UEN00262-00

Shop Manual

HYDRAULIC
EXCAVATOR

GALEO

PC340LC-7
PC340NLC-7

SERIAL NUMBERS PC340LC-7E0 K45001
PC340NLC-7E0 K45001 and up

KOMATSU

HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

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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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PC340 (LC / NLC)-7 Hydraulic excavator

Form No. UEN00264-00

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Printed in Belgium 05-06 (00)

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PC340NLC-7

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Foreword and general information

(Rev. 2005/09)

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.

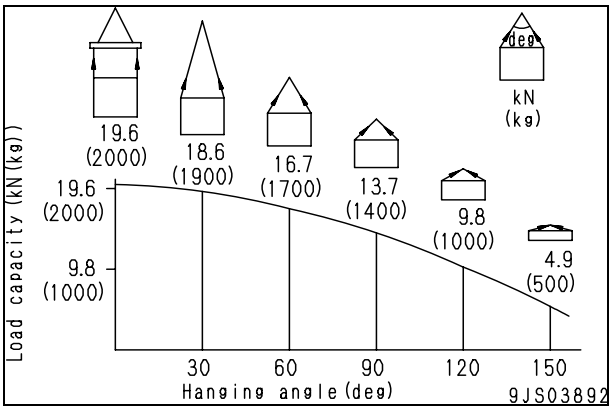
3) When disassembling or assembling, support the machine with blocks, jacks, or stands before starting work.
4) Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off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

3. Precautions during work

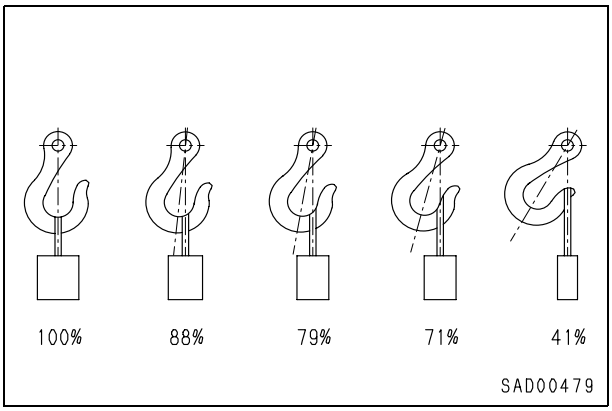
1) Before disconnecting or removing components of the oil, water, or air circuits, first release the pressure completely from the circuit. When removing the oil filler cap, a drain plug, or an oil pressure pickup plug, loosen it slowly to prevent the oil from spurting out.
2) The coolant and oil in the 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:

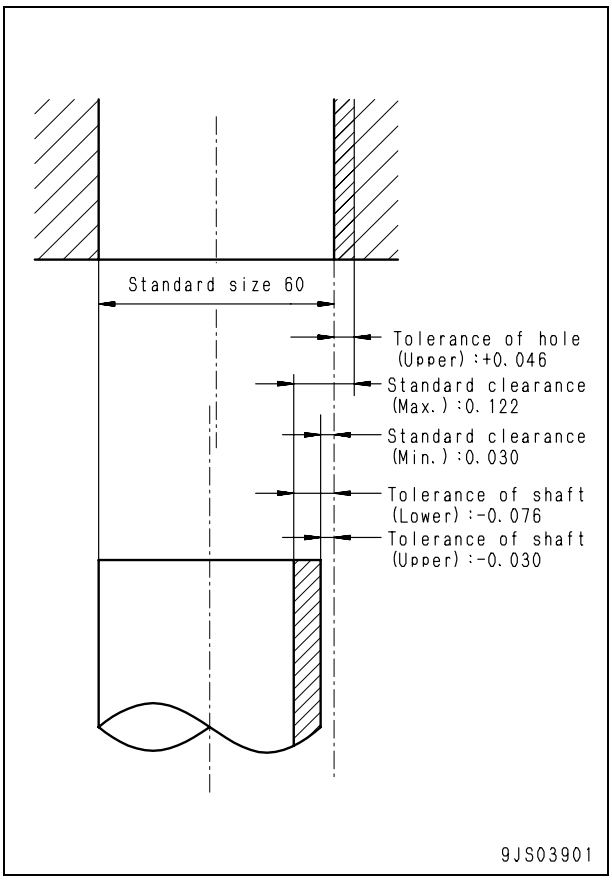
Standard size	Tolerance
120	–0.022 –0.126

★ 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 shaft 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

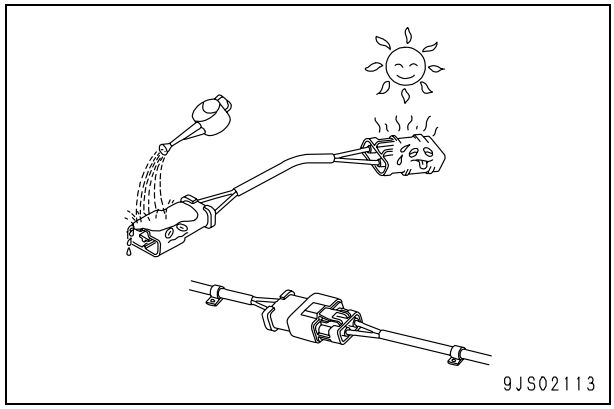
- The allowable maximum interference between the hole of a part and the shaft of another part to be assembled is called the “interference limit”.
- The interference limit shows the repair limit of the part of smaller tolerance.
- If the interference between the parts exceeds the interference limit, they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

Handling electric equipment and hydraulic component

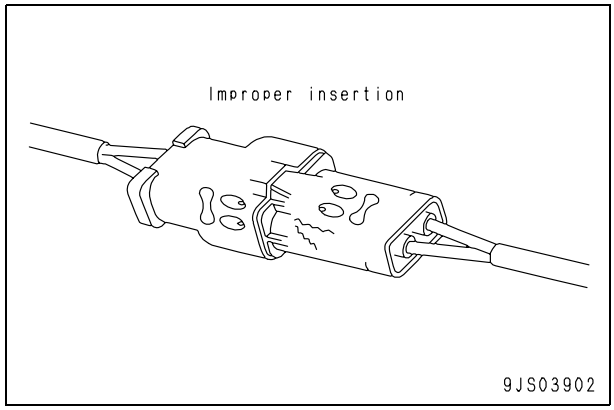
To maintain the performance of the machine over a long period, and to prevent failures or other troubles before they occur, correct “operation“, “maintenance and inspection“, “troubleshooting“, and “repairs” must be carried out. This section deals particularly with correct repair procedures for mechatronics 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

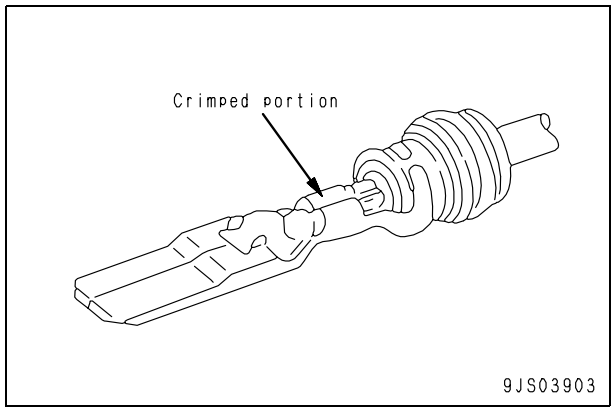
1. **Handling wiring harnesses and connectors**
   Wiring harnesses consist of wiring connecting one component to another component, connectors used for connecting and disconnecting one wire from another wire, and protectors or tubes used for protecting the wiring.
   Compared with other electrical components 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.



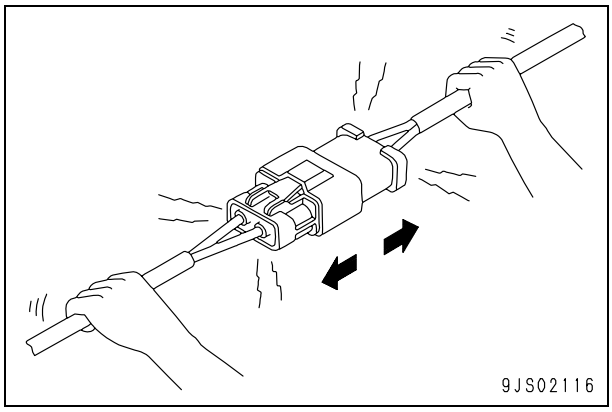
2. **Main failures occurring in wiring harness**
   1) Defective contact of connectors (defective contact between male and female)
      Problems with defective contact are likely to occur because the male connector is not properly inserted into the female connector, or because one or both of the connectors is deformed or the position is not correctly aligned, or because there is corrosion or oxidization of the contact surfaces.



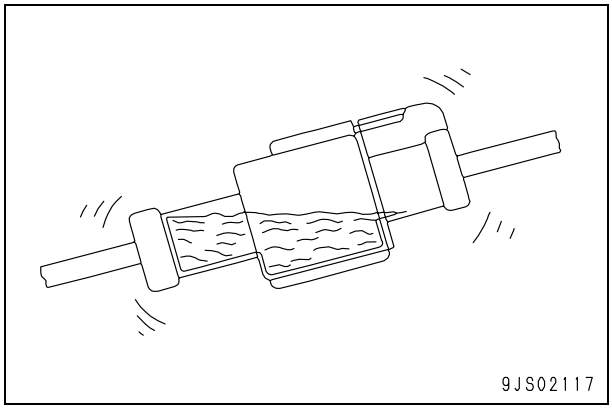
   2) Defective crimping or soldering of connectors
      The pins of the male and female connectors are in contact at the crimped terminal or soldered portion, but if there is excessive force brought to bear on the wiring, the plating at the joint will peel and cause improper connection or breakage.



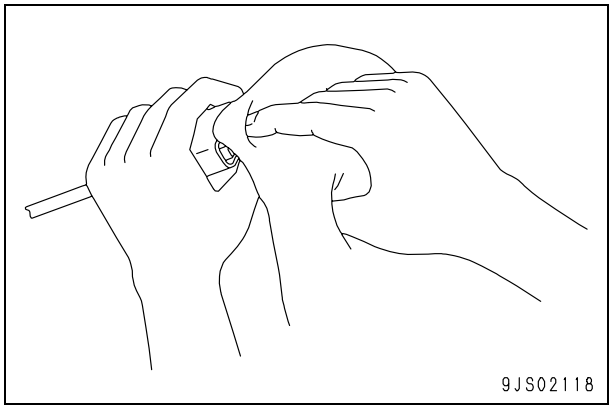
3) Disconnections in wiring
If the wiring is held and the connectors are pulled apart, or components are lifted with a crane with the wiring still connected, or a heavy object hits the wiring, the crimping of the connector may separate, or the soldering may be damaged, or the wiring may be broken.



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.



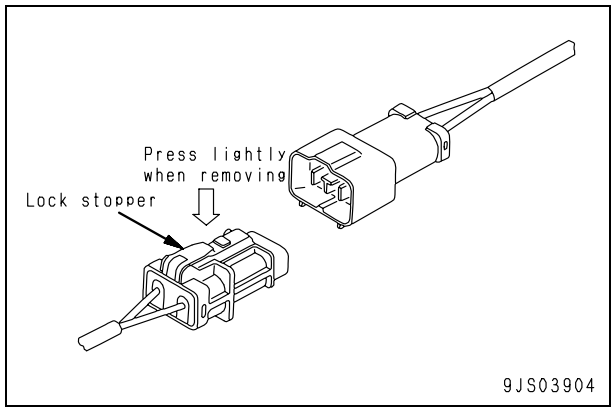
5) Oil or dirt stuck to connector
If oil or grease are stuck to the connector and an oil film is formed on the mating surface between the male and female pins, the oil will not let the electricity pass, so there will be defective contact. If there is oil or grease stuck to the connector, wipe it off 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

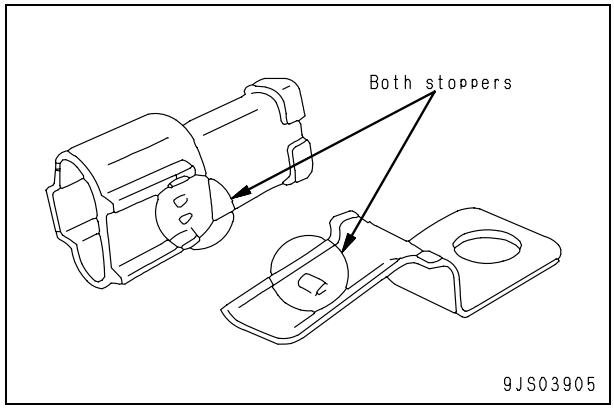
1) Disconnecting connectors

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.

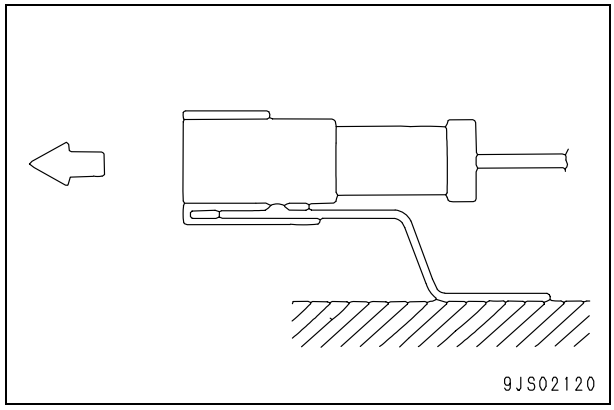


2] When removing from clips

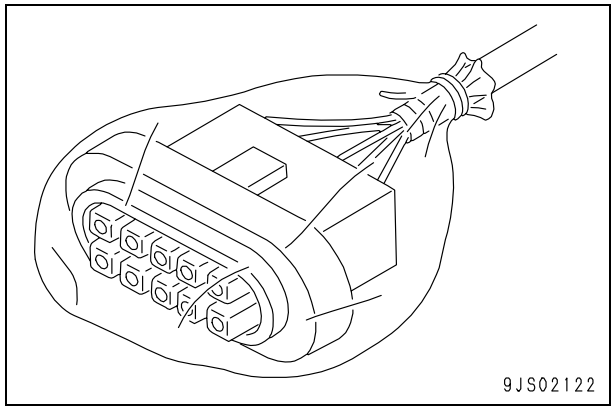
- Both of the connector and clip have stoppers, which are engaged with each other when the connector is installed.



- 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.



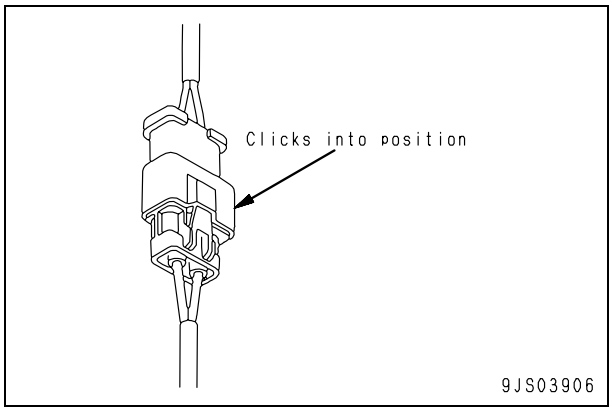
3] Action to take after removing connectors
After removing any connector, cover it with a vinyl bag to prevent any dust, dirt, oil, or water from getting in the connector portion.
★ If the machine is left disassembled for a long time, it is particularly easy for improper contact to occur, so always cover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

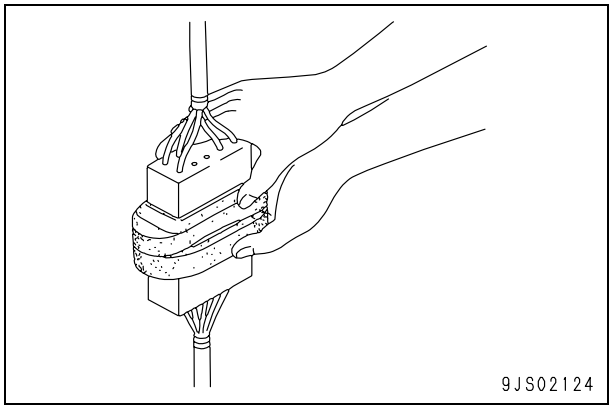


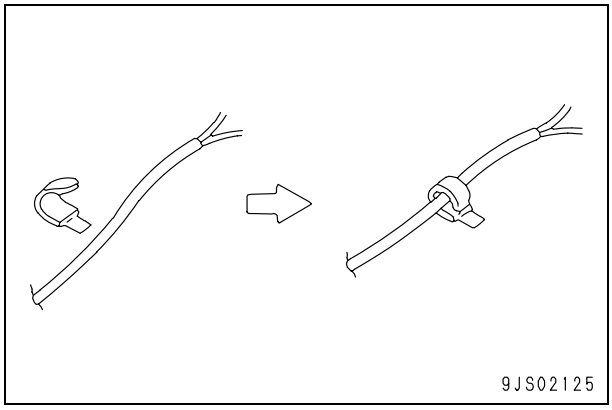
2) Connecting connectors
   1] Check the connector visually.
   Check that there is no oil, dirt, or water stuck to the connector pins (mating portion).
   Check that there is no deformation, defective contact, corrosion, or damage to the connector pins.
   Check that there is no damage or breakage to 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.

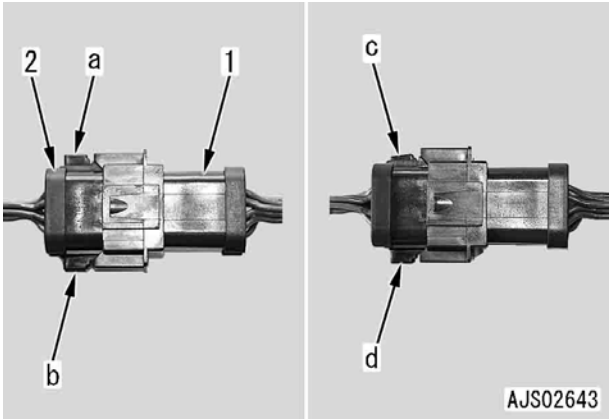
3) Connecting DT connectors
   Since the DT 8-pin and 12-pin heavy duty wire connectors have 2 latches respectively, push them in until they click 2 times.

   1. Male connector
   2. Female connector
   ● Normal locking state (Horizontal): a, b, d
   ● Incomplete locking state (Diagonal): c

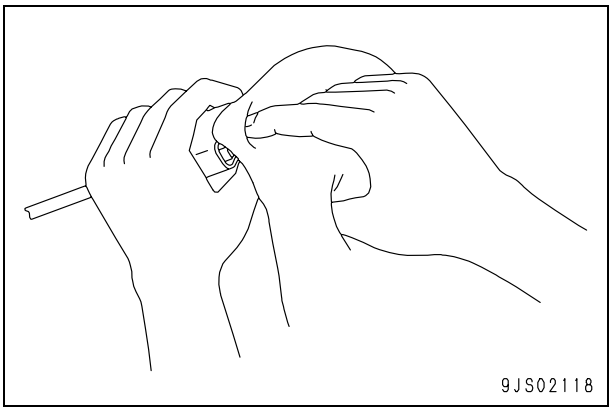


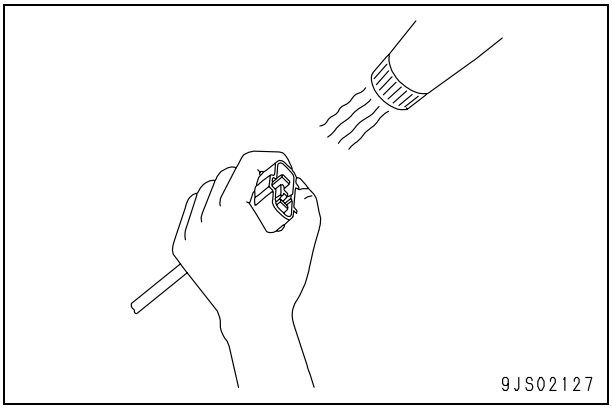


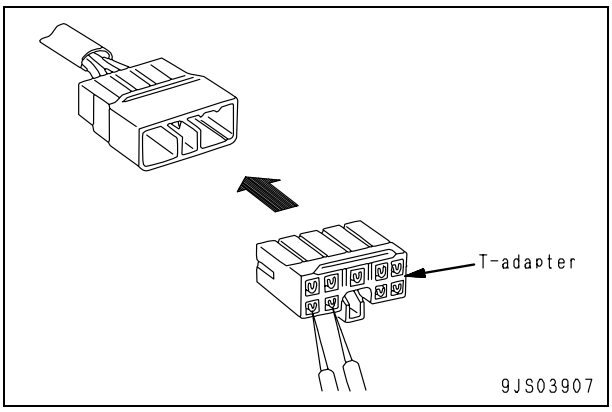




4) Drying wiring harness
If there is any oil or dirt on the wiring harness, wipe it off with a dry cloth. Avoid washing it in water or using steam. If the connector must be washed in water, do not use high-pressure water or steam directly on the wiring harness. If water gets directly on the connector, 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.

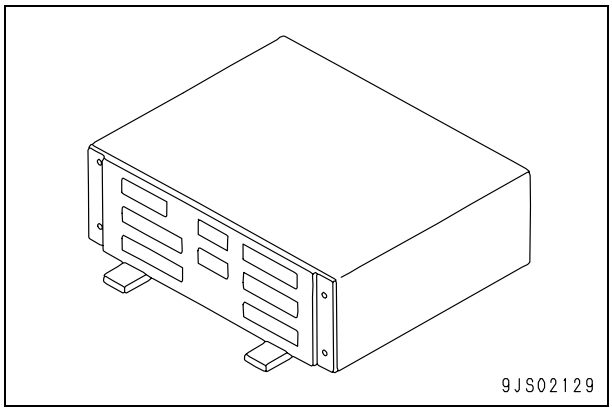


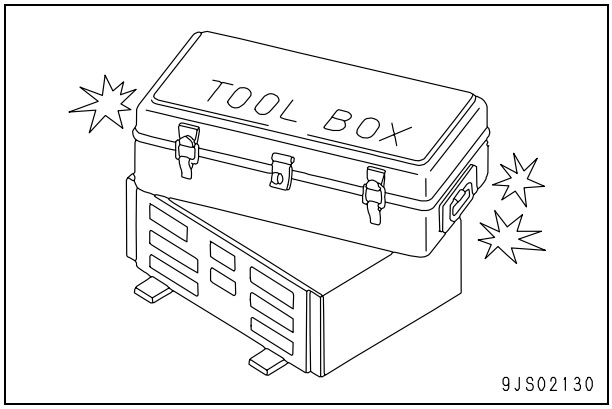




4. Handling controller

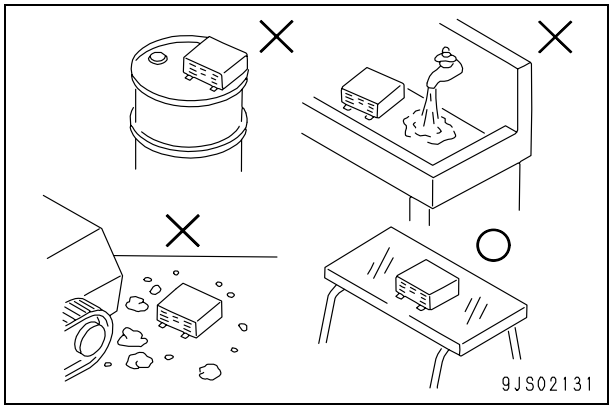
1) The controller contains a microcomputer and electronic control circuits. These control all of the electronic circuits on the machine, so be extremely careful when handling the controller.
2) Do not place objects on top of the controller.
3) Cover the control connectors with tape or a vinyl bag. Never 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

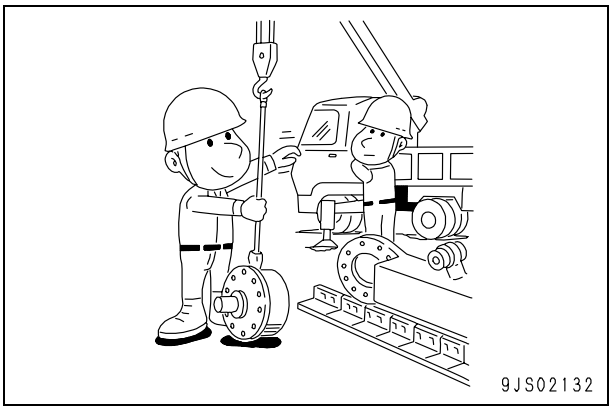
With the increase in pressure and precision of hydraulic equipment, the most common cause of failure is dirt (foreign material) in the hydraulic circuit. When adding hydraulic oil, or when disassembling or assembling hydraulic equipment, it is necessary to be particularly careful.

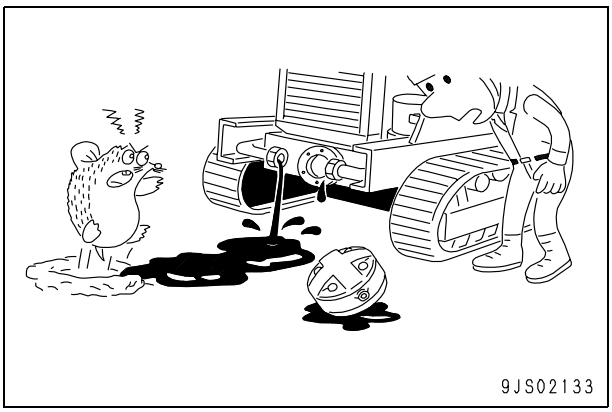
1. **Be careful of the operating environment.**
   Avoid adding hydraulic oil, replacing filters, or repairing the machine in rain or high winds, or places where there is a lot of dust.

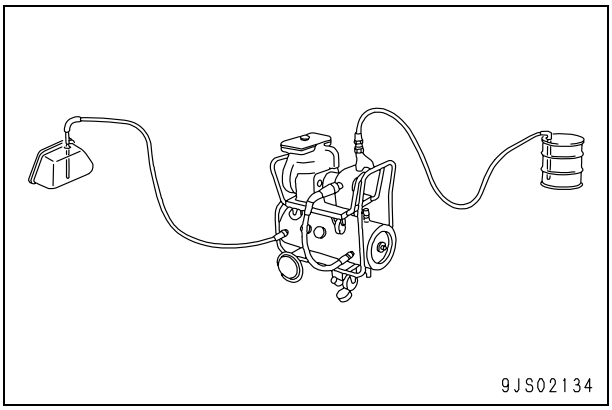
2. **Disassembly and maintenance work in the field**
   If disassembly or maintenance work is carried out on hydraulic equipment in the field, there is danger of dust entering the equipment. It is also difficult to check the performance after repairs, so it is desirable to use unit exchange. Disassembly 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.





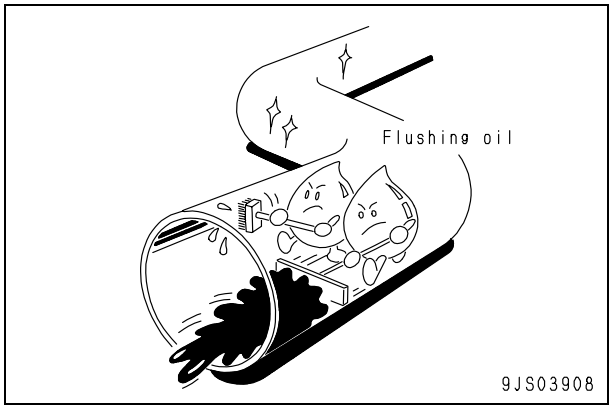


5. Change hydraulic oil when the temperature is high

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.

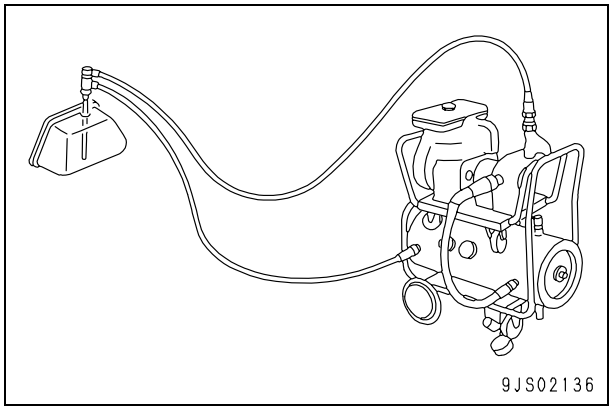
6. Flushing operations

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

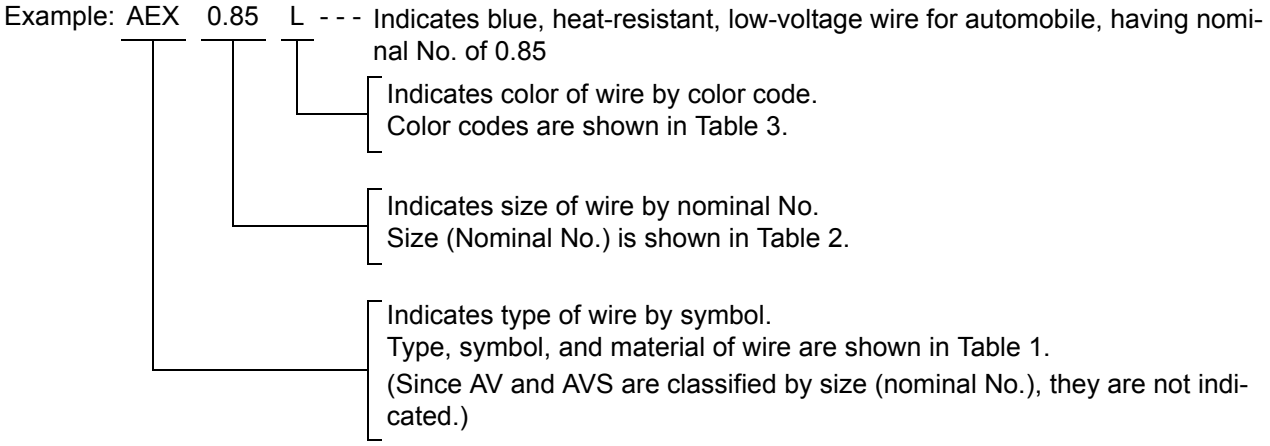
After repairing the hydraulic equipment (pump, control valve, etc.) or when running the machine, carry out oil cleaning to remove the sludge or contaminants in the hydraulic oil circuit. The oil cleaning equipment is used to remove the ultra fine (about 3 μ) particles that the filter built in the hydraulic 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		

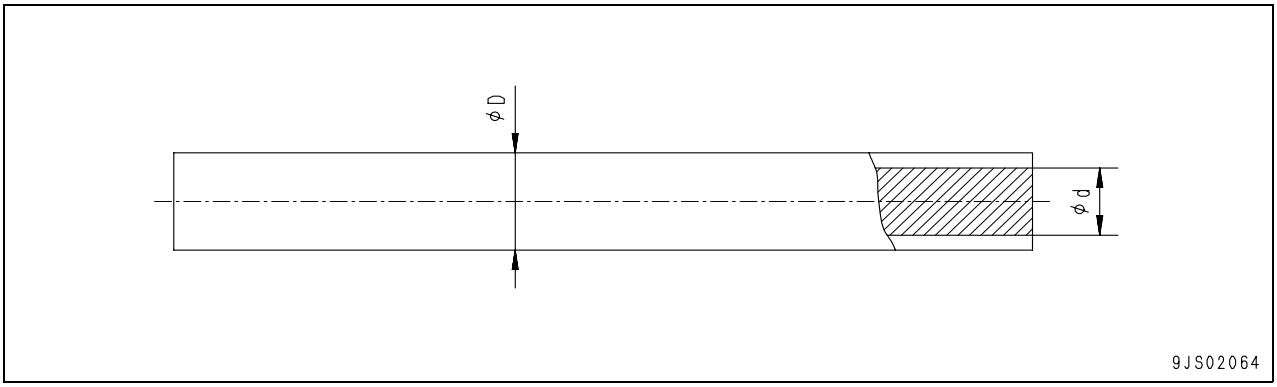
2. Dimensions

(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	Color Code	Color of wire
B	Black	LgW	Light green & White
Br	Brown	LgY	Light green & Yellow
BrB	Brown & Black	LR	Blue & Red
BrR	Brown & Red	LW	Blue & White
BrW	Brown & White	LY	Blue & Yellow
BrY	Brown & Yellow	O	Orange
Ch	Charcoal	P	Pink
Dg	Dark green	R	Red
G	Green	RB	Red & Black
GB	Green & Black	RG	Red & Green
GL	Green & Blue	RL	Red & Blue
Gr	Gray	RW	Red & White
GR	Green & Red	RY	Red & Yellow
GW	Green & White	Sb	Sky Blue
GY	Green & Yellow	Y	Yellow
L	Blue	YB	Yellow & Black
LB	Blue & Black	YG	Yellow &Green
Lg	Light green	YL	Yellow & Blue
LgB	Light green & Black	YR	Yellow & Red
LgR	Light green & 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

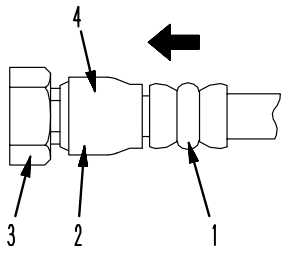


Fig. 2

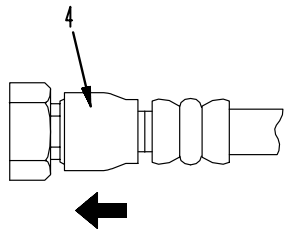
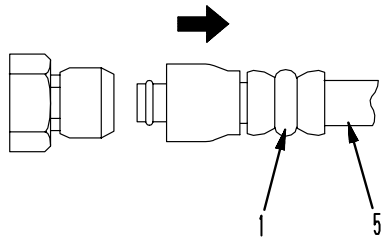


Fig. 3



9JS02109

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

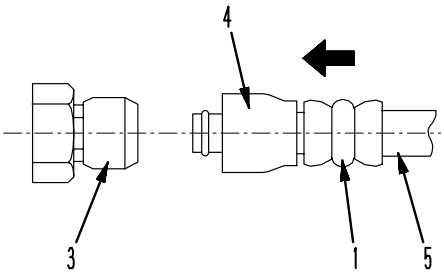
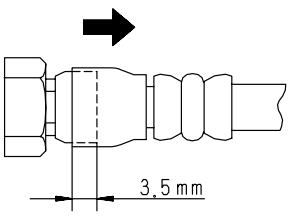


Fig. 5

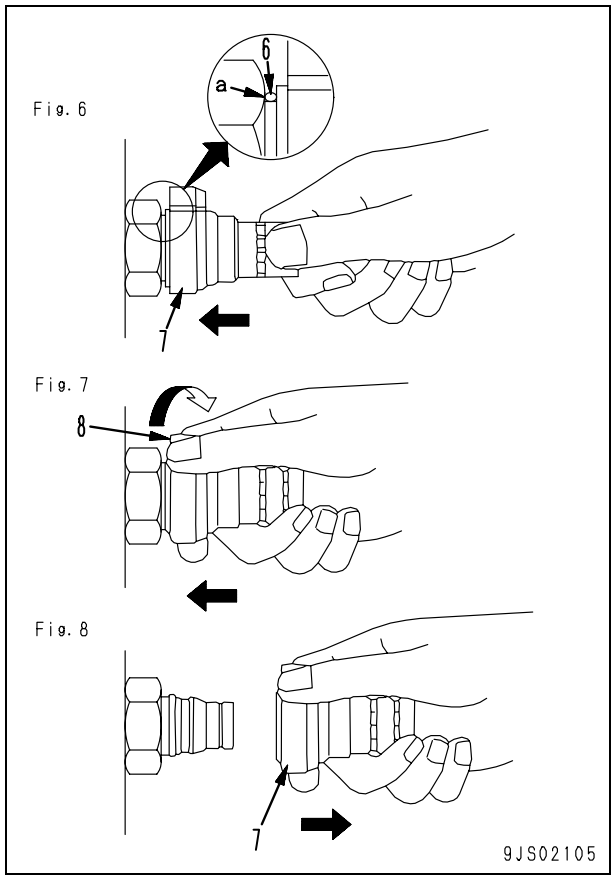


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Type 2

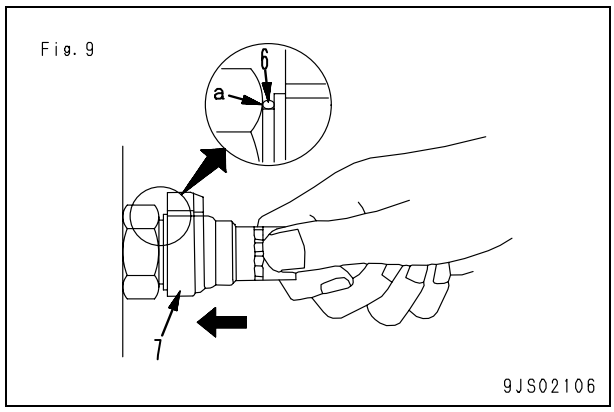
1. Disconnection

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

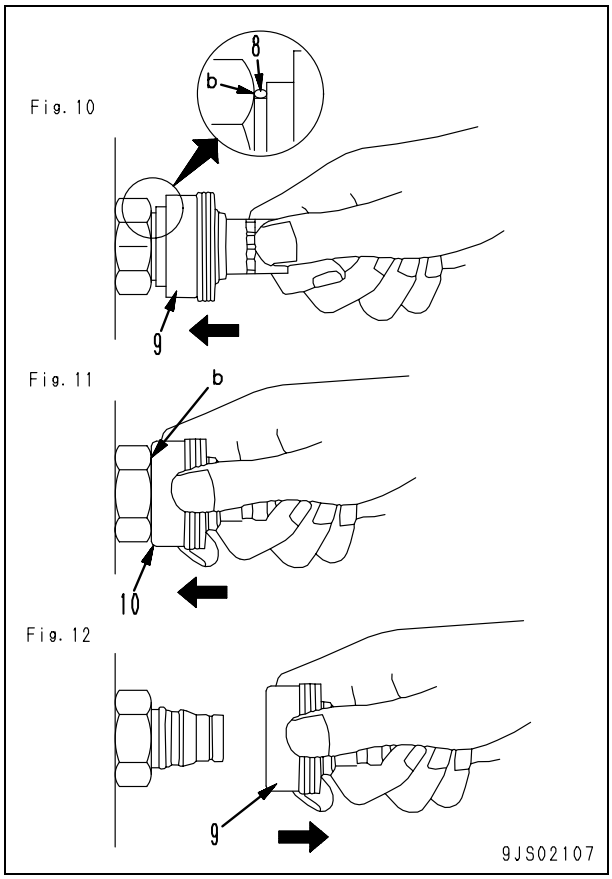
- Hold the tightening portion and push body (7) straight until sliding prevention ring (6) contacts contact surface (a) of the hexagonal portion at the male end. (Fig. 9)



Type 3

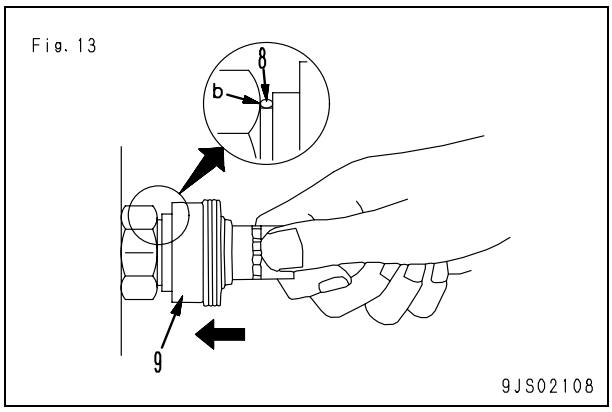
1. Disconnection

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)

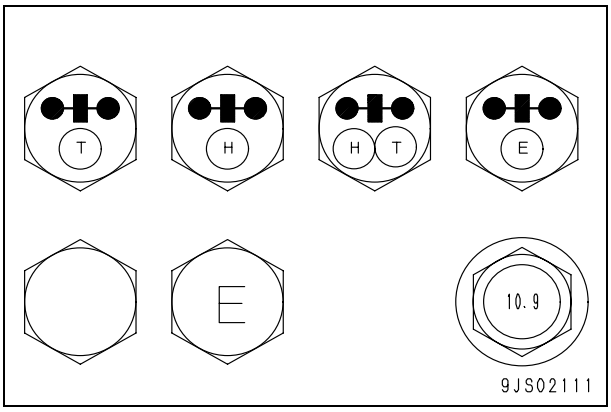
   ★ The following table corresponds to the bolts in Fig. A.

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	6.0 – 7.5
12	19	98 – 123	10.0 – 12.5
14	22	153 – 190	15.5 – 19.5
16	24	235 – 285	23.5 – 29.5
18	27	320 – 400	33.0 – 41.0
20	30	455 – 565	46.5 – 58.0
22	32	610 – 765	62.5 – 78.0
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

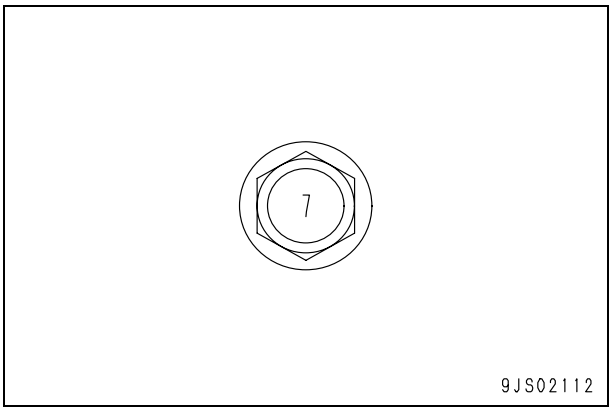
   ★ The following table corresponds to the bolts in Fig. B.

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/cm^2 to lb/in^2

1 kg/cm^2 = 14.2233 lb/in^2

	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

PC340 (LC/ NLC)-7 Hydraulic excavator

Form No. UEN00265-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

01 Specification

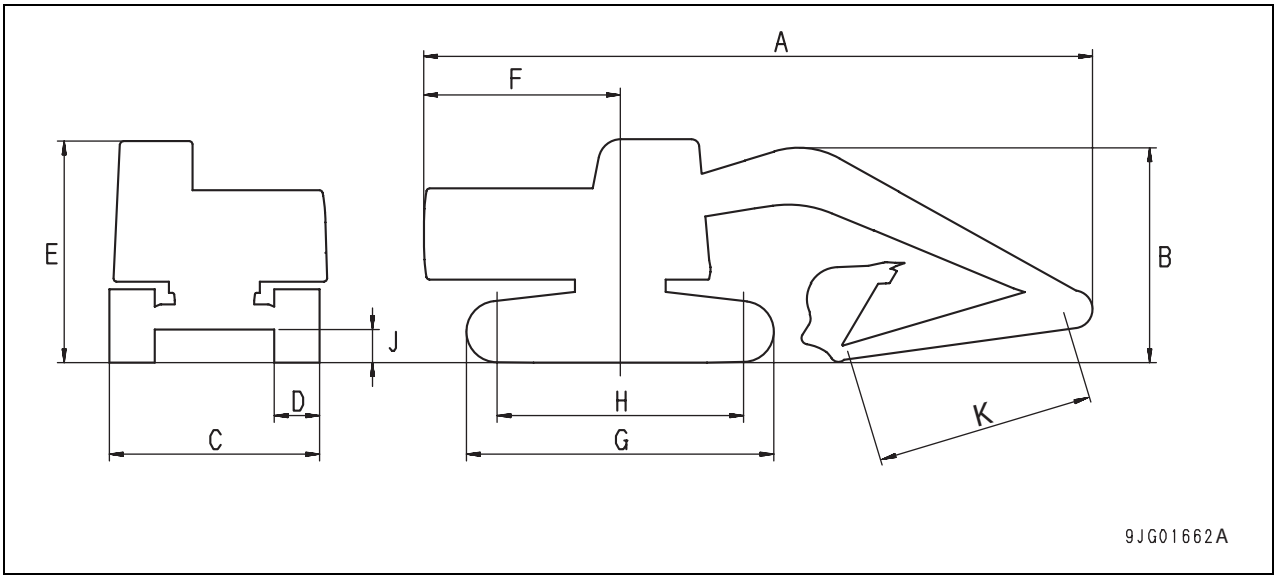
Specification and technical data

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Specification dimension drawings 2
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Table of fuel, coolant and lubricants 8

Specification and technical data

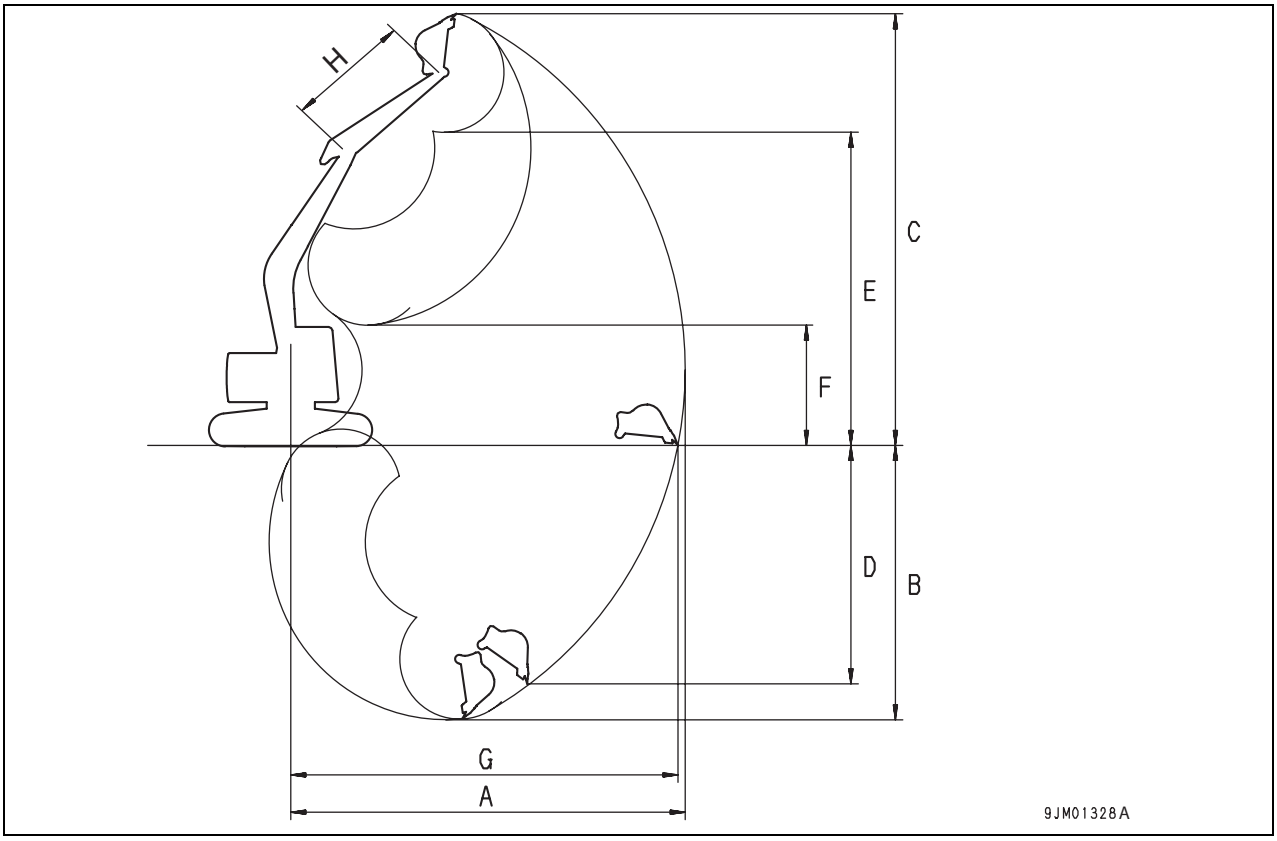
Specification dimension drawings

Dimensions



	Item	Unit	PC340LC-7	PC340NLC-7
A	Overall length	mm	11,180	11,180
B	Overall height	mm	3,410	3,280
C	Overall width	mm	3,290	2,990
D	Shoe width	mm	700	600
E	Cab height	mm	3,130	3,130
F	Tail swing radius	mm	3,450	3,450
G	Overall track length	mm	4,955	4,955
H	Length of track on ground	mm	4,030	4,030
J	Max.ground clearance	mm	498	498
K	Arm length	mm	2600	2600

Working ranges



	Item	Unit	PC340LC-7	PC340NLC-7
A	Max. digging reach	mm	10,550	
B	Max. digging depth	mm	6,705	
C	Max. digging height	mm	9,965	
D	Max. vertical wall digging depth	mm	5,880	
E	Max. dumping height	mm	6,895	
F	Min. dumping height	mm	3,290	
G	Max. reach at ground level	mm	1,035	
H	Arm length	mm	2,600	

Specifications

PC340LC-7, PC340NLC-7

Machine model				PC340LC-7	PC340NLC-7
Serial number				50001 and up	
Bucket capacity			m^3	1.4	1.4
Operating weight			kg	33,450	32,970
Performance	Working range	Max. digging depth	mm	7,380	7,380
		Max. vertical wall digging depth	mm	6,480	6,480
		Max. digging radius	mm	11,100	11,100
		Max. reach at ground level	mm	10,920	10,920
		Max. digging height	mm	10,210	10,210
		Max. dumping height	mm	7,110	7,110
	Max. digging force (When power max. function is turned on)		kN {kg}	211.8 {21,600} (226.5 {23,100})	211.8 {21,600} (226.5 {23,100})
	Swing speed		rpm	9.5	9.5
	Swing operation max. slope angle		deg.	21	21
	Travel speed		km/h	Lo: 3.2 Mi: 4.5 Hi: 5.5	Lo: 3.2 Mi: 4.5 Hi: 5.5
	Gradeability		deg.	35	35
	Ground pressure		kPa{kg/cm^2}	57.9 {0.59}	66.7 {0.68}
Dimensions	Overall length		mm	11,180	11,180
	Overall width		mm	3,190	2,990
	Overall crawler width		mm	3,190	2,290
	Overall height (During transportation)		mm	3,280	3,280
	Machine body overall height		mm	3,130	3,130
	Ground clearance of upper structure bottom		mm	1,186	1,186
	Maximum ground clearance		mm	498	498
	Tail swing radius		mm	3,450	3,450
	Work equipment minimum swing radius		mm	4,310	4,310
	Top height at minimum swing radius of work equipment		mm	8,520	8,520
	Length of track on ground		mm	3,700	4,030
	Track gauge		mm	2,590	2,590
	Cab height		mm	3,130	3,130
	Width of standard shoe		mm	700	600

Machine model				PC340LC-7	PC340NLC-7
Serial number				50001 and up	
Engine	Model			SAA6D114E	
	Type			4-cycle, water-cooled in-line, direct injection with turbocharger and air-cooled aftercooler	
	Number of cylinders – bore x stroke		mm	6-114x135	
	Piston displacement		ℓ {cc}	8.27 {8,270}	
	Performance	Rated output	kW/rpm {HP/rpm}	183.9/1,980 {250/1,980}	
		Max. torque	Nm/rpm {kgm/rpm}	1,108/1,450 {113/1,450}	
		High idle under no load	rpm	2,050	
		Low idle under no load	rpm	1,000	
		Min. fuel consumption ratio	g/kWh {g/HPh}	205 {151}	
	Starting motor			24 V, 11 kW	
	Alternator			24 V, 60 A	
	Battery			12 V, 140 Ah x 2	
	Radiator type			Alminum wave type, 4th row	
Undercarriage	Carrier roller			Two on one side	
	Track roller			7 on one side	8 on one side
	Track shoe			Assembly-type triple grouser 45 on one side	Assembly-type triple grouser 48 on one side

Machine model				PC340LC-7		PC340NLC-7
Serial number				50001 and up		
Hydraulic system	Hydraulic pump	Type and numbers		HPV125+125, Variable displacement piston type: 2		
		Delivery	ℓ/min	267.5 x 2		
		Set pressure	MPa {kg/cm^2}	37.8 {380}		
	Control valve	Type and numbers		6-spool + 1-spool type: 1		
		Operating method		Hydraulic		
	Hydraulic motor	Travel motor		HMV160ADT-2, piston type: 2 (with brake valve and parking brake)		
		Swing motor		KMF230ABE-5, piston type: 1 (with safety valve, shaft brake and reverse prevention valve)		
	Hydraulic cylinder			Boom (*1)	Arm (*1) (*2)	Bucket / 2.6M Arm
		Type		Double acting piston	Double acting piston	Double acting piston
		Cylinder inner diameter	mm	140	160	150
		Piston rod diameter	mm	100	110	110
		Stroke	mm	1,480	1,825	1,285
		Max. pin-to-pin distance	mm	3,525	4,255	3,155
		Min. pin-to-pin distance	mm	2,045	2,430	1,870
	Hydraulic tank			Box-shaped, closed type		
	Hydraulic oil filter			Tank return side		
	Hydraulic oil cooler			CF40-1 (Air-cooling type)		

*1: Cushion is provided on head side
*2: Cushion is provided on bottom side

Weight table

⚠ **This weight table is prepared for your reference when handling or transporting the components.**

PC340LC-7, PC340NLC-7

Unit: kg

Machine model	PC340LC-7	PC340NLC-7
Serial number	50001 and up	
Engine assembly	1,148	1,148
● Engine	865	865
● Damper	14.3	14.3
● Hydraulic pump	178	178
Radiator and oil cooler assembly	153	153
Hydraulic tank and filter assembly (Not including hydraulic oil)	176	176
Fuel tank and filter assembly (Not including fuel)	238	238
Revolving frame	2,723	2,723
Cab	292	292
Operator seat	35	35
Counterweight	5,470	5,470
Swing machinery	442	442
Control valve	242	242
Swing motor	88	88
Travel motor	164 x 2	164 x 2
Center swivel joint	29.9	29.9
Track frame assembly	7,979	7,864
● Track frame	4,441	4,326
● Swing circle	487	487
● Idler	169 x 2	169 x 2
● Idler cushion	287.5 x 2	287.5 x 2
● Carrier roller	28 x 4	28 x 4
● Track roller	52.2 x 14	52.2 x 16
● Final drive (including travel motor)	583 x 2	583 x 2
Track shoe assembly		
● Standard triple shoe (600 mm)	3,470	3,700
● Standard triple shoe (700 mm)	4,030	4,300
● Wide triple shoe (800 mm)	4,380	4,680
● Load liner (Rubber pad type) (600 mm)	–	–
Boom assembly	2,935	2,935
Arm assembly	1,590	1,590
Bucket assembly	1,700	1,700
Boom cylinder assembly	250 x 2	250 x 2
Arm cylinder assembly	379	379
Bucket cylinder assembly	269	269
Link (large) assembly	116	116
Link (small) assembly	39 x 2	39 x 2
Boom pin	76 + 13 x 2 + 57 + 21 + 42	76 + 13 x 2 + 57 + 21 + 42
Arm pin	13 + 17	13 + 17
Bucket pin	29 x 2	29 x 2
Link pin	27 x 2	27 x 2

Table of fuel, coolant and lubricants

★ For details of the notes (Notes 1, Note 2...) in the table, see 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	SAE 0W30EOS and HTHS 3.5min. (Note.1)	Komatsu EOS0W30
		SAE 5W40EOS and HTHS 3.5min. (Note.1)	Komatsu EOS5W40
		SAE 10W30DH	Komatsu EO10W30DH API CH-4 API CI-4
		SAE 15W40DH	Komatsu EO15W40DH API CH-4 API CI-4
		SAE 30DH	Komatsu EO30DH
Swing machinery case Final drive case Damper case	Power train oil (Note.2)	TO30	TO30
Hydraulic system	Power train oil	TO10	TO10
	Hydraulic oil	HO46-HM	HO46-HM
Grease fitting	Hyper grease (Note.3)	G2-TE	G2-TE
	Lithium EP grease	G2-LI	G2-LI
Cooling system	Supercoolant AF-NAC	AF-NAC (Note.4)	AF-NAC
Fuel tank	Diesel fuel	No.2-D No.1-D	ASTM No.2-D ASTM No.1-D

Unit: ℓ

Reservoir	PC340LC-7, PC340NLC-7	
	Specified (ℓ)	Refill (ℓ)
Engine oil pan	38	35
Swing machinery case	13.4	13.4
Final drive case	8.5	8.5
Damper case	1.3	1.3
Hydraulic system	365	188
Fuel tank	605	—
Cooling system	32	—

KOMATSU PC340 (LC / NLC) -7 Hydraulic excavator

Form No. UEN00267-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

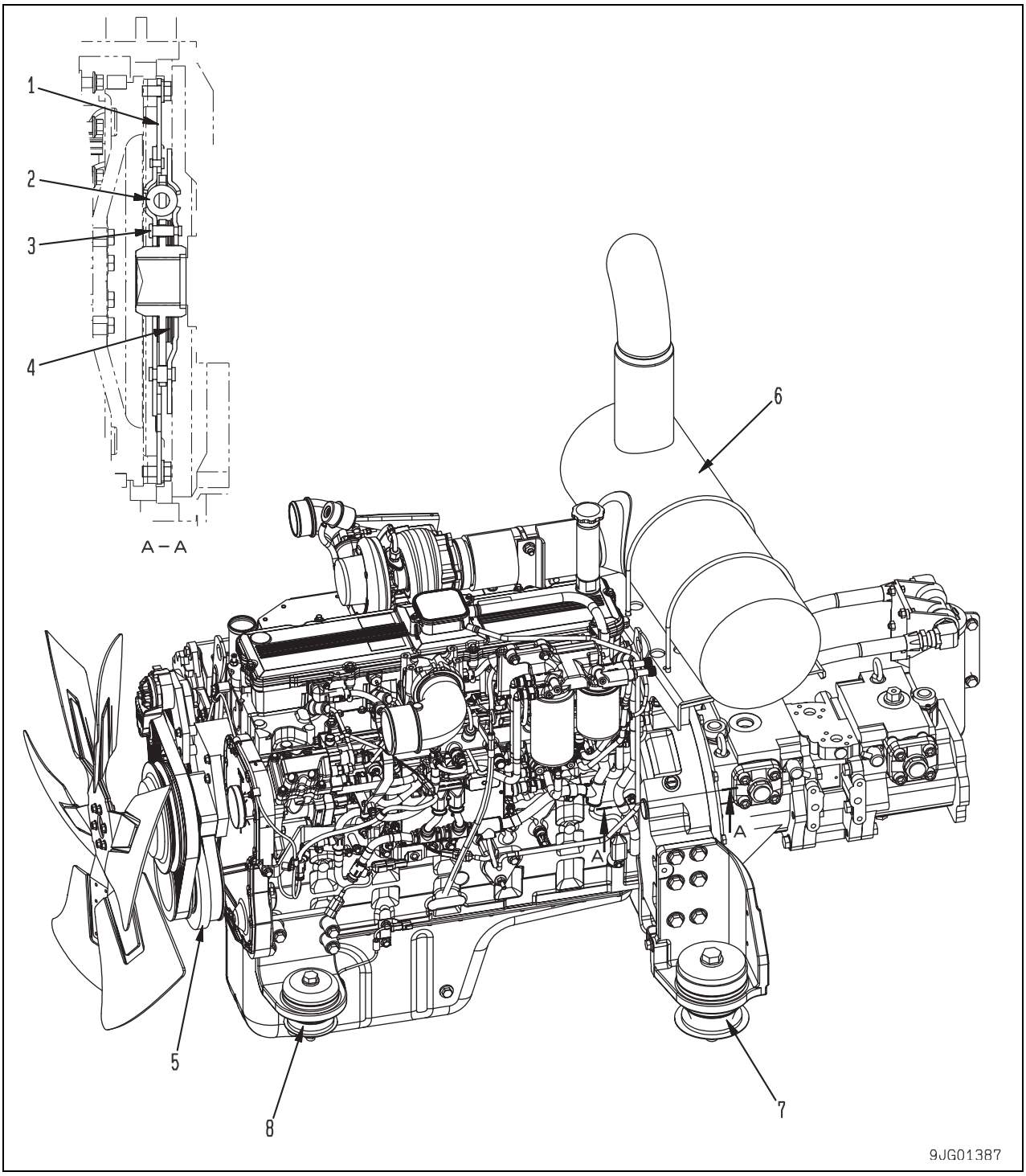
10 Structure, function and maintenance standard

Engine and cooling system

Engine and cooling system 2
Engine related parts 2
Radiator, oil cooler and aftercooler 3

Engine and cooling system

Engine related parts

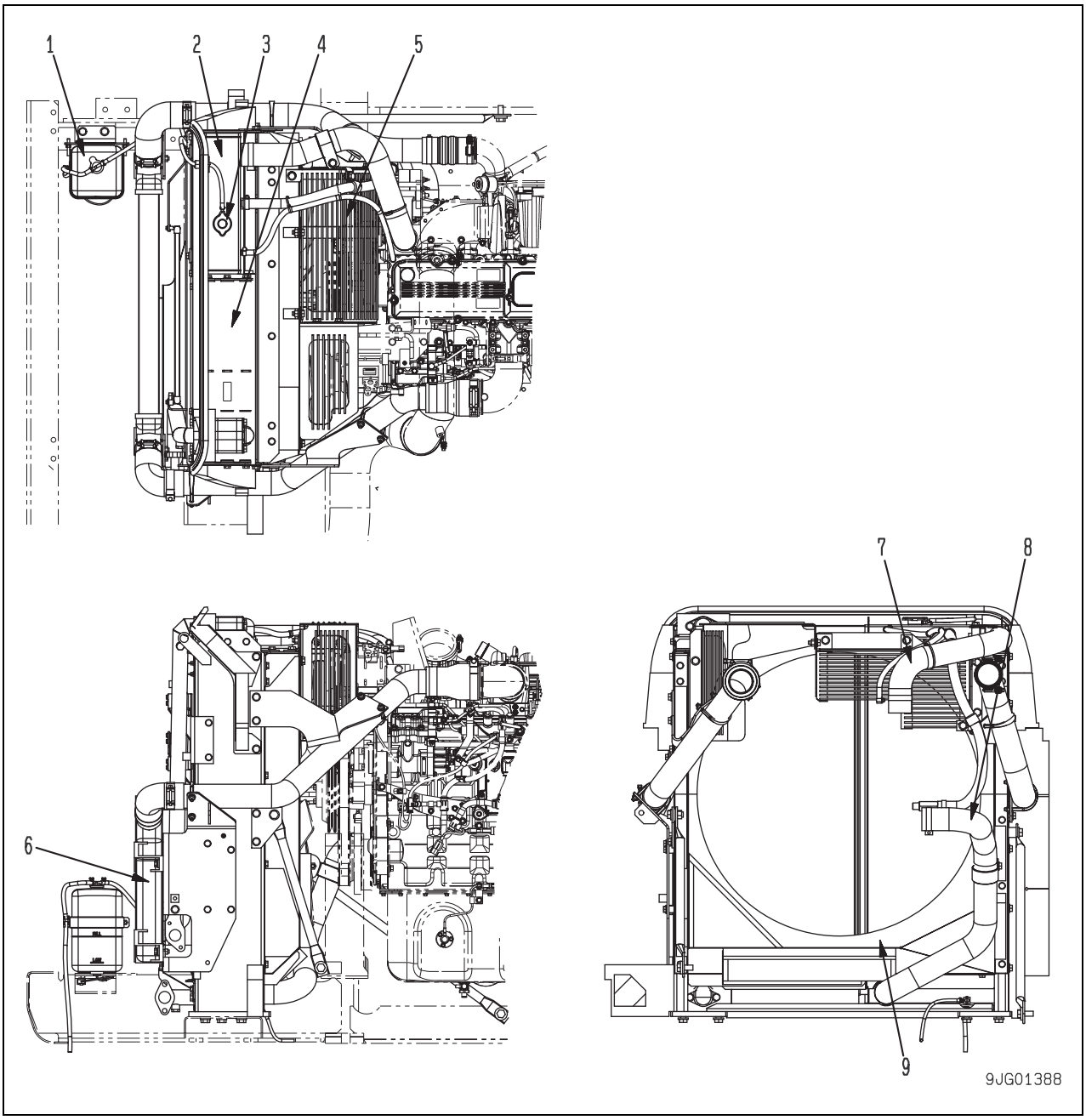


1. Drive plate
2. Torsion spring
3. Stopper pin
4. Friction plate
5. Damper assembly
6. Muffler
7. Rear engine mount
8. Front engine mount

Outline

A wet type damper assembly is used.
Oil capacity: 1.07 ℓ

Radiator, oil cooler and aftercooler



1. Reservoir tank
2. Radiator
3. Radiator cap
4. Oil cooler
5. Guard
6. Aftercooler
7. Radiator inlet hose
8. Radiator outlet hose
9. Shroud

Specifications

Radiator: Aluminum wave type, 4th row
Oil cooler: CF40-1

KOMATSU PC340 (LC / NLC) -7 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

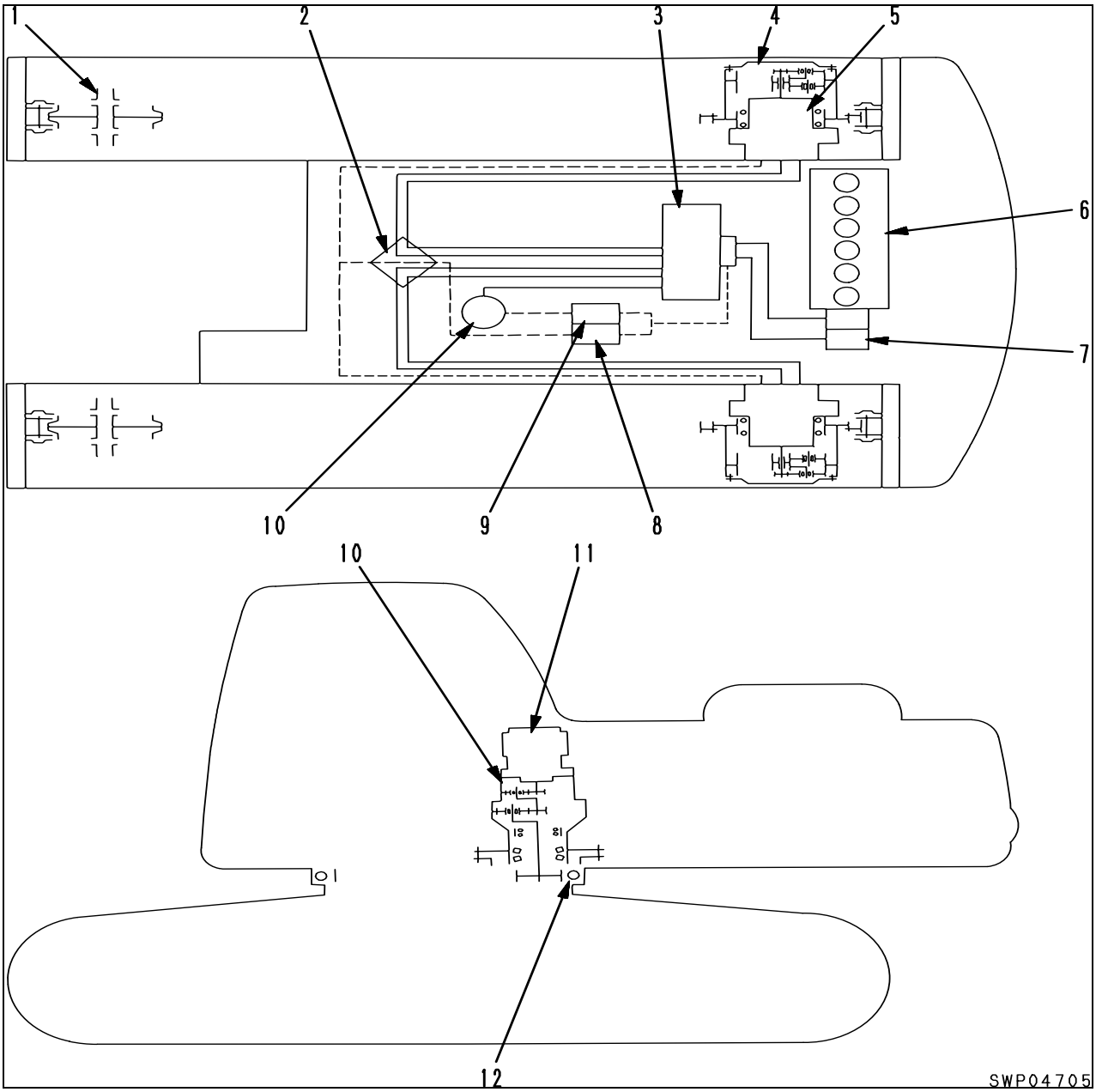
10 Structure, function and maintenance standard

Power train

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

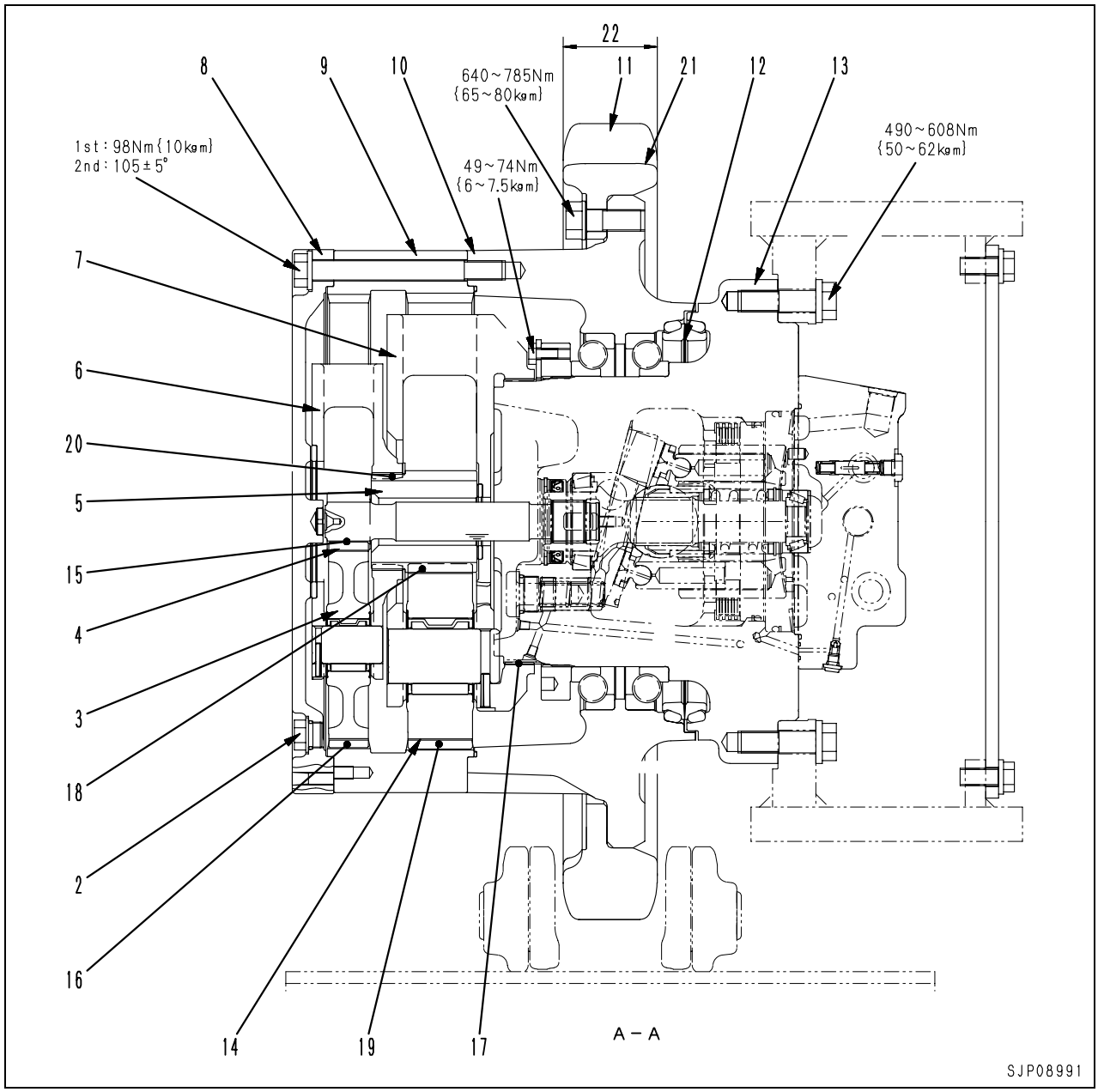
Power train

Power train



1. Idler
2. Center swivel joint
3. Control valve
4. Final drive
5. Travel motor (HMV160ADT-2)
6. Engine (SAA6D114E)
7. Hydraulic pump (HPV125+125)
8. Travel speed solenoid valve
9. Swing brake solenoid valve
10. Swing machinery
11. Swing motor (HMF230ABE-5)
12. Swing circle

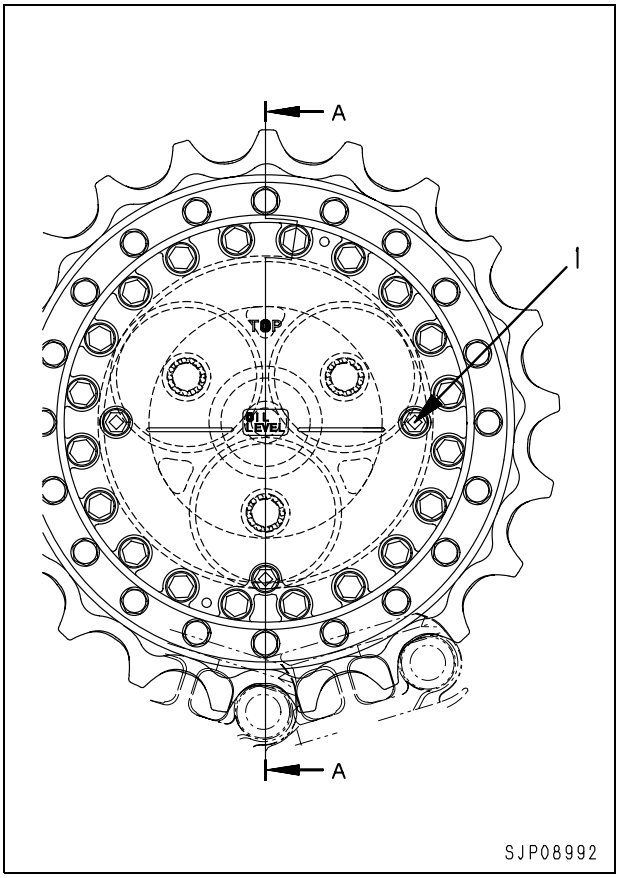
Final drive



1. Level plug
2. Drain plug
3. No.1 planetary gear (No. of teeth: 42)
4. No.1 sun gear (No. of teeth: 11)
5. No. 2 sun gear (No. of teeth: 19)
6. No.1 planetary carrier
7. No. 2 planetary carrier
8. Cover
9. Ring gear (No. of teeth: 97)
10. Hub
11. Sprocket
12. Floating seal
13. Travel motor
14. No. 2 planetary gear (No. of teeth: 38)

Specifications

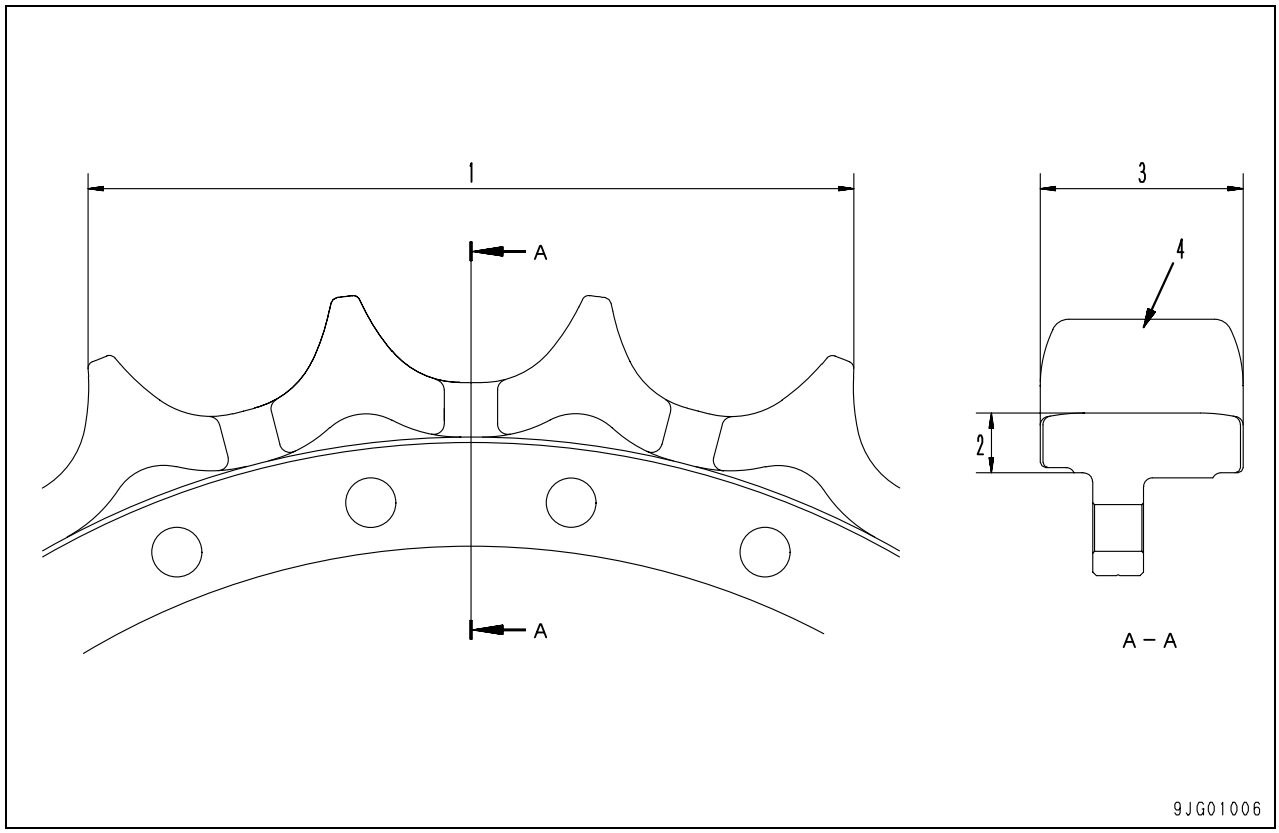
Reduction ratio: –((11+97)/11) x ((19+97)/19) = –59.943



Unit: mm

No.	Check Item	Criteria		Remedy
15	Backlash between No. 1 sun gear and No.1 planetary gear	Standard clearance	Clearance limit	Replace
		0.12 – 0.44	0.9	
16	Backlash between No. 1 planetary gear and ring gear	0.18 – 0.62	1.2	
17	Backlash between No. 2 planetary carrier and motor	0.06 – 0.25	–	
18	Backlash between No. 2 sun gear and No.2 planetary gear	0.15 – 0.51	1.00	
19	Backlash between No. 2 planetary gear and ring gear	0.19 – 0.66	1.3	
20	Backlash between No. 2 planetary carrier and No. 2 sun gear	0.39 – 0.80	1.6	
21	Amount of wear on sprocket tooth	Repair limit: 6		Build-up welding for rebuilding or replace
22	Width of sprocket tooth	Standard size	Repair limit	
		87	84	

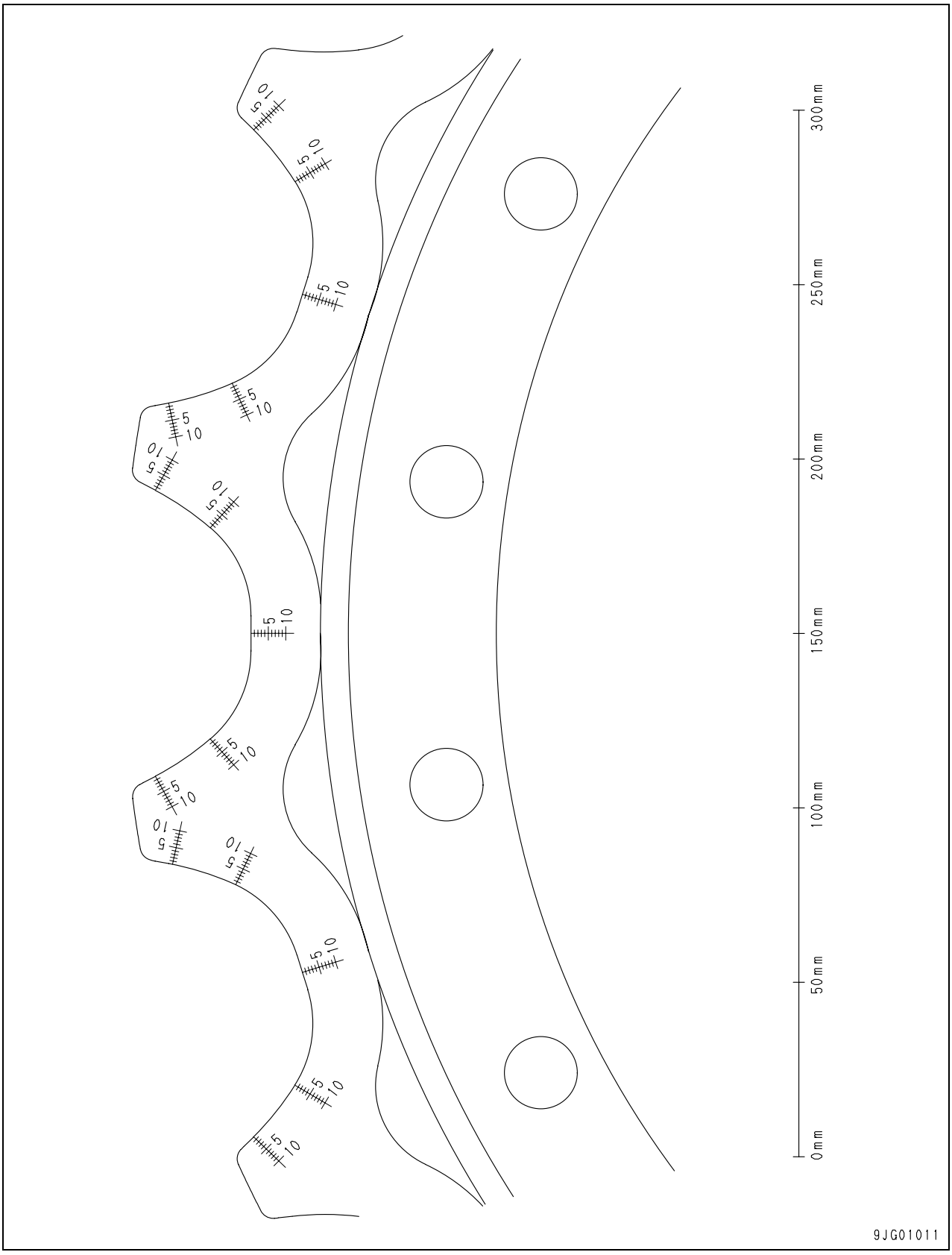
Sprocket



Unit: mm

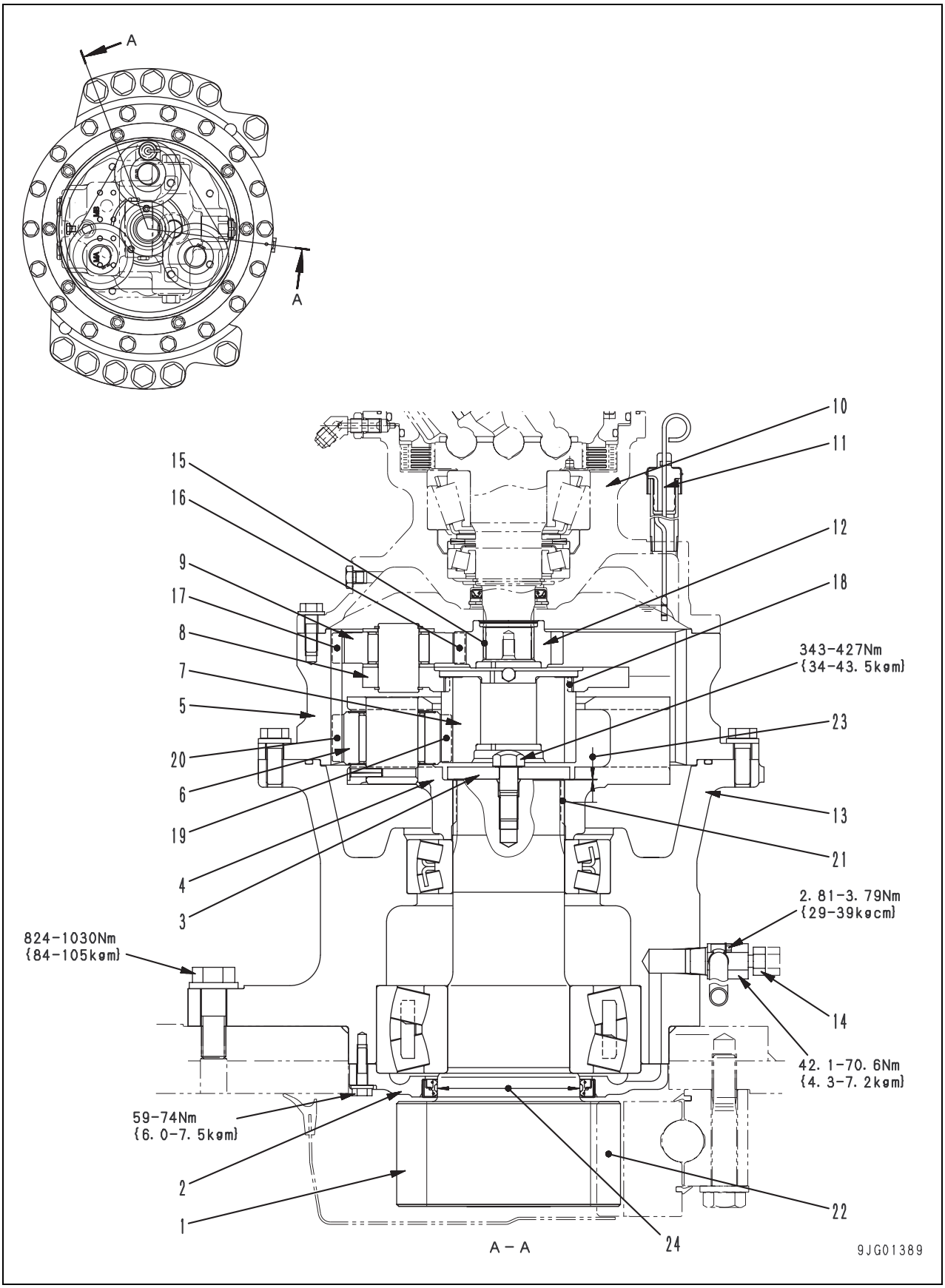
No.	Check Item	Criteria		Remedy
1	Wear of tooth tip	Standard size	Repair limit	Build-up welding for rebuilding or replace
		336.5	324.5	
2	Thickness of tooth root	20	14	
3	Width of tooth	87	84	
4	Wear of tooth shape	Repair limit: 6 (measure with the full-size drawing of sprocket tooth shape)		

Full-size drawing of sprocket tooth shape



★ The above drawing is reduced to 62%. Enlarge it to 160% to return it to the full scale and make a copy on an OHP sheet.

Swing machinery



1. Swing pinion (No. of teeth: 13)
2. Cover
3. Plate
4. No. 2 planetary carrier
5. Ring gear
6. No.2 planetary gear
7. No.2 sun gear
8. No. 1 planetary carrier
9. No. 1 planetary gear
10. Swing motor
11. Oil level gauge
12. No. 1 sun gear
13. Case
14. Drain plug

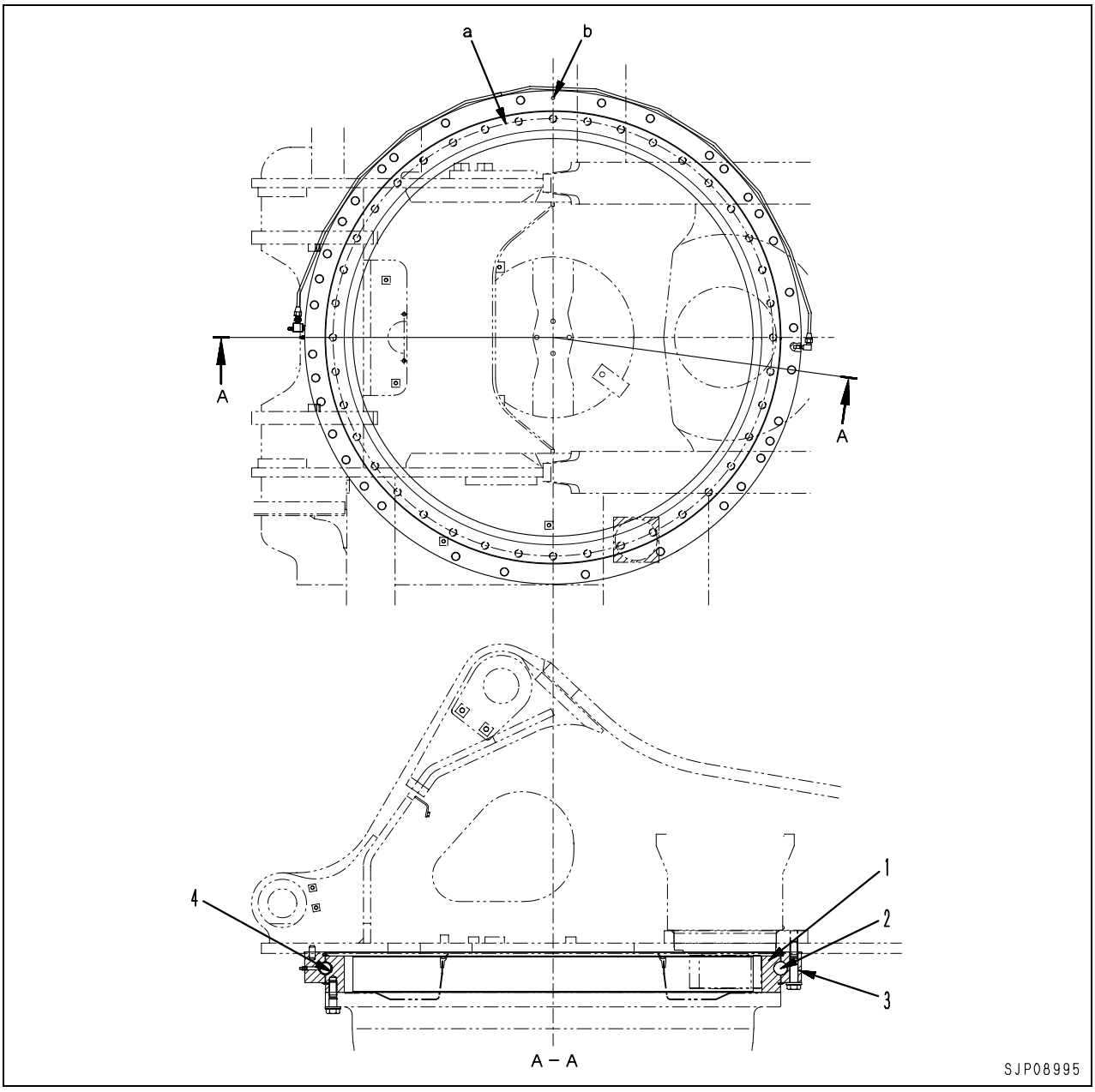
Specifications

Reduction ratio: ((19+68)/19) x ((24+68)/24) = 17.553

Unit: mm

No.	Check Item	Criteria		Remedy
15	Backlash between swing motor shaft and No. 1 sun gear	Standard clearance	Clearance limit	Replace
		0.18 – 0.28	–	
16	Backlash between No. 1 sun gear and No.1 planetary gear	0.15 – 0.51	1.00	
17	Backlash between No. 1 planetary gear and ring gear	0.17 – 0.60	1.10	
18	Backlash between No. 1 planetary carrier and No. 2 sun gear	0.40 – 0.75	1.20	
19	Backlash between No. 2 sun gear and No.2 planetary gear	0.16 – 0.55	1.00	
20	Backlash between No. 2 planetary gear and ring gear	0.17 – 0.60	1.10	
21	Backlash between No. 2 planetary carrier and swing pinion	0.07 – 0.23	–	
22	Backlash between swing pinion and swing circle	0 – 1.21	2.00	
23	Clearance between plate and No. 2 planetary carrier	0.57 – 1.09	–	
24	Wear of swing pinion surface contacting with oil seal	Standard size	Repair limit	Reapply hard chrome plating or replace
		$145\ ^{0}_{-0.100}$	–	

Swing circle



1. Swing circle inner race (No. of teeth: 90)
2. Ball
3. Swing circle outer race
a. Inner race soft zone “S“ position
b. Outer race soft zone “S“ position

Specifications

Reduction ratio: –90/13 = –6.923
Amount of grease: 33 ℓ (G2-LI)

Unit: mm

No.	Check Item	Criteria		Remedy
4	Axial clearance of bearing (when mounted on chassis)	Standard clearance	Clearance limit	Replace
		0.5 – 1.6	3.2	

KOMATSU PC340 (LC / NLC) -7 Hydraulic excavator

Form No. UEN00270-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial No.
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

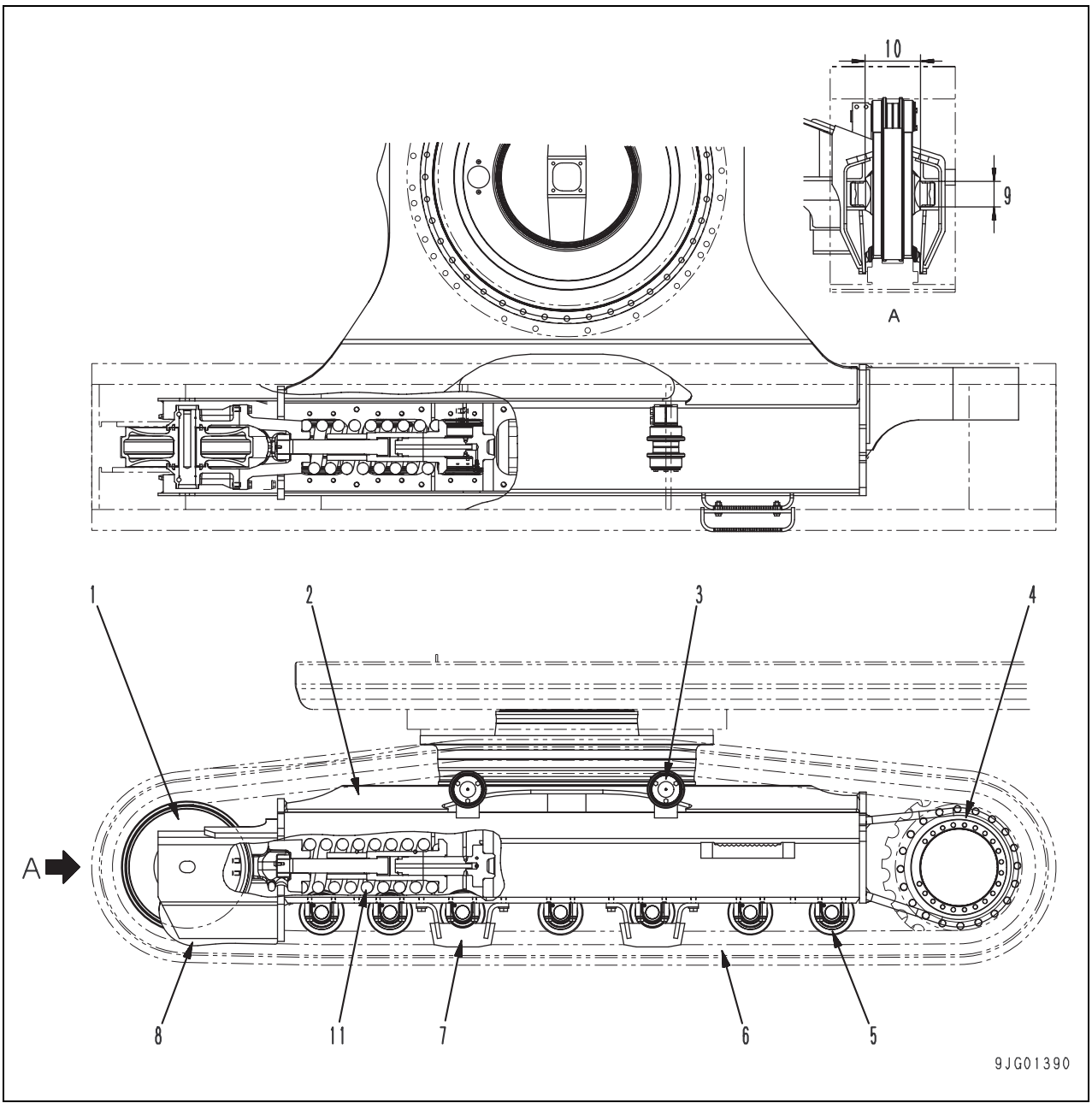
10 Structure, function and maintenance standard

Undercarriage and frame

Undercarriage and frame 2
Track frame and recoil spring 2
Idler 4
Carrier roller 6
Track roller 7
Track shoe 8

Undercarriage and frame

Track frame and recoil spring



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

- The dimensions and the number of track rollers depend on the model, but the basic structure is not different.
- Number of track rollers

Model	Q'ty (one side)
PC340LC, NLC-7	8

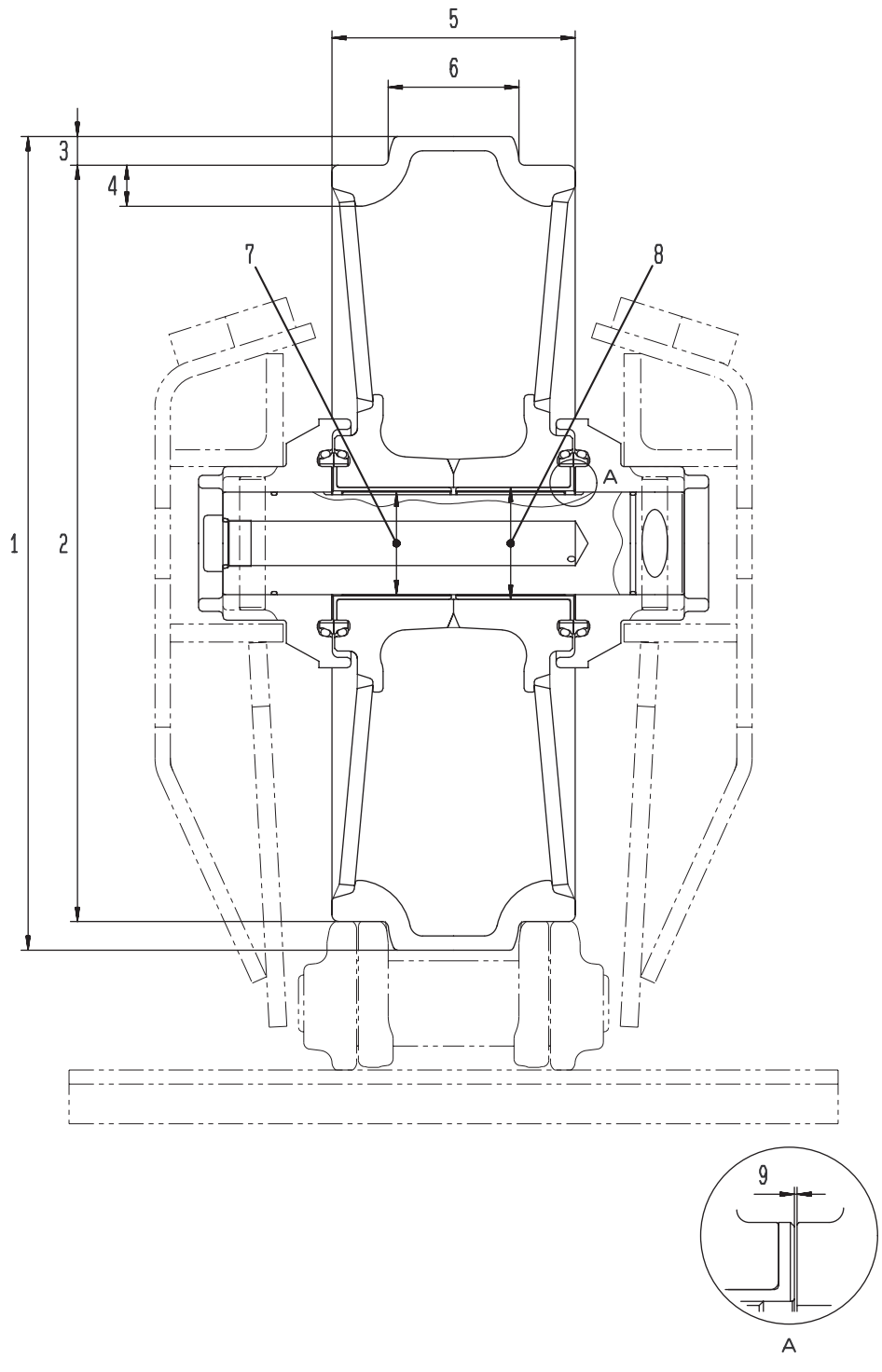
Standard shoe

Item \ Models	PC340LC-7	PC340NLC-7
Shoe width (triple shoe) (mm)	700	600
Link pitch (mm)	216	216
No. of shoes (one side)	48	48

Unit: mm

No.	Check Item		Criteria					Remedy
			Standard size	Tolerance	Repair limit			
9	Vertical width of idler guide	Track frame	123	+2 –1	127			Build-up welding for rebuilding or replace
		Idler support	120	±0.5	118			
10	Horizontal width of idler guide	Track frame	266	+3 –1	271			
		Idler support	261	—	259			
11	Recoil spring		Standard size			Rapair limit		Replace
			Free length x O.D.	Installation length	Installation load	Free length	Installation load	
			794 x 241	648	173.3 kN {17,680 kg}	—	138.56 kN {14,140 kg}	

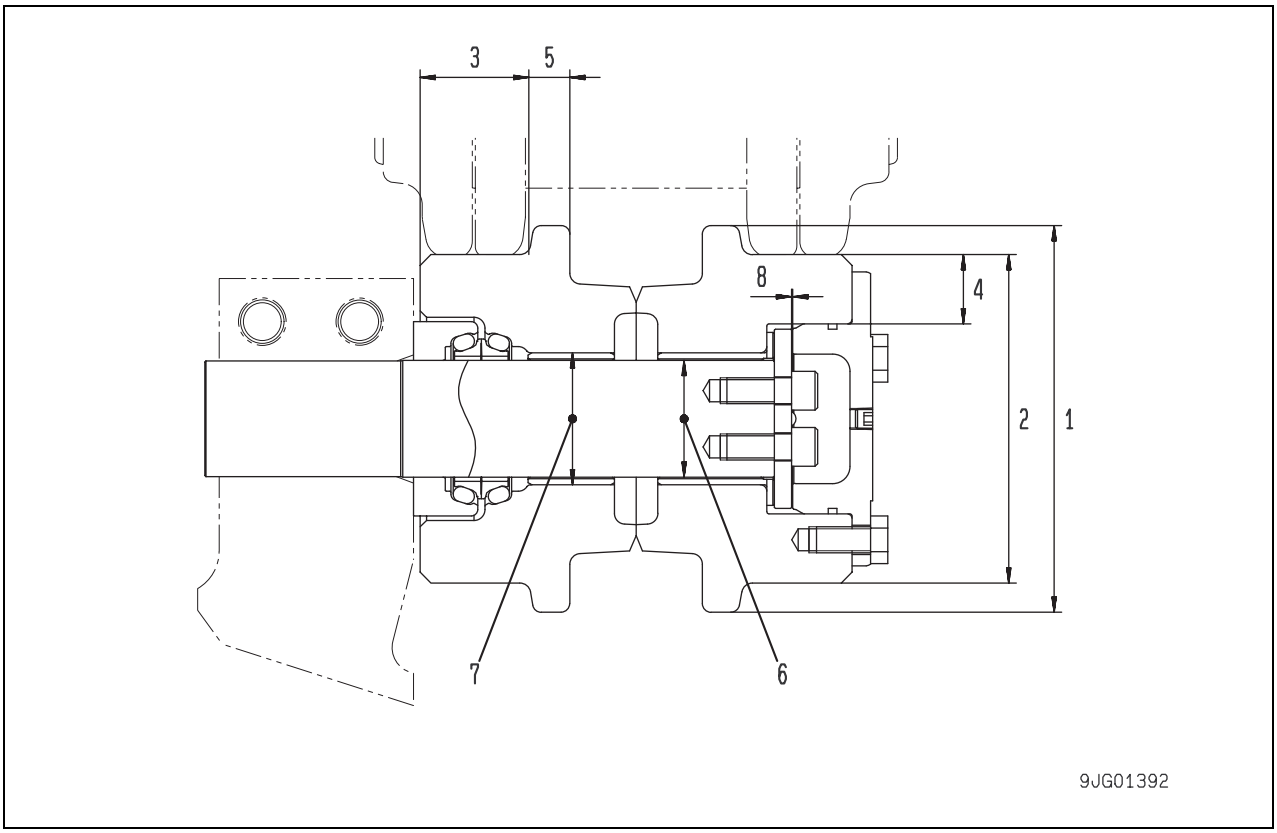
Idler



Unit: mm

<table>
<tr><th>No.</th><th>Check Item</th><th colspan="5">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Outside diameter of protrusion</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td><td rowspan="6">Build-up welding for rebuilding or replace</td></tr>
<tr><td colspan="3">635</td><td colspan="2">—</td></tr>
<tr><td>2</td><td>Outside diameter of tread</td><td colspan="3">590</td><td colspan="2">578</td></tr>
<tr><td>3</td><td>Difference of tread</td><td colspan="3">22.5</td><td colspan="2">28.5</td></tr>
<tr><td>4</td><td>Thickness of tread</td><td colspan="3">—</td><td colspan="2">—</td></tr>
<tr><td>5</td><td>Total width</td><td colspan="3">190</td><td colspan="2">—</td></tr>
<tr><td>6</td><td>Width of tread</td><td colspan="3">44</td><td colspan="2">50</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Clearance between shaft and bushing</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard clearance</td><td rowspan="2">Clearance limit</td><td rowspan="4">Replace bushing</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>80</td><td>–0.225
–0.325</td><td>+0.130
–0.024</td><td>0.201 –
0.455</td><td>—</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Interference between idler and bushing</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard interference</td><td rowspan="2">Interference limit</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>87.6</td><td>+0.087
+0.037</td><td>–0.027
–0.079</td><td>0.064 –
0.166</td><td>—</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Clearance between bushing and support
(Sum of clearance at both sides)</td><td colspan="3">Standard size</td><td colspan="2">Clearance limit</td></tr>
<tr><td colspan="3">0.68 – 1.22</td><td colspan="2">—</td></tr>
</table>

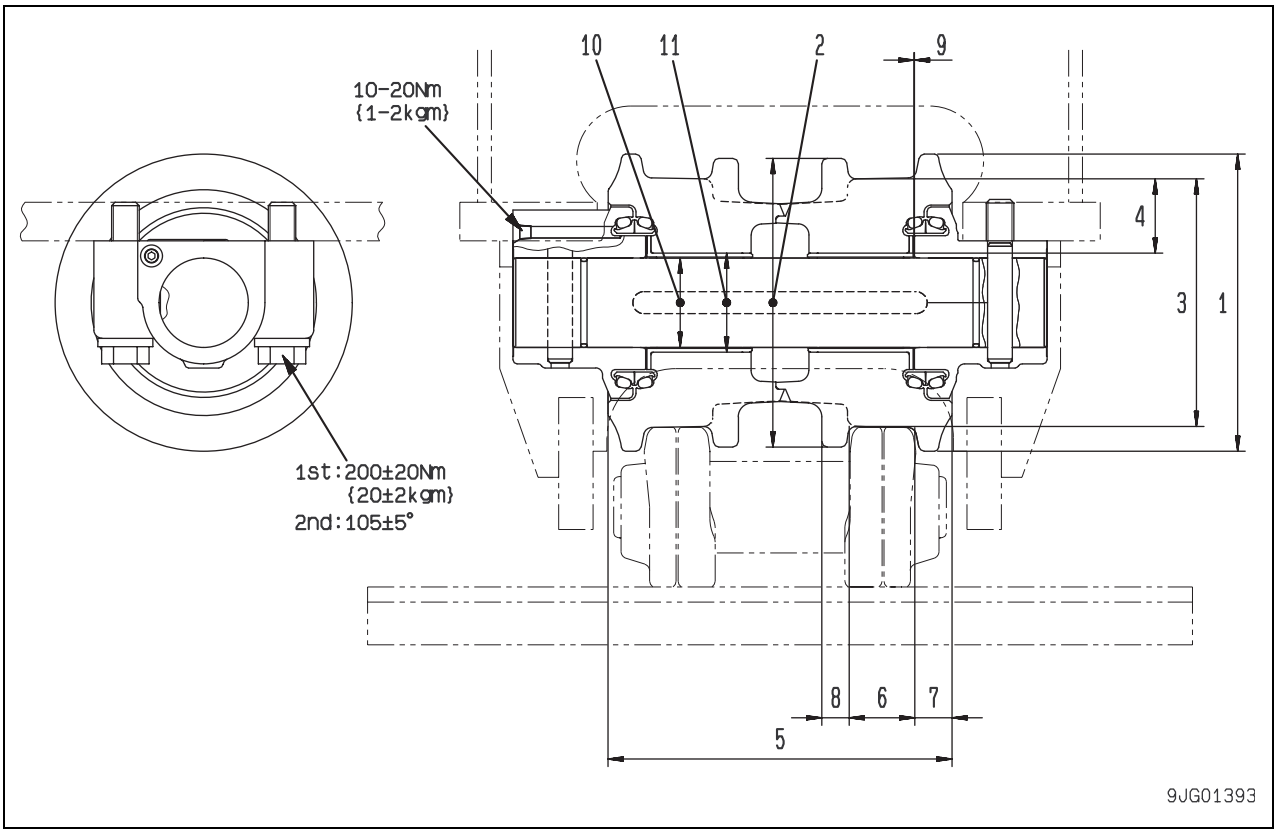
Carrier roller



Unit: mm

No.	Check Item	Criteria					Remedy
1	Outside diameter of flange	Standard size			Repair limit		Replace
		179			—		
2	Outside diameter of tread	152			138		
3	Width of tread	50.3			—		
4	Thickness of tread	32			25		
5	Width of flange	19			—		
6	Clearance between shaft and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
		54	–0.250 –0.280	+0.074 0	0.250 – 0.354	—	
7	Interference between roller and bushing	Standard size	Tolerance		Standard interference	Interference limit	
			Shaft	Hole			
		61	+0.117 +0.087	+0.030 0	0.057 – 0.117	—	
8	Axial clearance of roller	Standard clearance			Clearance limit		
		0.5 – 0.7			—		

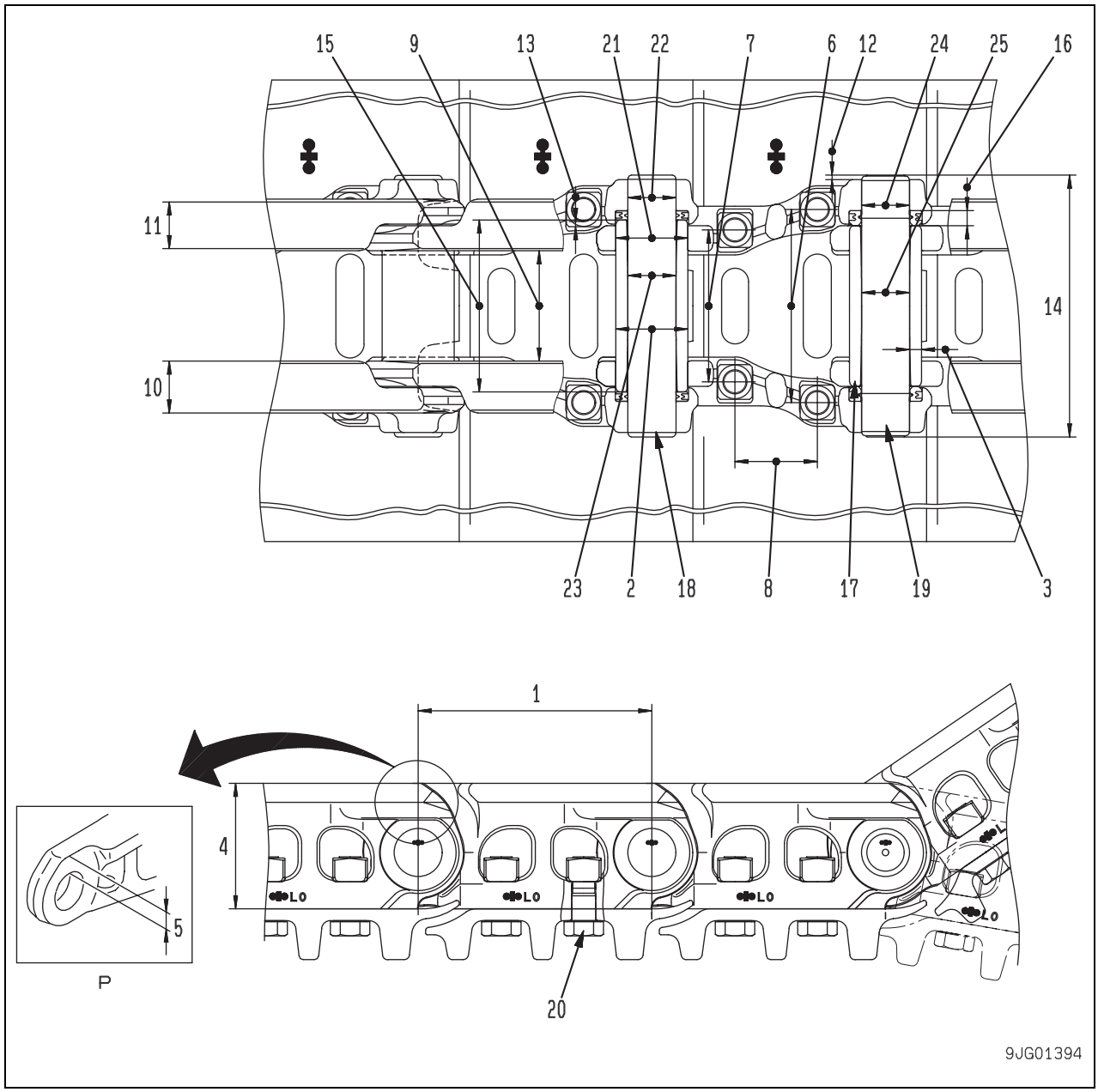
Track roller



Unit: mm

No.	Check Item		Criteria					Remedy
1	Outside diameter of outer flange		Standard size			Repair limit		Build-up welding for rebuilding or replace
			216			—		
2	Outside diameter of inner flange (Double flange)		210			—		
3	Outside diameter of tread		180			168		
4	Thickness of tread		54			48		
5	Overal width		250			—		
6	Width of tread	Single flange	49			—		
		Double flange	47.7					
7	Width of flange	Single flange	27			—		
		Double flange						
8	Width of inner frange (Double frame)		98			—		
9	Clearance between bushing and collar (Sum of clearance at both sides)		0.44 – 0.97			—		Replace bushing
10	Clearance between shaft and bushing		Standard size	Tolerance		Standard clearance	Clearance limit	
				Shaft	Hole			
			65	–0.250 –0.350	+0.186 –0.064	0.186 – 0.536	—	
11	Interference between roller and bushing		Standard size	Tolerance		Standard interference	Interference limit	
				Shaft	Hole			
			72	+0.108 +0.008	–0.006 –0.036	0.014 – 0.144	—	

Track shoe



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

Unit: mm

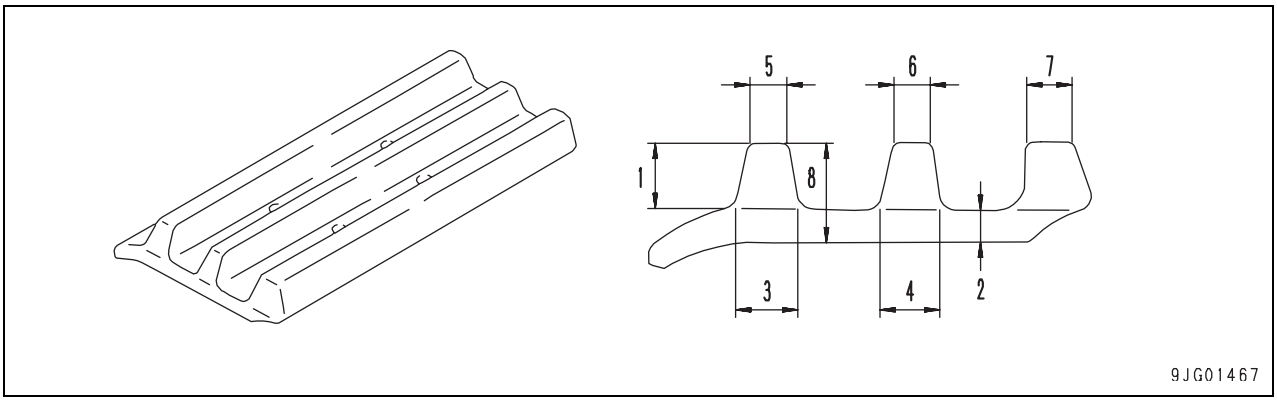
No.	Check Item	Criteria		Remedy
1	Link pitch	Standard size	Repair limit	Reverse or replace
		216.3	219.3	
2	Outside diameter of bushing	Standard size	Reverse	
		66.9	61.9	
3	Thickness of bushing metal	10.8	5.8	Adjust or replace
4	Link height	Standard size	Repair limit	Repair or replace
		116	107	
5	Thickness of link metal (bushing press-fitting portion)	30.7	21.7	

