	CA331	Inj #2 (L#2) Open/Short Error	ENG	Electrical system
E11	CA332	Inj #4 (L#4) Open/Short Error	ENG	Electrical system
E10	CA342	Calibration Code Incompatibility	ENG	Electrical system
E10	CA351	Injectors Drive Circuit Error	ENG	Electrical system
E15	CA352	Sens Supply 1 Volt Low Error	ENG	Electrical system
E15	CA386	Sens Supply 1 Volt High Error	ENG	Electrical system
E10	CA441	Battery Voltage Low Error	ENG	Electrical system
E10	CA442	Battery Voltage High Error	ENG	Electrical system

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
E11	CA449	Rail Press Very High Error	ENG	Electrical system
E11	CA451	Rail Press Sensor High Error	ENG	Electrical system
E11	CA452	Rail Press Sensor Low Error	ENG	Electrical system
E15	CA553	Rail Press High Error	ENG	Electrical system
—	CA554	Rail Press Sensor In Range Error	ENG	Electrical system
E15	CA559	Rail Press Low Error	ENG	Electrical system
E11	CA689	Eng Ne Speed Sensor Error	ENG	Electrical system
E11	CA731	Eng Bkup Speed Sens Phase Error	ENG	Electrical system
E10	CA757	All Persistent Data Lost Error	ENG	Electrical system
E11	CA778	Eng Bkup Speed Sensor Error	ENG	Electrical system
E15	CA1228	EGR Valve Servo Error 1	ENG	Electrical system
E11	CA1625	EGR Valve Servo Error 2	ENG	Electrical system
E11	CA1626	BP Valve Sol Current High Error	ENG	Electrical system
E11	CA1627	BP Valve Sol Current Low Error	ENG	Electrical system
E15	CA1628	Bypass Valve Servo Error 1	ENG	Electrical system
E11	CA1629	Bypass Valve Servo Error 2	ENG	Electrical system
E11	CA1631	BP Valve Pos Sens High Error	ENG	Electrical system
E11	CA1632	BP Valve Pos Sens Low Error	ENG	Electrical system
E0E	CA1633	KOMNET Datalink Timeout Error	ENG	Electrical system
E11	CA1642	EGR Inter Press Sens Low Error	ENG	Electrical system
E11	CA1653	EGR Inter Press Sens High Error	ENG	Electrical system
E14	CA2185	Throt Sens Sup Volt High Error	ENG	Electrical system
E14	CA2186	Throt Sens Sup Volt Low Error	ENG	Electrical system
E11	CA2249	Rail Press Very Low Error	ENG	Electrical system
E11	CA2271	EGR Valve Pos Sens High Error	ENG	Electrical system
E11	CA2272	EGR Valve Pos Sens Low Error	ENG	Electrical system
E11	CA2351	EGR Valve Sol Current High Error	ENG	Electrical system
E11	CA2352	EGR Valve Sol Current Low Error	ENG	Electrical system
E15	CA2555	Grid Htr Relay Volt Low Error	ENG	Electrical system
E15	CA2556	Grid Htr Relay Volt High Error	ENG	Electrical system
E01	D110KB	Battery Relay Drive S/C	ENG	Electrical system
—	D163KB	Flash Light Relay S/C	PUMP	Electrical system
—	D195KB	Step Light Relay S/C	PUMP	Electrical system
—	DA25KP	Press. Sensor Power Abnormality	PUMP	Electrical system
—	DA2SKQ	Model Selection Abnormality	PUMP	Electrical system
—	DA80MA	Auto. Lub. Abnormal.	PUMP	Mechanical system
E0E	DA2RMC	Pump Comm. Abnormality	PUMP	Electrical system
E0E	DAFRMC	Monitor Comm. Abnormality	PUMP	Electrical system
—	DGE5KY	Ambi. Temp. Sensor S/C	PUMP	Electrical system
—	DGH2KB	Hydr. Oil Temp. Sensor S/C	PUMP	Electrical system
E07	DH25KA	L Jet Sensor Disc.	PUMP	Electrical system
E07	DH25KB	L Jet Sensor S/C	PUMP	Electrical system
E07	DH26KA	R Jet Sensor Disc.	PUMP	Electrical system
E07	DH26KB	R Jet Sensor S/C	PUMP	Electrical system
E07	DHPEKA	F Pump P. Sensor Disc.	PUMP	Electrical system

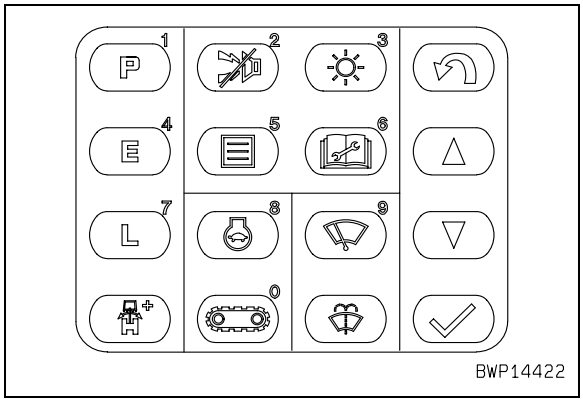
Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
E07	DHPEKB	F Pump P. Sensor S/C	PUMP	Electrical system
E07	DHPFKA	R Pump P. Sensor Disc.	PUMP	Electrical system
E07	DHPFKB	R Pump P. Sensor S/C	PUMP	Electrical system
—	DV20KB	Travel Alarm S/C	PUMP	Electrical system
—	DW41KA	Swing Priority Sol. Disc.	PUMP	Electrical system
—	DW41KB	Swing Priority Sol. S/C	PUMP	Electrical system
—	DW43KA	Travel Speed Sol. Disc.	PUMP	Electrical system
—	DW43KB	Travel Speed Sol. S/C	PUMP	Electrical system
E03	DW45KA	Swing Brake Sol. Disc.	PUMP	Electrical system
E03	DW45KB	Swing Brake Sol. S/C	PUMP	Electrical system
—	DW7BKA	Fan Reverse Sol. Disc.	PUMP	Electrical system
—	DW7BKB	Fan Reverse Sol. S/C	PUMP	Electrical system
—	DWK0KA	2-stage Relief Sol. Disc.	PUMP	Electrical system
—	DWK0KB	2-stage Relief Sol. S/C	PUMP	Electrical system
E11	DX16KA	Fan Pump EPC Sol. Disc.	PUMP	Electrical system
E11	DX16KB	Fan Pump EPC Sol. S/C	PUMP	Electrical system
E07	DXAAKA	F Pump EPC Sol. Disc.	PUMP	Electrical system
E07	DXAAKB	F Pump EPC Sol. S/C	PUMP	Electrical system
E07	DXABKA	R Pump EPC Sol. Disc.	PUMP	Electrical system
E07	DXABKB	R Pump EPC Sol. S/C	PUMP	Electrical system
—	DY20KA	Wiper Working Abnormality	PUMP	Electrical system
—	DY20MA	Wiper Parking Abnormality	PUMP	Electrical system
—	DY2CKB	Washer Drive S/C	PUMP	Electrical system
—	DY2DKB	Wiper Drive (For) S/C	PUMP	Electrical system
—	DY2EKB	Wiper Drive (Rev) S/C	PUMP	Electrical system

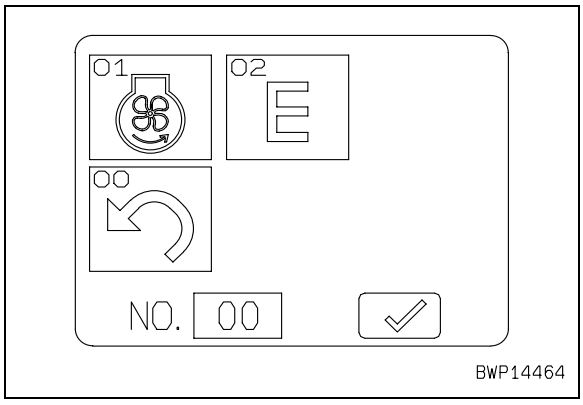
★ This table lists the failed sections in the order of the failure code.
★ Those failure codes to which the corresponding number is not indicated in the action code space are not displayed on the ordinary screen if a failure is found. They are just recorded in the abnormality record (electrical system and mechanical system) of the service menu.
★ The category of record is used for indicating to which of the electrical and mechanical system of the service menu's abnormality record a given failure is classified.
★ **E** of at beginning the action code indicates the following state.
★ With **E**: The failure still remains without being resolved.
★ Without **E**: The failure is already resolved.

15. Function of reversing fan rotation and adjusting economy mode value

1) Reversing fan rotation

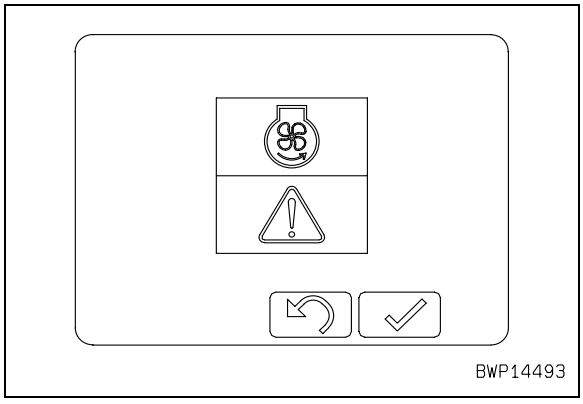
1] Press switch [5] of the monitor, and the following screen appears.
- "01": Fan rotation reversing menu
- "02": Economy mode value adjusting menu



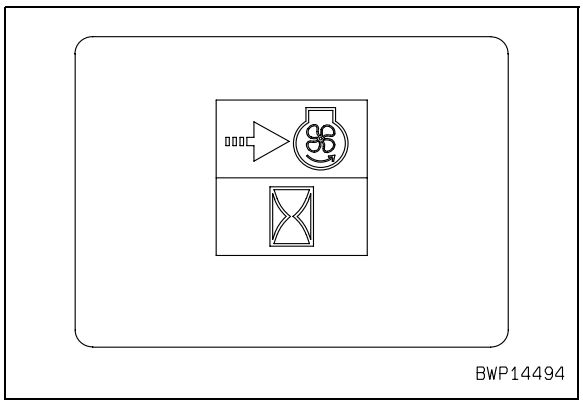


2] Select “1” Fan rotation reversing and press the [✓] switch, and the following screen appears.
★ The fan mark is green.

3] When reversing the fan rotation, press the [✓] switch.
★ When not reversing the fan rotation, press the return switch [↩], and the previous screen appears.

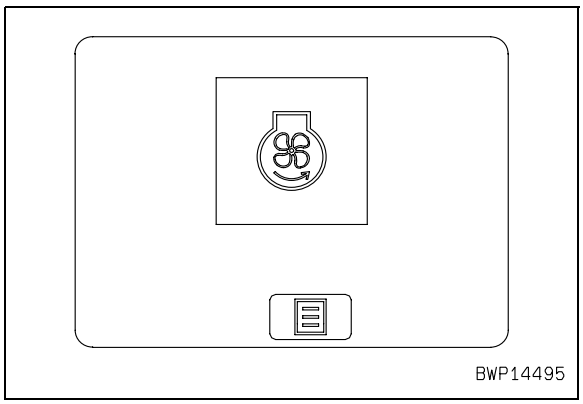


4] If the [✓] switch is pressed, the screen to wait for change of the fan rotation direction appears and the engine speed is lowered to low idle automatically. After about 15 seconds, the fan rotation is reversed. After 4 seconds, the engine speed returns to the level before the [✓] switch was pressed.

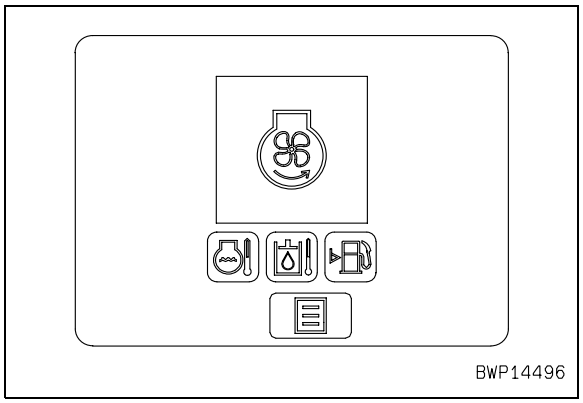


★ The fan speed is in proportion to the engine speed. If the engine speed is low idle, the fan speed is MIN.
To increase the fan speed, increase the engine speed with the fuel control dial.
★ When reversing the fan rotation while the engine is stopped, turn the starting switch to the START position after the above screen appears. (This screen does not change until the engine is started. When stopping reversing the fan rotation, turn the starting switch to the OFF position.)

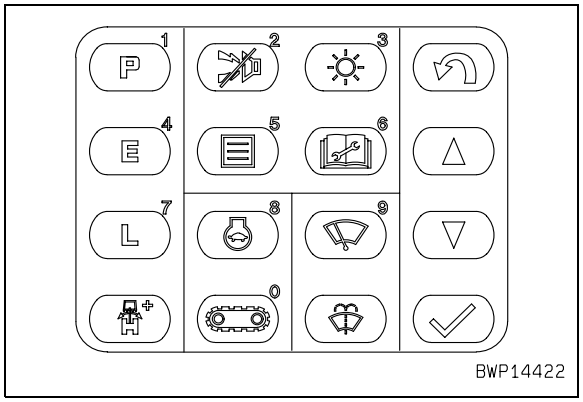
5] If the fan rotation is reversed, the following screen appears automatically and is maintained as long as the fan rotation is in reverse.
★ The fan mark is yellow.



6] If any trouble occurs while the fan is rotating in reverse, the following warning monitor is displayed. In this case, see the page of explanation of the monitoring items and take necessary remedy.

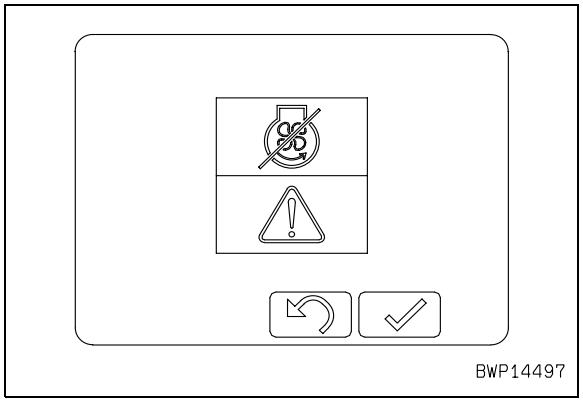

BWP14496

2) Returning fan rotation to normal direction
1] Press switch [5] of the panel.

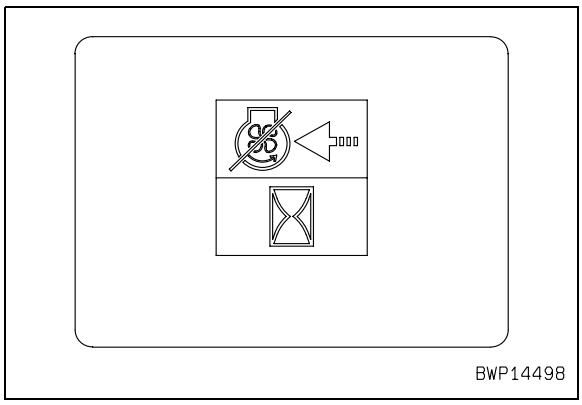


BWP14422

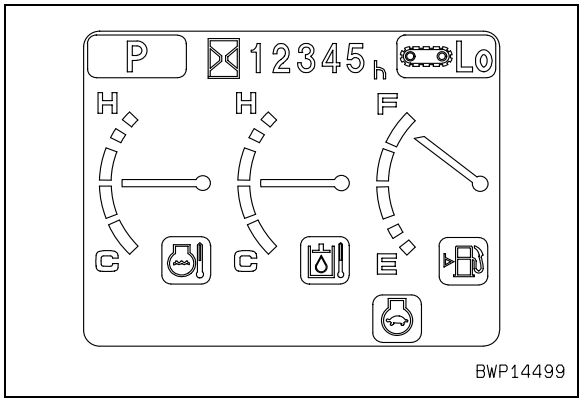
2] The following screen appears. When returning the fan rotation to the normal direction, press the [✓] switch.
★ If the [↩] switch is pressed, the previous screen appears.


BWP14497

3] If the [✓] switch is pressed, the screen to wait for change of the fan rotation direction appears and the engine speed is lowered to low idle automatically. After about 15 seconds, the fan rotation is returned to the normal direction. After 4 seconds, the engine speed returns to the level before the [✓] switch was pressed.

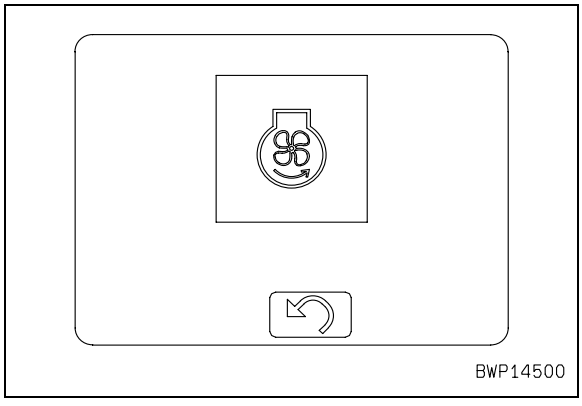

BWP14498

4] If the fan rotation is returned to the normal direction, the initial screen appears automatically.

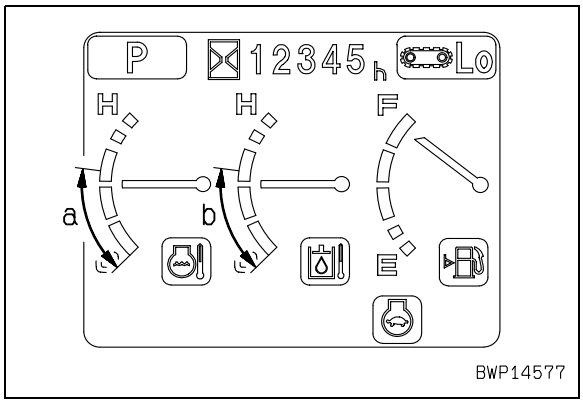


BWP14499

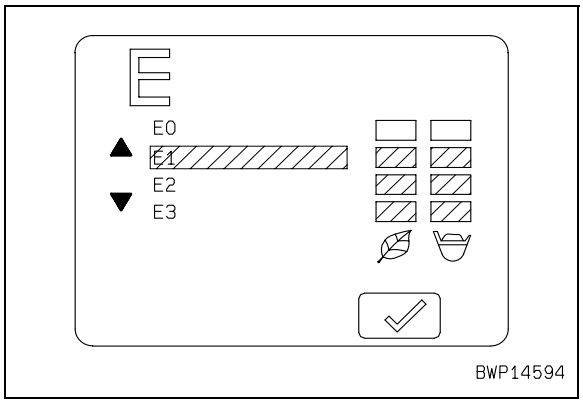
Remarks
1) The screen in 2)-1] may not change to the screen in 2)-2] but the following screen may appear and the fan rotation may not be reversed.
★ The fan mark is blue.


BWP14500

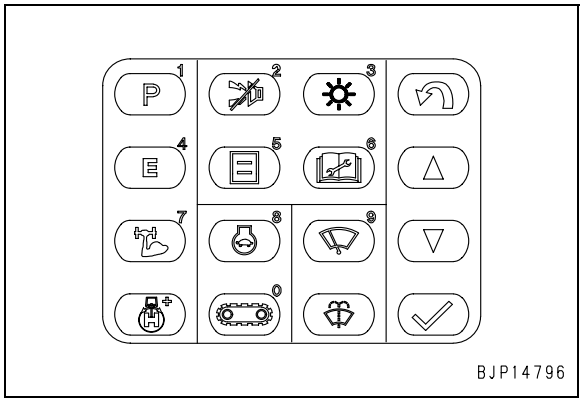
2) This state shows that reversing of the fan rotation is prohibited to protect the components under some conditions of coolant temperature and hydraulic oil temperature.
   ★ To reverse the fan rotation in this state, press the [↩] switch to return the screen to the normal screen and lower the engine speed to low idle or stop the engine to warm up (cool down) the engine.
   If the coolant temperature and hydraulic oil temperature gauges are in the range shown below, the fan rotation can be reversed.
   Perform the procedure from 2)-1].
   - a: Coolant temperature
   - b: Hydraulic oil temperature



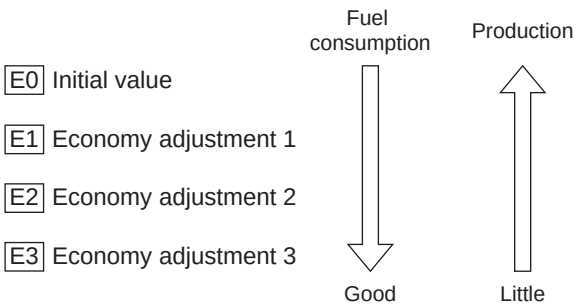
3) Adjusting economy mode value
   1] In the screen of 2)-1], select “2” E mode and press the [✓] switch, and the following screen appears.



   ★ The economy mode can be set to 4 levels of E0, E1, E2, and E3 as shown above.
   (It is set to E0 when delivered.)
   2] While watching the economy mode adjusting menu, press the [△] or [▽] switch of the panel to select E0 – E3 and press the [✓] switch.



   3] The relationship between the value and production is as follows.



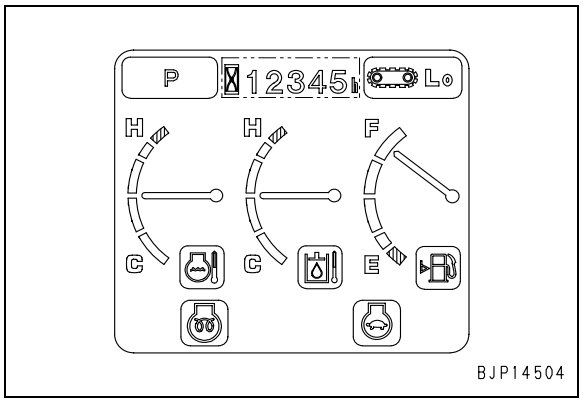
   ★ As the value is increased to [E3 side], the fuel consumption is reduced and the production is also reduced.

Operation and Display of Service Menu

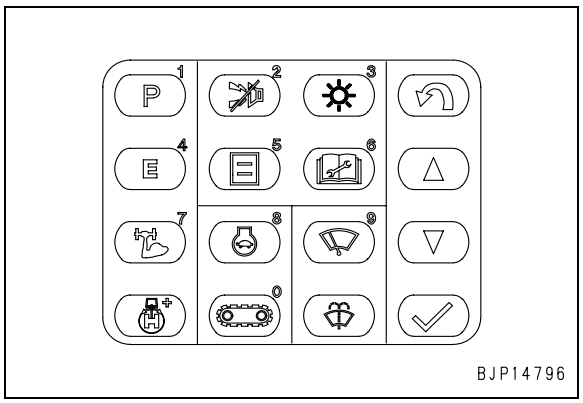
Way of switching to Service Menu

★ When using Service Menu, change the display to Service Menu display through the following special operation.

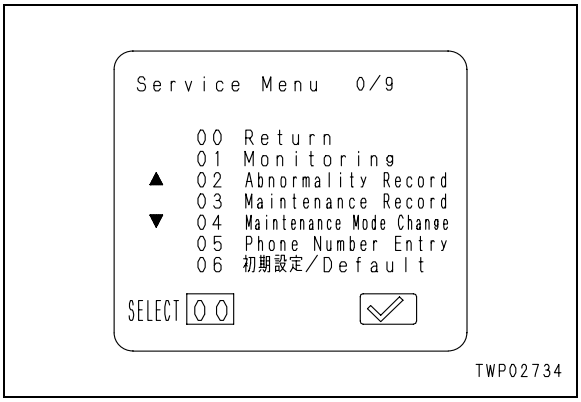
1) Confirmation of display
Confirm that the display of ordinary items is shown.
★ Changing to Service Menu cannot be made from displays other than this.



2) Switch operation
Operate the switch as instructed below.
• Switch operation: [△] + [1] → [2] → [3]
(Enter a figure, depressing [△])



3) Showing Service Menu display
The display is changed to the initial display of Service Menu program. Select an appropriate item from among the menu.



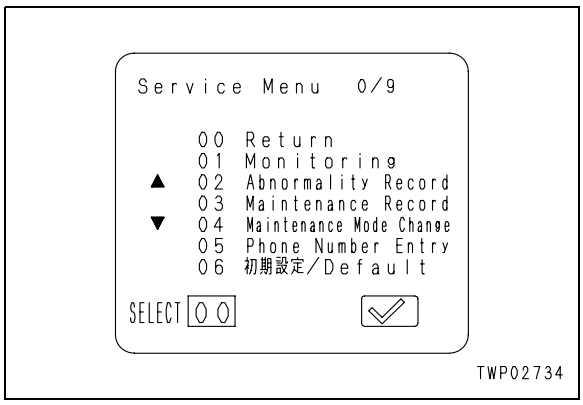
No.	Service Menu
00	Return (Termination of Service Menu)
01	Monitoring
02	Abnormality Record
03	Maintenance Record
04	Maintenance Mode Change
05	Phone Number Entry
06	☆☆☆☆☆ / Default
07	Adjustment
08	Cylinder cut out
09	No injection cranking

4) Termination of Service Menu function
When terminating the initial display or any subsequent display of Service Menu, do that through any one of the following methods.
[1] Depress [↩] switch. (This method may be used for terminating any display)
[2] If “Return” switch is shown, depress it.
[3] If “Return” menu is shown, call that menu and depress [✓] switch.

16. Function for monitoring [01]

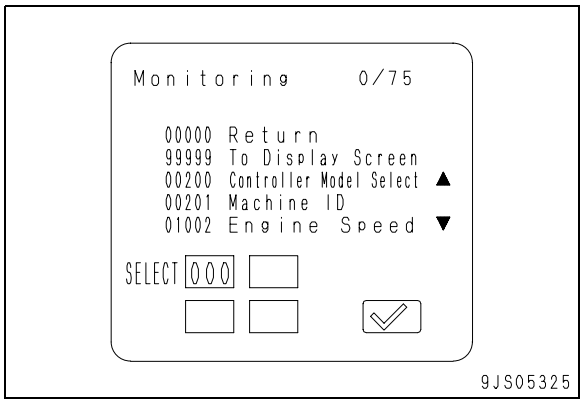
The machine monitor monitors signals from an assortment of switches, sensors and actuators installed in various parts of the machine. Monitored information can be put in display or confirmed on a real time basis through the following operations.

1) Selection of menu
Select "01 Monitoring" in the initial display of Service Menu and depress [✓] switch.



2) Setting of monitoring item
Select or register an item to be monitored through the following switch operation.

- [△] switch: Selection
- [▽] switch: Selection
- [✓] switch: Registration



★ A monitoring item can be set in any number between the min. one to the max. four. (Depending upon the selected item, the max. number is less than four)

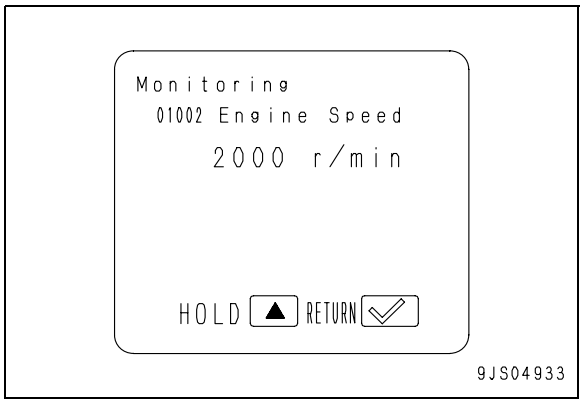
★ In case of monitoring 1 to 3 items, move to the monitored information display through any of the following switch operations, after the registration work has been completed.
- Keep [✓] switch depressed. (For about 3 seconds)
- Select Menu 99999 and depress [✓] switch.

★ The display automatically moves to the display of monitored information, when all of the registrable items have been duly registered.

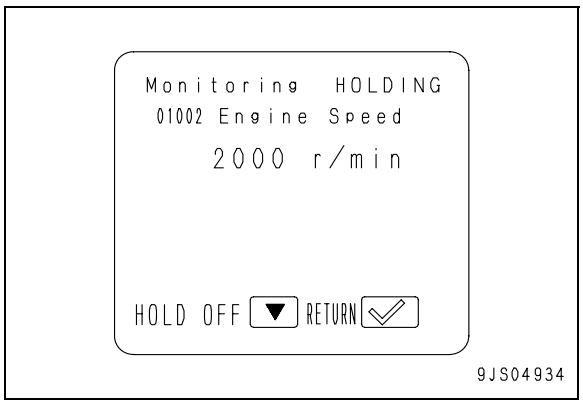
★ Monitored information are transmitted via communication circuits. Thus the number of selected items can impact the communication speed. If truly real time monitoring is required, reduce the selected items to the minimum.

★ For details on the monitoring items, display unit, etc., refer to the Table for Monitoring Items.

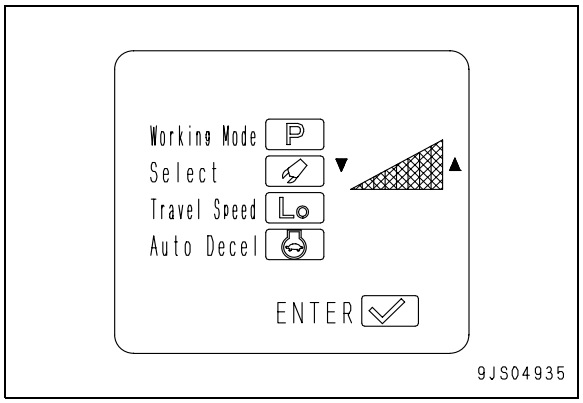
3) Monitoring operation
Call the monitoring information display and confirm the monitored information, while operating the machine.



4) Monitored information holding function
If [△] switch is depressed while monitoring, all the monitored information are put on hold. If [▽] switch is depressed in this condition, information holding is released.



5) Machine setting mode switching function
If it becomes necessary to change settings of working mode, travel speed and auto-decel while monitoring, depress the corresponding switch, then the mode confirmation display is shown.



★ When a specific setting is confirmed, depress [✓] switch, then the display returns to that of monitoring.
★ In case a specific setting has been changed while monitoring, the new setting is still maintained when returning from Service Menu to Operator's Menu after the monitoring is finished.

Monitoring items list

Code No.	Monitoring item	Unit (Default: ISO)			Remarks
		ISO	meter	inch	
00000	Return	(Not displayed)			Ending menu
99999	To Display Screen	(Not displayed)			Display execution menu
00200	Controller Model Select	Numeral			
00201	Machine ID	Numeral			
01002	Engine Speed	r/min	rpm	rpm	
01601	2nd Eng Speed Command	r/min	rpm	rpm	
01100	F Pump Pressure	MPa	kg/cm^2	Psi	
01101	R Pump Pressure	MPa	kg/cm^2	Psi	
04107	Coolant Temperature	°C	°C	°F	
14200	Fuel Temperature	°C	°C	°F	
04401	Hydr. Oil Temperature	°C	°C	°F	
37502	Ambient Temperature	°C	°C	°F	
01300	F pump PC-EPC Sol. Curr.	mA	mA	mA	
01302	R pump PC-EPC Sol. Curr.	mA	mA	mA	
01300	TVC Sol. Curr	mA	mA	mA	
31623	Fan Pump EPC Sol. Curr.	mA	mA	mA	
13800	L Jet Sensor Pressure	MPa	kg/cm^2	Psi	
13801	R Jet Sensor Pressure	MPa	kg/cm^2	Psi	
13802	L Jet Sensor Vol.	V	V	V	
13803	R Jet Sensor Vol.	V	V	V	
03200	Battery Voltage	V	V	V	
03203	Battery Power Supply	V	V	V	
04300	Battery Charge Vol.	V	V	V	
01006	Engine Speed	r/min	rpm	rpm	
37200	Engine Oil Pressure	MPa	kg/cm^2	Psi	
36400	Rail Pressure	MPa	kg/cm^2	Psi	
37400	Ambient Pressure	kPa	kg/cm^2	Psi	
18400	Intake Temperature	°C	°C	°F	
18500	Charge Temperature	°C	°C	°F	
36500	Boost Pressure	kPa	kg/cm^2	Psi	
18000	EGR Inlet Pressure-A	kPa	kg/cm^2	Psi	
18100	EGR Valve Position	mm	mm	in	
18200	BPS Valve Position	mm	mm	in	
36700	Engine Torque Ratio	%	%	%	
18700	Engine Output Torque	Nm	Nm	kgfm	
01112	F Pump Pres. Sensor Vol.	V	V	V	
01113	R Pump Pres. Sensor Vol.	V	V	V	
03000	Fuel Dial Pos Sens Volt	V	V	V	

Code No.	Monitoring item		Unit (Default: ISO)			Remarks
			ISO	meter	inch	
04200	Fuel Level Sensor Vol.		V	V	V	
04105	Eng. Water Temp. Vol. Lo		V	V	V	
14201	Fuel Temp. Sensor Vol.		V	V	V	
04402	Hydr. Temp. Sensor Vol.		V	V	V	
37503	Ambi. Temp. Sensor Vol.		V	V	V	
37201	Eng Oil Press Sens Volt		V	V	V	
37401	Ambient Press Sens Volt		V	V	V	
18401	Intake Temp Sens Volt		V	V	V	
18501	Charge Temp Sens Volt		V	V	V	
36501	Charge Press Sens Volt		V	V	V	
36401	Rail Pressure Sens Volt		V	V	V	
18001	EGR In Press Sens Volt		V	V	V	
18101	EGR Valve Pos Sens Volt		V	V	V	
18201	BPS Valve Pos Sens Volt		V	V	V	
17201	PCV Close Timing		CA	CA	CA	
17500	Engine Power Mode		—	—	—	
31701	Throttle Position		%	%	%	
31706	Final Throttle Position		%	%	%	
18600	Inject Fueling Command		mg/st	mg/st	mg/st	
36200	Rail Press Command		MPa	kg/cm^2	PSi	
36300	Injection Timing Command		CA	CA	CA	
37300	Fuel Rate		L/h	L/h	L/h	
01602	2nd Eng. Speed Command		%	%	%	
13100	F Pump Absorb Torque		Nm	kgm	lbft	
13101	R Pump Absorb Torque		Nm	kgm	lbft	
13113	Main Pump Absorb Torque		Nm	kgm	lbft	
13114	Fan Pump Absorb Torque		Nm	kgm	lbft	
13112	Total Pump Absorb Torque		Nm	kgm	lbft	
01900	Pressure Switch 1	Swing	Display of ON/OFF			
		R.H Travel	Display of ON/OFF			
		Boom Lower	Display of ON/OFF			
		Boom Raise	Display of ON/OFF			
		Arm Curl	Display of ON/OFF			
		Arm Dump	Display of ON/OFF			
01901	Pressure Switch 2	Bucket Curl	Display of ON/OFF			
		Bucket Dump	Display of ON/OFF			
		Service	Display of ON/OFF			
		L.H Travel	Display of ON/OFF			

Code No.	Monitoring item		Unit (Default: ISO)			Remarks
			ISO	meter	inch	
02300	Solenoid Valve 1	Travel Junction	Display of ON/OFF			
		Swing Brake	Display of ON/OFF			
		2-Stage Relief	Display of ON/OFF			
		Travel Speed	Display of ON/OFF			
		Fan Reverse	Display of ON/OFF			
		Swing Priority	Display of ON/OFF			
02200	Switch Input 1	Lever Sw.	Display of ON/OFF			
		Swing Release Sw.	Display of ON/OFF			
		Swing Brake Sw.	Display of ON/OFF			
02201	Switch Input 2	Model Select 1	Display of ON/OFF			
		Model Select 2	Display of ON/OFF			
		Model Select 3	Display of ON/OFF			
		Model Select 4	Display of ON/OFF			
		Model Select 5	Display of ON/OFF			
		Low-viscosity fuel mode	(Not displayed)			
02202	Switch Input 3	Key Switch (ACC)	Display of ON/OFF			
02203	Switch Input 4	Step Light Sw.	Display of ON/OFF			
		Horn Sw.	Display of ON/OFF			
05500	Sensor Input 1	Over Load Sensor	Display of ON/OFF			
		Auto Greasing	Display of ON/OFF			
03700	Controller Output 1	Batt. Relay Dr.	Display of ON/OFF			
03701	Controller Output 2	Step L. Relay	Display of ON/OFF			
		Flash L. Relay	Display of ON/OFF			
		Travel Alarm	Display of ON/OFF			
04500	Monitor Input 1	Key Switch	Display of ON/OFF			
		Start	Display of ON/OFF			
		Preheat	Display of ON/OFF			
		Light	Display of ON/OFF			
		Rad. Level	Display of ON/OFF			
04501	Monitor Input 2	Aircleaner	Display of ON/OFF			
		Eng. Oil Level	Display of ON/OFF			
		Battery Charge	Display of ON/OFF			

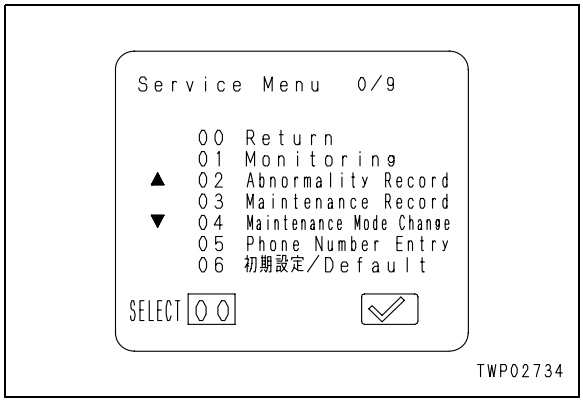
Code No.	Monitoring item		Unit (Default: ISO)			Remarks
			ISO	meter	inch	
04502	Monitor Input 3	Swing Brake Sw.	Display of ON/OFF			
		Bzzr Cancel Sw.	Display of ON/OFF			
		Window Limit Sw.	Display of ON/OFF			
		W Limit Sw.	Display of ON/OFF			
		Upper P Limit Sw.	Display of ON/OFF			
		Lower P Limit Sw. (Not displayed when 1 wiper is used)	Display of ON/OFF			
20216	ECM Build Version		—	—	—	
20217	ECM CAL Data Ver		—	—	—	
18900	ECM Internal Temp		°C	°C	°F	
20400	ECM Serial No		—	—	—	
20200	Monitor Prog. Version		—	—	—	
20212	Pump Con. Prog. Version		—	—	—	

★ As the unit of display, one of “SI unit system”, “Metric unit system”, and “Inch unit system” can be selected.
★ The unit of display can be changed with “Unit” in the “☆☆☆☆/ Default” function of the Service Menu.
★ “CA” of the unit of display denotes the crankshaft angle.
Note 1: The momentary Fuel Consumption Ratio shown above is the theoretical fuel consumption ratio (Since it is a theoretical value, it is a little different from the actual fuel consumption ratio).
Note 2: The Fuel Consumption is the theoretical fuel consumption amount after the engine is started until the engine is stopped (Since it is a theoretical value, it is a little different from the actual fuel consumption amount).

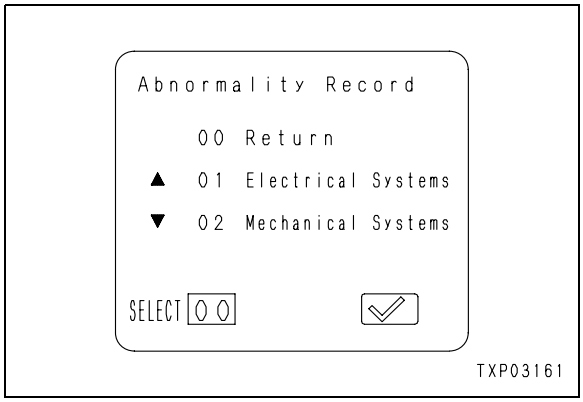
17. Function for Abnormality Record [02]

The machine monitor records failures that occurred on the machines in the past after classifying them into failures in the electric system and those in the mechanical system. Information on them can be displayed through the following operation.

1) Selection of menu
Select 02 Abnormality Record in the initial display of Service Menu and depress [✓] switch.

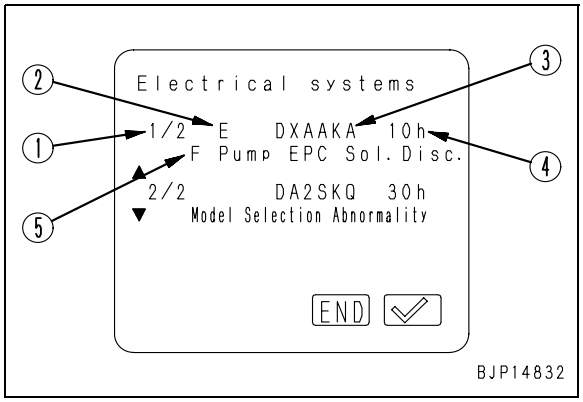


2) Selection of Submenu
Select an appropriate item from Submenu in the Abnormality Record display and depress [✓] switch.

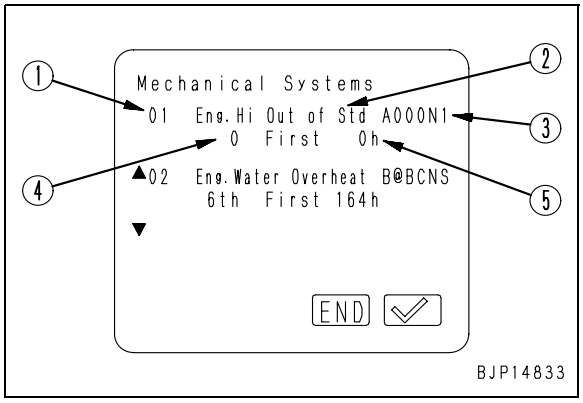


No.	Abnormality Record Submenu
00	Return (termination of Abnormality Record)
01	Electrical Systems
02	Mechanical Systems

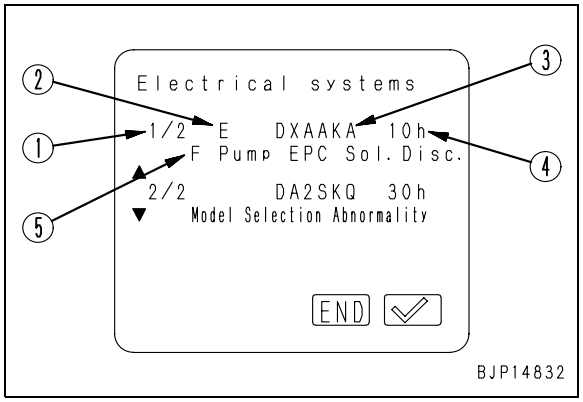
3) Information shown in display of Abnormality Record in the electrical system
[1]: The numerator expresses sequence of failure occurrence, counting from the latest one. The denominator expresses the total number of a specific failure recorded.
[2]: "E" is displayed as long as the failure is not repaired.
[3]: Abnormality Code No. (section in 4 digits and phenomenon in 2 digits)
[4]: Time elapsed since the occurrence of the first failure
[5]: Contents of failure
★ See the operator menu "Failure codes table".



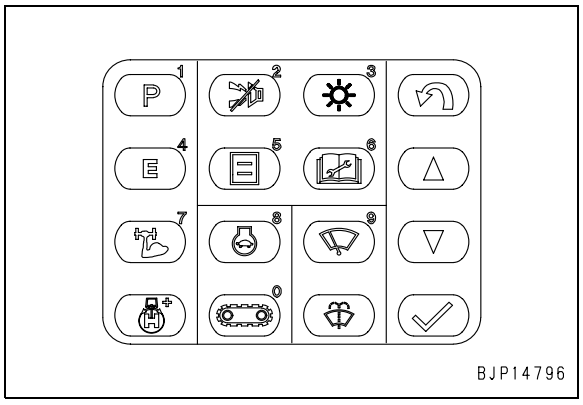
4) Information shown in display of Failure History in the mechanical systems
[1]: Record No.
[2]: Contents of Abnormality
[3]: Abnormality Code No. (section in 4 digits and phenomenon in 2 digits)
[4]: Total number of occurrence
[5]: Service meter reading at the initial occurrence
★ See the operator menu "Failure codes table".



5) Resetting Electrical Systems
   ★ Resetting Electrical Systems (deletion) is possible only with the electrical system. The failure history in the mechanical system cannot be reset.
   ★ For resetting any specific or all information in the Electrical Systems, follow the operation explained below.

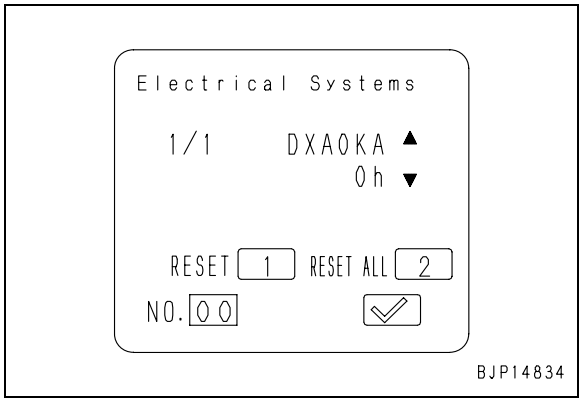


i) Through the following switch operation, call the resetting display in the display of Electrical Systems.
   • Switch operation: [△] +[1] → [2] → [3]



   ★ This is the same switch operation in changing the display to Service Menu.

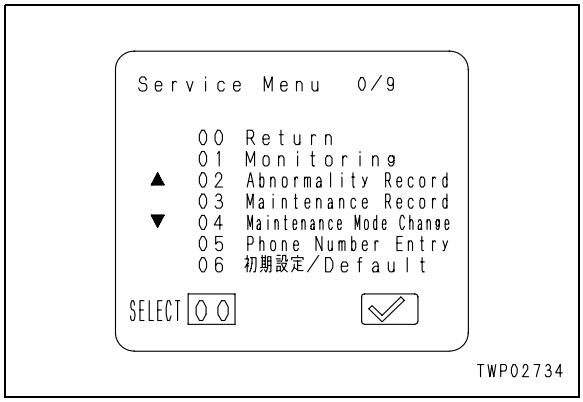
ii) Operate the switch, following the instructions shown in the resetting display.
   ★ When resetting specific information only, call the display of that specific information and reset it with either [△] switch or [▽] switch.
   ★ When resetting all the information, a display of any information will do.



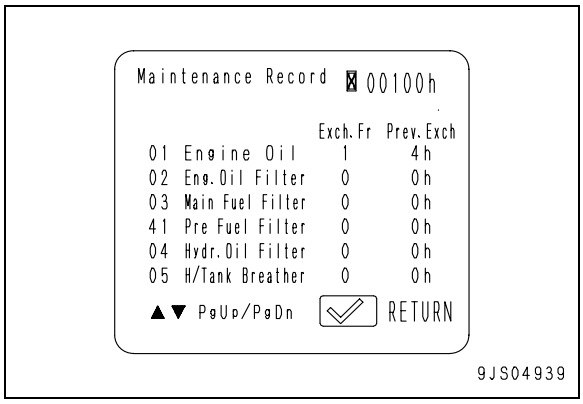
18. Function for maintenance history [03]

The machine monitor records information on the maintenance of filters and oils. The stored information can be displayed through the following switch operation.

1) Selection of menu
Select 03 Maintenance Record in Service Menu and depress [✓] switch.



2) Information to be displayed
[1]: Name of oils and filters
[2]: Times of replacement to date
[3]: Service meter reading at the latest replacement

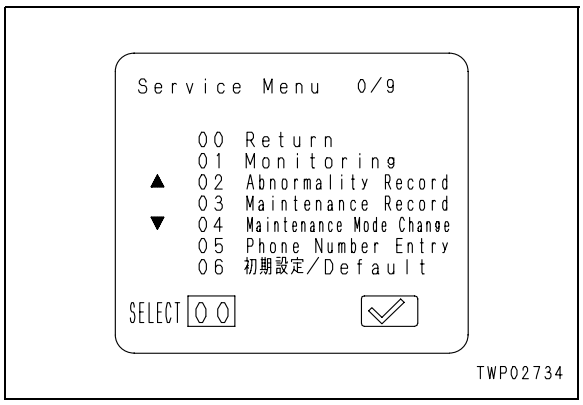


19. Function for maintenance mode change [04]

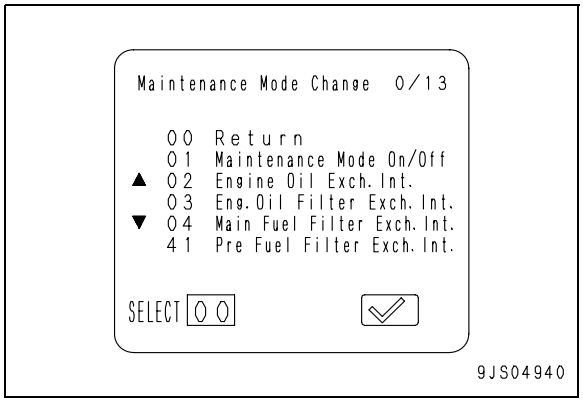
Conditions set for controlling maintenance display function can be changed in the following manner.

- Turn the function effectual or ineffectual.
- Change the set interval for replacement.

1) Selection of menu
Select 04 Maintenance Mode Change in the initial display of Service Menu, and depress [✓] switch.



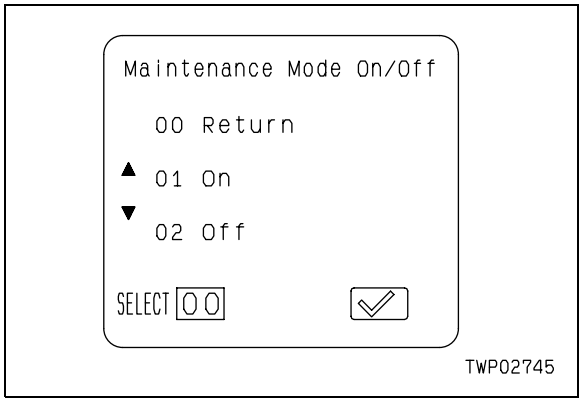
2) Selection of item to be changed
Select an item to be changed in the display of Maintenance Mode Change Selecting Menu.



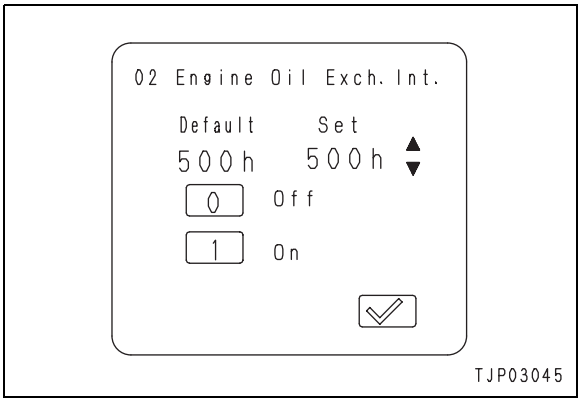
No.	Maintenance mode change item
00	Return (Termination of maintenance mode change)
01	Maintenance Mode On/Off
02	Engine Oil Exch. Int.
03	Engine Oil Filter Exch. Int.
04	Fuel Main Filter Exch. Int.
41	Fuel Pre Filter Change Int.
05	Hydr. Oil Filter Exch. Int.
06	H/Tank Breather Exch. Int.
07	Corro. Resis. Exch. Int.
08	PTO Oil Service Int.
09	Final Drive Oil Exch. Int.
10	S/Machinery Oil Exch. Int.
11	Hydraulic Oil Exch. Int.
12	Pilot Filter Exch. Int.
13	Drain Filter Exch. Int.
14	Use Default Values

★ 01 and 14 menus are provided for setting the whole maintenance mode, while those from 02 through 13 are for setting individual items.

3) Contents of Maintenance Mode On/Off
   - Use: The maintenance display function of all oil and filter-related items are turned effectual. (Irrespective of whether "On" or "Off" set for individual items, this setting prevails)
   - Do not use: The maintenance display function of all oil and filter-related items are turned ineffectual. (Irrespective of whether "On" or "Off" set for individual items, this setting prevails)



4) Set contents of individual items
   [1]: Default: The maintenance time set in the monitor (recommended by the manufacturer and cannot be changed).
   [2]: Set: Maintenance time that can be freely set. The maintenance mode program functions based on this maintenance time. (The maintenance time can be increased or decreased by 50 hours with [△] or [▽] switch)
   [3]: On: Maintenance display function with this instruction becomes effectual.
   [4]: Off: Maintenance display with this instruction becomes ineffectual.
   ★ The lowest maintenance time is 50 h.



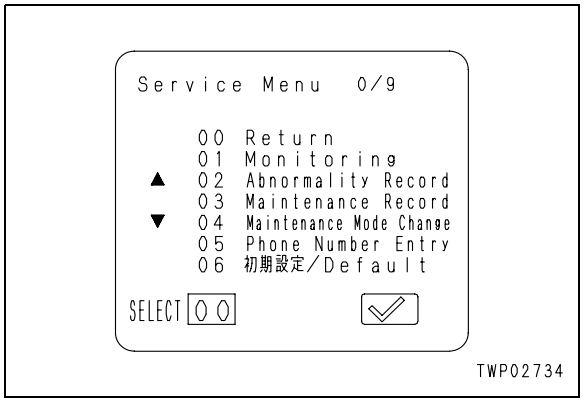
5) Set contents of "Use Default Values"
   When selecting this menu and depressing the switch [✓], all individual time settings are reduced to the initial settings.

20. Function for recording phone No. [05]

In the display of action code, a telephone number and failure code are shown alternately. Phone number can be inputted or modified in the following manner.

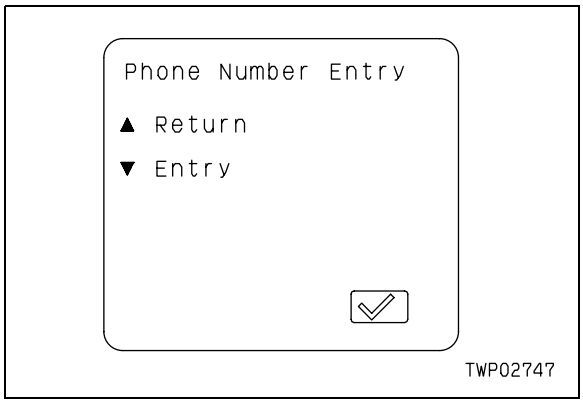
★ If there is no Phone number registered, the display for Phone numbers does not appear.

1) Selection of menu
Select 05 Phone Number Entry menu in the display of Service Menu, and depress [✓] switch.



2) Changing the display
Select Entry next to change the display to the Phone Number Entry display.

★ Even if a Phone number is already inputted, it is deleted, upon switching to the Phone Number Entry display.



3) Entry and setting Phone number
Following the method explained below, Entry a Phone number in the Phone Number Entry display. (Entry automatically begins with a cursor at the left end)

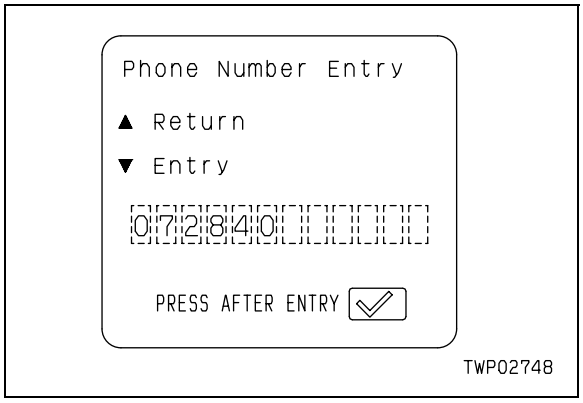
i) Enter a number into a cursor at the left end with a ten-key.

ii) Depress [✓] switch when all the numbers have been entered.

★ Numbers can be entered up to the max. 12 digits, but omit unnecessary digits.

★ When entering a wrong number, depress [Swing priority] switch, then the cursor goes back by one digit.

★ When input is finished, the display changes to Entry display shown above. If the inputted Phone number is shown in this display, the input is normal.

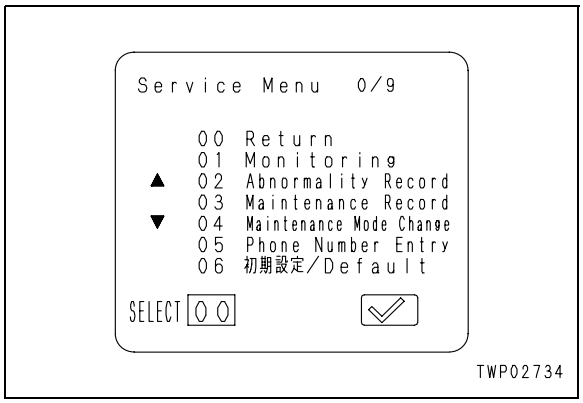


21. Function for initial value setting and default [06]

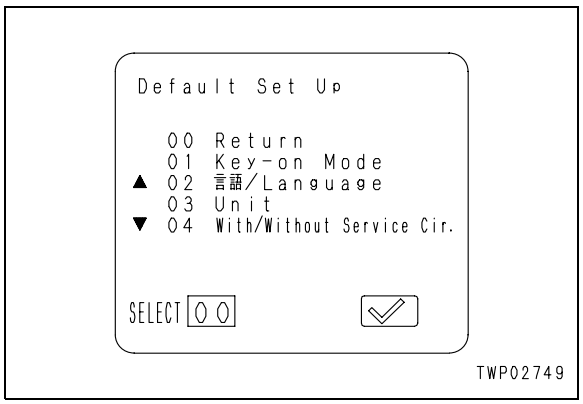
It is possible to change the following settings for the machine monitor as well as the machine. Make a change as is required.

- Working mode when the engine starting switch is in the ON position.
- Display language in Service Menu
- Display unit in the monitoring function
- Setting of double wiper or single wiper

1) Selection of menu
Select 06 "☆☆☆☆/Default menu" in the initial display of Service Menu, and depress [✓] switch.

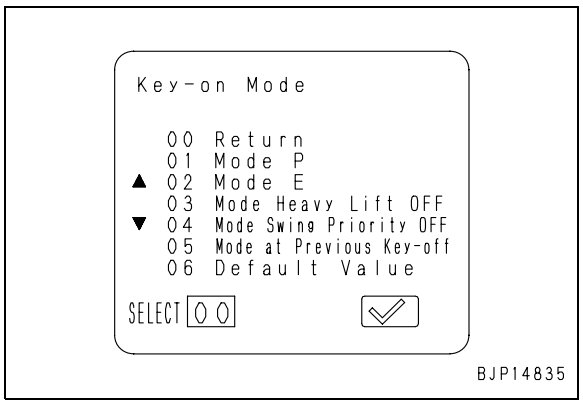


2) Selection of submenu
Select an item to change from the submenu, and depress [✓] switch.



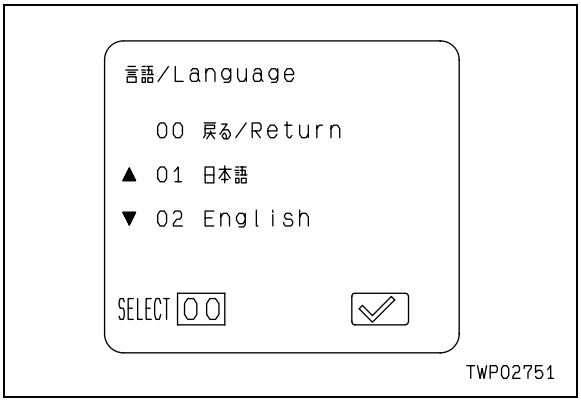
No.	☆☆☆☆/Default submenu
00	Return
01	Key-on Mode
02	☆☆/Language
03	Unit
04	Wiper Select
05	All Default Value

3) Function for Key-on Mode
When the engine starting switch is turned ON, a working mode can be set that is shown in the machine monitor.

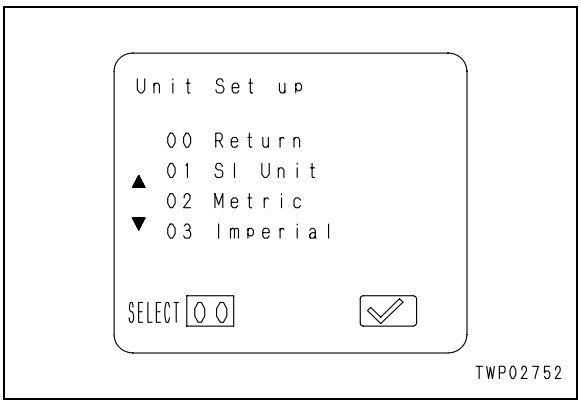


- P Mode, E Mode, Swing Priority Mode OFF/ON: If any of them is set, the machine always ramps up with that working mode, when turning the engine starting switch ON.
- Mode at Previous Key-off: If this mode is set, the machine ramps up with the working mode that was last used in the previous machine operation.
- Default Value: If this mode is set, the machine ramps up with the default mode (P mode) that was originally set at the time of delivery from the factory.

4) Function for ☆☆/Language
In Service Menu, the language in use can be changed between Japanese and English.
★ English is used as the language for default setting in the machine monitor.
★ If the machine monitor for spare parts is to be used in a Japanese-speaking region or organization, change the language from English to Japanese, using this function.

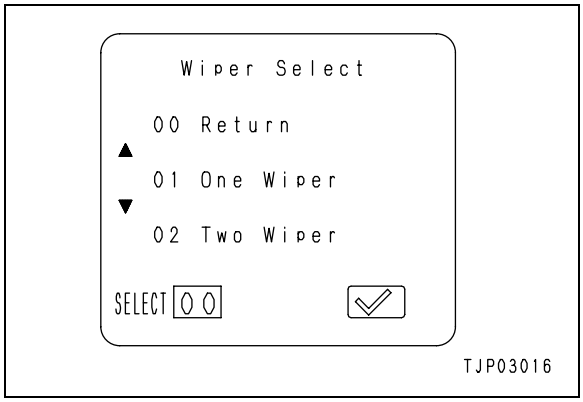


5) Function for unit selection
As the unit to be used in the monitoring function display of Service Menu, three kinds of unit are provided.
★ Unit used for default setting in the machine monitor is SI, i.e. International System of Units.



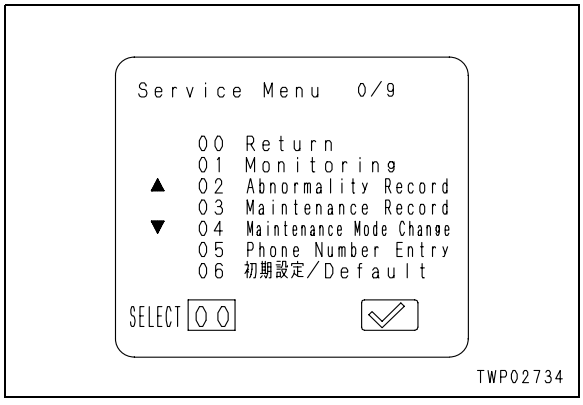
6) Function for selection of wiper specification
The wiper specification can be set.
- One wiper: Machine with standard cab or fixed-front window cab (Only upper wiper)
- Two wipers: Machine with fixed-front window cab (if equipped) (Upper wiper and lower wiper)

★ If this setting is not matched to the specification of the actually installed wiper, the wiper may not operate normally or an error is detected.

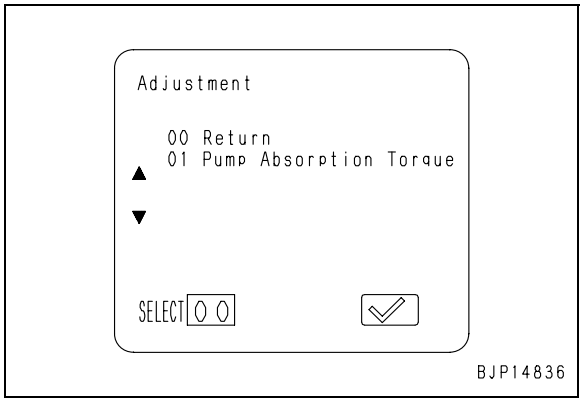


22. Function for adjustment [07]
The machine can be adjusted with the machine monitor.

1) Selection of menu
Select "07 Adjustment" on the service menu and press the [✓] switch.



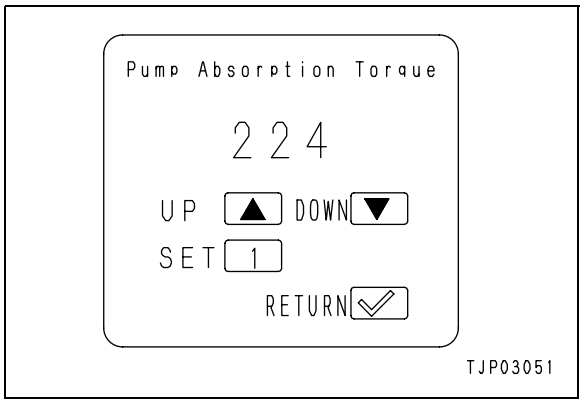
2) Selection of sub menu
Select the sub menu to check the setting and press the [✓] switch.



No.	Sub menu of adjustment
00	Return (Finish adjustment)
01	Pump Absorption Torque

3) Function of pump absorption torque
The pump absorption torque can be adjusted in the following ranges.

★ Basically, this setting does not need to be changed.



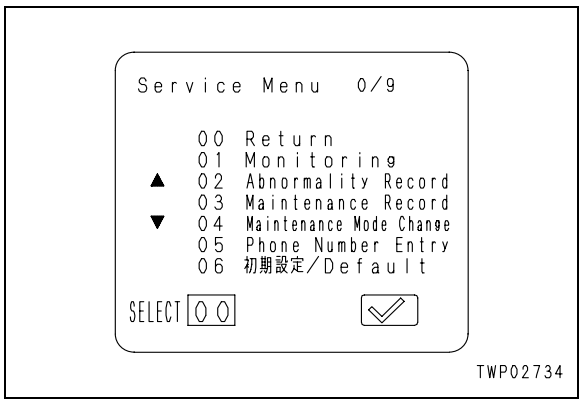
Adjustment value	Pump absorption torque
220	+98.1 Nm {+10.0 kgm}
221	+73.5 Nm {+7.5 kgm}
222	+49.0 Nm {+5.0 kgm}
223	+24.5 Nm {+2.5 kgm}
224	0.0 Nm {0.0 kgm}
225	–24.5 Nm {–2.5 kgm}
226	–49.0 Nm {–5.0 kgm}
227	–73.5 Nm {–7.5 kgm}
228	–98.1 Nm {–10.0 kgm}

23. Function of reduced cylinder mode operation [08]

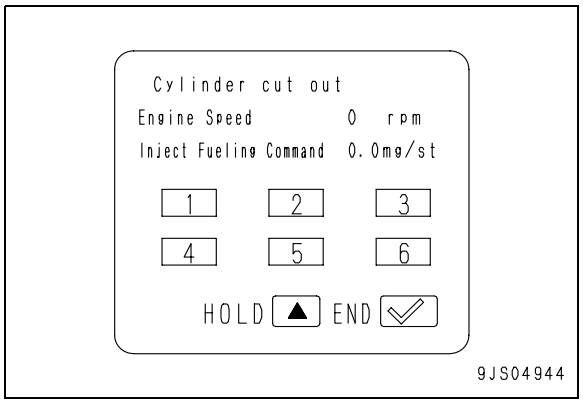
The reduced cylinder mode can be controlled with the machine monitor.

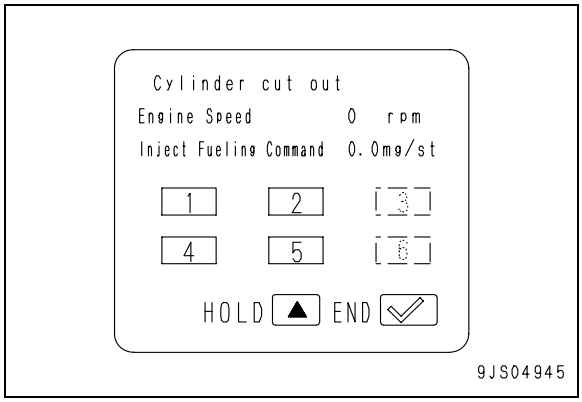
Reduced cylinder mode operation means to run the engine with 1 or more fuel injectors disabled electrically to reduce the number of effective cylinders. This operation is used to find out a cylinder which does not output power normally (or, combustion in it is abnormal).

1) Selection of menu
   Select "08 Cylinder cut out" on the initial screen of the service menu and press the [✓] switch.

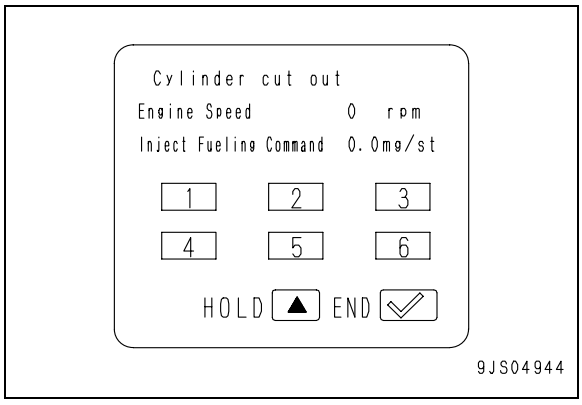


2) Setting of cylinders to be disabled
   Press switches [1] – [6] on the machine monitor corresponding to the cylinder Nos. to be disabled.
   - ★ After a switch is pressed, if the cylinder No. corresponding to it on the machine monitor is displayed white in a white frame, the cylinder is disabled (If setting is wrong, press the same switch again).
   - ★ Only one or more cylinders can be disabled for the reduced cylinder mode operation.

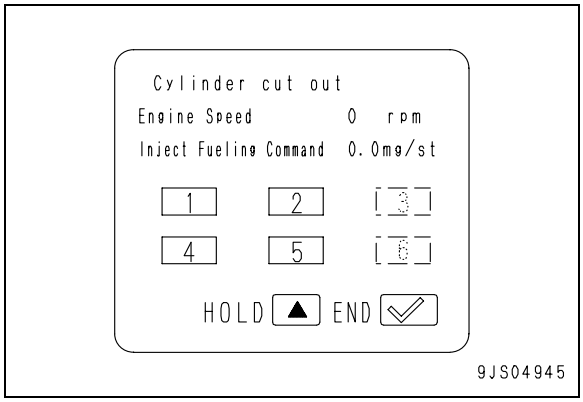


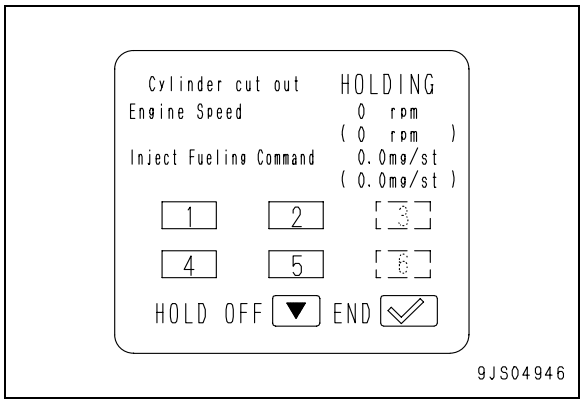


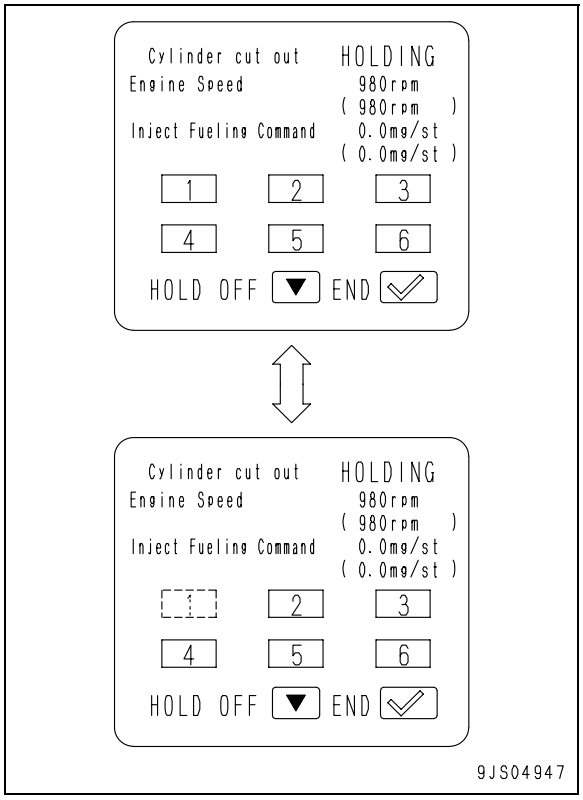
3) Cancellation of disabled cylinders
   Press switches [1] – [6] on the machine monitor corresponding to the disabled cylinder Nos. to cancel disabling of those cylinders.
   - ★ After a switch is pressed, if the cylinder No. corresponding to it on the machine monitor is displayed black in a black frame, disabling of the cylinder is cancelled.



4) Function of holding engine speed
   If the [△] switch is pressed while the reduced cylinder mode operation screen is used, the engine speed is held and displayed on the lower line.
   If the [▽] switch is pressed while the engine speed is held, holding of the engine speed is cancelled and the engine speed displayed on the lower line goes off.
   - ★ If the holding function is used, the held engine speed is displayed in ( ) on the lower line and the current engine speed is displayed on the upper line.
   - ★ The holding function can be used both in and out of the reduced cylinder mode.







[Reference]: How to use holding function effectively

The engine speed displayed by the holding function is held on the screen until the holding function is cancelled, regardless of setting and cancellation of the reduced cylinder mode. Accordingly, a defective cylinder can be found out effectively according to the following procedure.

(1) Run the engine normally (without disabling any cylinder) and hold the engine speed.
(2) Disable a cylinder to be checked.
(3) Run the engine under the same condition as the normal operation in step (1) and compare the engine speed at this time with the held engine speed.
(4) If there is not a difference between the current engine speed and the held engine speed in step (3), cancel the reduced cylinder mode.
(5) Repeat steps (2) – (4) to check the other cylinders.

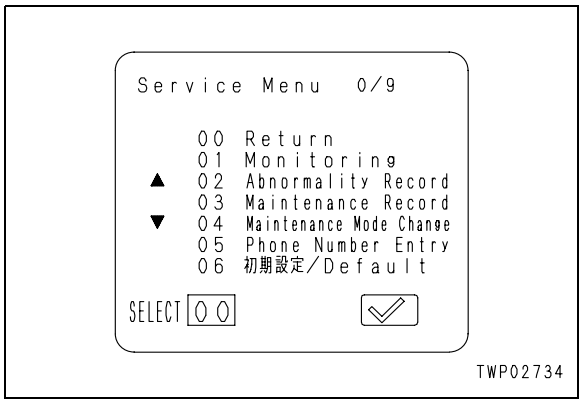
24. Function of no injection cranking [09]

No injection cranking of the engine is available from the machine monitor.

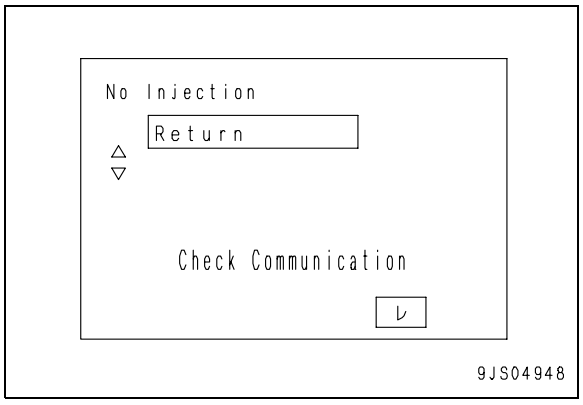
No injection cranking denotes stopping injection of fuel from the injector even if the engine is run from the starting motor. This mode is used, for instance, for measurement of compressive pressure.

★ This setting must be done after stopping the engine.

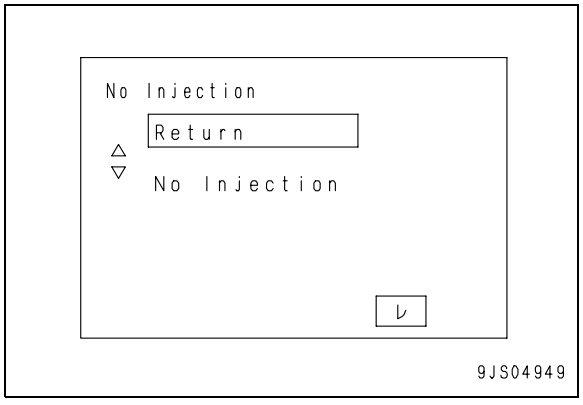
1) Selecting menu
Select “09 No Injection Cranking” from the service menu initial screen and press [✓] switch.



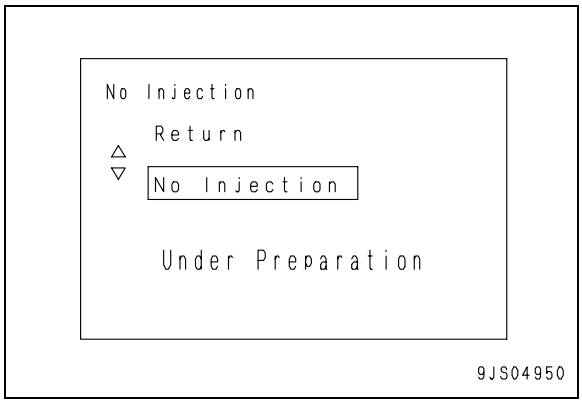
2) The initial screen for the no injection cranking will appear.
★ “Check Communication” will be displayed in red.



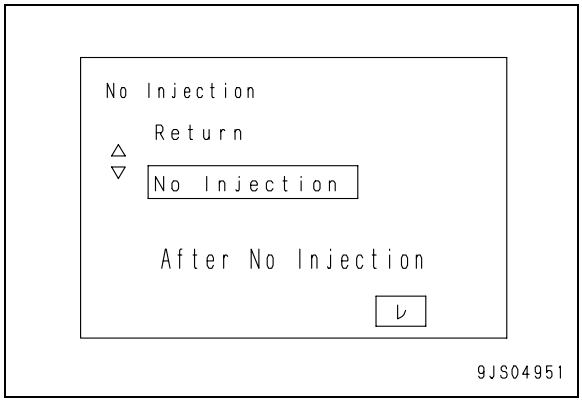
3) As the checkup is over, following screen appears.



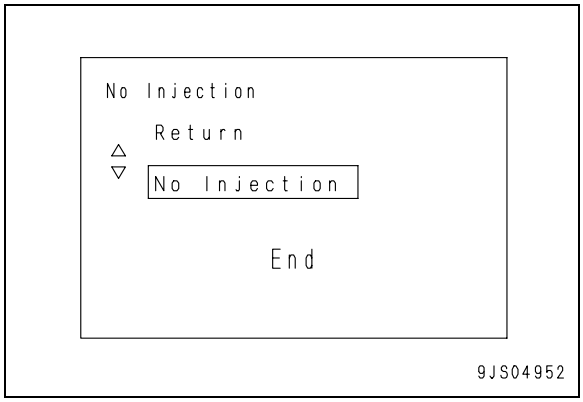
4) Select “No Injection” and press [✓] switch. “Under Preparation” will be displayed on the screen.
★ The letters “Under Preparation” are displayed in red.



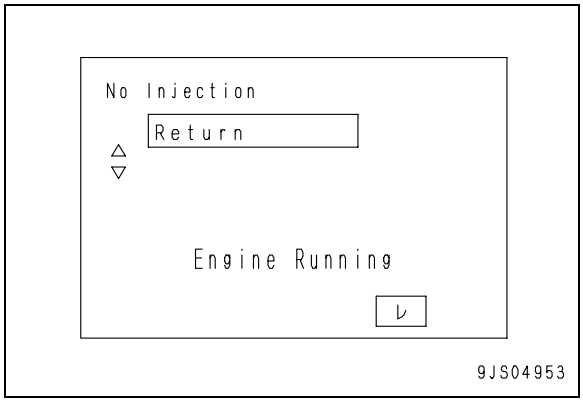
5) As the preparation for no injection cranking is completed, display of “Under Preparation” is replaced with “After No Injection”.
★ The letters “After No Injection” are displayed in green.



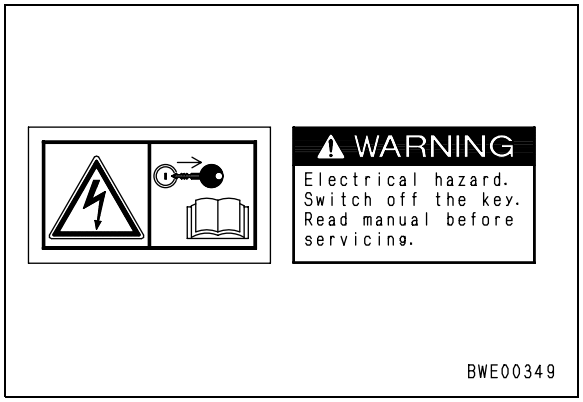
6) After the no injection cranking is over, press [P] switch from the previous screen and the letters “End” will be displayed for 3 seconds.
   ★ The letters “End” are displayed in green.



7) Press “Return” when ending the no injection cranking.
   ★ If the no injection cranking function is inadvertently selected while the engine is running, “Engine Running” will appear as No Injection in step 4) is selected. This “Engine Running” display remains on the screen even after the engine is stopped. Restoring the service menu screen alone deletes the display.



Handling engine controller high voltage circuit



⚠ The engine controller is equipped with high voltage circuits (Max. 65 V) for driving the fuel injector.
They are connected to the connectors and harnesses between the engine controller and the fuel injector.

★ Normally, a high voltage is only output while the engine is running. Once the engine is stopped, the output ceases.

⚠ Touching the high voltage circuit directly may cause an electric shock. To avoid this, observe the following precautions when inspecting the circuits.

1. Connectors containing high voltage circuits:
   - Engine controller connector: ENG
   - Injector connector: CN1, CN2, CN3, CN4, CN5, CN6
   - Injector head terminal (in head cover)

2. Be sure to connect and disconnect the relevant connectors with the starting switch off.

3. When diagnosing, do not start the engine with the T-adapter inserted in or connected to the relevant connector.
   ★ At that time, the starting switch can be set to ON and OFF only, but not to START.

PC800-8, PC800LC-8 Hydraulic excavator

Form No. **UEN00913-00**

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

30 Testing and adjusting
Testing and adjusting, Part 5

Testing and adjusting, Part 5 2
Procedure for turning on KOMTRAX terminal 2
KOMTRAX terminal lamp indications 5
Preparation work for troubleshooting electrical system 8
Pm-clinic service 11

Testing and adjusting, Part 5

Procedure for turning on KOMTRAX terminal

When the machine is delivered, KOMTRAX terminal is installed:

★ When the machine is delivered, KOMTRAX terminal is installed (machine with the standard equipment), implement the following procedure.

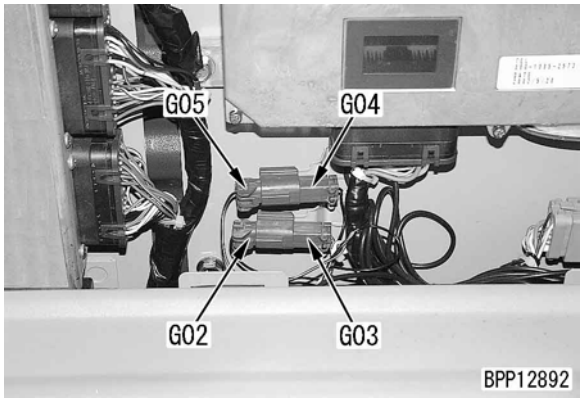
1. **Reporting of machine model, model number and serial number**
   Report the machine model, model number and serial number to the person responsible to operation of KOMTRAX.

2. **Registration of KOMTRAX terminal**
   The person responsible to operation of KOMTRAX shall register the subject terminal using the KOMTRAX client PC.
   ★ See “KOMTRAX administrator manual” for the procedure.
   ★ Above completes the necessary operations.

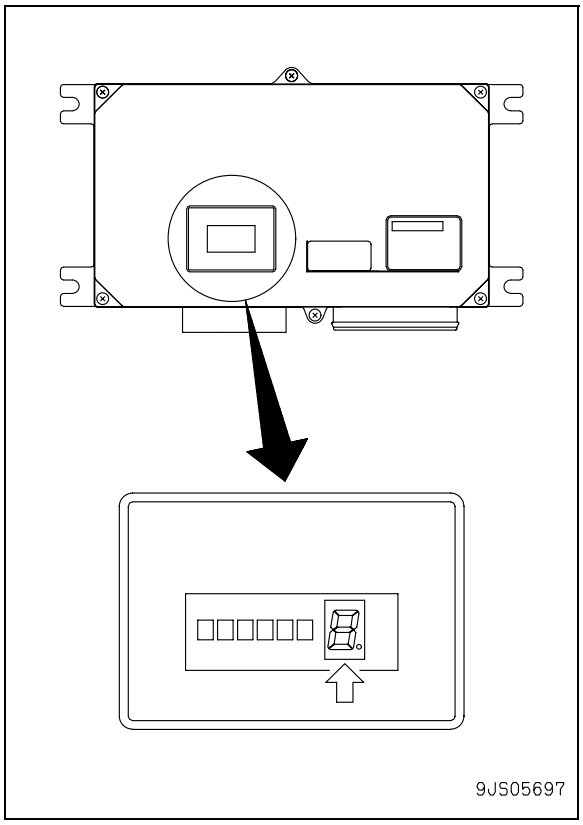
When installing KOMTRAX terminal after the machine is delivered:

★ When installing KOMTRAX terminal after the machine is delivered (machine with the retrospective equipment), implement the following procedure.

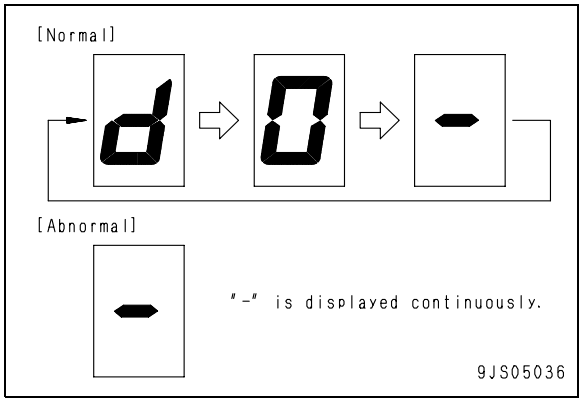
1. **Station opening inspection**
   ★ Finish the operations of steps 4) to 7) within 30 seconds.
   1) Turn OFF the starting switch and then, after making sure 5 seconds have elapsed, proceed to the next step.
   2) Make sure visually that the inspecting connectors 1 and 2 are connected.
   ★ The test connector is clamped to the back side of the KOMTRAX terminal cover (See “Preparation work for troubleshooting for electrical system”).
      • Inspecting connector 1:
        G02 (female) and **G03** (male)
      • Inspecting connector 2:
        G04 (female) and **G05** (male)



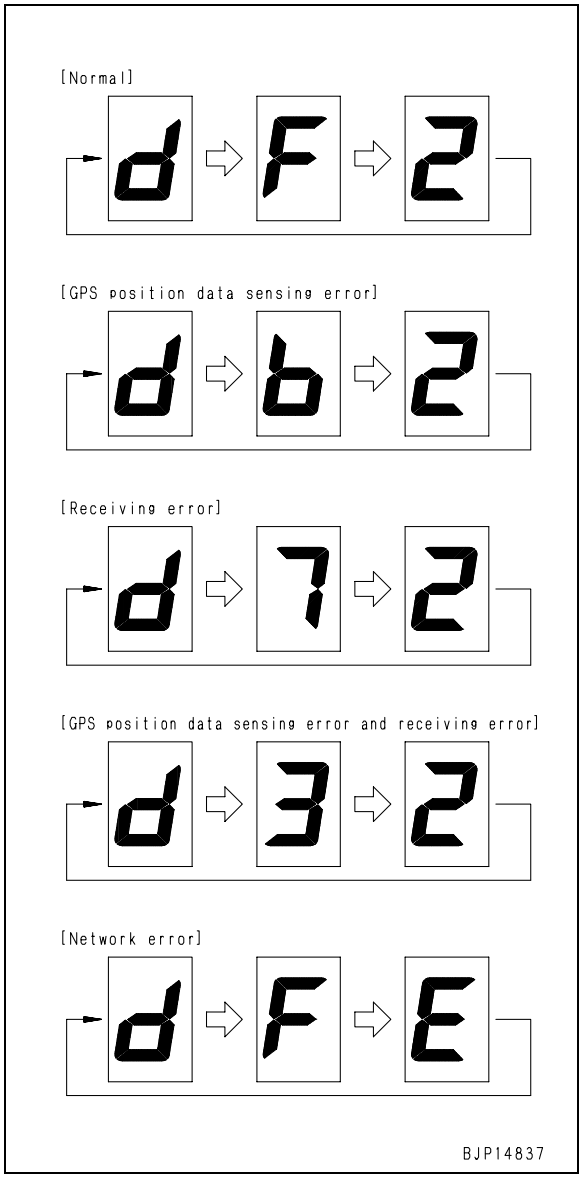
3) Disconnect the inspecting connector 1 and maintain that state for 5 seconds.
4) Turn ON the starting switch and maintain that state for 5 seconds.
5) Disconnect the inspecting connector 2 and maintain that state for 5 seconds.
6) Connect the inspecting connector 1 again and maintain that state for 5 seconds.
7) Connect the inspecting connector 2 again and maintain that state for 5 seconds.
8) Make sure that the KOMTRAX terminal 7-segment indicator lamps are normally turned on.
   ★ After step 7), if display is normal, the 7-segment indicator lamp displays for 30 seconds (“d”, “0”, and “–” are displayed repeatedly).



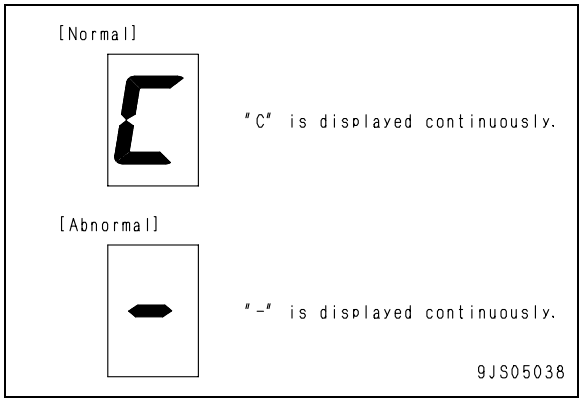
★ As [Normal] is indicated, proceed to the next step.
★ If [Abnormal] is indicated, repeat the procedure from step 1).



9) Set the starting switch to START position and maintain it in that state for 5 seconds. Make sure the engine is not started.
★ If the engine is started, repeat the procedure from step 1).
10) Return the starting switch to ON position and maintain that state for 5 seconds.
★ Don't return it to OFF position.
11) Set the starting switch to START position again and make sure the engine is started.
12) Make sure that the KOMTRAX terminal 7-segment indicator lamps are normally turned on.
★ As [Normal] is confirmed, proceed to the next step (it will take 90 seconds to 15 minutes until normal display is restored).
★ If [GPS position data sensing error] were displayed, check the GPS antenna and cable for external troubles. If any, repair the trouble and repeat the procedure from step 1).
★ If [Receiving error] were displayed, check the communication antenna and cable for external troubles. If any, repair the trouble and repeat the procedure from step 1).
★ If [GPS position data sensing error and receiving error] were displayed, check the GPS antenna and cable as well as the communication antenna and cable for external troubles. If any, repair the trouble and repeat the procedure from step 1).
★ If [Network error] were displayed, check the indication of [LED-C4] referencing "KOMTRAX terminal lamp indications". (When CAN is not recognized, check KOMTRAX terminal CAN harness for troubles. If any, repair the trouble and repeat the procedure from step 1)).



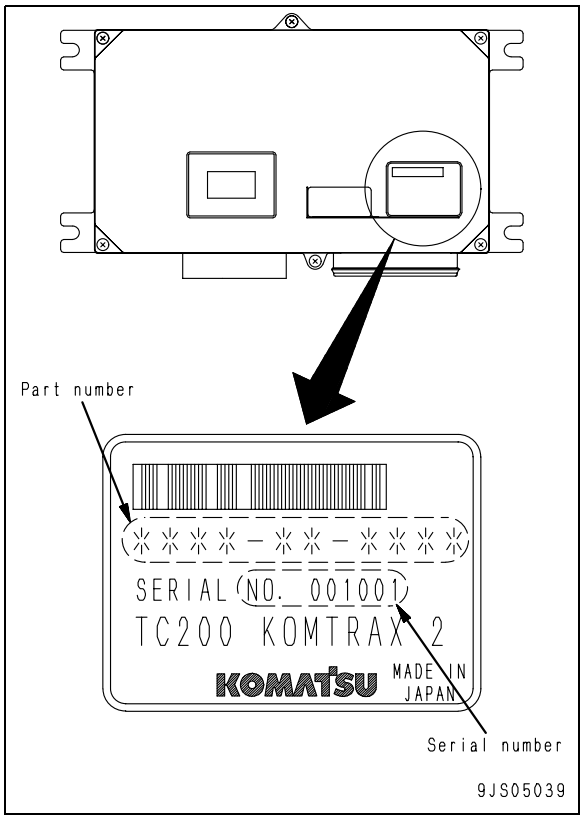
13) Turn the starting switch OFF.
14) Make sure that the 7-segment indicator lamp (a) comes on normally in 5 seconds.
★ As [Normal] is displayed, the station opening inspection is complete.
★ If [Abnormal] is displayed, the inspection is incomplete and must be repeated from step 1).



2. Application for start of use

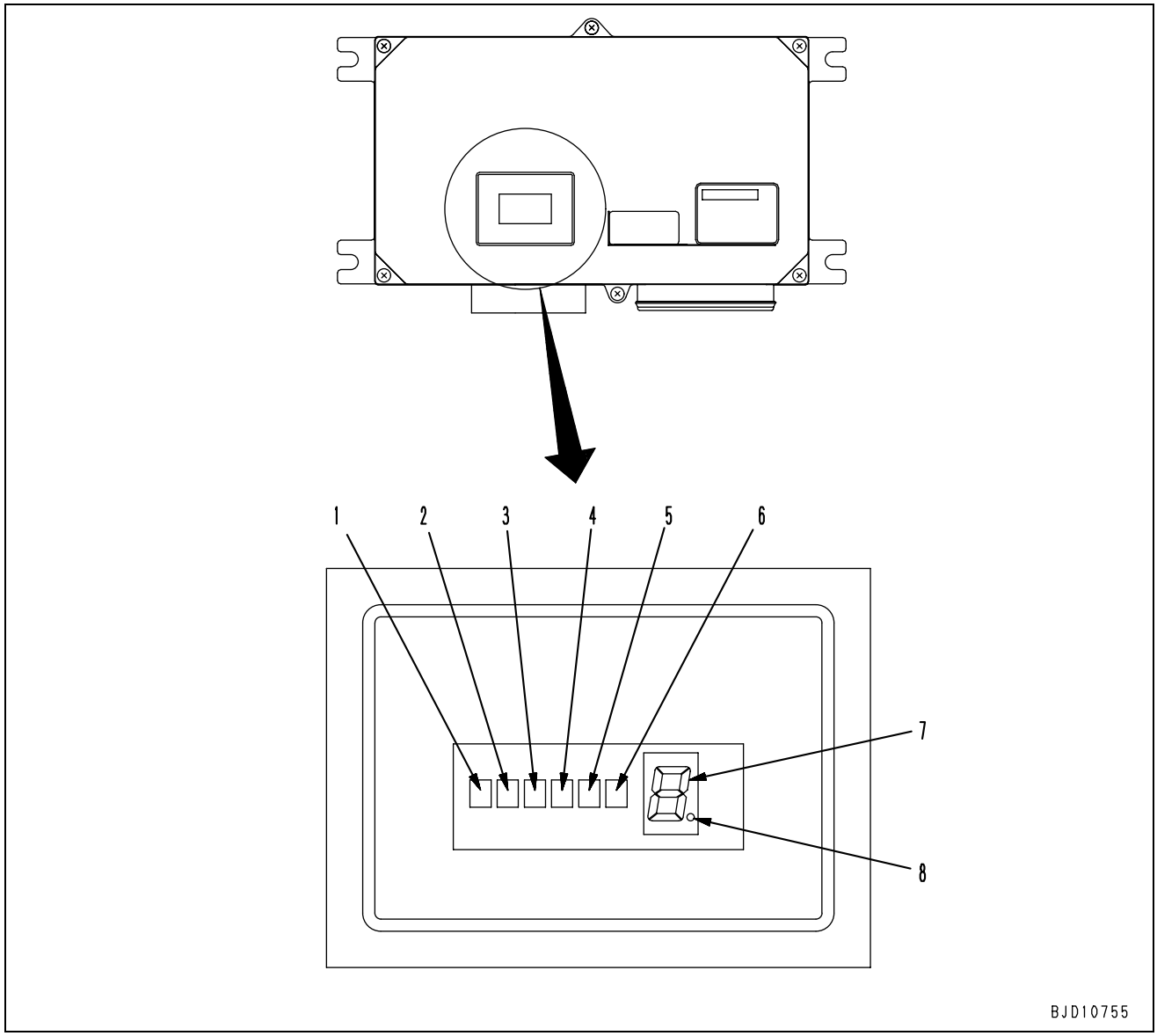
★ The application for start of use is allowed only after the terminal station opening inspection has been successfully ended.

1) Concerning the machine body for which the station opening inspection has been completed, report the following information to the person responsible to operation of KOMTRAX.
   (1) Information of the machine body for which the station opening inspection has been completed (machine model, model number and serial number)
   (2) Part number and serial number of KOMTRAX terminal
   (3) The service meter reading when KOMTRAX terminal was installed (in 0.1 h unit)



2) The person responsible to operation of KOMTRAX shall register the machine body using the KOMTRAX client PC.
   ★ See “KOMTRAX administrator manual” for the procedure.
   ★ Above completes the necessary operations.

KOMTRAX terminal lamp indications



LED for CPU

1. LED-C1 (R signal and ACC signal)
2. LED-C2 (Initial output state)
3. LED-C3 (S-NET and C signal state)
4. LED-C4 (CAN state)
5. LED-C5 (Download writing state)
6. LED-C6 (Download writing state)

7-segment and dot for CPU

7. 7-segment (Number of mails which are not transmitted yet and condition of satellite link)
8. Dot (GPS positioning state)

KOMTRAX system displays various information in the system as well as contents of information processing on the LED display unit located at the top of KOMTRAX terminal. Thus, when a failure on the system is suspected, implement the following checkups.
- Checking antennas
- Checking terminal LED display

Before using KOMTRAX, the application for start of use and the machine side station opening inspection must be completed.

Checking antennas

★ Before inspecting display of LED, check the communication antenna and its vicinity as well as GPS antenna and its vicinity for any trouble.
- The communication antenna shall not be disconnected or damaged.
- The communication antenna cable shall not be broken and shall be appropriately connected to KOMTRAX terminal.
- GPS antenna shall not be disconnected or damaged.
- GPS antenna cable shall not broken and shall be appropriately connected to KOMTRAX terminal.

Checking terminal LED indication

1. Display contents of LED for CPU

★ Turn ON, START the starting switch or the engine prior to inspection of LED display.

No.	LED	Name and function	Display (*1)	Contents of display
1	LED-C1	State of starting switch ACC signal, alternator R signal	ON	Starting switch ACC signal: ON, Alternator R signal: ON
			Quick flashing	Starting switch ACC signal: OFF, Alternator R signal: ON
			Slow flashing	Starting switch ACC signal: ON, Alternator R signal: OFF
			OFF	Starting switch ACC signal: OFF, Alternator R signal: OFF
2	LED-C2	State of engine control signal	ON	Engine control signal: ON
			OFF	Engine control signal: OFF
3	LED-C3	State of S-NET connection and starting switch C signal	ON	S-NET: Connected, starting switch C signal: OFF
			Quick flashing	Starting switch C signal: ON
			Slow flashing	(Not used)
			OFF	S-NET: Disconnected, Starting switch C signal: OFF
4	LED-C4	State of CAN connection	ON	CAN: Present (Fuel sensor: Absent)
			Quick flashing	CAN: Present (Fuel sensor: Present)
			Slow flashing	CAN: Absent (Fuel sensor: Present)
			OFF	CAN: Absent (Fuel sensor: Absent)
5	LED-C5	Download writing state	Single side ON	Download writing mode (Special function for system administrator)
6	LED-C6		Both sides OFF	Normal working mode

*1: Types of flashing and flashing duration
Quick flashing: Flashing of approximately 1 second cycle
Slow flashing: Flashing of approximately 4 seconds cycle

2. Display contents of 7-segment and dots for CPU

★ Turn ON the starting switch prior to inspection of LED display.

No.	Display unit	Name and function	Display (*2)	Contents of display
7	7-segment	Number of mails which are not sent yet and satellite capturing condition)	Lighting of 0 – 9	Figure indicates number of mails which are not sent yet (When 10 or more mails are not sent yet, 9 is indicated). Lighting indicates that satellite is captured.
			Quick blinking of 0 – 9	Figure indicates number of mails which are not sent yet (When 10 or more mails are not sent yet, 9 is indicated). Quick blinking indicates that satellite is not captured.
8	Dot	State of positioning with GPS	ON	Positioning with GPS complete (Position is recognized, *3)
			OFF	Positioning with GPS incomplete (Position is not recognized, *3)

*2: Types of flashing and flashing duration
Quick flashing: Flashing of approximately 0.5 second cycle.
Slow flashing: Flashing of approximately 2.0 seconds cycle

*3: Remarks on measuring condition of GPS
In a outdoor location within radio waves penetration range, it sometimes takes more than a minute from turning on of the starting switch to completion of the positioning.
Positioning is not available in a location where radio waves are extremely weak or unreachable.

Preparation work for troubleshooting electrical system

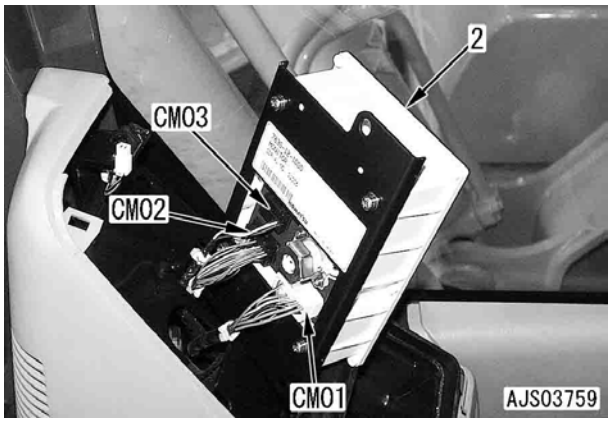
★ When troubleshooting an electric circuit related to the machine monitor, engine controller, or pump controller, expose the related connectors according to the following procedure.

1. Machine monitor

1) Remove cover (1).
   - ★ The cover is secured with 2 clips at the top and bottom. Those clips can be removed by pulling them up.
   - ★ If a sunlight sensor for the air conditioner is installed, disconnect connector **P31** on the backside of the cover.

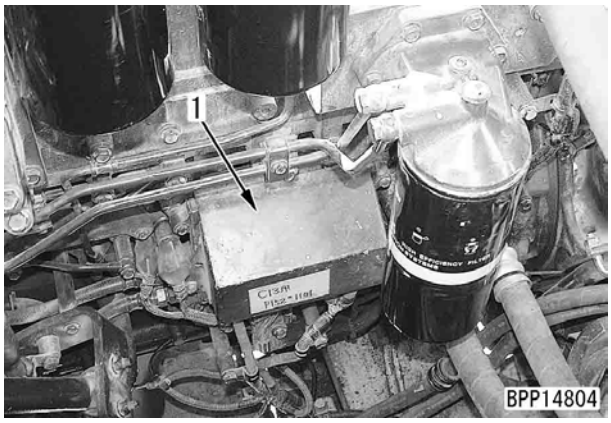


2) Remove the 3 mounting screws and disconnect machine monitor (2) from the mount.
   - ★ Take care not to drop the mounting screws in the console.
3) Insert or connect T-adapters for troubleshooting to connectors **CM01**, **CM02**, and **CM03** of the machine monitor.



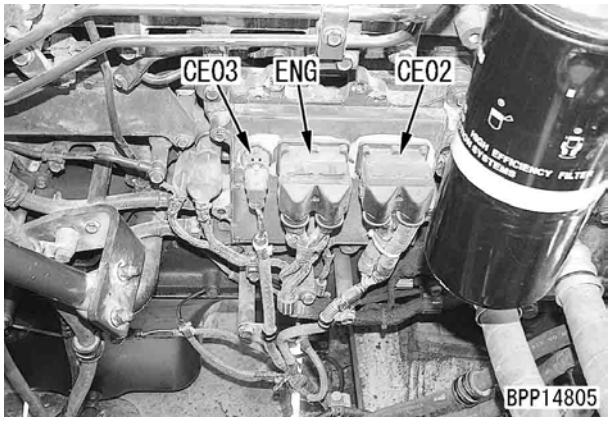
2. Engine controller

1) Remove controller cover (1).



2) Insert or connect T-adapters for troubleshooting to connectors **ENG**, **CE02**, and **CE03** of the engine controller (2).
   - ★ Since the connectors are secured with screws, loosen those screws before disconnecting them.
   - ★ After returning the connectors, tighten the screws to the specified torque.

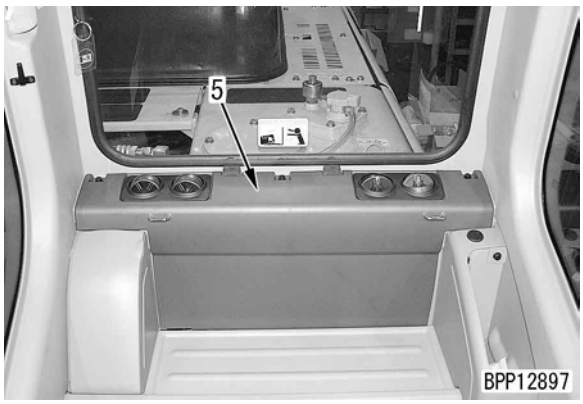
   Screw: **2.82 Nm {0.288 kgm}**



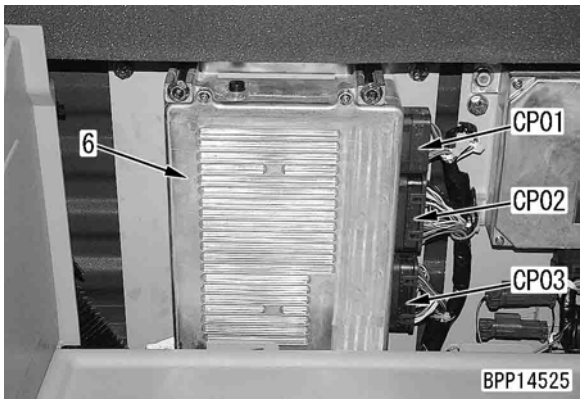
3. Pump controller

★ The pump controller is installed in the cover at the rear of the operator's seat.

1) Remove 3 caps (4) and 3 mounting bolts.
   ★ Remove the caps with a thin flat-head screwdriver.
2) Remove cover (5).



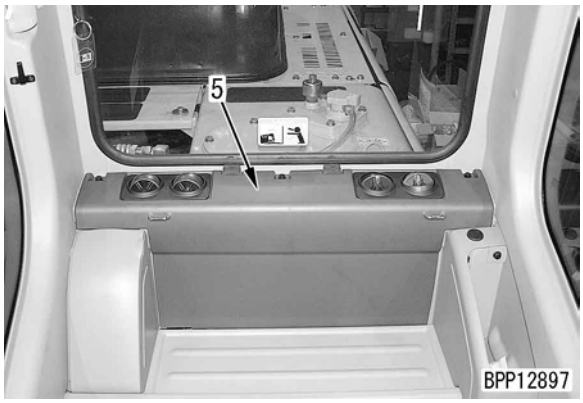
3) Insert or connect T-adapters for troubleshooting to connectors **C01**, **C02**, and **C03** of the pump controller (6).
   ★ Since the connectors are secured with screws, loosen those screws before disconnecting them.
   ★ After returning the connectors, tighten the screws to the specified torque.
   Screw: **2.82 Nm {0.288 kgm}**



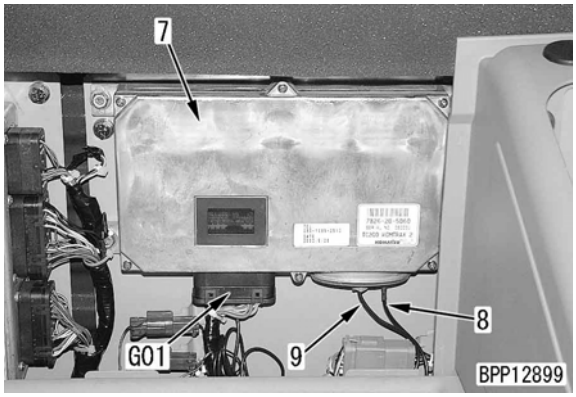
4. KOMTRAX terminal

★ KOMTRAX terminal is installed in the cover situated in the rear side of the operator seat.

1) Slide the operator's seat and seat stand to the forward end.
2) Remove the 4 mounting bolts and cover (7).



3) Insert or connect troubleshooting T-adapter in or to connector **CK01** KOMTRAX of terminal (8).
   ★ The connectors are fixed with screw. Loosen the screws before disconnecting them.
   ★ When returning the connectors to their original positions, fix them by tightening the screws with the specified torque.
   Screw: **2.82 Nm {0.288 kgm}**
   ★ Cable (9) is for the communication antenna.
   ★ Cable (10) is used for the GPS antenna.



Pm-CLINIC SERVICE PC800, 800LC-8
BASE INFORMATION

CUSTOMER NAME	LOCATION	DELIVERY
		Month Day Year / /

CUSTOMER'S No.	SERIAL No.	ENGINE No.

SPECIFICATION			
SPECIFICATION OF MACHINE		☐ PC800-8	☐ PC800LC-8
Boom	7.1-m	☐	☐
	8.0-m	☐	☐
Arm	2.9-m	☐	☐
	3.6-m	☐	☐
Bucket			
Shoe	610-mm double grouser	☐	☐
	710-mm double grouser	☐	☐
	810-mm double grouser	☐	☐
	910-mm double grouser	☐	☐
	1010-mm double grouser	-	☐
	1110-mm double grouser	-	☐

KIND OF JOB			
☐ Mining	☐ Construction	☐ High way & Road	☐ Water supply
☐ Forestry	☐ Scrap	☐ Demolition	☐ ( )

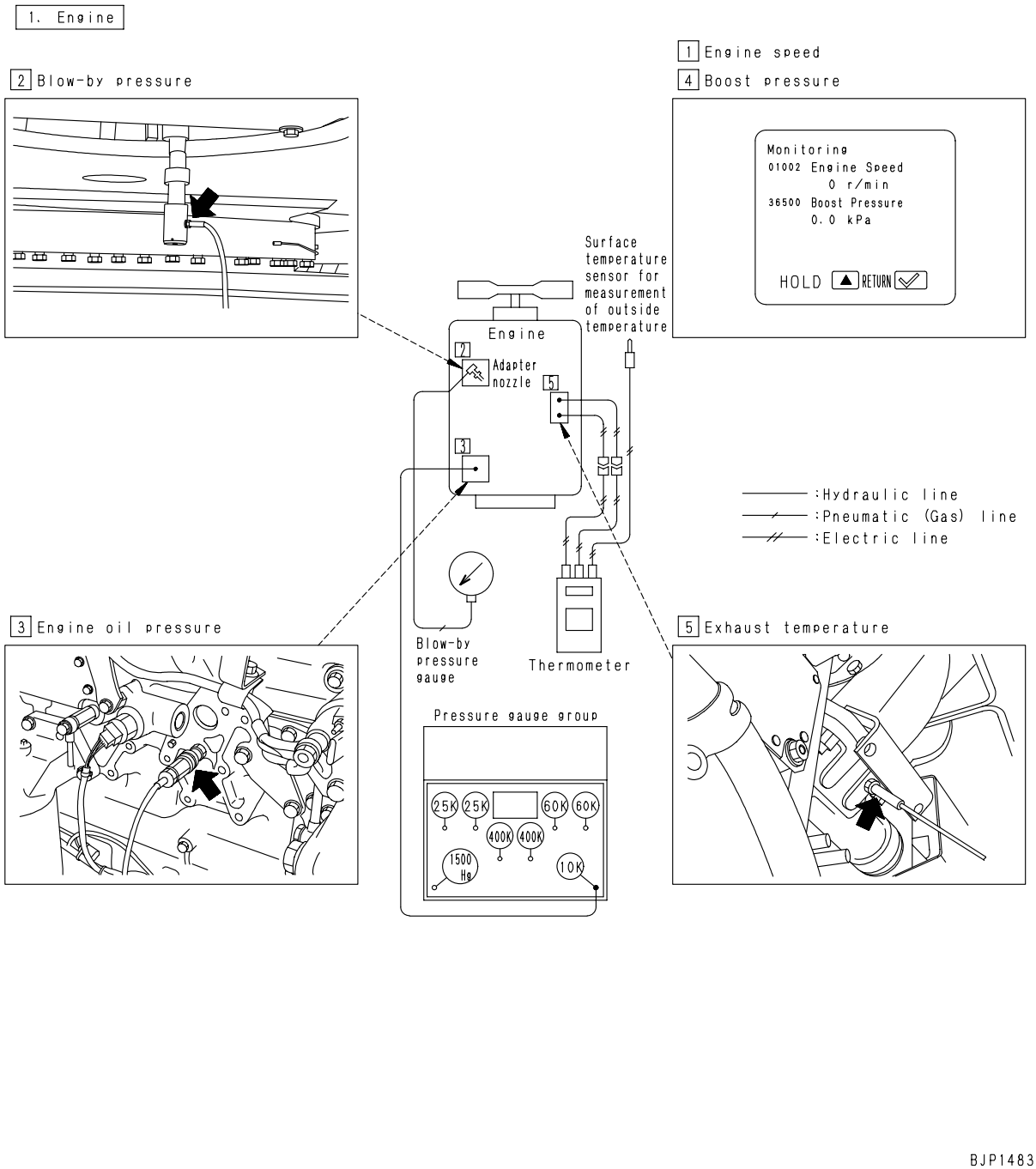
KIND OF OPERATION		
☐ Digging & Loading	☐ Basement digging	☐ Crash hard rock
☐ Other		

KIND OF SOIL			
☐ Rock [☐ Soft	☐ Medium	☐ Hard]	
☐ Gravel	☐ Sand	☐ Clay	☐ Soil

SCHEDULED WORKING HOUR	
Shifts/day	Hours/shift
☐ 1 ☐ 2 ☐ 3	_____ hrs.

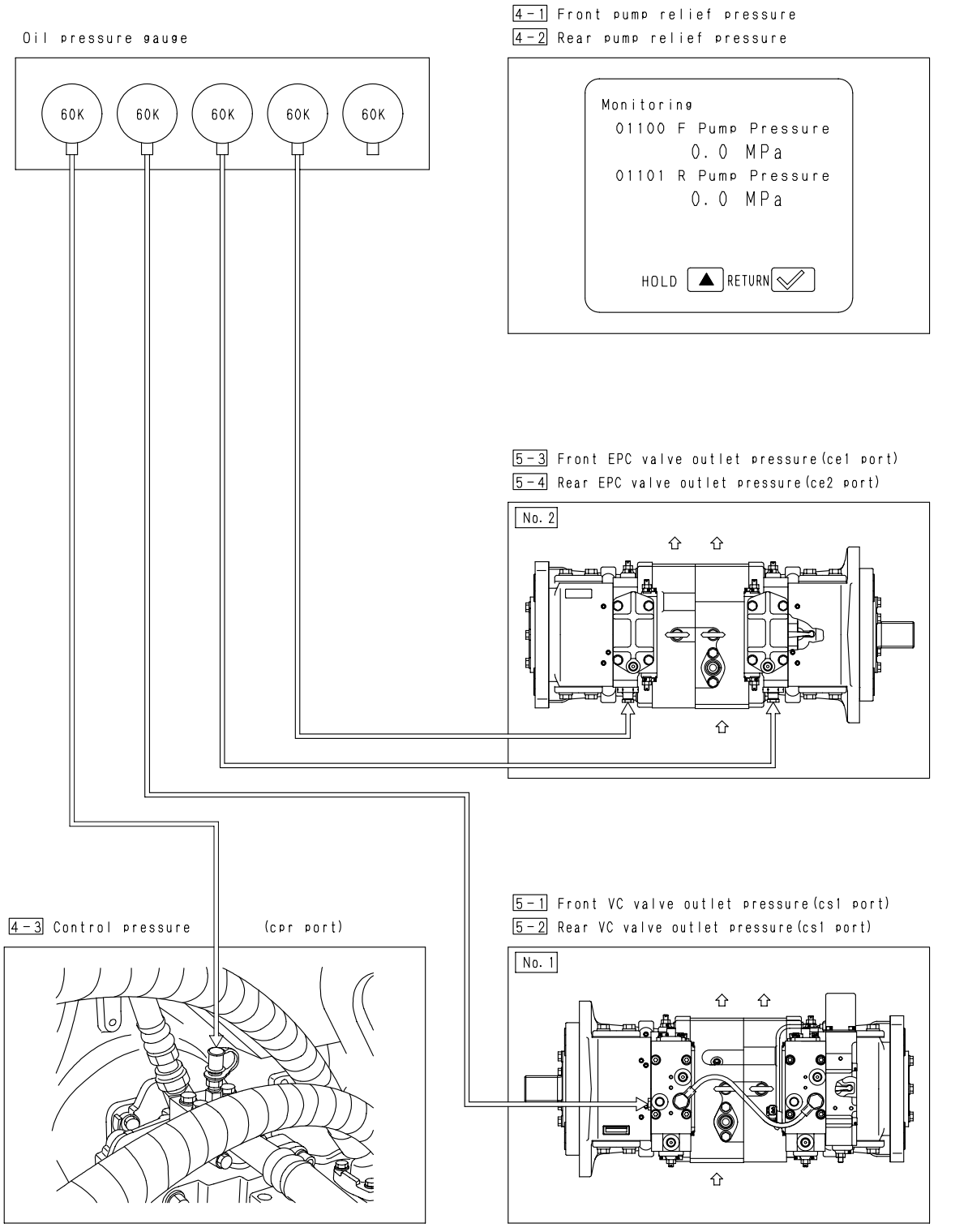
DISTRIBUTOR NAME

Positions to install measuring devices (Related to engine and PTO)



BJP14838

Positions to install measuring devices (Related to relief pressure and OLSS oil pressure)



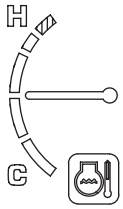
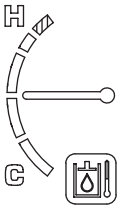
BJP14839

Pm-CLINIC SERVICE PC800, 800LC-8

HOUR INSPECTION

☐ PC800-8 Std. Spec. 7.1 Boom 2.9 Arm ☐ PC800-8 Std. Spec. 8.0 Boom 3.6 Arm ☐ PC800LC-8 LC Spec. 7.1 Boom 2.9 Arm ☐ PC800LC-8 LC Spec. 8.0 Boom 3.6 Arm	Machine serial No. Engine serial No. (SAA6D140E-5)

WORK INSTRUCTION No.	DATE OF EXECUTION	SERVICE METER	INSPECTOR
	Year: Month: Day:	hrs.	

Interview with operator and walk-around check	Good	Bad
Is there abnormality before starting inspection?		
What is maximum level of coolant temperature? (During work)  BWP10817		
What is maximum level of hydraulic oil temperature? (During work)  BWP10818		
Outside temperature Max.: °C Min.: °C Height: m		

	Measurement item	Condition		Unit	Standard value for new machine	Service limit value	Measurement result	Good	Bad
1. Engine	1. Engine speed (P-mode)	Low idle		rpm	800 – 850	800 – 850			
		High idle (*1)			1930 – 2030	1930 – 2030			
		Run engine at high idle + Raise boom to relieve (Turn heavy lift switch OFF)			Min. 1700	Min. 1700			
		Run engine at high idle + Raise boom to relieve (Turn heavy lift switch ON)			Min. 1700	Min. 1700			
		Turn auto-decelerator switch ON Set fuel dial to MAX position Set control levers in neutral			1300 – 1500	1300 – 1500			
	2. Blow-by pressure	High idle in P-mode Raise boom to relieve		kPa {mmH_2O}	Max. 1.96 (Max. 200)	3.9 {400}			
	3. Engine oil pressure	High idle	SAE30SE SAESW40EOS SAE10W30HD SAE15W40HD SAE30HD	MPa {kg/cm^2}	Min. 0.34 {Min.3.5}	0.21 {2.1}			
		Low idle			Min. 0.10 {Min.1.0}	0.08 {0.8}			
	4. Boost pressure	High idle Turn heavy lift switch ON Raise boom to relieve		kPa {mmHg}	Min. 147 {Min. 1100}	117 {880}			
	5. Exhaust temperature	High idle P-mode Turn heavy lift switch ON Raise boom to relieve	Exhaust temperature	°C	Max. 700	750			
			Outside temperature		—	—			

*1: Turn swing lock switch ON and operate swing control lever finely (Do not relieve).

2. Work equipment speed	1. Raise boom	High idle P-mode. Swing: Measure time for 5 turns after 1 turn. Travel: Raise track of either side, drive at Hi travel speed, and measure time for 5 turns after 1 turn. Then, measure the other side.	8.0 Boom / 3.6 Arm	sec	4.8 – 5.8	Max. 6.7			
			7.1 Boom / 2.9 Arm		5.0 – 6.2	Max. 7.2			
	2. Lower boom		8.0 Boom / 3.6 Arm		3.9 – 4.7	Max. 5.1			
			7.1 Boom / 2.9 Arm		4.0 – 4.8	Max. 5.2			
	3. Move arm in		8.0 Boom / 3.6 Arm		4.2 – 5.2	Max. 5.9			
			7.1 Boom / 2.9 Arm		4.9 – 5.9	Max. 6.6			
	4. Move arm out		8.0 Boom / 3.6 Arm		3.3 – 3.9	Max. 4.6			
			7.1 Boom / 2.9 Arm		3.7 – 4.5	Max. 5.1			
	5. Curl bucket		8.0 Boom / 3.6 Arm		3.0 – 3.6	Max. 3.9			
			7.1 Boom / 2.9 Arm		4.1 – 5.1	Max. 5.6			
	6. Dump bucket		8.0 Boom / 3.6 Arm		3.2 – 3.8	Max. 4.1			
			7.1 Boom / 2.9 Arm		3.8 – 4.6	Max. 5.0			
	7. Swing 5 turns				41 – 47	Max. 50			
	8. Drive right track 5 turns				48 – 59*	48 – 59*			
	9. Drive left track 5 turns				48 – 59*	48 – 59*			

* PC800LC-8: 52 – 64

Measurement item		Condition		Unit	Standard value for new machine	Service limit value	Measurement result	Good	Bad
3. Relief oil pressure	1. F pump relief pressure	Oil temperature: 45 – 55°C P-mode High idle	Raise boom to relieve (Turn heavy lift switch OFF)	MPa {kg/cm²}	30.4 – 32.4 {310 – 330}	29.4 – 32.4 {300 – 330}			
			Raise boom to releive (Turn heavy lift switch ON)		32.8 – 34.8 {335 – 355}	31.8 – 34.8 {325 – 355}			
			Relieve left travel motor		33.3 – 35.3 {340 – 360}	32.3 – 35.3 {330 – 360}			
			Relieve left swing motor		27.9 – 30.9 {285 – 315}	27.9 – 30.9 {285 – 315}			
			Relieve right swing motor		27.9 – 30.9 {285 – 315}	27.9 – 30.9 {285 – 315}			
	2. R pump relief pressure		Raise boom to relieve (Turn heavy lift switch OFF)		30.4 – 32.4 {310 – 330}	29.4 – 32.4 {300 – 330}			
			Raise boom to relieve (Turn heavy lift switch ON)		32.8 – 34.8 {335 – 355}	31.8 – 34.8 {325 – 355}			
			Relieve right travel motor		33.3 – 35.3 {340 – 360}	32.3 – 35.3 {330 – 360}			
	3. Control pressure		Set all control levers in neutral		3.33 – 3.82 {34 – 39}	3.33 – 3.82 {34 – 39}			

4. OLSS oil pressure	1. F-VCvalve output pressure	Oil temperature: 45 – 55°C P-mode High idle	Set all control levers in neutral	MPa {kg/cm²}	2.01 – 2.41 {20.5 – 24.5}	Min. 1.76 {Min. 18}			
			Raise boom to relieve (Turn heavy lift switch OFF)		1.03 – 1.43 {10.5 – 14.5}	0.98 – 1.38 {10 – 14}			
			Raise boom to relieve (Turn heavy lift switch ON)		0.99 – 1.39 {10.1 – 14.1}	0.94 – 1.34 {9.6 – 13.6}			
	2. R-VCvalve output pressure		Set all control levers in neutral		2.01 – 2.41 {20.5 – 24.5}	Min. 1.76 {Min. 18}			
			Raise boom to relieve (Turn heavy lift switch OFF)		1.03 – 1.43 {10.5 – 14.5}	0.98 – 1.38 {10 – 14}			
			Raise boom to relieve (Turn heavy lift switch ON)		0.99 – 1.39 {10.1 – 14.1}	0.94 – 1.34 {9.6 – 13.6}			
	3. L-EPC valve output pressure		Set all control levers in neutral		Max. 0.4 {Max. 4}	Max. 0.55 {Max. 5.5}			
			Raise boom to relieve (Turn heavy lift switch OFF)		1.03 – 1.43 {10.5 – 14.5}	0.98 – 1.38 {10 – 14}			
			Run left travel motor idle (Set lever at stroke end)		Min. 1.67 {Min. 17}	Min. 1.67 {Min. 17}			
			Raise boom to relieve (Turn heavy lift switch ON)		0.99 – 1.39 {10.1 – 14.1}	0.94 – 1.34 {9.6 – 13.6}			
	4. R-EPC valve output pressure		Set all control levers in neutral		Max. 0.4 {Max. 4}	Max. 0.55 {Max. 5.5}			
			Raise boom to relieve (Turn heavy lift switch OFF)		1.03 – 1.43 {10.5 – 14.5}	0.98 – 1.38 {10 – 14}			
			Run right travel motor idle (Set lever at stroke end)		Min. 1.67 {Min. 17}	Min. 1.67 {Min. 17}			
			Raise boom to relieve (Turn heavy lift switch ON)		0.99 – 1.39 {10.1 – 14.1}	0.94 – 1.34 {9.6 – 13.6}			

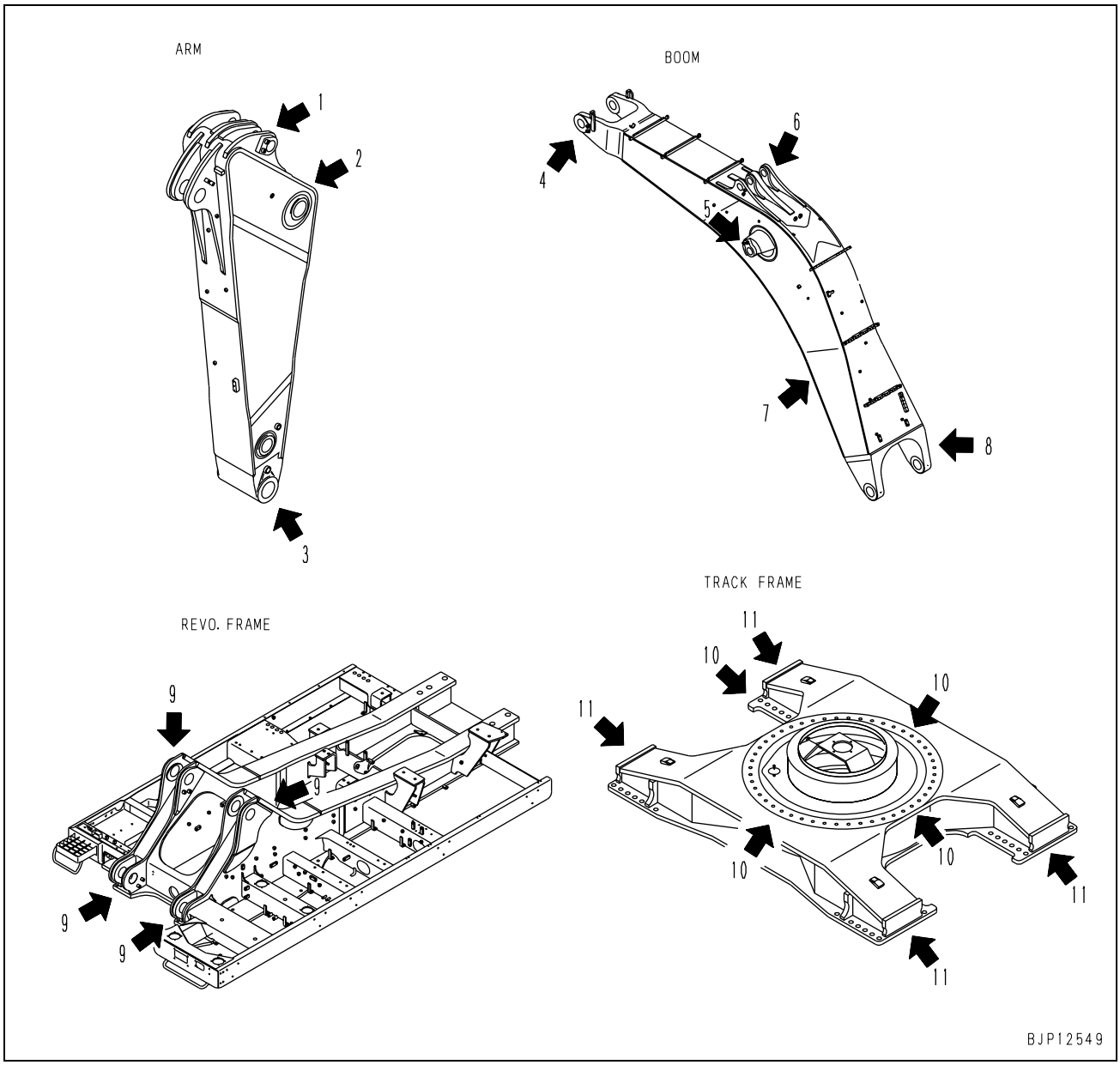
5	Hydraulic drift of work equipment	Oil temperature: 45 – 55°C Bucket • Backhoe spec.: Empty • Loading shovel spec.: Rated load on bucket	Hydraulic drift of tooth tip	Backhoe spec.	mm/15 min.	Max. 900	Max. 1000			
				Loading shovel spec.		Max. 1500	Max. 1800			

6	Hydraulic tank strainer	Check strainer visually (for metal dust, rubber chips, etc.)	—	There must not be excessive metal dust or foreign matter.			

Memo

Visual check of welded structures (For PC800, 800LC-8)

★ If any crack is found, draw its shape below.



Arm

1. **Arm cylinder bracket**
   □ Left □ Right
2. **Arm foot**
   □ Left □ Right □ End plate
3. **Arm top boss**
   □ Left □ Right

Boom

4. **Boom top bracket**
   □ Left □ Right
5. **Boom cylinder bracket**
   □ Left □ Right
6. **Arm cylinder bracket**
   □ Left □ Right
7. **Boom lower plate**
   □ Left □ Right
8. **Boom foot**
   □ Left □ Right

Revolving frame

9. **Boom bracket**
   □ Left □ Right

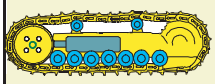
Track frame

10. **Circle bracket**
    □ Front □ Rear
    □ Left □ Right
11. **Track frame mounting section**
    □ Front □ Rear
    □ Left □ Right

UNDERCARRIAGE INSPECTION

(Program form No.: ********)**

KUC

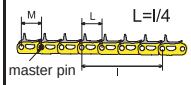
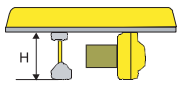
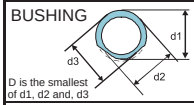
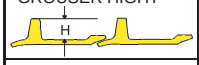
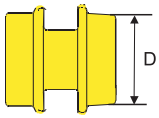
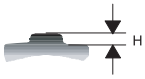
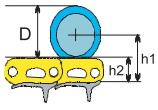


Komatsu
Undercarriage Inspection

Customer name:

Address:

Model	**PC800-8**	**Serial#**		**Equip#**		**Work Order No**	
Location		**SMR**				**Wet, AR, HD or Dry**	**DRY**
Soil condition		**Dealer**				**Shoe width (mm)**	
Working condition		**Inspector**				**Shoe type**	**DOUBLE**
		Insp.Date(yyyy/mm/dd)			(yyyy/m/d)	**Wear type**	**NORMAL**

			New	100% Wear	Measured mm	Wear %	SMR New	SMR Rebuilt	Hours on Parts:	Comments/Observation
LINK PITCH 	R	LH	1042.4	1054.4						
		RH	1042.4	1054.4						
	M	LH	260.60	263.60						
		RH	260.60	263.60						
 LINK HEIGHT	H	LH	156.0	143.0						
		RH	156.0	143.0						
BUSHING  D is the smallest of d1, d2 and, d3	D						New	Turned		
		LH	87.5	82.5						
							New	Turned		
		RH	87.5	82.5						
GROUSER HIGHT 	H	LH	50.0	25.0						
		RH	50.0	25.0						
CARRIER ROLLER 	Front	LH	175.0	155.0						
		RH	175.0	155.0						
	Rear	LH	175.0	155.0						
		RH	175.0	155.0						
IDLER 	Front	LH	22.5	28.5						
		RH	22.5	28.5						
	Rear	LH	22.5	28.5						
		RH	22.5	28.5						
TRACK ROLLER  D=2(h1- h2)	1	LH	255.0	243.0						
	2	LH	255.0	243.0						
	3	LH	255.0	243.0						
	4	LH	255.0	243.0						
	5	LH	255.0	243.0						
	6	LH	255.0	243.0						
	7	LH	255.0	243.0						
	8	LH	255.0	243.0						
	9	LH	255.0	243.0						
	10	LH	255.0	243.0						
	1	RH	255.0	243.0						
	2	RH	255.0	243.0						
	3	RH	255.0	243.0						
	4	RH	255.0	243.0						
	5	RH	255.0	243.0						
	6	RH	255.0	243.0						
	7	RH	255.0	243.0						
	8	RH	255.0	243.0						
	9	RH	255.0	243.0						
	10	RH	255.0	243.0						
SPROCKET H is the smallest of h1, h2, h3 	H	LH	0.0	6.0						
		RH	0.0	6.0						

Remarks:

PC800-8, PC800LC-8 Hydraulic excavator

Form No. **UEN00914-00**

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

40 Troubleshooting
General information on troubleshooting

General information on troubleshooting
Points to remember when troubleshooting 2
Sequence of events in troubleshooting 3
Checks before troubleshooting 4
Classification and troubleshooting steps 5
Connection table for connector pin numbers 9
T-boxes and T-adapters table 32

General information on troubleshooting

Points to remember when troubleshooting

⚠ Stop the machine in a level place, and check that the safety pin, blocks, and parking brake are securely fitted.

⚠ When carrying out the operation with 2 or more workers, keep strictly to the agreed signals, and do not allow any unauthorized person to come near.

⚠ If the radiator cap is removed when the engine is hot, hot water may spurt out and cause burns, so wait for the engine to cool down before starting troubleshooting.

⚠ Be extremely careful not to touch any hot parts or to get caught in any rotating parts.

⚠ When disconnecting wiring, always disconnect the negative (–) terminal of the battery first.

⚠ 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, and important point is of course to understand the structure and function. 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 any 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 manhours, parts, or oil or grease, and at the same time, 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 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?

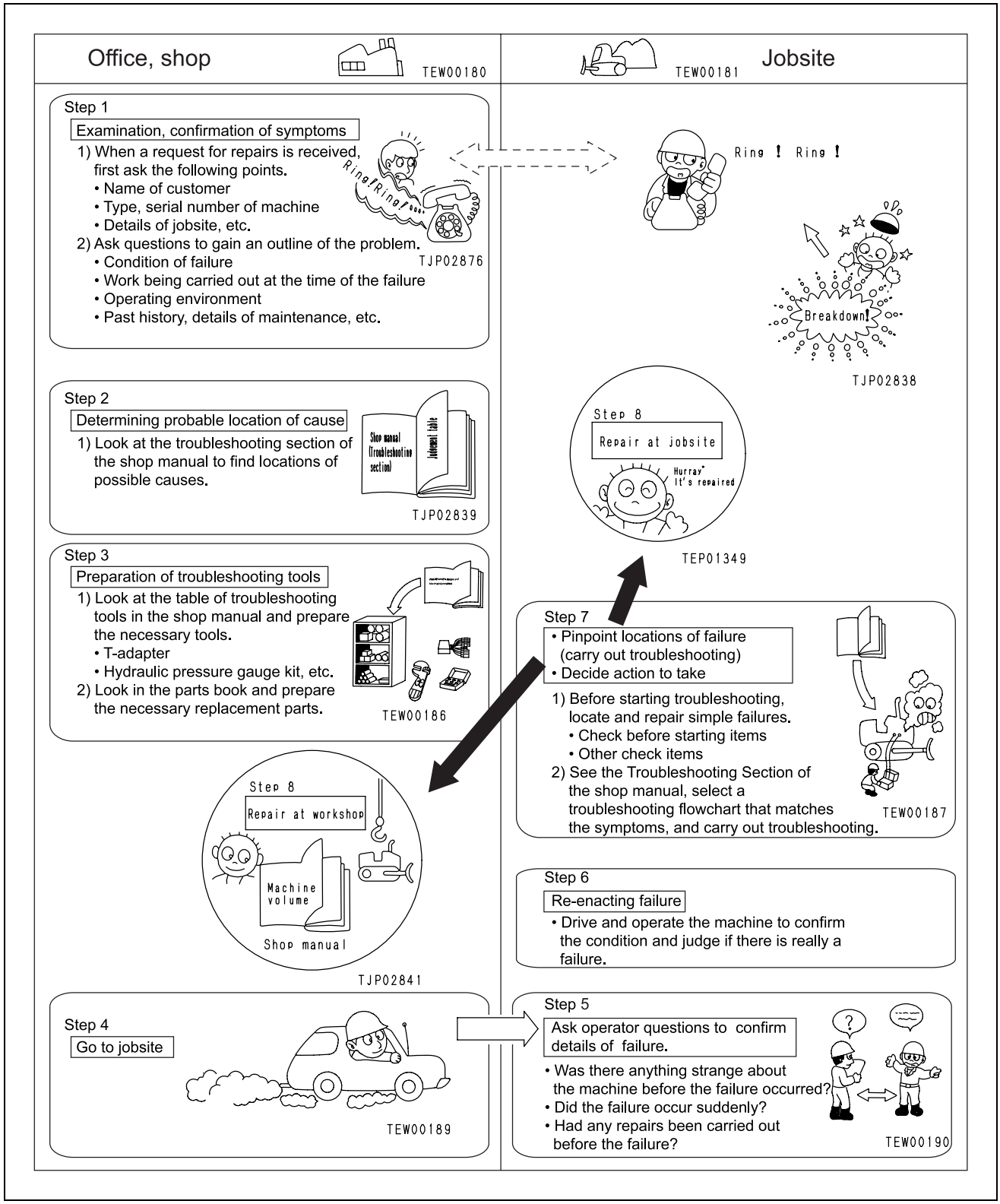
3. Check before troubleshooting
   1) Is there any sign of irregularities of the machine?
   2) Make checks before starting day's work.
   3) Make checks of other items.
   4) Other maintenance items can be checked externally, so check any item that is considered to be necessary.

4. Confirming 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 reenact 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 Items 2 – 4 to narrow down the causes of failure, then use the troubleshooting table or 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.

Sequence of events in troubleshooting



Checks before troubleshooting

	Item	Criterion	Remedy
Lubricating oil, Coolant	1. Check of level and type of fuel	—	Add fuel
	2. Check of fuel for foreign matter	—	Clean and drain
	3. Check of hydraulic oil level	—	Add oil
	4. Check of hydraulic oil strainer	—	Clean and drain
	5. Check of swing machinery oil level	—	Add oil
	6. Check of level and type of engine oil (in oil pan)	—	Add oil
	7. Check of coolant level	—	Add coolant
	8. Check of dust indicator for clogging	—	Clean or replace
	9. Check of hydraulic oil filter	—	Replace
Electrical equipment	1. Check of battery terminals and wiring for looseness and corrosion	—	Retighten or replace
	2. Check of alternator terminals and wiring for looseness and corrosion	—	Retighten or replace
	3. Check of starting motor terminals and wiring for looseness and corrosion	—	Retighten or replace
Hydraulic, Mechanical equipment	1. Check for abnormal noise and smell	—	Repair
	2. Check of oil leakage	—	Repair
	3. Bleeding air	—	Bleed air
Electric, electrical equipment	1. Check of battery voltage (with engine stopped)	20 – 30 V	Replace
	2. Check of electrolyte level	—	Add or replace
	3. Check of wires for discoloration, burn, and removal of cover	—	Replace
	4. Check for released wire clamp and drooping wire	—	Repair
	5. Check of wires for wetness (Check connectors and terminals for wetness, in particular)	—	Disconnect the connectors and dry
	6. Check of fuse for disconnection and corrosion	—	Replace
	7. Check of alternator voltage (while engine speed is at middle or higher)	After operating for several minutes: 27.5 – 29.5 V	Replace
	8. Check of battery relay for operating sound (When starting switch is turned ON or OFF)	—	Replace

Classification and troubleshooting steps

Classification of troubleshooting

Mode	Contents
Display of code	Troubleshooting by failure code
E-mode	Troubleshooting of electrical system
H-mode	Troubleshooting of hydraulic and mechanical system
S-mode	Troubleshooting of engine

Troubleshooting steps

If a problem that appears to be a failure occurs on the machine, identify the relevant troubleshooting No. by performing the following steps and proceed to the main body of troubleshooting.

1. **Procedure for troubleshooting to be taken when action code is displayed on machine monitor:**
   When action code is displayed on machine monitor, press [✓] switch at panel switch section to display failure code.
   Code for the electrical system, carry out the troubleshooting for the corresponding [**Display of code**] according to the displayed failure code.

2. **Troubleshooting steps when the electrical system failure code or mechanical system failure code is recorded in the failure history:**
   If not calling action code in the machine monitor, check the electrical system failure code or mechanical system failure code, using the failure history function of the monitor panel.
   If a code is recorded, carry out troubleshooting for the corresponding [**Display of code**] according to the recorded code.
   - ★ If an electrical system failure code is recorded, delete all the codes and reproduce them, and then see if the trouble is still detected.
   - ★ An error code of the mechanical system cannot be deleted.

3. **Procedure for troubleshooting to be taken when action code is not displayed and no failure code is recorded in abnormality record:**
   If an action code is not displayed on the machine monitor and no failure code is recorded in the abnormality record, a trouble that the machine cannot find out by itself may have occurred in the electrical system or hydraulic and mechanical system.
   In this case, check the phenomenon looking like a trouble again and select the same phenomenon from the table of “Phenomena looking like troubles and troubleshooting Nos.”, and then carry out troubleshooting corresponding to that phenomenon in the “**E-mode**”, “**H-mode**”, or “**S-mode**”.

Failure-looking phenomenon and troubleshooting No.

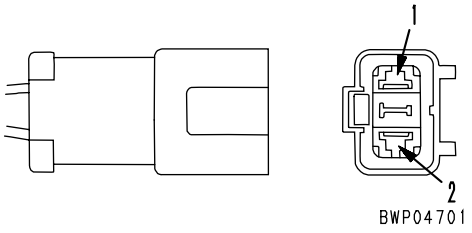
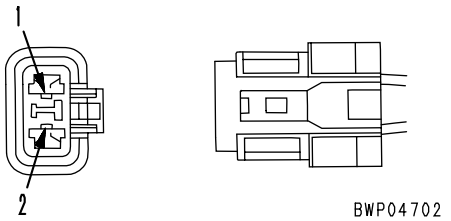
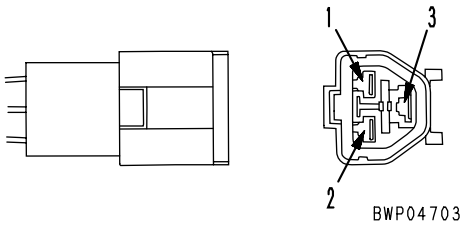
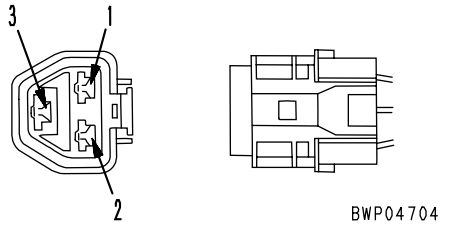
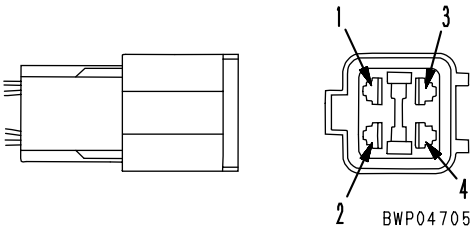
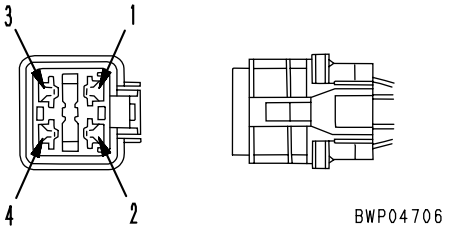
No.	Failure-looking phenomenon		Troubleshooting			
			Display of code	E mode	H mode	S mode
Action to be taken concerning action code and failure code						
1	Display action code in machine monitor		According to displayed code			
2	Display failure code in electrical system after checking failure history					
3	Display failure code in mechanical system after checking failure history					
Engine-related failure						
4	Starting performance is poor (starting always takes time)					S-1
5	Engine does not start	Engine does not turn		E-1		S-2 a)
6		Engine turns but no exhaust smoke comes out				S-2 b)
7		Exhaust smoke comes out but engine does not start (Fuel is being injected)				S-2 c)
8	Engine does not pick up smoothly (follow-up is poor)					S-3
9	Engine stops during operations					S-4
10	Engine does not rotate smoothly (hunting)					S-5
11	Engine lacks output (or lacks power)					S-6
12	Exhaust smoke is black (incomplete combustion)					S-7
13	Oil consumption is excessive (or exhaust smoke is blue)					S-8
14	Oil becomes contaminated quickly					S-9
15	Fuel consumption is excessive					S-10
16	Oil is in coolant (or coolant spurts back, or coolant level goes down)					S-11
17	Oil pressure caution lamp lights up (drop in oil pressure)					S-12
18	Oil level rises (water, fuel in oil)					S-13
19	Water temperature becomes too high (overheating)					S-14
20	Abnormal noise is made					S-15
21	Vibration is excessive					S-16
22	Preheater does not operate			E-2		
23	Auto engine warm-up device does not work			E-3		
24	Auto-decelerator does not operate			E-4		
Failure related to work equipment, swing and travel						
25	Speed or power of all work equipment, travel, and swing is low				H-1	
26	Engine speed lowers remarkably or engine stalls				H-2	
27	All work equipment, travel, and swing systems do not work			E-5	H-3	
28	Abnormal sound is heard from around pump				H-4	
Work equipment-related failure						
29	Boom speed or power is low				H-5	
30	Speed or power of arm is low				H-6	
31	Speed or power of bucket is low				H-7	

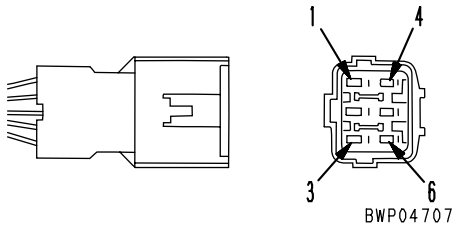
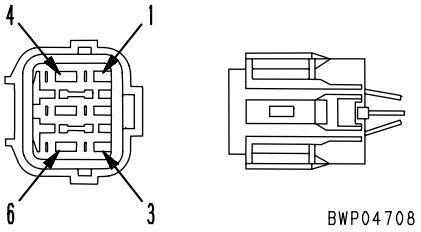
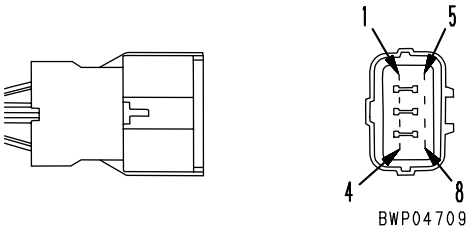
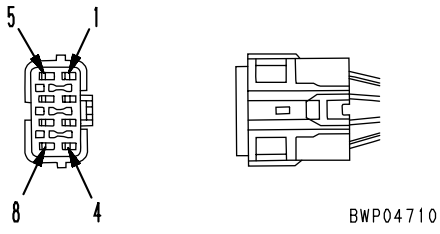
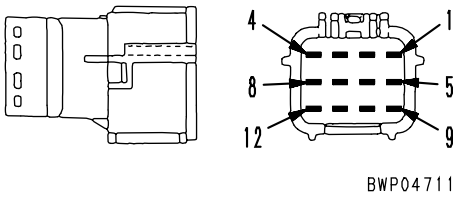
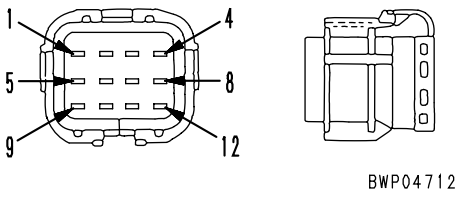
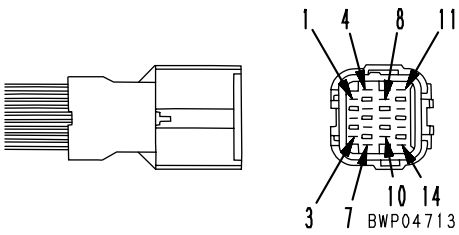
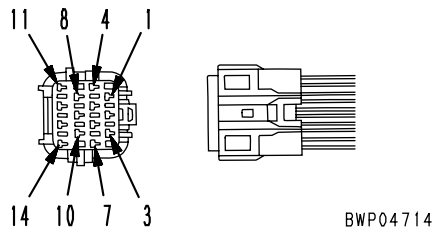
No.	Failure-looking phenomenon	Troubleshooting			
		Display of code	E mode	H mode	S mode
32	Boom does not move			H-8	
33	Arm does not move			H-9	
34	Bucket does not move			H-10	
35	Hydraulic drift of work equipment is large			H-11	
36	Time lag of work equipment is large			H-12	
37	Heavy lift function does not operate or stop			H-13	
38	Machine push-up function does not operate or stop		E-6	H-14	
39	Boom shockless function cannot be turned ON or OFF		E-7	H-15	
Travel-related failure					
40	Machine deviates in one direction			H-16	
41	Machine deviates largely at start			H-17	
42	Machine deviates largely during compound operation			H-18	
43	Travel speed or power is low			H-19	
44	Machine does not travel (only one track)			H-20	
45	Travel speed does not change			H-21	
46	Travel alarm does not sound or does not stop sounding		E-32		
Swing-related failure					
47	Upper structure does not swing			H-22	
48	Swing speed or acceleration is low			H-23	
49	Swing speed or acceleration is low during compound operation of swing and work equipment			H-24	
50	Upper structure overruns excessively when it stops swinging			H-25	
51	Large shock is made when upper structure stops swinging			H-26	
52	Large abnormal sound is made when upper structure stops swinging			H-27	
53	Hydraulic drift of swing is large			H-28	
Machine monitor-related failure (Operator's menu: ordinary display)					
54	Any item is not displayed on monitor panel		E-8		
55	Part of display on monitor panel is missing		E-9		
56	Monitor panel displays contents irrelevant to the model		E-10		
57	Fuel level monitor red lamp lights up while engine is running		E-11		
58	Engine coolant thermometer does not display normally		E-12		
59	Hydraulic oil temperature gauge does not display correctly		E-13		
60	Fuel gauge does not display correctly		E-14		
61	Swing lock monitor does not display correctly		E-15		
62	When monitor switch is operated, nothing is displayed		E-16		
63	Windshield wiper and window washer do not work		E-17		

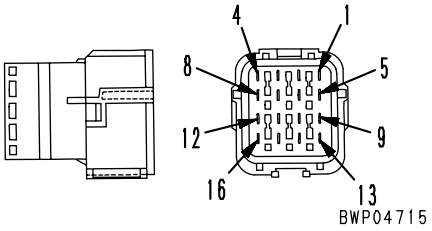
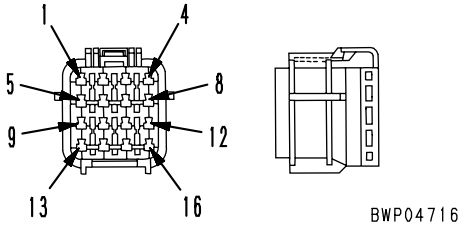
No.	Failure-looking phenomenon	Troubleshooting			
		Display of code	E mode	H mode	S mode
Machine monitor-related failure (Service menu: Special function display)					
64	"Boom RAISE" is not correctly displayed in monitor function		E-18		
65	"Boom LOWER" is not correctly displayed in monitor function		E-19		
66	"Arm IN" is not correctly displayed in monitor function		E-20		
67	"Arm OUT" is not correctly displayed in monitor function		E-21		
68	"Bucket CURL" is not correctly displayed in monitor function		E-22		
69	"Bucket DUMP" is not correctly displayed in monitor function		E-23		
70	"SWING" is not correctly displayed in monitor function		E-24		
71	"Left travel" is not displayed normally in monitoring function		E-25		
72	"Right travel" is not displayed normally in monitoring function		E-26		
73	"Service" is not correctly displayed in monitor function		E-27		
KOMTRAX-related failure					
74	KOMTRAX system does not operate normally		E-28		
Other failure					
75	Air conditioner does not work		E-29		
76	Step light does not light up or go off		E-30		
77	Electric grease gun does not operate		E-31		

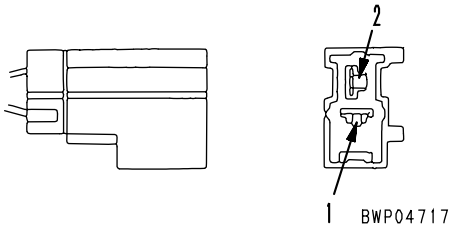
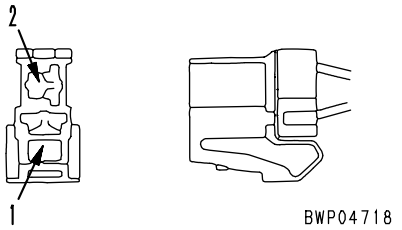
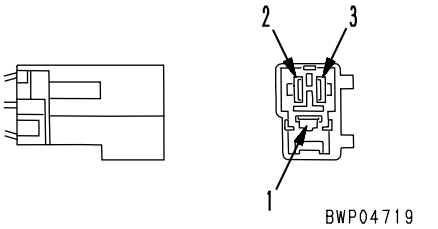
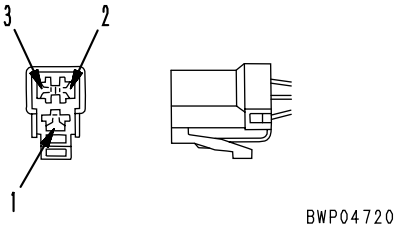
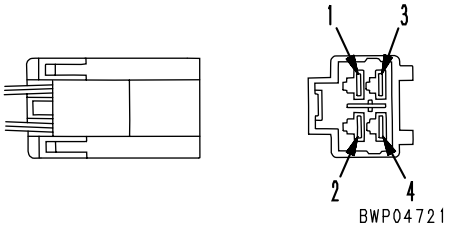
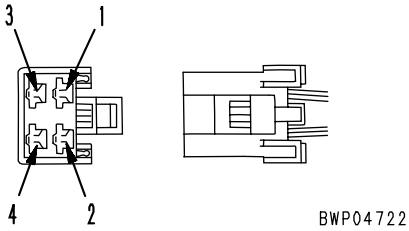
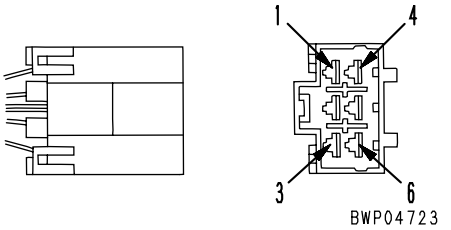
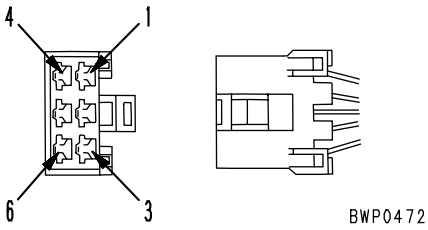
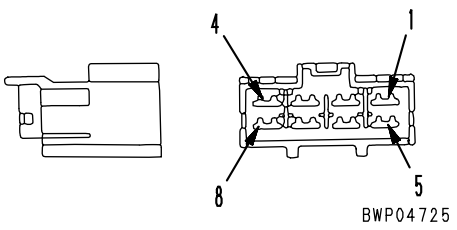
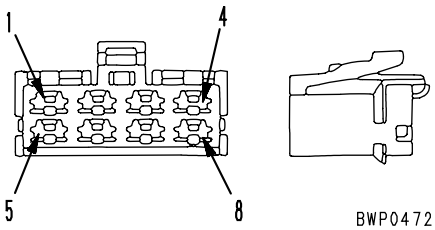
Connection table for connector pin numbers

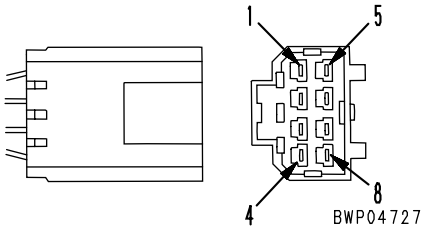
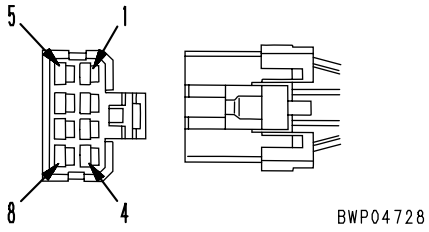
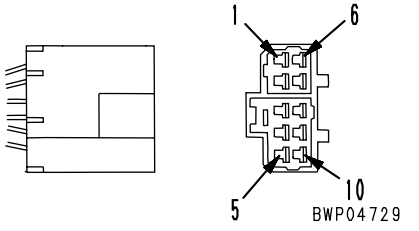
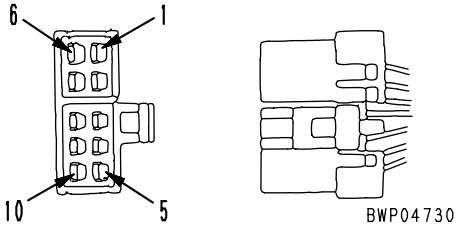
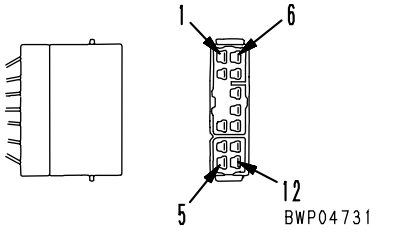
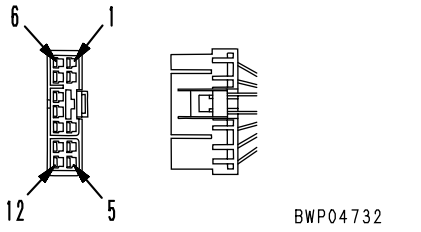
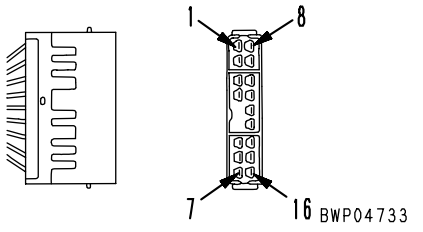
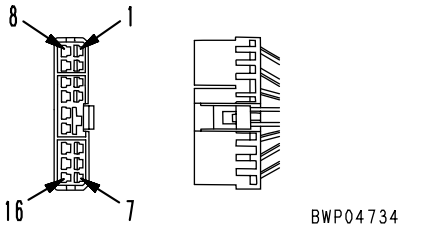
★ The terms male and female refer to the pins, while the terms male housing and female housing refer to the mating portion of the housing.

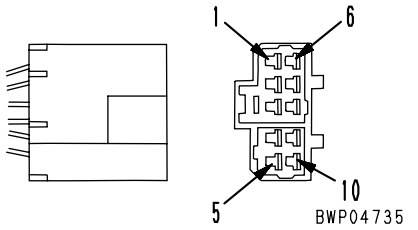
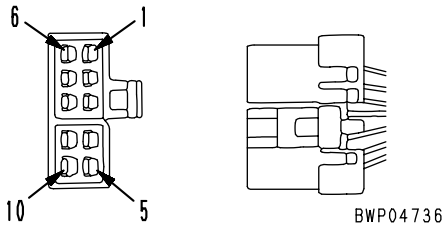
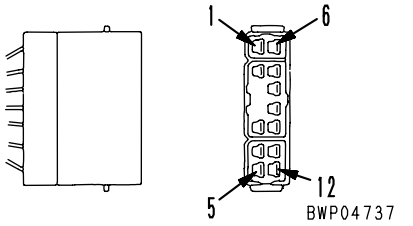
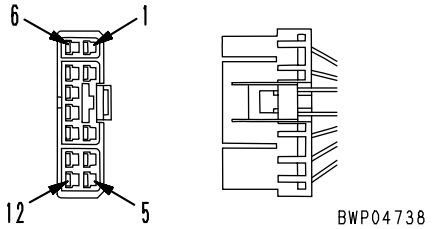
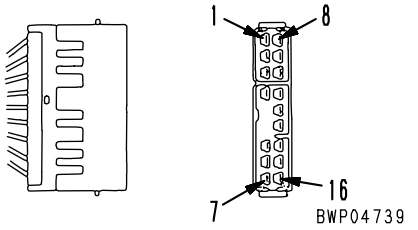
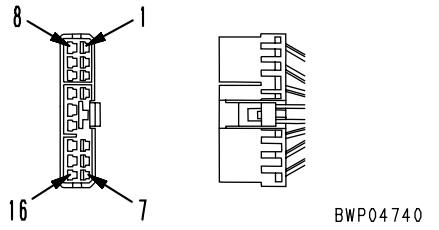
No.of pins	X type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
1	Part No.: 08055-00181	Part No.: 08055-00191	799-601-7010
2			799-601-7020
	Part No.: 08055-00282	Part No.: 08055-00292	
3			799-601-7030
	Part No.: 08055-00381	Part No.: 08055-00391	
4			799-601-7040
	Part No.: 08055-00481	Part No.: 08055-00491	
—	Terminal part No.: 79A-222-3370 • Electric wire size: 0.85 • Grommet: Black • Q'ty: 20	Terminal part No.: 79A-222-3390 • Electric wire size: 0.85 • Grommet: Black • Q'ty: 20	—
—	Terminal part No.: 79A-222-3380 • Electric wire size: 2.0 • Grommet: Red • Q'ty: 20	Terminal part No.: 79A-222-3410 • Electric wire size: 2.0 • Grommet: Red • Q'ty: 20	—

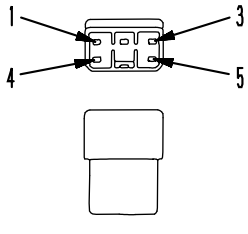
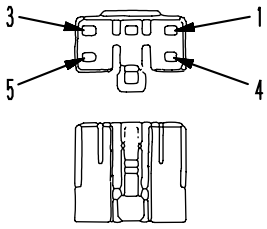
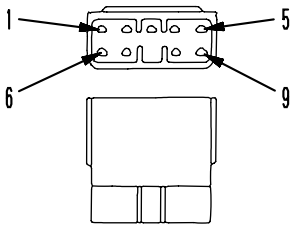
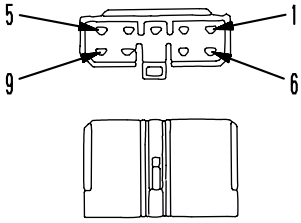
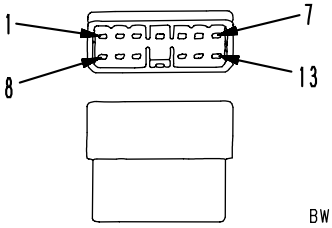
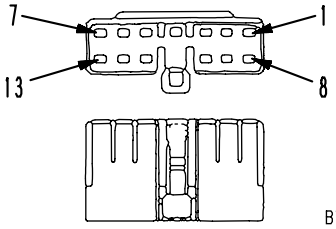
No.of pins	SWP type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
6			799-601-7050
	Part No.: 08055-10681	Part No.: 08055-10691	
8			799-601-7060
	Part No.: 08055-10881	Part No.: 08055-10891	
12			799-601-7310
	Part No.: 08055-11281	Part No.: 08055-11291	
14			799-601-7070
	Part No.: 08055-11481	Part No.: 08055-11491	

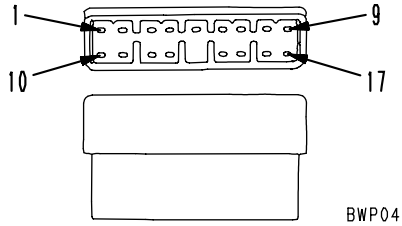
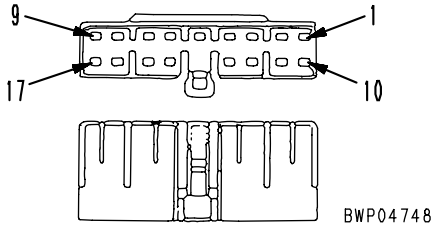
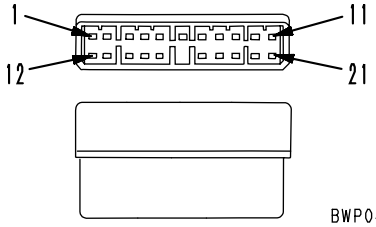
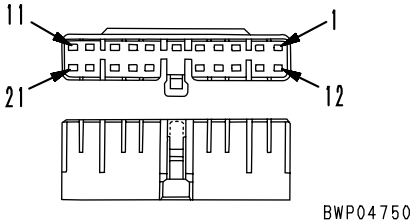
No. of pins	SWP type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
16			799-601-7320
	Part No.: 08055-11681	Part No.: 08055-11691	
—	Terminal part No.: • Electric wire size: 0.85 • Grommet: Black • Q'ty: 20	Terminal part No.: • Electric wire size: 0.85 • Grommet: Black • Q'ty: 20	—
—	Terminal part No.: • Electric wire size: 1.25 • Grommet: Red • Q'ty: 20	Terminal part No.: • Electric wire size: 1.25 • Grommet: Red • Q'ty: 20	—

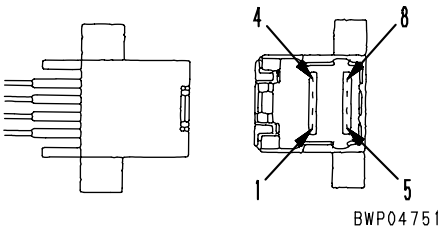
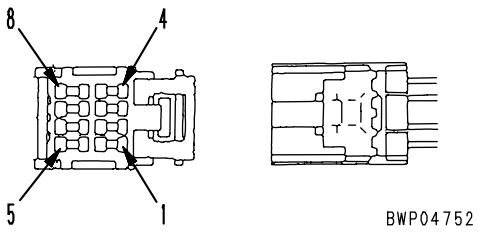
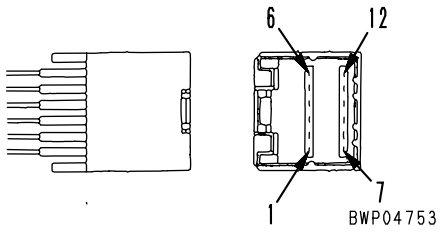
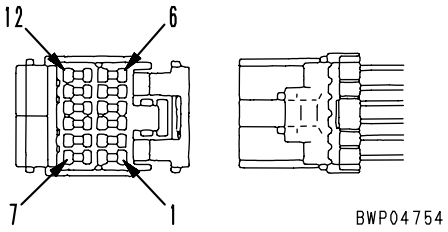
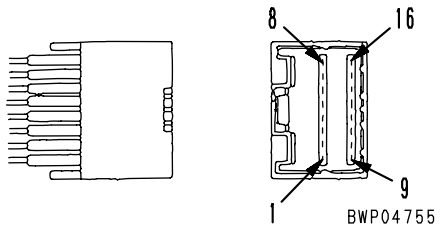
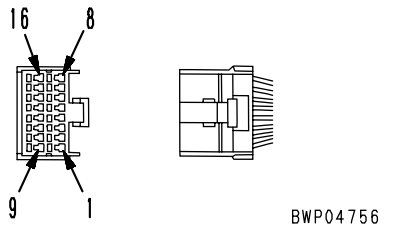
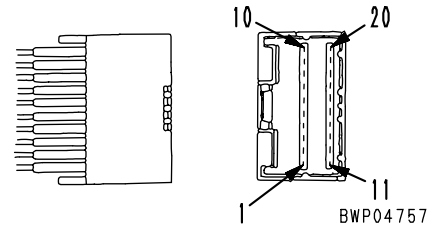
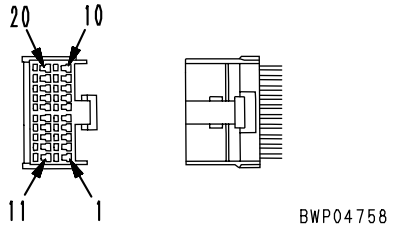
No.of pins	M type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
1	Part No.: 08056-00171	Part No.: 08056-00181	799-601-7080
2			799-601-7090
	Part No.: 08056-00271	Part No.: 08056-00281	
3			799-601-7110
	Part No.: 08056-00371	Part No.: 08056-00381	
4			799-601-7120
	Part No.: 08056-00471	Part No.: 08056-00481	
6			799-601-7130
	Part No.: 08056-00671	Part No.: 08056-00681	
8			799-601-7340
	Part No.: 08056-00871	Part No.: 08056-00881	

No.of pins	S type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			799-601-7140
	Part No.: 08056-10871	Part No.: 08056-10881	
10 (White)			799-601-7150
	Part No.: 08056-11071	Part No.: 08056-11081	
12 (White)			799-601-7350
	Part No.: 08056-11271	Part No.: 08056-11281	
16 (White)			799-601-7330
	Part No.: 08056-11671	Part No.: 08056-11681	

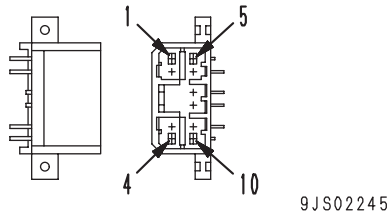
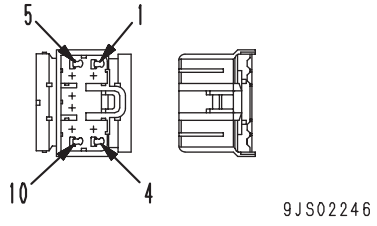
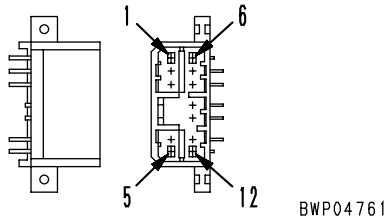
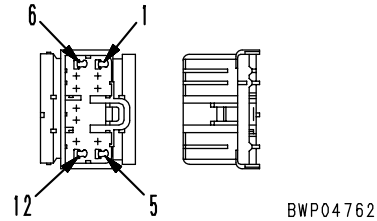
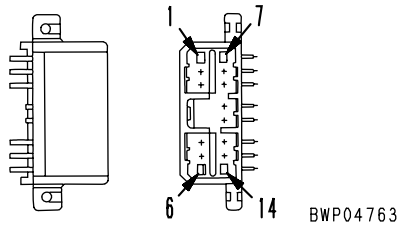
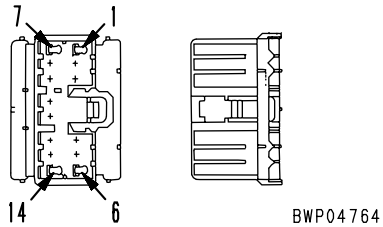
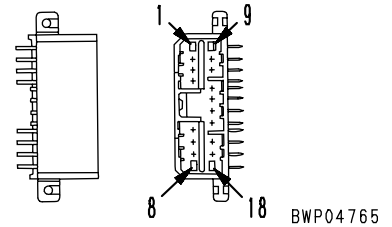
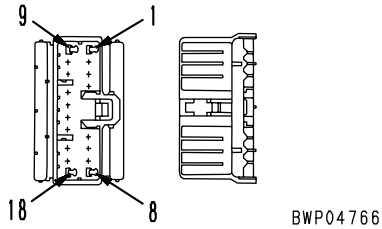
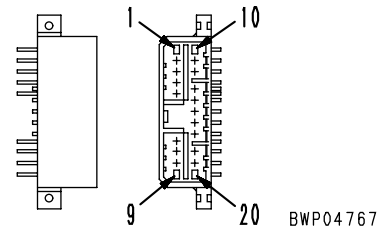
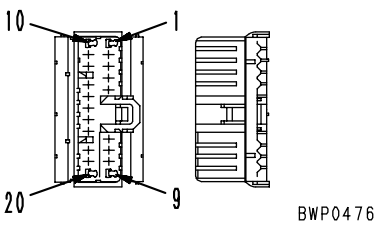
No.of pins	S type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10 (Blue)			—
	—	—	
12 (Blue)			799-601-7160
	Part No.: 08056-11272	Part No.: 08056-11282	
16 (Blue)			799-601-7170
	Part No.: 08056-11672	Part No.: 08056-11682	

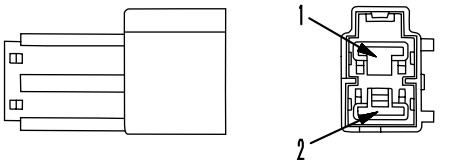
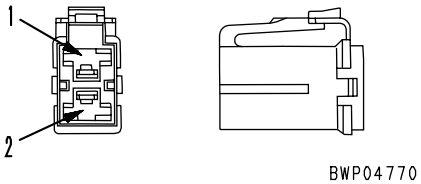
No.of pins	MIC type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
7	Body part No.: 79A-222-2640 (Q'ty: 5)	Body part No.: 79A-222-2630 (Q'ty: 5)	—
11	Body part No.: 79A-222-2680 (Q'ty: 5)	Body part No.: 79A-222-2670 (Q'ty: 5)	—
5	 BWP04741	 BWP04742	799-601-2710
	Body part No.: 79A-222-2620 (Q'ty: 5)	Body part No.: 79A-222-2610 (Q'ty: 5)	
9	 BWP04743	 BWP04744	799-601-2950
	Body part No.: 79A-222-2660 (Q'ty: 5)	Body part No.: 79A-222-2650 (Q'ty: 5)	
13	 BWP04745	 BWP04746	799-601-2720
	Body part No.: 79A-222-2710 (Q'ty: 2)	Body part No.: 79A-222-2690 (Q'ty: 2)	

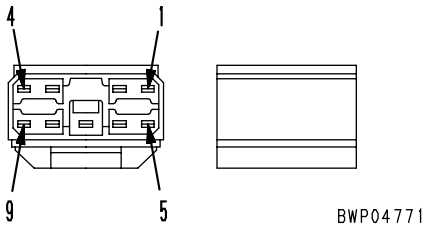
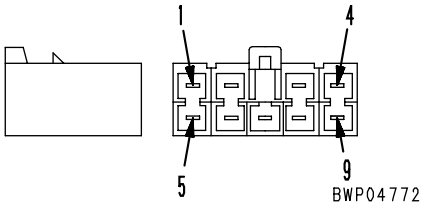
No.of pins	MIC type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
17			799-601-2730
	Body part No.: 79A-222-2730 (Q'ty: 2)	Body part No.: 79A-222-2720 (Q'ty: 2)	
21			799-601-2740
	Body part No.: 79A-222-2750 (Q'ty: 2)	Body part No.: 79A-222-2740 (Q'ty: 2)	
	Body part No.: 79A-222-2770 (Q'ty: 50)	Body part No.: 79A-222-2760 (Q'ty: 50)	—

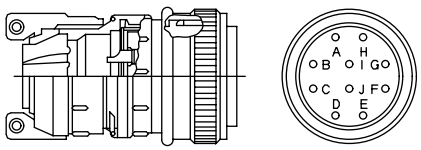
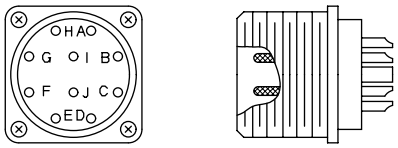
No.of pins	AMP040 type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			799-601-7180
	—	Housing part No.: 79A-222-3430 (Q'ty: 5)	
12			799-601-7190
	—	Housing part No.: 79A-222-3440 (Q'ty: 5)	
16			799-601-7210
	—	Housing part No.: 79A-222-3450 (Q'ty: 5)	
20			799-601-7220
	—	Housing part No.: 79A-222-3460 (Q'ty: 5)	

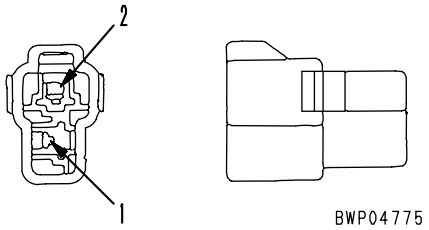
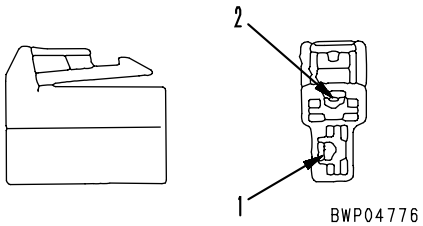
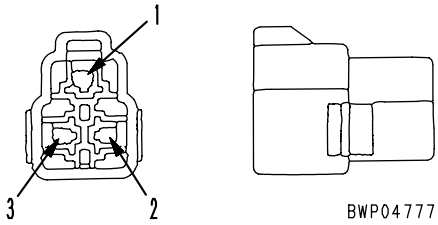
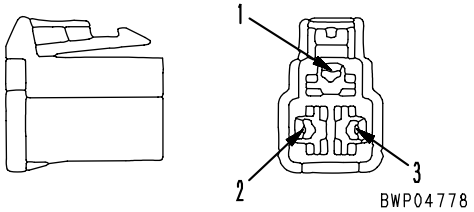
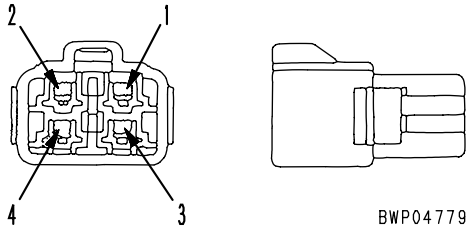
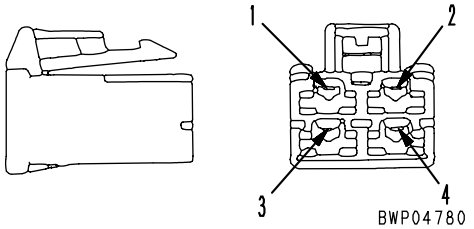
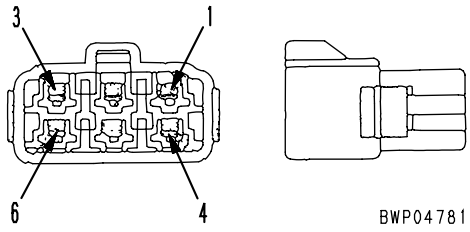
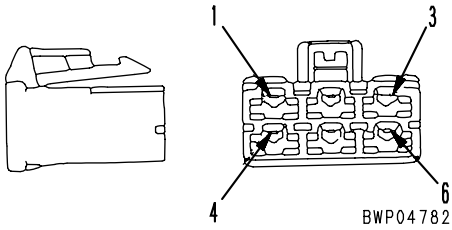
a Terminal part No.: 79A-222-3470 (No relation with number of pins)

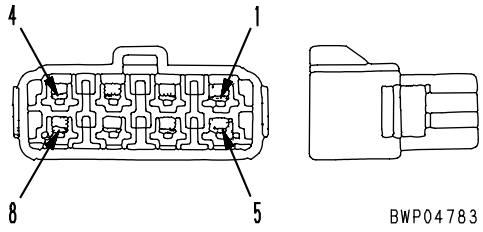
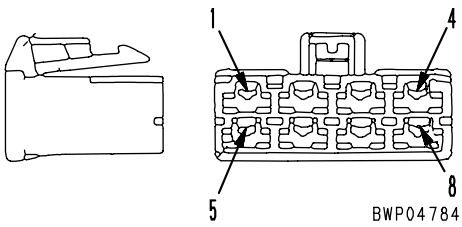
No.of pins	AMP070 type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10			799-601-7510
	—	Part No.: 7821-92-7330	
12			799-601-7520
	—	Part No.: 7821-92-7340	
14			799-601-7530
	—	Part No.: 7821-92-7350	
18			799-601-7540
	—	Part No.: 7821-92-7360	
20			799-601-7550
	—	Part No.: 7821-92-7370	

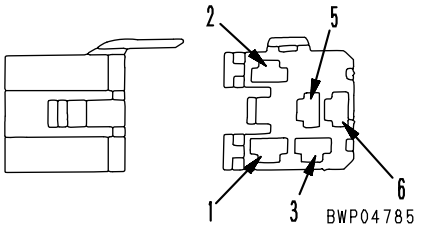
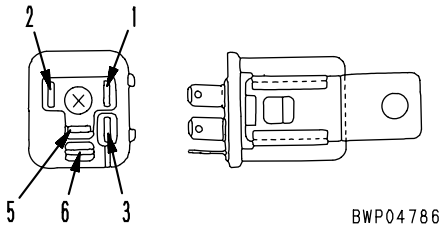
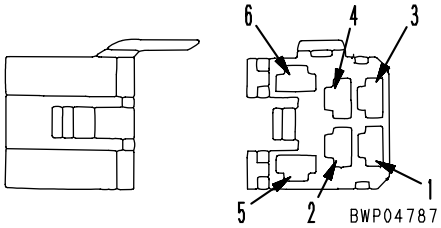
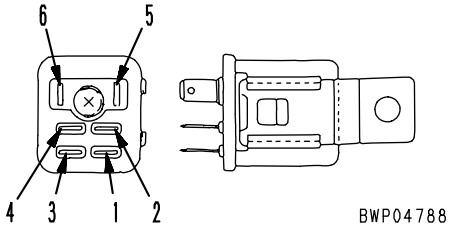
No.of pins	L type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
2	 BWP04769	 BWP04770	—
	—	—	

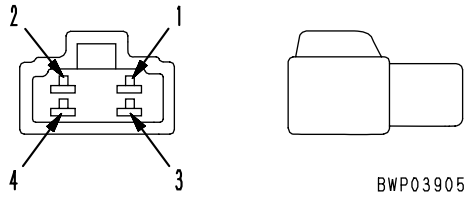
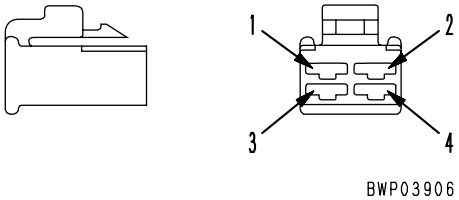
No.of pins	Connector for PA		
	Male (female housing)	Female (male housing)	T-adapter Part No.
9	 BWP04771	 BWP04772	—
	—	—	

No.of pins	Bendix MS connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10	 BWP04773	 BWP04774	799-601-3460
	—	—	

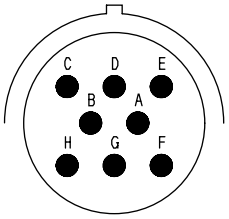
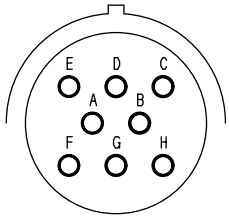
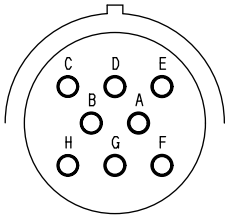
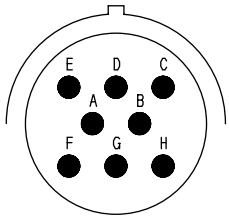
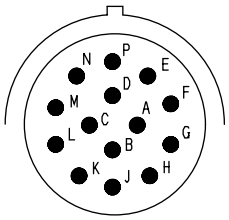
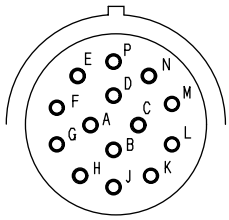
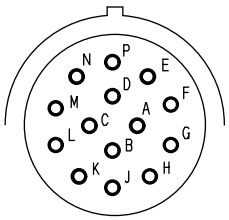
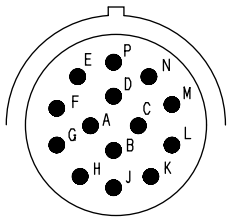
No.of pins	KES 1 (Automobile) connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
2			—
	Part No.: 08027-10210 (Natural color) 08027-10220 (Black)	Part No.: 08027-10260 (Natural color) 08027-10270 (Black)	
3			—
	Part No.:08027-10310	Part No.:08027-10360	
4			—
	Part No.: 08027-10410 (Natural color) 08027-10420 (Black)	Part No.: 08027-10460 (Natural color) 08027-10470 (Black)	
6			—
	Part No.: 08027-10610 (Natural color) 08027-10620 (Black)	Part No.: 08027-10660 (Natural color) 08027-10670 (Black)	

No.of pins	KES 1 (Automobile) connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			—
	Part No.: 08027-10810 (Natural color) 08027-10820 (Black)	Part No.: 08027-10860 (Natural color) 08027-10870 (Black)	

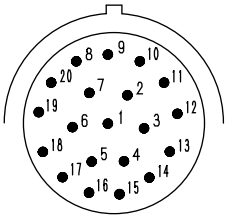
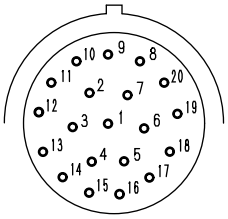
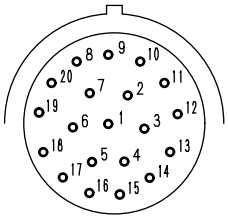
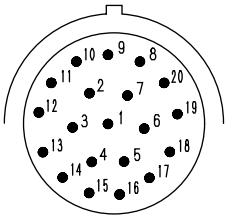
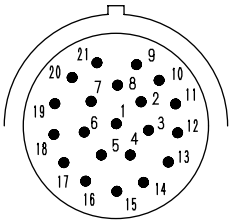
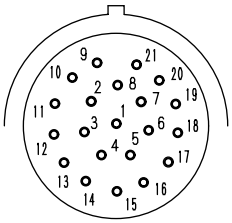
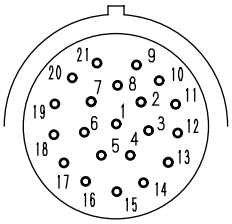
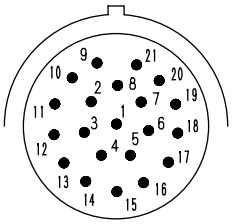
No.of pins	Connector for relay (Socket type)		
	Male (female housing)	Female (male housing)	T-adapter Part No.
5			799-601-7360
	—	—	
6			799-601-7370
	—	—	

No.of pins	F type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
4	 BWP03905	 BWP03906	—
	—	—	

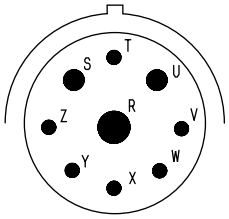
[The pin No. is also marked on the connector (electric wire insertion end)]

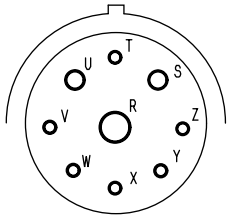
Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
18-8 (1)	Pin (male terminal)	Pin (female terminal)	799-601-9210
	 BWP05001	 BWP05002	
	Part No.: 08191-11201, 08191-11202, 08191-11205, 08191-11206	Part No.: 08191-14101, 08191-14102, 08191-14105, 08191-14106	
	Pin (female terminal)	Pin (male terminal)	799-601-9210
	 BWP05003	 BWP05004	
	Part No.: 08191-12201, 08191-12202, 08191-12205, 08191-12206	Part No.: 08191-13101, 08191-13102, 08191-13105, 08191-13106	
18-14 (2)	Pin (male terminal)	Pin (female terminal)	799-601-9220
	 BWP05005	 BWP05006	
	Part No.: 08191-21201, 08191-12202, 08191-21205, 08191-12206	Part No.: 08191-24101, 08191-24102, 08191-24105, 08191-24106	
	Pin (female terminal)	Pin (male terminal)	799-601-9220
	 BWP05007	 BWP05008	
	Part No.: 08191-22201, 08191-22202, 08191-22205, 08191-22206	Part No.: 08191-23101, 08191-23102, 08191-23105, 08191-23106	

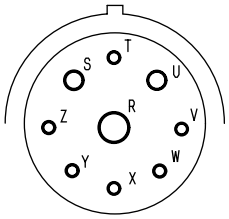
[The pin No. is also marked on the connector (electric wire insertion end)]

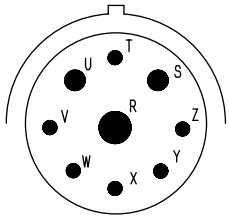
Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
18-20 (3)	Pin (male terminal)	Pin (female terminal)	799-601-9230
	 BWP05009	 BWP05010	
	Part No.:08191-31201, 08191-31202	Part No.:08191-34101, 08191-34102	
	Pin (female terminal)	Pin (male terminal)	799-601-9230
	 BWP05011	 BWP05012	
	Part No.:08191-32201, 08191-32202	Part No.:08191-33101, 08191-33102	
18-21 (4)	Pin (male terminal)	Pin (female terminal)	799-601-9240
	 BWP05013	 BWP05014	
	Part No.:08191-41201, 08191-42202	Part No.:08191-44101, 08191-44102	
	Pin (female terminal)	Pin (male terminal)	799-601-9240
	 BWP05015	 BWP05016	
	Part No.:08191-42201, 08191-42202	Part No.:08191-43101, 08191-43102	

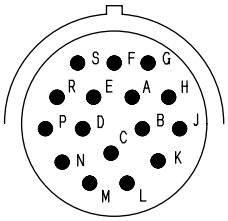
[The pin No. is also marked on the connector (electric wire insertion end)]

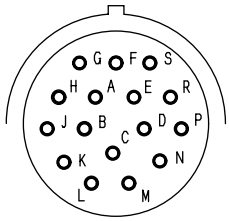
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<tr><td rowspan="2">Type (shell size code)</td><td colspan="3">HD30 Series connector</td></tr>
<tr><td>Body (plug)</td><td>Body (receptacle)</td><td>T-adapter Part No.</td></tr>
<tr><td rowspan="4">24-9 (5)</td><td>Pin (male terminal)</td><td>Pin (female terminal)</td><td rowspan="2">799-601-9250</td></tr>
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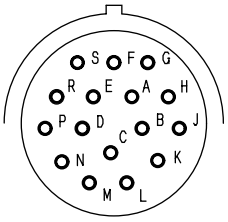
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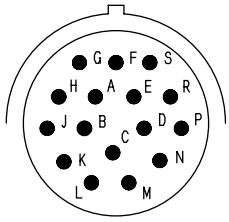
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BWP05020</td></tr>
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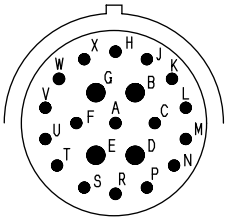
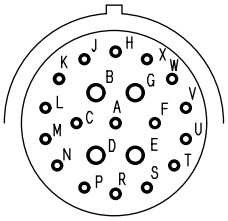
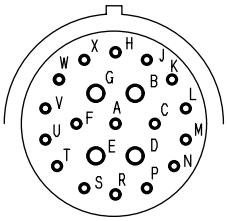
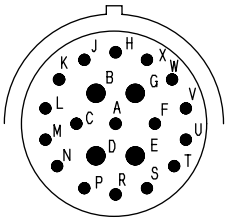
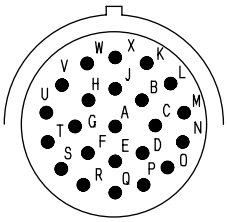
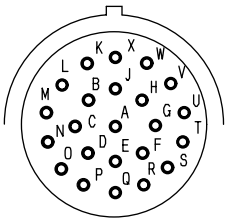
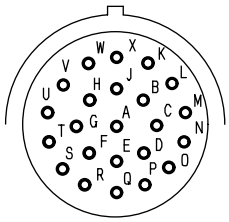
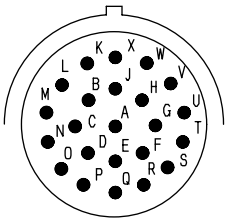
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08191-64105, 08191-64106</td></tr>
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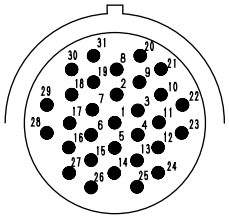
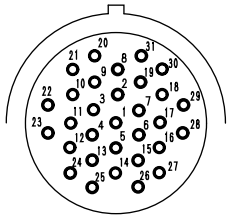
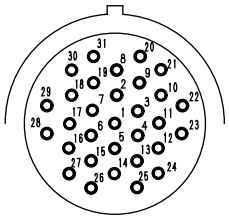
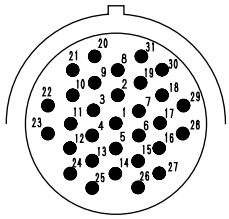
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<tr><td>Part No.: 08191-62201, 08191-62202,
08191-62205, 08191-62206</td><td>Part No.: 08191-63101, 08191-63102,
08191-63105, 08191-63106</td></tr>
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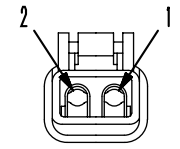
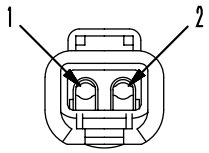
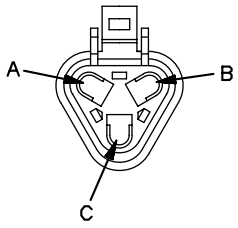
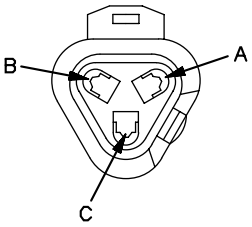
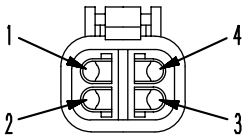
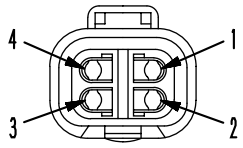
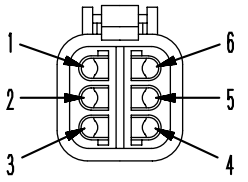
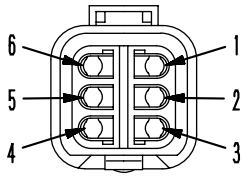
[The pin No. is also marked on the connector (electric wire insertion end)]

<table>
<tr><td rowspan="2">Type (shell size code)</td><td colspan="3">HD30 Series connector</td></tr>
<tr><td>Body (plug)</td><td>Body (receptacle)</td><td>T-adapter Part No.</td></tr>
<tr><td rowspan="4">24-21 (7)</td><td>Pin (male terminal)</td><td>Pin (female terminal)</td><td rowspan="2">799-601-9270</td></tr>
<tr><td> 
BWP05025</td><td> 
BWP05026</td></tr>
<tr><td>Part No.: 08191-71201, 08191-71202,
08191-71205, 08191-71206</td><td>Part No.: 08191-74101, 08191-74102,
08191-74105, 08191-74106</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male terminal)</td><td rowspan="2">799-601-9270</td></tr>
<tr><td> 
BWP05027</td><td> 
BWP05028</td></tr>
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08191-72205, 08191-72206</td><td>Part No.: 08191-73101, 08191-73102,
08191-73105, 08191-73106</td></tr>
<tr><td rowspan="4">24-23 (8)</td><td>Pin (male terminal)</td><td>Pin (female terminal)</td><td rowspan="2">799-601-9280</td></tr>
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BWP05029</td><td> 
BWP05030</td></tr>
<tr><td>Part No.: 08191-81201, 08191-81202
08191-81203, 08191-81204
08191-81205, 08191-80206</td><td>Part No.: 08191-84101, 08191-84102
08191-84103, 08191-84104
08191-84105, 08191-84106</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male terminal)</td><td rowspan="2">799-601-9280</td></tr>
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BWP05031</td><td> 
BWP05032</td></tr>
<tr><td>Part No.: 08191-82201, 08191-82202
08191-82203, 08191-82204
08191-82205, 08191-82206</td><td>Part No.: 08191-83101, 08191-83102
08191-83103, 08191-83104
08191-83105, 08191-83106</td></tr>
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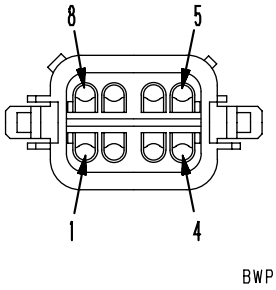
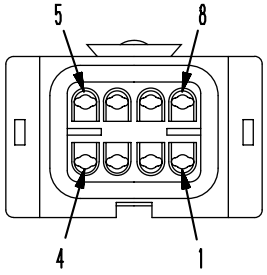
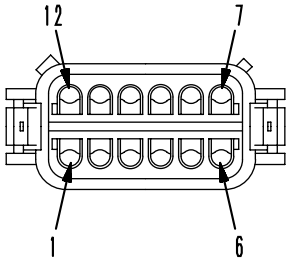
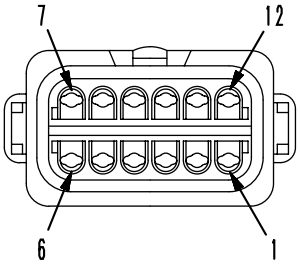
[The pin No. is also marked on the connector (electric wire insertion end)]

<table>
<tr><td rowspan="2">Type (shell size code)</td><td colspan="3">HD30 Series connector</td></tr>
<tr><td>Body (plug)</td><td>Body (receptacle)</td><td>T-adapter Part No.</td></tr>
<tr><td rowspan="4">24-31 (9)</td><td>Pin (male terminal)</td><td>Pin (female terminal)</td><td rowspan="2">799-601-9290</td></tr>
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BWP05033</td><td> 
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<tr><td>Pin (female terminal)</td><td>Pin (male terminal)</td><td rowspan="2">799-601-9290</td></tr>
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BWP05035</td><td> 
BWP05036</td></tr>
<tr><td>Part No.: 08191-92203, 08191-92204,
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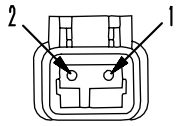
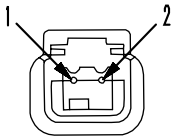
[The pin No. is also marked on the connector (electric wire insertion end)]

No.of pins	DT Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
2	 BWP05037	 BWP05038	799-601-9020
	Part No.: 08192-12200 (normal type) 08192-22200 (fine wire type)	Part No.: 08192-12100 (normal type) 08192-22100 (fine wire type)	
3	 BWP05039	 BWP05040	799-601-9030
	Part No.: 08192-13200 (normal type) 08192-23200 (fine wire type)	Part No.: 08192-13100 (normal type) 08192-23100 (fine wire type)	
4	 BWP05041	 BWP05042	799-601-9040
	Part No.: 08192-14200 (normal type) 08192-24200 (fine wire type)	Part No.: 08192-14100 (normal type) 08192-24100 (fine wire type)	
6	 BWP05043	 BWP05044	799-601-9050
	Part No.: 08192-16200 (normal type) 08192-26200 (fine wire type)	Part No.: 08192-16100 (normal type) 08192-26100 (fine wire type)	

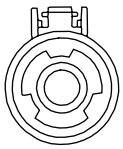
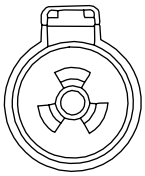
[The pin No. is also marked on the connector (electric wire insertion end)]

No.of pins	DT Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
8	 BWP05045	 BWP05046	Body color (Gray): 799-601-9060 Body color (Black): 799-601-9070 Body color (Green): 799-601-9080 Body color (Brown): 799-601-9090
	Part No.: 08192-1820☐ (normal type) 08192-2820☐ (fine wire type)	Part No.: 08192-1810☐ (normal type) 08192-2810☐ (fine wire type)	
12	 BWP05047	 BWP05048	Body color (Gray): 799-601-9110 Body color (Black): 799-601-9120 Body color (Green): 799-601-9130 Body color (Brown): 799-601-9140
	Part No.: 08192-1920☐ (normal type) 08192-2920☐ (fine wire type)	Part No.: 08192-1910☐ (normal type) 08192-2910☐ (fine wire type)	

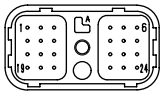
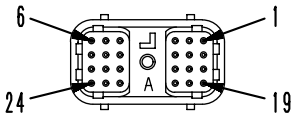
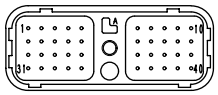
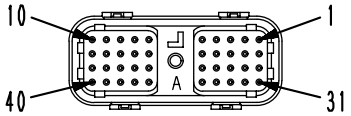
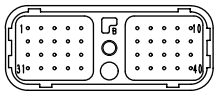
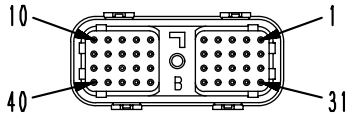
[The pin No. is also marked on the connector (electric wire insertion end)]

No.of pins	DTM Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
2	 BWP05049	 BWP05050	799-601-9010
	Part No.: 08192-02200	Part No.: 08192-02100	

[The pin No. is also marked on the connector (electric wire insertion end)]

No.of pins	DTHD Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
1	 BWP05051	 BWP05052	—
	Part No.: 08192-31200 (Contact size#12) 08192-41200 (Contact size #8) 08192-51200 (Contact size #4)	Part No.: 08192-31100 (Contact size#12) 08192-41100 (Contact size #8) 08192-51100 (Contact size #4)	

[The pin No. is also marked on the connector (electric wire insertion end)]

No.of pins	DRC26 Series connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
24	 BJD12722	 BJD12723	799-601-9360
	—	Part No.:7821-93-3110	
40 (A)	 BJD12724	 BJD12725	799-601-9350
	—	Part No.:7821-93-3120	
40 (B)	 BJD12726	 BJD12727	799-601-9350
	—	Part No.:7821-93-3130	

T-boxes and T-adapters table

★ The Nos. in the columns are the part Nos. of the T-boxes, T-adapters, and other parts. The Nos. in the lines are the kit Nos. of the T-adapter kits.

Part No.	Part name	Number of pins	Identification symbol	T-adapter kit																	Out of kit
				799-601-2500	799-601-2700	799-601-2800	799-601-2900	799-601-3000	799-601-5500	799-601-6000	799-601-6500	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	
799-601-2600	T-box (for ECONO)	21		●		●	●						●	●		●					
799-601-3100	T-box (for MS)	37						●													
799-601-3200	T-box (for MS)	37						●													
799-601-3300	T-box (for ECONO)	24								●											
799-601-3360	· Plate for MS (24-pin)									●											
799-601-3370	· Plate for MS (17-pin)									●											
799-601-3380	· Plate for MS (14-pin)									●											
799-601-3410	Adapter for BENDIX (MS)	24	MS-24P							●	●										
799-601-3420	Adapter for BENDIX (MS)	24	MS-24P							●	●										
799-601-3430	Adapter for BENDIX (MS)	17	MS-17P							●	●										
799-601-3440	Adapter for BENDIX (MS)	17	MS-17P							●	●										
799-601-3450	Adapter for BENDIX (MS)	5	MS-5P						●	●											
799-601-3460	Adapter for BENDIX (MS)	10	MS-10P							●	●										
799-601-3510	Adapter for BENDIX (MS)	5	MS-5S						●	●											
799-601-3520	Adapter for BENDIX (MS)	17	MS-17P						●	●											
799-601-3530	Adapter for BENDIX (MS)	19	MS-19P							●	●										
799-601-2910	Adapter for BENDIX (MS)	14	MS-14P						●	●											
799-601-3470	Case									●											
799-601-2710	Adapter for MIC	5	MIC-5P	●	●		●							●							
799-601-2720	Adapter for MIC	13	MIC-13P	●	●		●							●							
799-601-2730	Adapter for MIC	17	MIC-17P	●	●	●	●						●	●		●					
799-601-2740	Adapter for MIC	21	MIC-21P	●	●	●	●						●	●		●					
799-601-2950	Adapter for MIC	9	MIC-9P									●	●	●		●					
799-601-2750	Adapter for ECONO	2	ECONO2P	●	●																
799-601-2760	Adapter for ECONO	3	ECONO13P	●	●																
799-601-2770	Adapter for ECONO	4	ECONO4P	●	●																
799-601-2780	Adapter for ECONO	8	ECONO8P	●	●																
799-601-2790	Adapter for ECONO	12	ECONO12P	●	●																
799-601-2810	Adapter for DLI	8	DLI-8P	●	●																
799-601-2820	Adapter for DLI	12	DLI-12P	●	●																
799-601-2830	Adapter for DLI	16	DLI-16P	●	●																
799-601-2840	Extension cable (ECONO type)	12	ECONO12P	●	●									●							
799-601-2850	Case			●																	
799-601-4210	Adapter for DRC	50	DRC50																		●
799-601-7010	Adapter for X (T-adapter)	1												●		●					
799-601-7020	Adapter for X	2	X2P									●	●	●		●					
799-601-7030	Adapter for X	3	X3P									●	●	●		●					
799-601-7040	Adapter for X	4	X4P									●	●	●		●					
799-601-7050	Adapter for SWP	6	SW6P									●	●	●							
799-601-7060	Adapter for SWP	8	SW8P									●	●	●							
799-601-7310	Adapter for SWP	12	SW12P																		●
799-601-7070	Adapter for SWP	14	SW14P											●		●					
799-601-7320	Adapter for SWP	16	SW16P																		●
799-601-7080	Adapter for M (T-adapter)	1												●		●					
799-601-7090	Adapter for M	2	M2P									●	●	●		●					

Part No.	Part name	Number of pins	Identification symbol	T-adapter kit																	Out of kit
				799-601-2500	799-601-2700	799-601-2800	799-601-2900	799-601-3000	799-601-5500	799-601-6000	799-601-6500	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	
799-601-7110	Adapter for M	3	M3P									●	●	●		●					
799-601-7120	Adapter for M	4	M4P									●	●	●		●					
799-601-7130	Adapter for M	6	M6P									●	●	●		●					
799-601-7340	Adapter for M	8	M8P																		●
799-601-7140	Adapter for S	8	S8P									●	●	●		●					
799-601-7150	Adapter for S (White)	10	S10P									●	●	●		●					
799-601-7160	Adapter for S (Blue)	12	S12P									●	●	●							
799-601-7170	Adapter for S (Blue)	16	S16P									●	●	●		●					
799-601-7330	Adapter for S (White)	16	S16PW													●					
799-601-7350	Adapter for S (White)	12	S12PW																		●
799-601-7180	Adapter for AMP040	8	A8P											●							
799-601-7190	Adapter for AMP040	12	A12P											●		●					
799-601-7210	Adapter for AMP040	16	A16P									●	●	●		●					
799-601-7220	Adapter for AMP040	20	A20P									●	●	●		●					
799-601-7230	Short connector for X	2										●	●	●		●					
799-601-7240	Case											●	●								
799-601-7270	Case													●							
799-601-7510	Adapter for 070	10	07-10												●						
799-601-7520	Adapter for 070	12	07-12												●						
799-601-7530	Adapter for 070	14	07-14												●						
799-601-7540	Adapter for 070	18	07-18												●						
799-601-7550	Adapter for 070	20	07-20												●						
799-601-7360	Adapter for relay	5	REL-5P																		●
799-601-7370	Adapter for relay	6	REL-6P																		●
799-601-7380	Adapter for JFC	2																			●
799-601-9010	Adapter for DTM	2	DTM2														●		●		
799-601-9020	Adapter for DT	2	DT2														●		●		
799-601-9030	Adapter for DT	3	DT3														●		●		
799-601-9040	Adapter for DT	4	DT4														●		●		
799-601-9050	Adapter for DT	6	DT6														●		●		
799-601-9060	Adapter for DT (Gray)	8	DT8GR														●		●		
799-601-9070	Adapter for DT (Black)	8	DT8B														●		●		
799-601-9080	Adapter for DT (Green)	8	DT8G														●		●		
799-601-9090	Adapter for DT (Brown)	8	DT8BR														●		●		
799-601-9110	Adapter for DT (Gray)	12	DT12GR														●		●		
799-601-9120	Adapter for DT (Black)	12	DT12B														●		●		
799-601-9130	Adapter for DT (Green)	12	DT12G														●		●		
799-601-9140	Adapter for DT	12	DT12BR														●		●		
799-601-9210	Adapter for HD30-18	8	D18-8														●	●			
799-601-9220	Adapter for HD30-18	14	D18-14														●	●			
799-601-9230	Adapter for HD30-18	20	D18-20														●	●			
799-601-9240	Adapter for HD30-18	21	D18-21														●	●			
799-601-9250	Adapter for HD30-24	9	D24-9														●	●			
799-601-9260	Adapter for HD30-24	16	D24-16														●	●			
799-601-9270	Adapter for HD30-24	21	D24-21														●	●			
799-601-9280	Adapter for HD30-24	23	D24-23														●	●			
799-601-9290	Adapter for HD30-24	31	D24-31														●	●			
799-601-9310	Plate for HD30 (24-pin)																●	●		●	
799-601-9320	T-box (for DT/HD)	12															●	●		●	

Part No.	Part name	Number of pins	Identification symbol	T-adapter kit																Out of kit
				799-601-2500	799-601-2700	799-601-2800	799-601-2900	799-601-3000	799-601-5500	799-601-6000	799-601-6500	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	
799-601-9330	Case																●				
799-601-9340	Case																	●			
799-601-9350	Adapter for DRC	40	DRC-40																	●	
799-601-9360	Adapter for DRC	24	DRC-24																	●	
799-601-9410	Adapter for engine (CRI-T2)	2	G																		●
799-601-9420	Adapter for engine (CRI-T2) Adapter for engine (CRI-T3)	3	A3																		●
799-601-9430	Adapter for engine (CRI-T2) Adapter for engine (CRI-T3)	2	P																		●
799-601-9440	Adapter for engine (CRI-T2)	3	1,2,3																		●
795-799-5520	Adapter for engine (HPI-T2)	2	S																		●
795-799-5530	Adapter for engine (HPI-T2) Adapter for engine (CRI-T3)	2	C																		●
795-799-5540	Adapter for engine (HPI-T2) Adapter for engine (CRI-T3)	2	A																		●
795-799-5460	Cable for engine (HPI-T2)	3																			●
795-799-5470	Cable for engine (HPI-T2)	3																			●
795-799-5480	Cable for engine (HPI-T2)	3																			●
799-601-4160	Adapter for engine (CRI-T3)	2	OIL																		●
799-601-4340	Adapter for engine (CRI-T3)	2	1,2,3																		●
799-601-4130	Adapter for engine (CRI-T3)	3	FCIN																		●
799-601-4140	Adapter for engine (CRI-T3)	3	FCIG																		●
799-601-4150	Adapter for engine (CRI-T3)	3	FCIB																		●
799-601-4180	Adapter for engine (CRI-T3)	3	FCIP3																		●
799-601-4190	Adapter for engine (CRI-T3)	3	1,2,3																		●
799-601-4240	Adapter for engine (CRI-T3)	3	1,2,3																		●
799-601-4250	Adapter for engine (CRI-T3)	3	1,2,3																		●
799-601-4330	Adapter for engine (CRI-T3)	3	1,2,3																		●
799-601-4230	Adapter for engine (CRI-T3)	4	1,2,3,4																		●
799-601-4260	Adapter for controller (ENG)	4	DTP4																		●
799-601-4210	Adapter for controller (ENG)	50	DRC50																		●
799-601-4220	Adapter for controller (ENG)	60	DRC60																		●
799-601-4280	Box for controller (PUMP)	121																			●
799-601-9720	Adapter for controller (HST)	16	HST16A																		●
799-601-9710	Adapter for controller (HST)	16	HST16B																		●
799-601-9370	Adapter for controller (HST)	26	HST26A																		●

PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

40 Troubleshooting
Troubleshooting by failure code (Display of code), Part 1

Troubleshooting by failure code (Display of code), Part 1
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Troubleshooting by failure code (Display of code), Part 1

Failure codes table

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
—	A000N1	Eng. Hi Out of Std	MON	Mechanical system
—	AA10NX	Aircleaner Clogging	MON	Mechanical system
—	AB00KE	Charge Voltage Low	MON	Mechanical system
—	B@BAZG	Eng. Oil Press. Low	MON	Mechanical system
—	B@BAZK	Eng. Oil Level Low	MON	Mechanical system
—	B@BCNS	Eng. Water Overheat	MON	Mechanical system
—	B@BCZK	Eng. Water Lvl Low	MON	Mechanical system
—	B@HANS	Hydr. Oil Overheat	MON	Mechanical system
E10	CA111	ECM Critical Internal Failure	ENG	Electrical system
E10	CA115	Eng Ne and Bkup Speed Sens Error	ENG	Electrical system
E11	CA122	Chg Air Press Sensor High Error	ENG	Electrical system
E11	CA123	Chg Air Press Sensor Low Error	ENG	Electrical system
E14	CA131	Throttle Sensor High Error	ENG	Electrical system
E14	CA132	Throttle Sensor Low Error	ENG	Electrical system
E15	CA135	Eng Oil Press Sensor High Error	ENG	Electrical system
E15	CA141	Eng Oil Press Sensor Low Error	ENG	Electrical system
E15	CA144	Coolant Temp Sens High Error	ENG	Electrical system
E15	CA145	Coolant Temp Sens Low Error	ENG	Electrical system
E15	CA153	Chg Air Temp Sensor High Error	ENG	Electrical system
E15	CA154	Chg Air Temp Sensor Low Error	ENG	Electrical system
E15	CA187	Sens Supply 2 Volt Low Error	ENG	Electrical system
E15	CA221	Ambient Press Sens High Error	ENG	Electrical system
E15	CA222	Ambient Press Sens Low Error	ENG	Electrical system
E15	CA227	Sens Supply 2 Volt High Error	ENG	Electrical system
—	CA234	Eng Overspeed	ENG	Mechanical system
E15	CA238	Ne Speed Sens Supply Volt Error	ENG	Electrical system
E15	CA263	Fuel Temp Sensor High Error	ENG	Electrical system
E15	CA265	Fuel Temp Sensor Low Error	ENG	Electrical system
E11	CA271	IMV/PCV1 Short Error	ENG	Electrical system
E11	CA272	IMV/PCV1 Open Error	ENG	Electrical system
E11	CA273	PCV2 Short Error	ENG	Electrical system
E11	CA274	PCV2 Open Error	ENG	Electrical system
E11	CA322	Inj #1 (L#1) Open/Short Error	ENG	Electrical system
E11	CA323	Inj #5 (L#5) Open/Short Error	ENG	Electrical system
E11	CA324	Inj #3 (L#3) Open/Short Error	ENG	Electrical system
E11	CA325	Inj #6 (L#6) Open/Short Error	ENG	Electrical system
E11	CA331	Inj #2 (L#2) Open/Short Error	ENG	Electrical system

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
E11	CA332	Inj #4 (L#4) Open/Short Error	ENG	Electrical system
E10	CA342	Calibration Code Incompatibility	ENG	Electrical system
E10	CA351	Injectors Drive Circuit Error	ENG	Electrical system
E15	CA352	Sens Supply 1 Volt Low Error	ENG	Electrical system
E15	CA386	Sens Supply 1 Volt High Error	ENG	Electrical system
E10	CA441	Battery Voltage Low Error	ENG	Electrical system
E10	CA442	Battery Voltage High Error	ENG	Electrical system
E11	CA449	Rail Press Very High Error	ENG	Electrical system
E11	CA451	Rail Press Sensor High Error	ENG	Electrical system
E11	CA452	Rail Press Sensor Low Error	ENG	Electrical system
E15	CA553	Rail Press High Error	ENG	Electrical system
—	CA554	Rail Press Sensor In Range Error	ENG	Electrical system
E15	CA559	Rail Press Low Error	ENG	Electrical system
E11	CA689	Eng Ne Speed Sensor Error	ENG	Electrical system
E11	CA731	Eng Bkup Speed Sens Phase Error	ENG	Electrical system
E10	CA757	All Persistent Data Lost Error	ENG	Electrical system
E11	CA778	Eng Bkup Speed Sensor Error	ENG	Electrical system
E15	CA1228	EGR Valve Servo Error 1	ENG	Electrical system
E11	CA1625	EGR Valve Servo Error 2	ENG	Electrical system
E11	CA1626	BP Valve Sol Current High Error	ENG	Electrical system
E11	CA1627	BP Valve Sol Current Low Error	ENG	Electrical system
E15	CA1628	Bypass Valve Servo Error 1	ENG	Electrical system
E11	CA1629	Bypass Valve Servo Error 2	ENG	Electrical system
E11	CA1631	BP Valve Pos Sens High Error	ENG	Electrical system
E11	CA1632	BP Valve Pos Sens Low Error	ENG	Electrical system
E0E	CA1633	KOMNET Datalink Timeout Error	ENG	Electrical system
E11	CA1642	EGR Inter Press Sens Low Error	ENG	Electrical system
E11	CA1653	EGR Inter Press Sens High Error	ENG	Electrical system
E14	CA2185	Throt Sens Sup Volt High Error	ENG	Electrical system
E14	CA2186	Throt Sens Sup Volt Low Error	ENG	Electrical system
E11	CA2249	Rail Press Very Low Error	ENG	Electrical system
E11	CA2271	EGR Valve Pos Sens High Error	ENG	Electrical system
E11	CA2272	EGR Valve Pos Sens Low Error	ENG	Electrical system
E11	CA2351	EGR Valve Sol Current High Error	ENG	Electrical system
E11	CA2352	EGR Valve Sol Current Low Error	ENG	Electrical system
E15	CA2555	Grid Htr Relay Volt Low Error	ENG	Electrical system
E15	CA2556	Grid Htr Relay Volt High Error	ENG	Electrical system
E01	D110KB	Battery Relay Drive S/C	ENG	Electrical system
—	D163KB	Flash Light Relay S/C	PUMP	Electrical system
—	D195KB	Step Light Relay S/C	PUMP	Electrical system

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
—	DA25KP	Press. Sensor Power Abnormality	PUMP	Electrical system
—	DA2SKQ	Model Selection Abnormality	PUMP	Electrical system
—	DA80MA	Auto. Lub. Abnormal.	PUMP	Mechanical system
E0E	DA2RMC	Pump Comm. Abnormality	PUMP	Electrical system
E0E	DAFRMC	Monitor Comm. Abnormality	PUMP	Electrical system
—	DGE5KY	Ambi. Temp. Sensor S/C	PUMP	Electrical system
—	DGH2KB	Hydr. Oil Temp. Sensor S/C	PUMP	Electrical system
E02 *	DH25KA	L Jet Sensor Disc.	PUMP	Electrical system
E02 *	DH25KB	L Jet Sensor S/C	PUMP	Electrical system
E02 *	DH26KA	R Jet Sensor Disc.	PUMP	Electrical system
E02 *	DH26KB	R Jet Sensor S/C	PUMP	Electrical system
E02 *	DHPEKA	F Pump P. Sensor Disc.	PUMP	Electrical system
E02 *	DHPEKB	F Pump P. Sensor S/C	PUMP	Electrical system
E02 *	DHPFKA	R Pump P. Sensor Disc.	PUMP	Electrical system
E02 *	DHPFKB	R Pump P. Sensor S/C	PUMP	Electrical system
—	DV20KB	Travel Alarm S/C	PUMP	Electrical system
—	DW41KA	Swing Priority Sol. Disc.	PUMP	Electrical system
—	DW41KB	Swing Priority Sol. S/C	PUMP	Electrical system
—	DW43KA	Travel Speed Sol. Disc.	PUMP	Electrical system
—	DW43KB	Travel Speed Sol. S/C	PUMP	Electrical system
E03	DW45KA	Swing Brake Sol. Disc.	PUMP	Electrical system
E03	DW45KB	Swing Brake Sol. S/C	PUMP	Electrical system
—	DW7BKA	Fan Reverse Sol. Disc.	PUMP	Electrical system
—	DW7BKB	Fan Reverse Sol. S/C	PUMP	Electrical system
—	DWK0KA	2-stage Relief Sol. Disc.	PUMP	Electrical system
—	DWK0KB	2-stage Relief Sol. S/C	PUMP	Electrical system
E11	DX16KA	Fan Pump EPC Sol. Disc.	PUMP	Electrical system
E11	DX16KB	Fan Pump EPC Sol. S/C	PUMP	Electrical system
E02 *	DXAAKA	F Pump EPC Sol. Disc.	PUMP	Electrical system
E02 *	DXAAKB	F Pump EPC Sol. S/C	PUMP	Electrical system
E02 *	DXABKA	R Pump EPC Sol. Disc.	PUMP	Electrical system
E02 *	DXABKB	R Pump EPC Sol. S/C	PUMP	Electrical system
—	DY20KA	Wiper Working Abnormality	PUMP	Electrical system
—	DY20MA	Wiper Parking Abnormality	PUMP	Electrical system
—	DY2CKB	Washer Drive S/C	PUMP	Electrical system
—	DY2DKB	Wiper Drive (For) S/C	PUMP	Electrical system
—	DY2EKB	Wiper Drive (Rev) S/C	PUMP	Electrical system

*: If a trouble occurs, “E02” is displayed. If the emergency pump drive switch is set in the upper (emergency) position, “E02” changes to “E07”.