Unit: mm

No.	Check Item		Criteria			Remedy
6	Shoe bolt pitch		178.4			Replace
7			140.4			
8			76.2			
9	Link	Inside width	102			Repair or replace
10		Overall width	47.8			
11		Tread width	42.6			
12	Protrusion of pin		4.2			Adjust or replace
13	Protrusion of regular bushing		5.25			
14	Overall length of pin		242			
15	Overall length of bushing		148.4			
16	Thickness of spacer		Standard size	Reverse		
			10.8	5.8		
17	Press-fitting force	Bushing	98 – 264.6 kN {10 – 27 ton}			—
18		Regular pin	147 – 362.6 kN {15 – 37 ton}			
19 (*)		Master pin	98 – 215.6 kN {10 – 22 ton}			
20	Shoe bolt	a. Regular link	Tightening torque (Nm {kgm})		Retightening angle (deg.)	Retighten
			Triple grouser shoe	393±39 {40±4}	120±10	
		b. Master link	Tightening torque (Nm {kgm})	Retightening angle (deg.)	Lower limit torque (Nm {kgm})	
			—	—	—	
21	Interference between bushing and link		Standard size	Tolerance		Standard interference	Adjust or replace
				Shaft	Hole	
			66.5	+0.464 +0.424	+0.074 0	0.350 – 0.464
22	Interference between regular pin and link		44.6	+0.235 +0.085	–0.188 –0.250	0.273 – 0.485
23	Clearance between regular pin and bushing		Standard size	Tolerance		Standard clearance	
				Shaft	Hole	
			44.6	+0.235 +0.085	+0.915 +0.415	0.180 – 0.830
24 (*)	Interference between master pin and link		Standard size	Tolerance		Standard interference	
				Shaft	Hole	
			44.6	+0.03 0	–0.188 –0.250	0.188 – 0.280
25 (*)	Clearance between master pin and bushing		Standard size	Tolerance		Standard clearance	
				Shaft	Hole	
			44.3	+0.050 –0.050	+0.915 +0.415	0.365 – 0.965

* Dry type track link

Triple grouser shoe



Unit: mm

No.	Check Item		Criteria		Remedy
			Standard size	Repair limit	
1	Height		36	24	
		(*)	30	18	
2	Thickness		11		
3	Length of base		32		
		(*)	29		
4			26		
		(*)	24		Build-up welding for rebuilding or replace
5	Length at tip		24		
		(*)	22		
6			18		
		(*)	16		
7			18		
		(*)	22		
			Standard size	Repair limit	
8	Thickness		47	35	
		(*)	41	29	

*: PC340LC / NLC-7: 600 mm width shoe

KOMATSU PC340 (LC / NLC) -7 Hydraulic excavator

Form No. UEN00271-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

10 Structure, function and maintenance standard

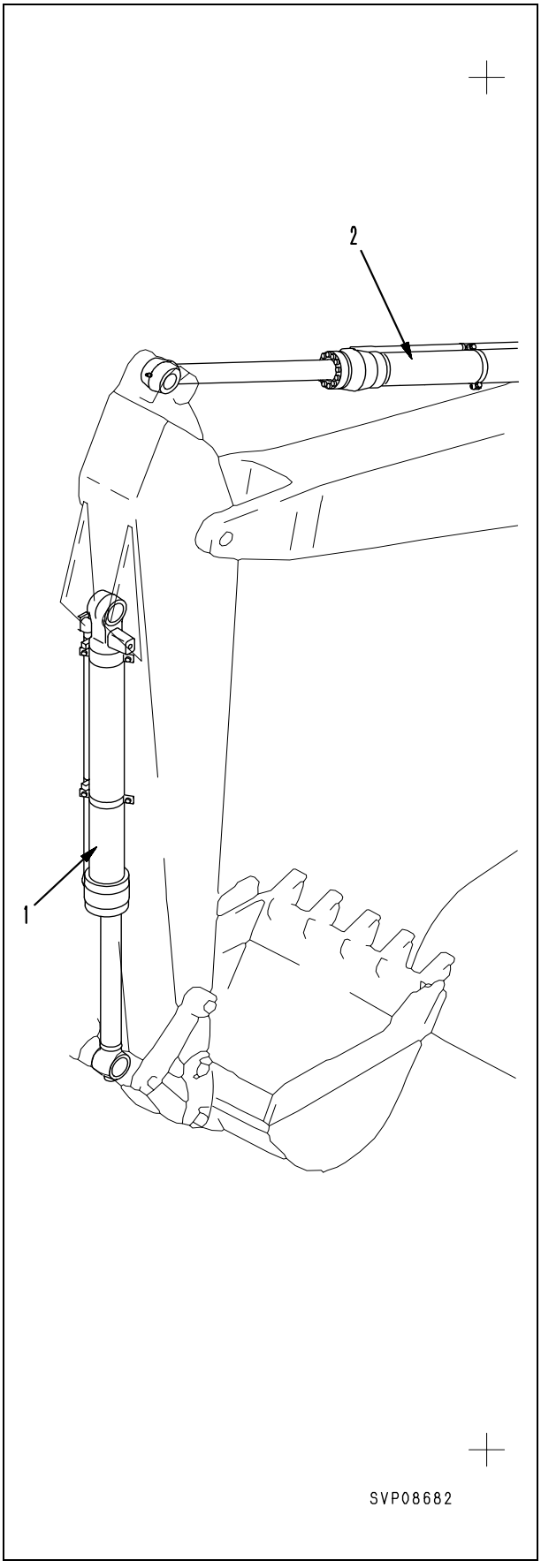
Hydraulic system, Part 1

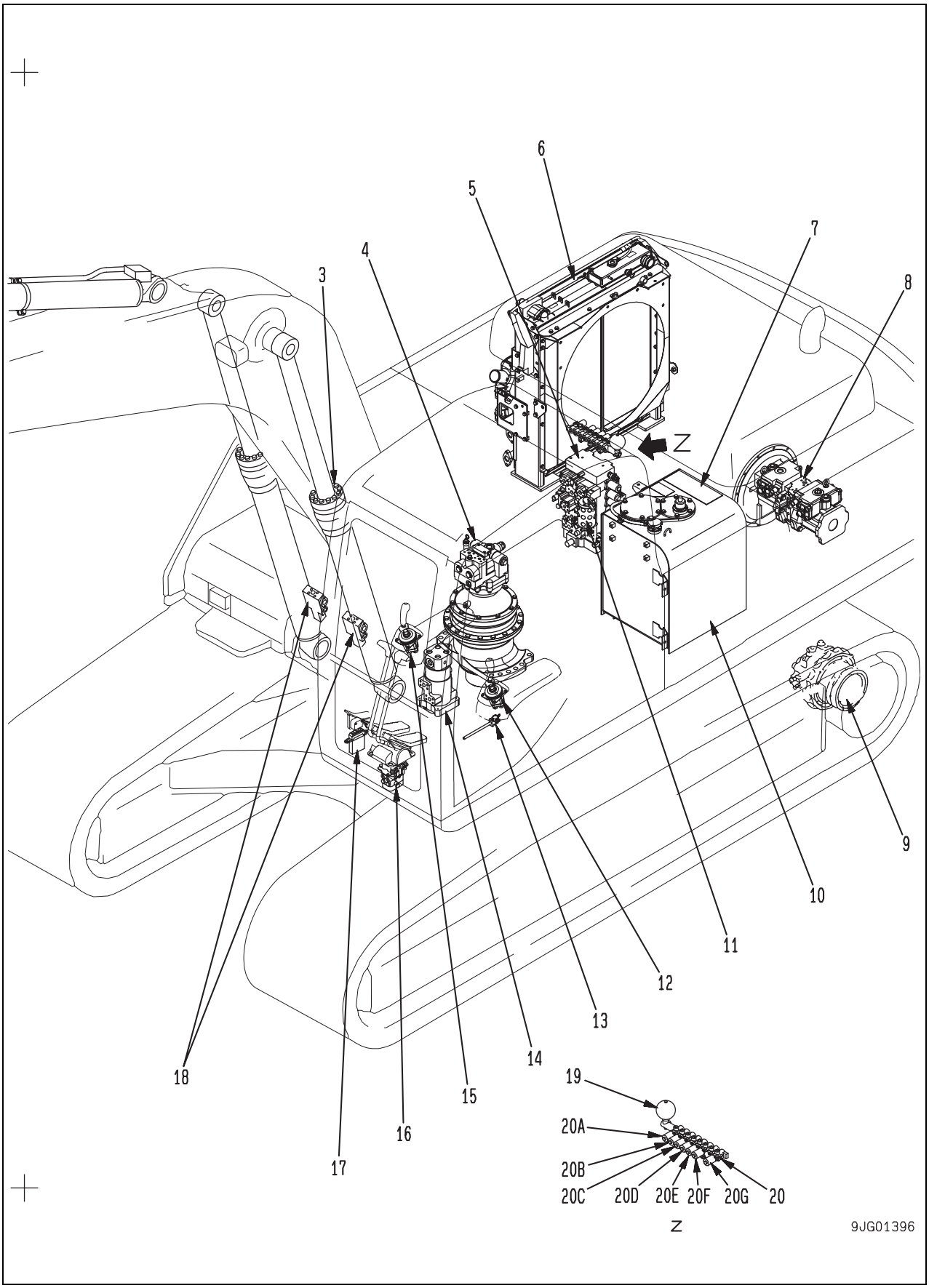
Hydraulic system, Part 1 2
Hydraulic equipment layout drawing 2
Hydraulic tank and filter 4
Hydraulic pump 6

Hydraulic system, Part 1

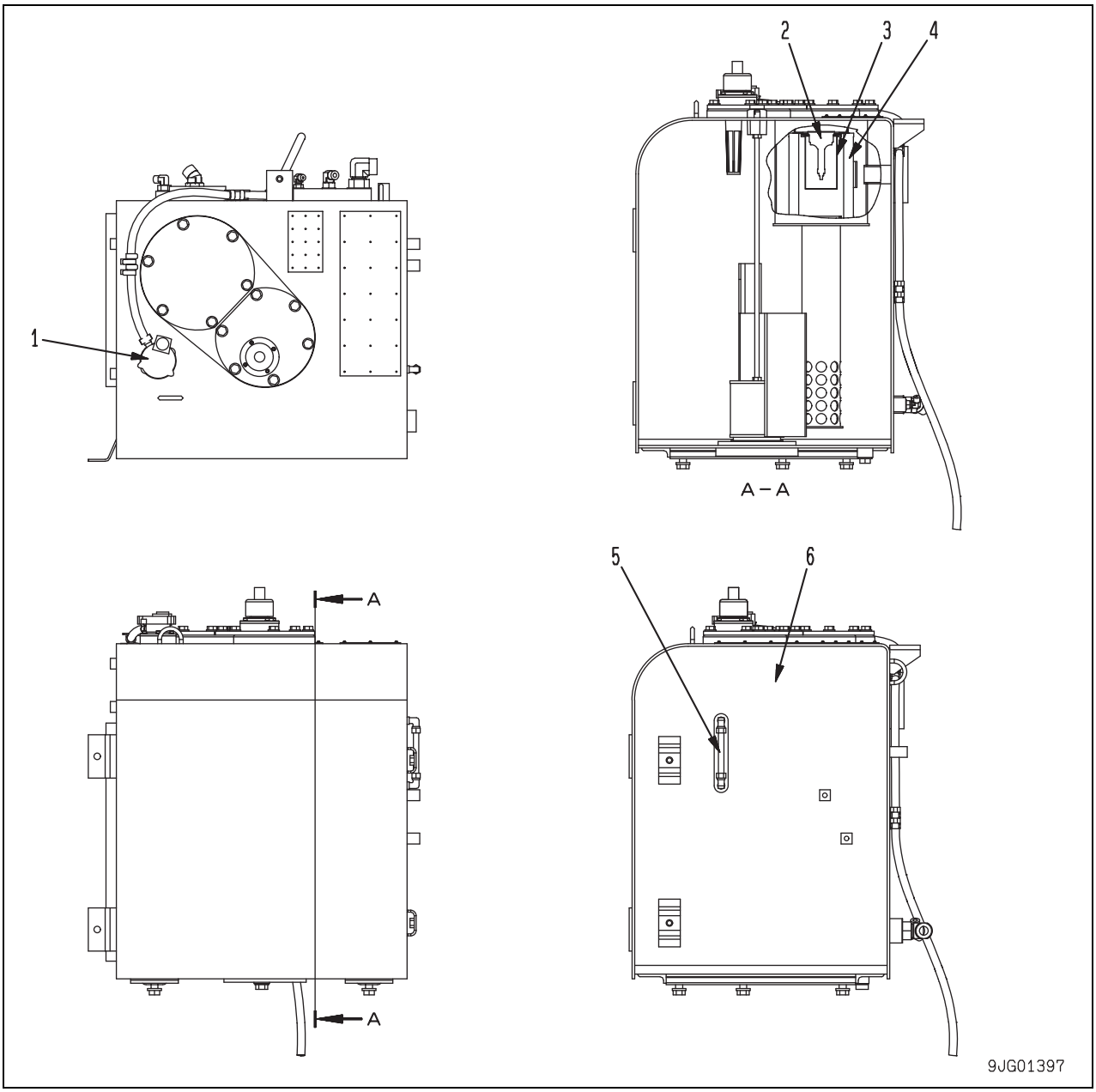
Hydraulic equipment layout drawing

1. Bucket cylinder
2. Arm cylinder
3. Boom cylinder
4. Swing motor
5. Control valve
6. Oil cooler
7. Hydraulic filter
8. Hydraulic pump
9. L.H. travel motor
10. Hydraulic tank
11. Multi-pattern selector valve
12. L.H. PPC valve
13. Work equipment lock lever (electric type)
14. Center swivel joint
15. R.H. PPC valve
16. Travel PPC valve
17. Attachment circuit selector valve
18. Hydraulic drift prevention valve
19. Accumulator
20. Solenoid valve assembly
20A. PPC lock solenoid
20B. Travel junction solenoid
20C. Pump merge-divider solenoid
20D. Travel speed solenoid
20E. Swing brake solenoid
20F. Machine push-up solenoid
20G. 2-stage relief solenoid




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20D
20E
20F
20G
20
Z
9JG01396

Hydraulic tank and filter



1. Oil filler cap
2. Bypass valve
3. Strainer
4. Filter element
5. Sight gauge
6. Hydraulic tank

Specifications

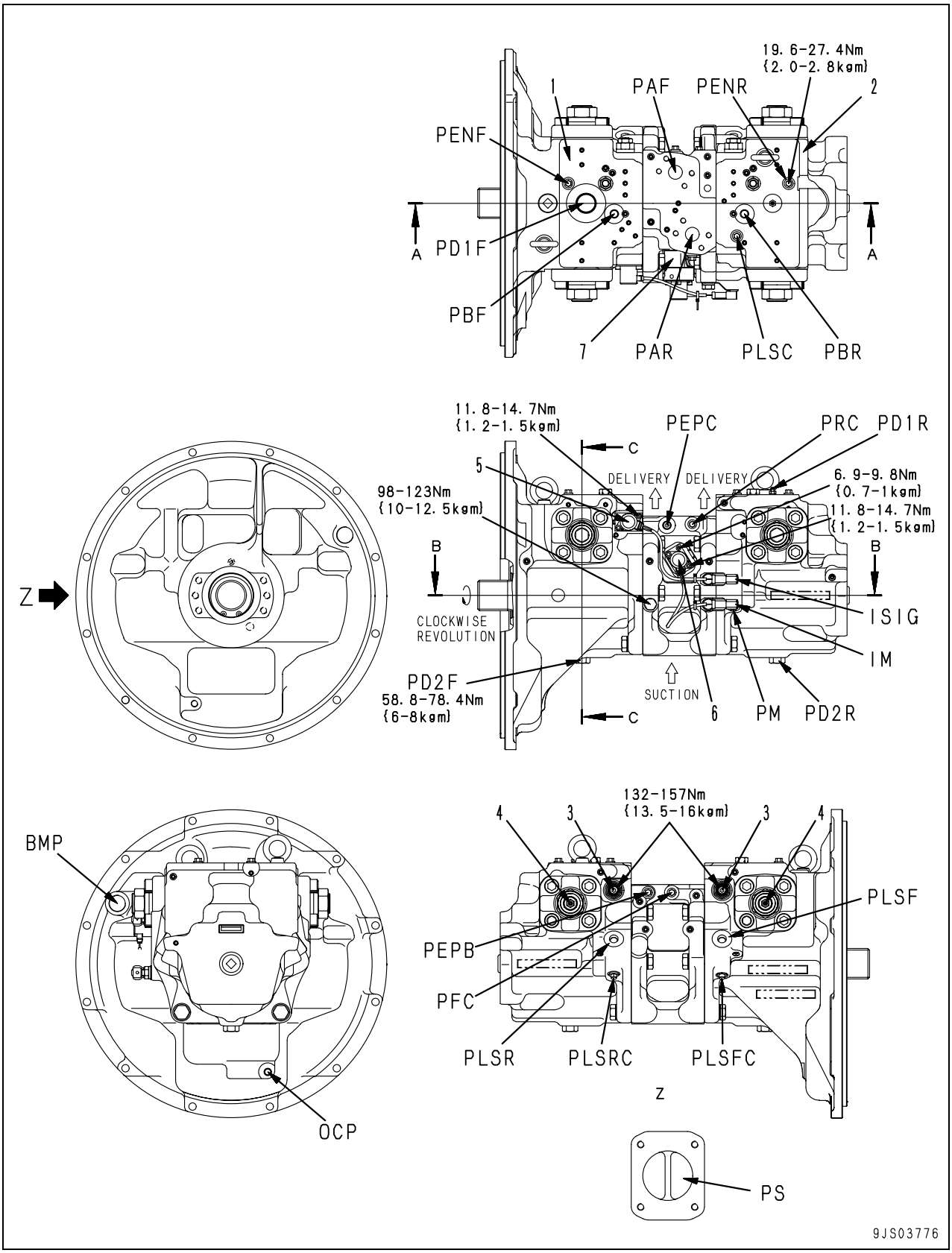
Tank capacity: 275 ℓ
Amount of oil inside tank: 188 ℓ

Safety 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:
150 ± 30 kPa {1.5 ± 0.3 kg/cm^2}

Hydraulic pump

Type: HPV125+125

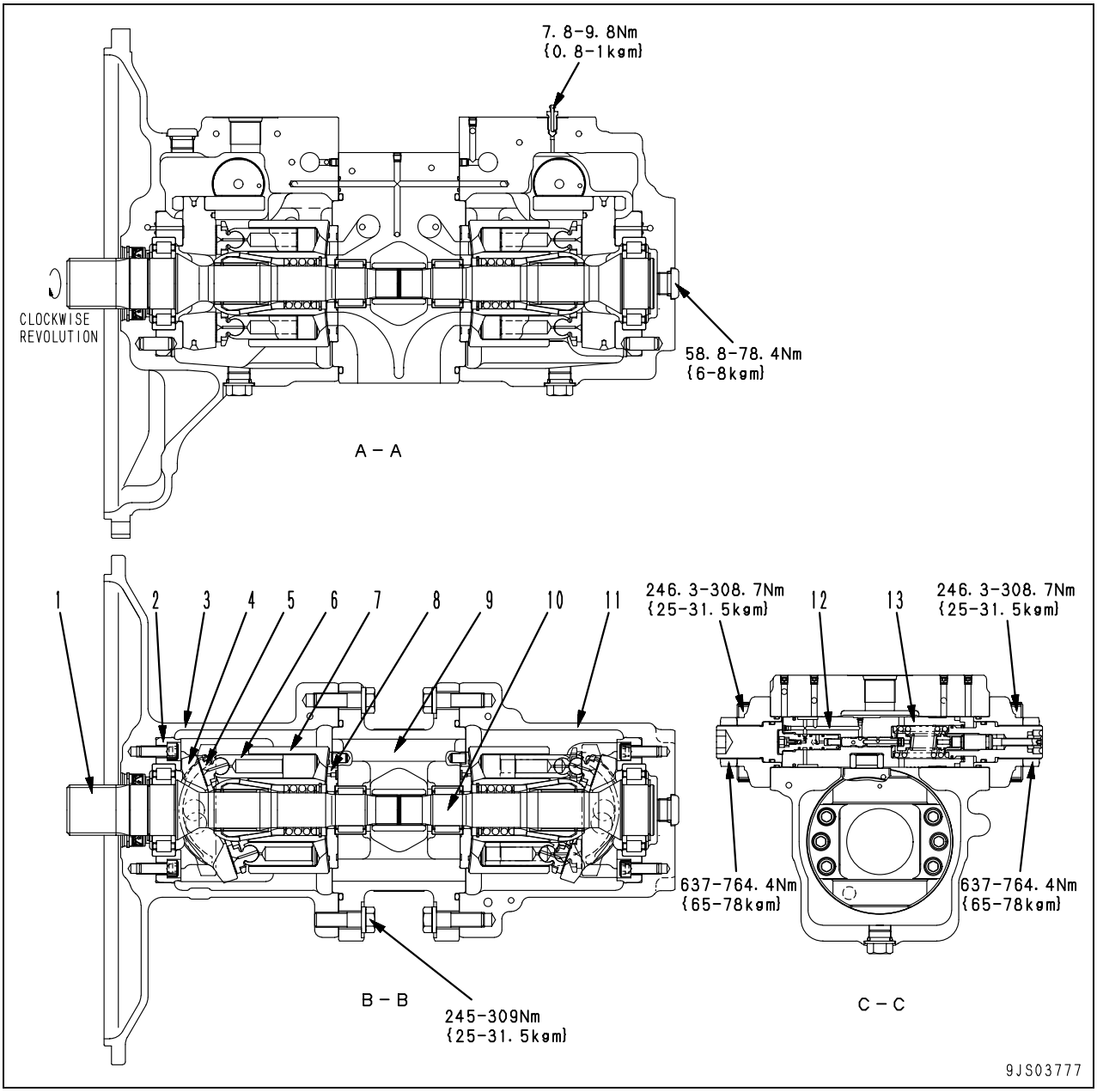


Outline

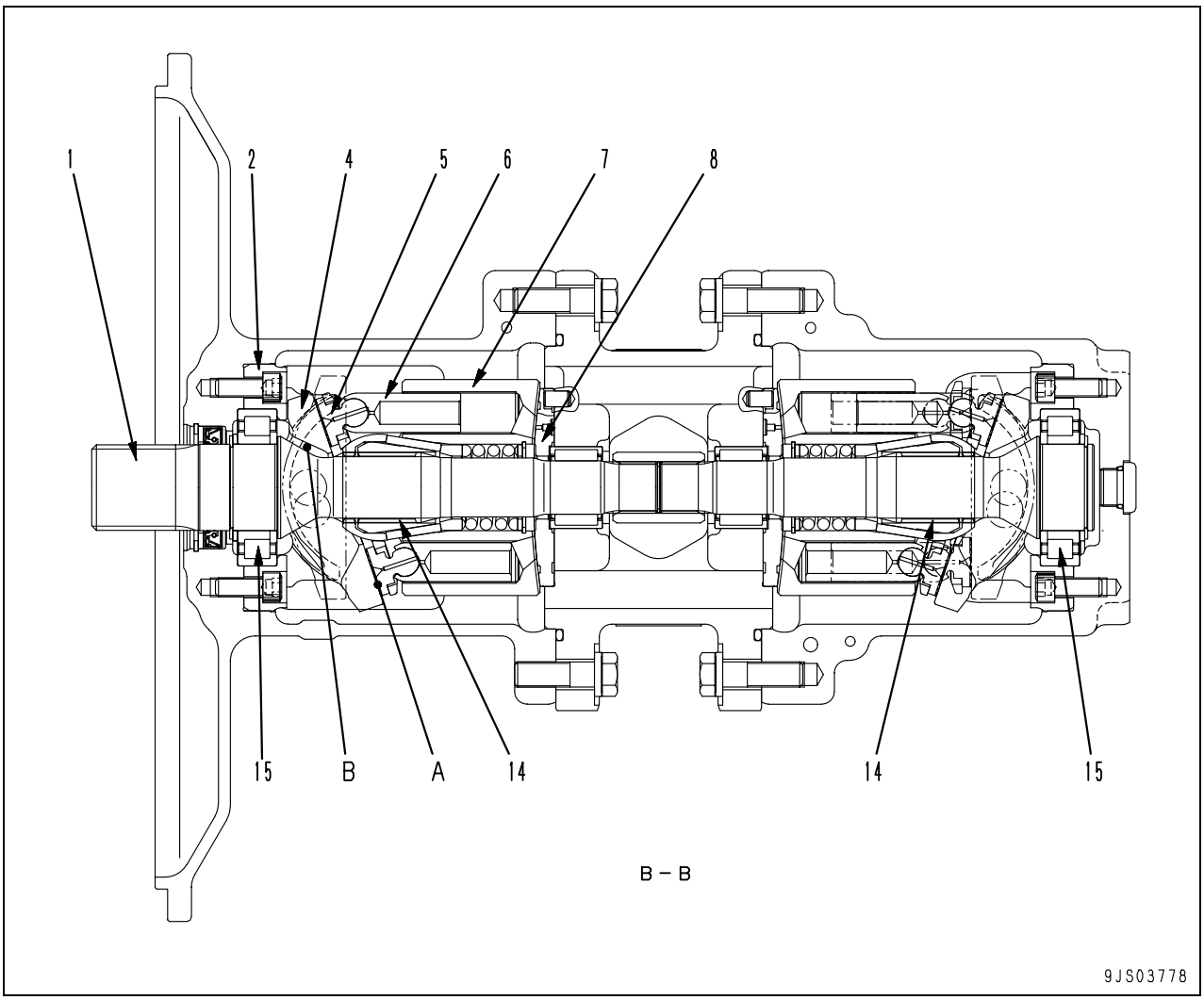
- This pump consists of 2 variable capacity swash plate piston pumps, PC valve, LS valve, EPC valve and variable volume valve.

BMP: Breather fitting port
IM: PC mode selector current
ISIG: LS set pressure selector current
OCP: Oil level detection port
PAF: Front pump delivery port
PAR: Rear pump delivery port
PBF: Front pump pressure input port
PBR: Rear pump pressure input port
PD1F: Case drain port
PD1R: Air breeder
PD2F: Drain plug
PD2R: Drain plug
PENF: Front control pressure detection port
PENR: Rear control pressure detection port
PEPC: EPC basic pressure port
PEPB: EPC basic pressure detection port
PFC: Front pump delivery pressure detection port
PLSC: LS set selector pressure detection port
PLSF: Front load pressure input port
PLSFC: Front load pressure detection port
PLSR: Rear load pressure input port
PLSRC: Rear load pressure detection port
PM: PC mode selector pressure detection port
PRC: Rear pump delivery pressure detection port
PS: Pump suction port

1. Front pump
2. Rear pump
3. LS valve
4. PC valve
5. LS-EPC valve
6. PC-EPC valve
7. Variable volume valve



1. Front shaft
2. Cradle
3. Front case
4. Rocker cam
5. Shoe
6. Piston
7. Cylinder block
8. Valve plate
9. End cap
10. Rear shaft
11. Rear case
12. Servo piston
13. PC valve



Function

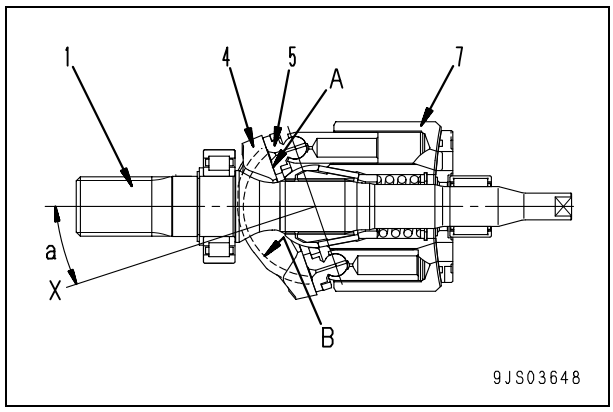
- The pump converts the engine rotation transmitted to the shaft to oil pressure and delivers pressurized oil corresponding to the load.
- It is possible to change the discharge amount by changing the swash plate angle.

Structure

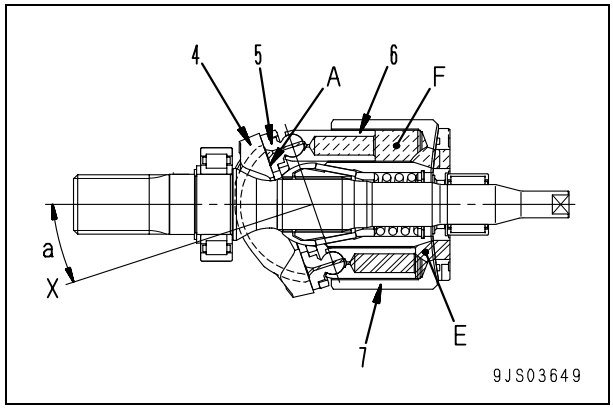
- Cylinder block (7) is supported to shaft (1) by spline (14).
- Shaft (1) is supported by front and rear bearings (15).
- Tip of piston (6) is shaped as a concave ball and shoe (5) is caulked to it to form one unit.
- Piston (6) and shoe (5) constitute the spherical bearing.
- Rocker cam (4) has flat surface (A), and shoe (5) is always pressed against this surface while sliding in a circular movement.
- Rocker cam (4) conducts high pressure oil to cylinder 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).
- Cylinder block (7) seals the pressurized oil to valve plate (8) 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 suctioned and discharged through valve plate (8).

Operation of pump

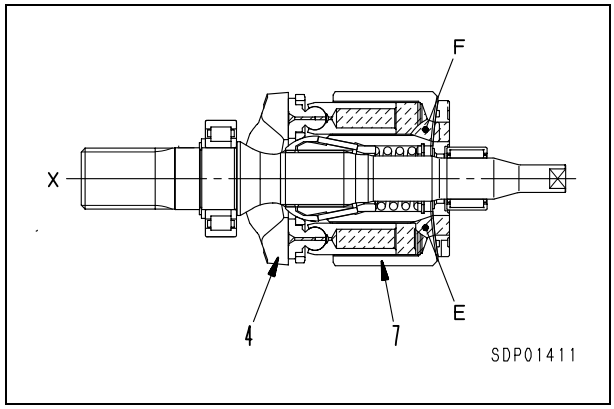
- Cylinder block (7) rotates together with shaft (1), and shoe (5) slides on flat surface (A).
- When this happens, rocker cam (4) moves along cylindrical surface (B), so angle (a) between center line (X) of rocker cam (4) and the axial direction of cylinder block (7) changes.
- (a) is named the swash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



- With center line (X) of rocker cam (4) at a swash plate angle (a) in relation to the axial direction of cylinder block (7), flat surface (A) acts 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 volumes (E) and (F) is created inside cylinder block (7).
- A single piston (6) sucks and discharges the oil by the amount (F) – (E).
- As cylinder block (7) rotates and the volume of chamber (E) becomes smaller, the pressurized oil is discharged.
- On the other hand, the volume of chamber (F) grows larger and, in this process, the oil is suctioned.

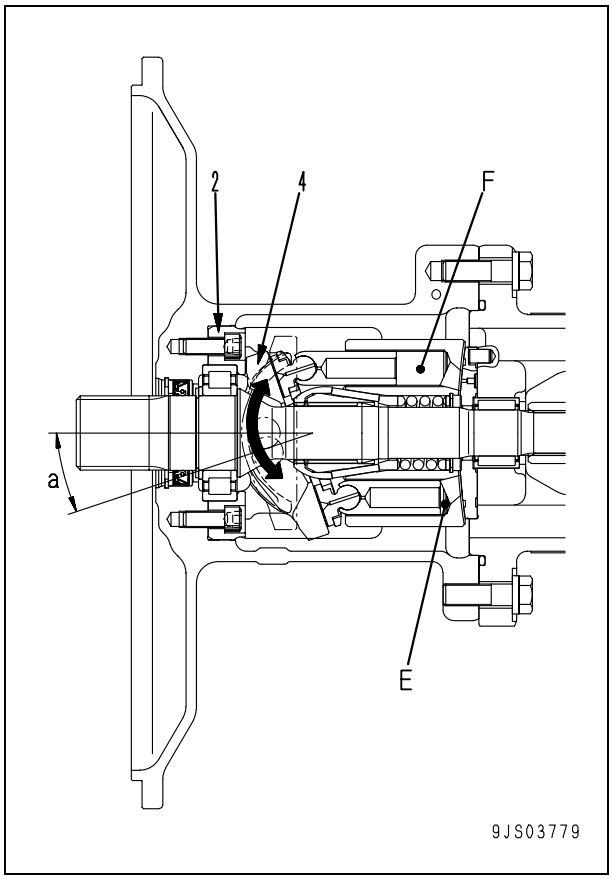


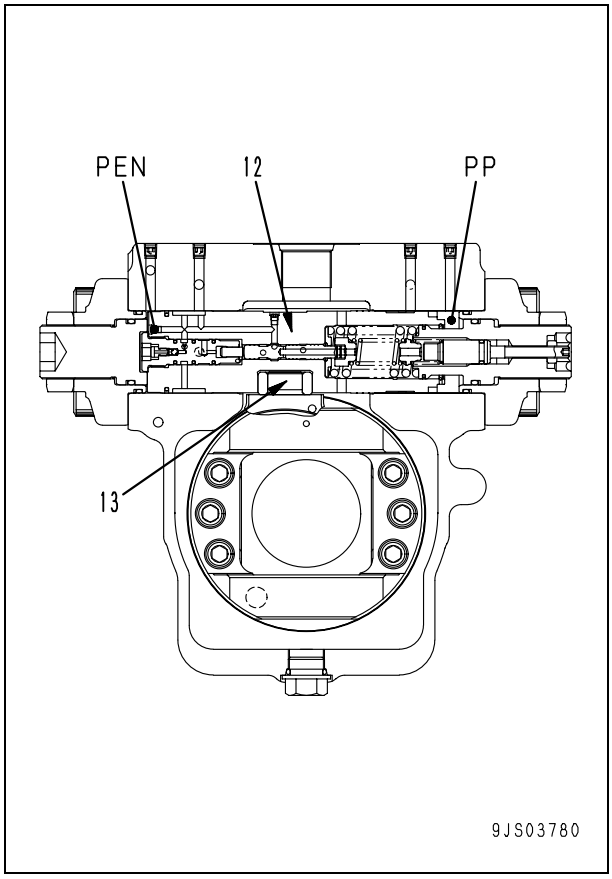
- As center line (X) of rocker cam (4) matches the axial direction of cylinder block (7) (swash plate angle (a) = 0), the difference between volumes (E) and (F) inside cylinder block (7) becomes 0.
- Suction and discharge of pressurized oil is not carried out in this state. Namely pumping action is not performed. (Actually, however, the swash plate angle is not set to 0)



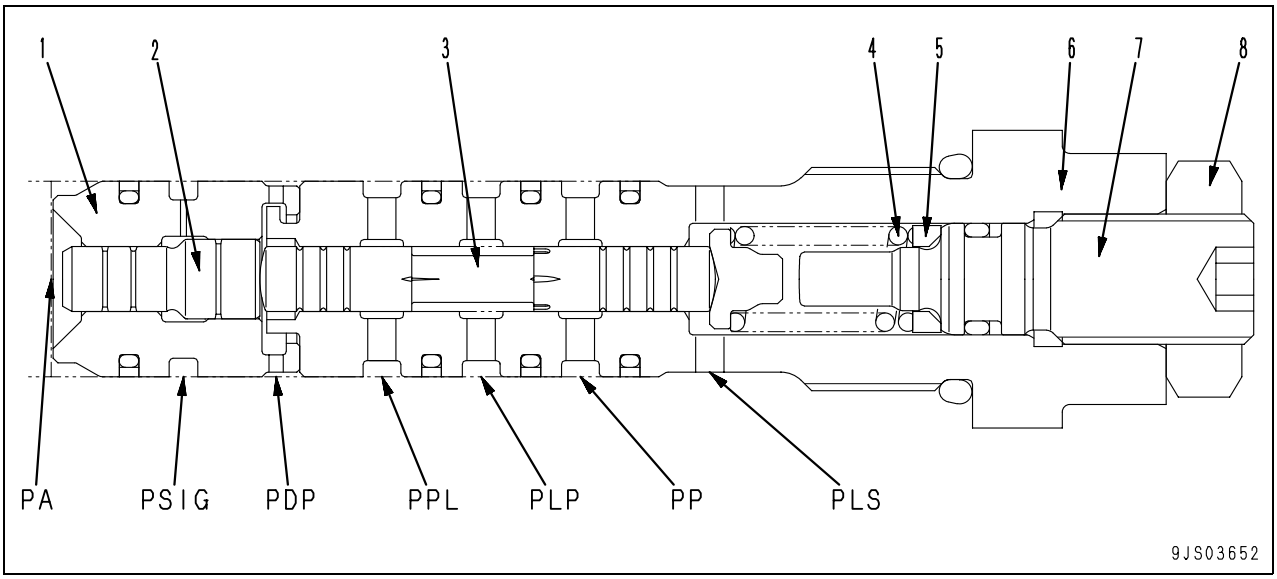
Control of discharge amount

- If the swash plate angle (a) becomes larger, the difference between volumes (E) and (F) becomes larger and pump delivery (Q) increases.
- Servo piston (12) is used for changing swash plate angle (a).
- Servo piston (12) carries out linear reciprocal movement according to the signal pressure from the PC and LS valves.
- This linear movement is transmitted to rocker cam (4) via slider (13).
- Being supported by cradle (2) on the cylindrical surface, rocker cam (4) slides on the surface while continuing revolving movement.
- Space of the pressure receiving area of servo piston (12) are not identical on the left side and right side. Main pump discharge pressure (self pressure) (PP) is always brought to the pressure chamber of the small diameter piston side.
- Output pressure (PEN) of the LS valve is brought to the chamber receiving the pressure at the large diameter piston end.
- The relationship in the size of pressure (PP) at the small diameter piston end and pressure (PEN) at the large diameter piston end, and the ratio between the area receiving the pressure of the small diameter piston and the large diameter piston controls the movement of servo piston (12).





1. LS valve



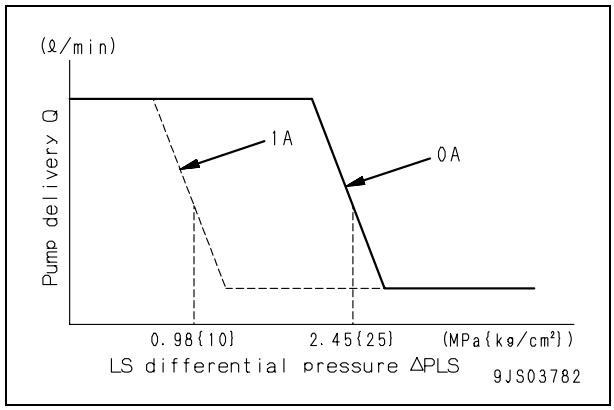
PA: Pump port
PDP: Drain port
PLP: LS control pressure output port
PLS: LS pressure input port
PP: Pump port
PPL: Control pressure input port
PSIG: LS mode selector pilot port

1. Sleeve
2. Piston
3. Spool
4. Spring
5. Seat
6. Sleeve
7. Plug
8. Locknut

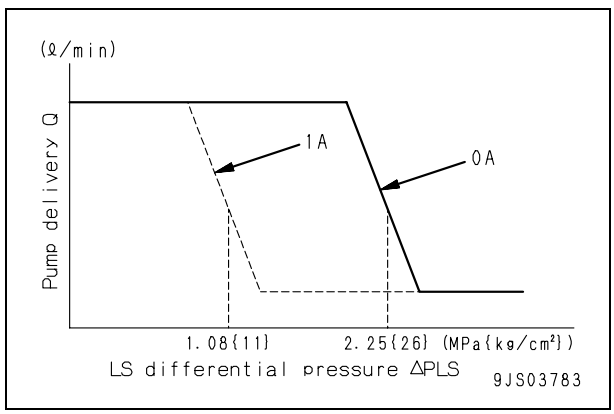
Function

- The LS (load sensing) valve detects the load and controls the discharge amount.
- This valve controls main pump delivery (Q) according to differential pressure (△PLS)[= PP – LS], called the LS differential pressure (the difference between main pump pressure PP and control valve outlet port pressure PLS).
- Main pump pressure (PP), pressure (PLS) (called the LS pressure) coming from the control valve output, and pressure (PSIG) (called the LS selector pressure) from the proportional solenoid valve enter this valve.
- The relationship between the LS differential pressure between the main pump pressure (PP) and LS pressure (PLS) (△PLS) [= (PP) – (PLS)] and the pump delivery (Q) changes as shown in the diagram according to LS selector current (ISIG) of the LS-EPC valve.
- If (ISIG) changes from 0 to 1A, setting force the spring changes, too. As the result, the specified median of the pump delivery volume switching point changes as shown in the diagram. As for the front pump side, it will change in the range of 0.98 to 2.45 MPa {in the range of 10 to 25 kg/cm^2] and as for the rear pump side, it will change in the range of 1.08 to 2.55 MPa {in the range of 11 to 26 kg/cm^2}.

Front pump

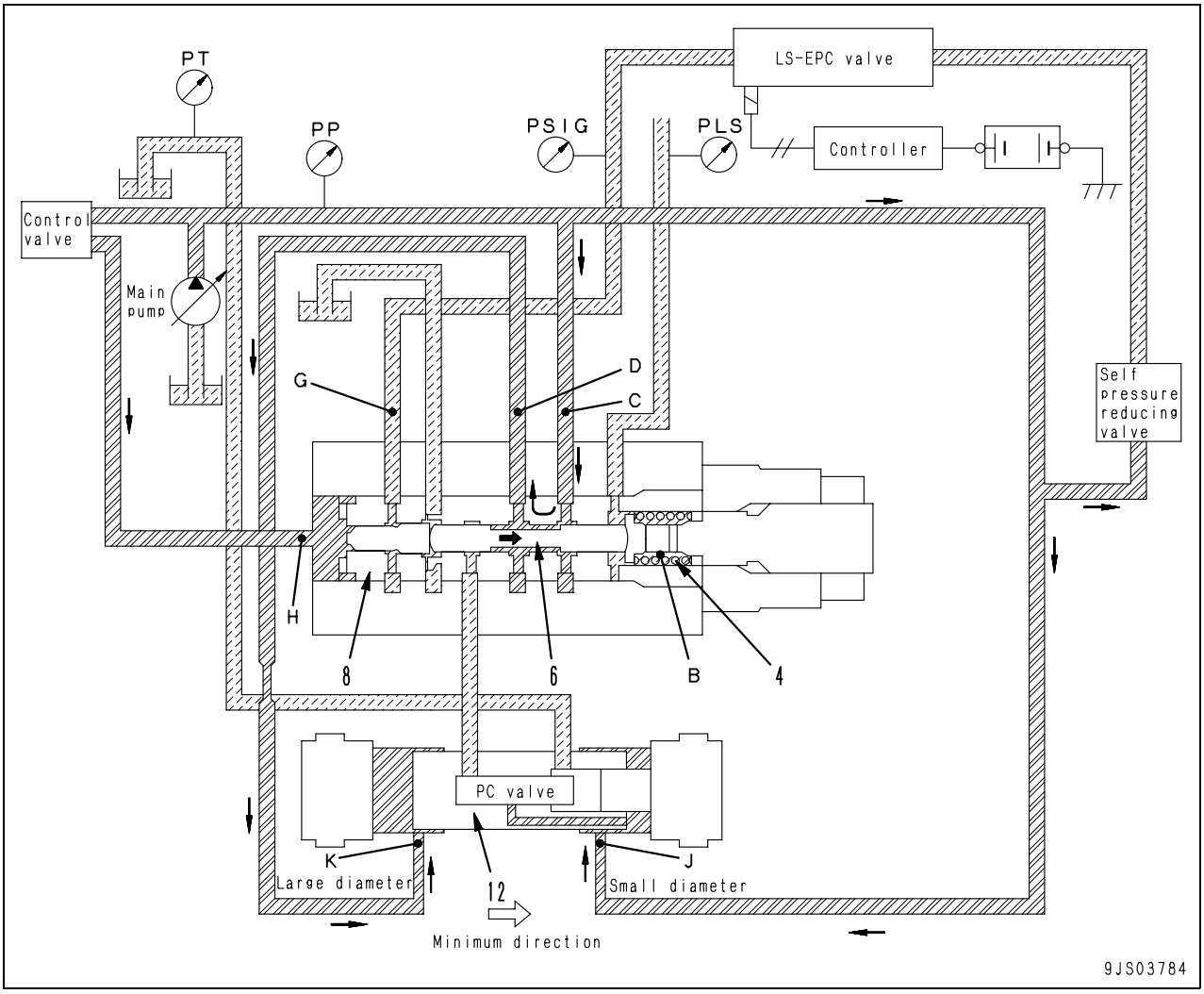


Rear pump

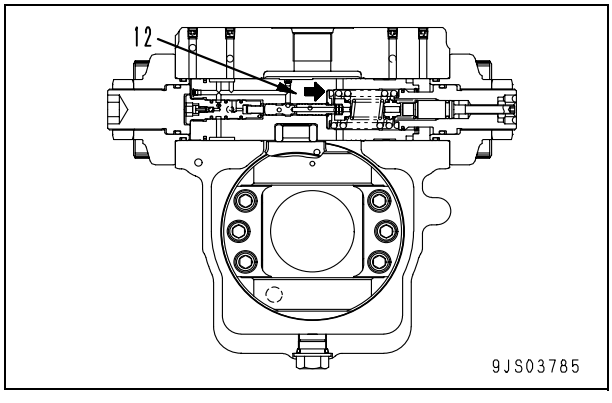


Operation

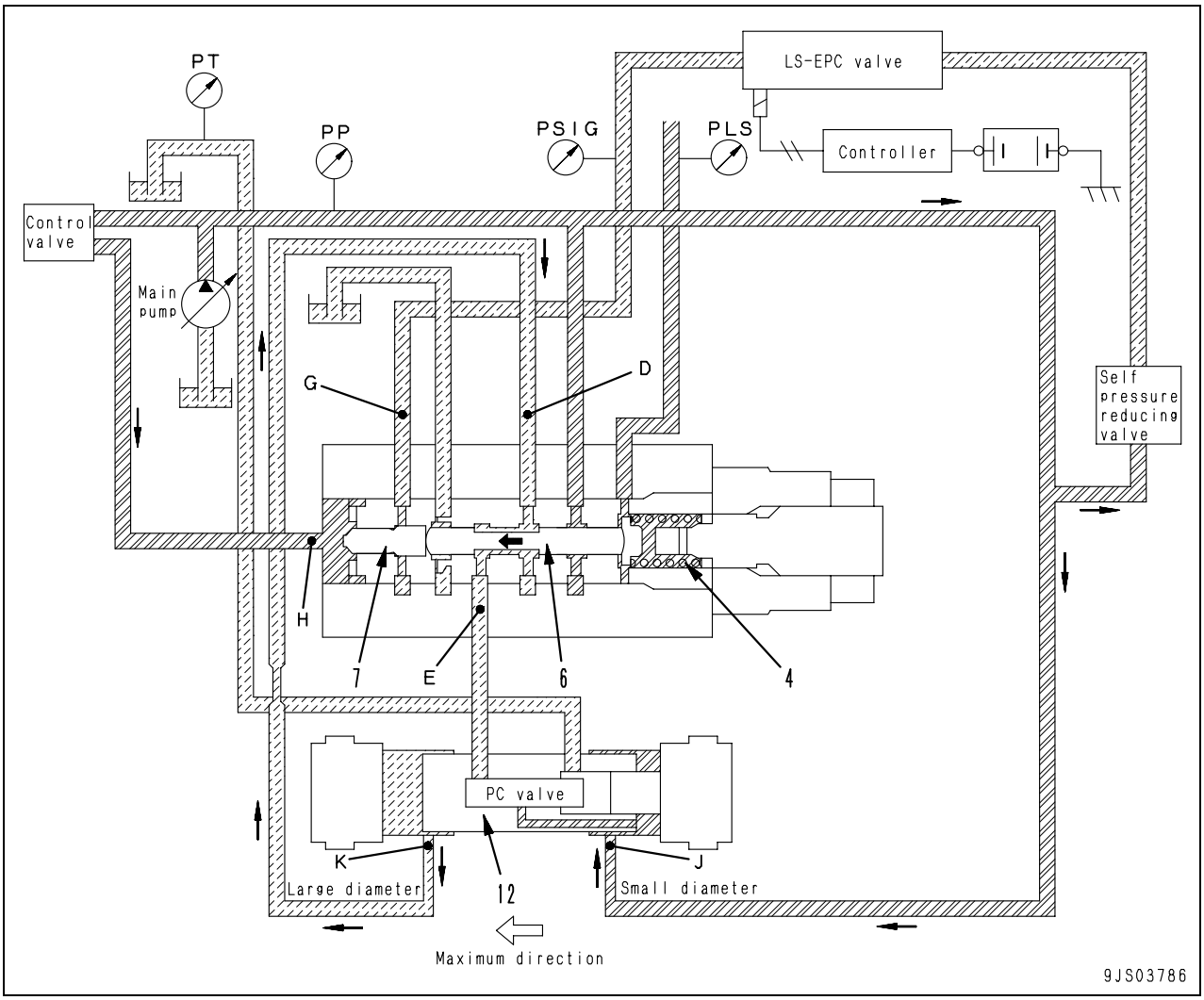
1) When the control valve is situated at neutral



- The LS valve is a 3-way selector valve, with pressure (PLS) (LS pressure) from the outlet port of the control valve brought to spring chamber (B), and main pump discharge pressure (PP) brought to port (H) of sleeve (8).
- Magnitude of the force resulting from this LS pressure (PLS), force of spring (4) and the pump delivery pressure (self pressure) (PP) determine the position of spool (6).
- However, magnitude of the output pressure (PSIG) (called the LS selector pressure) of the EPC valve for the LS valve entering port (G) also changes the position of spool (6). (Setting force of the spring is changed)
- Before the engine is started, servo piston (12) is pushed to the right. (See the figure)
- If the control lever is at the neutral position when the engine is started, LS pressure (PLS) will be set to 0 MPa {0 kg/cm^2}. (It is interconnected to the drain circuit via the control valve spool)
- Spool (6) is pushed to the right, and port (C) and port (D) will be connected.
- Pump pressure (PP) is conducted to the larger diameter end from the port (K).
- The same pump pressure (PP) is conducted to the smaller diameter end from the port (J).
- According to the difference in the areas on servo piston (12), the pressure moves in such that the swash plate angle may be minimized.

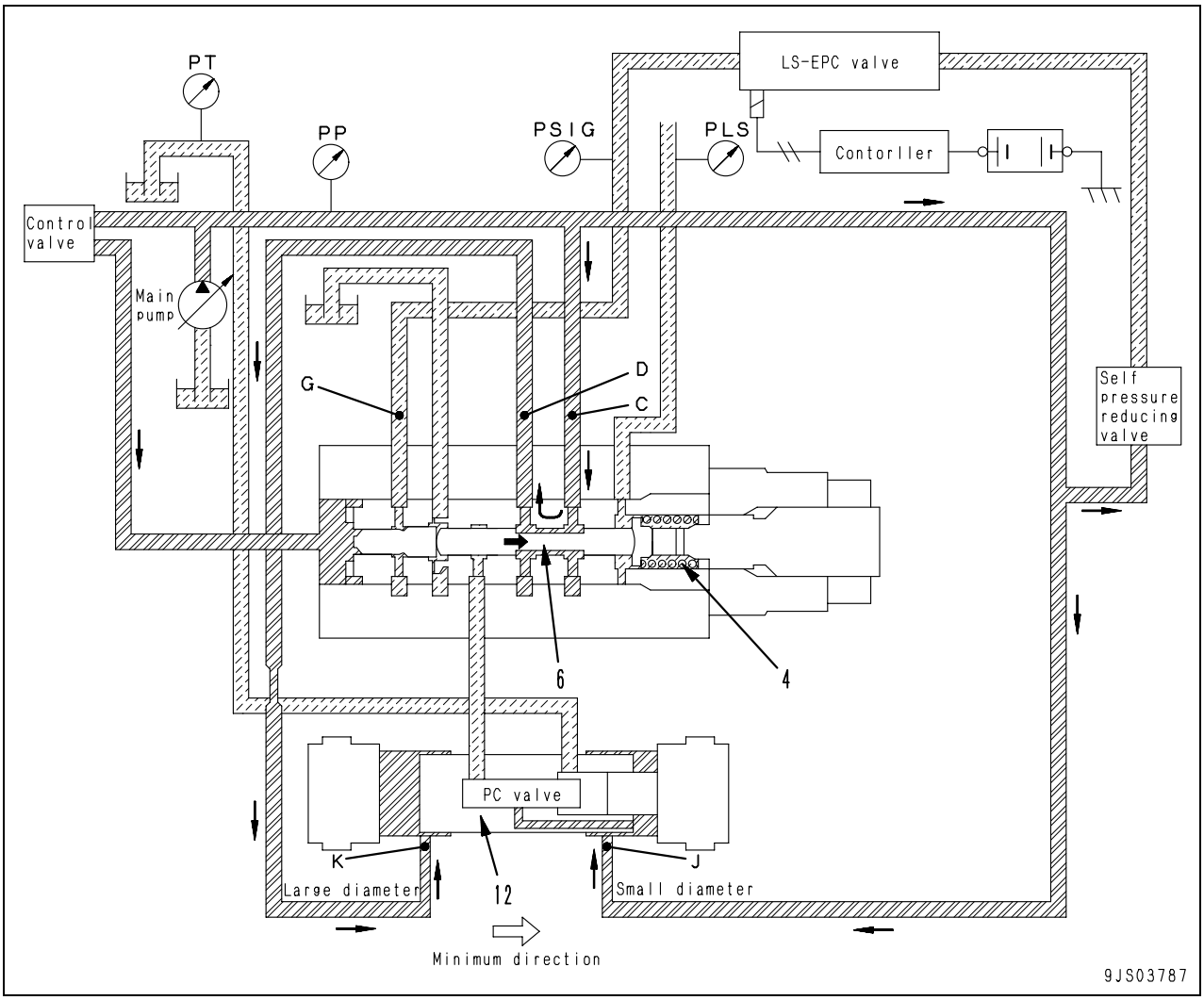


2) Action for the direction of maximizing the pump delivery



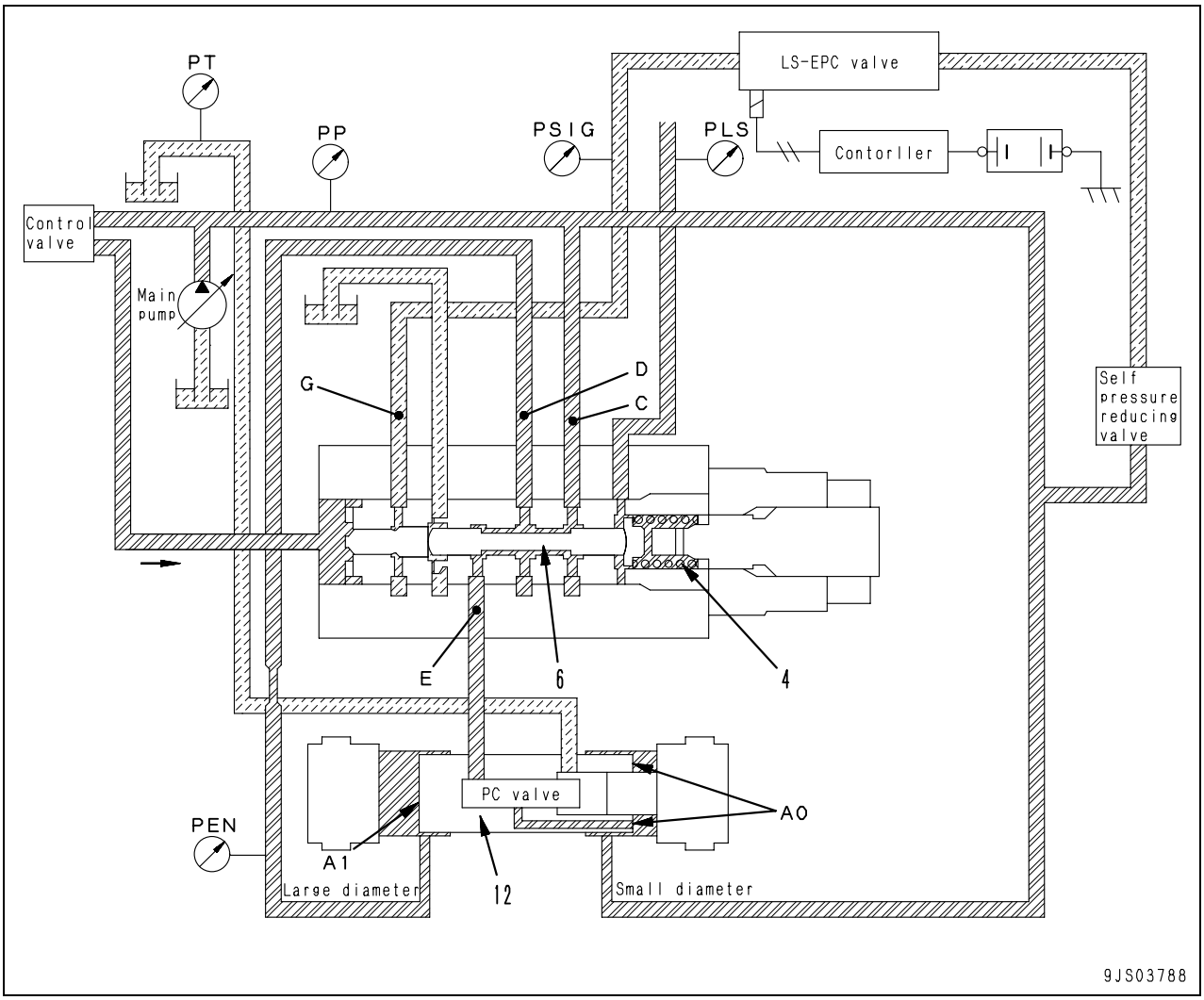
- When the difference between the main pump pressure (PP) and LS pressure (PLS), in other words, LS differential pressure (△PLS) becomes smaller (for example, when the area of opening of the control valve becomes larger and pump pressure PP drops), spool (6) is pushed to the left by the combined force of LS pressure (PLS) and the force of spring (4).
- When spool (6) moves, port (D) and port (E) are interconnected and connected to the PC valve.
- The PC valve is connected to the drain port, so the pressure across circuits (D) and (K) becomes drain pressure (PT). (The operation of the PC valve is explained later.)
- The pressure at the large diameter end of servo piston (12) becomes drain pressure (PT), and pump pressure (PP) enters port (J) at the small diameter end, so servo piston (12) is pushed to the left side. Therefore, the swash plate is moved in the direction to make the discharge amount larger.
- If the output pressure of the EPC valve for the LS valve enters port (G), rightward force is generated on piston (7).
- If piston (7) is pushed to the right, setting force of spring (4) is weakened, changing the LS differential pressure (△PLS) [Difference between oil pressures (PLS) and (PP)] when ports (D) and (E) of spool (6) are connected.

3) Action for the direction of minimizing the pump delivery



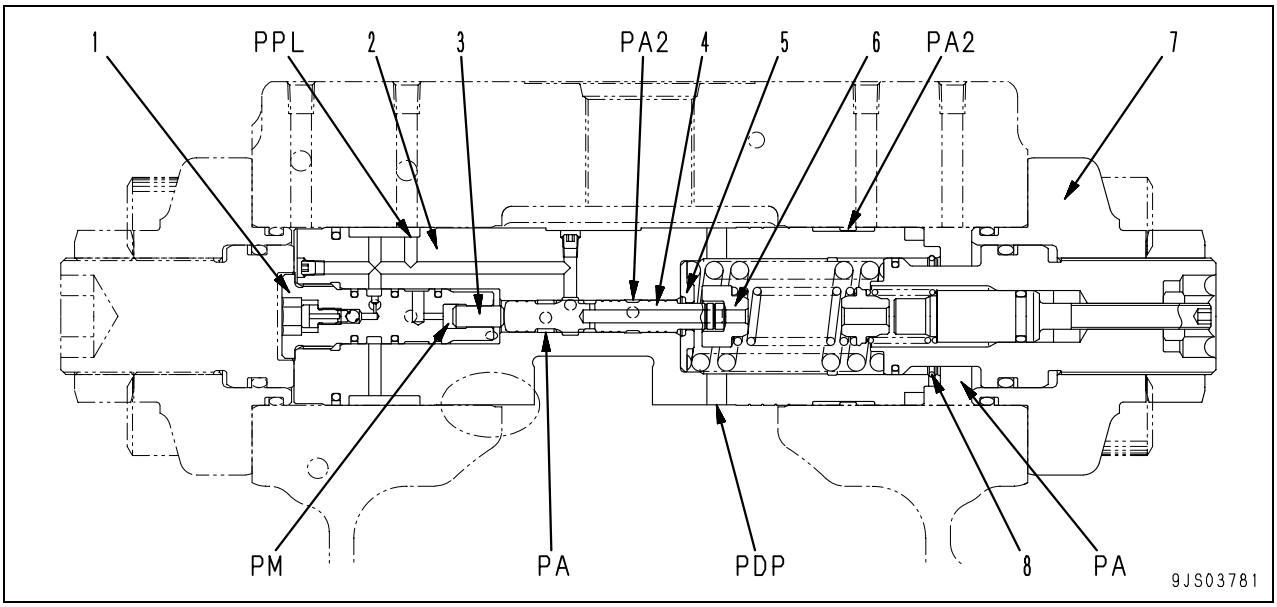
- When LS differential pressure (△PLS) becomes larger (for example, when the area of opening of the control valve becomes smaller and pump pressure (PP) rises) because of the rightward move (it reduces discharge amount) of servo piston (12), pump pressure (PP) pushes spool (6) to the right.
- When spool (6) moves, main pump pressure (PP) flows from port (C) to port (D) and from port (K), it enters the large diameter end of the piston.
- Main pump pressure (PP) also enters port (J) of the small diameter end of the piston, but because of the difference in area between the large diameter end and the small diameter end on servo piston (12), it is pushed to the right. As the result, servo piston (12) moves into the direction of reducing the swash plate angle.
- As LS selector pressure (PSIG) is input to port (G), setting force of spring (4) is reduced.

4) When servo piston is balanced



- Let us take the area receiving the pressure at the large diameter end of the piston as (A1), the area receiving the pressure at the small diameter end as (A0), and the pressure flowing into the large diameter end of the piston as (PEN).
- If the main pump pressure (PP) of the LS valve and the combined force of spring (4) and LS pressure (PLS) are balanced, and the relationship is (A0) x (PP) = (A1) x (PEN), servo piston (12) will stop in that position.
- And the swash plate of the pump will be held in an intermediate position. [Spool (6) will be stopped at a position where the distance of the opening from port (D) to port (E) and the distance from port (C) to port (D) is almost the same.]
- At this point, the relationship between the pressure receiving areas across servo piston (12) is (A0) : (A1) = 3 : 5, so the pressure applied across the piston when it is balanced becomes (PP) : (PEN) ≒ 5 : 3.
- Force of spring (4) is adjusted in such that the position of the balanced stop of this spool (6) may be determined when (PP) – (PLS) = 2.45 MPa {25 kg/cm^2} on the front pump side and (PP) – (PLS) = 2.55 MPa {26 kg/cm^2} on the rear pump side at the median of the specified value.
- If (PSIG) [Output pressure of LS-EPC valve, 0 to 2.9 MPa {0 to 30 kg/cm^2}] is input to port (G), the position of the balanced stop is changed. The front pump side will be moved in the range of (PP) –(PLS) = 2.45 to 0.98 MPa {25 to 0 kg/cm$_2$} and the rear pump will be moved in the range of (PP) – (PLS) = 2.55 to 1.08 MPa {26 to 11 kg/cm^2} in proportion to (PSIG) pressure.

2. PC valve

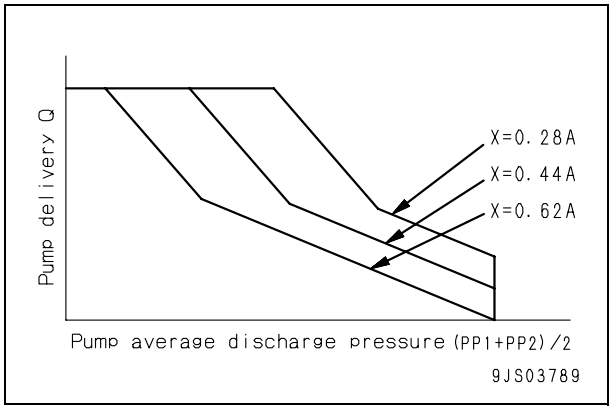


PA: Pump port
PA2: Pump pressure pilot port
PDP: Drain port
PM: Mode selector pressure pilot port
PPL: Control pressure output port (to LS valve)

1. Plug
2. Servo piston assembly
3. Pin
4. Spool
5. Retainer
6. Seat
7. Cover
8. Wiring

Function

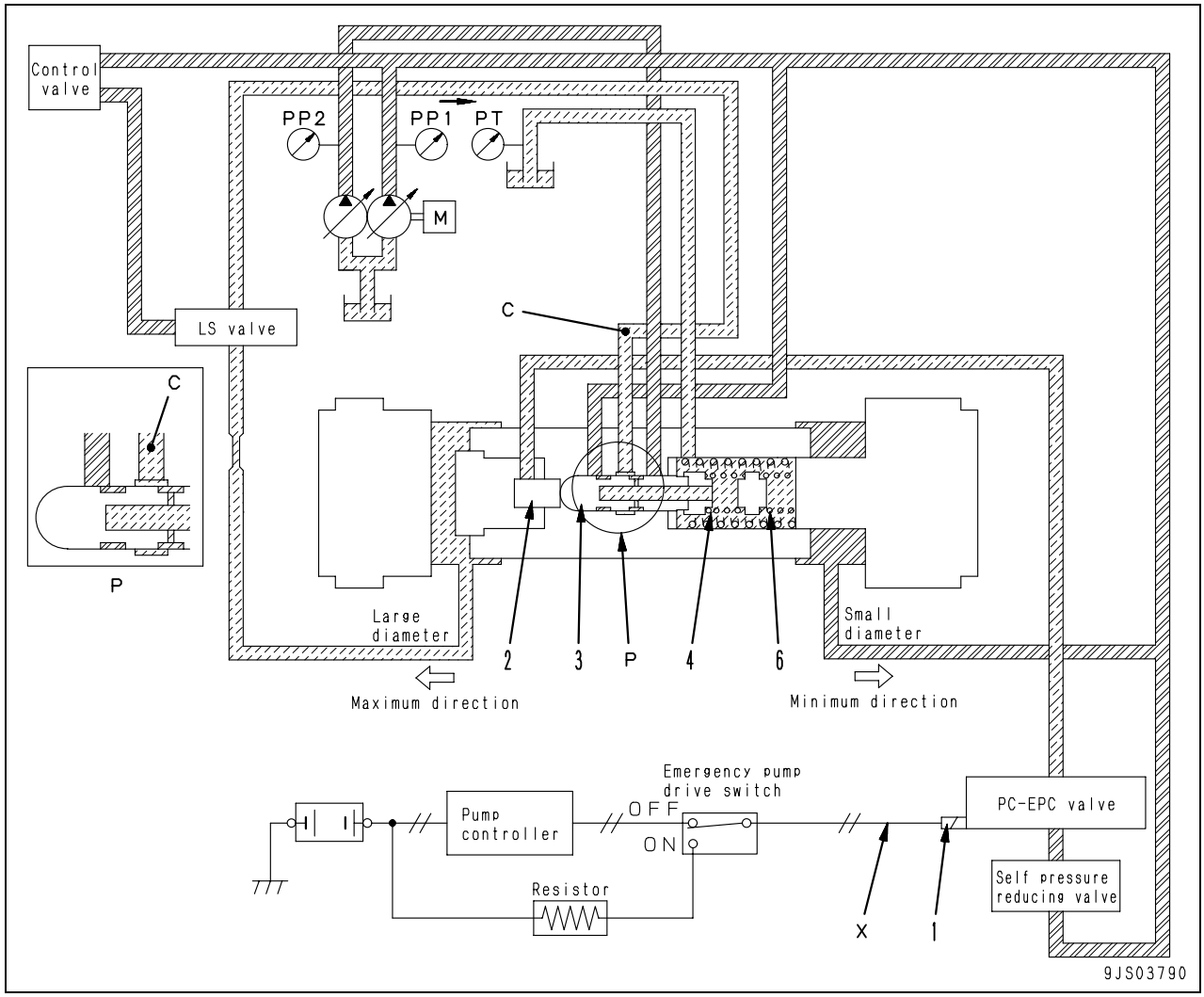
- When the pump discharge pressure (PP1) (self-pressure) and (PP2) (other pump pressure) are high, the PC valve controls the pump so that the volume of oil beyond the discharge pressure-based specific flowrate may not be conducted however you may increase the control valve stroke. Namely it is intended at controlling the horse power for the pumps so that it may not exceed the engine hose power.
- If the pump discharge pressure increases due to increased load during operation, this valve decreases the pump delivery.
- And if the pump delivery pressure goes low, it increases the pump delivery.
- In this case, relation between the mean discharge pressure of the front and rear pumps [(PP1) + (PP2)]/2 and the pump delivery (Q) will becomes as shown in the diagram if the relation is represented as the parameter the current value (X) to be given to PC-EPC valve solenoid.
- The controller continues counting the actual engine speed.
- If the engine speed is slowed down due to increased load, the controller reduces the pump delivery to recover the speed.
- If the engine speed goes below the specified value because of increased load, the controller sends a command current to PC-EPC valve solenoid in order to reduce the slope angle in proportion to reduction in the engine speed.



Operation

1) When pump controller is normal

(1) When the load on the actuator is small and pump discharge pressures (PP1) and (PP2) are low



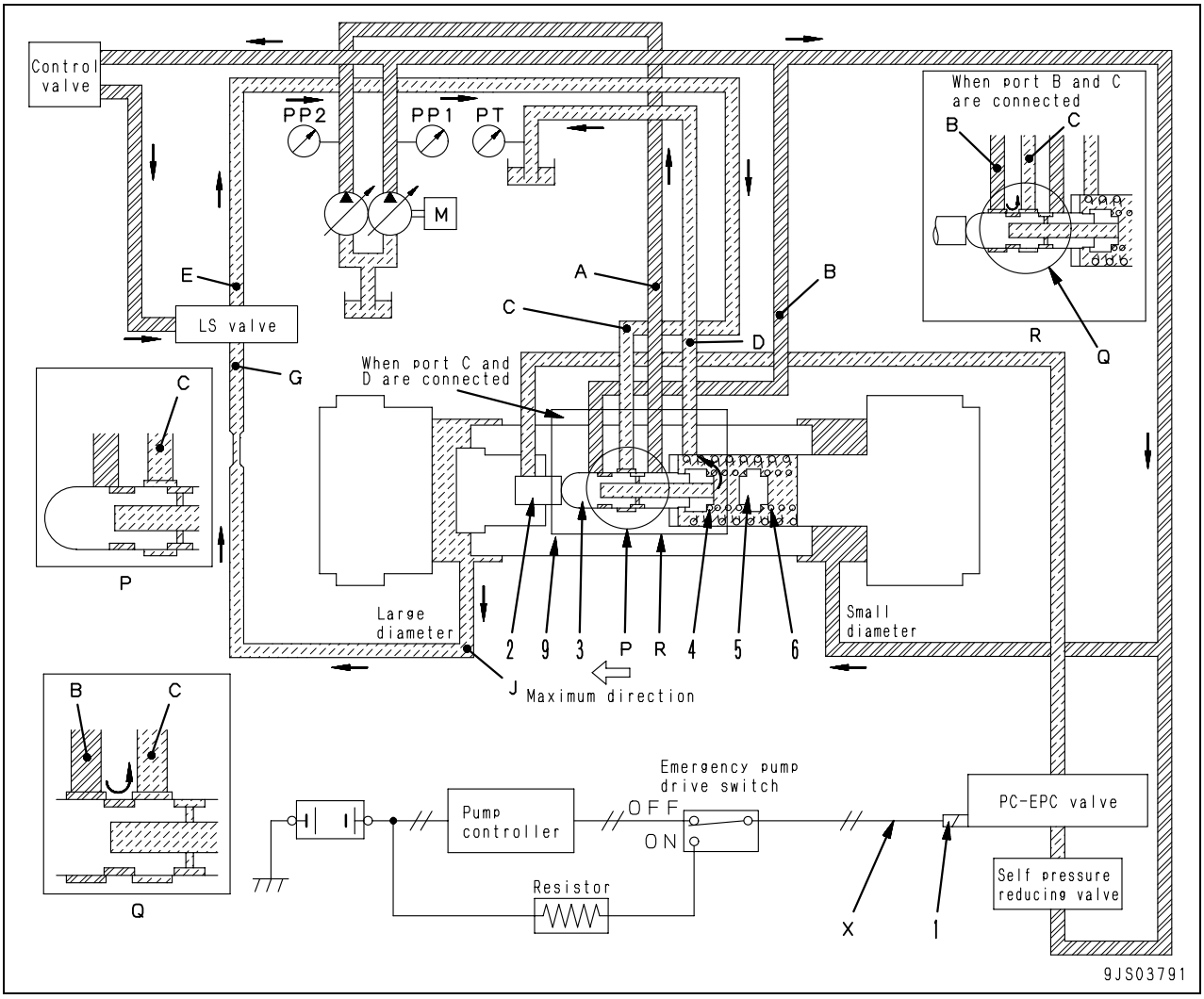
Action of PC-EPC valve solenoid (1)

- Command current (X) is being sent to PC-EPC valve solenoid (1) from the pump controller.
- This command current acts on PC-EPC valve to output the signal pressure in order to modify the force pushing piston (2).
- Spool (3) stops at a position where the combined spool-pushing force is balanced by the setting force of springs (4) and (6) as well as the pump pressures (PP1) (self-pressure) and (PP2) (another pump's pressure).
- The pressure [port (C) pressure] output from PC valve is changed depending on the above position.
- The size of command current (X) is determined by the nature of the operation (lever operation), the selected working mode, and the set value and actual value of the engine speed.

★ Other pump's pressure denotes the pressure of the pump situated on the opposite side.

For the front pump pressure, the other pump's pressure is that of the rear pump.

And for the rear pump pressure, the other pump's pressure is that of the front pump.

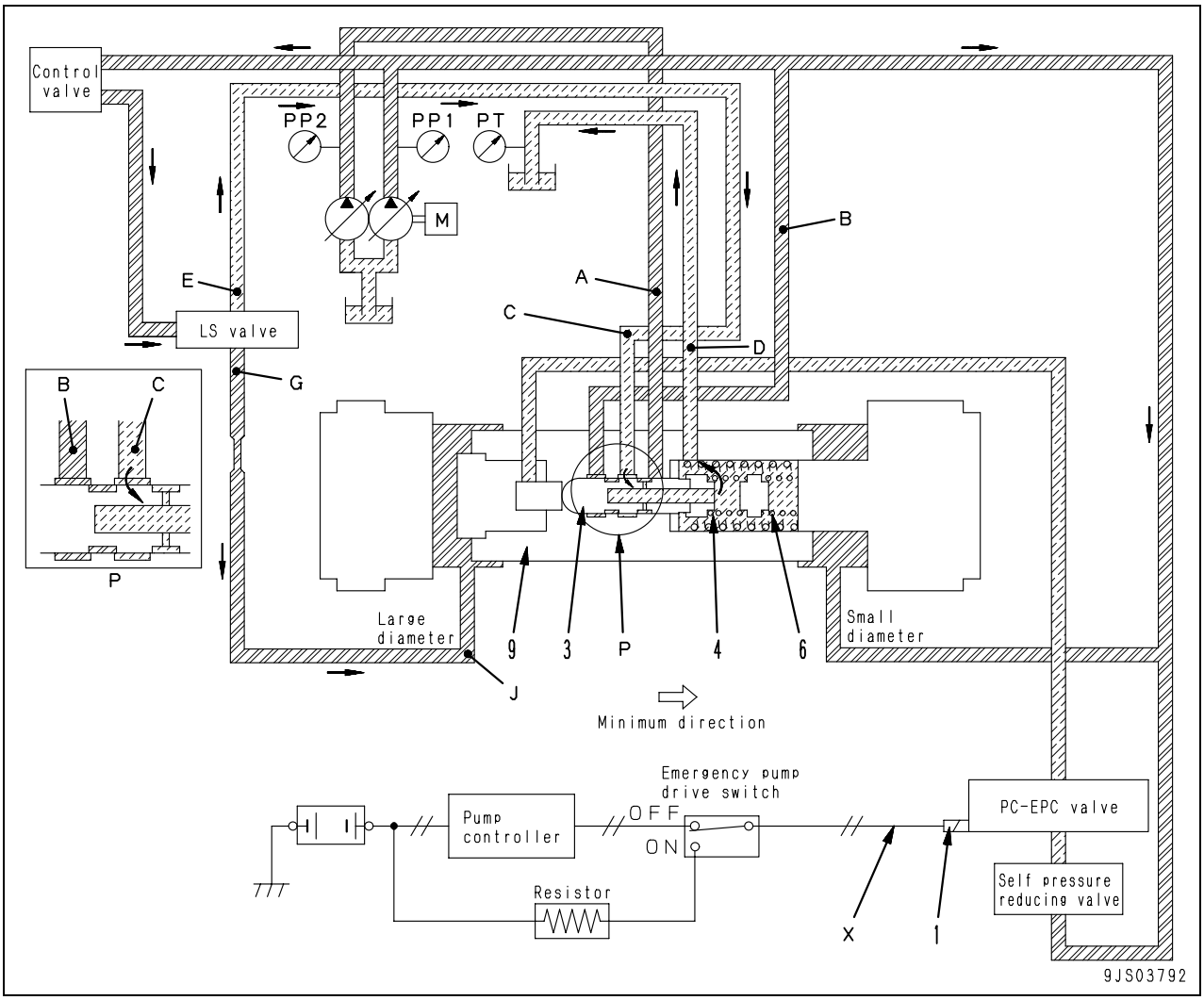


Action of spring

- Load of springs (4) and (6) on the PC valve is determined by the swash plate position.
- As servo piston (9) moves to right, spring (6) is retracted.
- If the servo piston moves further, it will be contacted again seat (5) and spring (6) will be fixed.
- After that, spring (4) alone will operate.
- The spring load is changed by servo piston (9) as it extends or compresses springs (4) and (6).
- If the command current (X) to PC-EPC valve solenoid (1) changes, so does the force pushing piston (2).
- Spring load of springs (4) and (6) is also affected by the command current (X) to PC-EPC valve solenoid.
- Port (C) of the PC valve is connected to port (E) of the LS valve.
- Self pressure (PP1) enters port (B) and the small diameter end of servo piston (9), and other pump pressure (PP2) enters port (A).
- When pump pressures (PP1) and (PP2) are small, spool (3) will be positioned in the left side.
- Port (C) and (D) are connected, and the pressure entering the LS valve becomes drain pressure (PT).
- If port (E) and port (G) of the LS valve are connected, the pressure entering the large diameter end of the piston from port (J) becomes drain pressure (PT), and servo piston (9) moves to the left side.
- The pump delivery will be set to the increasing trend.
- Accompanied with move of servo piston (9), springs (4) and (6) will be expanded and the spring force becomes weaker.
- As the spring force is weakened, spool (3) moves to the right, the connecting between port (C) and port (D) is shut off and the pump discharge pressure ports (B) and (C) are connected.

- As a result, the pressure on port (C) rises and the pressure on the large diameter end of the piston also rises. Thus, the leftward move of servo piston (9) is stopped.
- Servo piston (9) stop position (= Pump delivery) is decided by the position where the pushing force generated from the pressures (PP1) and (PP2) applied to spool (3), the pushing force of the solenoid in PC-EPC valve generates and the pushing force of springs (4) and (6) are balanced.

(2) When load on actuator is large and pump discharge pressure is high



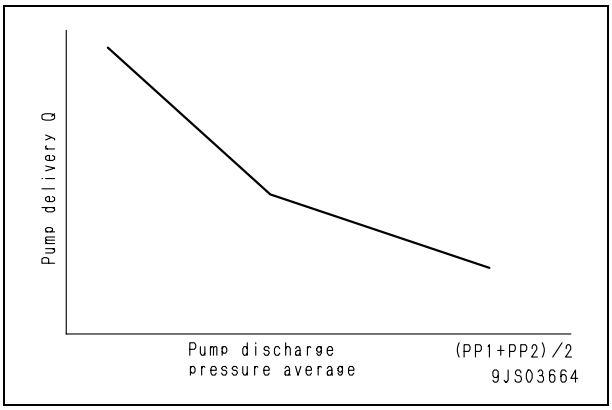
Outline

- When the load is large and pump discharge pressures (PP1) and (PP2) are high, the force pushing spool (3) to the right becomes larger and spool (3) will be moved to the position shown in above figure.
- Part of the pressure to be conducted from port (C) to LS valve flows from port (B) to port (C) and (D) via LS valve. At the end this flow, level of this pressure becomes approximately half of the main pump pressure (PP2).

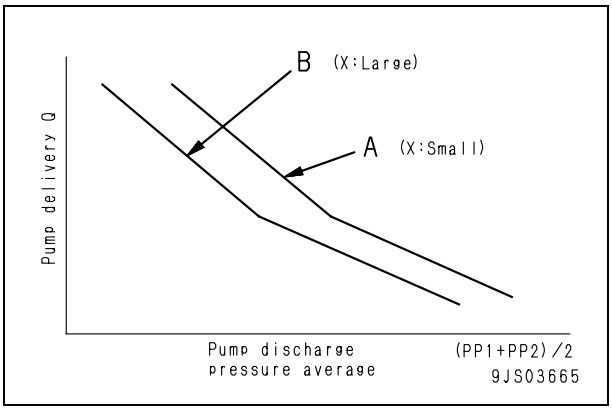
Operation

- When port (E) and port (G) of the LS valve are connected, this pressure from port (J) enters the large diameter end of servo piston (9), stopping servo piston (9).
- If main pump pressure (PP2) increases further and spool (3) moves further to the right, main pump pressure (PP1) flows to port (C) and acts to make the pump delivery the minimum.
- When servo piston (9) moves to the right, springs (4) and (6) are compressed and push back spool (3).
- When spool (3) moves to the left, the opening of port (C) and port (D) becomes larger.
- As a result, the pressure on port (C) (= J) is decreased and the rightward move servo piston (9) is stopped.
- The position in which servo piston (9) stops at this time is further to the right than the position when pump pressures (PP1) and (PP2) are low.

- The relationship between the average pump pressure (PP1 + PP2)/2 and servo piston (9) in terms of their positions can be represented by the broken line in the figure springs (4) and (6) form the double springs.
- The relationship between the average pump pressure (PP1 + PP2)/2 and average pump delivery (Q) becomes as shown below.

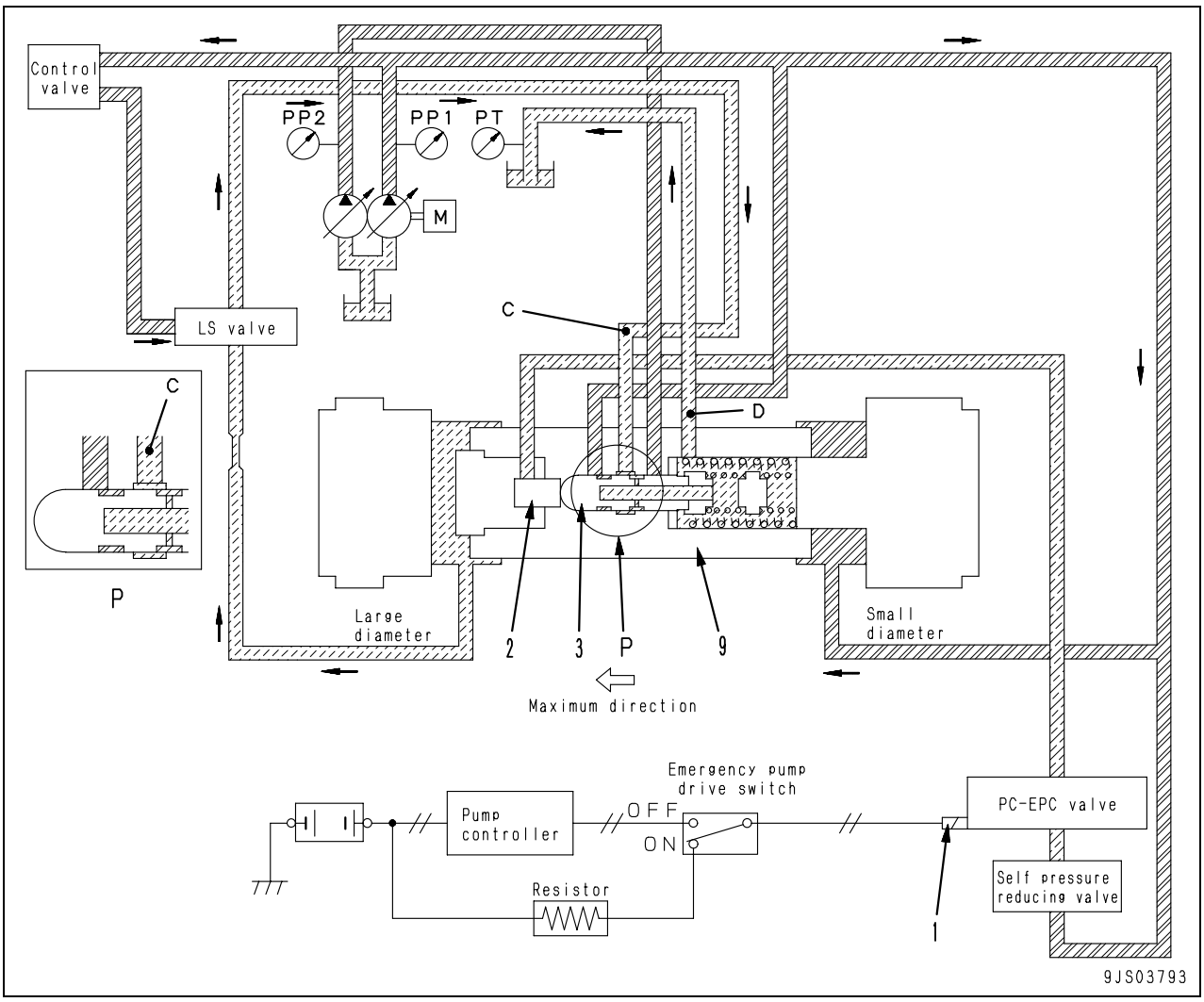


- If command voltage (X) sent to PC-EPC valve solenoid (1) increases further, the relationship between average pump pressure (PP1 + PP2)/2, and pump delivery (Q) is proportional to the force of the PC-EPC valve solenoid and moves in parallel.
- Namely, the force of PC-EPC valve solenoid (1) is added to the pushing force to the right because of the pump pressure applied to the spool (3), so the relationship between the average pump pressure (PP1 + PP2)/2 and the pump delivery (Q) moves from (A) to (B) as the command current (X) is increased.



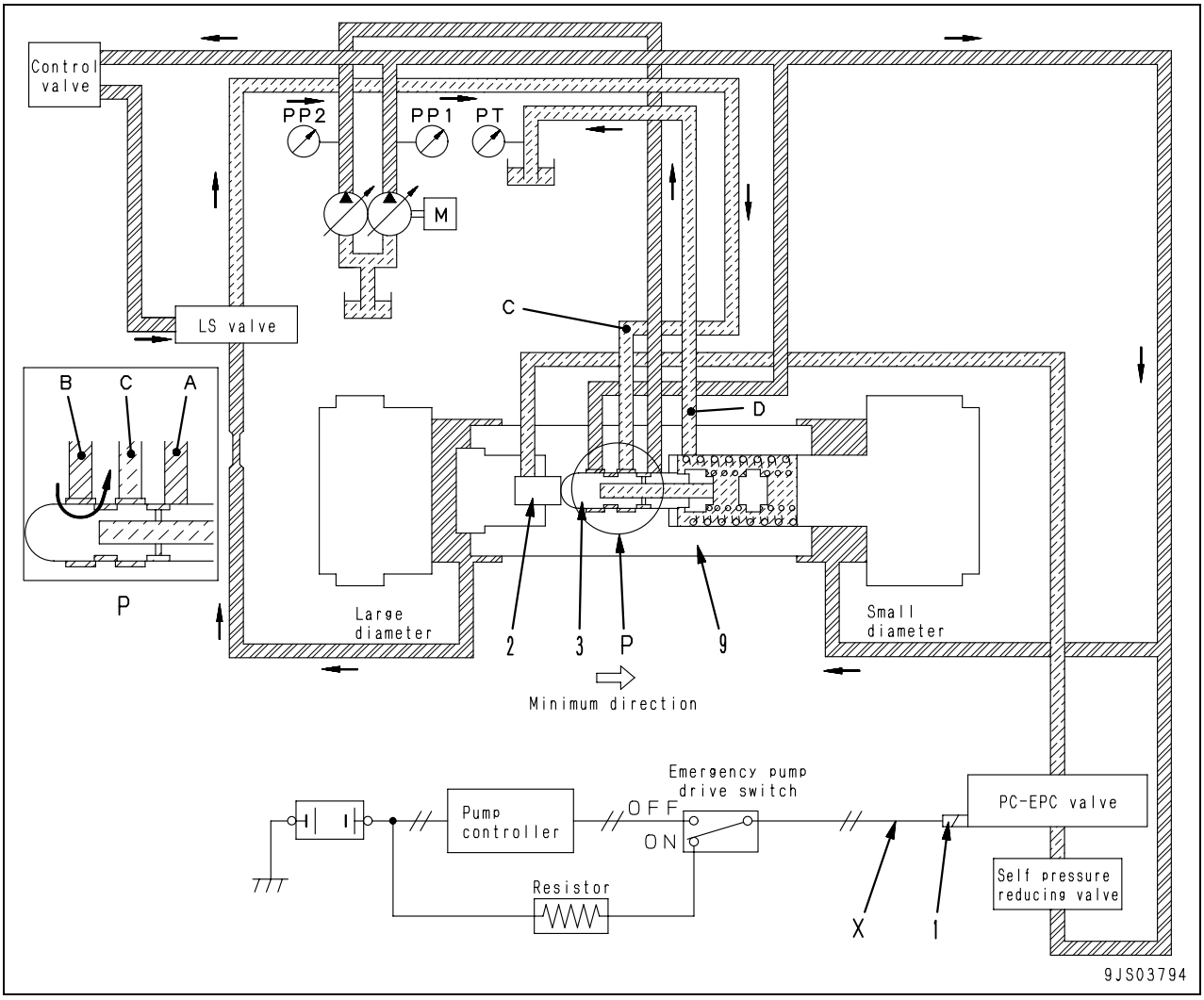
2) As the emergency pump drive switch is turned on due to failure on the pump controller

(1) When the main pump is under light load

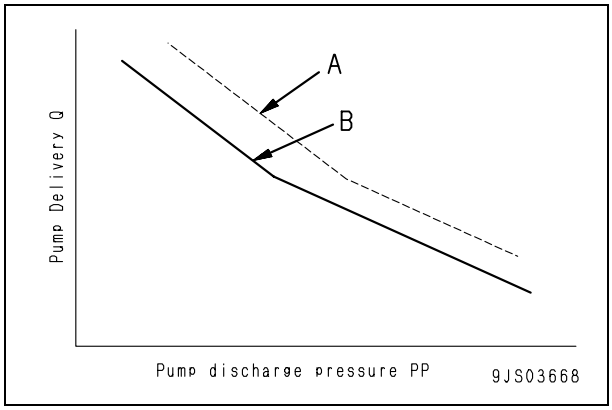


- If there is a failure in the pump controller, the emergency pump drive switch is turned on to hand the control to the resistor side.
- In this case, the power is directly supplied from the battery. The current, however, is too large as is, so the resistor is set in between to control the current flowing to PC-EPC valve solenoid (1).
- The current becomes constant, so the force pushing piston (2) is also constant.
- If the main pump pressures (PP1) and (PP2) are low, the combined force of the pump pressure and the PC-EPC valve solenoid (1) is weaker than the spring set force, so spool (3) is balanced at a position to the left.
- At this point, port (C) is connected to the drain pressure of port (D), and the large diameter end of the piston of servo piston (9) also becomes the drain pressure (PT) through the LS valve.
- Since the pressure on the small diameter end of the piston large, servo piston (9) moves in the direction to make the discharge amount larger.

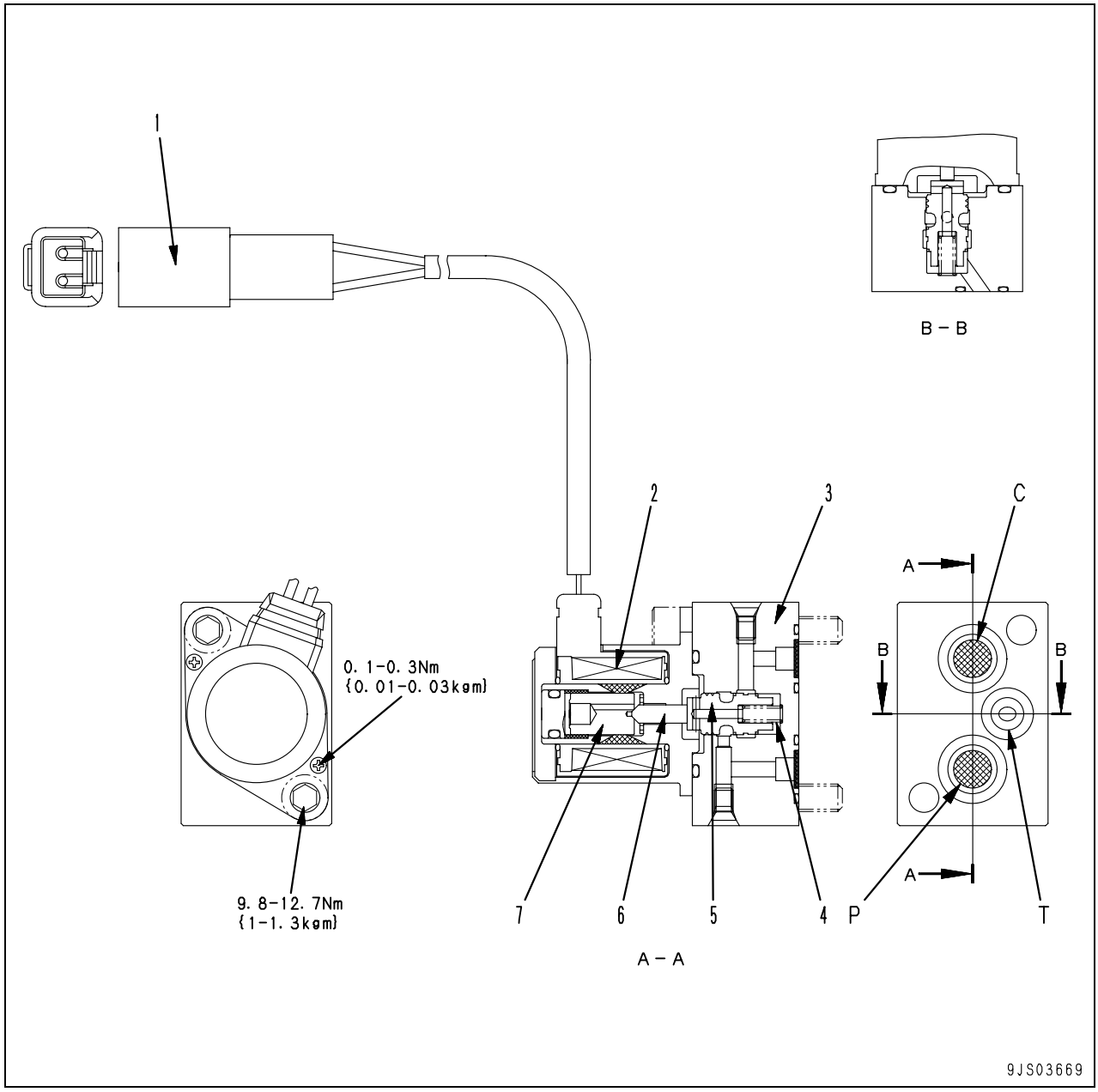
(2) When the main pump is under heavy load



- If the emergency pump drive switch is turned on In the same way as in above, the command current (X) sent to PC-EPC valve solenoid (1) becomes constant.
- For this reason, the force of piston (2) pushing spool (3) is constant.
- If main pump pressures (PP1) and (PP2) increase, spool (3) moves further to the right than when the main pump load is light, and is balanced at the position in the diagram above.
- In this case, the pressure from port (B) flows to port (C), so servo piston (9) moves to the right (smaller pump delivery) and stops at a position to the further to the right then when the load on the pump is light.
- When the emergency pump drive switch is turned on, too, the pump pressure (PP) and pump delivery (Q) have a relationship as shown with the curve in the figure corresponding to the current sent to the PC-EPC valve solenoid through the resistor.
- The curve resulting when the emergency pump drive switch is ON is situated further to the left (B) than when the pump controller is normal (A).



3. LS(PC)-EPC Valve

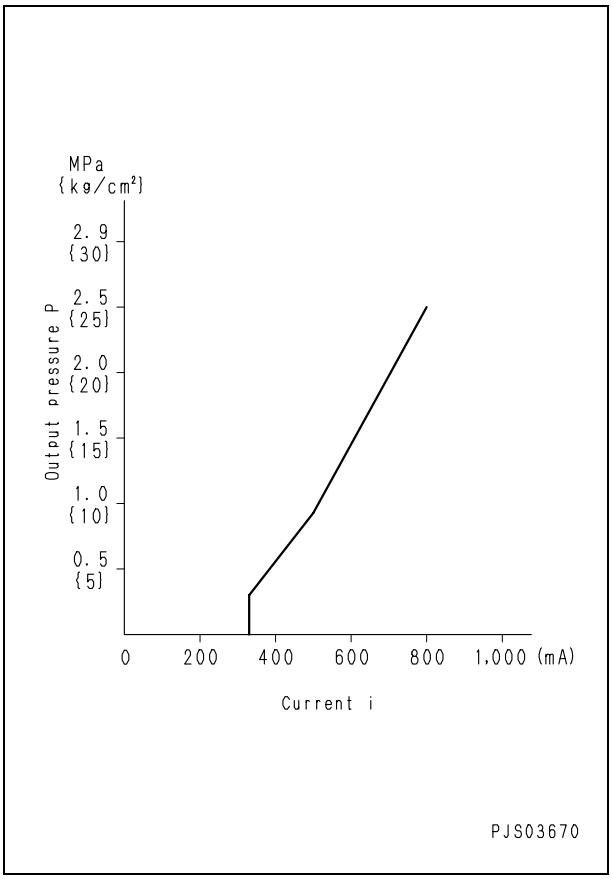


C: To LS(PC) valve
P: From self pressure reducing valve
T: To tank

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

Function

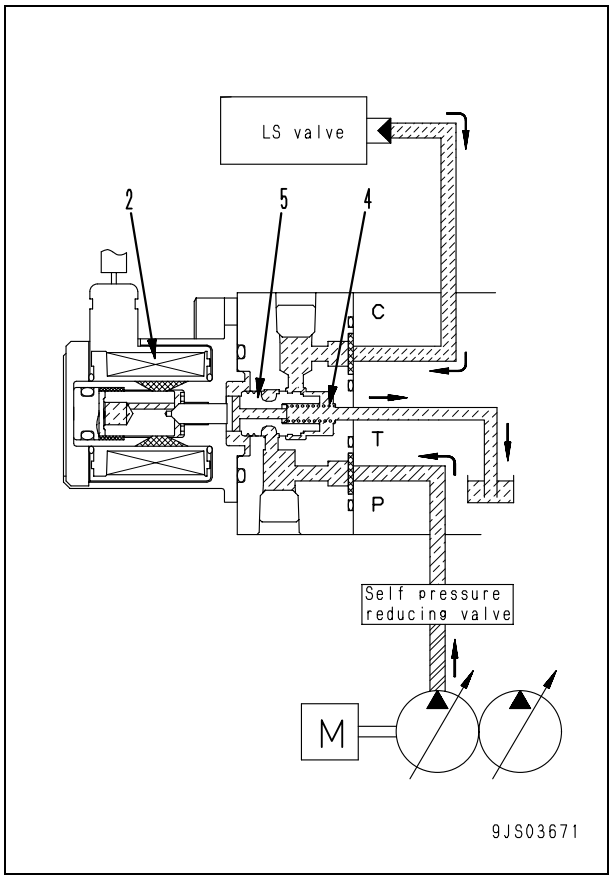
- The EPC valve consists of the proportional solenoid portion and the hydraulic valve portion.
- When it receives signal current (i) from the controller, it generates the EPC output pressure in proportion to the size of the signal, and outputs it to the LS (PC) valve.



Operation

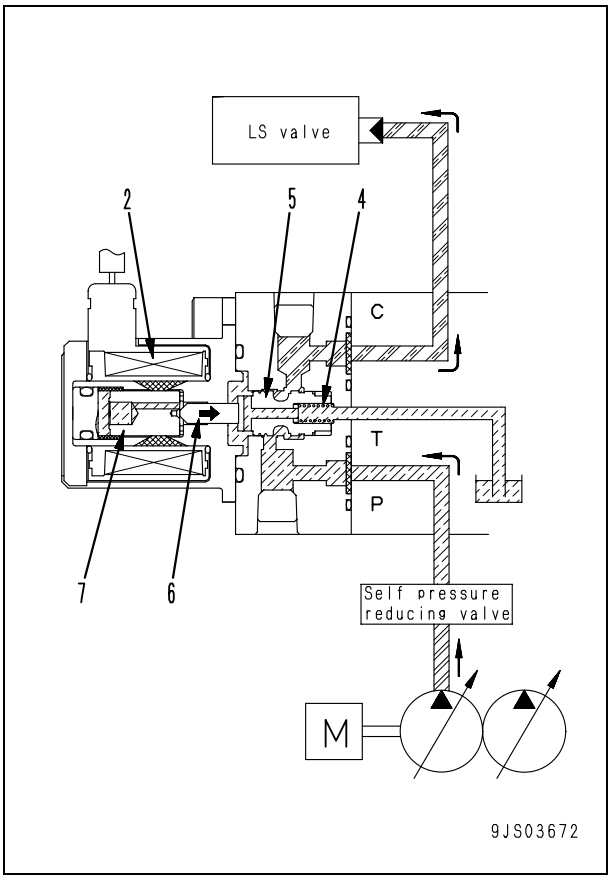
1) When signal current is 0 (coil is deenergized)

- When there is no signal current flowing from the controller to coil (2), coil (2) is deenergized.
- Spool (5) is pushed to the left by spring (4).
- Port (P) closes and the pressurized oil from the self pressure reducing valve does not flow to the LS (PC) valve.
- The pressurized oil from the LS (PC) valve is drained to the tank via port (C) and port (T).



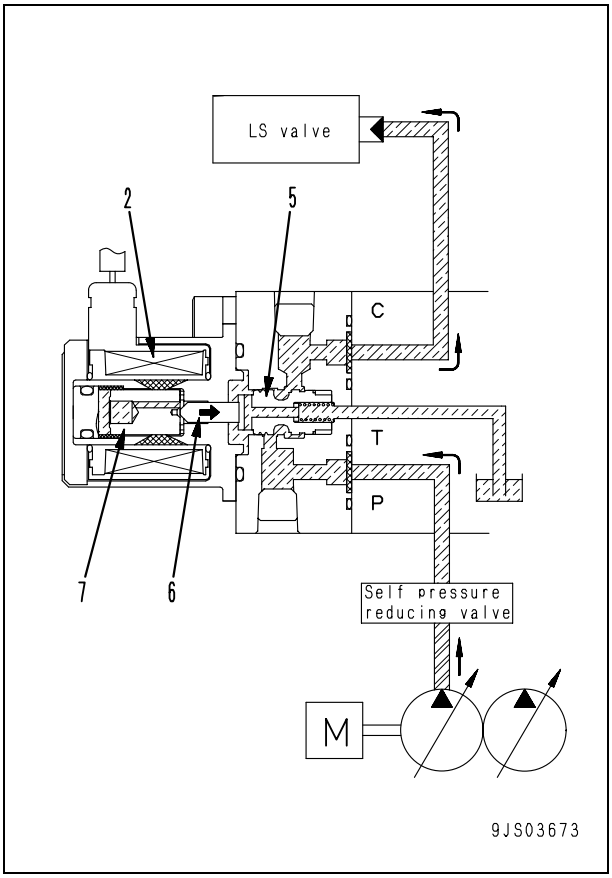
2) When signal current is very small (coil is energized)

- When a very small signal current flows to coil (2), coil (2) is energized, and a propulsion force is generated on the right side of plunger (7).
- Rod (6) pushes spool (5) to the right, and pressurized oil flows from port (P) to port (C).
- Pressures on port (C) increases and the force to act on spool (5) surface and the spring load on spring (4) become larger than the propulsion force of plunger (7).
- Spool (5) is pushed to the left, and port (P) is shut off from port (C).
- Port (C) and port (T) are connected.
- Spool (5) moves up and down so that the propulsion force of plunger (7) may be balance with pressure of port (C) + spring load of spring (4).
- The circuit pressure between the EPC valve and the LS (PC) valve is controlled in proportion to the size of the signal current.

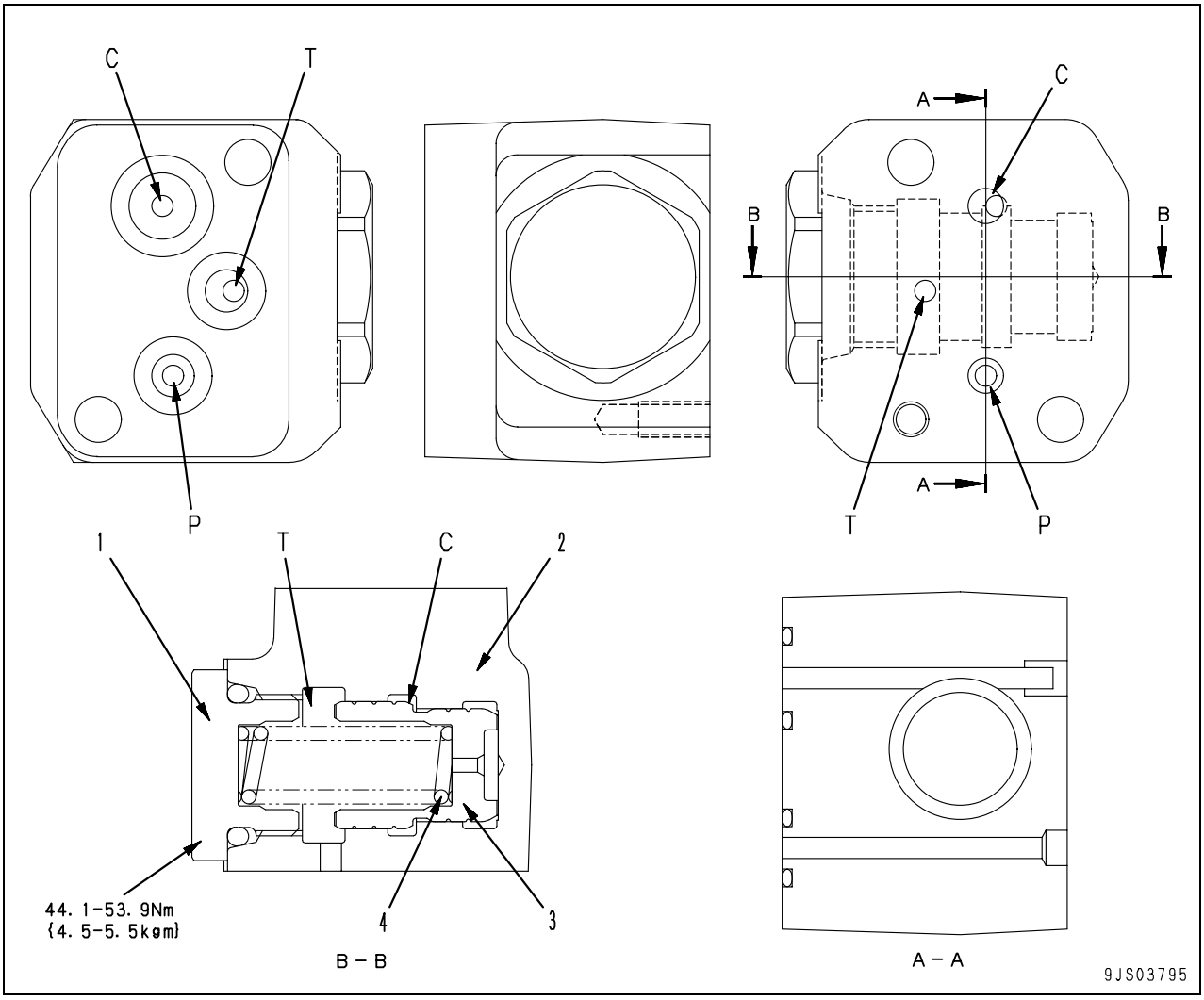


3) When signal current is maximum (coil is energized)

- As the signal current flows to coil (2), coil (2) is energized.
- When this happens, the signal current is at its maximum, so the propulsion force of plunger (7) is also at its maximum.
- Spool (5) is pushed toward right side by rod (6).
- The maximum volume of pressurized oil is conducted from port (P) to port (C), increasing the circuit pressure across EPC valve and LS (PC) valve to the maximum level.
- Since port (T) is closed, pressurized oil does not flow to the tank.



4. Variable Volume Valve



C1: To PC valve
P1: From self pressure reducing valve
T1: To tank

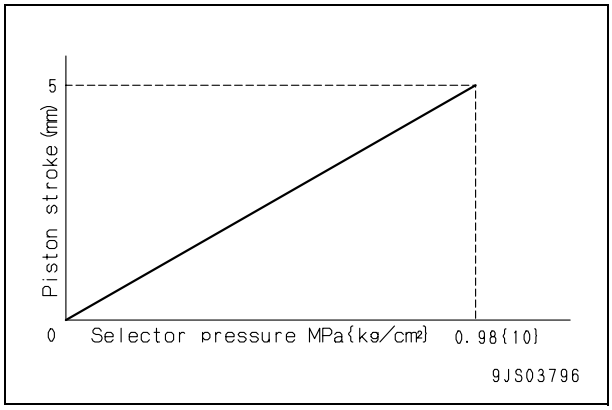
1. Plug
2. Block
3. Piston
4. Spring

Function

- The variable volume valve stabilizes the EPC valve's output pressure.

Operation

- Output pressure from EPC valve is conducted to port (C) and as the result propulsion force of piston (3) is increased by the load of spring (4).
- Piston (3) is pushed to the left, and volume of port (C) is increased.
- The propulsion force of piston (3) becomes smaller than the load of spring (4).
- Piston (3) is pushed toward right, and volume of port (C) is decreased.



KOMATSU PC340 (LC / NLC)-7 Hydraulic excavator

Form No. UEN00272-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

10 Structure, function and maintenance standard

Hydraulic system, Part 2

Hydraulic system, Part 2 2
Control valve 2
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Functions and operation by valve 18
Merge-divider valve 33
Attachment circuit selector valve 52
Hydraulic drift prevention valve 54

Hydraulic system, Part 2

Control valve

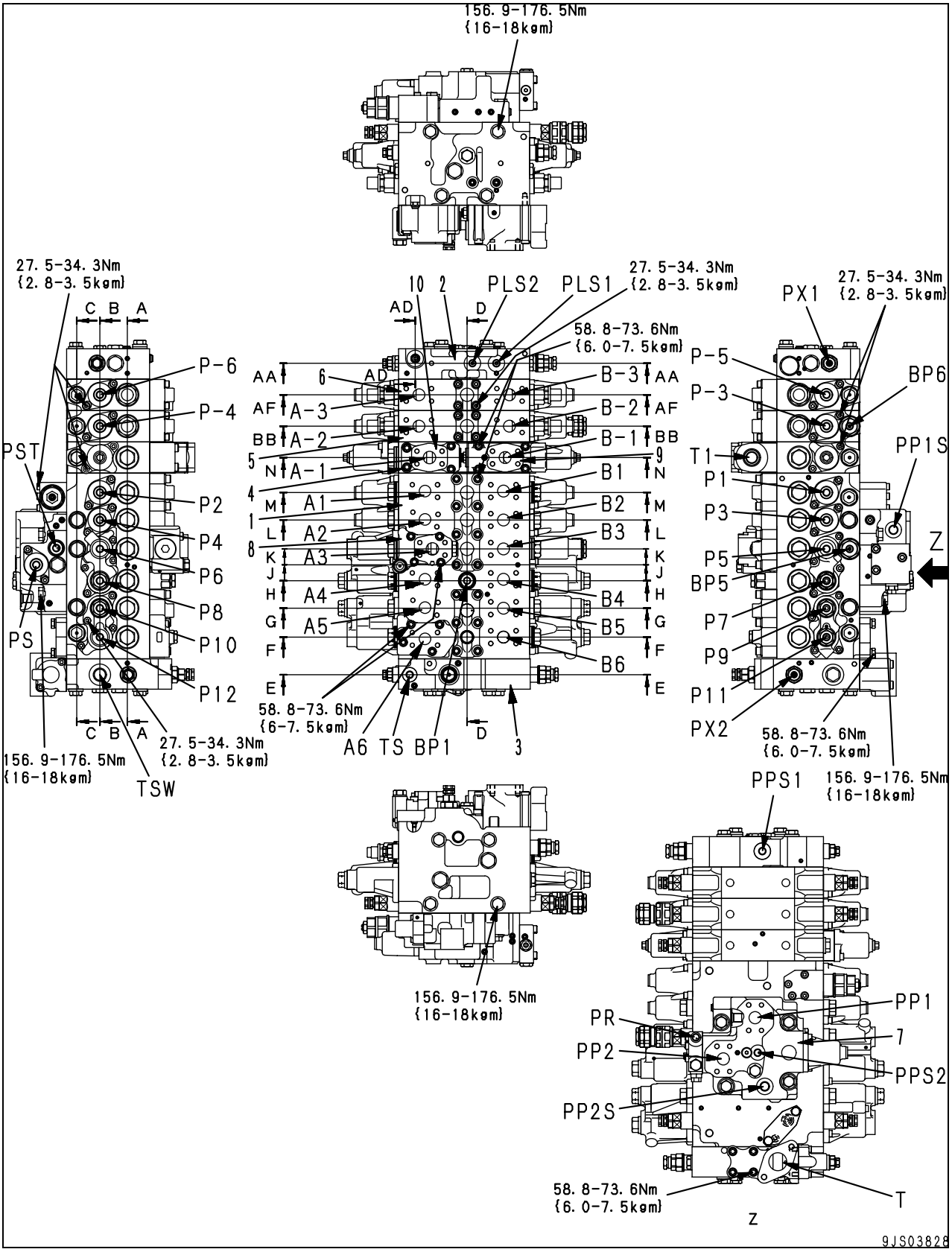
Outline

- The control valve consists of a 7-spool valve (6-spool valve + boom Hi, arm Hi valve) and a set of service valves. A merge-divider valve, a back pressure valve, a boom drift prevention valve are installed to it.
- Since all the valves are assembled together with connecting bolts and their passes are connected to each other inside the assembly, the assembly is compact and easy to maintain.
- With one spool provided for one work equipment, this control valve is simple in construction.