★ This failure codes table is the same as that in Testing and adjusting, Special functions of machine monitor.

Before carrying out troubleshooting when failure code is displayd

Connection table of circuit breakers

★ This connection table shows the devices to which each power supply of the circuit breakers supplies power (A switch power supply is a device which supplies power while the starting switch is at the ON position and a constant power supply is a device which supplies power while the starting switch is at the OFF position).

★ When carrying out troubleshooting for a displayed code, you should check the circuit breakers to see if the power is supplied normally.

Type of power supply	Circuit breaker No.	Circuit breaker capacity	Destination of power
Switch power supply (Battery relay terminal M)	1	40A	Fuse box (Fuses No. 1 – 15)
	2	20A	Boom working lamp, right head lamp
	3	20A	Grease pump
	4	20A	Pump controller power source
	5	20A	Head lamp on cab
Constant power supply (Battery relay terminal B)	6	20A	Starting switch and engine controller (Power supply control)
	7	20A	Engine controller (Power supply drive)
	8	20A	Machine monitor
	9	20A	Fuse box (Fuses No. 16 – 19)

Connection table of fuse boxes

★ This connection table shows the devices to which each power supply of the fuse boxes supplies power (A switch power supply is a device which supplies power while the starting switch is at the ON position and a constant power supply is a device which supplies power while the starting switch is at the OFF position).

★ When carrying out troubleshooting for a displayed code, you should check the fuse boxes to see if the power is supplied normally.

Type of power supply	Fuse No.	Fuse capacity	Destination of power
Switch power supply (Circuit breaker 1)	1	10 A	EPC solenoid (for emergency pump drive)
			Swing holding brake solenoid (for swing brake release)
	2	10 A	Starting motor cut-out relay
			Machine push-up solenoid
			Boom shockless solenoid
	3	10 A	PPC lock solenoid
	4	20 A	Cigarette lighter
			Windshield washer motor
	5	10 A	Horn
			Flash light
Switch power supply (Circuit breaker 1)	6	10 A	Intake air heater relay
			KOMTRAX terminal
	7	10 A	Rotary lamp
	8	10 A	(Spare)
	9	10 A	Radio
			Left-hand knob switch
	10	20 A	Machine monitor
			Buzzer
Switch power supply (Circuit breaker 1)	11	25 A	Air conditioner unit
	12	20 A	(Spare)
	13	20 A	(Spare)
	14	10 A	Service power supply (M32 connector)
	15	10 A	DC/DC converter (12 V power supply)
Constant power supply (Circuit breaker 9)	16	10 A	Radio
			Room lamp
	17	10 A	Step light
	18	10 A	(Spare)
	19	10 A	(Spare)
	20 (ACC circuit)	10 A (ACC signal)	Engine controller
			Pump controller
			KOMTRAX

Information in troubleshooting table

★ The following information is summarized in the troubleshooting table and the related electrical circuit diagram. Before carrying out troubleshooting, understand that information fully.

Action code	Failure code	Trouble	
Display on machine monitor	**Display on machine monitor**		**Title of failure phenomenon shown in failure history**
Contents of trouble	**Contents of trouble detected by machine monitor or controller**		
Action of machine monitor or controller	**Action taken by machine monitor or controller to protect system or devices when engine controller detects trouble**		
Problem that appears on machine	**Problem that appears on machine as result of action taken by machine monitor or controller (shown above)**		
Related information	**Information related to detected trouble or troubleshooting**		

	Cause		Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	**Possible causes of trouble (Given numbers are reference numbers, which do not indicate priority)**	<Contents of description> • Standard value in normal state to judge possible causes • Remarks on judgment <Troubles in wiring harness> • Disconnection Connector is connected imperfectly or wiring harness is broken. • Ground fault Wiring harness which is not connected to chassis ground circuit is in contact with chassis ground circuit. • Hot short Wiring harness which is not connected to power source (24 V) circuit is in contact with power source (24 V) circuit. <Precautions for troubleshooting> (1) Method of indicating connector No. and handling of T-adapter Insert or connect T-adapter as explained below for troubleshooting, unless otherwise specified. • If connector No. has no marks of “male” and “female”, disconnect connector and insert T-adapters in both male side and female side. • If connector No. has marks of “male” and “female”, disconnect connector and connect T-adapter to only male side or female side. (2) Entry order of pin Nos. and handling of tester leads Connect positive (+) lead and negative (–) lead of tester as explained below for troubleshooting, unless otherwise specified. • Connect positive (+) lead to pin No. or wiring harness entered on front side. • Connect negative (–) lead to pin No. or harness entered on rear side.
	2		
	3		
	4		
	5		

Related circuit diagram

This drawing is a part of the electric circuit diagram related to troubleshooting.
- Connector No.: Indicates (Model – Number of pins) and (Color).
- (Arrow): Roughly shows the location on the machine.

Failure code [A000N1] Eng. Hi Out of Std

Action code	Failure code	Trouble	Eng. Hi Out of Std (Mechanical system)
—	**A000N1**		
Contents of trouble	• Engine speed higher than 2,500 rpm is detected while the engine is running.		
Action of controller	• None in particular.		
Problem that appears on machine	• If machine is operated as it is, engine may be damaged.		
Related information	• Input from the engine speed sensor (engine speed) can be checked with monitoring function. (Code 01002: Engine speed)		

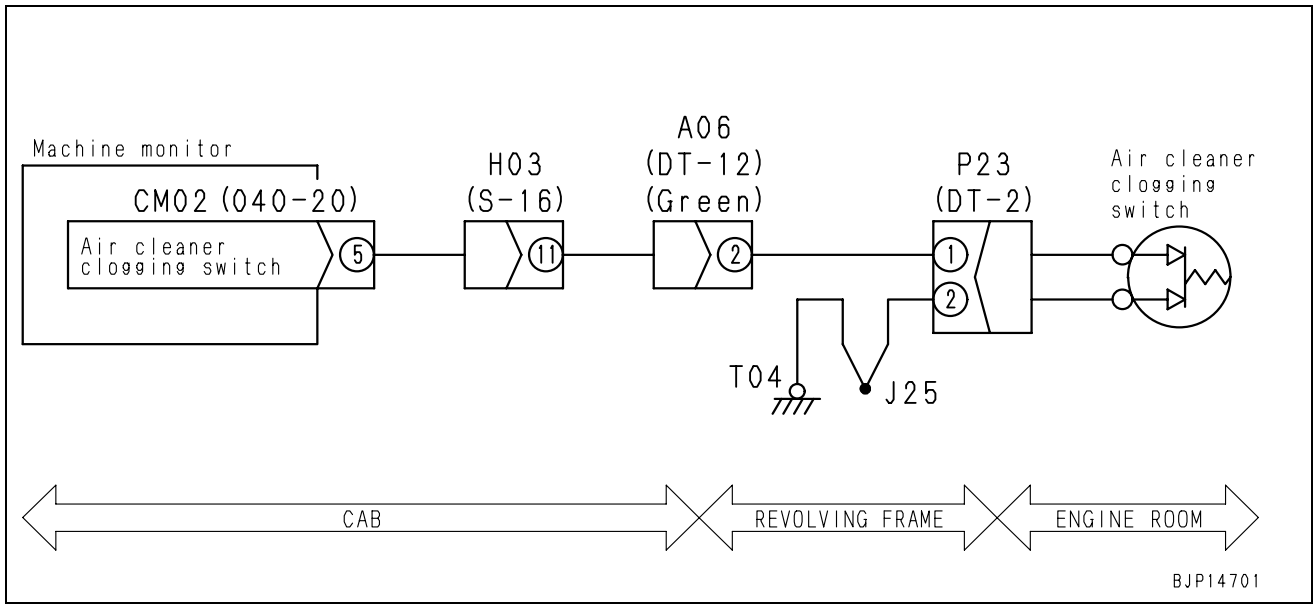
	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Engine overrun (While system is normal)	Check for any internal or external factor that might cause the excessive engine high idle speed for troubleshooting of engine mechanical system.		
	2	Engine Ne sensor system defective	If failure code [CA238] is displayed, carry out troubleshooting for it.		
	3	Engine G sensor system defective	If failure code [CA778] is displayed, carry out troubleshooting for it.		
	4	Engine controller defective	★Turn the engine starting switch ON for the preparations, and keep the engine running during the troubleshooting.		
			Monitoring	Engine	Engine speed
			01006 Engine speed	High idle	1,930 – 2,030 rpm

Failure code [AA10NX] Aircleaner Clogging

Action code	Failure code	Trouble	Aircleaner Clogging (Mechanical system)
—	**AA10NX**		
Contents of trouble	• While engine was running, signal circuit of air cleaner clogging switch was opened (disconnected with GND).		
Action of machine monitor	• None in particular.		
Problem that appears on machine	• If machine is operated as it is, engine may be damaged.		
Related information	• If an air cleaner clogging monitor appears on the machine monitor lights up in red while the engine is running, this failure code will be recorded. • Input from the air cleaner clogging switch (ON/OFF) can be checked with monitoring function. (Code 04501: Monitor Input 1)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Clogging of air cleaner (when system is normal)	★Check the air cleaner for clogging and then clean or replace it if clogged.			
	2	Defective air cleaner clogging switch (internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position or keep the engine running during the troubleshooting.			
			P23 (male)	Air cleaner	Resistance	
			Between (1) – (2)	Value in normal state	Max. 1 Ω	
				Value when clogged	Min. 1 MΩ	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM02 (female) (5) – P23 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between P23 (female) (2) – J25 – chassis ground		Resistance	Max. 1 Ω
	4	Defective machine monitor	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position or keep the engine running during the troubleshooting.			
			CM02	Air cleaner	Voltage	
			Between (5) – chassis ground	Value in normal state	Max. 1 V	
				Value when clogged	20 – 30 V	

Circuit diagram related to air cleaner clogging switch of machine monitor

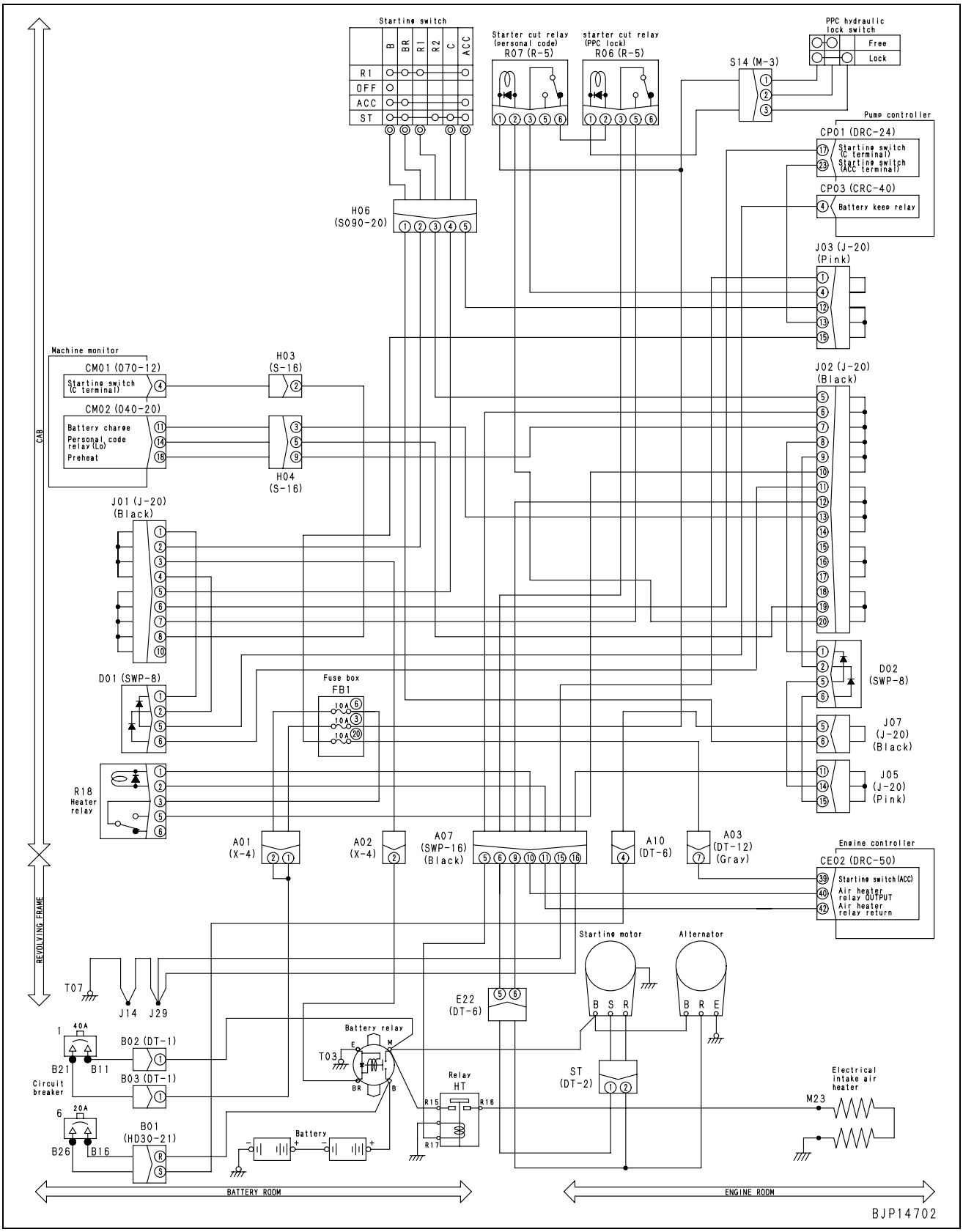


Failure code [AB00KE] Charge Voltage Low

Action code	Failure code	Trouble	Charge Voltage Low (Mechanical system)
—	**AB00KE**		
Contents of trouble	• Signal voltage from alternator is below 20 V while the engine is running.		
Action of machine monitor	• None in particular.		
Problem that appears on machine	• If machine is operated as it is, battery may not be charged.		
Related information	• If a charge level monitor on the machine monitor lights up in red while the engine is running, this failure code will be recorded. • Input from alternator (voltage, ON or OFF) can be checked with monitoring function. (Code 04300: Charge voltage, 04501: Monitor input 2)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective alternator (Low power generation)	★Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			Alternator	Engine	Voltage	
			Between R terminal – chassis ground	Above low idle	27.5 – 29.5 V	
			If the voltage is abnormal, check the belt tension too.			
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM02 (female) (11) – J02 – Alternator R terminal		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CM02 (female) (11), J02, and alternator terminal R, or between P02 (female) (11), D01, J01, and starting switch terminal BR, or between P02 (female) (11), battery relay terminal BR and grounding		Resistance	Min. 1 MΩ
	4	Defective machine monitor	★Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			CM02	Engine	Voltage	
			Between (11) – chassis ground	Above low idle	27.5 – 29.5 V	

Circuit diagram related to engine preheating, starting and charging circuits

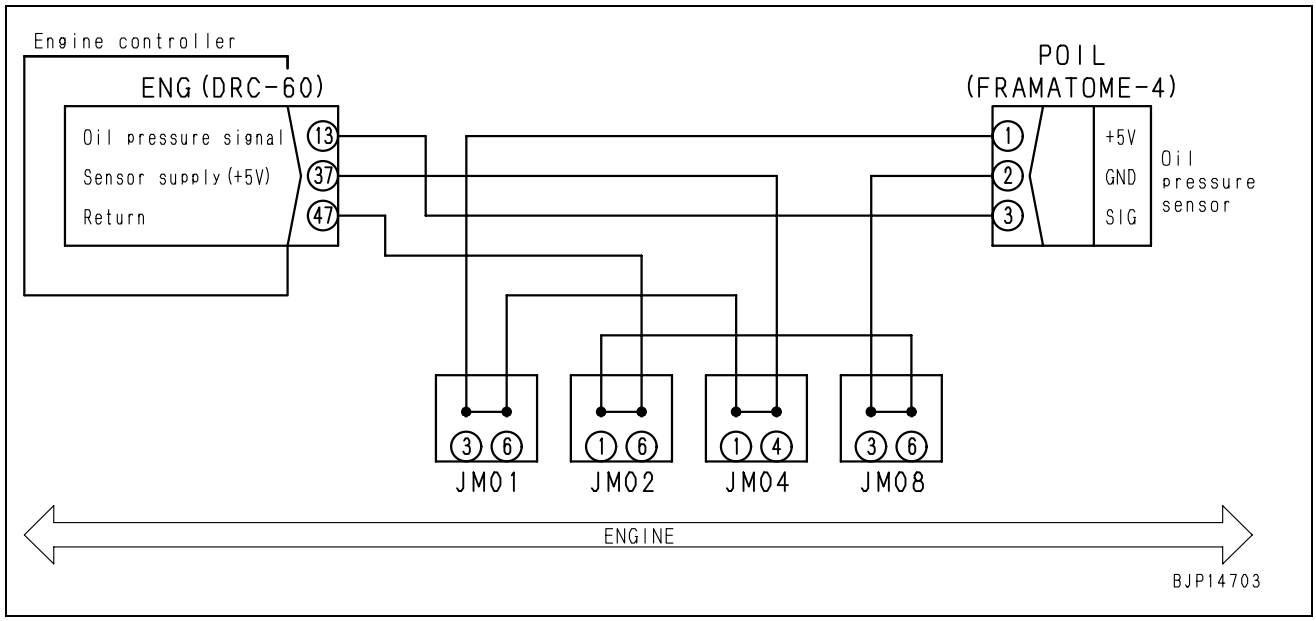


Failure code [B@BAZG] Eng. Oil Press. Low

Action code	Failure code	Trouble	Eng. Oil Press. Low
—	B@BAZG		
Contents of trouble	• While engine was running, signal circuit of engine oil pressure switch detected low engine oil pressure (opening of sensor contact).		
Action of controller	• Sets oil pressure to default value (250 kPa {2.5 kg/cm^2} and continues operation.		
Problem that appears on machine	If machine is operated as it is, engine may be damaged.		
Related information	• Input (Voltage) from oil pressure sensor can be checked with monitoring function (Code: 37201). • Signals of engine oil pressure switch are input to engine controller and then transmitted to machine monitor through communication system. • Method of reproducing failure code: Start engine.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective sensor power supply system	If code [**CA187**] or [**CA227**] is indicated, carry out troubleshooting for it first.			
	2	Defective oil pressure sensor (Internal trouble)	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.			
			POIL		Voltage	
			Between (1) – (2)	Power supply	4.75 – 5.25 V	
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.			
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – POIL (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – POIL (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (13) – POIL (female) (3)		Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – POIL (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (13) – POIL (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	5	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.			
			ENG		Voltage	
			Between (37) – (47)	Power supply	4.75 – 5.25 V	

Circuit diagram related to engine oil pressure sensor

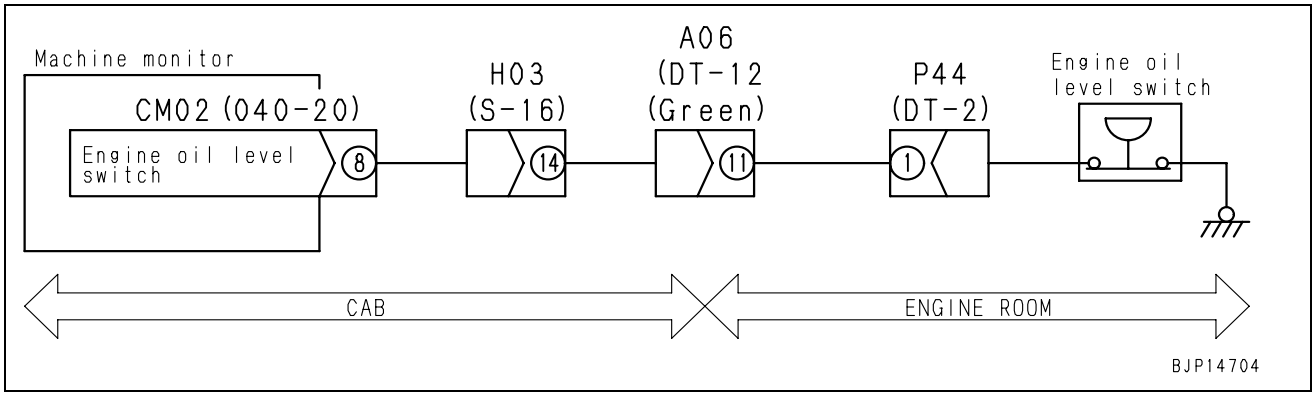


Failure code [B@BAZK] Eng. Oil Level Low

Action code	Failure code	Trouble	Eng. Oil Level Low (Machine monitor system)
—	**B@BAZK**		
Contents of trouble	• The signal circuit of the engine oil level switch is opened (disconnected from grounding) while the engine is stopped.		
Action of machine monitor	• None in particular.		
Problem that appears on machine	• If machine is operated as it is, engine may be damaged.		
Related information	• If the engine oil level monitor on the machine monitor lights up in red while the engine is running, this failure code is recorded. • Input from the engine oil level switch (ON or OFF) can be checked in the monitoring function. (Code No. 04501: Monitor input 2)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Lowering of engine oil level (when system is normal)	★Check the engine oil level and add new oil. (If this phenomenon frequently occurs, investigate the cause.)			
	2	Defective engine oil level switch (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P44 (male)	Engine oil level	Resistance	
			Between (1) – chassis ground	Normal level	Max. 1 Ω	
				Below normal level	Min. 1 MΩ	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM02 (female) (8) – P44 (female) (1)		Resistance	Max. 1 Ω
	4	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CM02	Engine oil level	Voltage	
			Between (8) – chassis ground	Normal level	Max. 1 V	
				Below normal level	20 – 30 V	

Circuit diagram related to engine oil level switch

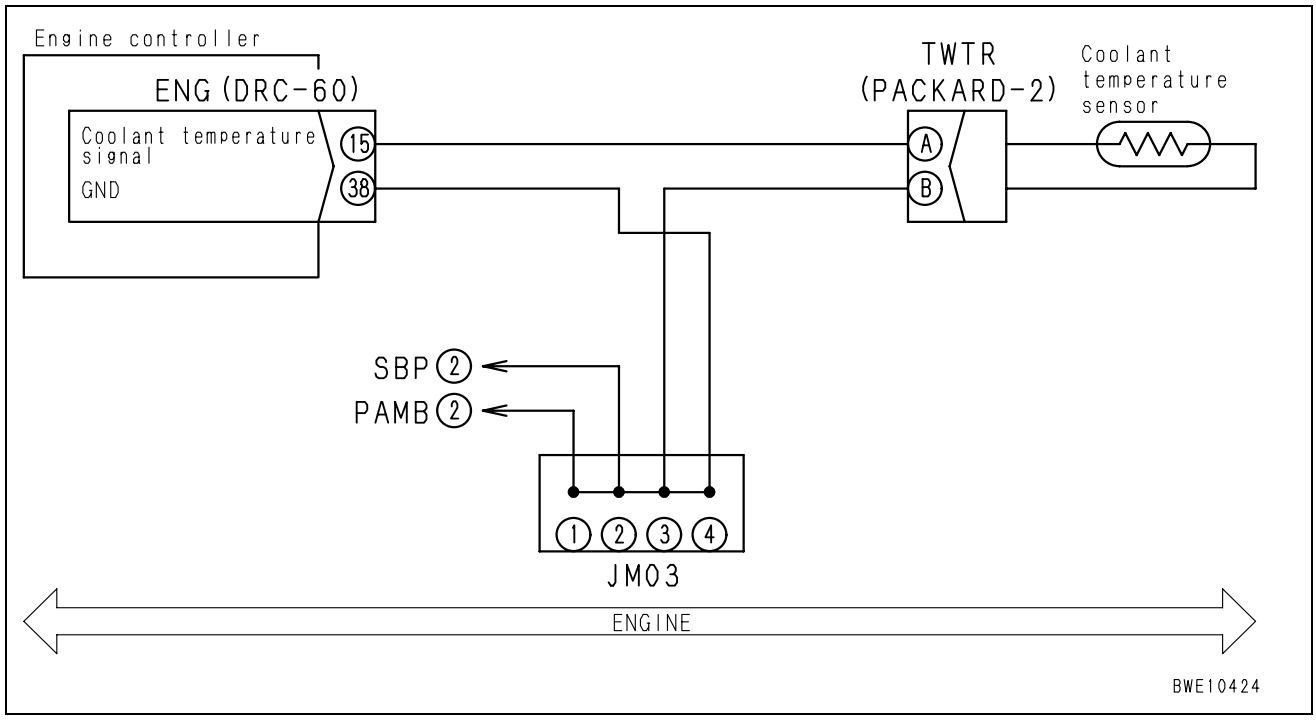


Failure code [B@BCNS] Eng. Water Overheat

Action code	Failure code	Trouble	Eng. Water Overheat (Engine controller system)
—	**B@BCNS**		
Contents of trouble	• The signal circuit of the engine coolant temperature sensor detected temperature above 105°C		
Action of machine monitor	• Fixes coolant temperature (90°C) and continues operation.		
Problem that appears on machine	• If machine is operated as it is, engine may be damaged.		
Related information	• Input from the engine coolant temperature sensor (temperature) can be checked with monitoring function (Code: 04107) • Engine coolant temperature sensor signal is input to engine controller and then transmitted to machine monitor.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective coolant temperature sensor (Internal trouble)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			TWTR (male)	Coolant temperature	Resistance	
			Between (A) – (B)	10 – 100°C	0.6 – 20 kΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (15) – TWTR (female) (A)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (38) – TWTR (female) (B)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between wiring harness of ENG (female) (15) – TWTR (female) (A) and chassis ground		Resistance	Min. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Engine coolant temperature	Resistance	
			Between (15) – (38) chassis ground	10 – 100°C	0.6 – 20 kΩ	

Circuit diagram related to coolant temperature sensor

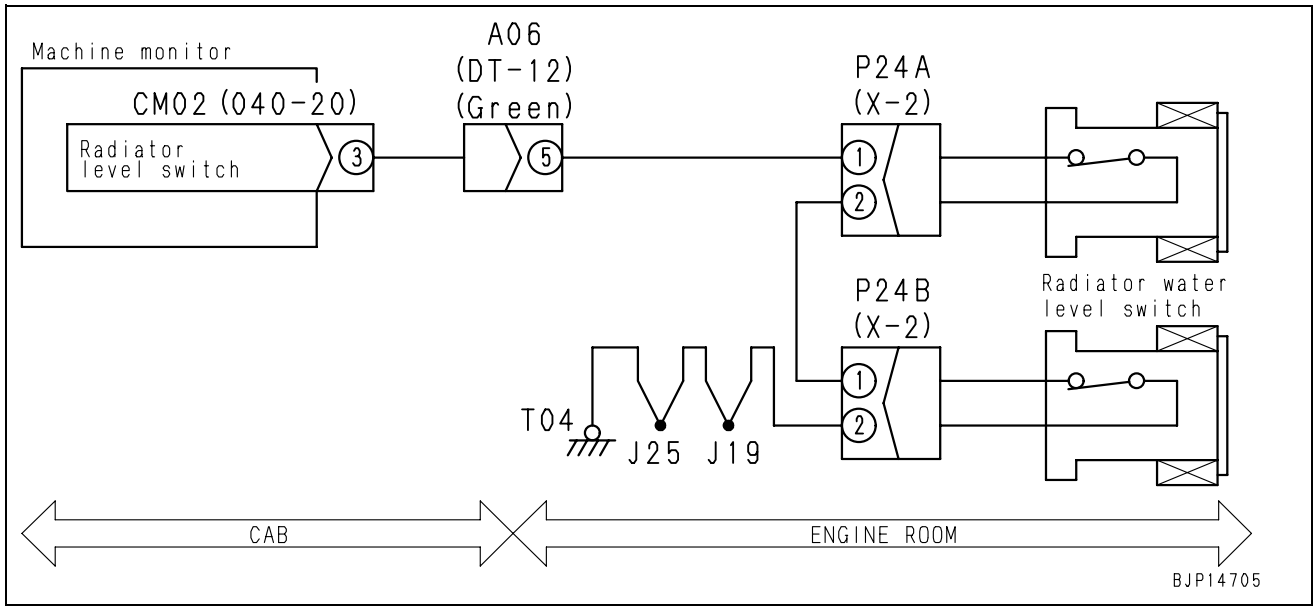


Failure code [B@BCZK] Eng. Water Lvl Low

Action code	Failure code	Trouble	Eng. Water Lvl Low (Mechanical system)
—	**B@BCZK**		
Contents of trouble	• While engine was running, signal circuit of radiator coolant level switch was opened (disconnected with GND).		
Action of machine monitor	• None in particular.		
Problem that appears on machine	• If machine is operated as it is, engine may overheat.		
Related information	• If the radiator coolant level monitor on the machine monitor lights up in red while the engine is stopped (the starting switch is at the ON position), this failure code is recorded. • Input from the radiator coolant level switch (ON/OFF) can be checked with monitoring function. (Code 04500: Monitor Input 1)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Sub-tank coolant level low (While system is normal)	Check the radiator sub-tank coolant level. If it is low, add coolant. (If it is reduced frequently, find out the cause.)			
	2	Defective radiator coolant level switch 1 (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P24A (male)	Sub-tank coolant level	Resistance	
			Between (1) – (2)	Within normal level	Max. 1 Ω	
				Below LOW level	Min. 1 MΩ	
	3	Defective radiator coolant level switch 2 (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			P24B (male)	Sub-tank coolant level	Resistance	
			Between (1) – (2)	Within normal level	Max. 1 Ω	
				Below LOW level	Min. 1 MΩ	
	4	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM02 (female) (3) – P24A (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between P24A (female) (2) – P24B (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between P24B (female) (2) – chassis ground		Resistance	Max. 1 Ω
	5	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CM02	Sub-tank coolant level	Voltage	
			Between (3) – chassis ground	Within normal level	Max. 1 V	
				Below LOW level	20 – 30 V	

Circuit diagram related to radiator coolant level switch

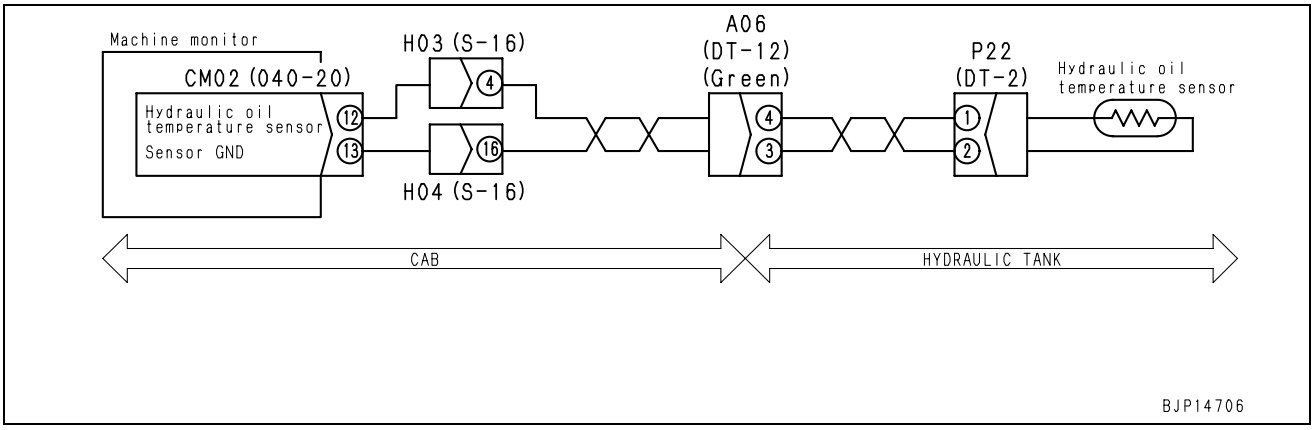


Failure code [B@HANS] Hydr. Oil Overheat

Action code	Failure code	Trouble	Hydr. Oil Overheat (Mechanical system)
—	**B@HANS**		
Contents of trouble	• While engine was running, signal of hydraulic oil temperature sensor input 102°C or higher.		
Action of machine monitor	• None in particular.		
Problem that appears on machine	• If machine is operated as it is, hydraulic components may be seized.		
Related information	• If hydraulic oil temperature monitor on the machine monitor lights up in red while the engine is running, this failure code will be recorded. • Input from the hydraulic oil temperature sensor (temperature) can be checked with monitoring function. (Code 04401: Hydraulic oil temperature, 04402: Hydraulic oil temperature sensor voltage)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Hydr. Oil Overheat (when system is normal)	Check the hydraulic oil for overheating. If it has been overheated, find out the cause and check the hydraulic equipment for damage, then repair.			
	2	Defective hydraulic oil temperature sensor (Internal short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P22 (male)	Hydraulic oil temperature	Resistance	
			Between (1) – (2)	10 – 100°C	90 – 3.5 kΩ	
			Between (2) – chassis ground		Min. 1 MΩ	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between P02 (female) (12) – P22 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
	4	Defective machine monitor	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P02 (female)	Hydraulic oil temperature	Resistance	
			Between (12) – (13)	10 – 100°C	90 – 3.5 kΩ	
			Between (12) – chassis ground		Min. 1 MΩ	

Circuit diagram related to hydraulic oil temperature sensor

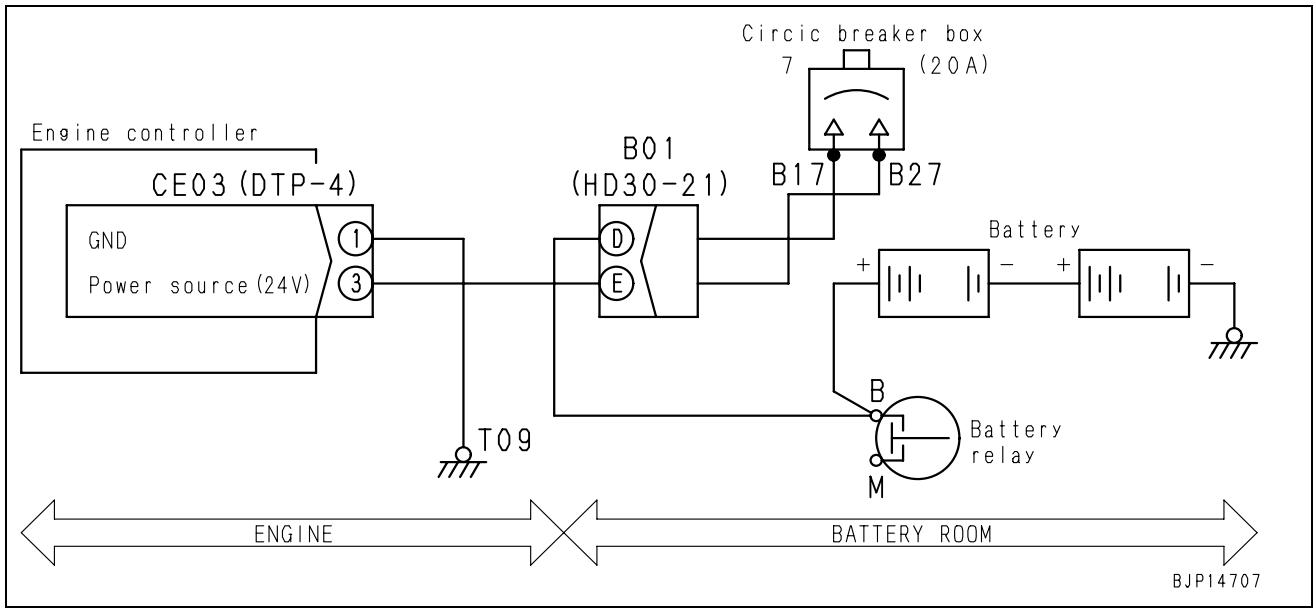


Failure code [CA111] ECM Critical Internal Failure

Action code	Failure code	Trouble	ECM Critical Internal Failure (Engine controller system)
E10	**CA111**		
Contents of trouble	• Incompatibility of data occurred in engine controller.		
Action of controller	• None in particular.		
Problem that appears on machine	• Operations are continued, but engine may stop during operations or may not start in stopped state.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective circuit breaker 7	Circuit breaker may be defective. Check it directly. (If circuit breaker is turned OFF, circuit probably has ground fault.)		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CE03 (female) (3) – battery (+)	Resistance	Max. 1 Ω
			Wiring harness between CE03 (female) (1) – chassis ground	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CE03 (female) (3) – battery (+) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CE03 (female) (1) – chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CE03	Voltage	
			Between (3) – (1)	20 – 30 V	

Circuit diagram related to controller power supply



Failure code [CA115] Eng Ne and Bkup Speed Sens Error

Action code	Failure code	Trouble	Eng Ne and Bkup Speed Sens Error (Engine controller system)
E10	**CA115**		
Contents of trouble	• Failure occurred simultaneously in engine Ne speed sensor and engine Bkup speed sensor.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine cannot be started. (Engine is stopped.) • Engine stops (during operations).		
Related information			

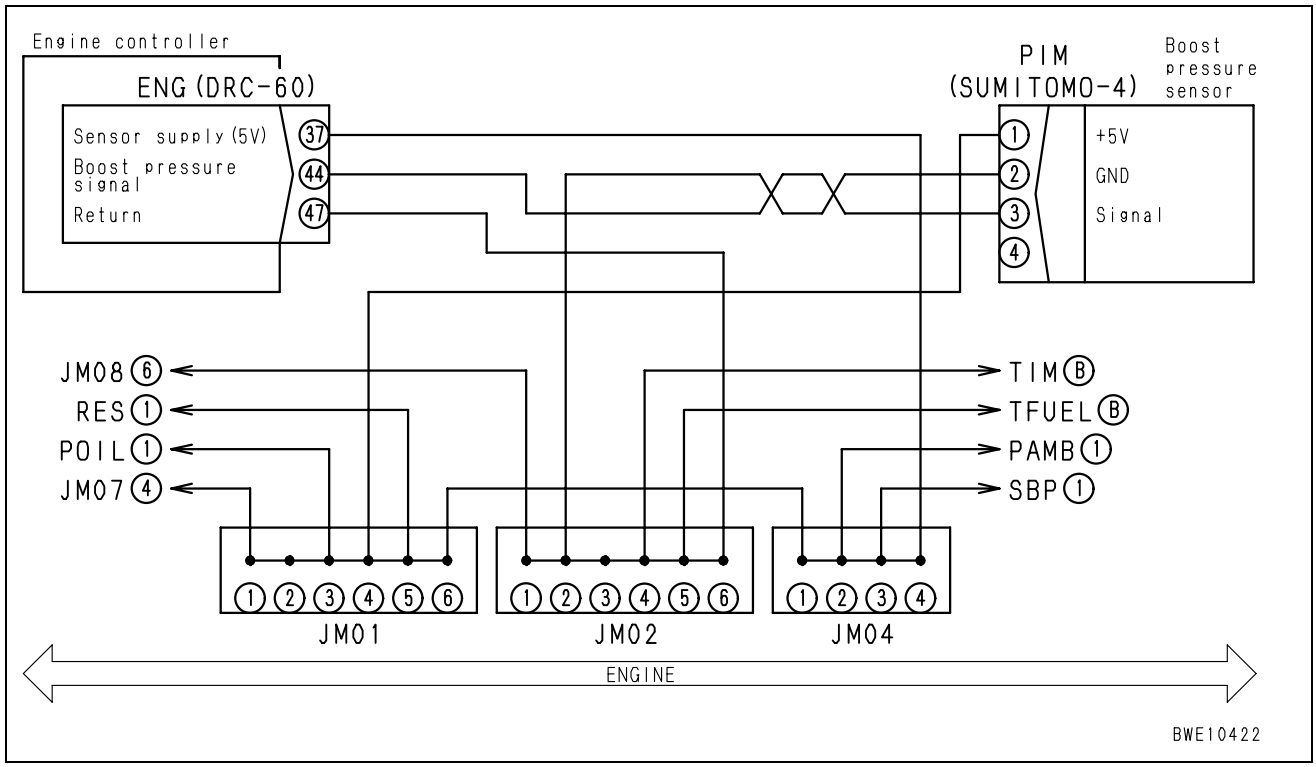
		Cause	Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	Defective Ne speed sensor system	Carry out troubleshooting for failure code [**CA689**].
	2	Defective Bkup speed sensor system	Carry out troubleshooting for failure code [**CA778**].
	3	Defective installation of Ne speed sensor	Ne speed sensor may be installed defectively. Check it directly. (Defective installation of sensor itself, internal defect of flywheel, etc.)
	4	Defective installation of Bkup speed sensor	Bkup speed sensor may be installed defectively. Check it directly. (Defective installation of sensor itself, internal defect of supply pump, etc.)
	5	Defective connection of sensor connector (Wrong connection)	Ne speed sensor and Bkup speed sensor may be connected defectively (or connected to wrong parts). Check them directly.
	6	Defective engine controller	If causes 1 – 5 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)

Failure code [CA122] Chg Air Press Sensor High Error

Action code	Failure code	Trouble	Chg Air Press Sensor High Error (Engine controller system)
E11	**CA122**		
Contents of trouble	• High pressure error occurred in charge air pressure sensor circuit.		
Action of controller	• Fixes charge pressure at 400 kPa {4.1 kg/cm^2} and continues operation.		
Problem that appears on machine	• Engine does not accelerate easily.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA187**] or [**CA227**] is displayed, carry out troubleshooting for it first.			
	2	Defective charge air pressure sensor (Internal defect)	Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting in each case.			
			PIM		Voltage	
			Between (1) – (2)	Power supply	4.75 – 5.25 V	
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.			
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – PIM (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – PIM (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (44) – PIM (female) (3)		Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between wiring harness of ENG (female) (37) – PIM (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Between wiring harness of ENG (female) (47) – PIM (female) (2) and chassis ground		Resistance	Min. 1 MΩ
			Between wiring harness of ENG (female) (44) – PIM (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	5	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – PIM (female) (1) and between ENG (female) (47) – PIM (female) (2)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – PIM (female) (1) and between ENG (female) (44) – PIM (female) (3)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – PIM (female) (2) and between ENG (female) (44) – PIM (female) (3)		Resistance	Min. 1 MΩ
	6	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.			
			ENG		Voltage	
			Between (37) – (47)	Power supply	4.75 – 5.25 V	

Circuit diagram related to charge pressure sensor



Failure code [CA123] Chg Air Press Sensor Low Error

Action code	Failure code	Trouble	Chg Air Press Sensor Low Error (Engine controller system)
E11	**CA123**		
Contents of trouble	• Low pressure error occurred in charge air pressure sensor circuit.		
Action of controller	• Fixes charge pressure at 400 kPa {4.1 kg/cm^2} and continues operation.		
Problem that appears on machine	• Engine does not accelerate easily.		
Related information			

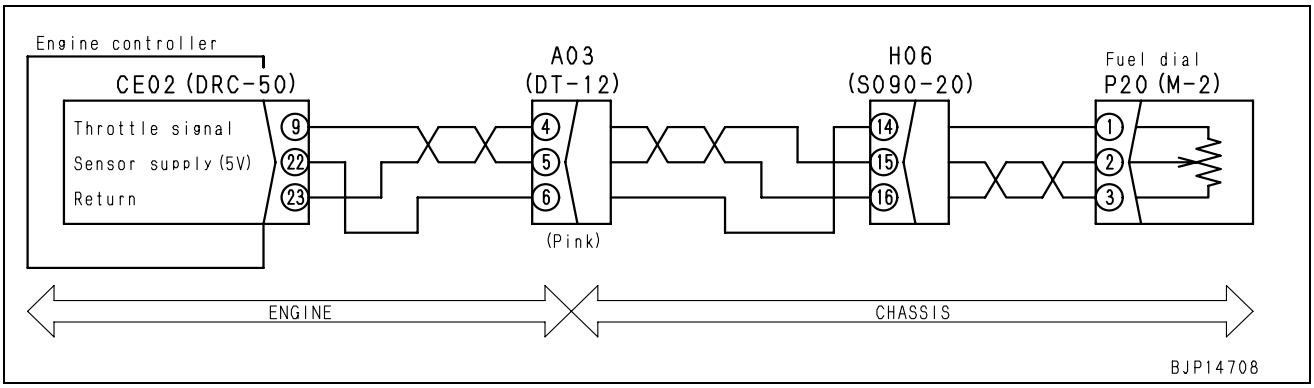
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA122**].	

Failure code [CA131] Throttle Sensor High Error

Action code	Failure code	Trouble	Throttle Sensor High Error (Engine controller system)
E14	**CA131**		
Contents of trouble	• High error occurred in throttle sensor circuit.		
Action of controller	• Use a signal other than throttle sensor to set the throttle position and continues operation.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA2185**] or [**CA2186**] is displayed, carry out troubleshooting for it first.			
	2	Defective fuel control dial (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P20 (male)		Resistance	
			Between (1) – (3)		4.0 – 6.0 kΩ	
			Between (2) – (1)		0.25 – 5.0 kΩ	
			Between (2) – (3)		0.25 – 5.0 kΩ	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CE02 (female) (22) – P20 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between CE02 (female) (9) – P20 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between CE02 (female) (23) – P20 (female) (3)		Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CE02 (female) (22) – P20 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between CE02 (female) (9) – P20 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between CE02 (female) (23) – P20 (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	5	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CE02		Voltage	
			Between (22) – (23)	Voltage	4.75 – 5.25 V	
			Between (9) – (23)	Signal	0.5 – 4.5 V	

Circuit diagram related to fuel control dial throttle sensor



Failure code [CA132] Throttle Sensor Low Error

Action code	Failure code	Trouble	Throttle Sensor Low Error (Engine controller system)
E14	**CA132**		
Contents of trouble	• Low error occurred in throttle sensor circuit.		
Action of controller	• Use a signal other than throttle sensor to set the throttle position for control.		
Problem that appears on machine			
Related information			

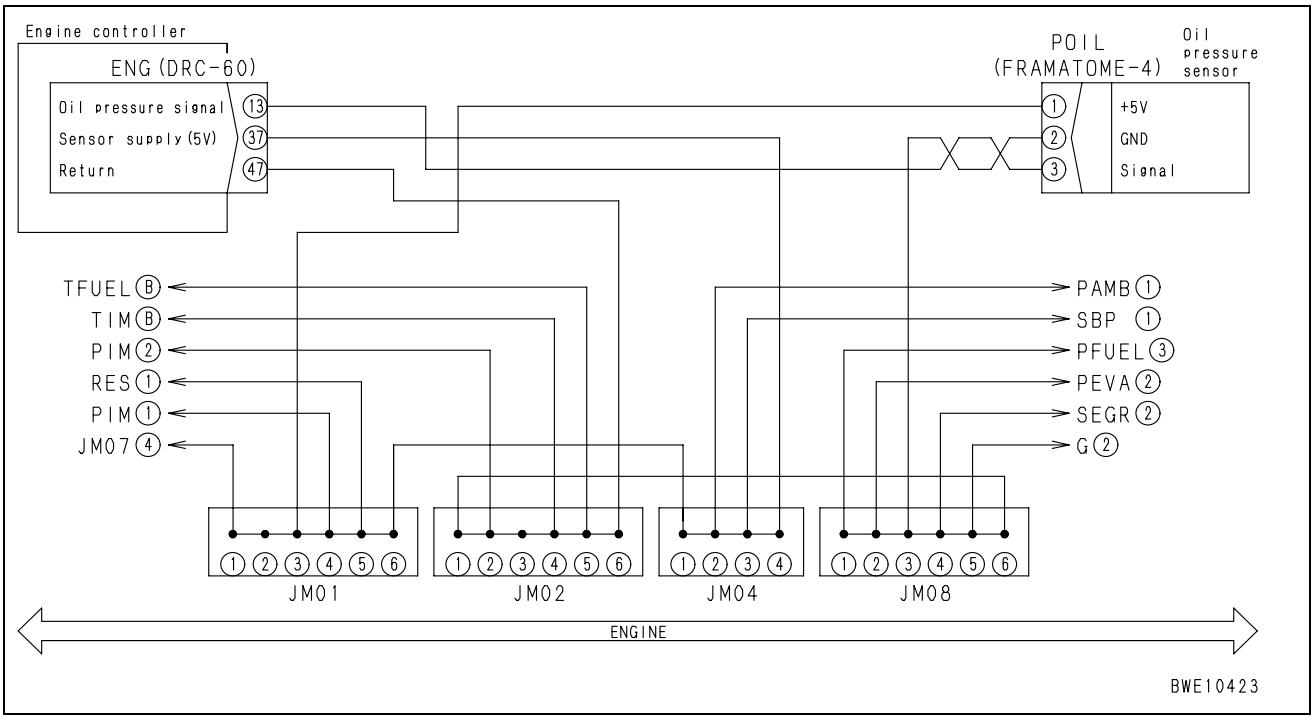
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA131**].	

Failure code [CA135] Eng Oil Press Sensor High Error

Action code	Failure code	Trouble	Eng Oil Press Sensor High Error (Engine controller system)
E15	**CA135**		
Contents of trouble	• High pressure error occurred in engine oil pressure sensor circuit.		
Action of controller	• Sets oil pressure to default (250 kPa {2.5 kg/cm^2}) and continues operation.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA187**] or [**CA227**] is displayed, carry out troubleshooting for it first.			
	2	Defective oil pressure sensor (Internal defect)	Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting in each case.			
			POIL		Voltage	
			Between (1) – (2)	Power supply	4.75 – 5.25 V	
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.			
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – POIL (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – POIL (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (13) – POIL (female) (3)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between wiring harness of ENG (female) (37) – POIL (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Between wiring harness of ENG (female) (47) – POIL (female) (2) and chassis ground		Resistance	Min. 1 MΩ
			Between wiring harness of ENG (female) (13) – POIL (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	4	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – POIL (female) (1) and between ENG (female) (47) – POIL (female) (2)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – POIL (female) (1) and between ENG (female) (13) – POIL (female) (3)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – POIL (female) (2) and between ENG (female) (13) – POIL (female) (3)		Resistance	Min. 1 MΩ
	5	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.			
			ENG		Voltage	
			Between (37) – (47)	Power supply	4.75 – 5.25 V	

Circuit diagram related to oil pressure sensor



Failure code [CA141] Eng Oil Press Sensor Low Error

Action code	Failure code	Trouble	Eng Oil Press Sensor Low Error (Engine controller system)
E15	**CA141**		
Contents of trouble	• Low pressure error occurred in engine oil pressure sensor circuit.		
Action of controller	• Sets oil pressure to default (250 kPa {2.5 kg/cm^2}) and continues operation.		
Problem that appears on machine			
Related information			

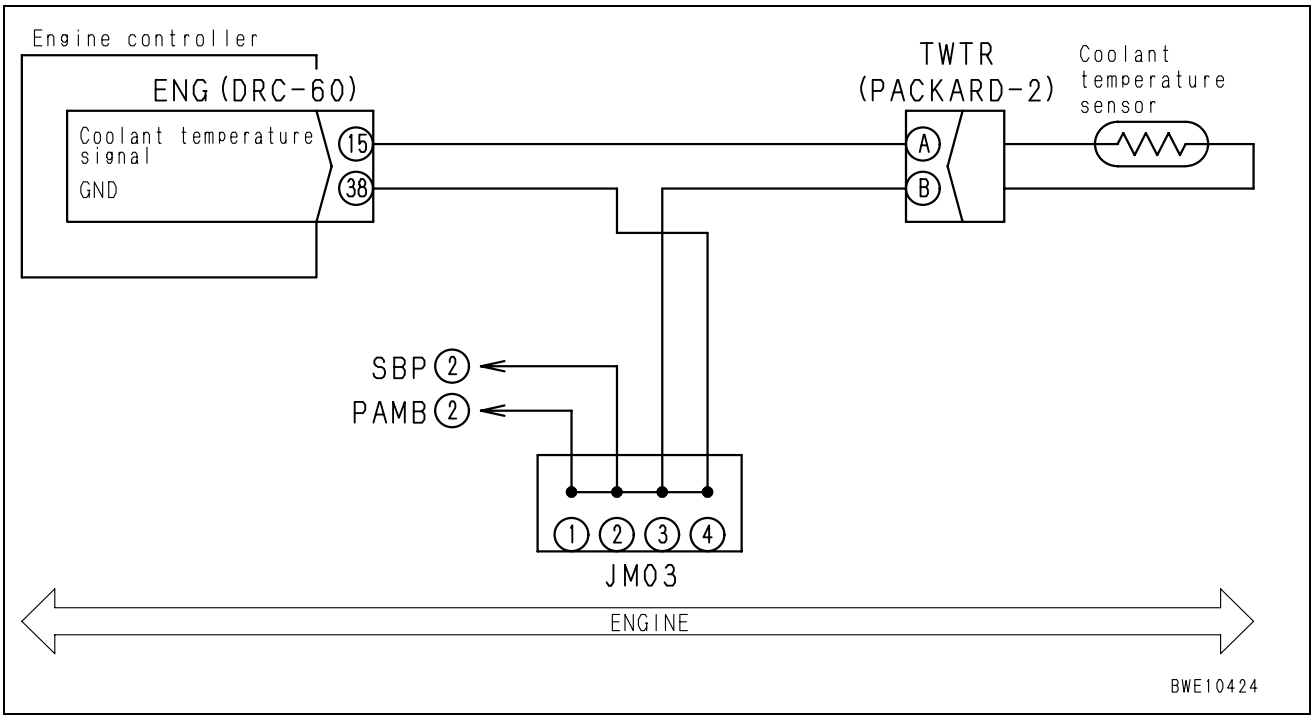
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA135**].	

Failure code [CA144] Coolant Temp Sens High Error

Action code	Failure code	Trouble	Coolant Temp Sens High Error (Engine controller system)
E15	**CA144**		
Contents of trouble	• High temperature error occurred in coolant temperature sensor circuit.		
Action of controller	• Fixes coolant temperature value (90°C) and continues operation.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective coolant temperature sensor (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			TWTR (male)	Coolant temperature	Resistance	
			Between (A) – (B)	10 – 100°C	0.6 – 20 kΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (15) – TWTR (female) (A)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (38) – TWTR (female) (B)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between wiring harness of ENG (female) (15) – TWTR (female) (A) and chassis ground		Resistance	Min. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Coolant temperature	Resistance	
			Between (15) – (38)	10 – 100°C	0.6 – 20 kΩ	

Circuit diagram related to coolant temperature sensor



Failure code [CA145] Coolant Temp Sens Low Error

Action code	Failure code	Trouble	Coolant Temp Sens Low Error (Engine controller system)
E15	**CA145**		
Contents of trouble	• Low temperature error occurred in coolant temperature sensor circuit.		
Action of controller	• Fixes coolant temperature value (90°C) and continues operation.		
Problem that appears on machine			
Related information			

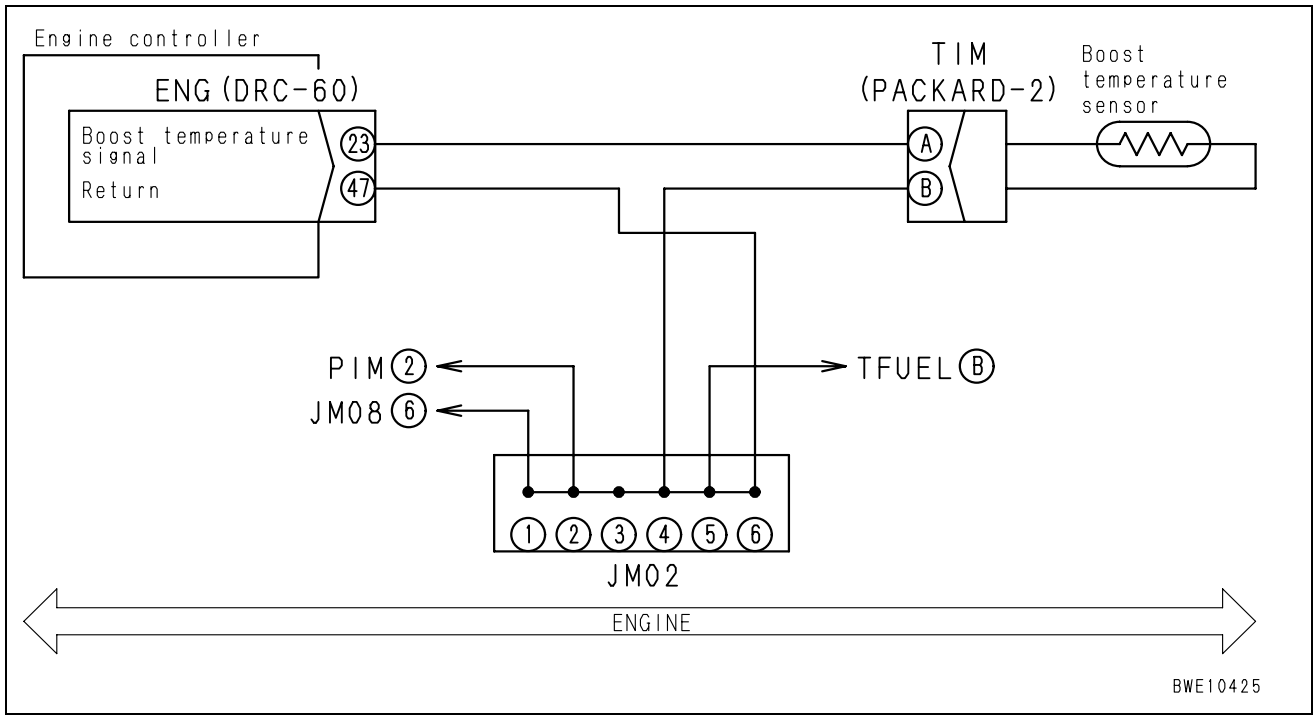
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA144**].	

Failure code [CA153] Chg Air Temp Sensor High Error

Action code	Failure code	Trouble	Chg Air Temp Sensor High Error (Engine controller system)
E15	**CA153**		
Contents of trouble	• High temperature error occurred in charge air temperature sensor circuit.		
Action of controller	• Fixes charge air temperature (air intake temperature) at 70°C and continues operation.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective charge air temperature sensor (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			TIM (male)	Air intake temperature	Resistance	
			Between (A) – (B)	10 – 100°C	0.5 – 20 kΩ	
			Between (A) – chassis ground	Whole area	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (23) – TIM (female) (A)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – TIM (female) (B)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between wiring harness of ENG (female) (23) – TIM (female) (A) and chassis ground		Resistance	Min. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Air intake temperature	Resistance	
			Between (23) – (47)	10 – 100°C	0.5 – 20 kΩ	

Circuit diagram related to charge temperature sensor



Failure code [CA154] Chg Air Temp Sensor Low Error

Action code	Failure code	Trouble	Chg Air Temp Sensor Low Error (Engine controller system)
E15	**CA154**		
Contents of trouble	• Low temperature error occurred in charge air temperature sensor circuit.		
Action of controller	• Fixes charge air temperature (air intake temperature) at 70°C and continues operation.		
Problem that appears on machine			
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA153**].	

Failure code [CA187] Sens Supply 2 Volt Low Error

Action code	Failure code	Trouble	Sens Supply 2 Volt Low Error (Engine controller system)
E15	**CA187**		
Contents of trouble	• Low voltage error occurred in sensor power supply 2 (5V) circuit.		
Action of controller	• Engine Bkup speed sensor operates with signal from engine Ne speed sensor. • Oil pressure sensor sets oil pressure to default (250 kPa {2.5 kg/cm^2}) and continues operation. • Ambient pressure sensor sets ambient pressure to default (52.44 kPa {0.5 kg/cm^2}) and continues operation. • Charge air pressure sensor fixes charge pressure at 400 kPa {4.1 kg/cm^2} and continues operation. • EGR inlet pressure sensor sets EGR inlet pressure to default (102 kPa {1.0 kg/cm^2}) and continues operation. • EGR valve lift sensor limits output, and closes EGR and bypass valves. • Bypass valve lift sensor limits output, and closes EGR and bypass valves.		
Problem that appears on machine	• Engine output lowers.		
Related information			

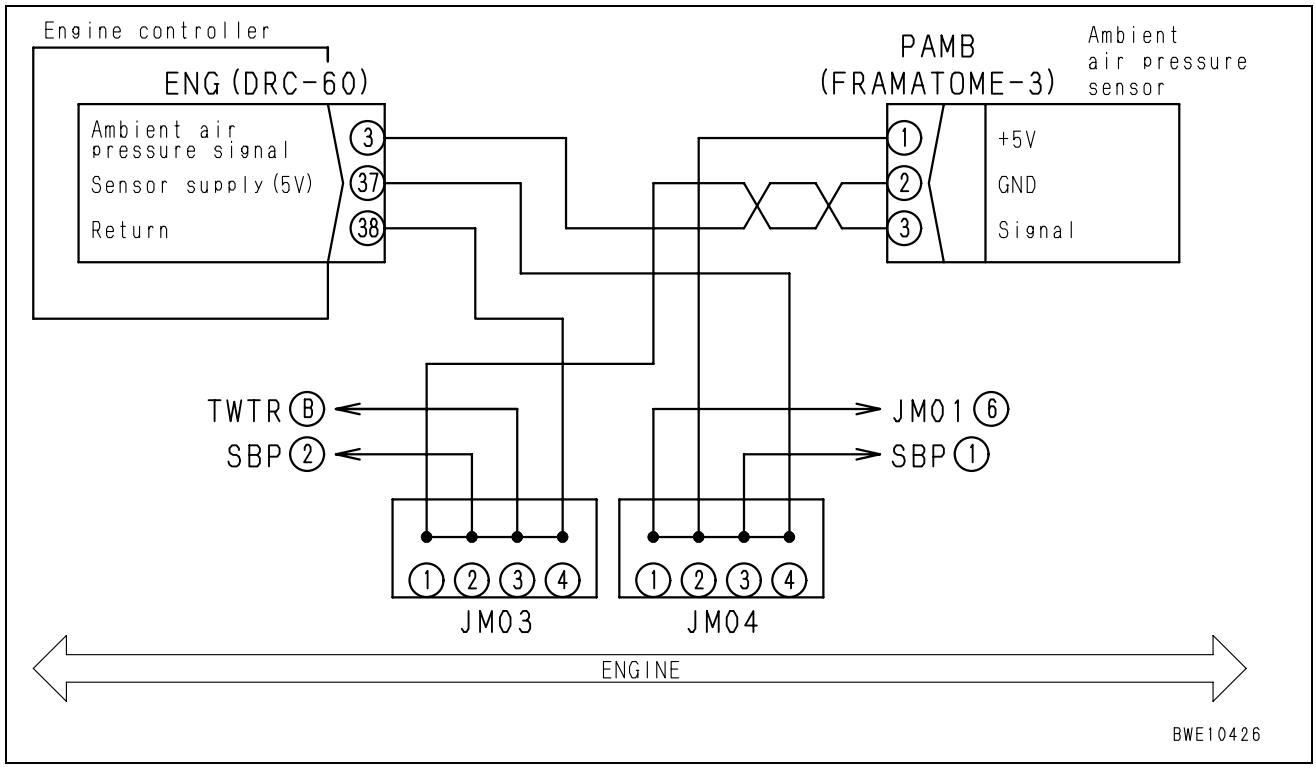
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA227**].	

Failure code [CA221] Ambient Press Sens High Error

Action code	Failure code	Trouble	Ambient Press Sens High Error (Engine controller system)
E15	**CA221**		
Contents of trouble	• High pressure error occurred in ambient pressure sensor circuit.		
Action of controller	• Sets ambient pressure to default (52.44 kPa {0.52 kg/cm^2}) and continues operation.		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA187**] or [**CA227**] is displayed, carry out troubleshooting for it first.			
	2	Defective ambient pressure sensor (Internal defect)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			PAMB		Voltage	
			Between (1) – (2)	Voltage	4.75 – 5.25 V	
			Between (3) – (2)	Signal		
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.			
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – PAMB (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (38) – PAMB (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (3) – PAMB (female) (3)		Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between wiring harness of ENG (female) (37) – PAMB (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Between wiring harness of ENG (female) (38) – PAMB (female) (2) and chassis ground		Resistance	Min. 1 MΩ
			Between wiring harness of ENG (female) (3) – PAMB (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	5	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – PAMB (female) (1) and between ENG (female) (38) – PAMB (female) (2)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – PAMB (female) (1) and between ENG (female) (3) – PAMB (female) (3)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (38) – PAMB (female) (2) and between ENG (female) (3) – PAMB (female) (3)		Resistance	Min. 1 MΩ
	6	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.			
			ENG		Voltage	
			Between (37) – (38)		4.75 – 5.25 V	
			Between (3) – (38)			

Circuit diagram related to atmospheric pressure sensor



Failure code [CA222] Ambient Press Sens Low Error

Action code	Failure code	Trouble	Ambient Press Sens Low Error (Engine controller system)
E15	**CA222**		
Contents of trouble	• Low pressure error occurred in engine ambient pressure sensor circuit.		
Action of controller	• Sets ambient pressure to default (52.44 kPa {0.51 kg/cm^2}) and continues operation.		
Problem that appears on machine	• Engine output lowers.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA221**].	

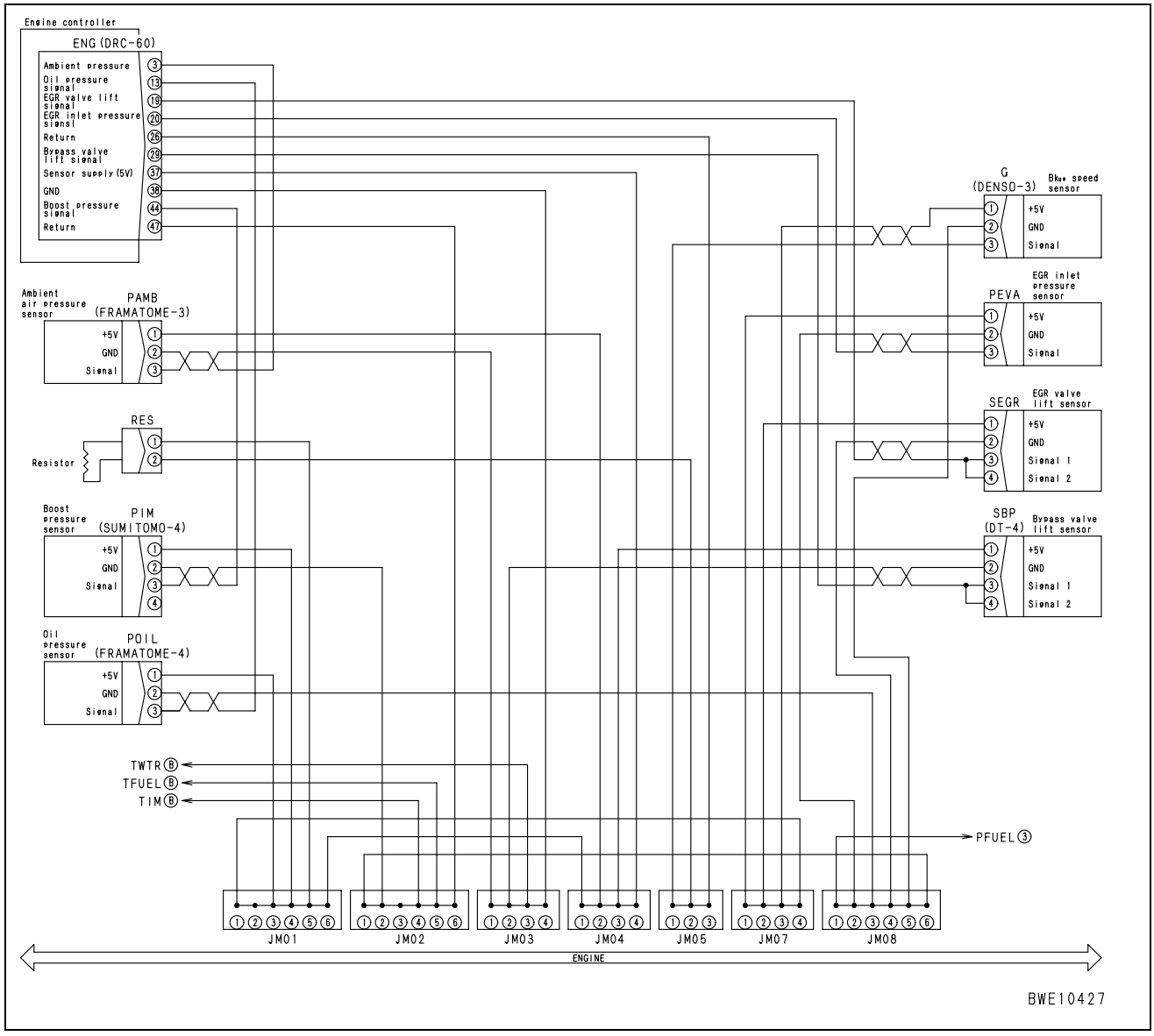
Failure code [CA227] Sens Supply 2 Volt High Error

Action code	Failure code	Trouble	Sens Supply 2 Volt High Error (Engine controller system)
E15	**CA227**		
Contents of trouble	• High voltage error occurred in sensor power supply 2 (5V) circuit.		
Action of controller	• Engine Bkup speed sensor operates with signal from engine Ne speed sensor. • Oil pressure sensor sets oil pressure to default (250 kPa {2.5 kg/cm^2}) and continues operation. • Ambient pressure sensor sets ambient pressure to default (52.44 kPa {0.51 kg/cm^2}) and continues operation. • Charge air pressure sensor fixes charge pressure at 400 kPa {4.1 kg/cm^2} and continues operation. • EGR inlet pressure sensor sets EGR inlet pressure to default (102 kPa {1.0 kg/cm^2}) and continues operation. • EGR valve lift sensor limits output, and closes EGR and bypass valves. • Bypass valve lift sensor limits output, and closes EGR and bypass valves.		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.			
	2	Defective sensor (Internal defect)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Disconnect sensors at right in order. If no error code is displayed, that sensor is defective.	Bkup Speed Sensor	G connector	
				Oil pressure sensor	POIL connector	
				Ambient pressure sensor	PAMB connector	
				Charge air pressure sensor	PIM connector	
				EGR inlet pressure sensor	PEVA connector	
				EGR valve lift sensor	SEGR connector	
				Bypass valve lift sensor	SBP connector	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – each sensor (female)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – each sensor (female)		Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – each sensor (female) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – each sensor (female) and chassis ground		Resistance	Min. 1 MΩ

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	5	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – each sensor (female) and between ENG (female) (47) – each sensor (female)	Resistance	Min. 1 MΩ
	6	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			ENG	Voltage	
			Between (37) – (47)	4.75 – 5.25 V	

Circuit diagram related to sensor power supply 2 (5 V)



Failure code [CA234] Eng Overspeed

Action code	Failure code	Trouble	Eng Overspeed (Mechanical system)
—	**CA234**		
Contents of trouble	• Engine speed exceeded operating range.		
Action of controller	• Limits fuel injection rate until it lowers in operating range.		
Problem that appears on machine	• Engine speed fluctuates.		
Related information			

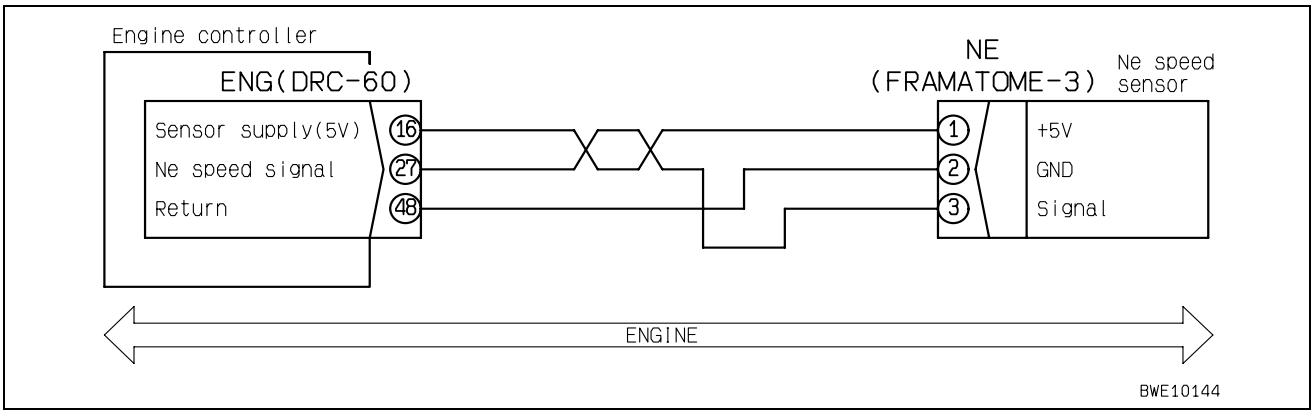
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.
	2	Improper use	Machine may be used improperly. Teach operator proper using method.
	3	Defective engine controller	If causes 1 and 2 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)

Failure code [CA238] Ne Speed Sens Supply Volt Error

Action code	Failure code	Trouble	Ne Speed Sens Supply Volt Error (Engine controller system)
E15	**CA238**		
Contents of trouble	• High voltage error in engine Ne speed sensor power supply (5V) circuit.		
Action of controller	• Controls the engine with signal from engine Bkup speed sensor.		
Problem that appears on machine	• Engine stops during operations. (when engine Bkup speed sensor is also defective) • Engine cannot be started during operations. (when engine Bkup speed sensor is also defective)		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective Ne speed sensor (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Disconnect sensors at right in order. If no error code is displayed, that sensor is defective.	Ne speed sensor	NE connector	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (16) – NE (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (48) – NE (female) (2)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (16) – NE (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (48) – NE (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	4	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (16) – NE (female) (1) and between ENG (female) (48) – NE (female) (2)		Resistance	Min. 1 MΩ
	5	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			ENG	Voltage		
			Between (16) – (48)	4.75 – 5.25 V		

Circuit diagram related to Ne speed sensor power supply

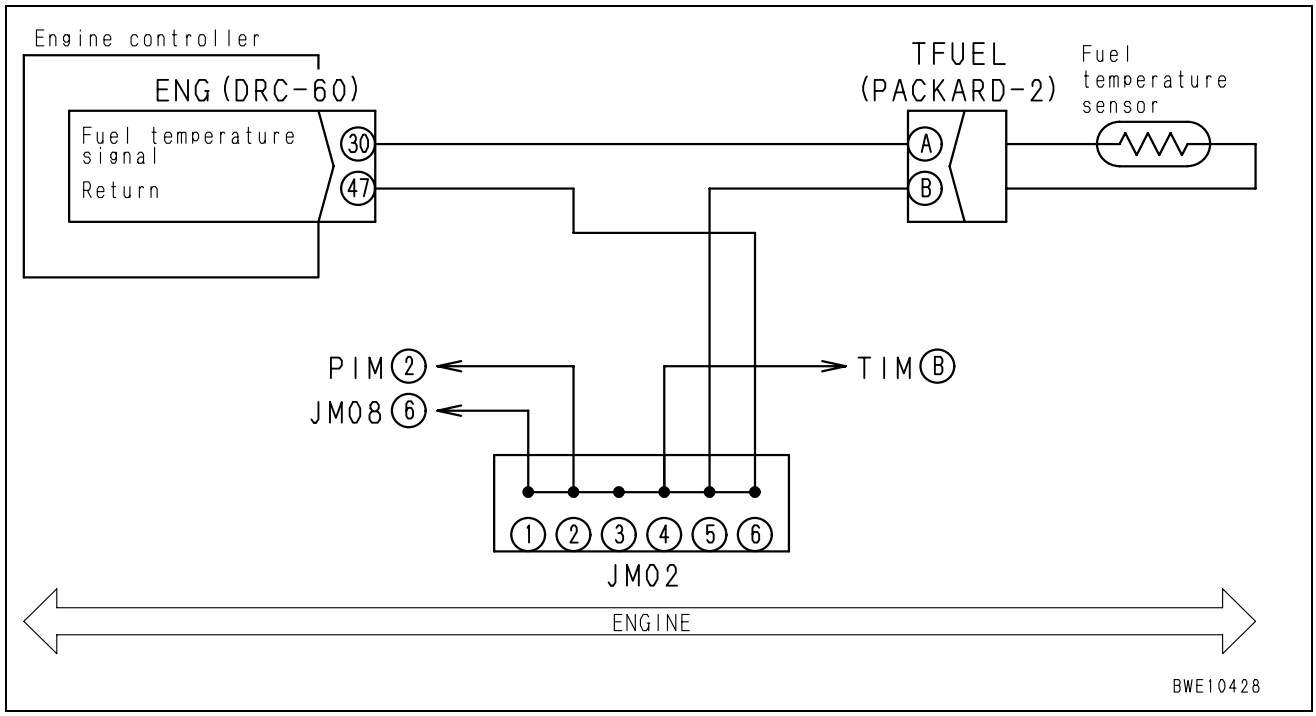


Failure code [CA263] Fuel Temp Sensor High Error

Action code	Failure code	Trouble	Fuel Temp Sensor High Error (Engine controller system)
E15	**CA263**		
Contents of trouble	• High temperature error occurred in fuel temperature sensor circuit.		
Action of controller	• Fixes fuel temperature value at 90°C and continues operation.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective fuel temperature sensor (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			TFUEL (male)	Fuel temperature	Resistance	
			Between (A) – (B)	10 – 100°C	0.6 – 20 kΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (30) – TFUEL (female) (A)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – TFUEL (female) (B)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (30) – TFUEL (female) (A) and chassis ground		Resistance	Min. 1 MΩ
			★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
	4	Defective engine controller	ENG (female)	Fuel temperature	Resistance	
			Between (30) – (47)	10 – 100°C	0.6 – 20 kΩ	

Circuit diagram related to fuel temperature sensor



Failure code [CA265] Fuel Temp Sensor Low Error

Action code	Failure code	Trouble	Fuel Temp Sensor Low Error (Engine controller system)
E15	CA265		
Contents of trouble	• Low temperature error occurred in fuel temperature sensor circuit.		
Action of controller	• Fixes fuel temperature value at 90°C and continues operation.		
Problem that appears on machine			
Related information			

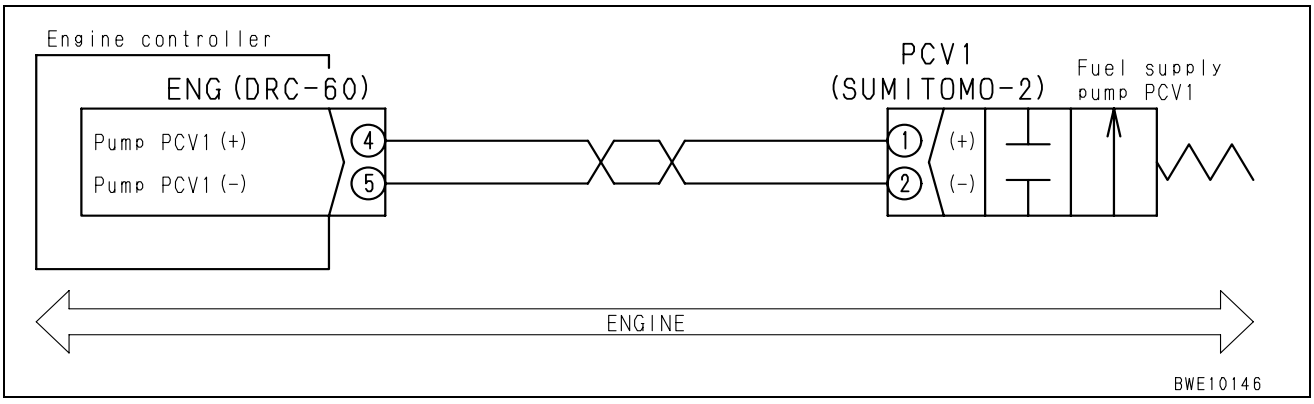
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA263**].	

Failure code [CA271] IMV/PCV1 Short Error

Action code	Failure code	Trouble	IMV/PCV1 Short Error (Engine controller system)
E11	**CA271**		
Contents of trouble	• Short circuit was detected in PCV1 circuit of supply pump.		
Action of controller	• None in particular.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective supply pump PCV1 (Internal short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			PCV1 (male)	Resistance		
			Between (1) – (2)	2.3 – 5.3 Ω		
			Between (1), (2) – chassis ground	Min. 1 MΩ		
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (4) – PCV1 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (5) – PCV1 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	3	Hot short in wiring harness (Short circuit with 24V circuit)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between ENG (female) (4) – PCV1 (female) (1) and chassis ground	Voltage	Max. 1 V	
			Wiring harness between ENG (female) (5) – PCV1 (female) (2) and chassis ground	Voltage	Max. 1 V	
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Resistance		
			Between (4) – (5)	2.3 – 5.3 Ω		
			Between (4), (5) – chassis ground	Min. 1 MΩ		

Circuit diagram related to supply pump PCV1

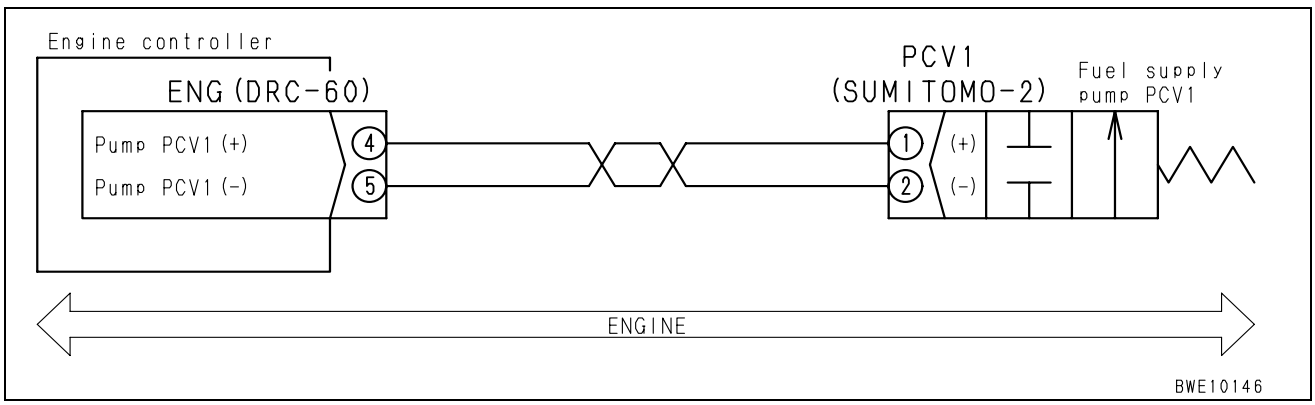


Failure code [CA272] IMV/PCV1 Open Error

Action code	Failure code	Trouble	IMV/PCV1 Open Error (Engine controller system)
E11	**CA272**		
Contents of trouble	• Open error was detected in PCV1 circuit of supply pump.		
Action of controller	• None in particular.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective supply pump PCV1 (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			PCV1 (male)	Resistance	
			Between (1) – (2)	2.3 – 5.3 Ω	
			Between (1), (2) – chassis ground	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (4) – PCV1 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (5) – PCV1 (female) (2)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between wiring harness of ENG (female) (4) – PCV1 (female) (1) and chassis ground and chassis ground	Resistance	Max. 1 MΩ
			Between wiring harness of ENG (female) (5) – PCV1 (female) (2) and chassis ground and chassis ground	Resistance	Max. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
			Between (4) – (5)	2.3 – 5.3 Ω	
			Between (4), (5) – chassis ground	Min. 1 MΩ	

Circuit diagram related to supply pump PCV1

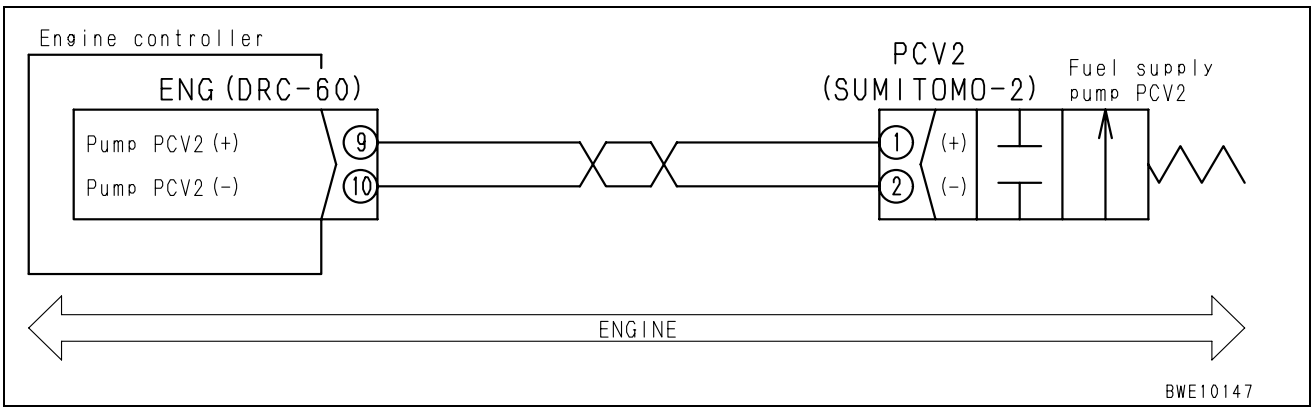


Failure code [CA273] PCV2 Short Error

Action code	Failure code	Trouble	PCV2 Short Error (Engine controller system)
E11	**CA273**		
Contents of trouble	• Short circuit was detected in PCV2 circuit of supply pump.		
Action of controller	• None in particular.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective supply pump PCV2 (Internal short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			PCV2 (male)	Resistance	
			Between (1) – (2)	2.3 – 5.3 Ω	
			Between (1), (2) – chassis ground	Min. 1 MΩ	
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (9) – PCV2 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (10) – PCV2 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
	3	Hot short in wiring harness (Short circuit with 24V circuit)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between ENG (female) (9) – PCV2 (female) (1) and chassis ground	Voltage	Max. 1 V
			Wiring harness between ENG (female) (10) – PCV2 (female) (2) and chassis ground	Voltage	Max. 1 V
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
			Between (9) – (10)	2.3 – 5.3 Ω	
			Between (9), (10) – chassis ground	Min. 1 MΩ	

Circuit diagram related to supply pump PCV2

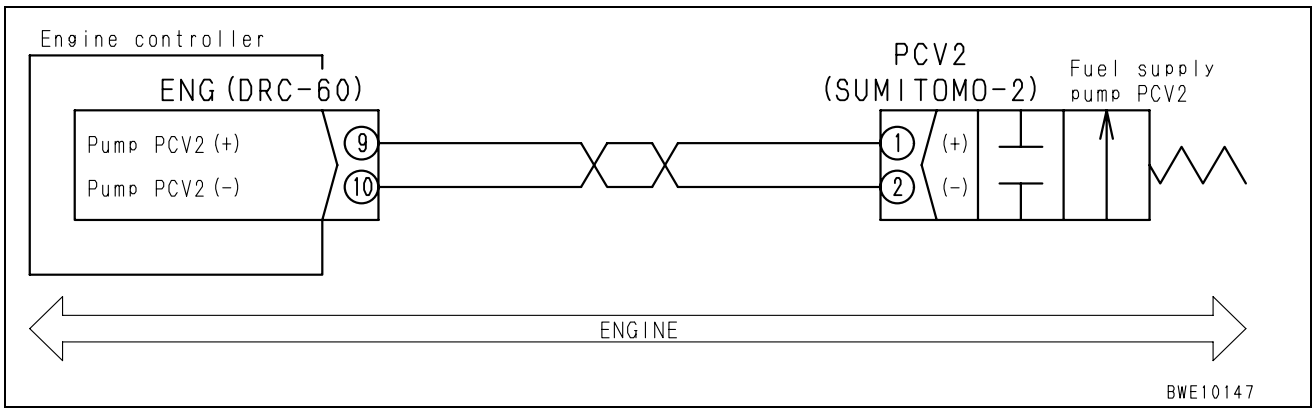


Failure code [CA274] PCV2 Open Error

Action code	Failure code	Trouble	PCV2 Open Error (Engine controller system)
E11	**CA274**		
Contents of trouble	• Open error was detected in PCV2 circuit of supply pump.		
Action of controller	• None in particular.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective supply pump PCV2 (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			PCV2 (male)	Resistance	
			Between (1) – (2)	2.3 – 5.3 Ω	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (9) – PCV2 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (10) – PCV2 (female) (2)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (9) – PCV2 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (10) – PCV2 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
			Between (9) – (10)	2.3 – 5.3 Ω	
			Between (9), (10) – chassis ground	Min. 1 MΩ	

Circuit diagram related to supply pump PCV2

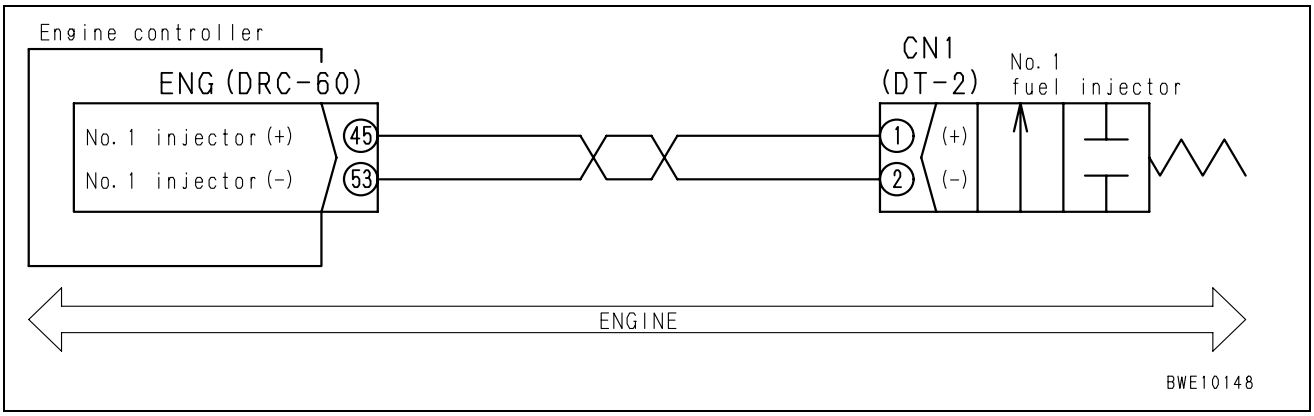


Failure code [CA322] Inj #1 (L#1) Open/Short Error

Action code	Failure code	Trouble	Inj #1 (L#1) Open/Short Error (Engine controller system)
E11	**CA322**		
Contents of trouble	• Opening or short circuit was detected in injector #1 circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine output lowers. • Speed is unstable.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective injector #1 (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CN1 (male)	Resistance	
			Between (1) – (2)	0.4 – 1.1 Ω	
			Between (1), (2) – chassis ground	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (45) – CN1 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (53) – CN1 (female) (2)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (45) – CN1 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (53) – CN1 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
			Between (45) – (53)	0.4 – 1.1 Ω	
			Between (45), (53) – chassis ground	Min. 1 MΩ	

Circuit diagram related to injector #1

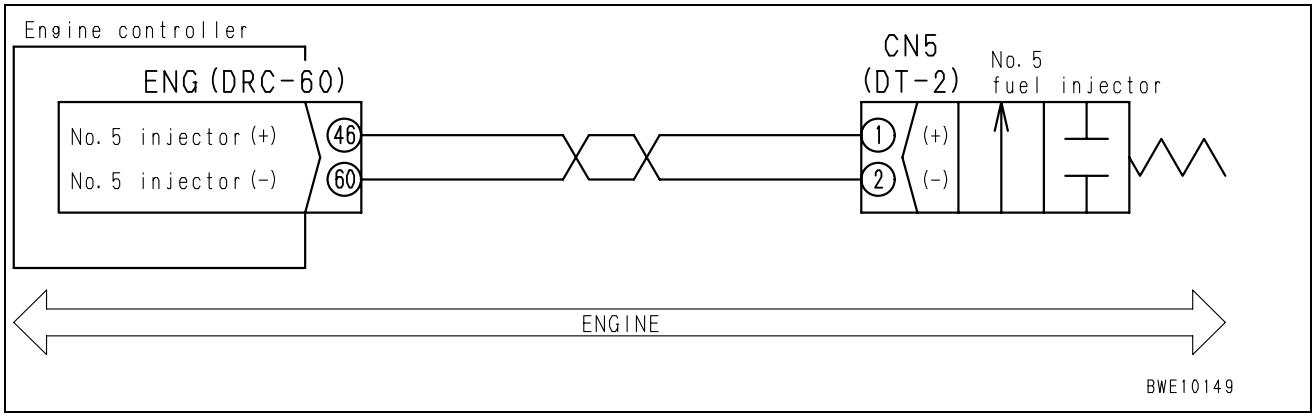


Failure code [CA323] Inj #5 (L#5) Open/Short Error

Action code	Failure code	Trouble	Inj #5 (L#5) Open/Short Error (Engine controller system)
E11	**CA323**		
Contents of trouble	• Opening or short circuit was detected in injector #5 circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine output lowers. • Speed is unstable.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective injector #5 (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CN5 (male)	Resistance		
			Between (1) – (2)	0.4 – 1.1 Ω		
			Between (1), (2) – chassis ground	Min. 1 MΩ		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (46) – CN5 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (60) – CN5 (female) (2)	Resistance	Max. 1 Ω	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (46) – CN5 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (60) – CN5 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Resistance		
			Between (46) – (60)	0.4 – 1.1 Ω		
			Between (46), (60) – chassis ground	Min. 1 MΩ		

Circuit diagram related to injector #5

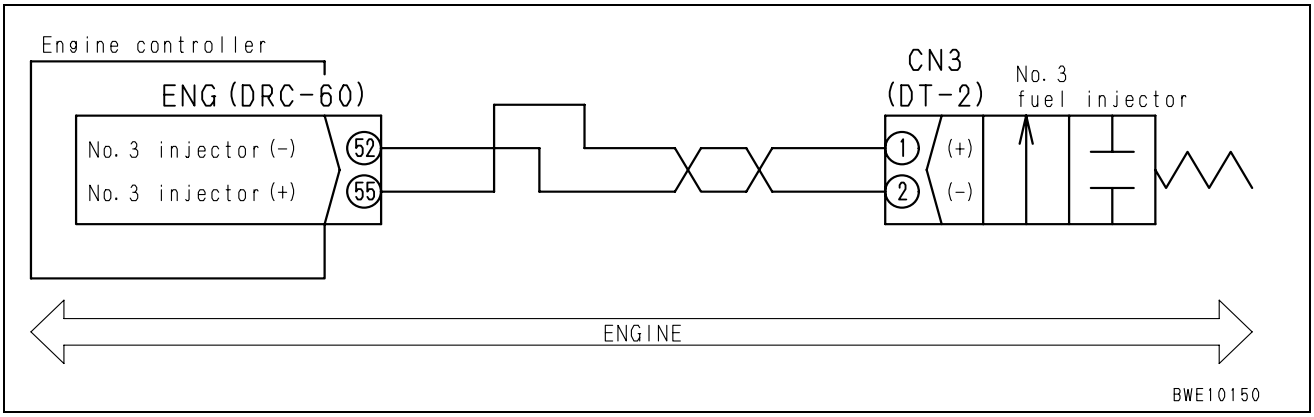


Failure code [CA324] Inj #3 (L#3) Open/Short Error

Action code	Failure code	Trouble	Inj #3 (L#3) Open/Short Error (Engine controller system)
E11	**CA324**		
Contents of trouble	• Opening or short circuit was detected in injector #3 circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine output lowers. • Speed is unstable.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective injector #3 (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CN3 (male)	Resistance	
			Between (1) – (2)	0.4 – 1.1 Ω	
			Between (1), (2) – chassis ground	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (55) – CN3 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (52) – CN3 (female) (2)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (55) – CN3 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (52) – CN3 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
			Between (55) – (52)	0.4 – 1.1 Ω	
			Between (55), (52) – chassis ground	Min. 1 MΩ	

Circuit diagram related to injector #3

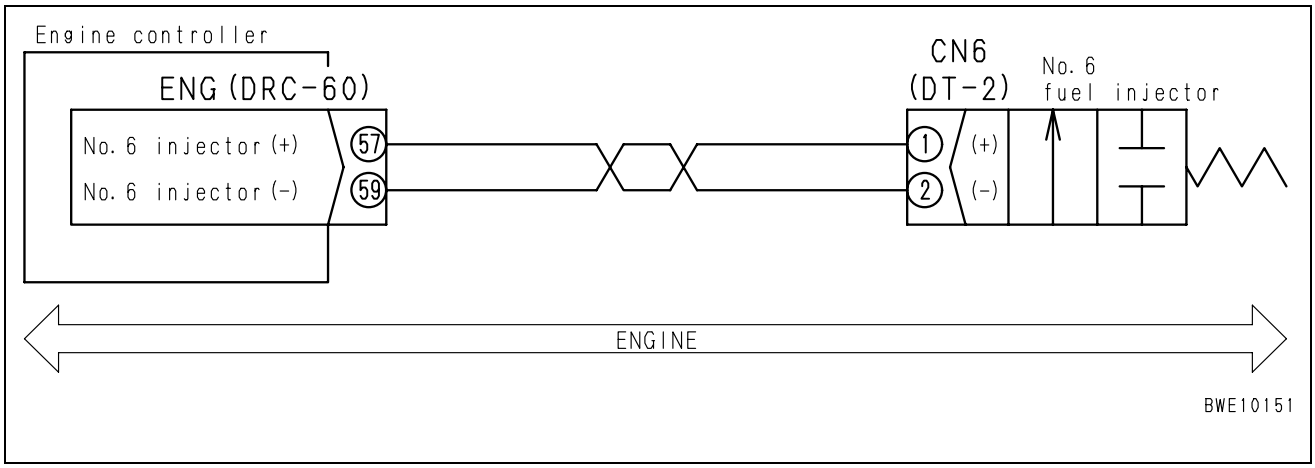


Failure code [CA325] Inj #6 (L#6) Open/Short Error

Action code	Failure code	Trouble	Inj #6 (L#6) Open/Short Error (Engine controller system)
E11	**CA325**		
Contents of trouble	• Opening or short circuit was detected in injector #6 circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine output lowers. • Speed is unstable.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective injector #6 (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CN6 (male)	Resistance		
			Between (1) – (2)	0.4 – 1.1 Ω		
			Between (1), (2) – chassis ground	Min. 1 MΩ		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (57) – CN6 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (59) – CN6 (female) (2)	Resistance	Max. 1 Ω	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (57) – CN6 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (59) – CN6 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Resistance		
			Between (57) – (59)	0.4 – 1.1 Ω		
			Between (57), (59) – chassis ground	Min. 1 MΩ		

Circuit diagram related to injector #6

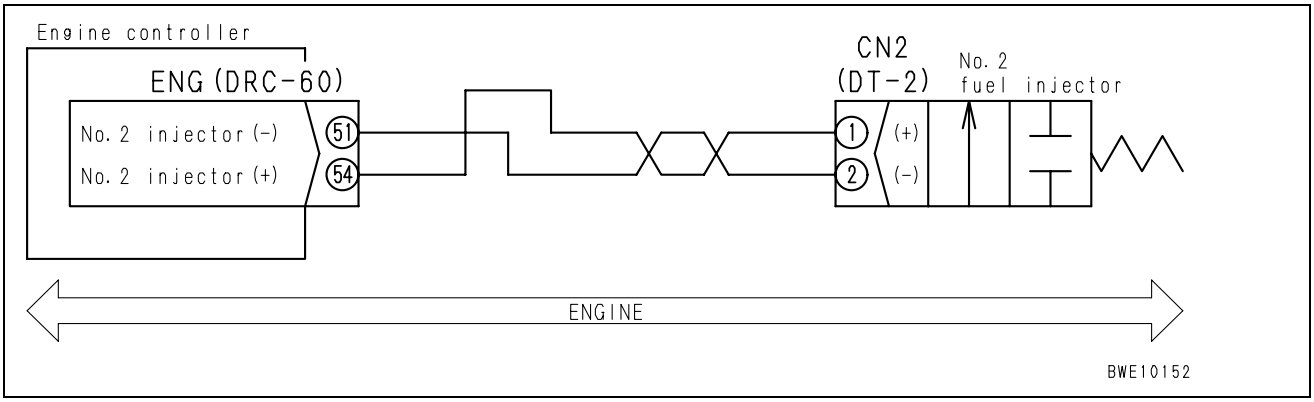


Failure code [CA331] Inj #2 (L#2) Open/Short Error

Action code	Failure code	Trouble	Inj #2 (L#2) Open/Short Error (Engine controller system)
E11	**CA331**		
Contents of trouble	• Opening or short circuit was detected in injector #2 circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine output lowers. • Speed is unstable.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective injector #2 (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CN2 (male)	Resistance		
			Between (1) – (2)	0.4 – 1.1 Ω		
			Between (1), (2) – chassis ground	Min. 1 MΩ		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (54) – CN2 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (51) – CN2 (female) (2)	Resistance	Max. 1 Ω	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (54) – CN2 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (51) – CN2 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Resistance		
			Between (54) – (51)	0.4 – 1.1 Ω		
			Between (54), (51) – chassis ground	Min. 1 MΩ		

Circuit diagram related to injector #2

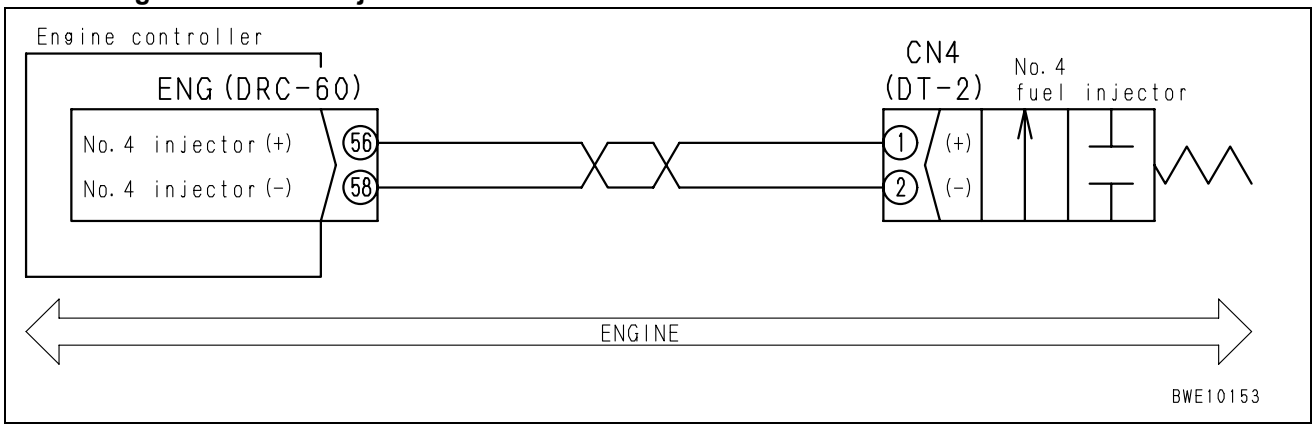


Failure code [CA332] Inj #4 (L#4) Open/Short Error

Action code	Failure code	Trouble	Inj #4 (L#4) Open/Short Error (Engine controller system)
E11	**CA332**		
Contents of trouble	• Opening or short circuit was detected in injector #4 circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine output lowers. • Speed is unstable.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective injector #4 (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CN4 (male)	Resistance		
			Between (1) – (2)	0.4 – 1.1 Ω		
			Between (1), (2) – chassis ground	Min. 1 MΩ		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (56) – CN4 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (58) – CN4 (female) (2)	Resistance	Max. 1 Ω	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (56) – CN4 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (58) – CN4 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	4	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Resistance		
			Between (56) – (58)	0.4 – 1.1 Ω		
			Between (56), (58) – chassis ground	Min. 1 MΩ		

Circuit diagram related to injector #4



Failure code [CA342] Calibration Code Incompatibility

Action code	Failure code	Trouble	Calibration Code Incompatibility (Engine controller system)
E10	CA342		
Contents of trouble	• Incompatibility of data occurred in engine controller.		
Action of controller	• None in particular.		
Problem that appears on machine	• Operations are continued, but engine may stop during operations or may not start in stopped state.		
Related information			

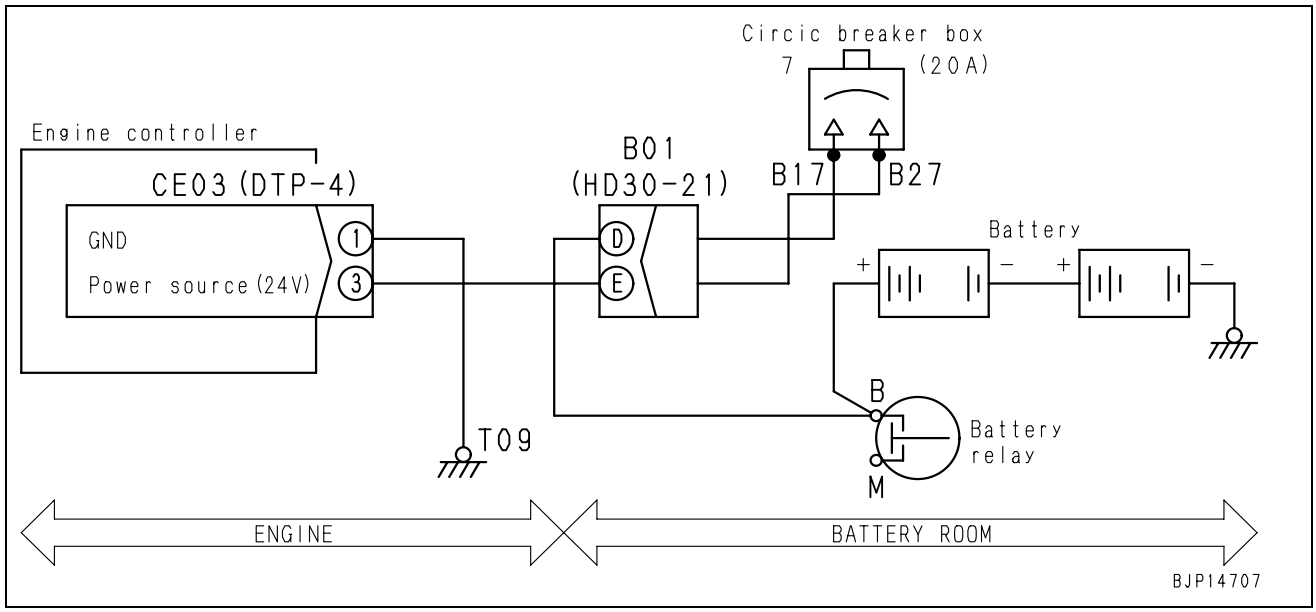
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA111**].	

Failure code [CA351] Injectors Drive Circuit Error

Action code	Failure code	Trouble	Injectors Drive Circuit Error (Engine controller system)
E10	CA351		
Contents of trouble	• There is error in injector drive circuit.		
Action of controller	• Limits output and continues operation (limits common rail pressure).		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defect in related system	Check the code (injector system error code) that is displayed simultaneously. If another code is displayed, carry out troubleshooting for it.		
	2	Defective fuse	Check fuse or circuit breaker on machine side directly for defect. (If fuse is broken or circuit breaker is shut down, circuit probably has ground fault.)		
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CE03 (female) (3) – battery (+)	Resistance	Max. 1 Ω
			Wiring harness between CE03 (female) (1) – chassis ground	Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CE03 (female) (3) – battery (+) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CE03 (female) (1) – chassis ground	Resistance	Min. 1 MΩ
	5	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CE03	Voltage	
			Between (3) – (1)	20 – 30 V	

Circuit diagram related to controller power supply



Failure code [CA352] Sens Supply 1 Volt Low Error

Action code	Failure code	Trouble	Sens Supply 1 Volt Low Error (Engine controller system)
E15	CA352		
Contents of trouble	• Low voltage error occurred in sensor power supply 1 (5V) circuit.		
Action of controller	• Common rail pressure sensor limits output and continues operation (limits common rail pressure).		
Problem that appears on machine	• Engine output lowers.		
Related information			

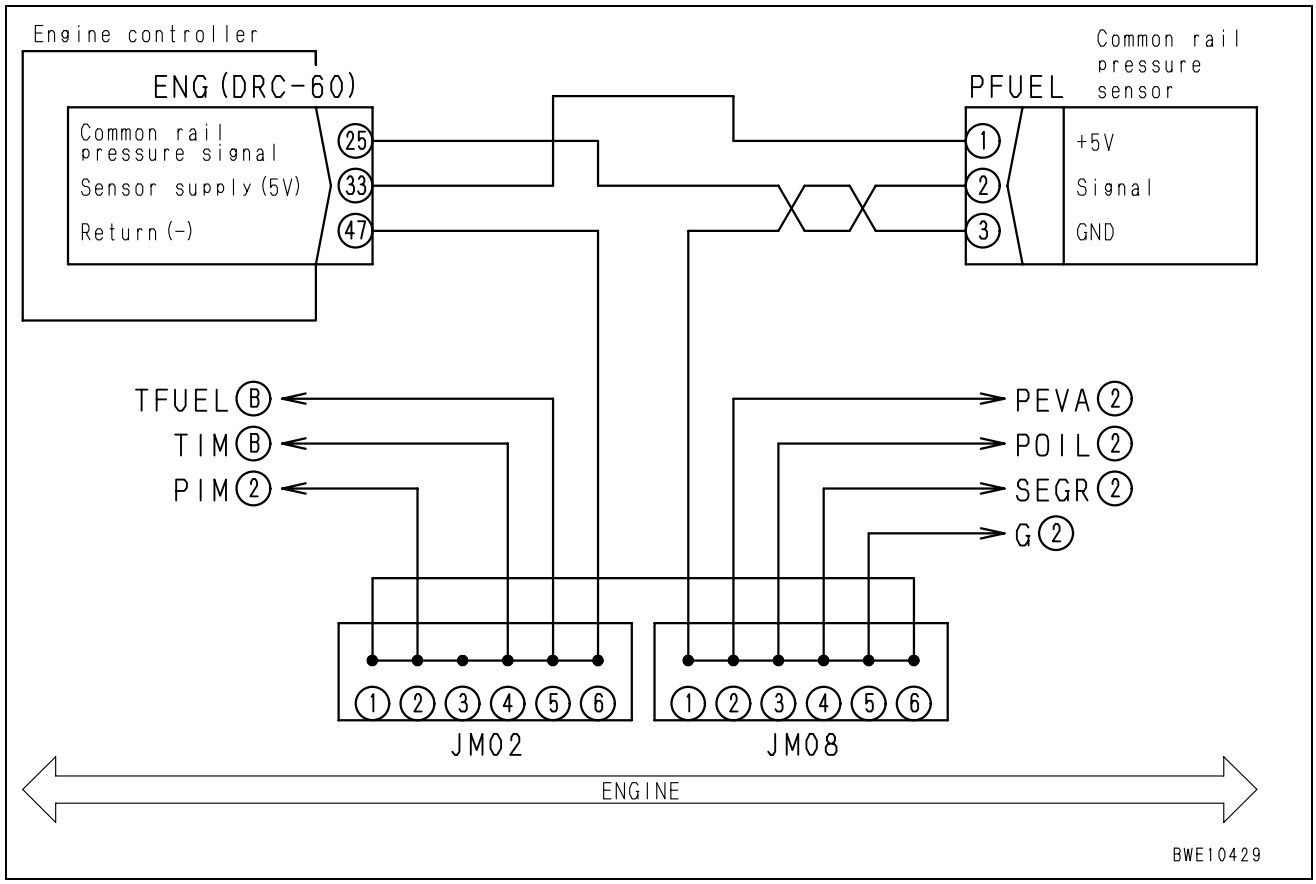
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA386**].	

Failure code [CA386] Sens Supply 1 Volt High Error

Action code	Failure code	Trouble	Sens Supply 1 Volt High Error (Engine controller system)
E15	**CA386**		
Contents of trouble	• High voltage error occurred in sensor power supply 1 (5V) circuit.		
Action of controller	• Common rail pressure sensor limits output and continues operation (limits common rail pressure).		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.			
	2	Defective sensor (Internal defect)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Disconnect sensors at right in order. If no error code is displayed, that sensor is defective.	Common rail pressure sensor	PFUEL connector	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (33) – PFUEL (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – PFUEL (female) (3)		Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (33) – PFUEL (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – PFUEL (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	5	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (33) – PFUEL (female) (1) and between ENG (female) (47) – PFUEL (female) (3)		Resistance	Min. 1 MΩ
	6	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			ENG	Voltage		
			Between (33) – (47)	4.75 – 5.25 V		

Circuit diagram related to sensor power supply 1 (5 V)



PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

40 Troubleshooting

Troubleshooting by failure code (Display of code), Part 2

Troubleshooting by failure code (Display of code), Part 2
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Troubleshooting by failure code (Display of code), Part 2

Failure code [CA441] Battery Voltage Low Error

Action code	Failure code	Trouble	Battery Voltage Low Error (Engine controller system)
E10	**CA441**		
Contents of trouble	• Low voltage error occurred in power supply circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Operations are continued, but engine may stop during operations or may not start in stopped state.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA111**].	

Failure code [CA442] Battery Voltage High Error

Action code	Failure code	Trouble	Battery Voltage High Error (Engine controller system)
E10	**CA442**		
Contents of trouble	• High voltage error occurred in power supply circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Operations are continued, but engine may stop during operations or may not start in stopped state.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA111**].	

Failure code [CA449] Rail Press Very High Error

Action code	Failure code	Trouble	Rail Press Very High Error (Engine controller system)
E11	**CA449**		
Contents of trouble	• There is high pressure error (level 2) in common rail pressure sensor circuit.		
Action of controller	• Limits output and continues operation (limits common rail pressure).		
Problem that appears on machine	• Engine output lowers.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA2249**].	

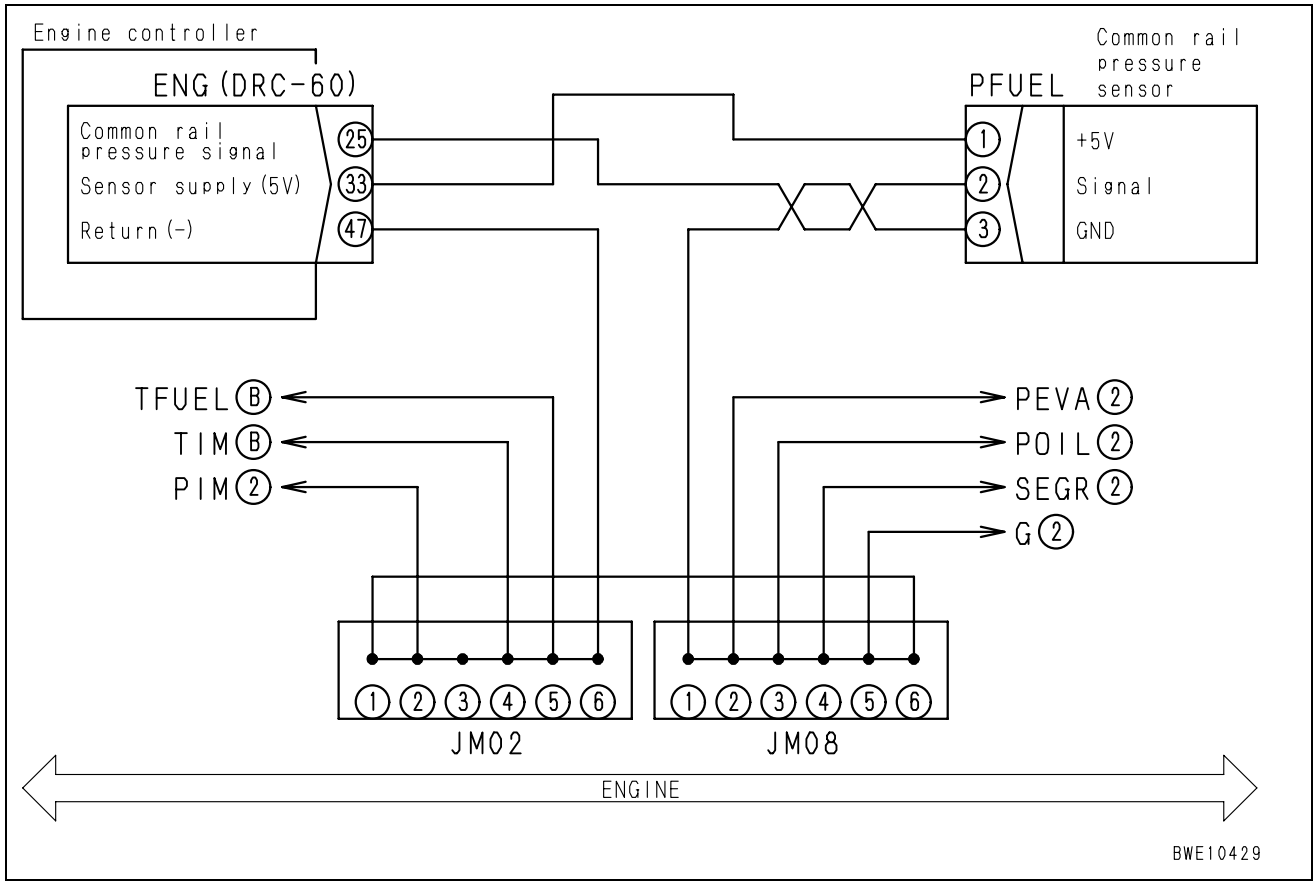
Failure code [CA451] Rail Press Sensor High Error

Action code	Failure code	Trouble	Rail Press Sensor High Error (Engine controller system)
E11	**CA451**		
Contents of trouble	• High pressure error occurred in common rail pressure sensor circuit.		
Action of controller	• Limits output and continues operation (limits common rail pressure).		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA352**] or [**CA386**] is displayed, carry out troubleshooting for it first.		
	2	Defective common rail pressure sensor (Internal defect)	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			PFUEL		Voltage
			Between (1) – (3)	Power supply	4.75 – 5.25 V
			Between (2) – (3)	Signal	0.25 – 4.6 V
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.		
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (33) – PFUEL (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (25) – PFUEL (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – PFUEL (female) (3)	Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (33) – PFUEL (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (25) – PFUEL (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – PFUEL (female) (3) and chassis ground	Resistance	Min. 1 MΩ
	5	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (33) – PFUEL (female) (1) and between ENG (female) (25) – PFUEL (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (33) – PFUEL (female) (1) and between ENG (female) (47) – PFUEL (female) (3)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (25) – PFUEL (female) (2) and between ENG (female) (47) – PFUEL (female) (3)	Resistance	Min. 1 MΩ

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting	
	6	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.	
			ENG	Voltage
			Between (33) – (47)	4.75 – 5.25 V
			Between (25) – (47)	0.25 – 4.6 V

Circuit diagram related to common rail pressure sensor



Failure code [CA452] Rail Press Sensor Low Error

Action code	Failure code	Trouble	Rail Press Sensor Low Error (Engine controller system)
E11	**CA452**		
Contents of trouble	• Low pressure error occurred in common rail pressure sensor circuit.		
Action of controller	• Limits output and continues operation (limits common rail pressure).		
Problem that appears on machine	• Engine output lowers.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA451**].	

Failure code [CA553] Rail Press High Error

Action code	Failure code	Trouble	Rail Press High Error (Engine controller system)
E15	**CA553**		
Contents of trouble	• There is high pressure error (level 1) in common rail pressure sensor circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine output lowers.		
Related information			

Possible causes and standard value in normal state		Cause	Standard value in normal state/Remarks on troubleshooting
	1	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.
	2	Use of improper fuel	Fuel used may be improper. Check it directly. (Viscosity is high)
	3	Defective electrical system of common rail pressure sensor	Electrical system of common rail pressure sensor may be defective. Carry out troubleshooting for failure code [**CA451**].
	4	Defective mechanical system of common rail pressure sensor	Mechanical system of common rail pressure sensor may be defective. Check it directly.
	5	Defective overflow valve	Spring damage, seat wear, or ball fixing of overflow valve is suspected. Check it directly.
	6	Clogged overflow piping	Overflow piping may be clogged. Check it directly.
	7	Defective pressure limiter	Pressure limiter may be damaged mechanically. Check it directly.

Failure code [CA554] Rail Press Sensor In Range Error

Action code	Failure code	Trouble	Rail Press Sensor In Range Error (Engine controller system)
—	**CA554**		
Contents of trouble	• In range error occurred in common rail pressure sensor circuit.		
Action of controller	• Limits output and continues operation (limits common rail pressure).		
Problem that appears on machine	• Engine output lowers.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA451**].	

Failure code [CA559] Rail Press Low Error

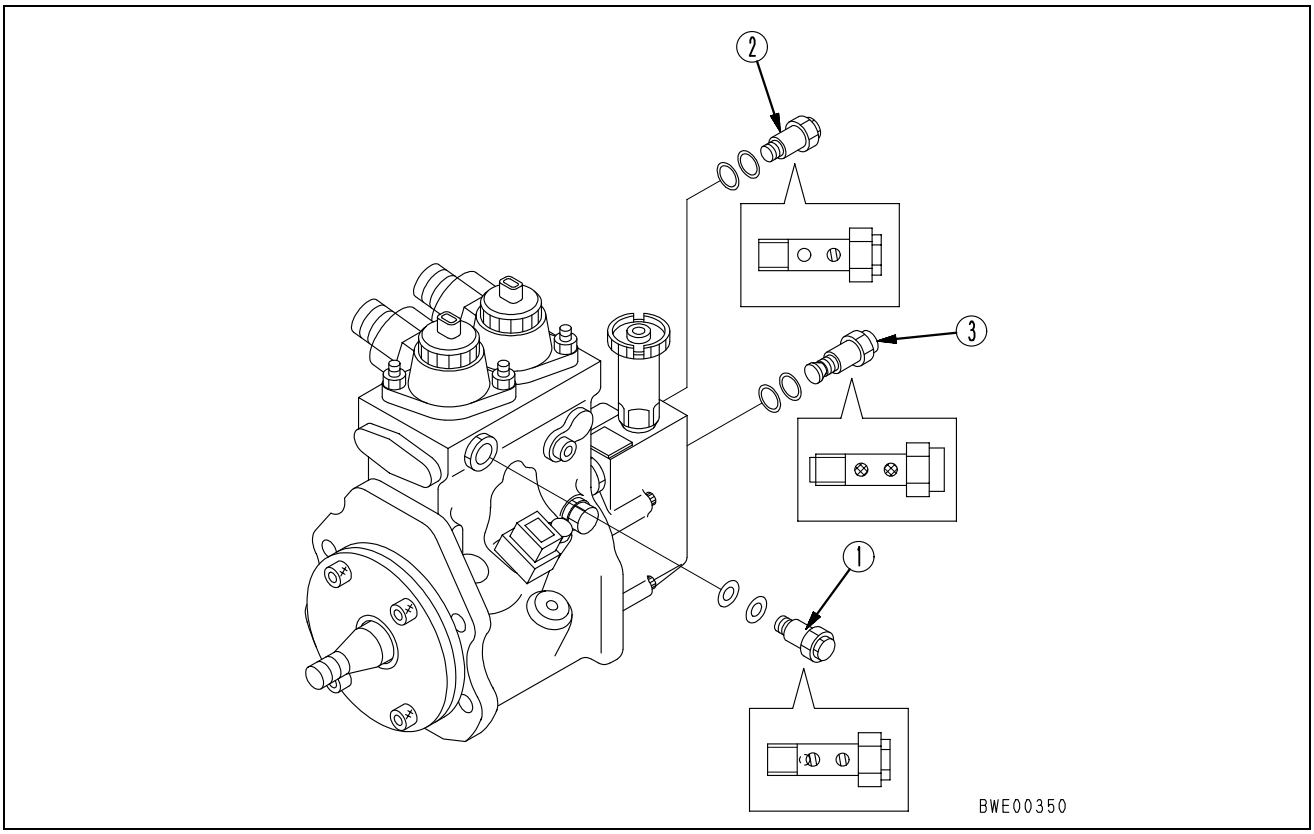
Action code	Failure code	Trouble	Rail Press Low Error (Engine controller system)
E15	**CA559**		
Contents of trouble	• There is rail press very low error (level 1).		
Action of controller	• Limits common rail pressure.		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting	
Possible causes and standard value in normal state	1	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.	
	2	Use of improper fuel	Fuel used may be improper. Check it directly.	
	3	Defect in low pressure circuit parts	★For more information on troubleshooting, see Note 1. For check of pressure in fuel low pressure circuit, see Testing and adjusting, Checking fuel pressure.	
			Pressure in fuel low-pressure circuit	Min. 0.15 MPa {Min. 1.5 kg/cm^2}
	4	Clogged fuel filter, strainer	★For more information on troubleshooting, see Note 2.	
	5	Defective electrical system of supply pump PCV	Electrical system of supply pump PCV may be defective. Carry out troubleshooting for failure code [**CA271**], [**CA272**], [**CA273**], or [**CA274**].	
	6	Defective common rail pressure sensor	Mechanical system of common rail pressure sensor may be defective. Check whether wiring harness is damaged.	
	7	Defective pressure limiter	★For check of leakage through pressure limiter, see Testing and adjusting, Checking fuel return rate and leakage.	
			Leakage through pressure limiter	Max. 10 cc/min (at 1,600 rpm)
	8	Defective injector	★For check of limit return rate (spill) from injector, see Testing and adjusting, Checking fuel return rate and leakage.	
			Speed in rated operation	Limited return (spill) rate from injector
			1,600 rpm	960 cc/min
			1,700 rpm	1,020 cc/min
			1,800 rpm	1,080 cc/min
			1,900 rpm	1,140 cc/min
			2,000 rpm	1,200 cc/min
	9	Defective supply pump	If causes 1 – 8 are not detected, supply pump may be defective.	

<How to use check sheet>
Carry out the above troubleshooting and take a record of the contents of the attached “Check sheet for no-pressure feed”.

Note 1: Check the low-pressure circuit parts for the following items.
1) Fuel level
2) Clogging of fuel tank breather
3) Sticking and wear of feed pump and clogging of filter
4) Leakage through and clogging of low-pressure fuel piping
5) Defective operation of bypass valve and installation of wrong part (See Fig. 1)
6) Clogging of fuel filter
7) Fuel in oil pan (Fuel leakage inside head cover)

Fig. 1: Locations of overflow valve (1), bypass valve (2), and fuel inlet joint (3)
- Overflow valve (1): Spring is seen through both holes.
- Bypass valve (2): Spring is seen through hole on nut side.
- Fuel inlet joint (3): Gauze filter is seen through both holes.



Note 2: Follow the procedure below to check, clean, and replace filter and strainer.
1) Gauze filter: Disassemble this filter for checking. If clogged, clean it
2) Gauze filter upstream strainer: Clean upstream strainer if gauze filter is clogged
3) Fuel filter: If failure is not remedied after steps 1) and 2) above were executed, replace fuel filter

Check sheet for no-pressure feed

Machine model		Working No.	
Model serial No.	#	Checked on	/ /
Engine		Service meter	h
Engine serial No.	#	Worker name	

A. Visual check		Good	Bad
1	Fuel leakage to outside		
2	Clogged fuel tank breather		

B. Check with machine monitor (Abnormality record, monitoring, cylinder cut-out operation)

							Good	Bad
3	Checking error/failure code	/ / / /						
4	Checking monitoring information							
	Code	Display item	Check conditions	Unit	Standard value (Reference value)	Measured value	Good	Bad
	*1	Engine Speed	Low idle	rpm	825 ± 25			
			High idle	rpm	1,980 ± 50			
			Rating or equivalent	rpm	1,800			
	*2	Throttle speed	Low idle	%	0			
			High idle	%	100			
	*3	Injection rate command	Rating or equivalent	mm^3	—		—	—
	*4	Common rail pressure command	Rating or equivalent	MPa				
	*5	Common rail fuel pressure	Rating or equivalent	MPa				
	*6	Injection timing command	Low idle	CA	—		—	—
			High idle	CA	—		—	—
			Rating or equivalent	CA	—		—	—
	*7	Boost Pressure	Rating or equivalent	kPa	—		—	—
	*8	Engine coolant temperature	Low idle	°C	—		—	—
	*9	Fuel temperature	Low idle	°C	—		—	—
5	Checking cylinder cut-out operation (Engine speed)							
	Function	Cut-out cylinder	Check conditions	Unit	Standard value (Reference value)	Measured value	Good	Bad
	*10	Cylinder 1	Low idle	rpm	—		—	—
		Cylinder 2	Low idle	rpm	—		—	—
		Cylinder 3	Low idle	rpm	—		—	—
		Cylinder 4	Low idle	rpm	—		—	—
		Cylinder 5	Low idle	rpm	—		—	—
		Cylinder 6	Low idle	rpm	—		—	—

C. Checking fuel circuit pressure		Check conditions	Unit	Standard value (Reference value)	Measured value	Good	Bad
6	Pressure in fuel low-pressure circuit	High idle	MPa {kg/cm^2}	Min. 0.15 {Min. 1.5}			

D. Checking strainer and filter		Good	Bad
7	Visual check of strainer		
8	Visual check of gauze filter		
9	Visual check of fuel filter		
10	Visual check of bypass valve		

E. Checking leakage and fuel return rate		Check conditions	Unit	Standard value (Reference value)	Measured value	Good	Bad
11	Leakage through pressure limiter	No-load, 1600 rpm	cc/min	Max. 10			
12	Return rate from injector	Rating or equivalent 1,600 rpm	cc/min	960	Speed: Return rate:		
		Rating or equivalent 1,700 rpm	cc/min	1,020			
		Rating or equivalent 1,800 rpm	cc/min	1,080			
		Rating or equivalent 1,900 rpm	cc/min	1,140			
		Rating or equivalent 2,000 rpm	cc/min	1,200			

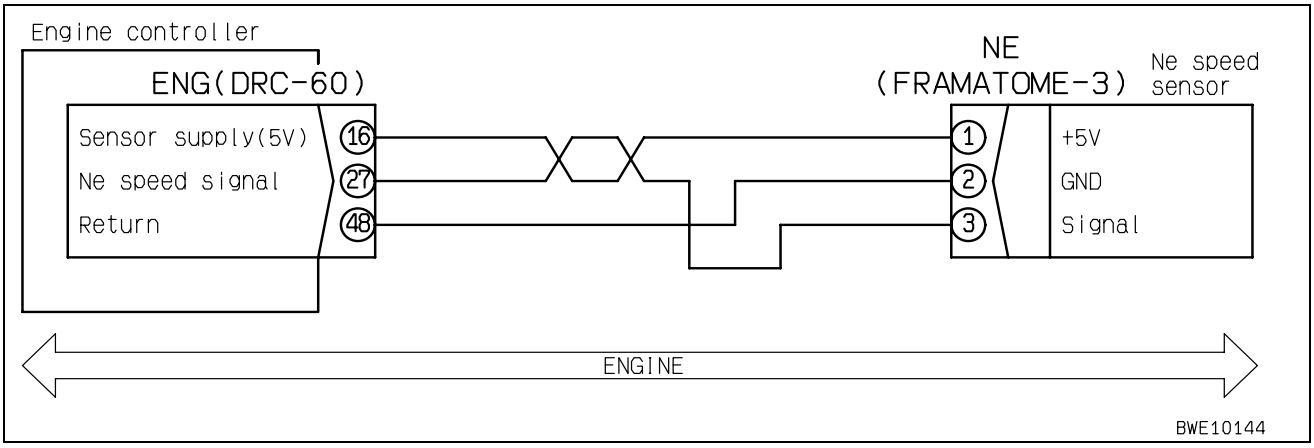
*1 – *10: Check with the monitoring function of the machine monitor.

Failure code [CA689] Eng Ne Speed Sensor Error

Action code	Failure code	Trouble	Eng Ne Speed Sensor Error (Engine controller system)
E11	**CA689**		
Contents of trouble	• There is error in engine Ne speed sensor circuit.		
Action of controller	• Operates the engine with signal from engine Bkup speed sensor.		
Problem that appears on machine	• Engine stops during operations. (When engine Bkup speed sensor is also defective) • Engine cannot be started during operations. (When engine Bkup speed sensor is also defective)		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA238**] is displayed, carry out troubleshooting for it first.		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENGINE (female) (16) – NE (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENGINE (female) (48) – NE (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between ENGINE (female) (27) – NE (female) (3)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (16) – NE (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (48) – NE (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (27) – NE (female) (3) and chassis ground	Resistance	Min. 1 MΩ
	4	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (16) – NE (female) (1) and between ENG (female) (48) – NE (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (16) – NE (female) (1) and between ENG (female) (27) – NE (female) (3)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (48) – NE (female) (2) and between ENG (female) (27) – NE (female) (3)	Resistance	Min. 1 MΩ
	5	Defective sensor installation or defective rotation sensor parts	Ne speed sensor may be installed defectively (improper clearance), or rotation sensor parts (flywheel) may be defective. Check them directly.		
	6	Defective engine Ne speed sensor	If causes 1 – 5 are not detected, engine Ne speed sensor may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		
	7	Defective engine controller	If causes 1 – 5 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to engine Ne speed sensor



Failure code [CA731] Eng Bkup Speed Sens Phase Error

Action code	Failure code	Trouble	Eng Bkup Speed Sens Phase Error (Engine controller system)
E11	**CA731**		
Contents of trouble	• There is phase error in engine Bkup speed sensor circuit.		
Action of controller	• Controls the engine with signal from engine Ne speed sensor.		
Problem that appears on machine	• Engine stops during operations. (When engine Ne speed sensor is also defective) • Engine cannot be started during operations. (When engine Ne speed sensor is also defective)		
Related information			

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective engine Ne speed sensor system	Engine Ne speed sensor may be defective. Carry out troubleshooting for failure code [**CA689**].
	2	Defective engine Bkup speed sensor system	Engine Bkup speed sensor may be defective. Carry out troubleshooting for failure code [**CA778**].

Failure code [CA757] All Persistent Data Lost Error

Action code	Failure code	Trouble	All Persistent Data Lost Error (Engine controller system)
E10	**CA757**		
Contents of trouble	• All data in engine controller are lost.		
Action of controller	• None in particular.		
Problem that appears on machine	• Operations are continued, but engine may stop during operations or may not start in stopped state.		
Related information			

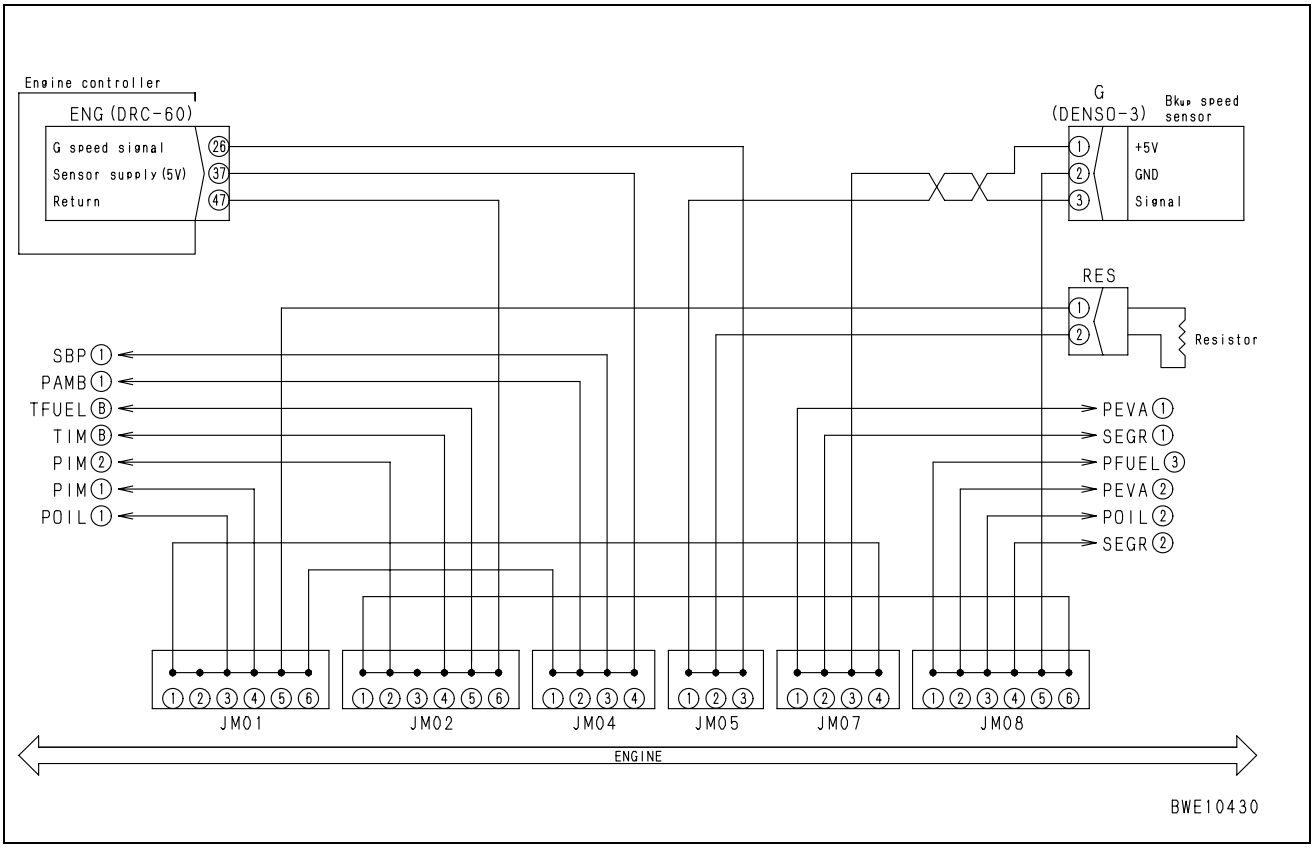
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA111**].	

Failure code [CA778] Eng Bkup Speed Sensor Error

Action code	Failure code	Trouble	Engine Bkup speed sensor error (Engine controller system)
E11	**CA778**		
Contents of trouble	• There is error in engine Bkup speed sensor circuit.		
Action of controller	• Operates the engine with signal from engine Ne speed sensor.		
Problem that appears on machine	• Engine stops during operations. (When engine Ne speed sensor is also defective) • Engine cannot be started during operations. (When engine Ne speed sensor is also defective)		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA187**] or [**CA227**] is displayed, carry out troubleshooting for it first.		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – G (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – G (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (26) – G (female) (3)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – G (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – G (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (26) – G (female) (3) and chassis ground	Resistance	Min. 1 MΩ
	4	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – G (female) (1) and between ENG (female) (47) – G (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – G (female) (1) and between ENG (female) (26) – G (female) (3)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – G (female) (2) and between ENG (female) (26) – G (female) (3)	Resistance	Min. 1 MΩ
	5	Defective sensor installation or defective rotation sensor parts	Bkup speed sensor may be installed defectively (improper clearance), or rotation sensor parts (in supply pump) may be defective. Check them directly.		
	6	Defective engine Bkup speed sensor	If causes 1 – 5 are not detected, engine Bkup speed sensor may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		
	7	Defective engine controller	If causes 1 – 6 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to engine Bkup speed sensor



Failure code [CA1228] EGR Valve Servo Error 1

Action code	Failure code	Trouble	EGR Valve Servo Error 1 (Engine controller system)
E15	**CA1228**		
Contents of trouble	• There is EGR valve servo error (level 1).		
Action of controller	• Performs open control.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting	
Possible causes and standard value in normal state	1	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.	
	2	Defective engine oil pressure system (main circuit)	★For check of engine oil pressure, see Testing and adjusting, Measuring engine oil pressure.	
			Engine	Engine oil pressure
			Low idle	0.08MPa {0.8kg/cm^2}
			High idle	0.21MPa {2.1kg/cm^2}
			If engine oil pressure is not normal, carry out troubleshooting for mechanical system. (S-12 Oil pressure lowers.)	
	3	Defective EGR valve oil pump	Oil pump or relief valve for EGR valve circuit may be defective. Check it directly.	
	4	Defective EGR valve oil pressure supply piping	Oil pressure supply piping for EGR valve circuit may be defective. Check it directly.	
	5	Defective EGR valve oil pressure return piping	Oil pressure return piping for EGR valve circuit may be defective. Check it directly.	
	6	Defective EGR valve	EGR valve may be damaged mechanically. Check it directly.	
	7	Defective engine controller	If causes 1 – 6 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)	

Failure code [CA1625] EGR Valve Servo Error 2

Action code	Failure code	Trouble	EGR Valve Servo Error 2 (Engine controller system)
E11	**CA1625**		
Contents of trouble	• There is EGR valve servo error (level 2).		
Action of controller	• Limits output and continues operation. • Close EGR and bypass valves.		
Problem that appears on machine	• Engine output lowers.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA1228**].	

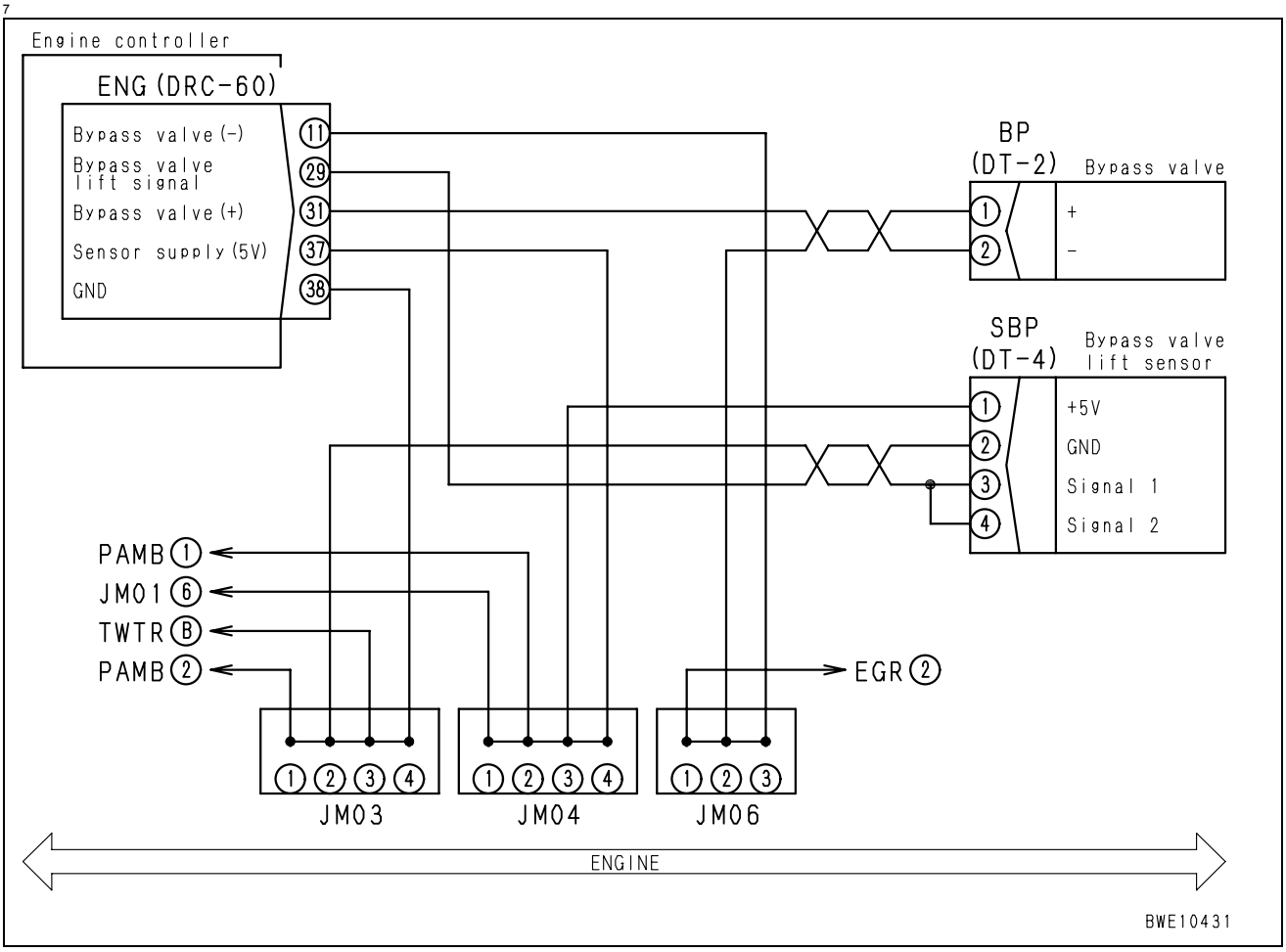
Failure code [CA1626] BP Valve Sol Current High Error

Action code	Failure code	Trouble	BP Valve Sol Current High Error (Engine controller system)
E11	**CA1626**		
Contents of trouble	• There is short circuit in drive circuit of bypass valve solenoid.		
Action of controller	• Limits output and continues operation. • Closes EGR valve and bypass valve.		
Problem that appears on machine	• Output drops.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective bypass valve solenoid (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			BP (male)	Resistance	
			Between (1) – (2)	10 – 21 Ω	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (31) – BP (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (11) – BP (female) (2)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (31) – BP (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (11) – BP (female) (2) and chassis ground	Resistance	Min. 1 MΩ
	4	Hot short (Short circuit with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between ENG (female) (31) – BP (female) (1) and chassis ground	Voltage	Max. 1 V
			Wiring harness between ENG (female) (11) – BP (female) (2) and chassis ground	Voltage	Max. 1 V
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
			Between (31) – (11)	10 – 21 Ω	

Circuit diagram related to bypass valve solenoid & lift sensor

7



Failure code [CA1627] BP Valve Sol Current Low Error

Action code	Failure code	Trouble	BP Valve Sol Current Low Error (Engine controller system)
E11	**CA1627**		
Contents of trouble	• There is disconnection in drive circuit of bypass valve solenoid.		
Action of controller	• Limits output and continues operation. • Closes EGR valve and bypass valve.		
Problem that appears on machine	• Output drops.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA1626**].	

Failure code [CA1628] Bypass Valve Servo Error 1

Action code	Failure code	Trouble	Bypass Valve Servo Error 1 (Engine controller system)
E15	**CA1628**		
Contents of trouble	• Abnormality (level 1) occurred in bypass valve servo.		
Action of controller	• Performs open control.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting	
Possible causes and standard value in normal state	1	Defective related system	If another failure code is indicated, carry out troubleshooting for it.	
	2	Defective engine oil pressure system (main circuit)	★For check of engine oil pressure, see TESTING AND ADJUSTING, Testing oil pressure.	
			Engine	Engine oil pressure
			Low idle	0.08 MPa {0.8 kg/cm^2}
			High idle	0.21 MPa {2.1 kg/cm^2}
			If engine oil pressure is abnormal, carry out troubleshooting for mechanical system (S-12 Oil pressure lowers).	
	3	Defective oil pump for bypass valve	Check oil pump and relief valve for bypass valve circuit directly.	
	4	Defective oil feed piping for bypass valve	Check oil feed piping for bypass valve circuit directly.	
	5	Defective oil return piping for bypass valve	Check oil return piping for bypass valve circuit directly.	
	6	Defective bypass valve	Check mechanical section of bypass valve directly.	
	7	Defective engine controller	If causes 1 – 6 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)	

Failure code [CA1629] Bypass Valve Servo Error 2

Action code	Failure code	Trouble	Bypass Valve Servo Error 2 (Engine controller system)
E11	**CA1629**		
Contents of trouble	• Abnormality (level 2) occurred in bypass valve servo.		
Action of controller	• Limits output and continues operation. • Closes EGR valve and bypass valve.		
Problem that appears on machine	• Output drops.		
Related information			

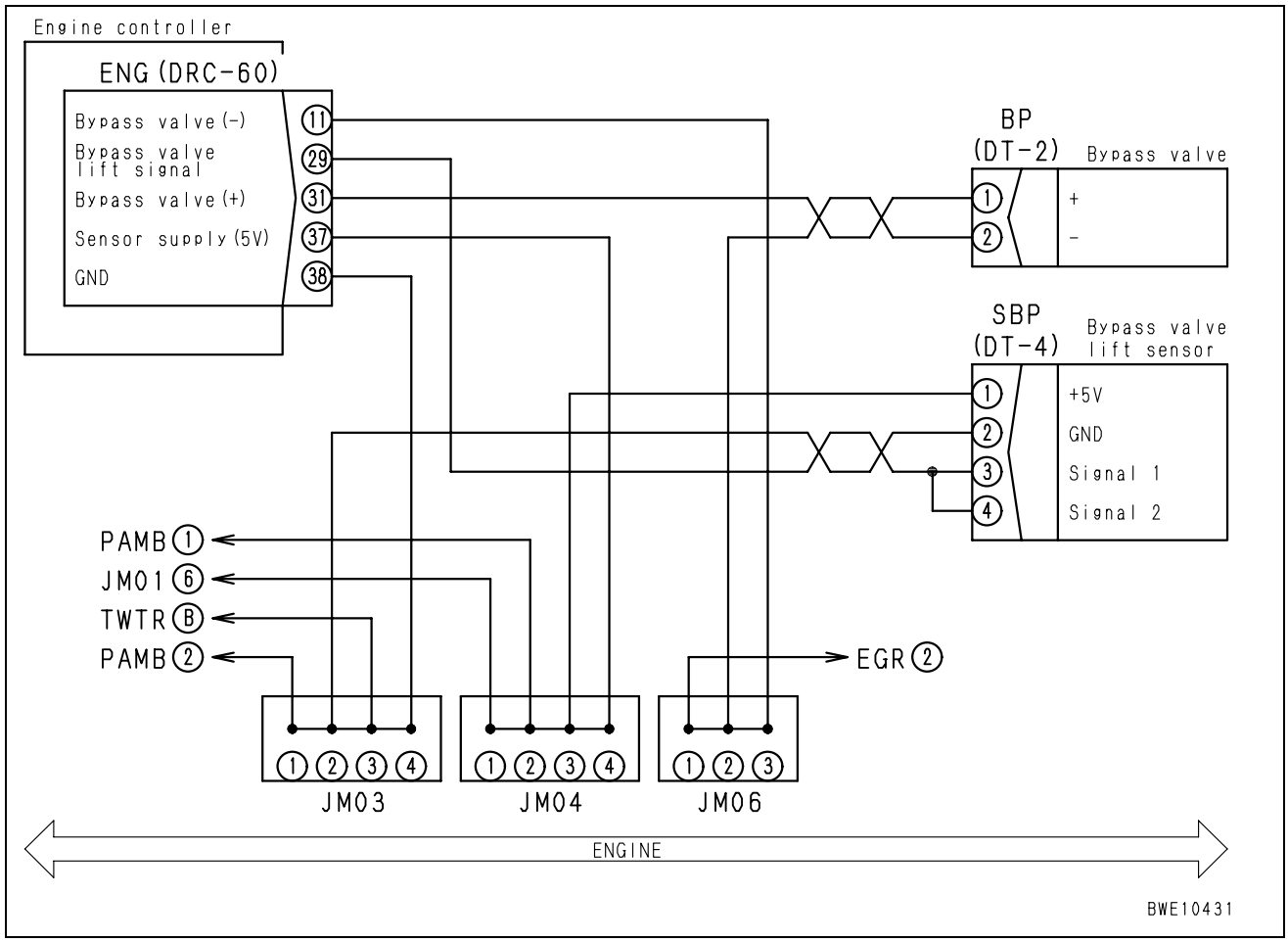
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA1628**].	

Failure code [CA1631] BP Valve Pos Sens High Error

Action code	Failure code	Trouble	BP Valve Pos Sens High Error (Engine controller system)
E11	**CA1631**		
Contents of trouble	• Signal voltage in bypass valve lift sensor circuit is abnormally high.		
Action of controller	• Limits output and continues operation. • Closes EGR valve and bypass valve.		
Problem that appears on machine	• Output drops.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective sensor power supply	If failure code [**CA352**] or [**CA386**] is displayed, carry out troubleshooting for it first.		
	2	Defective bypass valve lift sensor (Internal trouble)	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			SBP		Voltage
			Between (1) – (2)	Power supply	4.75 – 5.25 V
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.		
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – SBP (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (38) – SBP (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (29) – SBP (female) (3), (4)	Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – SBP (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (38) – SBP (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (29) – SBP (female) (3), (4) and chassis ground	Resistance	Min. 1 MΩ
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – SBP (female) (1) and between ENG (female) (38) – SBP (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – SBP (female) (1) and between ENG (female) (29) – SBP (female) (3), (4)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (38) – SBP (female) (2) and between ENG (female) (29) – SBP (female) (3), (4)	Resistance	Min. 1 MΩ
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			ENG	Voltage	
			Between (37) – (38)	4.75 – 5.25 V	

Circuit diagram related to bypass valve solenoid & lift sensor



Failure code [CA1632] BP Valve Pos Sens Low Error

Action code	Failure code	Trouble	BP Valve Pos Sens Low Error (Engine controller system)
E11	**CA1632**		
Contents of trouble	• Signal voltage in bypass valve lift sensor circuit is abnormally low.		
Action of controller	• Limits output and continues operation. • Closes EGR valve and bypass valve.		
Problem that appears on machine	• Output drops.		
Related information			

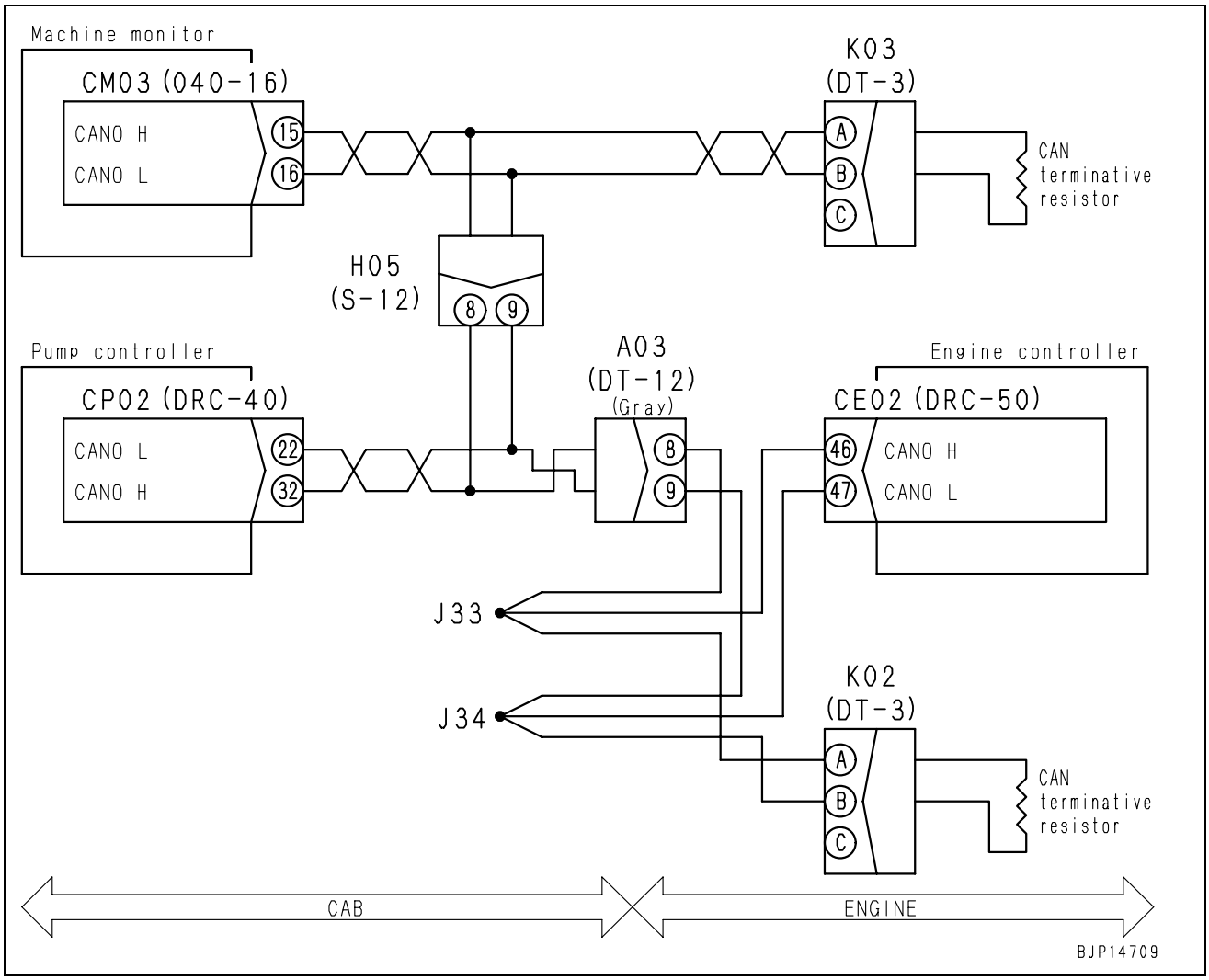
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA1631**].	

Failure code [CA1633] KOMNET Datalink Timeout Error

Action code	Failure code	Trouble	KOMNET Datalink Timeout Error (Engine controller system)
E0E	**CA1633**		
Contents of trouble	• There is error in KOMNET communication circuit with machine monitor, or pump controller.		
Action of controller	• Operates in default mode or holds the state set when error occurred.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22)	Resistance	Max. 1 Ω
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32)	Resistance	Max. 1 Ω
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
	3	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Voltage	Max. 1 V
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32), – other related circuit and chassis ground	Voltage	Max. 1 V
	4	Defective CAN terminal resistance	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			K02(male), K03 (male)	Resistance	
			Between (A) – (B)	40 – 80 Ω	
	5	Defective machine monitor, engine controller, or pump controller	If causes 1 – 4 are not detected, machine monitor, engine controller, or pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to CAN communication of pump controller



Failure code [CA1642] EGR Inter Press Sens Low Error

Action code	Failure code	Trouble	EGR Inter Press Sens Low Error (Engine controller system)
E11	**CA1642**		
Contents of trouble	• Signal voltage in EGR inlet pressure sensor circuit is abnormally low.		
Action of controller	• Sets EGR inlet pressure to default value (102 kPa {1.0kg/cm^2}) and continues operation. • Limits output and continues operation.		
Problem that appears on machine	• Output drops.		
Related information			

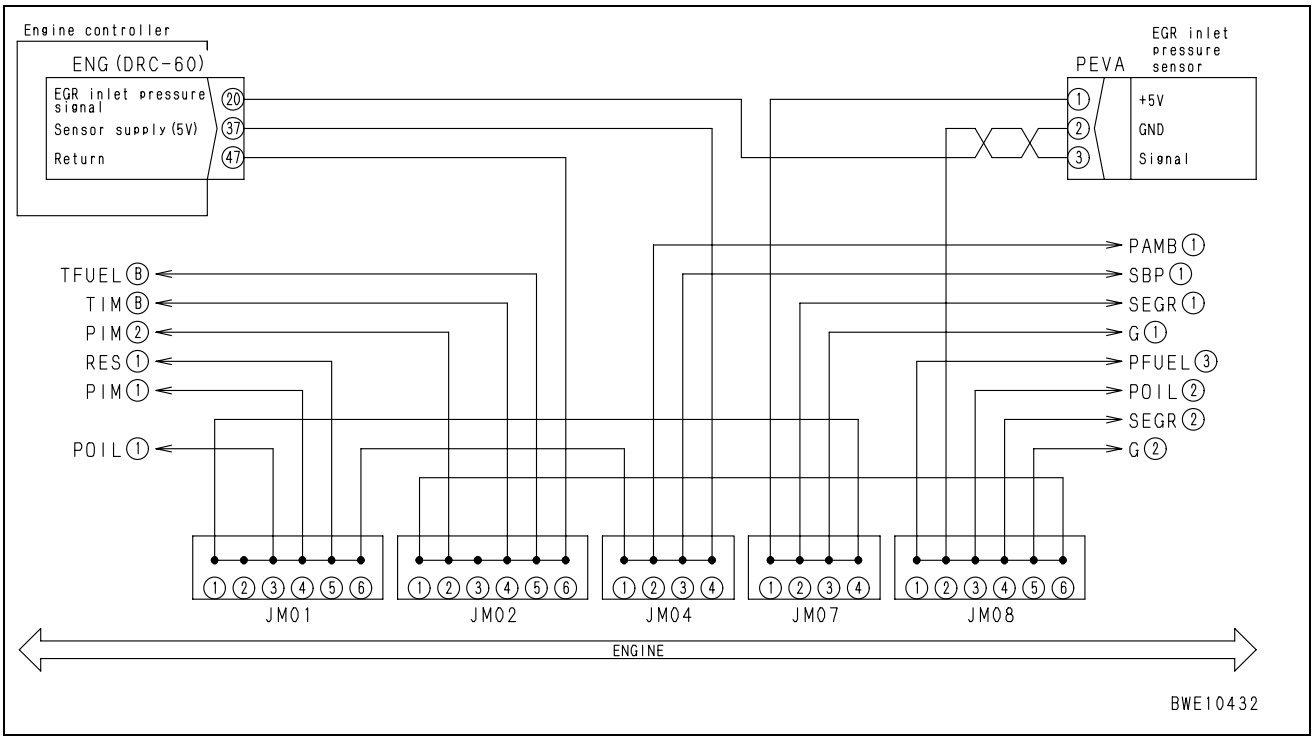
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA1653**].	

Failure code [CA1653] EGR Inter Press Sens High Error

Action code	Failure code	Trouble	EGR Inter Press Sens High Error (Engine controller system)
E11	**CA1653**		
Contents of trouble	• Signal voltage in EGR inlet pressure sensor circuit is abnormally high.		
Action of controller	• Sets EGR inlet pressure to default value (102 kPa {1.0kg/cm^2}) and continues operation. • Limits output and continues operation.		
Problem that appears on machine	• Output drops.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective sensor power supply	If failure code [**CA187**] or [**CA227**] is displayed, carry out troubleshooting for it first.		
	2	Defective EGR inlet pressure sensor (Internal trouble)	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			PEVA		Voltage
			Between (1) – (2)	Power supply	4.75 – 5.25 V
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.		
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – PEVA (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – PEVA (female) (2)	Resistance	Max. 1Ω
			Wiring harness between ENG (female) (20) – PEVA (female) (3)	Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – PEVA (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – PEVA (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (20) – PEVA (female) (3) and chassis ground	Resistance	Min. 1 MΩ
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – PEVA (female) (1) and between ENG (female) (47) – PEVA (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – PEVA (female) (1) and between ENG (female) (20) – PEVA (female) (3)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – PEVA (female) (2) and between ENG (female) (20) – PEVA (female) (3)	Resistance	Min. 1 MΩ
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			ENG		Voltage
			Between (37) – (47)		4.75 – 5.25 V

Circuit diagram related to EGR inlet pressure sensor

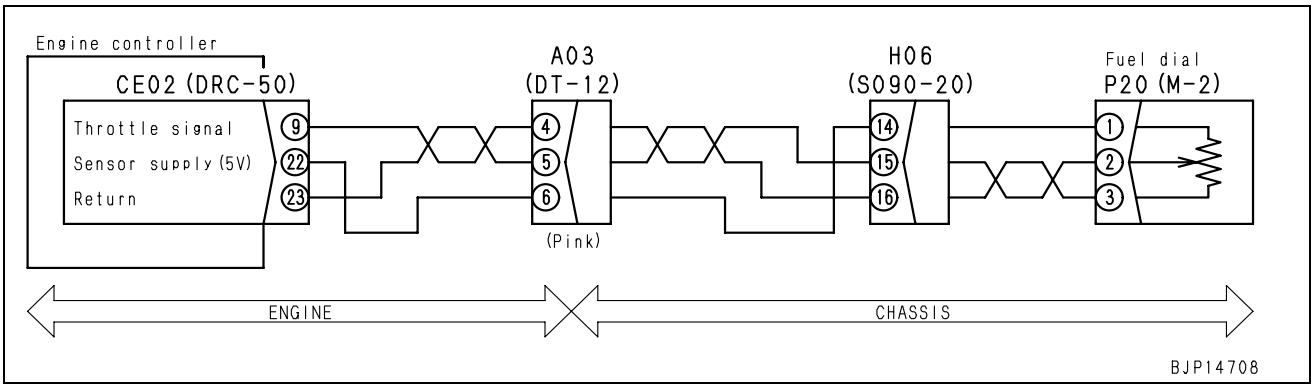


Failure code [CA2185] Throt Sens Sup Volt High Error

Action code	Failure code	Trouble	Throt Sens Sup Volt High Error (Engine controller system)
E14	**CA2185**		
Contents of trouble	• High voltage error occurred in throttle sensor power supply (5V) circuit.		
Action of controller	• Use a signal other than throttle sensor to set the throttle position for operations.		
Problem that appears on machine			
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective fuel control dial (Internal defect)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Disconnect sensors at right in order. If no error code is displayed, that sensor is defective.	Fuel control dial	P20 connector	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CE02 (female) (22) – P20 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between CE02 (female) (23) – P20 (female) (3)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CE02 (female) (22) – P20 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between CE02 (female) (23) – P20 (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	4	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CE02 (female) (22) – P20 (female) (1) and between CE02 (female) (23) – P20 (female) (3)		Resistance	Min. 1 MΩ
	5	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CE02	Voltage		
			Between (22) – (23)	4.75 – 5.25 V		

Circuit diagram related to fuel control dial throttle sensor



Failure code [CA2186] Throt Sens Sup Volt Low Error

Action code	Failure code	Trouble	Throt Sens Sup Volt Low Error (Engine controller system)
E14	**CA2186**		
Contents of trouble	• Low voltage error occurred in throttle sensor power supply (5V) circuit.		
Action of controller	• Use a signal other than throttle sensor to set the throttle position for operations.		
Problem that appears on machine			
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA2185**].	

Failure code [CA2249] Rail Press Very Low Error

Action code	Failure code	Trouble	Rail Press Very Low Error (Engine controller system)
E11	**CA2249**		
Contents of trouble	• There is rail press very low error (level 2).		
Action of controller	• Limits common rail pressure.		
Problem that appears on machine	• Engine output lowers.		
Related information			

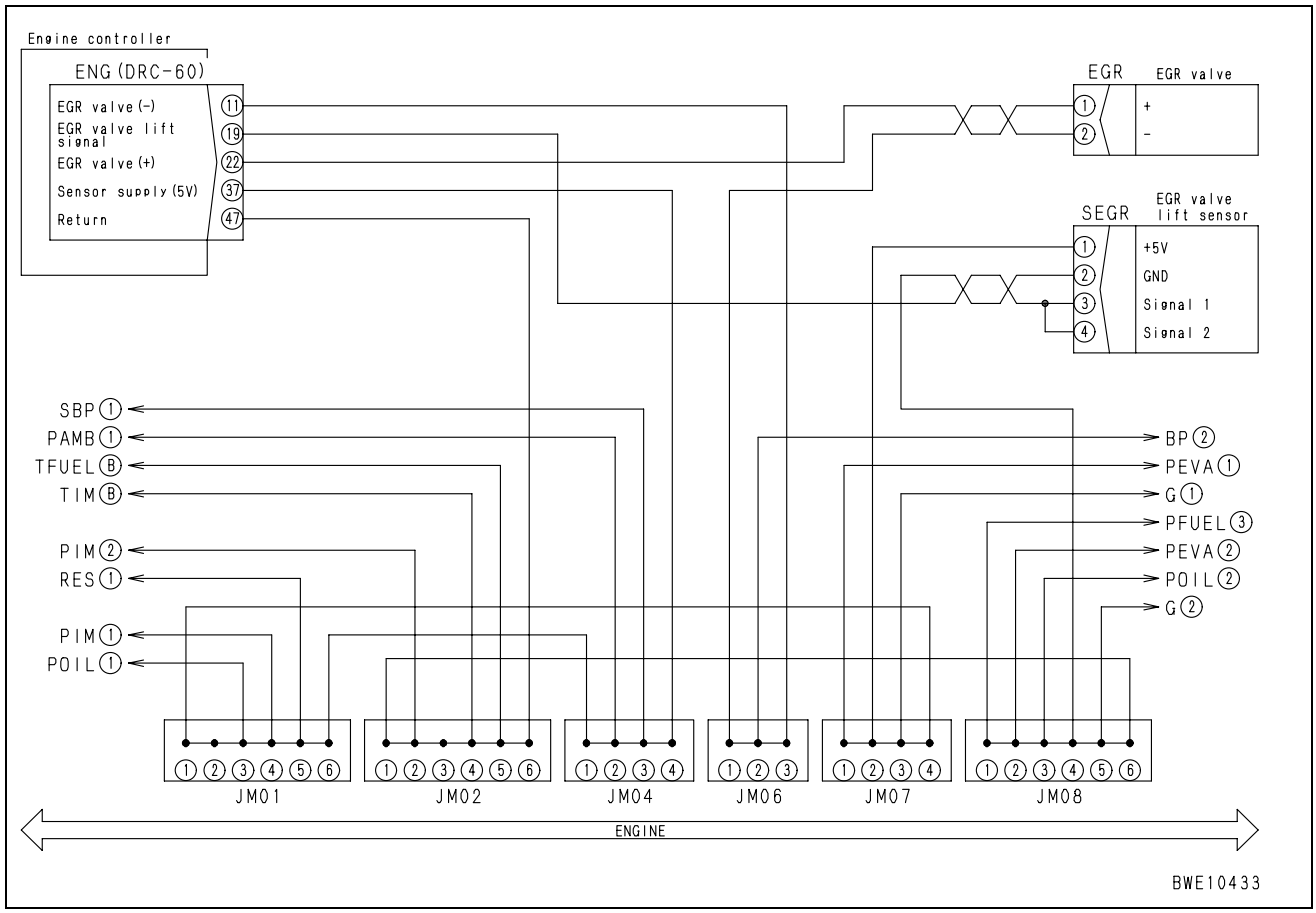
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA559**].	

Failure code [CA2271] EGR Valve Pos Sens High Error

Action code	Failure code	Trouble	EGR Valve Pos Sens High Error (Engine controller system)
E11	**CA2271**		
Contents of trouble	• High error occurred in EGR valve lift sensor circuit.		
Action of controller	• Limits output and continues operation. • Close EGR and bypass valves.		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective sensor power supply system	If failure code [**CA187**] or [**CA227**] is displayed, carry out troubleshooting for it first.			
	2	Defective EGR valve lift sensor (Internal defect)	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.			
			SEGR		Voltage	
			Between (1) – (2)	Power supply	4.75 – 5.25 V	
			Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.			
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – SEGR (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – SEGR (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (19) – SEGR (female) (3), (4)		Resistance	Max. 1 Ω
	4	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – SEGR (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – SEGR (female) (2) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (19) – SEGR (female) (3), (4) and chassis ground		Resistance	Min. 1 MΩ
	5	Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (37) – SEGR (female) (1) and between ENG (female) (47) – SEGR (female) (2)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – SEGR (female) (1) and between ENG (female) (19) – SEGR (female) (3), (4)		Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – SEGR (female) (2) and between ENG (female) (19) – SEGR (female) (3), (4)		Resistance	Min. 1 MΩ
	6	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.			
			ENG		Voltage	
			Between (37) – (47)		4.75 – 5.25 V	

Circuit diagram related to EGR valve solenoid and lift sensor



Failure code [CA2272] EGR Valve Pos Sens Low Error

Action code	Failure code	Trouble	EGR Valve Pos Sens Low Error (Engine controller system)
E11	**CA2272**		
Contents of trouble	• Low error occurred in EGR valve lift sensor circuit.		
Action of controller	• Limits output and continues operation. • Close EGR and bypass valves.		
Problem that appears on machine	• Engine output lowers.		
Related information			

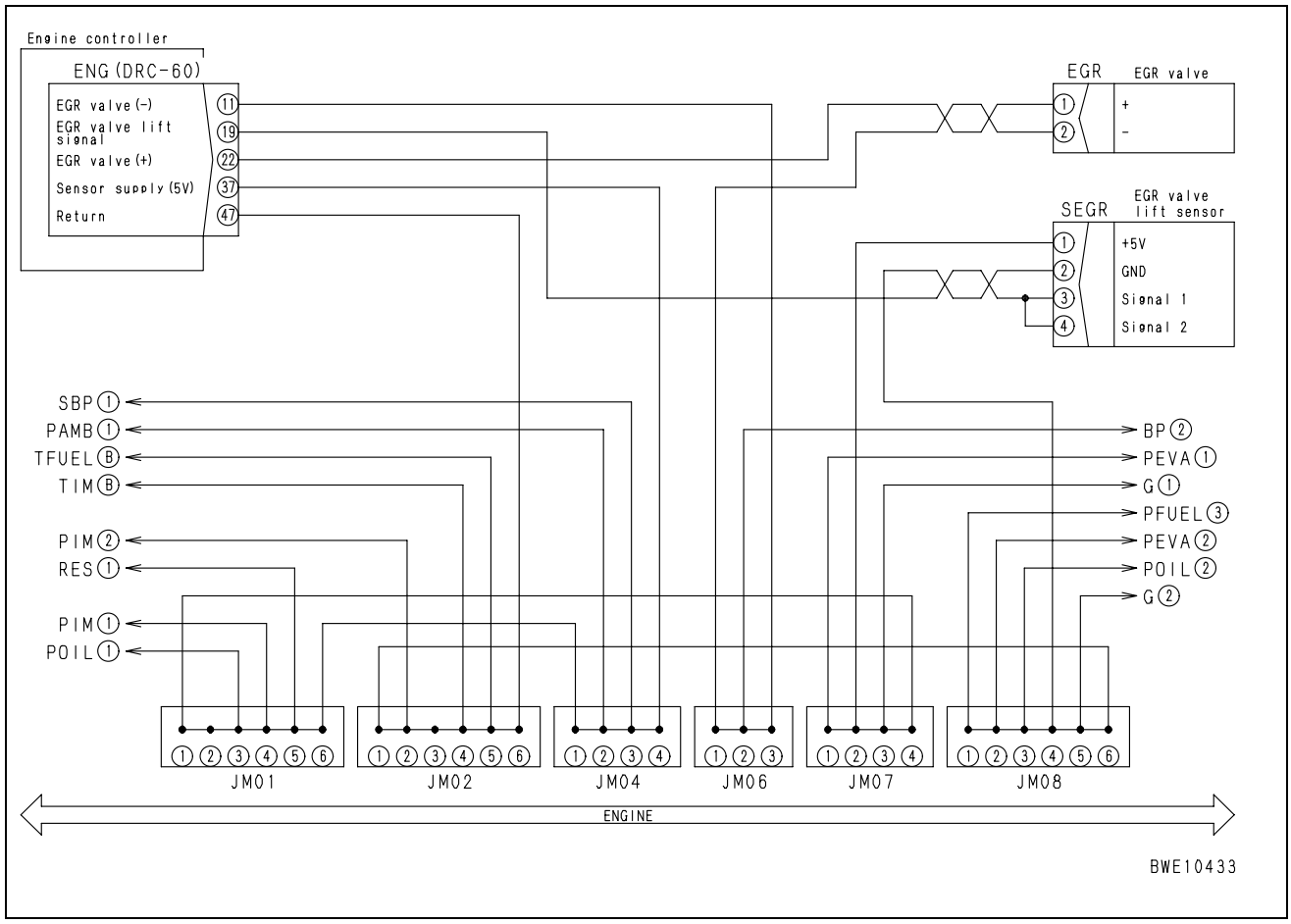
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA2271**].	

Failure code [CA2351] EGR Valve Sol Current High Error

Action code	Failure code	Trouble	EGR Valve Sol Current High Error (Engine controller system)
E11	**CA2351**		
Contents of trouble	• High current error occurred in drive circuit of EGR valve solenoid.		
Action of controller	• Limits output and continues operation. • Close EGR and bypass valves.		
Problem that appears on machine	• Engine output lowers.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective EGR valve solenoid (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			EGR (male)	Resistance		
			Between (1) – (2)	10 – 21 Ω		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (22) – EGR (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (11) – EGR (female) (2)	Resistance	Max. 1 Ω	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (22) – EGR (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (11) – EGR (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	4	Hot short in wiring harness (Short circuit with 24V circuit)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between ENG (female) (22) – EGR (female) (1) and chassis ground	Voltage	Max. 1 V	
			Wiring harness between ENG (female) (11) – EGR (female) (2) and chassis ground	Voltage	Max. 1 V	
	5	Defective engine controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Resistance		
			Between (22) – (11)	10 – 21 Ω		

Circuit diagram related to EGR valve solenoid and lift sensor



Failure code [CA2352] EGR Valve Sol Current Low Error

Action code	Failure code	Trouble	EGR Valve Sol Current Low Error (Engine controller system)
E11	**CA2352**		
Contents of trouble	• Low current error occurred in drive circuit of EGR valve solenoid.		
Action of controller	• Limits output and continues operation. • Close EGR and bypass valves.		
Problem that appears on machine	• Engine output lowers.		
Related information			

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA2351**].	

Failure code [CA2555] Grid Htr Relay Volt Low Error

Action code	Failure code	Trouble	Grid Htr Relay Volt Low Error (Engine controller system)
E15	**CA2555**		
Contents of trouble	• Voltage low error was detected in grid heater relay circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine does not start easily at low temperature.		
Related information			

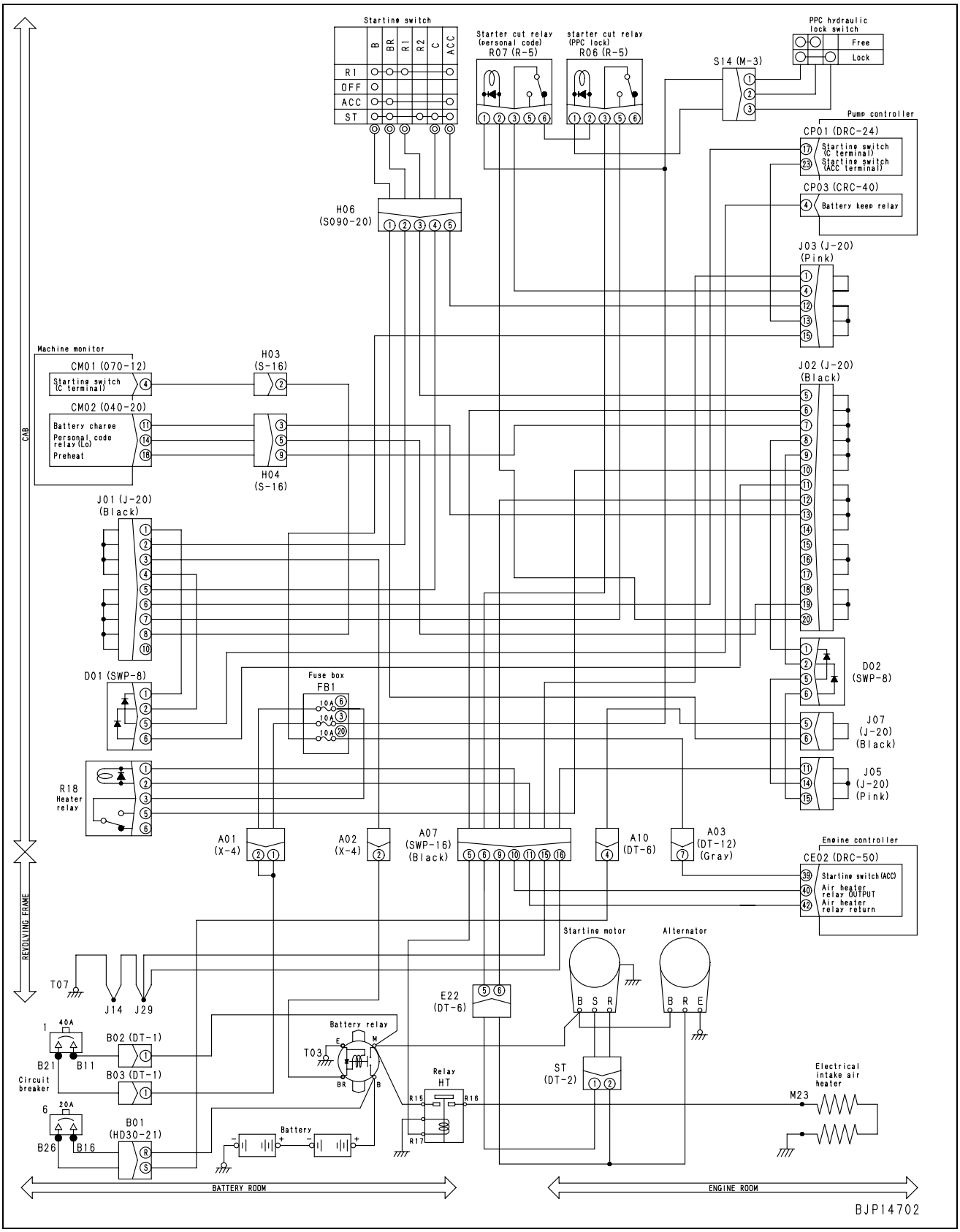
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code [**CA2556**].	

Failure code [CA2556] Grid Htr Relay Volt High Error

Action code	Failure code	Trouble	Grid Htr Relay Volt High Error (Engine controller system)
E15	**CA2556**		
Contents of trouble	• Open error was detected in intake air heater relay circuit		
Action of controller	• Stops driving auto-preheater relay R18.		
Problem that appears on machine	• Auto-preheater does not work (Manual preheater works). • Engine does not start easily at low temperature.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective grid heater relay (Internal defect)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			R18 (male)	Resistance		
			Between (1) – (2)	200 – 400 Ω		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CE02 (female) (40) – R18 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between CE02 (female) (42) – R18 (female) (2)	Resistance	Max. 1 Ω	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CE02 (female) (40) – R18 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between CE02 (female) (42) – R18 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	4	Defective engine controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CE02	Heater relay	Voltage	
			Between (40) – (42)	Operating condition	Max. 1 V	
				Stop condition	20 – 30 V	

Circuit diagram related to engine preheater

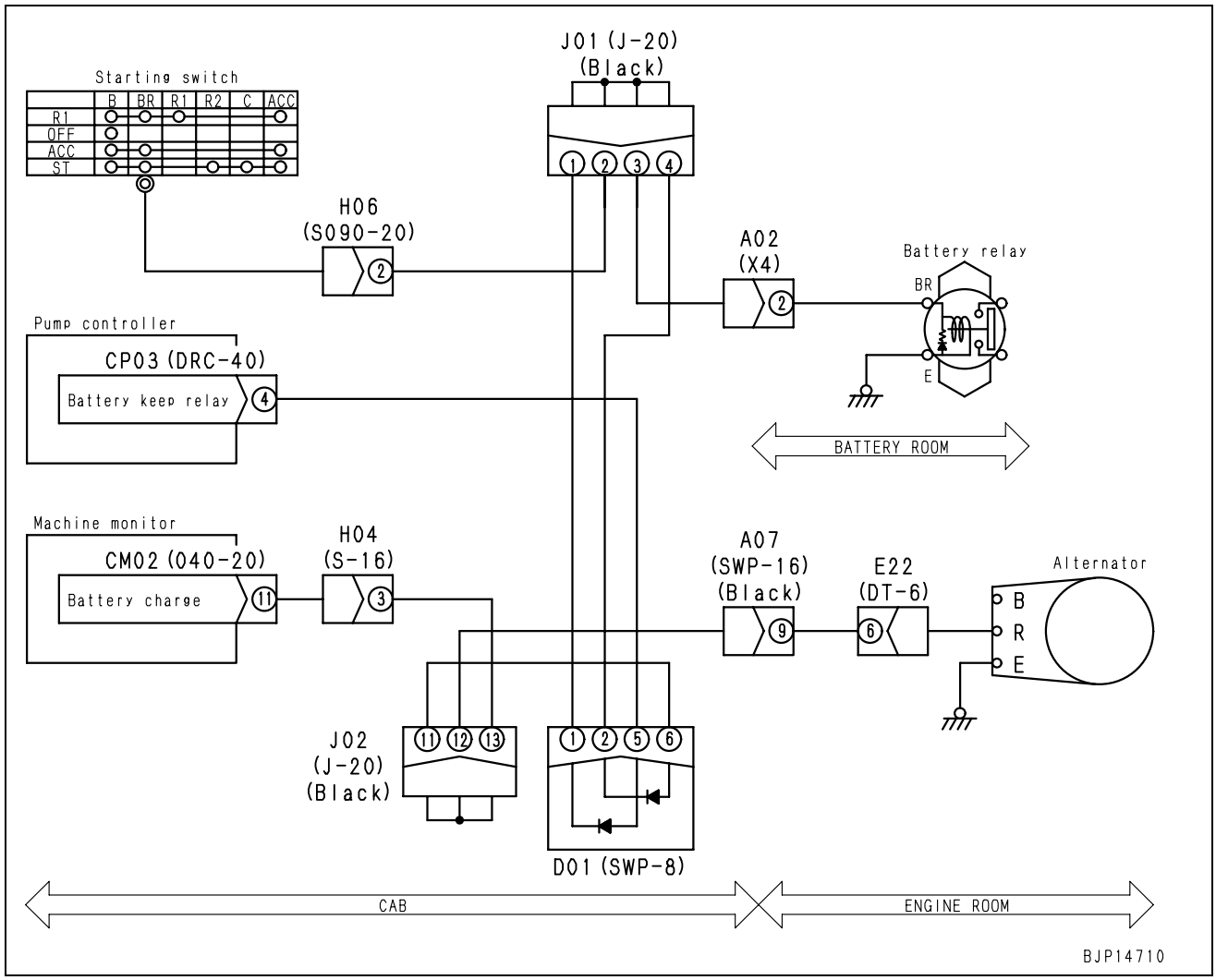


Failure code [D110KB] Battery Relay Drive S/C

Action code	Failure code	Trouble	Battery Relay Drive S/C (Pump controller system)
E01	**D110KB**		
Contents of trouble	• Abnormal current flowed at output to battery relay drive circuit.		
Action of controller	• Turns output to battery relay drive circuit OFF. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• There may be a trouble in writing data into the ROM (non-volatile memory) of each controller.		
Related information	• Operating condition of battery relay (ON/OFF) can be checked with monitoring function. (Code 03700: Controller Output)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective battery relay (Internal short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Battery relay (Unit)	Resistance		
			Between BR – E	Approx. 100Ω		
			Between BR – chassis ground	Min. 1 MΩ		
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP03 (female) (4) – D01 – J01 – battery relay terminal BR or between CP03 (female) (4) – starting switch terminal BR or between CP03 (female) (4) – D01 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	3	Defective pump controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CP03	Turn starting switch OFF.	Voltage	
			Between (4) – chassis ground	ON → OFF	20 – 30 V (0.5 sec.)	

Circuit diagram related to battery relay drive

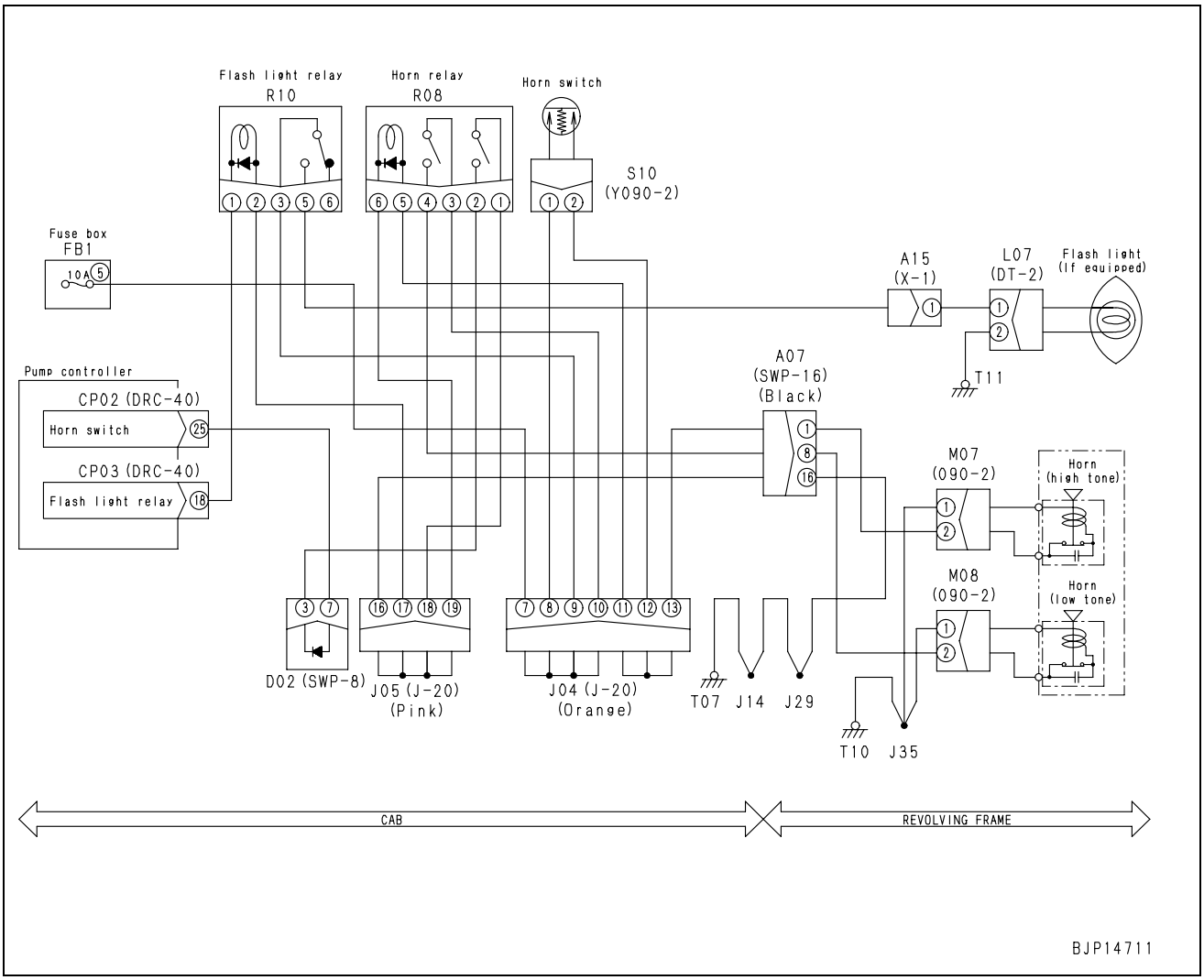


Failure code [D163KB] Flash Light Relay S/C

Action code	Failure code	Trouble	Flash Light Relay S/C (Pump controller system)
—	**D163KB**		
Contents of trouble	• Abnormal current flowed in the flash light relay circuit (the primary circuit of the relay), when power is supplied to the circuit.		
Action of controller	• The controller turns OFF the output to the coil circuit of the flash light relay. • Even after the failure cause disappears of itself, the machine operation does not return to normalcy, unless the engine starting switch is once turned OFF.		
Problem that appears on machine	• The flash light does not flash.		
Related information	• Operation of the flash light relay circuit (the primary side of the relay) (ON or OFF) can be checked in the monitoring function. (Code No. 03701: Controller output 2) • This error code detects abnormality on the primary (coil) side of the flash light relay and cannot detect abnormality on the secondary (contact) side.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Flash light relay defective (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			R10 (male)		Resistance	
			Between (1) – (2)		250 – 350 Ω	
	2	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP03 (female) (18) and R10 (female) (1) and grounding		Resistance	Min. 1 MΩ
	3	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CP03	Horn switch	Voltage	
			Between (18) – chassis ground	ON	20 – 30 V ⇔ Max. 1 V (at constant cycle, 5 seconds)	
				OFF	Max. 1 V	

Electric circuit diagram related to horn and flash light relay

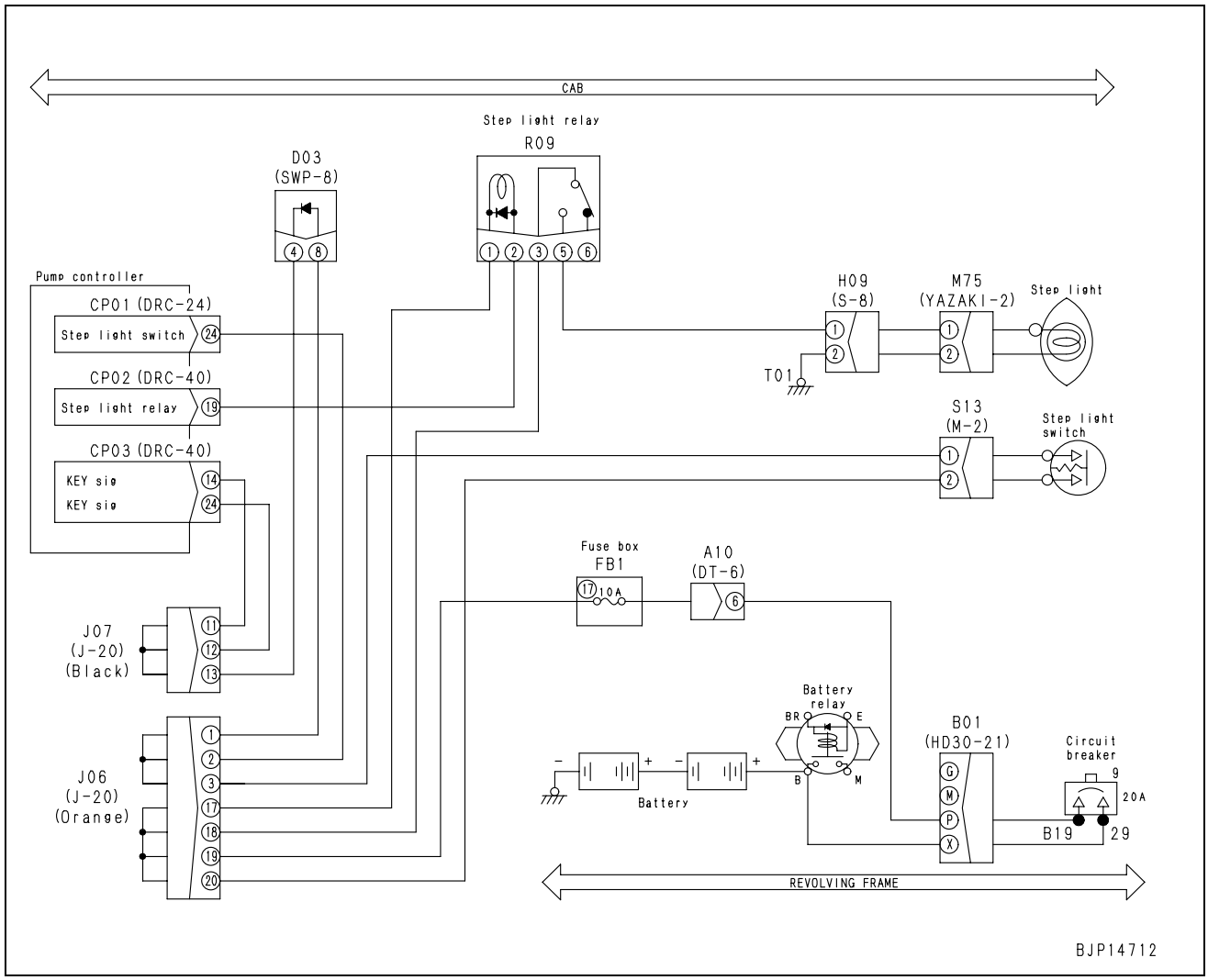


Failure code [D195KB] Step Light Relay S/C

Action code	Failure code	Trouble	Step Light Relay S/C (Pump controller system)
—	**D195KB**		
Contents of trouble	• Abnormal current flowed in the step light relay circuit (the primary circuit of the relay), when power is supplied to the circuit.		
Action of controller	• Power to the step light relay circuit is switched OFF. • Even after the failure cause disappears of itself, the machine operation does not return to normalcy, unless the engine starting switch is once turned OFF.		
Problem that appears on machine	• Step light does not light up.		
Related information	• Operation of the step light relay circuit (the primary side of the relay) (ON or OFF) can be checked in the monitoring function. (Code No. 03701: Controller output 2) • This error code detects abnormality on the primary (coil) side of the step light relay and cannot detect abnormality on the secondary (contact) side.		

	Cause		Standard value in normalcy and references for troubleshooting			
Possible causes and standard value in normal state	1	Step light relay defective (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			R09 (male)		Resistance value	
			Between (1) – (2)		250 – 350 Ω	
	2	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP02 (female) (19) and R09 (female) (2) and grounding		Resistance value	Above 1 MΩ
	3	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP02	Horn switch	Voltage	
			Between (19) – chassis ground	OFF	20 – 30 V (Kept for 60 sec)	
				ON	Below 1 V	

Electric circuit diagram related to step light

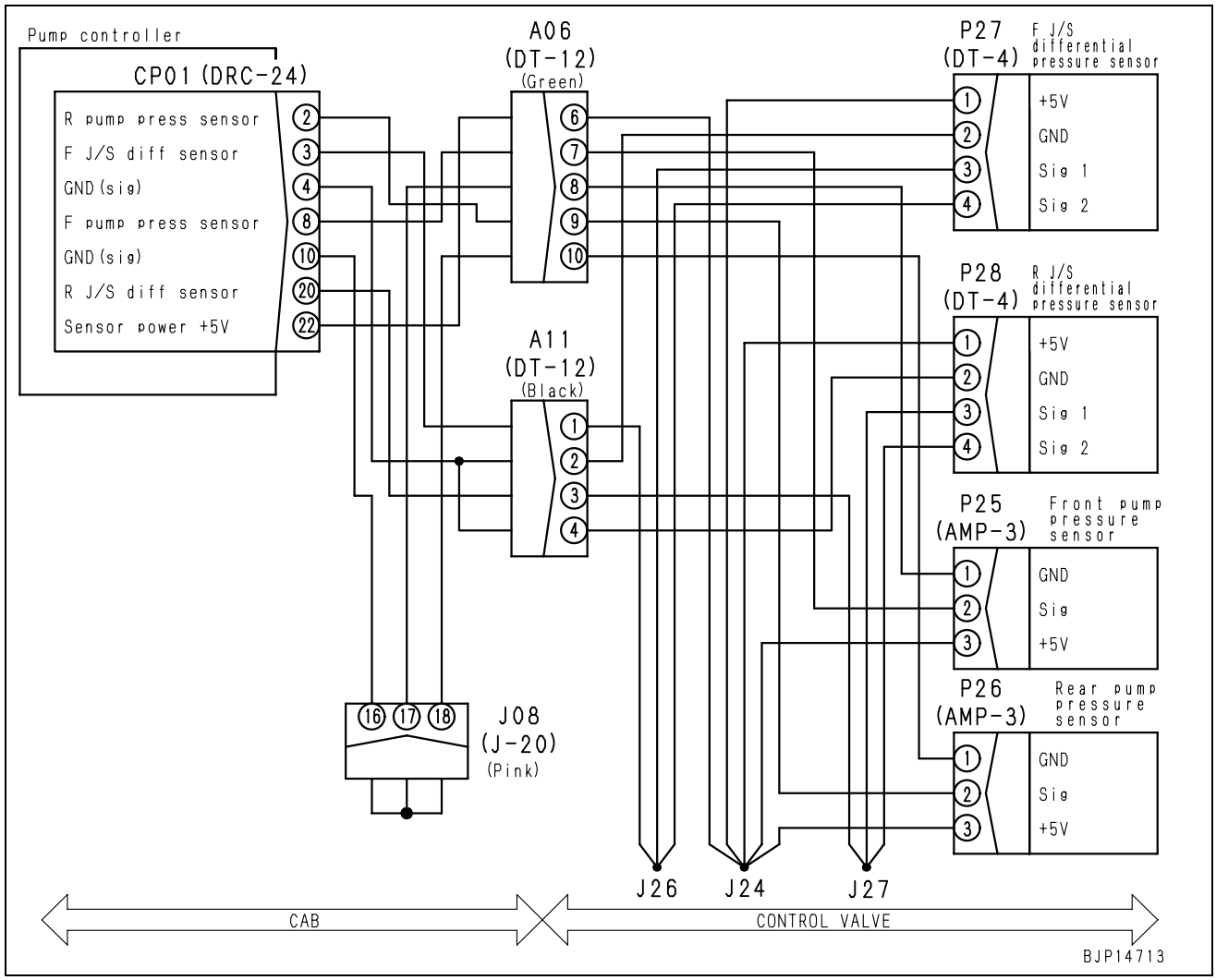


Failure code [DA25KP] Press. Sensor Power Abnormality

Action code	Failure code	Trouble	Press. Sensor Power Abnormality (Pump controller system)
—	**DA25KP**		
Contents of trouble	• Abnormal current flowed in pressure sensor power supply (5V) circuit.		
Action of controller	• Turns output to power supply (5V) circuit OFF. • Even if phenomenon of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Signal of pressure sensor is not input normally. • Pressure sensor failure code is displayed at the same time.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective pressure sensor (Internal short circuit)	★Disconnect connector with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Disconnect sensors at right in order. If no error code is displayed, that sensor is defective.	F pump pressure sensor	P25 connector	
				R pump pressure sensor	P26 connector	
				F J/S differential pressure sensor	P27 connector	
				R J/S differential pressure sensor	P28 connector	
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP01 (female) (22) – J24 – P25 (female) (3) and chassis ground [F pump pressure sensor system]		Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (22) – J24 – P26 (female) (3) and chassis ground [R pump pressure sensor system]		Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (22) – J24 – P27 (female) (3) and chassis ground [F J/S differential pressure sensor system]		Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (22) – J24 – P28 (female) (3) and chassis ground [R J/S differential pressure sensor system]		Resistance	Min. 1 MΩ
	3	Defective pump controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CP01		Voltage	
			Between (22) – (10)		4.5 – 5.5 V	

Circuit diagram related to pressure sensor power supply of pump controller

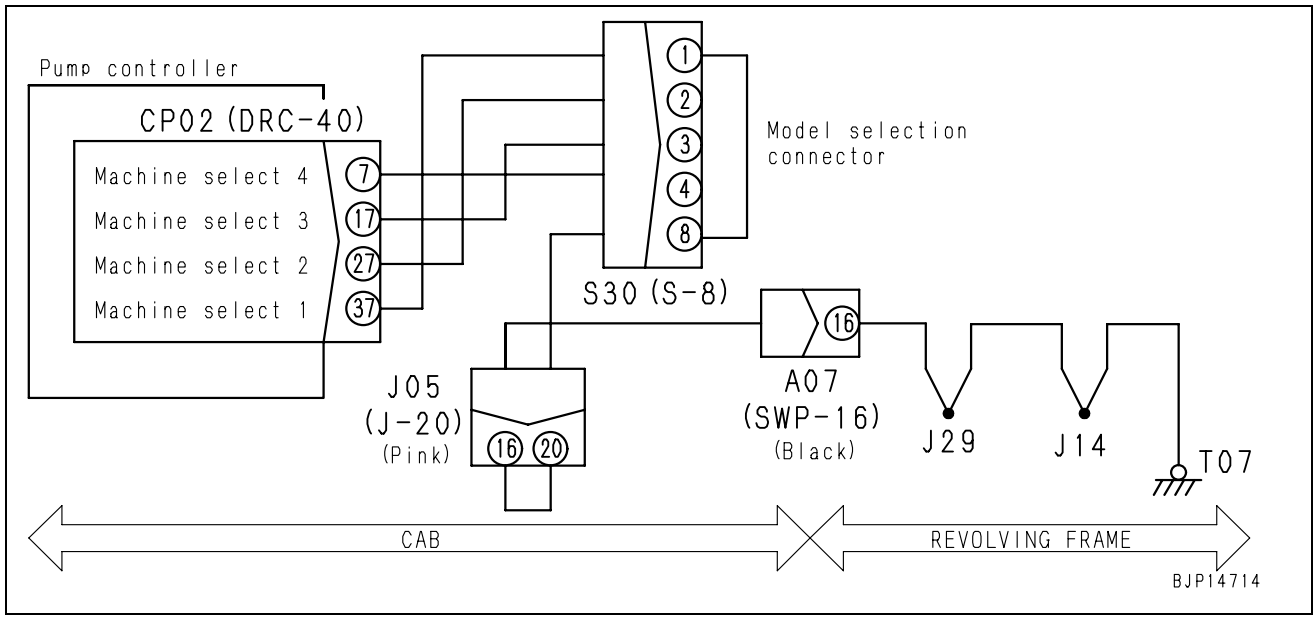


Failure code [DA2SKQ] Model Selection Abnormality

Action code	Failure code	Trouble	Model Selection Abnormality (Pump controller system)
—	**DA2SKQ**		
Contents of trouble	• Model code signal for model which is not registered in controller is input.		
Action of controller	• Changes input model code to code of default model (PC800) and continues control. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• None in particular with PC800, 800LC-8 model.		
Related information	• Controller-recognized model name (digits) can be checked with monitoring function. (Code No. 00200: Controler Model Code) • Input of model selection signal (ON/OFF) can be checked with monitoring function. (Code No.02201: Switch Input 2)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective model selection connector (Internal disconnection or short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			S30 (female)	Resistance	
			Between (2), (3), (4) – (8)	Min. 1 MΩ	
			Between (1) – (8)	Max. 1 Ω	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP02 (female) (37) – S30 (male) (1) and chassis ground	Resistance	Max. 1 Ω
			Wiring harness between S30 (male) (8) – J05 – A07 – J29 – J14 – chassis ground	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP02 (female) (27) – S30 (male) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CP02 (female) (17) – S30 (male) (3) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CP02 (female) (7) – S30 (male) (4) and chassis ground	Resistance	Min. 1 MΩ
	4	Defective pump controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CP02	Voltage	
			Between (7), (17), (27) – chassis ground	20 – 30 V	
			Between (37) – chassis ground	Max. 1 V	

Circuit diagram related to model selection connector of pump controller



Failure code [DA80MA] Auto. Lub. Abnormal.

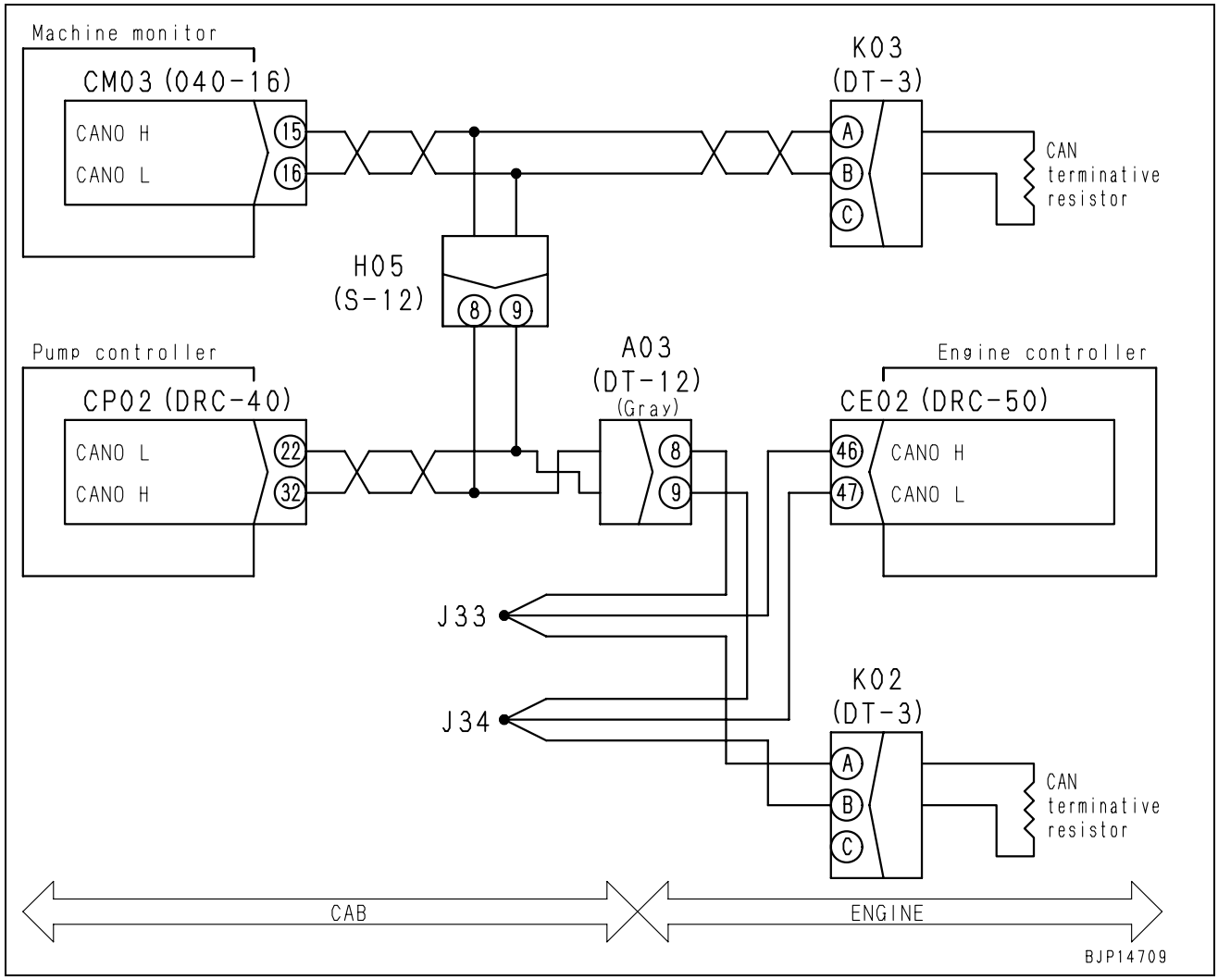
★ This failure code is displayed only when automatic lubrication equipment is installed.