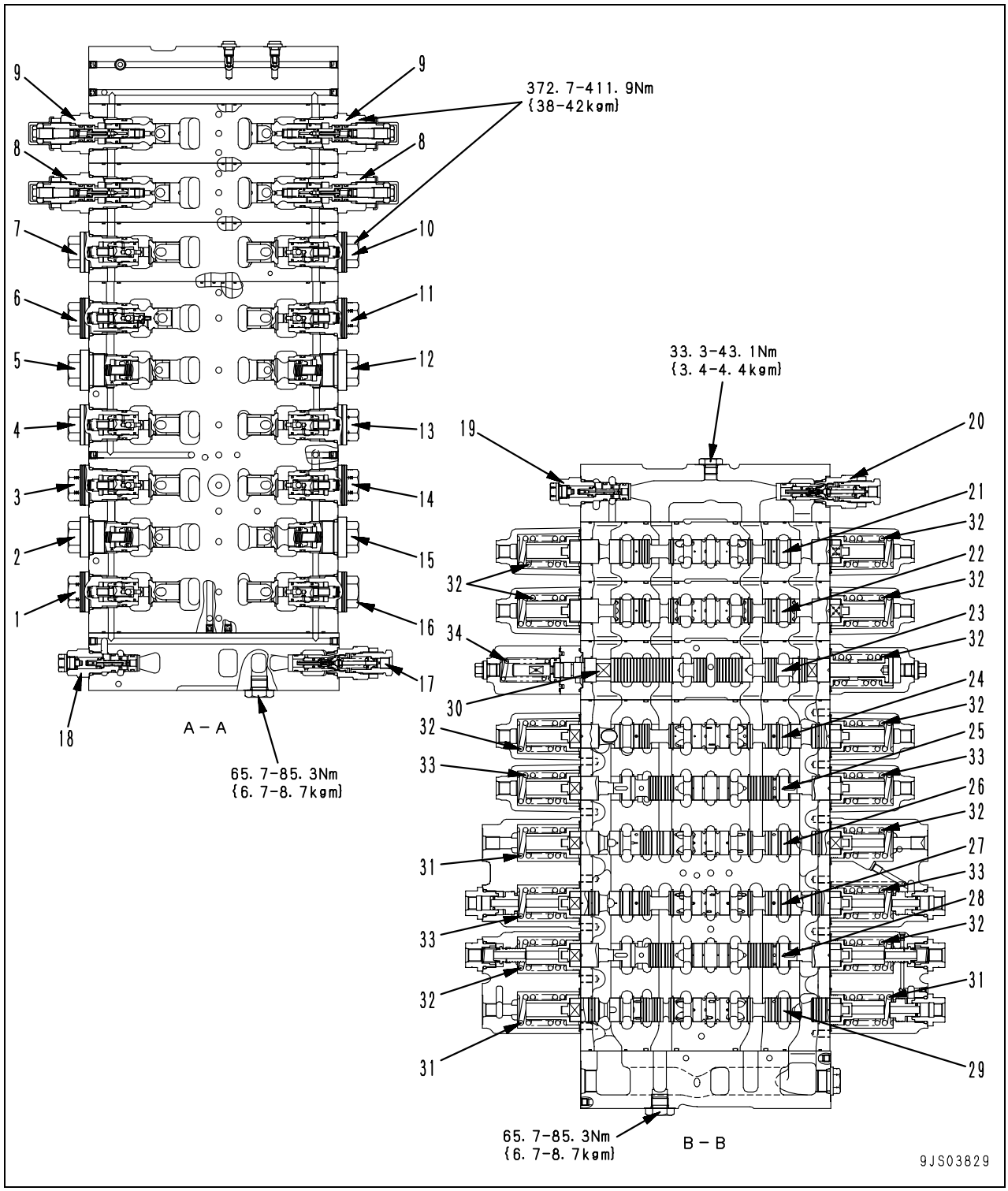
A1: To bucket cylinder bottom
A2: To L.H. travel motor
A3: To boom cylinder bottom
A4: To swing motor
A5: To R.H. travel motor
A6: To arm cylinder head
A-1: To boom cylinder bottom
A-2: To Attachment 1
A-3: To Attachment 2
B1: To bucket cylinder head
B2: To L.H. travel motor
B3: To boom cylinder head
B4: To swing motor
B5: To R.H. travel motor
B6: To arm cylinder bottom
B-1: To arm cylinder bottom
B-2: To Attachment 1
B-3: To Attachment 2
BP1: Boom raising PPC output pressure
BP5: From 2-stage safety valve solenoid valve
BP6: From attachment select solenoid valve
P1: From bucket PPC and EPC valves
P2: From bucket PPC and EPC valves
P3: From L.H. Travel PPC valve
P4: From L.H. Travel PPC valve
P5: From boom PPC and EPC valves
P6: From boom PPC and EPC valves
P7: From swing PPC and EPC valves
P8: From swing PPC and EPC valves
P9: From R.H. Travel PPC valve
P10: From R.H. Travel PPC valve
P11: From arm PPC and EPC valves
P12: From arm PPC and EPC valves
P-3: From Service 1 and PPC valves
P-4: From Service 1 and PPC valves
P-5: From Service 2 and PPC valves
P-6: From Service 2 and PPC valves
PLS1: To front pump control
PLS2: To rear pump control
PP1: From front pump
PP2: From rear pump
PP1S: Pressure sensor mounting port
PP2S: Pressure sensor mounting port
PPS1: To front pump control
PPS2: To rear pump control
PR: To solenoid valve, PPC valve, and EPC valve
PS: From merge-divide solenoid valve
PST: From travel junction valve solenoid valve
PX1: From 2-stage relief solenoid valve
PX2: From 2-stage relief solenoid valve
T: To tank
T1: To tank
TS: To tank
TSW: To swing motor S-port (suction side)

1. 6-spool valve
2. Cover A
3. Cover B
4. Boom Hi and arm Hi valve
5. Service valve 1
6. Service valve 2
7. Merge-divider valve
8. Boom drift prevention valve
9. Quick return valve
10. Boom Hi valve check valve

General view



Sectional view
(1/5)

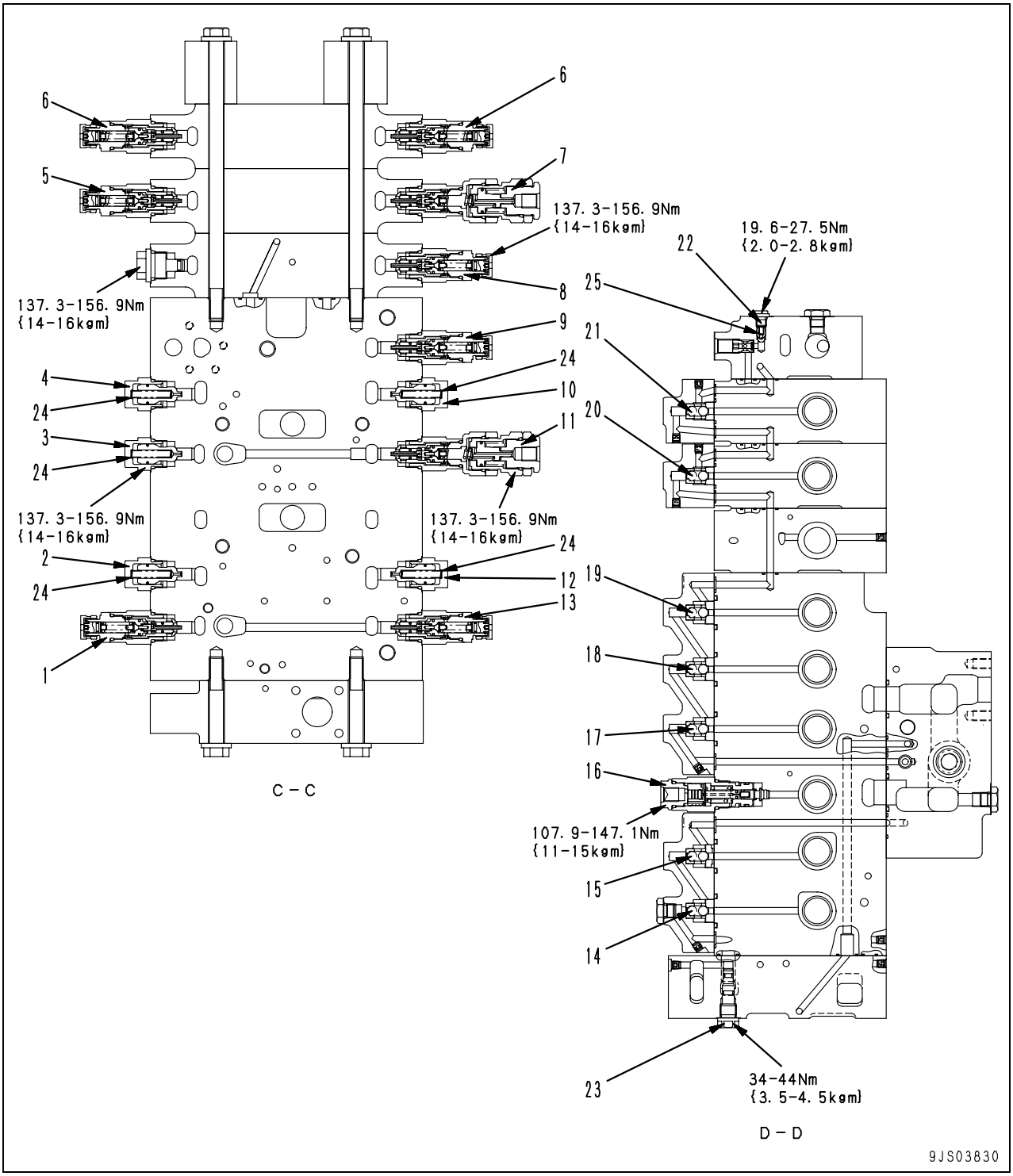


1. Pressure compensation valve (Arm out)
2. Pressure compensation valve (R.H. travel reverse)
3. Pressure compensation valve (Left swing)
4. Pressure compensation valve (Boom raise)
5. Pressure compensation valve (L.H. travel reverse)
6. Pressure compensation valve (Bucket dump)
7. Pressure compensation valve (Boom Hi raise)
8. Variable pressure compensation valve (Service 1)
9. Variable pressure compensation valve (Service 2)
10. Pressure compensation valve (Arm Hi in)
11. Pressure compensation valve (Bucket curl)
12. Pressure compensation valve (L.H. travel forward)
13. Pressure compensation valve (Boom lower)
14. Pressure compensation valve (Right swing)
15. Pressure compensation valve (R.H. travel forward)
16. Pressure compensation valve (Arm in)
17. Main relief valve
18. Unload valve
19. Unload valve
20. Main relief valve
21. Spool (Service 2)
22. Spool (Service 1)
23. Spool (Boom Hi)
24. Spool (Bucket)
25. Spool (L.H. travel)
26. Spool (Boom)
27. Spool (Swing)
28. Spool (R.H. travel)
29. Spool (Arm)
30. Spool (Arm Hi)

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
31	Spool return spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		54.2 x 34.8	51.2	417 N {42.5 kg}	—	333 N {34.0 kg}	
32	Spool return spring	54.5 x 34.8	51.2	393 N {40.1 kg}	—	315 N {32.1 kg}	
33	Spool return spring	54.6 x 34.8	51.2	421 N {42.9 kg}	—	336 N {34.3 kg}	
34	Spool return spring	54.9 x 24.2	52.0	251 N {25.6 kg}	—	201 N {20.5 kg}	

(2/5)

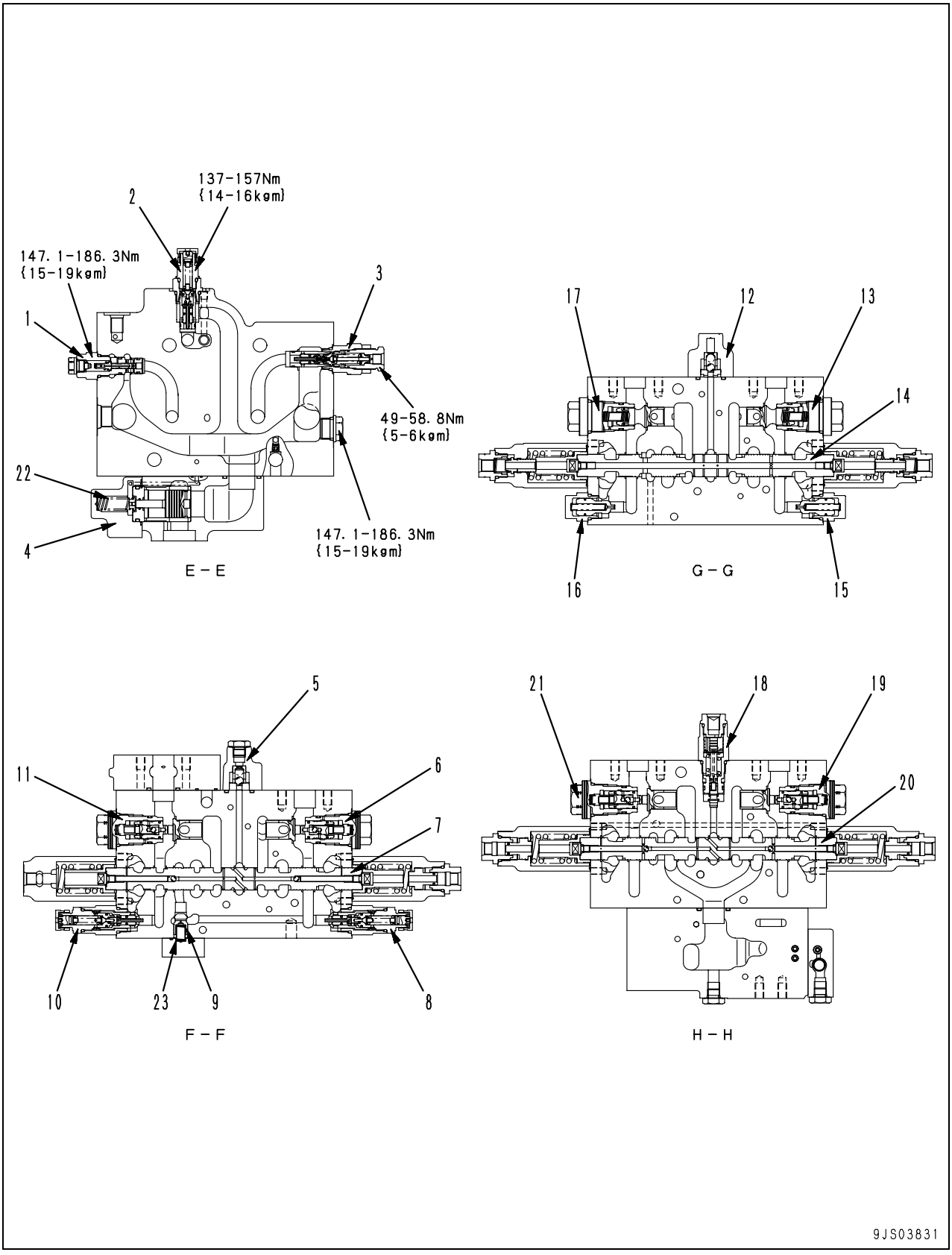

6
6
7
5
137. 3-156. 9Nm
{14-16kgm}
19. 6-27. 5Nm
{2. 0-2. 8kgm}
22
8
25
137. 3-156. 9Nm
{14-16kgm}
9
21
24
4
10
24
20
11
3
24
137. 3-156. 9Nm
{14-16kgm}
137. 3-156. 9Nm
{14-16kgm}
24
2
12
19
24
13
18
1
17
16
C - C
107. 9-147. 1Nm
{11-15kgm}
15
14
23
34-44Nm
{3. 5-4. 5kgm}
D - D
9JS03830

1. Safety-suction valve (Arm out)
2. Suction valve (R.H. travel reverse)
3. Suction valve (Boom raise)
4. Suction valve (L.H. travel reverse)
5. Safety-suction valve (Service 1)
6. Safety-suction valve (Service 2)
7. 2-stage safety-suction valve (Service 1)
8. Safety-suction valve (Arm Hi in)
9. Safety-suction valve (Bucket curl)
10. Suction valve (L.H. travel forward)
11. 2-stage safety-suction valve (Boom lower)
12. Suction valve (R.H. travel forward)
13. Safety-suction valve (Arm in)
14. LS shuttle valve (Arm)
15. LS shuttle valve (R.H. travel)
16. LS select valve
17. LS shuttle valve (Boom)
18. LS shuttle valve (L.H. travel)
19. LS shuttle valve (Bucket)
20. LS shuttle valve (Service 1)
21. LS shuttle valve (Service 2)
22. LS check valve
23. Pressure relief plug

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
24	Suction valve spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		46.8 x 7.5	40.6	5.5 N {0.56 kg}	—	4.4 N {0.45 kg}	
25	Check valve spring	11.5 x 4.6	8.5	1.5 N {0.15 kg}	—	1.2 N {0.12 kg}	

(3/5)


137-157Nm
{14-16kgm}
2
147. 1-186. 3Nm
{15-19kgm}
3
1
49-58. 8Nm
{5-6kgm}
22
4
147. 1-186. 3Nm
{15-19kgm}
E - E
17
12
13
14
16
15
G - G
5
11
6
7
10
23
9
8
F - F
21
18
19
20
H - H
9JS03831

1. Unload valve
2. Safety valve (Boom raise)
3. Main relief valve
4. Lift check valve

Arm valve

5. LS shuttle valve
6. Pressure compensation valve (IN)
7. Spool
8. Safety-suction valve (IN)
9. Regeneration circuit check valve
10. Safety-suction valve (OUT)
11. Pressure compensation valve (OUT)

R.H. travel valve

12. LS shuttle valve
13. Pressure compensation valve (Forward)
14. Spool
15. Suction valve (Forward)
16. Suction valve (Reverse)
17. Pressure compensation valve (Reverse)

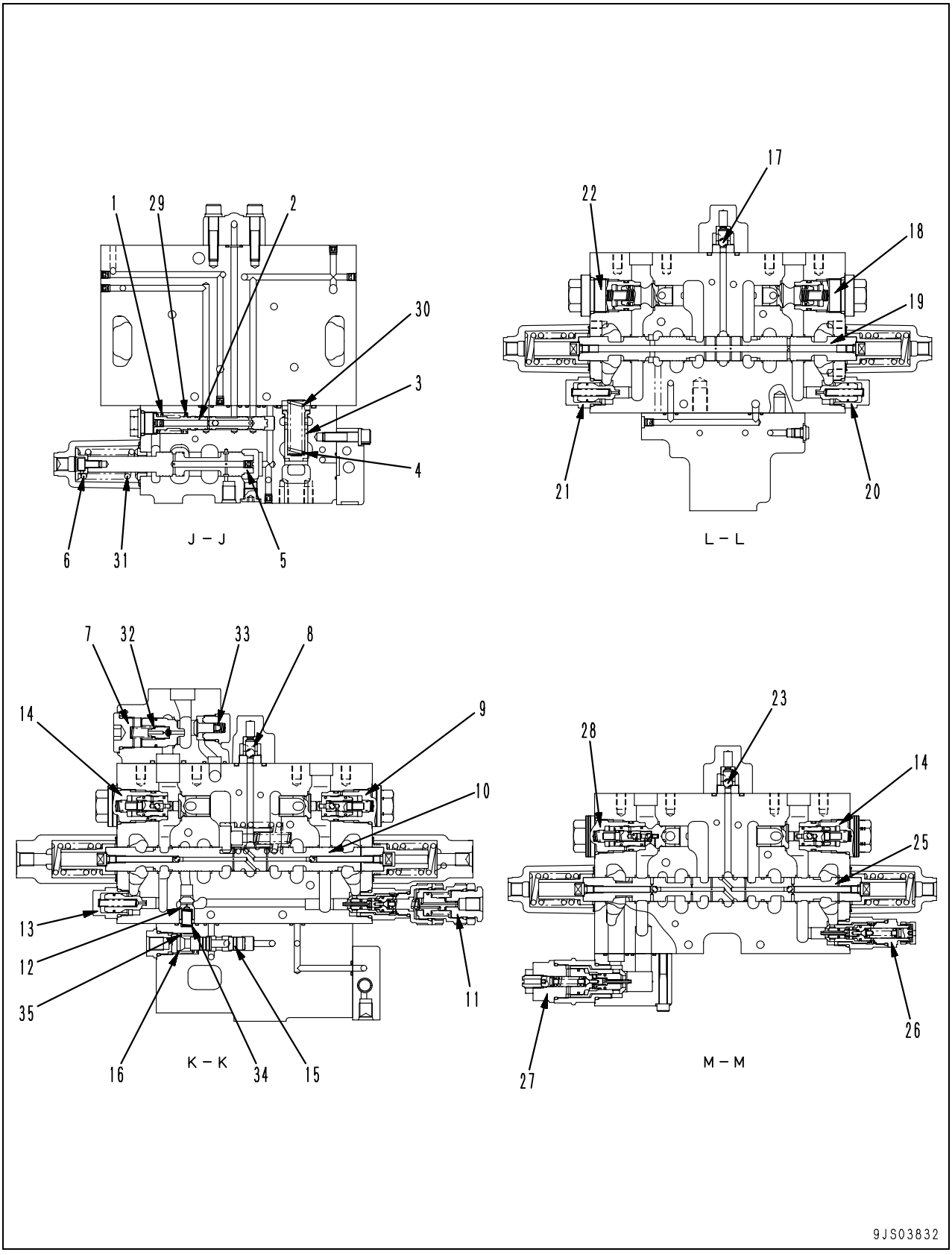
Swing valve

18. LS select valve
19. Pressure compensation valve (R.H.)
20. Spool
21. Pressure compensation valve (L.H.)

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
22	Spool return spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		50.0 x 14.4	42.0	19.6 N {2.0 kg}	—	15.7 N {1.6 kg}	
23	Check valve spring	31.5 x 10.3	19.5	5.9 N {0.6 kg}	—	4.71 N {0.48 kg}	

(4/5)


1
29
2
30
3
4
6
31
5
J – J
17
22
18
19
21
20
L – L
7
32
33
8
14
9
10
13
12
35
16
34
15
11
K – K
23
28
14
25
26
27
M – M
9JS03832

1. Return spring
2. Merge-divide valve (for LS)
3. Valve (Sequence valve)
4. Spring (Sequence valve)
5. Merge-divide valve (Main)
6. Return spring

Boom valve

7. Drift prevention valve
8. LS shuttle valve
9. Pressure compensation valve (Lower)
10. Spool
11. 2-stage safety-suction valve (Lower)
12. Regeneration circuit check valve
13. Suction valve (Raise)
14. Pressure compensation valve (Raise)

L.H. travel valve

15. Merge-divider valve (travel junction valve)
16. Return spring
17. LS shuttle valve
18. Pressure compensation valve (Forward)
19. Spool
20. Suction valve (Forward)
21. Suction valve (Reverse)
22. Pressure compensation valve (Reverse)

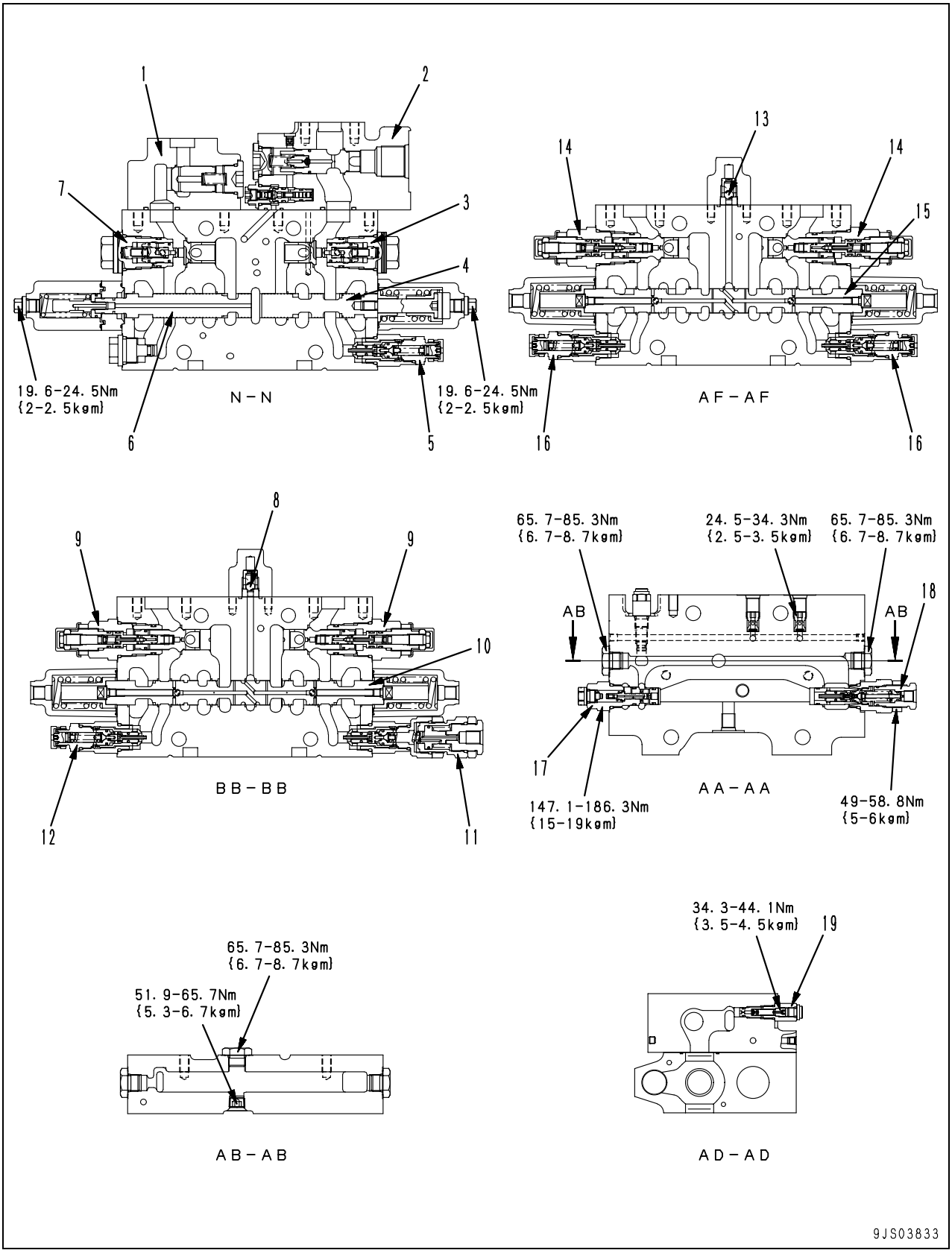
Bucket valve

23. LS shuttle valve
24. Pressure compensation valve (Curl)
25. Spool
26. Safety-suction valve (Curl)
27. Safety-suction valve (Dump)
28. Pressure compensation valve (Dump)

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
29	Spool return spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		46.6 x 21.8	33.0	157 N {16.0 kg}	—	126 N {12.8 kg}	
30	Check valve spring	70.9 x 18.0	56.0	250 N {25.5 kg}	—	200 N {20.4 kg}	
31	Spool return spring	64.5 x 32.3	63.0	178 N {18.1 kg}	—	142 N {14.5 kg}	
32	Check valve spring	33.0 x 12.0	26.0	35.3 N {3.6 kg}	—	28.2 N {2.88 kg}	
33	Check valve spring	16.4 x 8.9	11.5	13.7 N {1.4 kg}	—	11.0 N {1.12 kg}	
34	Check valve spring	31.5 x 10.3	19.5	5.9 N {0.6 kg}	—	4.71 N {0.48 kg}	
35	Piston return spring	30.7 x 20.5	23.0	50.0 N {5.1 kg}	—	40.0 N {4.08 kg}	

(5/5)


1
2
7
3
4
19. 6-24. 5Nm
{2-2. 5kgm}
N－N
19. 6-24. 5Nm
{2-2. 5kgm}
6
5
13
14
14
15
AF－AF
16
16
8
9
9
10
BB－BB
12
11
65. 7-85. 3Nm
{6. 7-8. 7kgm}
24. 5-34. 3Nm
{2. 5-3. 5kgm}
65. 7-85. 3Nm
{6. 7-8. 7kgm}
AB
AB
18
17
AA－AA
147. 1-186. 3Nm
{15-19kgm}
49-58. 8Nm
{5-6kgm}
65. 7-85. 3Nm
{6. 7-8. 7kgm}
51. 9-65. 7Nm
{5. 3-6. 7kgm}
AB－AB
34. 3-44. 1Nm
{3. 5-4. 5kgm}
19
AD－AD
9JS03833

Boom Hi and arm Hi valve

1. Boom Hi check valve
2. Quick return valve
3. Pressure compensation valve (Arm Hi in)
4. Arm Hi spool
5. Safety-suction valve (Arm Hi in)
6. Boom Hi spool
7. Pressure compensation valve (Boom Hi raise)

Service valve 1

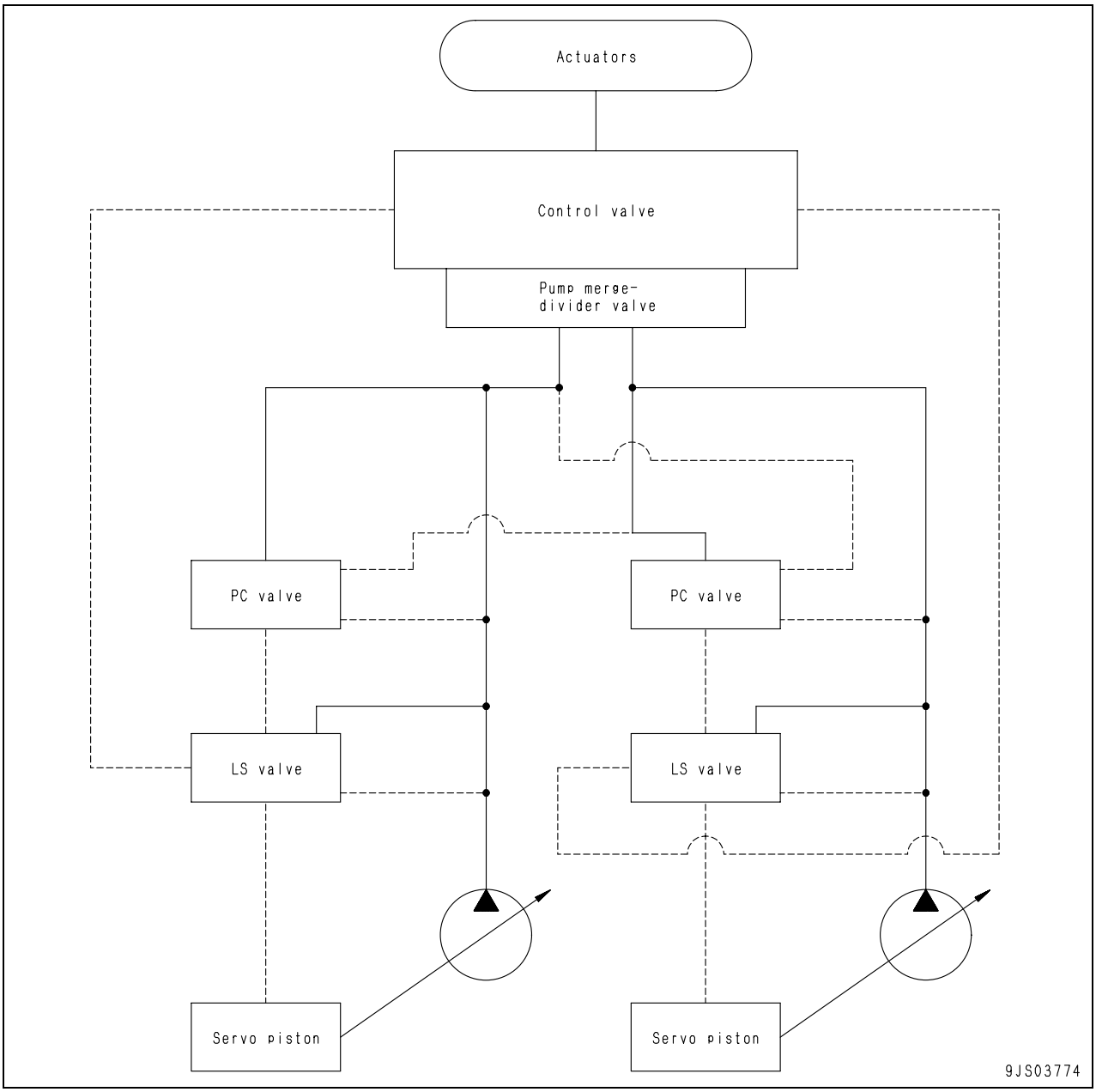
8. LS shuttle valve
9. Pressure compensation valve
10. Spool
11. 2-stage safety-suction valve
12. Safety-suction valve

Service valve 2

13. LS shuttle valve
14. Pressure compensation valve
15. Spool
16. Safety-suction valve
17. Unload valve
18. Main relief valve
19. LS bypass plug

CLSS

Outline of CLSS



Features

CLSS stands for Closed center Load sensing System, which has the following characteristics:

- Fine control not influenced by load
- Controllability enabling digging even with fine control
- Ease of compound operation ensured by flow divider function using area of opening of spool during compound operations
- Energy saving using variable pump control

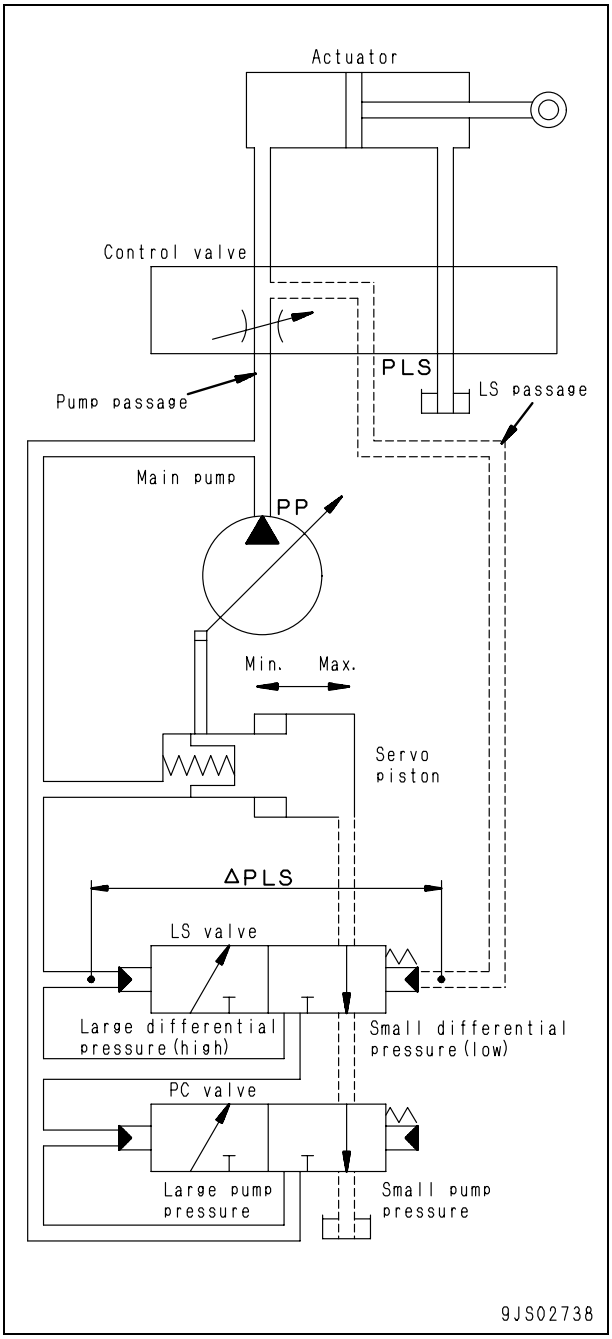
Configuration

- CLSS is configured with variable capacity piston pumps, control valves, and respective actuators.
- The hydraulic pump is configured with pump body, PC valve and LS valve.

Basic principle

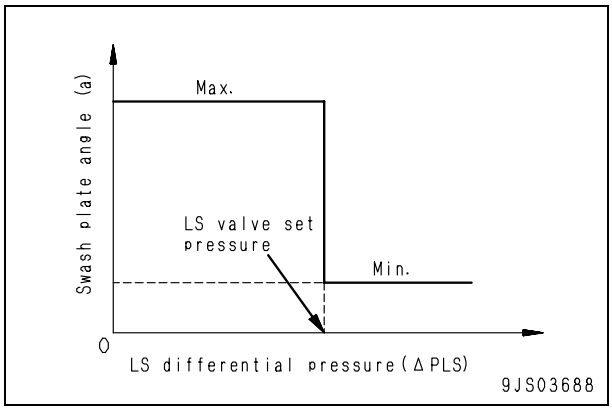
1. Pump swash plate angle control

- The pump swash plate angle (pump delivery) is controlled so that LS differential pressure (△PLS) (the difference between pump pressure PP and control valve outlet port LS pressure PLS) (load pressure of actuator) is constant.
- [LS differential pressure (△PLS) = Pump discharge pressure (PP) – S pressure (PLS)]



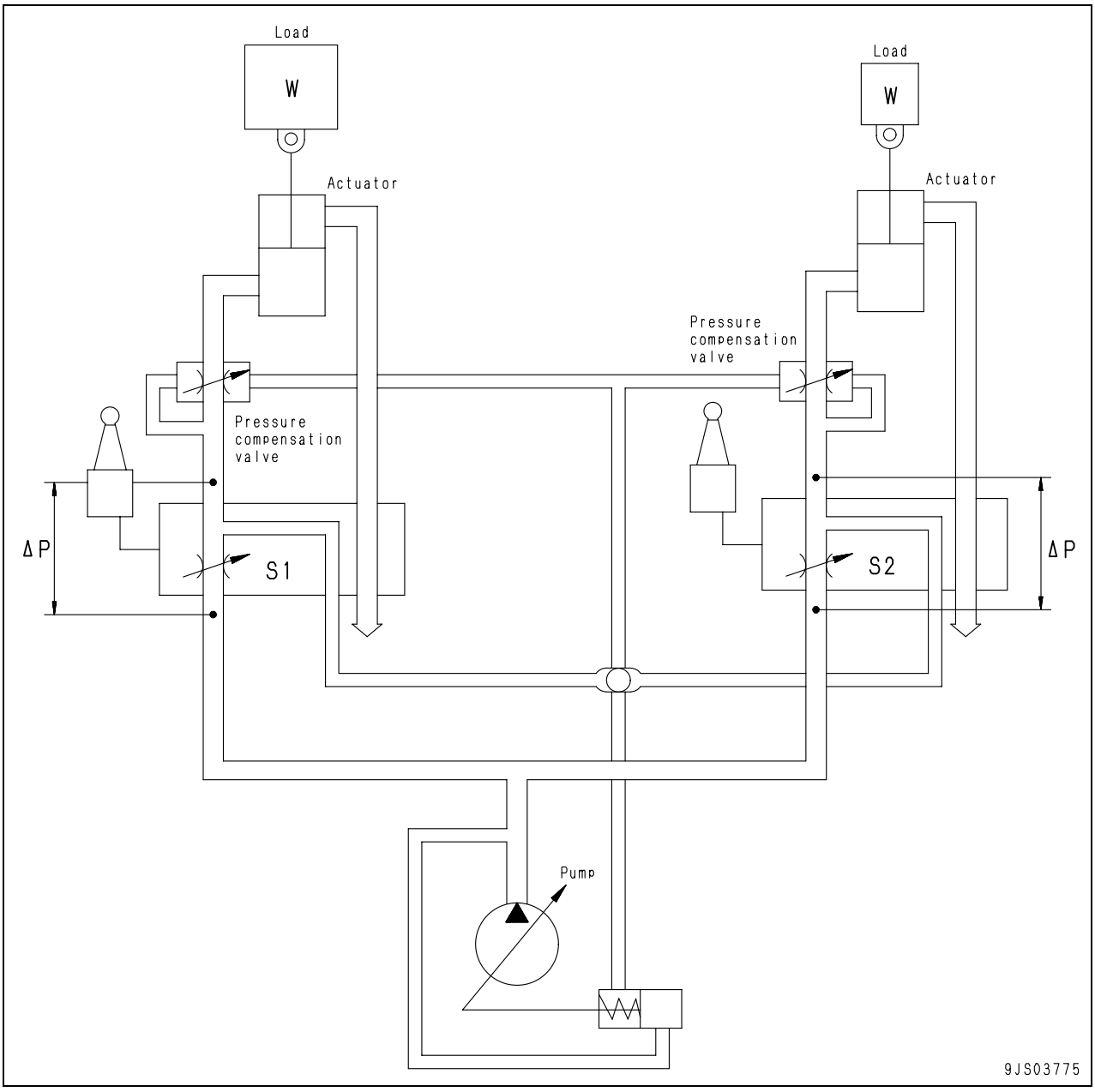
- The pump swash plate angle shifts toward the maximum position if LS differential pressure (△PLS) is lower than the set pressure of the LS valve (when the actuator load pressure is high).
- If it becomes higher than the set pressure (when the actuator load pressure is low), the pump swash plate angle shifts toward the minimum position.

LS differential pressure (△PLS) and pump swash plate angle



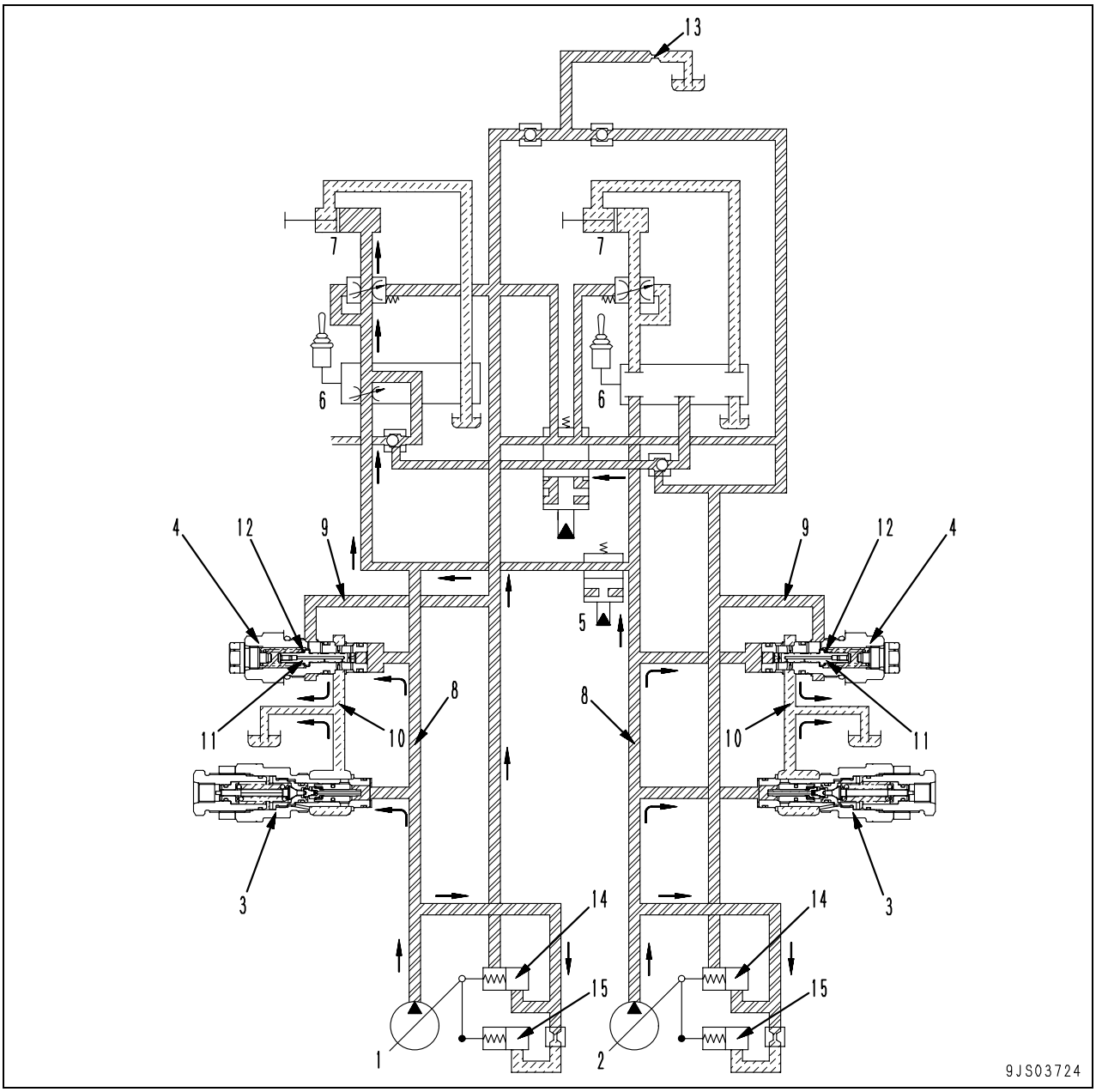
★ For details of functions, see the “Hydraulic pump“ paragraph.

2. Pressure compensation control



- A pressure compensation valve is installed to the outlet port side of the control valve to balance the load.
- When actuators are operated together, the pressure difference (△P) between the upstream (inlet port) and downstream (outlet port) of the spool of each valve becomes the same regardless the size of the load (pressure).
- The flow of oil from the pump is divided (compensated) in proportion to the area of opening (S1) and (S2) of each valve.

3. System diagram

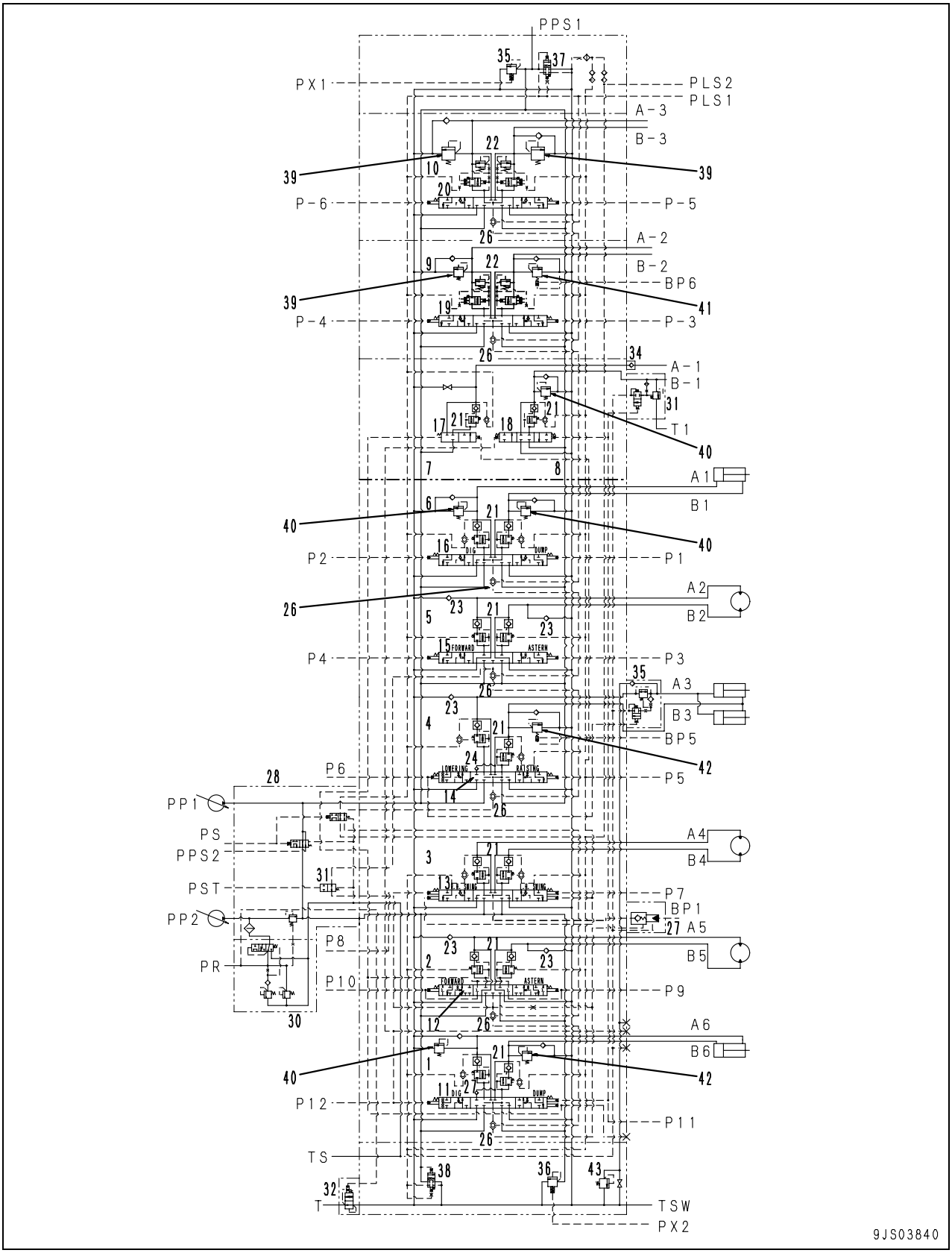


★ The illustration shows the actuator (6) in the merge mode with stroke end at the time of relief.

1. Front pump
2. Rear pump
3. Main relief valve
4. Unload valve
5. Merge-divider valve
6. Control valve
7. Actuator
8. Pump circuit
9. LS circuit
10. Tank circuit
11. Valve
12. Spring
13. LS bypass valve
14. LS valve
15. PC valve

Functions and operation by valve

Hydraulic circuit diagram and the name of valves



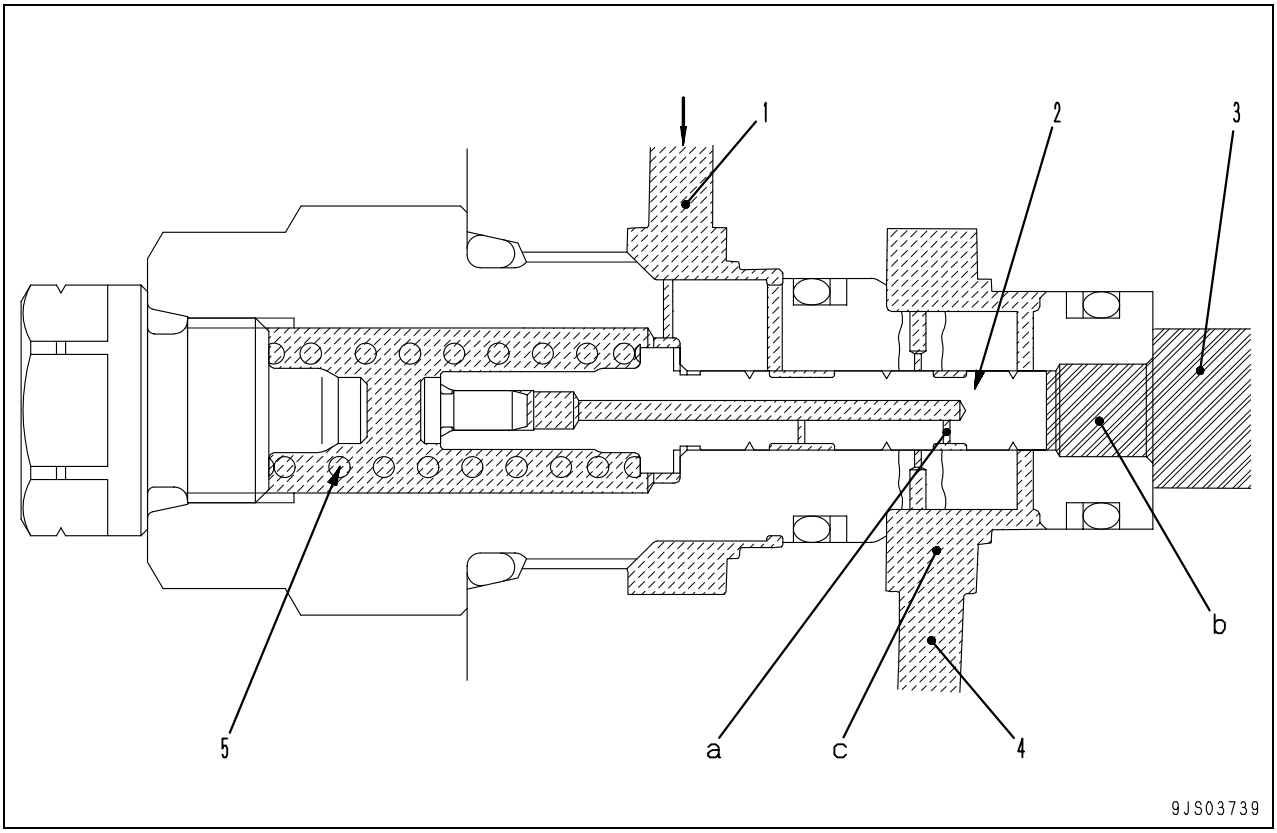
1. Arm valve
2. R.H. travel valve
3. Swing valve
4. Boom valve
5. L.H. travel valve
6. Bucket valve
7. Boom Hi valve
8. Arm Hi valve
9. Service valve 1
10. Service valve 2
11. Arm spool
12. R.H. travel spool
13. Swing spool
14. Boom spool
15. L.H. travel spool
16. Bucket spool
17. Boom Hi spool
18. Arm Hi spool
19. Service spool 1
20. Service spool 2
21. Pressure compensation valve
22. Variable pressure compensation valve
23. Suction valve
24. Check valve (for boom regeneration circuit)
25. Check valve (for arm regeneration circuit)
26. LS shuttle valve
27. LS select valve
28. Merge-divider valve
29. Arm quick return valve
30. Self pressure reducing valve
31. Travel junction valve
32. Back pressure valve
33. Boom drift prevention valve
34. Boom Hi check valve
35. Main relief valve (bucket side)
    Set pressure:
    36.1 ± 0.25 MPa {367.5 ± 2.5 kg/cm^2}
    (112 ℓ/min)

    When digging force increased:
    38.2 ± 0.25 MPa {389.5.5 ± 2.5 kg/cm^2}
    (110 ℓ/min)
36. Main relief valve (arm side)
    Set pressure:
    36.1 ± 0.25 MPa {367.5 ± 2.5 kg/cm^2}
    (112 ℓ/min)

    When digging force increased:
    38.2.1 ± 0.25 MPa {389.5.5 ± 2.5 kg/cm^2}
    (110 ℓ/min)
37. Unload valve (bucket side)
    Cracking pressure:
    3.1 ± 0.5 MPa {32 ± 5 kg/cm^2}
38. Unload valve (arm side)
    Cracking pressure:
    3.1 ± 0.5 MPa {32 ± 5 kg/cm^2}
39. Safety-suction valve
    Set pressure:
    17.2 ± 0.5 MPa {175 ± 5 kg/cm^2}
40. Safety-suction valve
    Set pressure:
    38.2 ± 0.5 MPa {390 ± 5 kg/cm^2}
41. 2-stage safety-suction valve
    Set pressure:
    1 stage: 21.1 ± 0.5 MPa {205 ± 5 kg/cm^2}
    2 stage: 17.2 ± 0.5 MPa {175 ± 5 kg/cm^2}
42. 2-stage safety-suction valve
    Set pressure:
    1 stage: 28.4 ± 0.5 MPa {290 ± 5 kg/cm^2}
    2 stage: 14.7 ± 0.5 MPa {150 ± 5 kg/cm^2}
43. Safety valve
    Set pressure:
    38.2 ± 0.5 MPa {390 ± 5 kg/cm^2}

Unload valve

1. When the unload valve is actuating



1. LS circuit
2. Valve
3. Pump circuit
4. Tank circuit
5. Spring

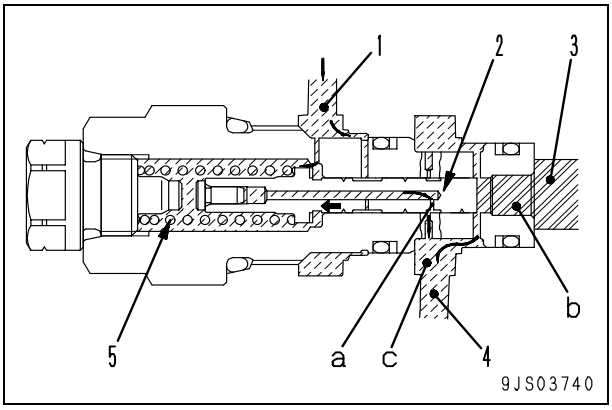
Function

- Drains an oil discharge for the portion of the minimum pump swash plate angle while all control valves are in the holding.
- The pump pressure will correspond to a set load of spring (5) inside the valve (this pressure will be P1).
- Since LS pressure is drained from the LS bypass valve, LS pressure ≒ tank pressure ≒ 0 MPa{0 kg/cm$_2$}.

Operation

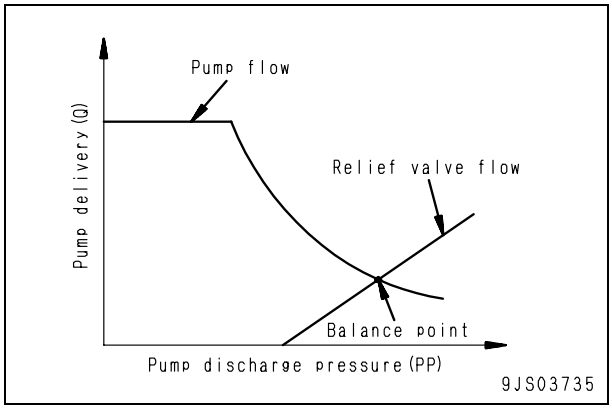
- Pressure of pump circuit (3) is received by the end of valve (2).
- Since the control valve is in neutral position, pressure of LS circuit (1) is 0 MPa{0 kg/cm$_2$}.
- Pressurized oil of pump circuit (3) stops at valve (2), and the pressure rises as no relief is available.
- When this pressure becomes larger than the force of spring (5), valve (2) moves to the left.
- Ports (b) and (c) are interconnected and the pump pressure flows to tank circuit (4).
- The pressurized oil of LS circuit (1) passes from orifice (a) via port (c) and is drained to the tank circuit (4).
- When actuated, LS pressure ≒ tank pressure.
- Since the pump discharge pressure - LS circuit pressure during unloading is larger than the pump LS control pressure, the signal is output to minimize the pump swash plate angle.

- During operation (a work within a scope of discharge by a minimum swash plate angle), the discharge pressure for the portion of minimum pump swash plate angle is set to LS pressure + P1 pressure.
- LS control differential pressure (△PLS) of discharge for the portion of minimum swash plate angle will be equal to P1 pressure.

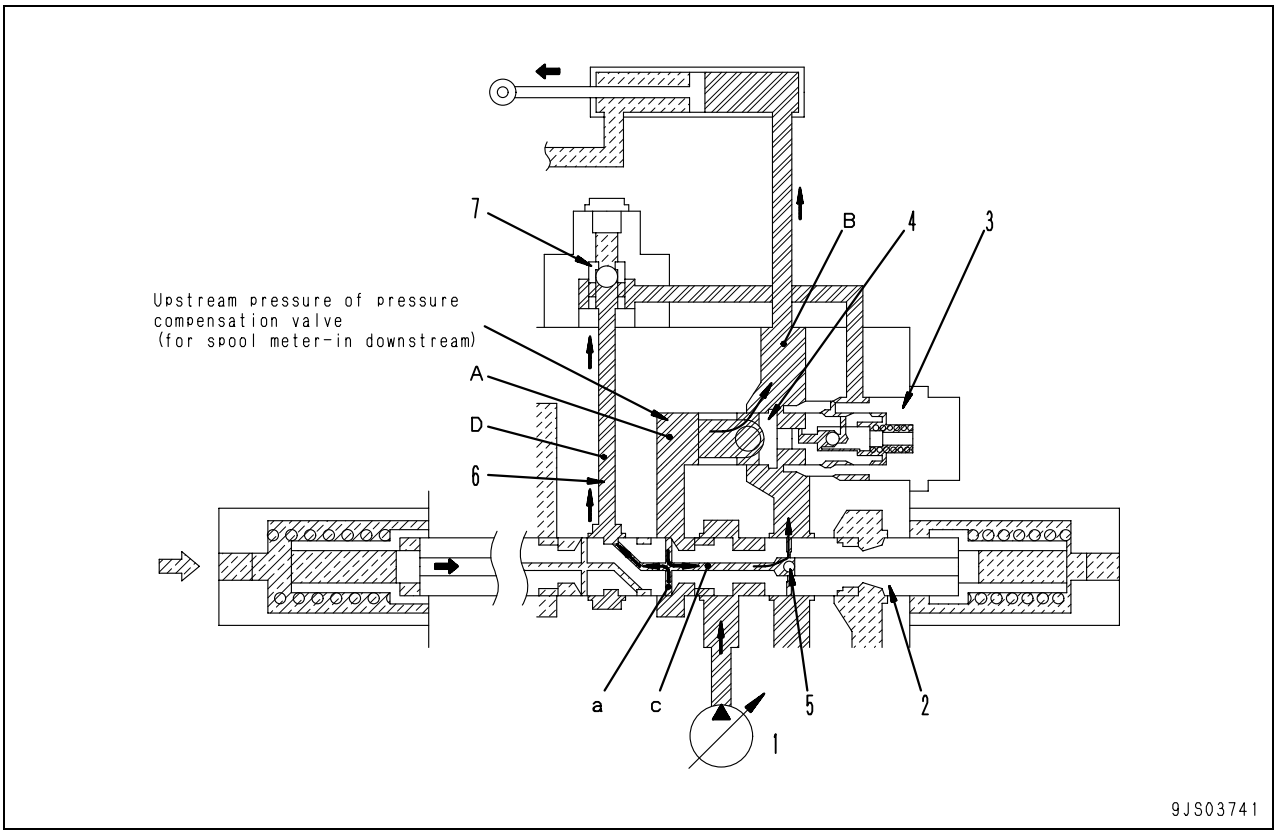


2. Operation of relief valve

- When the cylinder reaches the stroke end, the main relief valve opens.
- The pump delivery (Q) is relieved to the tank.(See the system diagram)
- The pump discharge pressure (PP) and LS pressure (PLS) become approximately the same as each has not flow at the upstream and downstream of the spool, and LS differential pressure (△PLS) becomes 0 kg/cm2.
- As LS differential pressure (△PLS) is lower than the LS set pressure of LS valve, LS valve is actuated to maximize the pump swash plate angle.
- Mechanically, operation of PC valve have the prevalence to that of LS valve.
- The pump is held at a minimum swash plate angle by the cut-off function of PC valve.



Introduction of LS pressure



1. Hydraulic pump
2. Main spool
3. Pressure compensation valve
4. Valve
5. Check valve
6. LS circuit
7. LS shuttle valve

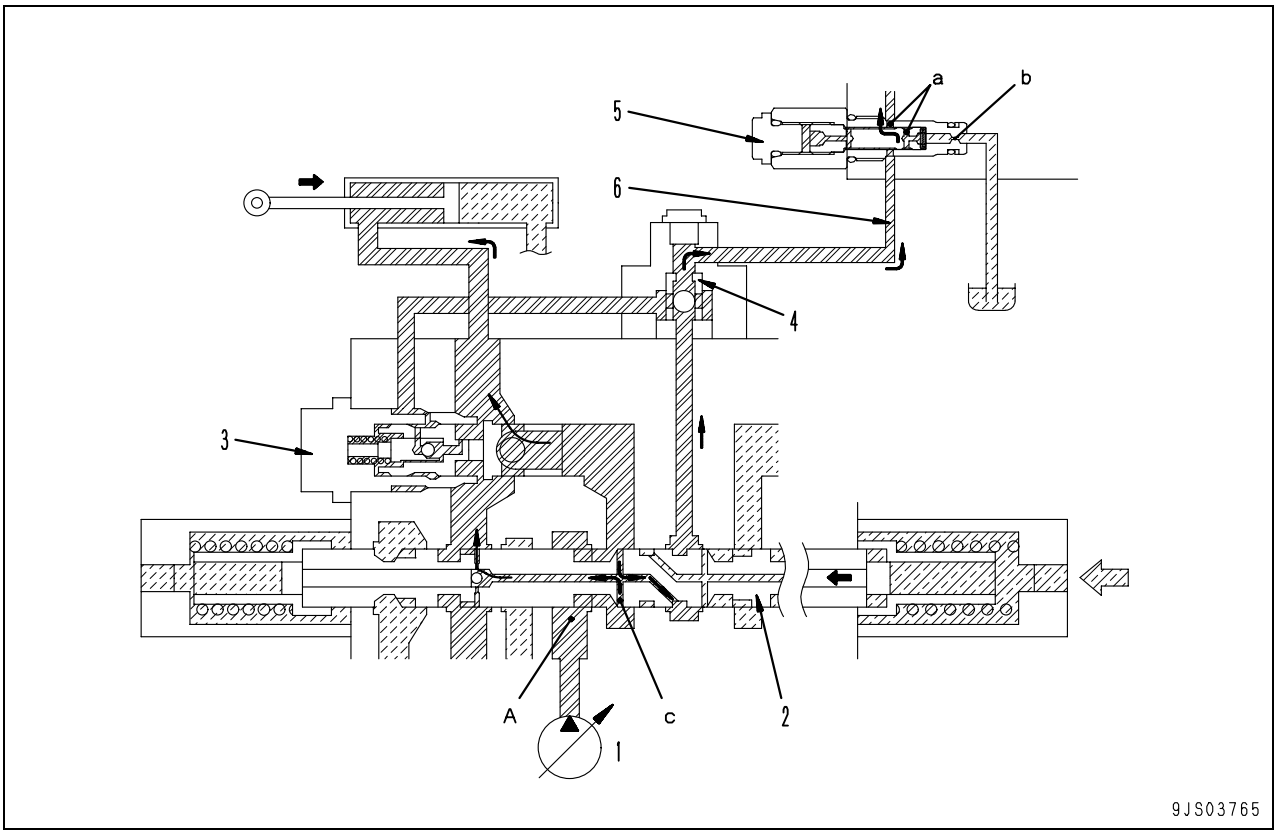
Function

- Introduces the upstream pressure (downstream pressure of the spool meter-in) of pressure compensation valve (3) and leads to LS shuttle valve (7) as the LS pressure.
- Connected to actuator port (B) via valve (4), and makes LS pressure ≒ actuator load pressure.
- Inlet pore (a) inside main spool (2) has a small diameter concurrently serving as a throttle.

Operation

- When main spool (2) is operated, the pump pressure enters port (c) via inlet pore (a) and is led to the LS circuit.
- When the pump pressures rises to reach the load pressure of port (B), check valve (5) opens.

LS bypass valve



1. Hydraulic pump
2. Main spool
3. Pressure compensation valve
4. LS shuttle valve
5. LS bypass valve
6. LS circuit

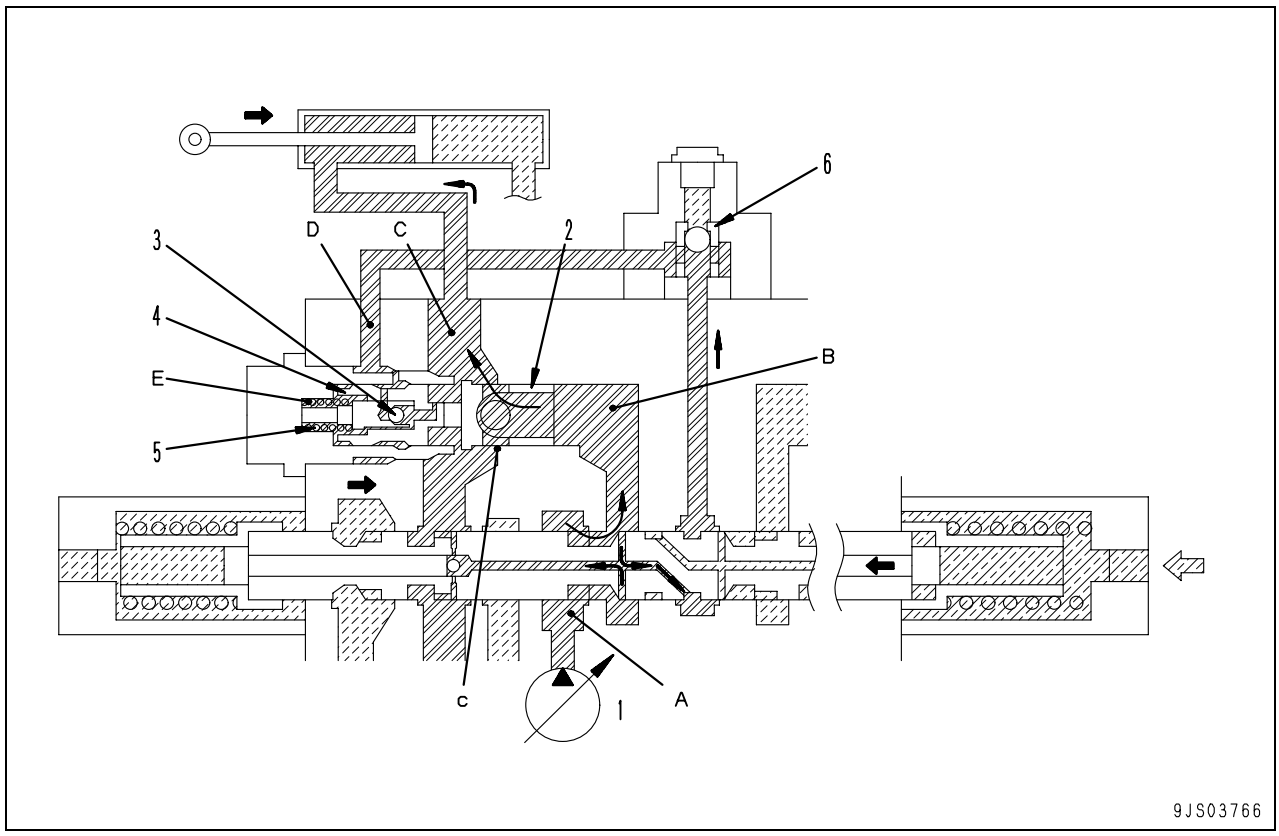
Function

- Releases the residual pressure in LS pressure circuit (6) from orifices (a) and (b).
- Slows down the rising rate of LS pressure to prevent a sudden change of hydraulic pressure.
- Bypass flow from LS bypass valve (5) causes a pressure loss to be generated due to the circuit resistance between throttle (c) of main spool (2) and LS shuttle valve (4).
- Effective LS differential pressure drops to improve a dynamic stability of the actuator.

Pressure compensation valve

1. During independent operation and under maximum load pressure

(If the load pressure is higher than other work equipment during a combined operation)



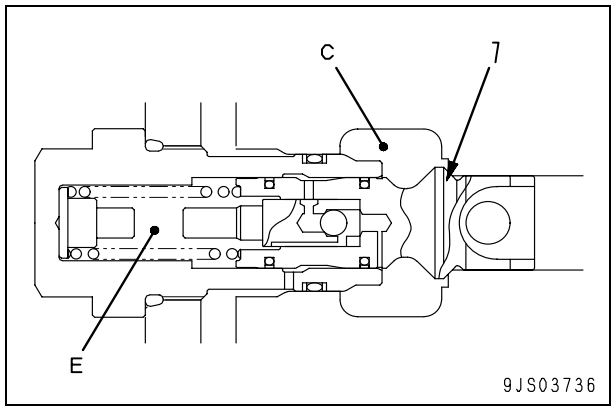
1. Hydraulic pump
2. Valve
3. Shuttle valve
4. Piston
5. Spring
6. LS shuttle valve

Function

- Pressure compensation valve works as the load check valve.
- If the pump pressure (LS pressure) is lower than the load at port (c), shuttle valve (3) in pressure compensation valve piston (4) interconnects spring chamber (E) and port (C).
- The force of spring (5) operates piston (4) and valve (2) to the closing direction.

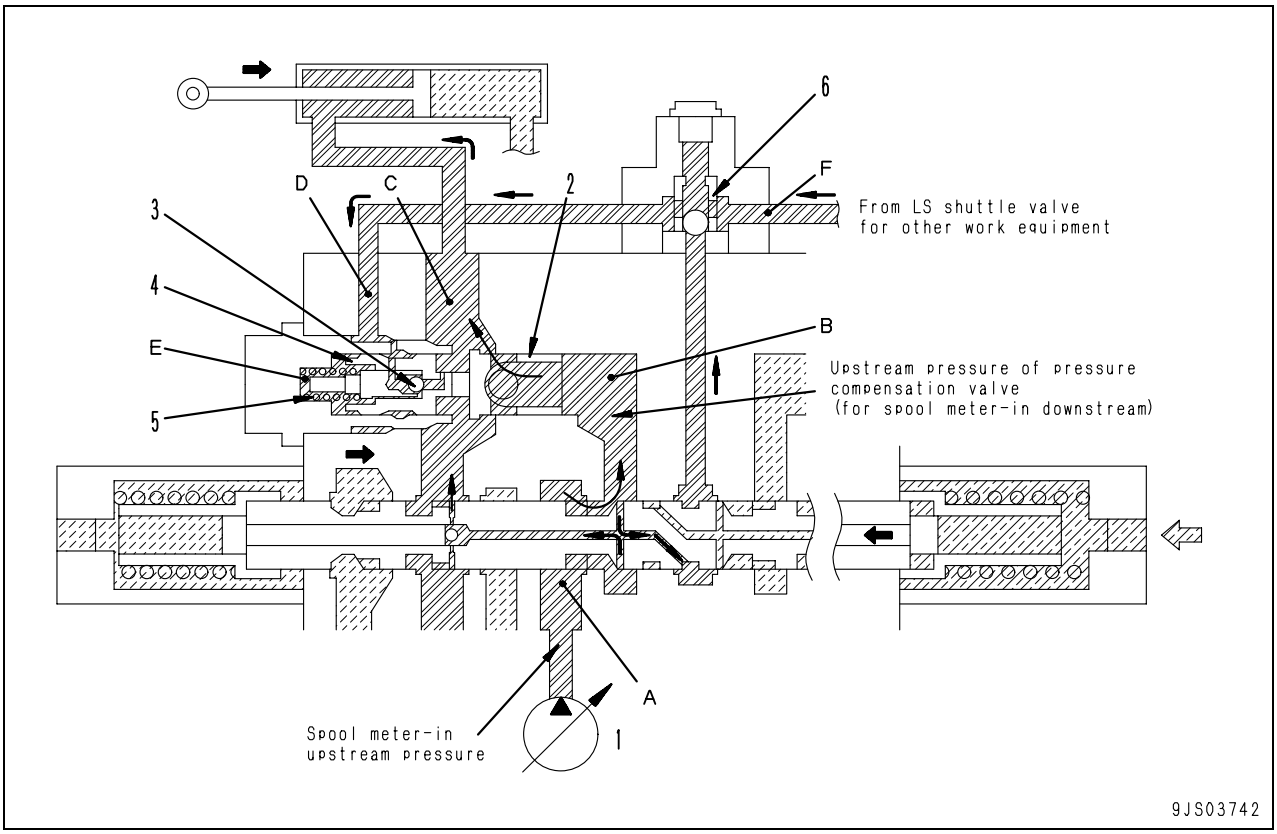
Integrated pressure compensation valve

- High stress may occur when valve (2) collides with valve chamber seat portion (C) if a high peak pressure is generated in the actuator circuit or repetitive peak pressure occurs continuously (example: when using the breaker).
- To prevent this, a pressure compensation valve with integrated valve (2) and piston (4) is used.
- With the present machine, this device is adopted for the bucket valve (cylinder bottom) and the service valve.
- As principle, port (C) and spring chamber (E) are not interconnected in an integrated pressure compensation valve.
- If high peak pressure is generated at port (C), valve (7) does not collide with the valve chamber.
- With a bucket valve, etc., port (C) and spring chamber (E) are designed to interconnect before valve (7) is seated.



2. When compensated

(If the load pressure is lower than other work equipment during a combined operation)



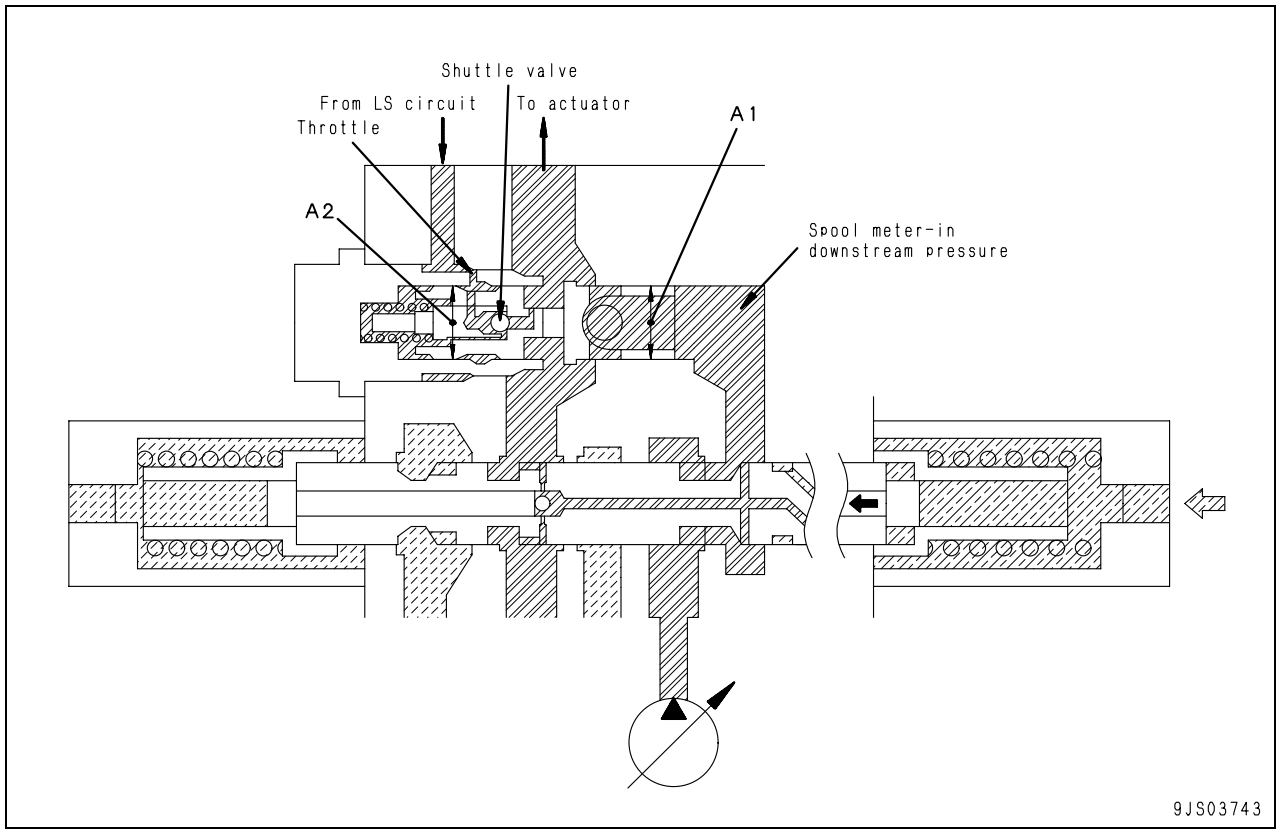
Function

- The pressure compensation valve closes under LS pressure of port (D), and the spool meter-in downstream pressure of port (B) becomes equivalent to the maximum pressure of other work equipment.
- Since the spool meter-in upstream pressure of port (A) is the pump pressure, the spool meter-in differential pressure [upstream pressure port (A) pressure] - downstream pressure [port (B) pressure] becomes equivalent to all the spools in operation.
- Pump flow is divided according to the ratio of the meter-in opening area.

Operation

- Spring chamber (E) is interconnected to port (D).
- Piston (4) and valve (2) operate in the closing direction (to the right) under the LS circuit pressure from other work equipment of port (F).
- Valve upstream pressure (= spool meter-in downstream pressure) of port (B) is controlled with LS pressure.

3. Pressure compensation valve area ratio

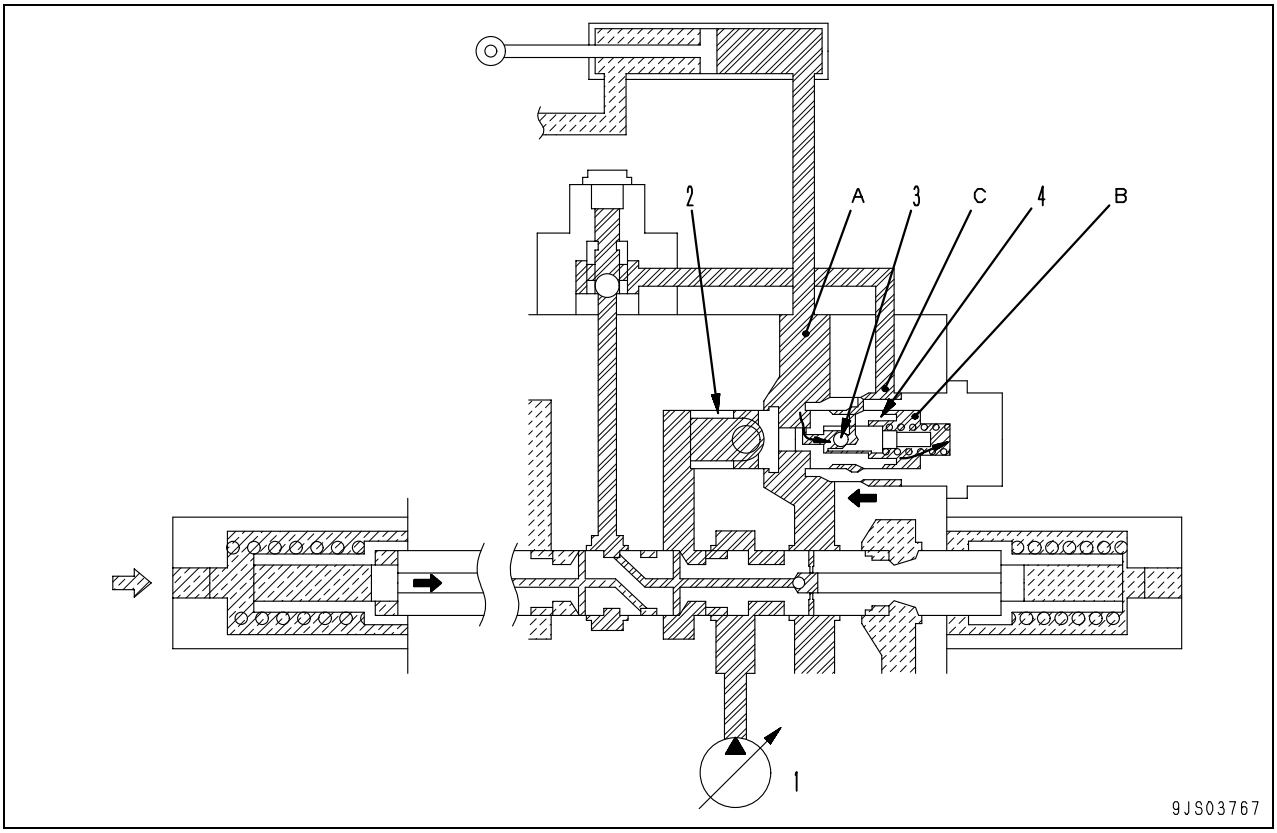


Function

- The state of division changes according to the area ratio of pressure compensation portion (A1) and (A2). Area ratio = (A2)/(A1)
- If area ratio = 1 : the spool meter-in downstream pressure will be equal to the maximum load pressure, and the pressure will be divided according to the opening area ratio.
- If area ratio = 1 or over : the spool meter-in downstream pressure will be greater than the maximum load pressure, and the pressure will be divided smaller than the opening area ratio.
- If area ratio = 1 or under : the spool meter-in downstream pressure will be smaller than the maximum load pressure, and the pressure will be divided greater than the opening area ratio.

Pressure compensation valve inner shuttle valve

1. If holding pressure at port (A) is larger than LS pressure in the springing chamber (B)

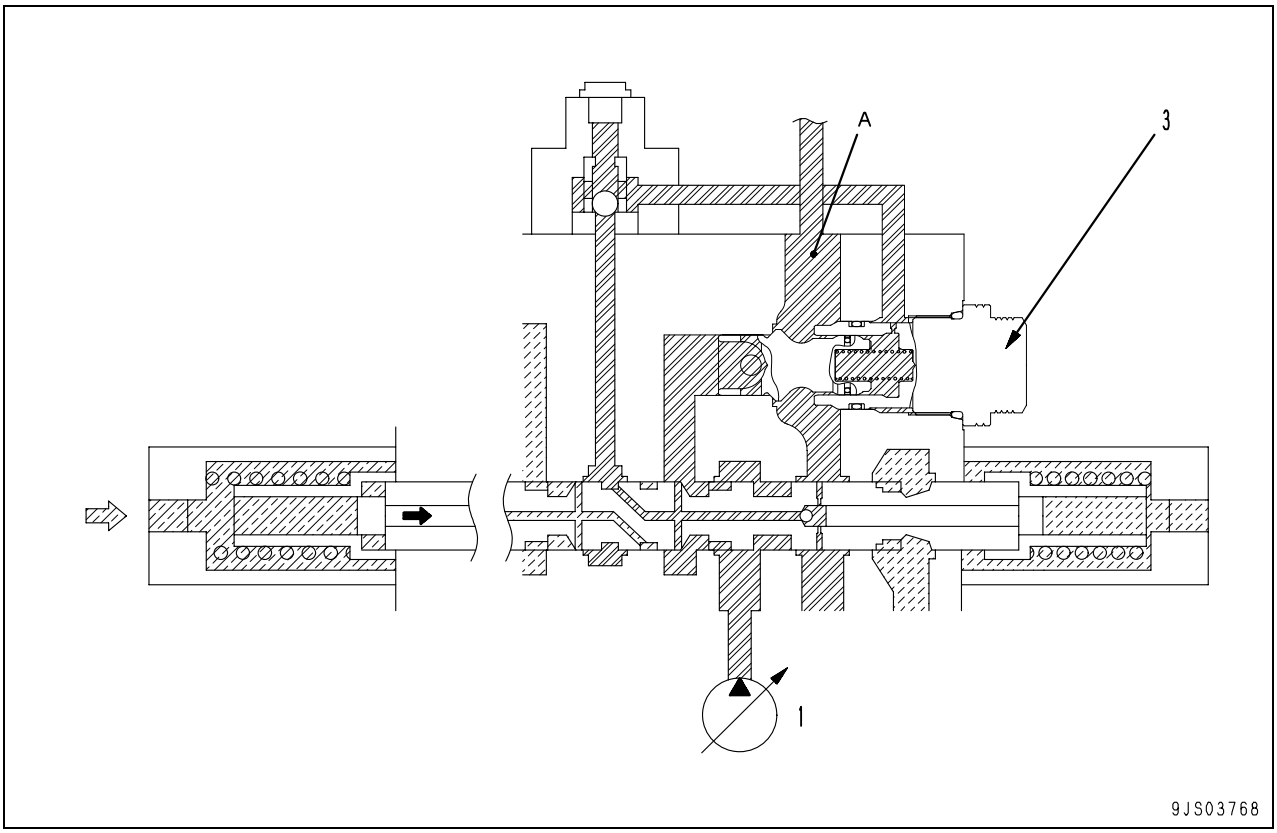


1. Hydraulic pump
2. Valve
3. Pressure compensation valve inner shuttle valve
4. Piston

Function

- Shuttle valve (3) is pushed to the right by port (A) pressure and cuts off interconnection between ports (A) and (C).
- Holding pressure at port (A) is led to the spring chamber (B) to push piston (4) to the left so that piston (4) and valve (2) will not be separated.

2. In the case of travel

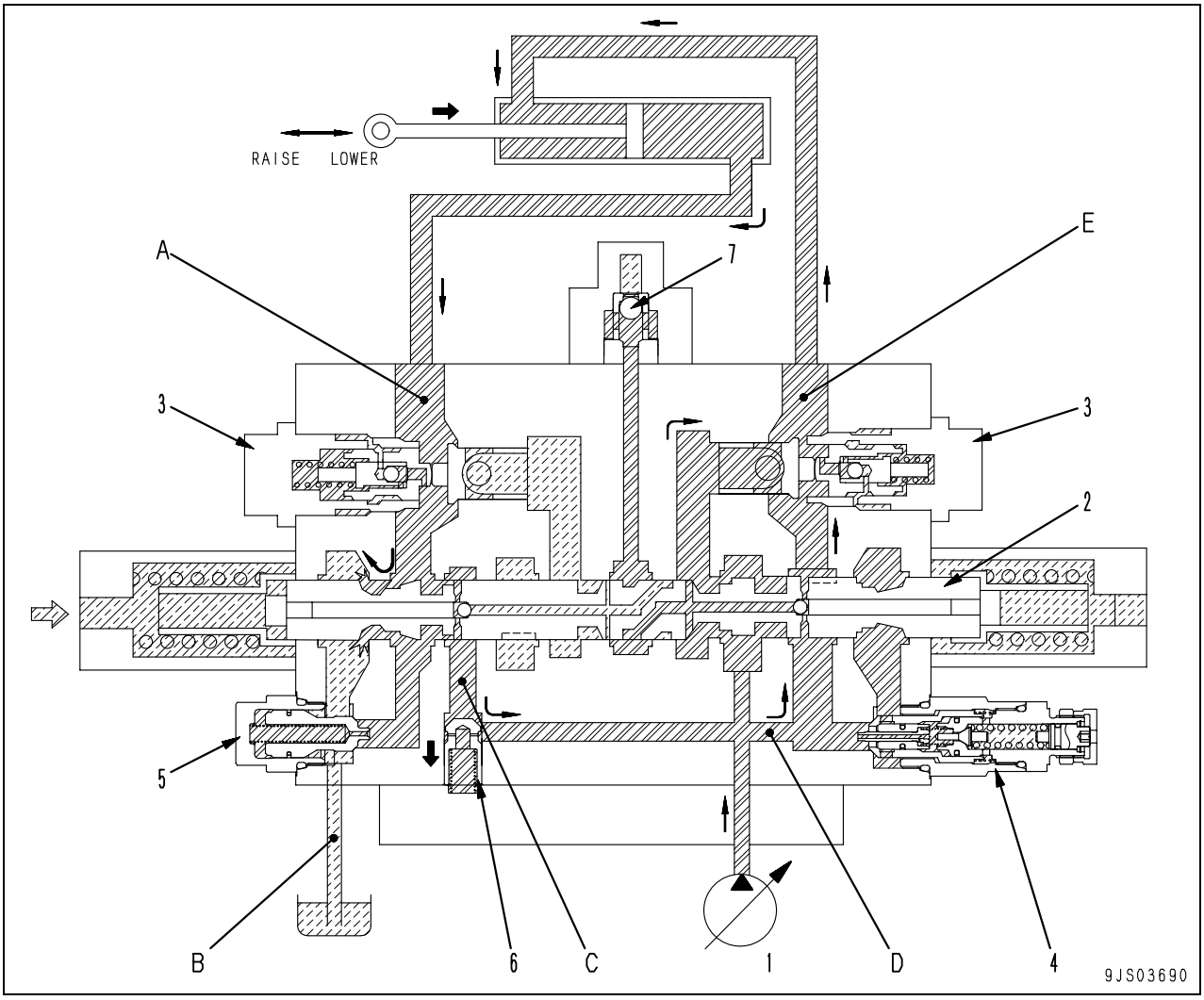


Outline

- Since no holding pressure is generated at port (A) of the travel circuit, a pressure compensation valve without shuttle valve (3) is adopted.

Boom regeneration circuit

1. If the cylinder head pressure is lower than the bottom pressure (free fall, etc.)



1. Hydraulic pump
2. Boom spool
3. Pressure compensation valve
4. Safety-suction valve
5. Suction valve
6. Check valve
7. LS shuttle valve

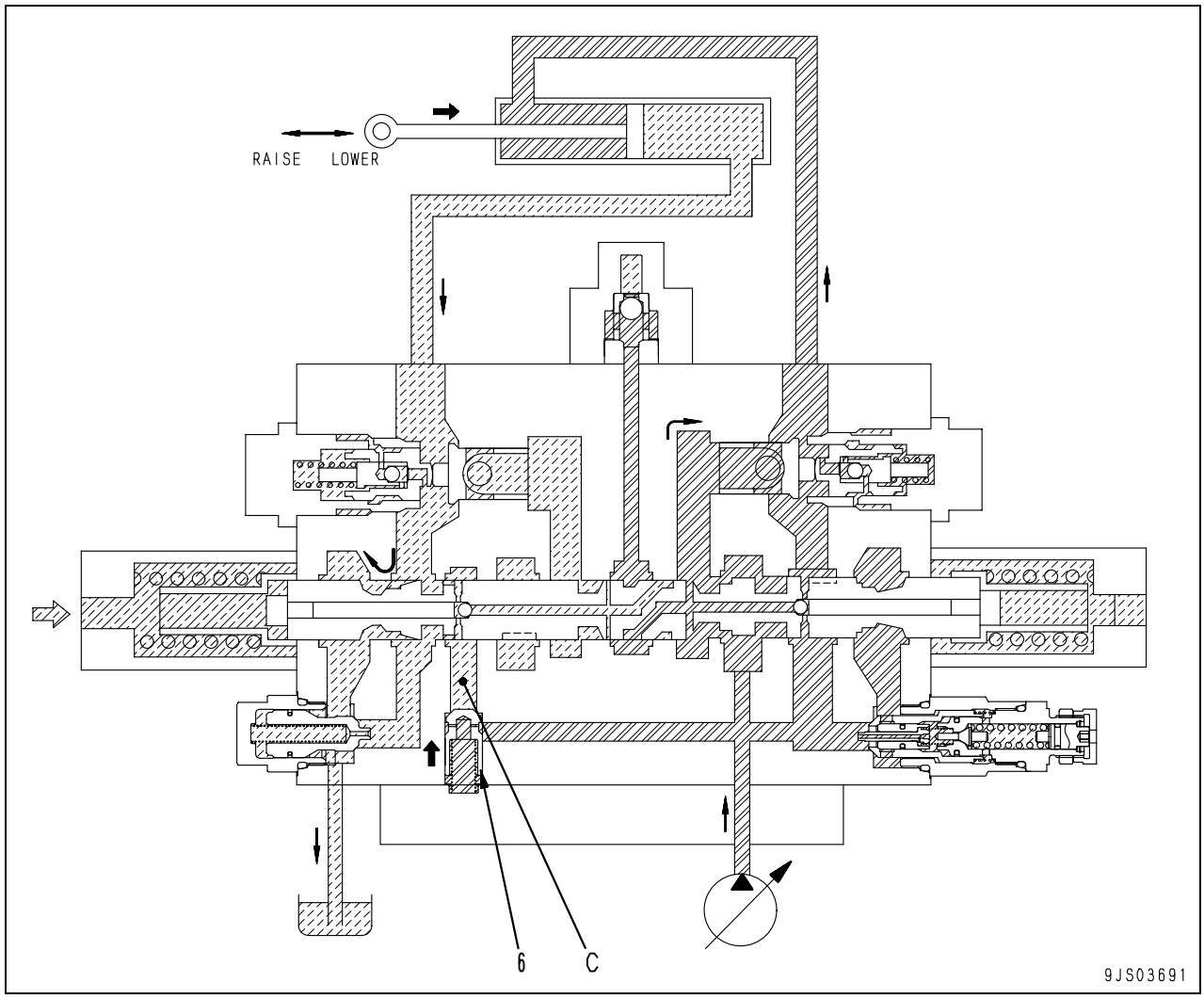
Function

- Provides the regeneration circuit from the cylinder bottom to the cylinder head when the boom is lowered and increases flow to the cylinder bottom.

Operation

- If the cylinder head pressure is lower than the bottom pressure, pressurized oil (A) from the cylinder bottom flows to drain circuit (B) from the notch of boom spool (2).
- On the other hand, remaining oil flows to regeneration circuit (C), opens check valve (6) and flows to the cylinder head via circuit (D).
- Flow from regeneration circuit (C) and pump (1) merges in circuit (E).

2. If the cylinder head pressure is higher than the bottom pressure (digging work, etc.)

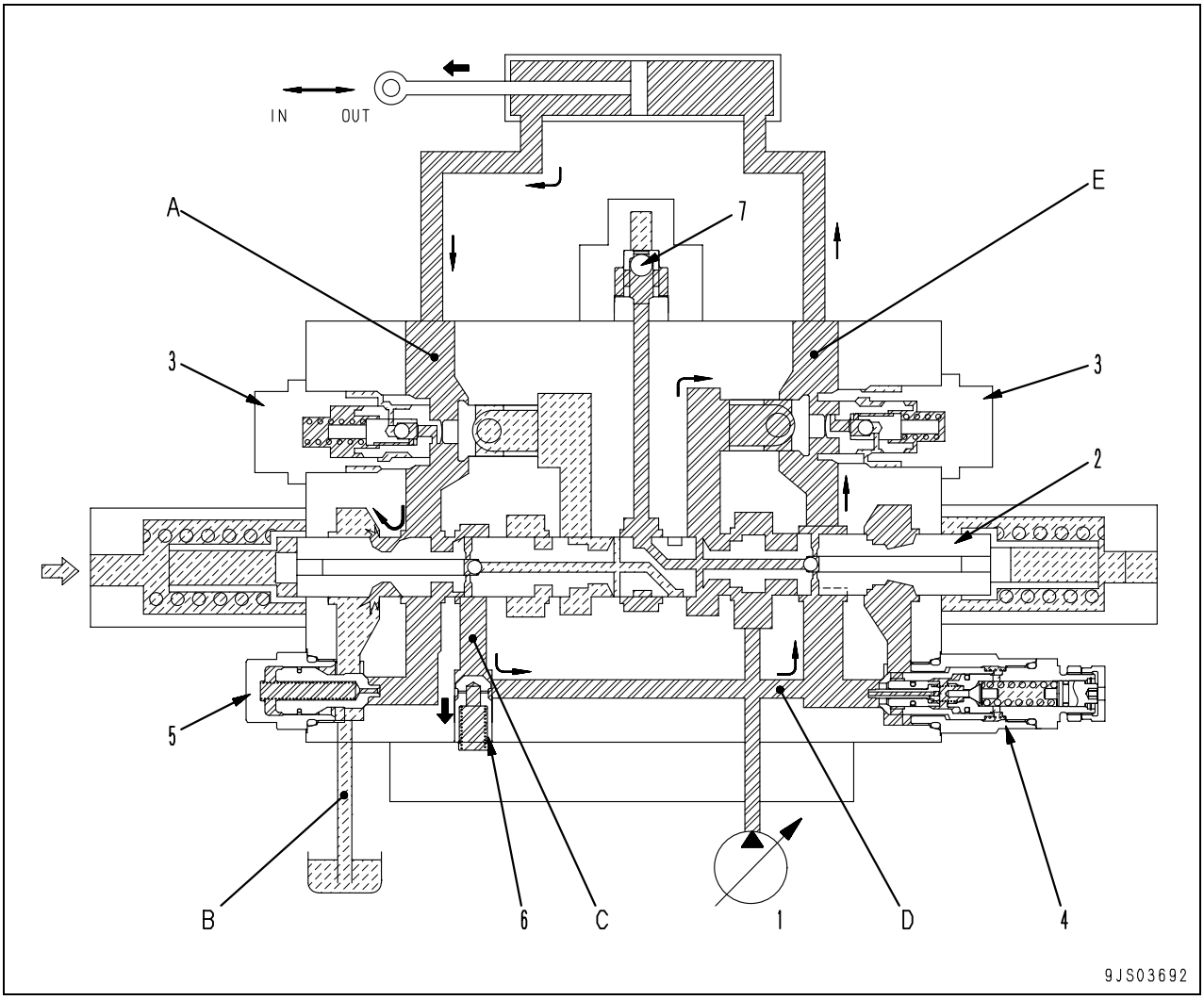


Function

- Check valve (6) provided to regeneration circuit (C) closes to shut off the flow from the cylinder bottom to the head.

Arm regeneration circuit

1. If the cylinder head pressure is higher than the bottom pressure



1. Hydraulic pump
2. Arm spool
3. Pressure compensation valve
4. Safety-suction valve
5. Suction valve
6. Check valve
7. LS shuttle valve

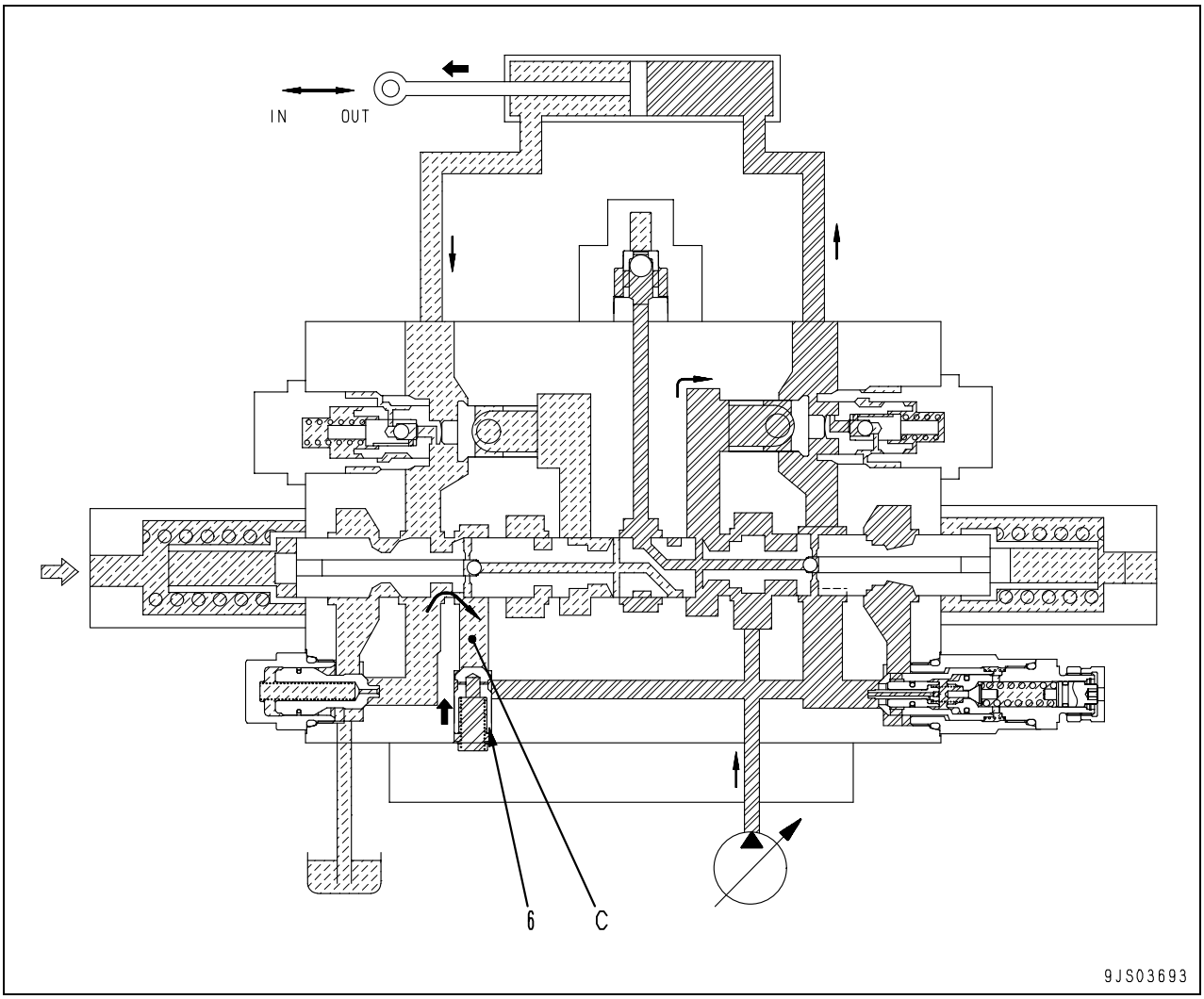
Function

- During arm digging, regeneration circuit provided from the cylinder head to the bottom increases the cylinder speed as the cylinder flow involves the pump delivery plus regenerated flow.

Operation

- If the cylinder head pressure is lower than the bottom pressure, pressurized oil (A) from the cylinder bottom flows to drain circuit (B) from the notch of arm spool (2).
- On the other hand, remaining oil flows to regeneration circuit (C), opens check valve (6) and flows to the cylinder head via circuit (D).
- Flow from regeneration circuit (C) and pump (1) merges in circuit (E).

2. If the cylinder head pressure is lower than the bottom pressure

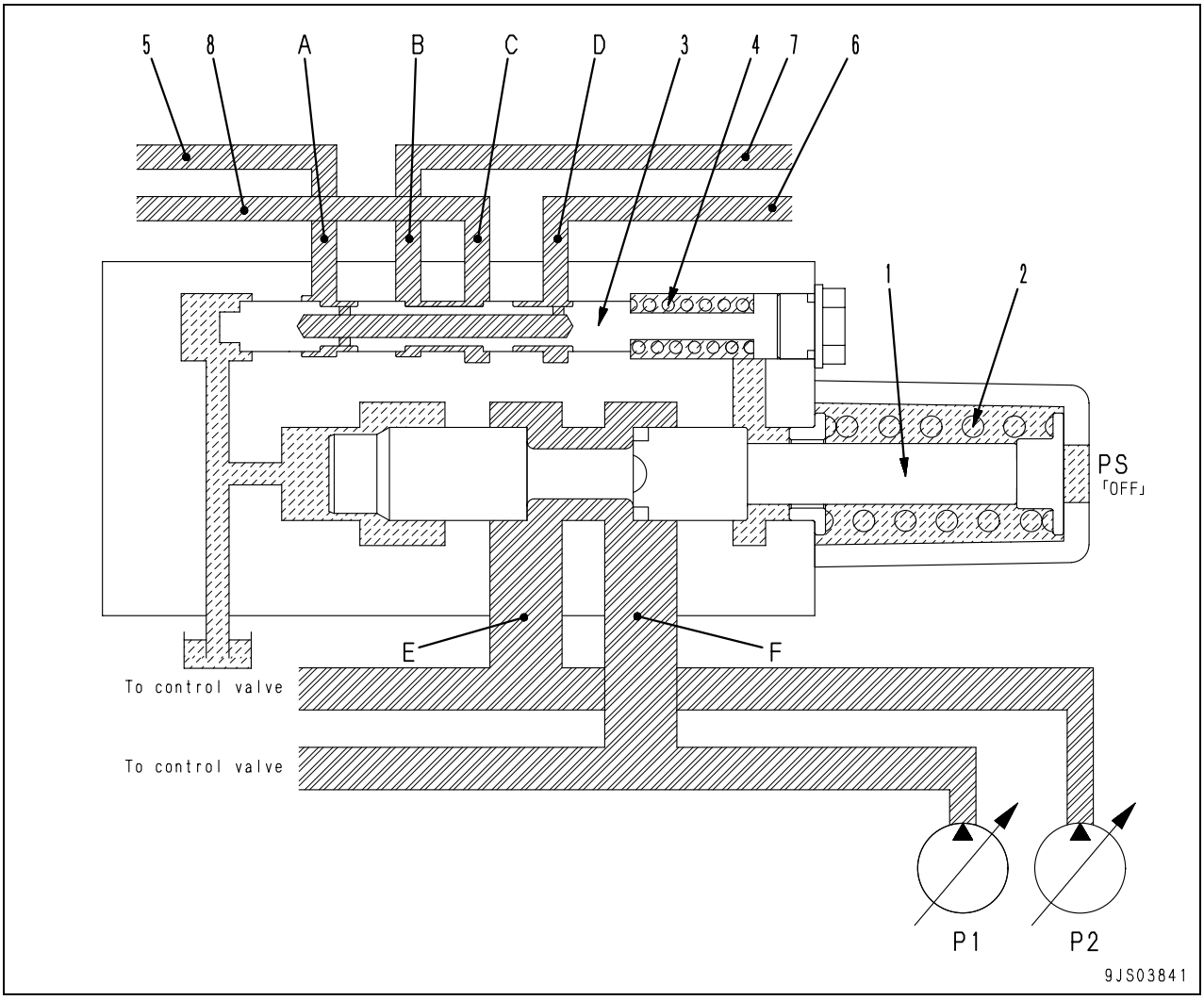


Function

- Check valve (6) provided to regeneration circuit (C) closes to shut off the flow from the cylinder bottom to the head.

Merge-divider valve

1. When flows from the pumps merge [if pilot pressure (PS) is OFF]



1. Main spool
2. Spring
3. LS spool
4. Spring
5. LS circuit (bucket side)
6. LS circuit (bucket side)
7. LS circuit (arm side)
8. LS circuit (arm side)

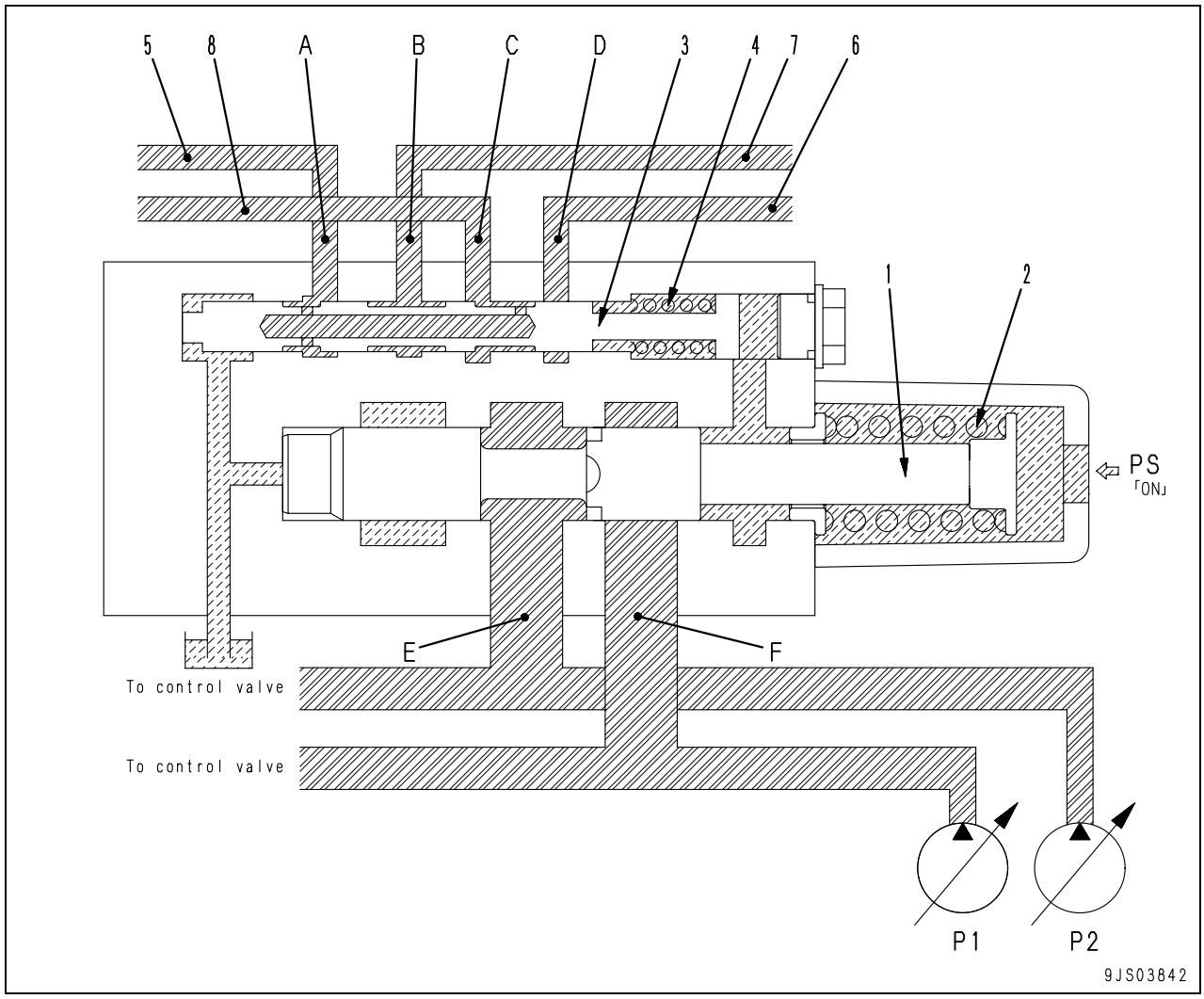
Function

- Merges pressurized oil (P1) and (P2) discharged from the two pumps or divides (to respective control valve group).
- Merges and divides LS circuit pressure.

Operation

- Since pilot pressure (PS) is OFF, output pressure from PPC valve is 0 kg/cm^2.
- Main spool (1) is pressed to the right by spring (2) and ports (E) and (F) are interconnected.
- Merges pressurized oil (P1) and (P2) discharged from the two pumps at ports (E) and (F) and sends to necessary control valve.
- Since pilot pressure (PS) is OFF for LS spool (3), it is pressed to the right by spring (4), and ports (A) - (D) and ports (B) - (C) are interconnected.
- Forwards LS pressure led from respective control valve spools to LS circuits (5), (6), (7) and (8) to all the pressure compensation valves.

2. When flows from the pumps are divided [if pilot pressure (PS) is ON]



Operation

- Pilot pressure (PS) turns ON, and output pressure from the PPC valve shifts main spool (1) to the left, and ports (E) and (F) are divided.
- Pressurized oil discharged from the two pumps are sent to respective control valves.

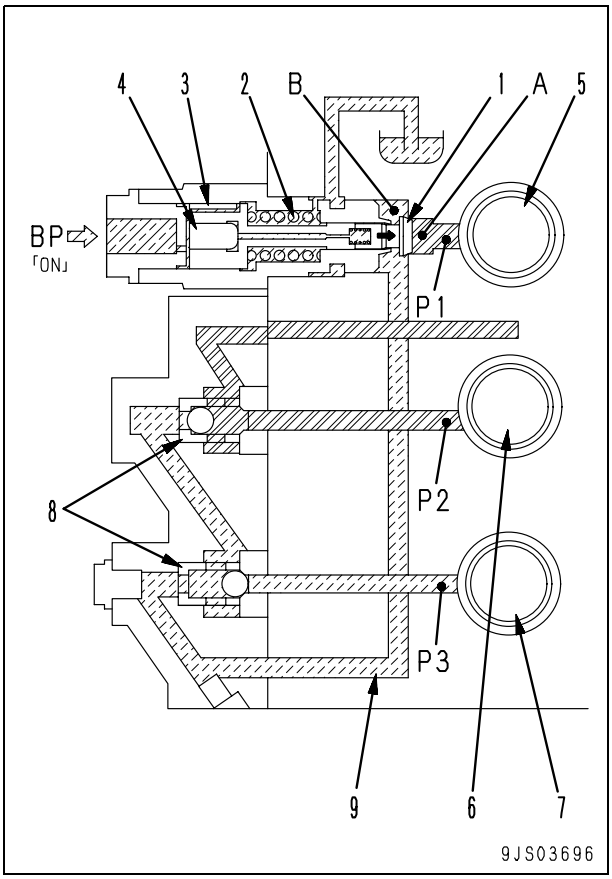
  P1 pressure: To bucket, L.H. travel, and boom
  P2 pressure: To swing, R.H. travel, and arm

- LS spool (3) too shifts to the left under the output pressure from the PPC valve, interconnects ports (A) and (C) and divides other ports.
- Forwards LS pressure led from each control valve spool to LS circuits (5), (6), (7) and (8) to respective control valves.

LS select valve

Function

- Prevents high LS pressure from the swinging from entering the LS circuit of work valves while the swinging and work equipment are in combined operation.
- Prevents high pressure generated during swing drive and improves operability of work equipment.



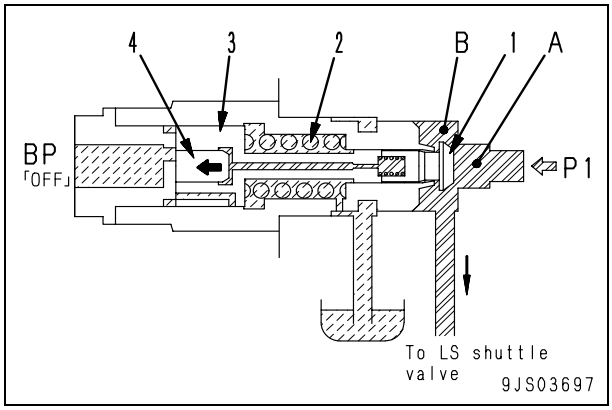
★ The illustration shows the state of simultaneous operation of swinging and R.H. travel. [(BP) pressure ON]

1. Valve
2. Spring
3. Piston
4. Piston
5. Swing spool
6. L.H. travel spool
7. Arm spool
8. LS shuttle valve
9. LS circuit

Operation

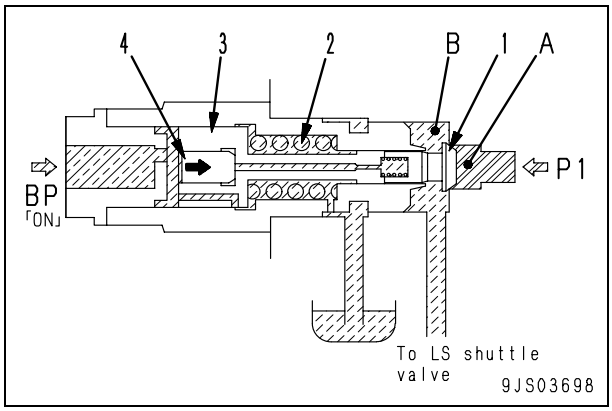
1. If pilot pressure (BP) is OFF

- Since pilot pressure (BP) is OFF, piston (3) is pressed to the left by spring (2).
- When swing-operated, swing LS pressure (P1) enters port (A) after passing swing spool (5).
- Valve (1) is pressed to the left and ports (A) and (B) are interconnected.
- Swing LS pressure (P1) flows to LS shuttle valve (8).