Failure code [DA2RMC] Pump Comm. Abnormality

Action code	Failure code	Trouble	Pump Comm. Abnormality (Pump controller system)
E0E	**DA2RMC**		
Contents of trouble	• Pump controller detected communication error in CAN communication circuit between machine monitor and engine controller.		
Action of controller	• Fix engine output to E-mode, and limit pump absorption torque to about 80%. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Output lowers. (Pump absorption torque decreases.) • As the working load increases, engine may stall.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22)	Resistance	Max. 1 Ω
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32)	Resistance	Max. 1 Ω
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
	3	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Voltage	Max. 1 V
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32), – other related circuit and chassis ground	Voltage	Max. 1 V
	4	Defective CAN terminal resistance	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			K02 (male), K03 (male)	Resistance	
			Between (A) – (B)	40 – 80 Ω	
	5	Defective machine monitor, engine controller, or pump controller	If causes 1 – 4 are not detected, machine monitor, engine controller, or pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to CAN communication of pump controller

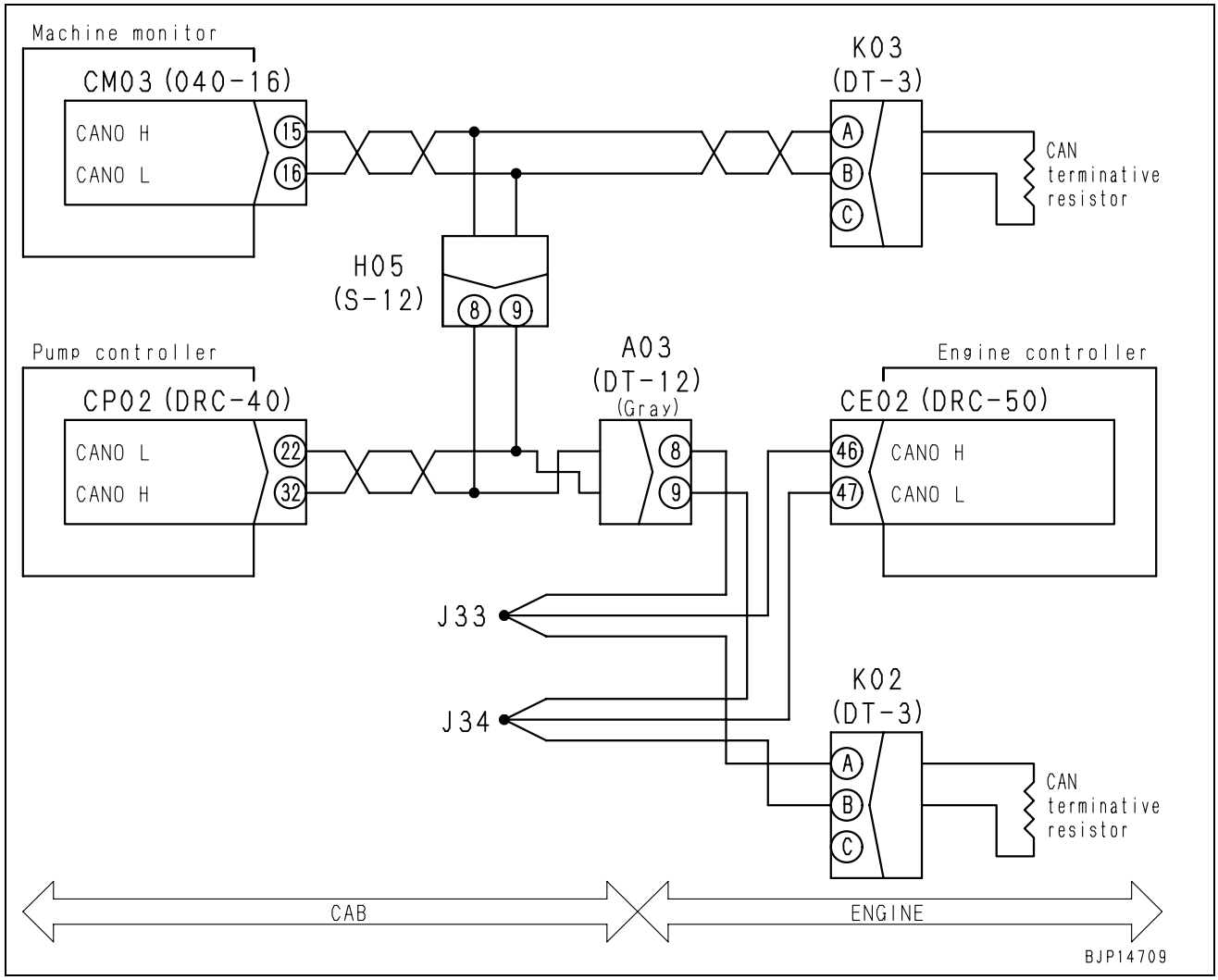


Failure code [DAFRMC] Monitor Comm. Abnormality

Action code	Failure code	Trouble	Monitor Comm. Abnormality (Machine monitor system)
E0E	**DAFRMC**		
Contents of trouble	• Machine monitor detected communication error in CAN communication circuit between pump controller and engine controller.		
Action of machine monitor	• Fix engine output to E-mode, and limit pump absorption torque to about 80%. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Output lowers. (Pump absorption torque decreases.) • As the working load increases, engine may stall.		
Related information			

		Cause	Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22)	Resistance	Max. 1 Ω
			Wiring harnesses between CM03 (female) (15) – CE02 (male) (46) and – CP02 (females) (32)	Resistance	Max. 1 Ω
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
	3	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between CM03 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Voltage	Max. 1 V
			Wiring harness between CM03 (female) (15) – CE02 (female) (46), – CP02 (female) (32), – other related circuit and chassis ground	Voltage	Max. 1 V
	4	Defective CAN terminal resistance	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			K02(male), K03 (male)	Resistance	
			Between (A) – (B)	40 – 80 Ω	
	5	Defective machine monitor, engine controller, or pump controller	If causes 1 – 4 are not detected, machine monitor, engine controller, or pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to CAN communication of machine monitor

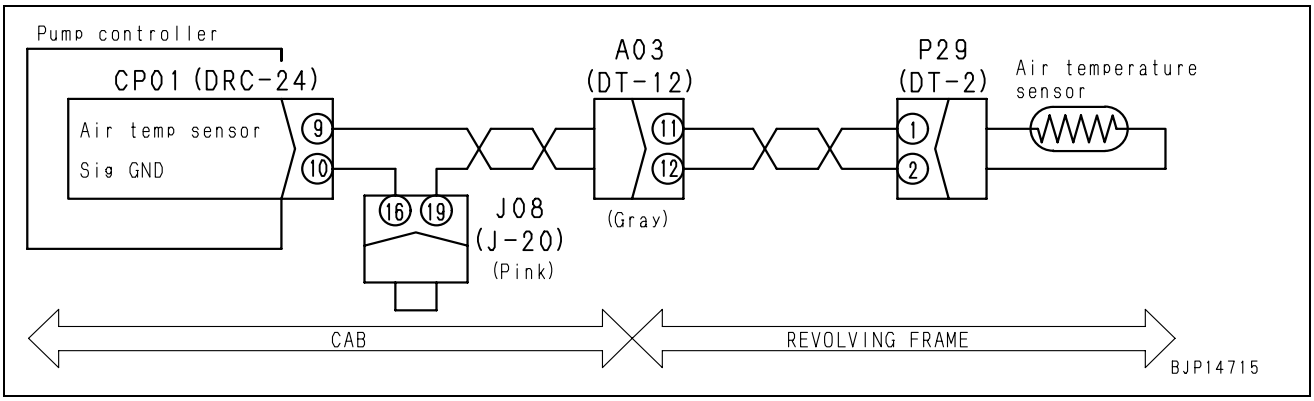


Failure code [DGE5KY] Ambi. Temp. Sensor S/C

Action code	Failure code	Trouble	Ambi. Temp. Sensor S/C (Pump controller system)
—	**DGE5KY**		
Contents of trouble	• Abnormal current flowed in ambient temperature sensor circuit.		
Action of machine monitor	• None in particular. • If failure disappears, system resets itself.		
Problem that appears on machine	• Fan speed may rise (depending on operating condition).		
Related information	• Input (Temperature) from ambient temperature sensor can be checked with monitoring function. (Code: 37502)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective ambient temperature sensor	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P29 (male)	Ambient temperature	Resistance	
			Between (1) – (2)	20°C	4 – 6 Ω	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP01 (female) (9) – P29 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (10) – P29 (female) (2)		Resistance	Max. 1 Ω
	3	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between CP01 (female) (9) – P29 (female) (1)		Voltage	Max. 1 V
	4	Defective pump controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP01 (male)	Ambient temperature	Resistance	
			Between (9) – (10)	20°C	4 – 6 Ω	

Circuit diagram related to ambient temperature sensor

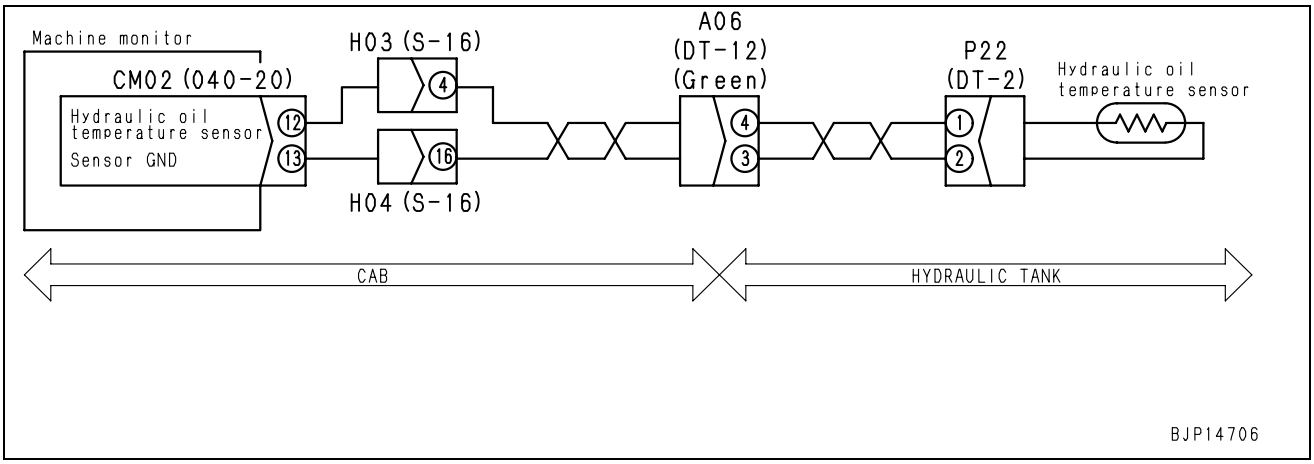


Failure code [DGH2KB] Hydr. Oil Temp. Sensor S/C

Action code	Failure code	Trouble	Hydr. Oil Temp. Sensor S/C (Mechanical system)
—	**DGH2KB**		
Contents of trouble	• The signal of the hydraulic oil temperature sensor rises above 102°C while the engine is running.		
Action of machine monitor	• None in particular.		
Problem that appears on machine	• If the machine is used as it is, the hydraulic equipment may be damaged.		
Related information	• If the hydraulic oil temperature monitor on the machine monitor lights up in red while the engine is running, this failure code is recorded. • Input from the hydraulic oil temperature sensor can be checked in the monitoring function. (Code No. 04401: Hydraulic oil temperature, 04402: Hydraulic oil temperature sensor voltage		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Hydraulic oil overheated (While system is normal)	Check the hydraulic oil for overheating. If it has been overheated, find out the cause and check the hydraulic equipment for damage, then repair.			
	2	Hydraulic oil temperature sensor defective (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			P22 (male)	Hydraulic oil temperature	Resistance	
			Between (1) – (2)	10 – 100°C	90 – 3.5 kΩ	
			Between (1) – chassis ground		Min. 1 MΩ	
	3	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CM02 (female) (12) – P22 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
	4	Machine monitor defective	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CM02 (female)	Hydraulic oil temperature	Resistance	
			Between (12) – (13)	10 – 100°C	90 – 3.5 kΩ	
			Between (12) – chassis ground		Min. 1 MΩ	

Circuit diagram related to hydraulic oil temperature sensor



PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

40 Troubleshooting

Troubleshooting by failure code (Display of code), Part 3

Troubleshooting by failure code (Display of code), Part 3
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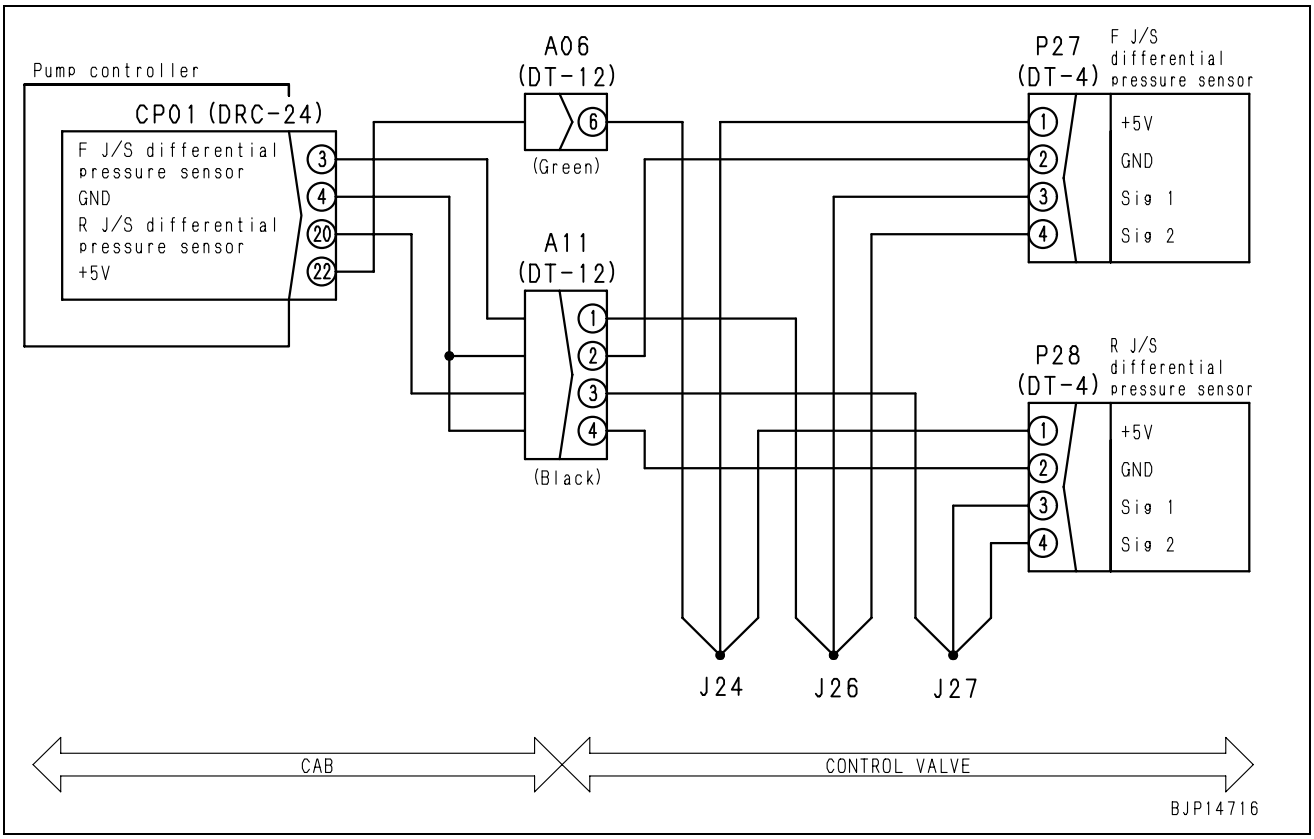
Troubleshooting by failure code (Display of code), Part 3

Failure code [DH25KA] L Jet Sensor Disc

Action code	Failure code	Trouble	L Jet Sensor Disc (Pump controller system)
—	**DH25KA**		
Contents of trouble	• Signal voltage of L jet sensor differential pressure sensor circuit is below ____ V or above ____ V.		
Action of machine monitor			
Problem that appears on machine			
Related information	• Information of L jet sensor differential pressure sensor can be checked with monitoring function. (Code 23800: Sensor differential pressure, Code 23802: Sensor voltage)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective 5V sensor power supply system	If failure code [DA25KP] is also displayed, carry out troubleshooting for it first.			
	2	Defective L jet sensor differential pressure sensor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			P27	Measurement conditions		Voltage
			Between (1) – (2)			4.5 – 5.5 V
			Between (3) – (2)			
			Between (4) – (2)			
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP01 (female) (22) – J24 – P27 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (3) – J26 – P27 (female) (3), (4)		Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (4) – P27 (female) (2)		Resistance	Max. 1 Ω
	4	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between CP01 (female) (22) – J24 – P27 (female) (1)		Voltage	Max. 1 V
			Wiring harness between CP01 (female) (3) – J26 – P27 (female) (3), (4)		Voltage	Max. 1 V
	5	Defective pump controller	If causes 1 – 4 are not detected, pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)			

Circuit diagram related to differential pressure sensor system

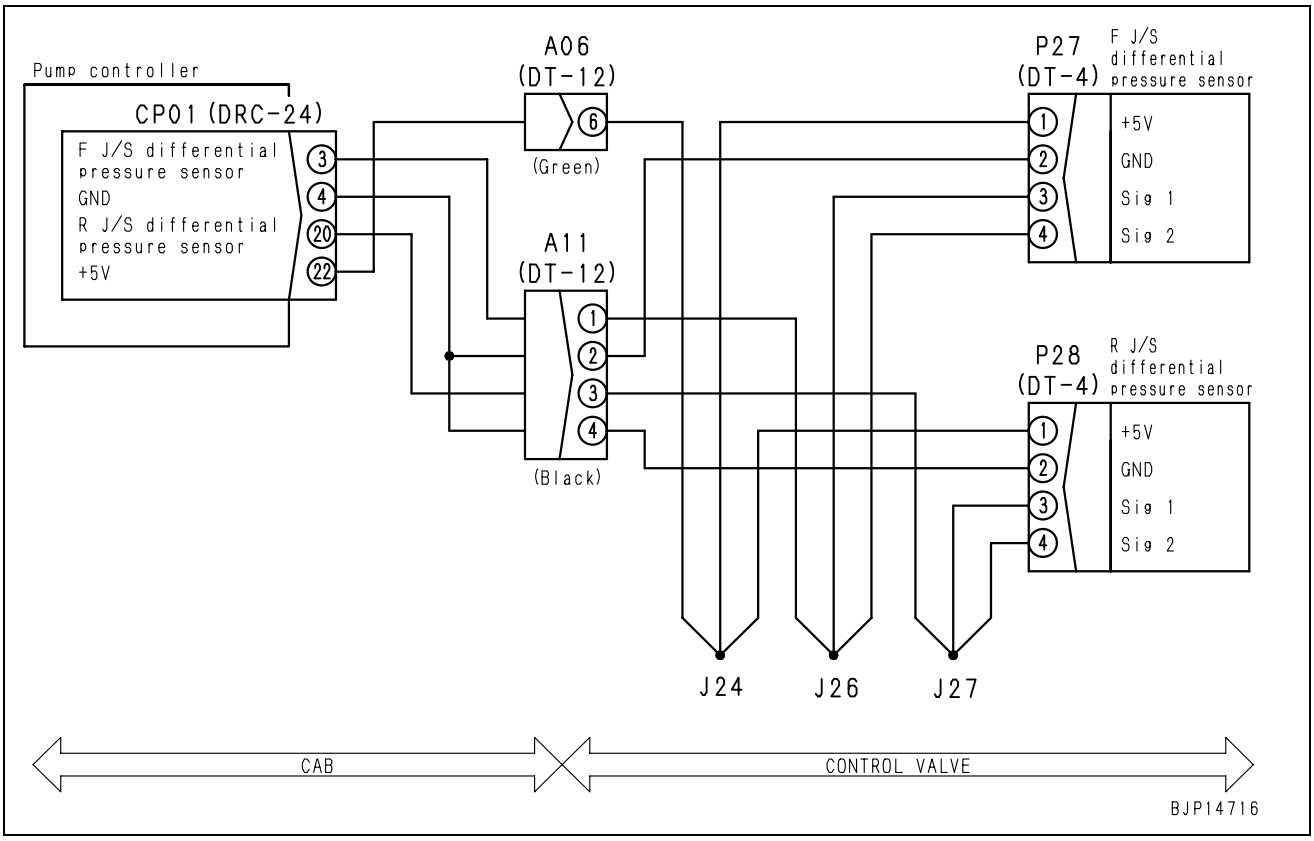


Failure code [DH25KB] L Jet Sensor S/C

Action code	Failure code	Trouble	L Jet Sensor S/C (Pump controller system)
—	**DH25KB**		
Contents of trouble	• Signal voltage of L jet sensor differential pressure sensor circuit is below ____ V or above ____ V.		
Action of machine monitor			
Problem that appears on machine			
Related information	• EInformation of L jet sensor differential pressure sensor can be checked with monitoring function. (Code 23800: Sensor differential pressure, Code 23802: Sensor voltage)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 5V sensor power supply system	If failure code [DA25KP] is also displayed, carry out troubleshooting for it first.		
	2	Defective L jet sensor differential pressure sensor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			P27	Measurement conditions	Voltage
			Between (1) – (2)		4.5 – 5.5 V
			Between (3) – (2)		
			Between (4) – (2)		
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP01 (female) (22) – J24 – P27 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (3) – J26 – P27 (female) (3), (4) and chassis ground	Resistance	Min. 1 MΩ
	4	Defective pump controller	If causes 1 – 3 are not detected, pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to differential pressure sensor system

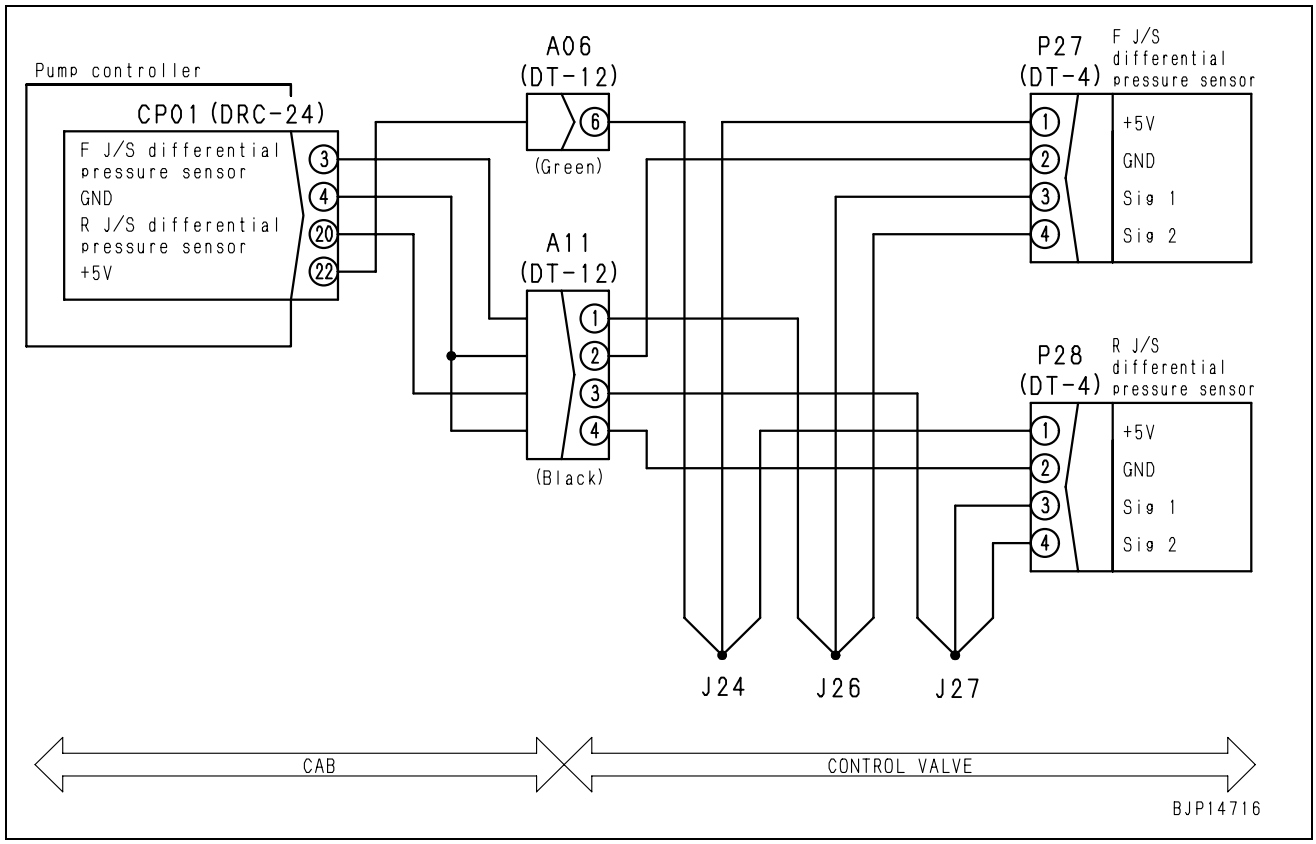


Failure code [DH26KA] R Jet Sensor Disc.

Action code	Failure code	Trouble	R Jet Sensor Disc (Pump controller system)
—	**DH26KA**		
Contents of trouble	• Signal voltage of R jet sensor differential pressure sensor circuit is below ____ V or above ____ V.		
Action of machine monitor			
Problem that appears on machine			
Related information	• Information of R jet sensor differential pressure sensor can be checked with monitoring function. (Code 23801: Sensor differential pressure, Code 23803: Sensor voltage)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 5V sensor power supply system	If failure code [DA25KP] is also displayed, carry out troubleshooting for it first.		
	2	Defective R jet sensor differential pressure sensor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			P28	Measurement conditions	Voltage
			Between (1) – (2)		4.5 – 5.5 V
			Between (3) – (2)		
			Between (4) – (2)		
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP01 (female) (22) – J24 – P28 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (20) – J27 – P28 (female) (3), (4)	Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (4) – P28 (female) (2)	Resistance	Max. 1 Ω
	4	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between CP01 (female) (22) – J24 – P28 (female) (1)	Voltage	Max. 1 V
			Wiring harness between CP01 (female) (20) – J27 – P28 (female) (3), (4)	Voltage	Max. 1 V
	5	Defective pump controller	★If causes 1 – 4 are not detected, pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to differential pressure sensor system

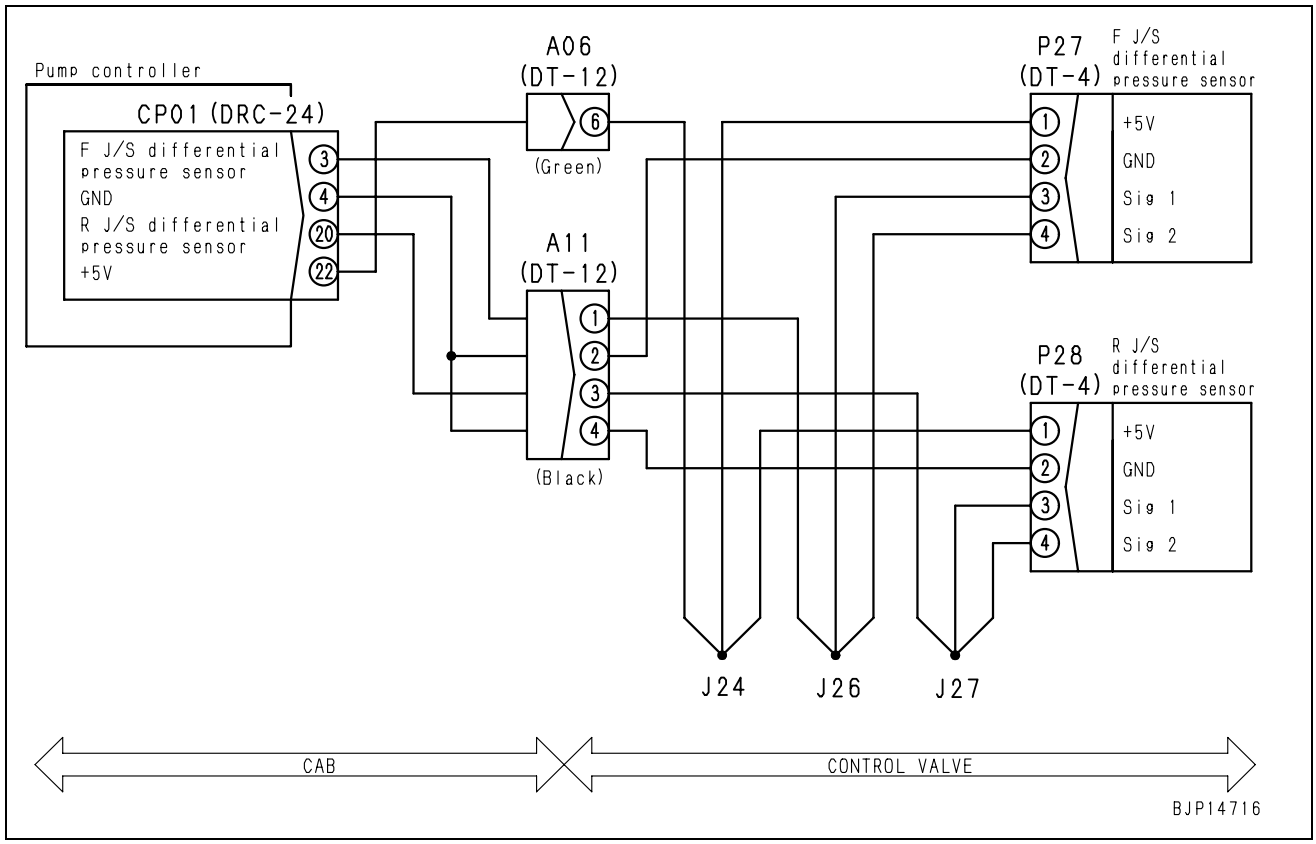


Failure code [DH26KB] R Jet Sensor S/C

Action code	Failure code	Trouble	R Jet Sensor S/C (Pump controller system)
—	**DH26KB**		
Contents of trouble	• Signal voltage of R jet sensor differential pressure sensor circuit is below ____ V or above ____ V.		
Action of machine monitor			
Problem that appears on machine			
Related information	• Information of R jet sensor differential pressure sensor can be checked with monitoring function. (Code 23801: Sensor differential pressure, Code 23803: Sensor voltage)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 5V sensor power supply system	If failure code [DA25KP] is also displayed, carry out troubleshooting for it first.		
	2	Defective R jet sensor differential pressure sensor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			P28	Measurement conditions	Voltage
			Between (1) – (2)		4.5 – 5.5 V
			Between (3) – (2)		
			Between (4) – (2)		
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP01 (female) (22) – J24 – P28 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (20) – J27 – P28 (female) (3), (4) and chassis ground	Resistance	Min. 1 MΩ
	4	Defective pump controller	If causes 1 – 3 are not detected, pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to differential pressure sensor system

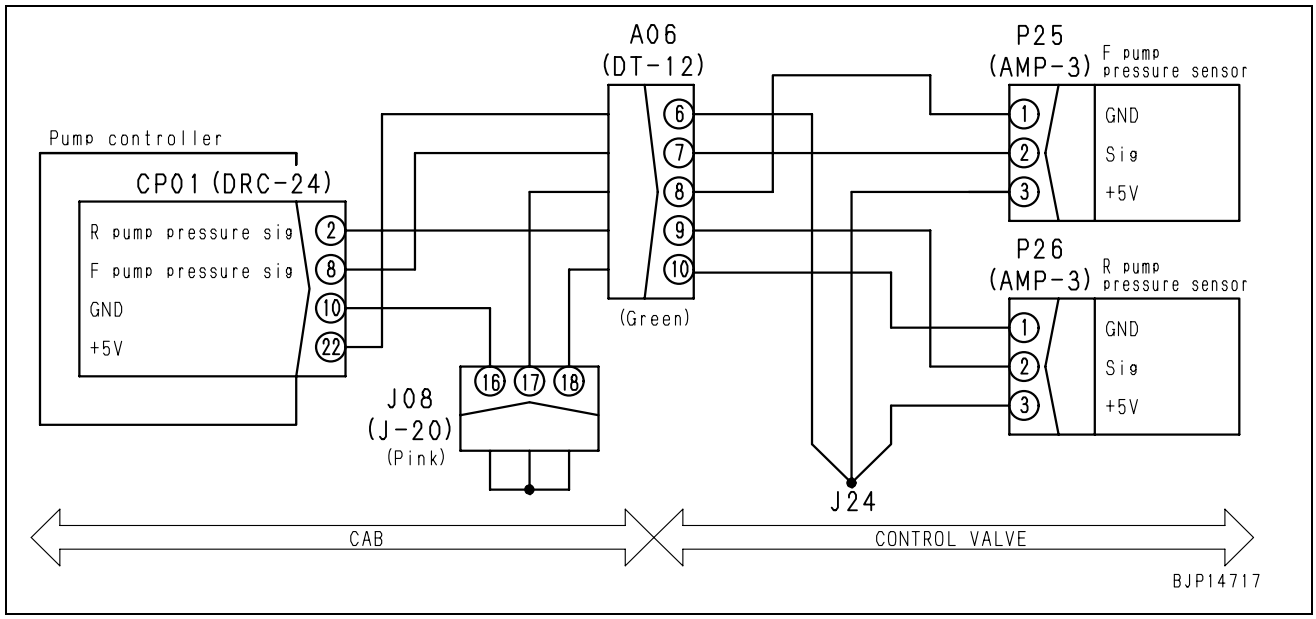


Failure code [DHPEKA] F Pump P. Sensor Disc.

Action code	Failure code	Trouble	F pump P. Sensor Disc. (Pump controller system)
E02	**DHPEKA**		
Contents of trouble	• Signal voltage of F pump pressure sensor circuit is below 0.5 V.		
Action of machine monitor	• Fixes F pump pressure at 0 MPa {0 kg/cm^2} and continues control. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Straight travel performance or steering performance lowers.		
Related information	• If 5V circuit (B) and ground circuit (A) of pressure sensor are connected inversely, pressure sensor will be broken. Accordingly, take extreme care when checking. • F pump pressure can be checked with monitoring function. (Code: 01112 F pump pressure) • Method of reproducing failure code: Turn starting switch ON or start engine.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 5V sensor power supply system	If failure code [DA25KP] is also displayed, carry out troubleshooting for it first.		
	2	Defective F pump pressure sensor (Internal trouble)	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting in each case.		
			P25		Voltage
			Between (3) – (1)	Power supply	4.5 – 5.5 V
			Between (2) – (1)	Signal	0.5 – 4.5 V
			Voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.		
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP01 (female) (10) – J08 – P25 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (8) – P25 (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (22) – J24 – P25 (female) (3)	Resistance	Max. 1 Ω
	4	Defective pump controller	If causes 1 – 3 are not detected, pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Cricuit diagram related to F pump pressure sensor

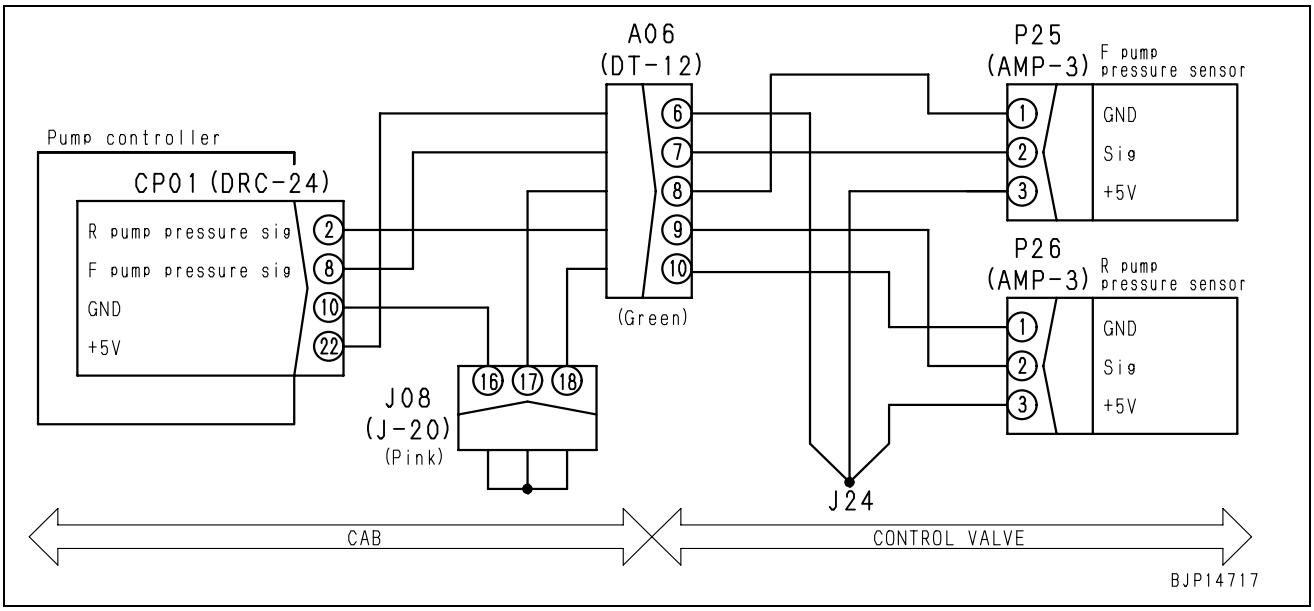


Failure code [DHPEKB] F Pump P. Sensor S/C

Action code	Failure code	Trouble	F Pump P. Sensor S/C (Pump controller system)
E02	**DHPEKB**		
Contents of trouble	• Signal voltage from the front pump pressure sensor is below 0.3 V or above 4.42 V.		
Action of machine monitor	• Fixes F pump pressure at 0 MPa {0 kg/cm^2} and continues control. • Even if phenomenon of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Straight travel performance.		
Related information	★If the 5-V circuit (B) and GND circuit (A) of the pressure sensor are connected inversely, the pressure sensor will be broken. Accordingly, take extreme care when checking. • Input from the front pump pressure sensor (pressure) can be checked in the monitoring function. (Code No. 01100: Front pump pressure) • Method of reproducing failure code: Turn starting switch ON or start engine.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Sensor power supply system defective	If failure code [DA25KP] is displayed, carry out troubleshooting for it first.			
	2	Front pump pressure sensor defective (Internal defect)	★Turn the engine starting switch OFF for the preparations, and turn to ON or keep the engine running during the troubleshooting.			
			P25		Voltage	
			Between (3) – (1)	Power supply	4.5 – 5.5 V	
			Between (2) – (1)	Signal	0.5 – 4.5 V	
			The pressure sensor voltage is measured with the wiring harness connected. Accordingly, if the voltage is abnormal, check the wiring harness and controller, too, for another cause of the trouble, and then judge.			
	3	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP01 (female) (8) – P25 (female) (2) and grounding		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP01 (female) (22), J24 – P25 (female) (3) and grounding		Voltage	Max. 1 V
			Between wiring harness between CP01 (female) (8) – P25 (female) (2) and grounding		Voltage	Max. 1 V
			Between wiring harness between C01 (female) (8) – P25 (female) (2) and grounding		Voltage	Max. 1 V
	5	Pump controller defective	★If causes 1 – 4 are not detected, pump may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)			

Cricuit diagram related to F pump pressure sensor

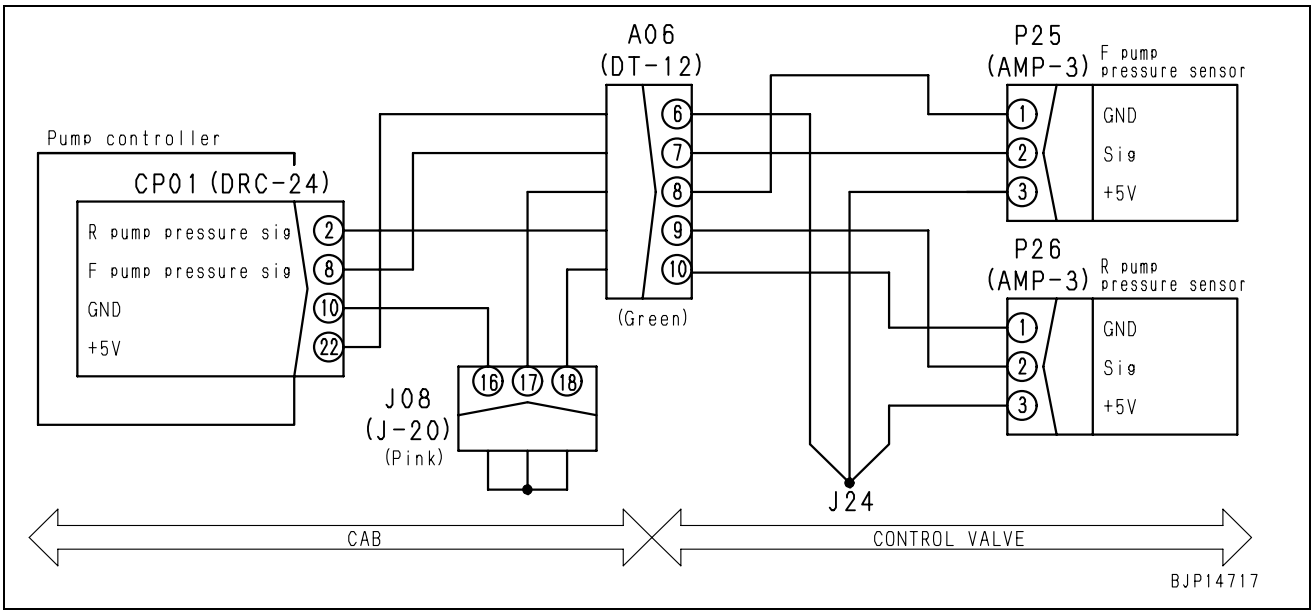


Failure code [DHPFKA] R Pump P. Sensor Disc.

Action code	Failure code	Trouble	R Pump P. Sensor Disc. (Pump controller system)
E02	**DHPFKA**		
Contents of trouble	• Signal voltage of R pump pressure sensor circuit is below 0.5 V or above 4.5 V.		
Action of machine monitor	• Fixes R pump pressure at 0 MPa {0 kg/cm^2} and continues control. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Straight travel performance or steering performance lowers.		
Related information	★If 5V circuit (B) and ground circuit (A) of pressure sensor are connected inversely, pressure sensor will be broken. Accordingly, take extreme care when checking. • R pump pressure can be checked with monitoring function. (Code: 01113 R pump pressure) • Method of reproducing failure code: Turn starting switch ON or start engine.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 5V sensor power	If failure code [DA25KP] is also displayed, carry out troubleshooting for it first.		
	2	Defective R pump pressure sensor (Internal trouble)	★Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting in each case.		
			P26		Voltage
			Between (3) – (1)	Power supply	4.5 – 5.5 V
			Between (2) – (1)	Signal	0.5 – 4.5 V
			Voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.		
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP01 (female) (10) – J08 – P26 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (2) – P26 (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between CP01 (female) (22) – J24 – P26 (female) (3)	Resistance	Max. 1 Ω
	4	Defective pump controller	If causes 1 – 3 are not detected, pump controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to F pump pressure sensor

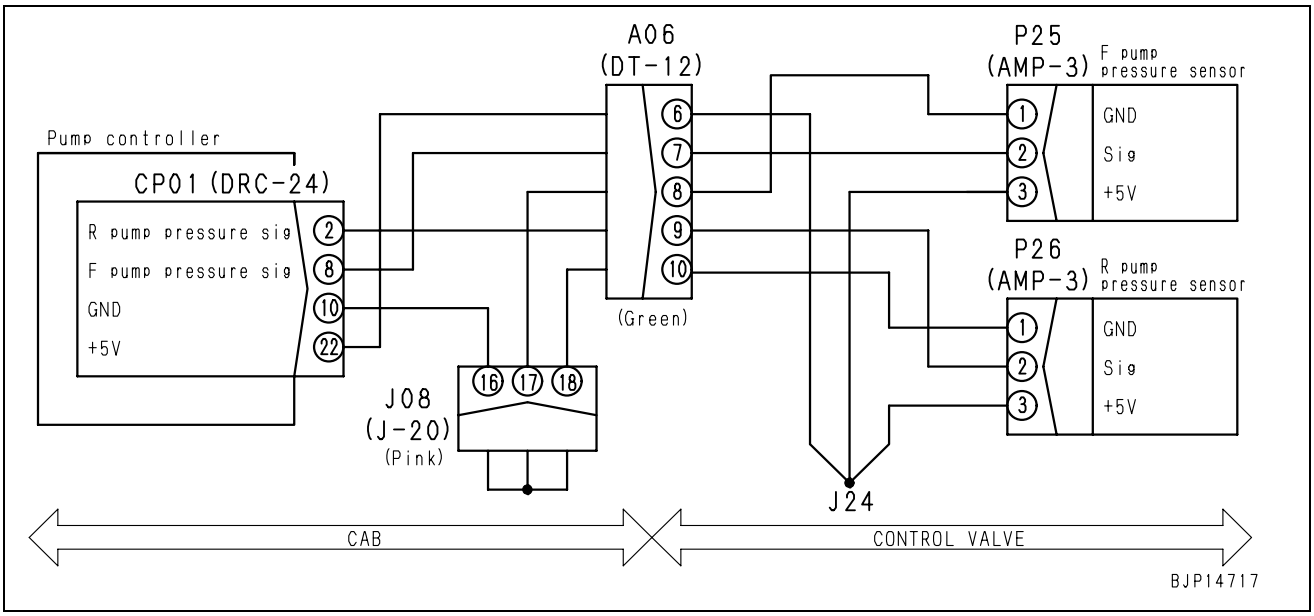


Failure code [DHPFKB] R Pump P. Sensor S/C

Action code	Failure code	Trouble	R Pump P. Sensor S/C (Pump controller system)
—	**DHPFKB**		
Contents of trouble	• Signal voltage from the front pump pressure sensor is below 0.3 V or above 4.42 V.		
Action of machine monitor	• Fixes F pump pressure at 0 MPa {0 kg/cm^2} and continues control. • Even if phenomenon of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Straight travel performance lowers.		
Related information	★If the 5-V circuit (B) and GND circuit (A) of the pressure sensor are connected inversely, the pressure sensor will be broken. Accordingly, take extreme care when checking. • Input from the rear pump pressure sensor (pressure) can be checked in the monitoring function. (Code No. 01101: Rear pump pressure) • Method of reproducing failure code: Turn starting switch ON or start engine.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Sensor power supply system defective	If failure code [DA25KP] is displayed, carry out troubleshooting for it first.			
	2	Rear pump pressure sensor defective (Internal defect)	★Turn the engine starting switch OFF for the preparations, and turn to ON or keep the engine running during the troubleshooting.			
			P26		Voltage	
			Between (3) – (1)	Power supply	4.5 – 5.5 V	
			Between (2) – (1)	Signal	0.5 – 4.5 V	
			The pressure sensor voltage is measured with the wiring harness connected. Accordingly, if the voltage is abnormal, check the wiring harness and controller, too, for another cause of the trouble, and then judge.			
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP01 (female) (2) – P26 (female) (2) – P26 grounding		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP01 (female) (22) – J21 – P26 (female) (3) and grounding		Voltage	Max. 1 V
			Between wiring harness between CP01 (female) (2) – P26 (female) (2) and grounding		Voltage	Max. 1 V
	5	Pump controller defective	★If causes 1 – 4 are not detected, pump may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)			

Circuit diagram related to R pump pressure sensor

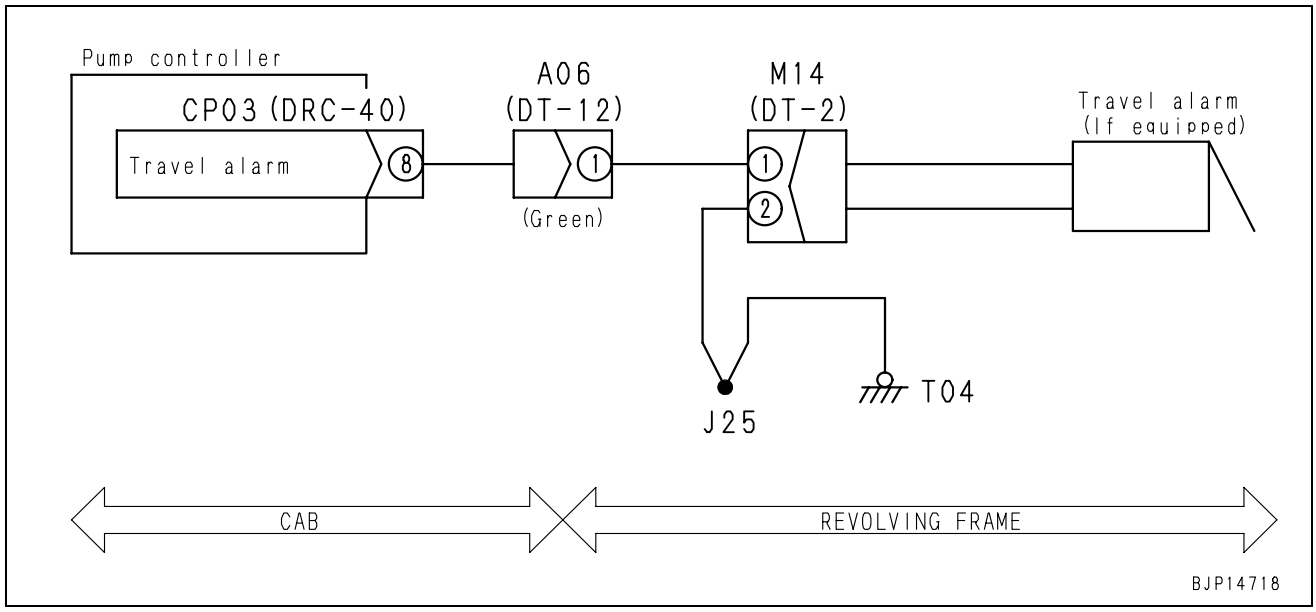


Failure code [DV20KB] Travel Alarm S/C

Action code	Failure code	Trouble	Travel Alarm S/C (Pump controller system)
—	**DV20KB**		
Contents of trouble	• Abnormal current flowed in the travel alarm circuit, when power is supplied to the circuit.		
Action of machine monitor	• Power to the travel alarm circuit is switched OFF. • Even after the failure cause disappears of itself, the machine operation does not return to normalcy, unless the engine starting switch is once turned OFF.		
Problem that appears on machine	• The travel alarm does not sound.		
Related information	• Operation of the travel alarm (ON or OFF) can be checked in the monitoring function. (Code No. 03701: Controller output 2)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Travel alarm defective (Internal defect)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			M14 (female)	Travel lever	Voltage	
			Between (1) – (2)	Neutral	Max. 1 V	
				Operated	20 – 30 V	
			If the above voltage is normal but the travel alarm does not operate, the travel alarm is defective.			
	2	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP03 (female) (8) – M14 (female) (1) and grounding		Resistance	Min. 1 MΩ
	3	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			CP03	Travel lever	Voltage	
			Between (8) – chassis ground	Neutral	Max. 1 V	
				Operated	20 – 30 V	

Circuit diagram related to travel alarm

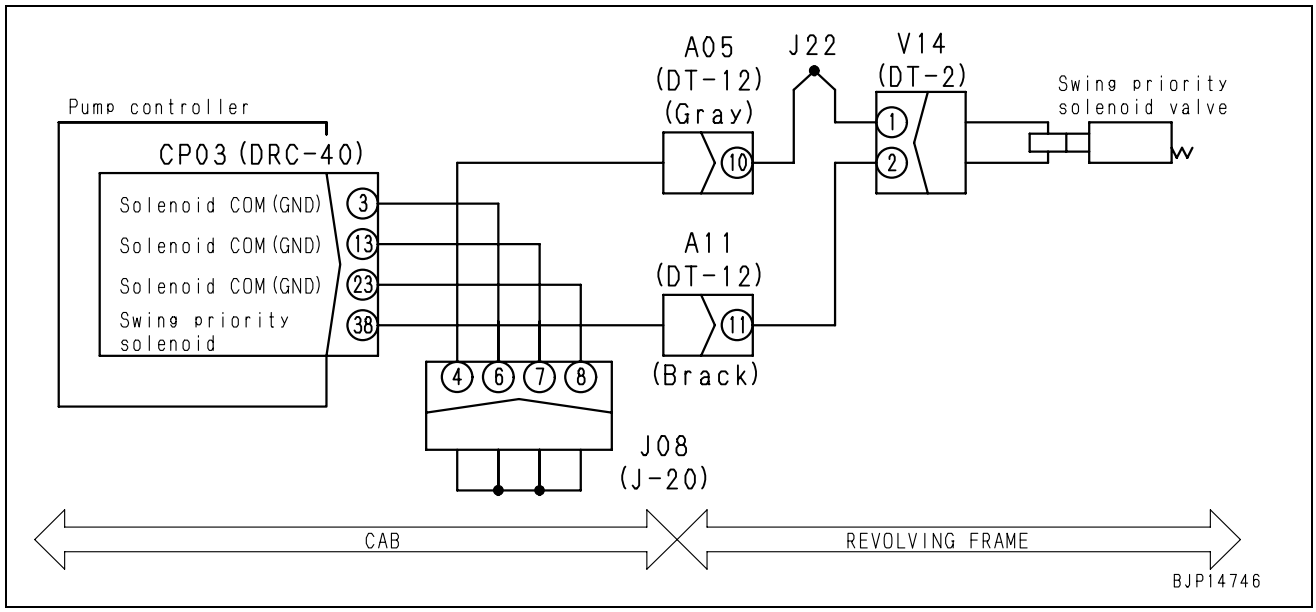


Failure code [DW41KA] Swing Priority Sol. Disc.

Action code	Failure code	Trouble	Swing Priority Sol. Disc. (Pump controller system)
—	**DW41KA**		
Contents of trouble	• No current flows to the swing priority solenoid circuit, when power is supplied to the circuit.		
Action of machine monitor	• None in particular (The solenoid does not function as there is no current flowing to it) • When the failure cause disappears of itself, the machine operation returns to normalcy.		
Problem that appears on machine	• When the boom is raised and the machine is swung simultaneously in the swing priority mode, the swing speed is low (the oil flow in the swing circuit is kept low).		
Related information	• Operation of the swing priority solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 02300: Solenoid 1) • Since the controller detects disconnection while the solenoid output is turned ON, be sure to turn the solenoid output ON when checking the solenoid again after repairing it. (For how to turn power ON or OFF, refer to the troubleshooting under failure code [DW41KB].)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Swing priority solenoid defective (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			V14 (male)	Resistance		
			Between (2) – (1)	20 – 60 Ω		
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness from CP03 (female) (38) – V14 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between V14 (female) (1) – CP03 (female) (3), (13), (23)	Resistance	Max. 1 Ω	
	3	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP03 (female) (38) – V14 (female) (2) and grounding	Voltage	Max. 1 V	
			CP03 (female)	Resistance		
			Between (38) – chassis ground	20 – 60 Ω		

Electric circuit diagram related to swing priority solenoid

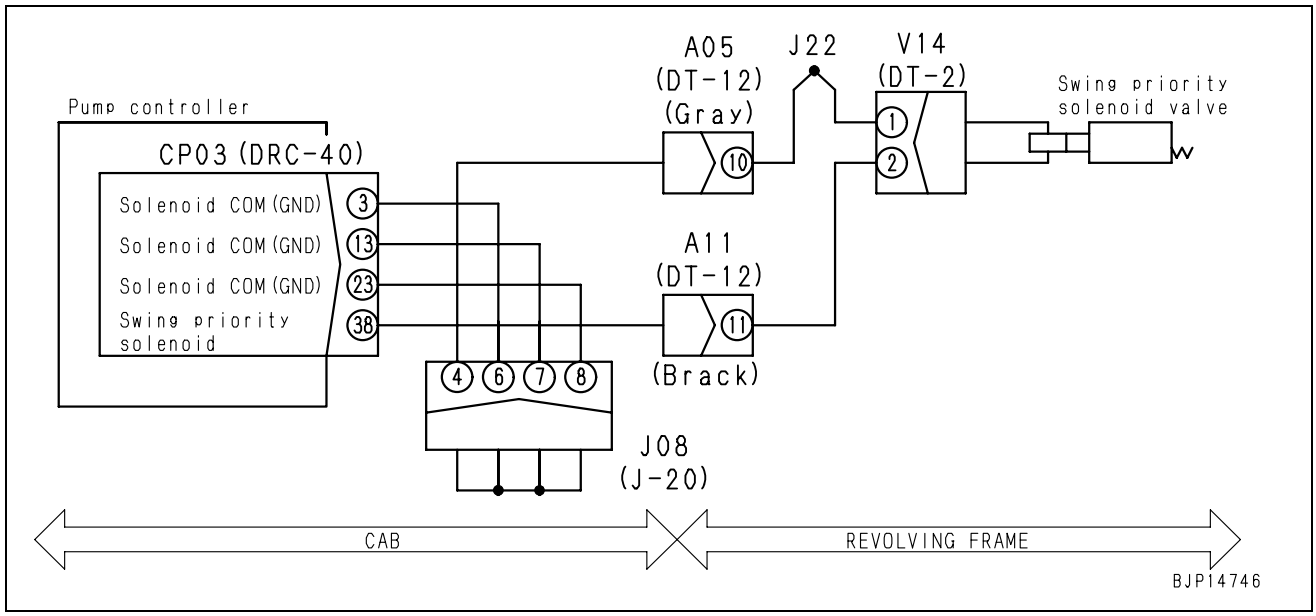


Failure code [DW41KB] Swing Priority Sol. S/C

Action code	Failure code	Trouble	Swing Priority Sol. S/C (Pump controller system)
—	**DW41KB**		
Contents of trouble	• Abnormal current flew to the swing priority solenoid, when power was supplied to the circuit.		
Action of machine monitor	• Power supply to the swing priority solenoid circuit is switched OFF. • Even after the failure cause disappears of itself, the machine operation does not return to normalcy, unless the engine starting switch is once turned OFF.		
Problem that appears on machine	• When the boom is raised and the machine is swung simultaneously in the swing priority mode, the swing speed is low (the oil flow in the swing circuit is kept low).		
Related information	• Operation of the swing priority solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 02300: Solenoid 1)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Swing priority solenoid defective (Internal short-circuiting or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			V14 (male)	Resistance	
			Between (2) – (1)	20 – 60 Ω	
			Between (2) and grounding	Min. 1 MΩ	
	2	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Between wiring harness between CP03 (female) (38) – V14 (female) (2) and grounding	Resistance	Min. 1 MΩ
	3	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.		
			CP03	Swing priority switch Left work equipment control lever	Voltage
			Between (38) – chassis ground	OFF + NEUTRAL	Max. 1 V
				Swing priority mode + Swing operation	20 – 30 V

Electric circuit diagram related to swing priority solenoid

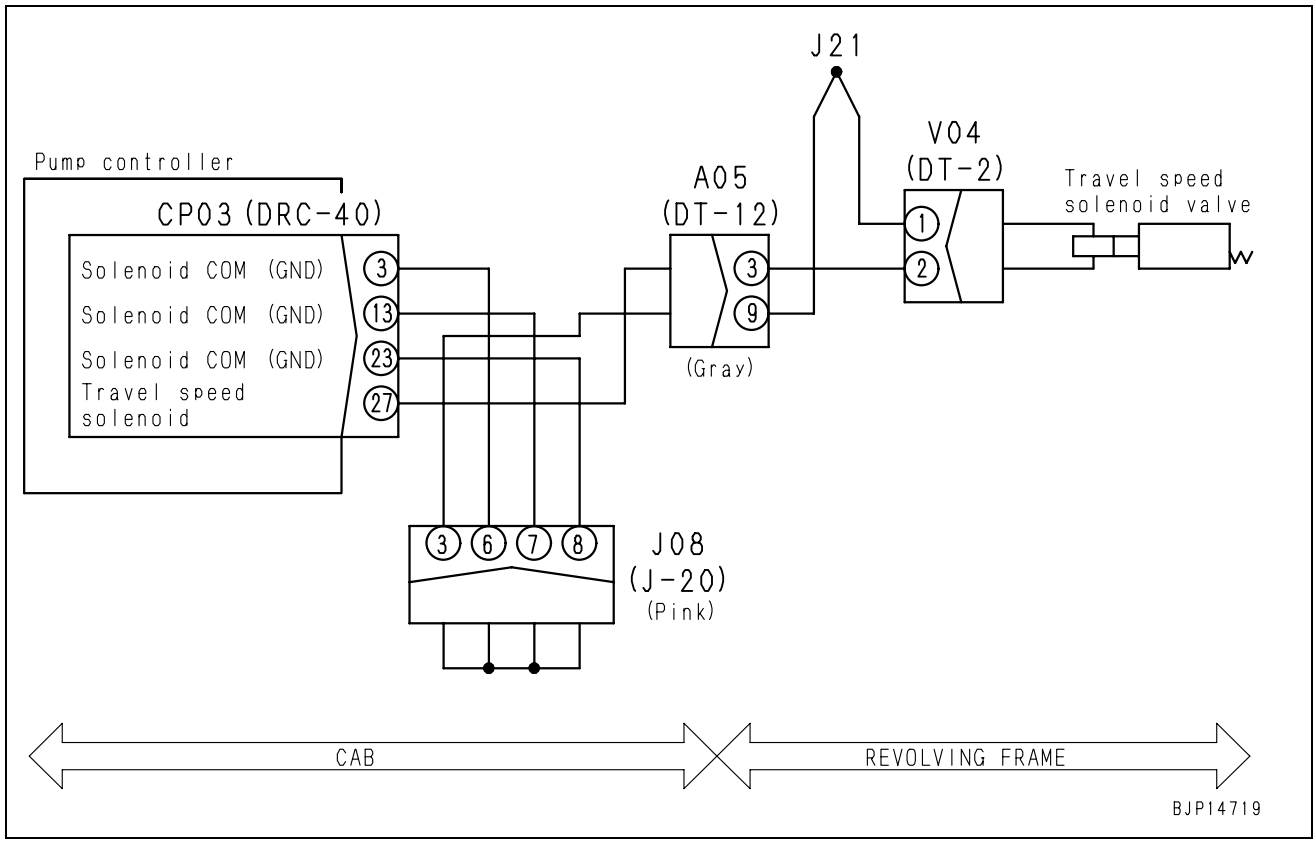


Failure code [DW43KA] Travel Speed Sol. Disc.

Action code	Failure code	Trouble	Travel Speed Sol. Disc. (Pump controller system)
—	**DW43KA**		
Contents of trouble	• No current flows travel speed solenoid circuit as power is turned on.		
Action of controller	• None in particular. (Since no current flows, solenoid does not operate.) • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Travel speed does not change to Hi. (The swash plate angle of the travel motor is not minimized)		
Related information	• The travel speed shifting solenoid is not turned ON when the engine speed is below 1,200 rpm. • Operation of the travel speed solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 02300: Solenoid 1) • Since the controller detects disconnection while the solenoid output is turned ON, be sure to turn the solenoid output ON when checking the solenoid again after repairing it. (For how to turn power ON or OFF, refer to the troubleshooting under failure code [DW43KB].)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Travel Speed Sol. Disc. (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V04 (male)	Resistance		
			Between (2) – (1)	20 – 60 Ω		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP03 (female) (27) – V04 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between V04 (female) (1) – CP03 (female) (3), (13), (23) – chassis ground	Resistance	Max. 1 Ω	
	3	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between CP03 (female) (27) – V04 (female) (2) and chassis ground	Voltage	Max. 1 V	
	4	Defective pump controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)	Resistance		
			Between (27) – chassis ground	20 – 60 Ω		

Circuit diagram related to travel speed solenoid of pump controller

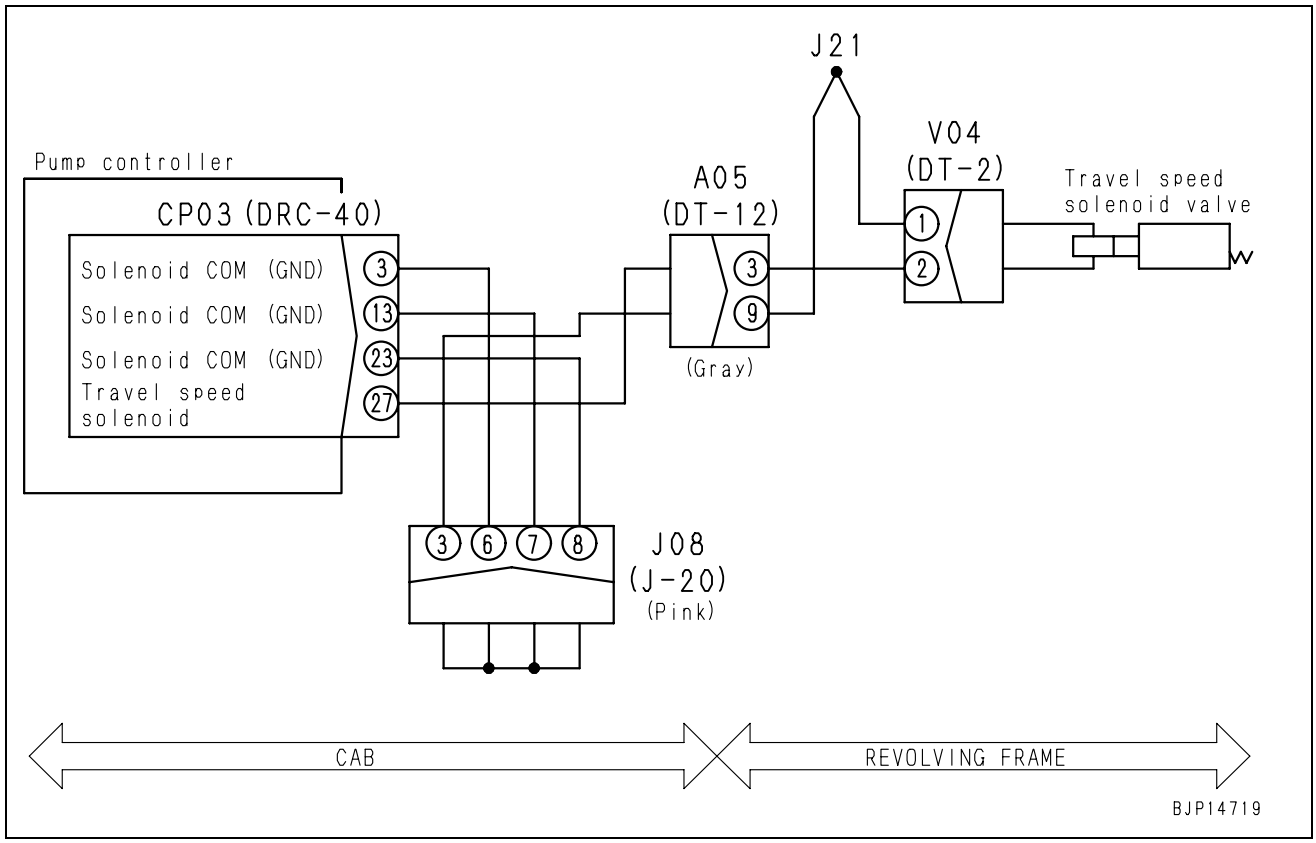


Failure code [DW43KB] Travel Speed Sol. S/C

Action code	Failure code	Trouble	Travel Speed Sol. S/C (Pump controller system)
—	**DW43KB**		
Contents of trouble	• Abnormal current flowed at output to travel speed solenoid circuit.		
Action of controller	• Turns output to travel speed solenoid circuit OFF. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Travel speed does not change to Hi. (The swash plate angle of the travel motor is not minimized.)		
Related information	• The travel speed shifting solenoid is not turned ON when the engine speed is below 1,200 rpm. • Operation of the travel speed solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 02300: Solenoid 1)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Travel Speed Sol. Disc. (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			V04 (male)	Resistance	
			Between (2) – (1)	20 – 60 Ω	
			Between (2) – chassis ground	Min. 1 MΩ	
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP03 (female) (27) – V04 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
	3	Defective pump controller	★Prepare with starting switch OFF, then start engine and carry out troubleshooting.		
			CP03	Travel speed	Voltage
			Between (27) – chassis ground	Lo	Max. 1 V
				Hi	20 – 30 V

Circuit diagram related to travel speed solenoid of pump controller

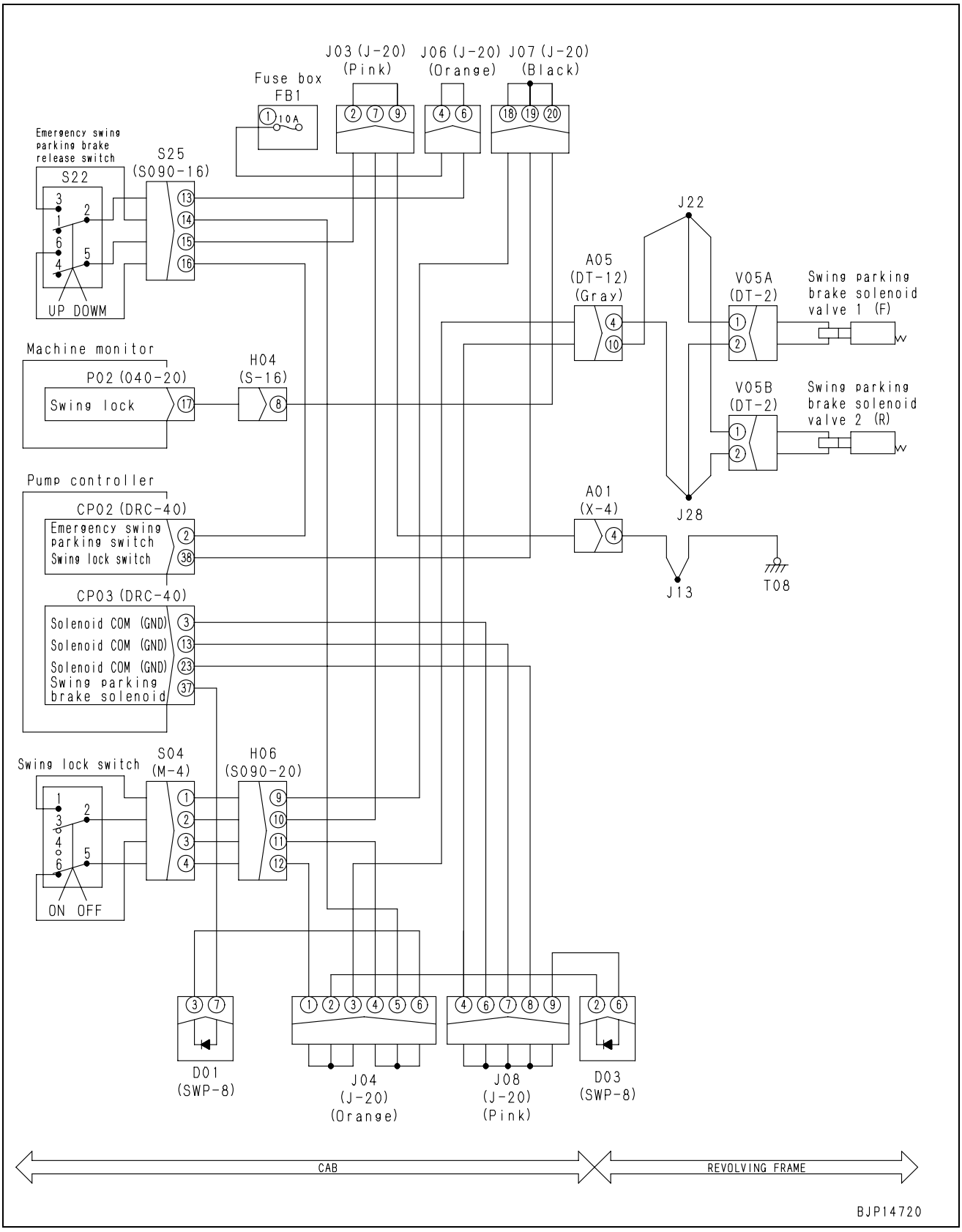


Failure code [DW45KA] Swing Brake Sol. Disc.

Action code	Failure code	Trouble	Swing Brake Sol. Disc. (Pump controller system)
E03	**DW45KA**		
Contents of trouble	• No current flows at output to swing brake solenoid circuit.		
Action of controller	• None in particular. (Since no current flows, solenoid does not operate.) • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Machine cannot swing (The swing holding brake cannot be released).		
Related information	• Operating condition of swing brake solenoid (ON/OFF) can be checked with monitoring function. (Code 02300: Solenoid 1) • If solenoid and wiring harness are normal, operator can swing machine by setting emergency swing brake release switch in release position (Swing holding brake does not work, however, when machine stops). • Keep the swing lock switch in the OFF position and the swing holding brake release switch in the RELEASE position during troubleshooting. • Since the controller detects disconnection while the solenoid output is turned ON, be sure to turn the solenoid output ON when checking the solenoid again after repairing it. (For how to turn power ON or OFF, refer to the troubleshooting under failure code [**DW45KB**].)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective swing holding brake solenoid (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V05A, V05B (male)		Resistance	
			Between (2) – (1)		20 – 60 Ω	
	2	Defective assembled-type diode D01 (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			D01 (male)	Digital circuit tester	Continuity	
			Between (7) – (3)	Diode mode	There is continuity	
	3	Defective swing lock switch (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			S04 (female)	Switch	Resistance	
			Between (3) – (4)	OFF	Max. 1 Ω	
				LOCK (ON)	Min. 1 MΩ	
	4	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP03 (female) (37) – D01 (female) (7)		Resistance	Max. 1 Ω
			Wiring harness between D01 (female) (3) – J04 – S04 (male) (3)		Resistance	Max. 1 Ω
			Wiring harness between S04 (female) (4) – J22 – V05A (female) (2) – V05B (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between V05A (female) (1) – V05B (female) (1) – J28 – CP03 (female) (3), (13), (23)		Resistance	Max. 1 Ω
	5	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between CP03 (female) (37) – D01 – female (7)		Voltage	Max. 1 V
	6	Defective pump controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)	Disconnect D01 and connect pins (3) and (7) on female side directly.	Resistance	
			Between (37) – chassis ground		20 – 60 Ω	

Circuit diagram related to swing holding brake solenoid of pump controller

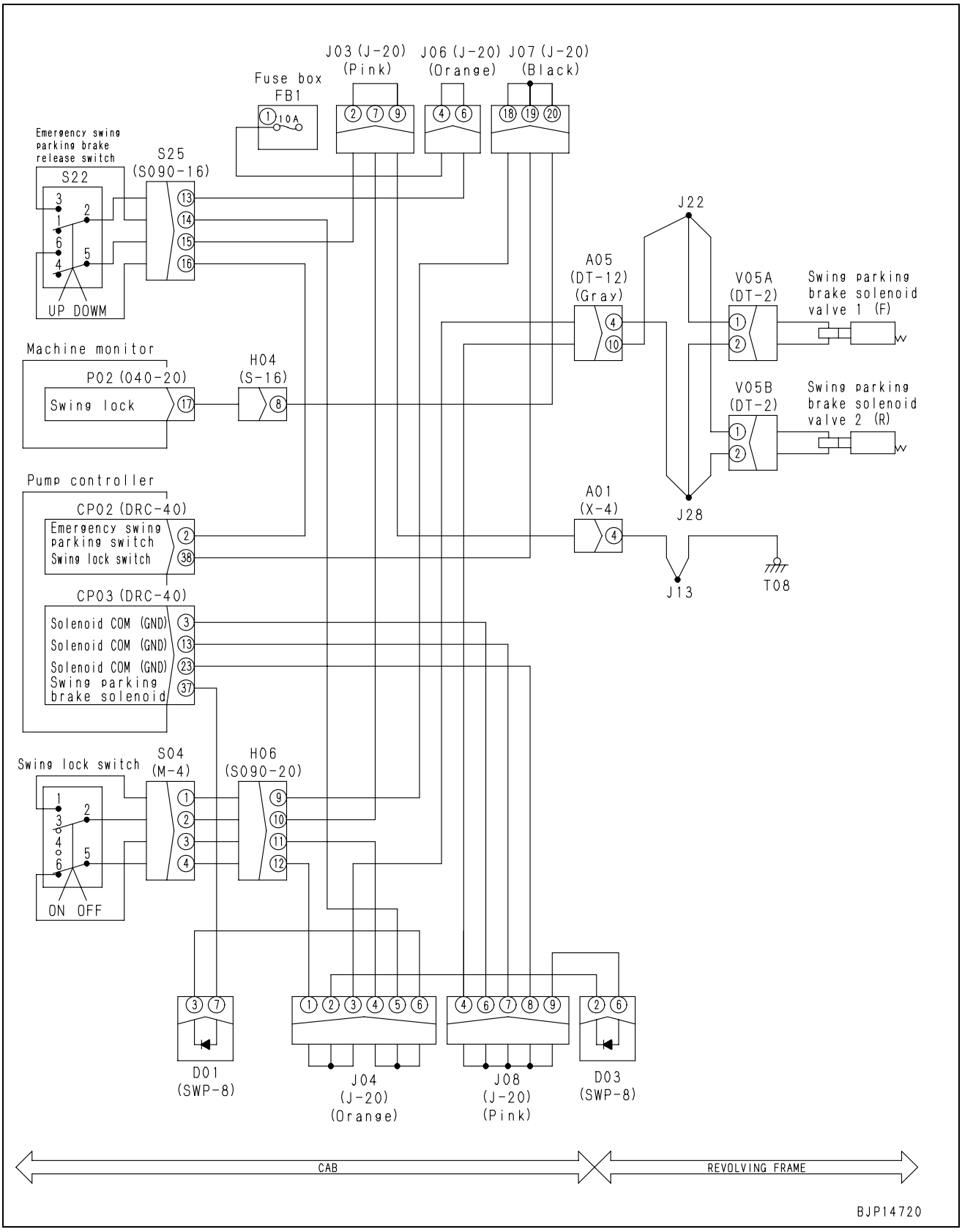


Failure code [DW45KB] Swing Brake Sol. S/C

Action code	Failure code	Trouble	Swing Brake Sol. S/C (Pump controller system)
E03	**DW45KB**		
Contents of trouble	• Abnormal current flowed at output to swing brake solenoid circuit.		
Action of controller	• Turns output to swing brake solenoid circuit OFF. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Machine cannot swing. (The swing holding brake cannot be released).		
Related information	• Operating condition of swing brake solenoid (ON/OFF) can be checked with monitoring function. (Code 02300: Solenoid 1) • If solenoid and wiring harness are normal, operator can swing machine by setting emergency swing brake release switch to release position (Swing holding brake does not work, however, when machine stops).		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective swing holding brake solenoid (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V05A, V05B (male)	Resistance		
			Between (2) – (1)	20 – 60 Ω		
			Between (2) – chassis ground	Min. 1 MΩ		
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP03 (female) (37) – D01 – J04 – S04 – J22 – V05A (female) (2) – V05B (female) (2) – S25 (female) (14)	Resistance	Min. 1 MΩ	
	3	Defective pump controller	★Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			CP03	Swing lever	Voltage	
			Between (37) – chassis ground	All levers in neutral	Max. 1 V (5 sec. after setting in neutral)	
				Work equipment or swing operated	20 – 30 V	

Circuit diagram related to swing holding brake solenoid of pump controller

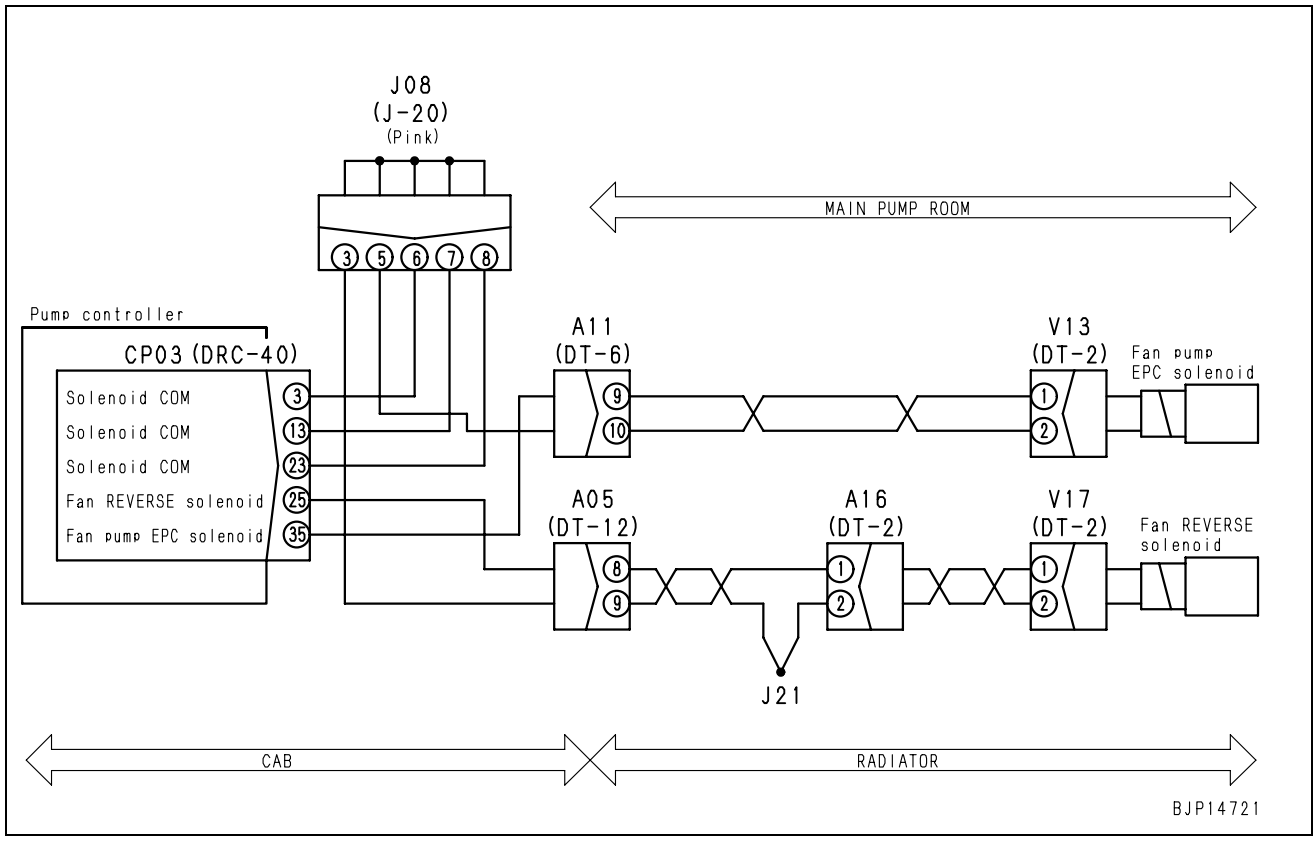


Failure code [DW7BKA] Fan Reverse Sol. Disc.

Action code	Failure code	Trouble	Fan Reverse Sol. Disc. (Pump controller system)
—	**DW7BKA**		
Contents of trouble	• When signal is output to hydraulic fan reverse solenoid circuit, no current flows.		
Action of controller	• None in particular (The solenoid does not function as there is no current flowing to it) • When the failure cause disappears of itself, the machine operation returns to normalcy.		
Problem that appears on machine	• Fan does not rotate in reverse.		
Related information	• Operating condition (ON/OFF) of fan reverse solenoid can be checked with monitoring function. (Code 02300: Solenoid 1) • Since disconnection of solenoid is detected while output is turned ON, be sure to turn output ON (rotate fan in reverse) when checking reproduction of failure after repair.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective hydraulic fan reverse solenoid (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			V17 (male)	Resistance	
			Between (1) – (2)	20 – 60 Ω	
	2	Disconnection of wiring harness (Disconnection of defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between CP03 (female) (25) – V17 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between V17 (female) (2) – CP03 (female) (3), (13), (17)	Resistance	Max. 1 Ω
	3	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			Between wiring harness between CP03 (female) (25) – V17 (female) (1) and grounding	Voltage	Max. 1 V
	4	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.		
			CP03 (female)	Resistance	
			Between (25) and grounding	20 – 60 Ω	

Circuit diagram related to hydraulic fan

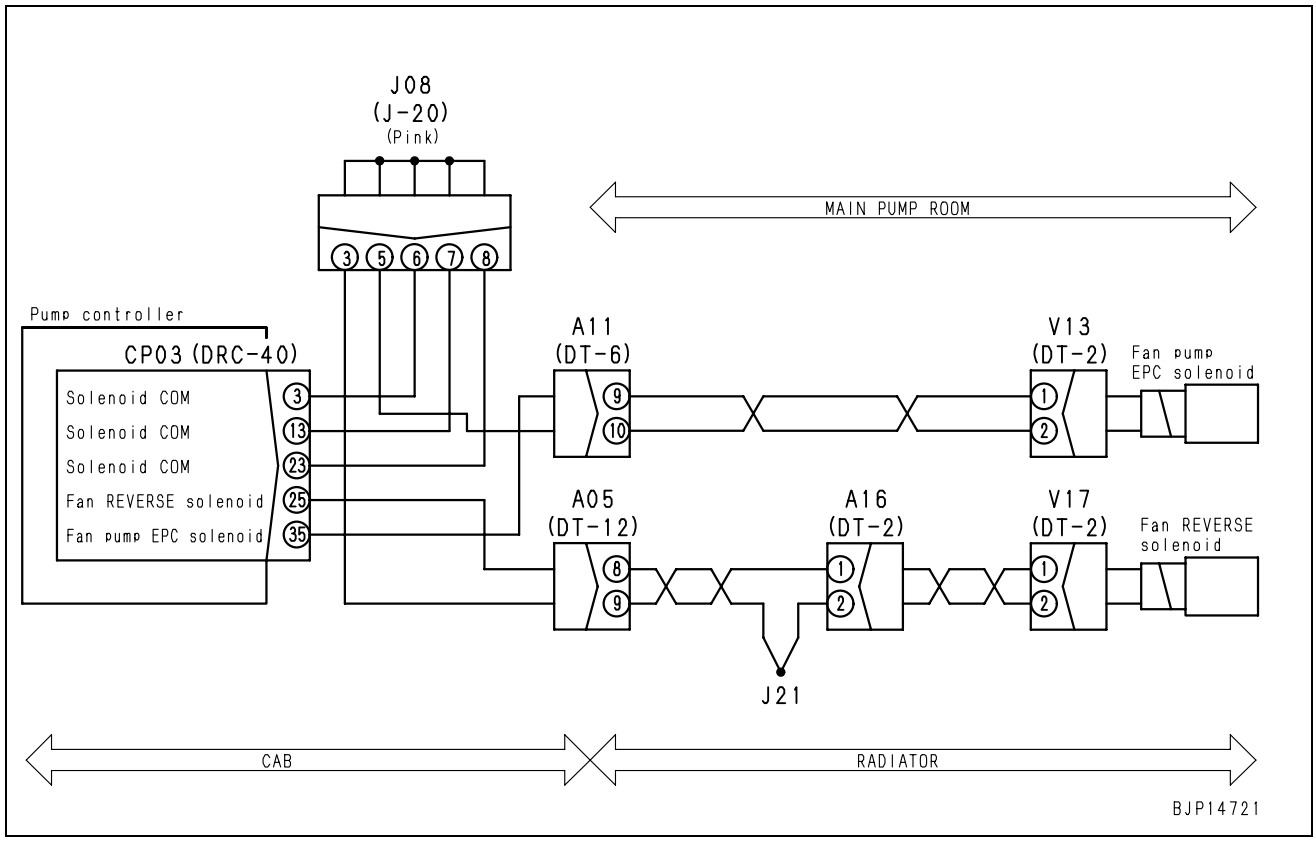


Failure code [DW78KB] Fan Reverse Sol. S/C

Action code	Failure code	Trouble	Fan Reverse Sol. S/C (Pump controller system)
—	**DW7BKB**		
Contents of trouble	• When signal was output to hydraulic fan reverse solenoid circuit, abnormal current flowed.		
Action of controller	• Turns signal to hydraulic fan reverse solenoid circuit OFF. • When the failure cause disappears of itself, the machine operation returns to normalcy.		
Problem that appears on machine	• Fan does not rotate in reverse.		
Related information	• Operating condition (ON/OFF) of fan reverse solenoid can be checked with monitoring function. (Code 02300: Solenoid 1)		

Possible causes and standard value in normal state		Cause	Standard value in normal state/Remarks on troubleshooting		
	1	Defective hydraulic fan reverse solenoid (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			V17 (male)	Resistance	
			Between (1) – (2)	20 – 60 Ω	
			Between (2) and grounding	Min. 1 MΩ	
	2	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Between wiring harness between CP03 (female) (25), – V17 (female) (1) and grounding	Resistance	Min. 1 MΩ
	3	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.		
			CP03	Resistance	
			Between (25) and grounding	20 – 60 Ω	

Circuit diagram related to hydraulic fan

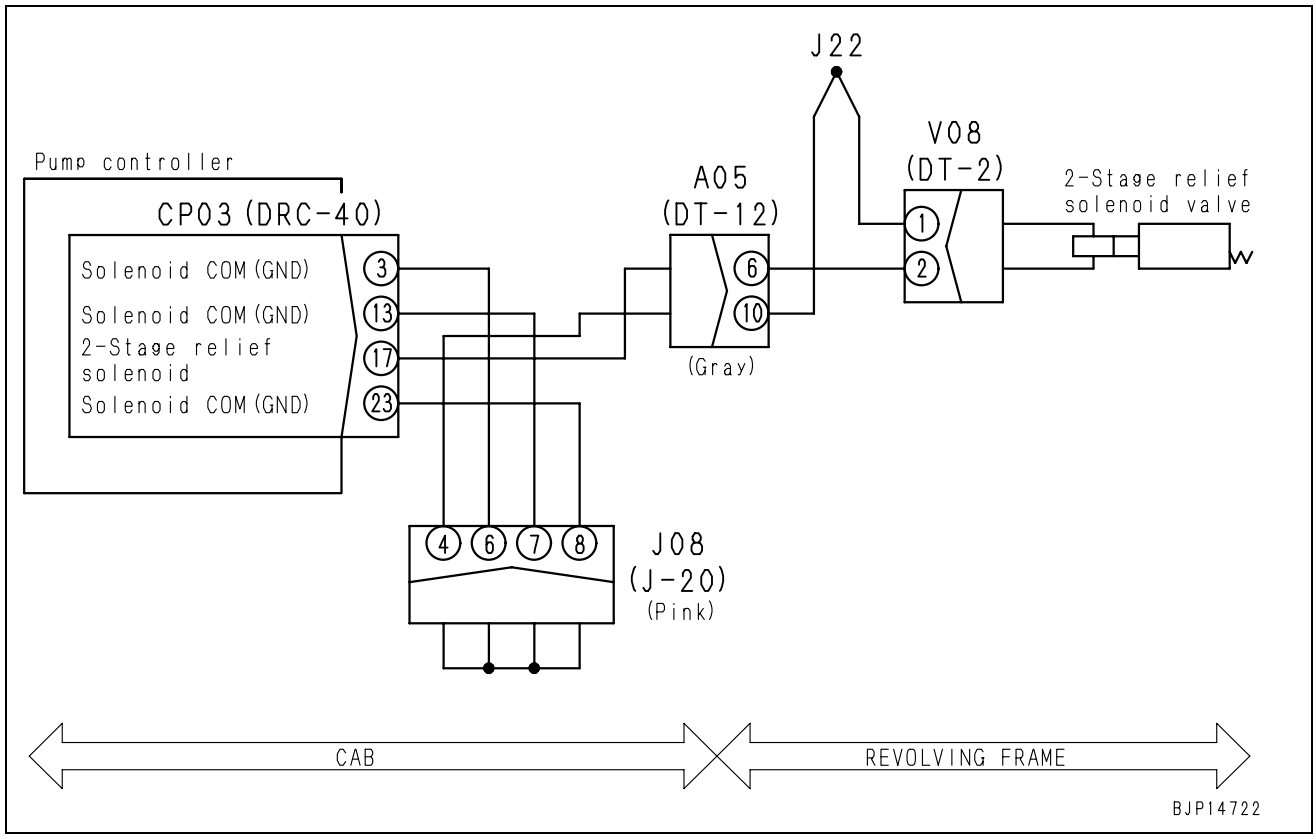


Failure code [DWK0KA] 2-stage Relief Sol. Disc.

Action code	Failure code	Trouble	2-stage Relief Sol. Disc. (Pump controller system)
—	**DWK0KA**		
Contents of trouble	• No current flows at output to 2-stage relief solenoid circuit.		
Action of controller	• None in particular. (Since no current flows, solenoid does not operate.) • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Travel power is low (The main relief valve is not set in the HIGH PRESSURE position).		
Related information	• Operating condition of 2-stage relief solenoid (ON/OFF) can be checked with monitoring function. (Code 02300: Solenoid 1) • Solenoid detects disconnection when output is turned on. To confirm the reproduction after repair, be sure to turn output on. (For more information on how to turn output on/off, see troubleshooting for failure code [**DWK0KB**].)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 2-stage relief solenoid (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			V08 (male)	Resistance	
			Between (2) – (1)	20 – 60 Ω	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP03 (female) (17) – V08 (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between V08 (female) (1) – J22 – CP03 (female) (3), (13), (23)	Resistance	Max. 1 Ω
	3	Hot short (short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between CP03 (female) (17) – V08 (female) (2) and chassis ground	Voltage	Max. 1 V
	4	Defective pump controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CP03 (female)	Resistance	
			Between (17) – chassis ground	20 – 60 Ω	

Circuit diagram related to 2-stage relief solenoid of pump controller

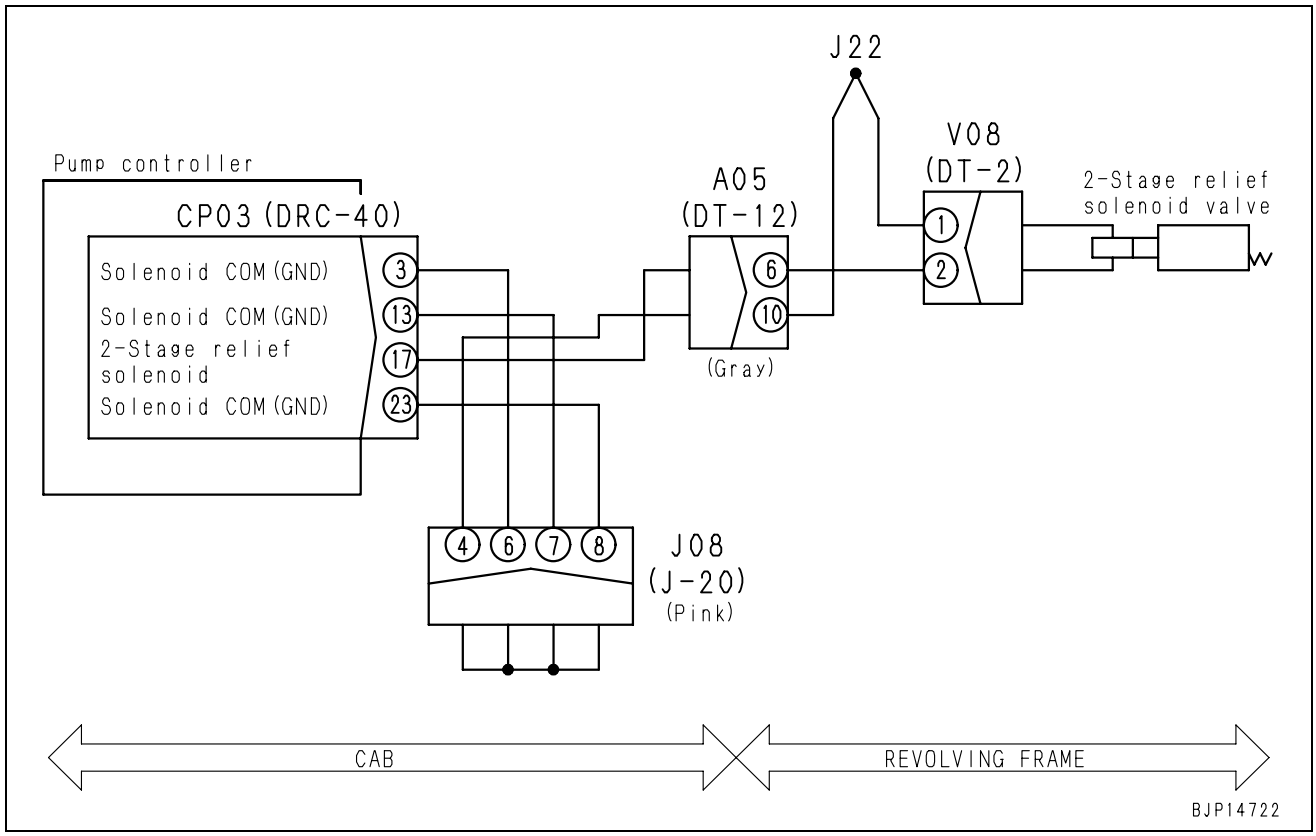


Failure code [DWK0KB] 2-stage Relief Sol. S/C

Action code	Failure code	Trouble	2-stage Relief Sol. S/C (Pump controller system)
—	**DWK0KB**		
Contents of trouble	• Abnormal current flowed at output to 2-stage relief solenoid circuit.		
Action of controller	• Turns output to 2-stage relief solenoid circuit OFF. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Travel power is low (The main relief valve is not set in the HIGH PRESSURE postion).		
Related information	• Operating condition of 2-stage relief solenoid (ON/OFF) can be checked with monitoring function. (Code 02300: Solenoid 1)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 2-stage relief solenoid (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			V08 (male)	Resistance	
			Between (2) – (1)	20 – 60 Ω	
			Between (2) – chassis ground	Min. 1 MΩ	
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between CP03 (female) (17) – V08 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
	3	Defective pump controller	★Prepare with starting switch OFF, then keep the engine running and carry out troubleshooting.		
			CP03	Travel control lever	Voltage
			Between (17) – chassis ground	NEUTRAL	Max. 1 V
				Travel operation	20 – 30 V

Circuit diagram related to 2-stage relief solenoid of pump controller

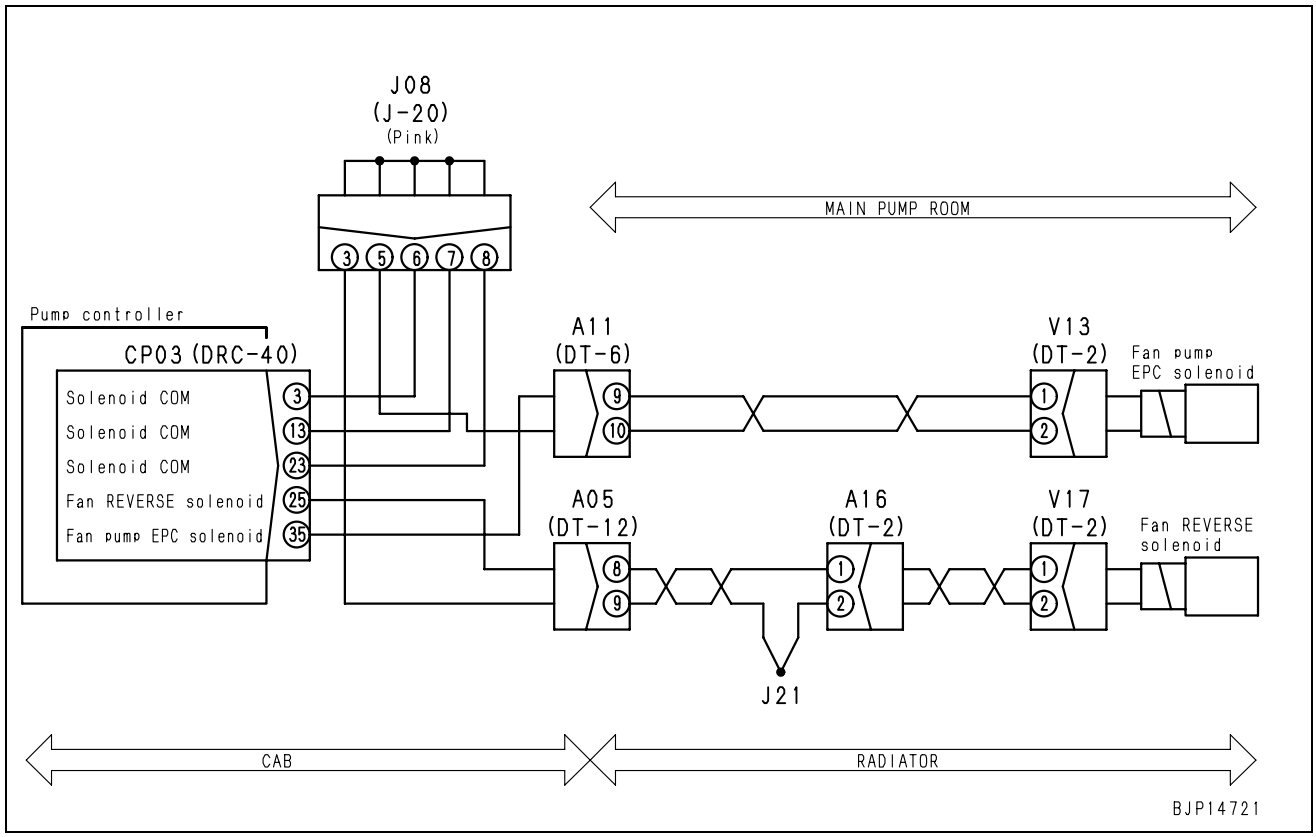


Failure code [DX16KA] Fan Pump EPC Sol. Disc.

Action code	Failure code	Trouble	Fan Pump EPC Sol. Disc. (Pump controller system)
E11	**DX16KA**		
Contents of trouble	• No current flows into hydraulic fan EPC solenoid circuit.		
Action of controller	• None in particular (The solenoid does not function as there is no current flowing to it). • When the failure cause disappears of itself, the machine operation returns to normalcy.		
Problem that appears on machine	• Fan motor speed cannot be controlled.		
Related information	• Output (Current) to EPC solenoid can be checked with monitoring function. (Code 31623: EPC solenoid current)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective hydraulic fan EPC solenoid (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			V13 (male)	Resistance		
			Between (1) – (2)	10 – 22 Ω		
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (35) – V13 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between V13 (female) (2) – CP03 (female) (3), (13), (23)	Resistance	Max. 1 Ω	
	3	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP03 (female) (35) – V13 (female) (1) and grounding	Voltage	Max. 1 V	
			Between wiring harness between V13 (female) (2) – V13 (female) (3), (13), (23) and grounding	Voltage	Max. 1 V	
	4	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP03 (female)	Resistance		
			Between (35) – (3) (13) (23)	7 – 14 Ω		

Circuit diagram related to fan pump EPC solenoid

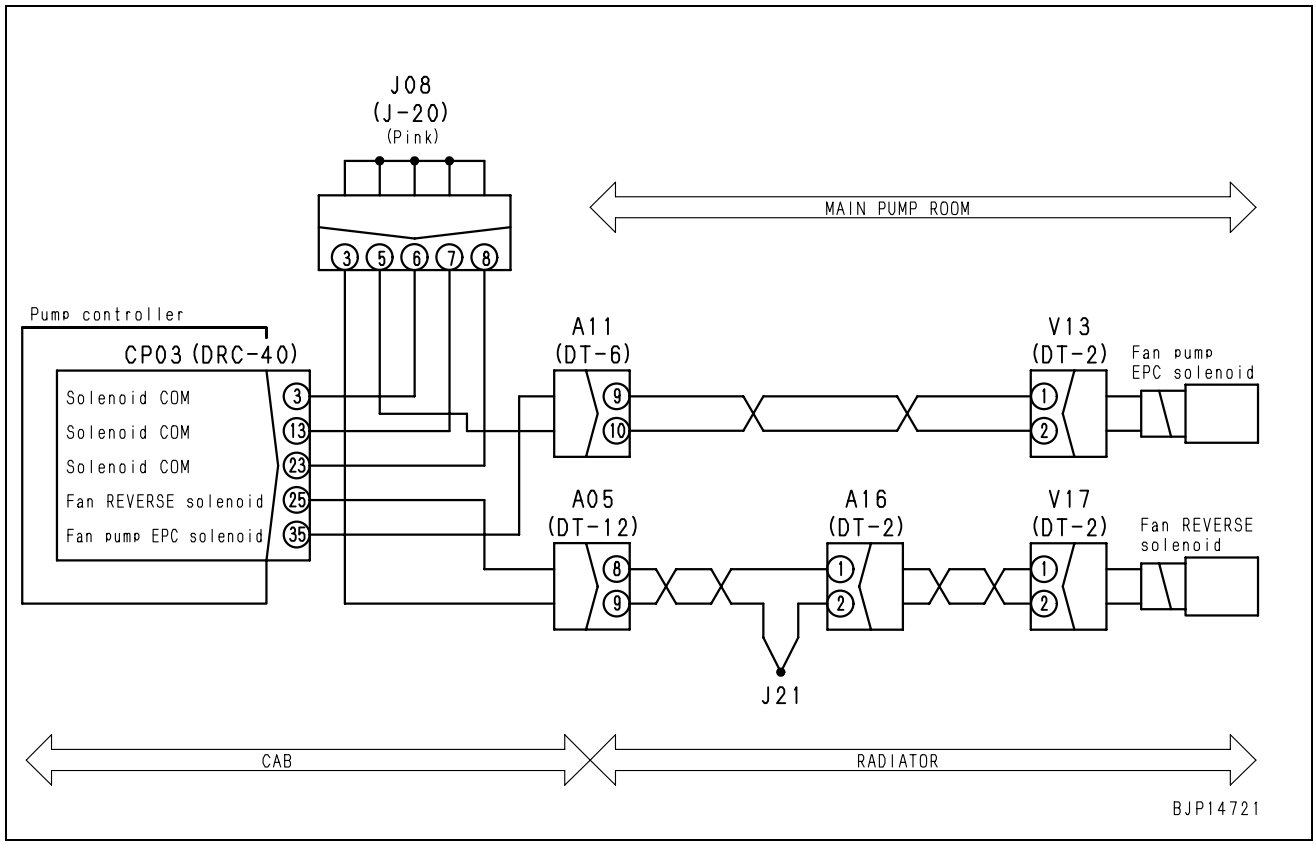


Failure code [DX16KB] Fan Pump EPC Sol. S/C

Action code	Failure code	Trouble	Fan Pump EPC Sol. S/C (Pump controller system)
E11	**DX16KB**		
Contents of trouble	• Abnormal current flowed in hydraulic fan EPC solenoid circuit.		
Action of controller	• Turns signal to EPC solenoid circuit OFF. • Even after the failure cause disappears of itself, the machine operation does not return to normalcy, unless the engine starting switch is once turned OFF.		
Problem that appears on machine	• Fan motor speed cannot be controlled.		
Related information	• Output (Current) to EPC solenoid can be checked with monitoring function. (Code 31623: EPC solenoid current)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective hydraulic fan EPC solenoid (Internal short-circuiting or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			V13 (male)	Resistance	
			Between (1) – (2)	7 – 14 Ω	
			Between (1) and grounding	Min. 1 MΩ	
	2	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Between wiring harness between CP03 (female) (35) – V13 (female) (1) and grounding	Resistance	Min. 1 MΩ
	3	Pump controller defective	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			C03 (female)	Resistance	
			Between (35) – (3) (13) (23)	7 – 14 Ω	
			Between (35) and grounding	Min. 1 MΩ	

Circuit diagram related to fan pump EPC solenoid

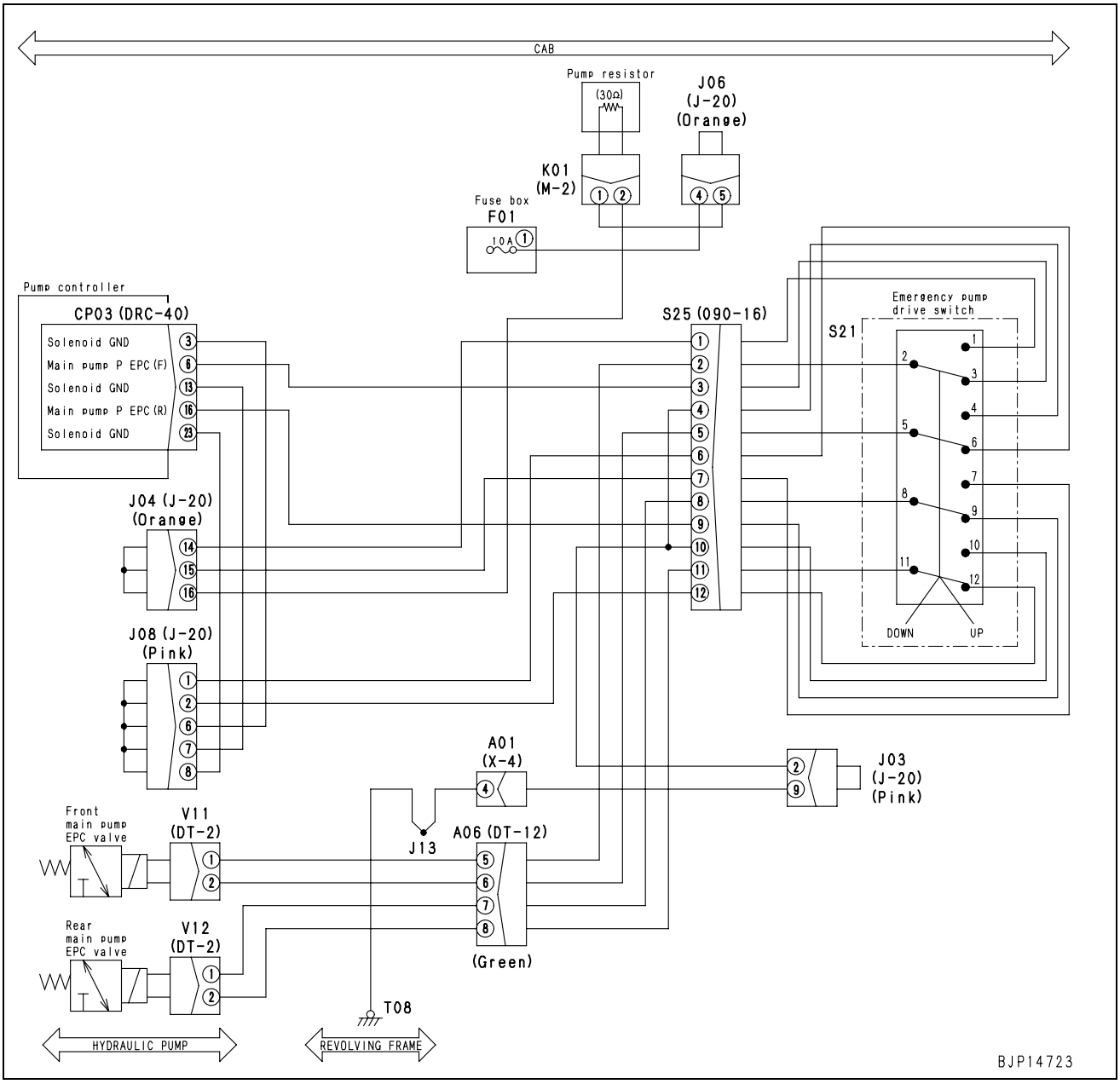


Failure code [DXAAKA] F Pump EPC Sol. Disc.

Action code	Failure code	Trouble	F Pump EPC Sol. Disc. (Pump controller system)
E02	**DXAAKA**		
Contents of trouble	• When main pump EPC (F) solenoid was energized, disconnection was detected in solenoid.		
Action of controller	• None in particular. (Since no current flows, solenoid does not operate.) • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• If pump load increases, engine speed lowers largely and engine may stall.		
Related information	• Current to energize main pump EPC (F) solenoid can be checked with monitoring function. (Code: 01300 Main pump EPC (F) solenoid current) • Method of reproducing failure code: Turn starting switch ON.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective main pump EPC (F) solenoid (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V11 (male)		Resistance	
			Between (1) – (2)		7 – 14 Ω	
	2	Defective emergency pump drive switch (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			S25 (male)	Emergency pump drive switch	Resistance	
			Between (3) – (2)	Normal	Max. 1 Ω	
				Emergency	Min. 1 MΩ	
			Between (6) – (5)	Normal	Max. 1 Ω	
				Emergency	Min. 1 MΩ	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP03 (female) (6) – S25 (female) (3)		Resistance	Max. 1 Ω
			Wiring harness between S25 (female) (2) – V11 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between CP03 (female) (3), (13), (23) – J08 – S25 (female) (6)		Resistance	Max. 1 Ω
			Wiring harness between S25 (female) (5) – V11 (female) (2)		Resistance	Max. 1 Ω
	4	Defective pump controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)		Resistance	
			Between (6) – (3), (13), (23)		7 – 14 Ω	

Circuit diagram related to main pump EPC solenoid

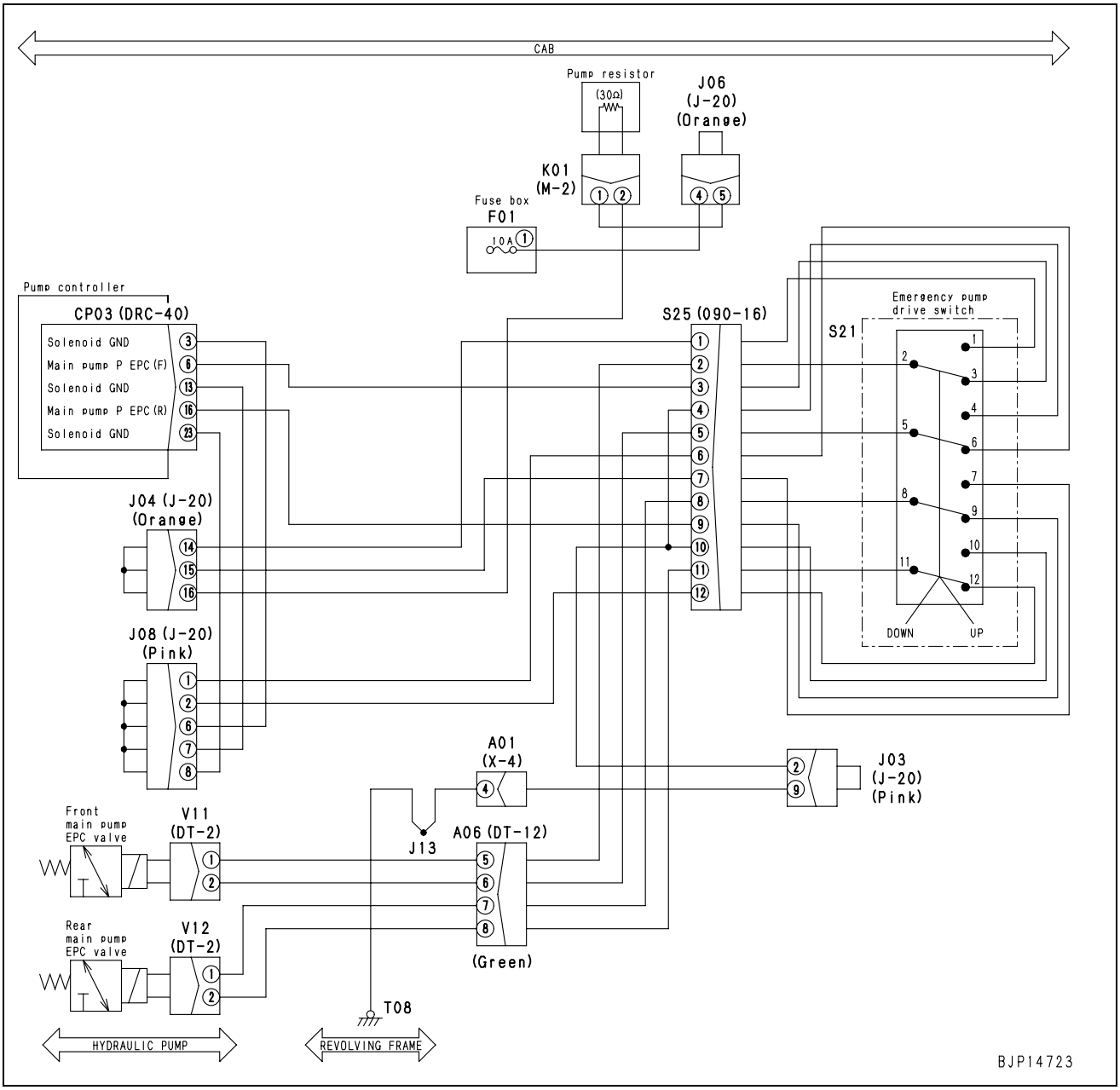


Failure code [DXAAKB] F Pump EPC Sol. S/C

Action code	Failure code	Trouble	F Pump EPC Sol. S/C (Pump controller system)
E02	**DXAAKB**		
Contents of trouble	• When main pump EPC (F) solenoid was energized, short circuit was detected in solenoid.		
Action of controller	• Turns signal to main pump (F) solenoid OFF. • Even if cause of failure disappers, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• If pump load increases, engine speed lowers largely and engine may stall.		
Related information	• Current to energize main pump EPC (F) solenoid can be checked with monitoring function. (Code: 01300 Main pump EPC (F) solenoid current) • Method of reproducing failure code: Turn starting switch ON.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective main pump EPC (F) solenoid (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V11 (male)		Resistance	
			Between (1) – (2)		7 – 14 Ω	
			Between (6) – chassing ground		Min. 1 MΩ	
	2	Defective emergency pump drive switch (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			S25 (male)	Emergency pump drive swith	Resistance	
			Between (2), (3) – (4)	Normal	Min. 1 MΩ	
			Between (2), (3) – chassing ground		Min. 1 MΩ	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP03 (female) (6) – S25 (female) (3) – chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between S25 (female) (5) – V11 (female) (2) – chassis ground		Resistance	Min. 1 MΩ
	4	Defective pump controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)		Resistance	
			Between (6) – (3), (13), (23)		7 – 14 Ω	
			Between (6) – chassis ground		Min. 1MΩ	

Circuit diagram related to main pump EPC solenoid

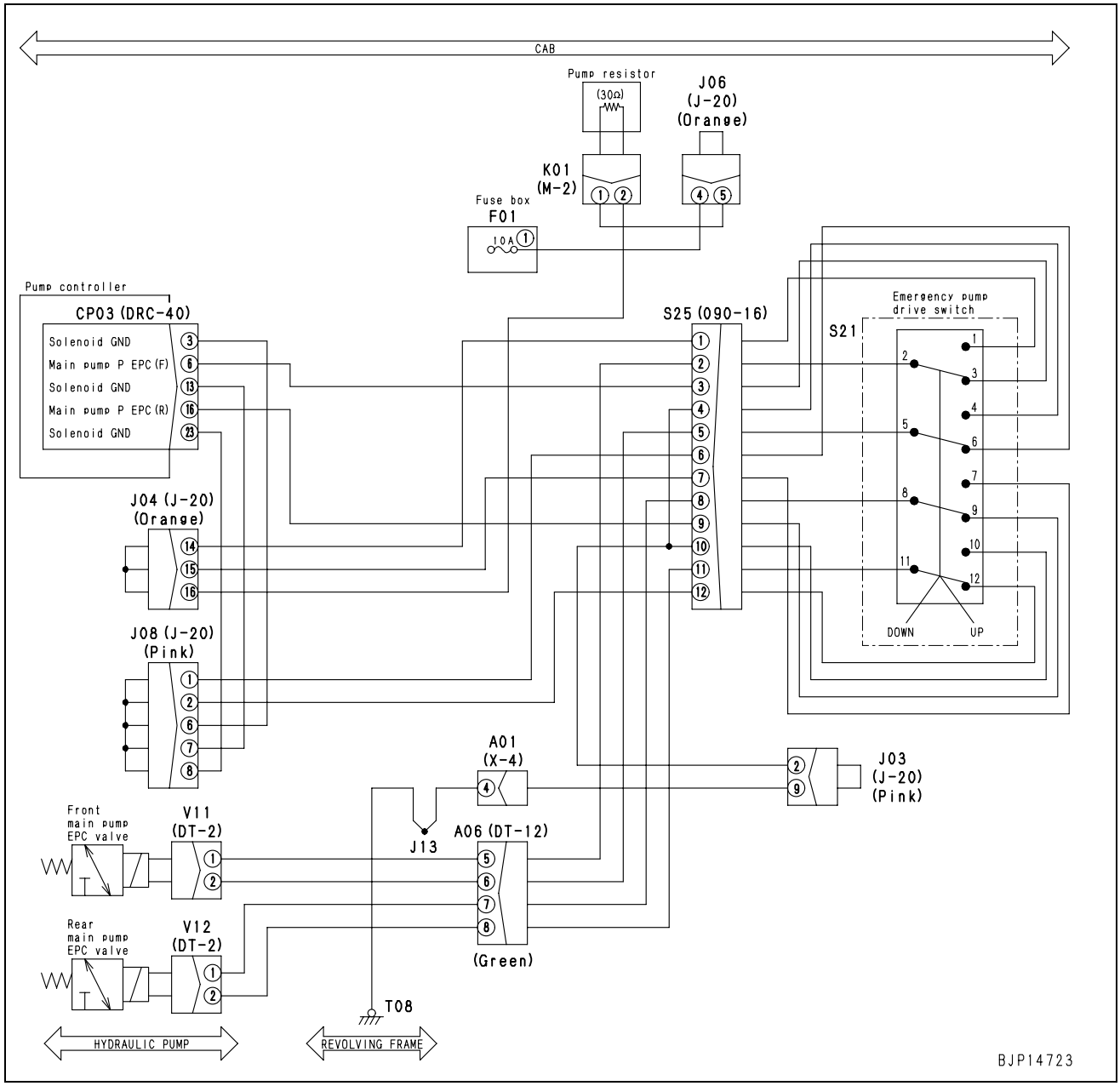


Failure code [DXABKA] R Pump EPC Sol. Disc.

Action code	Failure code	Trouble	R Pump EPC Sol. Disc. (Pump controller system)
E02	**DXABKA**		
Contents of trouble	• When main pump EPC (R) solenoid was energized, disconnection was detected in solenoid.		
Action of controller	• None in particular. (Since no current flows, solenoid does not operate.) • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• If pump load increases, engine speed lowers largely and engine may stall.		
Related information	• Current to energize main pump EPC (R) solenoid can be checked with monitoring function. (Code: 01302 Main pump EPC (R) solenoid current) • Method of reproducing failure code: Turn starting switch ON.		

<table>
<tr><td rowspan="15">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="4">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective main pump EPC (R) solenoid (Internal disconnection)</td><td colspan="4">★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">V12 (male)</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="2">Between (1) – (2)</td><td colspan="2">7 – 14 Ω</td></tr>
<tr><td rowspan="5">2</td><td rowspan="5">Defective emergency pump drive switch (Internal disconnection)</td><td colspan="4">★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>S25 (male)</td><td>Emergency pump drive swith</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (9) – (8)</td><td>Normal</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td>Emergency</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="2">Between (12) – (11)</td><td>Normal</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td>Emergency</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="5">3</td><td rowspan="5">Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)</td><td colspan="4">★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">Wiring harness between CP03 (female) (16) – S25 (female) (9)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between S25 (female) (8) – V12 (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between CP03 (female) (3), (13), (23) – J08 – S25 (female) (12)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between S25 (female) (11) – V12 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective pump controller</td><td colspan="4">★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">CP03 (female)</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="2">Between (16) – (3), (13), (23)</td><td colspan="2">7 – 14 Ω</td></tr>
</table>

Circuit diagram related to main pump EPC solenoid

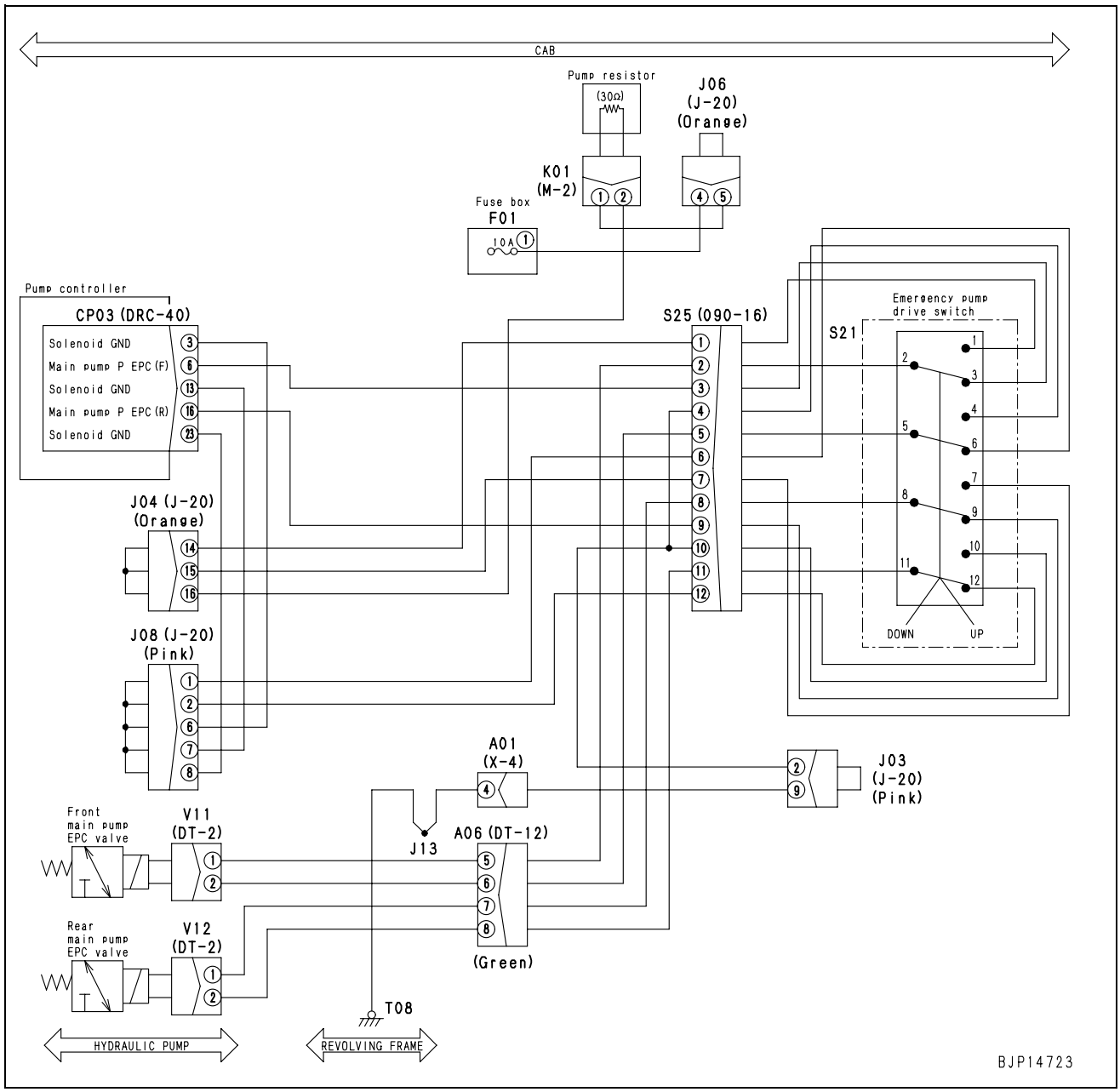


Failure code [DXABKB] R Pump EPC Sol. S/C

Action code	Failure code	Trouble	R Pump EPC Sol. S/C (Pump controller system)
E02	**DXABKB**		
Contents of trouble	• When main pump EPC (R) solenoid was energized, short circuit was detected in solenoid.		
Action of controller	• Turns signal to main pump (R) solenoid OFF. • Even if cause of failure disappers, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• If pump load increases, engine speed lowers largely and engine may stall.		
Related information	• Current to energize main pump EPC (R) solenoid can be checked with monitoring function. (Code: 01302 Main pump EPC (R) solenoid current) • Method of reproducing failure code: Turn starting switch ON.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective main pump EPC (R) solenoid (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V12 (male)		Resistance	
			Between (1) – (2)		7 – 14 Ω	
			Between (1) – chassis ground		Min 1. MΩ	
	2	Defective emergency pump drive switch (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			S25 (male)	Emergency pump drive swith	Resistance	
			Between (8), (9) – (10)	Normal	Min. 1 MΩ	
			Between (8), (9) – chassis ground		Min. 1 MΩ	
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CP03 (female) (16) – S25 (female) (9) – chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between S25 (female) (8) – V12 (female) (1) – chassis ground		Resistance	Min. 1 MΩ
	4	Defective pump controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)		Resistance	
			Between (16) – (3), (13), (23)		7 – 14 Ω	
			Between (16) – chassis ground		Min. 1 MΩ	

Circuit diagram related to main pump EPC solenoid

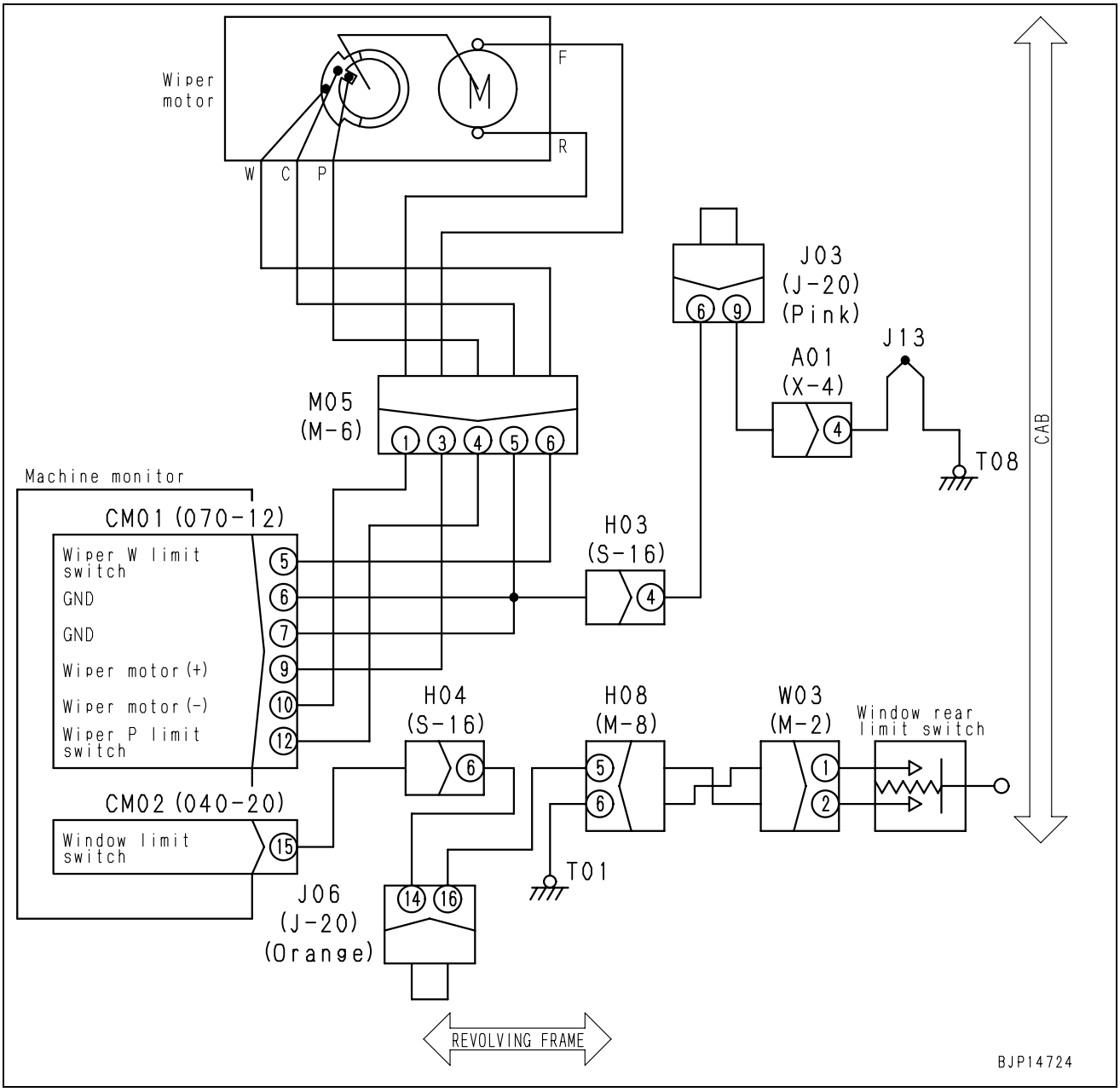


Failure code [DY20KA] Wiper Working Abnormality

Action code	Failure code	Trouble	Wiper Working Abnormality (Machine monitor system)
—	**DY20KA**		
Contents of trouble	• When windshield wiper works, W signal of working ends is not input.		
Action of monitor panel	• Turns working output to wiper motor OFF.		
Problem that appears on machine	• Windshield wiper motor does not operate.		
Related information	• Input of W signal in wiper working area (ON/OFF) can be checked with monitoring function. (Code 04502 Monitor Input 3)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective wiper motor (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M05 (female)	Wiper blade	Resistance	
			Between (6) – (5)	Upper operating limit	Max. 1 Ω	
				Other than upper operating limit	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM01 (female) (5) – M05 (male) (6)		Resistance	Max. 1 Ω
			Wiring harness between M05 (male) (5) – chassis ground		Resistance	Max. 1 Ω
	3	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CM01	Wiper blade	Voltage	
			Between (5) – chassis ground	Upper operating limit	Max. 1 V	
				Other than upper operating limit	20 – 30 V	

Circuit diagram related to wiper motor of machine monitor



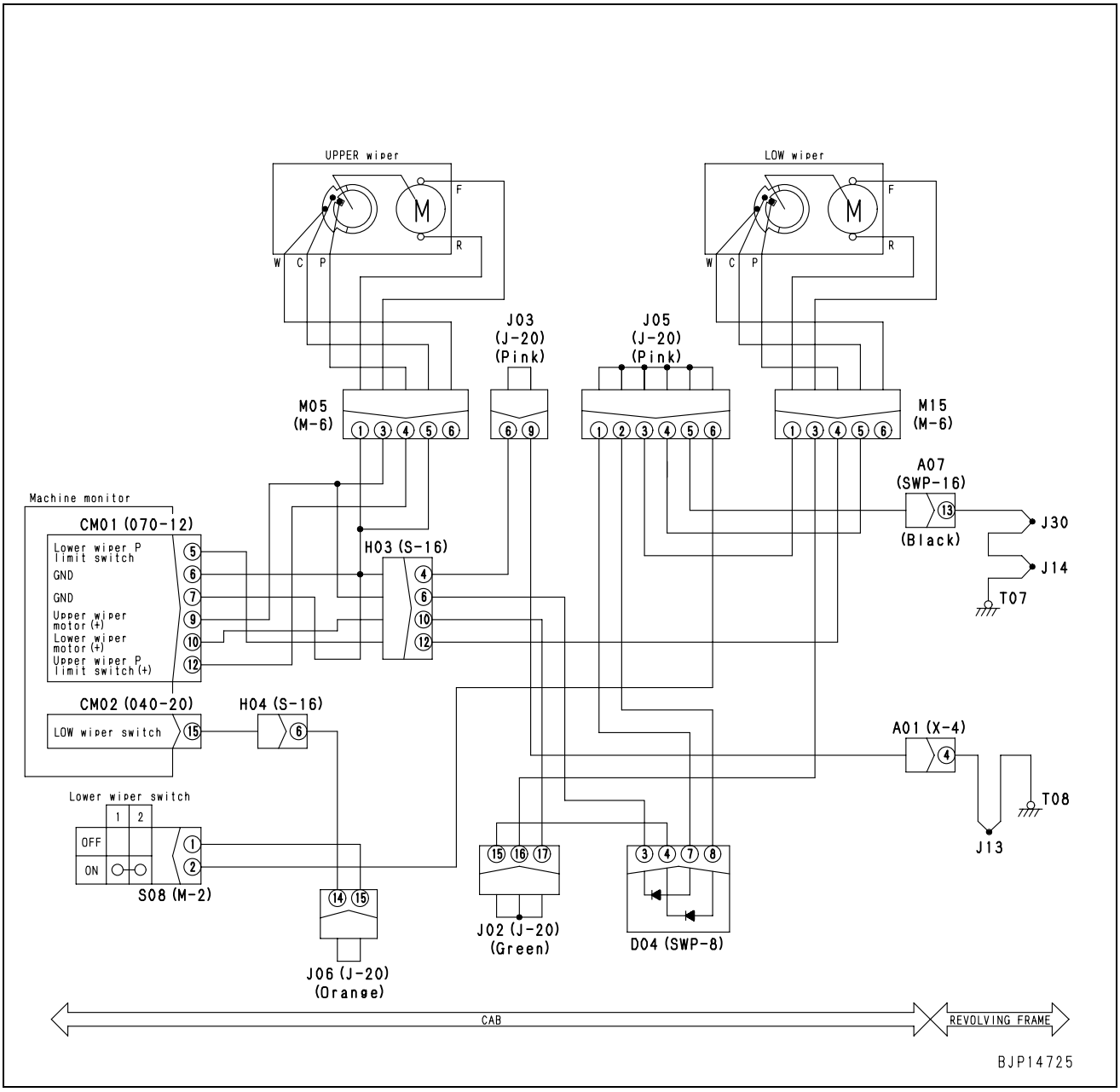
Failure code [DY20MA] Wiper Parking Abnormality

Double-wiper specification

Action code	Failure code	Trouble	Wiper Parking Abnormality (Machine monitor system)
—	**DY20MA**		
Contents of trouble	• When parking windshield wiper, P signal for storage area is not input.		
Action of monitor panel	• Turns parking output to wiper motor OFF.		
Problem that appears on machine	• Windshield wiper motor does not park.		
Related information	• Input of P signal for wiper parking area (ON/OFF) can be checked with monitoring function. (Code 04502 Monitor Input 3)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective upper windshield wiper motor (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M05 (female)	Wiper blade	Resistance	
			Between (4) – (5)	Storage area	Max. 1 Ω	
				Working area	Min. 1 MΩ	
	2	Defective lower windshield wiper motor (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M15 (female)	Wiper blade	Resistance	
			Between (4) – (5)	Storage area	Max. 1 Ω	
				Working area	Min. 1 MΩ	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM01 (female) (12) – M05 (male) (4)		Resistance	Max. 1 Ω
			Wiring harness between M05 (male) (5) – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between CM01 (female) (5) – M15 (male) (4)		Resistance	Max. 1 Ω
			Wiring harness between M15 (male) (5) – chassis ground		Resistance	Max. 1 Ω
	4	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CM01	Upper windshield wiper	Voltage	
			Between (12) – chassis ground	Storage area	Max. 1 V	
				Working area	20 – 30 V	
			CM01	Lower windshield wiper	Voltage	
			Between (5) – chassis ground	Storage area	Max. 1 V	
				Working area	20 – 30 V	

Circuit diagram related to wiper motor of machine monitor (Double-wiper specification)

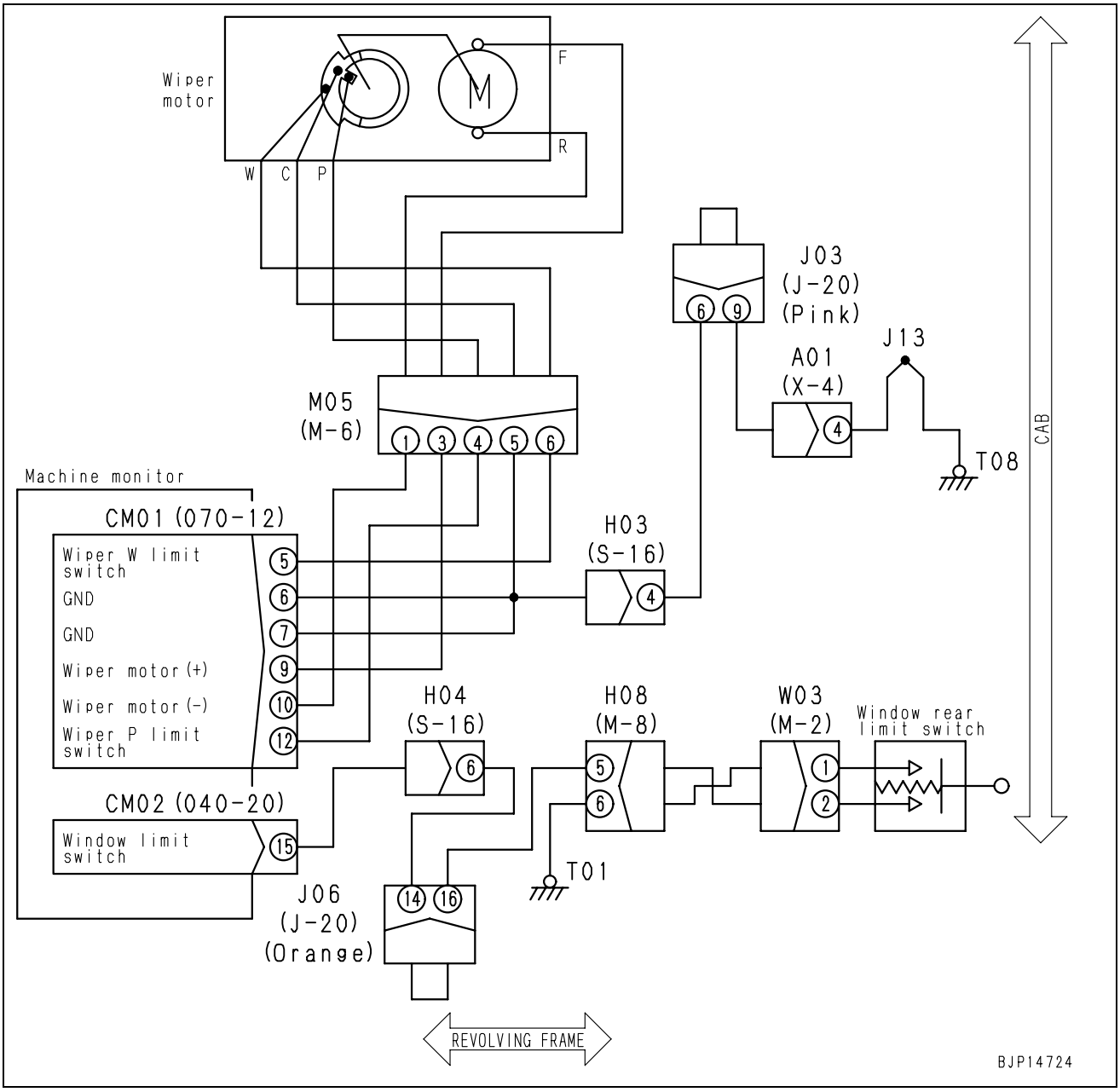


Single-wiper specification

Action code	Failure code	Trouble	Wiper Parking Abnormality (Machine monitor system)
—	**DY20MA**		
Contents of trouble	• When parking windshield wiper, P signal for storage area is not input.		
Action of monitor panel	• Turns parking output to wiper motor OFF.		
Problem that appears on machine	• Windshield wiper motor does not park.		
Related information	• Input of P signal for wiper parking area (ON/OFF) can be checked with monitoring function. (Code 04502 Monitor Input 3)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective wiper motor (Internal disconnection)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M05 (female)	Wiper blade	Resistance	
			Between (4) – (5)	Storage area	Max. 1 Ω	
				Working area	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM01 (female) (12) – M05 (male) (4)		Resistance	Max. 1 Ω
			Wiring harness between M05 (female) (5) – chassis ground		Resistance	Max. 1 Ω
	3	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CM01	Wiper blade	Voltage	
			Between (12) – chassis ground	Storage area	Max. 1 V	
				Working area	20 – 30 V	

Circuit diagram related to wiper motor of machine monitor (Single-wiper specification)

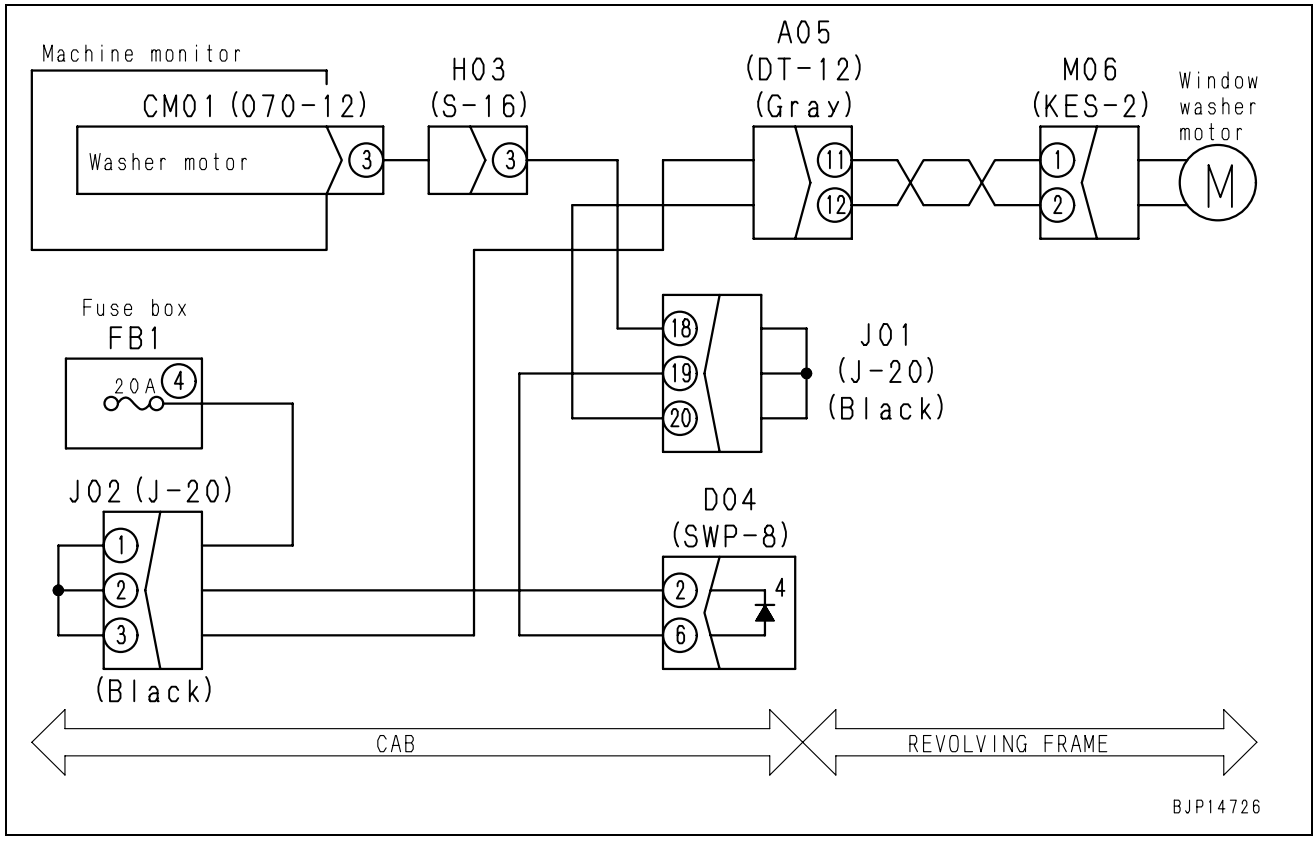


Failure code [DY2CKB] Washer Drive S/C

Action code	Failure code	Trouble	Washer Drive S/C (Machine monitor system)
—	**DY2CKB**		
Contents of trouble	• When washer drive circuit was connected to GND (when output was turned ON), abnormal current flowed.		
Action of monitor panel	• Turns output to washer motor circuit OFF.		
Problem that appears on machine	• Window washer operation stops.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective washer motor (Internal short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			M06 (male)	Resistance	
			Between (2) – (1)	5 – 20 Ω	
	2	Hot short (Short circuit with 24V circuit) in wiring harness	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harnesses between CM01 (female) (3) – M06 (female) (2), – D04(female) (6) and chassis ground	Voltage	Max. 1 V
	3	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CM01	Washer switch	Voltage
			Between (3) – chassis ground	OFF	20 – 30 V
				ON	Max. 1 V

Circuit diagram related to window washer motor of machine monitor



Failure code [DY2DKB] Wiper Drive (For) S/C

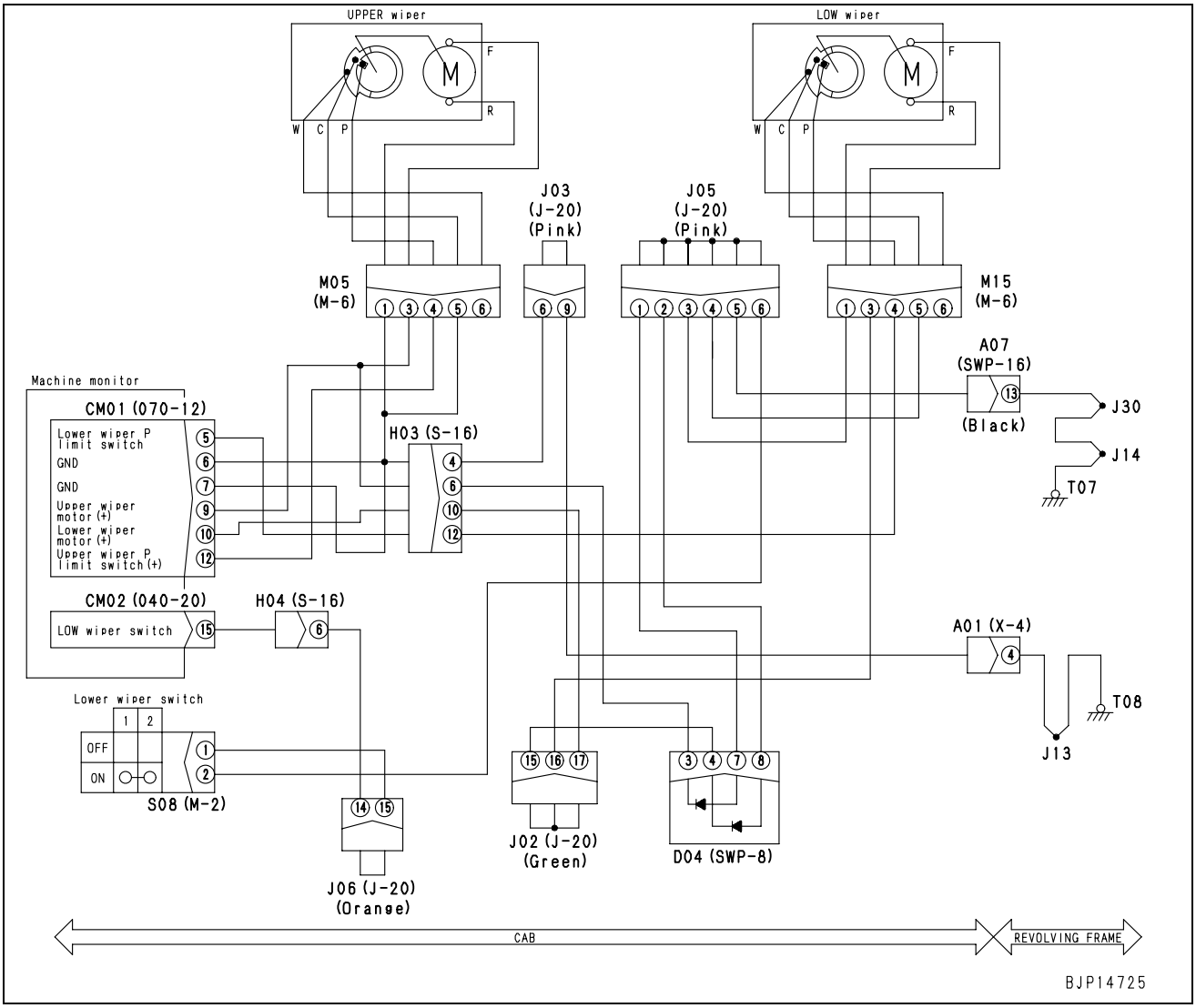
Double-wiper specification

Action code	Failure code	Trouble	Wiper Drive (For) S/C (Machine monitor system)
—	**DY2DKB**		
Contents of trouble	• Abnormal current flowed at output to wiper motor (for) circuit.		
Action of monitor panel	• Turns output to wiper motor (for) circuit OFF.		
Problem that appears on machine	• Wiper operation stops.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Upper wiper motor defective (Internal short-circuiting or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			M05 (female)	Continuity and resistance		
			Between (3) – (1)	Continued		
			Between (3) – chassis ground	Min. 1 MΩ		
	2	Lower wiper motor defective (Internal short-circuiting or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			M15 (female)	Continuity and resistance value		
			Between (3) – (1)	Continued		
			Between (3) – chassis ground	Min. 1 MΩ		
	3	Assembled-type diode D04 defective (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			D04 (male)	Resistance (Continuitiy)		
			Between (3) – (7)	Min. 1 MΩ (No continuitiy)		
			Between (4) – (8)	Min. 1 MΩ (No continuitiy)		
	4	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CM01 (female) (9) – M05 (male) (3) – D04 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
			Between wiring harness between CM01 (female) (10) – J02 – M15 (male) (3) – D04 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	5	Machine monitor defective (Upper wiper motor)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			P01	Upper wiper switch	Voltage	
			Between (9) – chassis ground	OFF	Max. 3 V	
				ON	20 – 30 V (Note)	
		Machine monitor defective (Lower wiper motor)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			P01	Lower wiper switch	Voltage	
			Between (10) – chassis ground	OFF	Max. 3 V	
				ON	20 – 30 V (Note)	

NOTE: When the upper wiper and lower wiper are operated simultaneously: Max. 3 V ⇔ 20 – 30 V (at regular intervals)

Circuit diagram related to wiper motor of machine monitor (Double-wiper specification)

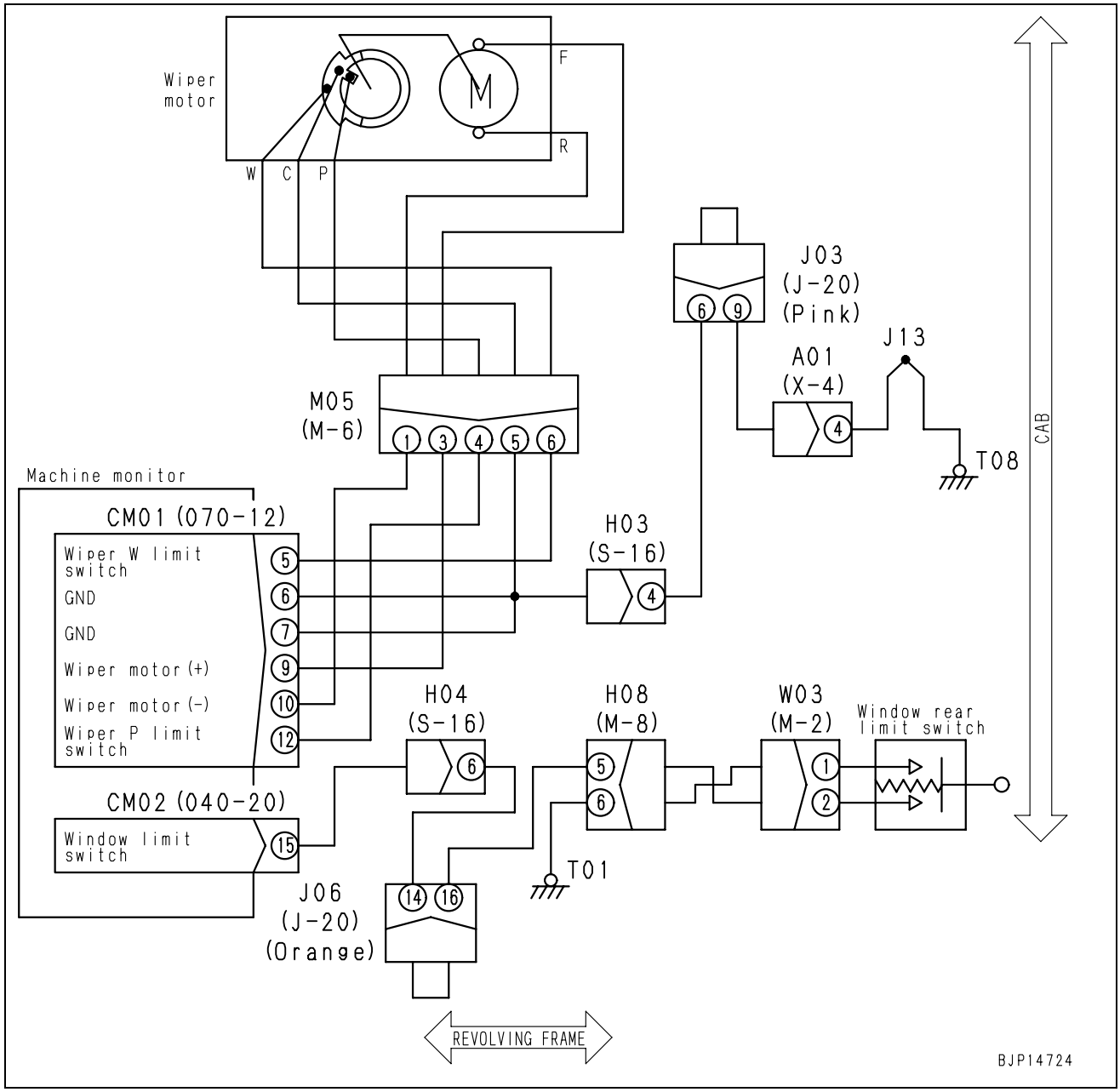


Single-wiper specification

Action code	Failure code	Trouble	Wiper Drive (For) S/C (Machine monitor system)
—	**DY2DKB**		
Contents of trouble	• Abnormal current flowed at output to wiper motor (for) circuit.		
Action of monitor panel	• Turns output to wiper motor (for) circuit OFF.		
Problem that appears on machine	• Wiper operation stops.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective wiper motor (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M05 (female)		Continuity/Resistance	
			Between (3) – (1)		There is continuity	
			Between (3) – chassis ground		Min. 1 MΩ	
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM01 (female) (9) – M05 (male) (3) and chassis ground		Resistance	Min. 1 MΩ
	3	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CM01	Wiper switch	Voltage	
			Between (9) – chassis ground	OFF	Max. 3 V	
				ON	Max. 3 V ⇔ 20 – 30 V (Constant cycle)	

Circuit diagram related to wiper motor of machine monitor (Single-wiper specification)



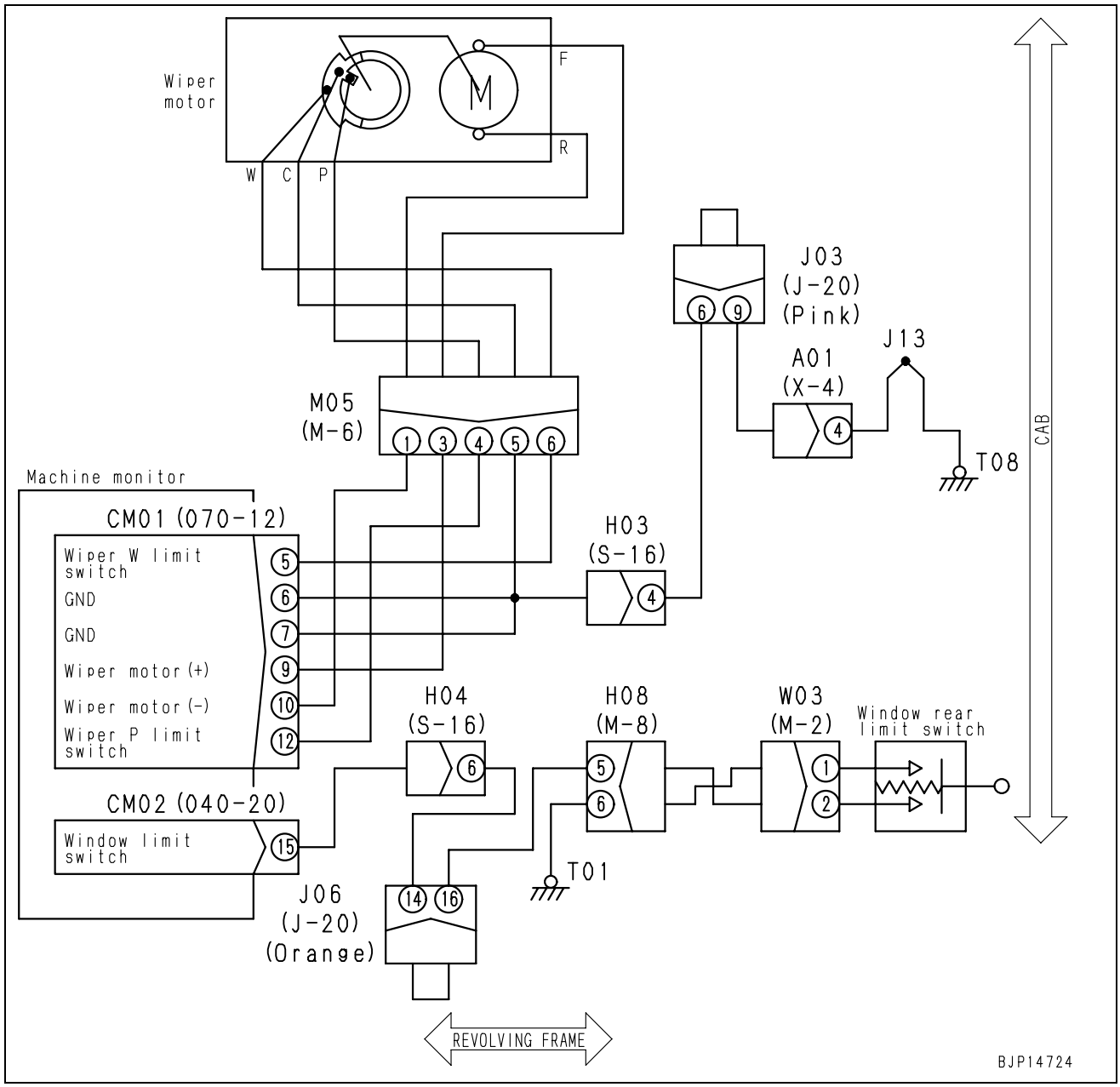
Failure code [DY2EKB] Wiper Drive (Rev) S/C

Single-wiper specification

Action code	Failure code	Trouble	Wiper Drive (Rev) S/C (Machine monitor system)
—	**DY2EKB**		
Contents of trouble	• Abnormal current flowed at output to wiper motor (rev.) circuit.		
Action of monitor panel	• Turns output to wiper motor (rev.) circuit OFF.		
Problem that appears on machine	• Wiper operation stops.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective wiper motor (Internal short circuit or ground fault)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M05 (female)		Continuity/Resistance	
			Between (1) – (3)		There is continuity	
			Between (1) – chassis ground		Min. 1 MΩ	
	2	Ground fault in wiring harness (Short circuit with GND circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between CM01 (female) (10) – M05 (male) (1) and chassis ground		Resistance	Min. 1 MΩ
	3	Defective machine monitor	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CM01	Wiper switch	Voltage	
			Between (10) – chassis ground	OFF	Max. 3 V	
				ON	Max. 3 V ⇔ 20 – 30 V (Constant cycle)	

Circuit diagram related to wiper motor of machine monitor (Single-wiper specification)



PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

40 Troubleshooting
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Troubleshooting of electrical system (E-mode)

Before carrying out troubleshooting of electrical system

Connection table of circuit breakers

★ This connection table shows the devices to which each power supply of the circuit breakers supplies power (A switch power supply is a device which supplies power while the starting switch is at the ON position and a constant power supply is a device which supplies power while the starting switch is at the OFF position).

★ When carrying out troubleshooting related to the electrical system, you should check the circuit breakers first to see if the power is supplied normally.

Type of power supply	Circuit breaker No.	Circuit breaker capacity	Destination of power
Switch power supply (Battery relay terminal M)	1	40 A	Fuse box (Fuses No. 1 – 15)
	2	20 A	Boom working lamp, right head lamp
	3	20 A	Grease pump
	4	20 A	Pump controller power source
	5	20 A	Head lamp on cab
Constant power supply (Battery relay terminal B)	6	20 A	Starting switch and engine controller (Power supply control)
	7	20 A	Engine controller power supply relay (Power supply drive)
	8	20 A	Machine monitor
	9	20 A	Fuse box (Fuses No. 16 – 19)

Connection table of fuse boxes

★ This connection table shows the devices to which each power supply of the fuse boxes supplies power (A switch power supply is a device which supplies power while the starting switch is at the ON position and a constant power supply is a device which supplies power while the starting switch is at the OFF position).

★ When carrying out troubleshooting for a displayed code, you should check the fuse boxes to see if the power is supplied normally.

Type of power supply	Fuse No.	Fuse capacity	Destination of power
Switch power supply (Circuit breaker 1)	1	10 A	EPC solenoid (for emergency pump drive)
			Swing holding brake solenoid (for swing brake release)
	2	10 A	Starting motor cut-out relay
			Machine push-up solenoid
			Boom shockless solenoid
	3	10 A	PPC lock solenoid
	4	20 A	Cigarette lighter
			Windshield washer motor
	5	10 A	Horn
			Flash light
Switch power supply (Circuit breaker 1)	6	10 A	Intake air heater relay
			KOMTRAX terminal
	7	10 A	Rotary lamp
	8	10 A	(Spare)
	9	10A	Radio
			Left-hand knob switch
	10	20 A	Machine monitor
			Buzzer
Switch power supply (Circuit breaker 1)	11	25 A	Air conditioner unit
	12	20 A	(Spare)
	13	20 A	(Spare)
	14	10 A	Service power supply (M32 connector)
	15	10 A	DC/DC converter (12 V power supply)
Constant power supply (Circuit breaker 9)	16	10 A	Radio
			Room lamp
	17	10 A	Step light
	18	10 A	(Spare)
	19	10 A	(Spare)
	20 (ACC circuit)	5 A (ACC signal)	Engine controller
			Pump controller
			KOMTRAX

Information contained in troubleshooting table

★ Troubleshooting Table and Related Circuit Diagram collectively carry the following information. Carry out troubleshooting work after fully grasping their contents.

Failure phenomenon	**Phenomenon occurring on machine**
Relative information	**Information on the failure occurred as well as the troubleshooting**

	Cause		Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	**Possible causes of trouble (Given numbers are reference numbers, which do not indicate priority)**	<Contents of description> • Standard value in normal state to judge possible causes • Remarks on judgment <Troubles in wiring harness> • Disconnection Connector is connected imperfectly or wiring harness is broken. • Ground fault Wiring harness which is not connected to chassis ground circuit is in contact with chassis ground circuit. • Hot short Wiring harness which is not connected to power source (24 V) cir-
	2		
	3		<Precautions for troubleshooting> (1) Method of indicating connector No. and handling of T-adapter Insert or connect T-adapter as explained below for troubleshooting, unless otherwise specified. • If connector No. has no marks of “male” and “female”, disconnect connector and insert T-adapters in both male side and female side. • If connector No. has marks of “male” and “female”, disconnect connector and connect T-adapter to only male side or female side. (2) Entry order of pin Nos. and handling of tester leads Connect positive (+) lead and negative (–) lead of tester as explained below for troubleshooting, unless otherwise specified. • Connect positive (+) lead to pin No. or wiring harness entered on front side. • Connect negative (–) lead to pin No. or harness entered on rear side.
	4		
	5		

Relative Electrical Circuit Diagram

This is part of the electrical circuit diagram which shows the portion where the failure occurred.
- **Connector No.: Indicates (Type – numbers of a pin) (color)**
- **Arrow : Roughly indicates the location in the machine where it is installed.**

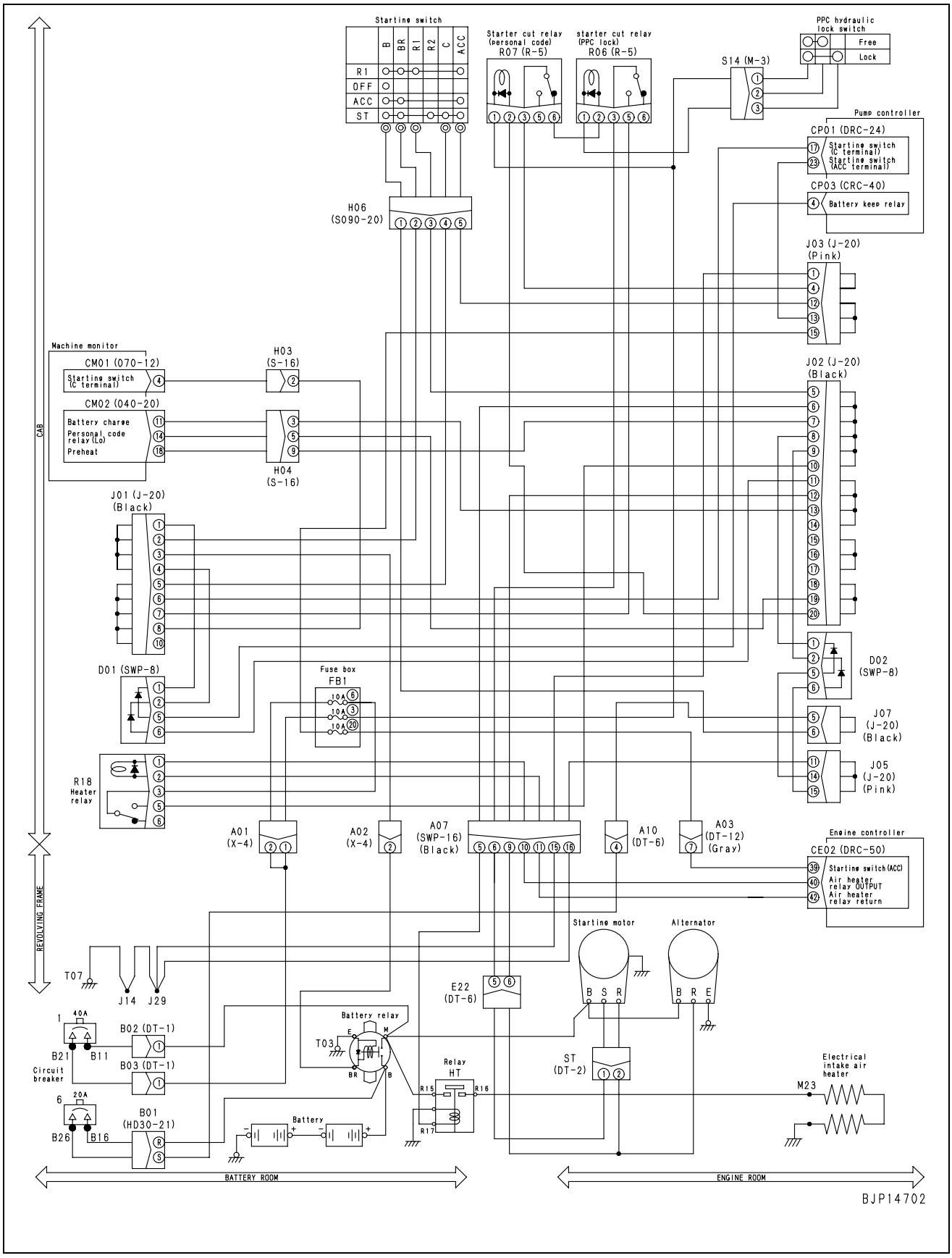
E-1 Engine does not start (Engine does not rotate)

Failure phenomenon	• The engine does not start. (Engine does not rotate)
Relative information	• The engine starting circuit is equipped with the start lock mechanism of lock lever type.

<table>
<tr><td rowspan="20">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Battery capacity insufficient</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Battery voltage</td><td colspan="2">Electrolyte specific gravity</td></tr>
<tr><td colspan="2">Min. 24 V</td><td colspan="2">Min. 1.26</td></tr>
<tr><td>2</td><td>Defective circuit breakers No. 1 or 6 or fuse 3 or 20</td><td colspan="4">If a circuit breaker is turned OFF or a fuse is broken, the circuit probably has grounding fault (See cause 9).</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Defective starting switch (Internal disconnection)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the ON position or start the engine during the troubleshooting.</td></tr>
<tr><td>H06 (male)</td><td>Starting switch</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (4)</td><td>OFF</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td>ON</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Defective lock switch (Internal short-circuiting)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td>S14 (female)</td><td>Lock lever</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (3)</td><td>FREE</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td>LOCK</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="5">5</td><td rowspan="5">Defective starting motor cut-out relay (Internal defect)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">R06 (male), R07 (male)</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="2">Between (1) – (2)</td><td colspan="2">100 – 500 Ω</td></tr>
<tr><td colspan="2">Between (3) – (5)</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td colspan="2">Between (3) – (6)</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="6">6</td><td rowspan="6">Defective starting motor (Internal defect)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations (with the wiring harness connected), and start the engine for troubleshooting.</td></tr>
<tr><td colspan="2">Starting motor</td><td colspan="2">Voltage</td></tr>
<tr><td>Between B – chassis ground</td><td>B (Power supply)</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Between ST (1) – chassis ground</td><td>S (Start)</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Between ST (2) – chassis ground</td><td>R (Charge)</td><td colspan="2">Max. 12 V</td></tr>
<tr><td colspan="4">If the above voltages are normal and the starting motor does not rotate, the starting motor has a defect in it or the engine is defective.</td></tr>
<tr><td rowspan="3">7</td><td rowspan="3">Defective alternator (Internal short-circuiting)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations (with only wiring harness R disconnected), and hold it in the ON position during the troubleshooting.</td></tr>
<tr><td colspan="2">Alternator</td><td colspan="2">Voltage</td></tr>
<tr><td colspan="2">Between terminal R – chassis ground</td><td colspan="2">Max. 12 V</td></tr>
</table>

	Cause		Standard value in normalcy and references for troubleshooting		
Presumed cause and standard value in normalcy	8	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between battery relay terminal B and B16	Resistance	Max. 1 Ω
			Wiring harness between B26 – J07 – H06 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between H06 (female) (4) – J01 – R06 (female) (5)	Resistance	Max. 1 Ω
			Wiring harness between R06 (female) (3) – ST (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between FB1-3 – S14 (male) (1)	Resistance	Max. 1 Ω
			Wiring harness between S14 (male) (3) – R06 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between R06 (female) (2) – R07 (female) (6)	Resistance	Max. 1 Ω
			Wiring harness between R07 (female) (3) – J03 – J29 – J14 – chassis ground	Resistance	Max. 1 Ω
	9	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between B26 – J07 – H06 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between H06 (female) (4) – J01 – R06 (female) (5) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between R06 (female) (3) – ST (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between FB1-3 – S14 (male) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between S14 (male) (3) – R06 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between R06 (female) (2) – R07 (female) (6) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between R07 (female) (2) – J02 – CM02 (female) (14) and chassis ground	Resistance	Min. 1 MΩ
	10	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			Wiring harness between ST (female) (2) – alternator terminal R or between ST (female) (2) – J02 – D02 (female) (2) or between ST (female) (2) – CM02 (female) (11) and chassis ground	Voltage	Max. 1 V

Circuit diagram related to engine preheat, start and battery charging

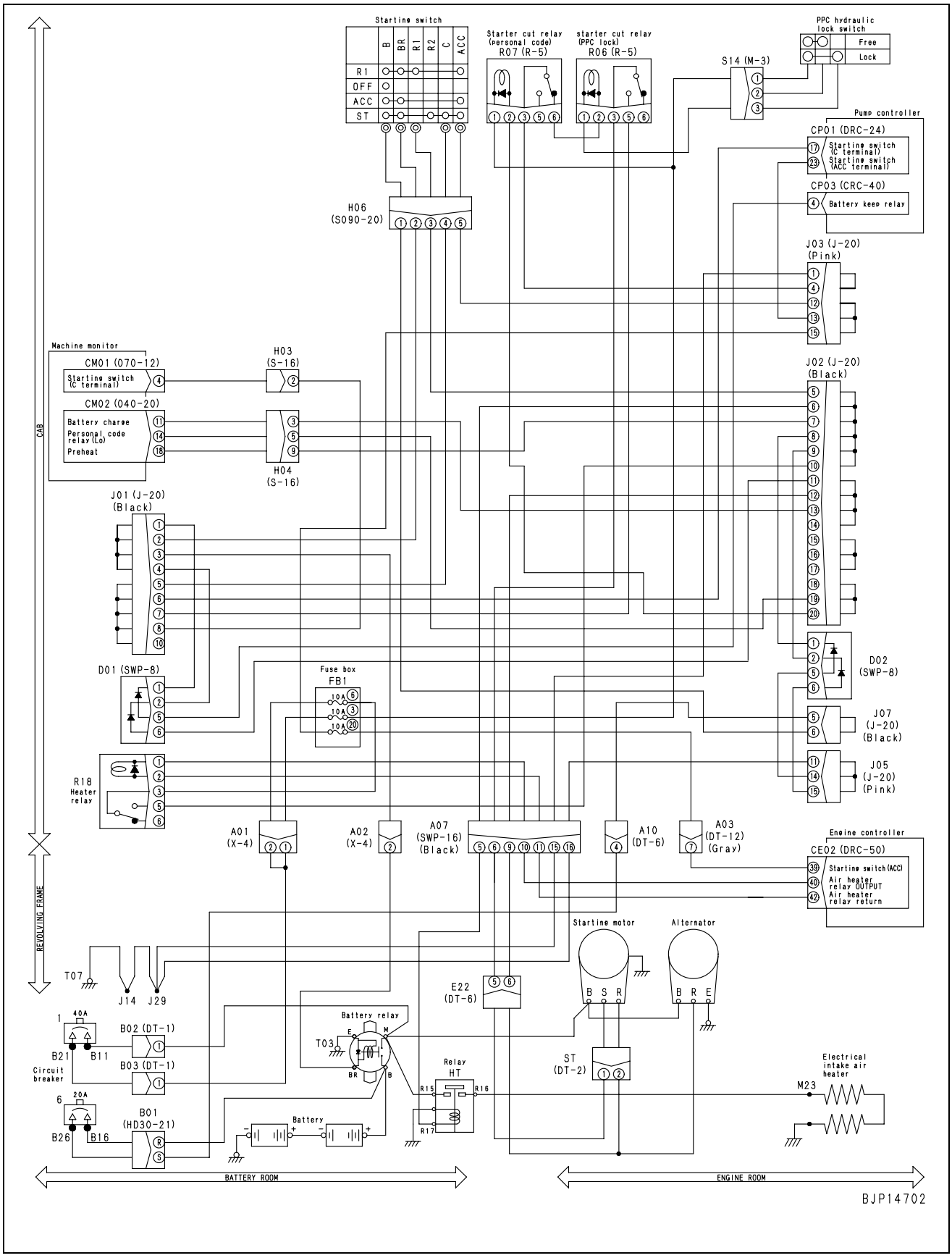


E-2 Preheater does not operate

Failure phenomenon	• Preheater does not operate	(1) When starting switch is turned ON, auto-preheater does not work.
Relative information	• When starting switch is turned ON, HEAT lamp on panel lights up for about 30 seconds and then starts blinking to notify completion of preheating. • Check that the starting motor rotates normally in advance.	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective circuit breaker No. 1 or fuse No. 6	If a circuit breaker is turned OFF or a fuse is broken, the circuit probably has grounding fault			
	2	Defective starting switch (Internal defect)	★Prepare with starting switch OFF, then hold starting switch OFF and ON and carry out troubleshooting in each case.			
			H06 (male)	Starting switch	Resistance	
			Between (1) – (5)	ON	Max. 1 Ω	
				OFF	Min. 1 MΩ	
	3	Defective auto-preheater relay	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			R18 (female)	Resistance		
			Between (1) – (2)	100 – 500 Ω		
			Between (3) – (5)	Min. 1 MΩ		
			Between (3) – (6)	Max. 1 Ω		
	4	Defective air heater relay	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			1) Between terminal R15 – chassis ground	Voltage	20 – 30 V	
			2) Between terminal R17 – chassis ground	Voltage	20 – 30 V	
			★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			3)Between heater relay ground terminal – chassis ground	Resistance	Max. 1 Ω	
			If check results of 1) – 3) above are normal, air heater relay is defective.			
	5	Defective air heater	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Air heater	Continuity		
			Between terminal (+) – terminal (–)	Continued		
	6	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between H06 (female) – J03 FB1 (20) – CE02 (female) (39)	Resistance	Max. 1 Ω	
			Wiring harness between CE02 (female) (40) R18 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between CE02 (female) (42) R18 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between B21 – FB1 (6) – R18 (female) (3)	Resistance	Max. 1 Ω	
			Wiring harness between R18 (female) (5) – J02 – air heater relay terminal R17	Resistance	Max. 1 Ω	

Circuit diagram related to engine preheat, start and battery charging



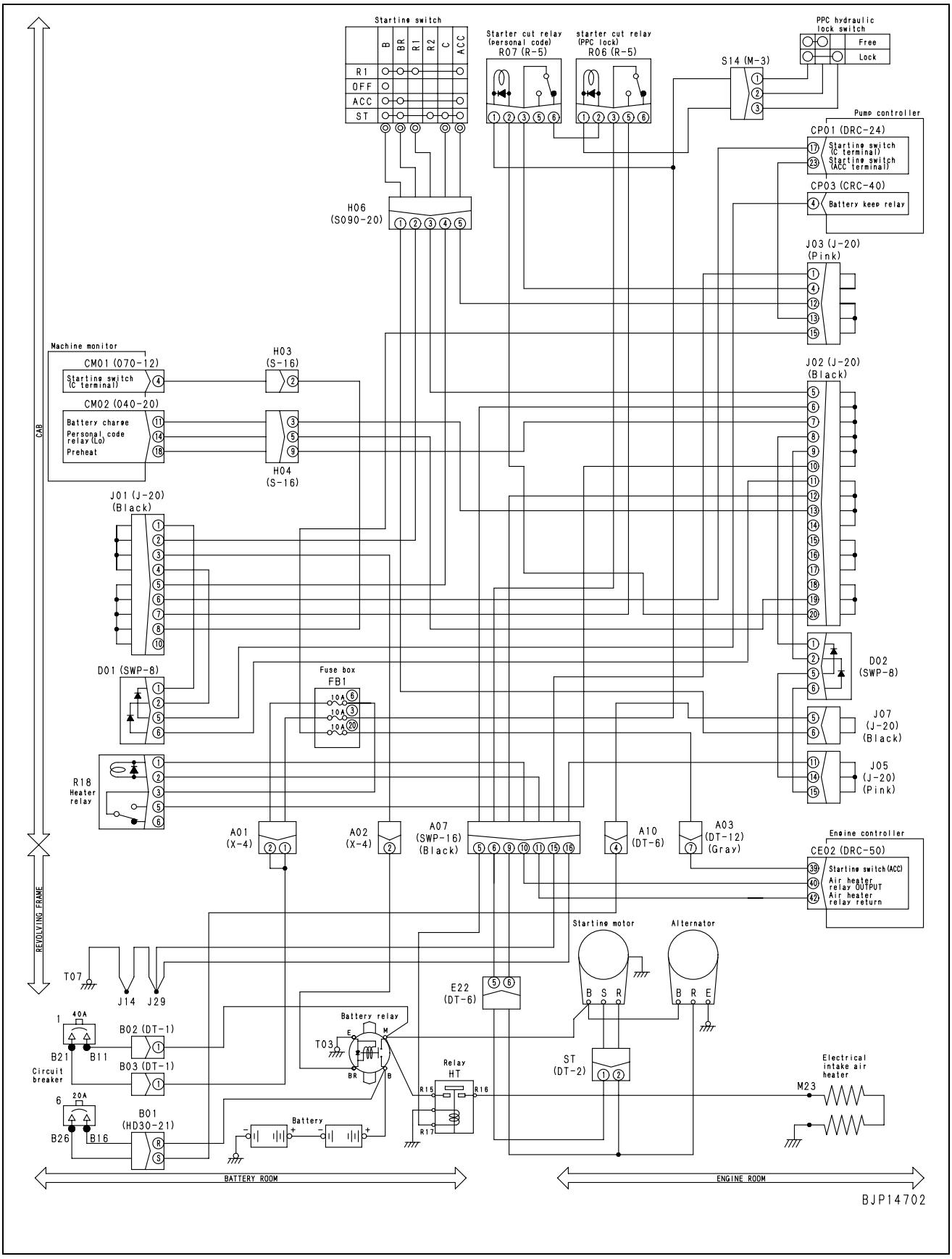
Failure phenomenon	• The preheater does not operate.	(2) When the starting switch is turned to the HEAT position, the preheating monitor does not light up.
Relative information	• The preheating monitor starts lighting when the starting switch is turned to the HEAT position. After about 30 seconds, it start flashing to notify that preheating is finished (It stops flashing in about 10 seconds). • Input of the preheating signal (ON or OFF) can be checked in the monitoring function. (Code No. 04500: Monitor input 1)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective starting switch system	If the preheater does not operate (the heater unit is not warmed), carry out troubleshooting (2).			
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM02 (female) (18) – J02 (female) (7)		Resistance	Max. 1 Ω
	3	Defective machine monitor	★Turn the engine starting switch OFF for the preparations , and hold it in the OFF or HEAT position during troubleshooting.			
			CM02	Starting switch	Voltage	
			Between (18) – chassis ground	OFF	Max. 1 V	
				HEAT	20 – 30 V	

Failure phenomenon	• The preheater does not operate.	(3) When the starting switch is turned to the HEAT position, the heater unit is not warmed.
Relative information	• Check that the starting motor rotates normally. (If the starting motor does not rotate, carry out troubleshooting in "Engine does not start".)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective starting switch (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF or HEAT position during troubleshooting.			
			H06 (male)	Starting switch	Resistance	
			Between (1) – (3)	OFF	Min. 1 MΩ	
				HEAT	Max. 1 Ω	
	2	Defective heater relay (Internal disconnection)	★Turn the engine starting switch OFF for the preparations (with the wiring harness connected), and hold it in the OFF or HEAT position during troubleshooting.			
			Heater relay	Starting switch	Continuity and resistance	
			Between coil terminal – chassis ground	OFF	Continued	
			Between contact terminals	HEAT	Max. 1 Ω	
	3	Defective intake air heater (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Intake air heater		Continuity	
			Between terminals		Continued	
	4	Disconnection of wiring harness (Disconnection or defective contact with connector)	Wiring harness between H06 (female) (3) – J02 – heater relay terminal R17		Resistance	Max. 1 Ω
			Wiring harness between starting motor terminal B – heater relay terminal R15		Resistance	Max. 1 Ω
			Wiring harness between heater relay terminal R16 – intake air heater		Resistance	Max. 1 Ω
			Wiring harness between intake air heater – engine		Resistance	Max. 1 Ω

Circuit diagram related to engine preheat, start and battery charging



E-3 Auto engine warm-up device does not work

Failure phenomenon	• The auto engine warm-up device does not work.
Relative information	• The auto engine warm-up device is activated, when the engine coolant temperature is below 30°C, and raise the engine rotation up to 1,200 rpm. • The auto engine warm-up device is released by keeping the fuel dial opening at above 70% for more than 3 seconds, when the engine starting switch is in the ON position or after the engine is started. • If the engine coolant temperature is below 10°C, the turbocharger protection function operates to keep the engine speed below 1,000 rpm for up to 5 seconds after the engine is started.

<table>
<tr><td rowspan="5">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="3">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Engine coolant temperature signal fault</td><td colspan="3">★ Turn the starting switch ON for the troubleshooting (monitoring).</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>04107</td><td>Engine coolant temperature (low temperature)</td><td>Compare the monitor indication with the actual engine coolant temperature.</td></tr>
<tr><td colspan="4">If the display on the monitor panel is abnormal, carry out troubleshooting in “Engine coolant thermometer does not display normally”.</td></tr>
<tr><td>2</td><td>Defective engine controller</td><td colspan="3">If cause 1 is not detected, the engine controller may be defective. (Since trouble is in the engine controller, troubleshooting cannot be carried out.)</td></tr>
</table>

E-4 Auto-decelerator does not operate

Failure phenomenon	• The auto-decelerator does not operate.
Relative information	• Since the auto-decelerator is set to 1,400 rpm, it does not operate if the fuel control dial is not set above this level. • Check the display on the monitor panel while the engine is running. • If the display on the monitor panel is abnormal, carry out troubleshooting in "*** is not displayed normally in monitoring function".

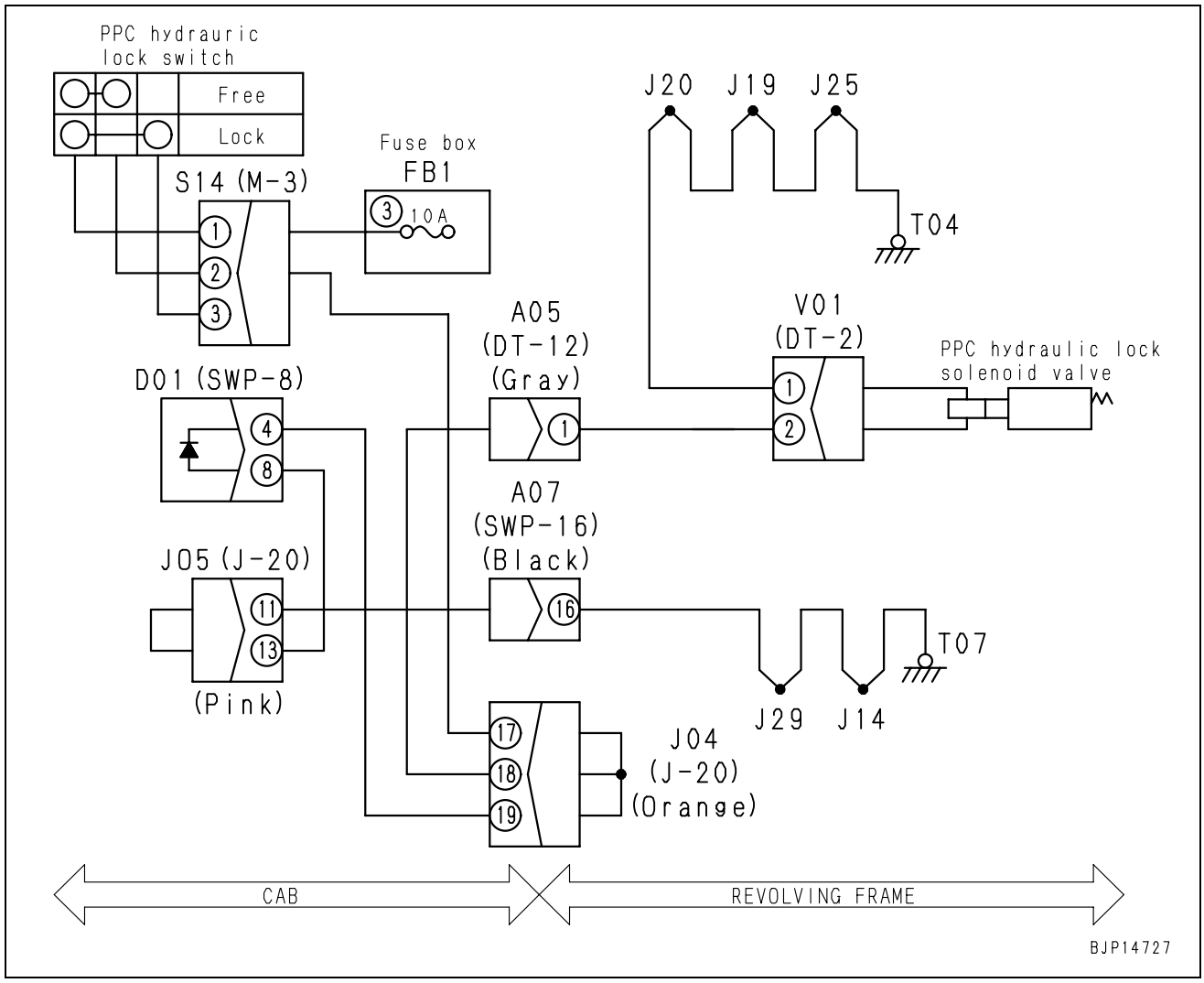
	Cause		Standard value in normalcy and references for troubleshooting		
Presumed cause and standard value in normalcy	1	Defective boom RAISE signal	Monitoring code	Item	Normal display
			01900 Pressure switch 1	Boom RAISE	Lever operated: ON Lever in neutral: OFF
	2	Defective boom LOWER signal	Monitoring code	Item	Normal display
			01900 Pressure switch 1	Boom LOWER	Lever operated: ON Lever in neutral: OFF
	3	Defective arm IN signal	Monitoring code	Item	Normal display
			01900 Pressure switch 1	Arm IN	Lever operated: ON Lever in neutral: OFF
	4	Defective arm OUT signal	Monitoring code	Item	Normal display
			01900 Pressure switch 1	Arm OUT	Lever operated: ON Lever in neutral: OFF
	5	Defective bucket CURL signal	Monitoring code	Item	Normal display
			01901 Pressure switch 2	Bucket CURL	Lever operated: ON Lever in neutral: OFF
	6	Defective bucket DUMP signal	Monitoring code	Item	Normal display
			01901 Pressure switch 2	Bucket DUMP	Lever operated: ON Lever in neutral: OFF
	7	Defective swing signal	Monitoring code	Item	Normal display
			01900 Pressure switch 1	Swing	Lever operated: ON Lever in neutral: OFF
	8	Defective left travel signal	Monitoring code	Item	Normal display
			01901 Pressure switch 2	Left travel	Lever operated: ON Lever in neutral: OFF
	9	Defective right travel signal	Monitoring code	Item	Normal display
			01900 Pressure switch 1	Right travel	Lever operated: ON Lever in neutral: OFF
	10	Defective service signal	Monitoring code	Item	Normal display
			01901 Pressure switch 2	Service	Lever operated: ON Lever in neutral: OFF
	11	Defective pump controller	If causes 1 – 10 are not detected, the pump controller may be defective. (Since trouble is in the pump controller, troubleshooting cannot be carried out.)		
	12	Defective engine controller	If causes 1 – 10 are not detected, the engine controller may be defective. (Since trouble is in the pump controller, troubleshooting cannot be carried out.)		

E-5 All work equipment, swing and travel do not move

Failure phenomenon	• All the work equipment, swing and travel do not move.
Relative information	

<table>
<tr><td rowspan="20">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td>1</td><td>Fuse No. 3 fault</td><td colspan="4">If the fuse is blown, there is a big possibility that grounding fault occurred in the circuit. (See Cause 6.)</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Defective lock switch (Internal disconnection)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td>S14 (female)</td><td>Lock lever</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (2)</td><td>Free</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td>Lock</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">PPC lock solenoid fault (Internal disconnection, short-circuiting, or grounding fault)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">V01 (male)</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="2">Between (2) – (1)</td><td colspan="2">20 – 60 Ω</td></tr>
<tr><td colspan="2">Between (2) – chassis ground</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Assembled-type diode D01 fault (Internal short-circuiting)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">D01 (male)</td><td colspan="2">Resistance (Continuitiy)</td></tr>
<tr><td colspan="2">Between (4) – (8)</td><td colspan="2">Min. 1 MΩ (No continuitiy)</td></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Disconnection of wiring harness (Disconnection or defective contact with connector)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between FB1-3 outlet – S14 (male) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness from S14 (male) (2) – J04 – V01 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between V01 (female) (1) – J20 – J19 – J25 – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Grounding fault of wiring harness (Contact with grounding (GND) circuit)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Between wiring harness between FB1-3 outlet – S14 (male) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Wiring harness from S14 (male) (2) – V01 (female) (2), or between wiring harness between S14 (male) (2) – D01 (female) (4) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
</table>

Circuit diagram related to PPC lock solenoid

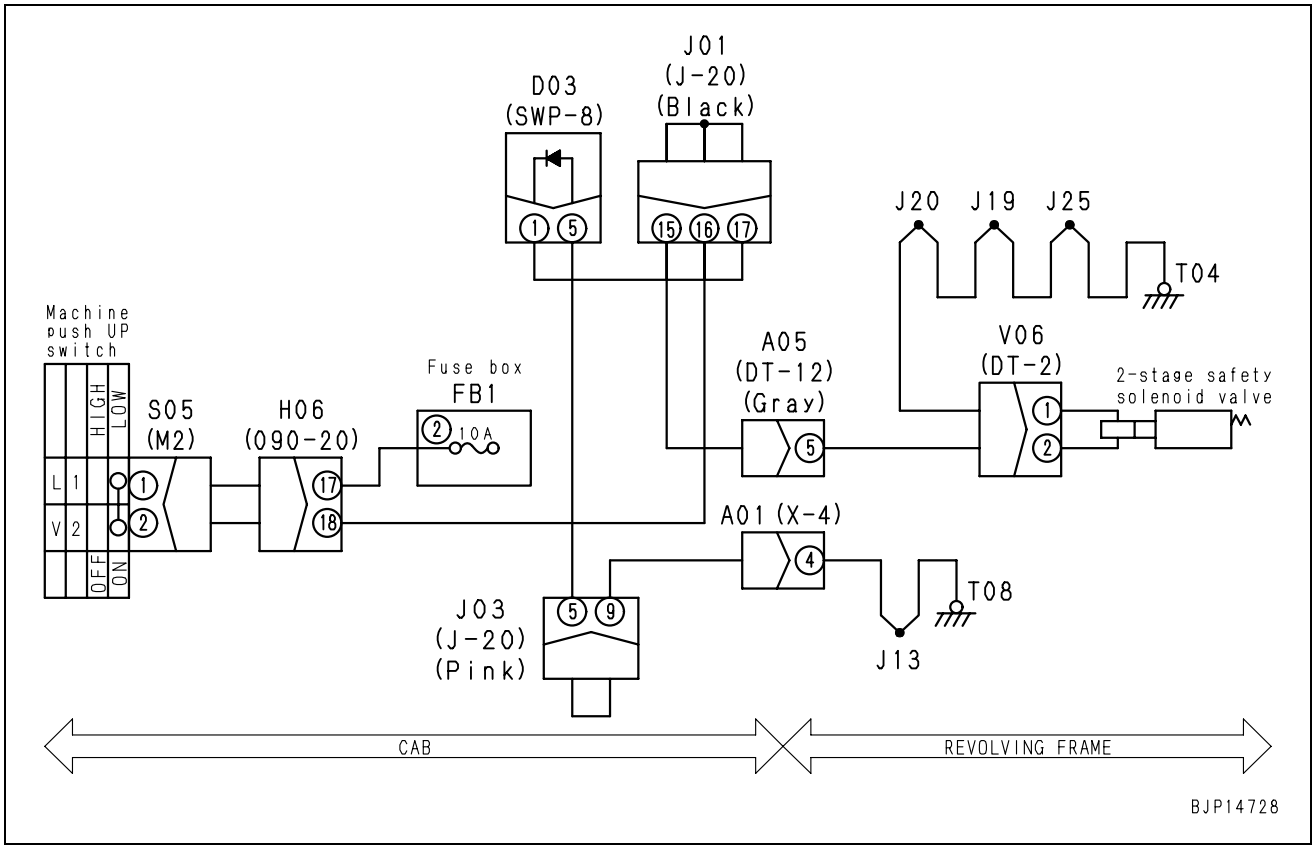


E-6 Machine push-up function does not operate normally

Failure phenomenon	• The machine push-up function does not operate normally.	(1) The machine push-up function does not operate.
Relative information	• When the machine push-up function is set in the high pressure position, the solenoid is turned OFF.	

<table>
<tr><td rowspan="6">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective machine push-up switch
(Internal short-circuiting)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td>S05 (female)</td><td>Machine push-up switch</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (1) – (2)</td><td>Low pressure position</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Short-circuiting of wiring harness
(Contact with 24 V circuit)</td><td colspan="2">High pressure position</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during troubleshooting.</td></tr>
<tr><td colspan="2">Wring harness between S05 (female) (2) – J01 – V06 (female) (2) or between S05 (female) (2) – D03 (female) (1) and chassis ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
</table>

Circuit diagram related to machine push-up solenoid



Failure phenomenon	• The machine push-up function does not operate normally.	(2) The machine push-up function is not turned OFF.
Relative information	• When the machine push-up function is set in the low pressure position, the solenoid is turned ON.	

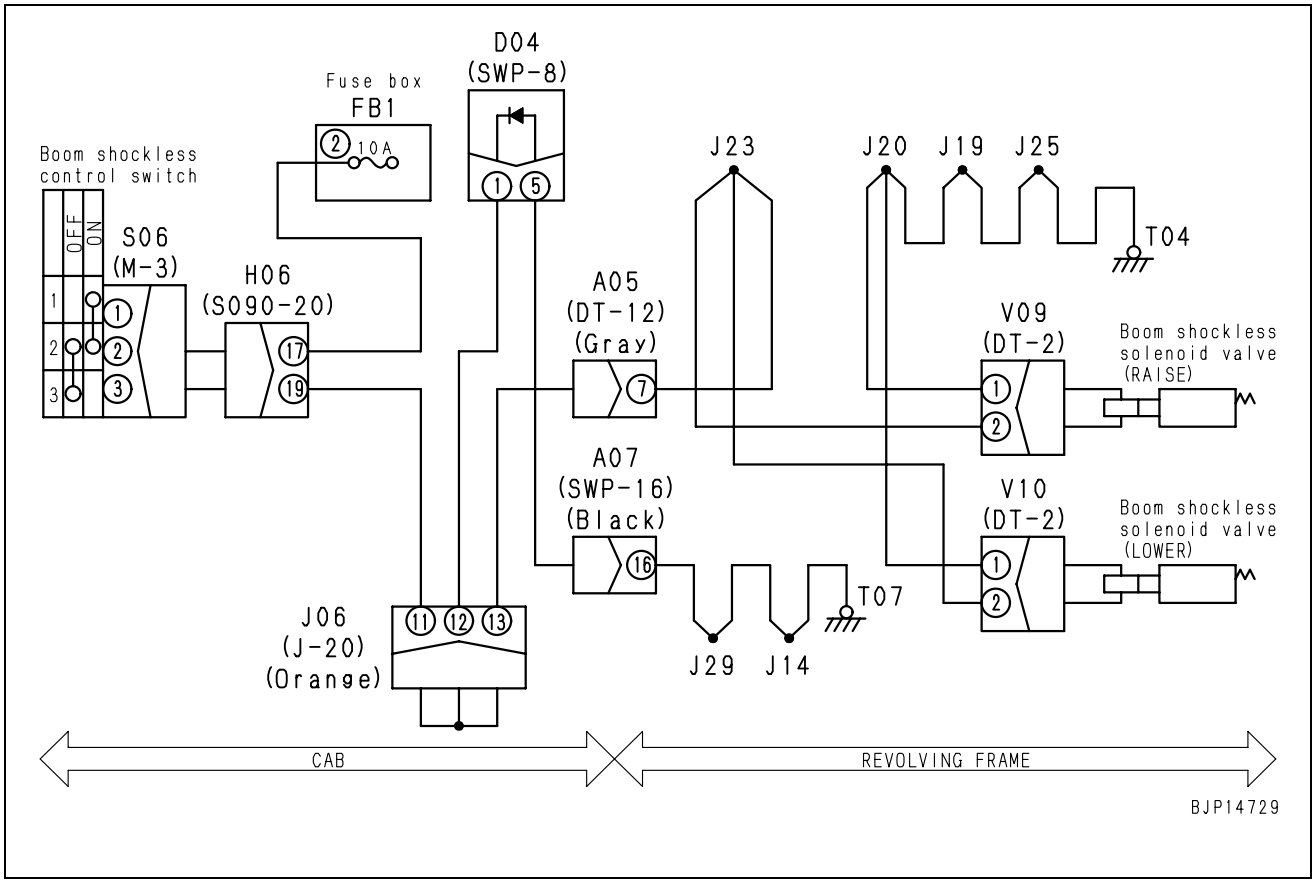
	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective fuse No. 2	If the fuse is broken, the circuit probably has grounding fault (See cause 6).			
	2	Defective machine push-up switch (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S05 (female)	Machine push-up switch	Resistance	
			Between (1) – (2)	Low pressure position	Max. 1 Ω	
				High pressure position	Min. 1 MΩ	
	3	Defective machine push-up solenoid (Internal disconnection, short-circuiting or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			V06 (male)	Resistance		
			Between (2) – (1)	20 – 60 Ω		
			Between (1) – chassis ground	Min. 1 MΩ		
	4	Defective assembled-type diode D03 (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during troubleshooting.			
			D03 (male)	Resistance (Continuitiy)		
			Between (1) – (5)	Min. 1 MΩ (No continuitiy)		
	5	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between FB1-2 outlet – S05 (male) (1)	Resistance	Max. 1 Ω	
			Wiring harness between S05 (male) (2) – J01 – V06 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between V06 (female) (1) – J20 – J19 – J25 – chassis ground	Resistance	Max. 1 Ω	
	6	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between FB1-2 outlet – S05 (male) (1) or between FB1-2 outlet – related circuits and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between S05 (male) (2) – J01 – V06 (female) (2) or between S05 (male) (2) – D03 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	

E-7 Boom shockless function does not operate normally

Failure phenomenon	• The boom shockless function does not operate normally.	(1) The boom shockless function does not operate.
Relative information	• When the boom shockless function is turned ON, the solenoid is turned OFF.	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	1	Defective boom shockless control switch (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S06 (female)	Boom shockless control switch	Resistance	
			Between (2) – (3)	OFF	Max. 1 Ω	
				ON	Min. 1 MΩ	
	2	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between S06 (male) (3) – J06 – J23 – V09 (female) (2) – V10 (female) (2) – D04 (female) (1) and chassis ground		Voltage	Max. 1 V

Circuit diagram related to boom shockless solenoid



Failure phenomenon	• The boom shockless function does not operate normally.	(2) The boom shockless function is not turned OFF.
Relative information	• When the boom shockless function is turned OFF, the solenoid is turned ON.	

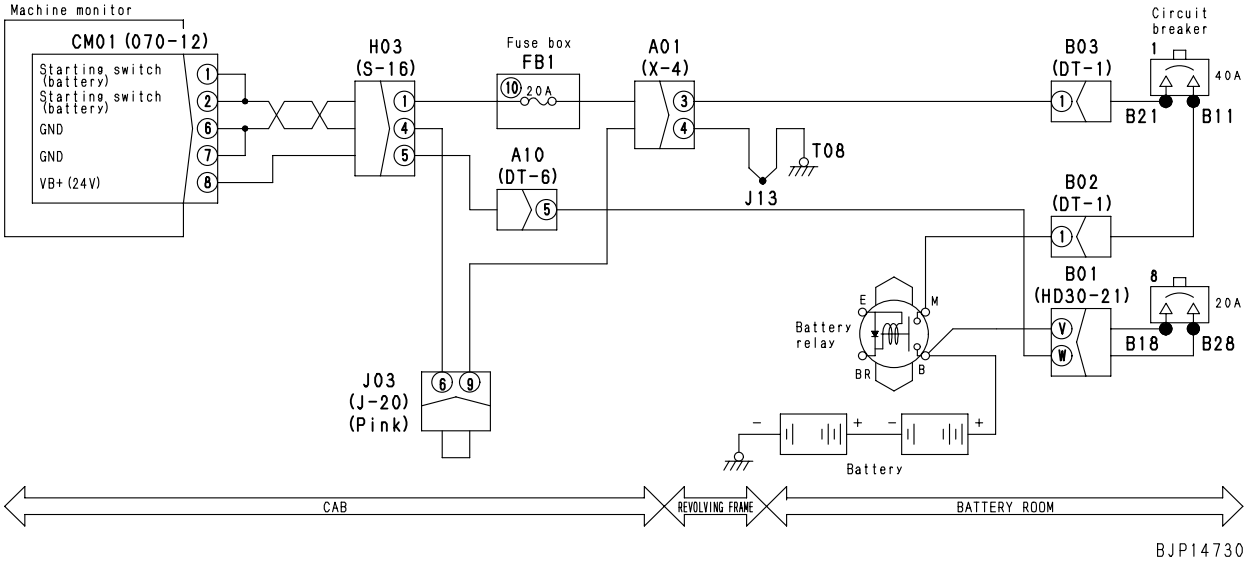
	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective fuse No. 2	If the fuse is broken, the circuit probably has grounding fault (See cause 6).			
	2	Defective boom shockless control switch (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S06 (female)	Boom shockless control switch	Resistance	
			Between (2) – (3)	OFF	Max. 1 Ω	
				ON	Min. 1 MΩ	
	3	Defective boom shockless solenoid (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			V09 (male), V10 (male)	Resistance		
			Between (2) – (1)	20 – 60 Ω		
			Between (1) – chassis ground	Min. 1 MΩ		
	4	Defective assembled-type diode D04 (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			D04 (male)	Resistance (Continuitiy)		
			Between (1) – (5)	Min. 1 MΩ (No continuitiy)		
	5	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between FB1-2 outlet – S06 (male) (2)	Resistance	Max. 1 Ω	
			Wiring harness between S06 (male) (3) – V09 (female) (2) or between S06 (male) (3) – V10 (female) (2).	Resistance	Max. 1 Ω	
			Wiring harness between V09 (female) (1), V10 (female) (1) – J20 – J19 – J25 – chassis ground	Resistance	Max. 1 Ω	
	6	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between FB1-2 outlet – S06 (female) (2) or between FB1-2 outlet – related circuits and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between S06 (male) (3) – V09 (female) (2) and V10 (female) (2) or between S06 (male) (3) – D04 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	

E-8 Any item is not displayed on machine monitor

Failure phenomenon	• Any item is not displayed on machine monitor.	When the starting switch is turned ON, any item is not displayed on machine monitor.
Relative information		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	1	Defective circuit breaker No. 1 or fuse No. 10	If the circuit breaker is turned OFF or the fuse is broken, the circuit probably has grounding fault (See cause 3).			
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM01 (female) (1), (2) – FB1-10 outlet		Resistance	Max. 1 Ω
			Wiring harness between FB1 inlet – B21		Resistance	Max. 1 Ω
			Wiring harness between B11 – battery relay terminal M		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM01 (female) (1), (2) – FB1-10 outlet and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between FB1 inlet – B21 and chassis ground		Resistance	Min. 1 MΩ
	4	Defective machine monitor	★Turn the engine starting switch OFF for the preparations, and hold it in the ON or OFF position during troubleshooting.			
			CM01 (female)	Starting switch	Voltage, Resistance	
			Between (1), (2) – chassis ground	ON	Voltage: 20 – 30 V	
			Between (6), (7) – chassis ground	OFF	Resistance: Max. 1 Ω	

Circuit diagram related to monitor panel power supply



E-9 Part of display on machine monitor is missing

Failure phenomenon	• Part of display on machine monitor is missing	Part of display on machine monitor is missing during starting switch in ON.
Relative information	—	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Machine monitor LCD fault	★Turn the starting switch ON during the troubleshooting.
			If all the LCD (Liquid Crystal Display) in the machine monitor light up (i.e. the screen becomes totally white) by the following switching operation, then the machine monitor is normal. • Switching operation: [↶] + [A] (push swiches simultaneously.)
	2	Defective machine monitor	If cause 1 is not detected, the machine monitor may be defective. (Since trouble is in the machine monitor, troubleshooting cannot be carried out.)

E-10 Machine monitor displays contents irrelevant to the model

Failure information	• Machine monitor displays contents irrelevant to the model.
Relative information	—

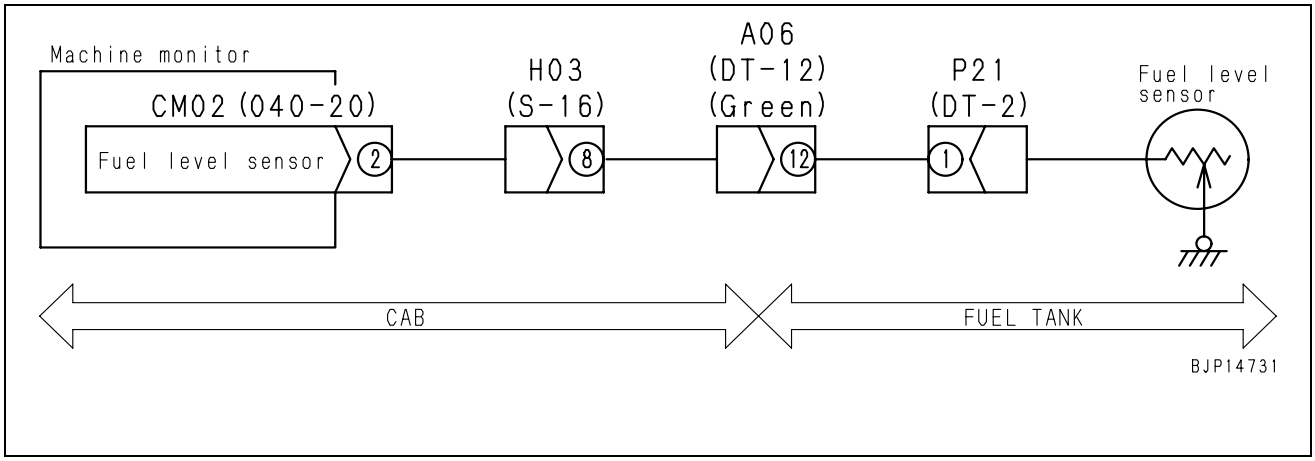
Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting		
	1	Model code signal fault (Internal failure)	★Turn the starting switch in ON during the troubleshooting (monitoring).		
			Monitoring code	Item	Normal display
			00200	Controller model code	PC800
			If the display on the machine monitor is normal, troubleshoot failure code [DA25KQ].		
	2	Defective machine monitor	If cause 1 is not detected, the machine monitor may be defective. (Since trouble is in the machine monitor, troubleshooting cannot be carried out.)		

E-11 Fuel level monitor red lamp lights up while engine is running

Failure phenomenon	• Fuel level monitor red lamp lights up while the engine is running.
Relative information	• If the fuel gauge shows in a red range on the machine monitor, the fuel level monitor lamp lights up red.

<table>
<tr><td rowspan="11">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td>1</td><td>Fuel level lowered (system in normal condition)</td><td colspan="4">Check the fuel level in the fuel tank. If it is low, add fuel.</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Fuel level sensor fault (Internal disconnection)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td>P21 (male)</td><td>Fuel level</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (1) – chassis ground</td><td>FULL (Upper limit)</td><td colspan="2">Approx. 12 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Disconnection of wiring harness (Disconnection or defective contact with connector)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between CM02 (female) (2) – P21 (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Defective machine monitor</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td>CM02 (female)</td><td>Fuel level</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (2) – chassis ground</td><td>FULL (Upper limit)</td><td colspan="2">Approx. 12 Ω</td></tr>
<tr><td>EMPTY (Lower limit)</td><td colspan="2">85 – 110 Ω</td></tr>
</table>

Circuit diagram related to fuel level sensor

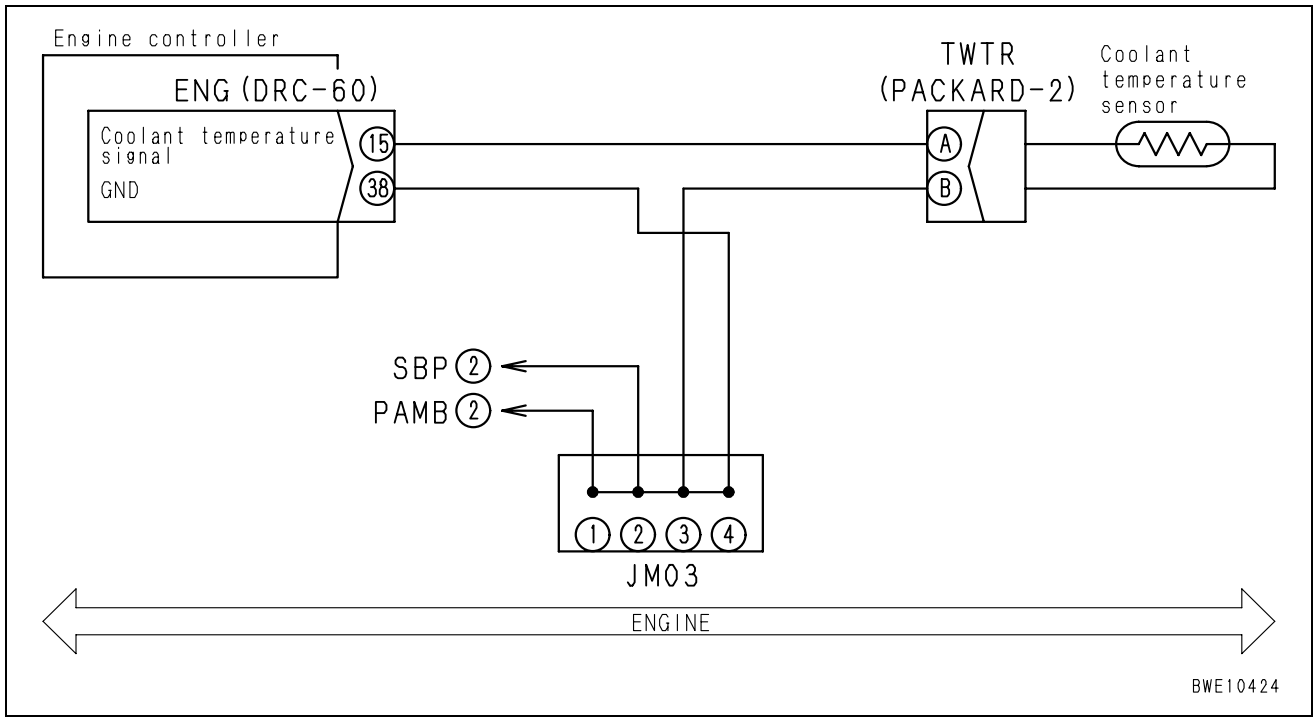


E-12 Engine coolant thermometer does not display normally

Failure phenomenon	• Engine coolant thermometer does not display normally	(1) While the engine coolant temperature rises normally, the thermometer does not rise above the white range (C). (2) While the engine coolant temperature is stabilized normally, the thermometer rises up to the red range (H).
Relative information	• The signal of the engine coolant temperature sensor for the coolant thermometer is received from the engine controller through the communication line. • If the engine coolant temperature sensor system becomes defective, failure code [CA144] [CA145] may be displayed. • Input from the engine coolant temperature sensor (voltage and temperature) can be checked in the monitoring function. (Code No. 04105: Engine coolant sensor voltage, 04107: Engine coolant temperature)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective engine coolant temperature sensor (Internal disconnection, short-circuiting or grounding fault)	★Turn the engine starting switch OFF for the preparations, and turn to ON or keep the engine running during the troubleshooting.			
			TWTR (male)	Resistance		
			Between (A) – (B)	3.5 k – 90 kΩ		
			Between (1), (2) – chassis ground	Min. 1 MΩ		
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between ENG (female) (15) – TWTR (female) (A)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (38) – JM03 – TWTR (female) (B)	Resistance	Max. 1 Ω	
	3	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between ENG (female) (15) – TWTR (female) (A) and chassis ground	Resistance	Min. 1 MΩ	
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between ENG (female) (15) – TWTR (female) (A) and chassis ground	Voltage	Max. 1 V	
	5	Defective engine controller	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			ENG (female)	Resistance		
			Between (15) – (38)	3.5 k – 90 kΩ		
			Between (15), (38) – chassis ground	Min. 1 MΩ		
	6	Defective machine monitor	If causes 1 – 5 are not detected, the machine monitor may be defective. (Since trouble is in the machine monitor, troubleshooting cannot be carried out.)			