2. If pilot pressure (BP) is ON

- If pilot pressure (BP) is ON, BP pressure contracts spring (2), and piston (3) shifts to the right.
- Valve (1) is pressed to the right and interconnection between ports (A) and (B) is closed.
- Swing LS pressure (P1) stops flowing to LS shuttle valve (8).
- If swing LS pressure (P1) rises, other LS circuits are not affected.



Self pressure reducing valve

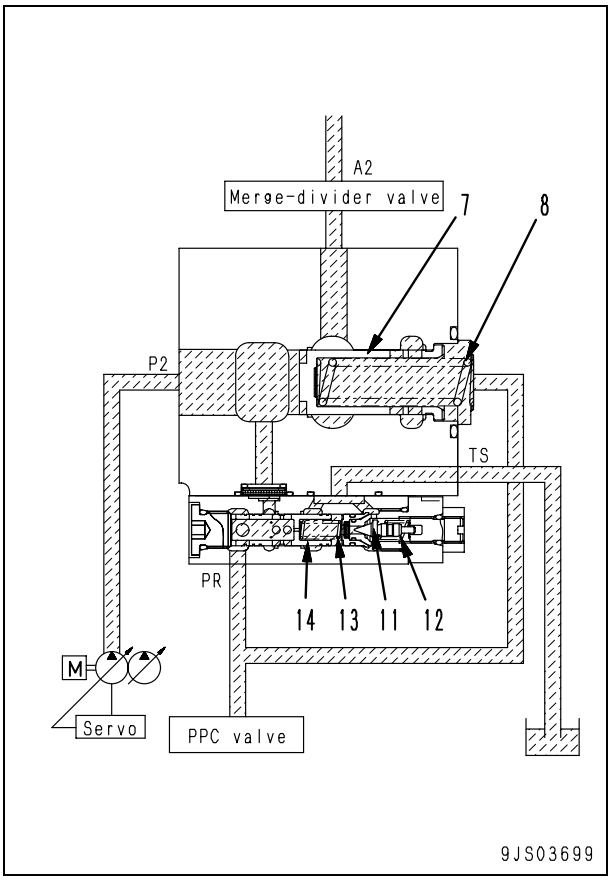
Function

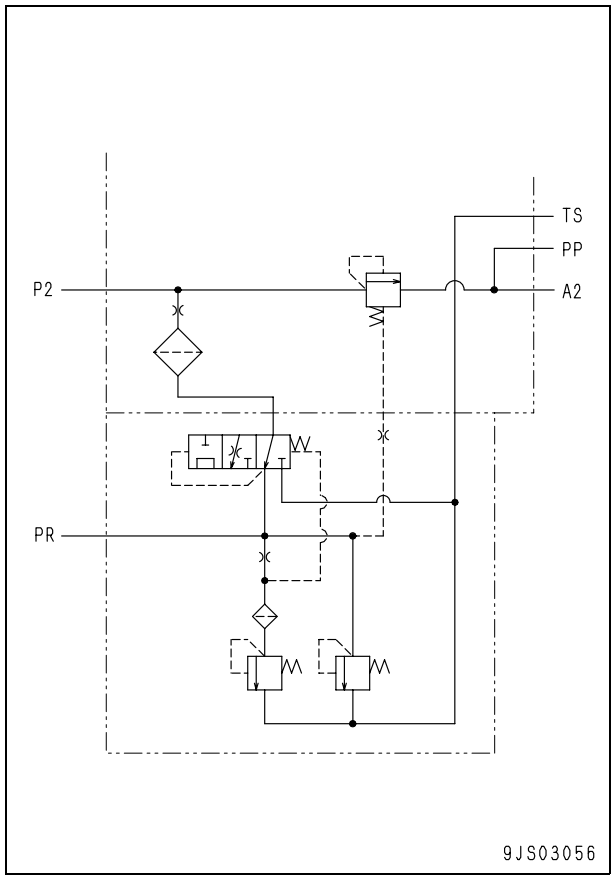
- Reduces the discharge pressure of the main pump and supplies it as control pressure for the solenoid valves, EPC valves, etc.

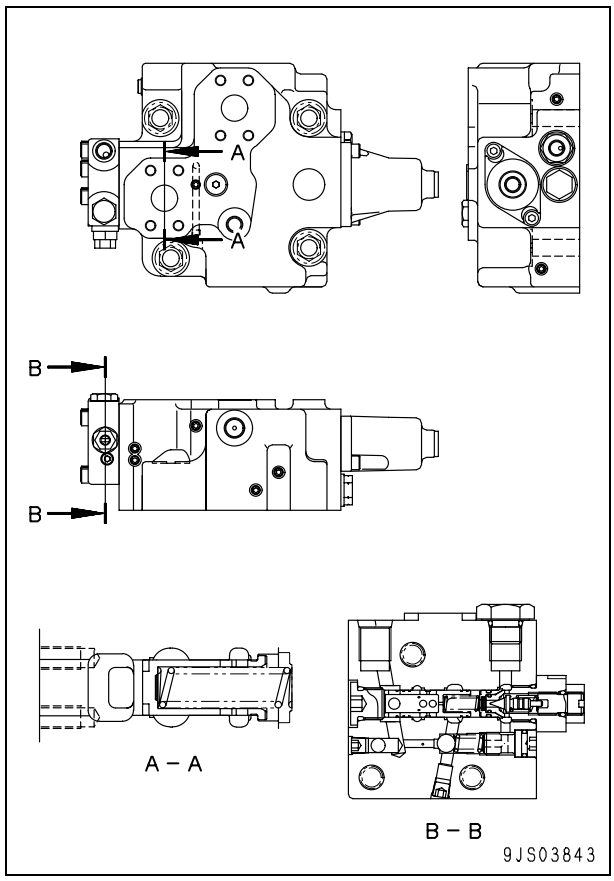
Operation

1. While 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 (P2) is connected to (TS).
- Valve (7) is pressed by spring (8) against the left side and port (P2) is closed to (A2).



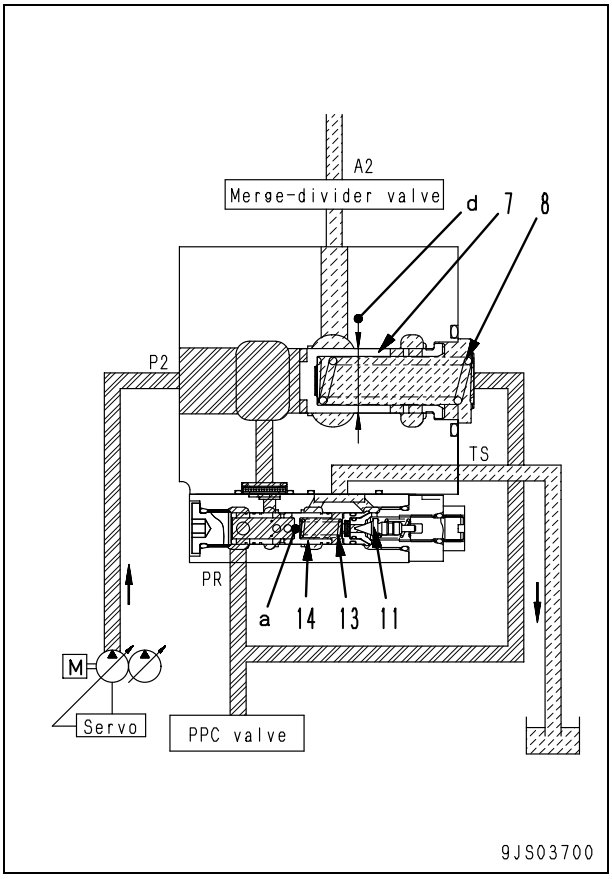




2. During neutral and when load pressure (P2) is low

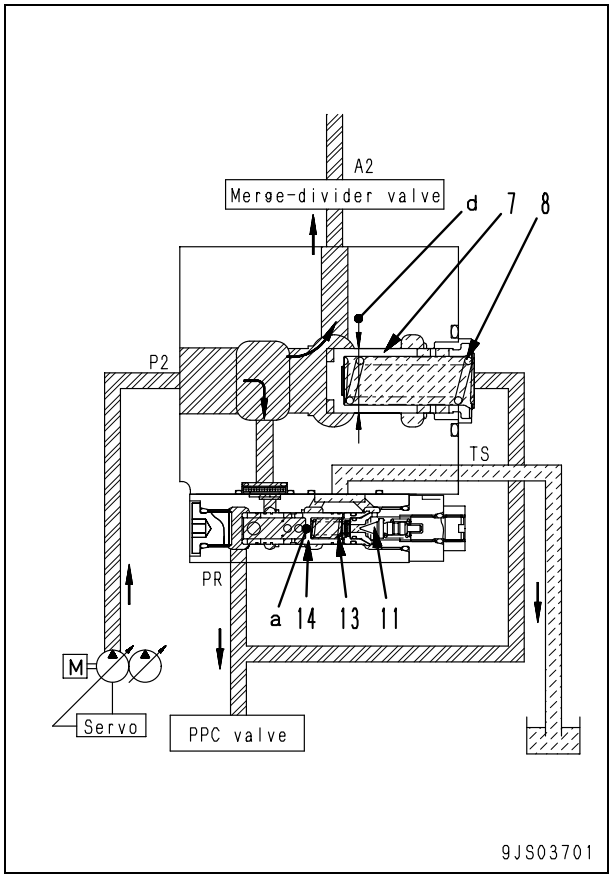
★ When load pressure (A2) is lower than self pressure reducing valve output pressure (PR)

- Valve (7) is pressed to the closing direction of circuit between ports (P2) and (A2) by spring (8) and under pressure (PR) (which is 0 MPa {0 kg/cm^2}).
- When pressurized oil flows in from port (P2), a balance is reached due to [(ϕd area x P2 pressure) = force of spring (8) + (ϕd area x PR pressure)].
- Adjusts valve (7) opening to keep pressure (P2) at a constant level over pressure (PR).
- When pressure (PR) rises above the set pressure, poppet (11) opens.
- Pressurized oil flows from port (PR) to orifice (a) in spool (14), then flows to seal drain port (TS) from poppet (11) opening.
- Differential pressure is generated before and after orifice (a) in spool (14) and then spool (14) moves to close the pass between ports (P2) and (PR).
- Pressure (P2) is reduced by the opening at this time and adjusted to a constant pressure (the set pressure) and supplied as pressure (PR).



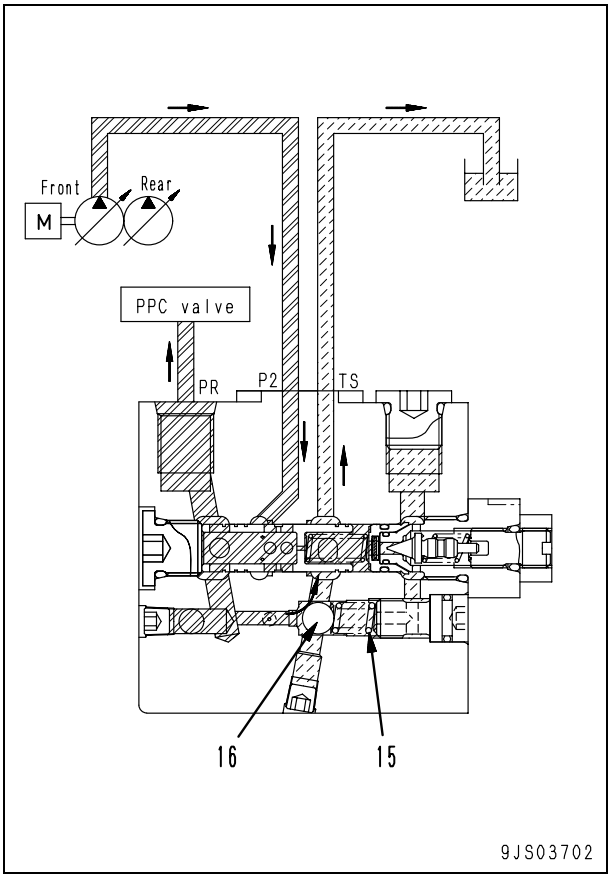
3. When load pressure (P2) is high

- Load pressure (A2) increases with the operation of digging, etc., and the pump discharge increases accordingly.
- Pressure (P2) increases to [(ϕd area x P2 pressure) = force of spring (8) + (ϕd area x PR pressure)]., and valve (7) moves to the right to the stroke end.
- As a result, opening between ports (P2) and (A2) increases, and the pass resistance reduces, reducing the engine horsepower loss.
- When pressure (PR) rises above the set pressure, poppet (11) opens.
- Pressurized oil flows from port (PR) to orifice (a) in spool (14), then flows to seal drain port (TS) from poppet (11) opening.
- Differential pressure is generated before and after orifice (a) in spool (14) and then spool (14) moves to close the pass between ports (P2) and (PR).
- Pressure (P2) is reduced by the opening at this time and adjusted to a constant pressure (the set pressure) and supplied as pressure (PR).



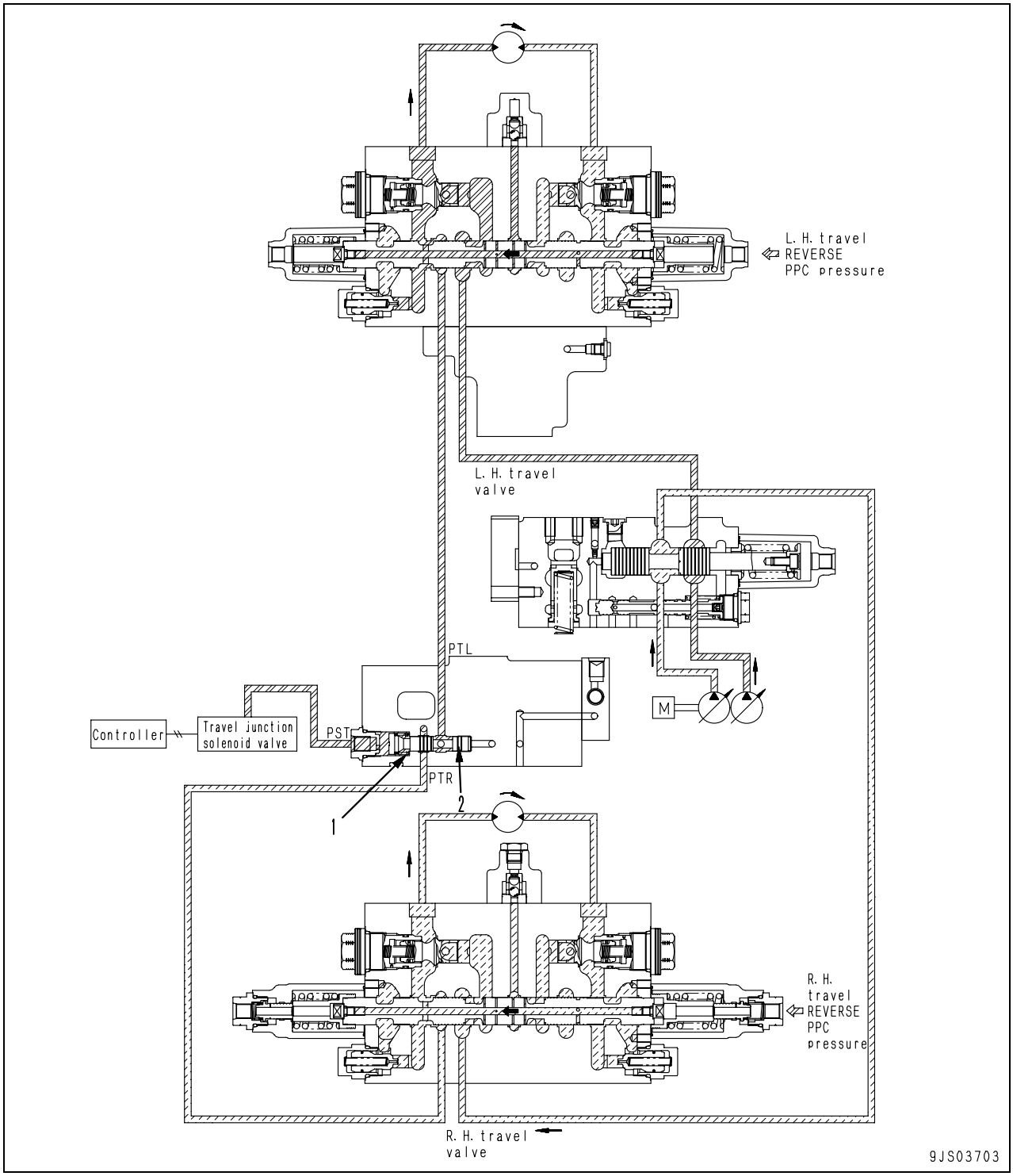
4. When abnormally high pressure is generated

- If pressure (PR) of self pressure reducing valve becomes abnormally high, ball (16) contracts spring (15) and becomes separated from the seat.
- Allows the pressurized oil to (TS) from port (PR) and lowers pressure (PR).
- Protects PPC valve, solenoid valve and other devices from abnormal pressure.



Travel junction valve

1. When pilot pressure is turned ON



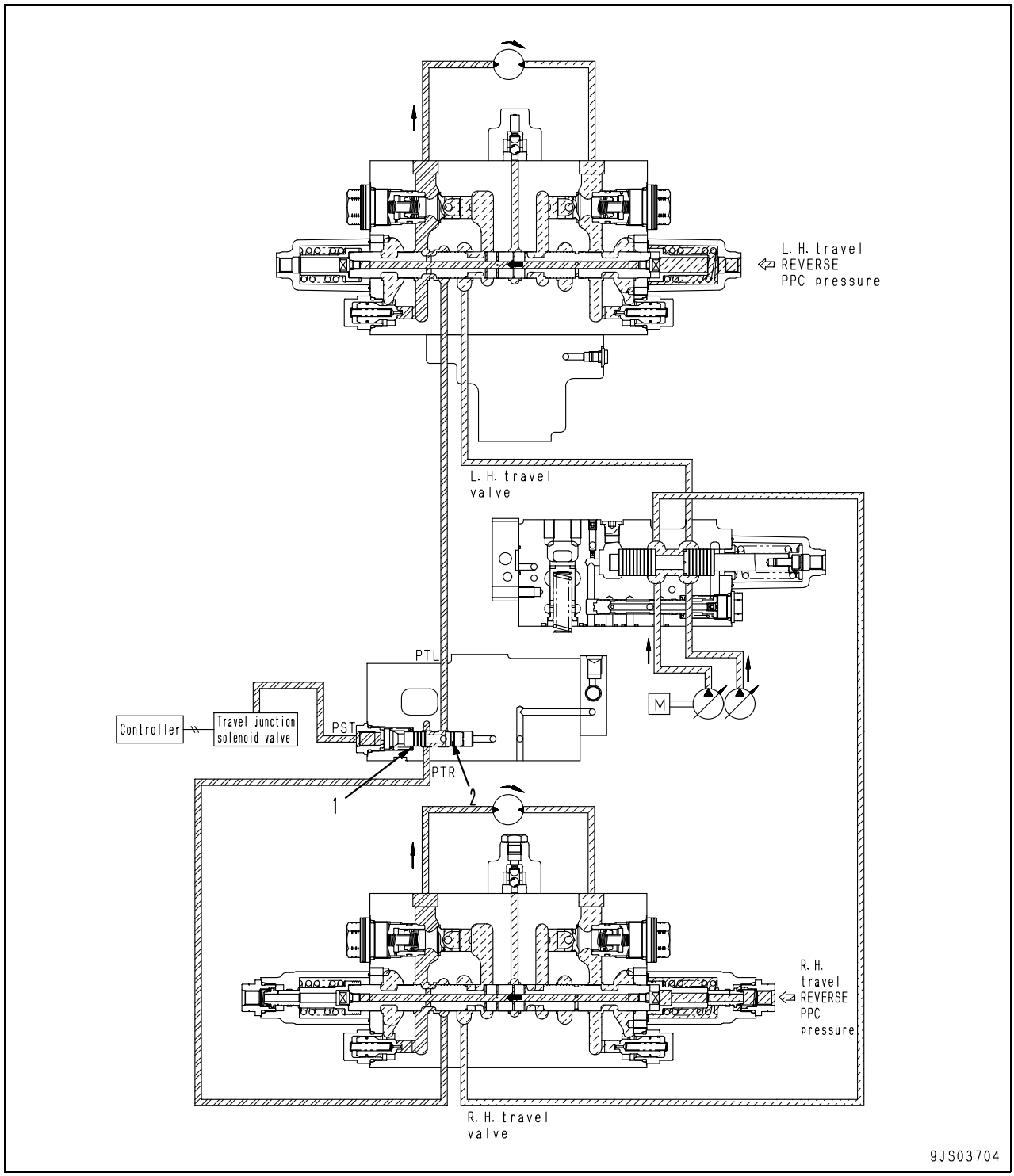
Function

- This valve connects the L.H. and R.H. travel circuits via travel junction valve so that the hydraulic oil will be supplied evenly to both travel motors to improve machine's straight travel performance.
- When the machine is steered, outside pilot pressure (PST) closes the travel junction valve to improve steering performance.

Operation

- Pilot pressure from the travel junction solenoid valve contracts spring (1), and travel junction spool (2) moves to the left to the stroke end.
- Junction circuit between port (PTL) (L.H. travel circuit) and port (PTR) (R.H. travel circuit) is closed.

2. When pilot pressure is turned OFF

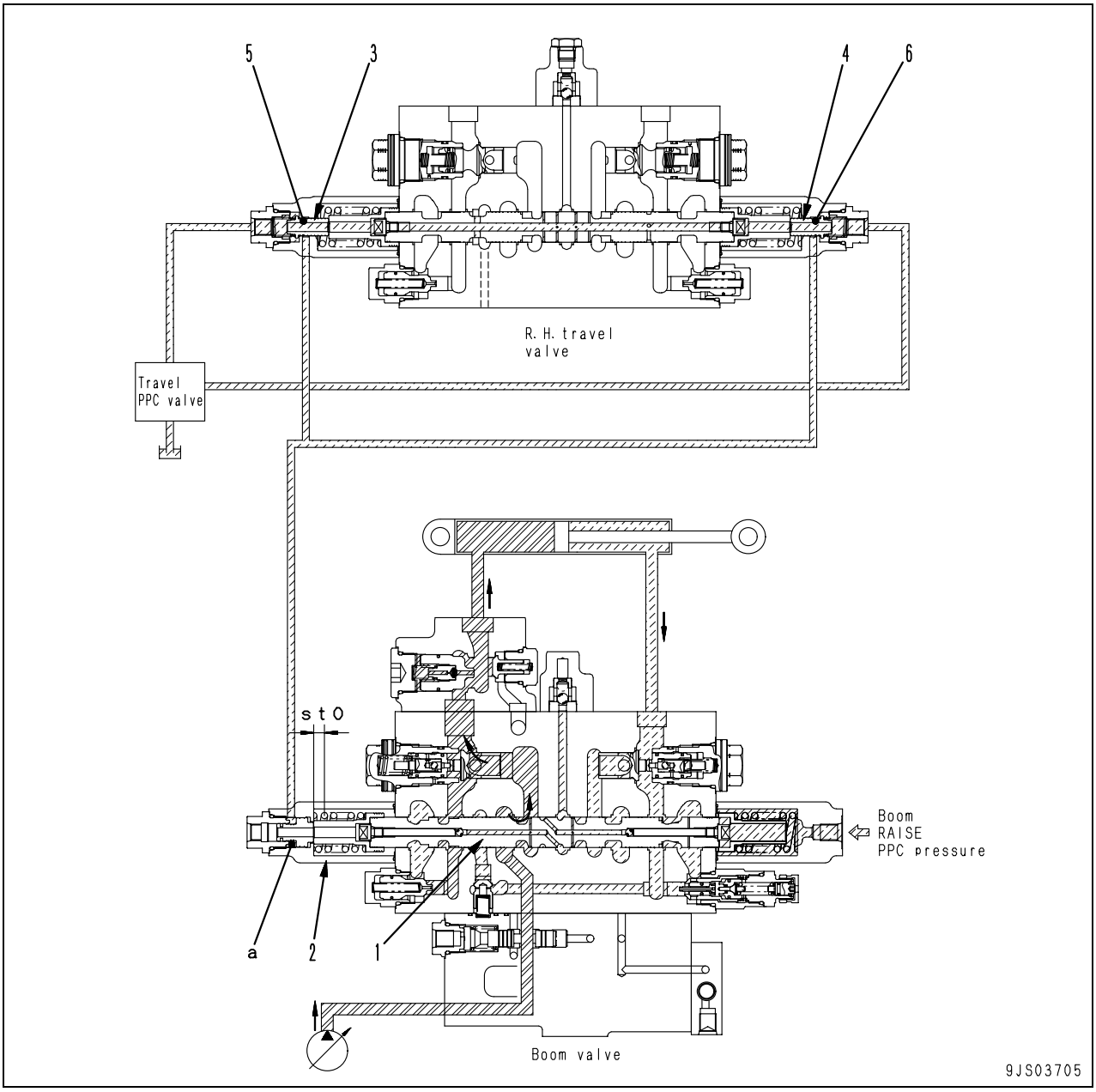


Operation

- If pilot pressure (PST) from the solenoid valve is 0, travel junction spool (2) is pressed by the force of spring (1) against the right side and the pass between ports (PTL) and (PTR) is open.
- If the oil flow rates to the L.H. and R.H. travel motors become different from each other, the oil flows through the route between port (PTL), travel junction spool (2), and port (PTR) so that the oil flow rates to both motors will be equalized again.

Travel PPC shuttle valve

1. When travel lever is in neutral



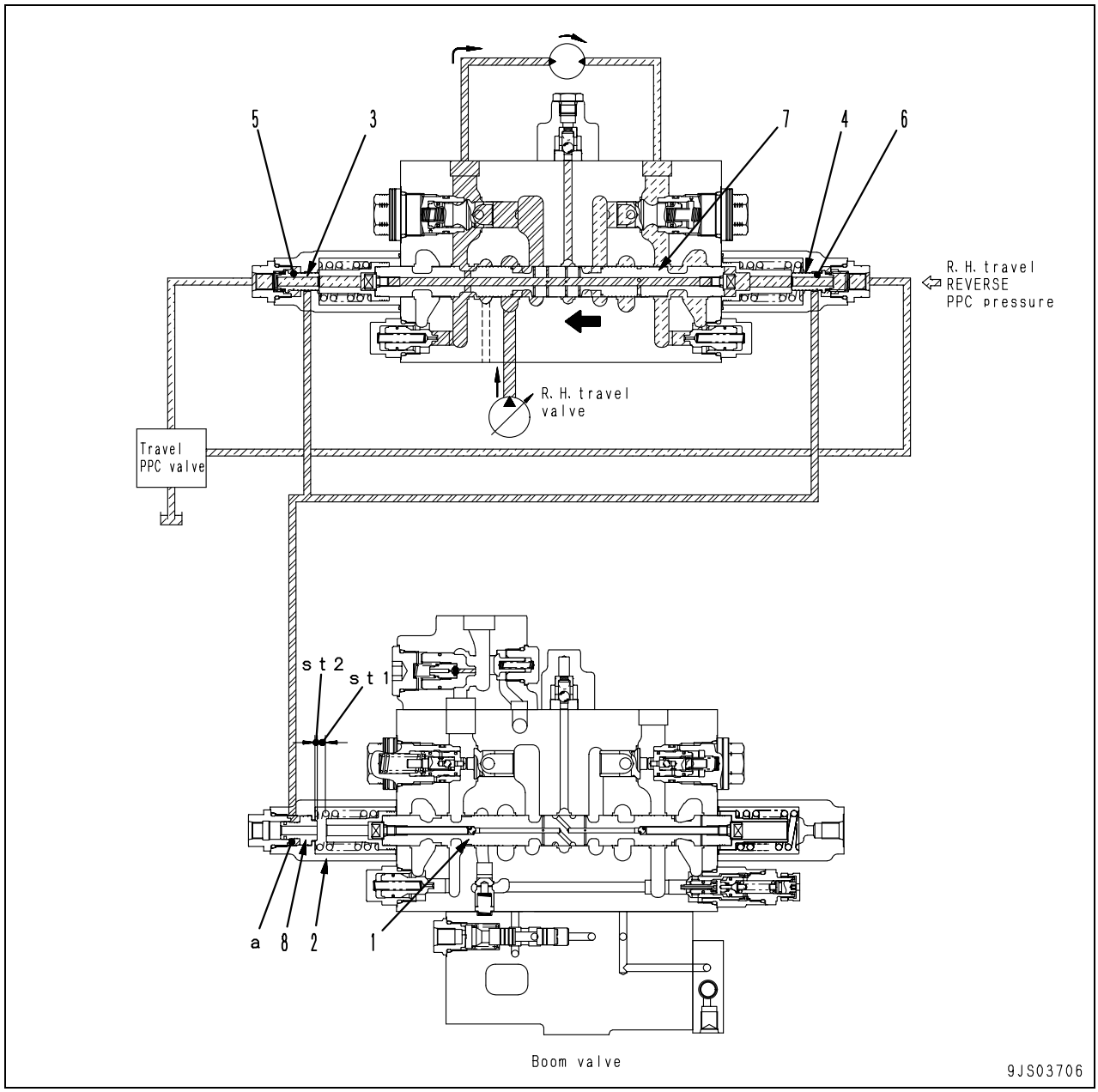
Function

- Regulates flow to each cylinder by controlling the stroke of each spool of the boom, arm, and bucket using the pilot pressure of travel PPC valve while climbing a steep grade, raising the boom, digging with arm, dumping, bucket-digging or operating dump.
- When controlling the stroke of the boom, arm and/or bucket, pilot pressure of travel PPC valve passes through the circuit inside the control valves to actuate the system.

Operation

- The oil in stroke regulation signal chamber (a) is drained through orifices (5) and (6) of pistons (3) and (4) in the travel spring case and the travel PPC valve.
- When operated for boom raising (or arm digging, dumping, bucket digging, dumping), spool (1) moves to the left until it makes contact with the end face of spring casing (2) (st0).

2. When traveling

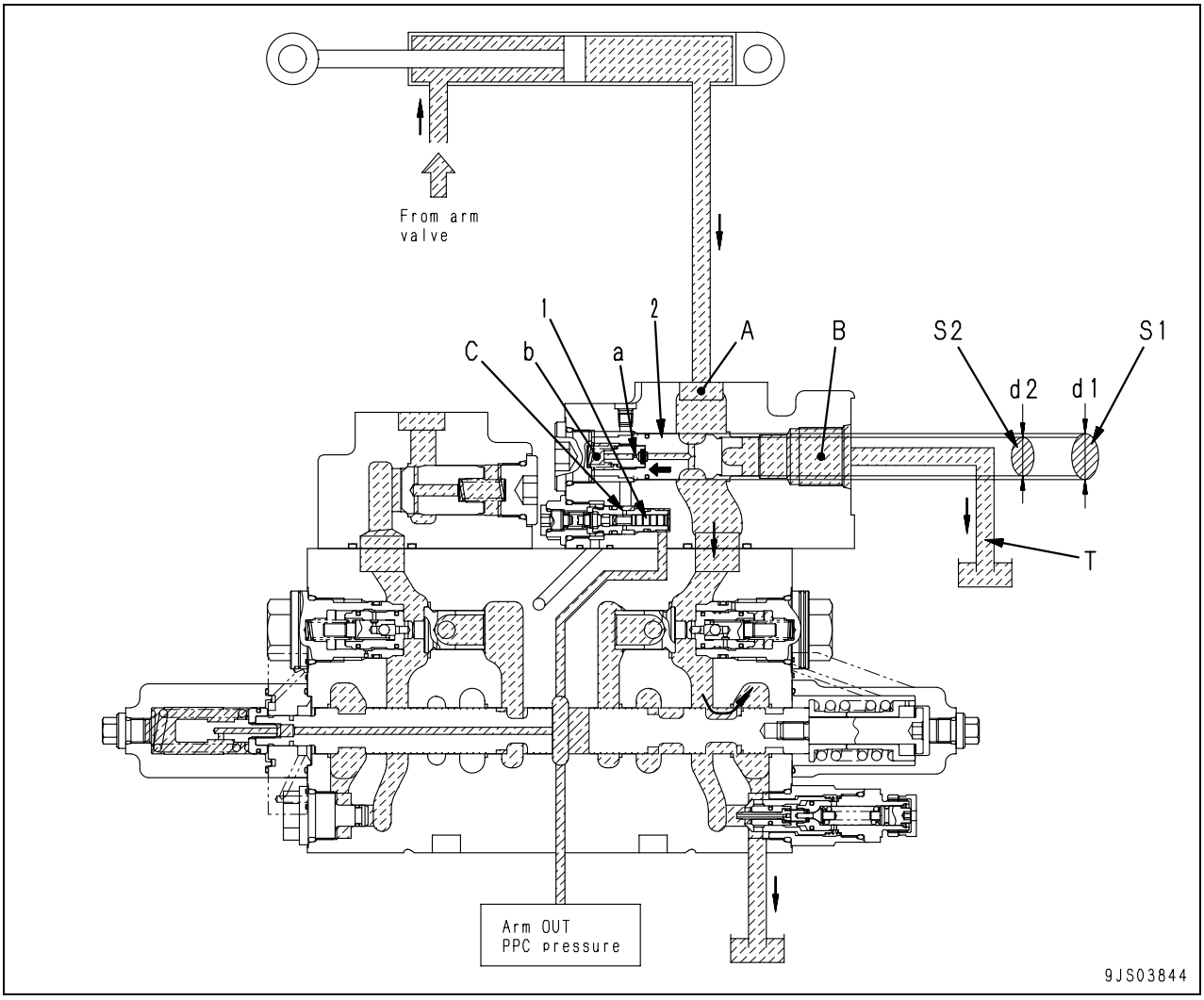


Operation

- If the right travel lever is set in the reverse (or forward) direction, pilot pressure from the PPC valve presses spool (7) to the left (or right).
- Spool (7) pushes piston (3) to close orifice (5) and shut off stroke regulation signal chamber (a) and the drain circuit of the travel PPC valve.
- At this time, the right travel reverse (or forward) lever is set, PPC pressure is applied through orifice (6) of piston (4) to the left end of piston (8) to push piston (8) to the right.
- When operated for boom raising (or arm IN, OUT, bucket CURL, DUMP), spool (1) moves to the left.
- Maximum stroke of the spool is limited to (st1) for the amount of movement (st2) of piston (8) to the right.

Quick return valve

1. When arm OUT



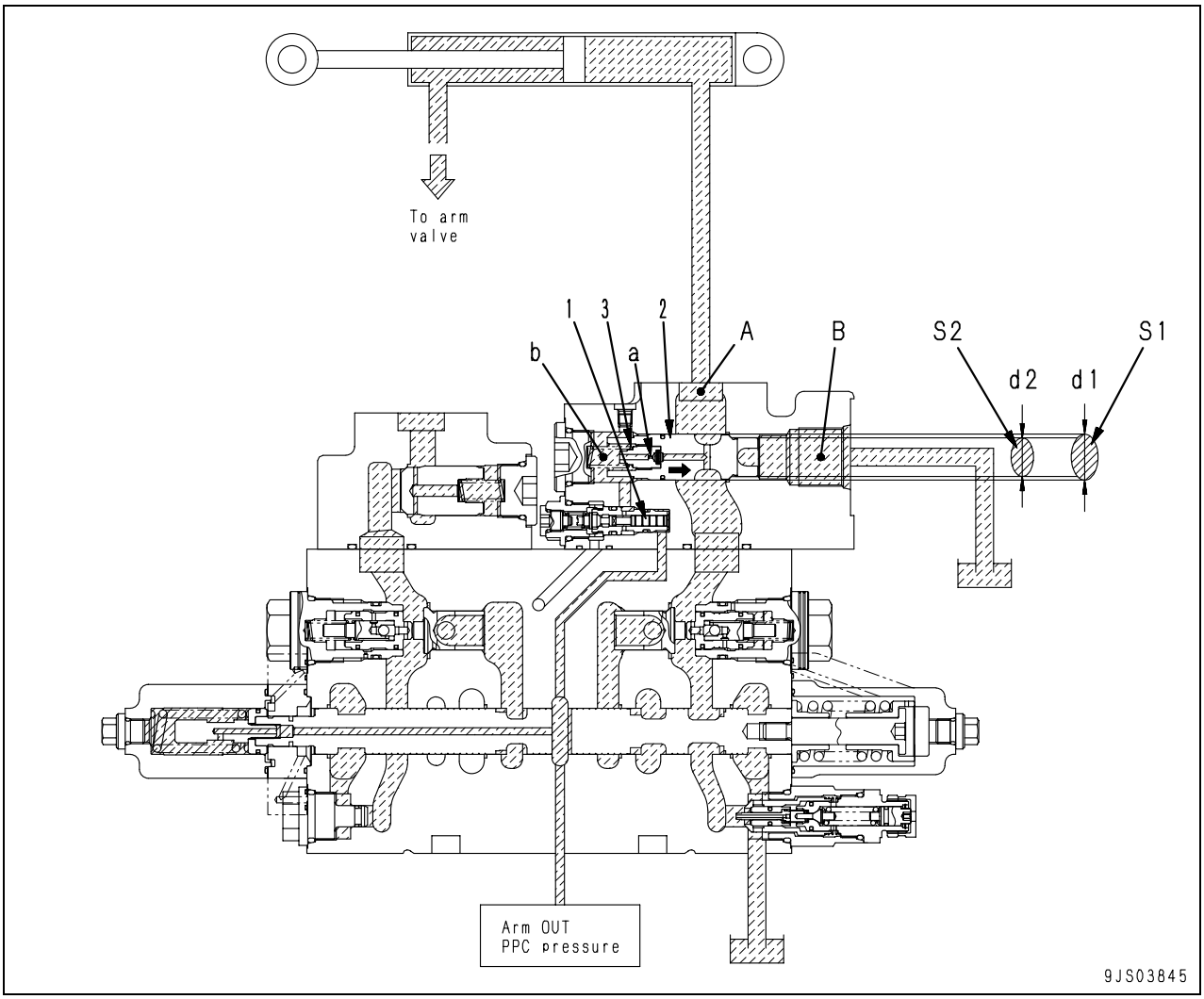
Function

- When arm OUT, large volume of oil returns from the cylinder bottom.
- Reduces this pressure loss.

Operation

- When the arm OUT is operated, pilot spool (1) is pushed under the pilot pressure from the PPC valve.
- Pressurized oil in chamber (b) inside the valve is drained via orifice (c).
- Pressurized oil of the arm bottom side flows to orifice (a) → chamber (b) → orifice (c) → drain (T), and the pressure in chamber (b) lowers.
- If the pressure of chamber (b) drops lower than that of port (A), pressure receiving force of the pressure receiving portion [ϕd2 area (S2) (seat diameter area)] on the side of port (A) increases by the sum of the pressure receiving force of pressure receiving portion[ϕd1 area (S1)] on the chamber (b) side of valve (2) and the spring force.
- Or (ϕd2 pressure receiving force > ϕd1 pressure receiving force + spring force)
- Valve (2) is pressed to the left and pressurized oil is led from port (A) to (B).
- From port (B), pressurized oil is drained directly to the tank.

2. When the arm is in neutral



Operation

- Returning the lever to neutral reduces the pilot pressure from the PPC valve to 0 kg/cm^2.
- The pressurized oil that has flowed and been drained through orifice (a) in valve (2) is closed by pilot piston (1).
- The holding pressure on the arm bottom side works on the difference between areas (S2) and (S1) of valve (2) to the right.
- Valve (2) is closed by the total of this force and the force of spring (3), so ports (A) and (B) are shut off.

Lift check valve

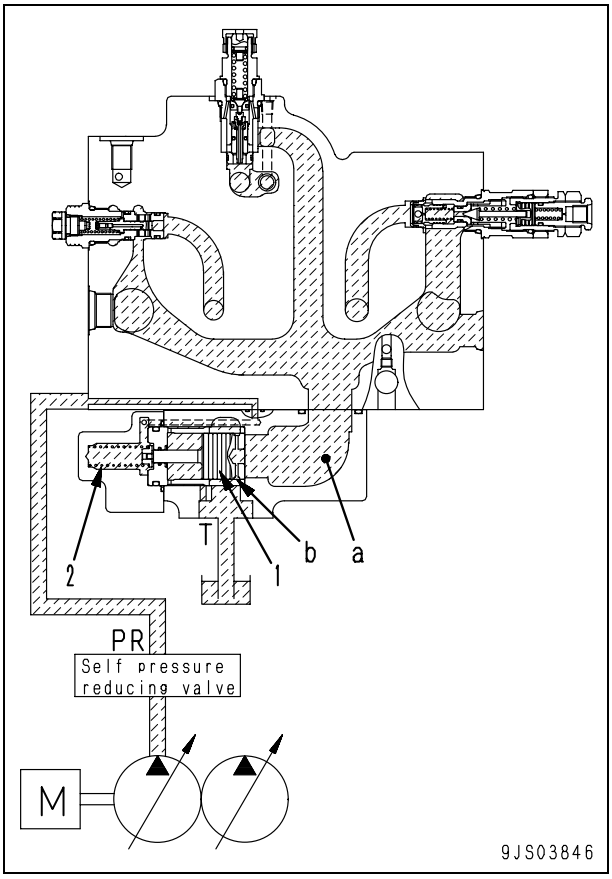
Function

- This valve applies back pressure to the drain circuit to prevent generation of negative pressure on each actuator (motors, cylinders, etc.).

Operation

1. While engine is stopped

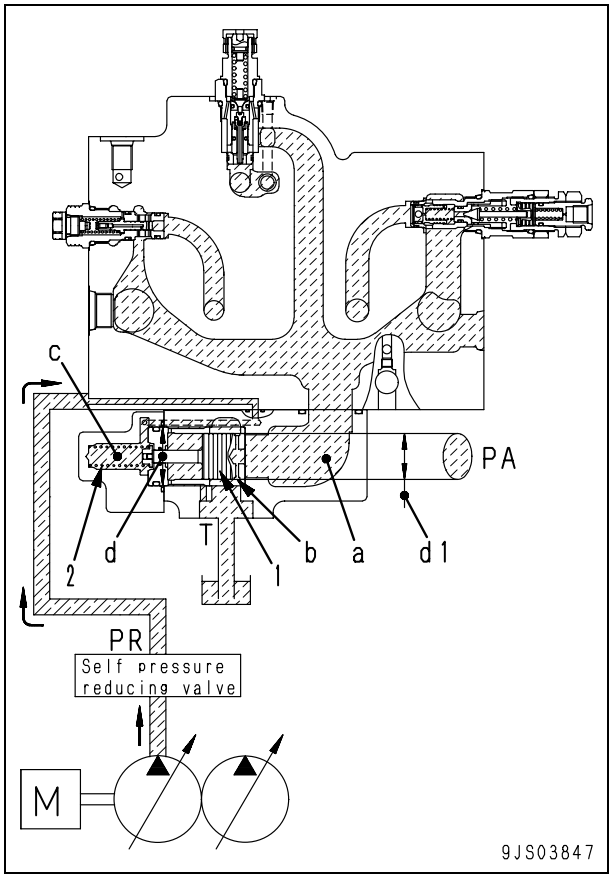
- Pressurized oil is not fed to the self pressure reducing valve from the pump, and valve (1) is pressed to the right by the force of spring (2).
- Drain circuit (a) of the control valve is connected with port (T) through orifice (b) of valve (1).



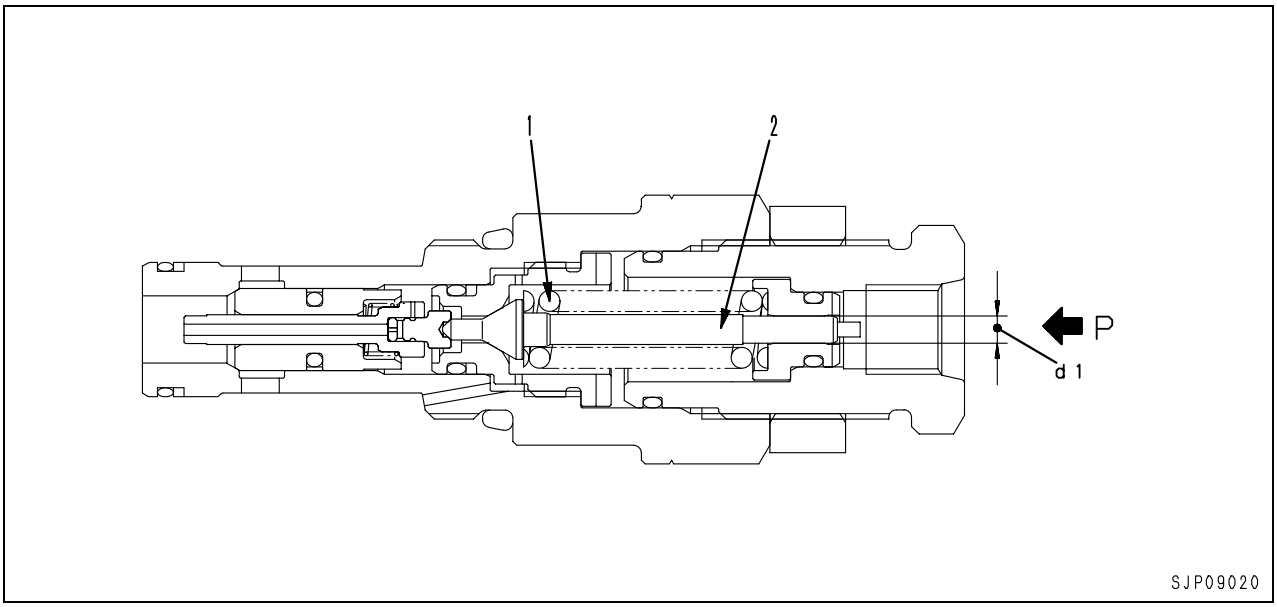
2. While engine is running

- Output pressure (PR) of the self pressure reducing valve is applied via the control valve to spring chamber (c) of back pressure valve (3).
- Output pressure (PR) applied to spring chamber (c) is applied to the left end of valve (1) (area of ϕd) to push valve (1) to the right.
- At this time, pressure (PA) of drain circuit (a) of the control valve is applied to the right end of valve (1) (area of ϕd1) to push valve (1) to the left.
- Valve (1) strikes balance to make the back pressure equal to (PA) in the equation below.

$$PA = \frac{(\text{Area of } \phi d) \times PR + \text{force of spring (2)}}{\text{Area of } \phi d1}$$



Main relief valve



1. Spring
2. Poppet

Function

- Set pressure of the relief valve is in two stages.
- When power is needed, pilot pressure (P) is turned ON and the set pressure becomes higher.

Operation

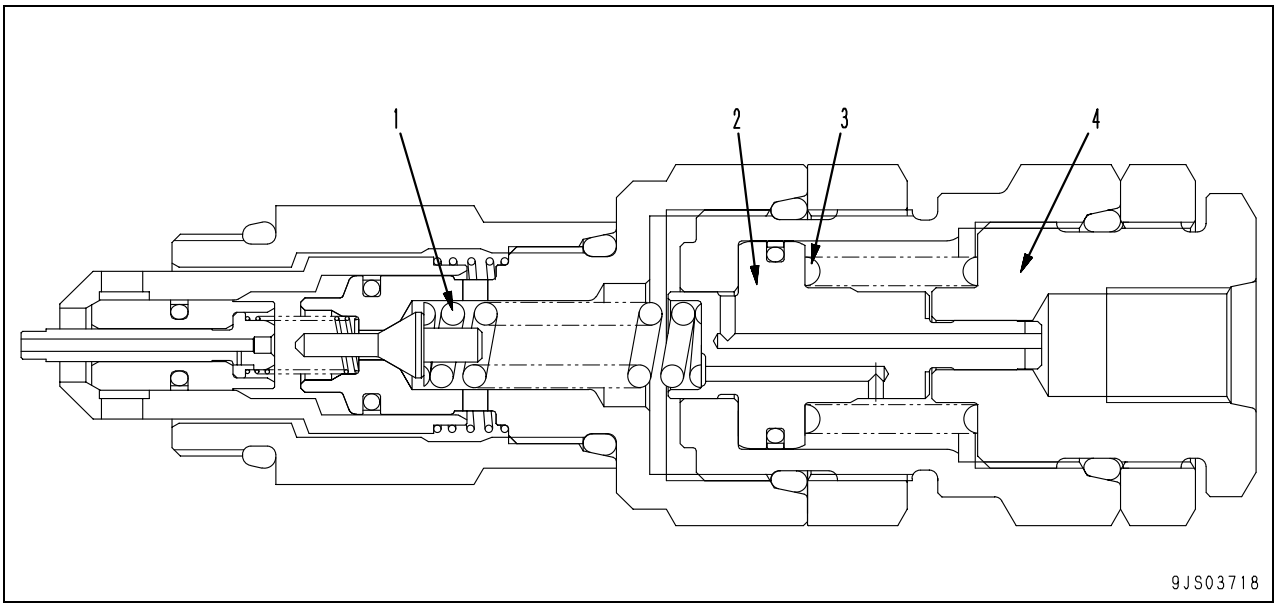
- The set pressure of relief valve is determined by spring (1) installed load. (1st stage)
- Respective setting is not required for both the 1st and 2nd stages. Setting the 1st stage completes the setting of the 2nd stage.

1. **If pilot pressure (P) is OFF: Low-pressure setting**
   Set pressure is determined by spring (1) installed load.

2. **If pilot pressure (P) is ON: High-pressure setting**
   Spring (1) installed load is added with pilot pressure (P) applied to the area of poppet diameter (d1), raising the set pressure to higher level.

2-stage safety-suction valve

[Installed to port (B) on the boom cylinder head side and port (B) of the service valve]



1. Spring
2. Piston
3. Spring
4. Holder

Function

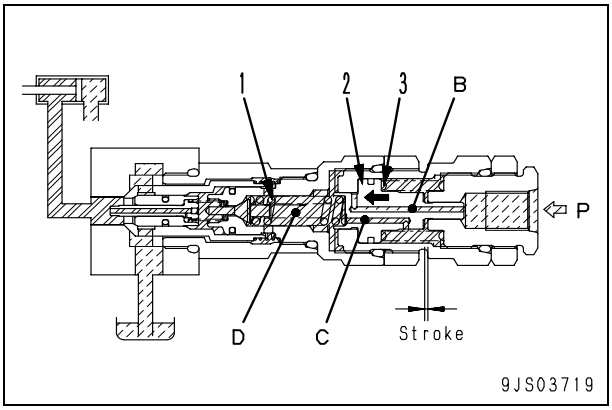
- Enables to provide the safety valve set pressure in two stages, and make the low-pressure setting smaller.
- Enables to relieve a load without lever operation if high load is applied to the cylinder.
- Improves work efficiency and reduces machine body vibration.

Operation

- The safety set pressure is determined by spring (1) installed load.

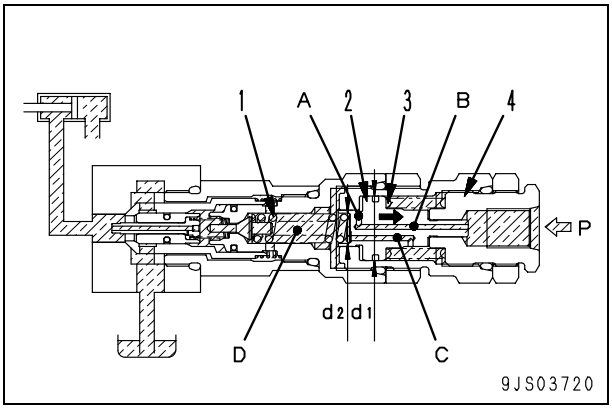
1. If pilot pressure is OFF (high-pressure setting)

- Since pilot pressure (P) is OFF, piston (2) is pressed to the left by spring (3). [Spring (1) installed load < spring (3) installed load]
- Spring (1) installed load becomes maximum and the set pressure rises.
- Passage (B) is interconnected to the drain circuit via passage (C) and chamber (D).



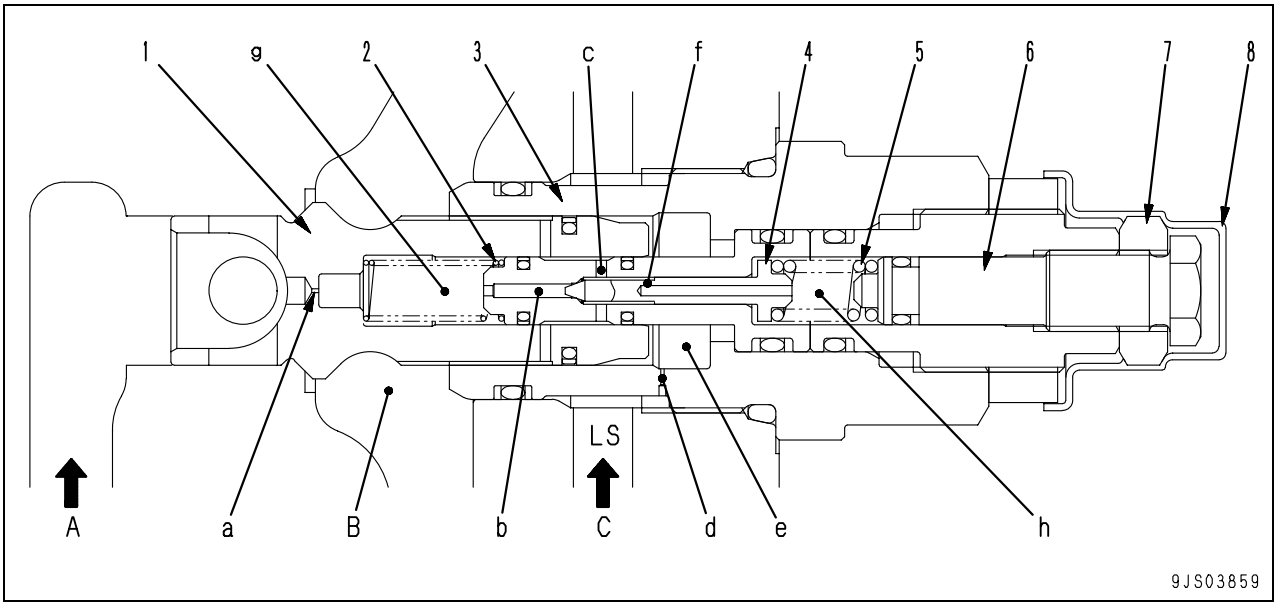
2. If pilot pressure is ON (low-pressure setting)

- If the pilot pressure (P) is ON, the pilot pressure is led to section (A) via passage (B).
- Piston (2) works on the pressure-receiving bore portion [(d2) ñ\ (d1)] of section A.
- This pilot pressure contracts spring (3), and piston (2) moves to the right until making contact with holder (4).
- Spring (1) stretches, installed load is reduced, and the set pressure lowers.
- Pressurized oil proportionate to the piston stroke is drained via passage (C) and chamber (D).



Variable pressure compensation valve

(Installed to the service valve)



A. Pump discharge pressure (P) (From service valve spool)
B. Cylinder port
C. Load pressure of other work equipment

1. Valve
2. Spring
3. Sleeve
4. Poppet
5. Spring
6. Screw
7. Locknut
8. Cap

Function

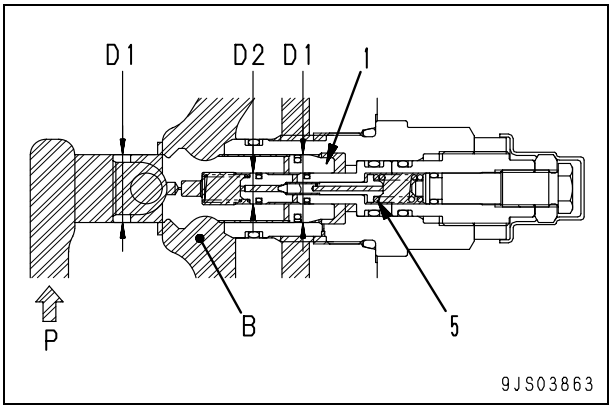
- Regulates flow distribution to the service valve when the service valve (attachment) and the work equipment valve (boom raising, etc.) are operated together. (Equivalent surface area ratio variable)
- Pressurized oil from the service valve spool is applied to the left side of valve (1) and is led to chamber (g) via orifice (a).
- LS pressure is led to chamber (e) via orifice (d).
- Pressurized oil of cylinder port is led to chamber (h) via passage (c) and orifice (f).
- The force of spring (2) acts on valve (1), and the force of spring (5) acts on poppet (4).
- The force of spring (5) can be adjusted with screw (6).

Operation when jointly operated with a high-load work equipment (such as the boom raising)

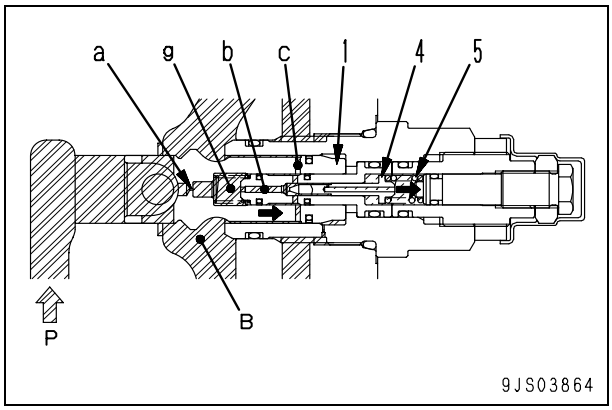
- Both of the pump discharge pressure (P) and LS pressures are determined by other equipment's pressure, while cylinder port pressure causes the attachment to operate.
- If the difference between the pump discharge pressure (P) and cylinder pressure is smaller than the force of spring (5), the balance of forces applying to valve (1) may be expressed with the following equation:

  P x A1 = P x A2 + LS(A2 – 1) + F

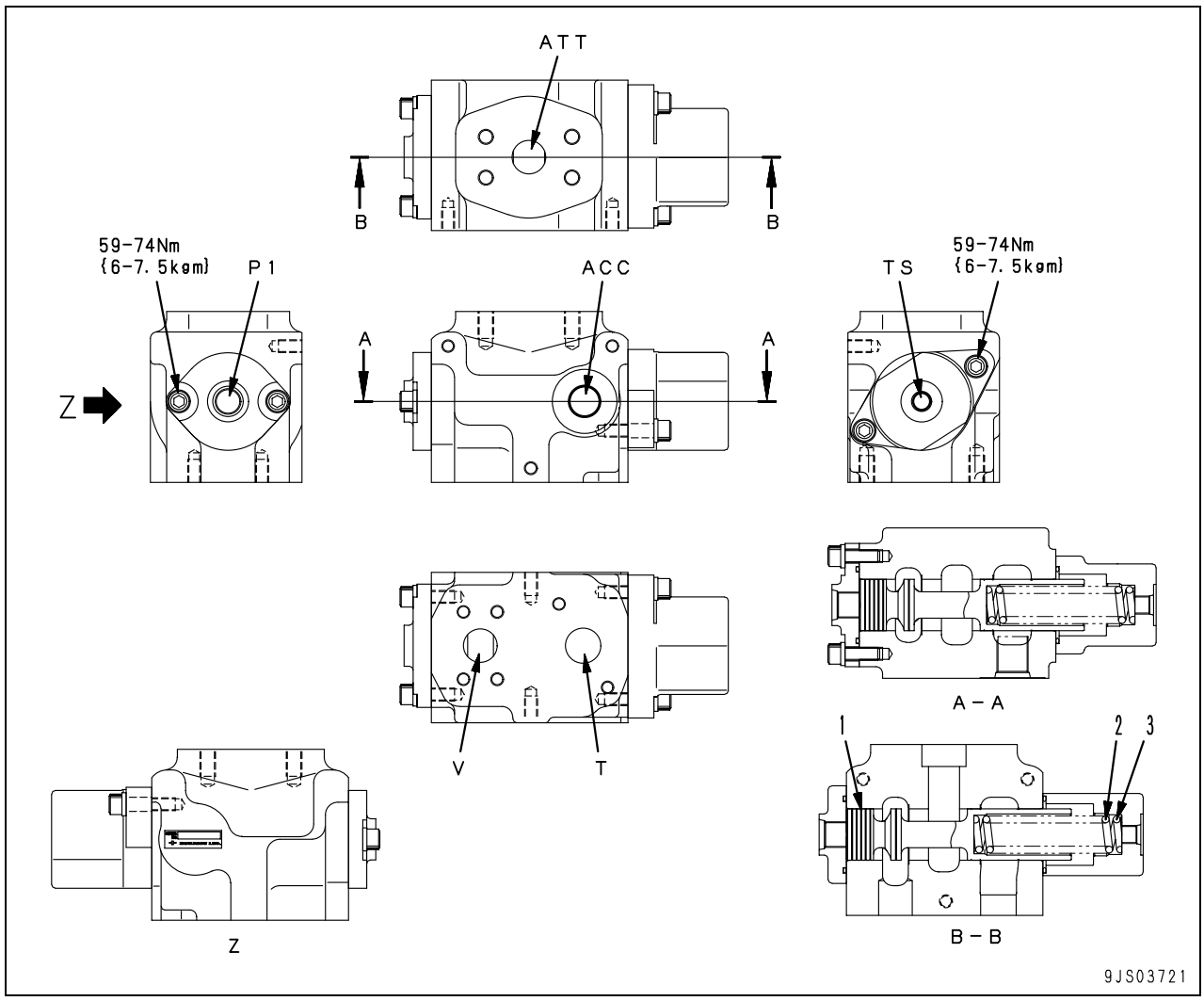
  A1: Area of ϕd1
  A2: Area of ϕd2
  F: Force of spring
  P: Pump discharge oil pressure



- If the difference between the pump discharge pressure (P) and cylinder port pressure (B) is larger than the force of spring (5), poppet (4) is pressed to the right.
- Pump discharge pressure (P) flows to orifice (a) and chamber (g) and is interconnected to cylinder port via passages (b) and (c).
- Differential pressure is generated between the upstream and downstream of orifice (a), which reduces the pressure force in chamber (g).
- Force that presses valve (1) to the left is reduced.
- A state is reached where the area ratio has become smaller.
- Valve (1) moves to the right, and the flow increases from the pump to the cylinder.



Attachment circuit selector valve



ACC: To accumulator
ATT: To attachment
P1: From attachment selector solenoid valve
T: To hydraulic oil tank
TS: To hydraulic oil tank
V: To control valve

1. Spool
2. Spring

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
3	Spool return spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		132 x 29	114.5	834 N {85.0 kg}	—	667 N {68.0 kg}	

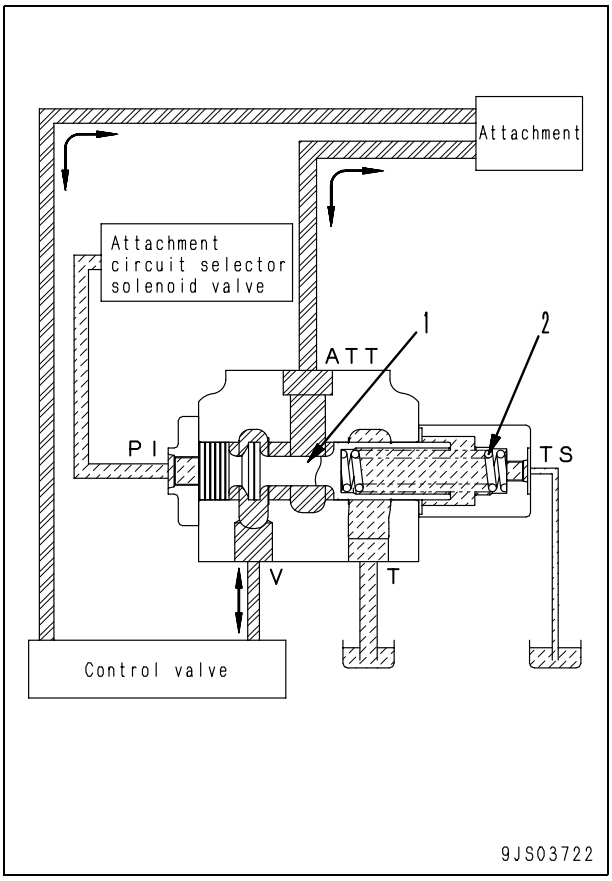
Function

- When a breaker is installed, the return oil from the breaker does not pass through the main valve, but returns directly to the hydraulic tank.
- When other attachments (crusher, etc.) are installed, the attachment and the main valve are interconnected.

Operation

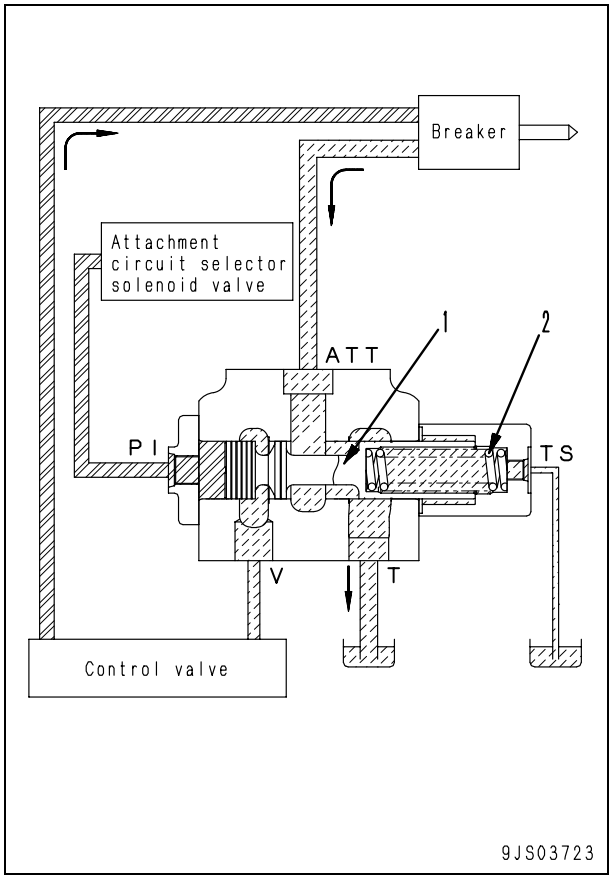
1. When attachment other than breaker is installed

- Spool (1) is pressed to the left by the force of spring (2).
- Ports (ATT) and (V) are interconnected and ports (ATT) and (T) are shut off. Attachment is thus interconnected to the control valve.



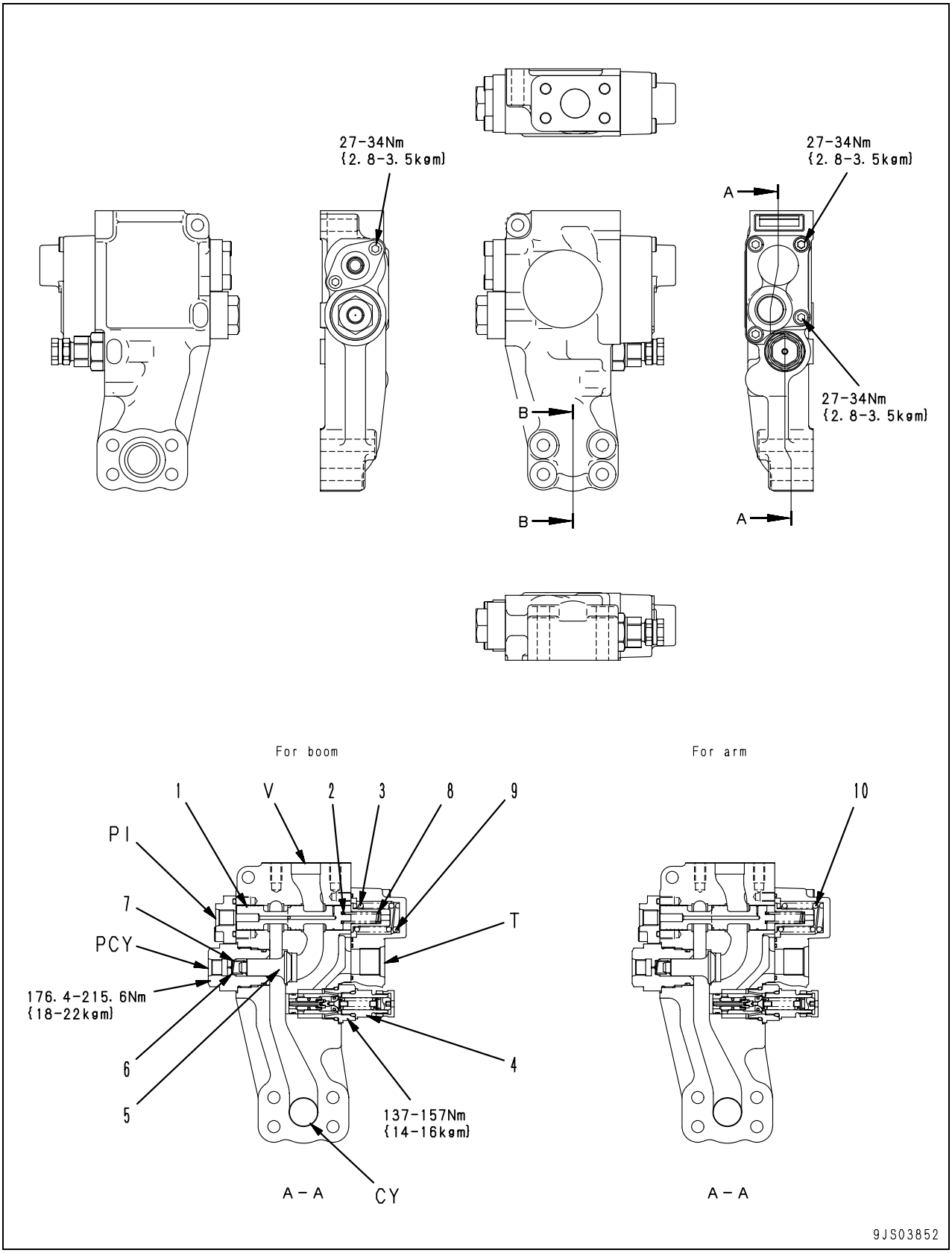
2. When breaker is installed

- Pilot pressure from the attachment circuit selector solenoid valve contracts spring (2), and spool (1) moves to the right to the stroke end.
- Ports (ATT) and (V) are shut off and ports (ATT) and (T) are interconnected.
- Pressurized oil returning from the breaker returns directly to the hydraulic tank via port (T) without passing through the control valve.



Hydraulic drift prevention valve

(For the boom and arm)



CY: To work equipment cylinder
PCY: For pressure pickup port and equalizer circuit
PI: From PPC valve
T: To tank
V: From control valve

1. Pilot spool
2. Spool (1st stage spool)
3. Spring (2nd stage spool)
4. Safety valve
5. Check valve
6. Spring

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
7	Check valve spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		20.8 x 12.2	13.5	12.7 N {1.3 kg}	—	10.2 N {1.04 kg}	
8	Spool return spring	41.1 x 9.6	35.0	58.8 N {6.0 kg}	—	47.1 N {4.8 kg}	
9	Spool return spring	41.9 x 25.8	41.0	78.5 N {8.0 kg}	—	62.8 N {6.4 kg}	
10	Spool return spring	44.6 x 25.6	41.0	181 N {18.5 kg}	—	145 N {14.8 kg}	

Function

- Prevents the pressurized oil from reversing from the work equipment cylinder and the latter from a sudden drop if the piping bursts between the control valve and the work equipment cylinder.

Operation

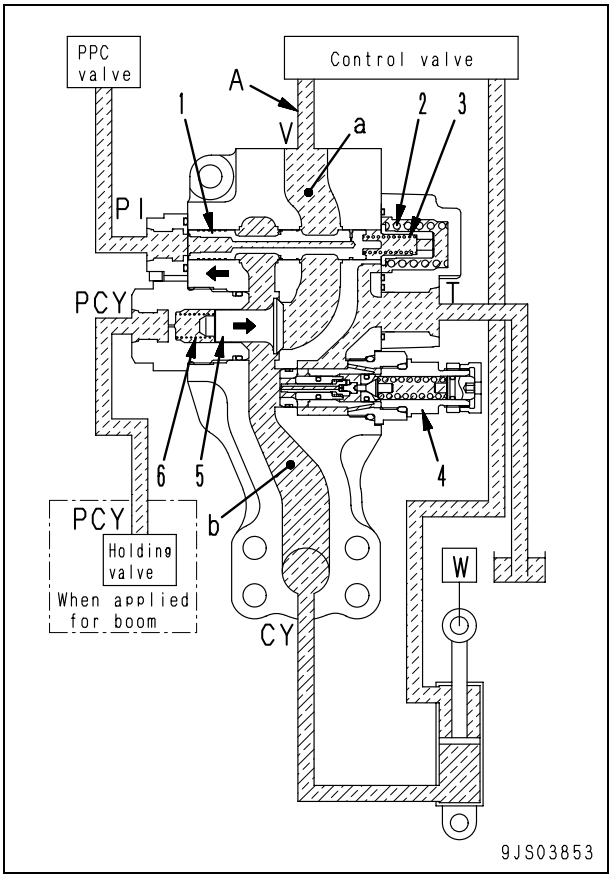
1. When the work equipment lever is in neutral

When the piping is free of burst

- Check valve (5) is closed under the holding pressure of the cylinder led from port (CY) to chamber (b).
- Pilot pressure led to port (PI) from the PPC valve when in neutral is 0 kg/cm^2.
- Spool (1) is pressed to the left by the force of springs (2) and (3)
- Chambers (a) and (b) are shut off.
- No pressurized oil flows between the control valve and the work equipment cylinder.
- Accordingly, the work equipment is held in position.
- If the work equipment cylinder has abnormally high pressure, safety valve (4) is actuated by the holding pressure of the work equipment cylinder.
- Chambers (b) of L.H. and R.H. hydraulic drift prevention valve for the boom are interconnected by port (PCY).
- Chambers (b) will have the same pressure if the L.H. and R.H. hydraulic drift prevention valves have a difference in leakage.

If the piping is bursted

- If piping (A) bursts between the control valve and the work equipment cylinder, chambers (a) and (b) are shut off same as when the piping has no burst.
- Pressure for the work equipment cylinder is held to prevent a sudden drop of the work equipment.



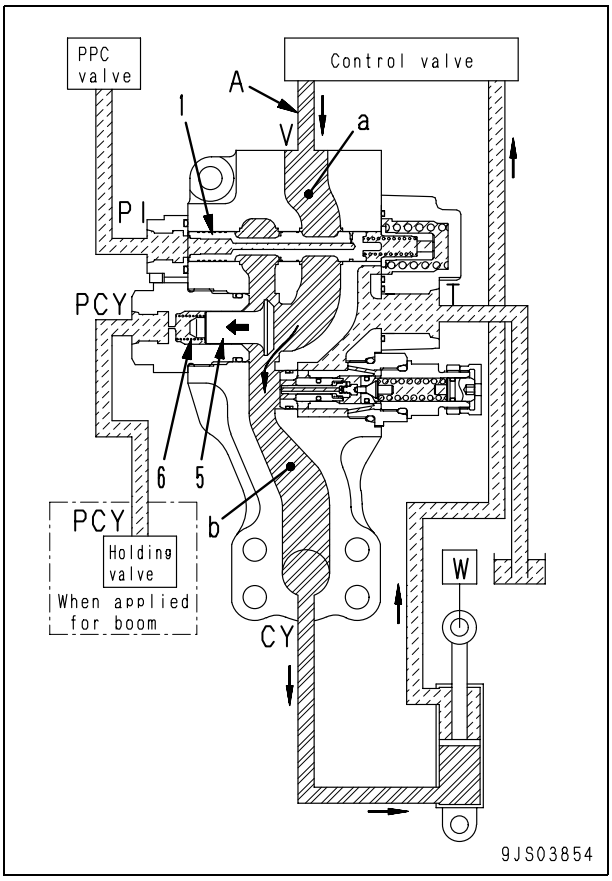
2. When pressurized oil flows from the main valve to the cylinder

When the piping is free of burst

- Pressurized oil led to chamber (a) from the control valve becomes higher than the combined force of pressure from work equipment cylinder circuit chamber (b) and spring (6).
- Check valve (5) opens and chambers (a) and (b) are interconnected.
- Pressurized oil flows from the control valve to the work equipment cylinder.

If the piping is bursted

- If piping (A) bursts between the control valve and the work equipment cylinder, pressurized oil in chamber (a) flows outside from the bursted portion.
- Pressure force in chamber (a) drops.
- Pressure force in chamber (a) drops lower than the combined pressure force of chamber (b) and spring (6).
- Check valve (5) closes and chambers (a) and (b) are cut off.
- Pressure for the work equipment cylinder is held to prevent a sudden drop of the work equipment.



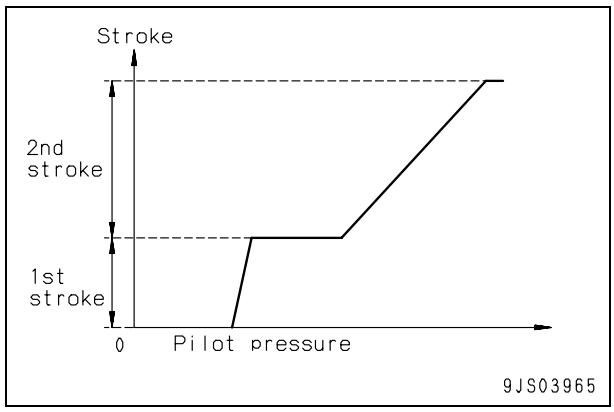
3. When returning pressurized oil to the main valve from the work equipment cylinder

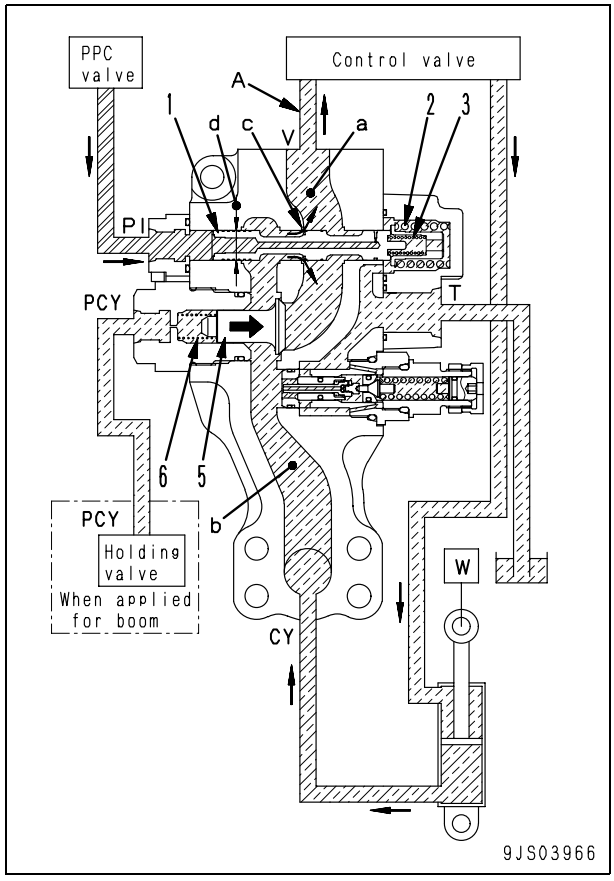
When the piping is free of burst

- Holding pressure of the work equipment cylinder is led to chamber (b) and check valve (5) closes.
- Pilot pressure from the PPC valve is led to port (PI) and reaches [Pilot Pressure > Force of Spring (3)] (area of d).
- Spool (1) moves to the right to the standby position. (1st stage stroke)
- At this point, chambers (a) and (b) are not interconnected.
- Pilot pressure further rises, and reaches [Pilot pressure > Force of spring (2)] (area of d).
- Spool (1) moves further to the right, and chambers (a) and (b) are interconnected. (2nd stage stroke)
- Pressurized oil returns to the control valve from the work equipment cylinder.

If the piping is bursted

- If piping (A) bursts between the control valve and the work equipment cylinder.
- Pressurized oil in chamber (a) flows out to the bursted portion but resupplied from chamber (b).
- Since pressurized oil flows via opening (c) of spool (1), a sudden drop of the cylinder is prevented.





KOMATSU PC340 (LC / NLC) -7 Hydraulic excavator

Form No. UEN00273-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

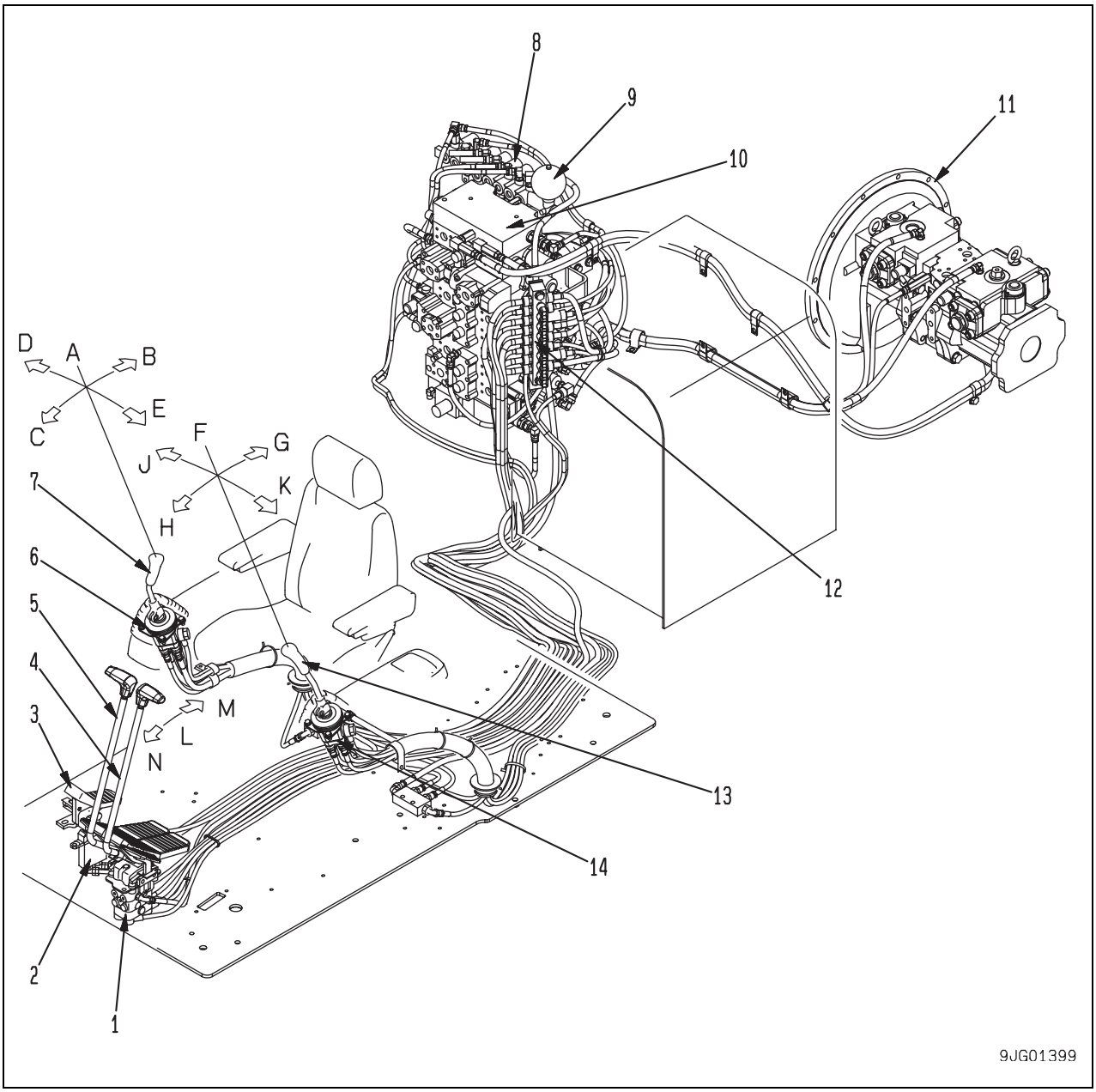
10 Structure, function and maintenance standard

Hydraulic system, Part 3

Hydraulic system, Part 3 2
Valve control 2
PPC valve 4
Solenoid valve 20
PPC accumulator 22
Return oil filter 23
Center swivel joint 24
Travel motor 25
Swing motor 37
Hydraulic cylinder 46

Hydraulic system, Part 3

Valve control



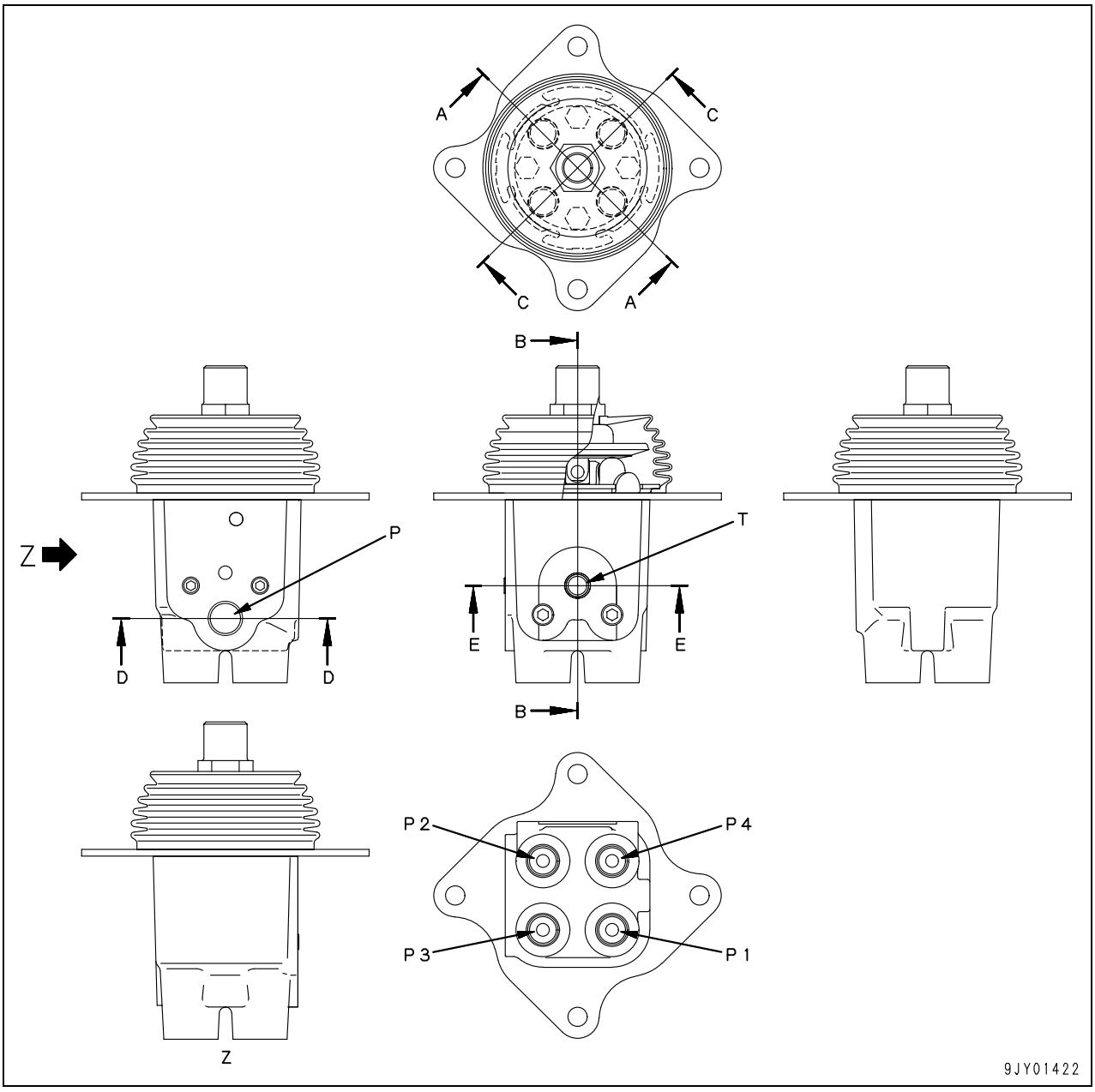
1. Travel PPC valve
2. Service PPC valve
3. Service pedal
4. L.H. travel lever
5. R.H travel lever
6. R.H. PPC valve
7. R.H. work equipment control lever
8. Solenoid block
9. Accumulator
10. Control valve
11. Hydraulic pump
12. Junction box
13. L.H. work equipment control lever
14. L.H. PPC valve

Lever positions

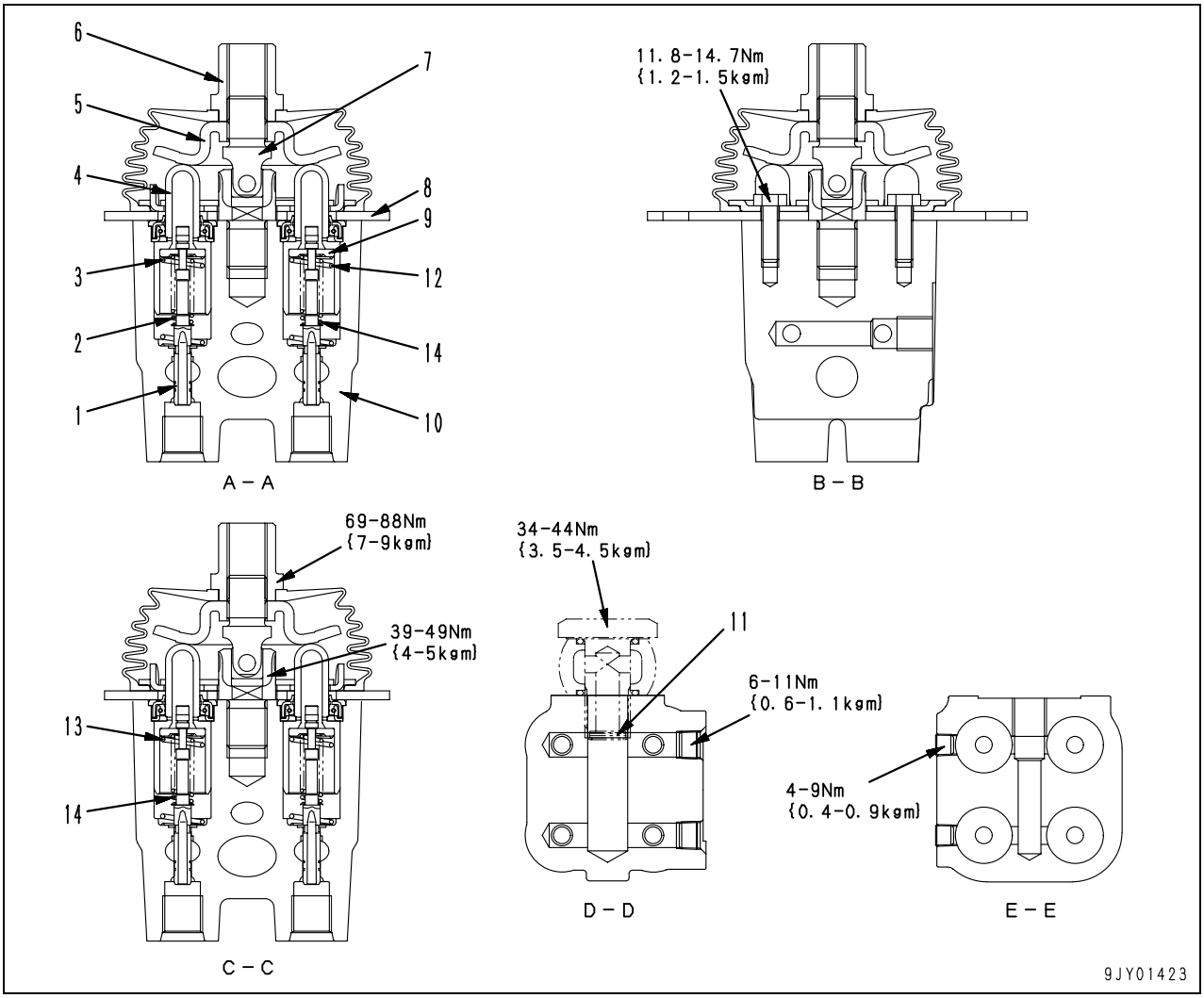
A. Hold
B. Boom (RAISE)
C. Boom (LOWER)
D. Bucket (DUMP)
E. Bucket (CURL)
F. Hold
G. Arm (IN)
H. Arm (OUT)
J. Swing (RIGHT)
K. Swing (LEFT)
L. Neutral
M. Travel (REVERSE)
N. Travel (FORWARD)

PPC valve

Work equipment and swing PPC valve



P: From self pressure reducing valve
P1: L.H. PPC: Arm out/R.H. PPC: Boom lower
P2: L.H. PPC: Arm in/R.H. PPC: Boom raise
P3: L.H. PPC: Swing left/R.H. PPC: Bucket curl
P4: L.H. PPC: Swing right/R.H. PPC: Bucket dump
T: To tank



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

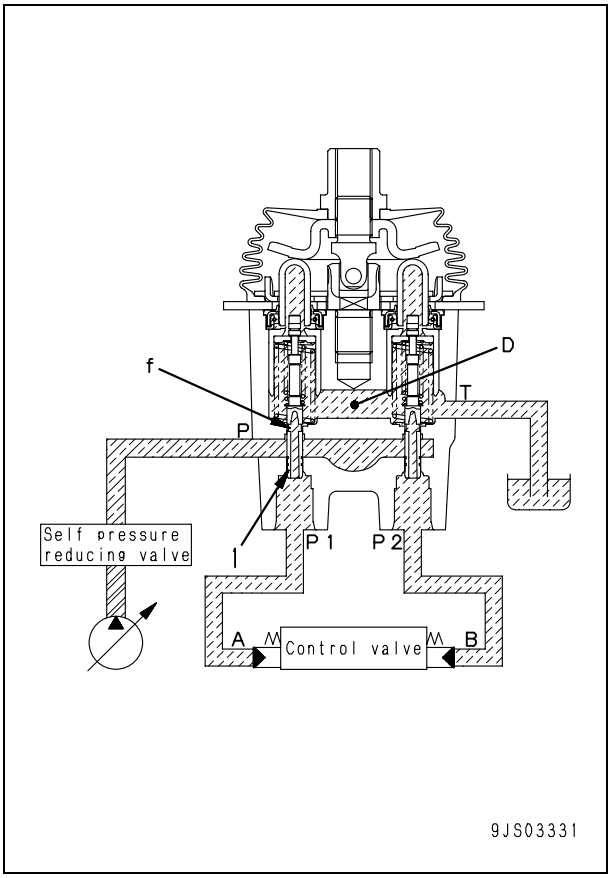
Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
12	Centering spring (for ports P3 and P4)	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		42.5 x 15.5	34.0	17.7 N {1.80 kg}	—	13.7 N {1.40 kg}	
13	Centering spring (for ports P1 and P2)	44.5 x 15.5	34.0	29.4 N {3.0 kg}	—	23.5 N {2.40 kg}	
14	Metering spring	26.5 x 8.15	24.9	16.7 N {1.70 kg}	—	13.7 N {1.40 kg}	

Operation

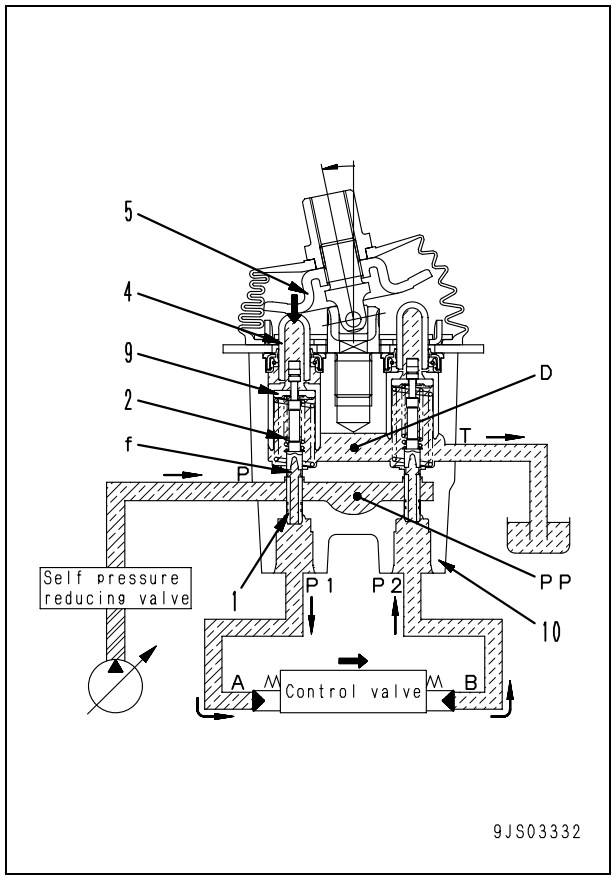
1. When in neutral

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



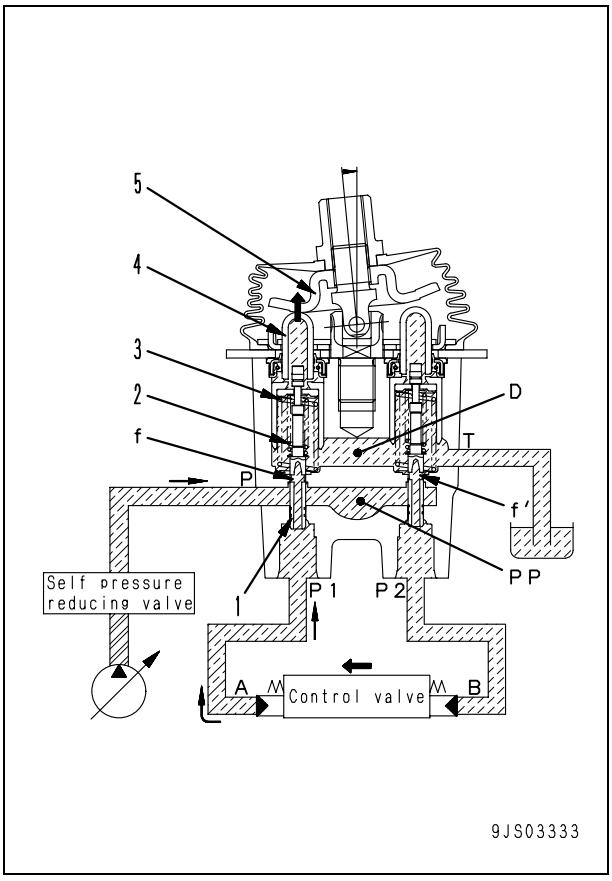
2. During fine control (Neutral → fine control)

- When piston (4) is pushed by disc (5), retainer (9) is pushed, spool (1) is also pushed by metering spring (2), and moves down.
- When fine control hole (f) is shut off from drain chamber (D), it is almost simultaneously interconnected to pump pressure chamber (PP).
- Pilot pressurized oil of the control pump is led to port (A) from port (P1) via fine control hole (f).
- When the pressure at port (P1) becomes higher, spool (1) is pushed back and 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 at port (P1).
- The relationship of the position of spool (1) and body (10) [fine control hole (f) is in the middle between drain chamber (D) and pump pressure chamber (PP)] does not change until retainer (9) contacts spool (1).
- Metering spring (2) contracts in proportion to the stroke of the control lever.
- Pressure at port (P1) also rises in proportion to the stroke 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.



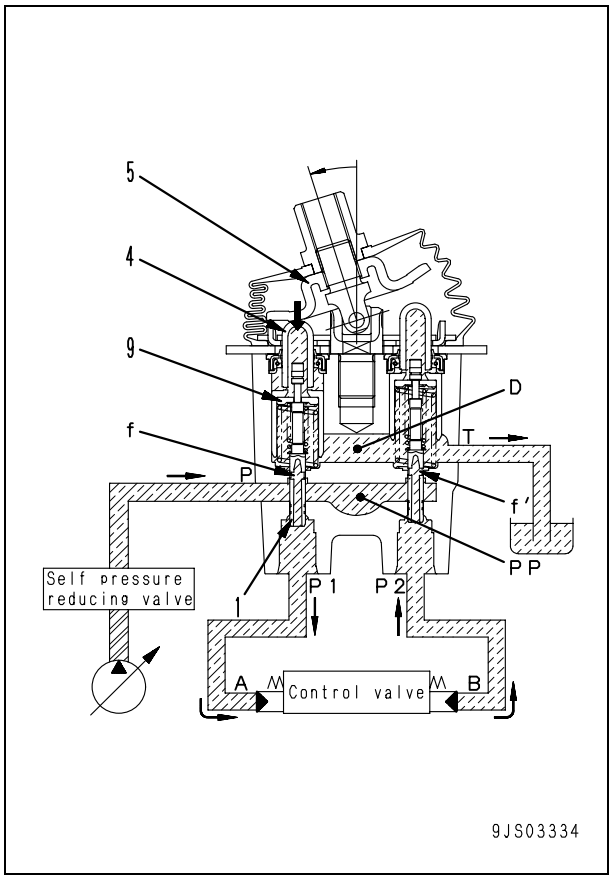
3. During fine control
(When control lever is returned)

- 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 of port (P1) is lowered excessively, spool (1) is pushed down by metering spring (2).
- Fine control hole (f) is shut off from drain chamber (D), and it is almost simultaneously interconnected to pump pressure chamber (PP).
- Pump pressure is supplied until the pressure at port (P1) recovers to the level equivalent to the lever position.
- When the spool of the control valve returns, the oil in drain chamber (D) flows in from fine control hole (f') in the valve on the side that is not working. The oil passes through port (P2) and enters chamber (B) to replenish the chamber with pressurized oil.

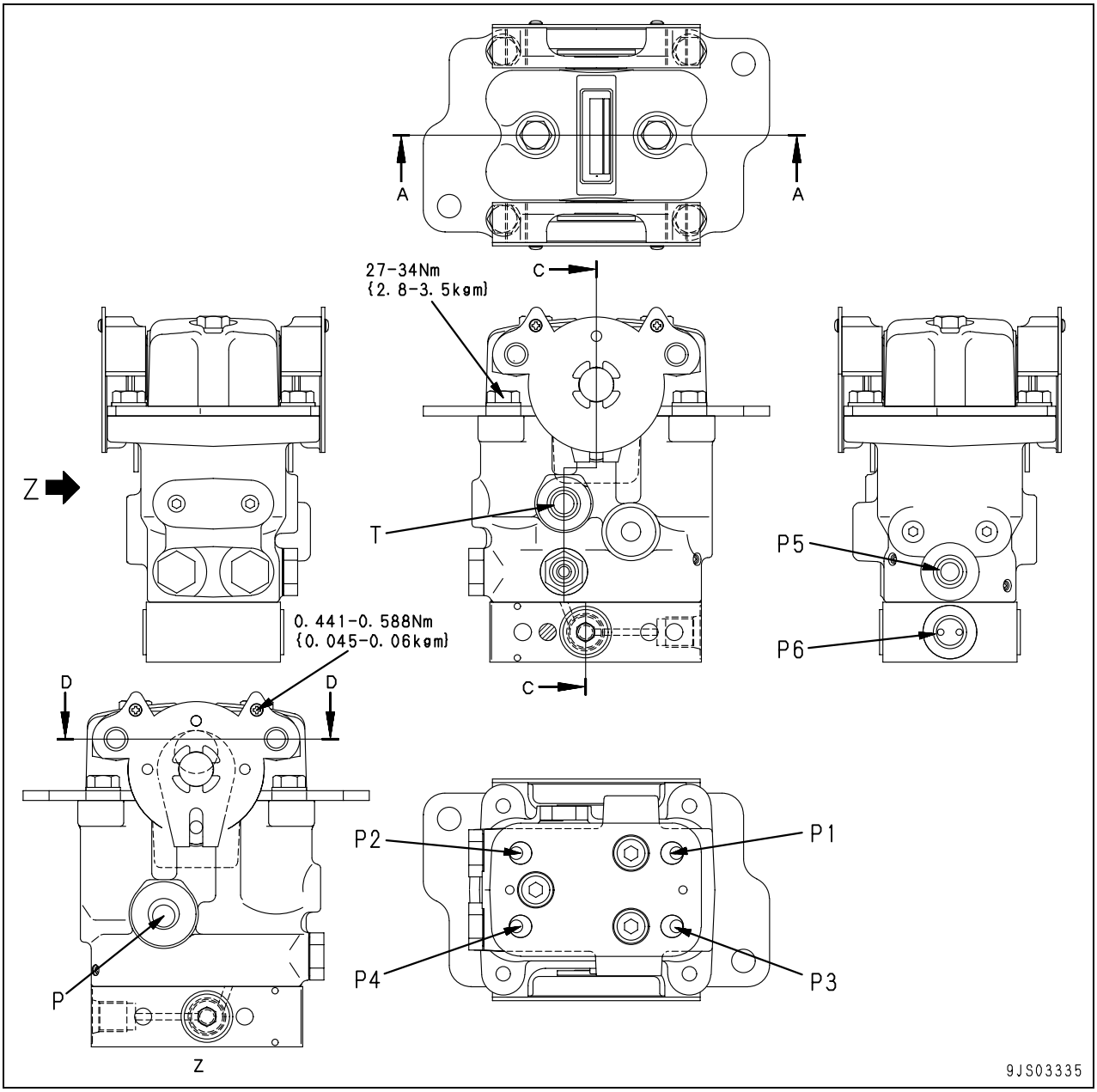


4. At full stroke

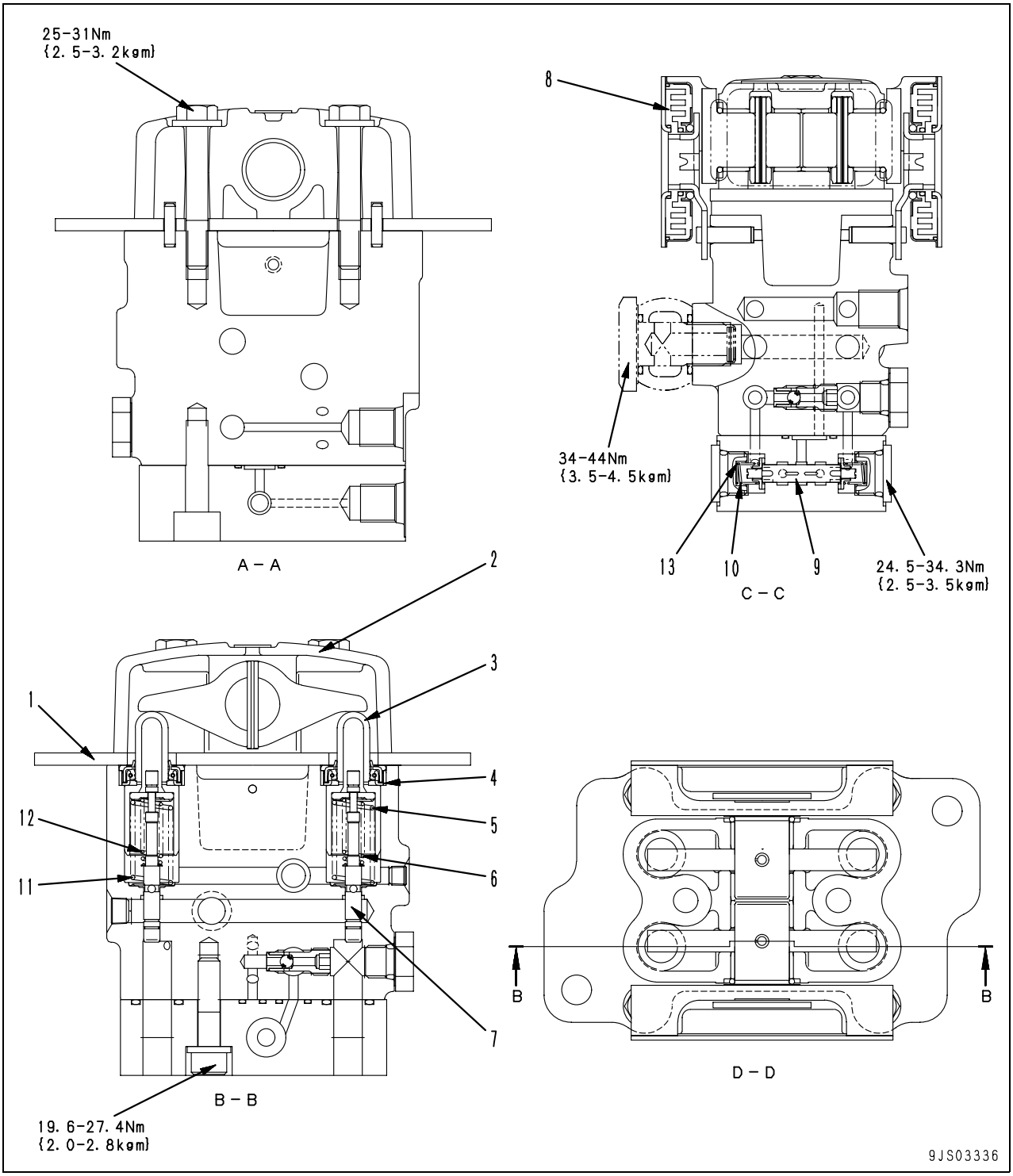
- Disc (5) pushes down piston (4), and retainer (9) pushes down spool (1).
- Fine control hole (f) is shut off from drain chamber (D), and is interconnected to pump pressure chamber (PP).
- Therefore, the pilot pressure oil from the self pressure reducing valve passes through fine control hole (f) and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



Travel PPC valve



P: From self pressure reducing valve
P1: L.H. reverse
P2: L.H. forward
P3: R.H. reverse
P4: R.H. forward
P5: Travel signal
P6: Steering signal
T: To tank


25-31Nm
{2.5-3.2kgm}
A - A
8
34-44Nm
{3.5-4.5kgm}
13
10
9
24.5-34.3Nm
{2.5-3.5kgm}
C - C
2
3
1
4
12
5
11
6
7
19.6-27.4Nm
{2.0-2.8kgm}
B - B
B
B
D - D
9JS03336

1. Plate
2. Body
3. Piston
4. Collar
5. Centering spring
6. Metering spring
7. Valve
8. Dumper
9. Steering signal spool
10. Steering signal spool spring

Unit: mm

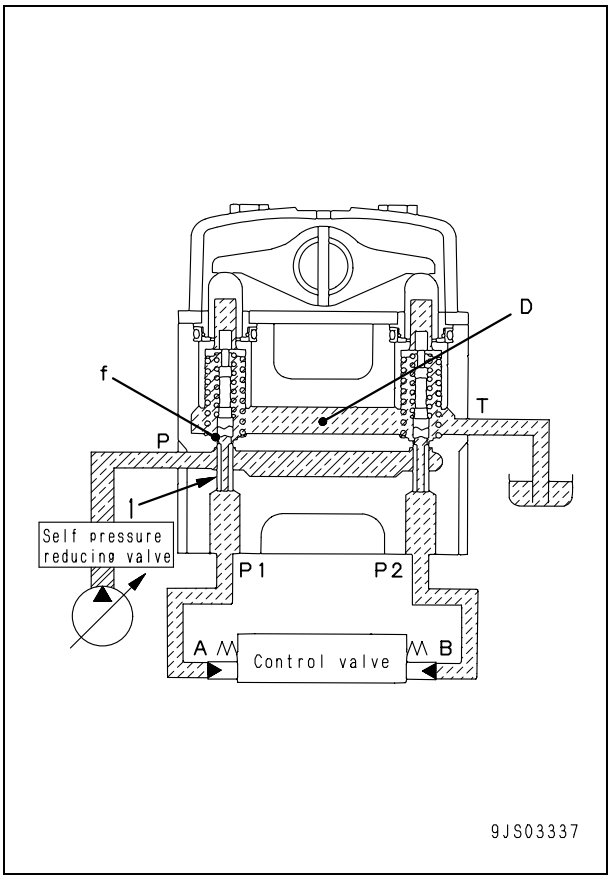
No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
11	Centering spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		47.6 x 15.5	32.5	108 N {11.0 kg}	—	86.3 N {8.8 kg}	
12	Metering spring	26.5 x 8.15	24.9	16.7 N {1.7 kg}	—	13.7 N {1.4 kg}	
13	Steering signal spring	12.8 x 7.3	8.5	8.8 N {0.9 kg}	—	7.1 N {0.72 kg}	

1. Pressure reducing valve

Operation

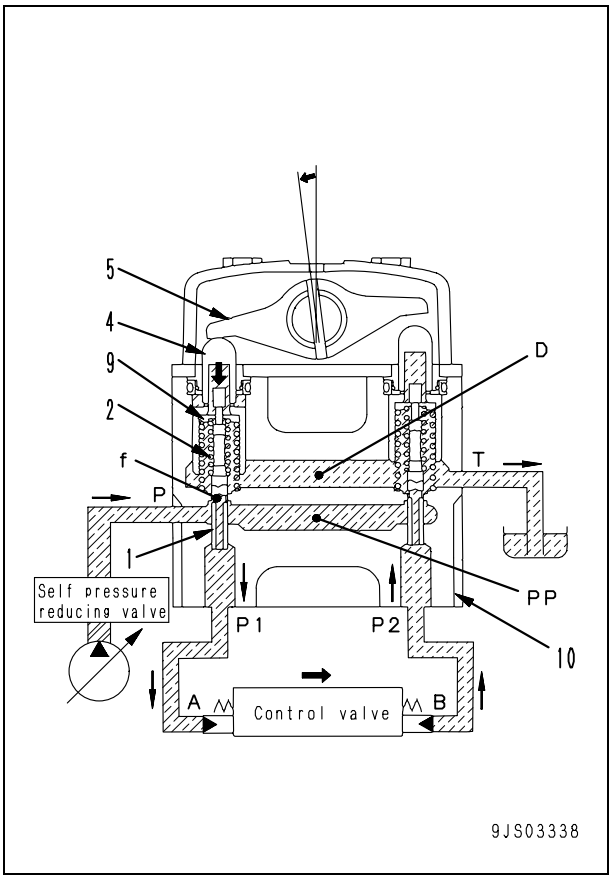
1) When in neutral

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



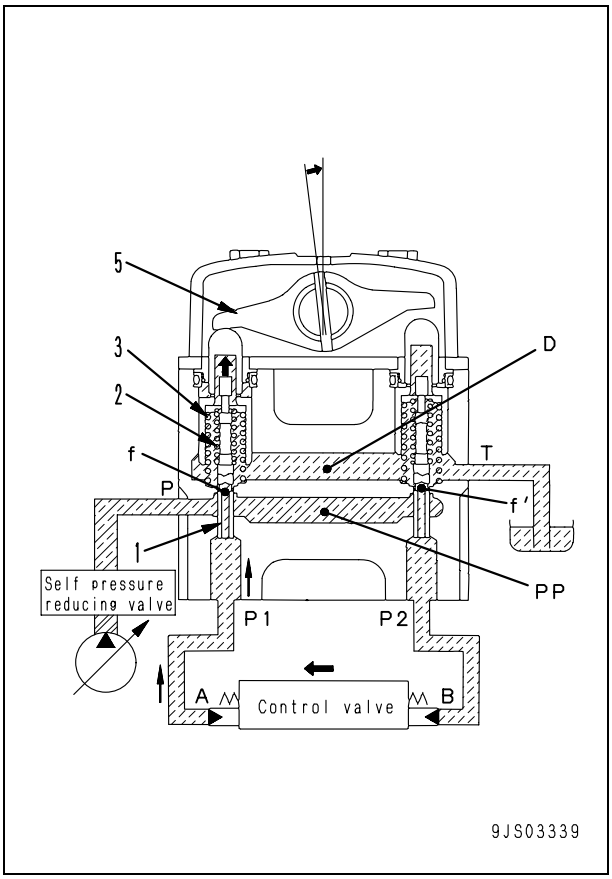
2) During fine control (Neutral → fine control)

- When piston (4) is pushed by disc (5), retainer (9) is pushed, spool (1) is also pushed by metering spring (2), and moves down.
- When fine control hole (f) is shut off from drain chamber (D), it is almost simultaneously interconnected to pump pressure chamber (PP).
- Pilot pressurized oil of the control pump is led to port (A) from port (P1) via fine control hole (f).
- When the pressure at port (P1) becomes higher, spool (1) is pushed back and 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 at port (P1).
- The relationship of the position of spool (1) and body (10) [fine control hole (f) is in the middle between drain chamber (D) and pump pressure chamber (PP)] does not change until retainer (9) contacts spool (1).
- Metering spring (2) contracts in proportion to the stroke of the control lever.
- Pressure at port (P1) also rises in proportion to the stroke 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.