Circuit diagram related to engine coolant temperature sensor

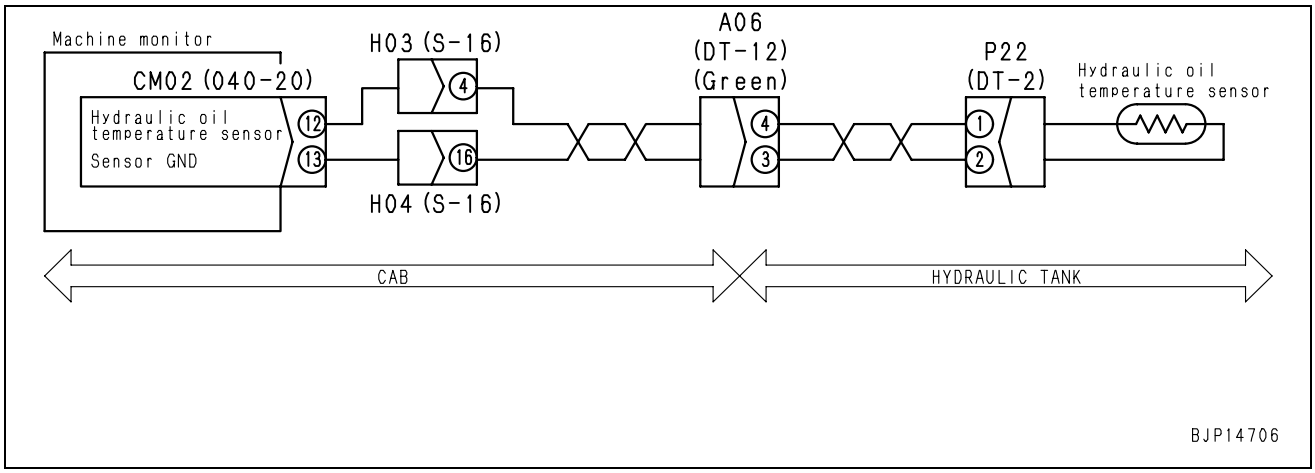


E-13 Hydraulic oil temperature gauge does not display correctly

Failure phenomenon	• Hydraulic oil temperature gauge does not display correctly	(1) Hydraulic oil temperature rises normally, but the display does not exceed the white range (C). (2) Hydraulic oil temperature remains stable, but the display rises up the red range (H).
Relative information	• Input from the hydraulic oil temperature sensor can be confirmed in the monitor function. (Code No. 04401: Hydraulic oil temperature, 04402: Hydraulic oil temperature sensor voltage)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Hydraulic oil temperature sensor fault (Internal disconnection, short-circuiting or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			P22 (male)	Hydraulic oil temperature	Resistance	
			Between (1) – (2)	10 – 100°C	90 – 3.5 kΩ	
			Between (1) – chassis ground		Min. 1 MΩ	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM02 (female) (12) – P22 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between CM02 (female) (13) – P22 (female) (2)		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM02 (female) (12) – P22 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CM02 (female) (12) – P22 (female) (1) and chassis ground		Voltage	Max. 1 V
	5	Defective machine monitor	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CM02 (female)	Hydraulic oil temperature	Resistance	
			Between (12) – (13)	10 – 100°C	90 – 3.5 kΩ	
			Between (12) – chassis ground		Min. 1 MΩ	

Circuit diagram related to hydraulic oil temperature sensor

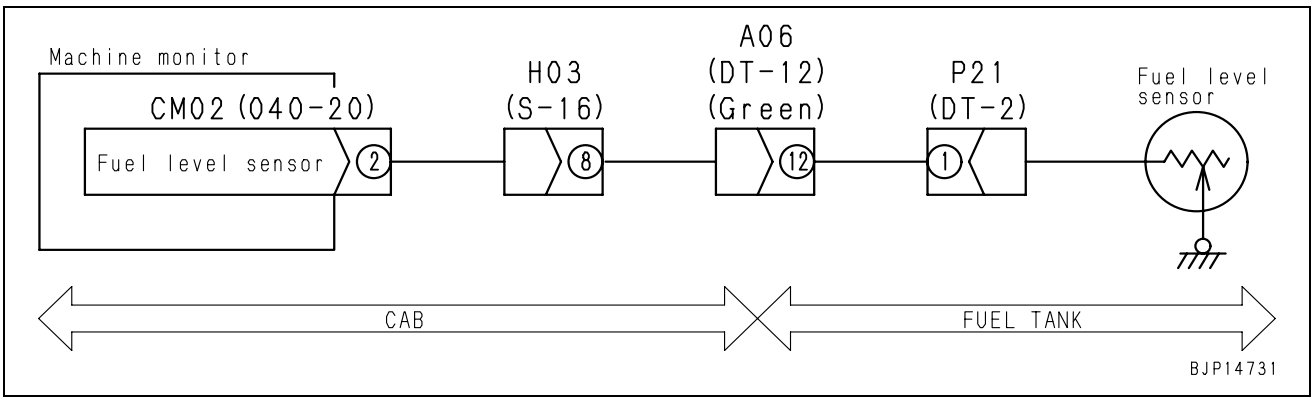


E-14 Fuel gauge does not display correctly

Failure phenomenon	• Fuel gauge does not display correctly	(1) Though fuel was refilled, the display does not exceed the red range (E). (2) Though the remaining fuel level is low, the display does not drop below the green range (F).
Relative information	• Input from the fuel level sensor (voltage) can be confirmed in the monitor function. (Code No. 04200: Fuel sensor voltage)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Fuel level sensor fault (Internal disconnection or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			P21 (male)	Fuel level	Resistance	
			Between (1) – chassis ground	FULL (Upper limit)	Approx. 12 Ω	
				EMPTY (Lower limit)	85 – 110 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM02 (female) (2) – P21 (female) (1)		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CM02 (female) (2) – P21 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CM02 (female) (2) – P21 (female) (1) and chassis ground		Voltage	Max. 1 V
	5	Defective machine monitor	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CM02 (female)	Fuel level	Resistance	
			Between (2) – chassis ground	FULL (Upper limit)	Approx. 12 Ω	
				EMPTY (Lower limit)	85 – 110 Ω	

Circuit diagram related to fuel level sensor

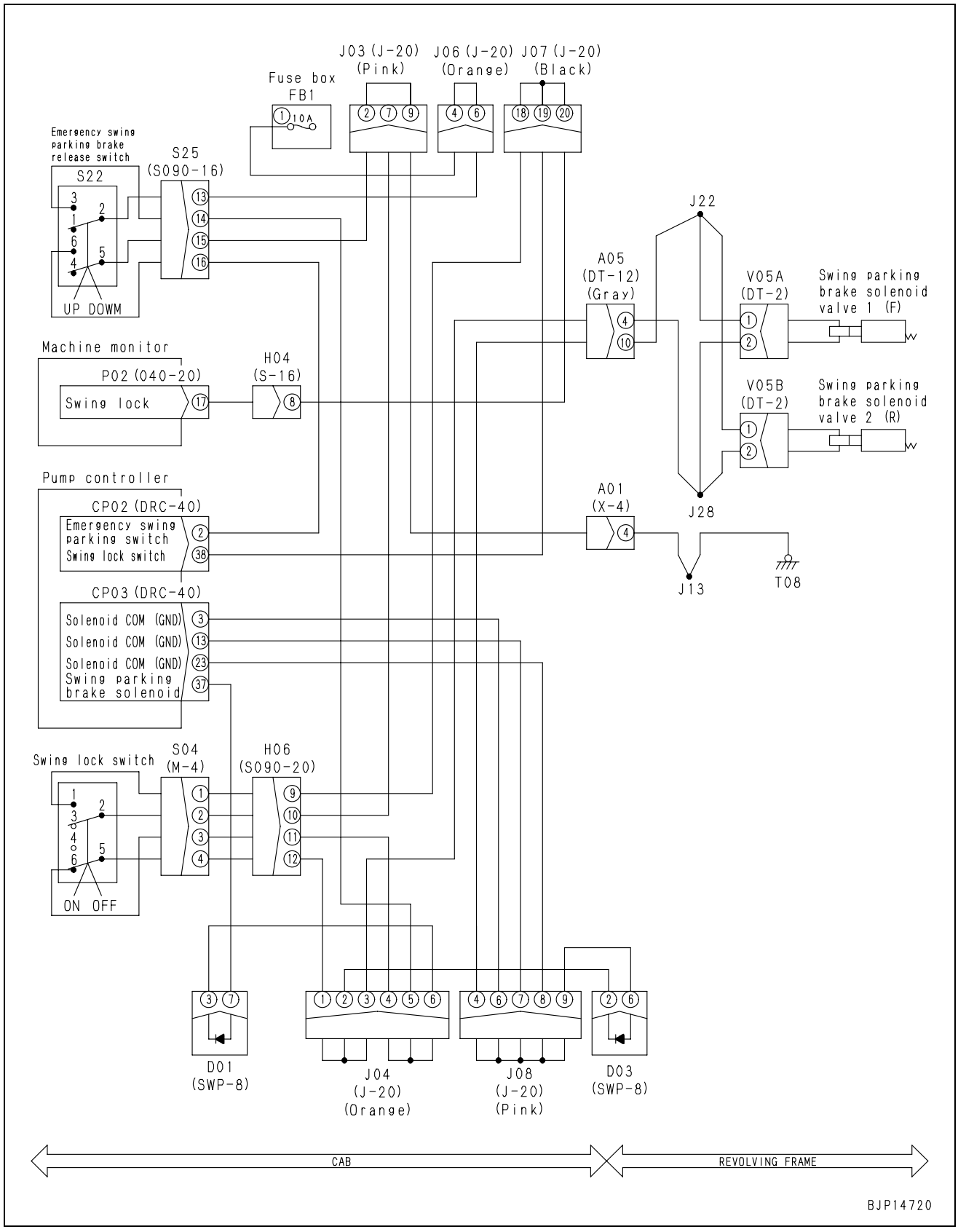


E-15 Swing lock monitor does not display correctly

Failure phenomenon	• Swing lock monitor does not display correctly	(1) Though the swing lock switch was turned ON, the swing lock monitor does not light up. (2) Though the swing lock switch was turned OFF, the swing lock monitor lights up.
Relative information	• Input from the swing lock switch (ON or OFF) can be confirmed in the monitor function. (Code No.: 04502 Monitor input 3, 02200: Switch input 1)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Swing lock switch fault (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S04 (female)	Swing lock switch	Resistance	
			Between (1) – (2)	OFF	Min. 1 MΩ	
				ON	Max. 1 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness from CM02 (female) (17) – J07 – S04 (male) (1)		Resistance	Max. 1 Ω
			Wiring harness from S04 (male) (2) – J03 – chassis ground		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness from CM02 (female) (17) – J07 – S04 (male) (1), or between CM02 (female) (17) – CP02 (female) (38) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness from CM02 (female) (17) – J07 – S04 (male) (1), or between CM02 (female) (17) – CP02 (female) (38) and chassis ground		Voltage	Max. 1 V
	5	Defective machine monitor	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CM02	Swing lock switch	Voltage	
			Between (17) – chassis ground	OFF	20 – 30 V	
				ON	Max. 1 V	

Circuit diagram related to swing holding brake



E-16 When monitor switch is operated, nothing is displayed

Failure phenomenon	• When monitor switch is operated, nothing is displayed.	(1) When mode selector switch is operated, working mode monitor is not displayed.
Relative information	—	

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Defective machine monitor	As this is an internal failure, troubleshooting cannot be conducted.

Failure phenomenon	• When monitor switch is operated, nothing is displayed.	(2) When LCD monitor adjustment switch is operated, mode selection screen is not displayed.
Relative information	—	

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Defective machine monitor	As this is an internal failure, troubleshooting cannot be conducted.

Failure phenomenon	• When monitor switch is operated, nothing is displayed.	(3) When maintenance switch is operated, item selection screen is not displayed.
Relative information	—	

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Defective machine monitor	As this is an internal failure, troubleshooting cannot be conducted.

Failure phenomenon	• When monitor switch is operated, nothing is displayed.	(4) When automatic deceleration switch is operated, automatic deceleration monitor is not displayed.
Relative information	• When the automatic decelerator does not operate either, conduct the troubleshooting for "Auto-decelertor does not operate".	

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Defective machine monitor	As this is an internal failure, troubleshooting cannot be conducted.

Failure phenomenon	• When monitor switch is operated, nothing is displayed.	(5) When travel speed selector switch is operated, travel speed monitor is not displayed.
Relative information		

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Defective machine monitor	As this is an internal failure, troubleshooting cannot be conducted.

Failure phenomenon	• When monitor switch is operated, nothing is displayed.	(6) When wiper switch is operated, wiper monitor is not displayed.
Relative information	• When the wiper does not operate either, conduct the troubleshooting for "Windshield wiper and window washer do not work".	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Defective machine monitor	As this is an internal failure, troubleshooting cannot be conducted.

E-17 Windshield wiper and window washer do not work

Double-wiper specification

Failure phenomenon	• Windshield wiper and window washer do not work	(1) The upper windshield wiper does not operate
Relative information		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	1	Defective upper wiper motor (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			M05 (female)		Continuity and resistance	
			Between (3) – (1)		Continued	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM01 (female) (9) – M05 (male) (3)		Resistance	Max. 1 Ω
			Wiring harness between M05 (male) (1) – chassis ground		Resistance	Max. 1 Ω
	3	Defective machine monitor	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CM01	Wiper switch	Voltage	
			Between (9) – chassis ground	OFF	Max. 3 V	
				ON	20 – 30 V (Note)	

Note: When the upper wiper and lower wiper are operated simultaneously: Max. 3 V ⇔ 20 – 30 V (at regular intervals)

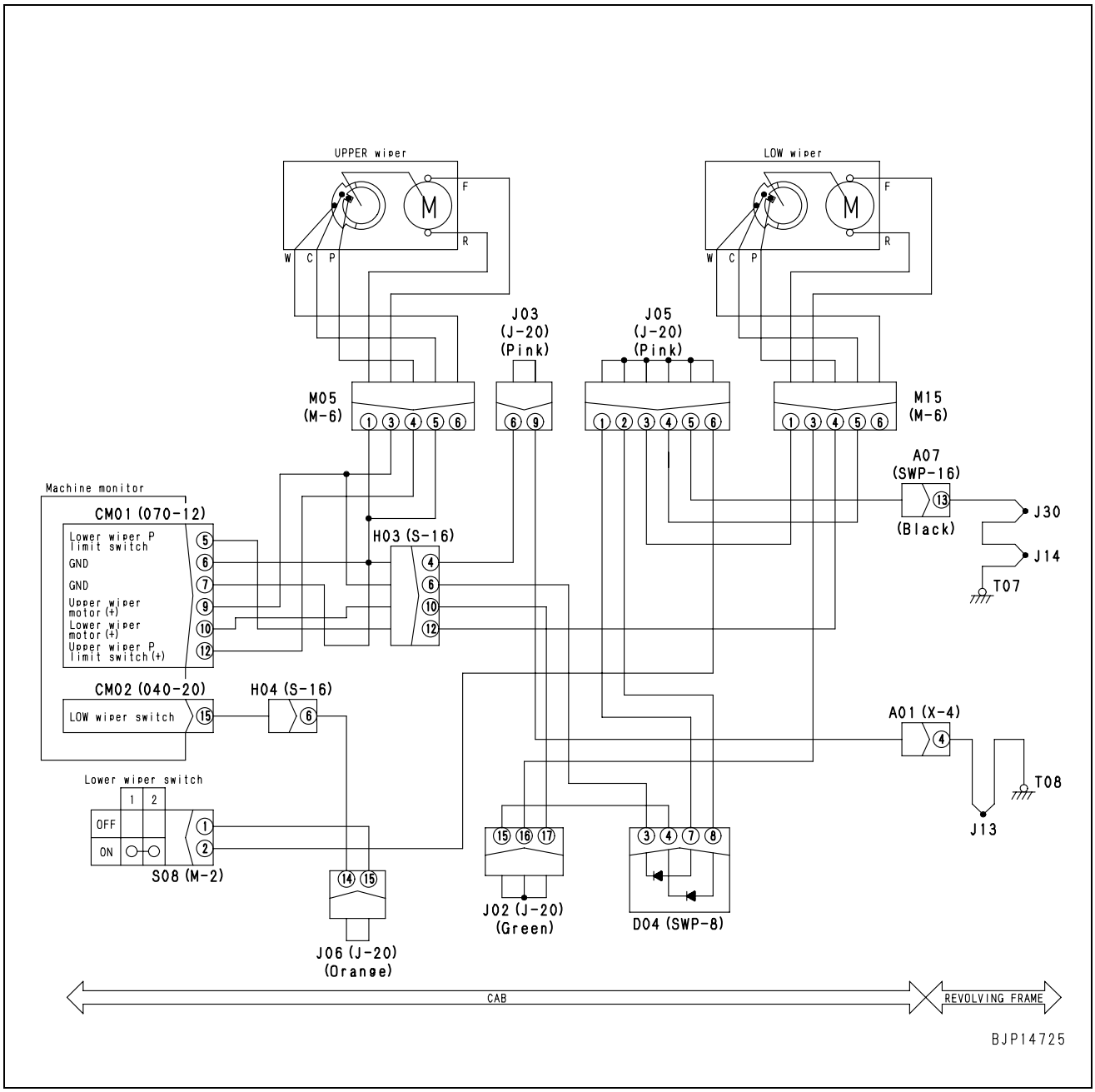
Double-wiper specification

Failure phenomenon	• Windshield wiper and window washer do not work	(2) Lower windshield wiper does not operate.
Relative information		

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective lower wiper switch (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S08 (female)	Lowe wiper switch	Resistance	
			Between (1) – (2)	OFF	Min. 1 MΩ	
				ON	Max. 1 Ω	
	2	Defective lower wiper motor (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			M15 (female)		Continuity and resistance	
			Between (3) – (1)		Continued	
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM02 (female) (15) – S08 (male) (1)		Resistance	Max. 1 Ω
			Wiring harness between S08 (male) (2) – J05 – J30 – J14 – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between CM01 (female) (10) – J02 – M15 (male) (3)		Resistance	Max. 1 Ω
			Wiring harness between M15 (male) (1) – J05 – J30 – J14 – chassis ground		Resistance	Max. 1 Ω
	4	Defective machine monitor (Lower wiper switch system)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CM02	Lower wiper switch	Voltage	
			Between (15) – chassis ground	OFF	20 – 30 V	
				ON	Max. 1 V	
		Defective machine monitor (Lower wiper motor system)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CM01	Lower wiper switch	Voltage	
			Between (10) – chassis ground	OFF	Max. 3 V	
				ON	20 – 30 V (Note)	

Note: When the upper wiper and lower wiper are operated simultaneously: Max. 3 V ⇔ 20 – 30 V (at regular intervals)

Circuit diagram related to wiper motor (double-wiper specification)

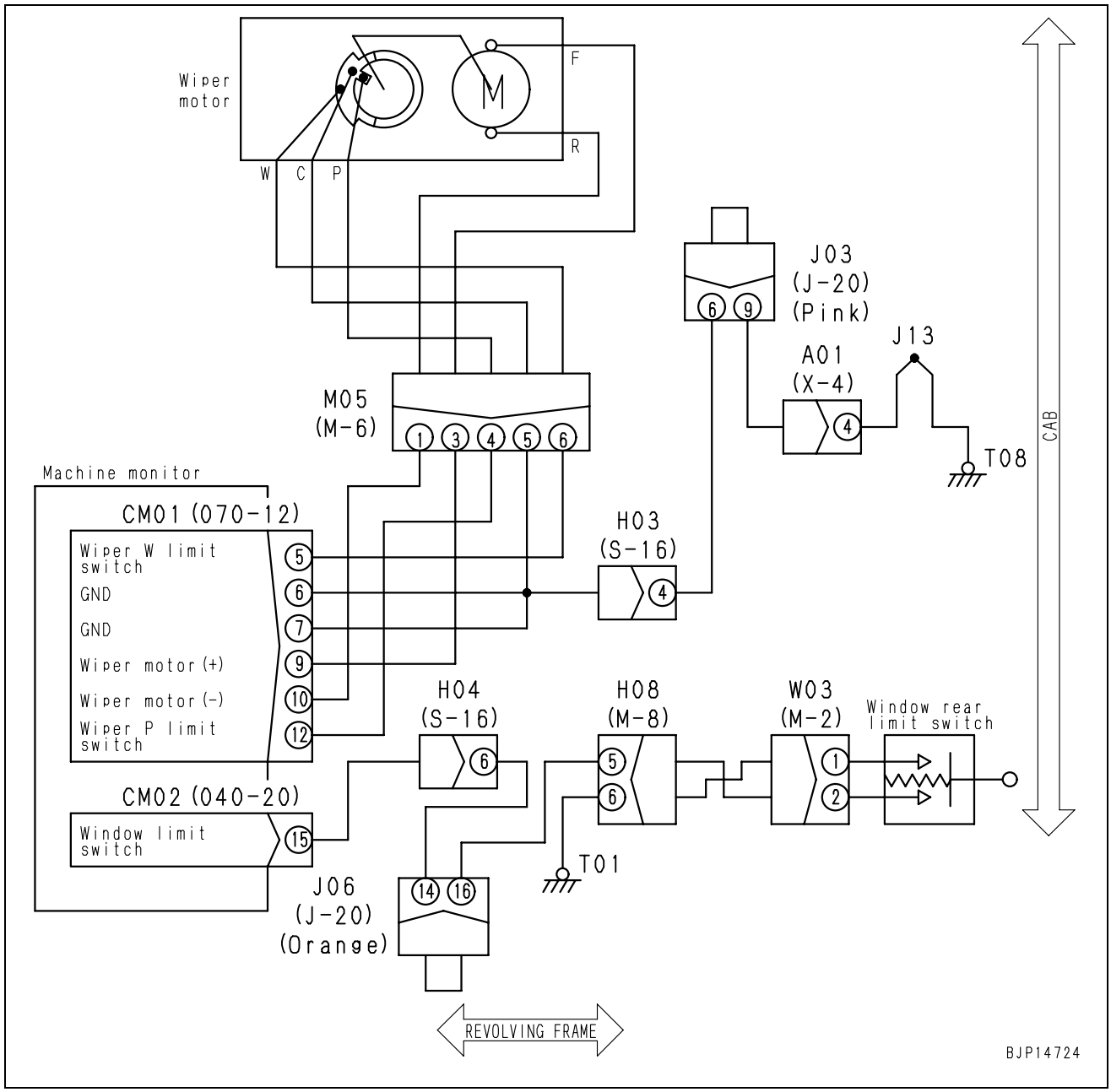


Single-wiper specification

Failure phenomenon	• Windshield wiper and window washer do not work.	(3) The windshield wiper does not work.
Relative information		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	1	Window rear limit switch fault (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			W03 (female)	Front window	Resistance	
			Between (1) – (2)	When installed at front	Min. 1 MΩ	
				When retracted at rear	Max. 1 Ω	
	2	Windshield wiper motor fault (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			M05 (female)	Continuity and Resistance		
			Between (3) – (1)	Continued		
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM01 (male) (9) – M05 (female) (3)	Resistance	Max. 1 Ω	
			Wiring harness between CM01 (male) (10) – M05 (female) (1)	Resistance	Max. 1 Ω	
	4	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CM02 (female) (15) – W03 (male) (2) and chassis ground	Resistance	Min. 1 MΩ	
	5	Defective machine monitor (Window rear limit switch system)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CM02	Front window	Voltage	
			Between (15) – chassis ground	When installed at front	20 – 30 V	
				When retracted at rear	Max. 1 V	
		Defective machine monitor (Windshield wiper motor system)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CM01	Windshield wiper switch	Voltage	
			Between (9) – chassis ground, Between (10) – chassis ground	OFF	Max. 3 V	
				ON	Max. 3 V ⇔ 20 – 30 V (Constant cycle)	

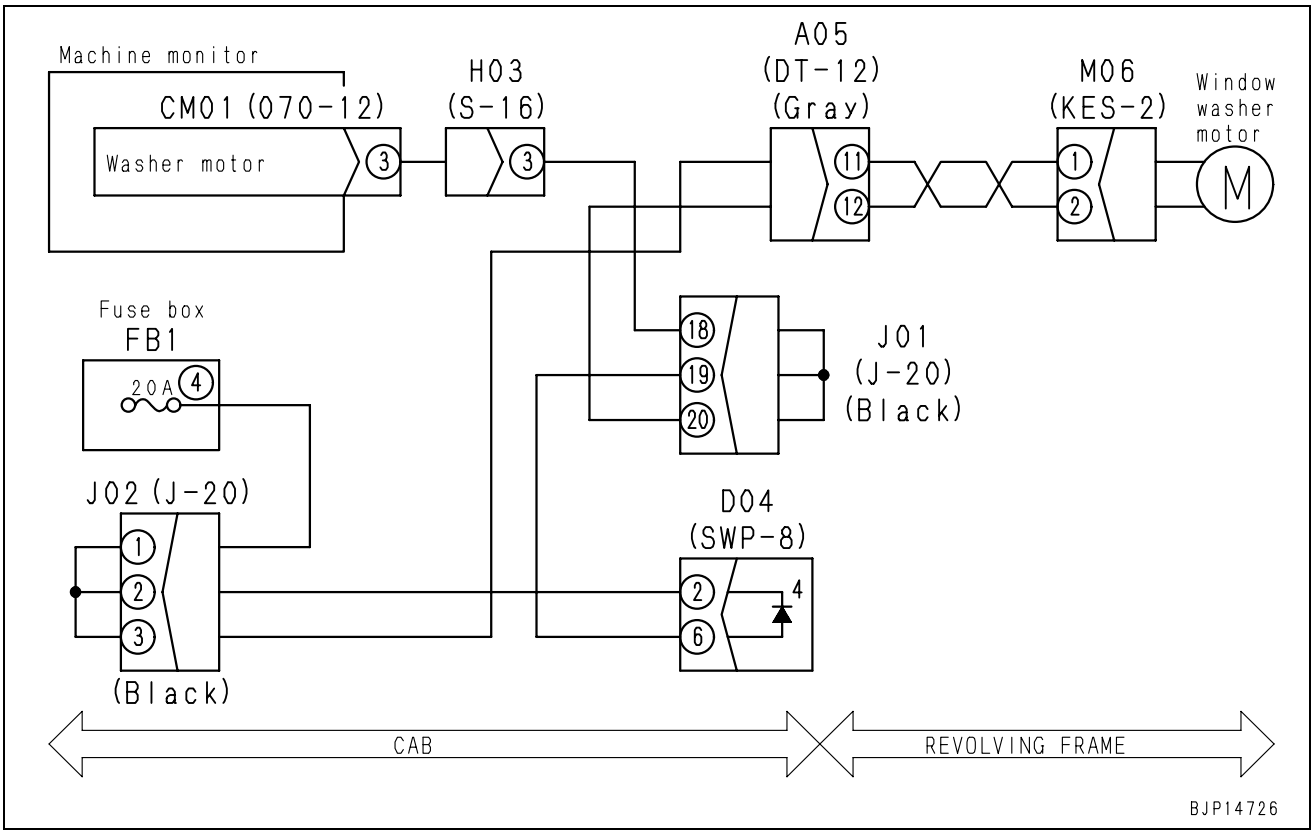
Circuit diagram related to windshield wiper motor (single-wiper specification)



Failure phenomenon	• Windshield wiper and window washer do not work.	(4) Windshield washer does not operate.
Relative information	—	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective fuse No. 4	If fuse is broken, the circuit probably has grounding fault, etc. (See cause 4.)			
	2	Defective washer motor (Internal disconnection or grounding fault)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			M06 (male)		Resistance	
			Between (1) – (2)		5 – 20 Ω	
			Between (1) – chassis ground		Min. 1 MΩ	
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness from FB1-4 outlet – J02 – M06 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness from M06 (female) (2) – CM01 (female) (3)		Resistance	Max. 1 Ω
	4	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness from FB1-4 outlet – J02 –M06 (female) (1), or FB1-4 outlet – D04 (female) (3), and to other relative circuits and chassis ground		Resistance	Min. 1 MΩ
	5	Defective machine monitor	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CM01	Windshield washer switch	Voltage	
			Between (3) – chassis ground	OFF	20 – 30 V	
				ON	Max. 1 V	

Circuit diagram related to window washer motor

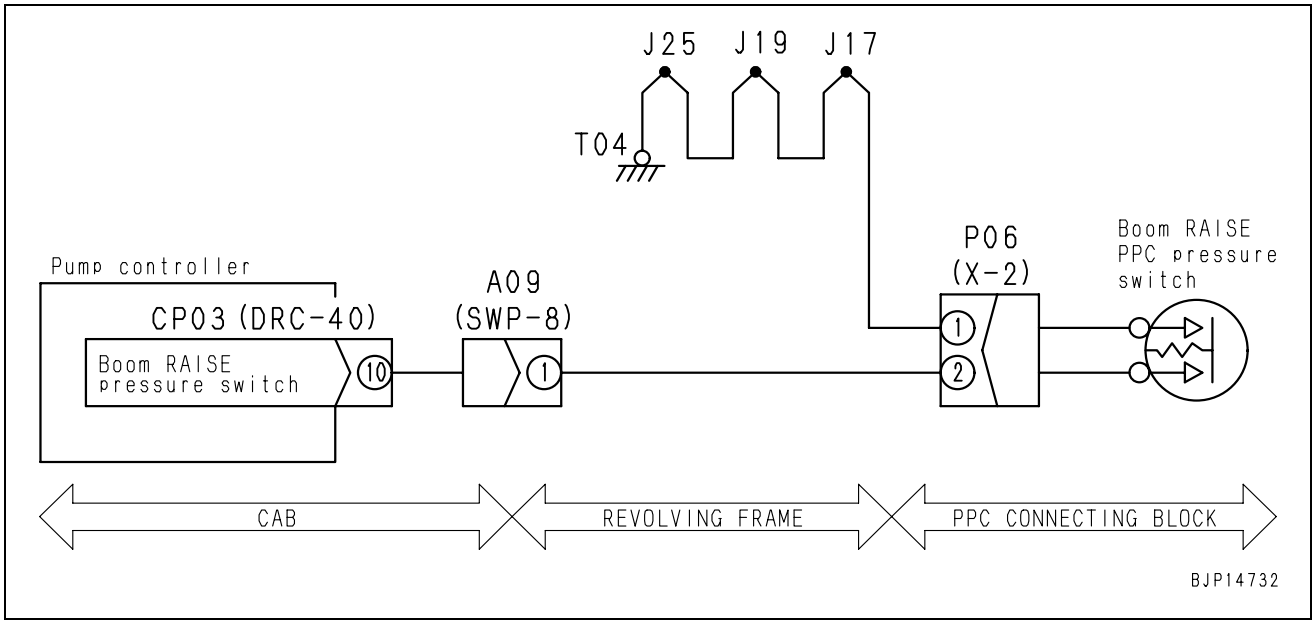


E-18 "Boom RAISE" is not correctly displayed in monitor function

Failure phenomenon	• "Boom RAISE" is not correctly displayed in monitor function	"Boom RAISE" is not correctly displayed in the monitor function on the machine monitor.
Relative information	• Monitoring code: 01900 (Pressure switch 1)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Boom RAISE PPC hydraulic switch fault (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P06 (male)	R.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Boom RAISE	Max. 1 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (10) – P06 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P06 (female) (1) – J17 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (10) – P06 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (10) – P06 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.			
			CP03	R.H. work equipment control lever	Voltage	
			Between (10) – chassis ground	NEUTRAL	20 – 30 V	
				Boom RAISE	Max. 1 V	

Circuit diagram related to boom RAISE PPC hydraulic switch

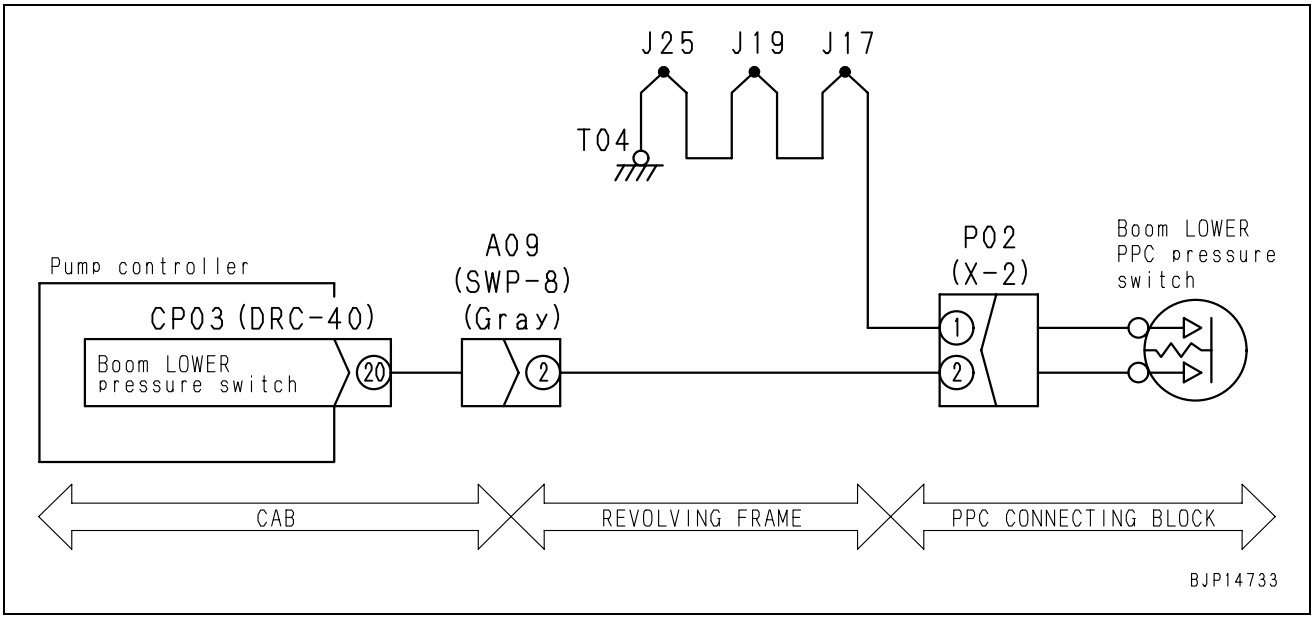


E-19 "Boom LOWER" is not correctly displayed in monitor function

Failure phenomenon	• "Boom LOWER" is not correctly displayed in monitor function	"Boom LOWER" is not correctly displayed in the monitor function on the machine monitor.
Relative information	• Monitoring code: 01900 (Pressure switch 1)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Boom LOWER PPC hydraulic switch fault (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P02 (male)	R.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Boom LOWER	Max. 1 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (20) – P02 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P02 (female) (1) – J17 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (20) – P02 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (20) – P02 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.			
			CP03	R.H. work equipment control lever	Voltage	
			Between (20) – chassis ground	NEUTRAL	20 – 30 V	
				Boom LOWER	Max. 1 V	

Circuit diagram related to boom LOWER PPC hydraulic switch

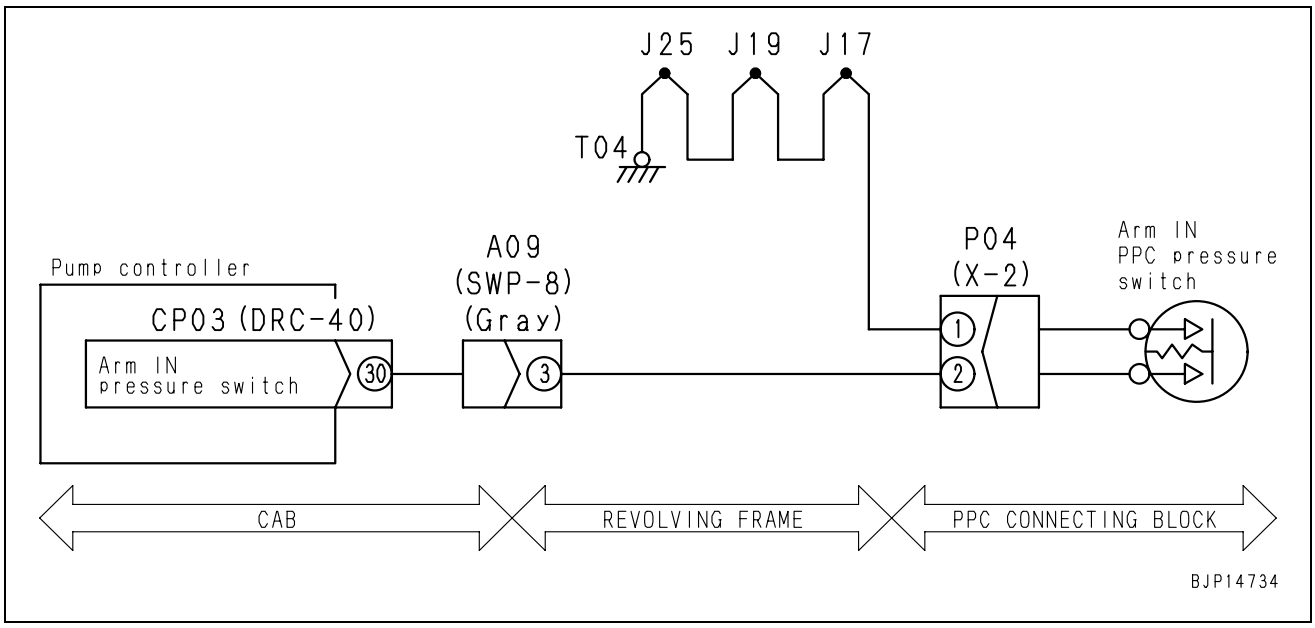


E-20 "Arm IN" is not correctly displayed in monitor function

Failure phenomenon	• "Arm IN" is not correctly displayed in monitor function	"Arm IN" is not correctly displayed in the monitor function (special function) on the machine monitor.
Relative information	• Monitoring code: 01900 (Pressure switch 1)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Arm IN PPC hydraulic switch fault (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P04 (male)	L.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Arm IN	Max. 1 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (30) – P04 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P04 (female) (1) – J17 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (30) – P04 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (30) – P04 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.			
			CP03	L.H. work equipment control lever	Voltage	
			Between (30) – chassis ground	NEUTRAL	20 – 30 V	
				Arm IN	Max. 1 V	

Circuit diagram related to arm IN PPC hydraulic switch

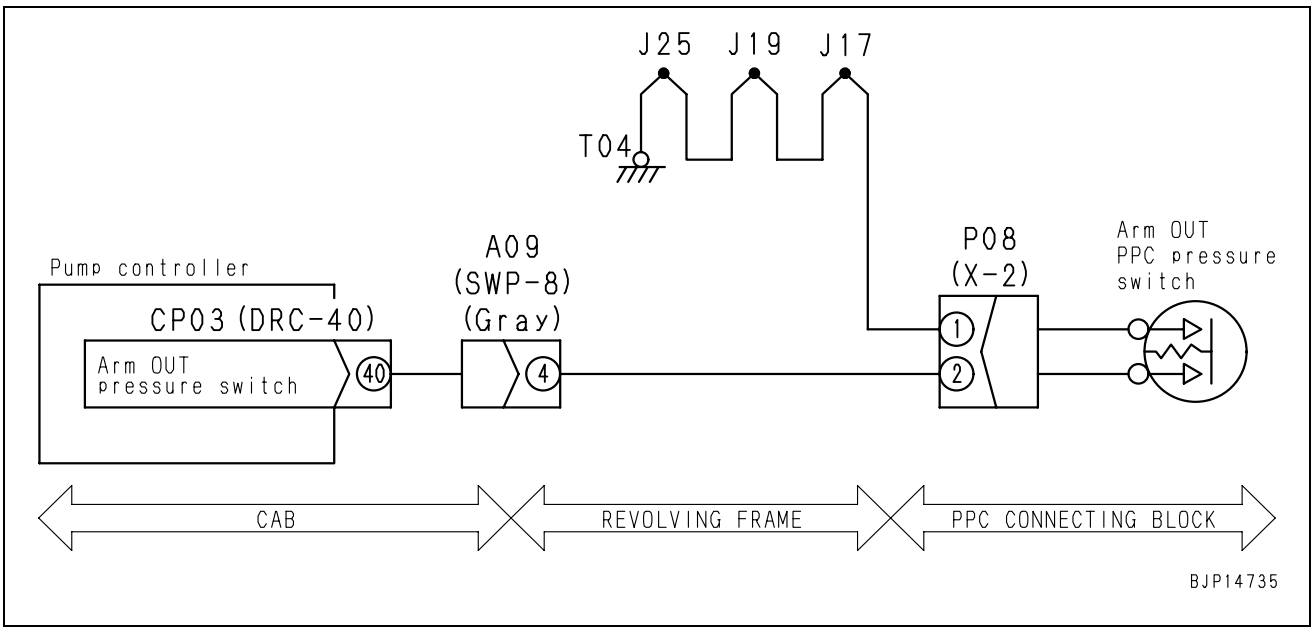


E-21 "Arm OUT" is not correctly displayed in monitor function

Failure phenomenon	• "Arm OUT" is not correctly displayed in monitor function	"Arm OUT" is not correctly displayed in the monitor function (special function) on the machine monitor.
Relative information	• Monitoring code: 01900 (Pressure switch 1)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective arm OUT PPC hydraulic switch (Internal disconnection and short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P08 (male)	L.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Arm OUT	Max. 1 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (40) – P08 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P08 (female) (1) – J17 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (40) – P08 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (40) – P08 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.			
			CP03	L.H. work equipment control lever	Voltage	
			Between (40) – chassis ground	NEUTRAL	20 – 30 V	
				Arm OUT	Max. 1 V	

Circuit diagram related to arm OUT PPC hydraulic switch

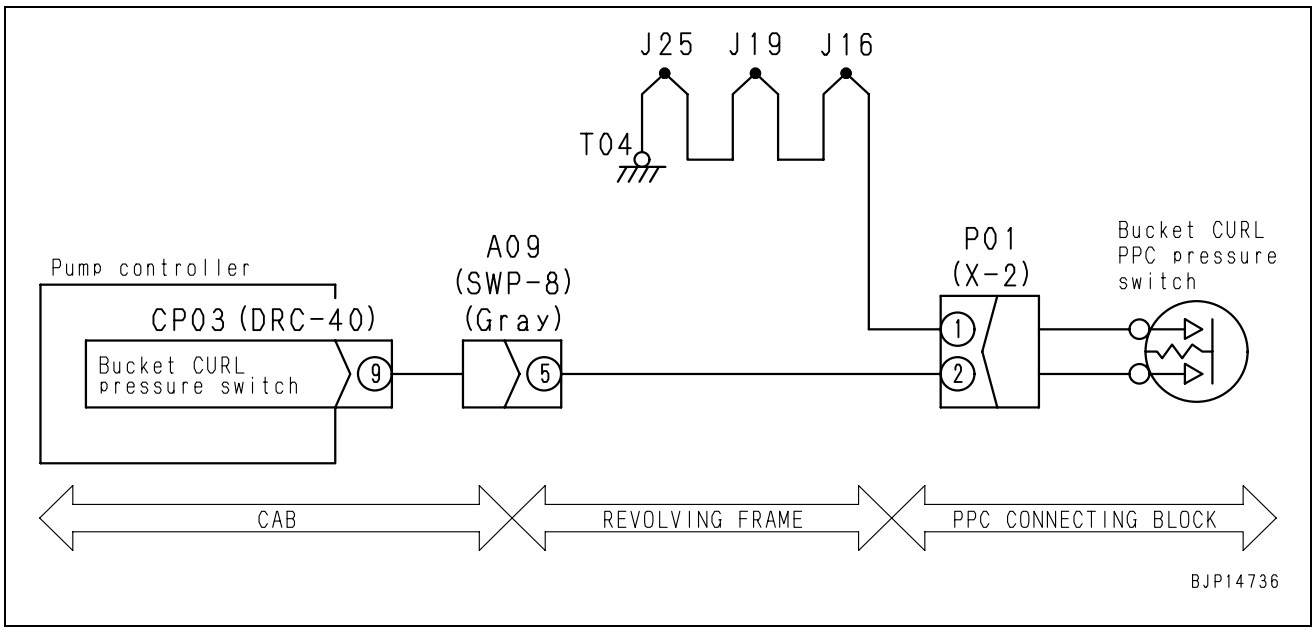


E-22 "Bucket CURL" is not correctly displayed in monitor function

Failure phenomenon	• "Bucket CURL" is not correctly displayed in monitor function	"Bucket CURL" is not correctly displayed in the monitor function (special function) on the machine monitor.
Relative information	• Monitoring code: 01901 (Pressure switch 2)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Bucket CURL PPC hydraulic switch fault (Internal disconnection and short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P01 (male)	R.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Bucket CURL	Max. 1 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (9) – P01 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P01 (female) (1) – J16 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (9) – P01 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (9) – P01 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.			
			CP03	R.H. work equipment control lever	Voltage	
			Between (9) – chassis ground	NEUTRAL	20 – 30 V	
				Bucket CURL	Max. 1 V	

Circuit diagram related to bucket CURL PPC hydraulic switch

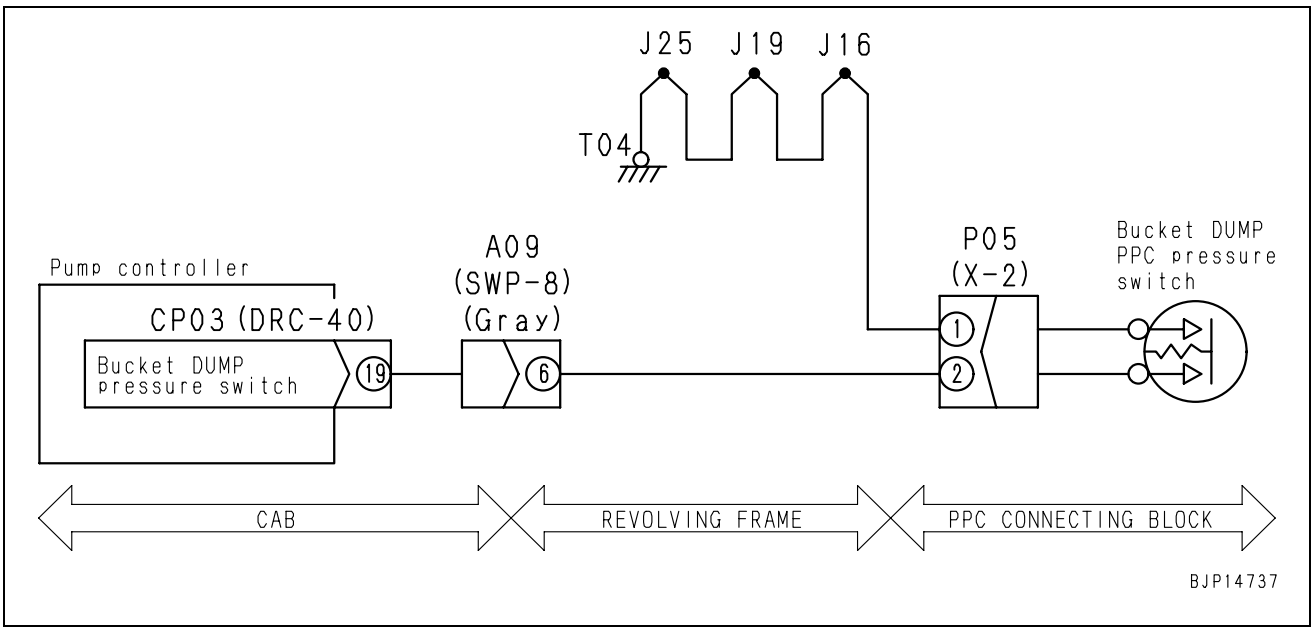


E-23 "Bucket DUMP" is not correctly displayed in monitor function

Failure phenomenon	"Bucket DUMP" is not correctly displayed in monitor function	"Bucket DUMP" is not correctly displayed in the monitor function (special function) on the machine monitor.
Relative information	• Monitoring code: 01901 (Pressure switch 2)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Bucket DUMP PPC hydraulic switch fault (Internal disconnection and short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P05 (male)	R.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Bucket DUMP	Max. 1 Ω	
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (19) – P05 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P05 (female) (1) – J16 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (19) – P05 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (19) – P05 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.			
			CP03	R.H. work equipment control lever	Voltage	
			Between (19) – chassis ground	NEUTRAL	20 – 30 V	
				Bucket DUMP	Max. 1 V	

Circuit diagram related to bucket DUMP PPC hydraulic switch

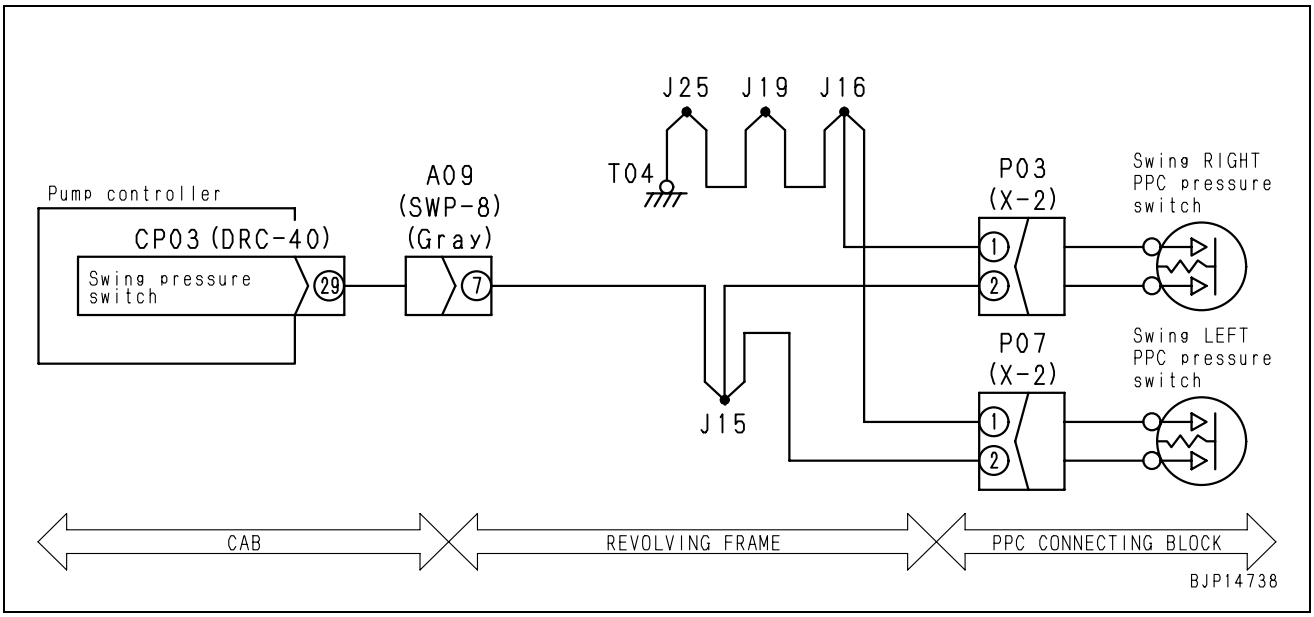


E-24 "SWING" is not correctly displayed in monitor function

Failure phenomenon	• "SWING" is not correctly displayed in monitor function	"SWING" is not correctly displayed in the monitor function (special function) on the machine monitor.
Relative information	• Monitoring code: 01901 (Pressure switch 2)	

		Cause	Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Swing PPC hydraulic switch, left, fault (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P07 (male)	L.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Swing Left	Max. 1 Ω	
	2	Swing PPC hydraulic switch, right, fault (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P03 (male)	L.H. work equipment control lever	Resistance	
			Between (1) – (2)	NEUTRAL	Min. 1 MΩ	
				Swing Right	Max. 1 Ω	
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (29) – J15 – P03 (female) (2), or wiring harness between CP03 (female) (29) – P07 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P03 (female) (1) – J16 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between P07 (female) (1) – J16 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	4	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (29) – J15 – P03 (female) (2), or wiring harness between CP03 (female) (29) – P07 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	5	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (29) – J15 – P03 (female) (2), or wiring harness between CP03 (female) (29) – P07 (female) (2) and chassis ground		Voltage	Max. 1 V
	6	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.			
			CP03	L.H. work equipment control lever	Voltage	
			Between (29) – chassis ground	NEUTRAL	20 – 30 V	
				Swing Right or left	Max. 1 V	

Circuit diagram related to right and left swing PPC hydraulic switches

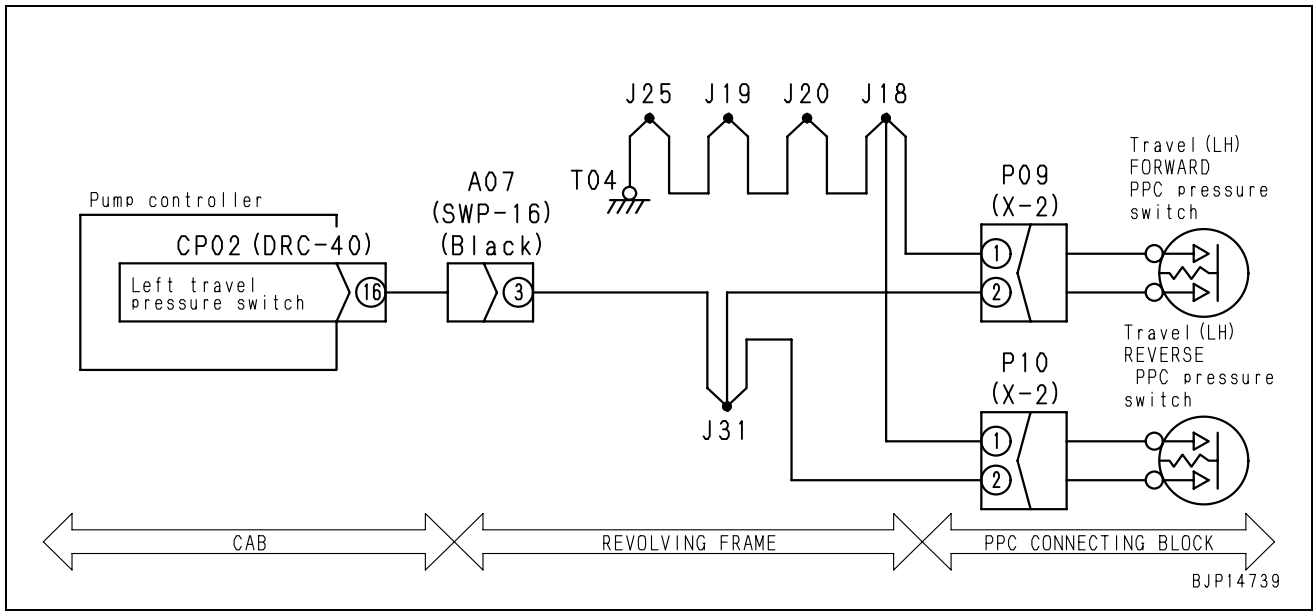


E-25 "Left travel" is not displayed normally in monitoring function

Failure phenomenon	• "Left travel" is not displayed normally in monitoring function.	"Left travel" is not displayed normally in the monitoring function (special function) of the machine monitor.
Relative information	• Monitoring code: 01901 (Pressure switch 2)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective left travel forward PPC oil pressure switch (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P09 (male)	Left travel lever	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Forward	Max. 1 Ω	
	2	Defective left travel reverse PPC oil pressure switch (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P10 (male)	Left travel lever	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Reverse	Max. 1 Ω	
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP02 (female) (16) – J31 – P09 (female) (2) or between CP02 (female) (16) – P10 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P09 (female) (1) – J18 – J20 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between P10 (female) (1) – J18 – J20 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	4	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP02 (female) (16) – J31 – P09 (female) (2) or between CP02 (female) (16) – P10 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	5	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP02 (female) (16) – J31 – P09 (female) (2) or between CP02 (female) (16) – P10 (female) (2) and chassis ground		Voltage	Max. 1 V
	6	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			CP02	Left travel lever	Voltage	
			Between (16) – chassis ground	Neutral	20 – 30 V	
				Forward or reverse	Max. 1 V	

Circuit diagram related to left travel forward PPC oil pressure switch and left travel reverse PPC oil pressure switch

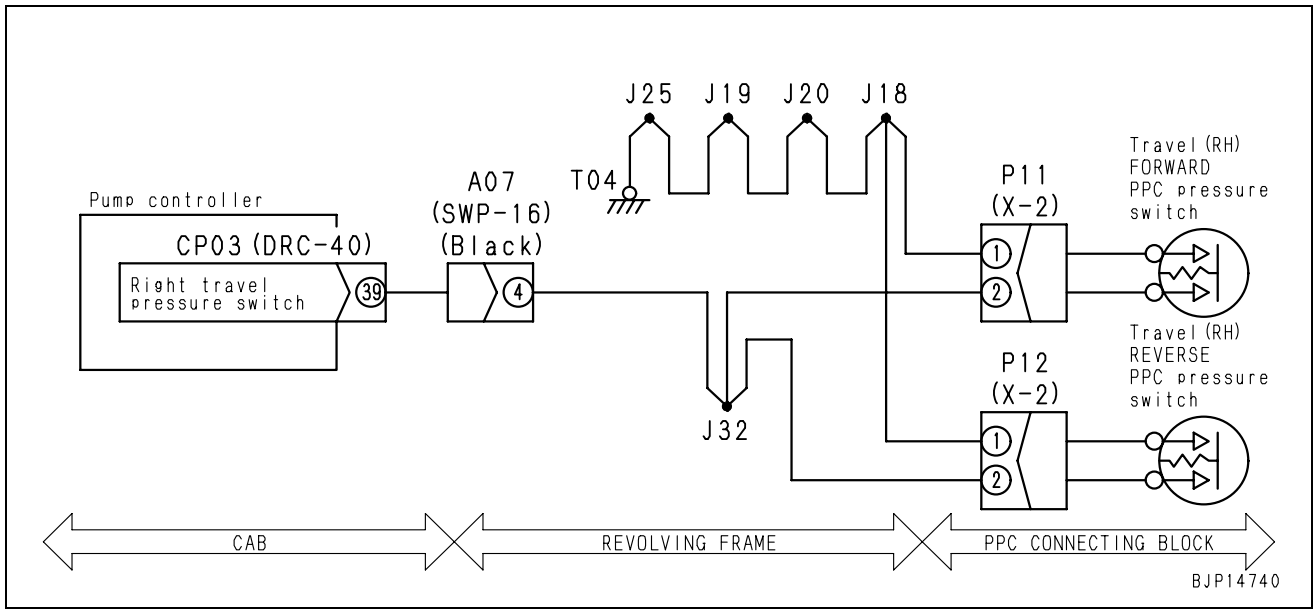


E-26 "Right travel" is not displayed normally in monitoring function

Failure phenomenon	• "Right travel" is not displayed normally in monitoring function	"Right travel" is not displayed normally in the monitoring function (special function) of the machine monitor.
Relative information	• Monitoring code: 01901 (Pressure switch 2)	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective right travel forward PPC oil pressure switch (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P11 (male)	Right travel lever	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Forward	Max. 1 Ω	
	2	Defective right travel reverse PPC oil pressure switch (Internal disconnection or short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			P12 (male)	Right travel lever	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Reverse	Max. 1 Ω	
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (39) – J32 – P11 (female) (2) or between CP03 (female) (39) – P12 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P11 (female) (1) – J18 – J20 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between P12 (female) (1) – J18 – J20 – J19 – J25 – chassis ground		Resistance	Max. 1 Ω
	4	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (39) – J32 – P11 (female) (2) or between CP03 (female) (39) – P12 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	5	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between CP03 (female) (39) – J32 – P11 (female) (2) or between CP03 (female) (39) – P12 (female) (2) and chassis ground		Voltage	Max. 1 V
	6	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			CP03	Right travel lever	Voltage	
			Between (39) – chassis ground	Neutral	20 – 30 V	
				Forward or reverse	Max. 1 V	

Circuit diagram related to right travel forward PPC oil pressure switch and right travel reverse PPC oil pressure switch



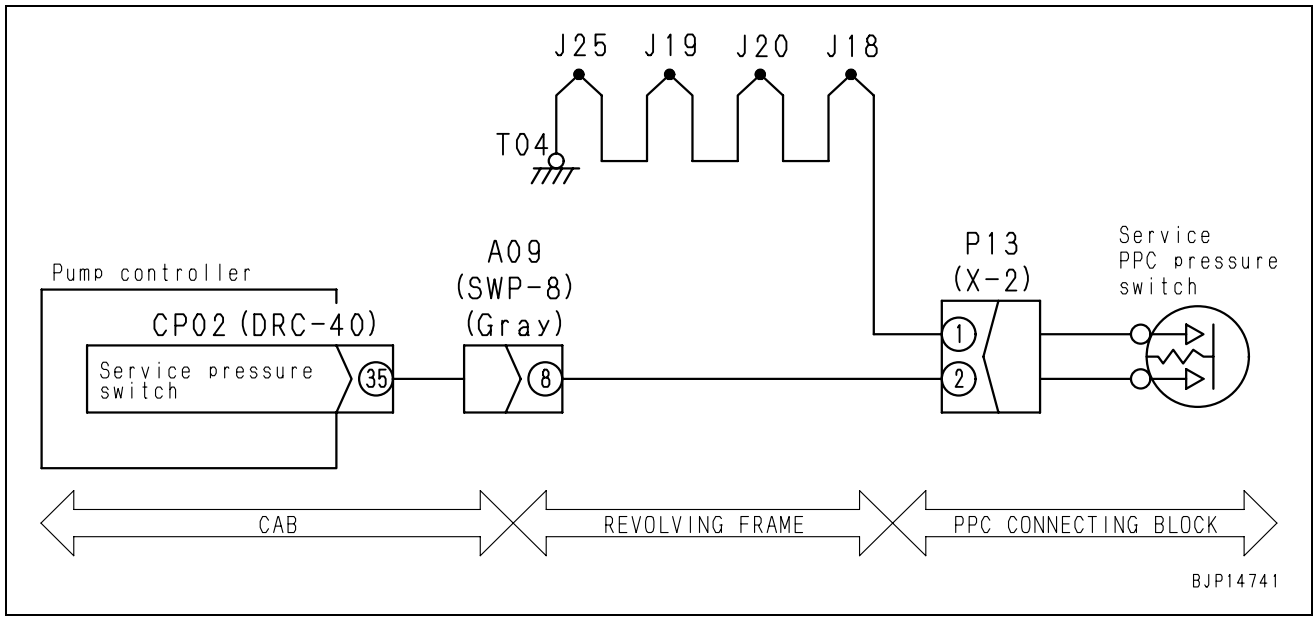
E-27 "Service" is not correctly displayed in monitor function

When attachment is installed

Failure phenomenon	• "Service" is not correctly displayed in monitor function	"Service" is not correctly displayed in the monitor function (special function) on the machine monitor.
Relative information	• Monitoring code: 01901 (Pressure switch 2)	

<table>
<tr><td rowspan="15">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Service PPC hydraulic switch fault
(Internal disconnection or short-circuiting)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.</td></tr>
<tr><td>P13 (male)</td><td>Service pedal</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (2)</td><td>NEUTRAL</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td>Operated</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Disconnection of wiring harness
(Disconnection or defective contact with connector)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between CP02 (female) (35) – P13 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between P13 (female) (1) – J18 – J20 – J19 – J25 – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Grounding fault of wiring harness
(Contact with grounding (GND) circuit)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between CP02 (female) (35) – P13 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Short-circuiting of wiring harness
(Contact with 24 V circuit)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between CP02 (female) (35) – P13 (female) (2) and chassis ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Defective pump controller</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.</td></tr>
<tr><td>CP02</td><td>Service pedal</td><td colspan="2">Voltage</td></tr>
<tr><td rowspan="2">Between (35) – chassis ground</td><td>NEUTRAL</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Operated</td><td colspan="2">Max. 1 V</td></tr>
</table>

Circuit diagram related to service PPC hydraulic switch

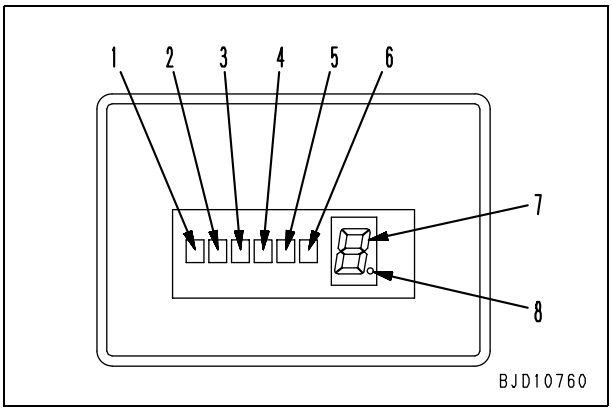


E-28 KOMTRAX system does not operate normally

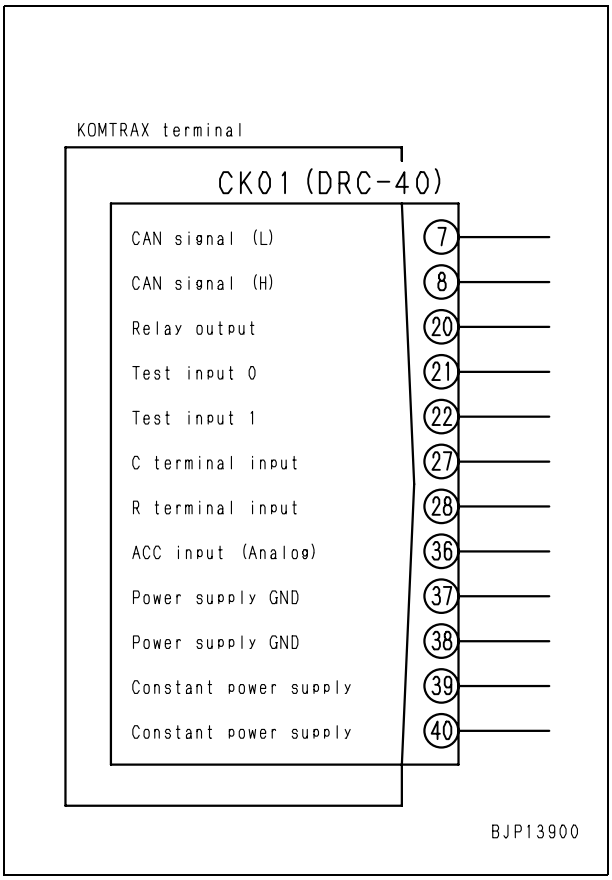
Failure phenomenon	• KOMTRAX system does not operate normally.
Related information	• If KOMTRAX system administrator makes request for checking system on machine side for trouble, carry out following troubleshooting. • Even if KOMTRAX system has trouble, it does not particularly appear on machine.

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective power supply	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CK01	Signal	Voltage
			(39), (40) – Between (37) – (38)	Constant power supply	20 – 30 V
	2	Defective starting switch ACC signal and alternator R signal	★Start engine and carry out troubleshooting.		
			LED (1)	Normal state	
			LED-C1	ON	
			★Prepare with starting switch OFF, then start engine and carry out troubleshooting.		
			CK01	Signal	Voltage
			Between (36) – (37), (38)	Starting switch ACC	20 – 30 V
			Between (28) – (37), (38)	Alternator R	20 – 30 V
	3	Defective starting switch C signal	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CK01	Signal	Voltage
			Between (27) – (37), (38)	Starting switch C	20 – 30 V
	4	State of CAN connection	★Turn starting switch ON and carry out troubleshooting.		
			LED (4)	Normal state	
			LED-C4	ON	
			★Prepare with starting switch OFF and carry out troubleshooting.		
			CK01 (female)	Signal	Resistance
			Between (7) – (8)	CAN	40 – 80 Ω
	5	Number of mails not transmitted yet	★Turn starting switch ON and carry out troubleshooting.		
			LED (7)	Normal state	
			7-segment	0 – 9	
	6	State of positioning with GPS	★Turn starting switch ON and carry out troubleshooting		
			LED (8)	Normal state	
			Dot	ON	
			In an outdoor location within radio waves' penetration range, it sometimes takes more than a minute from turning on of the starting switch to completion of the positioning.		

LED display unit



CK01 connector

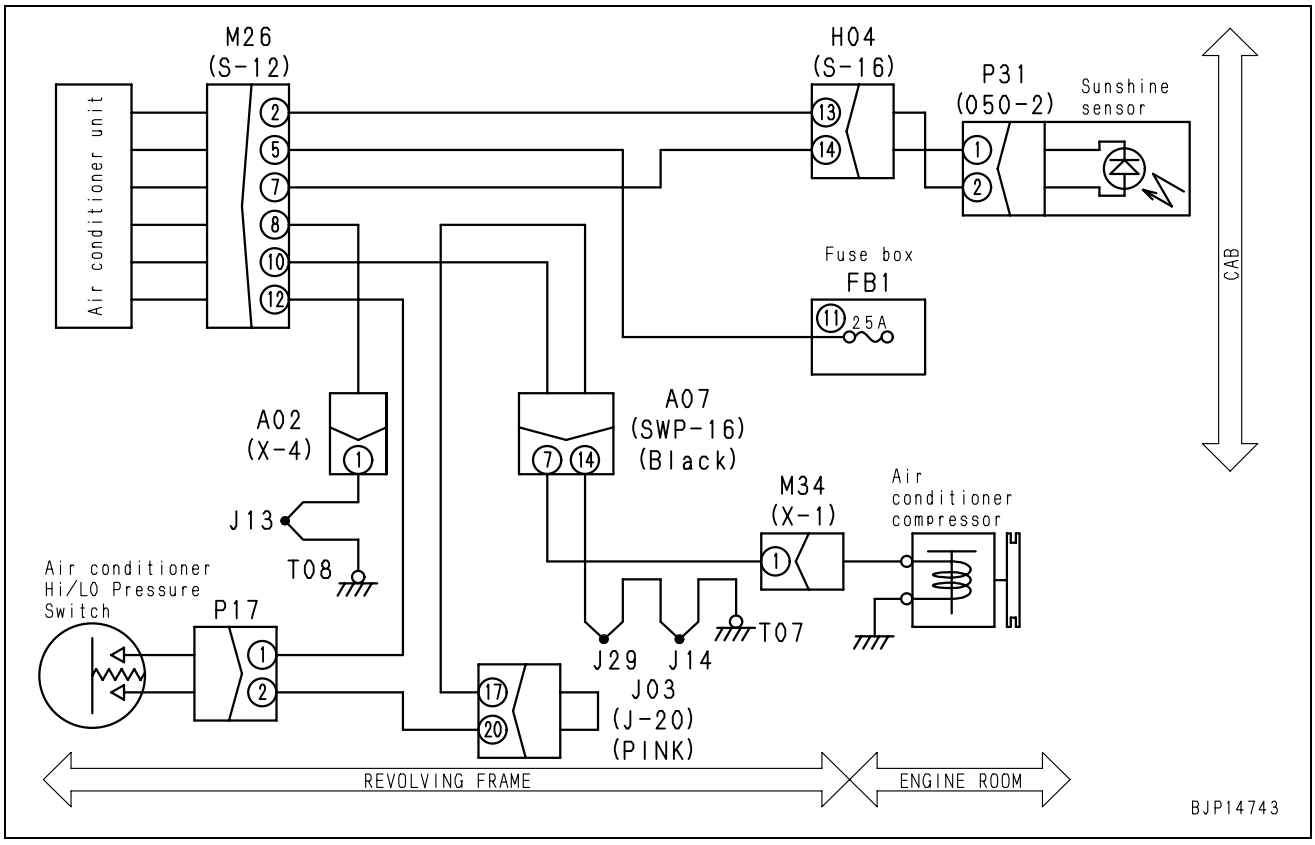


E-29 Air conditioner does not work

Failure phenomenon	• Air conditioner does not work.
Relative information	

	Cause		Standard value in normalcy and references for troubleshooting		
Presumed cause and standard value in normalcy	1	Fuse No. 11 fault	When fuse is blown, there is a big possibility that grounding fault occurred in the circuit. (See Cause 3.)		
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between FB1-11 – M26 (male) (5)	Resistance	Max. 1 Ω
			Wiring harness between M26 (male) (8) – chassis ground	Resistance	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between FB1-11 outlet – M26 (male) (5) and chassis ground	Voltage	Min. 1 MΩ
	4	Defective air conditioner unit	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			M26	Voltage	
			Between (5) – (8)	20 – 30 V	
			If the above voltages are normal and the air conditioner does not operate, the air conditioner unit is defective.		

Circuit diagram related to air conditioner



E-30 Step light does not light up or go off

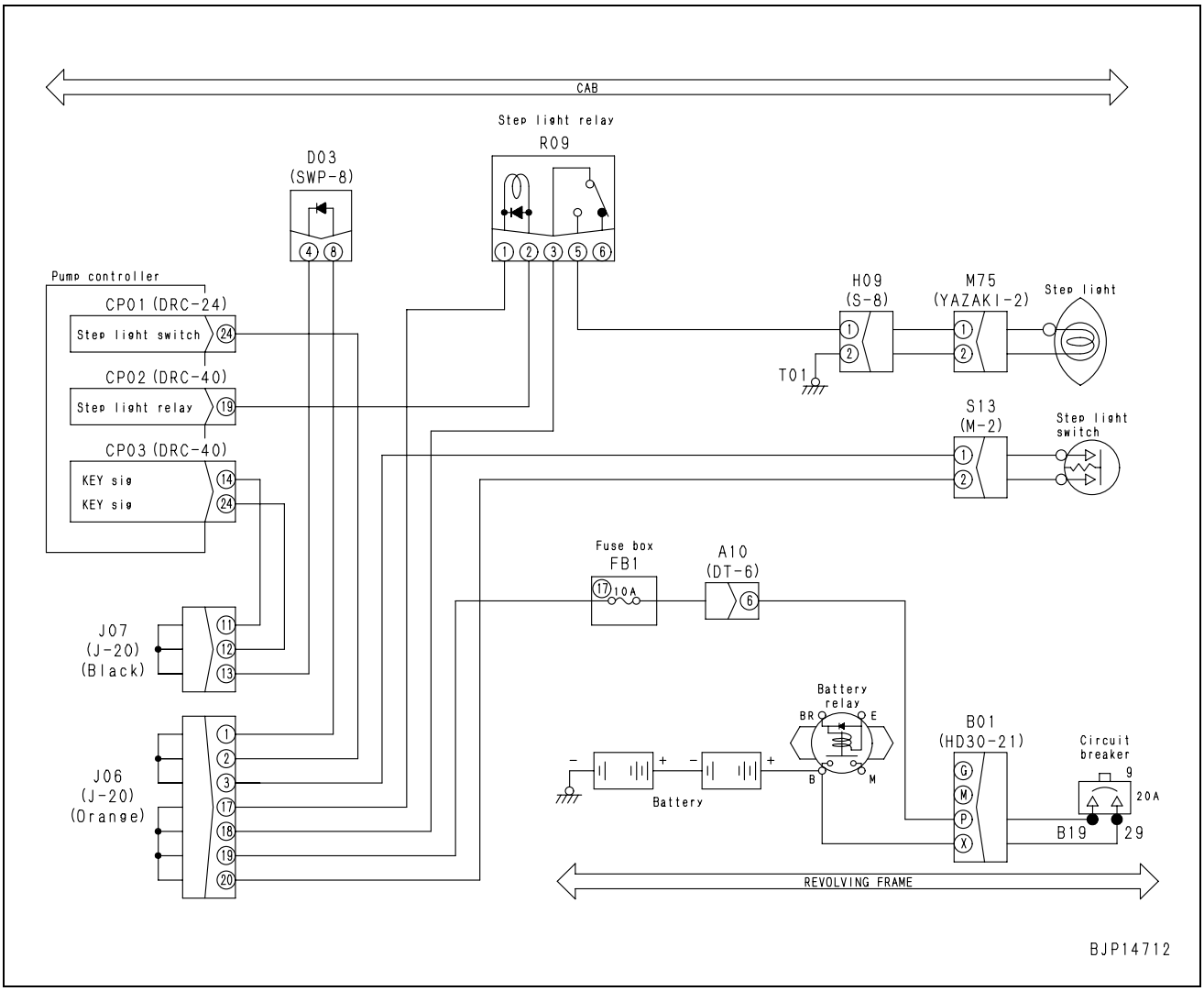
Failure phenomenon	• Step light does not light up or go off.	(1) When the switch is pressed, the light does not keep lighting up for 1 minute.
Relative information	• If failure code **[D195KB]** is also displayed, carry out troubleshooting for it first.	

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective fuse No. 17	If the fuse is broken, the circuit probably has grounding fault (See cause 6).			
	2	Defective step light	The step light may be defective. Check the bulb directly for breakage.			
	3	Defective step light switch (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S13 (male)	Step light switch	Resistance	
			Between (1) – (2)	Released	Min. 1 MΩ	
				Pressed	Max. 1 Ω	
	4	Step light relay defective (Internal defect)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Replace the step light relay with another one. If trouble is repaired, the relay is defective (5-pole relay).			R09
	5	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between FB1-17 outlet – S13 (female) (2) or between FB1-17 outlet – R09 (female) (1), (3)		Resistance	Max. 1 Ω
			Wiring harness between S13 (female) (1) – J06 – CP01 (female) (24) or between S13 (female) (1) – D03 – CP03 (female) (14), (24)		Resistance	Max. 1 Ω
			Wiring harness between CP03 (female) (19) – R09 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between R09 (female) (5) – M75 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between M75 (female) (2) – chassis ground		Resistance	Max. 1 Ω
	6	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between FB1-17 outlet – S13 (female) (2) or between FB1-17 outlet – R09 (female) (1) (3) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between S13 (female) (1) – J06 – CP01 (female) (24) or between S13 (female) (1) – D03 – CP03 (female) (14), (15) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between R09 (female) (5) – M75 (female) (1) and chassis ground		Resistance	Min. 1 MΩ
	7	Defective pump controller (Step light switch input system)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP01	Step light switch	Voltage	
			Between (24) – chassis ground	Released	Max. 1 V	
				Pressed	20 – 30 V	
		Defective pump controller (Step light relay output system)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP02	Step light switch	Voltage	
			Between (19) – chassis ground	Released	Max. 1 V	
				Pressed	20 – 30 V (60 seconds)	

Failure phenomenon	• Step light does not light up or go off.	(2) While the switch is not pressed, the light lights up.
Relative information		

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective step light switch (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S13 (male)	Step light switch	Resistance	
			Between (1) – (2)	Released	Min. 1 MΩ	
				Pressed	Max. 1 Ω	
	2	Defective step light relay (Internal defect)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Replace the step light relay with another one. If trouble is repaired, the relay is defective.			R09
	3	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness between S13 (female) (1) – J06 – CP01 (female) (24) or between S13 (female) (1) – D03 (female) (8) and chassis ground		Voltage	Max. 1 V
			Wiring harness between CP02 (female) (19) – R09 (female) (2) and chassis ground		Voltage	Max. 1 V
	4	Defective pump controller (Step light switch input system)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP01	Step light switch	Voltage	
			Between (24) – chassis ground	Released	Max. 1 V	
				Pressed	20 – 30 V	
		Defective pump controller (Step light relay output system)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP02	Step light switch	Voltage	
			Between (19) – chassis ground	Released	Max. 1 V	
				Pressed	20 – 30 V (60 seconds)	

Circuit diagram related to step light

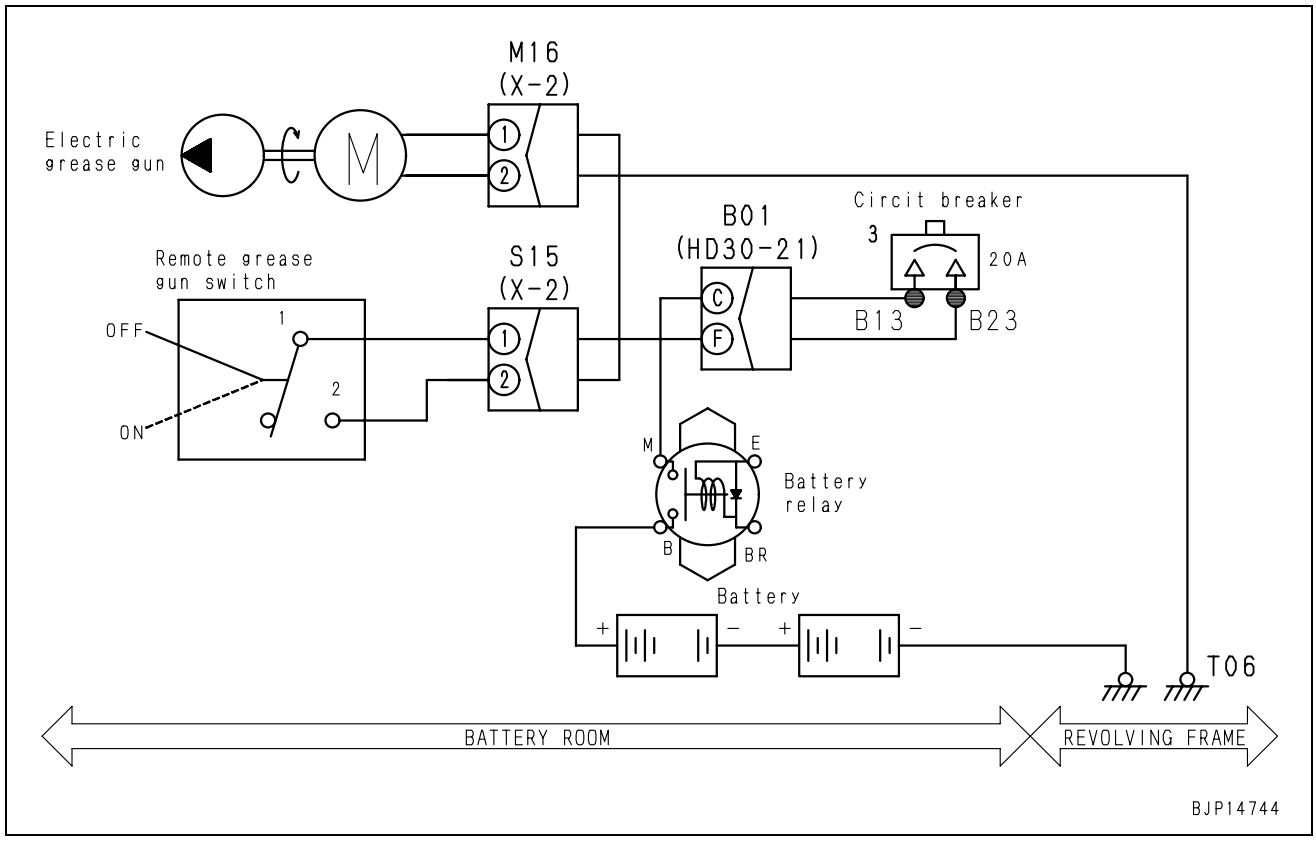


E-31 Electric grease gun does not operate

Failure phenomenon	• Electric grease gun does not operate.
Relative information	

<table>
<tr><td rowspan="11">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td>1</td><td>Defective circuit breaker No. 3</td><td colspan="4">If the circuit breaker is turned OFF, the circuit probably has grounding fault
(See cause 4).</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective grease gun remote switch
(Internal disconnection)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td>S15 (female)</td><td>Remote switch</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (2)</td><td>OFF</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td></td><td>ON</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Disconnection of wiring harness
(Disconnection or defective contact with connector)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between B23 – S15 (male) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between S15 (male) (2) – M16 (male) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between M16 (male) (2) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Grounding fault of wiring harness
(Contact with grounding circuit)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between B23 – S15 (male) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Wiring harness between S15 (male) (2) – M16 (male) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td>5</td><td>Defective grease pump</td><td colspan="4">If causes 1 – 4 are not detected, the grease pump may be defective.
(Since trouble is in the grease pump, troubleshooting cannot be carried out.)</td></tr>
</table>

Circuit diagram related to electric grease gun

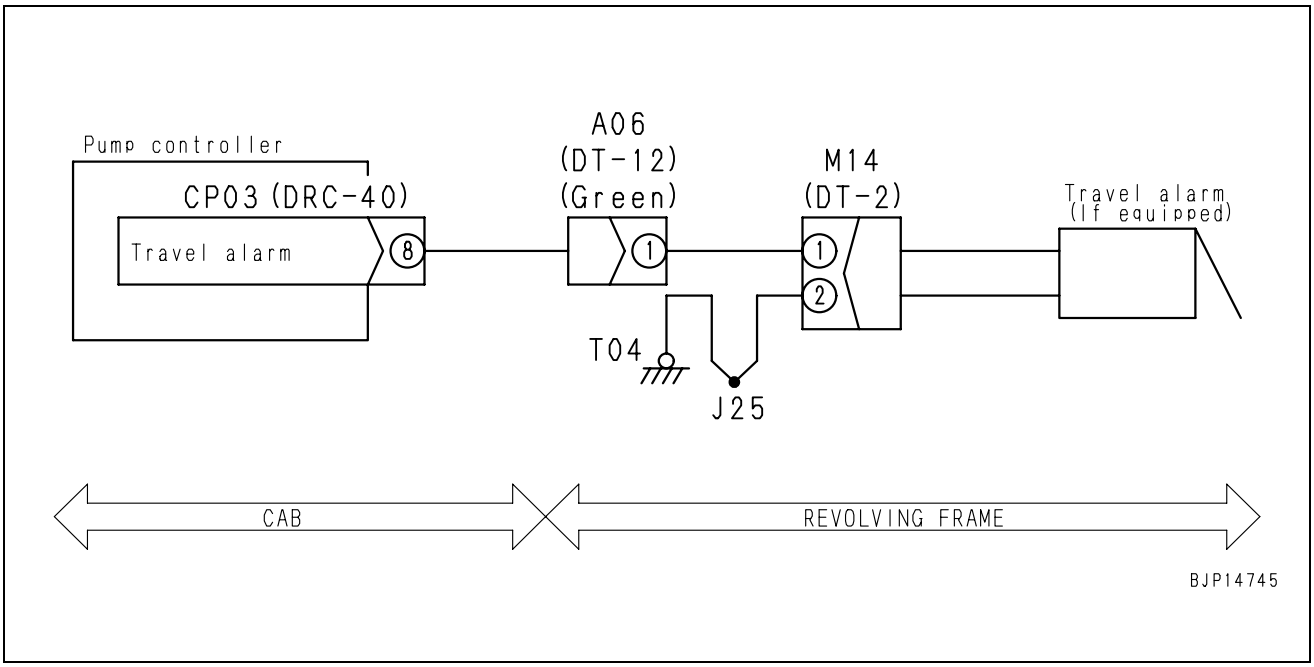


E-32 Travel alarm does not sound or does not stop sounding

Failure phenomenon	• Travel alarm does not sound or does not stop sounding.	(1) The alarm does not sound while the machine is traveling. (2) The alarm sounds while the machine is stopped.
Relative information		

	Cause		Standard value in normalcy and references for troubleshooting			
Presumed cause and standard value in normalcy	1	Defective travel signal	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			Monitoring code	Item	Normal display	
			01901 Pressure switch 2	Left travel	Lever operated: ON Lever in neutral: OFF	
			01900 Pressure switch 1	Right travel	Lever operated: ON Lever in neutral: OFF	
			If the display on the monitor panel is abnormal, carry out troubleshooting in "*** is not displayed normally in monitoring function".			
	2	Defective travel alarm (Internal defect)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			M14 (female)	Travel lever	Voltage	
			Between (1) – (2)	Neutral	Below 1 V	
				Operated	20 – 30 V	
			If the above voltages are normal and the travel alarm does not sound, the travel alarm is defective.			
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (8) – M14 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between M14 (female) (2) – J25 – chassis ground		Resistance	Max. 1 Ω
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP03 (female) (8) – M14 (female) (1) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			CP03	Travel lever	Voltage	
			Between (8) – chassis ground	Neutral	Max. 1 V	
				Operated	20 – 30 V	

Circuit diagram related to travel alarm



PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

40 Troubleshooting

Troubleshooting of hydraulic and mechanical system (H-mode)

Troubleshooting of hydraulic and mechanical system (H-mode) 3
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Troubleshooting of hydraulic and mechanical system (H-mode)

Information in troubleshooting table

★ Tables and related circuit diagrams concerning troubleshooting contains the following information. Please understand the contents sufficiently before carrying out troubleshooting.

Failure phenomenon	Phenomena on machine
Relative information	Information concerning to failure or troubleshooting.

	Cause		Standard value in normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	Possible causes of failure (The sequence number is only for reference and does not state priority.)	<Contents> • Standard values for judgement of possible causes. • Remarks for judgement
	2		
	3		
	4		

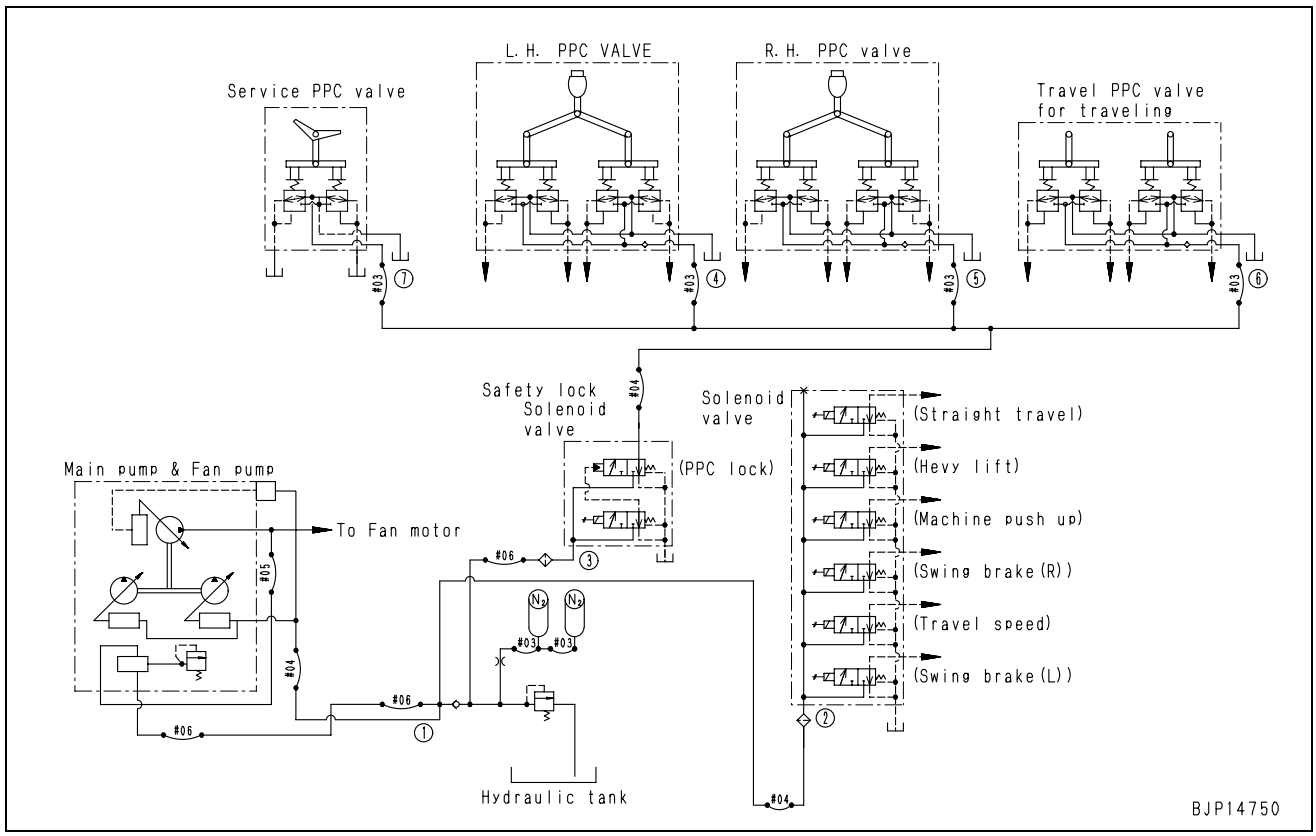
H-1 Speed or power of all work equipment, travel, and swing is low

Failure phenomenon	• Speed or power of all work equipment, travel, and swing is low
Relative information	• Measure the speed of the work equipment, travel, and swing speed and check that all of them are slow (or their power is low). • Check that abnormal sound is not heard from around the pump. (If abnormal sound is heard, carry out the related troubleshooting.) • Check that the machine does not deviate. (If the machine deviates, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P. • If failure code related to pump control is also displayed, carry out troubleshooting for it first.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Defective engine unit	★Run the engine at high idle during troubleshooting.	
			Heavy lift switch and right work equipment control lever	Engine speed
			Heavy lift switch OFF + Boom RAISE relief	Above 1,700 rpm
			Heavy lift switch ON + Boom RAISE relief	Above 1,700 rpm
	2	Malfunction of self pressure reducing valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Control levers	Control relief pressure
			All levers in neutral	$3.33\,^{+0.49}_{0}$ MPa $\{34\,^{+5}_{0}$ kg/cm$^2\}$
			If fan is rotating and pressure at self pressure reducing valve is low, self pressure reducing valve may be malfunctioning. Check self pressure reducing valve directly (It cannot be adjusted).	
	3	Leakage in control system devices	★Stop the engine and block (1) – (9) in Fig. 1 in order. Run the engine at high idle and check.	
			Control levers	Control relief pressure
			All levers in neutral	$3.33\,^{+0.49}_{0}$ MPa $\{34\,^{+5}_{0}$ kg/cm$^2\}$
	4	Wrong adjustment or malfunction of main relief valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Heavy lift switch and right work equipment control lever	Main relief pressure
			Heavy lift switch OFF + Boom RAISE relief	$31.4\,^{+1.0}_{-2.0}$ MPa $\{320\,^{+10}_{-20}$ kg/cm$^2\}$
			Heavy lift switch ON + Boom RAISE relief	$33.8\,^{+1.0}_{-2.0}$ MPa $\{345\,^{+10}_{-20}$ kg/cm$^2\}$
			If the oil pressure is still abnormal after adjustment, the main relief valve (on the low-pressure set side and high-pressure set side) may be defective. Check the main relief valve directly.	
	5	Malfunction of EPC valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Control levers	EPC valve output pressure

<table>
<tr><td rowspan="8">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="3">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="5">6</td><td rowspan="5">Wrong adjustment or malfunction of VC valve</td><td colspan="3">★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting (Start troubleshooting after checking that causes 4, 5 are not detected).</td></tr>
<tr><td colspan="2">Heavy lift switch and right work equipment control lever</td><td>VC valve output pressure</td></tr>
<tr><td colspan="2">All levers in neutral</td><td>Min. 1.76 MPa
{Min. 18 kg/cm^2}</td></tr>
<tr><td colspan="2">Heavy lift switch OFF + Boom RAISE relief</td><td>1.18 ± 0.2 MPa
{12 ± 2 kg/cm^2}</td></tr>
<tr><td colspan="2">Heavy lift switch ON + Boom RAISE relief</td><td>1.14 ± 0.2 MPa
{11.6 ± 2 kg/cm^2}</td></tr>
<tr><td rowspan="3">7</td><td rowspan="3">Malfunction of jet sensor</td><td colspan="3">If the oil pressure is still abnormal after adjustment, the VC valve may be defective. Check the VC valve directly.</td></tr>
<tr><td colspan="3">★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.</td></tr>
<tr><td>Working mode</td><td>Control levers</td><td>Jet sensor differential pressure</td></tr>
<tr><td>P-mode</td><td>All levers in neutral</td><td>Min. 2.74 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td></td><td></td><td>P-mode</td><td>Operated to travel with no load</td><td>MPa { kg/cm^2}</td></tr>
</table>

Fig. 1: Control system devices



H-2 Engine speed lowers remarkably or engine stalls

Failure phenomenon	• Engine speed lowers remarkably or engine stalls
Related information	• Carry out all the troubleshooting in working mode P. • If failure code related to pump control is also displayed, carry out troubleshooting for it first.

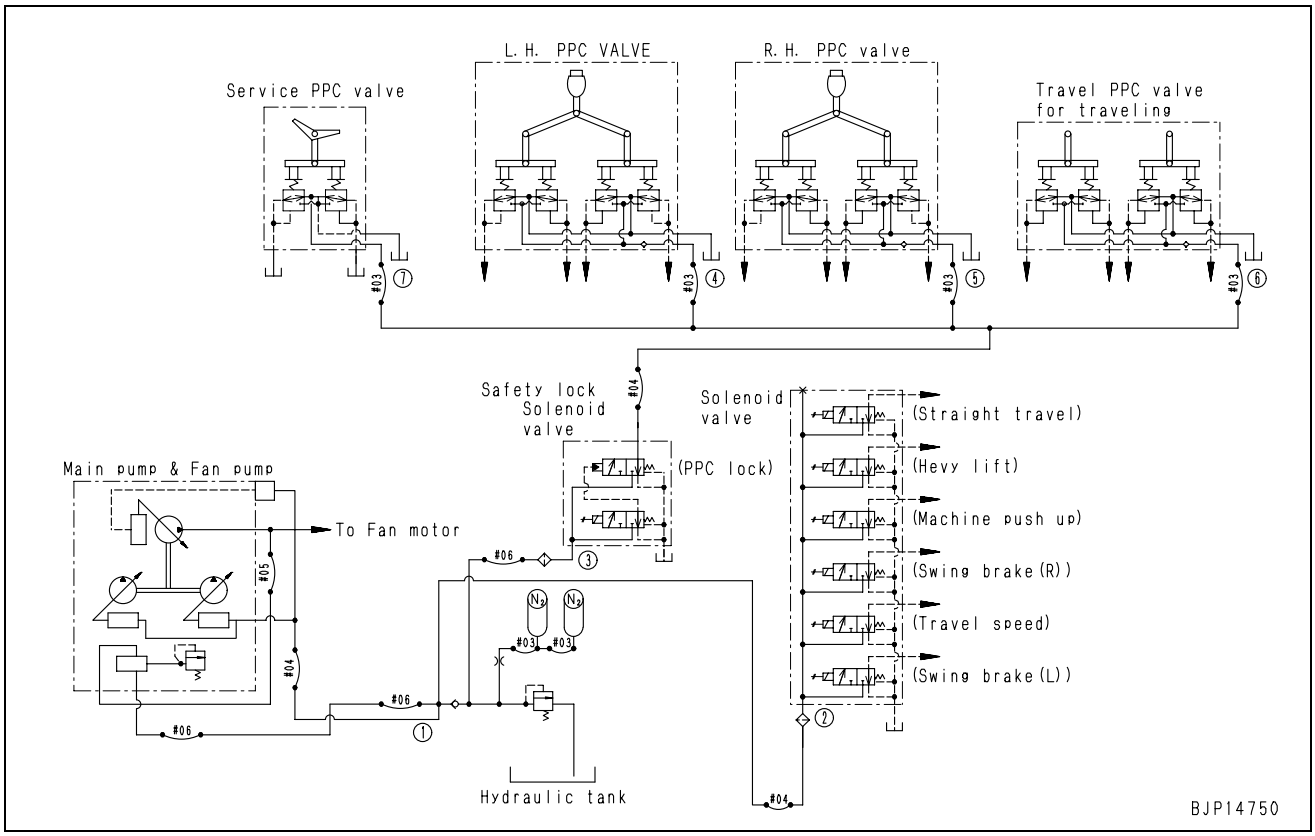
<table>
<tr><th rowspan="2">Presumed cause and standard value in normalcy</th><th colspan="2">Cause</th><th colspan="2">Standard value in normalcy and references for troubleshooting</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Malfunction of EPC valve</td><td colspan="2">★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.</td></tr>
<tr><td>Control levers</td><td>EPC valve output pressure</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="6">2</td><td rowspan="6">Defective adjustment or malfunction of VC valve</td><td colspan="2">★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.</td></tr>
<tr><td>Heavy lift switch
R.H. work equipment control lever</td><td>VC valve output pressure</td></tr>
<tr><td>All control levers in neutral</td><td>Min. 1.76 MPa
{Min. 18 kg/cm^2}</td></tr>
<tr><td>Heavy lift switch OFF +
Boom relieved in RAISE position</td><td>1.18 ± 0.2 MPa
{12 ± 2 kg/cm^2}</td></tr>
<tr><td>Heavy lift switch ON +
Boom relieved in RAISE position</td><td>1.14 ± 0.2 MPa
{11.6 ± 2 kg/cm^2}</td></tr>
<tr><td colspan="2">If the oil pressure cannot be set normally by adjustment, the VC valve may have a malfunction. Check the VC valve directly.</td></tr>
<tr><td rowspan="5">3</td><td rowspan="5">Defective adjustment or malfunction of jet sensor relief valve</td><td colspan="2">★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle. (Check cause 1, 2 and confirm that the result is normal before troubleshooting.)</td></tr>
<tr><td>Work equipment control lever</td><td>Jet sensor differential pressure</td></tr>
<tr><td></td><td>MPa
{kg/cm^2}</td></tr>
<tr><td>Boom relieved in RAISE position</td><td>MPa
{kg/cm^2}</td></tr>
<tr><td colspan="2">If the oil pressure cannot be set normally by adjustment, the jet sensor relief valve may have a malfunction. Check the jet sensor relief valve directly.</td></tr>
<tr><td>4</td><td>Defective engine</td><td colspan="2">If the results of check of causes 1 – 3 are normal, the engine may be defective. Check the engine</td></tr>
</table>

H-3 All work equipment, travel, and swing systems do not work

Failure phenomenon	• All work equipment, travel, and swing systems do not work
Relative information	• Carry out all the troubleshooting in working mode P. • If failure code related to pump control is also displayed, carry out troubleshooting for it first.

<table>
<tr><td rowspan="12">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="2">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Defective coupling (Main pump drive system)</td><td colspan="2">★Keep the engine stopped for the preparations and troubleshooting.</td></tr>
<tr><td colspan="2">Disconnect the main pump oil pressure pickup coupler and rotate the crankshaft. If oil flows out of the pump outlet, PTO is normal.</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Malfunction of self pressure reducing valve</td><td colspan="2">★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.</td></tr>
<tr><td>Control levers</td><td>Control relief pressure</td></tr>
<tr><td>All levers in neutral</td><td>$3.33\ ^{+0.49}_{0}$ MPa
{$34\ ^{+5}_{0}$ kg/cm^2}</td></tr>
<tr><td colspan="2">Self pressure reducing valve may be malfunctioning. Check it directly (It cannot be adjusted).</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Leakage in control system devices</td><td colspan="2">★Stop the engine and block (1) – (9) in Fig. 1 in order. Run the engine at high idle and check.</td></tr>
<tr><td>Control levers</td><td>Control relief pressure</td></tr>
<tr><td>All levers in neutral</td><td>$3.33\ ^{+0.49}_{0}$ MPa
{$34\ ^{+5}_{0}$ kg/cm^2}</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Malfunction of PPC lock solenoid valve</td><td colspan="2">★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.</td></tr>
<tr><td>Lock lever</td><td>Solenoid valve outlet pressure</td></tr>
<tr><td>FREE</td><td>Min. 2.74 MPa
{28 kg/cm^2}</td></tr>
<tr><td>LOCK</td><td>0 MPa {0 kg/cm^2}</td></tr>
</table>

Fig. 1: Control system devices



H-4 Abnormal sound is heard from around pump

Failure phenomenon	• Abnormal sound is heard from around pump
Relative information	

		Cause	Standard value in normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	Low hydraulic oil level	Since the hydraulic oil level may be low, check it directly.
	2	Loosened piping clamp	Since a piping clamp between the hydraulic tank and hydraulic pump may be loosened, check it directly.
	3	Clogged hydraulic tank strainer	Since the hydraulic tank strainer may be clogged, check it directly.
	4	Internal defect of hydraulic pump	Since the hydraulic pump may have a defect in it, check it directly.
	5	Observation of condition	If a cause cannot be found by troubleshooting, operate the machine as it is for a while and observe the condition for change.

H-5 Boom speed or power is low

Failure phenomenon	• Boom speed or power is low	(1) The boom speed or power is low in the normal mode.
Relative information	• The normal mode is the state that the heavy lift switch, swing priority switch, and machine push-up switch are turned OFF. • Check that the other work equipment, travel, and swing are normal. (If any of them is abnormal, carry out troubleshooting related to it.) • Check that the machine does not deviate. (If it deviates, carry out troubleshooting related to deviation.) • When carrying out the following troubleshooting, set the working mode in the P-mode. • Before carrying out troubleshooting, check that electric circuit related to boom control is normal.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of right PPC valve (Boom circuit)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Right work equipment control lever	PPC valve output pressure
			Boom RAISE/LOWER stroke end	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of swing priority solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Swing priority switch and right work equipment control lever	Solenoid valve outlet pressure
			Swing priority switch OFF + Lever in neutral	0 MPa {0 kg/cm^2}
			Swing priority switch ON + Boom RAISE operation	Min. 2.74 MPa {Min. 28 kg/cm^2}
	3	Malfunction of boom control valve (spool)	The spool of the boom control valve (Lo, Hi) may malfunction. Check it directly.	
	4	Malfunction of boom control valve (Safety-suction valve)	The safety-suction valve of the boom control valve (Lo) may malfunction. Check it directly. (When checking the safety-suction valve by exchanging it with a valve of another work equipment circuit, stop the hose of the machine push-up solenoid securely. After finishing check, be sure to return the safety-suction valve since its set pressure and structure are different from others.)	
	5	Boom control valve (control valve unit) defective	The control valve unit of the boom control valve (Lo, Hi) may be defective. Check it directly.	
	6	Boom cylinder seal defective	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Right work equipment control lever	Leakage from cylinder
			Boom RAISE relief	Max. 20 cc/min

Failure phenomenon	• Boom speed or power is low	(2) The boom raise speed or power is low in the heavy lift mode.
Relative information	• The heavy lift mode is the state that the heavy lift switch is turned ON. • Check that the other work equipment, travel, and swing are normal. (If any of them is abnormal, carry out troubleshooting related to it.) • Check that the machine does not deviate. (If it deviates, carry out troubleshooting related to deviation.) • When carrying out the following troubleshooting, set the working mode in the P-mode. • Before carrying out troubleshooting, check that electric circuit related to heavy lift solenoid is normal.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of 2-stage relief solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Right work equipment control lever	Solenoid valve outlet pressure
			Neutral	0 MPa {0 kg/cm^2}
			Single boom RAISE operation	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Wrong adjustment or malfunction of main relief valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Right work equipment control lever	Main relief pressure
			Single boom RAISE operation	$33.8^{+1.0}_{-2.0}$ MPa {345^{+10}_{-20} kg/cm^2}
			If the main relief valve is still abnormal after adjustment, its operation (on the high pressure set side) may be defective. Check it directly.	

Failure phenomenon	• Boom speed or power is low	(3) The boom lower speed or power is low in the machine push-up mode.
Relative information	• The heavy lift mode is the state that the machine push-up switch is turned ON. • Check that the other work equipment, travel, and swing are normal. (If any of them is abnormal, carry out troubleshooting related to it.) • Check that the machine does not deviate. (If it deviates, carry out troubleshooting related to deviation.) • When carrying out the following troubleshooting, set the working mode in the P-mode. • Carry out troubleshooting for electric circuit related to machine push-up solenoid first.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of machine push-up solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Machine push-up switch	Solenoid valve outlet pressure
			OFF	Min. 2.74 MPa {Min. 28 kg/cm^2}
			ON	0 MPa {0 kg/cm^2}
	2	Malfunction of boom control valve (Safety-suction valve)	The safety-suction valve of the boom control valve (Lo) (on the high pressure set side on the head side) may malfunction. Check it directly.	

H-6 Speed or power of arm is low

Failure phenomenon	• Speed or power of arm is low
Relative information	• Check that the speeds of the other work equipment, travel, and swing are normal. (If they are abnormal, carry out the related troubleshooting.) • Check that the machine does not deviate. (If the machine deviates, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P. • Before carrying out troubleshooting, check that electric circuit related to arm control is normal.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of left PPC valve (arm circuit)	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			L.H. work equipment control lever	PPC valve output pressure
			Arm IN, OUT Full stroke	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of arm control valve (spool)	Since the spool of the arm control valve (Lo, Hi) may have a malfunction, check it directly.	
	3	Malfunction of arm control valve (safety & suction valve)	The safety-suction valve of the arm control valve (Lo, Hi) may malfunction. Check it directly. (After checking the safety-suction valve by exchanging it with a valve of another work equipment circuit, be sure to return it since its set pressure is different from others.)	
	4	Defective arm control valve (body)	Since the body of the arm control valve (Lo, Hi) may have a malfunction, check it directly.	
	5	Defective seal of arm cylinder	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			L.H. work equipment control lever	Leakage from cylinder
			Relieved in arm IN position	Max. 20 cc/min

H-7 Speed or power of bucket is low

Failure phenomenon	• Speed or power of bucket is low
Relative information	• Check that the speeds of the other work equipment, travel, and swing are normal. (If they are abnormal, carry out the related troubleshooting.) • Check that the machine does not deviate. (If the machine deviates, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P. • Before carrying out troubleshooting, check that electric circuit related to bucket control is normal.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of right PPC valve (bucket circuit)	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			R.H. work equipment control lever (bucket)	PPC valve output pressure
			Bucket CURL, DUMP Full stroke	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of bucket control valve (spool)	Since the spool of the bucket control valve (Lo, Hi) may have a malfunction, check it directly.	
	3	Malfunction of bucket control valve (safety & suction valve)	Since the safety & suction valve of the bucket control valve (Lo, Hi) may have a malfunction, check it directly. (The safety & suction valve may be checked by replacing it with one of another work equipment circuit. After checking, however, be sure to return the safety & suction valve since its set pressure and structure are different from the others.)	
	4	Defective bucket control valve (body)	Since the body of the bucket control valve (Lo, Hi) may have a malfunction, check it directly.	
	5	Defective seal of bucket cylinder	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			R.H. work equipment control lever (bucket)	Leakage from cylinder
			Relieved in bucket CURL position	Max. 20 cc/min

H-8 Boom does not move

Failure phenomenon	• Boom does not move
Relative information	• Check that operations of the other work equipment, travel, and swing are normal. (If they are abnormal, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of right PPC valve (boom circuit)	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			R.H. work equipment control lever	PPC valve output pressure
			Boom RAISE, LOWER Full stroke	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of boom control valve (spool)	Since the spool of the boom control valve (Lo, Hi) may have a malfunction, check it directly.	

H-9 Arm does not move

Failure phenomenon	• Arm does not move
Relative information	• Check that operations of the other work equipment, travel, and swing are normal. (If they are abnormal, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of left PPC valve (arm circuit)	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			L.H. work equipment control lever	PPC valve output pressure
			Arm IN, OUT Full stroke	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of arm control valve (spool)	Since the spool of the arm control valve (Lo, Hi) may have a malfunction, check it directly.	

H-10 Bucket does not move

Failure phenomenon	• Bucket does not move
Relative information	• Check that operations of the other work equipment, travel, and swing are normal. (If they are abnormal, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of right PPC valve (bucket circuit)	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			R.H. work equipment control lever	PPC valve output pressure
			Bucket CURL, DUMP Full stroke	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of bucket control valve (spool)	Since the spool of the bucket control valve (Lo, Hi) may have a malfunction, check it directly.	

H-11 Hydraulic drift of work equipment is large

Failure phenomenon	• Hydraulic drift of work equipment is large	(1) Hydraulic drift of boom is large
Relative information		

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Defective seal of boom control valve (spool)	Since the spool of the boom control valve (Lo) may have a malfunction, check it directly.	
	2	Malfunction of boom control valve (safety & suction valve)	Since the safety & suction valve (bottom side) of the boom control valve (Lo) may have a malfunction, check it directly. (The safety & suction valve may be checked by replacing it with one of another work equipment circuit. After checking, however, be sure to return the safety & suction valve since its set pressure and structure are different from the others.)	
	3	Defective seal of boom cylinder	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			R.H. work equipment control lever	Leakage from cylinder
			Relieved in boom RAISE position	Max. 20 cc/min

Failure phenomenon	• Hydraulic drift of work equipment is large	(2) Hydraulic drift of arm is large
Relative information		

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Defective seal of arm control valve (spool)	Since the spool of the arm control valve (Lo) may have a malfunction, check it directly.	
	2	Malfunction of arm control valve (safety & suction valve)	Since the safety & suction valve (head side) of the arm control valve (Lo) may have a malfunction, check it directly. (The safety & suction valve may be checked by replacing it with one of another work equipment circuit. After checking, however, be sure to return the safety & suction valve since its set pressure and structure are different from the others.)	
	3	Defective seal of arm cylinder	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			L.H. work equipment control lever	Leakage from cylinder
			Relieved in arm IN position	Max. 20 cc/min

Failure phenomenon	• Hydraulic drift of work equipment is large	(3) Hydraulic drift of bucket is large
Relative information		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Defective seal of bucket control valve (spool)	Since the spool of the bucket control valve (Lo, Hi) may have a malfunction, check it directly.	
	2	Malfunction of bucket control valve (safety & suction valve)	Since the safety & suction valve (bottom side) of the bucket control valve (Lo, Hi) may have a malfunction, check it directly. (The safety & suction valve may be checked by replacing it with one of another work equipment circuit. After checking, however, be sure to return the safety & suction valve since its set pressure and structure are different from the others.)	
	3	Defective seal of bucket cylinder	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			R.H. work equipment control lever	Leakage from cylinder
			Relieved in bucket CURL position	Max. 20 cc/min

H-12 Time lag of work equipment is large

Failure phenomenon	• Time lag of work equipment is large	(1) Time lag of boom is large
Relative information		

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Malfunction of boom control valve (safety & suction valve)	Since the safety & suction valve (head side) of the boom control valve (Lo) may have a malfunction, check it directly. (When checking by replacing the safety & suction valve with one of another work equipment circuit, stop the oil in the machine pushup solenoid hose securely. After checking, be sure to return the safety & suction valve since its set pressure and structure are different from the others.)

Failure phenomenon	• Time lag of work equipment is large	(2) Time lag of arm is large
Relative information		

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Malfunction of arm control valve (safety & suction valve)	Since the safety & suction valve (bottom side) of the arm control valve (Lo, Hi) may have a malfunction, check it directly. (The safety & suction valve may be checked by replacing it with one of another work equipment circuit. After checking, however, be sure to return the safety & suction valve since its set pressure and structure are different from the others.)

Failure phenomenon	• Time lag of work equipment is large	(3) Time lag of bucket is large
Relative information		

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting
	1	Malfunction of bucket control valve (safety & suction valve)	Since the safety & suction valve (bottom side) of the bucket control valve (Lo, Hi) may have a malfunction, check it directly. (The safety & suction valve may be checked by replacing it with one of another work equipment circuit. After checking, however, be sure to return the safety & suction valve since its set pressure and structure are different from the others.)