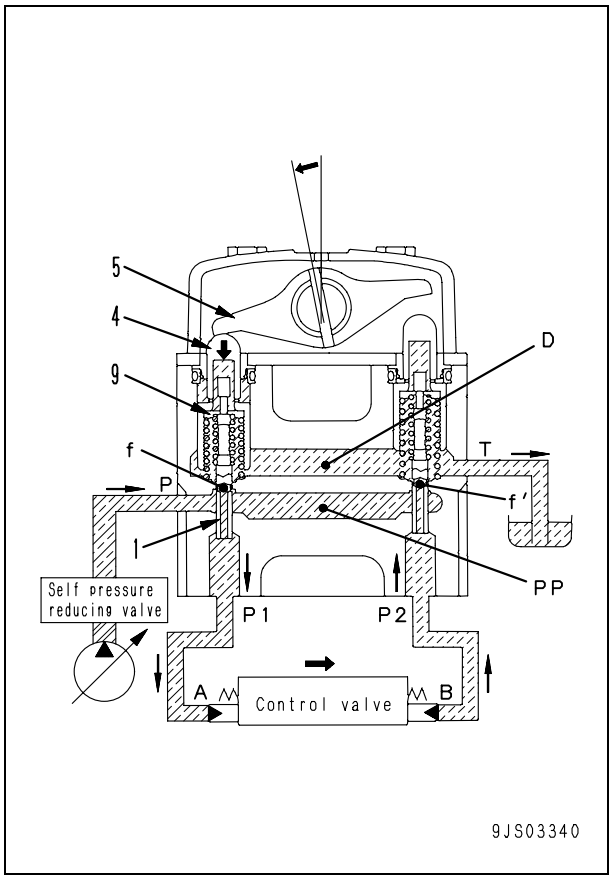
3) During fine control
(When control lever is returned)

- When lever (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and 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 of port (P1) is lowered excessively, spool (1) is pushed down by metering spring (2).
- Fine control hole (f) is shut off from drain chamber (D), and it is almost simultaneously interconnected to pump pressure chamber (PP).
- Pump pressure is supplied until the pressure at port (P1) recovers to the level equivalent to the lever position.
- When the spool of the control valve returns, the oil in drain chamber (D) flows in from fine control hole (f') in the valve on the side that is not working. The oil passes through port (P2) and enters chamber (B) to replenish the chamber with pressurized oil.



4) At full stroke

- Lever (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 interconnected to pump pressure chamber (PP).
- Therefore, the pilot pressure oil from the self pressure reducing valve passes through fine control hole (f) and flows to chamber (A) from port (P1) to push the control valve spool.
- The oil returning from chamber (B) passes from port (P2) through fine control hole (f') and flows to drain chamber (D).



2. Travel signal/Steering function

Travel signal

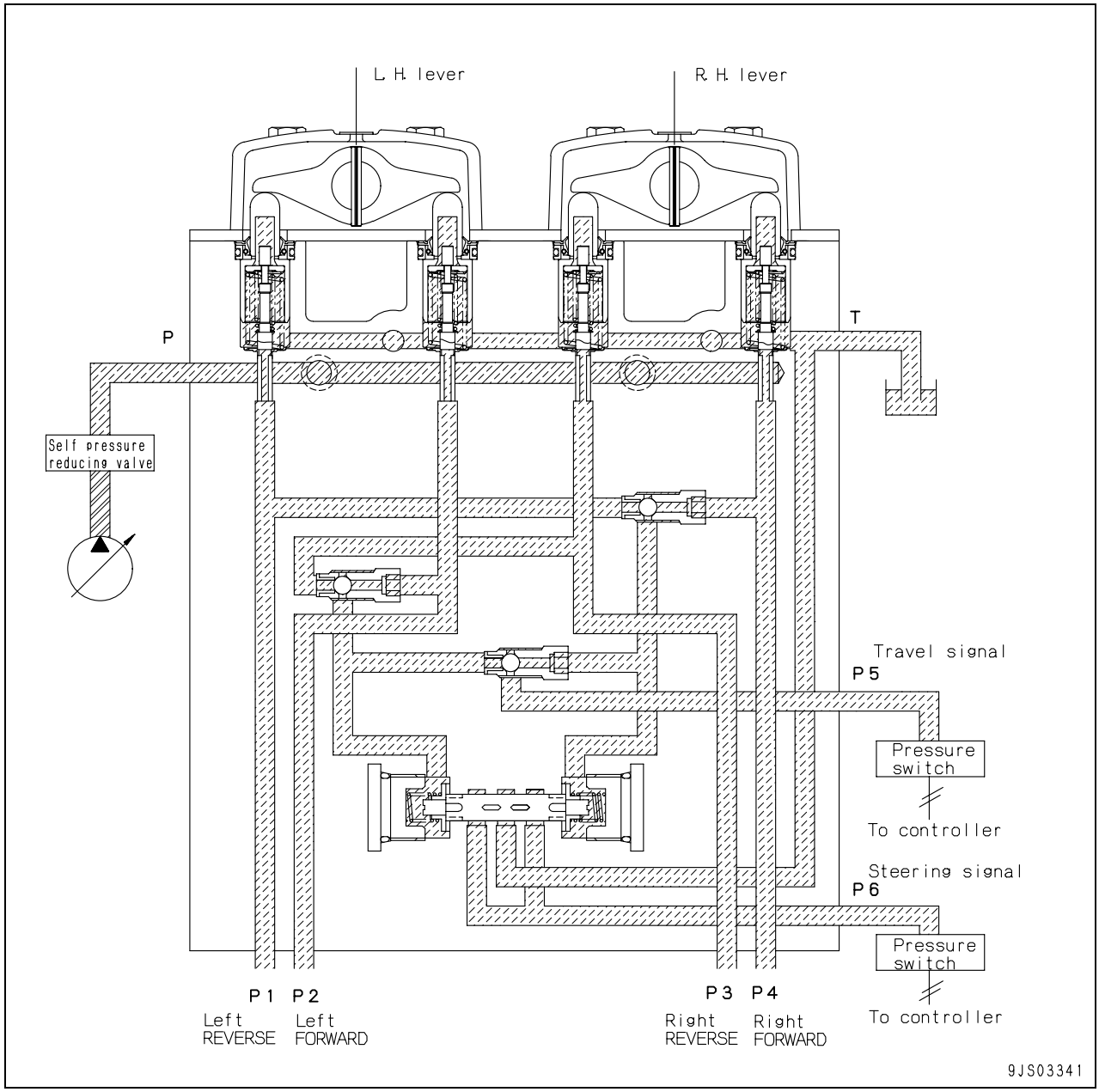
- Travel signal if either of the L.H. or R.H. travel levers is operated, the higher PPC output pressure of both sides is output as the travel signal.
- Accordingly, whether the machine is travelling is judged by the signal of port (P5).

Steering signal

- If the operation quantities of both levers are different from each other as in the steering operation, the higher one of the PPC output pressures of both sides is output as the steering signal.
- Any signal is not output from port (P6) while the machine is travelling straight (forward or reverse) or in neutral.
- Accordingly, whether the machine is being steered is judged by the signal of port (P6).

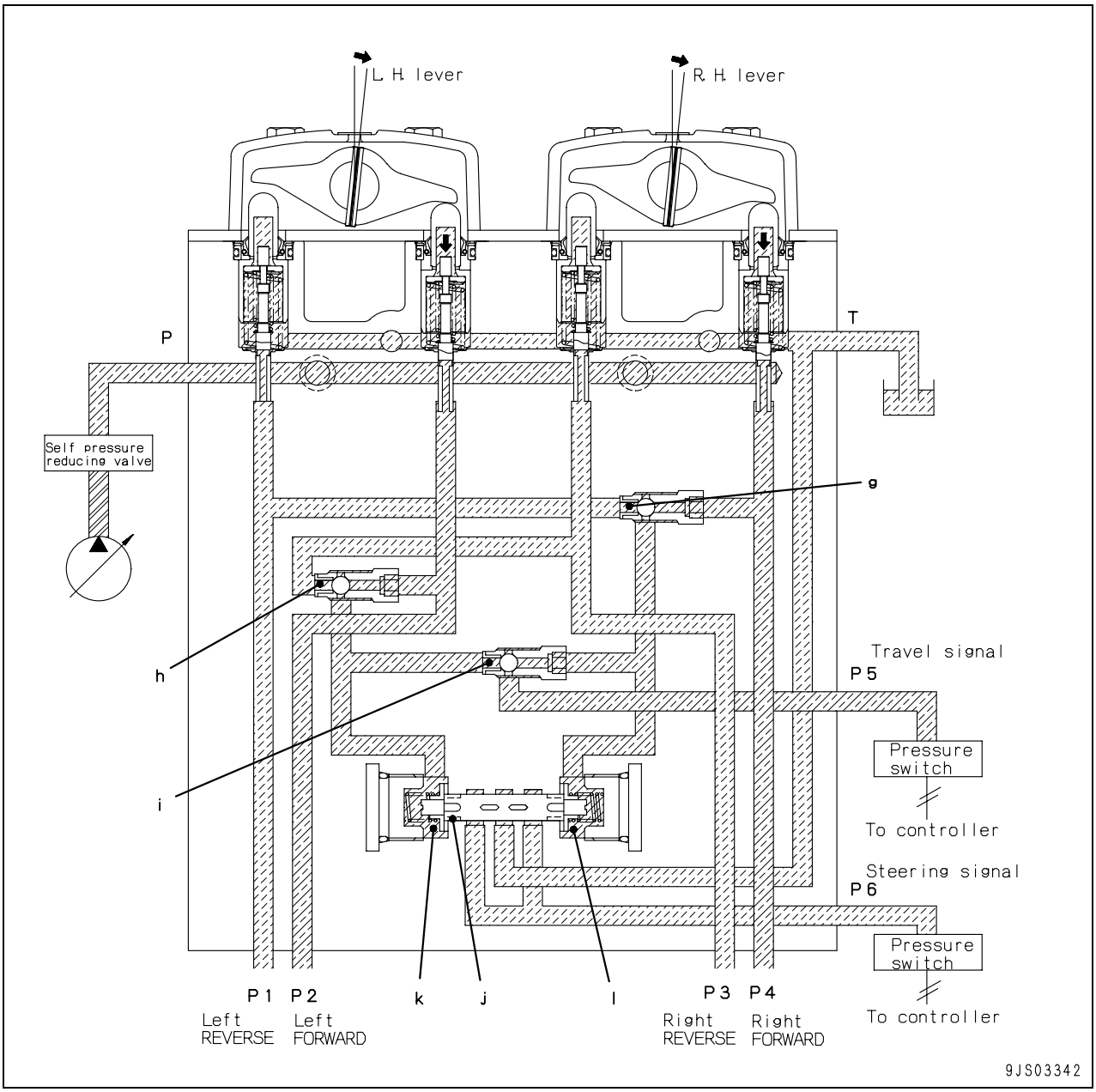
Operation

1) When in neutral



- No output is made from respective output ports [from port (P1) to (P4)], travel signal [port (P5)] and steering signal [port (P6)].

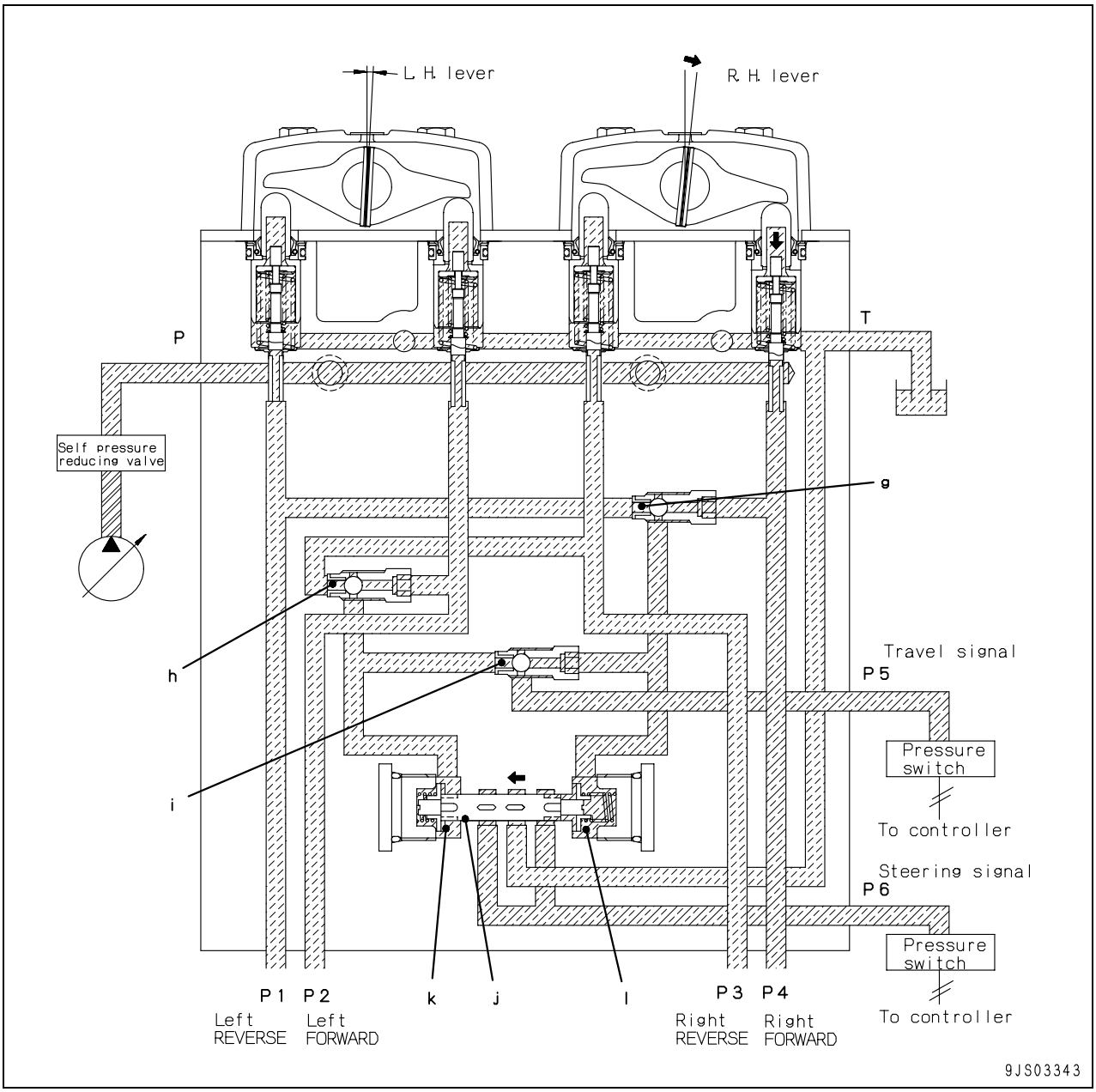
2) During straight travel



★ The Illustration shows the circuit for travelling straight forward.

- When operating L.H. motor forward [port (P2) output] and R.H. motor forward [port (P4) output], pressure of both L.H. spring chamber (k) and R.H. spring chamber (l) rises high.
- Steering signal spool (j) remains at neutral position and does not output a steering signal to port (P6).

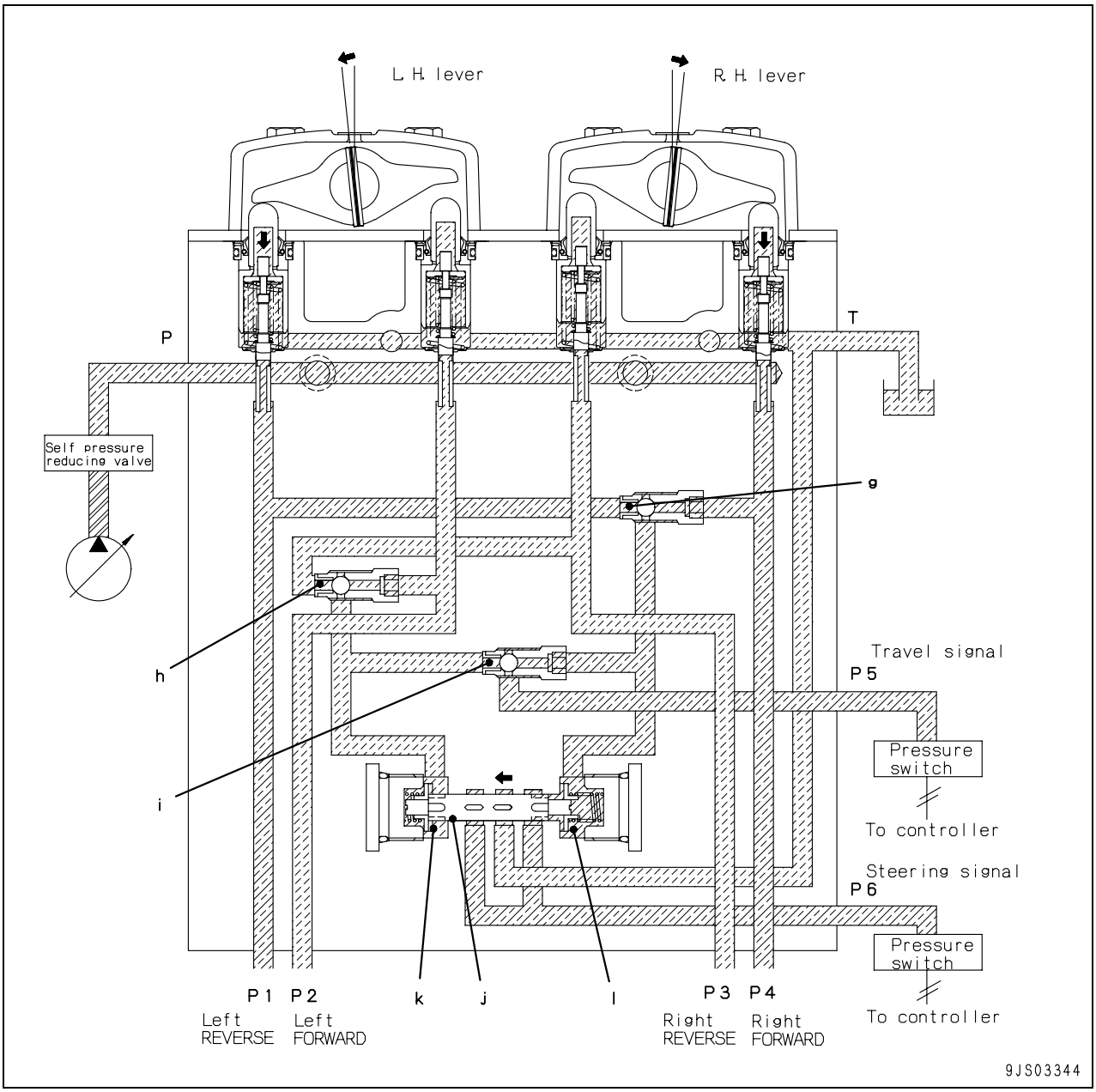
3) When steered or pivot-turned



★ The Illustration shows the circuit for left forward (slow) and right forward (fast) operation.

- If the operation quantities of both levers are different from each other as in the steering operation (if the difference of the pilot pressure between both sides is higher than a certain level), the pilot pressure is output as the steering signal.
- The pressure in left spring chamber (k) of steering signal spool (j) is (P2).
- The pressure in right spring chamber (l) is (P4).
- When the pressure state reaches [(P4 - P2) x (Spool section) > Spring set load], the spool is switched to the direction of the arrow.
- Port (P4) pressure of the L.H. or R.H. PPC valves, whichever having a higher output pressure, is output to port (P6) as the steering signal.

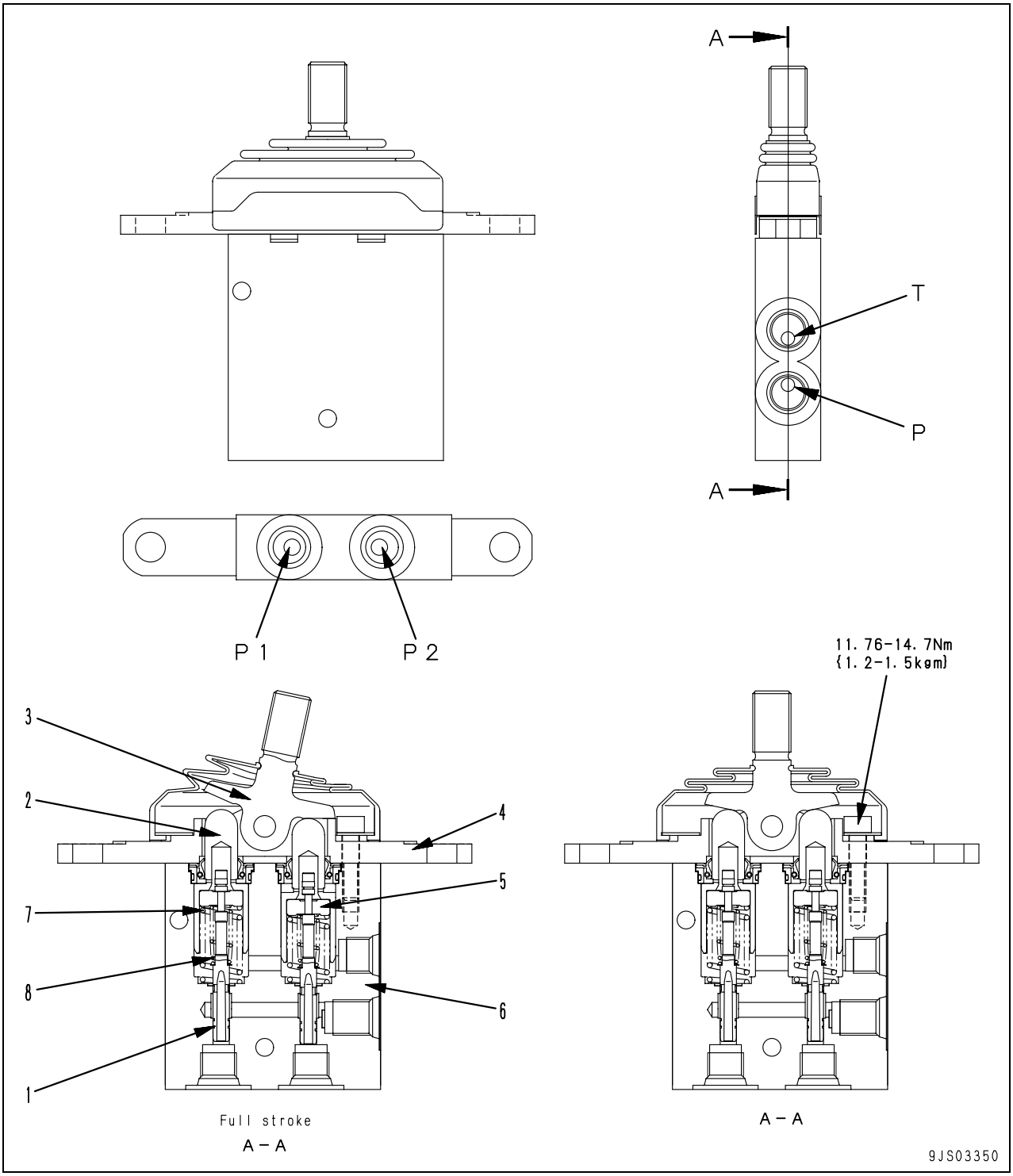
4) When counter-rotated



★ The illustration shows the circuit for travelling left reverse and right forward.

- When operating L.H. motor reverse [port (P1) output] and R.H. motor forward [port (P4) output], pressure of the R.H. spring chamber (l) only rises high.
- Steering signal spool (j) strokes to the left to output the steering signal to port (P6).

Service PPC valve



★ For the details of operation, see the paragraph of “Work equipment swing PPC valve.“

P: From self pressure reducing valve
P1: To service valve
P2: To service valve
T: To tank

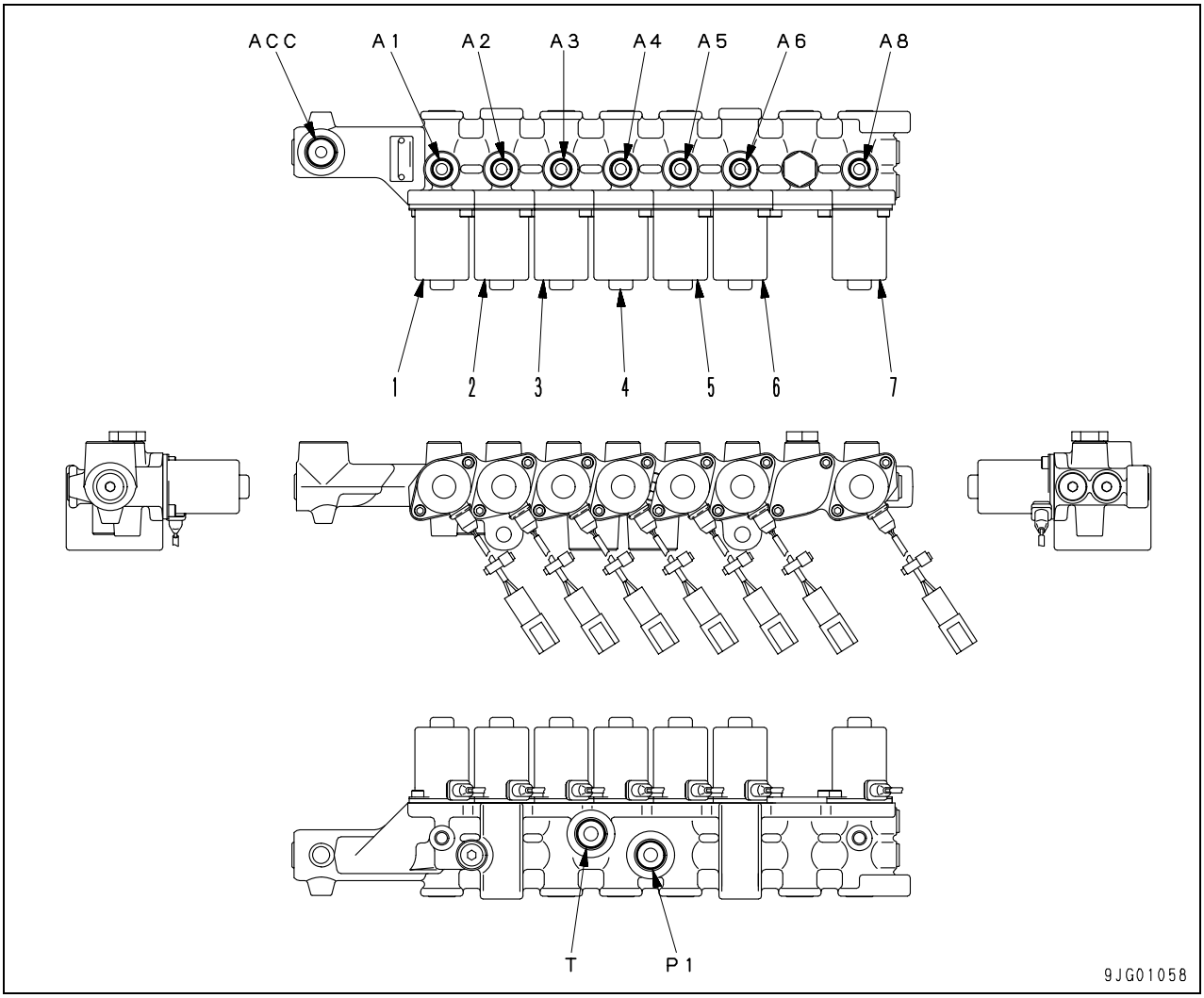
1. Spool
2. Piston
3. Lever
4. Plate
5. Retainer
6. Body

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
7	Centering spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		33.9 x 15.3	28.4	125 N {12.7 kg}	—	100 N {10.2 kg}	
8	Metering spring	22.7 x 8.10	22.0	16.7 N {1.70 kg}	—	13.3 N {1.36 kg}	

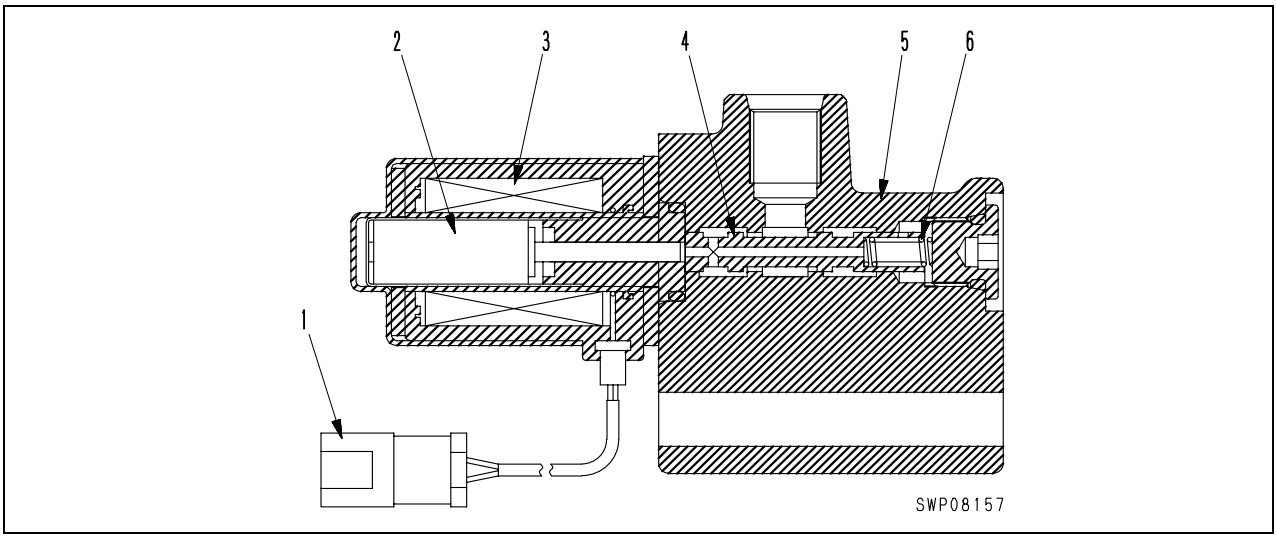
Solenoid valve

PPC lock, travel junction, merge-divider, travel speed, swing brake, machine push-up and 2-stage relief solenoid valves



1. PPC lock solenoid valve
2. Travel junction solenoid valve
3. Merge-divider solenoid valve
4. Travel speed solenoid valve
5. Swing brake solenoid valve
6. Machine push-up solenoid valve
7. 2-stage relief solenoid valve

T: To tank
A1: To PPC valve
A2: To main valve (Travel junction valve)
A3: To main valve (Merge-divider valve)
A4: To both travel motors
A5: To swing motor
A6: To main valve (2-stage safety valve at boom cylinder head)
A8: To main valve (2-stage relief valve)
P1: From main pump
ACC: To accumulator

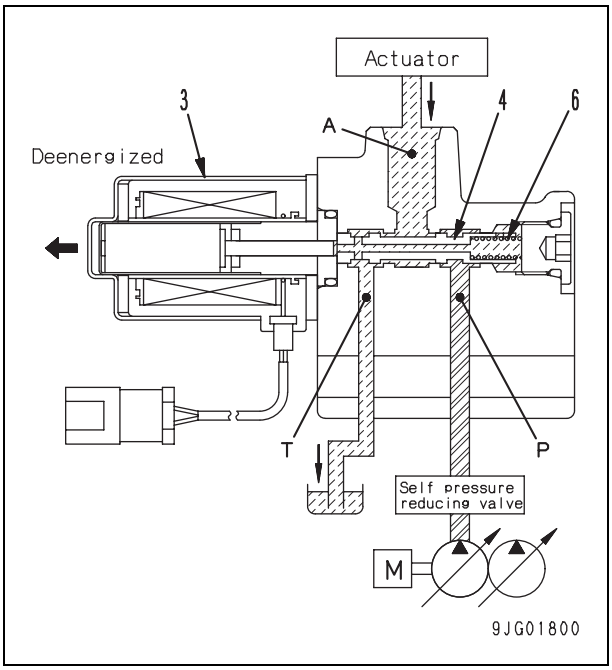


1. Connector
2. Moving core
3. Coil
4. Spool
5. Block
6. Spring

Operation

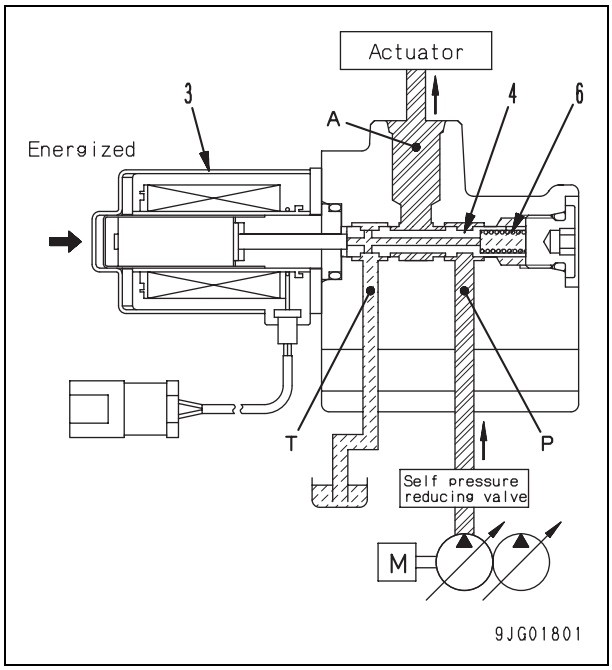
When solenoid is deenergized

- Since the signal current does not flow from the controller, solenoid (3) is deenergized. For this reason, spool (4) is pushed to the left by spring (6). By this operation, the pass from port (P) to port (A) is closed and the pressurized oil from the main pump does not flow into the actuator. At this time, the oil from the actuator is drained through ports (A) and (T) into the tank.

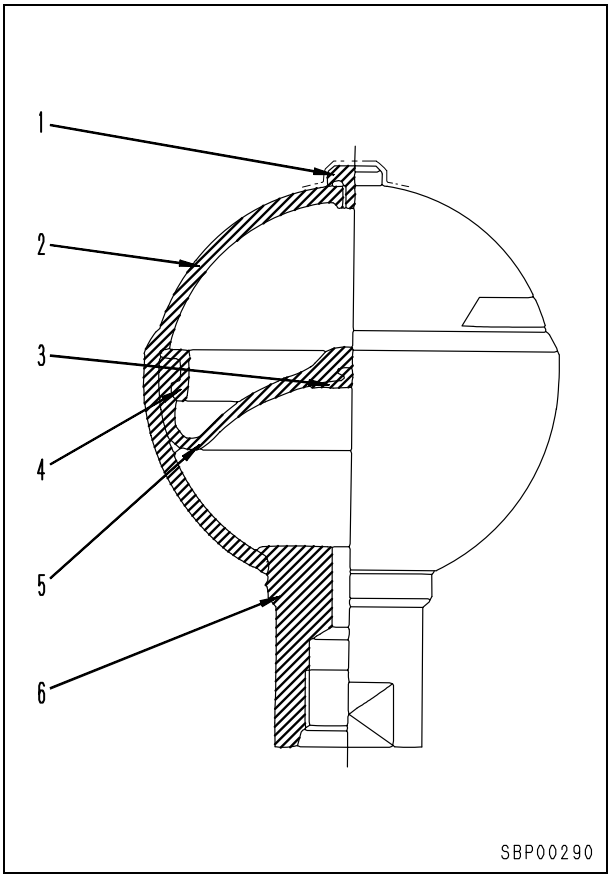


When solenoid is energized

- The signal current flows from the controller to solenoid (3), and the latter is energized. Accordingly, spool (4) is pressed against to the right side. By this operation, the pressurized oil from the main pump flows through port (P) and spool (4) to port (A), then flows into the actuator. At the same time, port (T) closes and stops the oil from flowing to the tank.



PPC accumulator



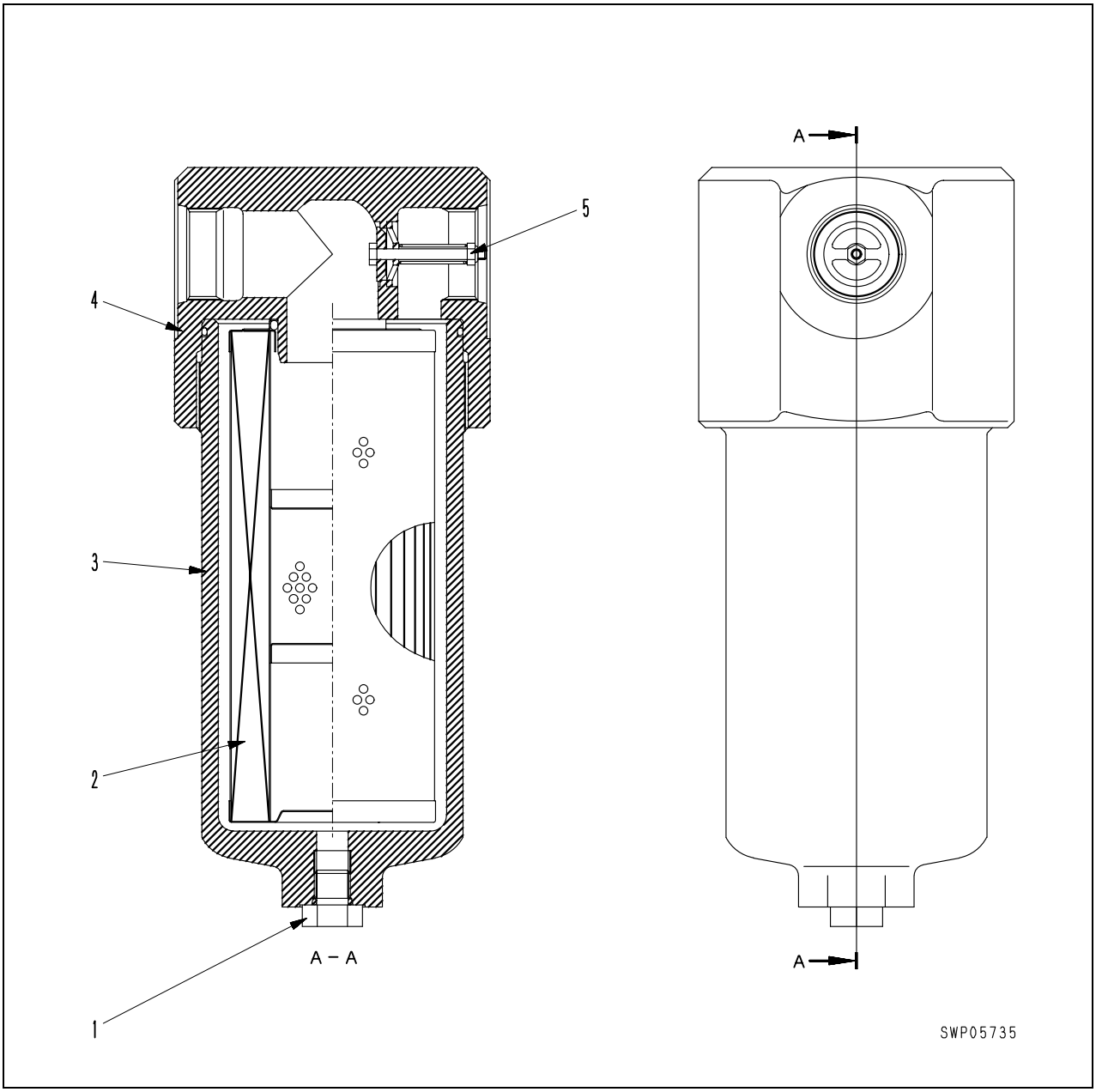
1. Gas plug
2. Shell
3. Poppet
4. Holder
5. Bladder
6. Oil port

Specifications

Gas capacity: 300 cc (for PPC)

Return oil filter

For breaker

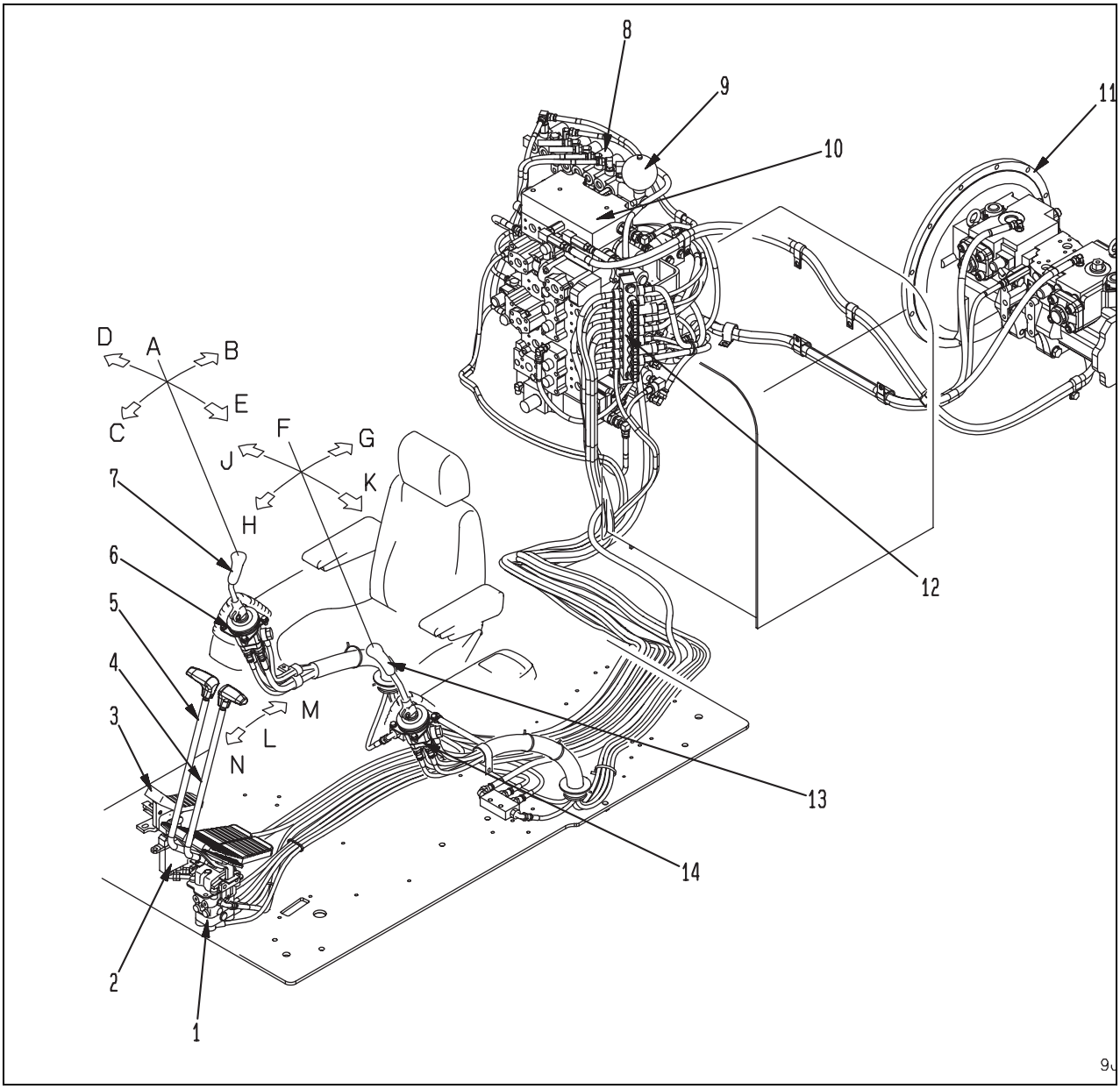


1. Drain plug
2. Filter
3. Case
4. Head cover
5. Relief valve

Specifications

Rated pressure: 6.9 MPa {70 kg/cm^2}
Flow: 200 ℓ/min
Relief valve cracking pressure:
0.34 ± 0.05 MPa {3.5 ± 0.5 kg/cm^2}
Filter mesh size: 6 µm
Filtering area: 4,570 cm^2

Center swivel joint



1. Cover
2. Body
3. Slipper seal
4. O-ring
5. Shaft

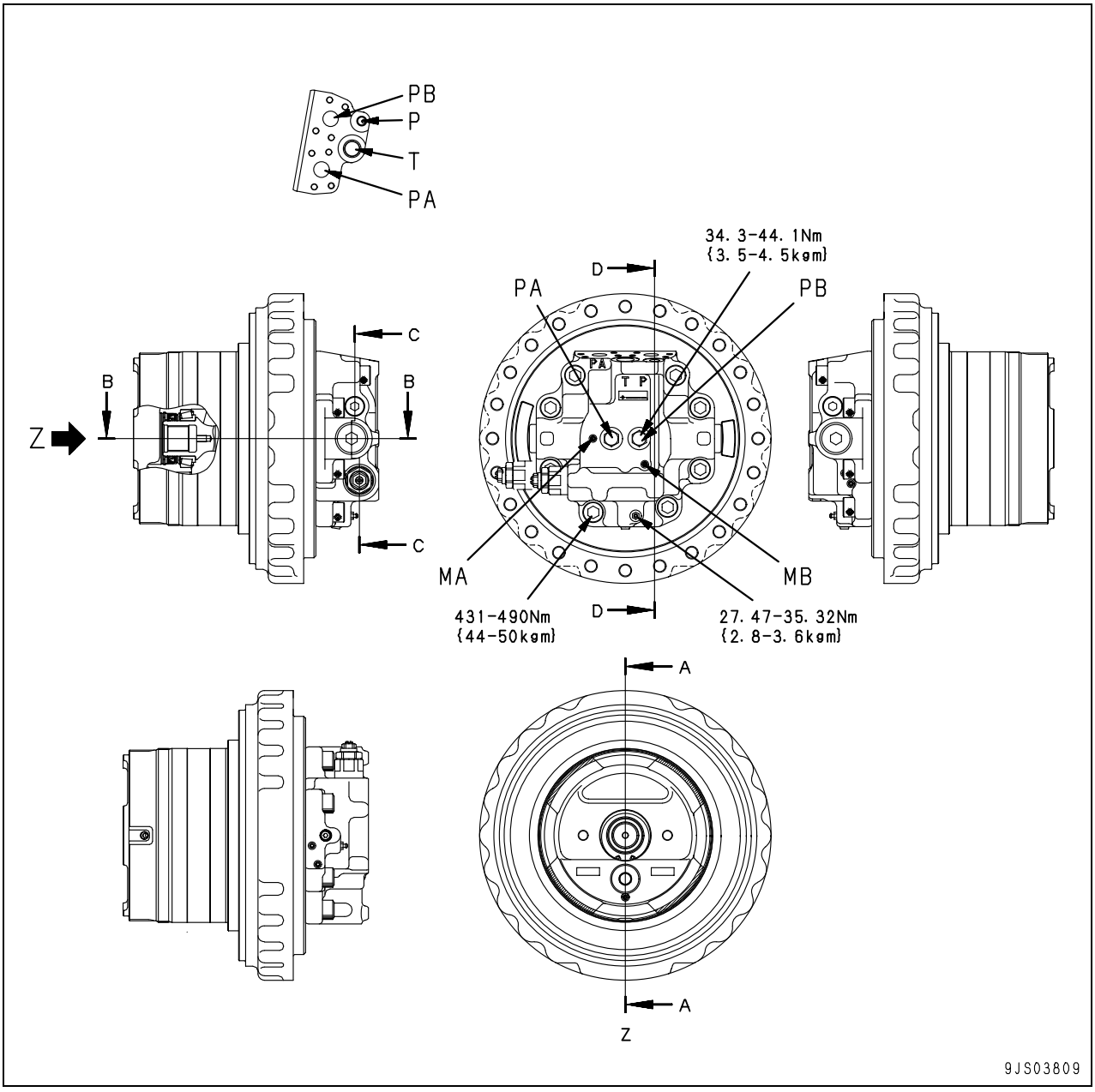
A1: To L.H. travel motor port PB
A2: From control valve port A2
B1: To L.H. travel motor port PA
B2: From control valve port B2
C1: To R.H. travel motor port PA
C2: From control valve port A5
D1: To R.H. travel motor port PB
D2: From control valve port B5
E: To L.H. and R.H. travel motors port P
T1: From L.H. and R.H. travel motors port T
T2: To tank

Unit: mm

No.	Check item	Criteria			Remedy
		Standard size	Standard clearance	Clearance limit	
6	Clearance between rotor and shaft	80	—	—	Replace

Travel motor

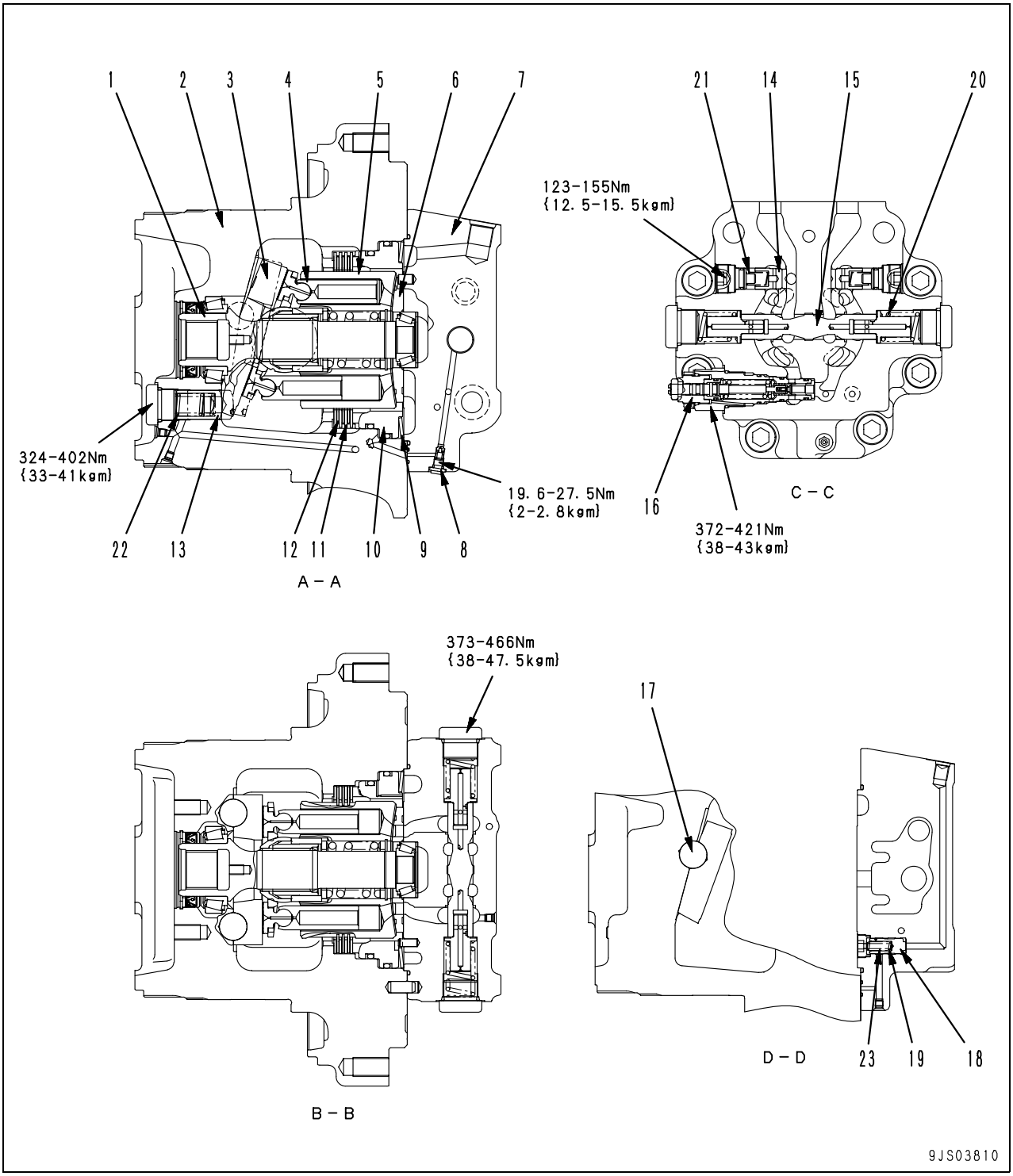
Type: HMV160ADT-3



MA: MA pressure detection port
MB: MB pressure detection port
P: From travel speed solenoid valve
PA: From control valve
PB: From control valve
T: To tank

Specifications

Type	:HMV160ADT-3
Theoretical displacement	
(Min.)	:103.5 cm^3/rev
(Max.)	:160.8 cm^3/rev
Rated pressure	: 37.3 MPa {380 kg/cm^2}
Rated speed	
(Capacity min.)	:2,638 rpm
(Capacity max.)	:1,590 rpm
Brake release pressure	:1.18 MPa {12 kg/cm^2}
Travel speed selector pressure	
(differential pressure)	:0.78 MPa {8 kg/cm^2}


1
2
3
4
5
6
7
324-402Nm
{33-41kgm}
19.6-27.5Nm
{2-2.8kgm}
22
13
12
11
10
9
8
A-A
21
14
15
20
123-155Nm
{12.5-15.5kgm}
16
372-421Nm
{38-43kgm}
C-C
373-466Nm
{38-47.5kgm}
B-B
17
D-D
23
19
18
9JS03810

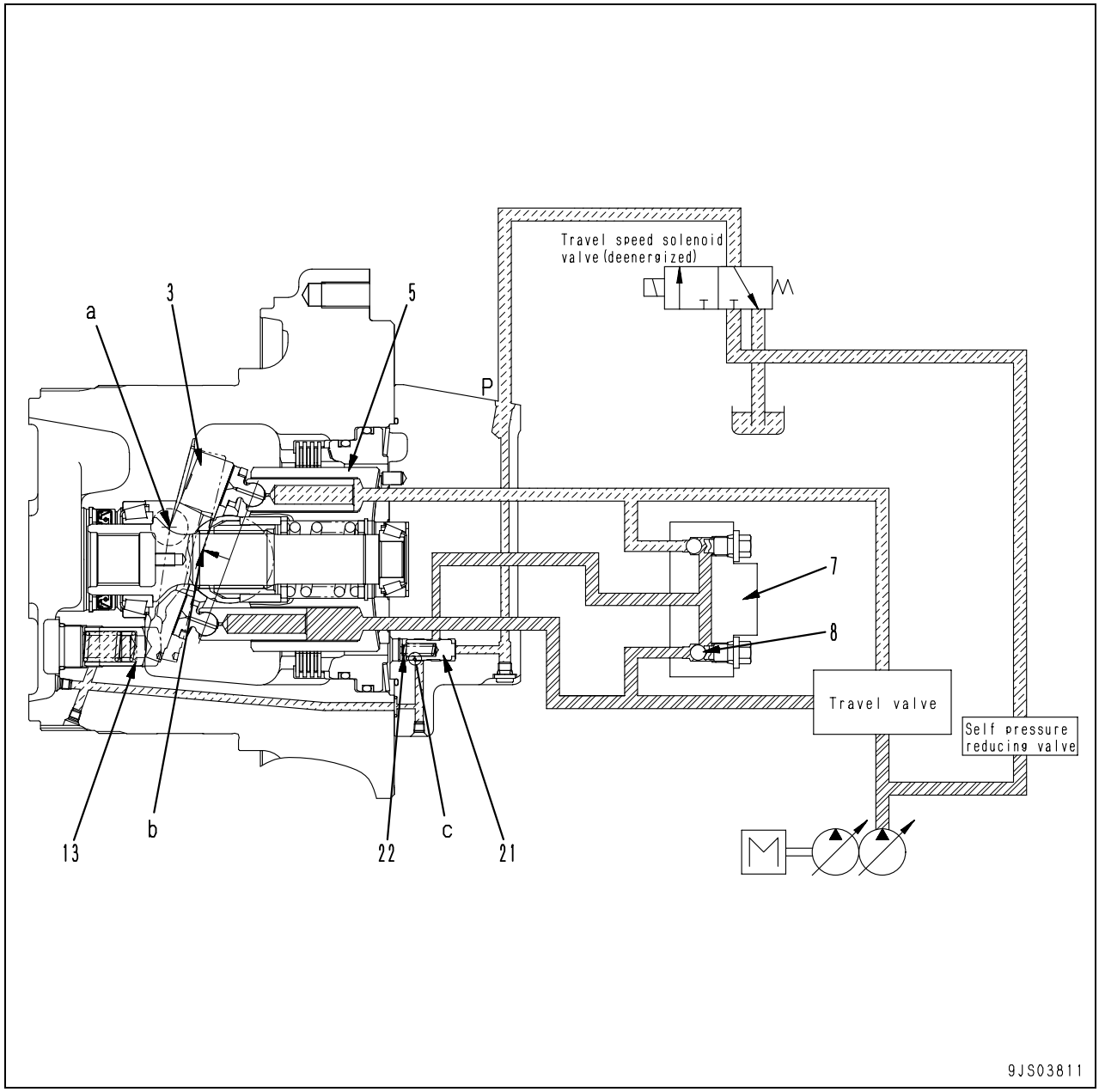
1. Output shaft
2. Motor case
3. Rocker cam
4. Piston
5. Cylinder block
6. Valve plate
7. End cover
8. Slow return valve
9. Brake spring
10. Brake piston
11. Plate
12. Disc
13. Regulator piston
14. Check valve
15. Counter balance valve
16. Safety valve
17. Ball
18. Regulator valve
19. Spring

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
20	Spool return spring	Free length x Outside diameter	Installation length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		58.43 x 30.0	42.0	427 N {43.5 kg}	—	341 N {34.8 kg}	
21	Check valve spring	33.0 x 13.8	23.0	1.27 N {0.13 kg}	—	0.98 N {0.10 kg}	
22	Regulator piston spring	61.1 x 23.2	43.9	221 N {22.5 kg}	—	177 N {18.0 kg}	
23	Regulator valve spring	29.6 x 9.0	26.0	98.1 N {10.0 kg}	—	78.5 N {8.0 kg}	

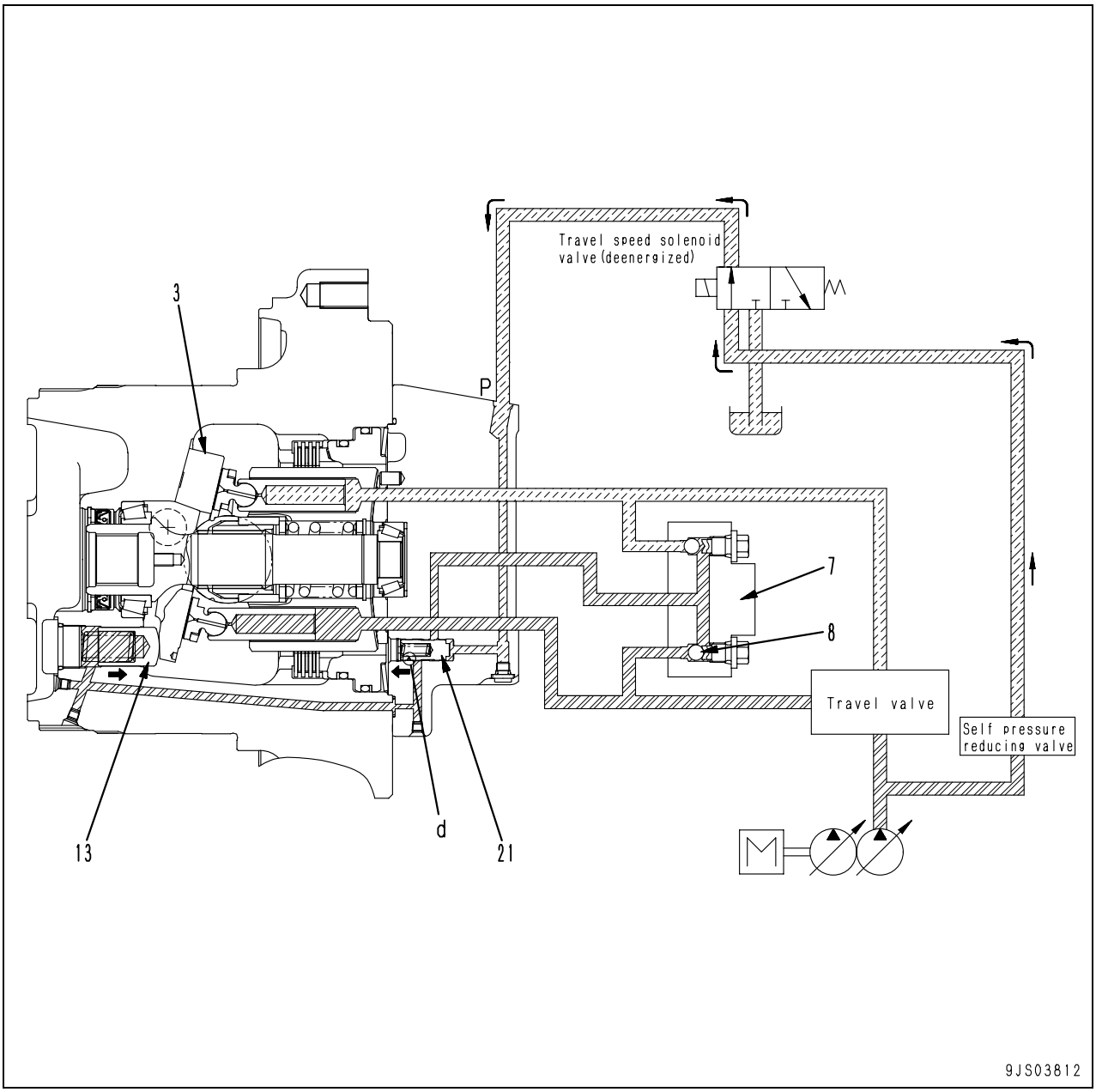
Operation of motor

1) At slow speed (motor swash plate angle at maximum)



- As the solenoid valve is deenergized, the pilot pressurized oil from the self pressure reducing valve does not flow to port (P).
- Regulator valve (21) is pushed to the right by spring (22).
- Pressurized oil being conducted from the control valve to end cover (7) by pressing slow return valve (8) is shut off by regulator valve (21).
- Fulcrum (a) of rocker cam (3) is eccentric to the working point (b) of the combined force of the propulsion force of cylinder (5).
- The combined force of the piston propulsion forces works as the moment of inclining rocker cam (3) toward the maximum swash plate angle.
- The pressurized oil at regulator piston (13) passes through orifice (c) of regulator valve (21) and is drained to the motor case.
- Rocker cam (3) is inclined in the maximum swash plate angle direction. The motor capacity becomes maximum, turning on the low speed travel.

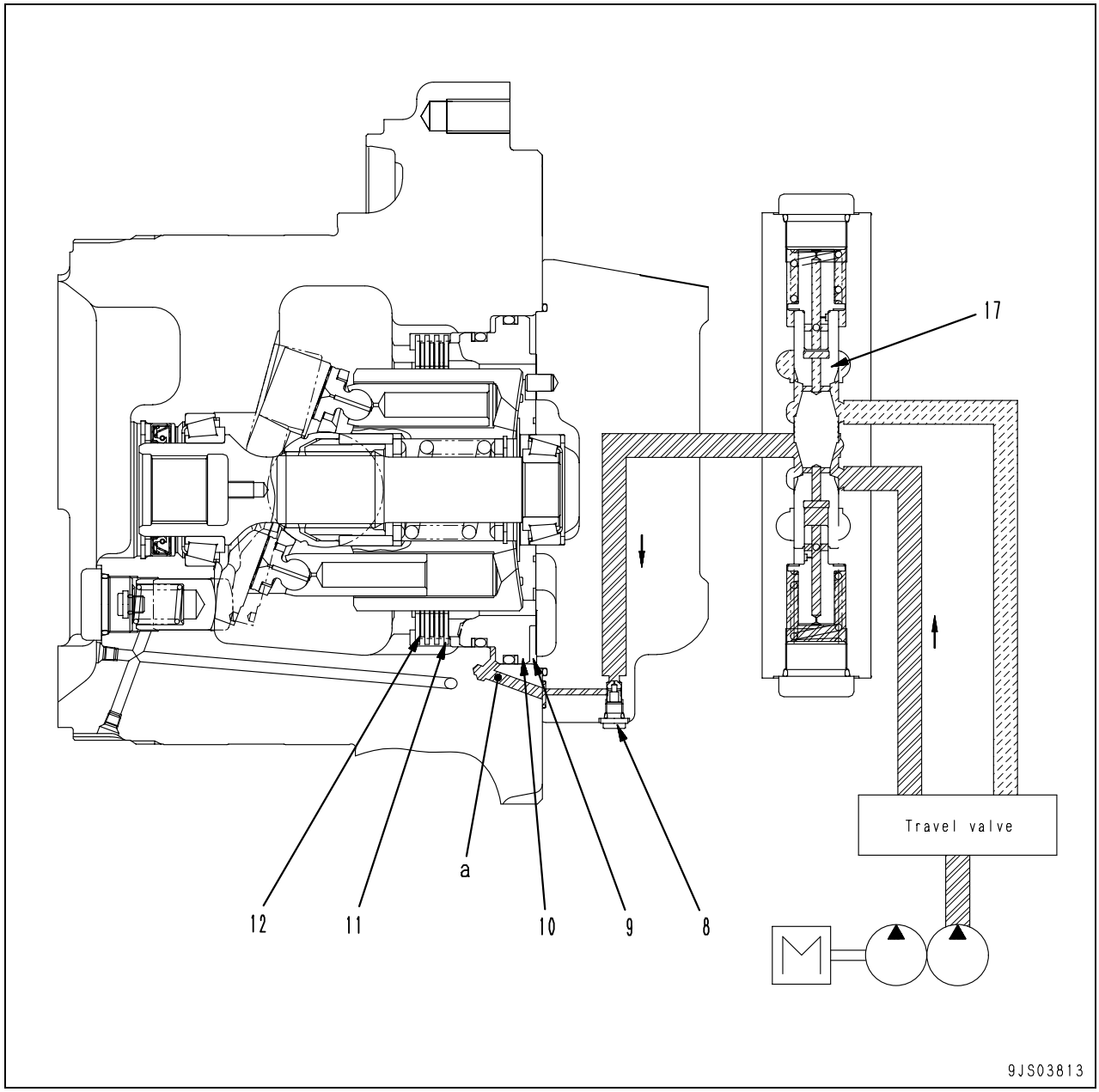
2) At high peed (motor swash plate angle at minimum)



- As the solenoid valve is energized, the pilot pressurized oil from the self pressure reducing valve flows to port (P).
- Regulator valve (21) is pushed to the left.
- The pressurized oil from the control valve passes through passage (d) in regulator valve (21) and enters regulator piston (13).
- Regulator piston (13) is pushed to the right.
- Rocker cam (3) is inclined in the minimum swash plate angle direction. The motor capacity becomes minimum, turning on the high speed travel.

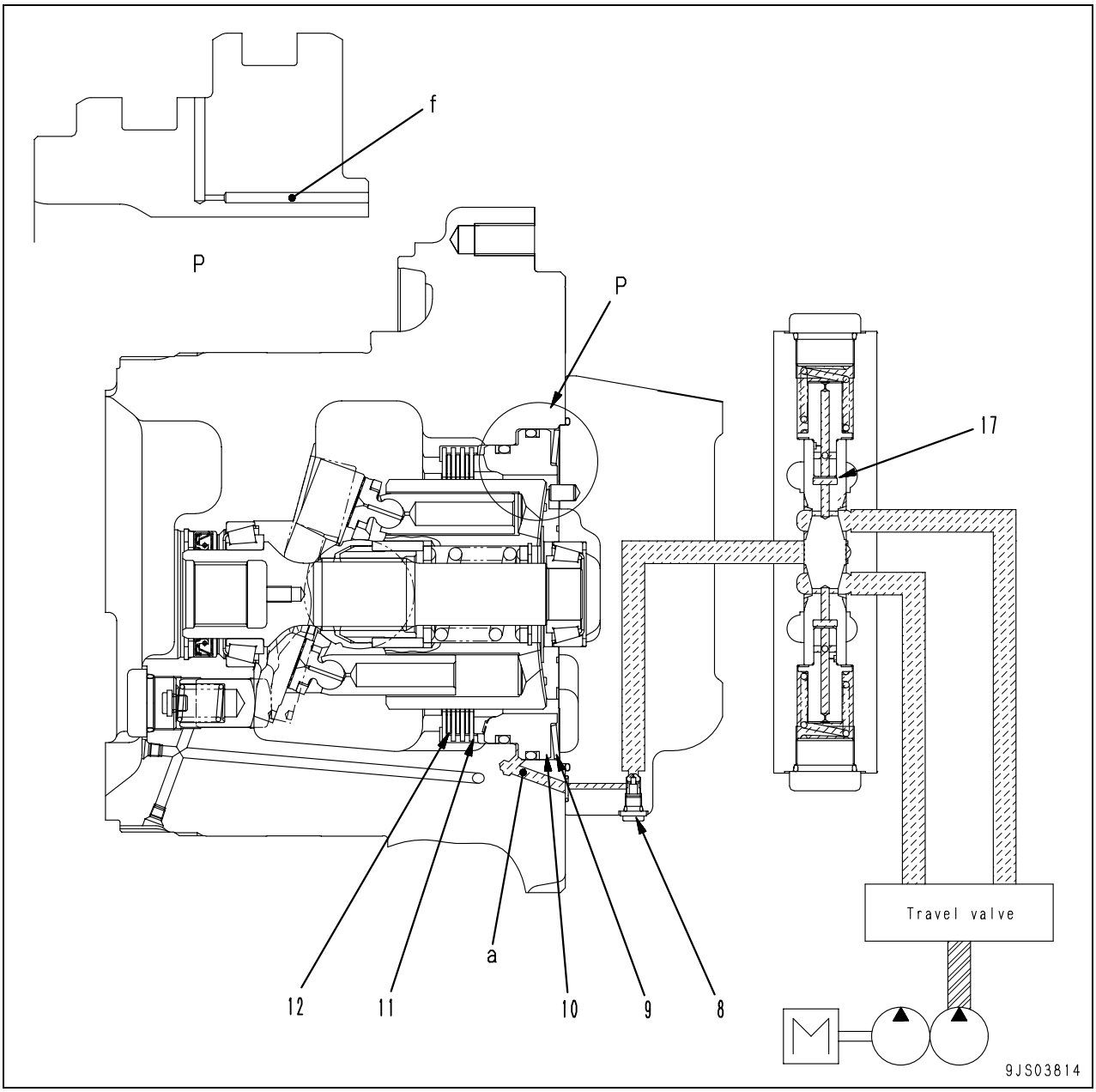
Operation of parking brake

1) When starting travel



- As the travel lever is operated, pressurized oil from the pump activates counterbalance valve spool (17), opening the parking brake circuit.
- The pressurized oil is conducted to chamber (a) of brake piston (10) and compresses spring (9), pushing piston (10) toward right.
- Since the pushing force to plate (11) and disc (12) disappears, plate (11) is separated from disc (12) and the brake is released.

2) When travel is stopped



- As the travel lever is placed in neutral, counterbalance valve spool (17) returns to the neutral position and closing the parking brake circuit.
- The pressurized oil in chamber (a) of brake piston (10) passes through orifice (f) of brake piston (10) and is drained to the motor case.
- Brake piston (10) is pushed to the right by spring (9).
- Plate (11) and disc (12) are pushed together, and the brake is applied.
- As brake piston (10) returns, flow of pressurized oil is reduced with slow return valve (8).
- The time delay will be set to activate the brake only after the machine has stopped.

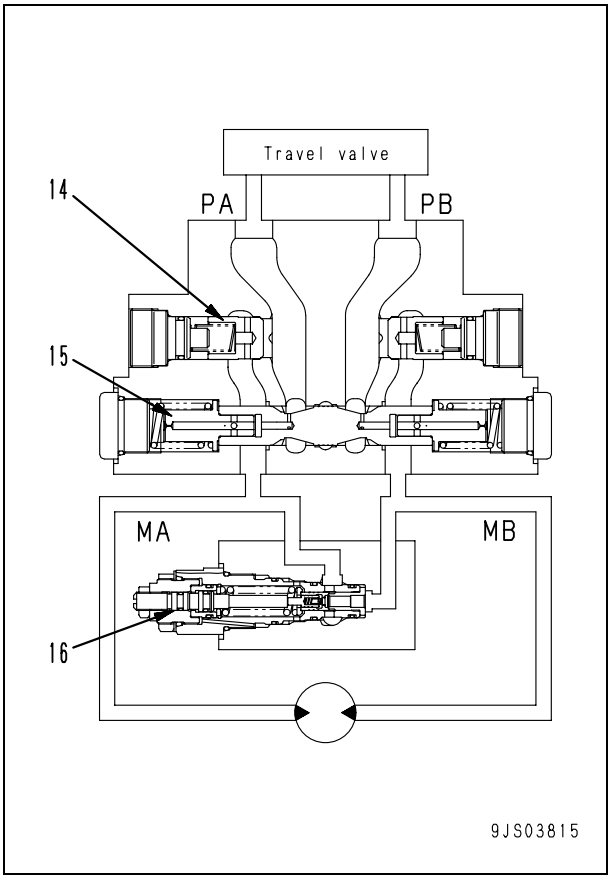
Brake valve

- The brake valve consists of check valves (14), counterbalance valve (15) and safety valve (16).
- Functions and operations of respective components shall conform to the following.

1. Counterbalance valve and check valve

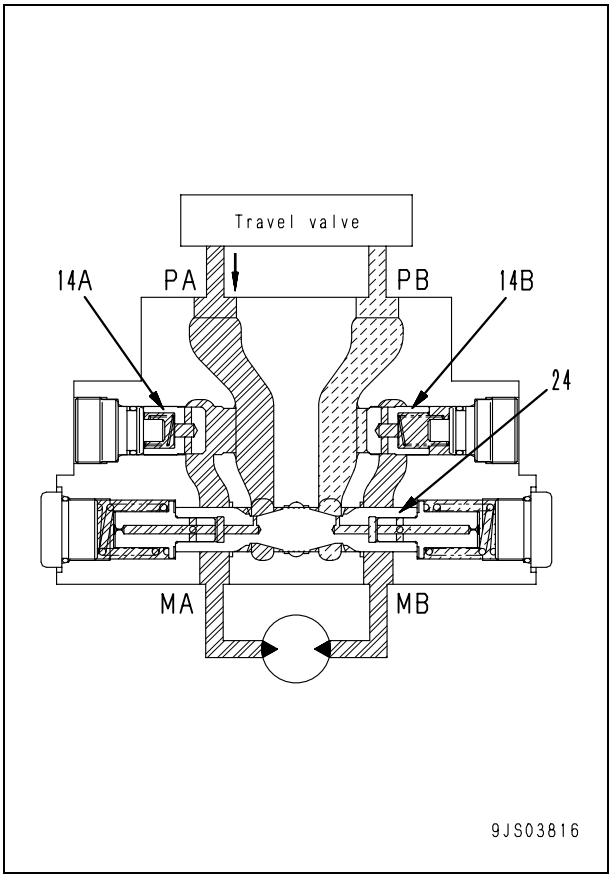
Function

- When traveling downhill, the machine travel speed tends to get faster than the motor (engine) speed because of the downward force generated from its own weight.
- If the machine travels with the engine at low speed, the motor may rotate without load, resulting in run away and inviting a very dangerous situation.
- These valves are used to prevent above by controlling the machine to travel according to the engine speed (pump delivery).

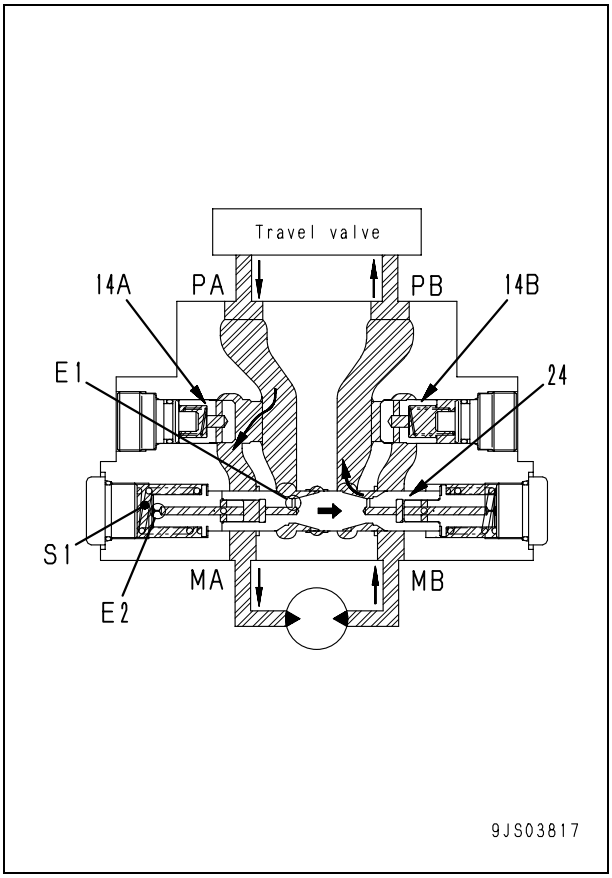


Operation when pressurized oil is supplied

- Operating the travel lever conducts the pressurized oil from the control valve to port (PA).
- The pressurized oil push-opens check valve (14A) and then flows to motor outlet port (MB) via motor inlet port (MA).
- The motor outlet side is closed by check valve (14B) and spool (24), so the pressure at the supply side rises.

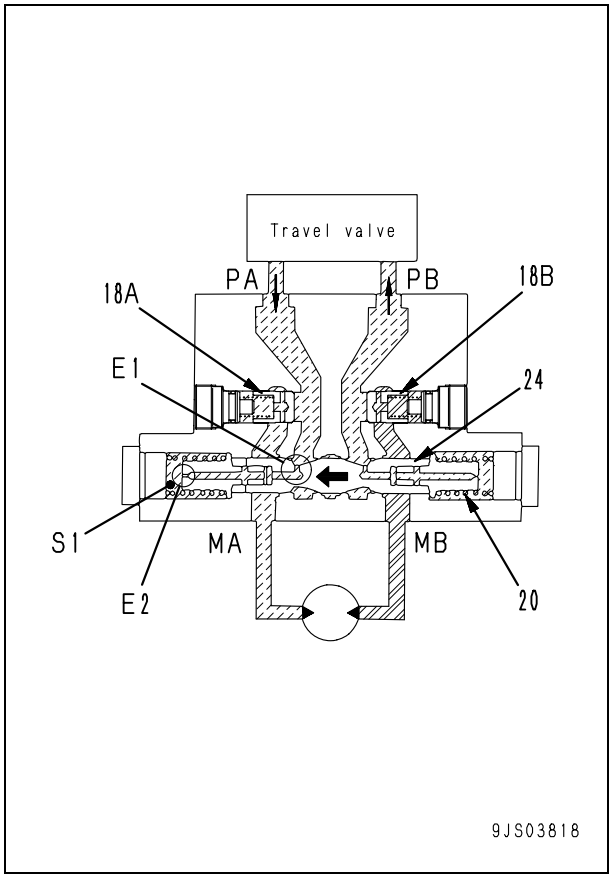


- The pressurized oil on the supply side flows to chamber (S1) via orifice (E1) and orifice (E2) of the spool (24).
- As the pressure in chamber (S1) goes above the spool selector pressure, spool (24) is pushed toward right.
- Port (MB) and port (PB) are connected, opening the motor outlet port side and starting the motor rotating.



Operation of brake during travelling downhill

- If indication of the machine runaway is sensed while travelling downhill, the motor will be caused to rotate without load to decrease the inlet side oil pressure.
- Pressure in chamber (S1) is released via orifices (E1) and (E2).
- As the pressure in chamber (S1) goes below the spool selector pressure, spool (24) is returned to the left by spring (20) and outlet port (MB) is throttled.
- The pressure at the outlet port side rises, generating rotation resistance on the motor to prevent the machine from running away.
- The spool moves to a position where the pressure on outlet port (MB) can be balanced against the machine's own weight and the inlet port pressure.
- Oil flow from the outlet circuit is reduced to ensure the travel speed corresponded to the pump delivery.



2. Safety valve (bidirectional 2-stage set safety valve)

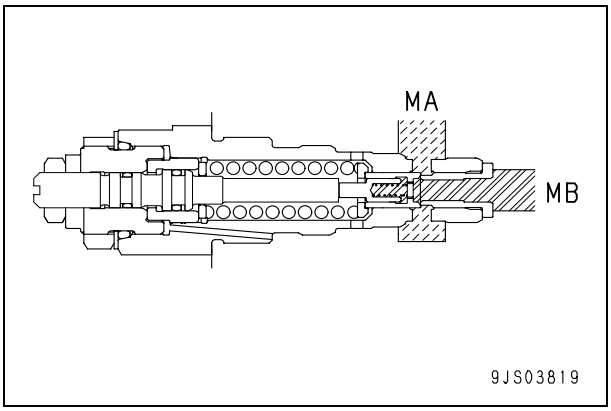
Function

- As long as the machine travel is stopped (or it is travelling downhill), the counterbalance valve closes the inlet and outlet circuits of the motor.
- Since the motor is rotated by inertial force, pressure in the motor outlet port side is abnormally increased, potentially resulting in damages on the motor and piping.
- The safety valve releases this abnormal pressure to the inlet port side of the motor in order to prevent damages to the equipment.

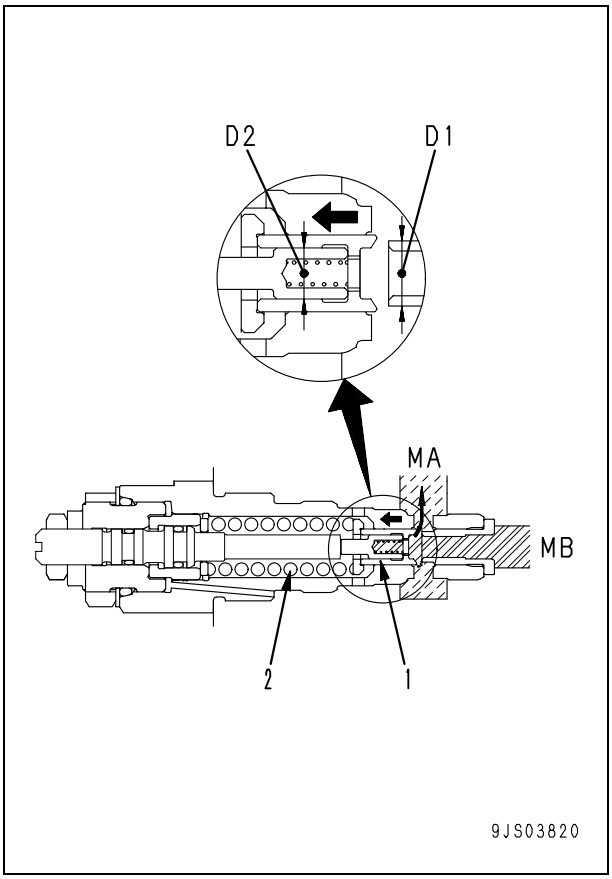
Bidirectional action

1) When pressure in chamber (MB) has become high (when rotating clockwise)

- As long as the machine travel is stopped (or it is travelling downhill), the check valve of counterbalance valve closes chamber (MB) of the outlet port circuit.
- The motor tries to continue rotation resorting to inertial force, thus pressure on the outlet port (MB) is increased.

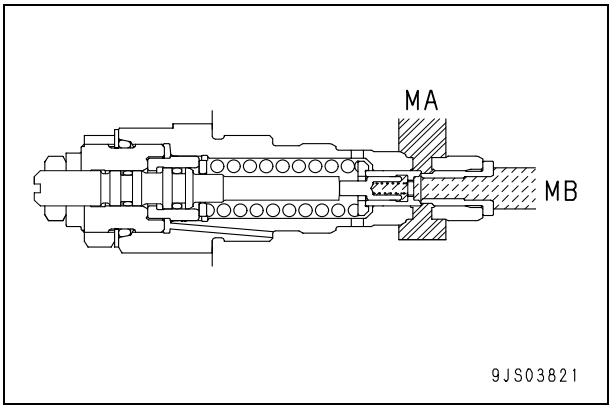


- As the pressure goes above the set pressure, [Difference in areas of circles (D1) and (D2) x Pressure] compresses spring (2).
- Poppet (1) is moved leftward and the pressurized oil flows into chamber (MA) of the opposite circuit.

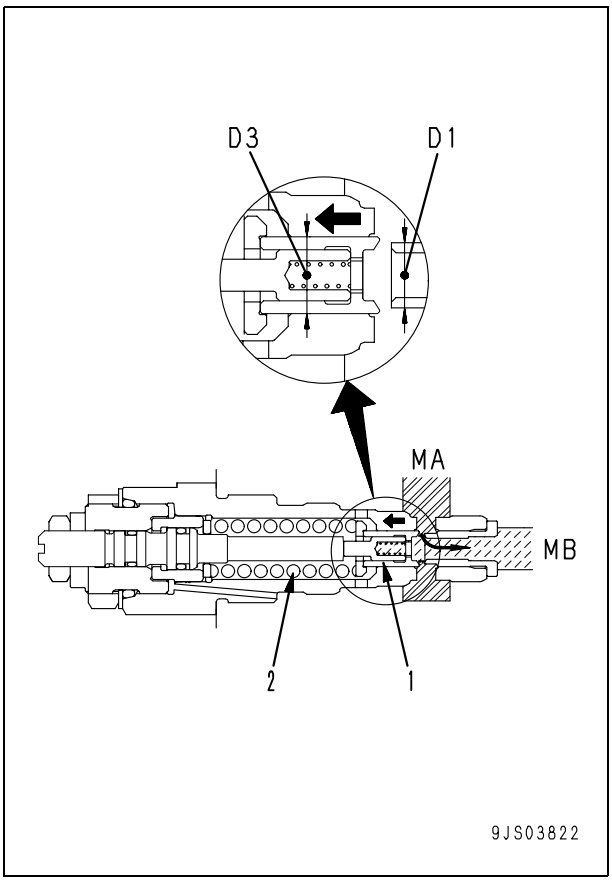


2) When pressure in chamber (MA) has become high (when rotating counterclockwise)

- As long as the machine travel is stopped (or it is travelling downhill), the check valve of counterbalance valve closes chamber (MA) of the outlet port circuit.
- The motor tries to continue rotation resorting to inertial force, thus pressure on the outlet port (MA) is increased.



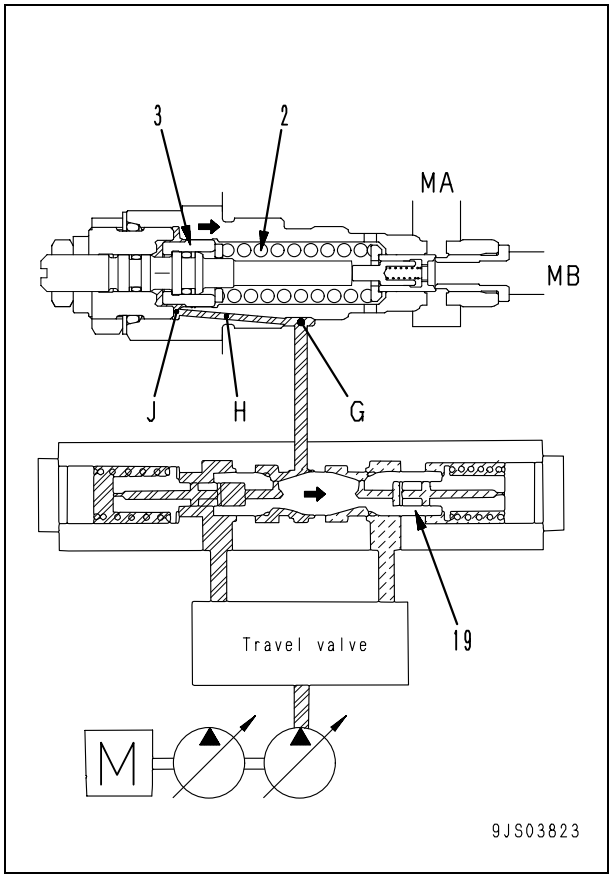
- As the pressure goes above the set pressure, [Difference in areas of circles (D1) and (D3) x Pressure] compresses spring (2).
- Popoppet (1) is moved leftward and the pressurized oil flows into chamber (MB) of the opposite circuit.



Operation of mechanism for varying set pressure

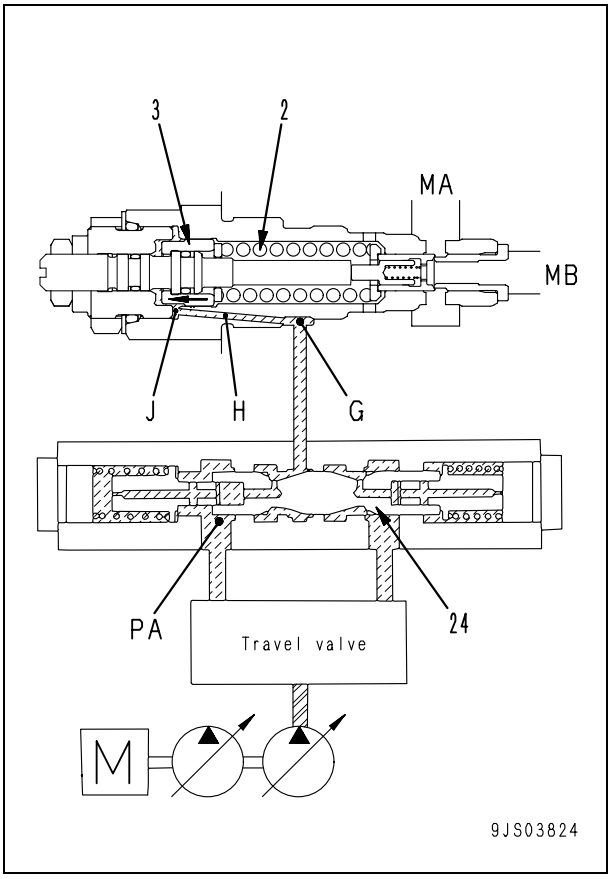
1) When starting travel (high-pressure setting)

- As the travel lever is operated, the pressurized oil from the pump moves spool (19) toward right.
- Above opens the pilot circuit to the safety valve, conducting the pressurized oil to chamber (J) via chamber (G) and passage (H).
- Piston (3) is pushed rightward, spring (2) is compressed and the set load is increased.
- High pressure is turned on the safety valve, providing a large tractional force to the valve.



2) When travel is stopped (low-pressure setting)

- When the travel lever is placed in neutral, the pressure in chamber (PA) drops and spool (24) returns to the neutral position.
- When spool (24) is in the process of returning to the neutral position, the pressurized oil in chamber (J) flows to chamber (PA) via passage (H) and chamber (G).
- Piston (3) moves to the left side, decreasing the set load.
- The safety valve is caused to the low pressure setting, thereby attenuating the shocks when the speed is reduced.

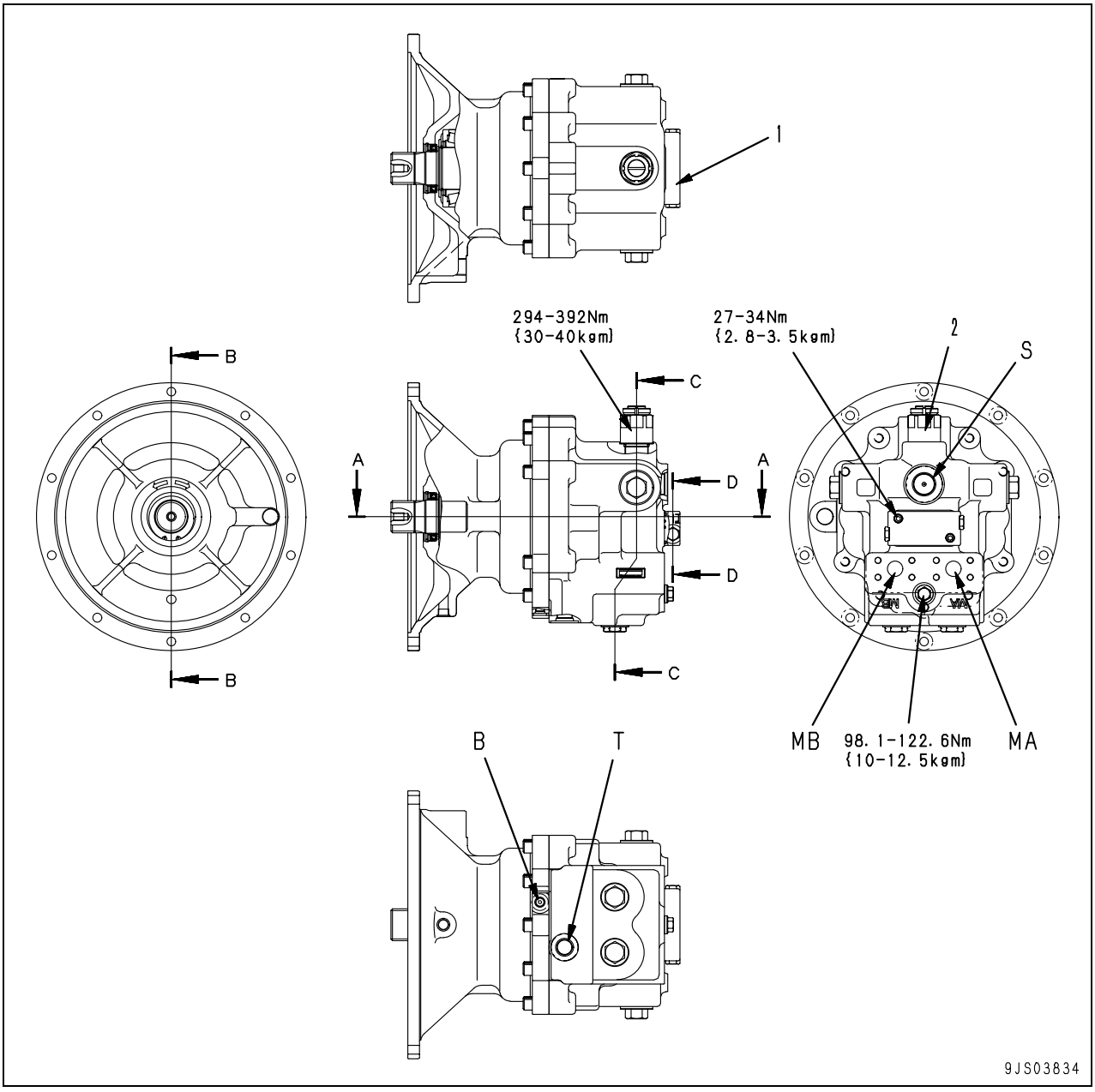


Set pressure of safety valve

High pressure setting:
40.2 MPa {410 kg/cm^2}
(at start of travel and during travel)
Low pressure setting:
27.5 MPa {280 kg/cm^2} (during stop)

Swing motor

Type: KMF230ABE-5

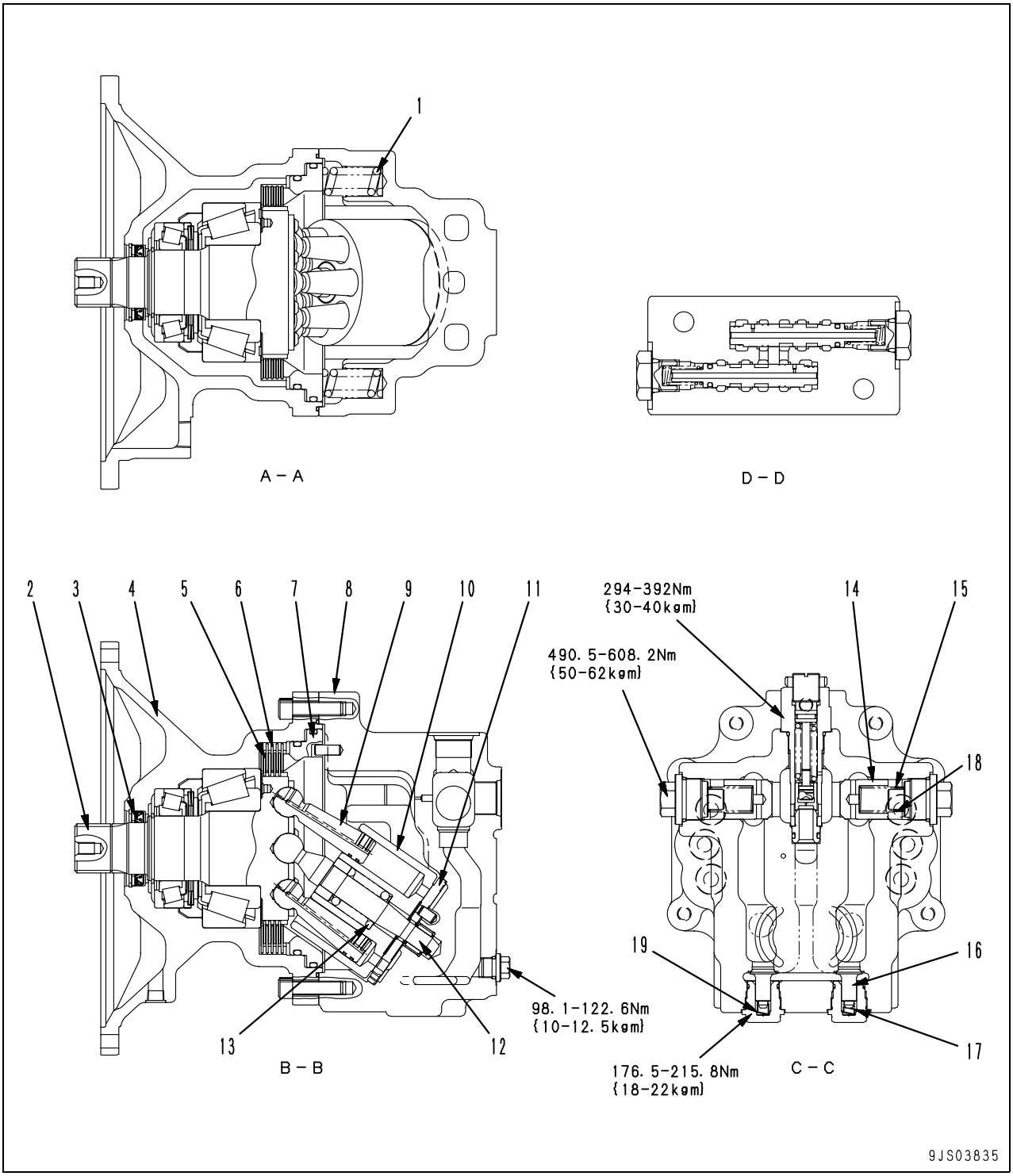


B: From swing holding brake solenoid
MA: From control valve
MB: From control valve
S: From control valve
T: To tank

1. Reverse prevention valve
2. Safety valve

Specifications

Type	: KMF230ABE-5
Theoretical displacement	: 229.4 cm^3/rev
Safety valve set pressure	: 27.9 MPa {285 kg/cm^2}
Rated engine speed	: 1,130 rpm
Brake release pressure	: 1.9 MPa {19 kg/cm^2}


1
A – A
D – D
2
3
4
5
6
7
8
9
10
11
294-392Nm
{30-40kgm}
490. 5-608. 2Nm
{50-62kgm}
14
15
18
19
16
17
98. 1-122. 6Nm
{10-12. 5kgm}
13
12
B – B
176. 5-215. 8Nm
{18-22kgm}
C – C
9JS03835

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. Check valve
15. Check valve spring
16. Shuttle valve
17. Shuttle valve spring

Unit: mm

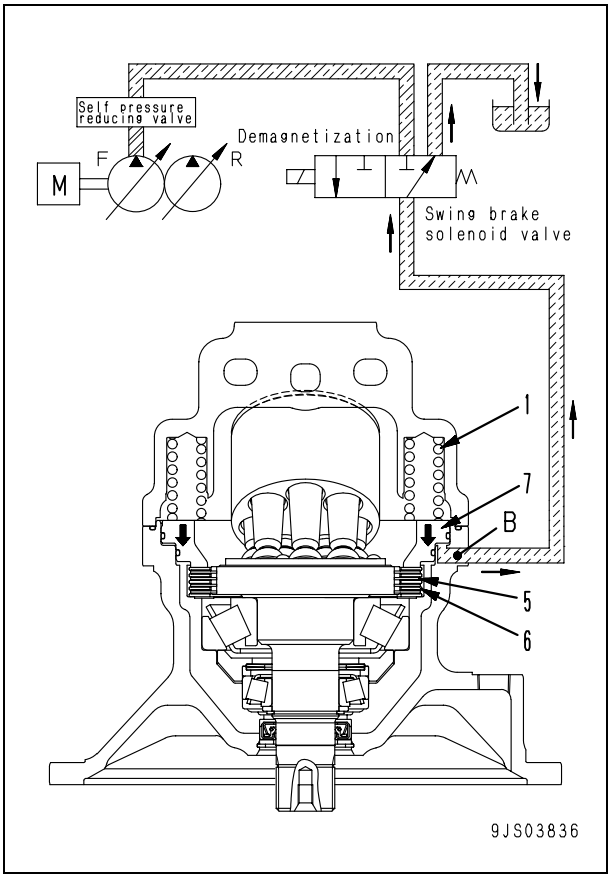
No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
18	Check valve spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring.
		66.5 x 25.6	45.0	6.96 N {0.71 kg}	—	5.59 N {0.57 kg}	
19	Shuttle valve spring	24.5 x 11.6	14.5	7.45 N {0.76 kg}	—	5.98 N {0.61 kg}	

Swing holding brake

1. When solenoid valve is deenergized

Operation

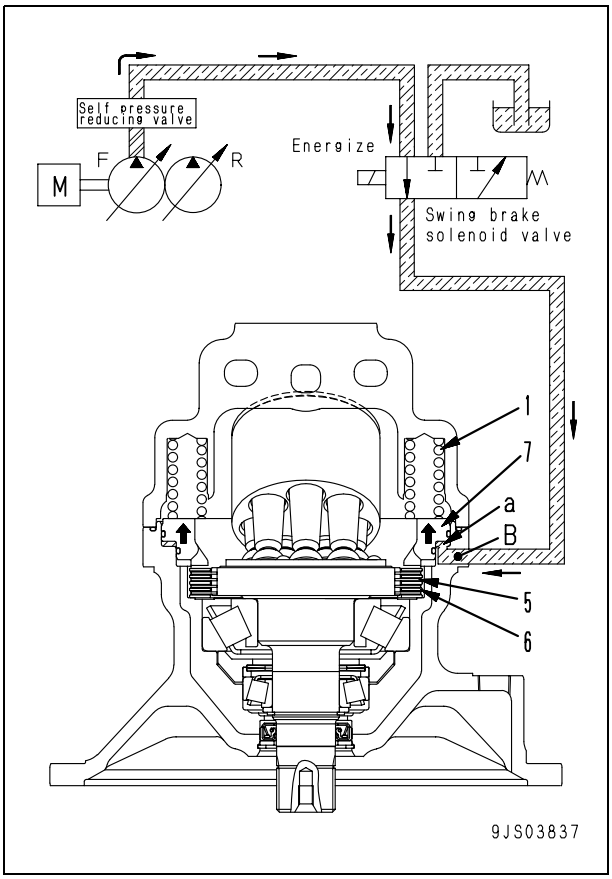
- As the swing holding brake is deenergized, the pressurized oil from the self pressure reducing valve is shut off.
- Port (B) is connected to tank circuit (T).
- Brake piston (7) is pushed down by brake spring (1).
- Disc (5) and plate (6) are pushed together, and the brake is applied.



2. When solenoid valve is energized

Operation

- As the swing brake solenoid valve is energized, the valve is switched.
- The pressurized oil from the self pressure reducing valve is conducted brake chamber (a) via port (B).
- After entering chamber (a), the pressurized oil compresses brake spring (1) and pushes brake piston (7) up.
- Disc (5) is separated from plate (6), releasing the brake.



Relief valve portion

Outline

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

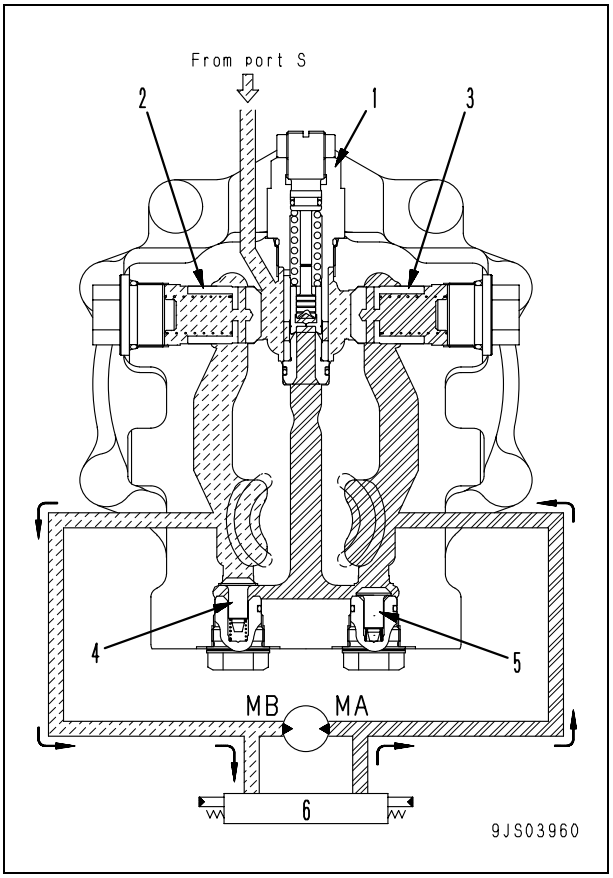
Function

- When the machine is in the swing holding mode, control valve (6) closes the motor outlet circuit, but the motor rotation is continued by inertial force.
- The motor output, therefore, is abnormally increased, resulting in damaging the motor.
- In order to prevent the motor damages, the relief valve relieves the abnormally high pressure to port (S) from the motor outlet side (high-pressure side) of the motor.

Operation

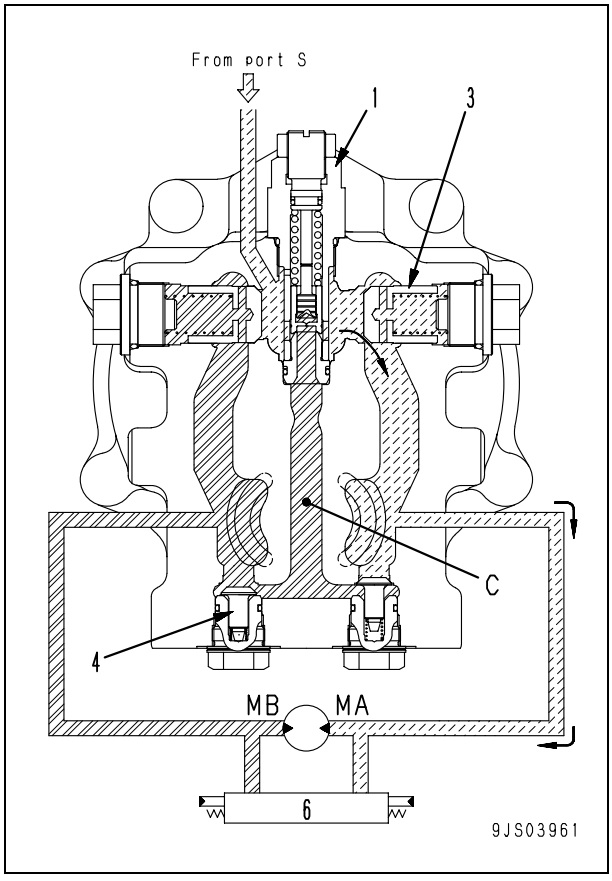
1. When starting swing

- When the swing control lever is operated to the right- swing, the pressurized oil from the pump is supplied to port (MA) via control valve (6).
- The pressure on port (MA) rises, the starting torque is generated in the motor, and the motor starts to rotate.
- The pressurized oil from the outlet port of the motor passes from port (MB) through the control valve (6) and returns to the tank.

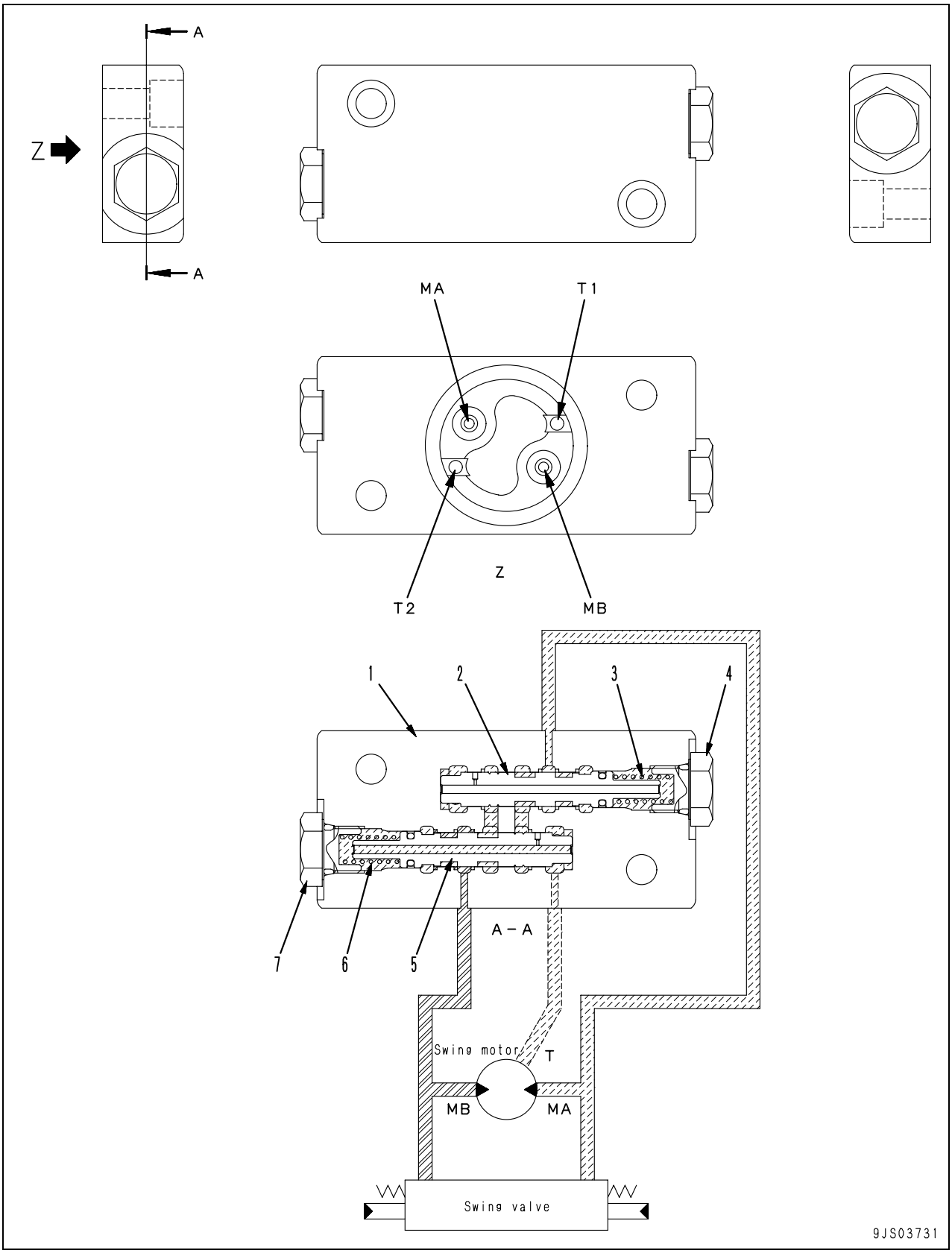


2. When swing is stopped

- When the swing control lever is returned to neutral, the supply of pressurized oil from the pump to port (MA) is stopped.
- The pressurized oil from the motor outlet can't return to the tank since the returning circuit to the tank is closed from control valve (6). Thus, pressure on port (MB) increases.
- Rotation resistance is generated on the motor and hence the brake tarts working.
- Shuttle valve (4) is pressed as pressure on port (MB) goes above port (MA).
- The pressure on chamber (C) is increased to the set pressure of relief valve (1) and becomes the same as that of port (MB).
- A high braking torque works on the motor, thereby stopping the motor.
- When relief valve (1) is being actuated, the relieved pressurized oil and the pressurized oil from port (S) are fed to port (MA) via check valve (3).
- Above prevents cavitation on port (MA).



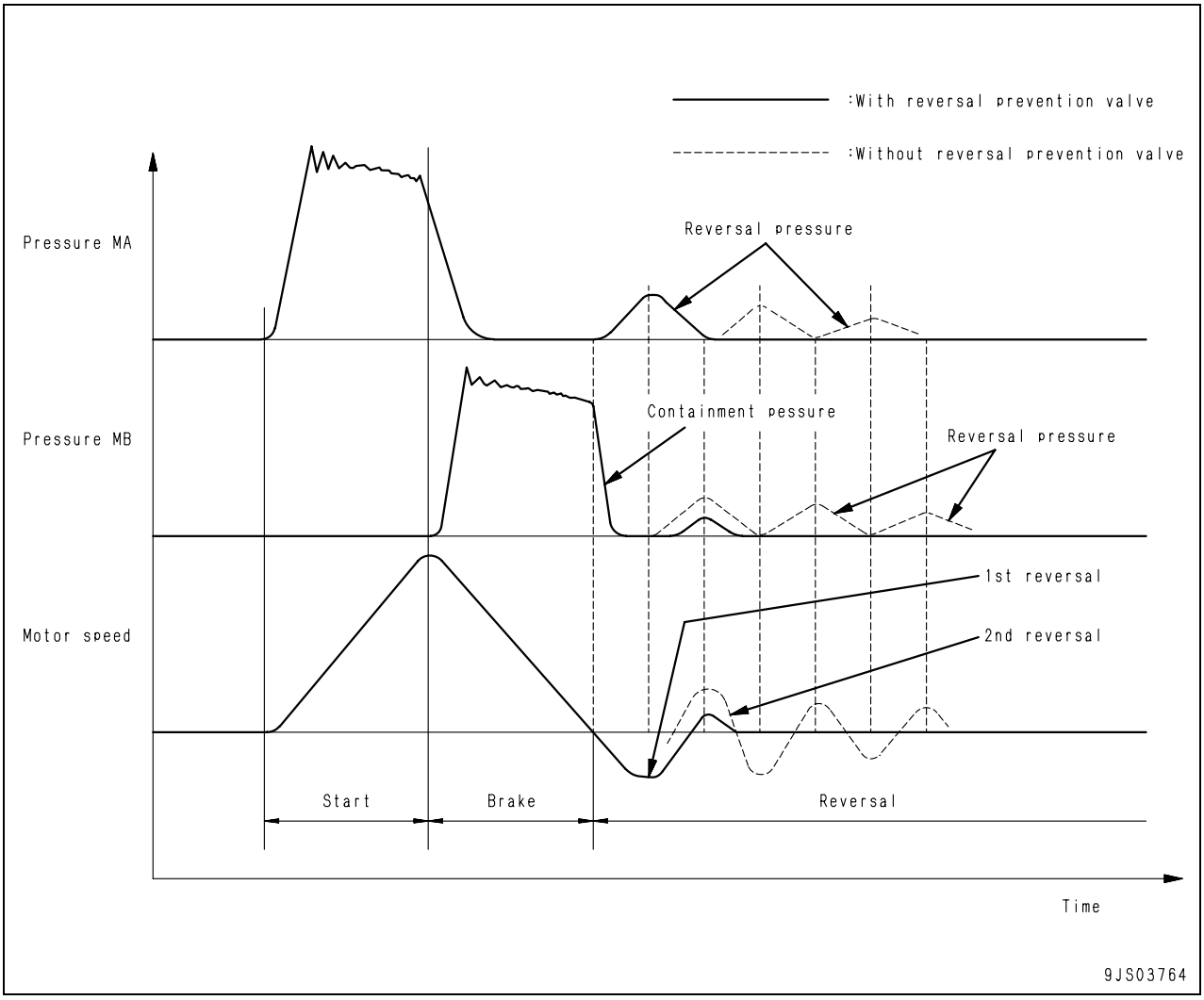
Reverse prevention valve



MA: From control valve
MB: From control valve
T1: To tank
T2: To tank

1. Valve body
2. Spool (MA side)
3. Spring (MA side)
4. Plug (MA side)
5. Spool (MB side)
6. Spring (MB side)
7. Plug (MB side)

Explanatory drawing of effects



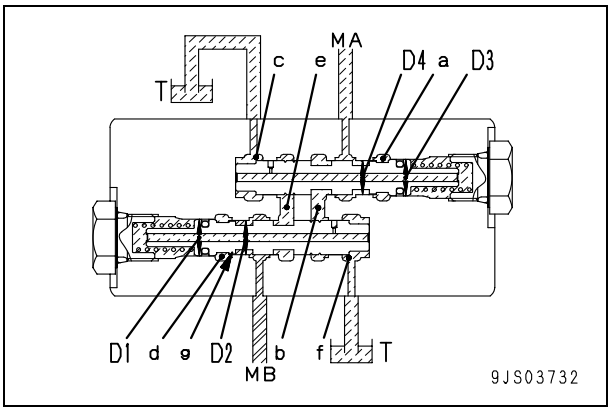
Function

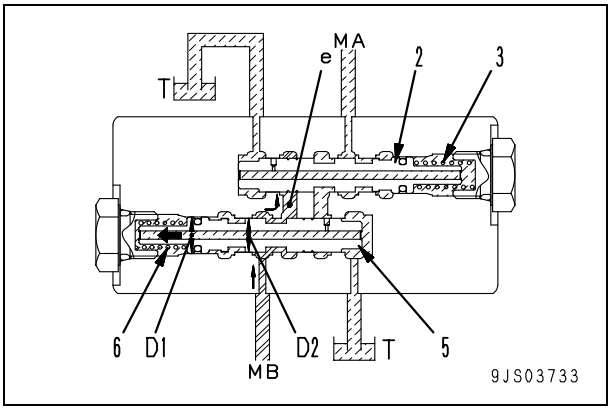
- This valve reduces the swing back generation in the swing body by the inertia of the swing body, the backlash and rigidity of the machinery system, and the compression of the hydraulic oil when the swing is stopped.
- The valve contributes in preventing collapsing of load when the swing is stopped and also contributes in reducing cycle time (enhances the positioning performance, enabling you to proceed to the next work quicker than ever).