H-13 Heavy lift function does not operate or stop

Failure phenomenon	• Heavy lift function does not operate or stop
Relative information	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Check by (2) in "H-5 Boom speed or power is low".	

H-14 Machine push-up function does not operate or stop

Failure phenomenon	• Machine push-up function does not operate or stop
Relative information	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Check by (3) in "H-5 Boom speed or power is low".	

H-15 Boom shockless function cannot be turned ON or OFF

Failure phenomenon	• Boom shockless function cannot be turned ON or OFF
Relative information	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Malfunction of boom shock-less solenoid valve	★Prepare with starting switch OFF, then carry out troubleshooting with the starting switch ON.
			Remove the solenoid valve from the valve assembly and connect the connector and operate the boom shockless control switch. If the spool moves at this time, the solenoid valve is normal.
	2	Malfunction of boom shock-less valve	Since the boom shockless valve may have a malfunction, check it directly.

H-16 Machine deviates in one direction

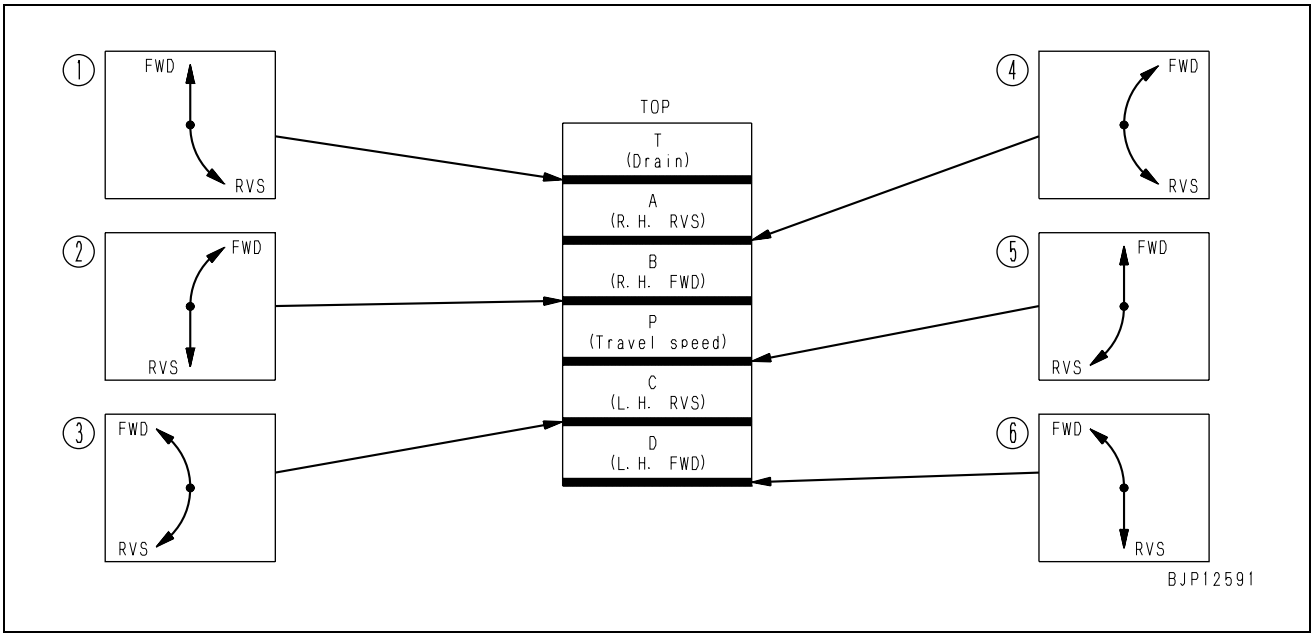
Failure phenomenon	• Machine deviates in one direction	(1) Machine deviates in the same direction, regardless of its travel direction
Relative information	• Check that the travel speed is normal. (If it is abnormal, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Wrong adjustment of main pump	See TESTING AND ADJUSTING, Testing and adjusting travel deviation.	
	2	Malfunction of travel PPC valve	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel lever	PPC valve output pressure
			FORWARD, REVERSE Full stroke	2.74 MPa {28 kg/cm^2}
	3	Malfunction of travel control valve (spool)	Since the spool of the travel control valve may have a malfunction, check it directly.	
	4	Defective travel control valve (body)	Since the body of the travel control valve may have a malfunction, check it directly.	
	5	Defective seal of center swivel joint	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel lever	Leakage from swivel joint
			Relieved on one side	Max. 100 cc/min
			If seal is defective, the machine deviates as shown in Fig. 1.	
	6	Leakage in travel motor	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel lever	Leakage from travel motor
			Relieved on one side	Max. 40 ℓ/min
	7	Defective travel motor	Since the travel motor may be defective, check it directly.	
	8	Internal defect of final drive	Since the final drive may have a defect in it, check it directly. (The defect can be judged by abnormal sound, abnormal heat, metal chips in drained oil, etc.)	

Failure phenomenon	• Machine deviates in one direction	(2) Machine deviates in different directions, depending on its travel direction
Relative information	• Check that the travel speed is normal. (If it is abnormal, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of travel PPC valve	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel lever	PPC valve output pressure
			FORWARD, REVERSE Full stroke	2.74 MPa {28 kg/cm^2}
	2	Malfunction of travel control valve (spool)	Since the spool of the travel control valve may have a malfunction, check it directly.	
	3	Defective seal of center swivel joint	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel lever	Leakage from swivel joint
			Relieved on one side	Max. 100 cc/min
			If seal is defective, the machine deviates as shown in Fig. 1.	
	4	Low set pressure of travel motor safety valve	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel lever	Travel relief pressure
			Relieved on one side	$34.3\,^{+1.0}_{-2.0}$ MPa $\{350\,^{+10}_{-20}$ kg/cm$^2\}$

Fig. 1 Defective seals in center swivel joint and travel deviation directions



H-17 Machine deviates largely at start

Failure phenomenon	• Machine deviates largely at start	(1) Machine deviates only when started with travel lever at full stroke
Relative information	• Check that the machine does not deviate during constant-speed travel. (If the machine deviates even during constant-speed travel, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.	

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of main pump servo-valve	Since the servo-valve of main pumps may have a malfunction, check it directly. (Test the servo-valve unit or measure its stroke.)	
	2	Malfunction of travel control valve (spool)	Since the spool of the travel control valve may have a malfunction, check it directly.	
	3	Defective seal of center swivel joint	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Travel lever	Leakage from swivel joint
			Either side relief	Max. 100 cc/min
	4	Internal defect of travel motor (body)	Since the travel motor may have a defect in it, check it directly.	

Failure phenomenon	• Machine deviates largely at start (2) Machine deviates when started, regardless of travel lever stroke
Relative information	• Check that the machine does not deviate during constant-speed travel. (If the machine deviates even during constant-speed travel, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Defective adjustment or malfunction of VC valve	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle. (Check cause 3 and confirm that the result is normal before troubleshooting.)	
			Travel lever	VC valve output pressure
			Neutral	Max. 0.55 MPa {Max. 5.5 kg/cm^2}
			Full stroke on one side (Idle travel)	Min. 1.67 MPa {Min. 17 kg/cm^2}
			If the oil pressure cannot be set normally by adjustment, the VC valve may have a malfunction or may be adjusted defectively. Check the VC valve directly.	
	2	Malfunction of main pump servo-valve	Since the servo-valve of main pump may have a malfunction, check it directly. (Test the servo-valve unit or measure its stroke.)	
	3	Defective adjustment or malfunction of jet sensor	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel lever	Differential pressure of jet sensor
			Neutral	Min. 1.14 MPa {Min. 11.6 kg/cm^2}
			Full stroke on one side (Idle travel)	Max. 0.15 MPa {Max. 1.5 kg/cm^2}
			If the oil pressure cannot be set normally by adjustment, the relief valve may have a malfunction or the orifice may be defective. Check the relief valve and orifice directly.	

H-18 Machine deviates largely during compound operation

Failure phenomenon	• Machine deviates largely during compound operation
Relative information	• Check that the machine does not deviate when the work equipment is not operated. (If the machine deviates under that condition, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of travel junction solenoid valve	Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Control levers	Solenoid valve outlet pressure
			All levers in neutral	0 MPa {0 kg/cm^2}
			Operation of work equipment or swing + Travel	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of travel junction valve	Since the travel junction valve of the travel control valve may have a malfunction, check it directly.	

H-19 Travel speed or power is low

Failure phenomenon	• Travel speed or power is low
Relative information	• Check that speed of work equipment and travel is normal. • Check that the machine does not deviate. (If the machine deviates, carry out the related troubleshooting.) • Carry out all the troubleshooting in working mode P.

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of travel PPC valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Travel lever	PPC valve output pressure
			Forward/Reverse stroke end	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of 2-stage relief solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Travel lever	Solenoid valve outlet pressure
			Neutral	0 MPa {0 kg/cm^2}
			Operated	Min. 2.74 MPa {Min. 28 kg/cm^2}
	3	Wrong adjustment or malfunction of main relief valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Travel lever	Travel relief pressure
			Either side relieved	$34.3^{+1.0}_{-2.0}$ MPa {350^{+10}_{-20} kg/cm^2}
			If the main relief valve is still abnormal after adjustment, its operation (on the high pressure set side) may be defective. Check it directly.	

H-20 Machine does not travel (only one track)

Failure phenomenon	• Machine does not travel (only one track)	(1) Machine does not travel in either direction.
Relative information		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Malfunction of travel motor (parking brake)	Since the parking brake of the travel motor may have a malfunction, check it directly.
	2	Internal defect of travel motor (body)	Since the travel motor may have a defect in it, check it directly.
	3	Internal defect of final drive	Since the final drive may have a defect in it, check it directly. (The defect can be judged by abnormal sound, abnormal heat, metal chips in drained oil, etc.)

Failure phenomenon	• Machine does not travel (only one track)	(2) Machine does not travel forward or in reverse
Relative information	• Carry out all the troubleshooting in working mode P.	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Malfunction of travel PPC valve	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel levers	PPC valve output pressure
			FORWARD, REVERSE Full stroke	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of travel control valve (spool)	Since the spool of the travel control valve may have a malfunction, check it directly.	
	3	Defective travel control valve (suction valve)	Since the suction valve of the travel control valve may have a malfunction, check it directly. (The suction valve can be checked by replacing it with normal one.)	
	4	Malfunction of travel motor (safety valve)	★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			Travel levers	Travel relief pressure
			Relieved on one side (Direction in which machine does not travel)	$34.3\ ^{+1.0}_{-2.0}$ MPa $\{350\ ^{+10}_{-20}$ kg/cm$^2\}$
	5	Malfunction of travel motor (counterbalance valve)	Since the counterbalance valve of the travel motor may have a malfunction, check it directly.	

H-21 Travel speed does not change

Failure phenomenon	• Travel speed does not change
Relative information	• Check that the Lo and Hi travel speeds are normal. (If they are abnormal, carry out the related troubleshooting.) • The travel speed selection system has the automatic speed changing function. If the oil pressure rises above 22.6 MPa {230 kg/cm^2} during travel, the travel speed is changed to Lo even while the machine is traveling at Hi (Hi is still displayed on the monitor panel). • Carry out all the troubleshooting in working mode P.

<table>
<tr><td rowspan="5">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="2">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Malfunction of travel speed solenoid valve</td><td colspan="2">★Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.</td></tr>
<tr><td>Travel speed selection switch</td><td>Solenoid valve outlet pressure</td></tr>
<tr><td>Lo</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of travel motor (servo mechanism)</td><td>Hi</td><td>Min. 2.74 MPa
{Min.28 kg/cm^2}</td></tr>
<tr><td colspan="2">Since the servo mechanism of the travel motor may have a malfunction, check it directly.</td></tr>
</table>

H-22 Upper structure does not swing

Failure phenomenon	• Upper structure does not swing	(1) The upper structure swings in neither direction.
Relative information	• Check that the other work equipment and travel are normal. (If either of them is abnormal, carry out troubleshooting related to it.) • When carrying out the following troubleshooting, set the swing lock switch in OFF and the working mode in the P-mode.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of swing holding brake solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Solenoid valve outlet pressure
			Neutral (After 10 seconds or more)	0 MPa {0 kg/cm^2}
			Operated to swing (in either direction)	Min. 2.74 MPa {Min.28 kg/cm^2}
	2	Malfunction of swing motor (parking brake)	The parking brake of the swing motor may malfunction. Check it directly.	
	3	Wrong adjustment or malfunction of swing motor (safety valve)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Swing relief pressure
			Swing relief (in either direction)	$28.4\ ^{+2.5}_{-0.5}$ MPa {$290\ ^{+25}_{-5}$ kg/cm^2}
			If the oil pressure is still abnormal after adjustment, the safety valve may malfunction. check the safety valve directly.	
	4	Swing motor (motor unit) defective internally	The motor unit of the swing motor may have a defect in it. Check it directly.	
	5	Swing machinery defective internally	Swing machinery may have a defect in it. Check it directly. (The swing machinery can be checked by abnormal sound, abnormal heating, metal dust in the drained oil, etc.)	

Failure phenomenon	• Upper structure does not swing	(2) The upper structure does not swing in only 1 direction.
Relative information	• Check that the other work equipment and travel are normal. (If either of them is abnormal, carry out troubleshooting related to it.) • When carrying out the following troubleshooting, set the swing lock switch in OFF and the working mode in the P-mode.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of left PPC valve (swing circuit)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	PPC valve output pressure
			Swing RIGHT/LEFT stroke end	Min. 2.74 MPa {Min.28 kg/cm^2}
	2	Malfunction of swing control valve (spool)	The spool of the swing control valve may malfunction. Check it directly.	
	3	Malfunction of swing control valve (suction valve)	The suction valve of the swing control valve may malfunction. Check it directly. (The suction valves of the right and left swing control valves can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	4	Malfunction of swing motor (suction valve)	The suction valve of the swing motor may malfunction. Check it directly. (The suction valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	5	Malfunction of swing motor (check valve)	The check valve of the swing motor may malfunction. Check it directly. (The check valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	

H-23 Swing speed or acceleration is low

Failure phenomenon	• Swing speed or acceleration is low	(1) The swing speed or acceleration is low in both directions.
Relative information	• Check that the other work equipment and travel are normal. (If either of them is abnormal, carry out troubleshooting related to it.) • When carrying out the following troubleshooting, set the working mode in the P-mode and turn the swing lock switch OFF.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Leakage in swing motor	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Leakage from swing motor
			Swing relief (in either direction)	Max. 10 ℓ/min
	2	Malfunction of swing motor (parking brake)	The parking brake of the swing motor may malfunction. Check it directly.	
	3	Wrong adjustment or malfunction of swing motor (safety valve)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Swing relief pressure
			Swing relief (in either direction)	$28.4\ ^{+2.5}_{-0.5}$ MPa {$290\ ^{+25}_{-5}$ kg/cm^2}
			If the oil pressure is still abnormal after adjustment, the safety valve may malfunction. check the safety valve directly.	
	4	Swing motor (motor unit) defective internally	The motor unit of the swing motor may have a defect in it. Check it directly.	
	5	Swing machinery defective internally	Swing machinery may have a defect in it. Check it directly. (The swing machinery can be checked by abnormal sound, abnormal heating, metal dust in the drained oil, etc.)	

Failure phenomenon	• Swing speed or acceleration is low	(2) The swing speed or acceleration is low in only 1 direction.
Relative information	• Check that the other work equipment and travel are normal. (If either of them is abnormal, carry out troubleshooting related to it.) • When carrying out the following troubleshooting, set the working mode in the P-mode and turn the swing lock switch OFF.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of left PPC valve (swing circuit)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	PPC valve output pressure
			Swing RIGHT/LEFT stroke end	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of swing control valve (spool)	The spool of the swing control valve may malfunction. Check it directly.	
	3	Malfunction of swing control valve (suction valve)	The suction valve of the swing control valve may malfunction. Check it directly. (The suction valves of the right and left swing control valves can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	4	Malfunction of swing motor (suction valve)	The suction valve of the swing motor may malfunction. Check it directly. (The suction valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	5	Malfunction of swing motor (check valve)	The check valve of the swing motor may malfunction. Check it directly. (The check valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	

H-24 Swing speed or acceleration is low during compound operation of swing andwork equipment

Failure phenomenon	• Swing speed or acceleration is low during compound operation of swing and work equipment	(1) The swing speed or acceleration is low during compound operation of swing and work equipment with the swing priority mode OFF.
Relative information	• When carrying out the following troubleshooting, set the working mode in the P-mode and turn the swing lock switch OFF.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of swing priority solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Swing priority switch and right work equipment control lever	Solenoid valve outlet pressure
			Swing priority switch OFF + Boom RAISE operation	Min. 2.35 MPa {Min. 24 kg/cm^2}
			Swing priority switch ON + Boom RAISE operation	0 Pa {0 kg/cm^2}
	2	Malfunction of swing PPC shuttle valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Right work equipment control lever	Swing PPC shuttle valve outlet pressure
			Swing RIGHT/LEFT stroke end	Min. 2.74 MPa {Min. 28 kg/cm^2}
	3	Malfunction of swing priority selector valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Right work equipment control lever	Swing priority selector valve outlet pressure (Port A2)
			Neutral	0 Pa {0 kg/cm^2}
			Swing RIGHT/LEFT stroke end	Same as main pump pressure
	4	Malfunction of arm control valve (throttle valve)	The throttle valve of the arm control valve (Lo) may malfunction. Check it directly.	
	5	Malfunction of bucket control valve (throttle valve)	The throttle valve of the bucket control valve (Hi) may malfunction. Check it directly.	

Failure phenomenon	• Swing speed or acceleration is low during compound operation of swing and work equipment	(2) The swing speed or acceleration is low during compound operation of swing and work equipment with the swing priority mode ON.
Relative information	• Before carry out the following troubleshooting, check that the swing speed is normal when the swing priority switch is turned OFF. • When carrying out the following troubleshooting, set the working mode in the P-mode and turn the swing lock switch OFF.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of swing priority solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Swing priority switch and right work equipment control lever	Solenoid valve outlet pressure
			Swing priority switch OFF + Boom RAISE operation	Min. 2.35 MPa {Min. 24 kg/cm^2}
			Swing priority switch ON + Boom RAISE operation	0 Pa {0 kg/cm^2}
	2	Malfunction of swing priority selector valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Right work equipment control lever	Swing priority selector valve outlet pressure (Port A1)
			Neutral	0 Pa {0 kg/cm^2}
			Boom RAISE stroke end	0 Pa {0 kg/cm^2}
	3	Malfunction of swing control valve (throttle valve)	The throttle valve of the swing control valve may malfunction. Check it directly.	

H-25 Upper structure overruns excessively when it stops swinging

Failure phenomenon	• Upper structure overruns excessively when it stops swinging	(1) The upper structure overruns excessively when it stops swinging in both directions.
Relative information		

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Wrong adjustment or malfunction of swing motor (safety valve)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Swing relief pressure
			Swing relief (in either direction)	28.4 $^{+2.5}_{-0.5}$ MPa {290 $^{+25}_{-5}$ kg/cm^2}
			If the oil pressure is still abnormal after adjustment, the safety valve may malfunction. check the safety valve directly.	
	2	Leakage in swing motor	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Leakage from swing motor
			Swing relief (in either direction)	Max. 10 ℓ/min

Failure phenomenon	• Upper structure overruns excessively when it stops swinging	(2) The upper structure overruns excessively when it stops swinging in only 1 direction.
Relative information		

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of left PPC valve (swing circuit)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	PPC valve output pressure
			Swing RIGHT/LEFT stroke end	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of swing control valve (spool)	The spool of the swing control valve may malfunction. Check it directly.	
	3	Malfunction of swing control valve (suction valve)	The suction valve of the swing control valve may malfunction. Check it directly. (The suction valves of the right and left swing control valves can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	4	Malfunction of swing motor (suction valve)	The suction valve of the swing motor may malfunction. Check it directly. (The suction valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	5	Malfunction of swing motor (check valve)	The check valve of the swing motor may malfunction. Check it directly. (The check valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	

H-26 Large shock is made when upper structure stops swinging

Failure phenomenon	• Large shock is made when upper structure stops swinging	(1) Large shock is made when the upper structure stops swinging in both directions.
Relative information	• When carrying out the following troubleshooting, set the working mode in the P-mode and turn the swing lock switch OFF.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of swing holding brake solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Solenoid valve outlet pressure
			Neutral (After 5 seconds or more)	0 MPa {0 kg/cm^2}
			Operated to swing (in either direction)	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of swing motor (parking brake)	The parking brake of the swing motor may malfunction. Check it directly.	
	3	Wrong adjustment or malfunction of swing motor (safety valve)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Swing relief pressure
			Swing relief (in either direction)	$28.4\ ^{+2.5}_{-0.5}$ MPa {$290\ ^{+25}_{-5}$ kg/cm^2}
			If the oil pressure is still abnormal after adjustment, the safety valve may malfunction. Check the safety valve directly.	
	4	Swing motor (motor unit) defective internally	The motor unit of the swing motor may have a defect in it. Check it directly.	
	5	Swing machinery defective internally	Swing machinery may have a defect in it. Check it directly. (The swing machinery can be checked by abnormal sound, abnormal heating, metal dust in the drained oil, etc.)	

Failure phenomenon	• Large shock is made when the upper structure stops swinging.	(2) Large shock is made when the upper structure stops swinging in only 1 direction.
Relative information	• When carrying out the following troubleshooting, set the working mode in the P-mode and turn the swing lock switch OFF.	

	Cause		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of left PPC valve (swing circuit)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	PPC valve output pressure
			Neutral	0 MPa {0 kg/cm^2}
			Swing RIGHT/LEFT stroke end	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of swing control valve (spool)	The spool of the swing control valve may malfunction. Check it directly.	
	3	Malfunction of swing motor (suction valve)	The suction valve of the swing motor may malfunction. Check it directly. (The suction valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	

H-27 Large abnormal sound is made when upper structure stops swinging

Failure phenomenon	• Large abnormal sound is made when upper structure stops swinging	(1) Large abnormal sound is made when the upper structure stops swinging in both directions.
Relative information		

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of back pressure compensation valve	The back pressure compensation valve may malfunction. Check it directly.	
	2	Wrong adjustment or malfunction of swing motor (safety valve)	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Swing relief pressure
			Swing relief (in either direction)	$28.4\ ^{+2.5}_{-0.5}$ MPa {$290\ ^{+25}_{-5}$ kg/cm^2}
			If the oil pressure is still abnormal after adjustment, the safety valve may malfunction. Check the safety valve directly.	
	3	Swing machinery defective internally	Swing machinery may have a defect in it. Check it directly. (The swing machinery can be checked by abnormal sound, abnormal heating, metal dust in the drained oil, etc.)	

Failure phenomenon	• Large abnormal sound is made when upper structure stops swinging	(2) Large abnormal sound is made when the upper structure stops swinging in only 1 direction.
Relative information		

		Cause	Standard value in normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	Malfunction of swing control valve (suction valve)	The suction valve of the swing control valve may malfunction. Check it directly. (The suction valves of the right and left swing control valves can be checked by exchanging them with each other and seeing the change of the phenomenon.)
	2	Malfunction of swing motor (suction valve)	The suction valve of the swing motor may malfunction. Check it directly. (The suction valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)

H-28 Hydraulic drift of swing is large

Failure phenomenon	• Hydraulic drift of swing is large	(1) While the swing holding brake is applied.
Relative information	• Carry out all the troubleshooting in working mode P.	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Malfunction of swing holding brake solenoid valve	★Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.	
			Left work equipment control lever	Solenoid valve outlet pressure
			Neutral (After 5 seconds or more)	0 MPa {0 kg/cm^2}
			Operated to swing (in either direction)	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of swing motor (parking brake)	The parking brake of the swing motor may malfunction. Check it directly.	

Failure phenomenon	• Hydraulic drift of swing is large	(2) While the swing holding brake is released.
Relative information		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Malfunction of swing control valve (spool)	The spool of the swing control valve may malfunction. Check it directly.
	2	Malfunction of swing control valve (suction valve)	The suction valve of the swing control valve may malfunction. Check it directly.
	3	Malfunction of swing motor (safety valve)	The safety valve of the swing motor may malfunction. Check it directly.
	4	Malfunction of swing motor (suction valve)	The suction valve of the swing motor may malfunction. Check it directly.
	5	Malfunction of swing motor (check valve)	The check valve of the swing motor may malfunction. Check it directly.

PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

40 Troubleshooting
Troubleshooting of engine (S-mode)

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Troubleshooting of engine (S-mode)

Method of using troubleshooting chart

The troubleshooting chart consists of the “questions”, “check items”, “causes”, and “troubleshooting” blocks.
The questions and check items are used to pinpoint high probability causes by simple inspection or from phenomena without using troubleshooting tools.
Next, troubleshooting tools or direct inspection are applied to check the narrowed causes in order from the most probable one to make final confirmation according to the troubleshooting procedure.

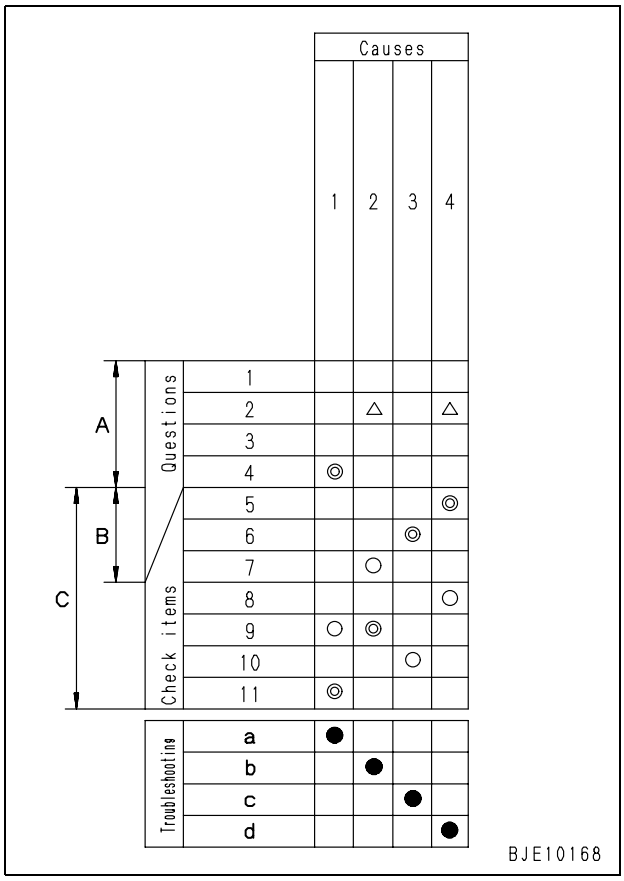
Questions:
Items to be drawn from the user or operator. They correspond to **A** and **B** in the chart on the right.
The items in **A** are basic ones. The items in **B** can be drawn from the user or operator, depending on their level.

Check items:
Simple check items used by the serviceman to narrow the causes. They correspond to **C** in the chart on the right.

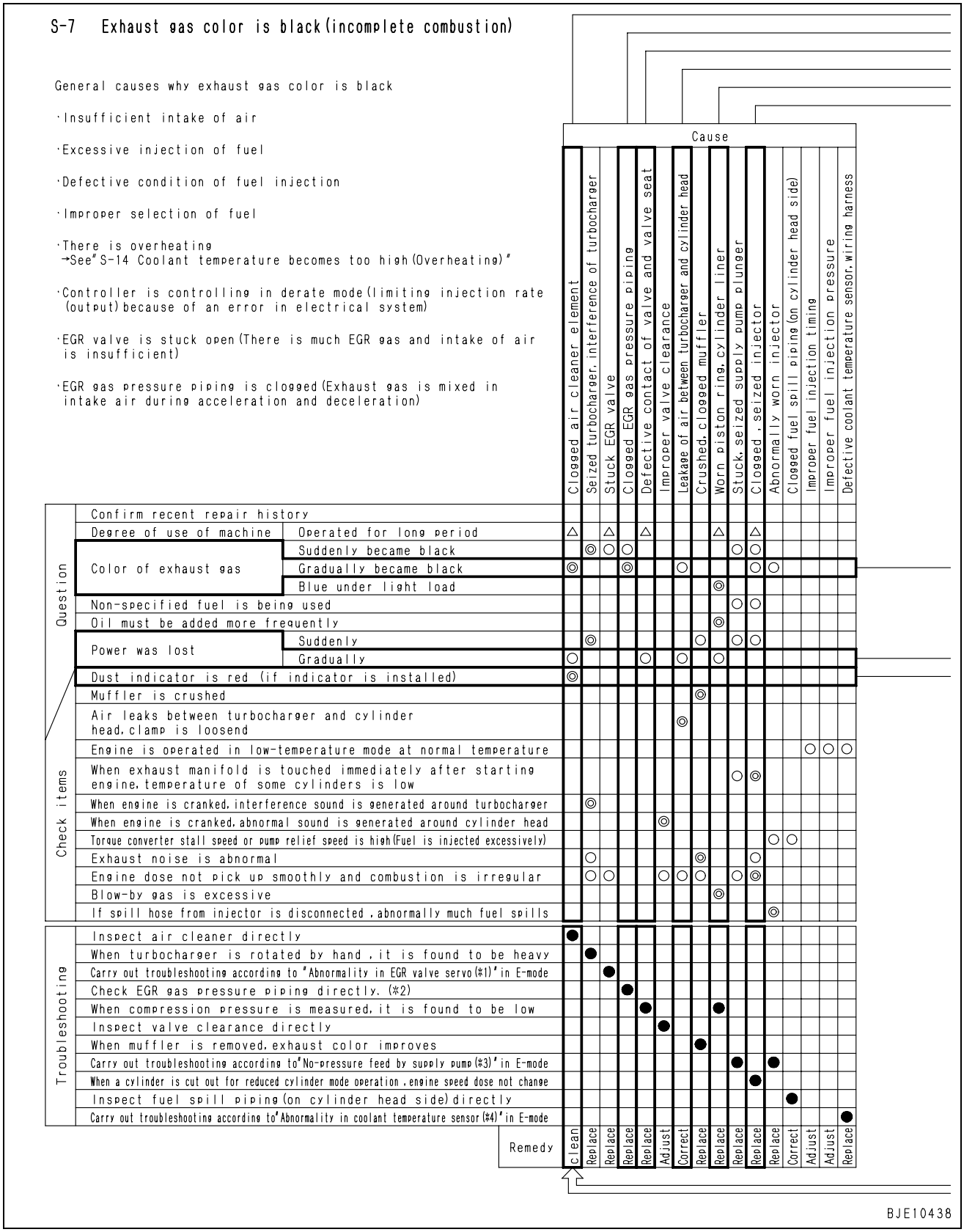
Causes:
Items to be narrowed from the questions and check items.
The serviceman narrows down the probable causes from **A**, **B**, and **C**.

Troubleshooting:
Items used to find out the true cause by verifying the narrowed causes finally in order from the most probable one by applying troubleshooting tools or direct inspection.
Items listed in the [Questions] and [Check items] and related to the [Causes] are marked with △, ○, and ◎.

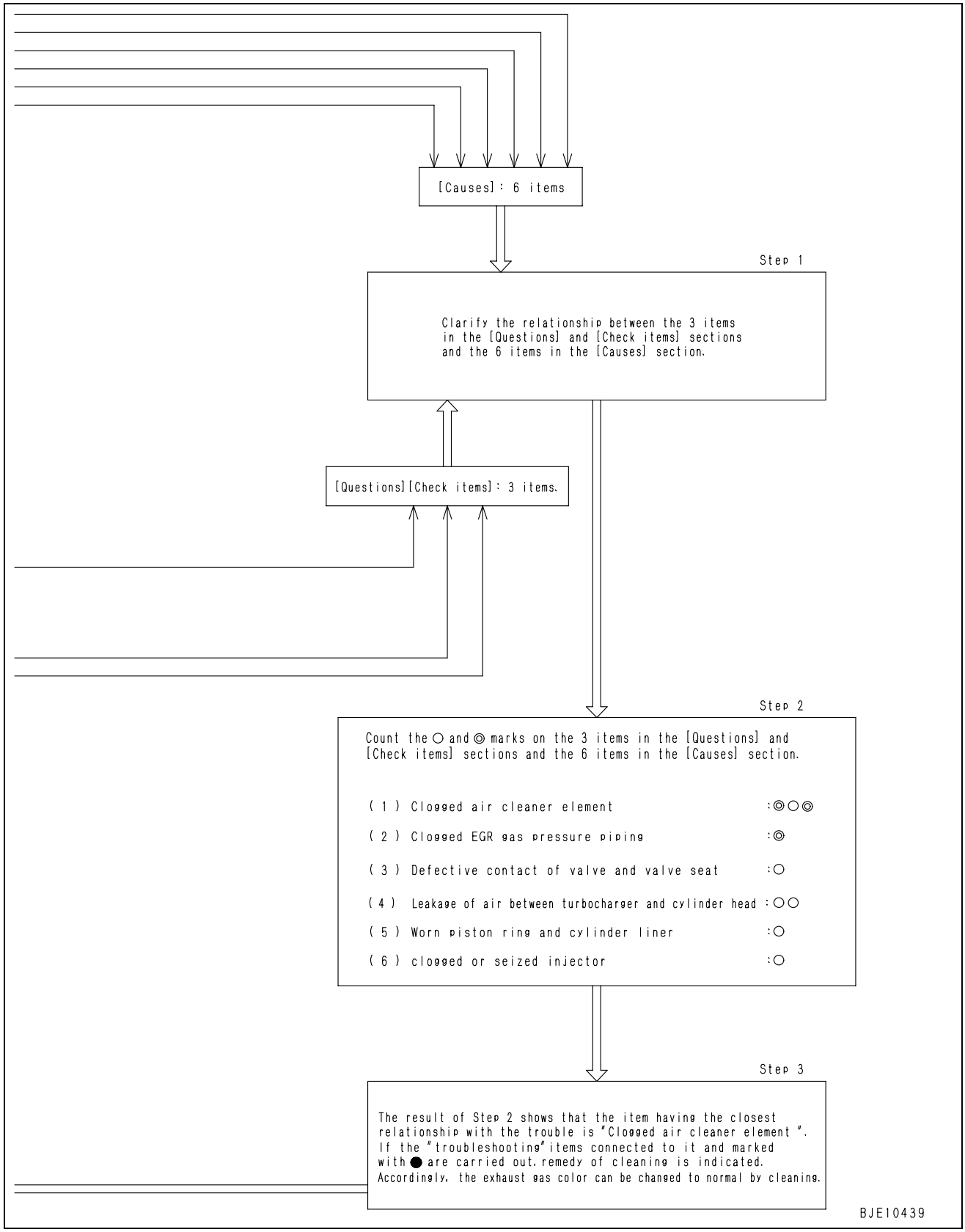
△ : Causes to be referred to for questions and check items
○ : Causes related to questions and check items
◎ : Causes highly probable among ones marked with
★ When narrowing the “causes”, apply the items marked with ◎ before those marked with ○.
When narrowing the “causes”, do not apply the items marked with △ (If no items have other marks and the causes cannot be narrowed, however, you may apply them.)



<Example of troubleshooting> Exhaust gas color is black (incomplete combustion)
Let us assume that a trouble of “Exhaust gas color is black” occurred and we checked the [Questions] and [Check items] and found the following 3 items to be the causal symptoms; [Exhaust gas color slowly became black], [Power slowly became weaker], and [Dust indicator is lighting red].



There is a causal relationship between 3 items in the [Questions] and [Check items] sections and 6 items in the [Causes] sections.
The method of pinpointing the [cause] from the causal relationship and approaching the [troubleshooting] is explained according to Step 1 — Step 3 shown below.



S-1 Starting performance is poor

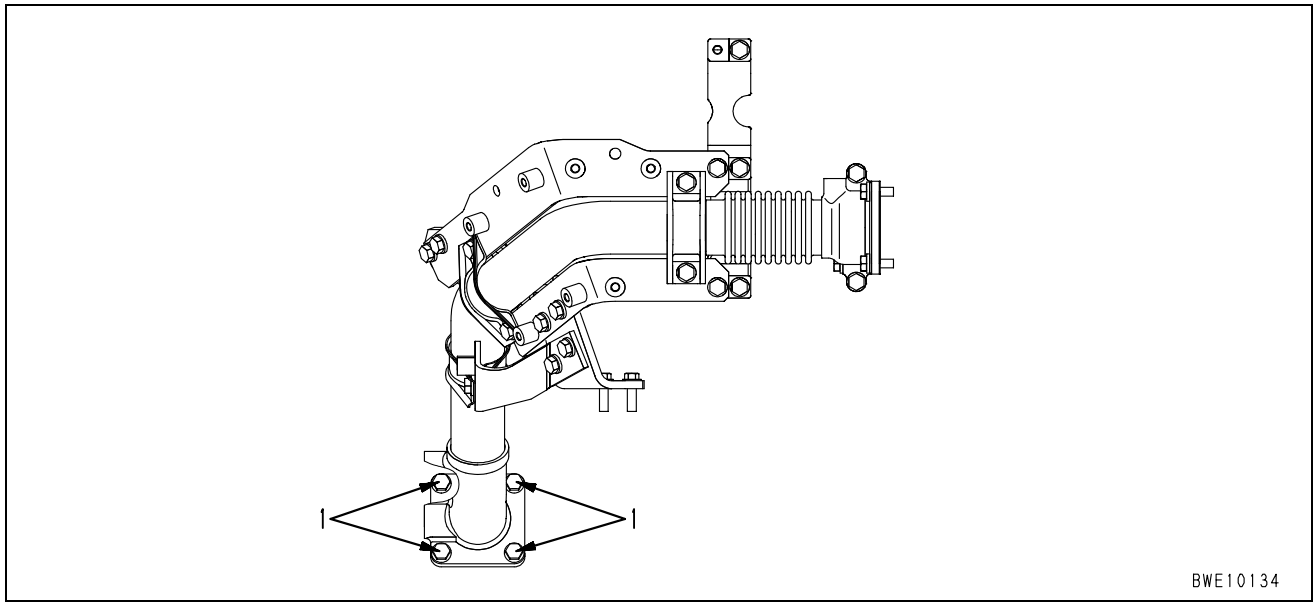
General causes why starting performance is poor

- Defective electrical system
- Insufficient supply of fuel
- Insufficient intake of air
- Improper selection of fuel
- Coolant in exhaust pipe

★The common rail fuel injection system (CRI) recognizes the fuel injection timing electrically. Accordingly, even if the starting operation is carried out, the engine may not start until the crankshaft revolves 2 turns at maximum. This phenomenon does not indicate a trouble, however.

			Causes														
			Clogged air cleaner element	Cracked EGR cooler (Coolant in exhaust pipe)	Defective contact of valve, vale seat	Worn piston ring, cylinder	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter, element	Clogged feed pump gauze filter	Stuck, seized supply pump plunger	Defective injector	Defective intake air heater system	Defective alternator (regulator section)	Defective alternator (generator section)	Defective, deteriorated battery
Questions	Confirm recent repair history																
	Degree of use of machine	Operated for long period	△	△					△	△						△
	Starting performance	Became worse gradually	○	○	◎	◎			○	○						
		Engine starts easily when warm											◎			◎
	Non-specified fuel is being used								○	○	○	○				
	Replacement of filters has not been carried out according to Operation and Maintenance Manual		◎						◎	◎	○	○				
	Engine oil must be added more frequently					◎										
	When engine is preheated or when temperature is low, preheating monitor does not indicate normally (if monitor is installed)												◎			
	During operation, charge level monitor indicates abnormal charge (if monitor is installed)													◎	◎	
Check items	Dust indicator is red (if indicator is installed)		◎													
	Air breather hole of fuel tank cap is clogged						◎									
	Fuel is leaking from fuel piping							◎			○					
	When priming pump is operated, it makes no reaction or it is heavy							◎	○	○						
	Starting motor cranks engine slowly			○												◎
	While engine is cranked with starting motor	If air bleeding plug of fuel filter is removed, fuel does not flow out							◎	◎						
		If spill hose from injector is disconnected, little fuel spills									◎					
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low											◎				
	Engine does not pick up smoothly and combustion is irregular				○	○						◎				
	There is hunting from engine (rotation is irregular)						○	◎	○	○						
	Blow-by gas is excessive					◎										
Troubleshooting	Inspect air cleaner directly		●													
	When EGR cooler outlet gas piping is removed, coolant containing antifreeze flows out (*1)			●												
	When compression pressure is measured, it is found to be low				●	●										
	When air is bled from fuel system, air comes out							●								
	Inspect fuel filter, strainer directly								●							
	Inspect feed pump gauze filter directly									●						
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*2)” See *2 for failure code.										●					
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change											●				
	When starting switch is turned to HEAT, intake air heater mount does not become warm												●			
	Is voltage 25 – 30 V between alternator terminal B and terminal E with engine at low idle?	Yes												●		
		No													●	
	When specific gravity of electrolyte and voltage of battery are measured, they are low															●
		Remedy	Clean	Replace	Correct	Replace	Clean	Correct	Clean	Clean	Replace	Replace	Replace	Replace	Replace	Replace

*1: EGR cooler outlet gas piping
Loosen 4 mounting bolts (1) of the EGR cooler outlet gas piping and check that the coolant flows out. A little condensate produced from cooled exhaust gas may flow out. If it is colorless and transparent, however, it is not a problem.



*2: Failure code [**CA559**] and [**CA2249**]

S-2 Engine does not start

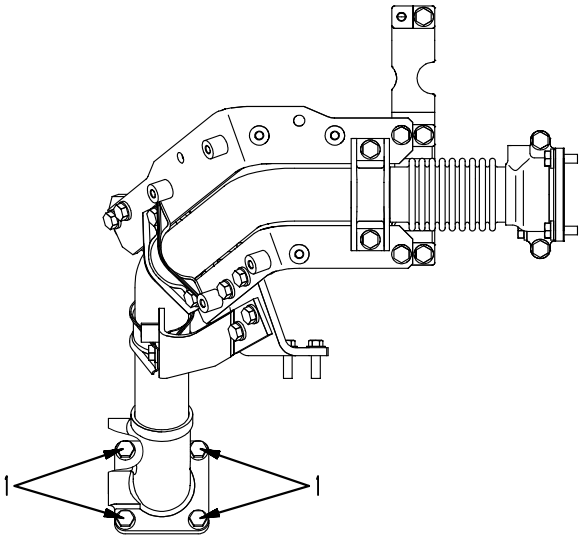
a) Engine does not turn

General causes why engine does not turn

- Internal parts of engine seized
  →See “S-4 Engine stops during operations.”
- Water hammer caused by coolant which entered cylinder
- Defective electrical system
- Defective hydraulic pump

			Causes										
			Cracked EGR cooler (Coolant in exhaust pipe)	Broken flywheel ring gear	Defective or deteriorated battery	Defective connection of battery terminal	Defective battery relay	Defective starting switch	Defective starting motor (safety relay section)	Defective starting motor (motor section)	Defective starting circuit wiring	Defective hydraulic pump
Questions	Confirm recent repair history											
	Degree of use of machine	Operated for long period	△	△	△							
	Condition of horn when starting switch is turned ON	Horn does not sound				○		○			◎	
		Horn volume is low			◎							
Check items	Battery electrolyte is low				◎							
	Battery terminal is loose					◎						
	When starting switch is turned ON, there is no operating sound from battery relay				○		◎					
	When starting switch is turned to START, starting pinion does not move out				○			○			◎	
	When starting switch is turned to START, starting pinion moves out, but	Speed of rotation is low	○		◎							
		Makes grating noise		◎					◎			
		Soon disengages again							◎			
		Makes rattling noise and does not turn	◎		○				○	◎		
Troubleshooting	When EGR cooler outlet gas piping is removed, coolant containing antifreeze flows out (*1).		●								Carry out troubleshooting in E-mode	Carry out troubleshooting in H-mode
	Inspect flywheel ring gear directly			●								
	When specific gravity of electrolyte and voltage of battery are measured, they are low				●							
	Turn starting switch OFF, connect cord, and carry out troubleshooting at ON	There is not voltage (20 – 30 V) between battery relay terminal B and terminal E					●					
		When terminal B and terminal C of starting switch are connected, engine starts						●				
		When terminal B and terminal C at safety relay outlet are connected, engine starts							●			
		Even if terminal B and terminal C at safety relay outlet are connected, engine does not start								●		
		Remedy	Replace	Replace	Replace	Correct	Replace	Replace	Replace	Replace	—	—

*1: EGR cooler outlet gas piping
Loosen 4 mounting bolts (1) of the EGR cooler outlet gas piping and check that the coolant flows out. A little condensate produced from cooled exhaust gas may flow out. If it is colorless and transparent, however, it is not a problem.



b) Engine turns but no exhaust smoke comes out

General causes why engine turns but no exhaust smoke comes out

- Fuel is not being supplied
- Supply of fuel is extremely small
- Improper selection of fuel (particularly in winter)

			Causes														
			Use of improper fuel	Insufficient fuel in tank	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter element	Clogged feed pump gauze filter	Seized, abnormally worn feed pump	Broken supply pump shaft, key	Stuck, seized supply pump plunger	Defective supply pump PCV	Wrong connection of supply pump PCV	Defective operation of overflow valve (Does not close)	Defective operation of flow damper	Defective fuel injector
Questions	Confirm recent repair history																
	Degree of use of machine	Operated for long period				△	△	△									
	Exhaust smoke suddenly stopped coming out (when starting again)								◎	○	◎	◎	◎		△	△
	Replacement of filters has not been carried out according to Operation and Maintenance Manual						◎	◎			△					○
Check items	When fuel tank is inspected, it is found to be empty			◎												
	Air breather hole of fuel tank cap is clogged			○	◎											
	Rust and water are found when fuel tank is drained						○	○	○		○	○				
	When fuel filter is removed, there is not fuel in it		◎			◎										
	Fuel is leaking from fuel piping					◎										
	When priming pump is operated, it makes no reaction or it is heavy					◎	○	○								
	While engine is cranked with starting motor	If air bleeding plug of fuel filter is removed, fuel does not flow out		○		○			◎	○						
		If spill hose from injector is disconnected, little fuel spills				○				◎	◎	◎	◎			○
Troubleshooting	When air is bled from fuel system, air comes out					●										
	Inspect fuel filter directly						●									
	Inspect feed pump gauze filter directly							●								
	Inspect feed pump directly								●							
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*1)” See *1 for failure code.									●	●		●			
	Carry out troubleshooting for “PCV1 Error (*2) or PCV2 Error (*3).” See *2 or *3 for failure code.											●				
	Inspect overflow valve directly													●		
	Engine can be started in reduced cylinder mode														●	●
		Remedy	Replace	Add	Correct	Correct	Replace	Clean	Replace	Replace	Replace	Replace	Correct	Replace	Replace	Replace

*1: Failure codes [**CA559**] and [**CA2249**]

*2: Failure codes [**CA271**] and [**CA272**]

*3: Failure codes [**CA273**] and [**CA274**]

c) Exhaust smoke comes out but engine does not start (fuel is being injected)

General causes why exhaust smoke comes out but engine does not start

- Lack of rotating force due to defective electrical system
- Insufficient supply of fuel
- Insufficient intake of air
- Improper selection of fuel

			Causes													
			Clogged air cleaner element	Worn dynamic valve system (Valve, rocker lever, etc.)	Worn piston ring, cylinder liner	Use of improper fuel	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel system, entry of air	Clogged fuel filter, strainer	Clogged feed pump gauze filter	Stuck, seized supply pump plunger	Clogged injector, defective spray	Defective, deteriorated battery	Defective coolant temperature sensor, wiring harness	Defective intake air heater system
Questions	Confirm recent repair history														
	Degree of use of machine	Operated for long period			△				△	△		△			
	Suddenly failed to start			◎							◎			○	
	Non-specified fuel is being used										○	○			
	Replacement of filters has not been carried out according to Operation and Maintenance Manual		◎						◎	◎					
	Engine oil must be added more frequently				◎										
	When engine is preheated or when temperature is low, preheating monitor does not indicate normally (if monitor is installed)														◎
Check items	Dust indicator is red (if indicator is installed)		◎												
	Air breather hole of fuel tank cap is clogged						○								
	Rust and water are found when fuel tank is drained								◎	◎					
	When fuel filter is removed, there is not fuel in it					◎									
	Fuel is leaking from fuel piping							◎							
	When priming pump is operated, it makes no reaction or it is heavy							◎	○	○					
	Starting motor cranks engine slowly												◎		
	When engine is cranked, abnormal sound is generated around cylinder head			◎											
	While engine is cranked with starting motor,	If air bleeding plug of fuel filter is removed, fuel does not flow out				○			◎	◎					
		If spill hose from injector is disconnected, little fuel spills									◎				
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low											◎			
Troubleshooting	Inspect air cleaner directly		●												
	Inspect dynamic valve system directly			●											
	When compression pressure is measured, it is found to be low				●										
	When air is bled from fuel system, air comes out							●							
	Inspect fuel filter, strainer directly								●						
	Inspect feed pump gauze filter directly									●					
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*1)”. See *1 for failure code.										●				
	When injector unit is tested, spray condition is bad											●			
	When specific gravity of electrolyte and voltage of battery are measured, they are low												●		
	Coolant temperature gauge does not indicate normally (if coolant temperature gauge is installed)													●	
	When starting switch is turned to HEAT, intake air heater mount does not become warm														●
		Remedy	Clean	Replace	Replace	Replace	Clean	Correct	Clean	Clean	Replace	Clean	Replace	Replace	Replace

*1: Failure codes [**CA559**] and [**CA2249**]

S-3 Engine does not pick up smoothly

General causes why engine does not pick up smoothly

- Insufficient intake of air
- Insufficient supply of fuel
- Defective condition of fuel spray
- Improper selection of fuel
- Controller is controlling in derate mode (limiting injection rate (output) because of an error in electrical system)
- EGR valve is stuck open
  (There is much EGR gas and intake of air is insufficient)

			Causes														
			Clogged air cleaner element	Stuck EGR valve	Defective contact of valve and valve seat	Improper valve clearance	Seized turbocharger, interference of turbocharger	Worn piston ring, cylinder liner	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter, strainer	Clogged feed pump gauze filter	Stuck, seized supply pump plunger	Defective operation of flow damper (Large leakage from injector)	Clogged injector, defective spray
Questions	Confirm recent repair history														
	Degree of use of machine	Operated for long period	△	△	△			△			△	△			
	Engine pick-up suddenly became worse			○			◎		○	○					○
	Non-specified fuel is being used										◎	◎	◎		◎
	Replacement of filters has not been carried out according to Operation and Maintenance Manual		◎								◎	◎			
	Oil must be added more frequently							◎							
Check items	Dust indicator is red (if indicator is installed)		◎												
	Air breather hole of fuel tank cap is clogged								◎						
	Rust and water are found when fuel tank is drained										◎	◎			
	Fuel is leaking from fuel piping									◎					
	When priming pump is operated, it makes no reaction or it is heavy									◎	○	○			
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low												○		◎
	Color of exhaust gas	Blue under light load						◎							
		Black	◎		○		◎								◎
	When engine is cranked, abnormal sound is generated around cylinder head					◎									
	When engine is cranked, interference sound is generated around turbocharger						◎								
	High idle speed under no load is normal, but speed suddenly drops when load is applied								○		◎	◎			
	There is hunting from engine (rotation is irregular)								○		○	◎			○
	Blow-by gas is excessive							◎							
Troubleshooting	Inspect air cleaner directly		●												
	Carry out troubleshooting for “EGR Valve Servo Error. (*1)”. See *1 for failure code.			●											
	When compression pressure is measured, it is found to be low				●			●							
	Inspect valve clearance directly					●									
	When turbocharger is rotated by hand, it is found to be heavy						●								
	When air is bled from fuel system, air comes out									●					
	Inspect fuel filter, strainer directly										●				
	Inspect feed pump gauze filter directly											●			
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*2)”. See *2 for failure code.												●		
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change													●	●
		Remedy	Clean	Replace	Replace	Adjust	Replace	Replace	Clean	Correct	Clean	Clean	Replace	Replace	Correct

*1: Failure codes [**CA1228**] and [**CA1625**]
*2: Failure codes [**CA559**] and [**CA2249**]

S-4 Engine stops during operations

General causes why engine stops during operations

- Seized parts inside engine
- Insufficient supply of fuel
- There is overheating
- Defective hydraulic pump

			Causes														
			Broken dynamic valve system (valve, rocker arm, etc.)	Broken, seized piston, connecting rod	Broken, seized crankshaft bearing	Broken, seized gear train	Insufficient fuel in tank	Clogged air breather hole of fuel tank cap	Leaking, clogged fuel piping	Clogged fuel filter, strainer	Clogged feed pump gauze filter	Broken, seized feed pump	Broken supply pump shaft, key	Stuck, seized supply pump plunger	Defective hydraulic pump
Questions	Confirm recent repair history																
	Degree of use of machine	Operated for long period								△	△						
	Condition when engine stopped	Abnormal noise was heard and engine stopped suddenly	◎	◎	◎	◎						○	◎	○	◎
		Engine overheated and stopped		◎	○										
		Engine stopped slowly					◎			○	○				
		There was hunting and engine stopped					◎	○		○	○	○			
	Non-specified fuel is being used									○	○	○		○	
	Replacement of filters has not been carried out according to Operation and Maintenance Manual									◎	◎				
	Fuel level monitor indicates low level (if monitor is installed)						◎								
Check items	When fuel tank is inspected, it is found to be empty						◎								
	Air breather hole of fuel tank cap is clogged							◎							
	Fuel is leaking from fuel piping								◎						
	When priming pump is operated, it makes no reaction or it is heavy								◎	○	○				
	Rust and water are found when fuel tank is drained									◎	◎				
	Metal particles are found when oil is drained			◎	◎						○	○			
	When engine is cranked by hand	Does not turn at all		◎	◎										
		Turns in opposite direction	◎												
		Moves by amount of gear backlash				◎									
		Supply pump shaft does not turn											◎		
Troubleshooting	Inspect dynamic valve system directly		●													Carry out troubleshooting in H-mode
	Inspect piston, connecting rod directly			●												
	Inspect crankshaft bearing directly				●											
	Inspect gear train directly					●										
	Inspect fuel filter, strainer directly									●						
	Inspect feed pump gauze filter directly										●					
	Inspect feed pump directly											●				
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*1)” See *1 for code.												●	●		
		Remedy	Replace	Replace	Replace	Replace	Add	Clean	Correct	Clean	Clean	Replace	Replace	Replace	—	

*1: Failure code [**CA559**] and [**CA2249**]

S-5 Engine does not rotate smoothly

General causes why engine does not rotate smoothly

- Air in fuel system
- Defective speed sensor (Error at degree that it is not indicated)
- Defective EGR valve
- Defective bypass valve

			Causes												
			Low setting of low idle speed	Defective operation of EGR valve	Defective operation of bypass valve	Insufficient fuel in tank	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged feed pump gauze filter	Clogged fuel filter, strainer	Defective operation of flow damper (Large leakage from injector)	Clogged injector, defective spray (dirt in injector)	Defective Ne speed sensor, wiring harness	Defective Bkup speed sensor, wiring harness
Questions	Confirm recent repair history													
	Degree of use of machine	Operated for long period		△	△				△	△				
	Condition of hunting	Occurs at a certain speed range	○	○	○								○	○
		Occurs at low idle	◎					○	○	○	○	○	○	○
		Occurs even when speed is raised		○	○		○						○	○
		Occurs on slopes				◎							○	○
	Replacement of filters has not been carried out according to Operation and Maintenance Manual								◎	◎				
Check items	When fuel tank is inspected, it is found to be empty					◎								
	Air breather hole of fuel tank cap is clogged						◎							
	Rust and water are found when fuel tank is drained								○	○				
	Fuel is leaking from fuel piping							◎						
	When priming pump is operated, it makes no reaction or it is heavy							◎	○	○				
Troubleshooting	Carry out troubleshooting for “EGR Valve Servo Error. (*1)”. See *1 for failure code			●										
	Carry out troubleshooting for “Bypass Valve Servo Error. (*2)”. See *2 for failure code				●									
	When air is bled from fuel system, air comes out							●						
	Inspect feed pump gauze filter directly								●					
	Inspect fuel filter, strainer directly									●				
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change										●	●		
	Carry out troubleshooting for “Eng Ne Speed Sensor Error. (*3)” See *3 for failure code												●	
	Carry out troubleshooting for “Eng Bkup Speed Sensor Error. (*4)” See *4 for failure code													●
		Remedy	Correct	Replace	Replace	Add	Clean	Correct	Replace	Replace	Replace	Correct	Correct	Correct

*1: Failure codes [**CA1228**] and [**CA1625**]
*2: Failure codes [**CA1628**] and [**CA1629**]
*3: Failure code [**CA689**]
*4: Failure code [**CA778**]

S-6 Engine lacks output (or lacks power)

General causes why engine lacks output

- Insufficient intake of air
- Insufficient supply of fuel
- Defective spray condition of fuel
- Improper selection of fuel
- There is overheating
  →See “S-14 Coolant temperature becomes too high (Overheating)”
- Controller is controlling in derate mode (limiting injection rate (output) because of an error in electrical system)

			Causes																	
			Clogged air cleaner element	Air leakage from air intake piping	Seized turbocharger, interference of turbocharger	Defective contact of valve and valve seat	Improper valve clearance	Worn piston ring, cylinder liner	Clogged air breather hole of fuel tank cap	Leaking, clogged fuel piping	Clogged fuel filter, strainer	Clogged feed pump gauze filter	Stuck, seized supply pump plunger	Clogged injector, defective spray (dirt in injector)	Defective drive of injector (signal, solenoid)	Defective installation of charge pressure sensor (air leakage)	Defective charge pressure sensor, wiring harness	Defective fuel temperature sensor, wiring harness
Questions	Confirm recent repair history																			
	Degree of use of machine	Operated for long period	△			△		△			△	△								
	Power was lost	Suddenly		○											○	○	○			
		Gradually	○			○		○			○	○		○		○				
	Non-specified fuel is being used										○	○								
	Replacement of filters has not been carried out according to Operation and Maintenance Manual		◎																	
	Engine oil must be added more frequently					○	○	○												
	Dust indicator is red (if indicator is installed)		◎																	
	Air breather hole of fuel tank cap is clogged								◎											
	Fuel is leaking from fuel piping									◎										
	Output becomes insufficient after short stop of operation																			◎
	Color of exhaust gas	Black	◎	◎																
		Blue under light load			◎															
Check items	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low													◎						
	When engine is cranked, interference sound is generated around turbocharger			◎																
	When engine is cranked, abnormal sound is generated around cylinder head						◎													
	High idle speed is too low														○					
	High idle speed under no load is normal, but speed suddenly drops when load is applied										◎	◎	○							
	Engine does not pick up smoothly and combustion is irregular			◎					○	○				◎						
	There is hunting from engine (rotation is irregular)								○	○	○	○								
	Blow-by gas is excessive				◎															
Troubleshooting	Inspect air cleaner directly		●																	
	Inspect air intake piping directly			●																
	When boost pressure is measured, it is found to be low		●	●	●															
	When compression pressure is measured, it is found to be low					●		●												
	Inspect valve clearance directly						●													
	Inspect fuel filter, strainer directly										●									
	Inspect feed pump gauze filter directly											●								
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*1)”. See *1 for failure code												●							
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change													●	●					
	Inspect boost pressure sensor mount directly															●				
	Carry out troubleshooting for “Chg Air Press Sensor High (Low) Error. (*2)” See *2 for failure code																●			
	Carry out troubleshooting for “Fuel Temp Sensor High (Low) Error. (*3)” See *3 for failure code																			●
		Remedy	Clean	Correct	Replace	Replace	Adjust	Replace	Clean	Correct	Replace	Clean	Replace	Replace	Replace	Correct	Replace	Replace

*1: Failure codes [**CA559**] and [**CA2249**]
*2: Failure codes [**CA122**] and [**CA123**]
*3: Failure codes [**CA263**] and [**CA265**]

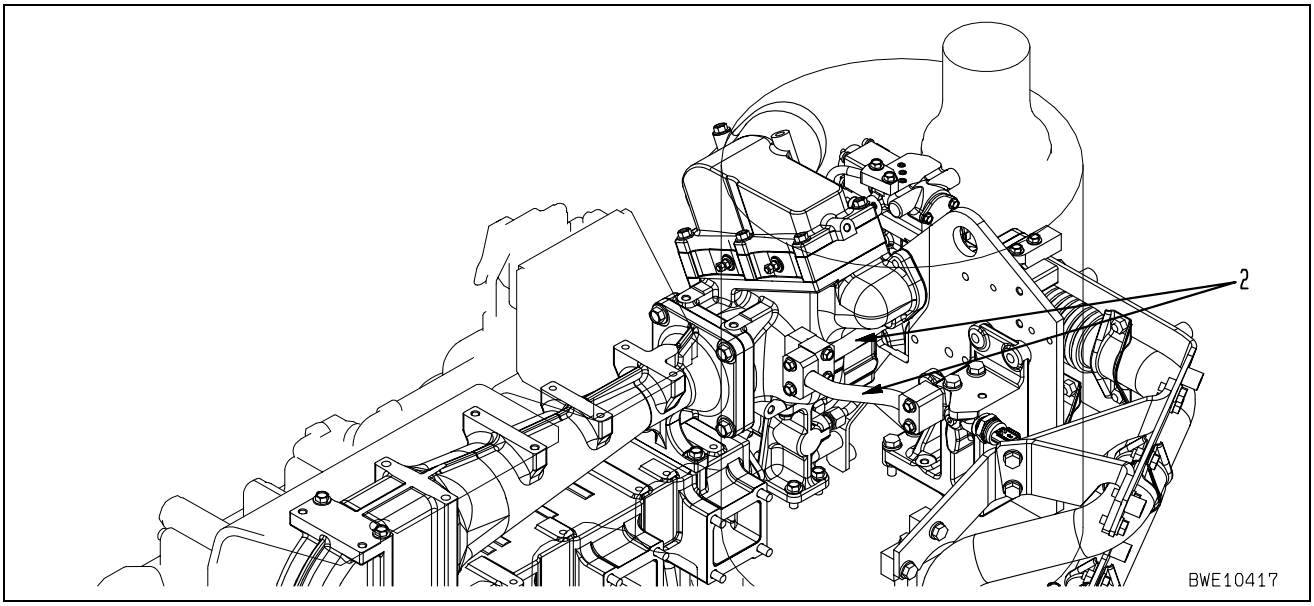
S-7 Exhaust gas color is black (incomplete combustion)

General causes why exhaust gas color is black

- Insufficient intake of air
- Excessive injection of fuel
- Defective condition of fuel injection
- Improper selection of fuel
- There is overheating
  →See “S-14 Coolant temperature becomes too high (Overheating)”
- Controller is controlling in derate mode (limiting injection rate (output) because of an error in electrical system)
- EGR valve is stuck open (There is much EGR gas and intake of air is insufficient)
- EGR gas pressure piping is clogged (Exhaust gas is mixed in intake air during acceleration and deceleration)

			Causes																
			Clogged air cleaner element	Seized turbocharger, interference of turbocharger	Stuck EGR valve	Clogged EGR gas pressure piping	Defective contact of valve and valve seat	Improper valve clearance	Leakage of air between turbocharger and cylinder head	Crushed, clogged muffler	Worn piston ring, cylinder liner	Stuck, seized supply pump plunger	Clogged, seized injector	Abnormally worn injector	Clogged fuel spill piping (on cylinder head side)	Improper fuel injection timing	Improper fuel injection pressure	Defective coolant temperature sensor, wiring harness
Questions	Confirm recent repair history																	
	Degree of use of machine	Operated for long period	△		△		△				△		△					
	Color of exhaust gas	Suddenly became black		◎	○	○						○	○					
		Gradually became black	◎			◎			○				○	○				
		Blue under light load									◎							
	Non-specified fuel is being used											○	○					
	Oil must be added more frequently										◎							
	Power was lost	Suddenly		◎						○		○	○					
		Gradually	○				○		○		○							
Check items	Dust indicator is red (if indicator is installed)		◎															
	Muffler is crushed									◎								
	Air leaks between turbocharger and cylinder head, clamp is loosened								◎									
	Engine is operated in low-temperature mode at normal temperature															○	○	○
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low											○	◎					
	When engine is cranked, interference sound is generated around turbocharger			◎														
	When engine is cranked, abnormal sound is generated around cylinder head							◎										
	Torque converter stall speed or pump relief speed is high (Fuel is injected excessively)													○	○			
	Exhaust noise is abnormal			○						◎			○					
	Engine does not pick up smoothly and combustion is irregular			○	○			○	○	○		○	◎					
	Blow-by gas is excessive										◎							
	If spill hose from injector is disconnected, abnormally much fuel spills													◎				
Troubleshooting	Inspect air cleaner directly		●															
	When turbocharger is rotated by hand, it is found to be heavy			●														
	Carry out troubleshooting for “EGR Valve Servo Error. (*1)”. See *1 for failure code				●													
	Check EGR gas pressure piping directly (*2)					●												
	When compression pressure is measured, it is found to be low						●				●							
	Inspect valve clearance directly							●										
	When muffler is removed, exhaust color improves									●								
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*3)” See *3 for failure code											●		●				
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change												●					
	Inspect fuel spill piping (on cylinder head side) directly														●			
	Carry out troubleshooting for “Coolant Temp Sens High (Low) Error. (*4)” See *4 for code																	●
		Remedy	Clean	Replace	Replace	Replace	Replace	Adjust	Correct	Replace	Replace	Replace	Replace	Replace	Correct	Adjust	Adjust	Replace

*1: Failure codes [**CA1228**] and [**CA1625**]
*2: EGR gas pressure piping
Remove 2 EGR gas pressure pipes (2) and check their inside for clogging.



*3: Failure codes [**CA559**] and [**CA2249**]
*4: Failure codes [**CA144**] and [**145**/**CA145**]

S-8 Oil consumption is excessive (or exhaust smoke is blue)

General causes why oil consumption is excessive

- Abnormal consumption of oil
- Long-time operation of engine at low idle or high idle (Do not run engine at idle for more than 20 minutes continuously)
- External leakage of oil
- Wear of pats in lubrication system

			Causes																
			Dust sucked in from intake system	Worn, damaged valve (stem, guide, seal)	Turbocharger: Worn seal at turbocharger end	Turbocharger: Worn seal at blower end	Oil leakage from EGR valve stem	Clogged breather, breather hose	Broken piston ring	Worn piston ring, cylinder liner	Worn, damaged rear oil seal	Broken oil cooler	Oil leakage from oil cooler	Oil leakage from oil filter	Oil leakage from oil piping	Oil leakage from oil drain plug	Oil leakage from oil pan, cylinder head, etc.
Questions / Check items	Confirm recent repair history																		
	Degree of use of machine	Operated for long period		△	△	△	△			△									
	Oil consumption suddenly increased								◎			○							
	Oil must be added more frequently						○			◎		○							
	Oil becomes contaminated quickly							○	○	◎									
	Outside of engine is dirty with oil												◎	◎	◎	◎	◎		
	There are loose piping clamps in intake system		◎																
	Inside of turbocharger intake outlet pipe is dirty with oil					◎													
	Inside of turbocharger exhaust outlet pipe is dirty with oil			○	◎														
	There is oil in coolant											◎							
	Oil level in damper chamber is high										◎								
	Exhaust smoke is blue under light load						○		◎	◎									
	Amount of blow-by gas	Excessive		○		○			◎	◎									
		None						◎											
Troubleshooting	When intake manifold is removed, dust is found inside		●																
	When intake manifold is removed, inside is found to be dirty abnormally			●															
	Excessive play of turbocharger shaft				●	●													
	When EGR valve is removed, exhaust port is found to be dirty with oil						●												
	Check breather and breather hose directly							●											
	When compression pressure is measured, it is found to be low								●	●									
	Inspect rear oil seal directly										●								
	Pressure-tightness test of oil cooler shows there is leakage											●	●						
	There is external leakage of oil from engine													●	●	●			
	Remedy		Correct	Correct	Replace	Replace	Replace	Clean	Replace	Replace	Correct	Replace	Replace	Correct	Correct	Correct	Correct		

S-9 Oil becomes contaminated quickly

General causes why oil becomes contaminated quickly

- Entry of exhaust gas into oil due to internal wear
- Clogging of lubrication passage
- Use of improper fuel
- Use of improper oil
- Operation under excessive load

			Causes										
			Defective turbocharger turbine side seal	Worn EGR valve guide	Worn valve, valve guide	Worn piston ring, cylinder liner	Clogged breather, breather hose	Clogged oil cooler	Clogged oil filter	Defective oil filter safety valve	Clogged turbocharger lubrication drain tube	Exhaust smoke is bad
Questions / Check items	Confirm recent repair history											
	Degree of use of machine	Operated for long period	△	△	△	△						
	Non-specified fuel is being used								○			
	Engine oil must be added more frequently			○		◎						
	Even when engine oil temperature rises, oil filter clogging monitor indicates clogging (if monitor is installed)								◎	○		
	Metal particles are found when oil is drained				○	○			◎			
	Inside of exhaust pipe is dirty with oil				◎							
	Engine oil temperature rises quickly							◎				
	Color of exhaust gas color	Blue under light load				◎						
		Black										◎
	Amount of blow-by gas	Excessive	○		○	◎					○	
		None					◎					
Troubleshooting	Excessive play of turbocharger shaft		●									See S-7
	When EGR valve is removed, exhaust port is found to be dirty with oil			●								
	When compression pressure is measured, it is found to be low				●	●						
	Inspect breather and breather hose directly						●					
	Inspect oil cooler directly							●				
	Inspect oil filter directly								●			
	Spring of oil filter safety valve is hitched or broken									●		
	Inspect turbocharger lubrication drain tube directly										●	
		Remedy	Replace	Replace	Replace	Replace	Clean	Clean	Replace	Replace	Clean	—

S-10 Fuel consumption is excessive

General causes why fuel consumption is excessive

- Leakage of fuel
- Defective condition of fuel injection (fuel pressure, injection timing)
- Excessive injection of fuel

			Causes								
			Fuel leakage inside head cover	Fuel leakage from fuel filter, piping, etc.	Defective feed pump oil seal	Defective supply pump plunger	Defective common rail pressure	Defective spray by injector	Defective operation of injector	Improper fuel injection timing	Defective coolant temperature sensor, wiring harness
Questions	Confirm recent repair history										
	Degree of use of machine	Operated for long period			△	△		△			
	Condition of fuel consumption	More than for other machines of same model					○		○	○	○
		Gradually increased				○		○			
		Suddenly increased	○	○							
Check items	There is external leakage of fuel from engine			◎							
	Combustion is irregular							◎			
	Engine oil level rises and oil smells of diesel fuel		◎		◎						
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low							◎			
	Low idle speed is high								○		
	Torque converter stall speed or pump relief speed is high								○		
	Exhaust smoke color	Black					○	○		○	○
		White	○								
Troubleshooting	Remove and inspect head cover directly		●								
	Inspect feed pump oil seal directly				●						
	Carry out troubleshooting for “Rail Press (Very) Low Error. (*1)” See *1 for failure code					●					
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change							●			
	If spill hose from injector is disconnected, much fuel spills								●		
	Carry out troubleshooting for “Coolant Temp Sens High (Low) Error. (*2)” See *2 for failure code										●
	Check with monitoring function of the machine monitor						●			●	
		Remedy	Correct	Correct	Replace	Replace	Correct	Replace	Replace	Correct	Correct

*1: Failure codes [**CA559**] and [**CA2249**]
*2: Failure codes [**CA144**] and [**CA145**]

S-11 Oil is in coolant (or coolant spurts back or coolant level goes down)

General causes why oil is in coolant

- Internal leakage in lubrication system
- Internal leakage in cooling system

			Causes				
			Broken cylinder head, head gasket	Internal cracks in cylinder block	Damaged cylinder liner O-ring, holes caused by pitting	Insufficient protrusion of cylinder liner	Broken oil cooler core, O-ring
Questions / Check items	Confirm recent repair history						
	Degree of use of machine	Operated for long period			△		△
	Oil level	Suddenly increased	○				○
		Gradually increased		○	○		
	Hard water is being used as coolant				○		○
	Oil level has risen and oil is milky			○	○		◎
	There are excessive air bubbles in radiator, coolant spurts back		◎			◎	
Troubleshooting	Pressure-tightness test of cylinder head shows there is leakage		●				
	Inspect cylinder block, liner directly			●	●		
	Inspect cylinder liner directly					●	
	Pressure-tightness test of oil cooler shows there is leakage						●
		Remedy	Replace	Replace	Replace	Replace	Replace

S-12 Oil pressure drops

General causes why oil pressure drops

- Leakage, clogging, wear in lubrication system
- Defective oil pressure control
- Improper selection of fuel (improper viscosity)
- Deterioration of oil due to overheating

			Causes													
			Worn journal of bearing	Lack of oil in oil pan	Coolant, fuel in oil	Clogged strainer in oil pan	Clogged, broken pipe in oil pan	Defective oil pump	Defective oil pump relief valve	Clogged oil filter	Leaking, crushed, clogged hydraulic piping	Defective EGR oil pump	Leaking EGR hydraulic piping	Defective oil pressure sensor, wiring harness	Defective oil level sensor, wiring harness
Questions	Confirm recent repair history														
	Degree of use of machine	Operated for long period						△		△		△			
	Oil pressure monitor indicates low oil pressure (if monitor is installed)								○	◎					
	Non-specified oil is being used		○							○					
	Replacement of filters has not been carried out according to Operation and Maintenance Manual									◎					
	Oil pressure monitor (if installed)	Indicates pressure drop at low idle	◎						○			○			
		Indicates pressure drop at low, high idle		○		◎	◎	◎	○			○	○		
		Indicates pressure drop on slopes		◎											
		Sometimes indicates pressure drop							◎					○	○
Check items	Oil level monitor indicates oil level drop (if monitor is installed)			◎											◎
	Oil level in oil pan is low			◎											
	External hydraulic piping is leaking, crushed										◎		◎		
	Oil is milky or smells of diesel oil				◎										
	Metal particles are found when oil pan is drained		◎												
	Metal particles are found when oil filter is drained		◎					○				○			
Troubleshooting	Metal particles are found in oil filter		●		See S-13										
	Inspect oil pan strainer, pipe directly					●	●								
	Oil pump rotation is heavy, there is play in oil pump							●							
	Valve and spring of oil pump relief valve are fatigued, damaged								●						
	Inspect oil filter directly									●					
	Relief valve of EGR oil pump is damaged, oil leaks from it											●			
	Inspect EGR hydraulic piping directly												●		
	Carry out troubleshooting for “Eng Oil Press Sensor High (Low) Error. (*1)” See *1 for failure code													●	
	If oil level sensor is replaced, oil pressure monitor indicates normally														●
		Remedy	Replace	Add	—	Clean	Clean	Replace	Adjust	Replace	Correct	Replace	Replace	Replace	Replace

*1: Failure codes [**CA135**] and [**CA141**]

S-13 Oil level rises (Entry of coolant/fuel)

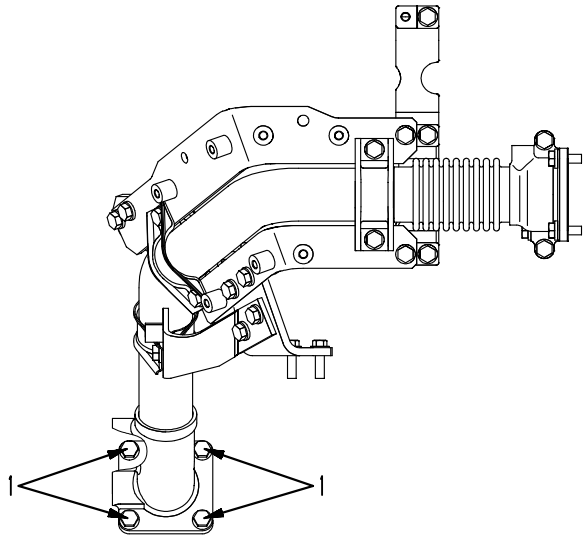
General causes why oil level rises

- Coolant in oil (milky)
- Fuel in oil (smells diluted diesel fuel)

★If oil is in coolant, carry out troubleshooting for “S-11 Oil is in coolant”

			Causes										
			Cracked EGR cooler (Entry of coolant)	Broken cylinder head, head gasket	Fuel leakage inside head cover	Cracks inside cylinder block	Damaged cylinder liner O-ring, holes caused by pitting	Worn, damaged rear oil seal	Broken oil cooler core, O-ring	Clogged water pump drain hole (breather hole), defective seal	Defective thermostat seat	Defects in supply pump
Questions	Confirm recent repair history											
	Degree of use of machine	Operated for long period					△	△		△		
	Fuel must be added more frequently				◎							◎
	Coolant must be added more frequently		○	○							◎	
Check items	There is oil in coolant			○		○	○		◎			
	Oil smells of diesel fuel				◎							◎
	Oil is milky		○	○							◎	
	When engine is started, drops of water come from muffler		○	○								
	When radiator cap is removed and engine is run at low idle, an abnormal number of bubbles appear, or coolant spurts back			◎			○					
	Exhaust smoke is white				○						○	
	Water pump drain hole (breather hole) is clogged									◎		
	When water pump drain hole (breather hole) is cleaned, coolant comes out									◎		
	Oil level in clutch or damper chamber of machine is low							◎				
Troubleshooting	When EGR cooler outlet gas piping is removed, coolant containing antifreeze flows out (*1)		●									
	When compression pressure is measured, it is found to be low			●								
	Remove and inspect head cover directly				●							
	Inspect cylinder block, liner directly					●	●					
	Inspect rear oil seal directly							●				
	Pressure-tightness test of oil cooler shows there is leakage								●			
	Remove and inspect water pump directly									●		
	Remove and inspect thermostat cover directly										●	
	Remove and inspect supply pump directly											●
		Remedy	Replace	Replace	Correct	Replace	Replace	Correct	Replace	Replace	Correct	Replace

*1: EGR cooler outlet gas piping
Loosen 4 mounting bolts (1) of the EGR cooler outlet gas piping and check that the coolant flows out. A little condensate produced from cooled exhaust gas may flow out. If it is colorless and transparent, however, it is not a problem.



S-14 Coolant temperature becomes too high (overheating)

General causes why coolant temperature becomes too high

- Lack of cooling air (deformation, damage of fan)
- Drop in heat dissipation efficiency
- Problem in coolant circulation system

			Causes												
			External leakage of coolant from EGR cooler	Broken cylinder head, head gasket	Damaged cylinder liner O-ring, hole caused by pitting	Clogged, broken oil cooler	Lack of coolant	Broken water pump	Defective operation of thermostat	Clogged, crushed radiator fins	Clogged radiator core	Defective radiator cap (pressure valve)	Slipping fan belt, worn fan pulley	Defective coolant temperature gauge
Questions	Confirm recent repair history													
	Degree of use of machine	Operated for long period	△	△	△					△	△			
	Condition of overheating	Sudden overheated	○				○	◎					○	
		Always tends to overheat							○	◎	◎		○	
	Coolant temperature gauge (if installed)	Rises quickly					○		◎					
		Does not go down from red range												◎
Check items	Radiator coolant level monitor indicates drop of coolant level (if monitor is installed)		○				◎							
	Engine oil level has risen, oil is milky				◎	○								
	Fan belt tension is low												◎	
	When fan pulley is turned, it has play							◎						
	Milky oil is floating on coolant					◎								
	There are excessive air bubbles in radiator, coolant spurts back			◎										
	When light bulb is held behind radiator core, no light passes through									◎				
	Radiator shroud, inside of underguard are clogged with dirt or mud									◎			◎	
	Coolant is leaking because of cracks in hose or loose clamps						◎							
	Coolant flows out from radiator overflow hose											◎		
	Fan belt whines under sudden acceleration												◎	
Troubleshooting	Inspect EGR cooler for coolant leakage		●											
	When compression pressure is measured, it is found to be low			●										
	Inspect cylinder liner directly				●									
	Inspect oil cooler directly					●								
	Temperature difference between upper and lower tanks of radiator is large							●						
	When operation of thermostat is carried out, it does not open at cracking temperature								●					
	Temperature difference between upper and lower tanks of radiator is slight									●				
	Inspect radiator core directly										●			
	When operation of radiator cap is carried out, its cracking pressure is low											●		
	Inspect fan belt, pulley directly												●	
	When coolant temperature is measured, it is fount to be normal													●
		Remedy	Replace	Replace	Replace	Replace	Add	Replace	Replace	Correct	Correct	Replace	Correct	Replace

S-15 Abnormal noise is made

General causes why abnormal noise is made

- Abnormality due to defective parts
- Abnormal combustion
- Air sucked in from intake system

★Judge if the noise is an internal noise or an external noise before starting troubleshooting.

★The engine is operated in the low-temperature mode while it is not warmed up sufficiently. Accordingly, the engine sound becomes a little larger. This does not indicate abnormality, however.

★When the engine is accelerated, it is operated in the acceleration mode and its sound becomes a little larger for up to about 5 seconds. This does not indicate abnormality, however.

			Causes													
			Leakage of air between turbocharger and cylinder head	Interference of turbocharger, seized turbocharger	Cracked, leaking EGR gas piping	Broken dynamic valve system (valve, rocker lever)	Defective inside of muffler (dividing board out of position)	Improper valve clearance	Excessive wear of piston ring, cylinder liner	Improper gear train backlash	Removed, seized gear train bushing	Deformed cooling fan, loose fan belt, interference of fan belt	Clogged, seized injector	Dirt caught in injector	Improper fuel injection timing (abnormality in coolant temperature sensor)
Questions	Confirm recent repair history															
	Degree of use of machine	Operated for long period							△							
	Condition of abnormal noise	Gradually occurred							○			○				
		Sudden occurred		○	○	○					○					
	Non-specified fuel is being used												○			
	Oil must be added more frequently								◎							
	Metal particles are found when oil filter is drained								◎		◎					
Check items	Air leaks between turbocharger and cylinder head		◎													
	When engine is cranked, interference sound is generated around turbocharger			◎												
	When engine is cranked, abnormal sound is generated around EGR gas piping				◎											
	When engine is cranked, abnormal sound is generated around cylinder head					◎		◎								
	When engine is cranked, beat noise is generated around muffler						◎									
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low												◎	○		
	Color of exhaust gas	Blue under light load							◎							
		Black	○	◎				○								
	Engine does not pick up smoothly and combustion is irregular												◎			
	Abnormal noise is loud when engine is accelerated							○		○		○	○			
	Blow-by gas is excessive								◎							
Troubleshooting	When turbocharger is rotated by hand, it is fount to be heavy			●												
	Inspect EGR gas piping directly				●											
	Inspect dynamic valve system directly					●										
	When muffler is removed, abnormal noise disappears						●									
	Inspect valve clearance directly							●								
	When compression pressure is measured, it is found to be low								●							
	Inspect gear train directly									●	●					
	Inspect fan and fan belt directly											●				
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change												●	●		
	Abnormal noise is heard only when engine is started													●		
	Check with monitoring function of the machine monitor														●	
	Remedy		Replace	Replace	Replace	Correct	Replace	Adjust	Replace	Replace	Replace	Correct	Replace	Correct	Correct	

S-16 Vibration is excessive

General causes why vibration is excessive

- Defective parts (abnormal wear, breakage)
- Misalignment between engine and chassis
- Abnormal combustion

★If abnormal noise is made and vibration is excessive, carry out troubleshooting for “S-15 Abnormal noise is made”, too.

			Causes							
			Stuck dynamic valve system (valve, rocker lever)	Worn main bearing, connecting rod bearing	Improper gear train backlash	Worn camshaft bushing	Improper injection timing	Loose engine mounting bolts, broken cushions	Worn front support spigot joint portion	Broken output shaft, parts in damper
Questions	Confirm recent repair history									
	Degree of use of machine	Operated for long period				△		△	△	
	Condition of vibration	Suddenly increased	○							○
		Gradually increased		○		○		○	○	
	Non-specified fuel is being used			○		○				
Check items	Metal particles are found when oil filter is drained			◎		◎				
	Metal particles are found when oil pan is drained			◎		◎				
	Oil pressure is low at low idle			○		○				
	Vibration occurs at mid-range speed							○		○
	Vibration follows engine speed				○			○	○	○
	Exhaust smoke is black		◎							
Troubleshooting	Inspect dynamic valve system directly		●							
	Inspect main bearing and connecting rod bearing directly			●						
	Inspect gear train directly				●					
	Inspect camshaft bushing directly					●				
	Check with monitoring function of machine monitor						●			
	Inspect engine mounting bolts and cushions directly							●		
	Inspect front support spigot joint portion directly								●	
	Inspect output shaft or inside of damper directly									○
		Remedy	Replace	Replace	Replace	Replace	Adjust	Replace	Replace	Replace

PC800-8, PC800LC-8 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC800-8
PC800LC-8

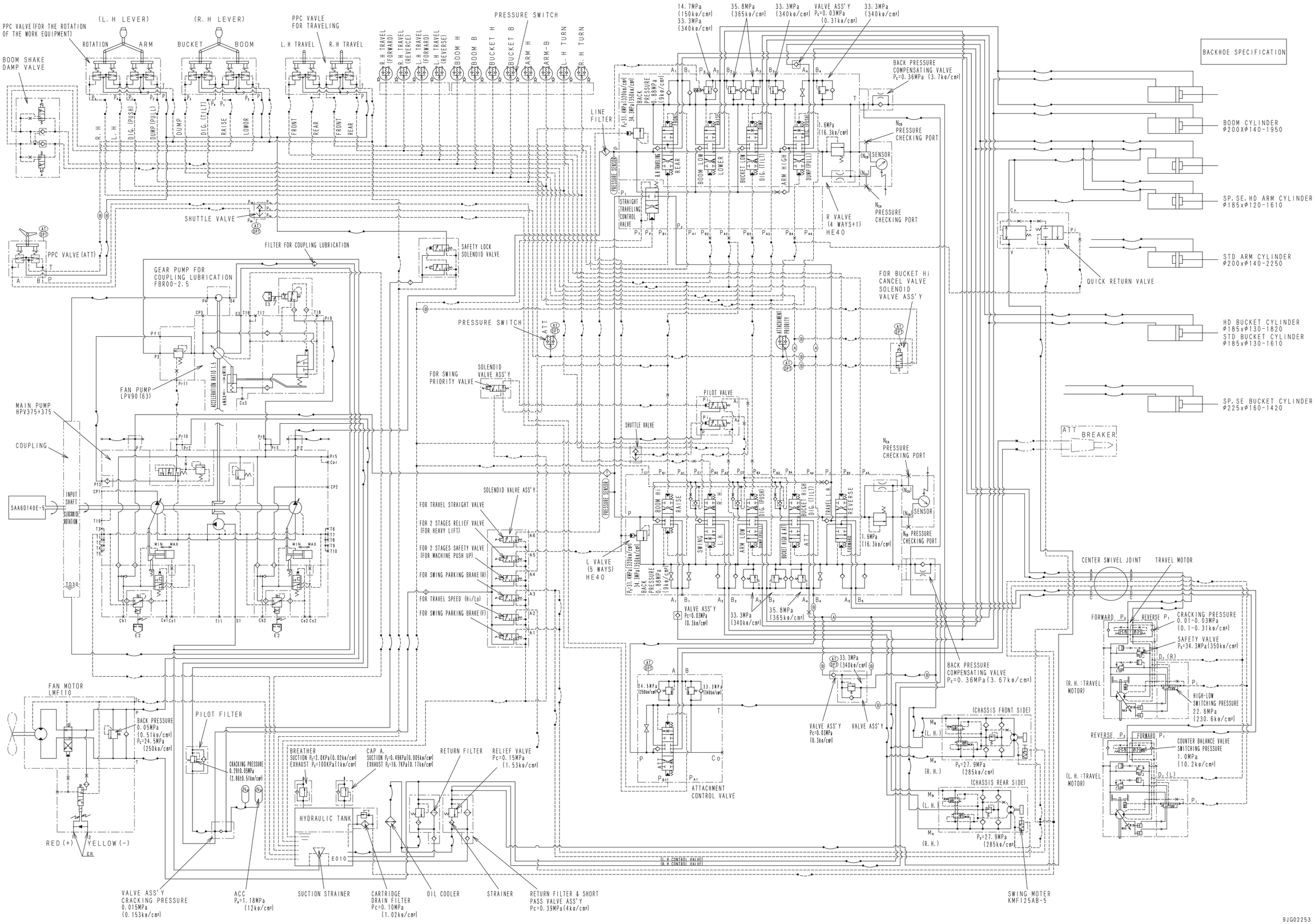
Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

90 Diagrams and drawings
Hydraulic diagrams and drawings

Hydraulic circuit diagram 3

Hydraulic diagrams and drawings

Hydraulic circuit diagram



9JG02253

PC800-8, PC800LC-8 Hydraulic excavator

Form No. **UEN00392-00**

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HYDRAULIC EXCAVATOR

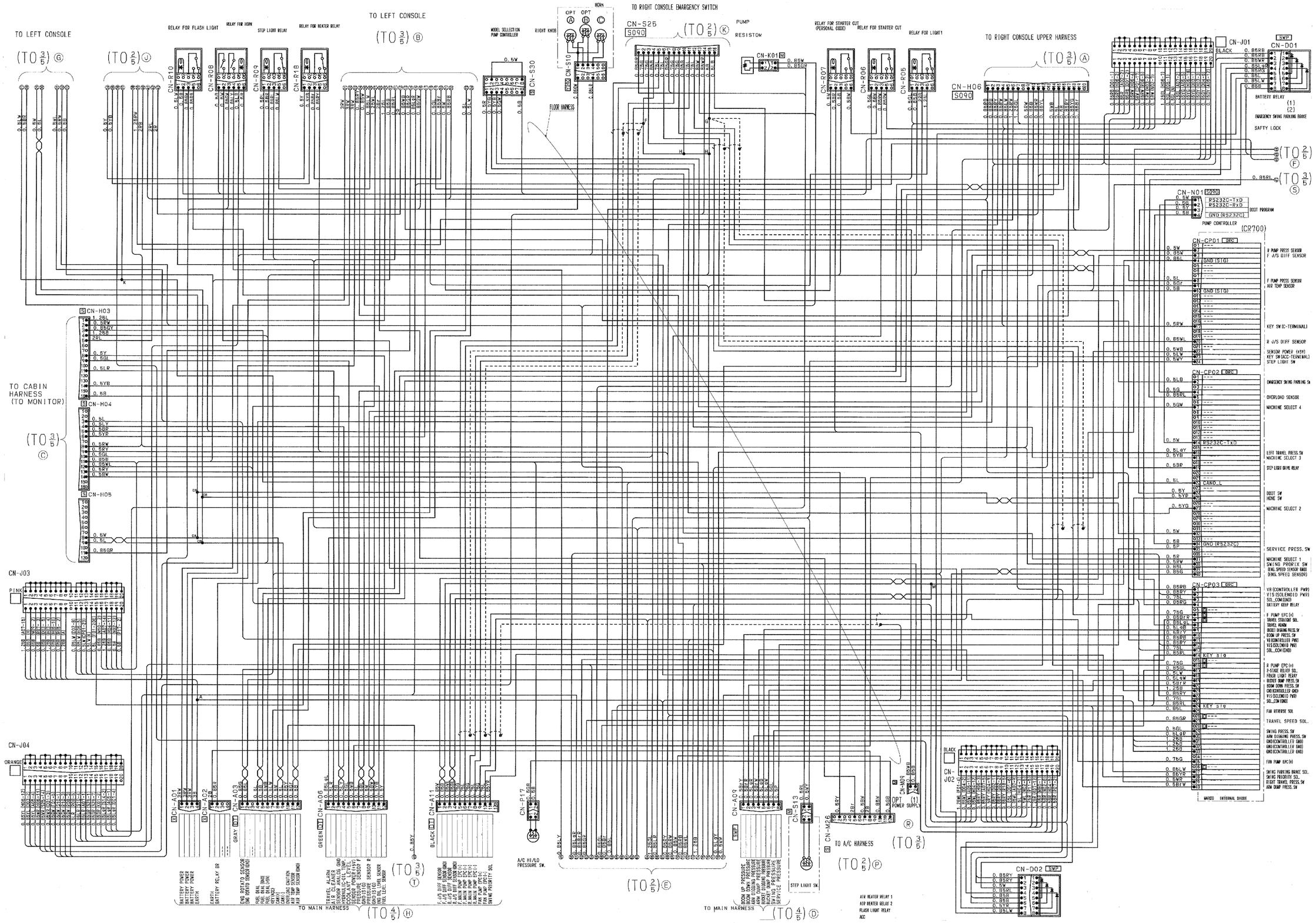
PC800-8
PC800LC-8

Machine model	Serial number
PC800-8	**50001 and up**
PC800LC-8	**50001 and up**

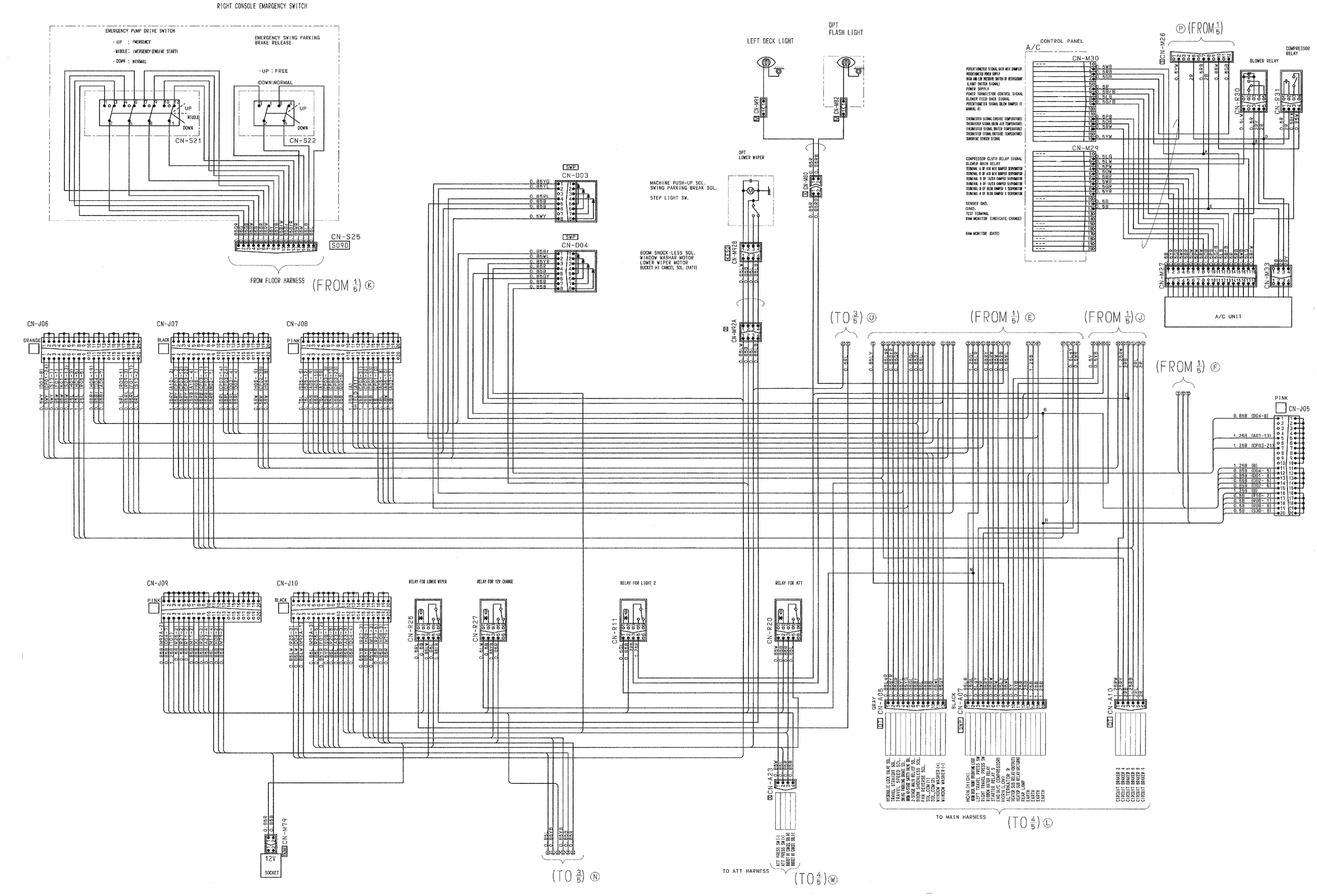
90 Diagrams and drawings
Electrical diagrams and drawings

Electrical circuit diagram (1/5) 3
Electrical circuit diagram (2/5) 5
Electrical circuit diagram (3/5) 7
Electrical circuit diagram (4/5) 9
Electrical circuit diagram (5/5) 11

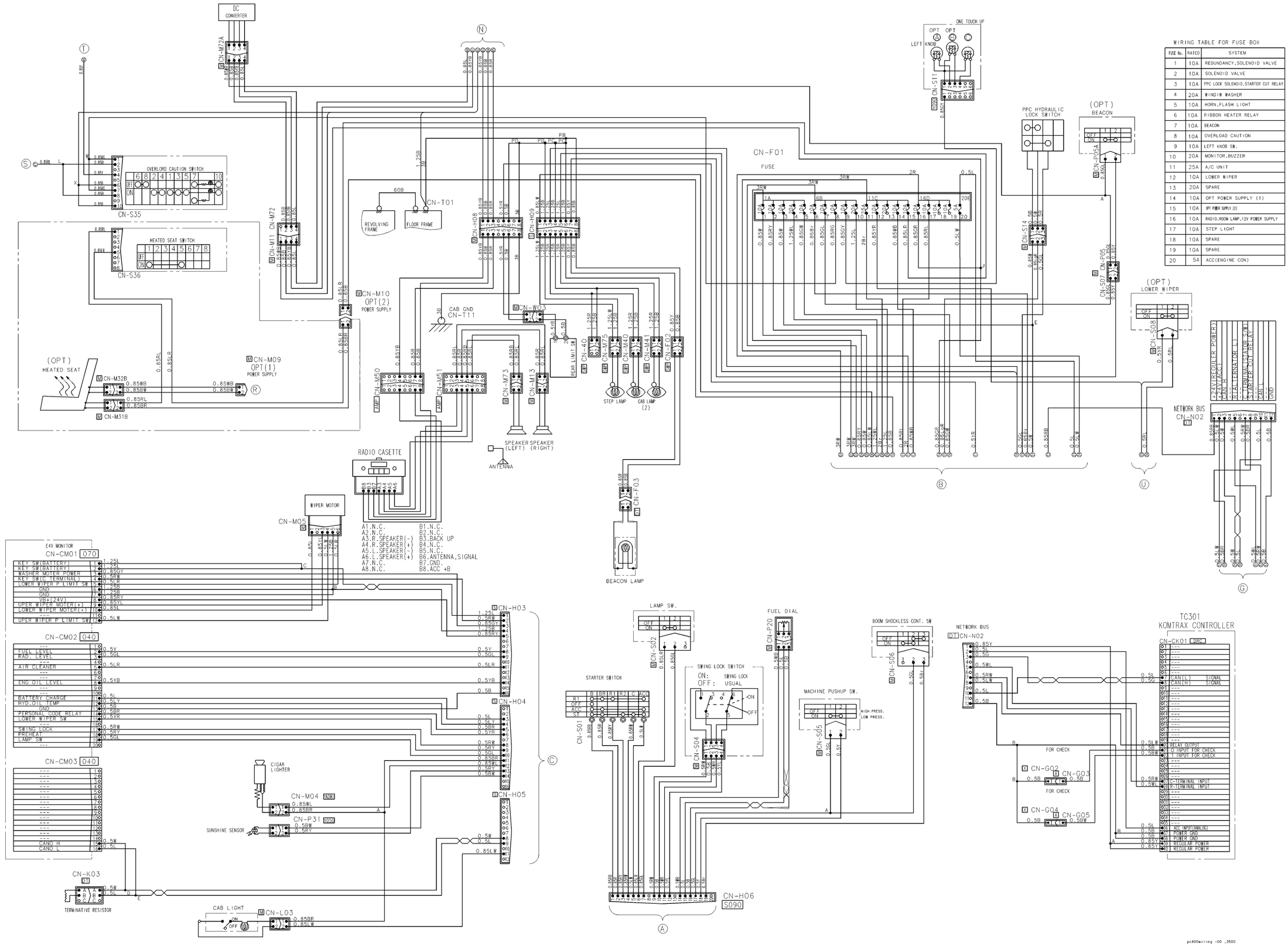
Electrical circuit diagram (1/5)



Electrical circuit diagram (2/5)



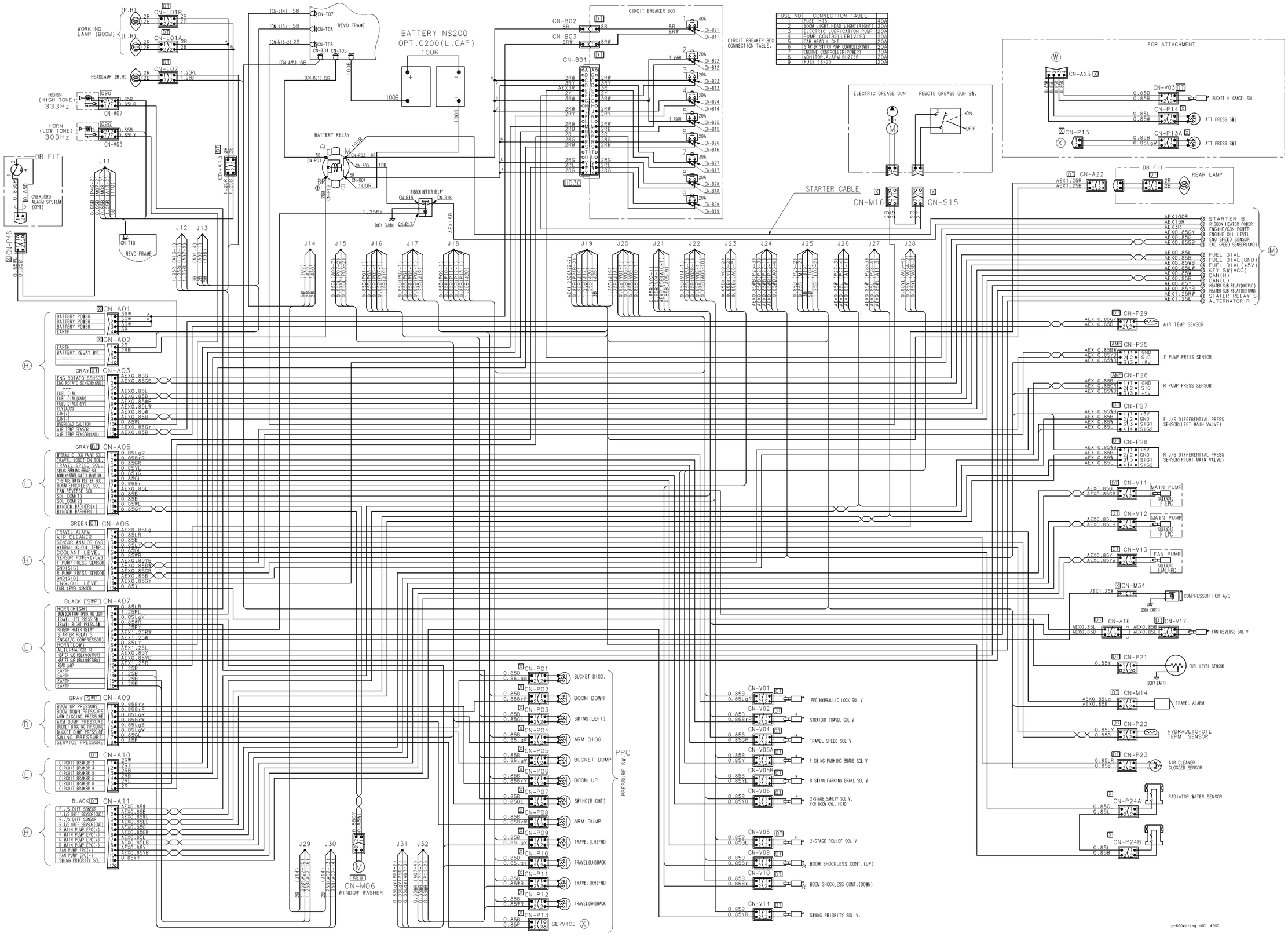
Electrical circuit diagram (3/5)



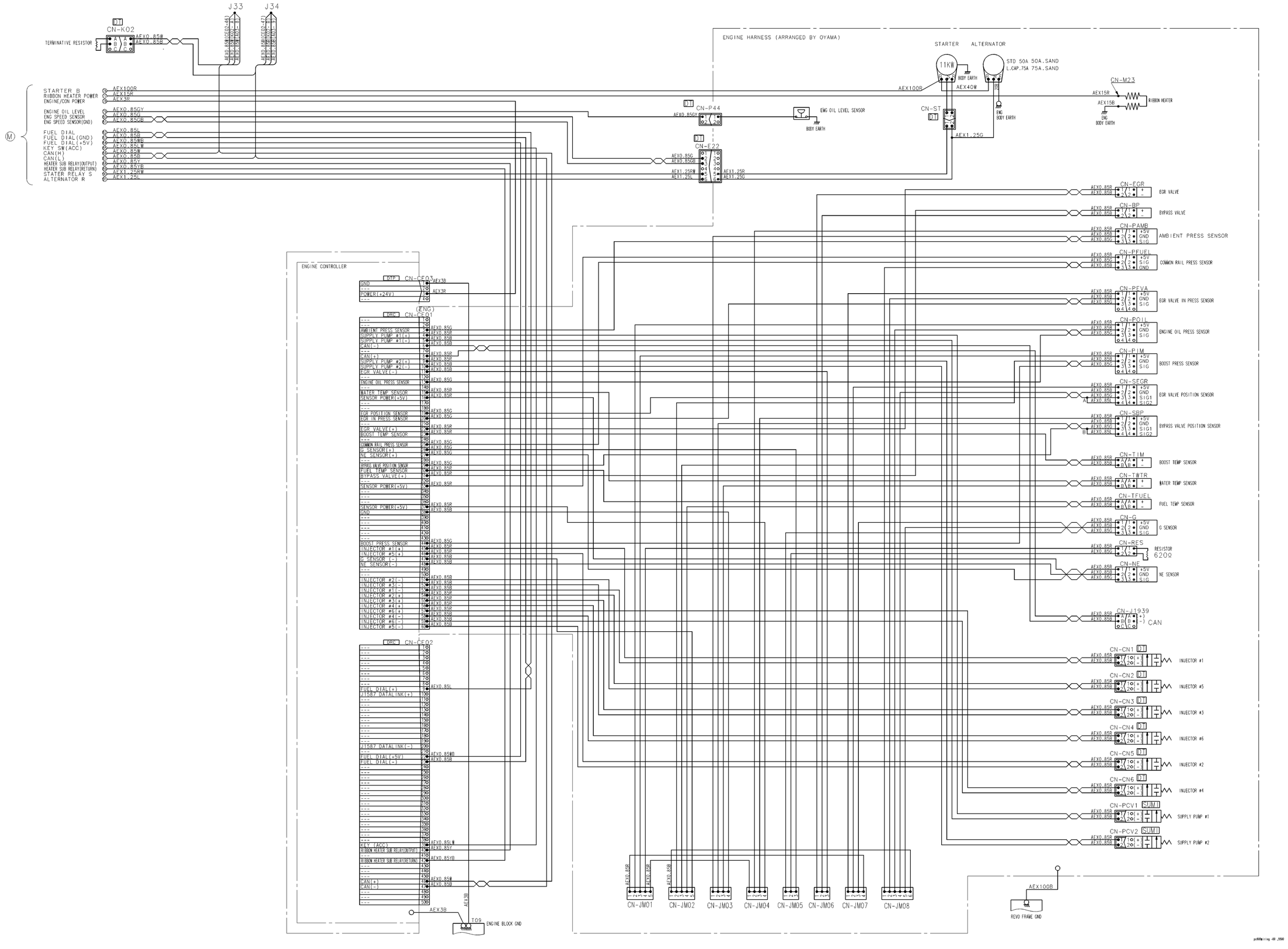
WIRING TABLE FOR FUSE BOX

FUSE No.	RATED	SYSTEM
1	10A	REDUNDANCY,SOLENOID VALVE
2	10A	SOLENOID VALVE
3	10A	PPC LOCK SOLENOID,STARTER CUT RELAY
4	20A	WINDOW WASHER
5	10A	HORN,FLASH LIGHT
6	10A	RIBBON HEATER RELAY
7	10A	BEACON
8	10A	OVERLOAD CAUTION
9	10A	LEFT KNOB SW.
10	20A	MONITOR,BUZZER
11	25A	A/C UNIT
12	10A	LOWER WIPER
13	20A	SPARE
14	10A	OPT POWER SUPPLY (1)
15	10A	OPT POWER SUPPLY (2)
16	10A	RADIO,ROOM LAMP,12V POWER SUPPLY
17	10A	STEP LIGHT
18	10A	SPARE
19	10A	SPARE
20	5A	ACC(ENGINE CON)

Electrical circuit diagram (4/5)



Electrical circuit diagram (5/5)



PC800-8, PC800LC-8 Hydraulic excavator

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