Operation

1. When port (MB) brake pressure is generated

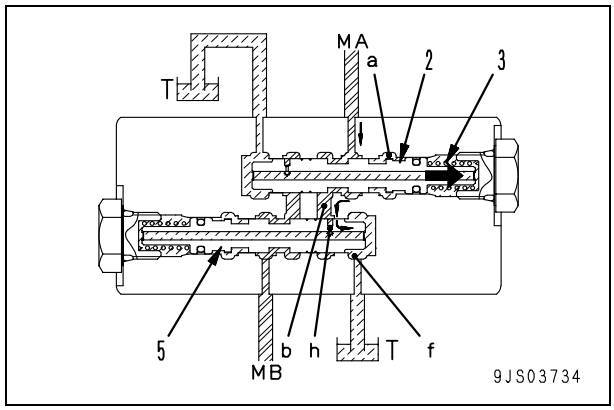
- Pressure (MB) is conducted to chamber (d) via notch (g).
- The pressure compresses spring (6) by use of the difference in areas of circles (ϕD1 > ϕD2) of spool (5) and moves spool (5) to the left side.
- Port (MB)→ chamber (e) will be interconnected.
- Since pressure (MA) is lower than the set pressure of spring (3), spool (2) does not move and the pressurized oil is kept in. Thus the braking force is ensured.





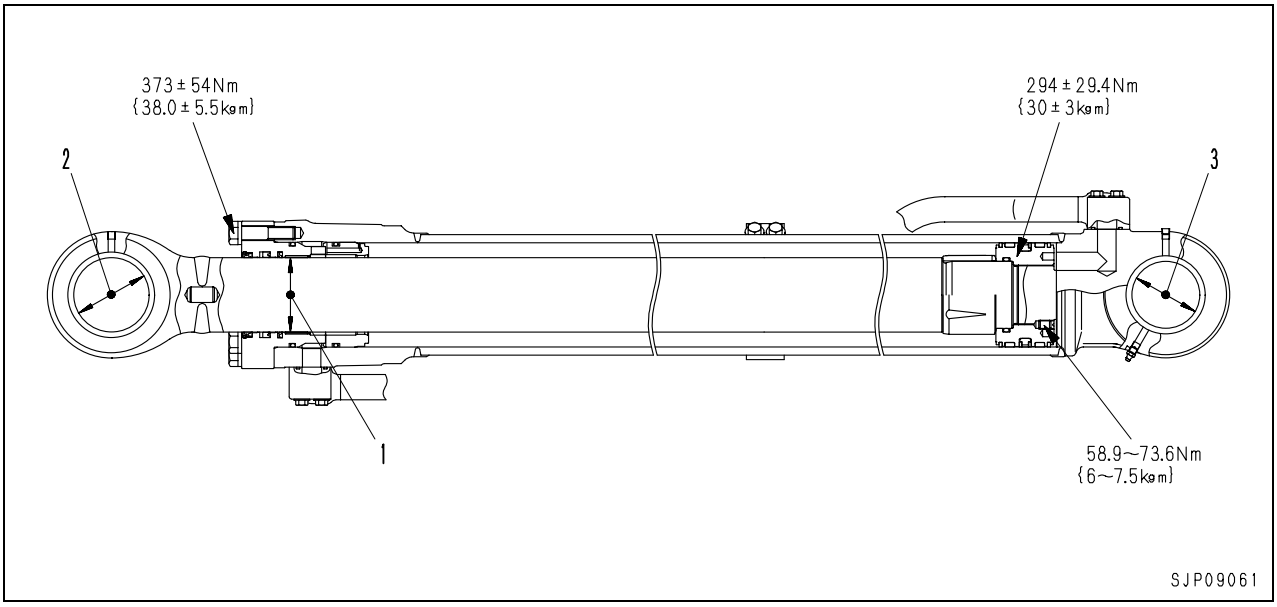
2. When motor is stopped temporarily

- The motor rotation is reversed by the closing pressure generated at port (MB). (1st time: reverse rotation)
- Reversing pressure is generated on port (MA). Pressure (MA) is conducted to chamber (a).
- The pressure compresses spring (3) by use of the difference in areas of circles (ϕD3 > ϕD4) of spool (2) and moves spool (2) to the right side.
- Port (MA) → chamber (b) will be interconnected.
- Then ports (b) and (f) will be interconnected through the drilled hole (h) on spool (5). This interconnection bypasses the reversing pressure on port (MA) to port (T), thereby preventing the reverse rotation of the 2nd time.

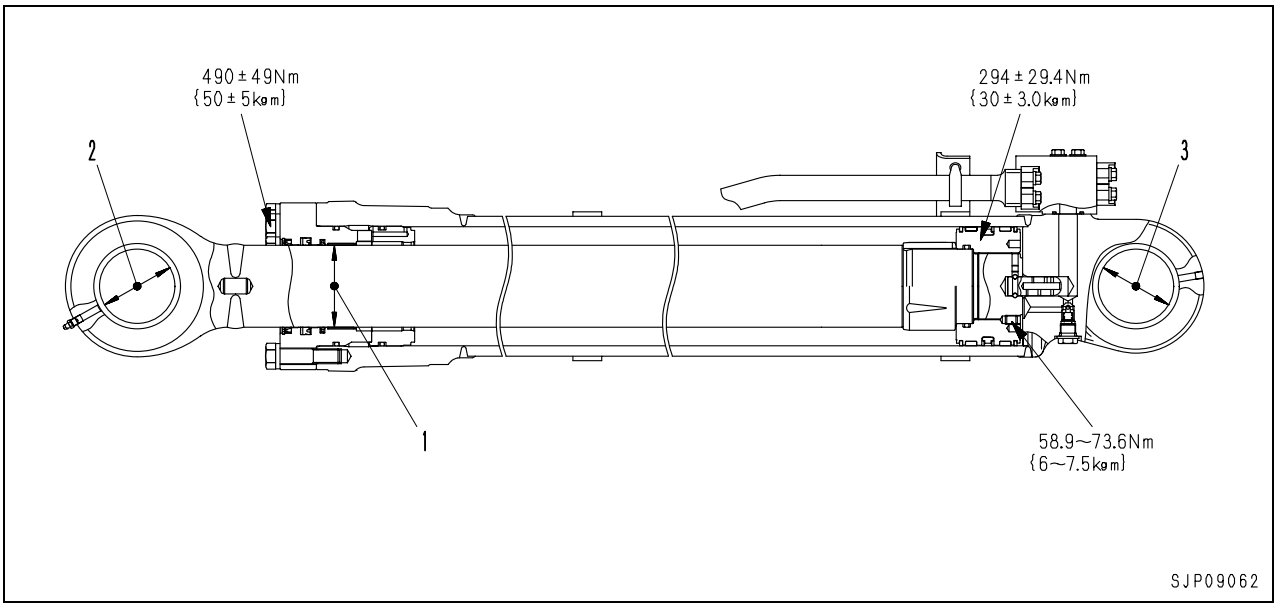


Hydraulic cylinder

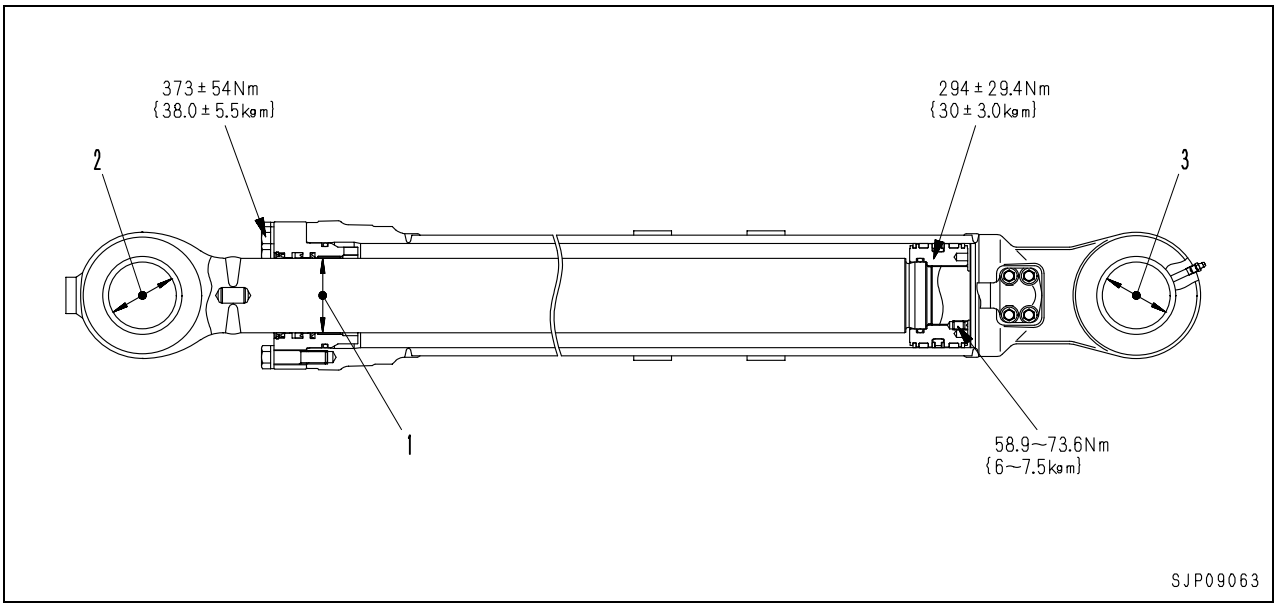
Boom cylinder



Arm cylinder



Bucket cylinder



Unit: mm

No.	Check item		Criteria					Remedy
		Cylinder	Standard size	Tolerance		Standard clearance	Clearance limit	
				Shaft	Hole			
1	Clearance between piston rod and bushing	Boom	100	-0.036 -0.091	+0.035 +0.005	0.041 – 0.126	0.412	Replace bushing
		Arm	110	-0.036 -0.091	+0.261 +0.047	0.083 – 0.352	0.412	
		Bucket *	110	-0.036 -0.091	+0.261 +0.047	0.083 – 0.352	0.447	
2	Clearance between piston rod support shaft and bushing	Boom	100	-0.036 -0.090	+0.190 +0.070	0.106 – 0.261	—	Replace pin or bushing
		Arm	100	-0.036 -0.090	+0.190 +0.070	0.106 – 0.280	—	
		Bucket *	90	-0.036 -0.090	+0.190 +0.070	0.106 – 0.280	—	
3	Clearance between cylinder bottom support shaft and bushing	Boom	90	-0.036 -0.090	+0.190 +0.070	0.0106 – 0.280	—	
		Arm	100	-0.036 -0.090	+0.190 +0.070	0.106 – 0.280	—	
		Bucket *	90	-0.036 -0.090	+0.190 +0.070	0.106 – 0.280	—	

***** - for 2.6M Arm.

KOMATSU PC340 (LC / NLC)-7 Hydraulic excavator

Form No. UEN00274-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

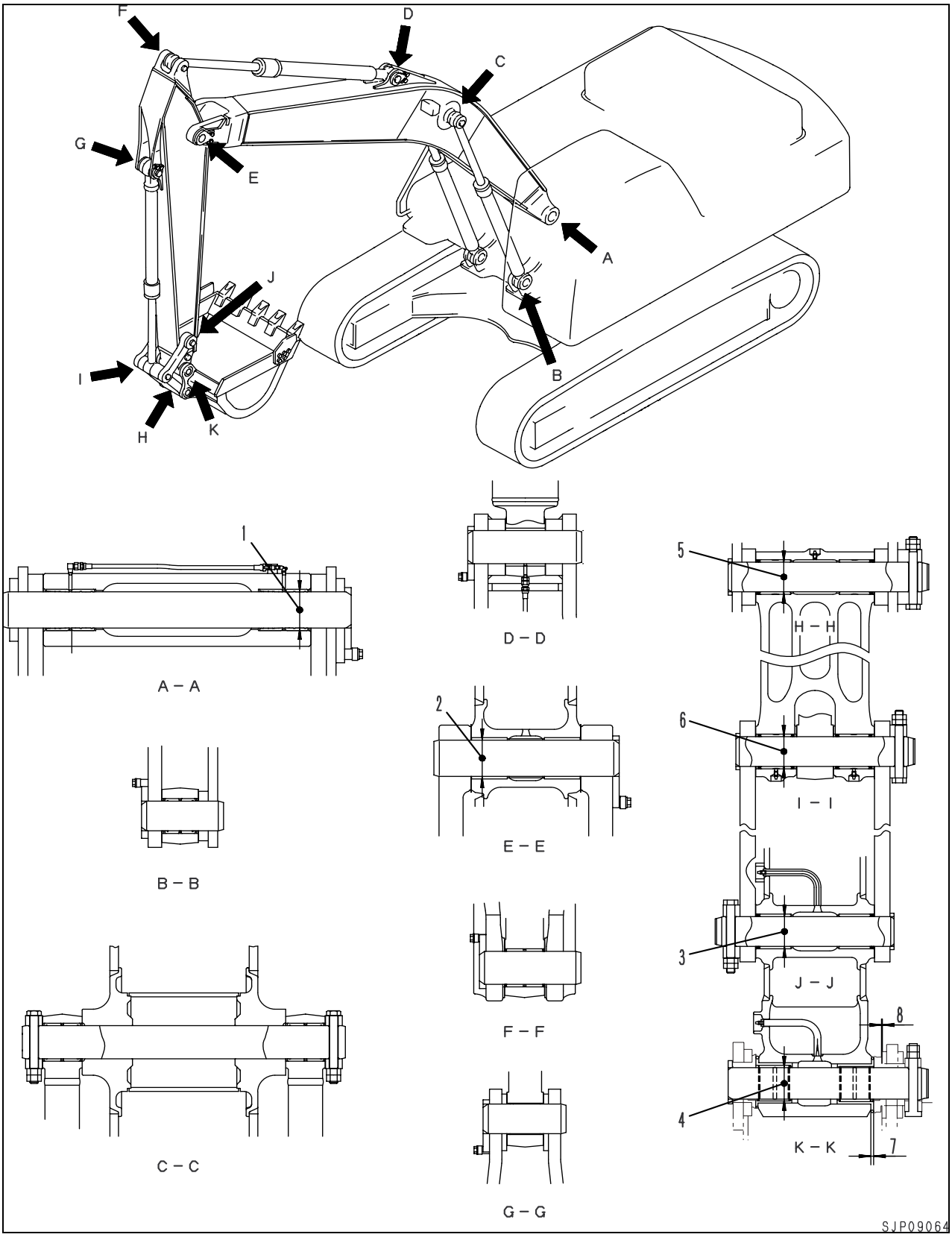
10 Structure, function and maintenance standard

Work equipment

Work equipment 2
Work equipment 2
Dimensions of components 4

Work equipment

Work equipment

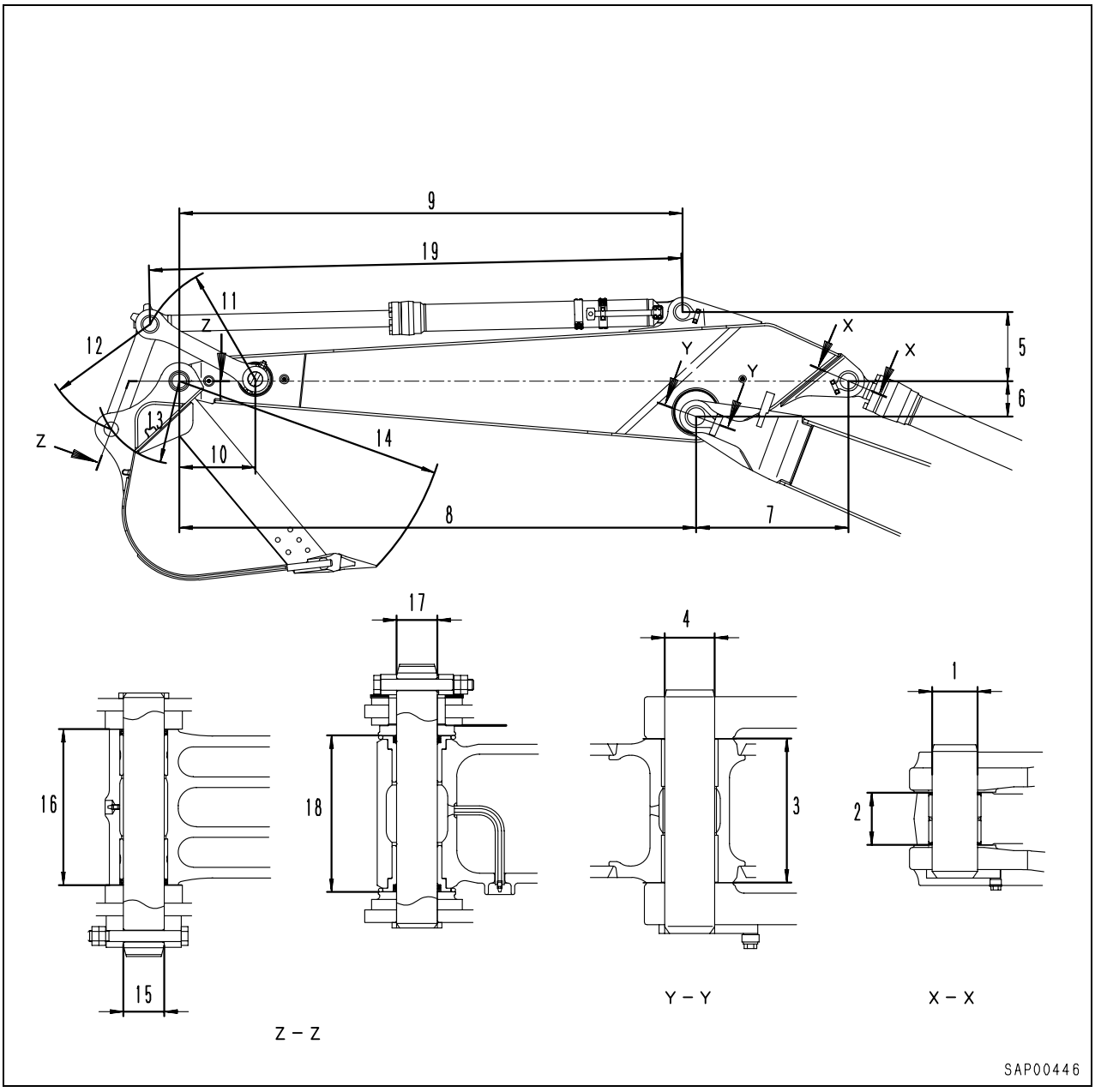


Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between pin connecting boom and revolving frame and bushing	110	–0.036 –0.090	+0.144 +0.074	0.110 – 0.234	1.0	Replace
2	Clearance between pin connecting boom and arm and bushing	110	–0.036 –0.090	+0.148 +0.080	0.116 – 0.238	1.0	
3	Clearance between pin connecting arm and link and bushing	90	–0.036 –0.090	+0.346 +0.275	0.311 – 0.436	1.0	
4	Clearance between pin connecting arm and bucket and bushing	90	–0.036 –0.090	+0.336 +0.275	0.311 – 0.426	1.0	
5	Clearance between pin connecting link and bucket and bushing	90	–0.036 –0.090	+0.346 +0.275	0.311 – 0.436	1.0	
6	Clearance between pin connecting links and bushing	90	–0.036 –0.090	+0.346 +0.275	0.311 – 0.436	1.0	
7	Bucket clearance (a)	0.5 – 1.0					Adjust shims
9	Bucket clearance (b)	2.0					

Dimensions of components

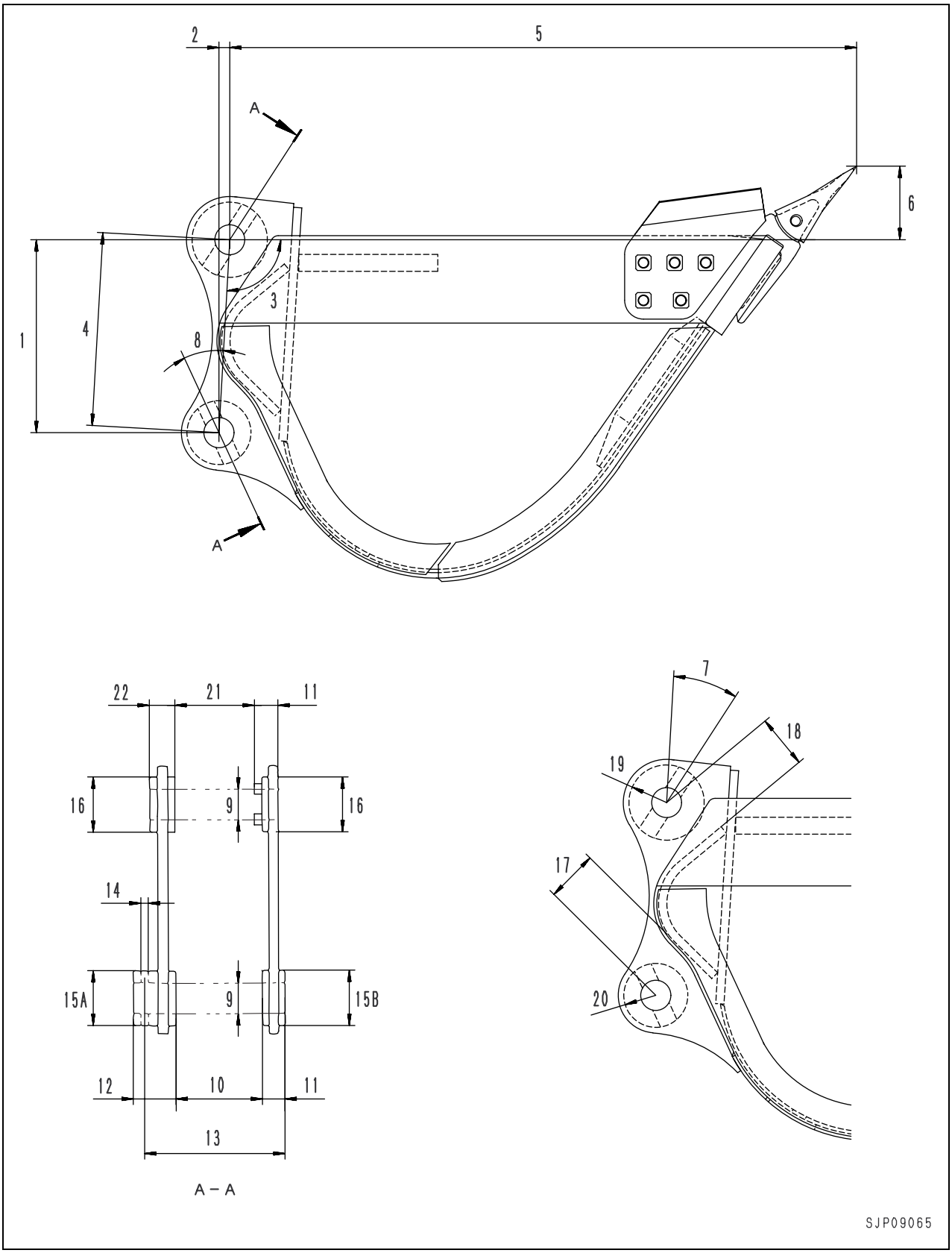
1. Dimension of arm



Unit: mm

No.	Measuring position	PC340-7		
		Standard size	Tolerance	
			Shaft	Hole
1	–	ϕ100	–0.036 –0.090	+0.1 0
2	Arm side	119.3	+1.5 0	
	Cylinder head side	116	±1.2	
3	Boom side	320	+0.5 0	
	Arm side	316	–0.3 –0.8	
4	–	ϕ110	–0.036 –0.090	+0.1 0
5	–	423.7	±1	
6	–	277.9	±0.5	
7	–	1037.4	±1	
8	–	2535	±3	
9	–	2986.4	±1	
10	–	476	±1	
11	–	731.0	±0.2	
12	–	728.0	±0.5	
13	–	513.6	–	
14	–	1670	–	
15	–	ϕ90	–0.036 –0.090	+0.2 0
16	–	345.0	±0.5	
17	–	ϕ90	–0.036 –0.090	+0.2 0
18	Arm itself	330	0 –0.5	
	When press fitting bushing	345	–	
19	Min.	1870	±2.5	
	Max.	3155	–	

2. Dimension of bucket



Unit: mm

No.		Measuring position	PC340LC / NLC -7	
			Standard size	Tolerance
1		–	512.2	±0.5
2		–	37.9	±0.5
3		–	94°19'	–
4		–	513.6	–
5		–	1658	–
6		–	193	–
7		–	–	–
8		–	50°	–
9		–	ϕ90	+0.2 0
10		–	346	+1 0
11		–	68	–
12		–	138	–
13		–	525.5	+0.5 –0.5
14		–	ϕ26	–
15	A	–	ϕ165	–
	B	–	ϕ150	–
16		–	ϕ200	–
17		–	146.1	–
18		–	138.2	–
19		–	R115	–
20		–	R100	–
21		–	370	+2 0
22		–	60	–

KOMATSU PC340 (LC / NLC)-7 Hydraulic excavator

Form No. UEN00275-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

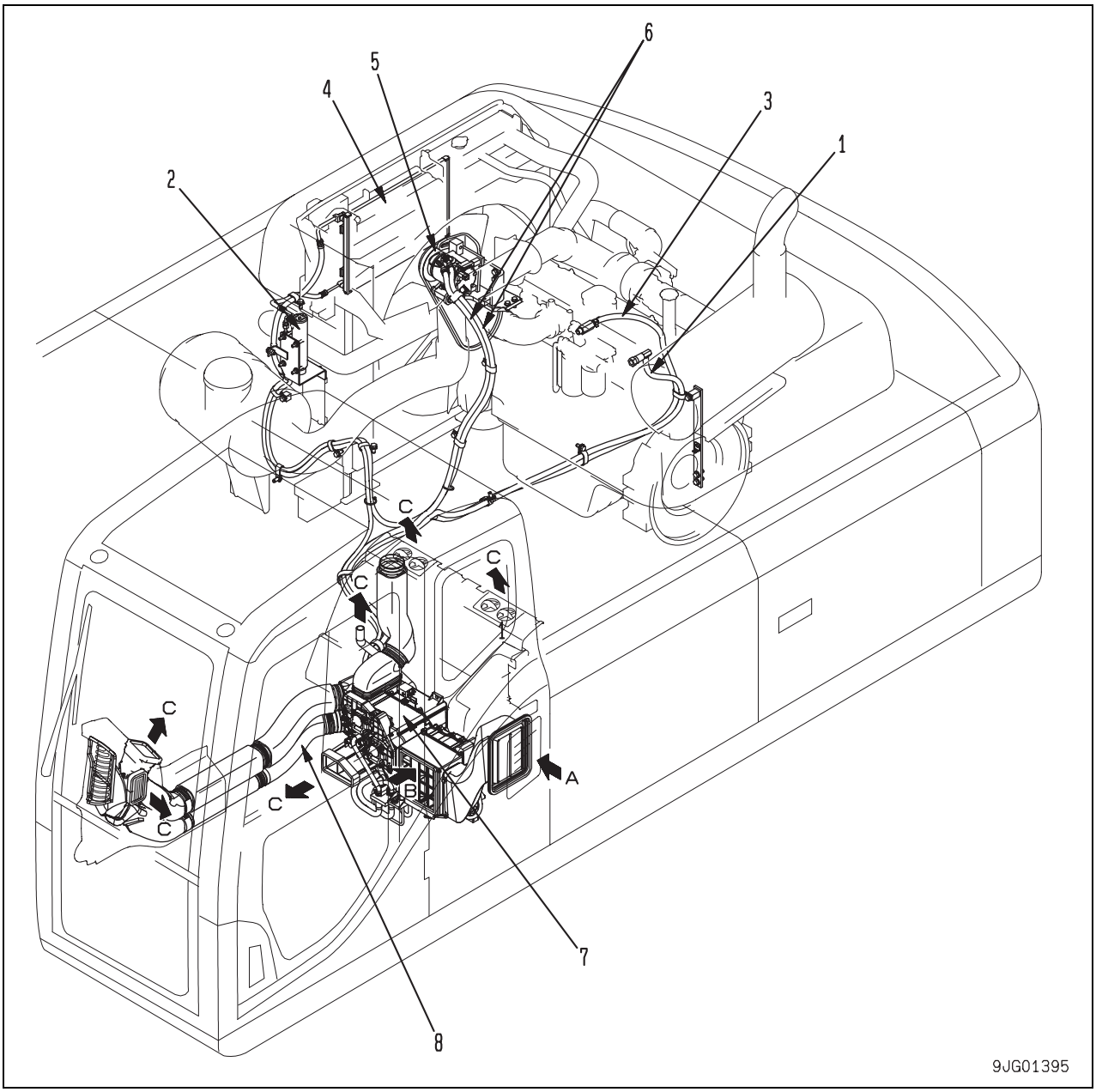
10 Structure, function and maintenance standard

Cab and its attachments

Cab and its attachments 2
Air conditioner piping 2

Cab and its attachments

Air conditioner piping



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

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

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00276-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

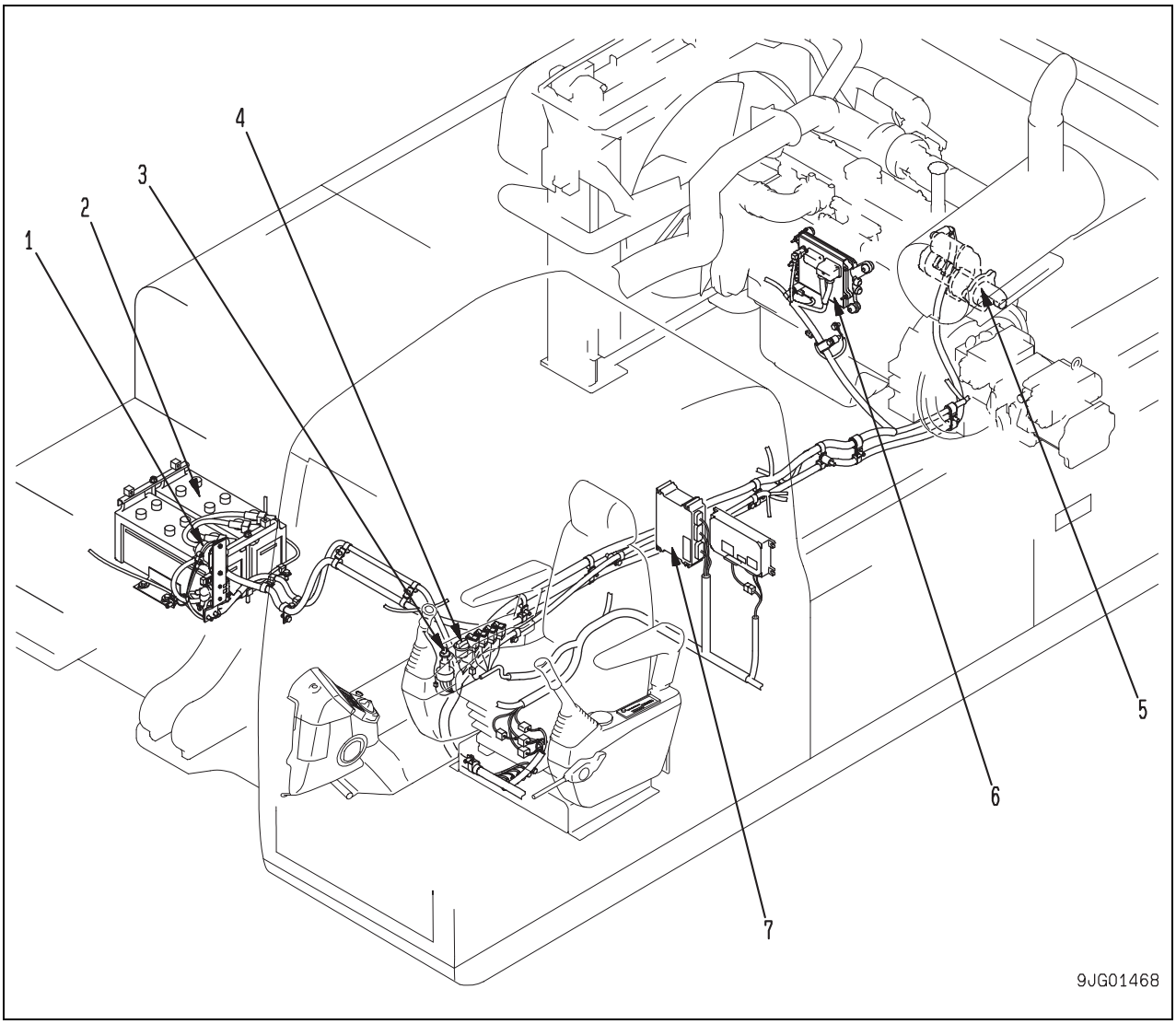
10 Structure, function and maintenance standard

Electrical system

Electrical system 2
Engine control 2
Electronic control system 11
Monitor system 38
Sensor 56
KOMTRAX terminal system 59

Electrical system

Engine control



1. Battery relay
2. Battery
3. Starting switch
4. Fuel control dial
5. Starting motor
6. Engine throttle controller
7. Pump contoroller

Outline

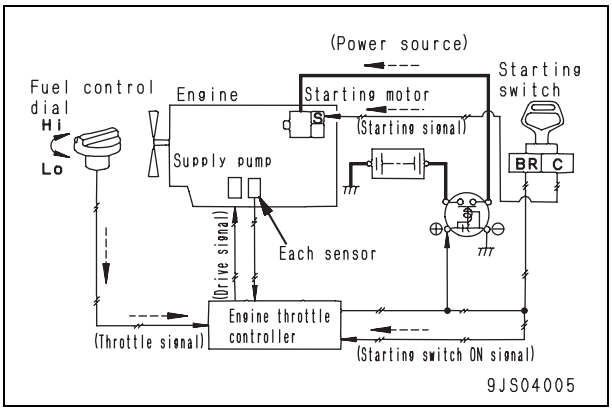
- The engine can be started and stopped with only starting switch (3).

Operation of system

Starting engine

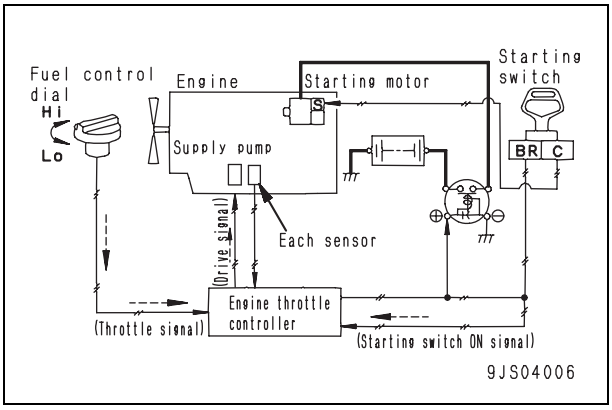
- When the starting switch is turned to the START position, the starting signal flows to the starting motor. Then, the starting motor turns to start the engine.

  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.



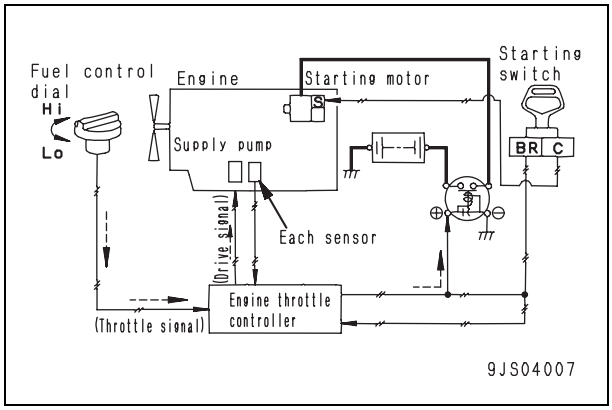
Engine speed control

- 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 decelerate, 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.



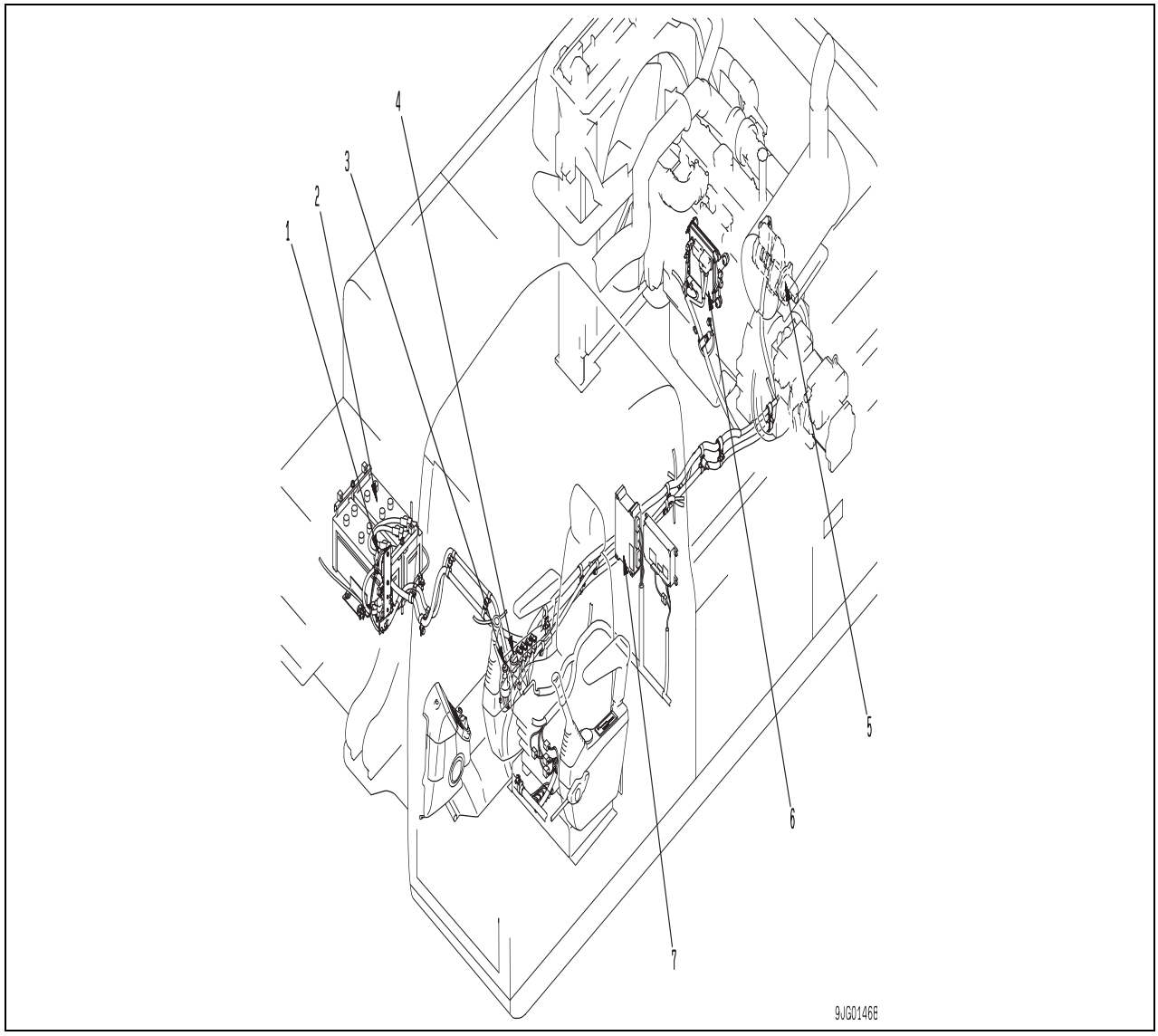
Stopping engine

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



Component

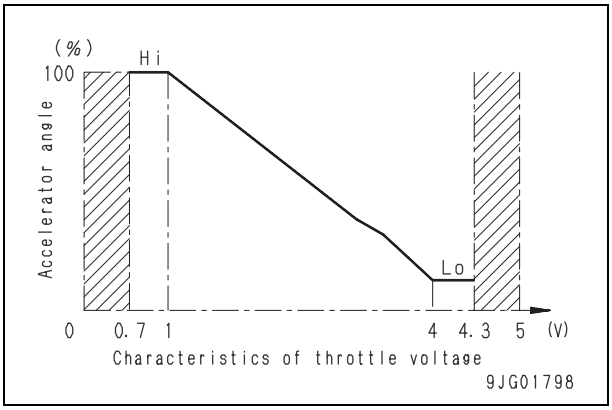
Fuel control dial



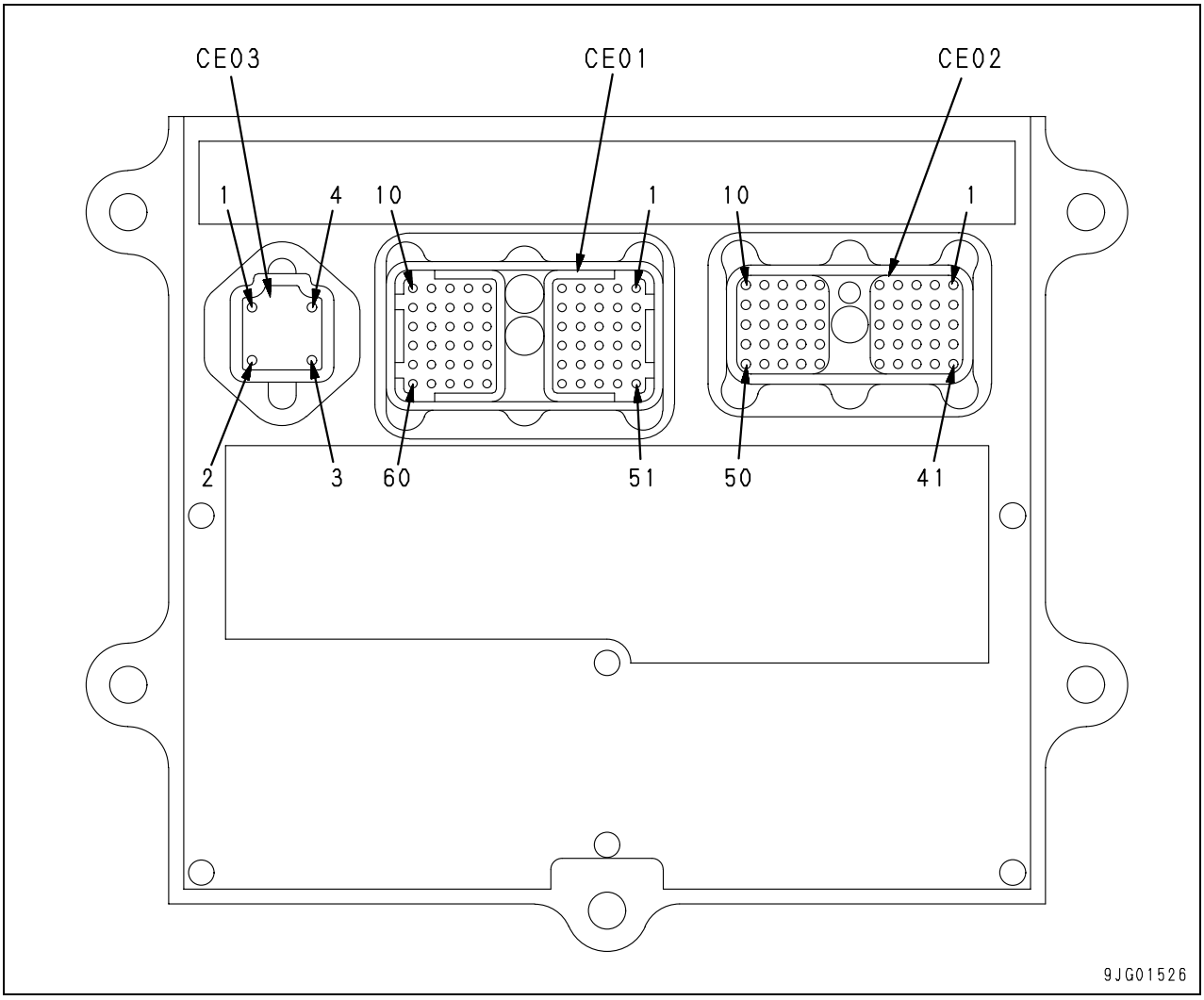
1. Knob
2. Dial
3. Spring
4. Ball
5. Potentiometer
6. Connector

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	Electric power supply for fuel feed pump	D
2	Electric power supply for IMA	D
3	Atmosphere sensor	B
4	NC(*)	–
5	NC(*)	–
6	CAN(–)	E
7	NC(*)	–
8	CAN(+)	E
9	NC(*)	–
10	NC(*)	–

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

CN-CE01

Pin No.	Signal name	Input/ output
11	Fuel feed pump return	C
12	NC(*)	–
13	NC(*)	B
14	WATER-IN-FUEL sensor	B
15	Coolant temperature sensor	B
16	5V electric power supply for sensor	A
17	Oil pressure switch	B
18	NC(*)	–
19	NC(*)	–
20	NC(*)	–
21	NC(*)	–
22	NC(*)	D
23	Boost temperature sensor	B
24	NC(*)	–
25	Common rail pressure sensor	B
26	Buckup 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	NC(*)	–
30	NC(*)	–
31	NC(*)	D
32	NC(*)	C
33	GND	A
34	NC(*)	–
35	NC(*)	A
36	NC(*)	–
37	NC(*)	A
38	NC(*)	C
39	Key switch (ACC)	–
40	Electrical intake air heater relay drive	–
41	NC(*)	–
42	Electrical intake air heater relay return	C
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(*)	B
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	GND	C
34	NC(*)	C
35	NC(*)	B
36	NC(*)	B
37	NC(*)	C
38	NC(*)	D
39	Key switch (ACC)	A
40	Electrical intake air heater relay drive	D
41	NC(*)	D
42	Electrical intake air heater relay return	C
43	NC(*)	D
44	NC(*)	D
45	NC(*)	–
46	CAN(+)	E
47	CAN(–)	E
48	NC(*)	D
49	PWM OUTPUT	D
50	NC(*)	D

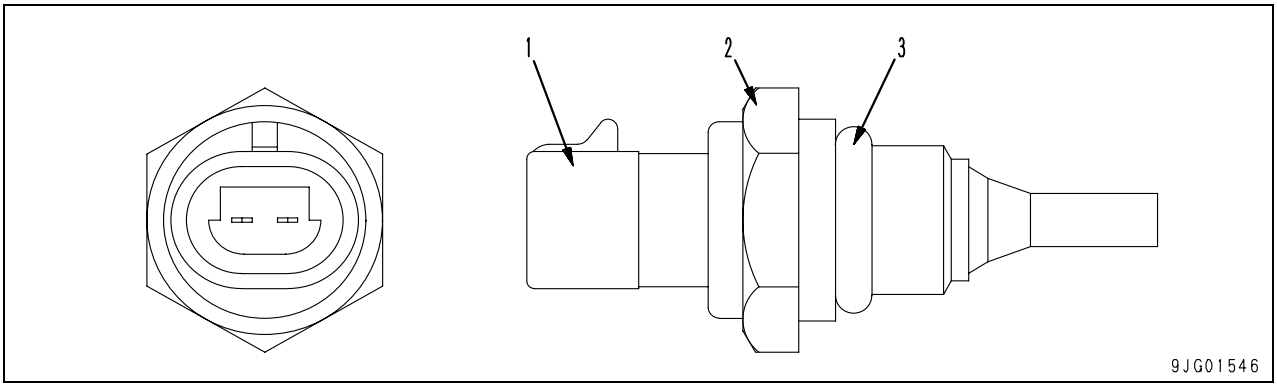
*: Never connect to NC or malfunctions or failures will occur.

CN-CE03

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

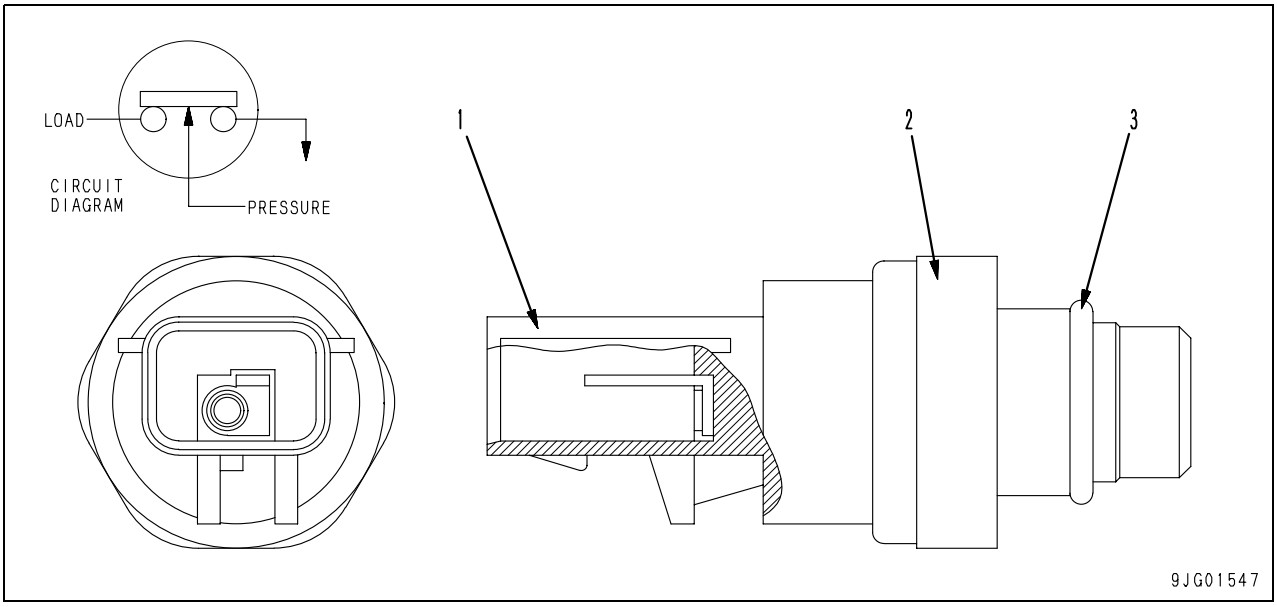
*: Never connect to NC or malfunctions or failures will occur.

Coolant temperature sensor



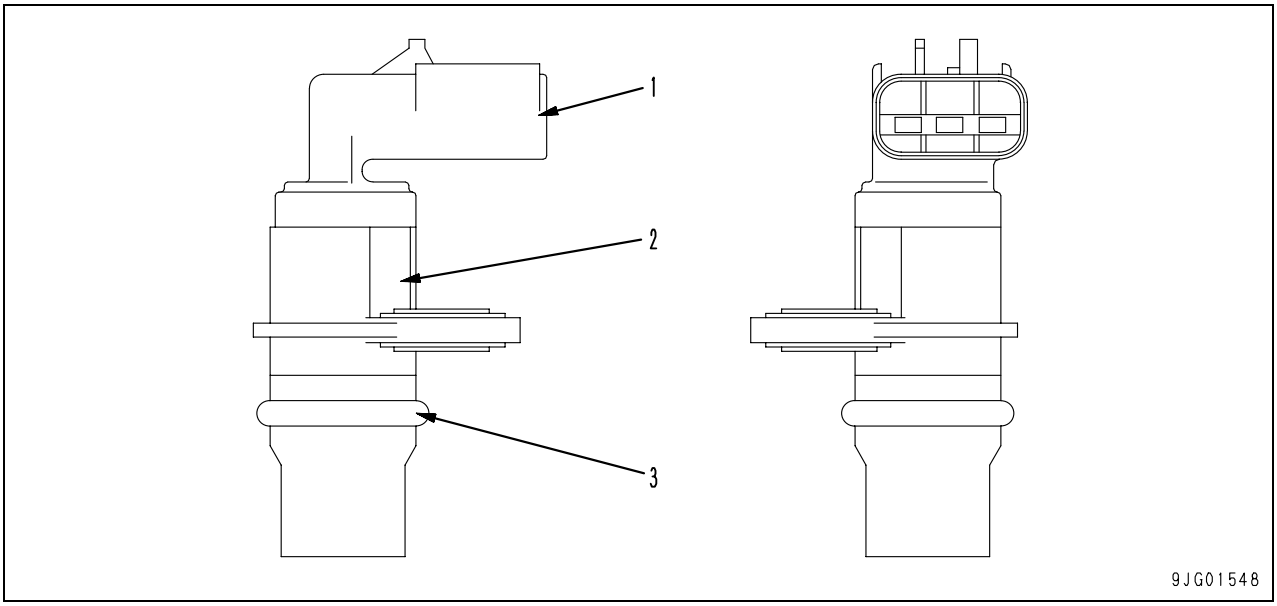
1. Connector
2. Sensor
3. O-ring

Oil pressure switch



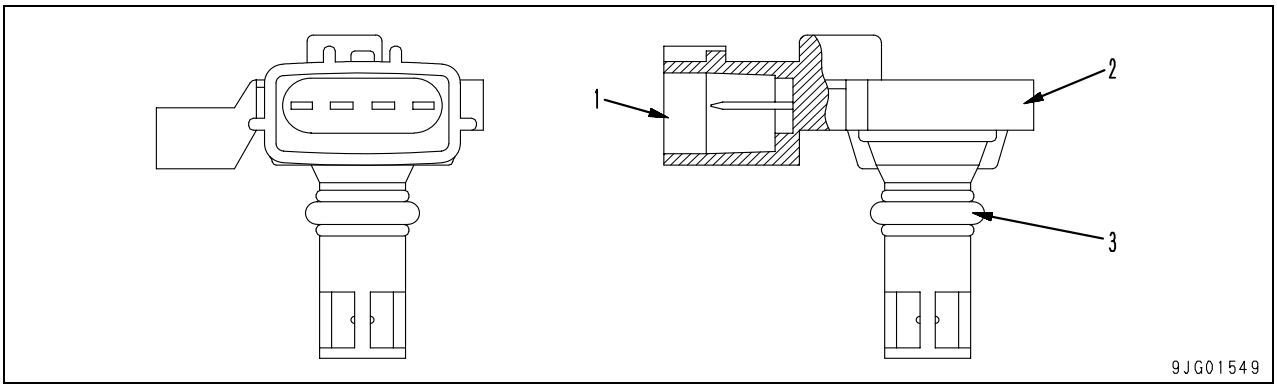
1. Connector
2. Sensor
3. O-ring

Rotation sensor



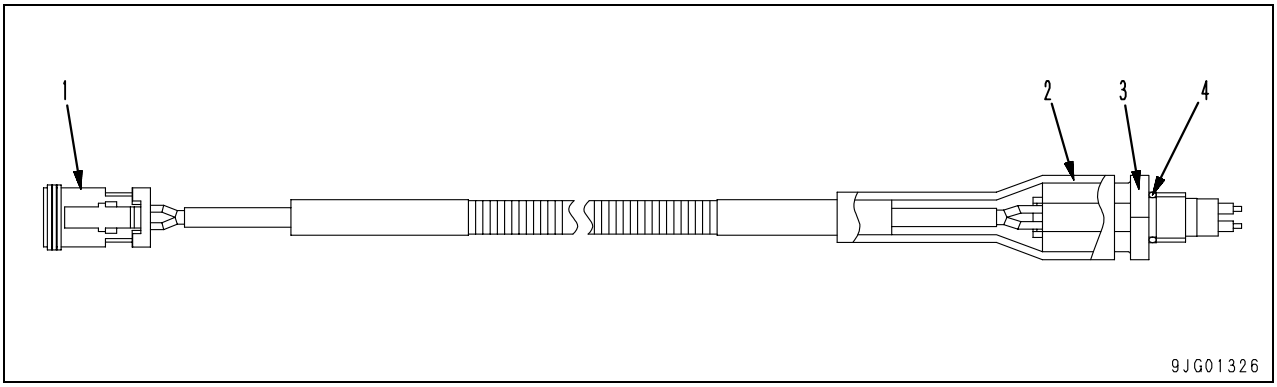
1. Connector
2. Sensor
3. O-ring

Boost pressure and temperature sensor



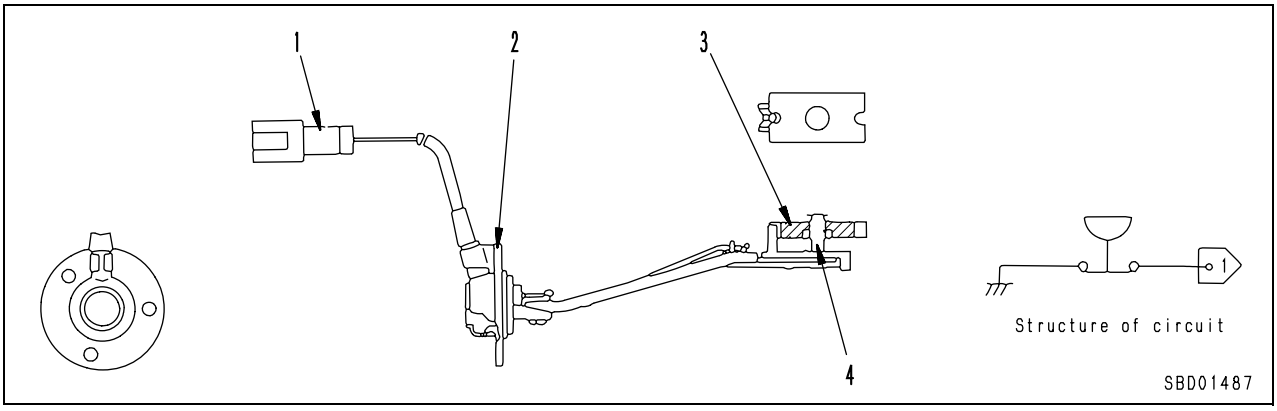
1. Connector
2. Sensor
3. O-ring

WIF (water-in-fuel detection) sensor



1. Connector
2. Tube
3. Sensor
4. O-ring

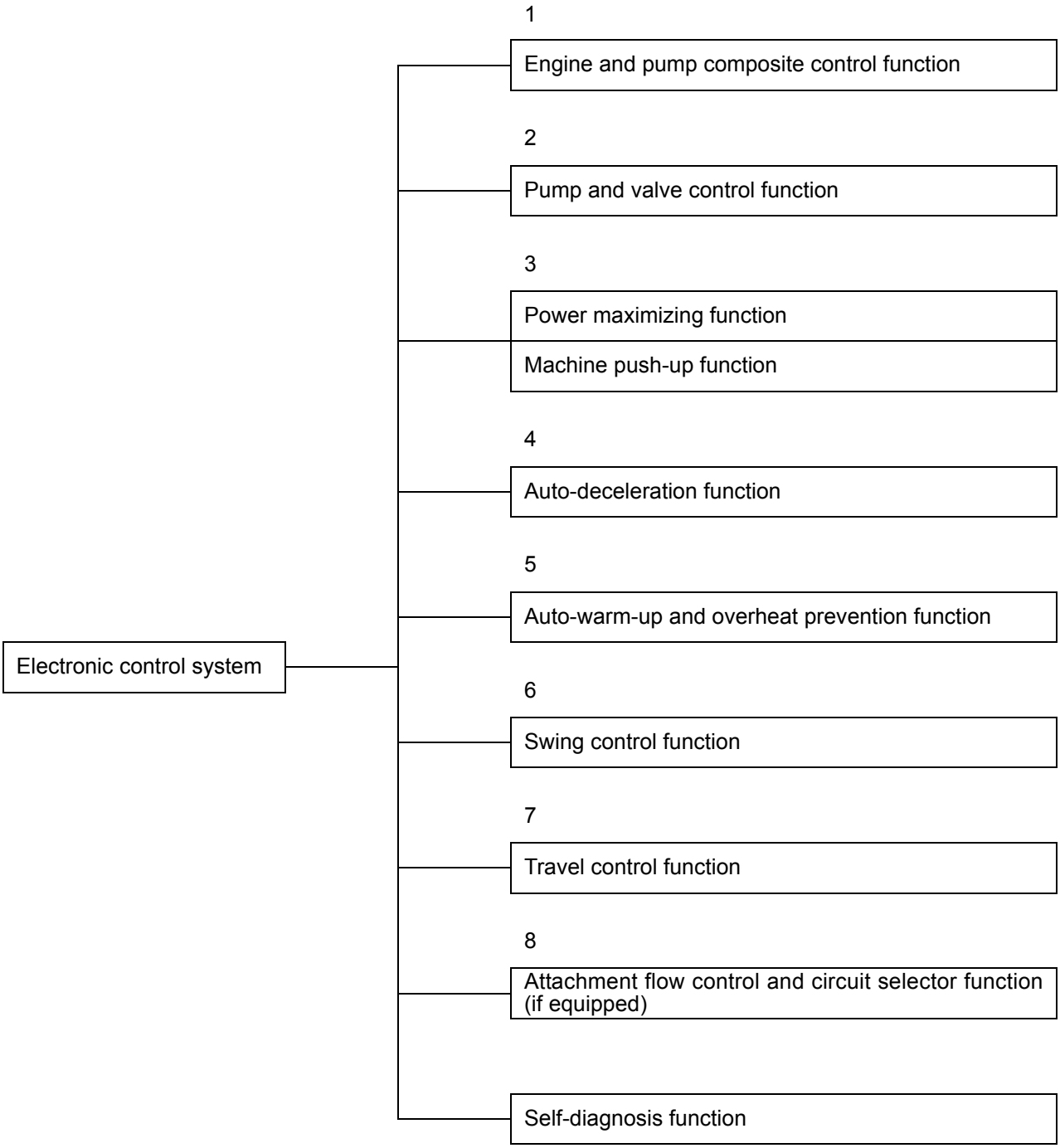
Engine oil level sensor



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

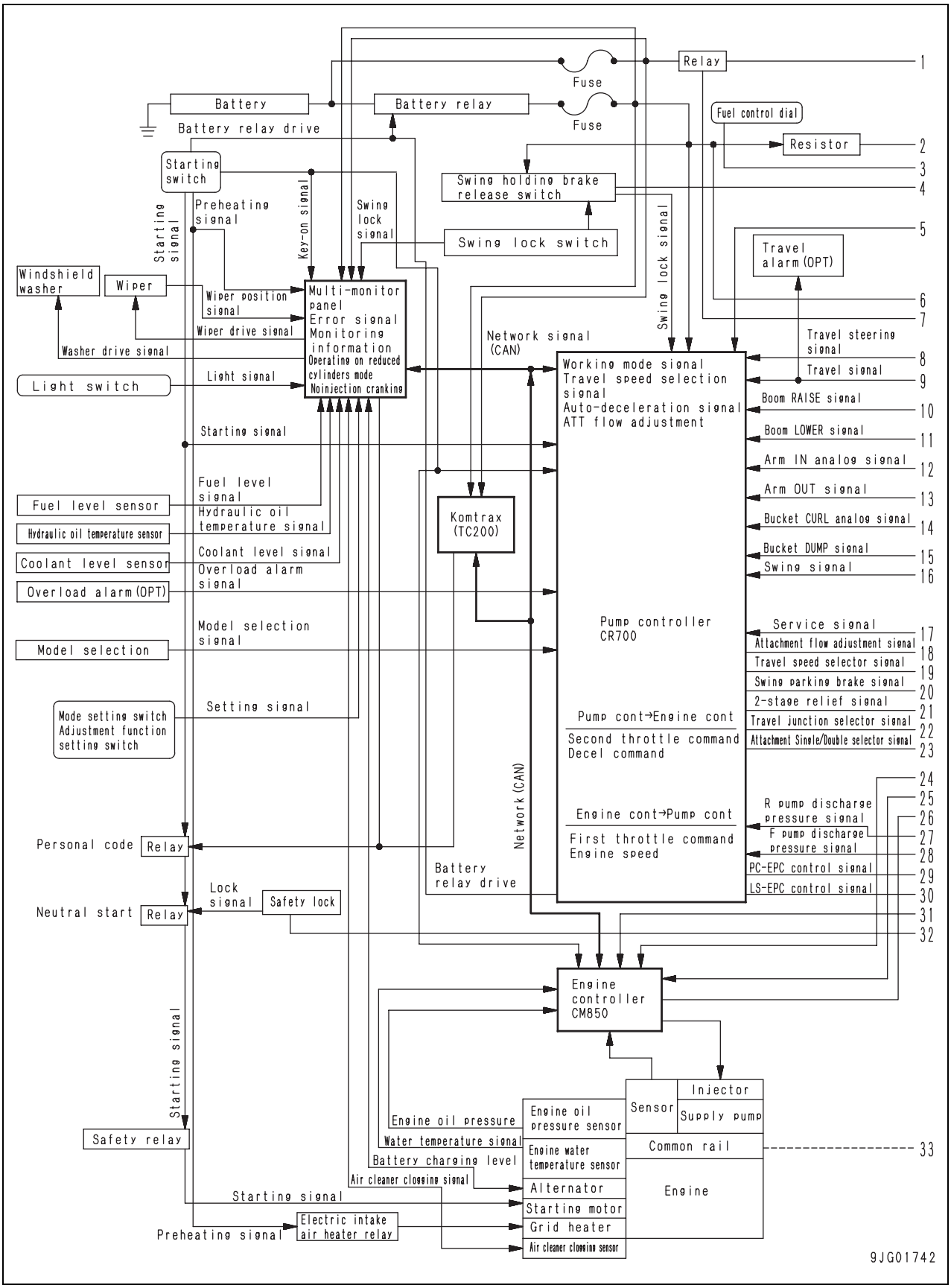
Electronic control system

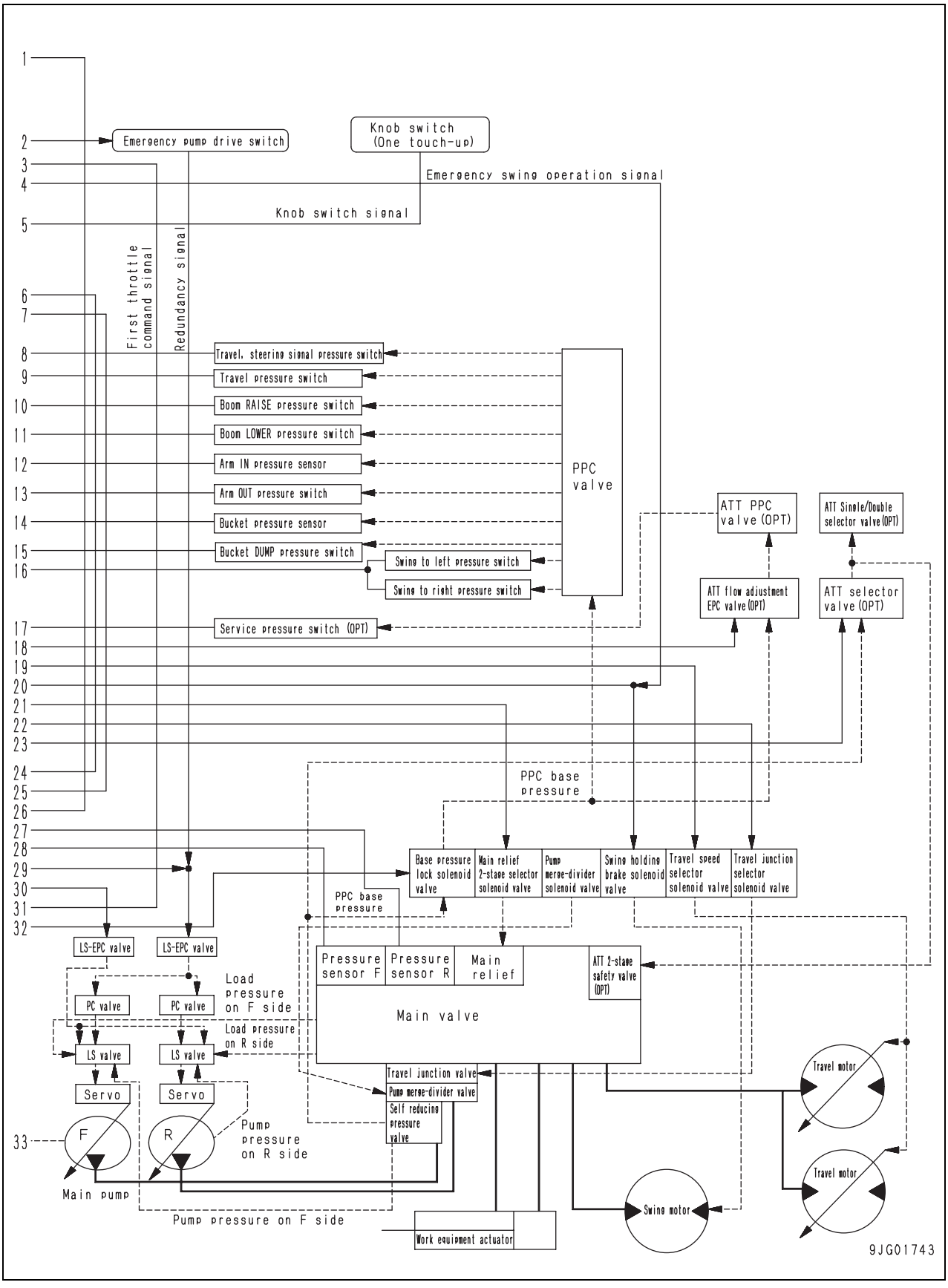
Control function



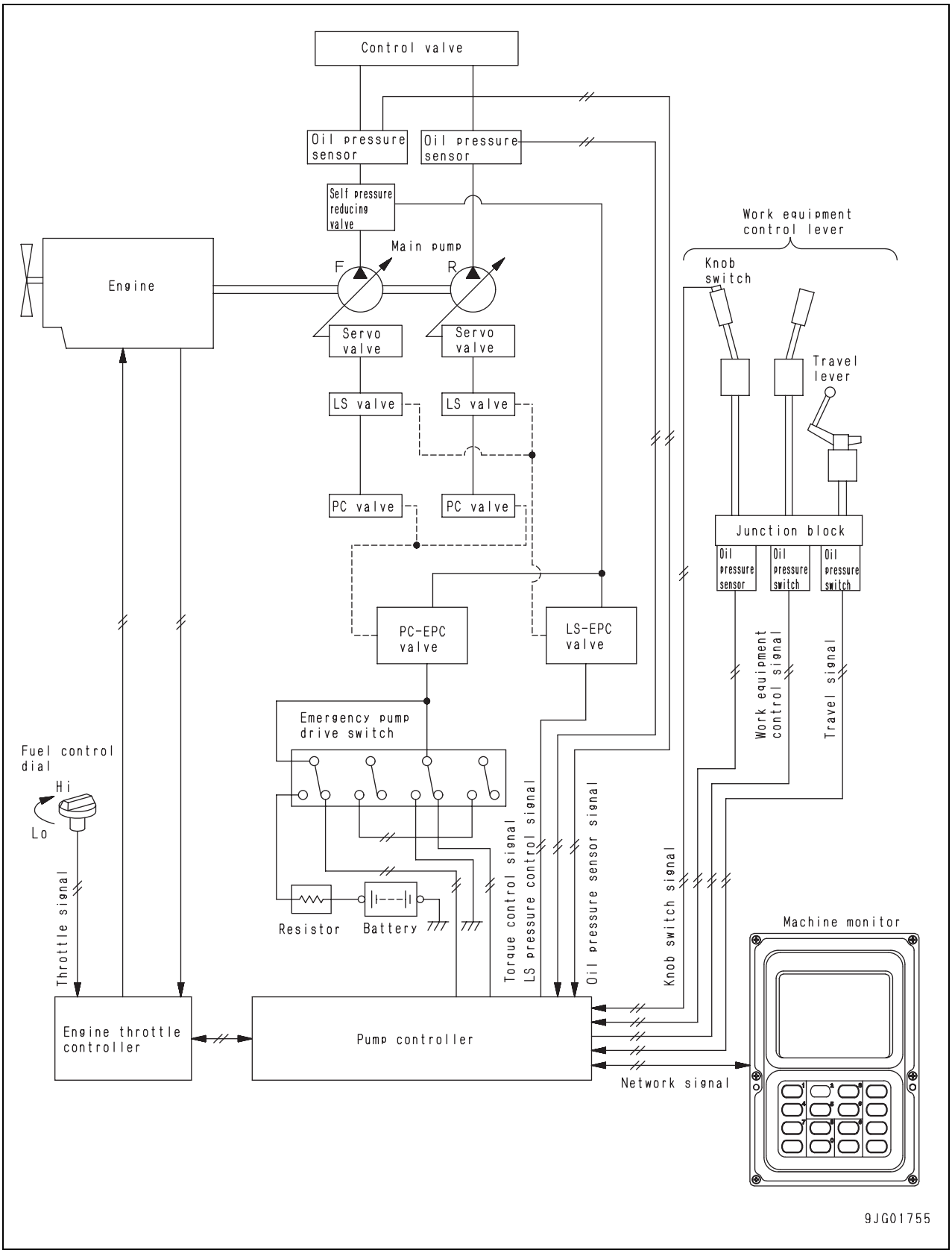
★ For the self-diagnosis function, see “Troubleshooting“.

Machine control system diagram



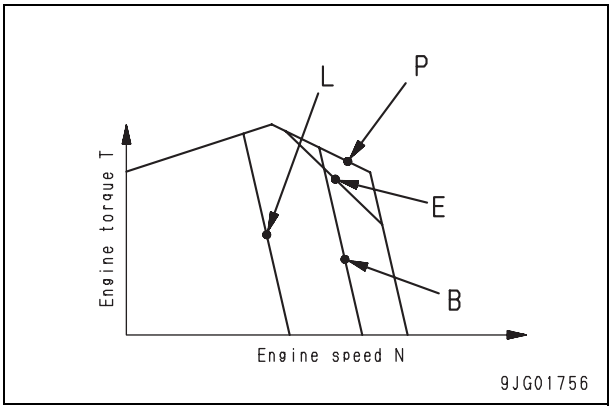

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Emergency pump drive switch
Knob switch (One touch-up)
Emergency swing operation signal
Knob switch signal
First throttle command signal
Redundancy signal
Travel, steering signal pressure switch
Travel pressure switch
Boom RAISE pressure switch
Boom LOWER pressure switch
Arm IN pressure sensor
Arm OUT pressure switch
Bucket pressure sensor
Bucket DUMP pressure switch
Swing to left pressure switch
Swing to right pressure switch
Service pressure switch (OPT)
PPC valve
ATT PPC valve (OPT)
ATT Single/Double selector valve (OPT)
ATT flow adjustment EPC valve (OPT)
ATT selector valve (OPT)
PPC base pressure
PPC base pressure
Base pressure lock solenoid valve
Main relief 2-stage selector solenoid valve
Pump merge-divider solenoid valve
Swing holding brake solenoid valve
Travel speed selector solenoid valve
Travel junction selector solenoid valve
LS-EPC valve
LS-EPC valve
Load pressure on F side
Load pressure on R side
PC valve
PC valve
LS valve
LS valve
Servo
Servo
F
R
Pump pressure on R side
Main pump
Pump pressure on F side
Pressure sensor F
Pressure sensor R
Main relief
ATT 2-stage safety valve (OPT)
Main valve
Travel junction valve
Pump merge-divider valve
Self reducing pressure valve
Travel motor
Travel motor
Swing motor
Work equipment actuator
9JG01743

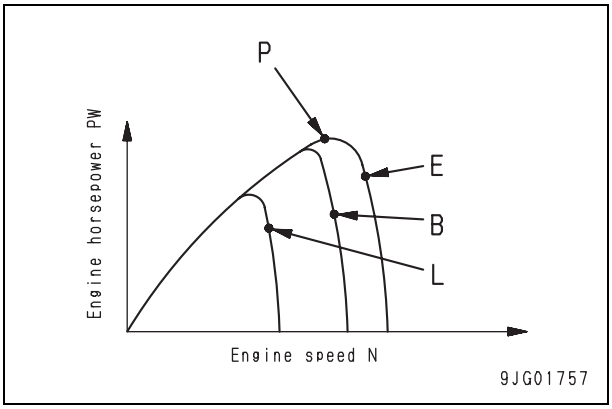
1. Engine and pump composite control function

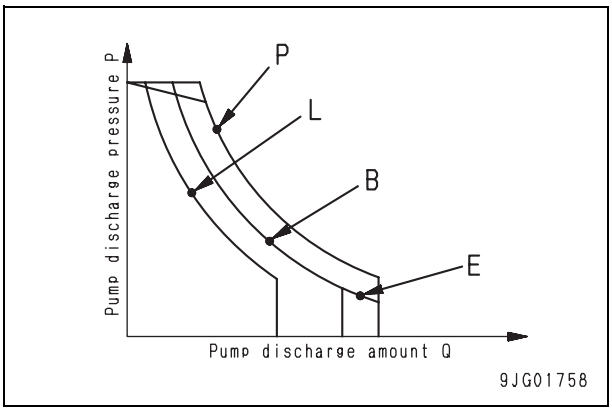


Function

- This function allows the operator to select proper engine torque and pump absorption torque according to the type of work. Four modes are provided: P, E, B and L. Using the work mode switch on the monitor panel, the operator is required to select one of them.
- The pump controller detects the speed of the engine governor set with the fuel control dial and the actual engine speed (N) and controls them so that the pump will absorb all the torque at each output point of the engine, according to the pump absorption torque set in each mode.







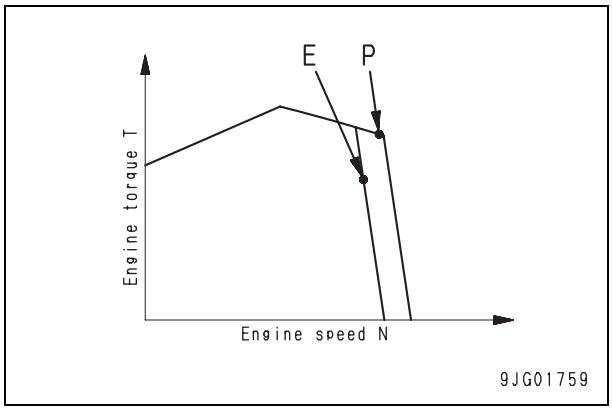
1) Control method in each mode

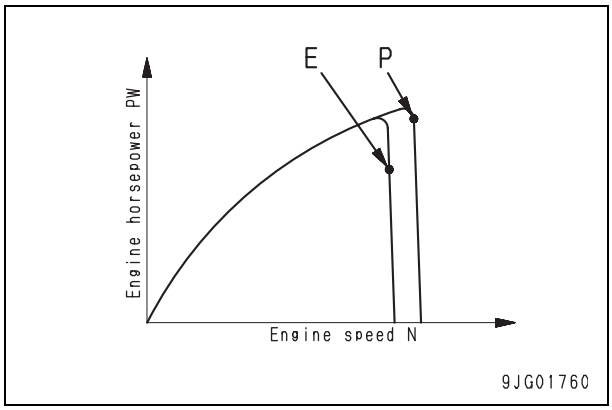
P and E modes

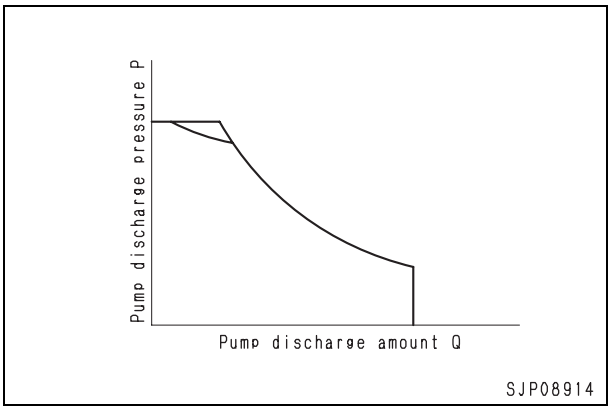
- Matching point in P mode: Rated speed

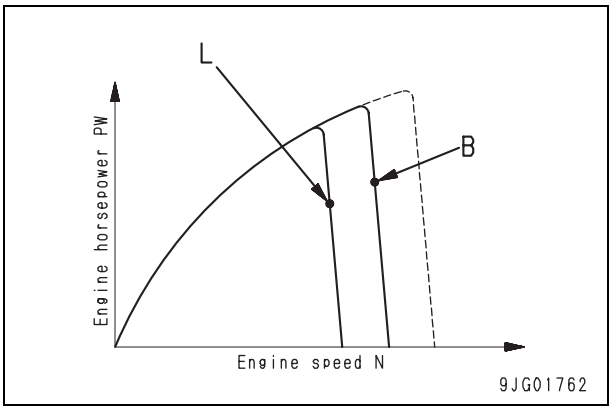
Mode	Matching point
P	180.2 kW/1,950 rpm {242 HP/1,950 rpm}
E	154.4 kW/1,750 rpm {207 HP/1,750 rpm}

- If the pump load increases and the pressure rises, engine speed (N) lowers. At this time, the controller lowers the pump discharge so that the engine speed will be near the maximum output point.
  If the pressure lowers, the controller increases pump discharge (Q) so that the engine speed will be near the maximum output point.
  By repeating these operations, the controller constantly uses the engine near the maximum output point.







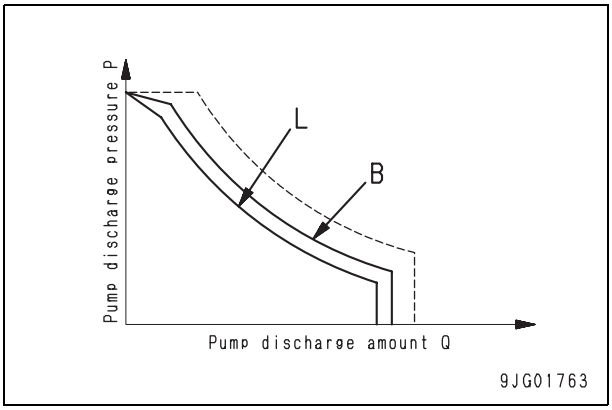


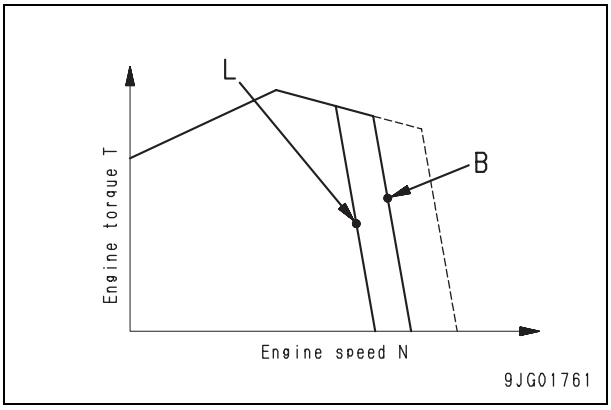
B and L modes

Mode	B mode	L mode
Partial output point	82%	61%

Mode	Matching point
B	147.1 kW/1,800 rpm {197 HP/1,800 rpm}
L	110.3 kW/1,550 rpm {148 HP/1,550 rpm}

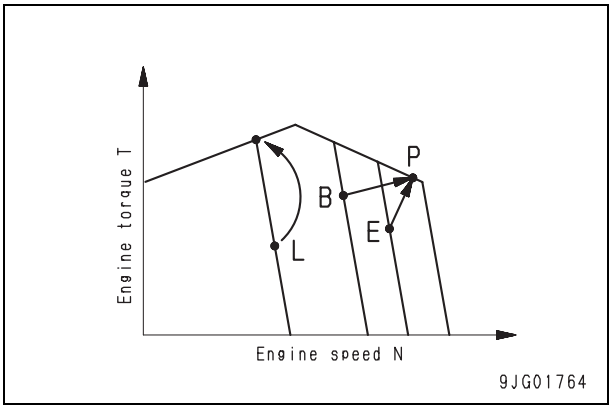
- In B or L mode, the controller controls the pump absorption torque through the pump and engine compound control function to decrease engine speed (N) while maintaining engine torque (T) constant along the constant horsepower curve. This ensures reduced fuel consumption.

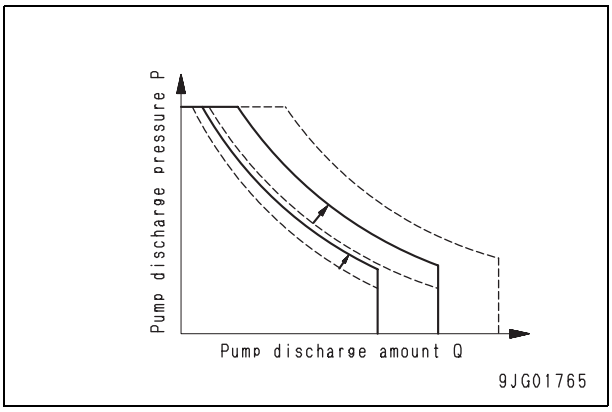




2) Function to control pump during travel

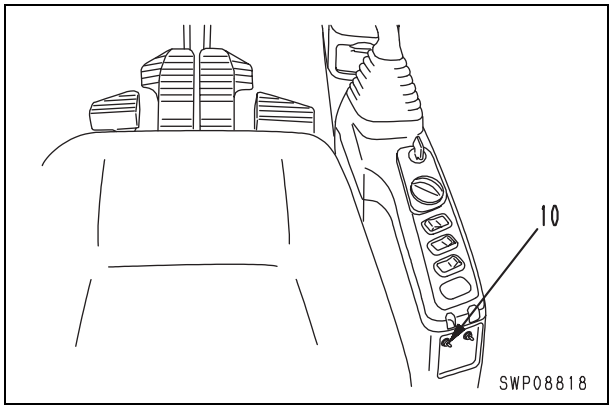
- Traveling the machine in E or B mode leaves the working mode unchanged, but raises the pump absorption torque and engine speed (N) to values same as those in P mode.
- If the machine travels in L mode, the working mode and engine speed (N) do not change, but the pump absorption torque is increased.

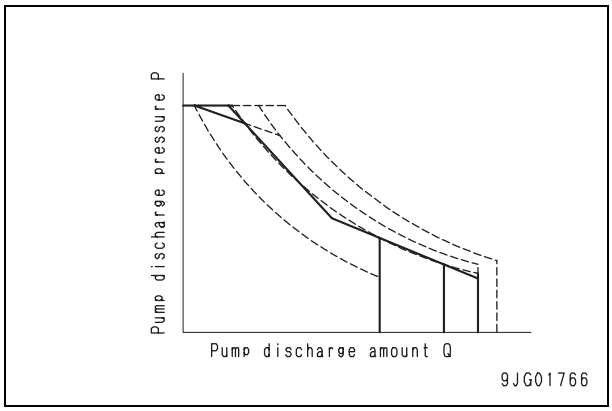




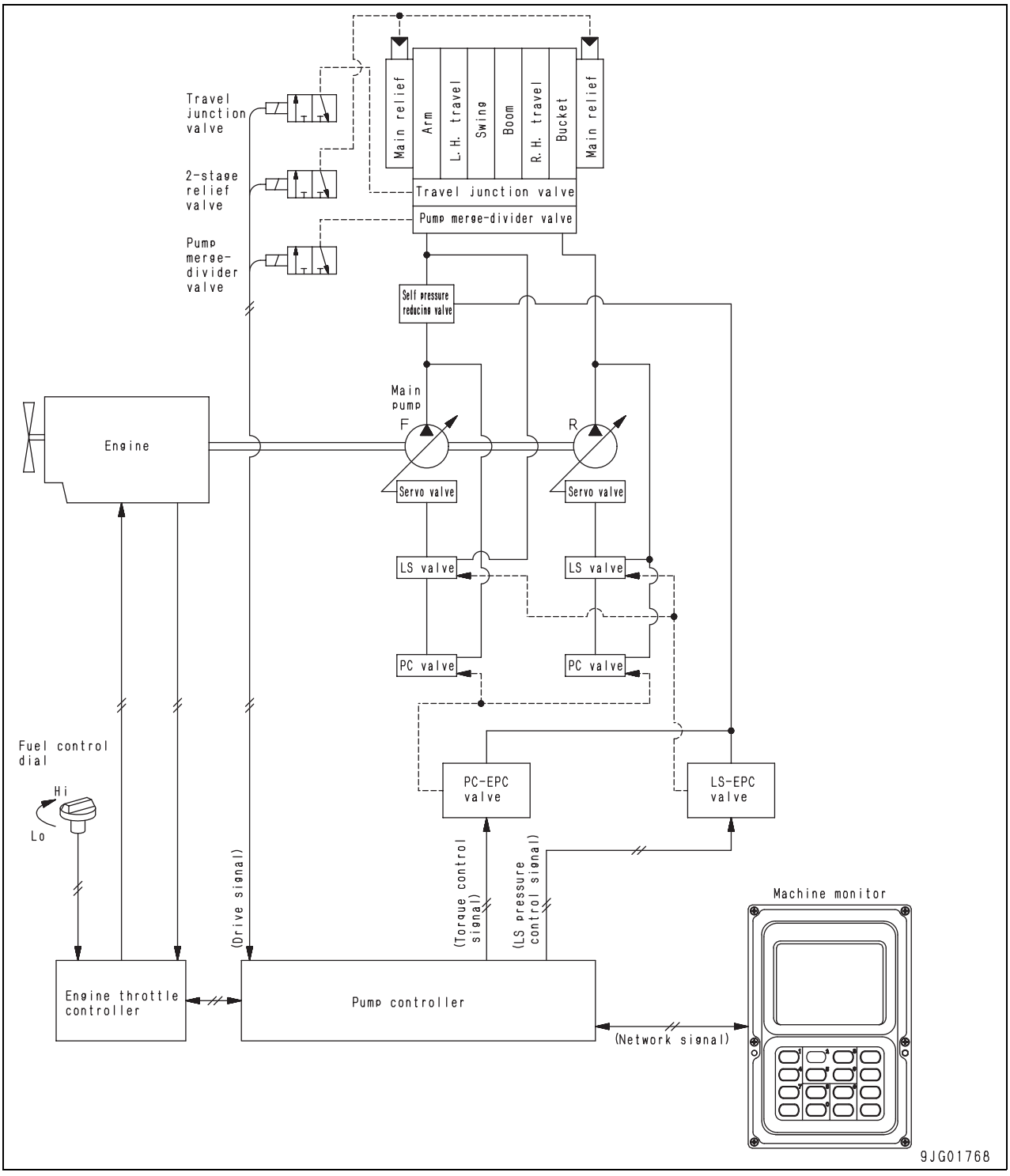
3) Function to control when emergency pump drive switch is turned on

- Even if any abnormality occurs in the controller or sensor, setting emergency pump drive switch (10) to the “ON” position activates the machine with an absorption torque approximately equivalent to that in E mode.
  In this case, a constant current flows from the battery to the EPC valve for PC and therefore, the oil pressure is sensed by only the EPC valve for PC.





2. Pump and valve control function

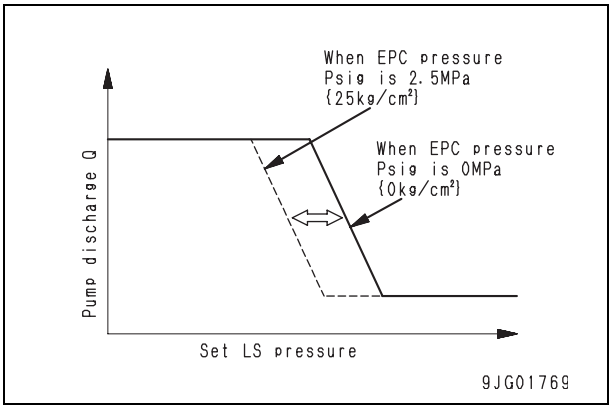


Function

- The machine is matched to various types of work properly with the 2-stage relief function to increase the digging force, etc.

1) LS control function

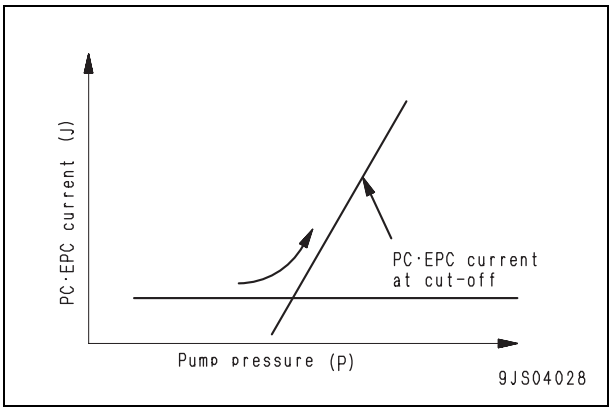
- Depending on the operation condition of the actuator, this function changes the pressure output from the LS-EPC valve to LS valve to change the change point (LS set differential pressure (DLS)) of the pump discharge in the LS valve.
- By this operation, the start-up time of the pump discharge is optimized and the composite operation and fine control performance is improved.



2) Cut-off function

- This function increases PC-EPC current (J) to reduce the flow rate in the relief state, improving fuel consumption.

Operating condition for turning on cut-off function
When the average value of the front and rear pressure sensors is above 27.9 MPa {285 kg/cm^2} with the power maximizing function off. The cut-off function does not work, however, while the machine is travelling in P mode, swing lock switch is in the “ON” position.

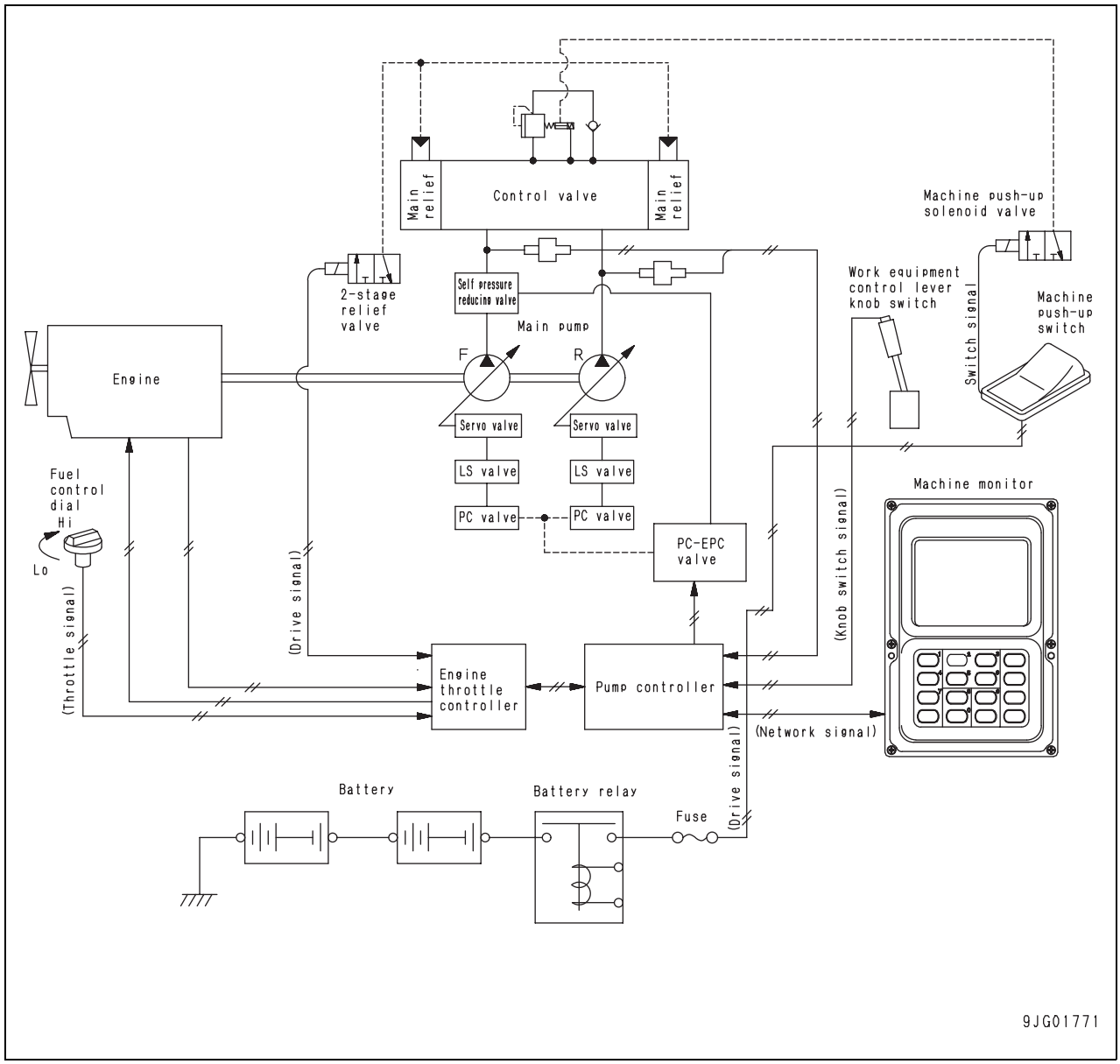


3) 2-stage relief function

- The relief pressure in the normal work is 34.8 MPa {355 kg/cm^2}. If the 2-stage relief function is turned on, however, the relief pressure rises to about 37.2 MPa {380 kg/cm^2}. By this operation, the hydraulic force is increased further.

Operating condition for turning on 2-stage relief function	Relief pressure
• During travel • When swing lock switch is turned to the ON position • When boom is lowered • When power maximizing function is turned on • When L mode is operated	34.8 MPa {355 kg/cm^2} ↓ 37.2 MPa {380 kg/cm^2}

3. Power maximizing and machine push-up function



Function

- The power maximizing function allows the operator to increase power for a certain time by operating the left knob switch.
- The machine push-up function allows the operator to increase the boom pushing force by operating the machine push-up switch.

1) Power maximizing function

- This function is used to increase digging force for a certain period of time (e.g., when digging up a large rock).
- If the left knob switch is pressed in P or E mode, the hydraulic force is increased about 7% to increase the digging force. Each function is set automatically as shown below.

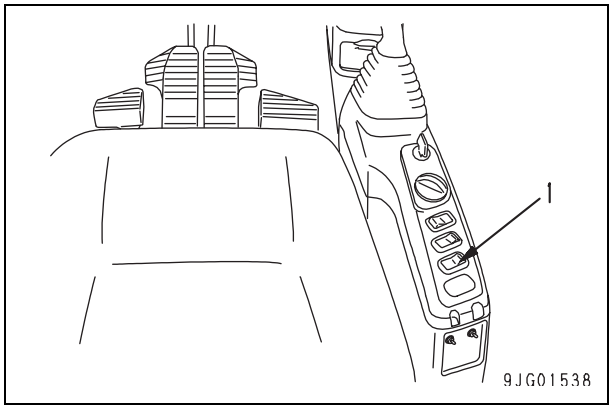
Function	Setting
Engine and pump control	Matching at rated ouptut point
2-stage relief function	34.8 MPa {355 kg/cm^2} ↓ 37.2 MPa {380 kg/cm^2}
Software cut-off function	Cancel

- These settings are automatically reset after 8.5 seconds when the switch is pressed.

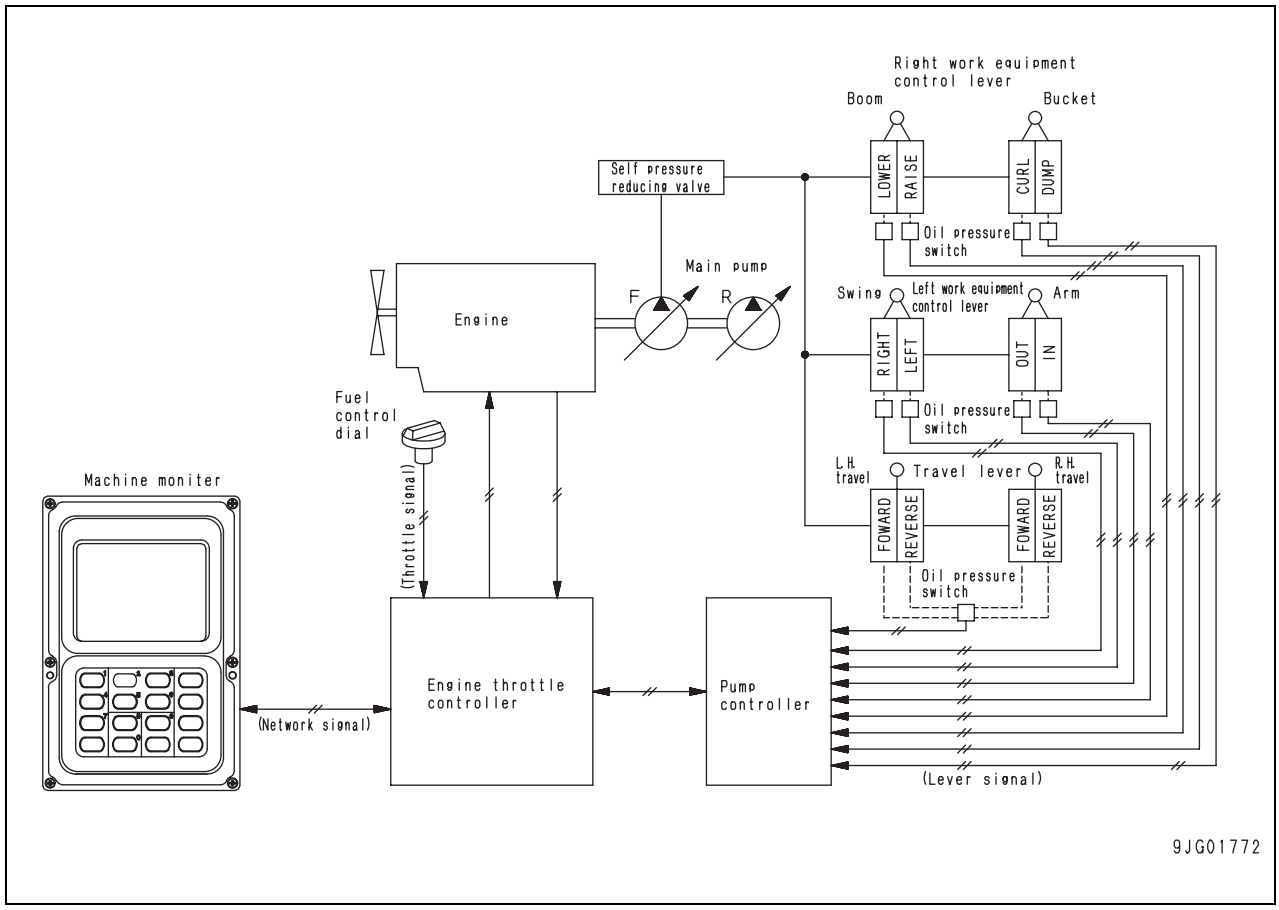
2) Machine push-up function

- The machine push-up function allows the operator to increase the boom pushing force that is required for ditching or mass excavation in hard ground by operating machine push-up switch (1).

Switch	2-stage safety valve function
OFF	Setting of safety valve at boom cylinder head 14.7 MPa {150 kg/cm^2}
ON	Setting of safety valve at boom cylinder head 28.4 MPa {290 kg/cm^2}

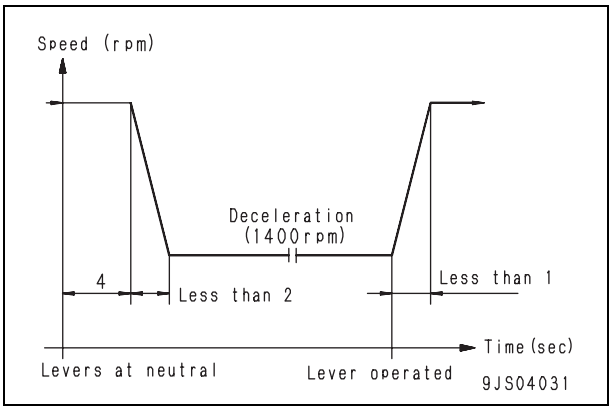


4. Auto-deceleration function



Function

- The auto-deceleration function automatically reduces the engine speed to its medium speed range when the all control levers are set in NEUTRAL while waiting for a dump truck or work to reduce the fuel consumption and noise.
- If any lever is operated, the engine speed instantly returns to the speed set with the fuel control dial.



Operation

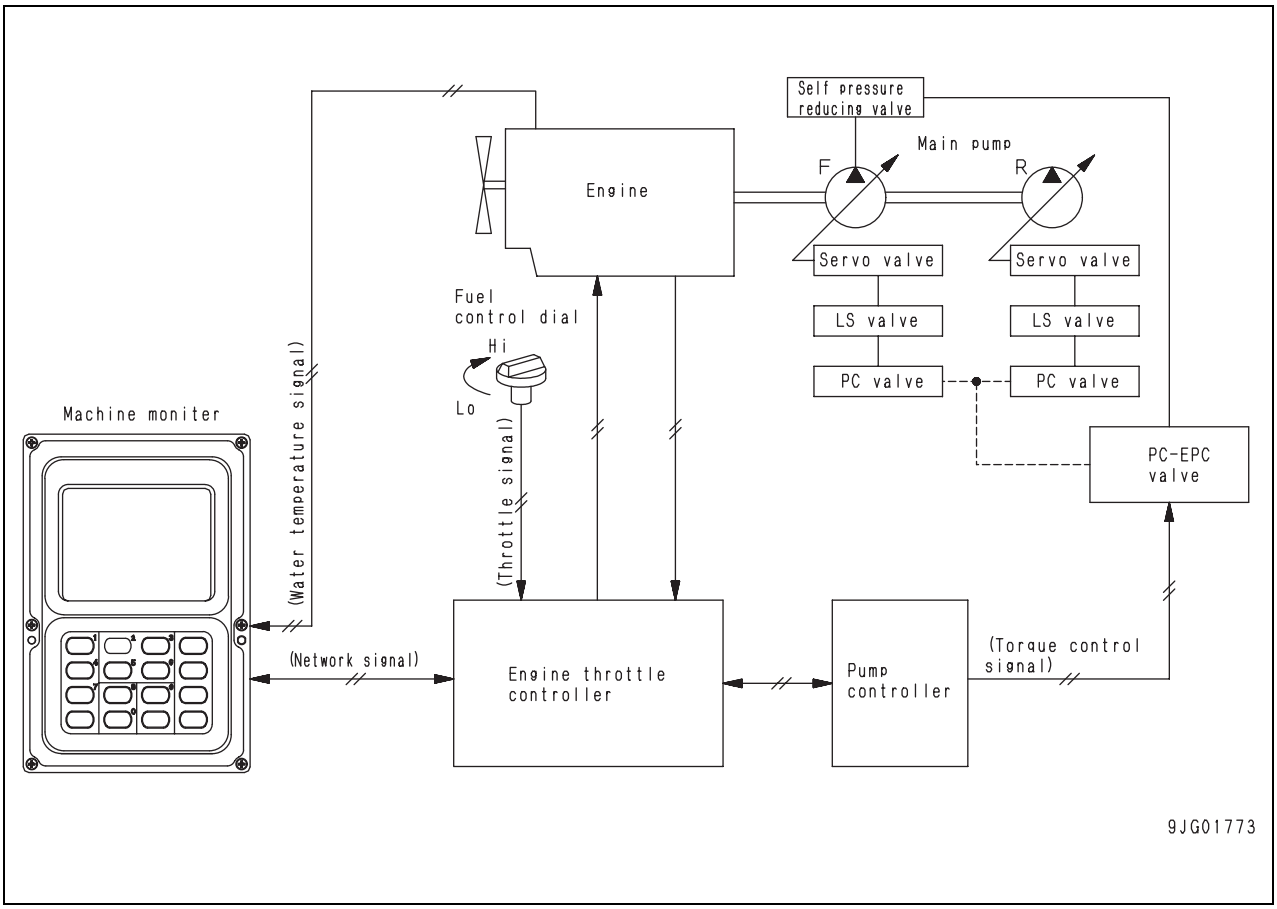
When control levers are set in neutral

- If all the control levers are kept to NEUTRAL for 4 sec. during operation at a engine speed above a decelerator operation level (approximately 1,400 rpm), this function lowers the engine speed to the deceleration operation level (approximately 1,400 rpm) and keeps it until you operate any lever.

When any control lever is operated

- If you operate any control lever while the engine speed is kept at the deceleration operation level, the engine speed instantly rises to the level set with the fuel control dial.

5. Auto-warm-up and overheat prevention function



Function

- The engine automatic warm-up function increases the engine speed to warm up the engine if coolant temperature is too low after the engine starts.
- The overheat prevention function reduces the pump load when coolant or hydraulic oil temperature is too high during operation to protect the engine from overheating.

1) Auto-warm-up function

- After the engine is started, if the engine coolant temperature is low, the engine speed is raised automatically to warm up the engine.

Operating condition (All)	⇒	Operated
Coolant temperature: Below 30°C. Engine speed: Max. 1,200 rpm		Engine speed: Max. 1,200 rpm

⇓

Resetting condition (Any one)		⇒	Reset
Auto	Coolant temperature: Above 30°C		Engine speed: Any level
	Auto-warm-up operation time: Min. 10 minutes		
Manual	Fuel control dial: Kept at 70% of full level for 3 sec. or longer		

2) Overheat prevention function

- If the engine coolant temperature rises too high during work, the pump load and engine speed are reduced to protect the engine from overheating.
- This function is turned on when the coolant temperature rises above 95°C.

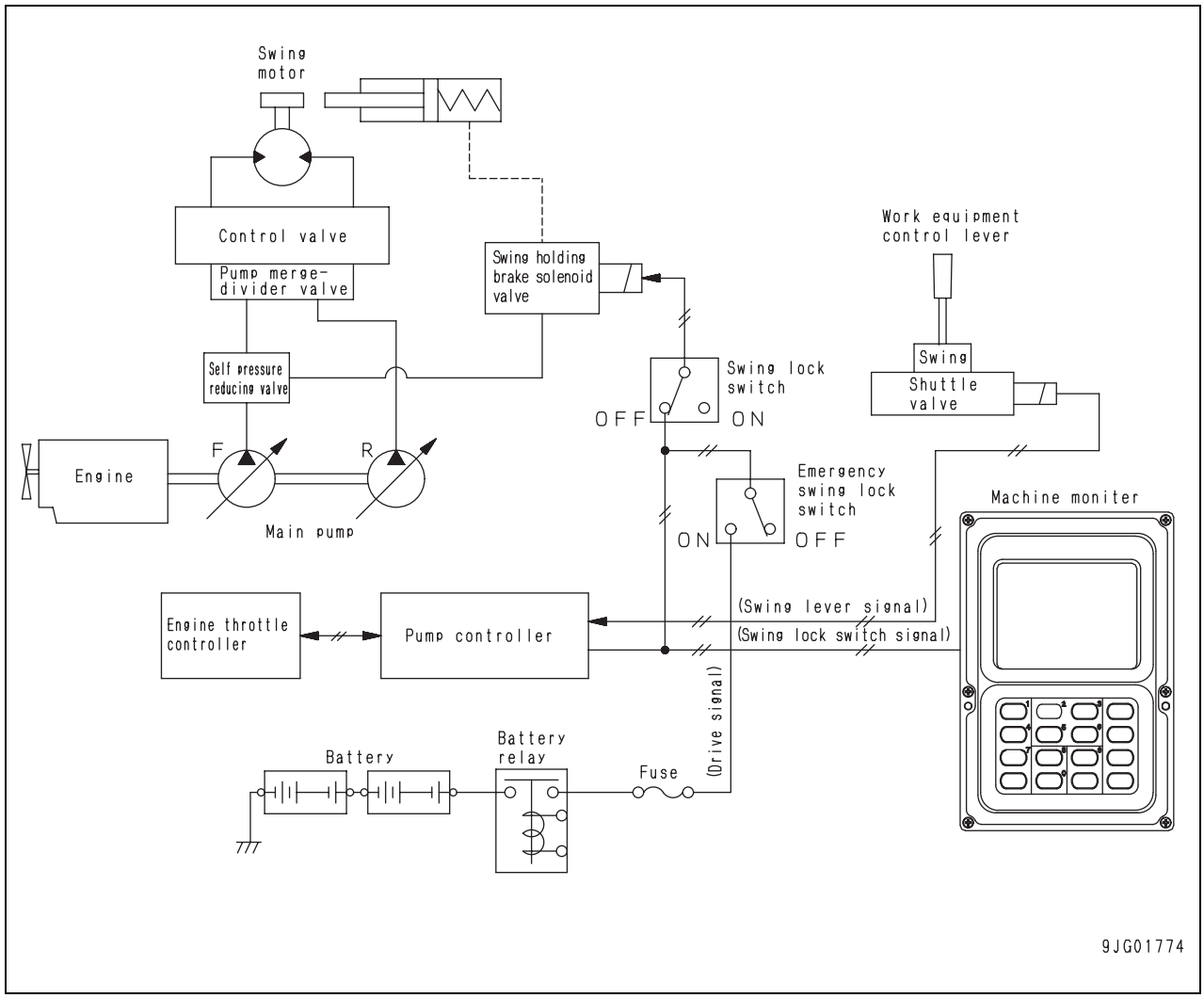
Operating condition	⇒	Operation/Remedy	⇒	Resetting condition
Hydraulic oil temperature: Above 95°C		Work mode: Travel Engine speed: Keep as is. Lower travel speed.		Hydraulic oil temperature: Below 95°C • Under above condition, controller is set to condition before operation of function. (Automatic reset)

Operating condition	⇒	Operation/Remedy	⇒	Resetting condition
Hydraulic oil or coolant temperature: Above 100°C		Work mode: P or E mode Engine speed: Keep as is. Lower pump discharge.		Hydraulic oil or coolant temperature: Below 100°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 102°C		Work mode: P, E, B or L mode Engine speed: Keep as is. Monitor alarm lamp: Lights up. Lower pump discharge.		Hydraulic oil or 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 or coolant temperature: Above 105°C		Work mode: Any mode Engine speed: Low idle Monitor alarm lamp: Lights up Alarm buzzer: Sounds		Hydraulic oil or 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)

6. Swing control function



Function

The swing lock and swing holding brake function are provided as a swing control function.

1) Swing lock and swing holding brake function

- The swing lock function (manual) is used to lock machine from swinging at any position. The swing holding brake function (automatic) is used to prevent hydraulic drift after the machine stops swinging.
- Operation of swing lock switch and swing lock/holding brake

Lock switch	Lock lamp	Function	Operation
OFF	OFF	Swing holding brake	If swing lever is set in neutral, swing brake operates in about 7 sec. If swing lever is operated, brake is released and machine can swing freely.
ON	ON	Swing lock	Swing lock operates and machine is locked from swinging. Even if swing lever is operated, swing lock is not reset and machine does not swing.

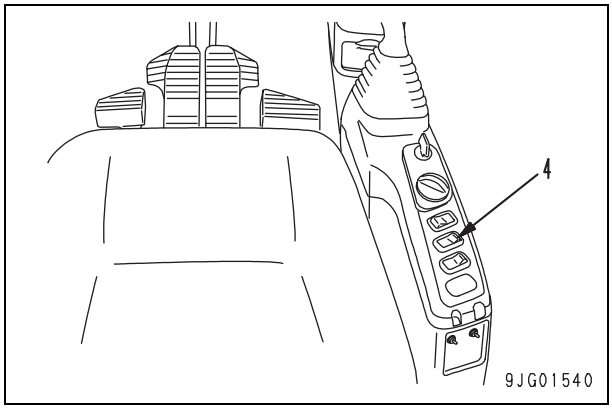
Swing holding brake release switch

- If the controller, etc. has a problem, the swing holding brake does not work normally, and the machine cannot swing, the swing lock can be reset with the swing holding brake release switch.
- Even if the swing holding brake release switch is turned on, if the swing lock switch is turned on, the swing brake is not released.
- If the swing lock is reset, only the hydraulic brake is applied by the safety valve. Note that if swinging is stopped on a slope, the upper structure may swing by its gravity.

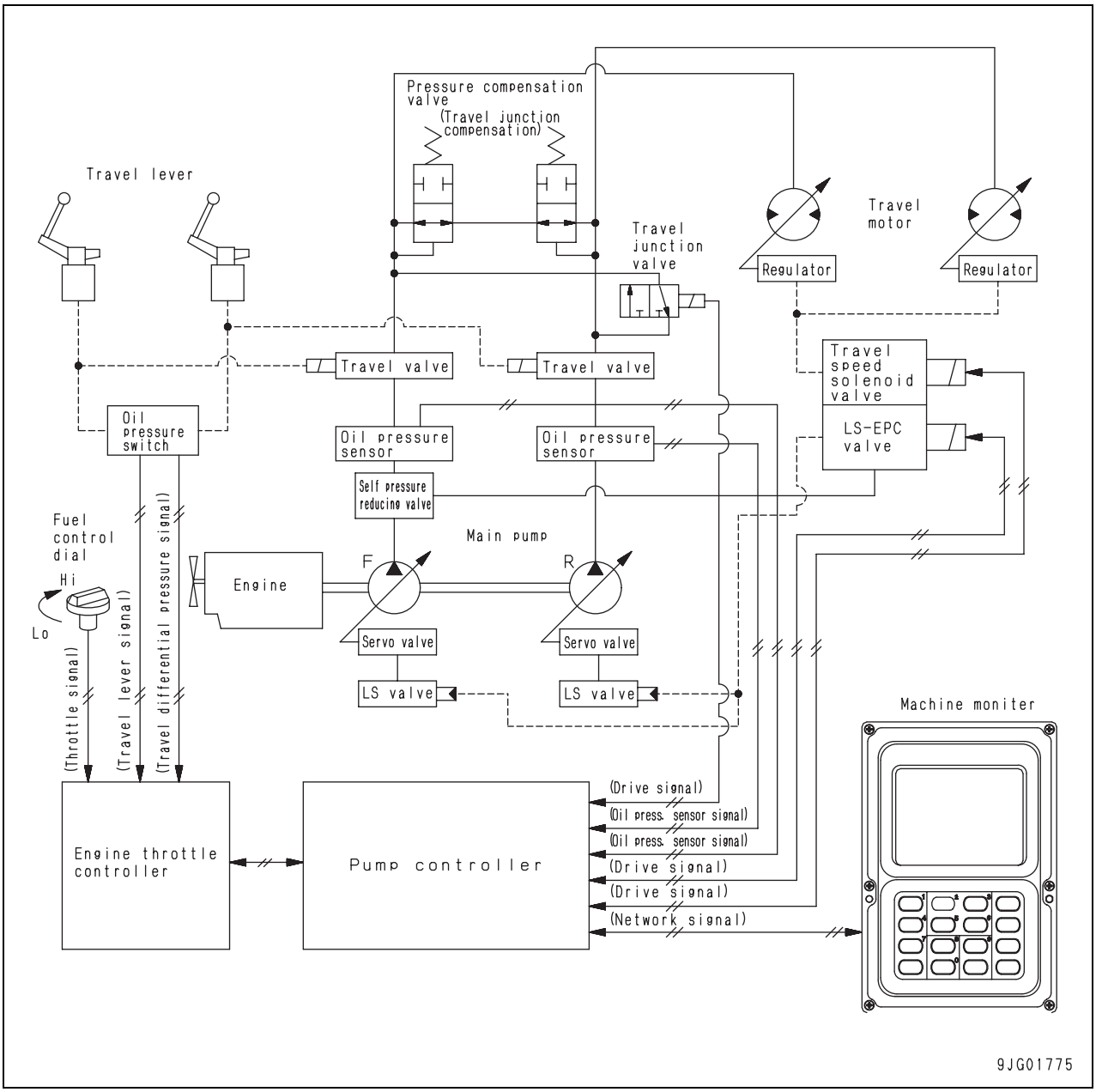
Swing holding brake release switch	ON (when controller has trouble)		OFF (when controller is normaly)	
Swing lock switch	ON	OFF	ON	OFF
Swing brake	Swing lock is turned on.	Swing lock is canceled.	Swing lock is turned on.	Swing holding brake is turned on.

2) Quick hydraulic oil warm-up function when swing lock switch is turned on

- If swing lock switch (4) is turned on, the pump cut-off function is cancelled and the relief pressure rises from 34.8 MPa {355 kg/cm^2} to 37.2 MPa {380 kg/cm^2}. If the work equipment is relieved under this condition, the hydraulic oil temperature rises quickly and the warm-up time can be shortened.



7. Travel control function



Function

- The machine is provided with a function that ensures travel performance best fit to the type of work and jobsite by controlling pumps during travel or allowing operator to change travel speed automatically or manually.

1) Pump control function during travel

- If the machine travels in a work mode other than P mode, the work mode and the engine speed are kept as they are and the pump absorption torque is increased.
- For details, see "Engine and pump composite control function."

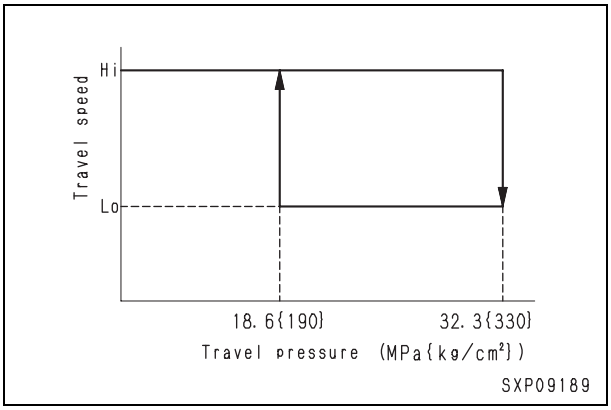
2) Travel speed change function

1] Manual change with travel speed switch
If one of Lo, Mi and Hi is selected with the travel speed switch, the pump controller controls the pump capacity and motor capacity at each gear speed as shown below to change the travel speed.

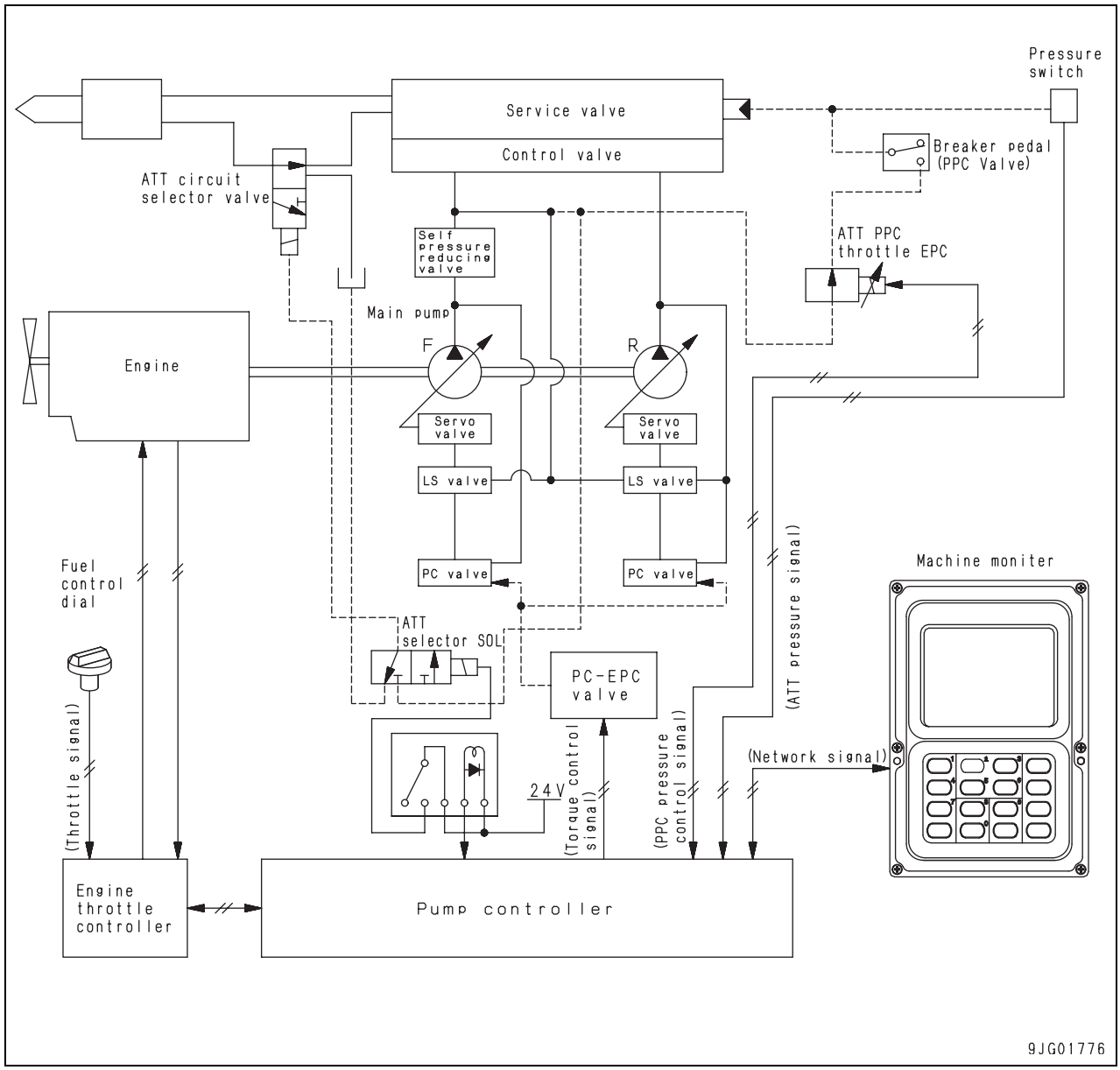
Travel speed switch	Lo (Low speed)	Mi (Midium speed)	Hi (High speed)
Pump capacity (%)	90	82	100
Motor capacity	Max.	Max.	Min.
Travel speed (km/h)	3.2	4.5	5.5

2] Automatic change by engine speed
If the fuel control dial is used to set the engine speed to less than 1,200 rpm, the travel speed changes to Lo when the machine is travelling in Mi or Hi, and the travel speed will not change to Mi or Hi.

3] Automatic change by pump discharge pressure
When traveling with the travel speed switch set to Hi or Mi, if the load increases, such as when travelling uphill, and the travel pressure goes above 32.3 MPa {330 kg/cm^2} for more than 0.5 sec, the travel motor capacity will automatically change to low speed (equivalent to Lo). (The travel speed switch will stay at Hi or Mi.)
If the load decreases, such as when travelling on level ground or travelling downhill, and the travel pressure goes below 18.6 MPa {190 kg/cm^2} for more than 0.5 sec, the travel motor capacity will automatically change and will return to Hi or Mi.



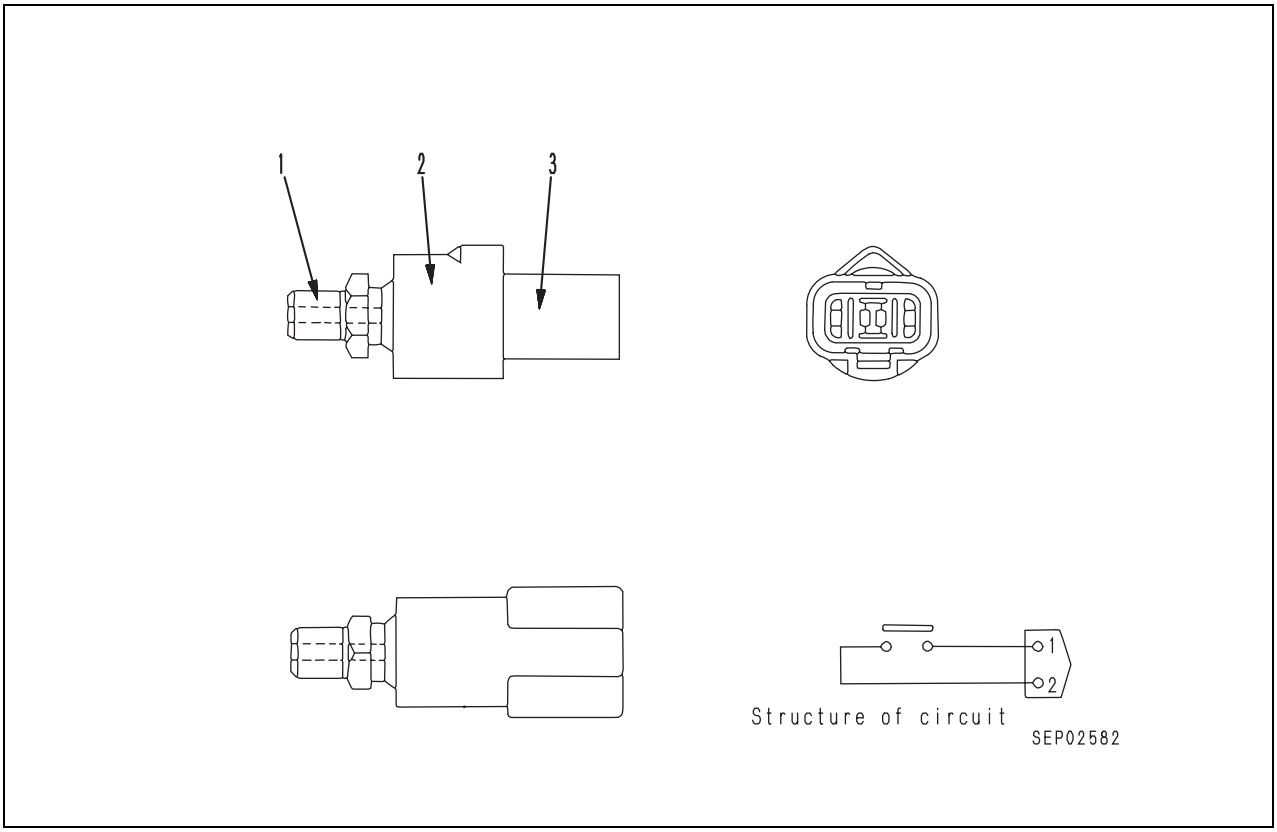
8. Attachment flow control and circuit selector function (if equipped)



Function

- This function is available only with the attachment specification.
- The function acts as follows according to the flow command and working mode from the monitor.
  1) It throttles the attachment PPC pressure and controls the flow when the pedal is depressed fully.
  2) In B mode and the other modes, it switches to attachment single acting (B) or double acting (other modes).

9. System component parts
1) PPC oil pressure switch



1. Plug
2. Switch
3. Connector

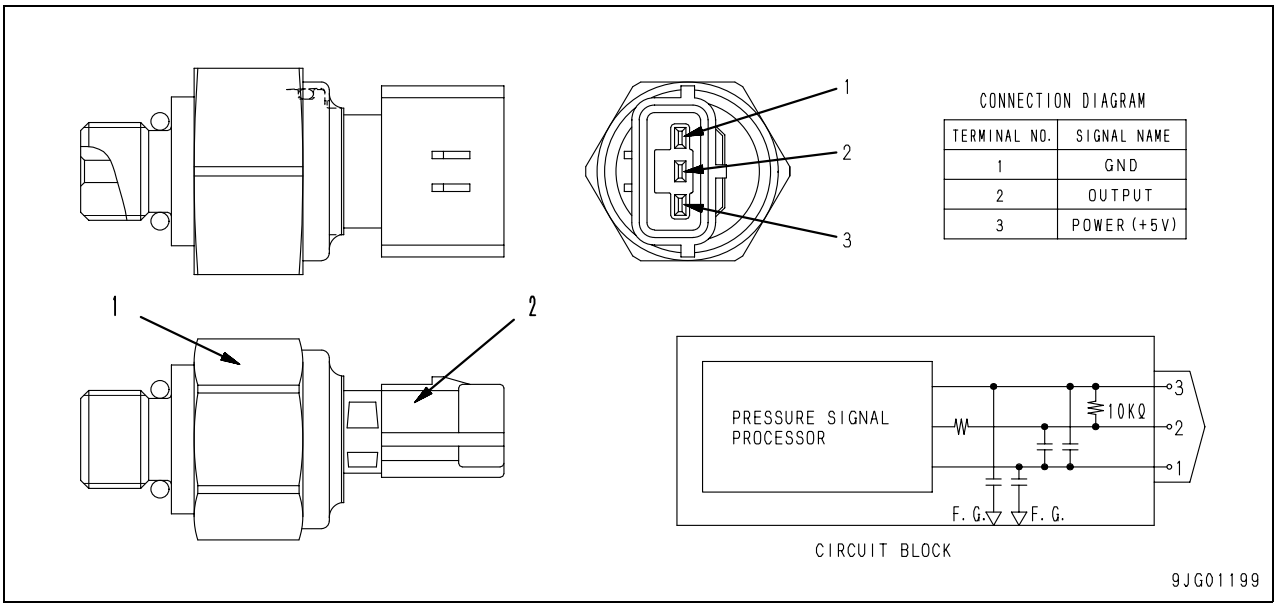
Specifications

Type of contacts: Normally open contacts
Operating (ON) pressure:
0.5 ± 0.1 MPa {5.0 ± 1.0 kg/cm^2}
Resetting (OFF) pressure:
0.3 ± 0.05 MPa {3.0 ± 0.5 kg/cm^2}

Function

- The junction block has 6 PPC oil pressure switches.
- This sensor detects the operating condition of each actuator by the PPC pressure and transmit it to the pump controller.

2) Oil pressure sensor



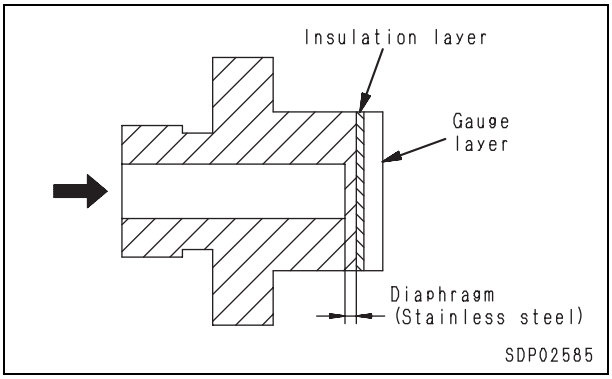
1. Sensor
2. Connector

Function

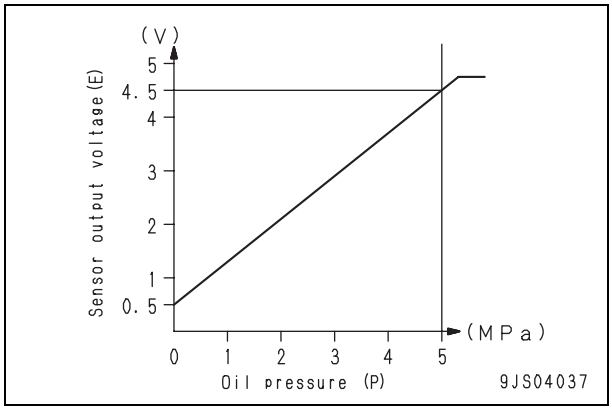
- The pump pressure sensor is installed to the input circuit of the control valve.
- It converts the pump discharge pressure into a voltage and transmits it to the pump controller.

Operation

- The oil pressure is applied to the diaphragm of the oil pressure sensor from the pressure intake part, the diaphragm is deformed.
- The deformation in the diaphragm causes the resistance of the gauge to change. This causes a change in the output voltage, which is transmitted to the amplifier (voltage amplifier).

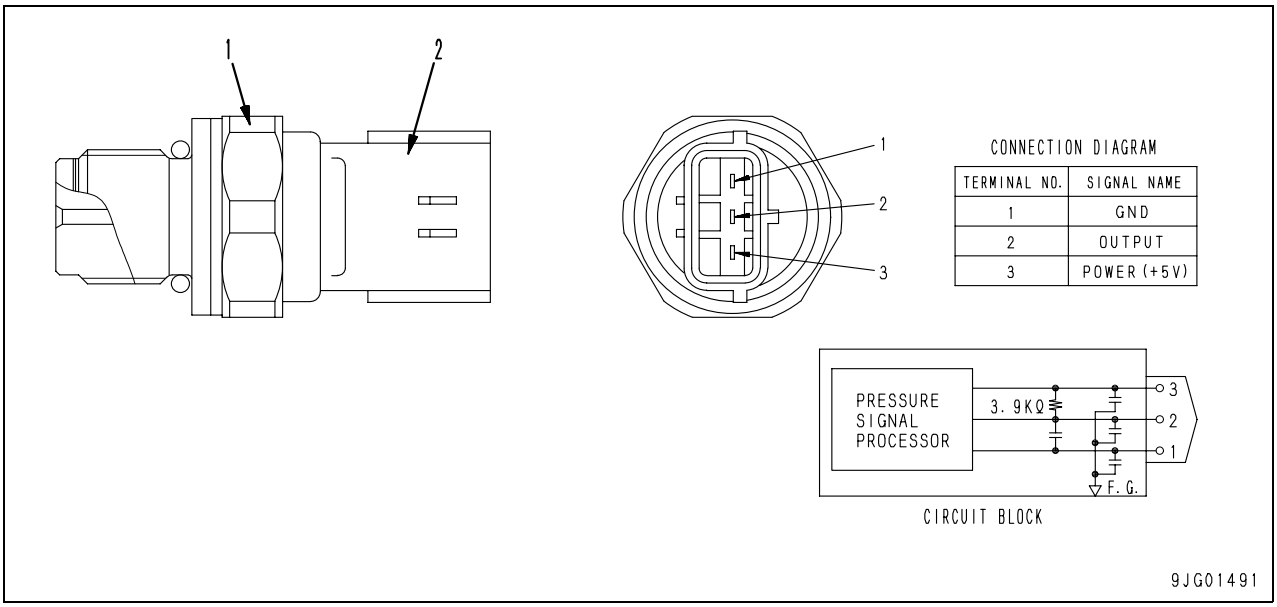


- The relationship between the pressure applied to sensors (P) and output voltage (E) is shown in the figure below.



- The amplifier magnifies output voltage (E) and transmits it to the pump controller.

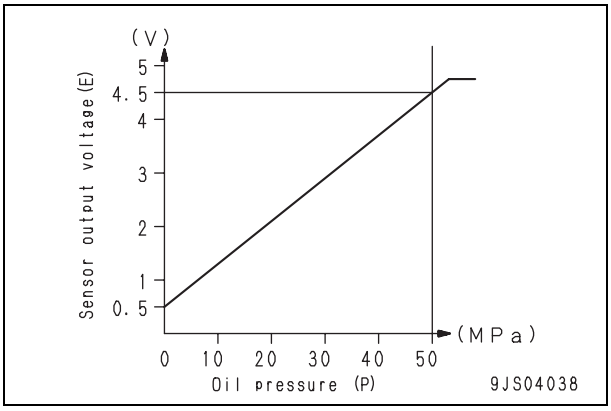
3) Pump pressure sensor (high pressure)



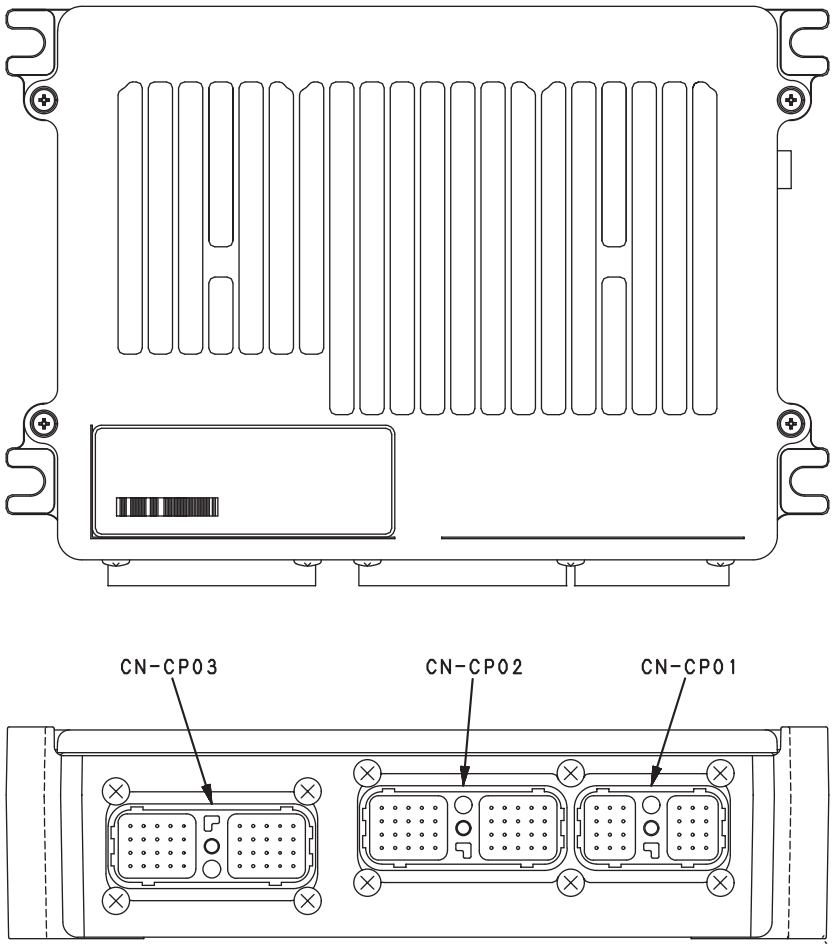
1. Sensor
2. Connector

Operation

- The relationship between the pressure applied to sensors (P) and output voltage (E) is shown in the figure below.



4) Pump controller



CN-CP01

Pin No.	Signal name	Input/ output
1	NC(*)	Input
2	R pump pressure sensor	Input
3	NC(*)	Input
4	NC(*)	–
5	NC(*)	Input
6	NC(*)	Input
7	NC(*)	Input
8	F pump pressure sensor	Input
9	NC(*)	Input
10	GND (SIG)	–
11	Knob switch	Input
12	NC(*)	Input
13	Bucket digging pressure sensor	Input
14	NC(*)	Input
15	NC(*)	Input
16	NC(*)	output
17	Key switch (C-terminal)	Input
18	NC(*)	Input
19	Arm digging pressure sensor	Input
20	NC(*)	Input
21	NC(*)	–
22	POT-PWR	output
23	Key switch (ACC-terminal)	Input
24	NC(*)	Input

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

CN-CP02

Pin No.	Signal name	Input/ output
1	NC(*)	output
2	Emergency swing parking switch	Input
3	NC(*)	Input
4	232C_RXD	Input
5	NC(*)	Input
6	NC(*)	Input
7	Machine select 4 (ATT)	Input
8	Service circuit SOL signal	output
9	NC(*)	output
10	NC(*)	Input
11	NC(*)	output
12	CAN_SH	–
13	Machine select 5 (ATT)	Input
14	232C_TXD	output
15	NC(*)	Input
16	Travel steering signal	Input
17	Machine select 3	Input
18	NC(*)	output
19	NC(*)	output
20	NC(*)	Input
21	NC(*)	Input/ output
22	CANO_L	Input/ output
23	NC(*)	Input/ output
24	FWE_switch	Input
25	NC(*)	Input
26	NC(*)	Input
27	Machine select 2	Input
28	NC(*)	Input
29	NC(*)	–
30	NC(*)	Input
31	NC(*)	–
32	CANO_H	Input/ output
33	NC(*)	Input/ output
34	GND (232C GND)	–
35	Service pressure switch	Input
36	NC(*)	Input
37	Machine select 1	Input
38	Swing prorix switch	Input
39	NC(*)	–
40	NC(*)	Input

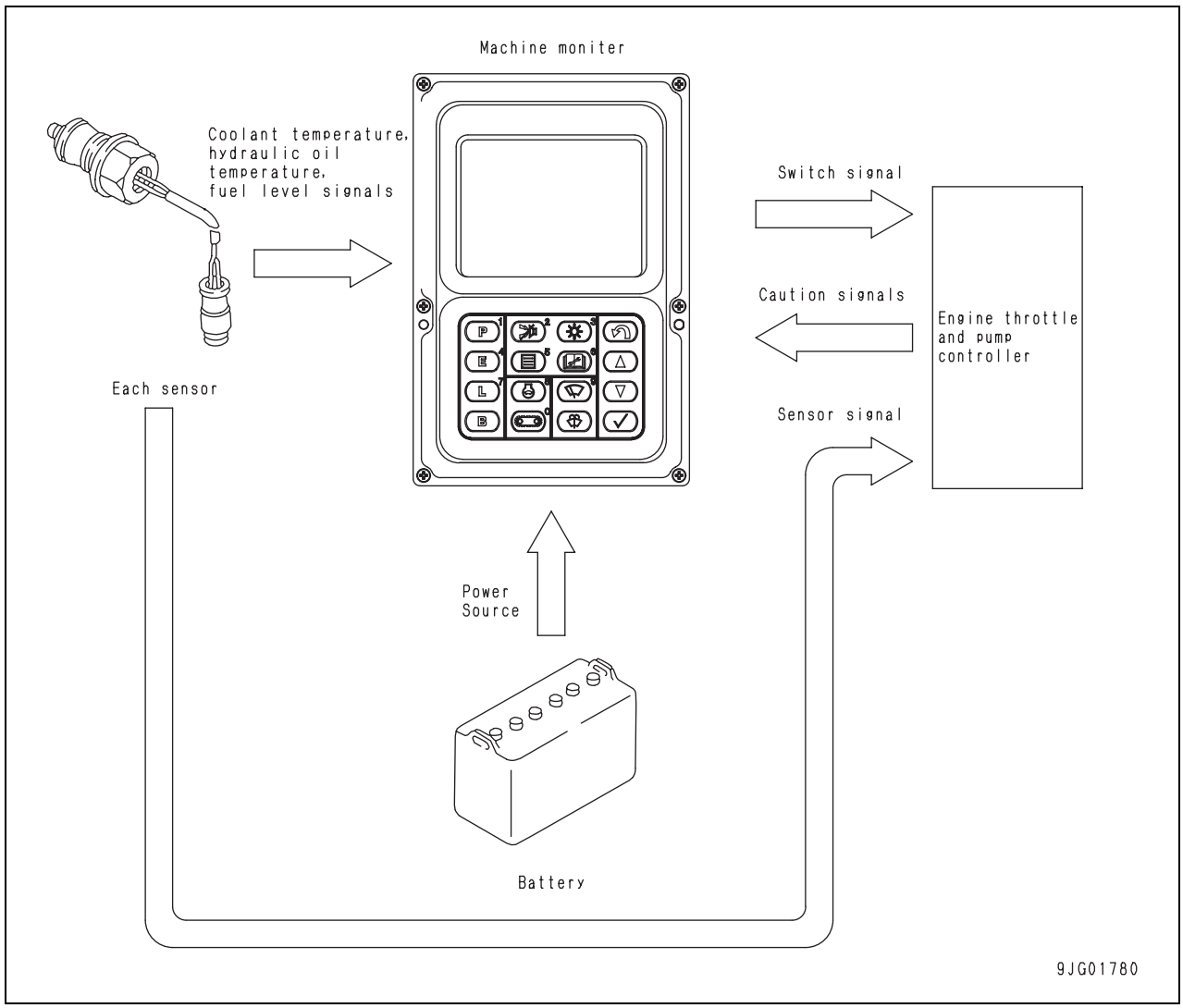
*: Never connect to NC or malfunctions or failures will occur.

CN-CP02

Pin No.	Signal name	Input/ output
1	VB (Controller PWR)	Input
2	VIS (Solenoid PWR)	Input
3	SOL_COM (SOL. COM. GND)	–
4	Battery relay drive signal	output
5	NC(*)	output
6	LS-EPC	output
7	Travel junction solenoid	output
8	NC(*)	output
9	(Bucket digging pressure switch)	Input
10	Boom rise pressure switch	Input
11	VB (Controller PWR)	Input
12	VIS (Solenoid PWR)	Input
13	SOL_COM (SOL. COM. GND)	–
14	KEY_SIG	Input
15	NC(*)	output
16	PC-EPC	output
17	Merge divider solenoid	output
18	NC(*)	output
19	Bucket dump pressure switch	Input
20	Boom down pressure switch	Input
21	GND (Controller GND)	–
22	NC(*)	Input
23	SOL_COM (SOL. COM. GND)	–
24	KEY_SIG	Input
25	NC(*)	output
26	ATT currented	output
27	Travel speed solenoid	output
28	2-stage relief solenoid	output
29	Swing pressure switch	Input
30	(Arm digging pressure switch)	Input
31	GND (Controller GND)	–
32	GND (Controller GND)	–
33	GND (Controller GND)	–
34	NC(*)	–
35	NC(*)	output
36	NC(*)	output
37	Swing parking brake SOL	output
38	NC(*)	output
39	Travel pressure switch	Input
40	Arm dump pressure switch	Input

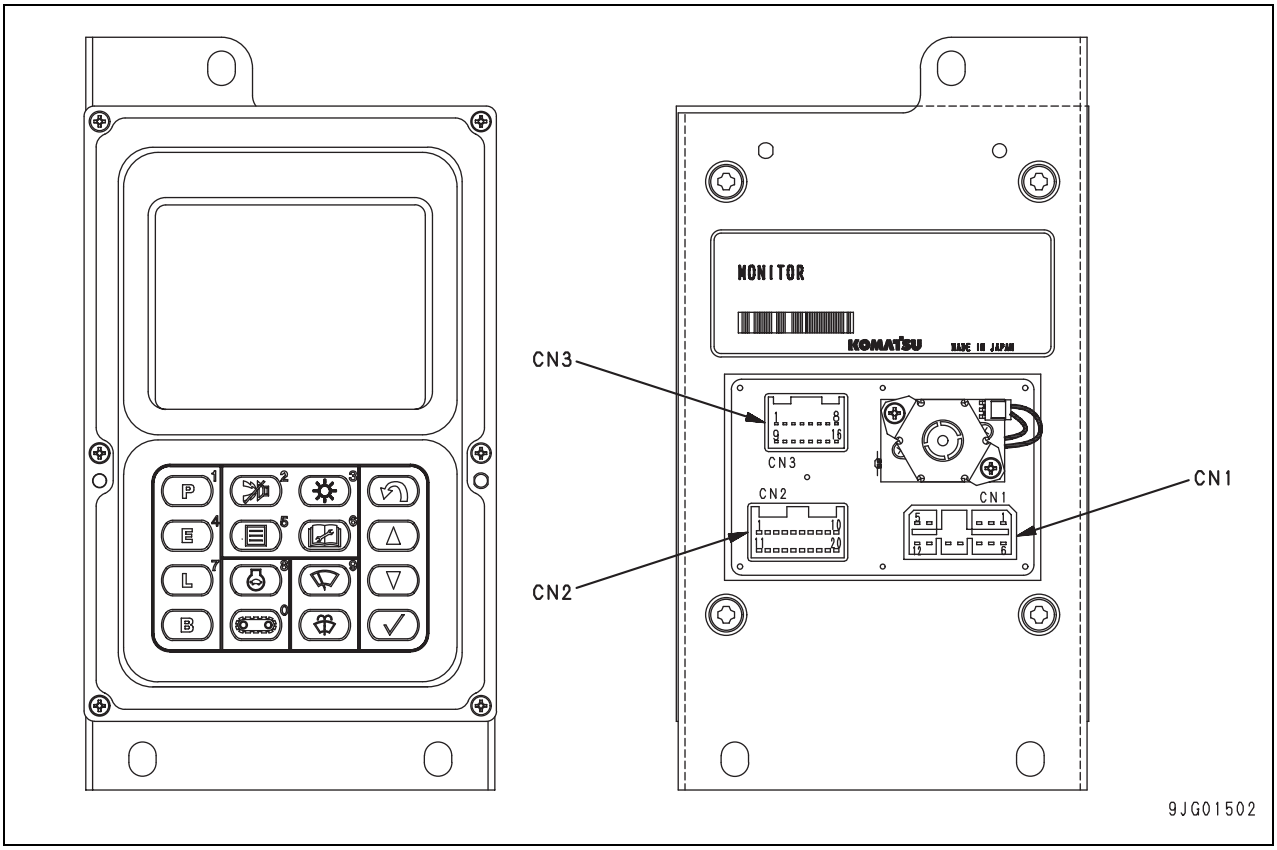
*: Never connect to NC or malfunctions or failures will occur.

Monitor system



- The monitor system notifies the operator of machine status. It monitors the condition of the machine with sensors installed on various parts of the machine, processes and immediately displays the obtained information on the panel. The information that appears on the panel is roughly divided as follows.
  1. Alarms that are issued when the machine has troubles
  2. Machine status, including coolant temperature, hydraulic oil temperature and fuel level
- The machine monitor also has various mode selector switches and functions to operate the machine control system.

Machine monitor



Outline

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

Input and output signals

CN-1

Pin No.	Signal name	Input/ output
1	Key ON	Input
2	Key ON	Input
3	Window washer motor output	output
4	Starting signal	Input
5	Limit switch (W)	Input
6	GND	–
7	GND	–
8	VB+	Input
9	Wiper motor (+)	output
10	Wiper motor (–)	output
11	Buzzer ON signal	Input
12	Limit switch (P)	Input

CN-2

Pin No.	Signal name	Input/ output
1	Engine coolant temperature	Input
2	Fuel level	Input
3	Radiator coolant level	Input
4	(Hydraulic oil level)	Input
5	Air cleaner clogging	Input
6	NC (*)	Input
7	Engine oil pressure	Input
8	Engine oil level	Input
9	Network signal	Input/ output
10	Network signal	Input/ output
11	Charge amount	Input
12	Hydraulic oil temperature (analog)	Input
13	GND (for analog signal)	–
14	Buzzer drive	Input
15	Limit switch (window)	Input
16	Buzzer cancel	Input
17	Swing lock	Input
18	Preheating	Input
19	Light switch	Input
20	Network GND	–

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

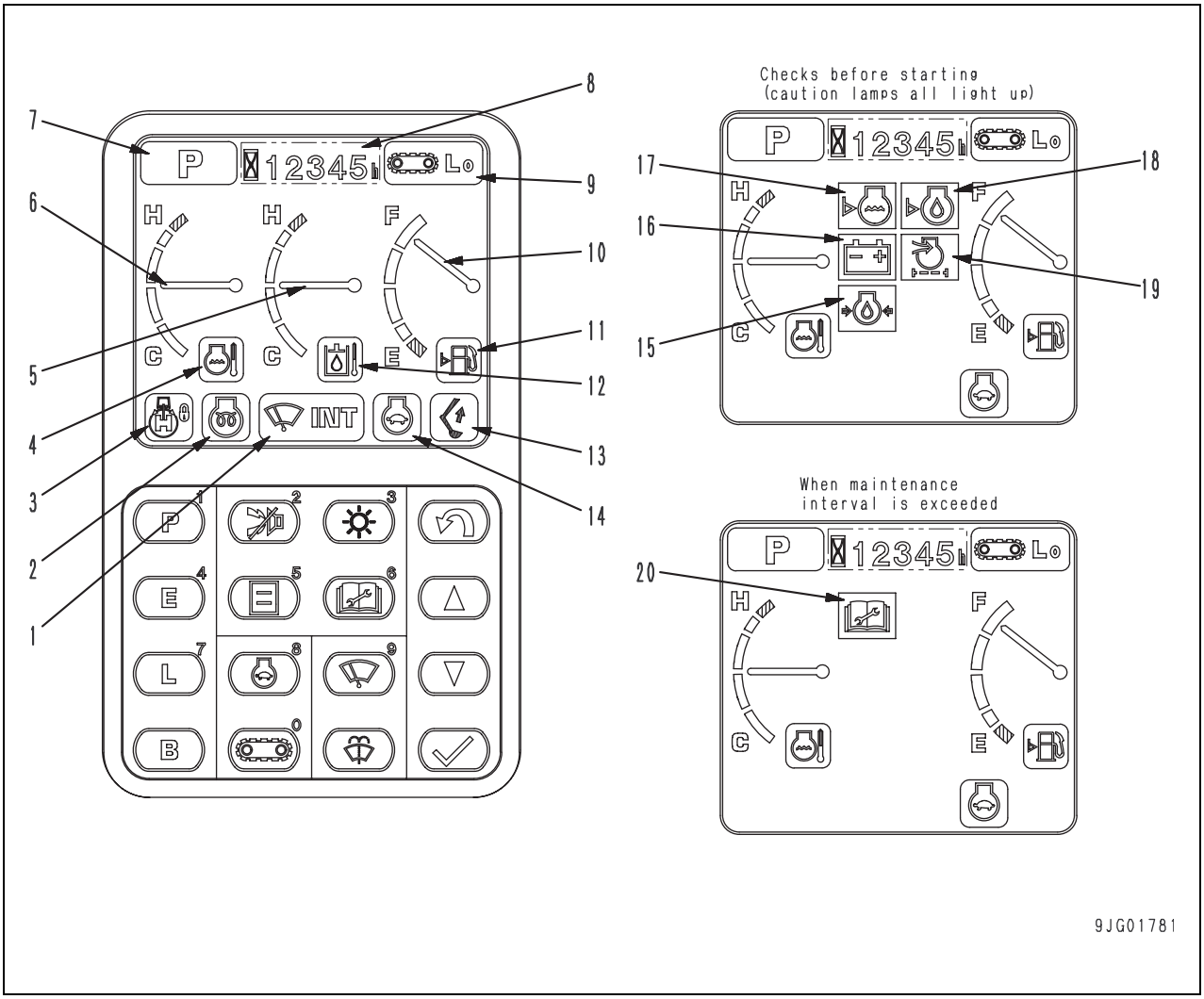
CN-3

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	RS230C CTS	Input
8	RS230C RXD	Input
9	RS230C RXD	Input/ output
10	RS230C RXD	Input/ output
11	BOOTSW	Input
12	NC (*)	Input
13	GND	–
14	CAN (SHIELD)	Input
15	CAN (+)	Input
16	CAN (–)	Input

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

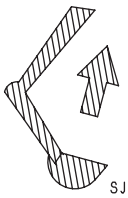
Monitor control and display portion

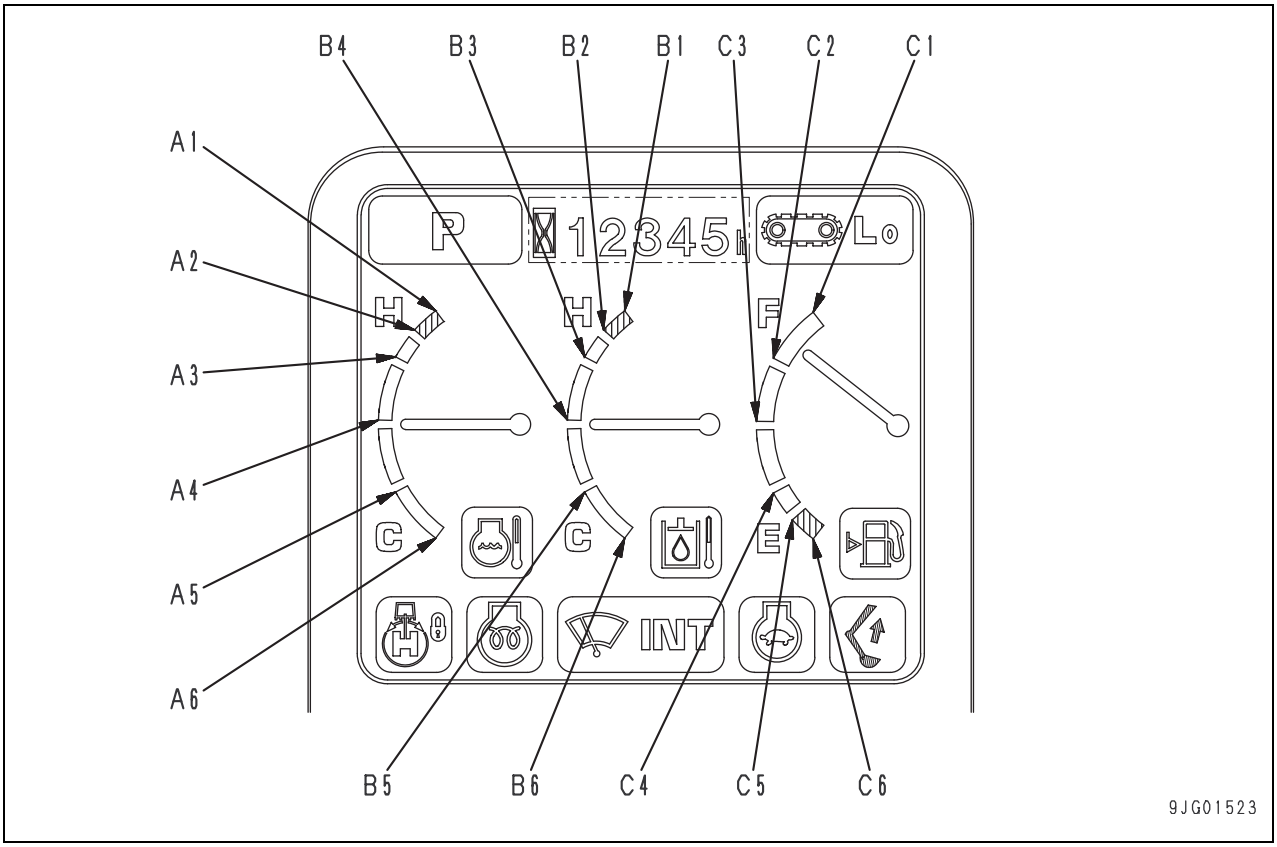
Monitor portion



1. Wiper monitor
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 monitor
9. Travel speed monitor
10. Fuel gauge
11. Fuel level monitor
12. Hydraulic oil temperature monitor
13. Power maximizing monitor
14. Auto-deceleration monitor
15. Engine oil pressure monitor
16. Charge level monitor
17. Radiator coolant level monitor
18. Engine oil level monitor
19. Air cleaner clogging monitor
20. Maintenance time warning monitor

Monitor items and display

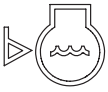
<table>
<tr><th>Symbol</th><th>Display item</th><th>Display method</th></tr>
<tr><td> 
SAT00098</td><td>Swing lock</td><td>
<table>
<tr><th>Swing lock switch</th><th>Swing holding brake release switch</th><th>Swing lock monitor</th></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>ON</td><td>OFF</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> 
SJP08778</td><td>Power max.</td><td>
<table>
<tr><th>Power max. switch status</th><th>Power max. monitor status</th></tr>
<tr><td>Being pressed</td><td>Lights up but goes out after approx. 9 sec. when kept pressed</td></tr>
<tr><td>Not being pressed</td><td>Flashes</td></tr>
</table>
</td></tr>
<tr><td></td><td>Engine coolant temperature</td><td rowspan="3">See gauge display on the next page</td></tr>
<tr><td></td><td>Hydraulic oil temperature</td></tr>
<tr><td></td><td>Fuel level</td></tr>
</table>



Gauge	Range	Temperature or 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	417	Green	
	C2	347.5	Green	
	C3	277.5	Green	
	C4	139	Green	
	C5	100	Green	
	C6	62	Red	

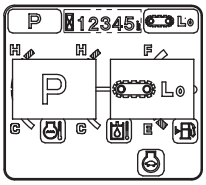
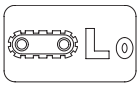
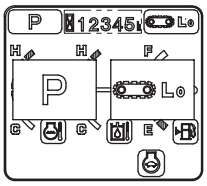
Checks before starting (all symbols light up), when maintenance interval is exceeded.

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 disappear and the following symbols are displayed.

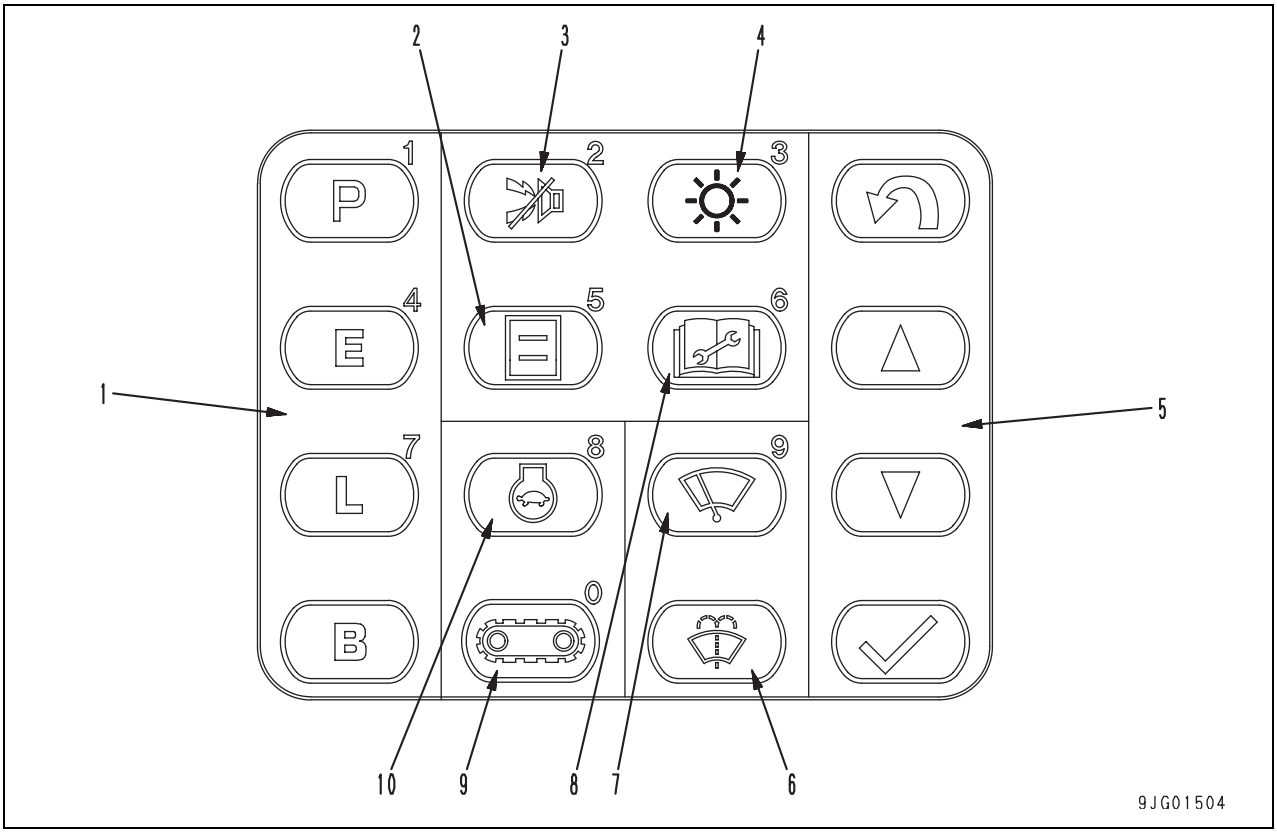
Symbol	Display item	Check before starting item	When engine is stopped	When engine is running
 SAP00520	Engine oil pressure	●	—	When abnormal, lights up and buzzer sounds
 SAP00522	Battery charge	●	—	Lights up when abnormal
 SAP00519	Radiator coolant level	●	Lights up when abnormal	When abnormal, lights 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.	

Symbols appear in the order in which they occur from the upper left. When symbols are displayed, if the hydraulic oil temperature is high or low, only its symbol is displayed.

Condition of hydraulic oil	Color of symbol
Low temperature (Max. B6 or equivalent)	Black on white background
Normal (B6 – B2)	No display
High temperature (Min. B2)	White on red background

Display category	Symbol	Display item	Display range	Display method
Monitor	 SJP08781	Wiper	INT → ON → OFF	Displays set condition
	 9JG01235	Working mode	 P, E, L, B 9JG01543	Displays set mode
	 9JG01236	Travel speed	 Lo, Mi, Hi 9JG01565	Displays set speed
	 9JG01237	Auto-deceleration	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. Selector switch
3. Buzzer cancel switch
4. Display brightness, contrast adjustment switch
5. Control switch
6. Window washer switch
7. Wiper switch
8. Maintenance switch
9. Travel speed selector switch
10. Auto-deceleration switch

Working mode selector switch

Press one of the P, E, B and L switches to set the desired working mode. It is possible to check which mode is active with the working mode monitor. The relationship between each working mode and the monitor display is shown in the table below.

Switch that is pressed	Display	Working mode status after setting
[P]	P	P mode (default)
[E]	E	E mode
[L]	L	L mode
[B]	B	B mode

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 switch

Check the condition of the maintenance items. For details, see "Maintenance function".

Auto-deceleration switch

The auto-deceleration switch toggles the auto-deceleration function on and off. When the working mode is switched, it is automatically set to ON. When it is set to ON, the auto-deceleration monitor appears.

Travel speed selector switch

Each time the travel speed selector switch is pressed, the travel speed changes as shown below.
Lo → Mi → Hi → Lo →.....
The travel speed settings can be viewed on the monitor. The relationship between the speed setting and the monitor display is shown in the table below.

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

Wiper switch

Each time the wiper switch is pressed, the wiper setting changes as shown below.
OFF → INT → ON → OFF →.....
The wiper settings can be viewed on the wiper monitor. The relationship between the wiper setting and the monitor display is shown in the table below.

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

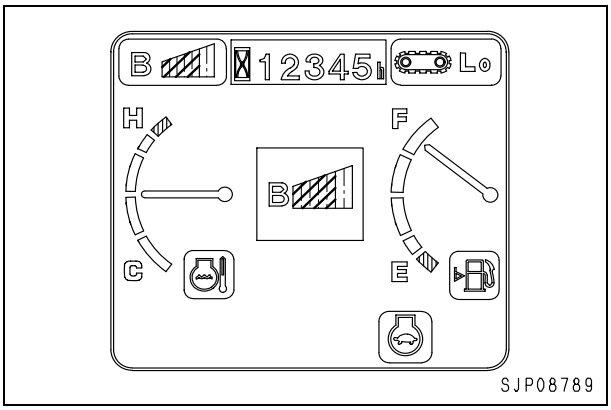
This function is used to adjust the brightness and contrast of the display. For details, see each function.

Select mode function

1. Setting of oil flow

- This is used when setting the flow in each working mode.
- It is available when genuine attachment piping is installed and "Attachment installed" is selected with the initial value setting function on the service menu.
- It is possible to check on the working mode monitor if this function can be used.

Working mode	Monitor display
P mode	[P] + crusher symbol
E mode	[E] + crusher symbol
B mode	[B] + flow symbol

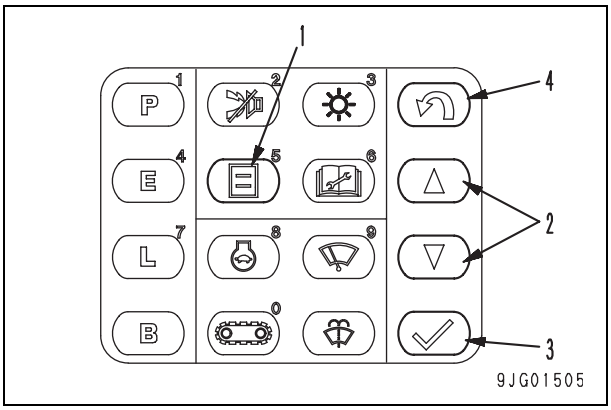


Method of use

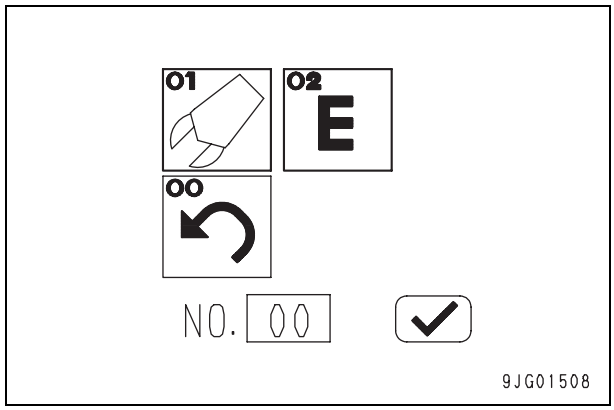
★ Carry out the setting on the normal screen

P mode, E mode

1) Press select switch (1).

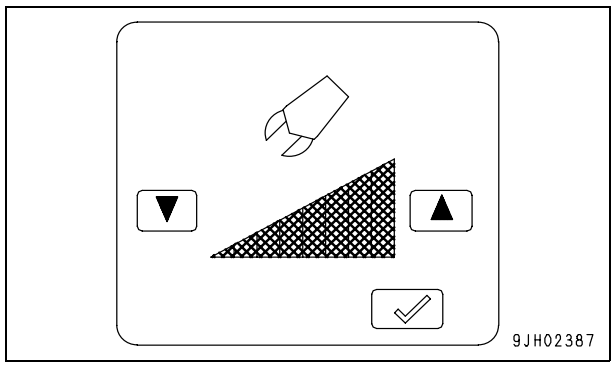


2) When the screen changed as below, select "01" by operating switch (2), and press input confirmation switch (3).



3) Press control switch (2) and select the flow level.

Control switch	Actuation
△	Flow level bar graph extends to the right
▽	Flow level bar graph retracts to the left



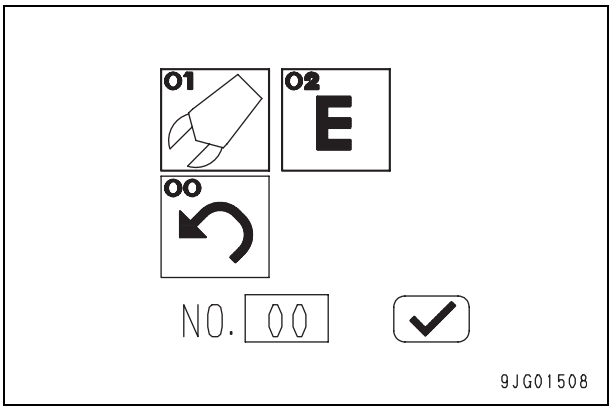
4) After completing the level selection, press input confirmation switch (3). The selection flow level is confirmed and the screen moves to the normal screen. When input confirmation switch (3) is pressed, the attachment flow is updated. The relationship between the flow level and the flow is shown in the table below.

Flow level	Flow (ℓ/min)	Remarks
8	530	Default
7	430	
6	370	
5	300	
4	230	
3	165	
2	100	
1	30	

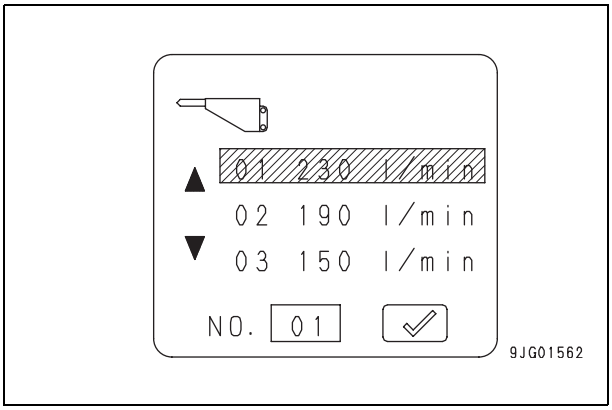
★ Flow level is not changed until the input confirmation switch is pressed. It is, therefore, possible not to change the flow level by pressing return switch (4) to return to the normal screen.

B mode

5) Press select switch (1).
6) When the screen changed as below, select "01" by operation switch (2), and press input confirmation switch (3).



7) Select one of the three flow levels by moving the cursor with operation switch (2) or entering the relevant number (01, 02 or 03) with the 10-key pad.

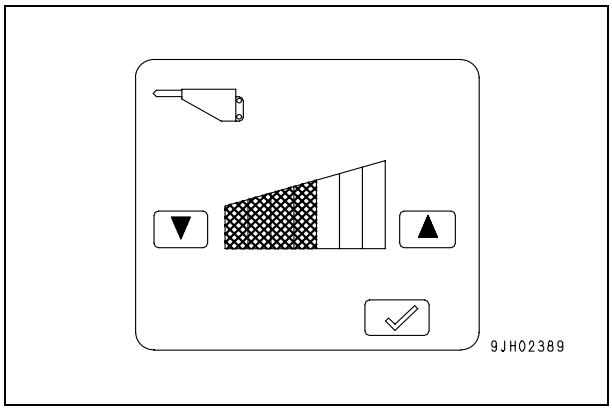


- The relationship between the flow level and the flow is shown in the table below.

No.	Flow (ℓ/min)	Remarks
01	230	Default
02	190	
03	150	

8) Pressing input confirmation switch (3) after selecting the flow level finalizes the selection.
   ★ Flow level is not finalized until the input confirmation switch is pressed. Returning to the normal screen by pressing return switch (4) will leave the flow level setting unchanged.

9) After the flow level is confirmed, the screen changes to the screen shown in the diagram below. With this screen, it is possible to make fine adjustment to the flow.



Control switch	Actuation
△	Flow level bar graph extends to the right
▽	Flow level bar graph retracts to the left

10) Pressing input confirmation switch (3) after selecting the flow level finalizes the selection.
   - The relationship between the flow level and the flow is shown in the table below.

Flow level	When flow is 100 ℓ/min.	When flow is 140 ℓ/min.	When flow is 180 ℓ/min.	Remarks
7	180	220	250	
6	170	210	250	
5	160	200	240	
4	150	190	230	Default
3	140	180	220	
2	130	170	210	
1	120	160	200	

   ★ Flow level is not finalized until input confirmation switch (3) is pressed. Returning to the normal screen by pressing return switch (4) will leave the flow level setting unchanged.

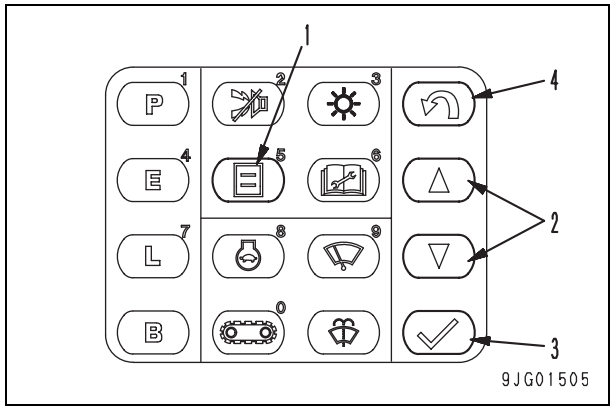
11) Check the set value with the working mode monitor. The relationship between the display level and the set value is shown in the table below.

Display level	Set value (ℓ/min.)
8	250 or 260
7	230 or 240
6	210 or 220
5	190 or 200
4	170 or 180
3	150 or 160
2	130 or 140
1	120

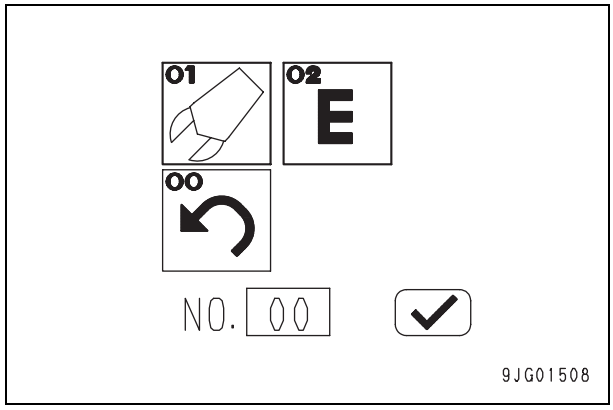
2. Adjusting E mode setting value

User can change a setting value on the E mode to adjust engine power and enhance fuel mileage on the E mode.

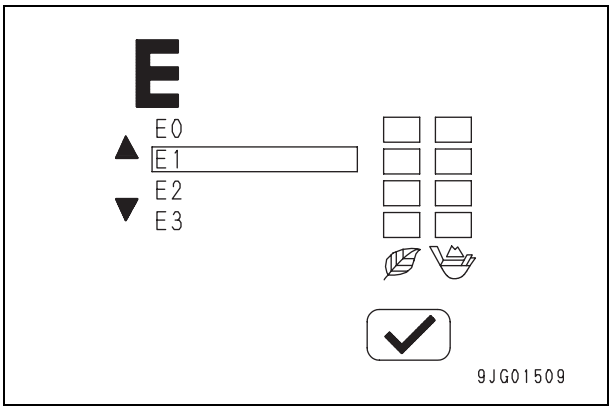
1) Press select switch (1).



2) The screen shown below is displayed. Operate operation switch (2) to select "02" and then press input confirmation switch (3).

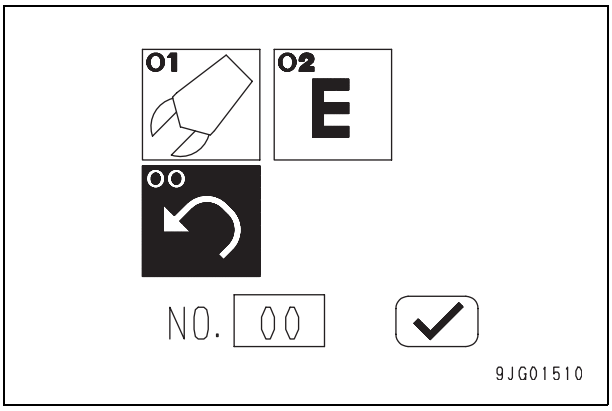


3) The setting value adjusting screen shown below is displayed. Operate operation switch (2) to select the setting value.
Relationship between fuel mileage and work rate for each of the setting values is as follows.
E0: Initial Setting Value
(highest priority is placed on work rate.)
E1: Economy Adjusting 1
(Priority is placed on work rate.)
E2: Economy Adjusting 2
(Priority is placed on fuel mileage.)
E3: Economy Adjusting 3
(highest priority is placed on fuel mileage.)



★ As the item goes lower, the fuel mileage is improved while, on the other hand, the work rate is decreased.

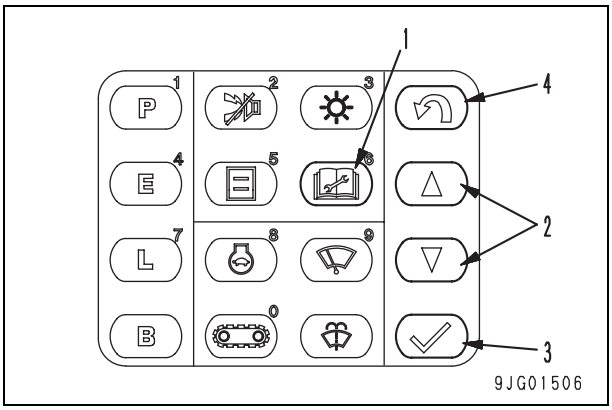
4) Press input confirmation switch (3) to confirm the setting value.



5) Press return switch (4) to return to the main screen.

Maintenance function

- This function alerts the operator when routine maintenance (replacement, inspection or filling for the 11 maintenance items) is due.
- When maintenance switch (1) is pressed, any maintenance item that is due is displayed yellow or red for 30 seconds.



- The table below shows the maintenance items and replacement intervals. The time remaining to maintenance is reduced as the machine is operated.

No.	Item	Replacement interval (Hours)
01	Engine oil	500
02	Engine oil filter	500
03	Fuel main filter	1000
41	Fuel prefilter	500
04	Hydraulic filter	1000
05	Hydraulic tank breather	500
06	Corrosion resistor	1000(*)
07	Damper case oil	1000
08	Final case oil	2000
09	Machinery case oil	1000
10	Hydraulic oil	5000

*: If equipped (To be determined)

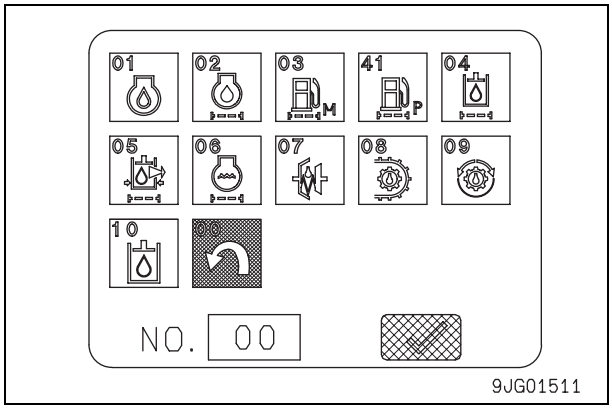
- The content of the caution display differs according to the remaining time. The relationship is as shown in the table below.

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 (white symbol displayed on red background)	There is one or more items with less than 0 hours remaining time for maintenance

1. Method of checking maintenance items

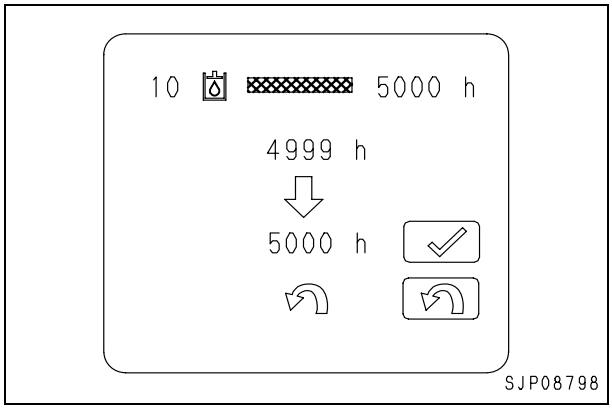
★ Carry out the setting on the normal screen

1) Press maintenance switch (1) and switch to the maintenance list display screen. The maintenance items are displayed as symbols on the screen.
2) Select one of the maintenance items by moving the cursor with control switch (2) or entering the relevant number (01 to 10) with the 10-key pad.
   ★ 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.

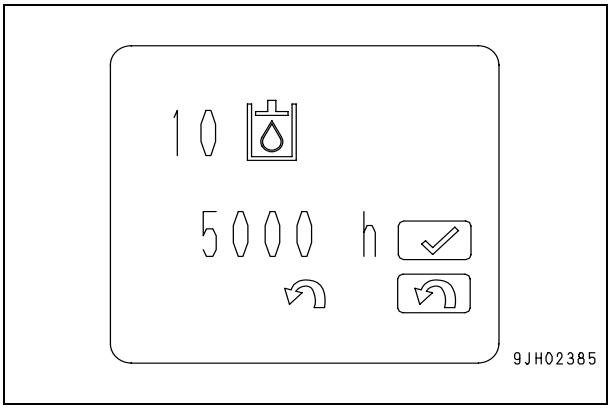


2. Maintenance operation

1) After completing the selection, press input confirmation switch (3). The screen will change to the maintenance reset screen.
2) The maintenance reset screen shows the time remaining before maintenance is due. To reset the remaining time, press input confirmation switch (3). When input confirmation switch (3) is pressed, the screen changes to the check screen. To retun to the maintenance list screen, press return switch (4).



3) The check screen shows the symbol for the selected maintenance item and the set time in large letters.
4) To reset the remaining time, press input confirmation switch (3). The remaining time is reset and the screen returns to the maintenance list display screen. To retun to the maintenance list screen without resetting the remaining time, press return switch (4).
5) On the maintenace list display screen, the background color of the symbol for the item where the maintenance item was reset is the same as the background of the screen.



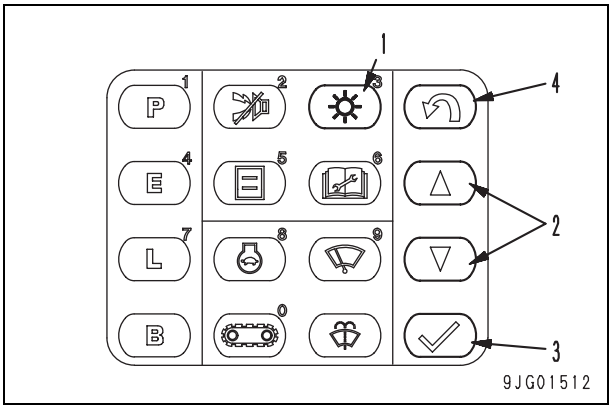
Brightness, contrast adjustment function

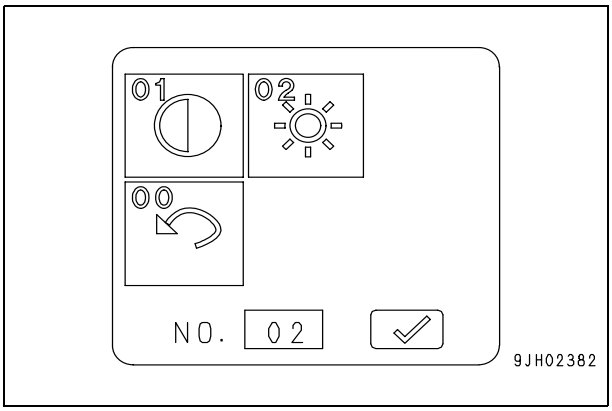
This function is used to adjust the brightness and contrast of the display.

★ Carry out the setting on the normal screen

1. Adjustment method

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



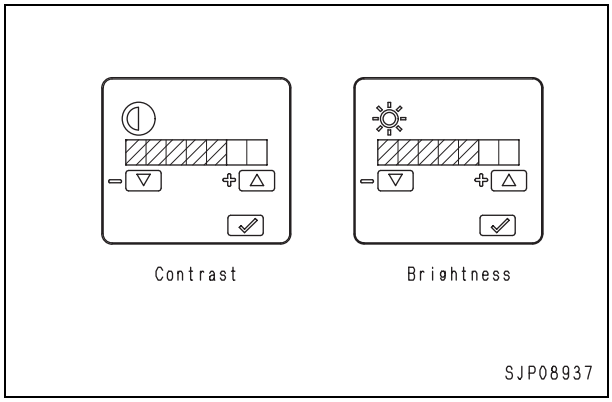


- Relationship between menu symbol and content.

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

2) Press operation switch (2), or use the 10-key pad to input the number (01 – 02) to select either contrast or brightness.

3) After completing the selection, press input confirmation switch (3) to return to the adjustment screen. Pressing return switch (4) without pressing input confirmation swith (3) or entering 00 with the 10-key pad and then pressing input confirmation switch (3) causes the screen to return to the normal screen.

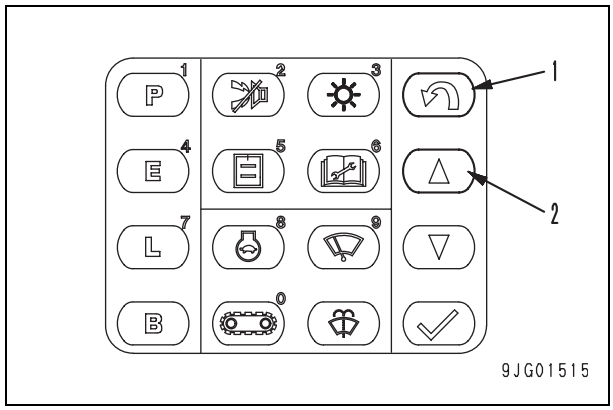


4) Press operation switch (2) and adjust the brightness or contrast as desired.

Control switch	Actuation
△	Flow level bar graph extends to the right
▽	Flow level bar graph retracts to the left

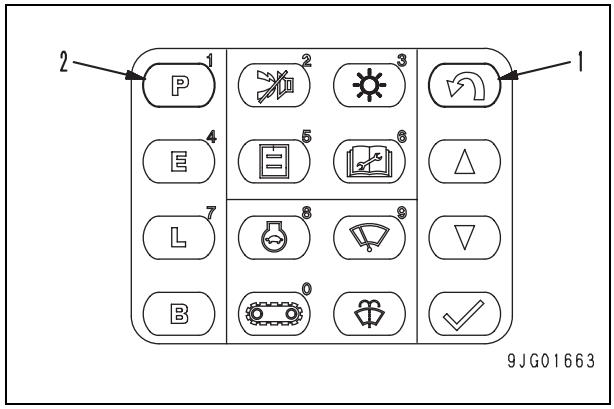
Service meter check function

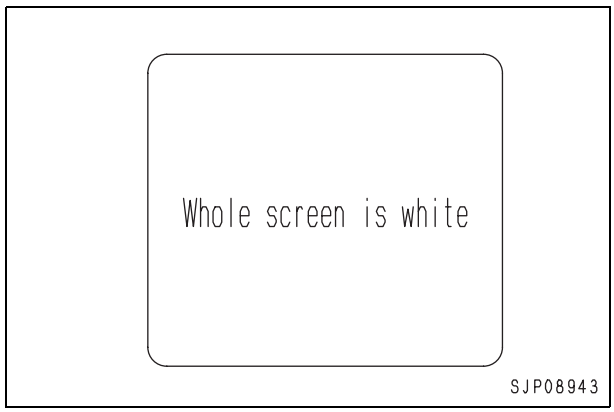
- With the starting switch in the OFF position, pressing return switch (1) while holding down operation switch (2) of the monitor for 3 to 5 seconds displays the service meter.
- When the 2 switches are released, the display goes out.



Display LCD check function

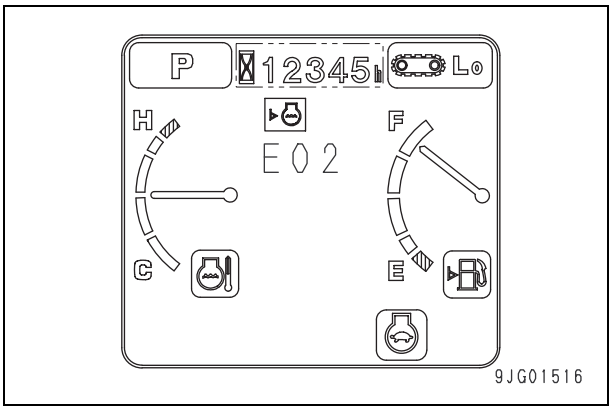
- On the normal screen, if monitor return switch (1) and working mode switch "P" (2) are kept pressed at the same time, the whole screen will become white. If any part of the display is black, the LCD is broken.



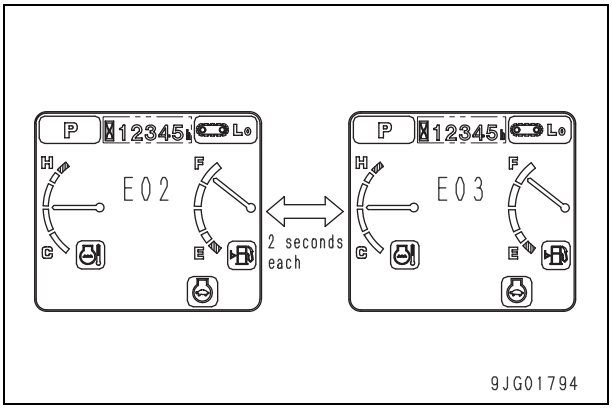


User code display function

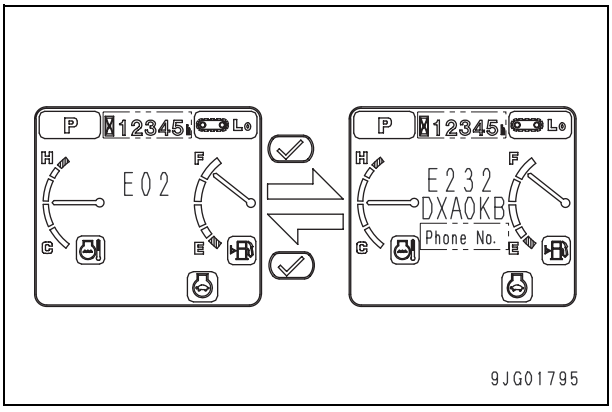
- If there is any problem in operating the machine, the user code is displayed on the monitor to advise the operator of the steps to take. This code appears on the normal screen.
- On the normal screen, the user code is displayed on the portion for the hydraulic oil temperature gauge in the center of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



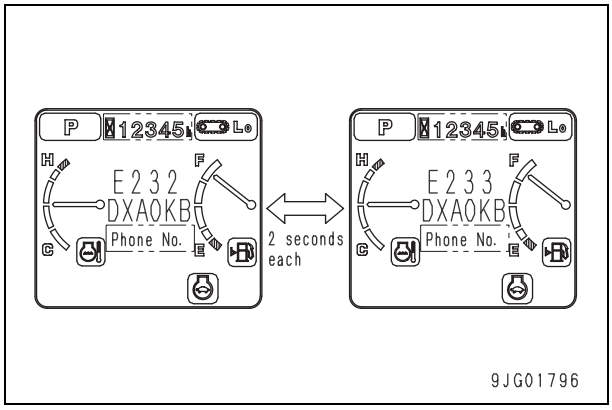
- If there are more than one user codes, they are displayed in turn every 2 seconds.



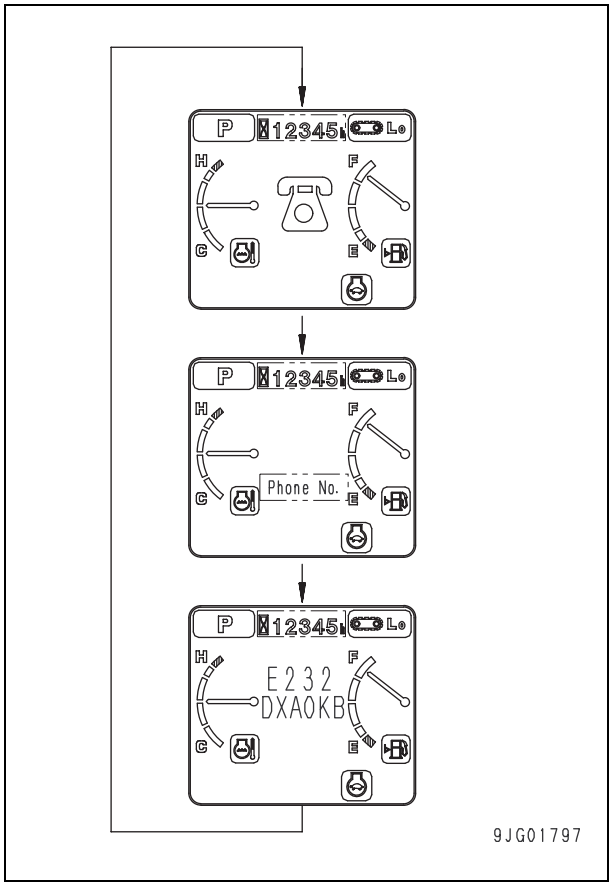
- While the user code is being displayed, if the input confirmation switch is pressed, the service code and failure code can be displayed. Both service code and failure code identify the cause of problem corresponding to the displayed user code.



- If there are more than one service or failure codes, they are displayed in turn every 2 seconds.
- Any service codes/failure codes that are not related to the displayed user code is displayed with this function.



- If the telephone number has been set using the service menu, the screen shows the service code/failure code as well as telephone symbol and telephone number. For details of inputting the telephone number, see "Special functions of monitor panel" in the "Testing and adjusting" section.

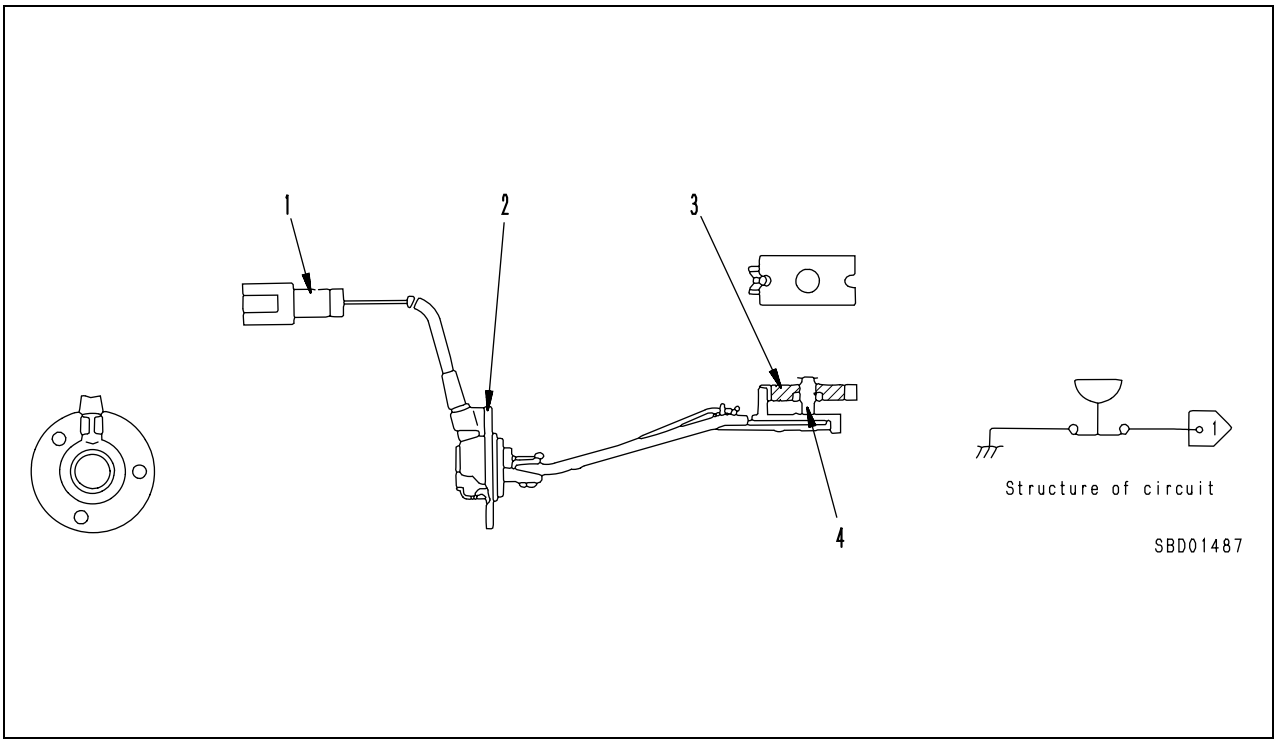


Sensor

- The signals from the sensors are input to the monitor panel directly.
- Either side of a sensor of contact type is always connected to the chassis ground.

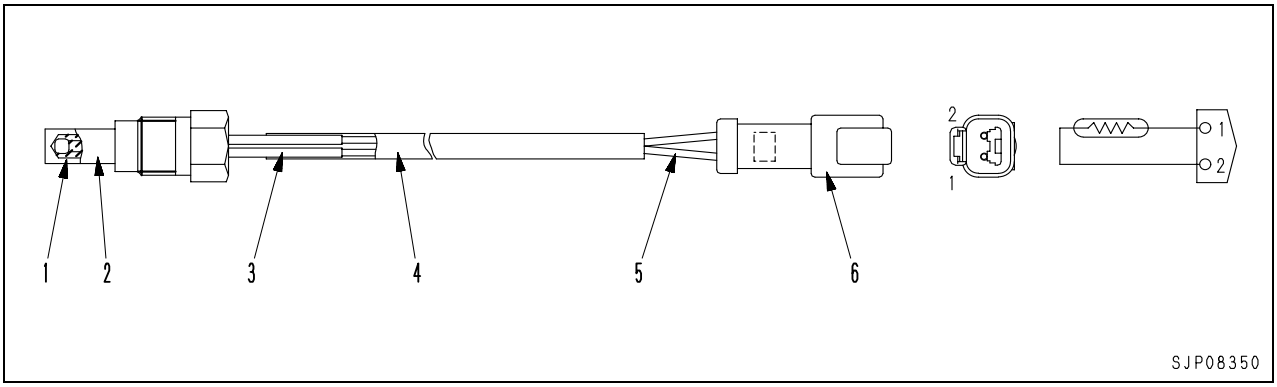
Sensor name	Type of sensor	When normal	When abnormal
Hydraulic oil level	Contact	ON (Closed)	OFF (Open)
Hydraulic oil temperature	Resis-tance	–	–
Coolant temperature	Resis-tance	–	–
Fuel level	Resis-tance	–	–
Air cleaner clogging	Contact	OFF (Closed)	ON (Open)

Hydraulic oil level sensor



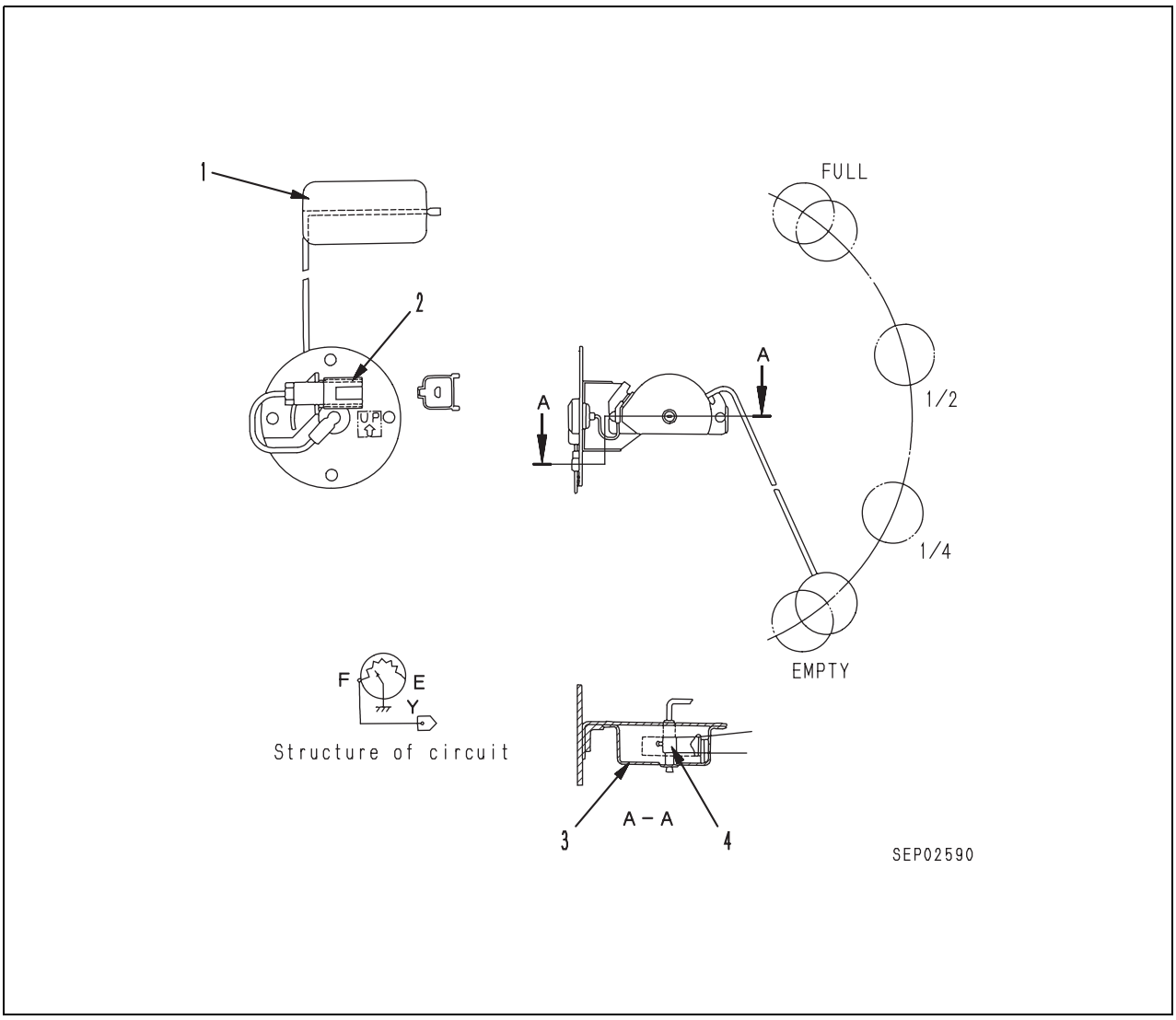
1. Connector
2. Bracket
3. Float
4. Switch

Hydraulic oil temperature sensor, coolant temperature sensor



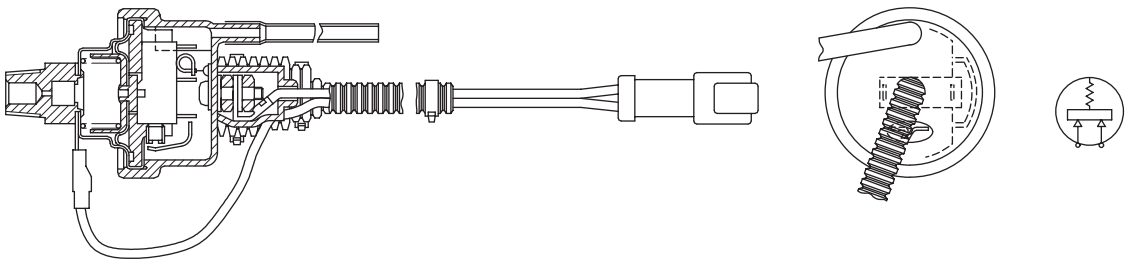
1. Thermistor
2. Body
3. Tube
4. Tube
5. Wire
6. Connector

Fuel level sensor

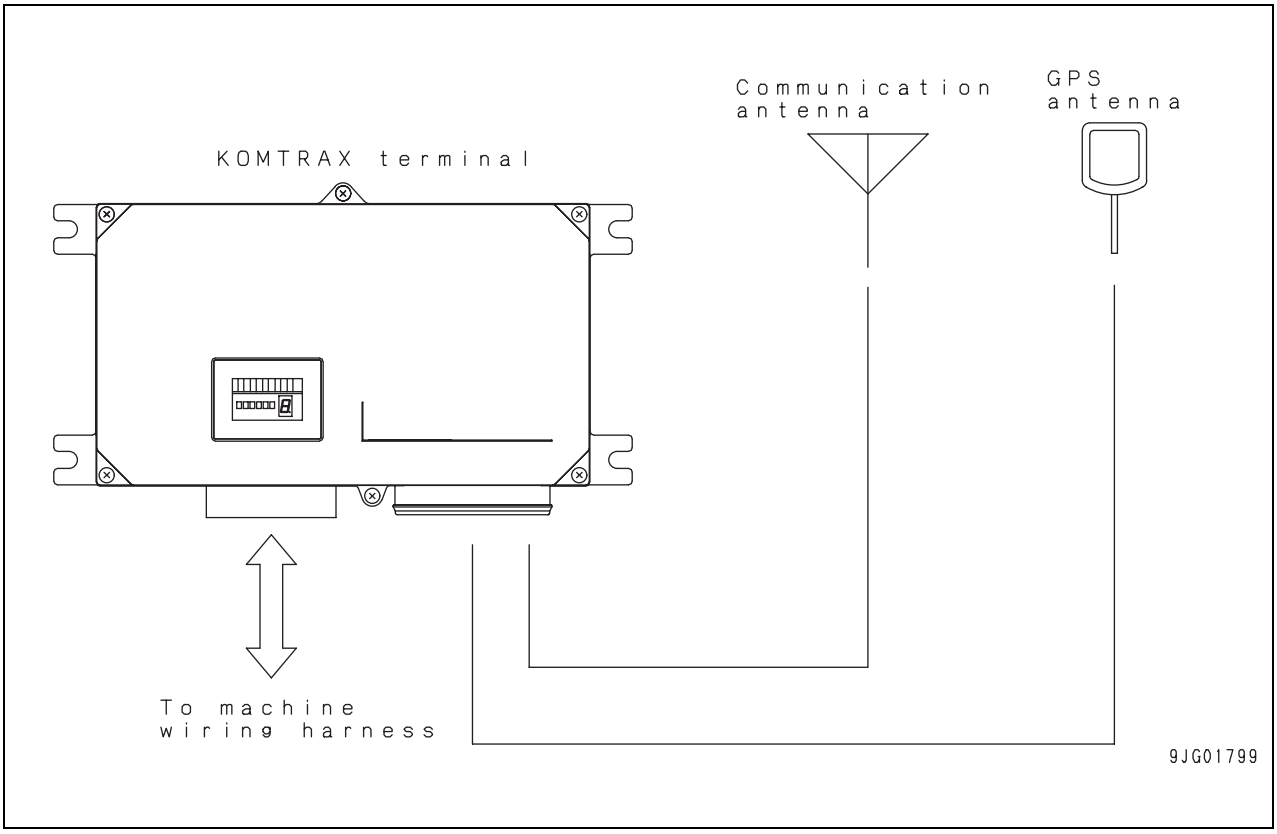


1. Float
2. Connector
3. Cover
4. Variable resistor

Air cleaner clogging sensor



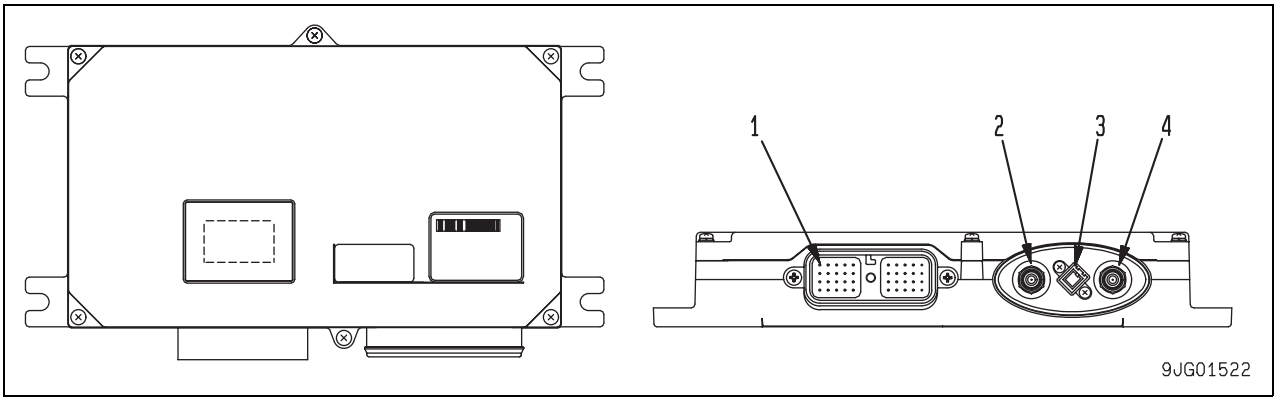
KOMTRAX terminal system



- The KOMTRAX terminal system transmits various kinds of machine information wirelessly. Persons to operate the KOMTRAX can refer to the information at office to provide various kinds of services for customers.
- Information transmittable from the KOMTRAX terminal system includes the following.
  1. Operation map
  2. Service meter
  3. Position information
  4. Error history

  and others.

KOMTRAX terminal



1. DRC connector connection (40 poles)
2. (Do not connect any cable)
3. GPS antenna connection
4. Film antenna connection

- The KOMTRAX terminal obtains various kinds of machine information from the network signals and input signals in the machine and transmits them via the wireless communication antenna. It contains a CPU (Central Processing Unit) and has wireless communication function and GPS function.
- This terminal has an LED lamp unit and a 7-segment display lamp unit used for inspection and troubleshooting.

Input and output signals

DRC conector

Pin No.	Signal name	Input/output
1	—	—
2	—	—
3	—	—
4	—	—
5	—	—
6	CAN shield GND	—
7	CAN signal (L)	Input/output
8	CAN signal (H)	Input/output
9	S-NET shield GND	—
10	S-NET signal	Input/output
11	—	—
12	—	—
13	—	—
14	—	—
15	—	—
16	—	—
17	—	—
18	—	—
19	—	—
20	Relay output	output
21	Input for check	Input
22	Input for check	Input
23	—	—
24	—	—
25	—	—

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

DRC conector

Pin No.	Signal name	Input/output
26	—	—
27	C-terminal input (Hi side)	Input
28	R-terminal input	Input
29	—	—
30	—	—
31	—	—
32	—	—
33	—	—
34	—	—
35	—	—
36	ACC input (analog)	Input
37	Power GND	—
38	Power GND	—
39	Regular power	Input
40	Regular power	Input

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

KOMATSU PC340 (LC / NLC)-7 Hydraulic excavator

Form No. UEN00277-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

20 Standard value table

Standard service value table

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

Standard service value table

Standard value table for engine related parts

Applicable model					PC340LC-7 PC340NLC-7	
Engine					SAA6D114E-3	
Category	Item	Measurement condition		Unit	Standard value for new machine	Judgement criteria
Engine	Engine speed	• Coolant temperature: operating range	High idle	rpm	2,050 ± 50	2,050 ± 50
			Low idle	rpm	1,000 ± 25	1,000 ± 25
			Rated speed	rpm	1,950	1,950
	Intake pressure (boost pressure)	• Coolant temperature: operating range • Arm IN relief + Power Max.	Inlet of aftercooler	kPa {mmHg}	147 – 187 {1,100 – 1,400}	120 {900}
			Outlet of aftercooler		135 – 175 {1,010 – 1,310}	100 {750}
	Exhaust gas color	• Coolant temperature: operating range	At sudden acceleration	%	Max. 25	Max. 35
			At high idle	%	Max. 1.0	Max. 2.0
	Valve clearance	• Normal temperature	Intake valve	mm	0.305	0.559
			Exhaust valve	mm	0.559	0.813
	Compression pressure	• Oil temperature: 40 – 60 °C	Compression pressure	MPa {kg/cm^2}	—	—
			Engine speed	rpm	250 – 280	250 – 280
	Blow-by pressure	• Coolant temperature: operating range • Arm IN relief + power max.		kPa {mmH$_2$O}	Max. 1.57 {Max. 160}	2.25 {260}
	Oil pressure	• SAE0W30E0S, SAE5W40E0S, SAE10W30DH, SAE15W40DH, SAE30DH engine oil • Coolant temperature: operating range	High idle	kPa {kg/cm^2}	0.34 – 0.59 {3.5 – 6.0}	0.21 {2.1}
			Low idle	kPa {kg/cm^2}	Min. 0.15 {Min. 1.5}	0.08 {0.8}
	Oil temperature	• Whole speed range (inside oil pan)		°C	80 – 120	120
	Fan belt tension	• Between fan pulley and alternator pulley • Deflection when pressed with finger force of approx. 98 N{10 kg}		mm	Auto-tensioner	Auto-tensioner
	Air conditioner compressor belt tension	• Between fan pulley and compressor pulley • Deflection when pressed with finger force of approx. 98 N{10 kg}		mm	5 – 8	5 – 8

Standard value table for chassis related parts

Applicable model				PC340LC-7 PC340NLC-7	
Category	Item	Measurement condition	Unit	Standard value for new machine	Judgement criteria
Engine speed	2 pumps at relief	• Engine coolant temperature: Within operating range • Hydraulic oil temperature: Within operating range • Engine at high idle • Arm IN relief condition	rpm	2,030 ± 100	2,030 ± 100
	At 2-pump relief + power max.	• Engine coolant temperature: Within operating range • Hydraulic oil temperature: Within operating range • Engine at high idle • Arm IN relief + Power max. switch ON	rpm	1,930 ± 100	1,930 ± 100
	Speed when auto-deceleration is operated	• Engine at high idle • Auto-deceleration switch in ON condition • All control levers in NEUTRAL condition	rpm	1,400 ± 100	1,400 ± 100
Spool stroke	Boom control valve		mm	9.5 ± 0.5	9.5 ± 0.5
	Arm control valve				
	Bucket control valve				
	Swing control valve				
	Travel control valve				
Travel of control levers	Boom control lever	• Engine stopped • Control lever grip at center • Max. reading up to stroke end (except lever play in NEUTRAL position)	mm	85 ± 10	85 ± 10
	Arm control lever			85 ± 10	85 ± 10
	Bucket control lever			85 ± 10	85 ± 10
	Swing control lever			85 ± 10	85 ± 10
	Travel control lever			115 ± 12	115 ± 12
	Play of control lever			Max. 10	Max. 15
Operating force of control levers and pedal	Boom control lever	• Hydraulic oil temperature: Within operating range • Engine at high idle • Control lever grip at center • Pedal at tip • Max. reading up to stroke end	N {kg}	15.7 ± 3.9 {1.6 ± 0.4}	Max. 24.5 {Max. 2.5}
	Arm control lever		N {kg}	15.7 ± 3.9 {1.6 ± 0.4}	Max. 24.5 {Max. 2.5}
	Bucket control lever		N {kg}	12.7 ± 2.9 {1.3 ± 0.3}	Max. 21.6 {Max. 2.2}
	Swing control lever		N {kg}	12.7 ± 2.9 {1.3 ± 0.3}	Max. 21.6 {Max. 2.2}
	Travel control lever		N {kg}	24.5 ± 5.9 {2.5 ± 0.6}	Max. 39.2 {Max. 4.0}
	Travel control pedal		N {kg}	74.5 ± 18.6 {7.6 ± 1.9}	Max. 107.6 {Max. 11}

Applicable model					PC340LC-7 PC340NLC-7	
Category	Item	Measurement condition		Unit	Standard value for new machine	Judgement criteria
Hydraulic pressure	Unload pressure	• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Hydraulic pump output pressure with all control levers in NEUTRAL position		MPa {kg/cm^2}	3.9 ± 1.0 {40 ± 10}	3.9 ± 1.0 {40 ± 10}
	Boom relief	• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Hydraulic pump output pressure with all measurement circuits relieved • Values marked *: Hydraulic oil pressure with power max. switch in ON (reference only)	Raise	MPa {kg/cm^2}	34.81(+1.47/–0.98) {355(+15/–10)}	33.34 – 37.23 {340 – 375}
					*37.26(+1.47/–0.98) {380(+15/–10)}	*35.80 – 39.23 {365 – 400}
			Lower (at low pressure setting)		18.13 ± 0.98 {185 ± 10}	16.66 – 19.6 {170 – 200}
			Lower (at high pressure setting)		31.36 ± 1.47 {320 ± 15}	29.4 – 33.32 {300 – 340}
	Arm relief				34.81(+1.47/–0.98) {355(+15/–10)}	33.34 – 37.23 {340 – 375}
	Bucket relief				*37.26(+1.47/–0.98) {380(+15/–10)}	*35.80 – 39.23 {365 – 400}
	Swing relief				30.87(+1.47/–2.45) {315(+15/–25)}	28.42 – 32.85 {285 – 335}
	Travel relief				37.27(+2.94/–0.98) {380(+30/–10)}	35.80 – 40.70 {365 – 415}
	Control circuit source pressure	• Hydraulic oil temperature: Within operating range • Engine at high idle • Self pressure reducing valve output pressure with all control levers in NEUTRAL position		MPa {kg/cm^2}	3.23 ± 0.2 {33 ± 2}	2.84 – 3.43 {29 – 35}
	LS differential pressure	• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Traveling speed: Hi • Hydraulic oil pump pressure – LS pressure	When all control levers in NEUTRAL position	MPa {kg/cm^2}	3.9 ± 1.0 {40 ± 10}	3.9 ± 1.0 {40 ± 10}
			When traveling at half stroke	MPa {kg/cm^2}	2.45 ± 0.1 {25 ± 1}	2.45 ± 0.1 {25 ± 1}
	PPC valve output pressure	• Hydraulic oil temperature: Within operating range • Engine at high idle • Control lever in full stroke		MPa {kg/cm^2}	2.9(+0.6/–0.2) {30(+5.5/–1.5)}	2.9(+0.6/–0.2) {30(+5.5/–1.5)}

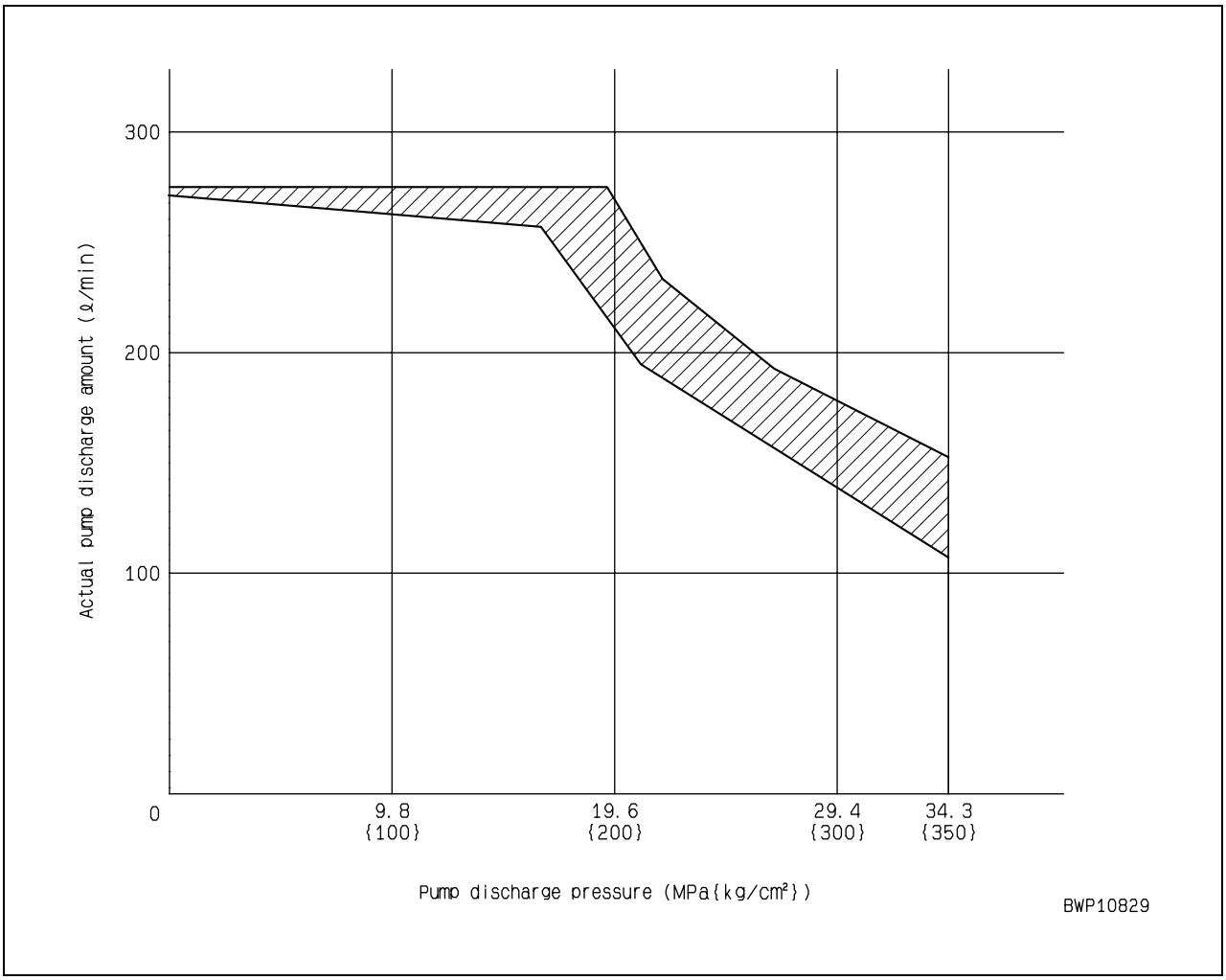
Applicable model					PC340LC-7 PC340NLC-7	
Cate-gory	Item	Measurement condition		Unit	Standard value for new machine	Judgement criteria
Swing	Swing brake angle	• Hydraulic oil temperature: Within operating range • Engine running at high idle • Working mode: P mode • Swing circle misalignment amount when stopping after one turn • For measuring posture, see **Swing 1**		deg. (mm)	PC300: Max. 110 PC350: Max. 120	PC300: Max. 140 PC350: Max. 150
	Time taken to start swing	• Hydraulic oil temperature: Within operating range • Engine running at high idle • Working mode: P mode • Time required for passing points 90° and 180° from starting point • For measuring posture, see **Swing 1**	90°	sec.	3.3 ± 0.4	Max. 4.2
			180°	sec.	4.7 ± 0.5	Max. 5.7
	Time taken to swing	• Hydraulic oil temperature: Within operating range • Engine running at high idle • Working mode: P mode • Time required for 5 more turns after making initial one turn • For measuring posture, see **Swing 1**		sec.	31.6 ± 2.9	Max. 38
	Hydraulic drift of swing	• Hydraulic oil temperature: Within operating range • Engine stopped • Keeping upper structure transverse on slope of 15° • Notching a mating mark on inner and outer races of swing circle • Mating mark misalignment amount during 5 minutes • For measuring posture, see **Swing 2**		mm	0	0
	Leakage from swing motor	• Hydraulic oil temperature: Within operating range • Engine running at high idle • Swing lock switch: ON • Leakage amount for one minute during swing relief		ℓ/min	Max. 5.5	Max. 11

Applicable model					PC340LC-7 PC340NLC-7	
Cate-gory	Item	Measurement condition		Unit	Standard value for new machine	Judgement criteria
Travel	Travel speed (without load)	• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Time required for track shoes to make 5 turns after making one initial idle turn • For measuring posture, see **Travel 1**	Lo	sec.	STD: 55.0 ± 11.0 LC: 58.0 ± 11.5	STD: 42.0 – 70.0 LC: 45.0 – 74.5
			Mi		STD: 39.0 ± 5.5 LC: 41.5 ± 6.0	STD: 31.5 – 48.5 LC: 34.0 – 51.5
			Hi		STD: 32.0 ± 2.0 LC: 34.0 ± 2.0	STD: 28.0 – 39.0 LC: 32.0 – 41.5
	Travel speed (actual run)	• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Flat ground • Time required for traveling 20 m after 10 m trial run • For measuring posture, see **Travel 2**	Lo	sec.	23.3 ± 4.4	18.9 – 31.0
			Mi		16.7 ± 2.2	14.4 – 21.0
			Hi		13.1 ± 0.7	12.1 – 15.1
	Travel deviation	• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Travel speed: Lo • Solid and flat ground • Swerving amount while traveling 20 m (X) after initial 10 m trial run • For measuring posture, see **Travel 2 and 3**		mm	Max. 200	Max. 300
	Hydraulic drift of travel	• Hydraulic oil temperature: Within operating range • Engine stopped • Parking machine on slope of 12° with sprocket facing upslope • Sliding distance for 5 minutes • For measuring posture, see **Travel 4**		mm	0	0
	Leakage of travel motor	• Hydraulic oil temperature: Within operating range • Engine at high idle • Traveling with sprocket locked • Oil leakage amount for one minute with traveling in relief condition		ℓ/min	Max. 15	Max. 30

Applicable model						PC340LC-7 PC340NLC-7	
Cate-gory	Item		Measurement condition		Unit	Standard value for new machine	Judgement criteria
Work equipment	Hydraulic drift of work equipment	Whole work equipment	• Hydraulic oil temperature: Within operating range • Flat and level ground • Bucket load: 2,160 kg • Engine stopped • Work equipment control lever in NEUTRAL position • Fall amount for 15 minutes as measured every 5 minutes starting immediately after initial setting • Whole work equipment: Lowering distance of tooth tip • Boom cylinder: Retraction distance of cylinder • Arm cylinder: Extraction distance of cylinder • Bucket cylinder: Retraction distance of cylinder • For measuring posture, see **Work equipment 1**		mm	Max. 450	Max. 675
		Boom cylinder				Max. 25	Max. 38
		Arm cylinder				Max. 135	Max. 203
		Bucket cylinder				Max. 20	Max. 30
	Work equipment speed	Boom	• Hydraulic oil temperature: Within operating range • Engine running at high idle • Working mode: P mode • Time required from raise stroke end till bucket touches ground • For measuring posture, see **Work equipment 2**	RAISE	sec.	3.7 ± 0.4	Max.4.5
				LOWER		2.9(+0.4/–0.1)	Max. 3.0
		Arm	• Hydraulic oil temperature: Within operating range • Engine running at high idle • Working mode: P mode • Time required from dumping stroke end to digging stroke end • For measuring posture, see **Work equipment 3**	IN	sec.	3.8 ± 0.4	Max. 4.5
				OUT		2.9 ± 0.3	Max. 3.5
		Bucket	• Hydraulic oil temperature: Within operating range • Engine running at high idle • Working mode: P mode • Time required from dumping stroke end to digging stroke end • For measuring posture, see **Work equipment 4**	CURL	sec.	3.2 ± 0.3	Max. 3.8
				DUMP		2.3 ± 0.3	Max. 2.9

Applicable model					PC340LC-7 PC340NLC-7	
Category	Item		Measurement condition	Unit	Standard value for new machine	Judgement criteria
Work equipment	Time lag	Boom	• Hydraulic oil temperature: Within operating range • Engine at low idle • Working mode: P mode • Time required from raise stroke end till bucket touches ground and pushes up machine front • For measuring posture, see **Work equipment 5**	sec.	Max. 3.0	Max. 3.6
		Arm	• Hydraulic oil temperature: Within operating range • Engine at low idle • Working mode: P mode • Time required from dumping stroke end till bucket stops momentarily after control lever is tilted to digging and starts to move again • For measuring posture, see **Work equipment 6**	sec.	Max. 3.0	Max. 3.6
		Bucket	• Hydraulic oil temperature: Within operating range • Engine at low idle • Working mode: P mode • Time required from dumping stroke end till bucket stops momentarily after control lever is tilted to digging and starts to move again • For measuring posture, see **Work equipment 7**	sec.	Max. 3.0	Max. 5.0
	Internal leackage	Cylinders	• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Leakage amount for one minute with cylinder or travel to be measured in relief condition	cc/min	4.5	20
		Center swivel joint			10	50
Performance in compound operation	Swerving amount in simultaneous operation of work equipment and travel		• Hydraulic oil temperature: Within operating range • Engine at high idle • Working mode: P mode • Traveling speed: Lo • On hard and flat ground, make approach run of 10 m and then measure deviation (X) in the travel of 20 m • For measuring posture, see **Travel 2 and 3**	mm	Max. 400	Max. 440
—	Discharge amount of hydraulic pump		See performance of hydraulic pump (next page)	ℓ/min	See performance of hydraulic pump (next page)	

Discharge amount of hydraulic pump (P mode)



- Pump speed: At 1,950 rpm, PC current 280 mA

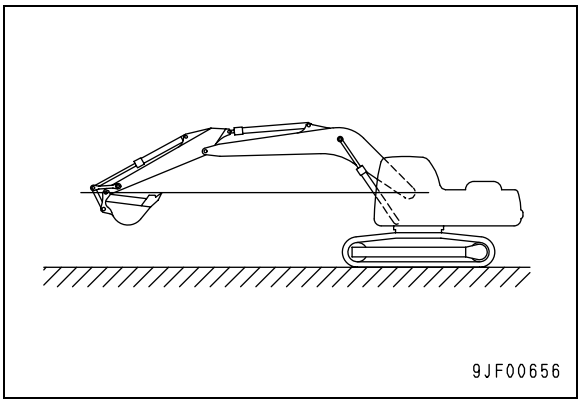
Check point	Test pump discharge pressure (MPa {kg/cm^2})	Discharge pressure of other pump (MPa {kg/cm^2})	Average pressure (MPa {kg/cm^2})	Standard value for discharge amount Q (ℓ/min)	Judgement standard lower limit Q (ℓ/min)
As desired	P1	P2	$\frac{P1+P2}{2}$	See graph	See graph

★ As far as possible, bring pump discharge pressure P1 and P2 as close as possible to the average pressure when measuring.
The error is large near the point where the graph curves, so avoid measuring at this point.

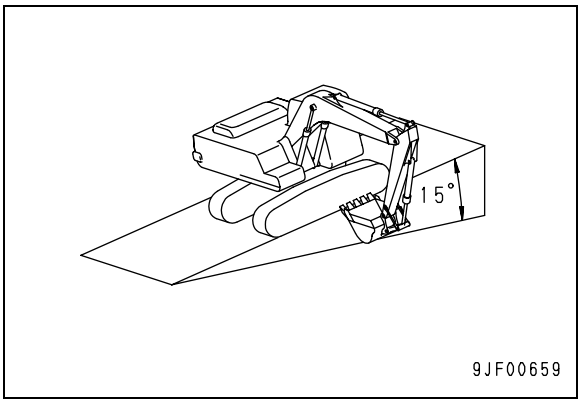
★ When measuring with the pump mounted on the machine, if it is impossible to set the engine speed to the specified speed with the fuel control dial, take the pump discharge amount and the engine speed at the point of measurement, and use them as a base for calculating the pump discharge amount at the specified speed.

For all models (Posture of machine for measuring performance and measurement procedure)

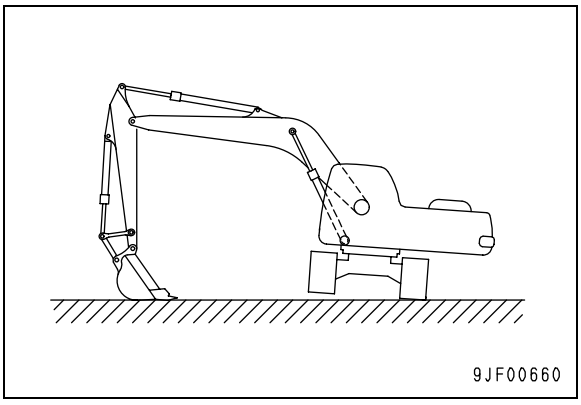
Swing 1: Swing brake angle, time taken to start swing, time taken to swing



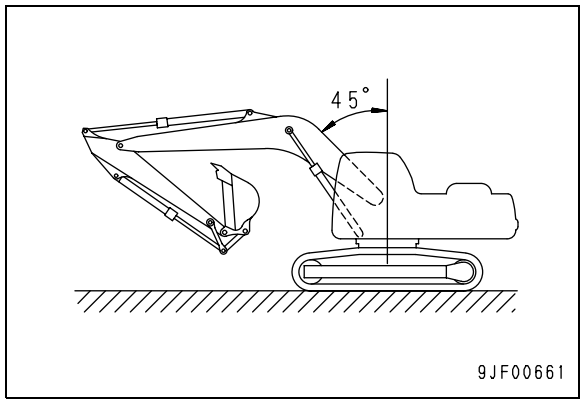
Swing 2: Hydraulic drift of swing



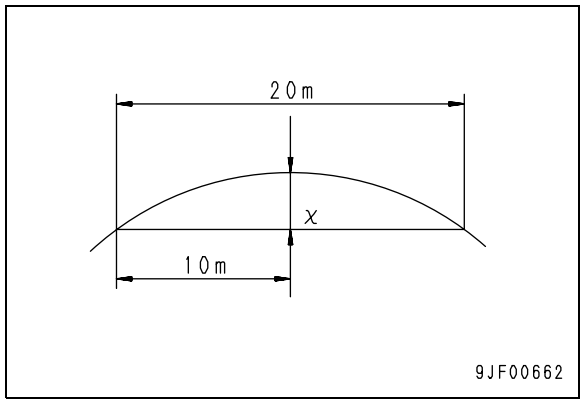
Travel 1: Travel speed (without load)



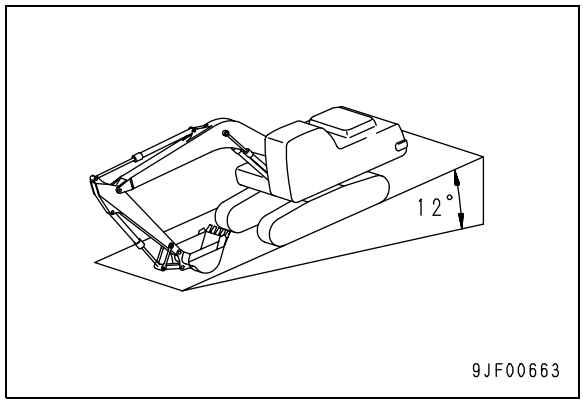
Travel 2: Travel speed (actual run), travel deviation



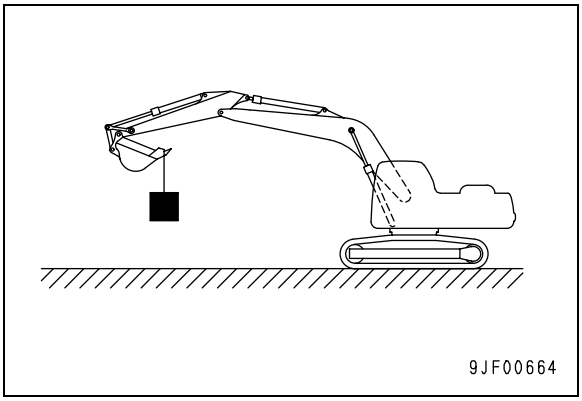
Travel 3: Travel deviation



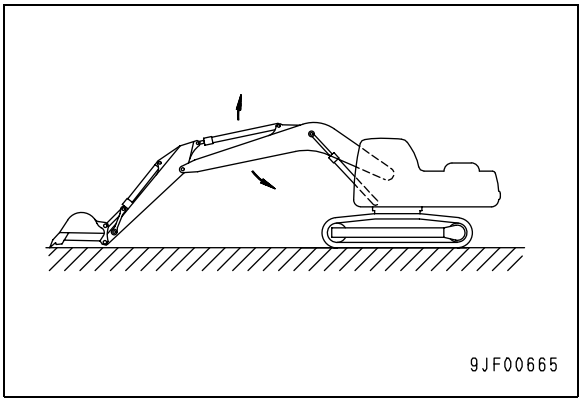
Travel 4: Hydraulic drift of travel



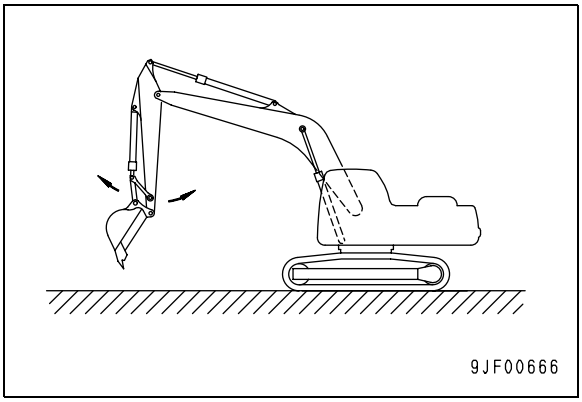
Work equipment 1: Hydraulic drift of work equipment



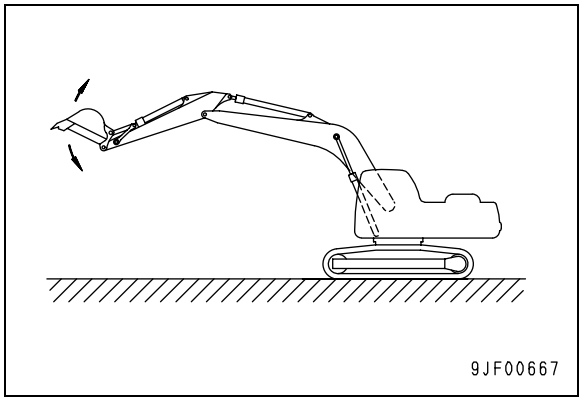
Work equipment 2: Boom speed



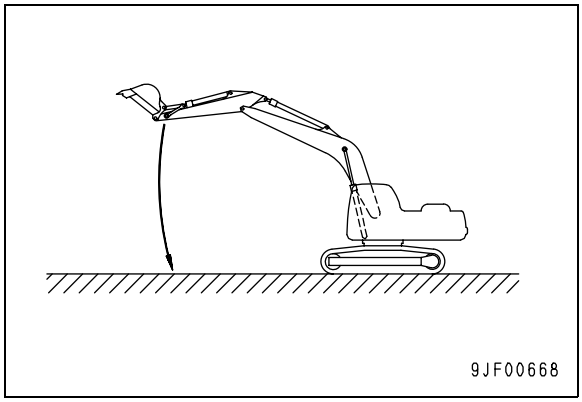
Work equipment 3: Arm speed



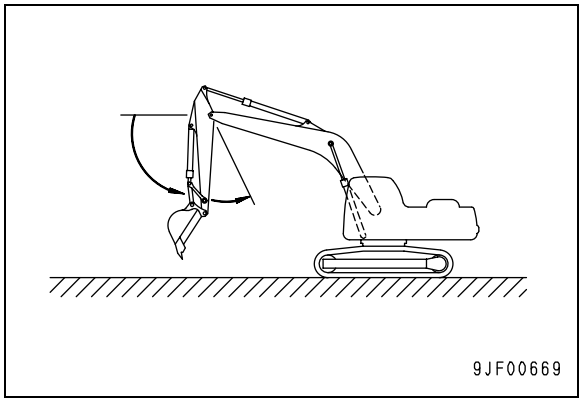
Work equipment 4: Bucket speed



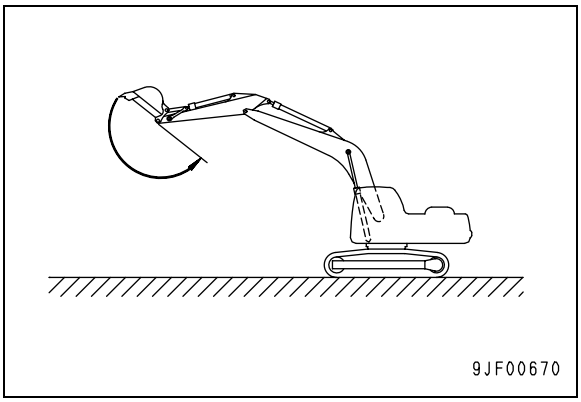
Work equipment 5: Boom time lag



Work equipment 6: Arm time lag



Work equipment 7: Bucket time lag



KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00366-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 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
Intake air pressure (boost pressure)	A	1	799-201-2202	Boost gauge kit	1	–101 – 200 kPa {–760 – 1,500 mmHg}
		2	799-401-2220	Hose	1	
Measuring exhaust gas color	B	1	799-201-9001	Handy smoke checker	1	Degree of contamination 0 to 70% (with the standard color) (Degree of contamination x 1/10 ≒ Bosch index)
		2	Commercially available	Smoke meter	1	
Valve clearance	C	1	795-799-1131	Gear	1	
		2	Commercially available	Clearance gauge	1	
Measuring compression pressure	D	1	795-799-6700	Injector puller	1	
		2	795-502-1590	Compression gauge	1	0 – 6.9 MPa {0 – 70 kg/cm^2}
		3	795-790-6110	Adapter	1	
		4	6754-11-3130	Gasket	1	
Blow-by pressure	E	1	799-201-1504	Blow-by checker	1	0 – 4.9 kPa {0 – 500 mmH_2O}
		2	795-790-3300	Tool (Nozzle)	1	
Engine oil pressure	F	1	799-101-5002	Oil pressure gauge kit (Analog)	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Oil pressure gauge kit (Digital)	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-2320	Oil pressure gauge	1	Pressure gauge: 0.98 MPa {10 kg/cm^2}
		3	6732-81-3170	Adapter	1	10 x 1.0 mm → R1/8
			6215-81-9710	O-ring	1	
Measuring fuel 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	6732-81-3170	Adapter	1	10 x 1.0 mm → R1/8
			6215-81-9710	O-ring	1	
		3	799-401-2320	Gauge	1	Pressure gauge: 0.98 MPa {10 kg/cm^2}
		4	795-790-1500	Fuel vacuum gauge	1	Male: 7/8-14UNF– Female: 7/8-14UNF Male: 3/4-16UNF– Female: 3/4-16UNF
			799-201-1201		1	
Measuring fuel return rate and leakage	H	1	Not set yet	Supply pump testing tool	1	
		2	Not set yet	Pressure limiter testing tool	1	
		3	Not set yet	Injector testing tool	1	
		4	Commercially available	Measuring cylinder	1	
Clearance of swing circle bearing	J		Commercially available	Dial gauge	1	

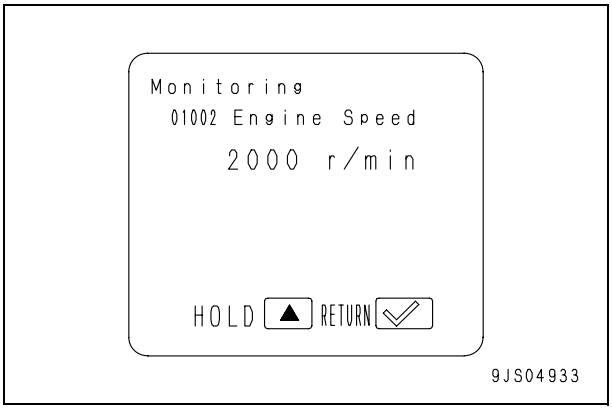
Testing and adjusting item	Symbol		Part No.	Part name	Q'ty	Remarks
Oil pressure in work equipment, swing and travel circuits, basic pressure of control circuit and oil pressure of pump PC control circuit	L	1	799-101-5002	Oil pressure gauge kit (Analog)	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Oil pressure gauge kit (Digital)	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-101-5220	Nipple	1	10 x 1.25 mm
			07002-11023	O-ring	1	
Oil pressure of pump LS control circuit	M	1	799-101-5002	Oil pressure gauge kit (Analog)	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Oil pressure gauge kit (Digital)	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-101-5220	Nipple	1	10 x 1.25 mm
			07002-11023	O-ring	1	
		3	799-401-1340	Differential pressure gauge	1	
Solenoid valve output pressure	N	1	799-101-5002	Oil pressure gauge kit (Analog)	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Oil pressure gauge kit (Digital)	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-3100	Nipple	1	02 size
			02896-11008	O-ring	1	
		3	799-401-3200	Nipple	1	03 size
			02896-11009	O-ring	1	
PPC valve output pressure	P	1	799-101-5002	Oil pressure gauge kit (Analog)	1	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm^2}
			790-261-1204	Oil pressure gauge kit (Digital)	1	Pressure gauge: 58.8 MPa {600 kg/cm^2}
		2	799-401-3100	Nipple	1	02 size
		3	799-401-3200	Nipple	1	03 size
Oil leakage in work equipment cylinder	Q		Commercially available	Measuring cylinder	1	
Water and oil temperature	—		799-101-1502	Digital thermometer	1	–99.9 – 1,299°C
Operating effort and depressing force	—		79A-264-0021	Push-pull scale	1	0 – 294 N {0 – 30 kg}
			79A-264-0091	Push-pull scale	1	0 – 490 N {0 – 50 kg}
Stroke and hydraulic drift	—		Commercially available	Ruler	1	
Work equipment speed	—		Commercially available	Stopwatch	1	
Voltage and resistance value	—		Commercially available	Circuit tester	1	

Measuring engine speed

★ Measure the engine speed with the monitoring function of the machine monitor.
★ Measure the engine speed under the following condition.
- Engine coolant temperature: Within operating range
- Hydraulic oil temperature: Within operating range

1. Preparation work

Operate the machine monitor so that the engine speed can be monitored.
★ For the operating method of the machine monitor, see “Special functions of machine monitor”.
★ Monitoring code: 01002 Engine speed



2. Measuring low idle speed

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



3. Measuring high idle speed

1) Start the engine and set the fuel control dial to the high idle (MAX) position.
2) Set the working mode in the power mode (P) and turn the auto-decelerator OFF.
3) Set all the control levers and pedals for work equipment, swing and travel to the neutral and measure the engine speed.

4. Measuring the engine speed when 2-pumps are relieved

1) Start the engine and move the arm cylinder to the IN stroke end.
2) Set the fuel control dial in the high idle (MAX) position and set the working mode in the power mode (P).
3) Operate the left work equipment control lever to relieve the arm circuit at the IN stroke end and measure the engine speed.

5. Measuring the engine speed at 2-pump relief and power maximizing (near rated speed)

1) Start the engine and move the arm cylinder to the IN stroke end.
2) Set the fuel control dial in the high idle (MAX) position and set the working mode in the power mode (P).
3) While operating the left work equipment control lever to relieve the arm at the IN stroke end and depressing the power maximizing switch, measure the engine speed.
★ The power maximizing function is reset automatically in about 8.5 seconds even if the switch is being depressed. Thus measurement of the engine speed must be completed within that period.

6. Measuring the speed when auto-deceleration speed is in operation

1) Start the engine, set the fuel control dial in the high idle position (MAX), and turn the auto-decelerator ON.
2) Set all the control levers and pedals for work equipment, swing and travel to neutral and measure the engine speed when the auto-decelerator is operated.
★ The engine speed is slowed down to a certain level in about 5 seconds from setting all the control levers and pedals to the neutral. This level is the engine speed when operation of the auto-deceleration is turned on.

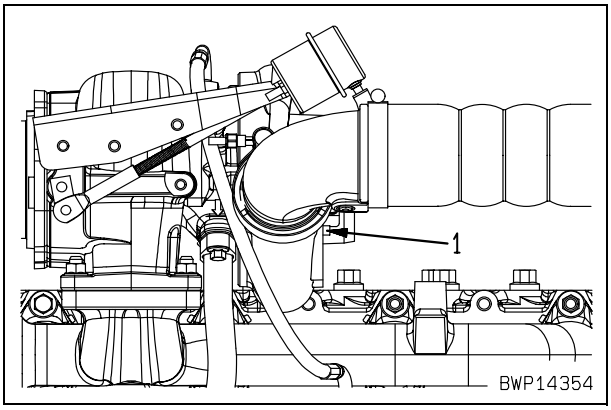
Measuring air boost pressure

★ Air boost pressure measuring tools

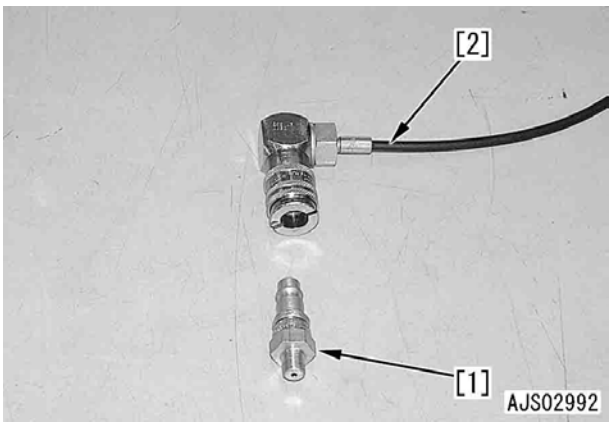
Symbol		Part No.	Part name
A	1	799-201-2202	Boost gauge kit
	2	799-401-2220	Hose

1. Open the engine hood.

2. Remove intake air pressure pickup plug (1) (R 1/8).



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



4. Start the engine and keep it running until temperature of the engine coolant and hydraulic oil rise to the operating range.

5. Run the engine at middle or higher speed and drain oil from the hose.
   ★ When draining the oil, open the self seal of the hose by insert approximately half of the gauge and hose connection. Repeat operation until the oil is drained out.
   ★ If Pm kit (A) is available, you may use the air bleeding coupling (790-261-1130) in that kit.
   ★ If oil is left in the hose, the gauge does not work. Accordingly, be sure to drain the oil.

6. Measure the air boost pressure at high idle under the following conditions.
   - Working mode: P-mode
   - Swing lock switch: ON (high pressure relief)
   - Work equipment, swing and travel: Arm IN relief position



7. Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

Measuring exhaust gas color

★ Exhaust gas color measurement tools

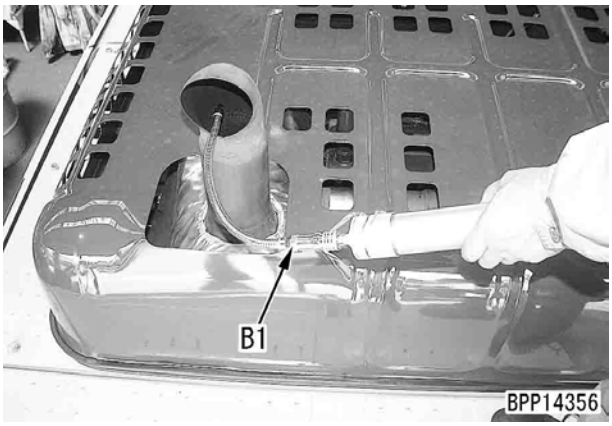
Symbol		Part No.	Part name
B	1	799-201-9001	Handy smoke checker
	2	Commercially available	Smoke meter

⚠ **Be careful not to touch any hot part when removing or installing the measuring instruments.**

★ If an air source and an electric power source are not available in the field, use handy smoke checker **B1**. When recording official data, use smoke meter **B2**.

1. Measuring with handy smoke checker B1

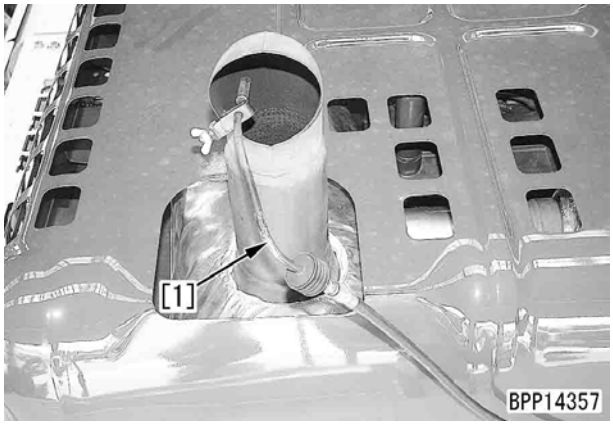
1) Fit a sheet of filter paper to smoke checker **B1**.
2) Insert the exhaust gas intake pipe into the exhaust pipe.
3) Start the engine and keep it running until the engine coolant temperature rises to the operating range.
4) Start the engine and accelerate it suddenly or run it at high idle and then operate the handle of smoke checker **B1** in order to suction exhaust gas to the filter paper.



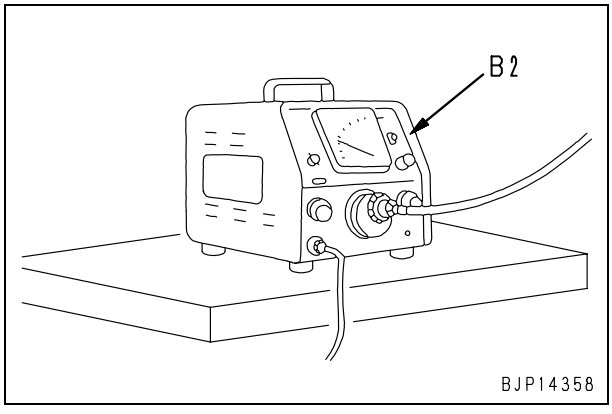
5) Take out the filtering paper and compare it with the attached scale for judgement.
6) Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

2. Measuring with smoke meter B2

1) Insert probe [1] of smoke meter **B2** to the outlet of the exhaust pipe and fix it to the exhaust pipe with a clip.



2) Connect the probe hose, receptacle of the accelerator switch and air hose to smoke meter **B2**.
   ★ Limit the supplied air pressure to 1.5 MPa {15 kg/cm^2}.
3) Connect the power cable to an AC receptacle.
   ★ Confirm that the smoke meter power switch is in the OFF position, before connecting the power cable to an outlet.
4) Loosen the cap nut of the suction pump and fit in the filter paper.
   ★ Fit in the filter paper securely so that the exhaust gas may not leak.
5) Turn on the power switch of smoke meter **B2**.



6) Start the engine and keep it running until the engine coolant temperature rises to the operating range.

7) Start the engine and accelerate it suddenly or run it at high idle and then depress the accelerator pedal of smoke meter **B2** to collect the exhaust gas into the filter paper.
8) Put the polluted filtering paper on non-polluted filtering paper (more than 10 sheets) in the filtering paper holder, and read the indicated value.
9) Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

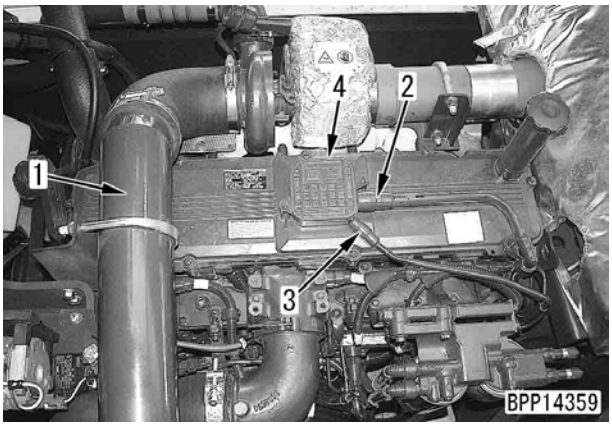
Adjusting valve clearance

★ Valve clearance adjustment tools

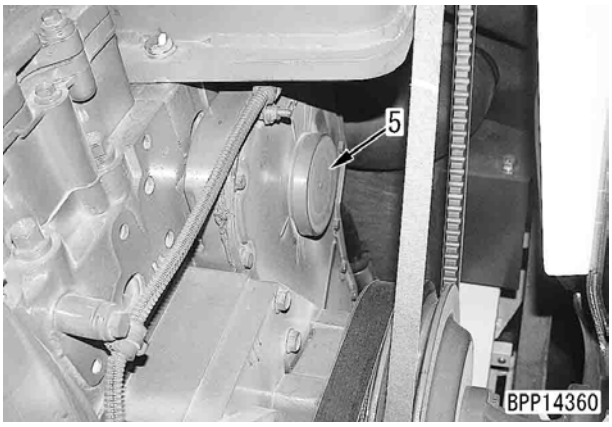
Symbol		Part No.	Part name
C	1	795-799-1131	Gear
	2	Commercially available	Clearance gauge

1. Remove air intake tube (1).

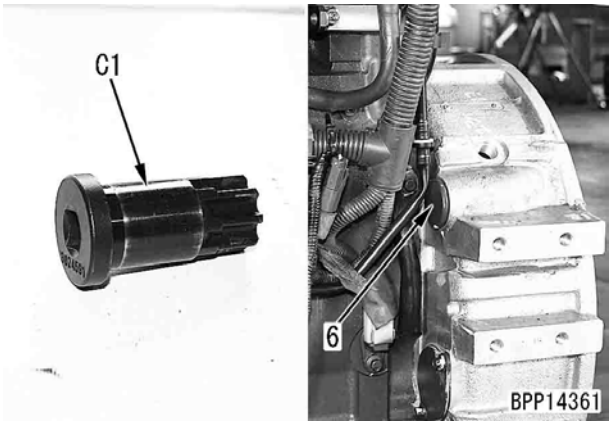
2. Disconnect blow-by tube (2) and breather tube (3) and remove cylinder head cover (4).



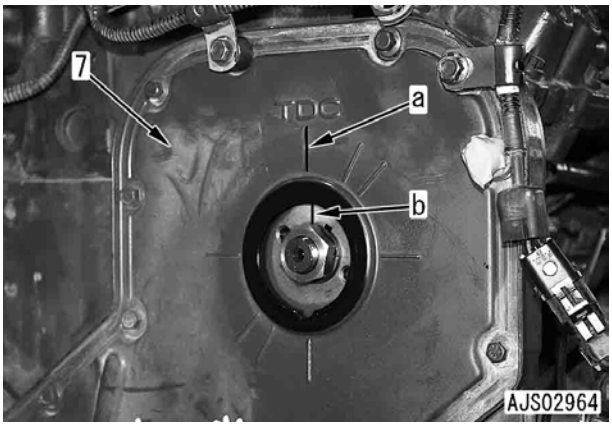
3. Remove cap (5).



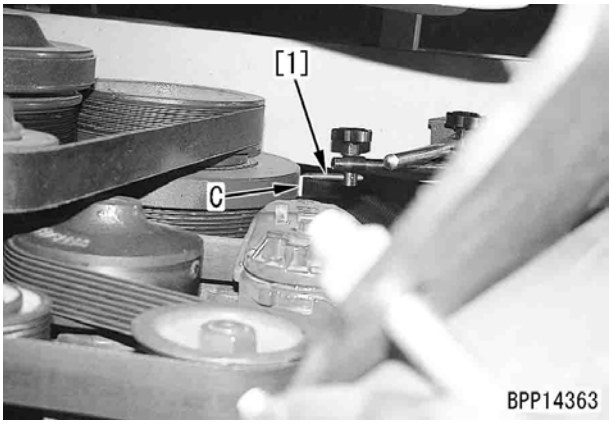
4. Remove cap (6), set gear **C1** and rotate the crank shaft forward to set No.1 cylinder to the compression top dead center.



★ Aligning TDC stamp line (a) of gear cover (7) and supply pump gear stamp line (b), set No.1 cylinder to the compression top dead center.



5. After setting No.1 cylinder to the compression top dead center, apply counter mark **C** to the damper and then install pointer [1] of the magnet base.



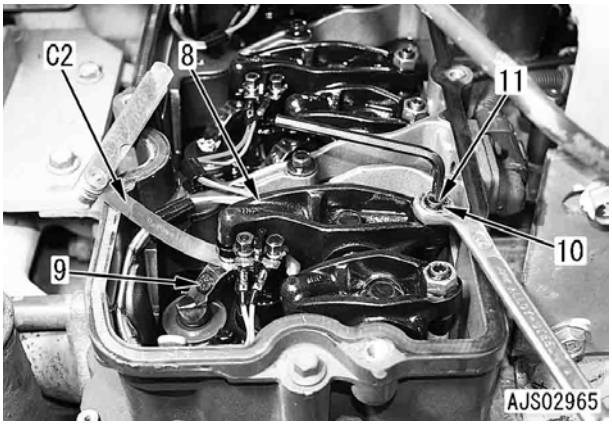
6. Adjust the valve clearance in the following procedure.
   ★ When No.1 cylinder is at the compression top dead center, adjust the valve clearance indicated with ● mark in the valve arrangement drawing.

Valve arrangement

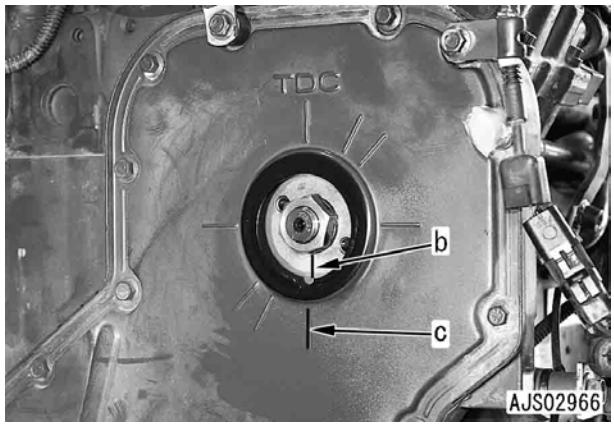
Cylinder No.	1	2	3	4	5	6
Exhaust valve	●	○	●	○	●	○
Intake valve	●	●	○	●	○	○

TDD00723

   1) Insert clearance gauge **C2** to the clearance between rocker lever (8) and cross head (9).
   2) Loosen locknut (10) and adjust the valve clearance using adjustment screw (11).
      ★ With the clearance gauge being inserted, turn the adjustment screw until it allows clearance gauge **C2** to move slightly.
   3) Fix adjustment screw (11) and tighten locknut (10).
      Locknut:
      24 ± 4 Nm {2.45 ± 0.41 kgm}
      ★ After tightening the locknut, check the valve clearance again.



   4) Turn the crankshaft forward by 360° and align the counter mark applied in step 5 above accurately to the pointer.
      ★ This alignment moves the supply pump gear stamp line (b) to the position of stamp line (c) situated directly below.
   5) Adjust the valve clearance indicated with ○ mark in the above valve arrangement drawing.
      ★ Firing order: 1 – 5 – 3 – 6 – 2 – 4
      ★ The adjustment procedure is the same as that employed for adjustment of ● mark.



7. After finishing adjustment, return the removed parts.
   Cylinder head cover mounting bolt:
   11.8 ± 1.96 Nm {1.2 ± 0.2 kgm}

Measuring compression pressure

★ Testing tools for compression pressure

Symbol		Part No.	Part name
D	1	795-799-6700	Puller
	2	795-502-1590	Gauge assembly
	3	795-790-6110	Adapter
	4	6754-11-3130	Gasket

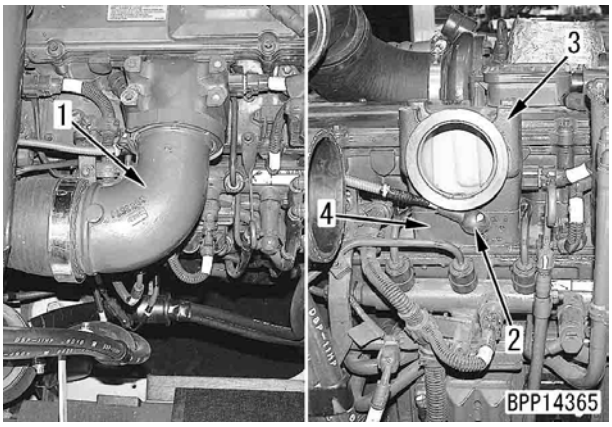
⚠ **Care must be exercised in measuring the compression pressure in order to avoid burn injury from touching the exhaust manifold or muffler, or pinching by rotating part.**

★ Measure the compression pressure after the engine is warmed up.
(Engine oil temperature: 40 – 60°C).

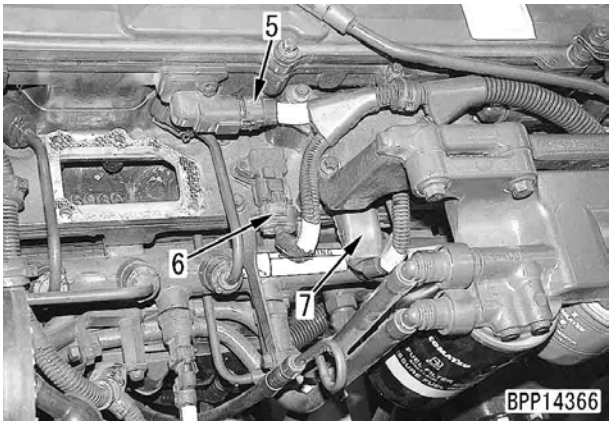
1. Open the engine hood.

2. Remove air intake connector (1).

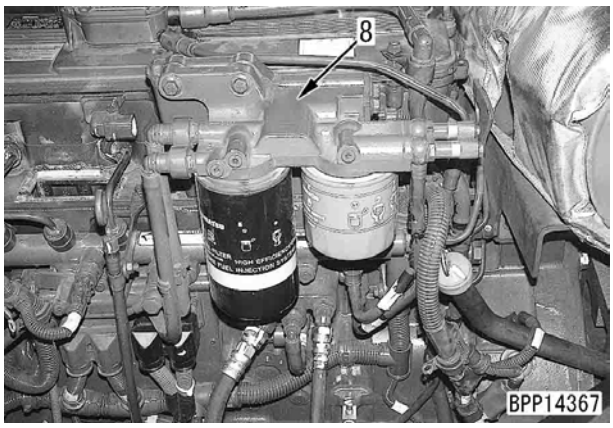
3. Disconnect harness (2) and remove bracket (3) and air heater (4).



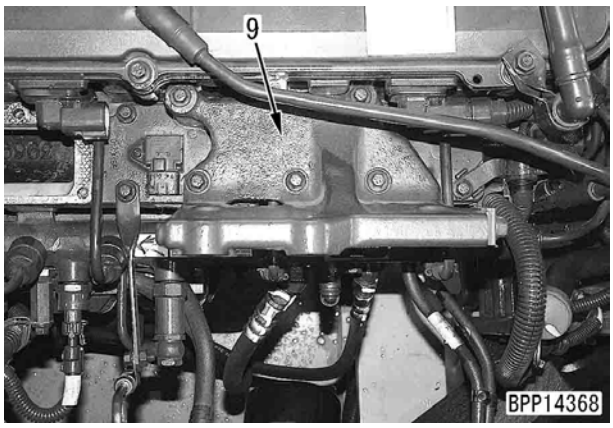
4. Disconnect wiring harness connectors (5), (6) and (7).



5. Move fuel filter and corrosion resistor assembly (8) to the control valve side along with the hose being connected to it.

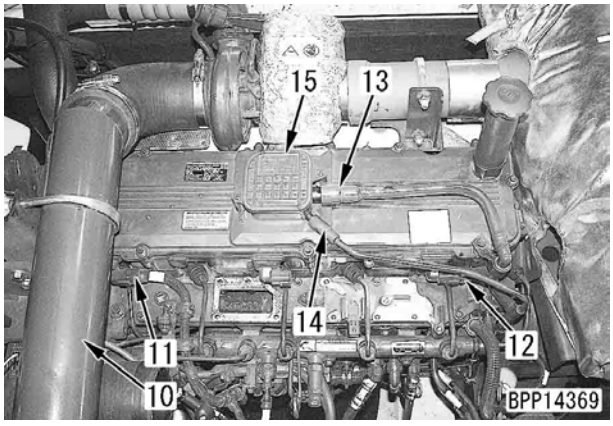


6. Remove bracket (9).

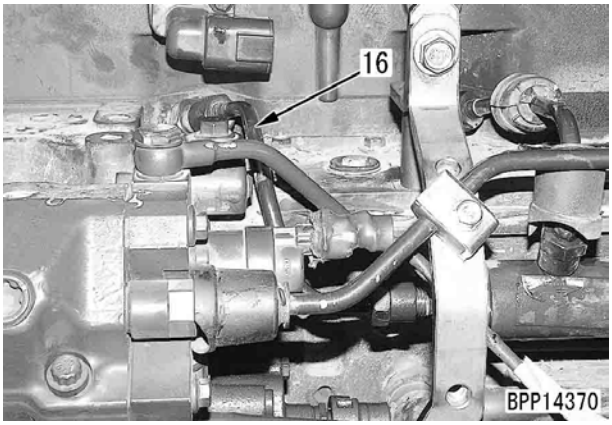


7. Disconnect air intake connector (10) and wiring harness connectors (11) and (12).

8. Remove blow-by hose (13) and breather hose (14) to remove cylinder head cover (15).



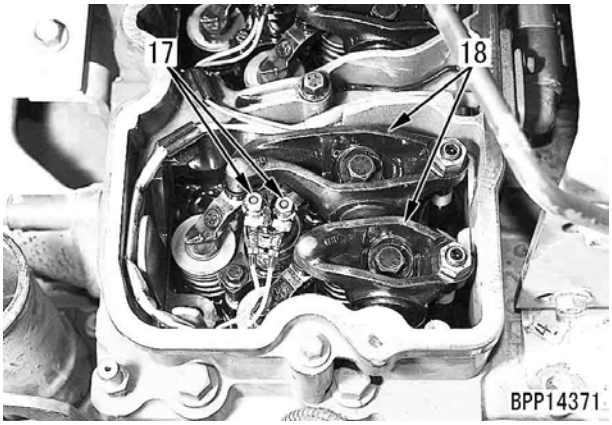
9. Disconnect high-pressure fuel tube (16).



10. Loosen injector terminal nut (17) and remove the terminal from the injector.

11. Move the cylinder to be tested to the compression top dead center.
    ★ For the adjustment, refer to the section, “Adjusting valve clearance”.

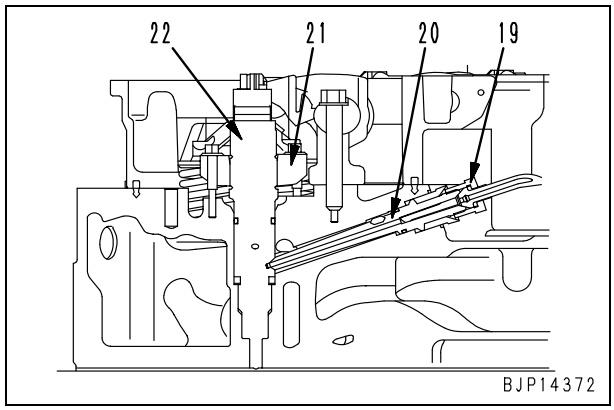
12. Remove rocker arm assembly (18).

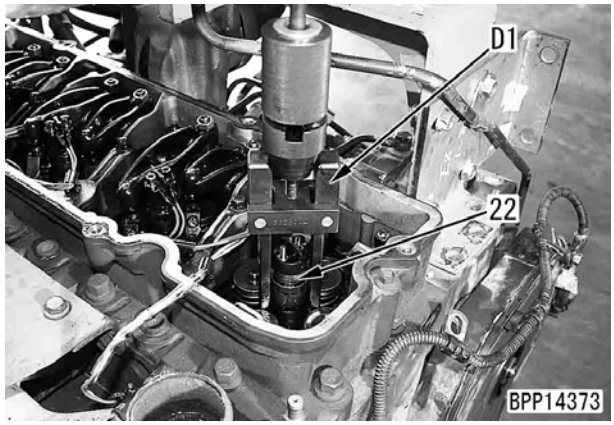


13. Remove retainer (19) and remove fuel inlet connector (20).

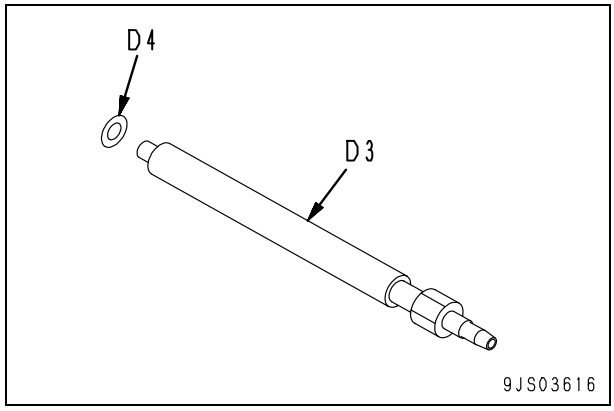
14. Remove holder (21).

15. Remove injector (22).
    ★ Remove the injector by use of impacts of the tool, slide hammer **D1**.
    ★ Do not unclench the upper part of the injector.





16. Install gasket **D4** to the tip of adapter **D3** and connect it to the injector mount.



17. Fix adapter **D3** with the injector holder.
    Holder mounting bolt:

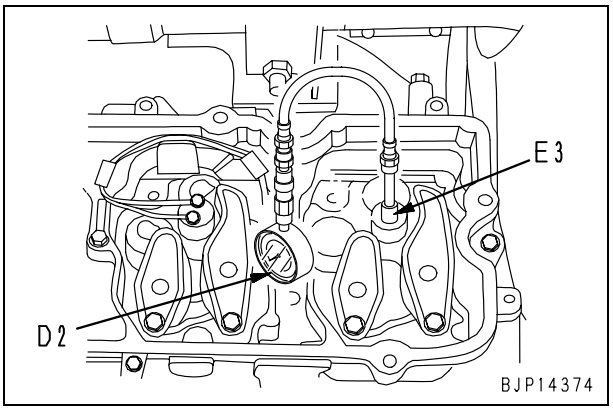
    1st time: **9.8 ± 2.0 Nm {1.0 ± 0.2 kgm}**

    2nd time: **40.2 ± 3.9 Nm {4.1 ± 0.4 kgm}**

18. Connect gauge assembly **D2** to adapter **D3**.
    ★ Apply a little amount of engine oil to the connecting parts of the adapter and gauge so that air will not leak easily.

19. Install rocker arm assembly.
    Rocker arm assembly mounting bolt:
    64.7 ± 4.9 Nm {6.6 ± 0.5 kgm}

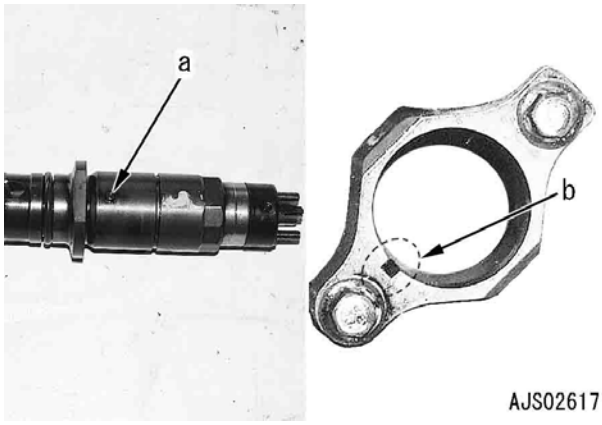
20. Adjust the valve clearance.
    ★ For the adjustment, refer to the section, “Adjusting valve clearance”.



21. Select the no-injection cranking operation from the machine monitor.
    ★ See the section of “Special functions of machine monitor”.
    ⚠ **Be sure to select the no-injection cranking operation. Otherwise, the engine can be started during the inspection, potentially inducing risks to the inspecting personnel.**

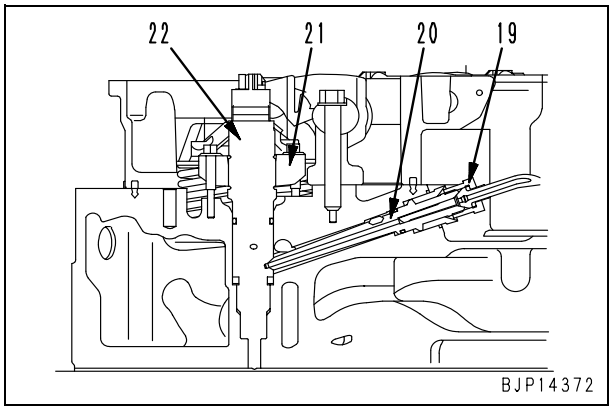
22. Rotate the engine with the starting motor and measure the compression pressure.
    ★ Read the pressure gauge pointer when it is stabilized.

23. 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) Mate the injector's projection (a) to notch (b) of the holder and then set them to the cylinder head.
       ★ Set the injector with the above mating position toward the fuel inlet connector insertion side.

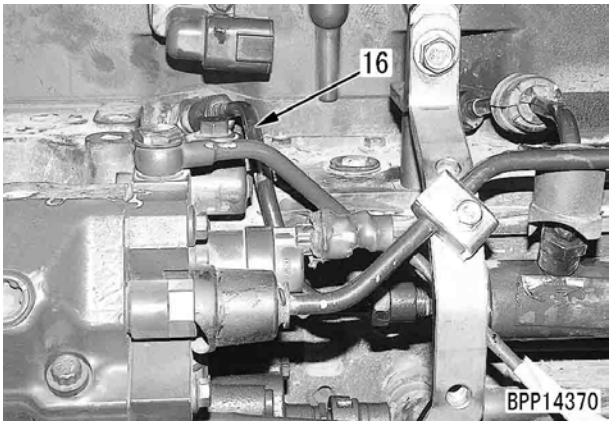


    2) Tighten the injector holder mounting bolt by 3 or 4 threads.
    3) Set fuel inlet connector (20).
       ★ Press it in until you feel the O-ring clicks in.
       ★ Install it in place temporarily using retainer (19).
       Retainer:
       14.7 ± 5.0 Nm {1.5 ± 0.51 kgm}
    4) Tighten the injector holder mounting bolt.
       Holder mounting bolt:

       1st time:
       9.8 ± 2.0 Nm {1.0 ± 0.2 kgm}
       2nd time:
       40.2 ± 3.9 Nm {4.1 ± 0.4 kgm}
    5) Tighten retainer (19) of the fuel inlet connector.
       Retainer:
       40.2 ± 3.9 Nm {4.1 ± 0.4 kgm}



6) Tighten the sleeve nut of high-pressure fuel hose (16) sequentially in the order of head side and common rail side.
   Sleeve nut:
   37.3 ± 4 Nm {3.8 ± 0.4 kgm}



★ After installing the rocker arm assembly, adjust the valve clearance. For details, see “Adjusting valve clearance”.
   Rocker arm assembly mounting bolt:
   64.7 ± 4.9 Nm {6.6 ± 0.5 kgm}

★ Tighten the injector terminal nut with the following torque.
   Terminal nut:
   1.25 ± 0.25 Nm {0.13 ± 0.03 kgm}

★ Tighten the head cover with the following torque.
   Head cover mounting nut:
   11.8 ± 1.96 Nm {1.2 ± 0.2 kgm}

Measuring blow-by pressure

★ Blow-by pressure measurement tools

Symbol		Part No.	Part name
E	1	799-201-1504	Blow-by checker
	2	795-790-3300	Tool (Nozzle)

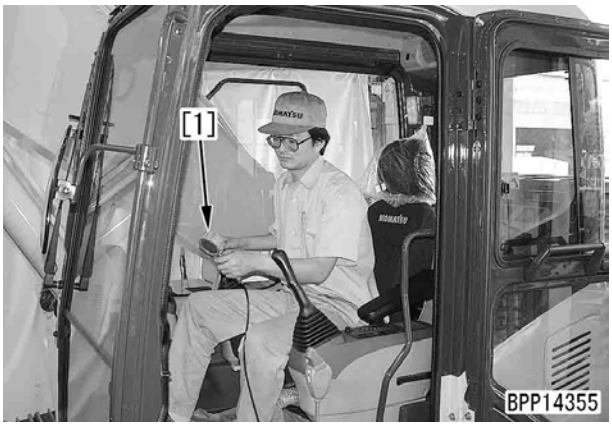
1. Remove the under cover of the engine block.

2. Install tool **E2** to blow-by hose (1) and connect gauge [1] of blow-by checker **E1**.



3. Start the engine and keep it running until temperature of the engine coolant and hydraulic oil rise to the operating range.

4. Measure the blow-by pressure at high idle and under the following conditions.
   - Working mode: P-mode
   - Swing lock switch: ON (high pressure relief)
   - Work equipment, swing and travel: Arm IN relief position
   - ★ Read off the blow-by pressure value, when the needle of the gauge steadies itself.



5. Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

Measuring engine oil pressure

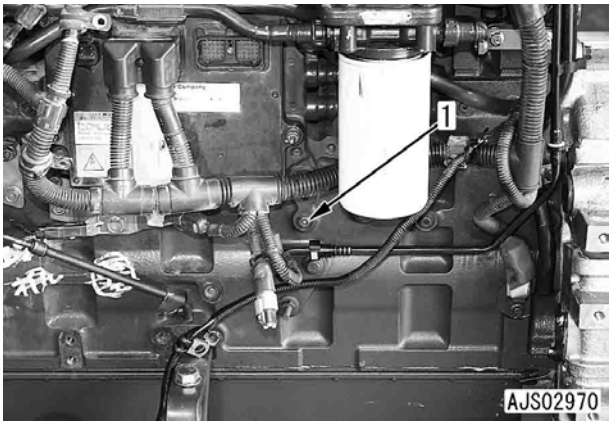
★ Measuring tools for engine oil pressure

Symbol		Part No.	Part name
F	1	799-101-5002	Hydraulic tester
	2	799-401-2320	Gauge
	3	6732-81-3170	Adapter
		6215-81-9710	O-ring

★ The test point is subject to machine models.

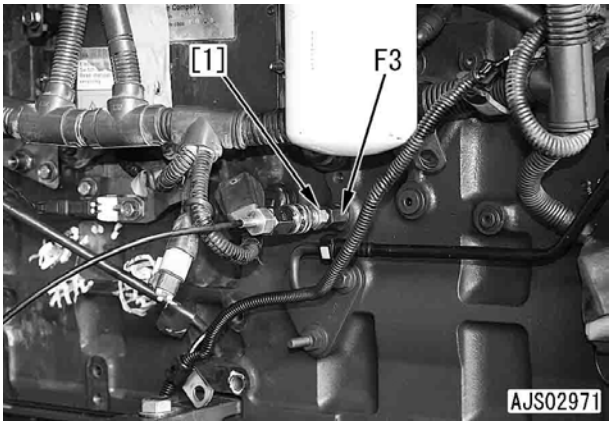
1. Open the engine hood.

2. Remove oil pressure pickup plug (1).

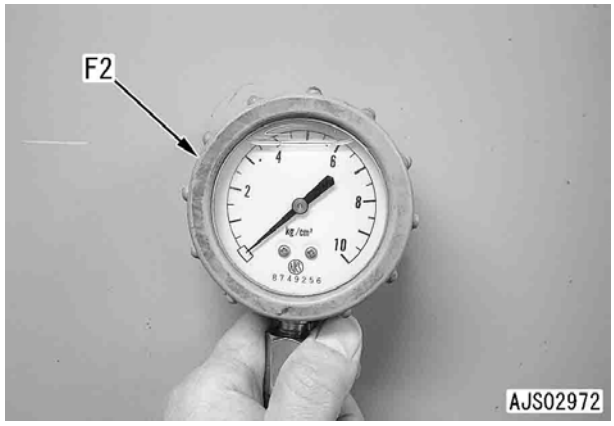


3. Install adapter **F3** and nipple (R1/8) [1] of hydraulic tester **F1** to the plug installation position.

4. Connect hose of hydraulic tester **F1** to nipple [1] and gauge **F2**.



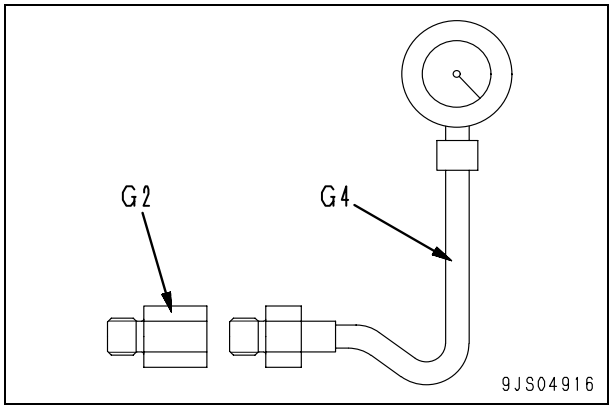
5. Run the engine at the rated output and low idle and test the oil pressure.
   ★ When testing with the engine mounted on the machine, test on the condition described in the shop manual for the machine.



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

Measuring fuel pressure

Symbol		Part No.	Part name
G	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	6732-81-3170	Adapter (10 x 1.0 mm → R1/8)
		6215-81-9710	O-ring
	3	799-401-2320	Gauge: 0.98 MPa {10 kg/cm^2}
	4	795-790-1500	Fuel vacuum gauge
		799-201-1201	

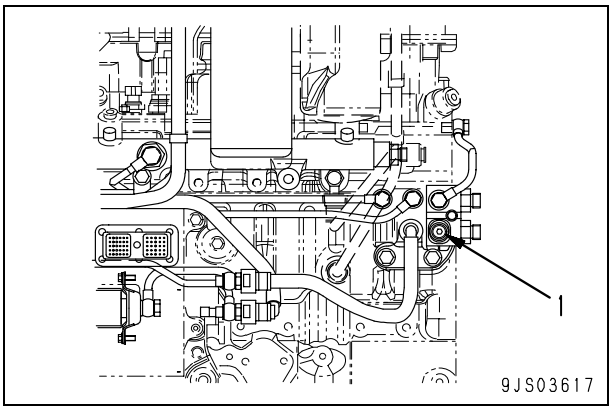


★ Fuel pressure shall be checked only in the following two circuits. Negative pressure circuit between the fuel supply connector and feed pump inlet and the low pressure circuit from the feed pump through the fuel main filter and up to the supply pump.

⚠ **Measurement in the high-pressure circuit is not available because of very high pressure generated in this circuit covering the supply pump through the common rail to the fuel injector.**

1. Measuring pressure in the fuel negative pressure circuit (fuel supply connector)

1) Remove fuel pressure pickup plug (1) of the fuel supply connector.



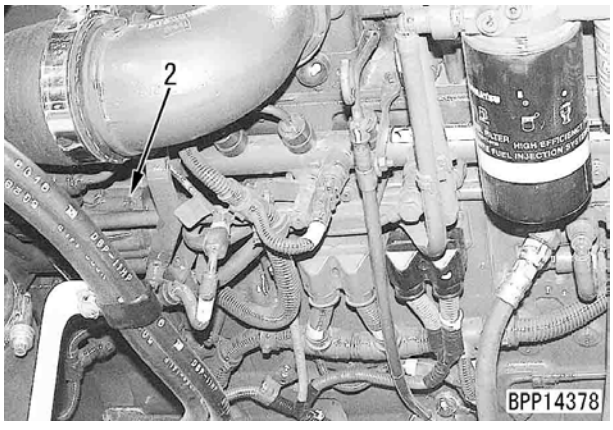
2) Connect adapter **G2** and fuel vacuum gauge **G4**.

3) Run the engine at high idle and measure the pressure in the fuel negative pressure circuit.
   ★ If the pressure in the fuel negative pressure circuit is in the following range, it is normal.
   - Standard pressure value in the fuel negative pressure circuit (fuel supply connector) **Max. 27.1 kPa {Max. 203 mmHg}**

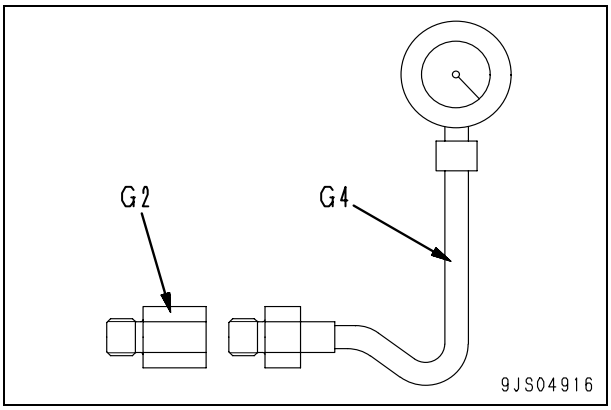
4) After finishing measurement, remove the measuring tools and return the removed parts.
   - Fuel pressure pickup plug:
     20 – 22 Nm {2.0 – 2.2 kgm}

2. Measuring pressure in the fuel negative pressure circuit (supply pump)

1) Remove fuel pressure pickup plug (2) of the supply pump.



2) Connect adapter **G2** and fuel vacuum gauge **G4**.

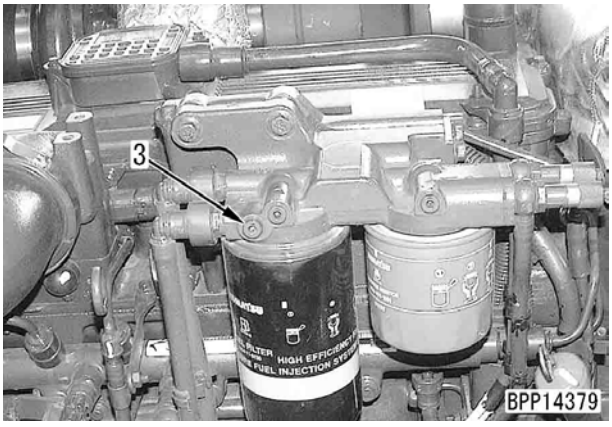


3) Run the engine at high idle and measure the pressure in the fuel negative pressure circuit.
   ★ If the pressure in the fuel negative pressure circuit is in the following range, it is normal.
   ● Standard pressure value in the fuel negative pressure circuit (supply pump) **Max. 33.9 kPa {Max. 254 mmHg}**
4) After finishing measurement, remove the measuring tools and return the removed parts.
   ● Fuel pressure pickup plug:

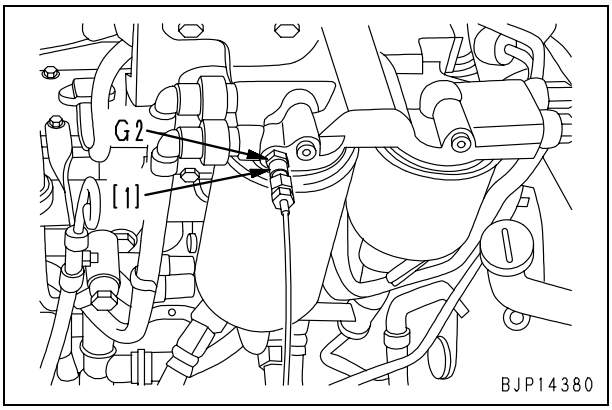
   20 – 22 Nm {2.0 – 2.2 kgm}

3. Measuring pressure in the fuel low-pressure circuit (fuel filter inlet side)

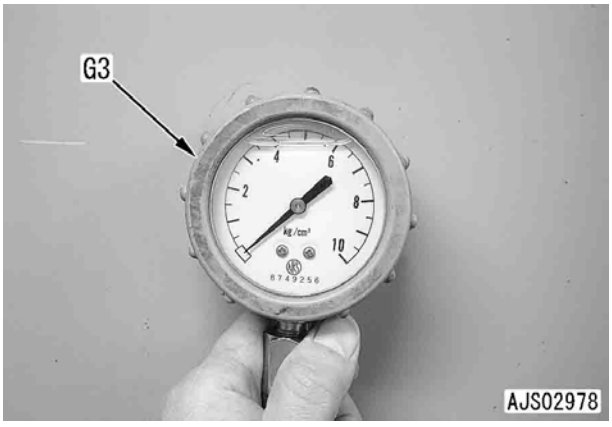
1) Remove fuel pressure pickup plug (3) situated at the fuel main filter inlet side.



2) Install adapter **G2** and nipple [1] of hydraulic tester **G1**and connect them to gauge **G3**.



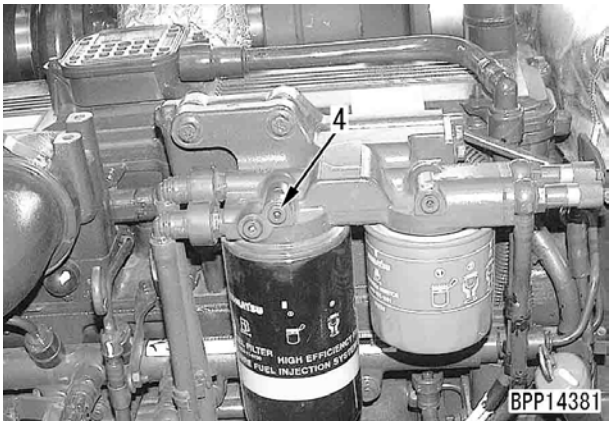
3) Measure pressure in the fuel low-pressure circuit when the engine is cranked.
   ★ If the pressure in the fuel low-pressure circuit (at the fuel filter inlet side) is in the following range, it is normal.
   ● Standard pressure values of the fuel low-pressure circuit (fuel filter inlet side) **Min. 0.14 MPa {Min. 1.4 kg/cm^2}**
   ⚠ **In order to protect the starting motor, it is prohibited to continue cranking for more than 30 seconds.**



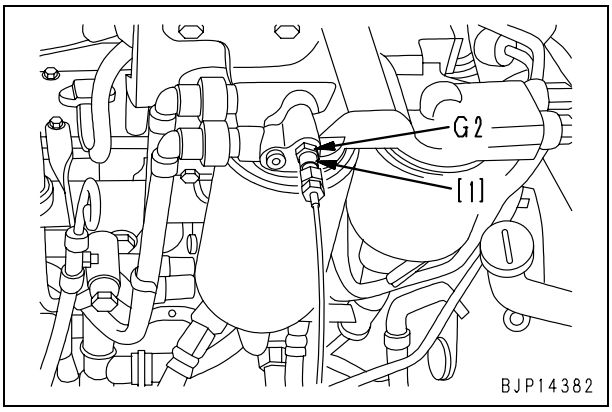
4) After finishing measurement, remove the measuring tools and return the removed parts.
   ● Fuel pressure pickup plug:
   20 – 22 Nm {2.0 – 2.2 kgm}

4. Measuring pressure in the fuel low-pressure circuit (fuel filter outlet side)

1) Remove fuel pressure pickup plug (4) situated at the fuel main filter outlet side.



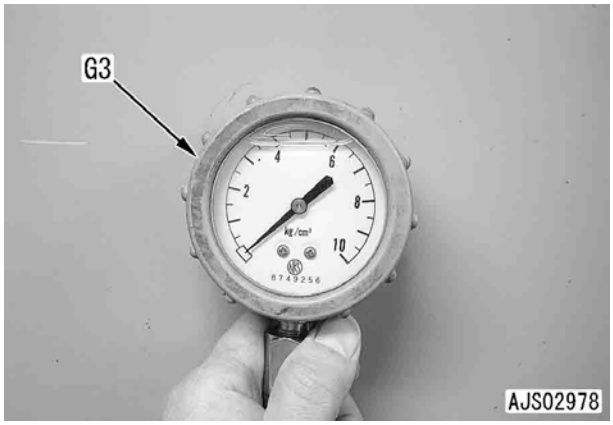
2) Install adapter **G2** and nipple [1] of hydraulic tester **G1** and connect them to gauge **G3**.



3) Run the engine at high idle and measure the pressure of the fuel low-pressure circuit.

★ If the pressure in the fuel low-pressure circuit (at the fuel filter outlet side) is in the following range, it is normal.

- Standard pressure values of the fuel low-pressure circuit (fuel filter outlet side) **Min. 0.48 MPa {Min. 4.9 kg/cm^2}**

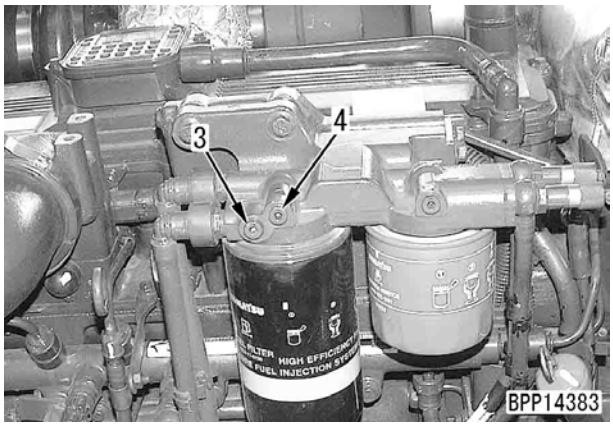


4) After finishing measurement, remove the measuring tools and return the removed parts.

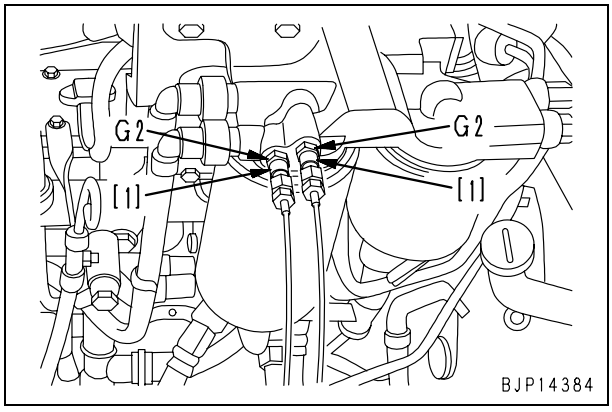
- Fuel pressure pickup plug:
  20 – 22 Nm {2.0 – 2.2 kgm}

5. Measuring drop of pressure in fuel low-pressure circuit

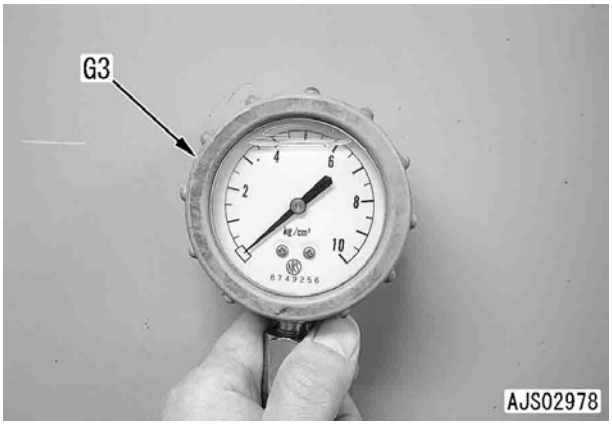
1) Remove fuel pressure pickup plug (3) at the fuel main filter inlet side and fuel pressure pickup plug (4) at the outlet side.



2) Install adapter **G2** and nipple [1] of hydraulic tester **G1** and connect them to gauge **G3**.



3) Run the engine at high idle and measure drop of the pressure of the fuel low-pressure circuit.
   - Pressure drop in the fuel low-pressure circuit =
     Fuel filter inlet pressure – Fuel pressure outlet pressure
   - ★ If the pressure drop in the fuel low-pressure circuit is in the following range, it is normal.
   - Standard pressure drop values for the fuel low-pressure circuit:
     Max. 0.14 MPa {Max. 1.4 kg/cm^2}
   - ★ When the measured pressure drop exceeded the standard value, clogging of the fuel filter should be suspected.



4) After finishing measurement, remove the measuring tools and return the removed parts.
   - Fuel pressure pickup plug:
     20 – 22 Nm {2.0 – 2.2 kgm}

Handling during cylinder cut-out operation

★ Reduced cylinder mode operation means to run the engine with the fuel injectors of 1 or more cylinders disabled electrically to reduce the number of effective cylinders. The purposes and effects of this operation are as follows.

1. This operation is used to find out a cylinder which does not output power normally (or, combustion in it is abnormal).
2. If the engine speed and output remain the same as the normal operation (full-cylinder mode operation) when a cylinder is set to no-injection in the cylinder cut-out operation, existence of a failure on the subject cylinder should be suspected.

   Followings are the potential causes.
   Leakage from the cylinder head gasket
   Defective injection from the injector
   Failure on the piston, piston ring or cylinder liner
   Failure on the valve mechanism (valve operating system)
   Failure in the electrical system
3. Since the common rail fuel injection system controls the injector of each cylinder electronically, the operator can perform the reduced cylinder mode operation easily with switches to find out a defective cylinder.

   ★ See the section of “Special functions of machine monitor” when turning on the cylinder cut-out operation.

Handling during no injection cranking operation

★ The no injection cranking operation denotes to crank the engine from the starting motor after setting all cylinders to no injection mode. Following describes the objective and effects of this operation.

When a machine or engine has been stored for a long period of time, implementing the no injection cranking operation before restarting the engine lubricates the engine respective parts and thus helps preventing seizure of the engine.

★ See the section of “Special functions of machine monitor” when turning on the no injection cranking operation.

Measuring fuel return rate and leakage

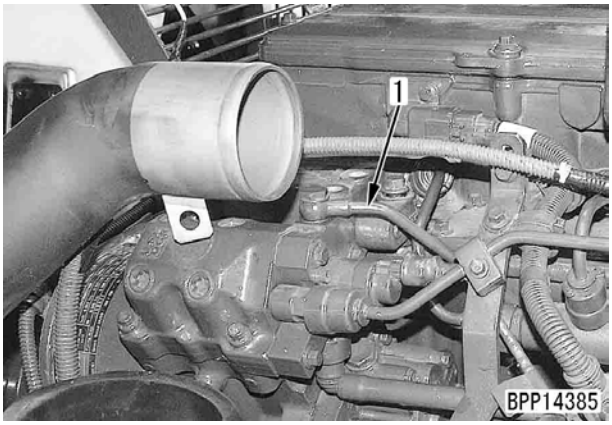
★ Testing tools for leakage from pressure limiter and return rate from injector

Symbol		Part No.	Part name
H	1	Not set yet	Supply pump testing tool
	2	Not set yet	Pressure limiter testing tool
	3	Not set yet	Injector testing tool
	4	Commercially available	Measuring cylinder

⚠ **Park the machine in a level ground and lower the work equipment to the ground.**

1. Testing supply pump return rate

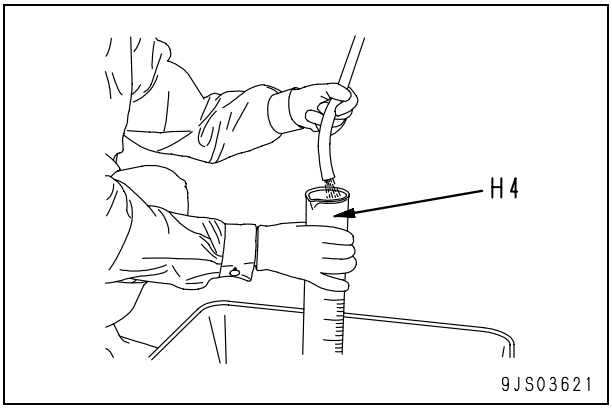
1) Disconnect return tube (1) of the supply pump.
   ★ Before starting the work, remove the return hose from the aftercooler so that it may not interfere with the inspection.



2) Connect testing tool **H1** to the supply pump side, and insert its tip into measuring cylinder **H4**.
3) Connect blocking tool **H1** to the fuel return connector side to prevent leakage of the fuel.
4) Install the aftercooler hose, run the engine at low idle and then measure the return rate from the supply pump.
   ★ If the return rate from the supply pump is in the following range, it is normal.

At low idle	300 cc/30 sec.
At cranking	200 cc/30 sec.

⚠ **If the engine cannot be started, you may measure the fuel return rate while rotating the engine with the starting motor. Do not rotate for more than 30 seconds continuously, however, for protection of the starting motor.**

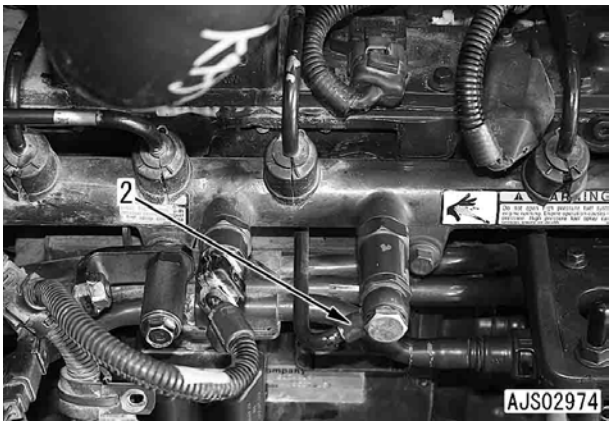


5) After finishing testing, remove the testing tools and return the removed parts.
   Joint bolt (M14):
   36 ± 5 Nm {3.67 ± 0.51 kgm}

2. Testing leakage from pressure limiter

★ Before displaying failure code [CA449], its troubleshooting must be done beforehand.

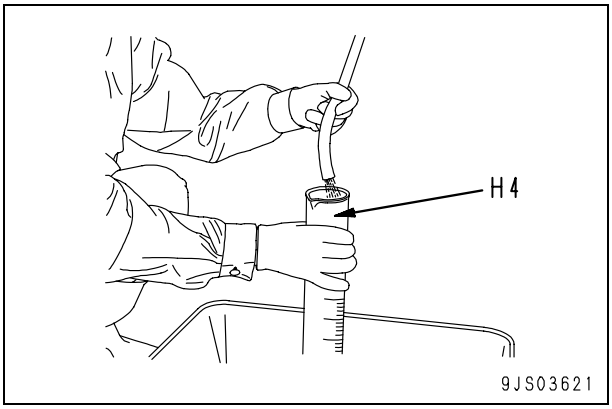
1) Disconnect return tube (2) of the pressure limiter.



2) Connect testing tool **H2** to the pressure limiter side, and insert its tip into measuring cylinder **H4**.
3) Connect blocking tool **H2** to the return tube joint connection of the cylinder block side to prevent leakage of the fuel.

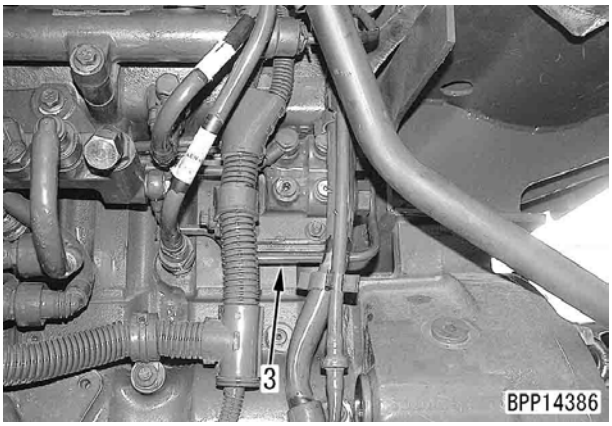
4) Run the engine at low idle and test the return rate from the pressure limiter.
★ If the leakage from the pressure limiter is in the following range, it is normal.

At low idle	Below 30 droppings/min.



5) After finishing testing, remove the testing tools and return the removed parts.
Joint bolt (M12):
24 ± 4 Nm {2.45 ± 0.41 kgm}

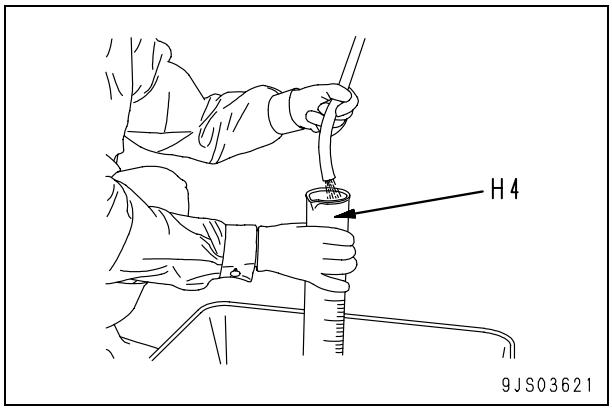
3. Testing return rate from injector
1) Disconnect return tube (3) of the injector.



2) Connect testing tool **H3** to the cylinder head side, and insert its tip into measuring cylinder **H4**.
3) Connect blocking tool **H3** to the return tube joint connection of the cylinder block side to prevent leakage of the fuel.
4) Run the engine at low idle and test the return rate from the injector.
★ If the return rate from the injector is in the following range, it is normal.

At low idle	300 cc/45 sec.
At cranking	100 cc/30 sec.

⚠ **If the engine cannot be started, you may measure the fuel return rate while rotating the engine with the starting motor. Do not rotate for more than 30 seconds continuously, however, for protection of the starting motor.**



5) After finishing testing, remove the testing tools and return the removed parts.
Joint bolt (M12):
24 ± 4 Nm {2.45 ± 0.41 kgm}

Bleeding air from fuel circuit

★ If fuel is used up or after a fuel circuit part has been removed or installed, bleed air from the fuel circuit using a power priming pump and according to the following procedure.

1. When fuel filter (1) is removed, installed or replaced, install the pump before filling fuel to the fuel filter.



2. Fill the fuel tank with fuel.

3. Set the starting switch to ON position and maintain it in that state for 30 seconds and then set the switch to OFF position and maintain it in that state for 10 seconds.

4. Repeat above procedures of step 3 four time.

5. Start the engine with the starting motor.
   - ★ The air in the high-pressure circuit is bled automatically if the engine is cranked.
   - ★ If the engine does not start, there may be still air in the low-pressure circuit. In this case, repeat the above procedure from step 2.
   - ★ If the engine is started while air is remained in the fuel circuit, a fuel system error (CA449 or CA559) can result. In such case, start the engine after implementing above procedure and then maintain the engine at low idle for about 3 minutes. As air is bled from the fuel circuit, the engine speed will be stabilized, erasing the error indication.

Checking fuel circuit for leakage

⚠ **Very high pressure is generated in the high-pressure circuit of the fuel system. If fuel leaks while the engine is running, it is dangerous since it can catch fire.**
After testing the fuel system or removing its parts, test it for fuel leakage according to the following procedure.

★ Clean and degrease the engine and the parts around it in advance so that you can test it easily for fuel leakage.

1. Spray color checker (developer) over the fuel supply pump, common rail, fuel injector, and joints of the high-pressure piping.

2. Run the engine at speed below 1,000 rpm and stop it after its speed is stabilized.

3. Inspect the fuel piping and devices for fuel leakage.
   ★ Check mainly around the high-pressure circuit parts coated with the color checker for fuel leakage.
   ★ If any fuel leakage is detected, repair it and check again from step 1.

4. Run the engine at low idle.

5. Inspect the fuel piping and devices for fuel leakage.
   ★ Check mainly around the high-pressure circuit parts coated with the color checker for fuel leakage.
   ★ If any fuel leakage is detected, repair it and check again from step 1.

6. Run the engine at high idle.

7. Inspect the fuel piping and devices for fuel leakage.
   ★ Check mainly around the high-pressure circuit parts coated with the color checker for fuel leakage.
   ★ If any fuel leakage is detected, repair it and check again from step 1.

8. Run the engine at high idle and load it.
   ★ When checking while the components to be checked are mounted on the machine, stall the torque converter or relieve the hydraulic pump.

9. Inspect the fuel piping and devices for fuel leakage.
   ★ Check mainly around the high-pressure circuit parts coated with the color checker for fuel leakage.
   ★ If any fuel leakage is detected, repair it and check again from step 1.
   ★ If no fuel leakage is detected, check is completed.

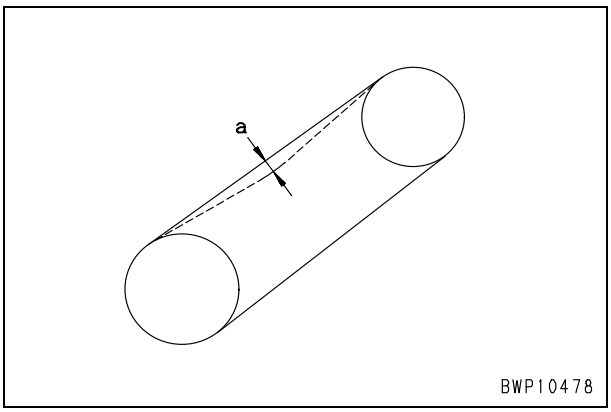
Checking and adjusting air compressor belt tension

Inspection

Check belt deflection amount **(a)** when depressing the mid point between the fan pulley and the compressor pulley with your finger.

- Belt depressing force:

  63.7 N {6.5 kg} or equivalent



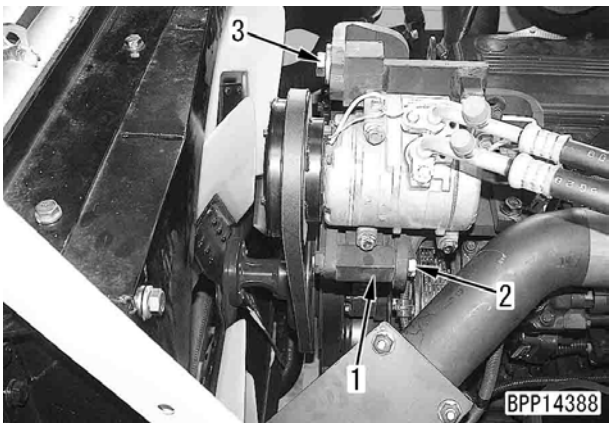
Adjustment

★ If the belt deflection amount is not proper, adjust it in the following manner.

1. Loosen mounting bolt (2) and fixing bolt (3) of compressor bracket (1).

2. Slide compressor bracket (1) using the bar, adjust the belt tension and then tighten fixing bolt (3).

3. Tighten mounting bolt (2) of compressor bracket (1).
   ★ Check the belt tension again after the adjustment.



Measuring clearance in swing circle bearings

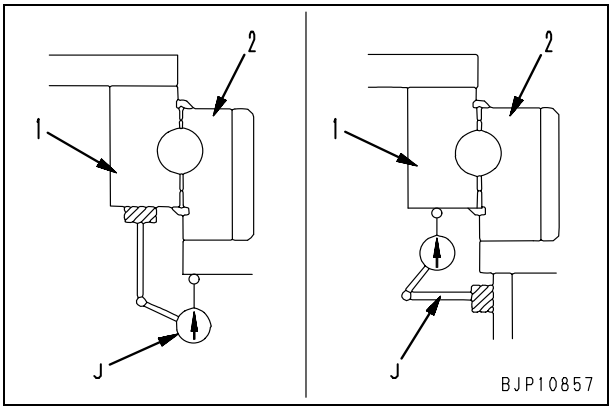
★ Swing circle bearing clearance measurement tools

Mark	Part No.	Part Name
J	Commercially available	Dial gauge

★ Follow the steps explained below when measuring clearance in the swing circle bearing on the actual machine.

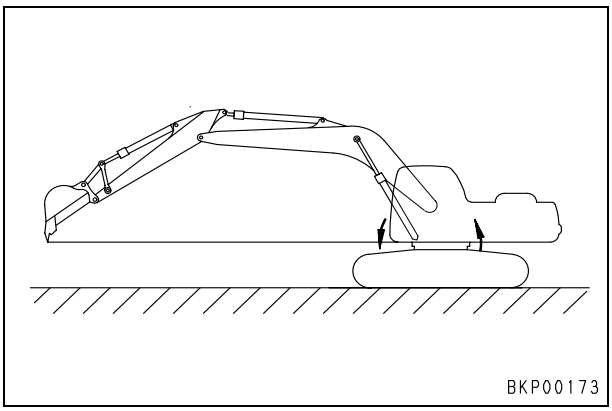
⚠ **Be careful not to put a hand or foot under the undercarriage, while taking measurement.**

1. Fasten dial gauge **J** to swing circle outer race (1) or inner race (2), and contact the probe against the end surface of inner race (2) or outer race (1) on the opposite side.
   ★ Set dial gauge **J** at the machine front or rear side.



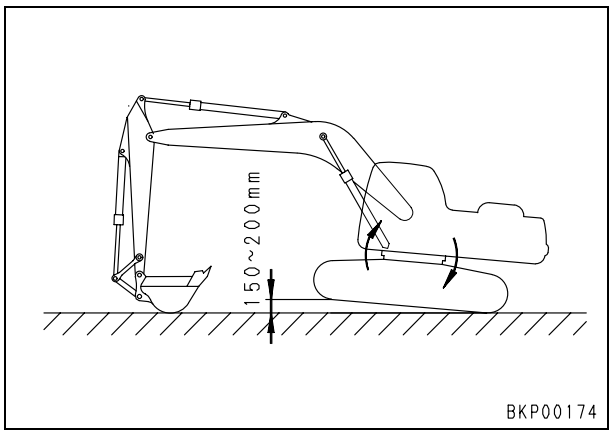
2. Keep the work equipment in the max. reach posture and keep the height of the bucket teeth tip level with the lower height of the revolving frame.
   ★ The upper structure is lowered at the front and raised at the rear at that time.

3. Set dial gauge to the zero point.



4. Hold the arm nearly perpendicular to the ground, and lower the boom until the track shoes will be lifted at the machine front.
   ★ The upper structure is raised at the front and lowered at the rear at that time.

5. Read the value indicated by dial gauge **J** in this condition.
   ★ The value indicated by dial gauge **J** represents the clearance in the bearings.



6. Return the machine to the posture in Item 2 above, and confirm dial gauge **J** reading returns to zero.
   ★ If zero value is not indicated, repeat the steps in Items 3 through 5.

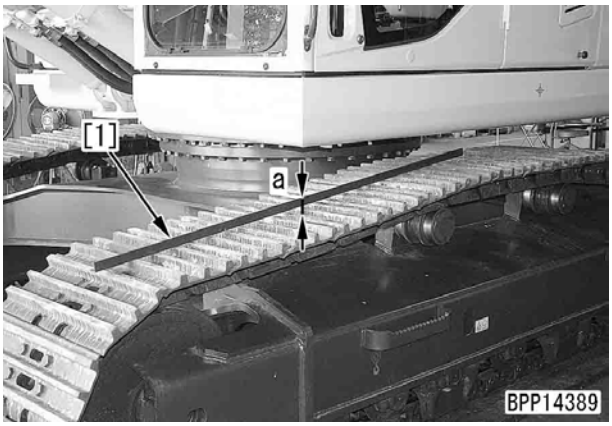
Checking and adjusting track shoe tension

Inspection

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

2. Place straight bar [1] on the track shoe between the idler and the 1st carrier roller.
   ★ L beam is recommended for bar [1] because of its deflection-free nature.

3. Measure maximum clearance **(a)** between bar [1] and the track shoe.
   ● Standard clearance **(a)**: 10 – 30 mm



Adjustment

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

1. When the tension is too strong

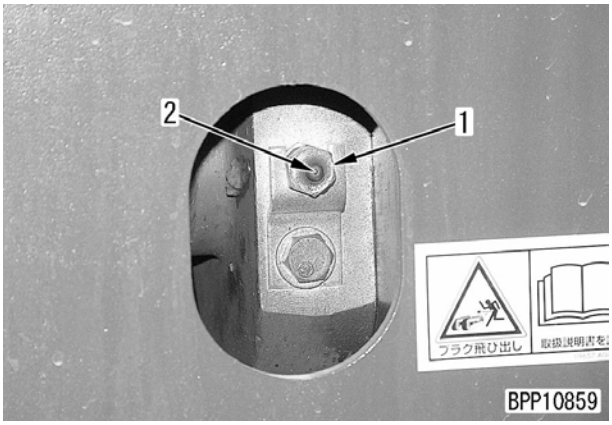
Loosen valve (1) to discharge the grease.

⚠ **Do not loosen the valve more than 1 turn. Otherwise, the valve may jump out because of the high-pressure grease inside.**

2. When the tension is too weak

Push in grease through grease fitting (2).

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



Checking and adjusting oil pressure in work equipment, swing and travel circuit

★ Checking and adjusting tools for hydraulic oil pressure in hydraulic circuit for work equipment, swing and travel

Symbol		Part No.	Part name
L	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5220	Nipple (10 x 1.25 mm)
		07002-11023	O-ring

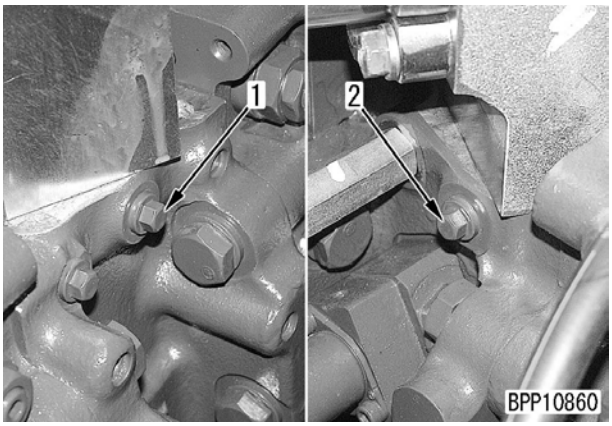
★ Checkup of the oil pressure in the work equipment, swing, and travel circuits (pump discharge pressure) is also available from the monitoring function of the machine monitor (Special functions of machine monitor).

Measurement

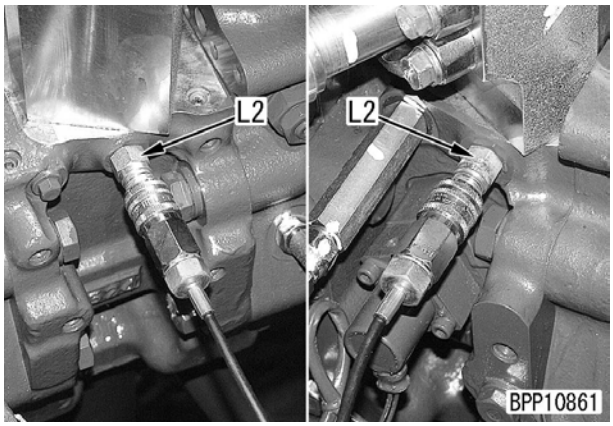
1. Preparation work

⚠ **Lower the work equipment to the ground and, after stopping the engine, release residual pressure in the piping by operating the control lever several times. Then loosen the oil filler cap gradually to release pressure inside the tank.**

1) Remove hydraulic oil pressure measuring plugs (1) and (2).
   - Plug (1): For the front pump circuit (situated in the rear side of the machine)
   - Plug (2): For the rear pump circuit (situated in the front side of the machine)



2) Fit nipple **L2** and connect it to oil pressure gauge [1] of hydraulic tester **L1**.
   ★ Use the oil pressure gauge with capacity 58.8 MPa {600 kg/cm^2}.



3) Start the engine and keep it running until the hydraulic oil pressure rises to the operating range.



2. Combination of pump, actuator, and valve

★ Care must be exercised when the oil from the pump is diverted since, at this time, the actuators of the front pump and rear pump work independently, relieving different valves.

★ When the work equipment circuit or swing circuit is relieved singly, the oil of the pumps is diverted.

★ The actuators in the table are arranged in the order when the control valve is seen from the front of the machine.

Pump	Actuator		Valve to be relieved
Front pump	(Unload)		R unload valve
	Service		Safety valve
	Boom Hi	Arm Hi	R main relief valve
	Bucket		R main relief valve
	L.H travel		R main relief valve
	Boom Lo		RAISE: R main relief valve LOWER: Safety valve
Rear pump	Swing		Swing motor safety valve
	R.H travel		F main relief valve
	Arm Lo		F main relief valve
	(Unload)		F unload valve

3. Measurement of unload pressure

1) Start the engine.
2) Measure hydraulic oil pressure, when the engine is running at high idle and all the control levers are moved to the NEUTRAL position.
   ★ Hydraulic oil pressure when the unload valve unloads is displayed.

4. Measurement of work equipment relief pressure

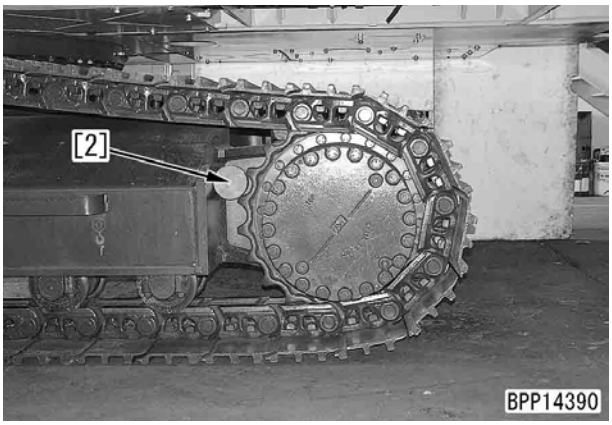
1) Start the engine and move the cylinder to be measured to its stroke end.
2) Measure hydraulic oil pressure when the cylinder is relieved while the engine is running at high idle.
   ★ Except when the boom LOWER is selected, the pressure at which the main relief valve was relieved is displayed.
   ★ Except when the boom LOWER is selected, releasing the power max. switch introduces the low-pressure relief pressure and pushing this switch introduces the high-pressure relief pressure.
   ★ Except when the boom LOWER is selected, keep the swing lock switch in the OFF position during the inspection. If it is moved to the ON position, hydraulic oil pressure is turned to high relief pressure, as the constant 2-stage relief valve is moved to the ON position.
   ★ When the boom LOWER is selected, the pressure at which the safety valve was relieved is displayed.
   ★ When the boom LOWER is selected, the relief pressure is lower than the main relief pressure.
   ★ When the boom LOWER is selected, turning off the machine push-up switch introduces the low-pressure relief pressure and turning it on introduces the high-pressure relief pressure.

5. Measurement of swing relief pressure

1) Start the engine and move the swing lock switch to the ON position.
2) Measure hydraulic oil pressure when the engine is running at high idle and the swing circuit is relieved.
   ★ Hydraulic oil pressure when the swing motor safety valve is relieved is displayed.
   ★ The relief pressure of the swing motor is lower than the main relief pressure.

6. Measurement of travel circuit relief pressure

1) Start the engine, and lock the travel.
   ⚠ **Insert pin [2] between the sprocket and the track frame to positively lock the travel circuit.**



2) Measure the pressure when the engine is set to high idle and the travel circuit is relieved.
   ★ Hydraulic oil pressure with the main relief valve in relief condition is displayed. In the travel circuit relief, the pressure is high pressure relief all the time.

Adjustment

★ Adjustment of the unload valve is not available.

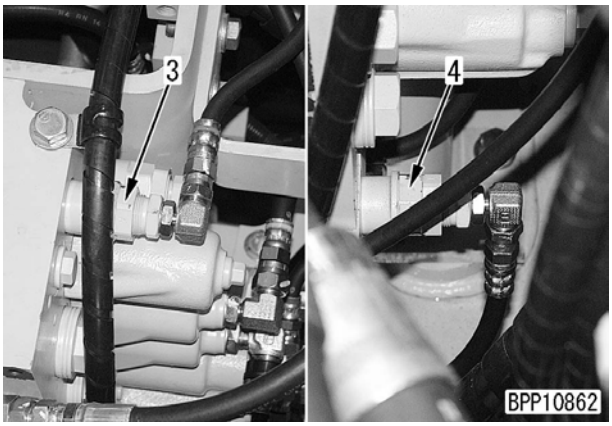
1. Adjustment of main relief pressure

★ When the relief pressure of the work equipment circuit or travel circuit is abnormal, adjust main relief valves (3) and (4) according to the following procedure.

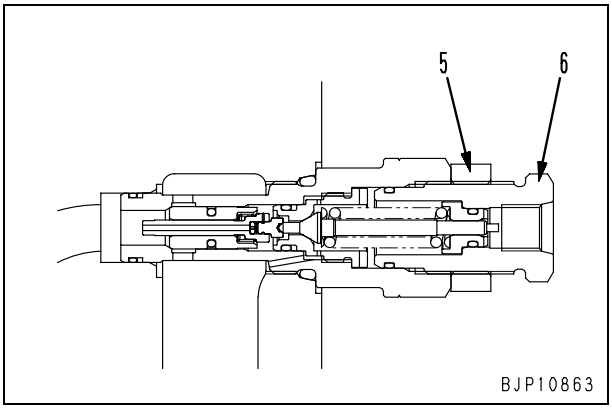
- (3): For the front pump circuit
- (4): For the rear pump circuit

★ As for the main relief valve, be sure to adjust its low-pressure relief pressure alone (adjusting the low-pressure relief pressure automatically sets the high-pressure relief pressure, too.).

★ When the low-pressure relief pressure is turned on, the 2-stage relief valve is OFF and thus the pilot pressure is not applicable to the switching port.



1) Disconnect the pilot hose.
2) Loosen locknut (5) and turn holder (6) to adjust the relief pressure.
   ★ Turning the holder clockwise increases the pressure. Turning it counterclockwise decreases the pressure.
   ★ Quantity of adjustment per turn of holder:
   Approx. 20.5 MPa {Approx. 209 kg/cm^2}
   Locknut:
   49.0 – 58.8 Nm {5 – 6 kgm}

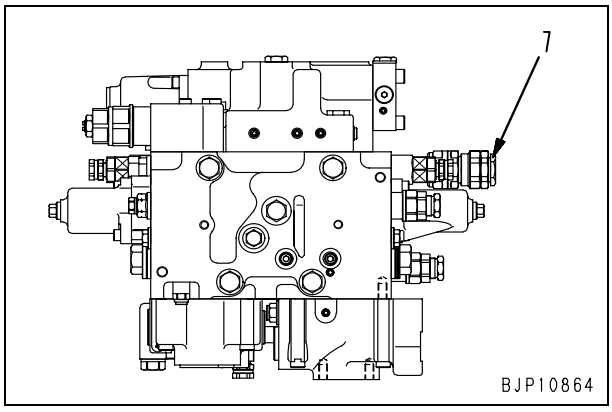


3) Check the pressure again after the adjustment, following the aforementioned steps for measurement.
   ★ Connect the pilot hose when measuring the oil pressure.

2. Adjustment of boom LOWER relief pressure (on the side where high pressure is set)

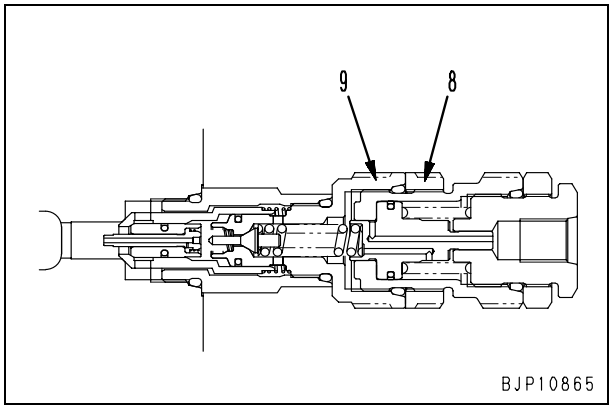
★ When the high-pressure relief pressure for the boom LOWER is not normal, adjust the high pressure side of the safety and suction valve (7) for the boom LOWER in the following procedure.

★ The the high-pressure relief pressure mode denotes the state in which the machine push-up switch is turned on, disabling to apply the pilot pressure to the switching port.



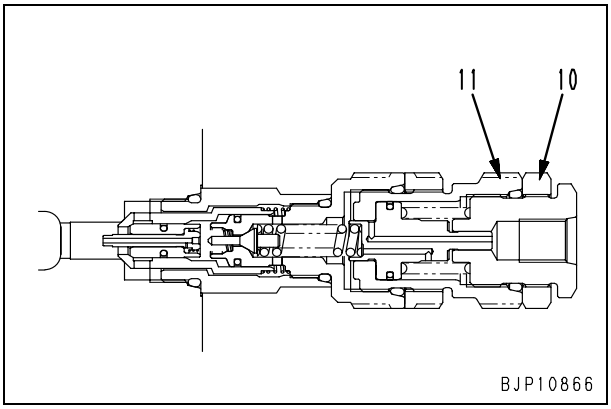
1) Disconnect the pilot hose.
2) Loosen locknut (8) and turn holder (9) to adjust the relief pressure.
   ★ Turning the holder clockwise increases the pressure. Turning it counterclockwise decreases the pressure.

★ Pressure adjustable from a single turn of the holder:
Approx. 21.8 MPa {Approx. 222 kg/cm^2}
Locknut: **93 – 123 Nm {9.5 – 12.5 kgm}**



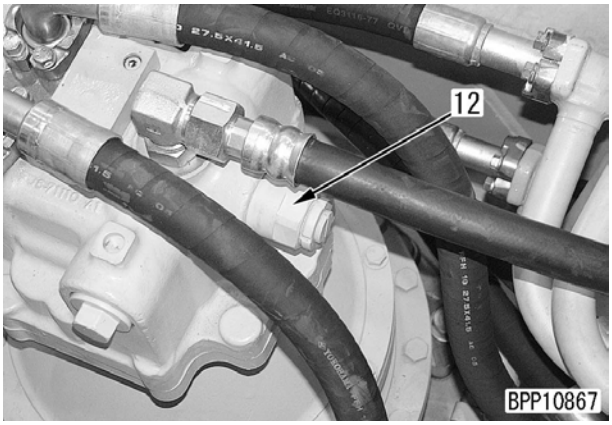
3) Check the pressure again after the adjustment, following the aforementioned steps for measurement.
★ Connect the pilot hose when measuring the oil pressure.

3. Adjustment of boom LOWER relief pressure (on the side where low pressure is set)
★ When low-pressure relief pressure of the boom LOWER is not normal or when adjustment is made of the high pressure setting side, adjust the low pressure side of the safety and suction valve for the boom LOWER in the following procedure.
★ The low-pressure relief pressure mode denotes the state in which the machine push-up switch is turned off, disabling to apply the pilot pressure to the switching port.
1) Disconnect the pilot hose.
2) Loosen locknut (10) and turn holder (11) to adjust the relief pressure.
★ Turning the holder clockwise increases the pressure. Turning it counterclockwise decreases the pressure.
★ Pressure adjustable from a single turn of the holder:
Approx. 21.8 MPa {Approx. 222 kg/cm^2}
Locknut:
78 – 93 Nm {8.0 – 9.5 kgm}

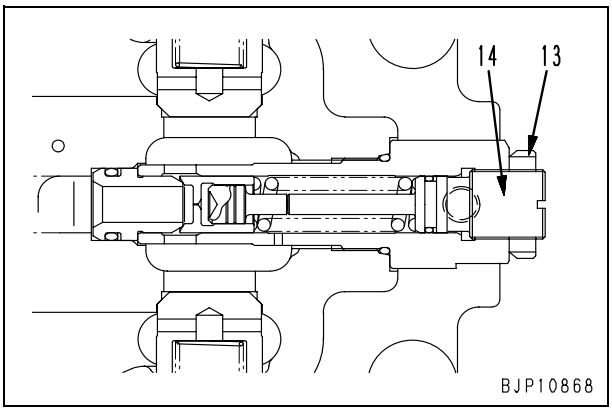


3) Check the pressure again after the adjustment, following the aforementioned steps for measurement.
★ Connect the pilot hose when measuring the oil pressure.

4. Adjustment of swing relief pressure
★ If the swing relief pressure is not normal, adjust the swing motor safety valve (12) in the following manner.



1) Loosen locknut (13) and turn adjustment screw (14) to adjust the relief pressure.
★ Turning the holder clockwise increases the pressure. Turning it counterclockwise decreases the pressure.
★ Quantity of adjustment per turn of adjusting screw:
Approx. 4.70 MPa {Approx. 47.9 kg/cm^2}
Locknut:
147 – 196 Nm {15 – 20 kgm}



2) Check the pressure again after the adjustment, following the aforementioned steps for measurement.

Checking and adjusting control circuit oil pressure

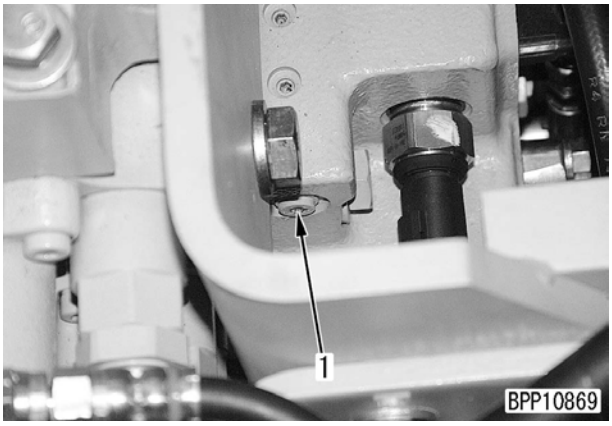
★ Control circuit oil pressure checking and adjusting tools

Symbol		Part No.	Part name
L	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5220	Nipple (10 x 1.25 mm)
		07002-11023	O-ring

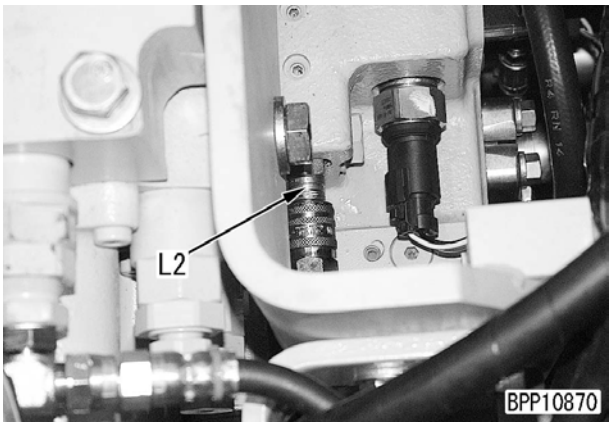
Measurement

⚠ **Lower the work equipment to the ground and, after stopping the engine, release residual pressure in the piping by operating the control lever several times. Then loosen the oil filler cap gradually to release pressure inside the tank.**

1. Remove oil pressure measurement plug (1).



2. Fit nipple **L2** and connect it to oil pressure gauge [1] of hydraulic tester **L1**.
   ★ Use the oil pressure gauge with capacity 5.9 MPa {60 kg/cm^2}.



3. Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.
4. Measure hydraulic oil pressure, when the engine is running at high idle and all the control levers are moved to the NEUTRAL position.



5. Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.
   ★ It is not allowed to adjust the relief valve of the control circuit source pressure.

Checking and adjusting pump PC control circuit oil pressure

★ Pump PC control circuit oil pressure checking and adjusting tools

Symbol		Part No.	Part name
L	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5220	Nipple (10 x 1.25 mm)
		07002-11023	O-ring

Measurement

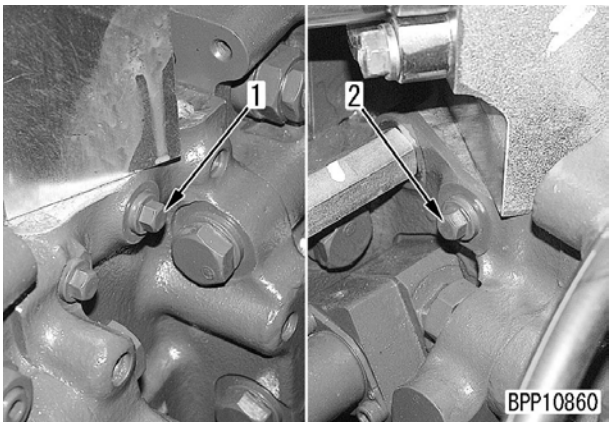
★ Measurement of the oil pressure in the pump PC control circuit shall be conducted after making sure that oil pressure of the work equipment, swing, and travel circuits as well as basic pressure of the control circuit is normal.

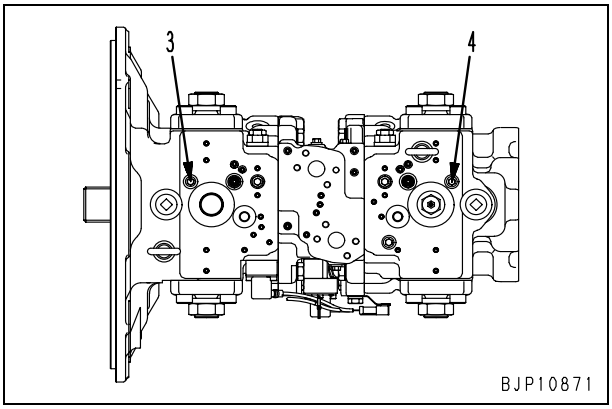
⚠ **Lower the work equipment to the ground and, after stopping the engine, release residual pressure in the piping by operating the control lever several times. Then loosen the oil filler cap gradually to release pressure inside the tank.**

1. Measurement of PC valve output pressure (servo piston inlet pressure)

★ PC valve output pressure (servo piston inlet pressure) is measured along with that of the pump discharge pressure and the result of the two is compared to each other.

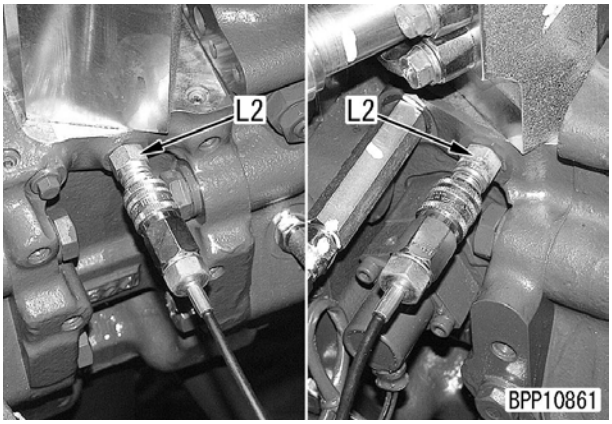
1) Remove oil pressure measurement plugs (1), (2), (3) and (4).
   - (1): For the front pump discharge pressure (situated in the rear side of the machine)
   - (2): For the rear pump discharge pressure (situated in the front side of the machine)
   - (3): For the front pump PC valve output pressure
   - (4): For the rear pump PC valve output pressure

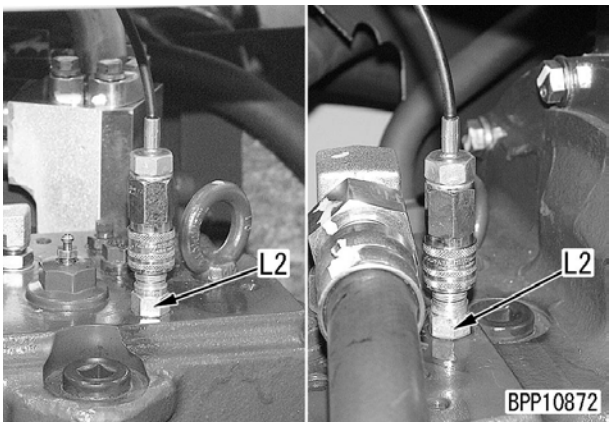




2) Fit nipple **L2** and connect it to oil pressure gauge [1] of hydraulic tester **L1**.

★ Use the oil pressure gauge with capacity 58.8 MPa {600 kg/cm^2}.





3) Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.



4) Measure the pump discharge pressure and PC valve output pressure (pressure at servo piston inlet) at the same time after setting following conditions with the engine running at high idle.
   - Working mode: P-mode
   - Swing lock switch: ON
     (Turning 2-stage relief ON induces high-pressure relief)
   - Work equipment, swing and travel: Arm IN relief

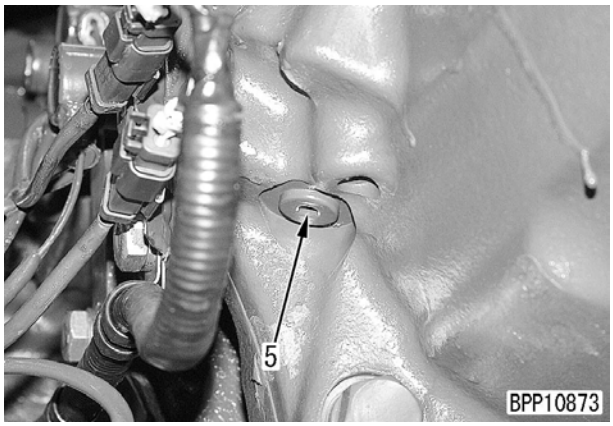
   ★ Judgement method: When the ratio between the pump discharge pressure and PC valve output pressure (servo piston output pressure) reaches the following values, both pressures are judged normal.

Measured oil pressure	Ratio between oil pressures
Pump discharge pressure	1
PC Valve output pressure	Approx. 3/5

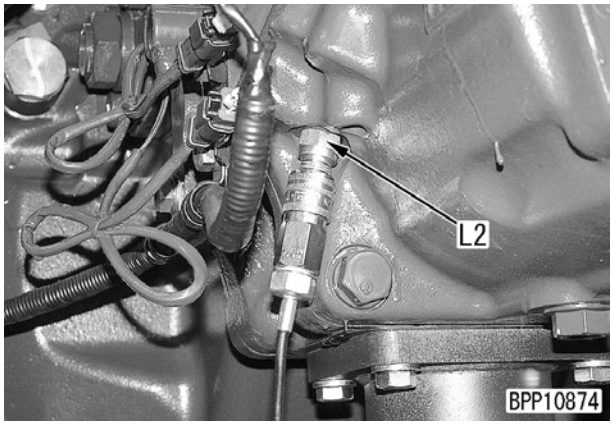
   ★ If there is any abnormality with PC valve or servo piston, the PC valve output pressure (servo piston output pressure) becomes identical with the pump discharge pressure or comes to neighborhood of 0 pressure.

2. Measurement of PC-EPC valve output pressure

1) Remove oil pressure measurement plug (5).
   ★ The plug is installed in the front side of the machine.



2) Fit nipple **L2** and connect it to oil pressure gauge [1] of hydraulic tester **L1**.
   ★ Use the oil pressure gauge with capacity 5.9 MPa {60 kg/cm^2}.



3) Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.

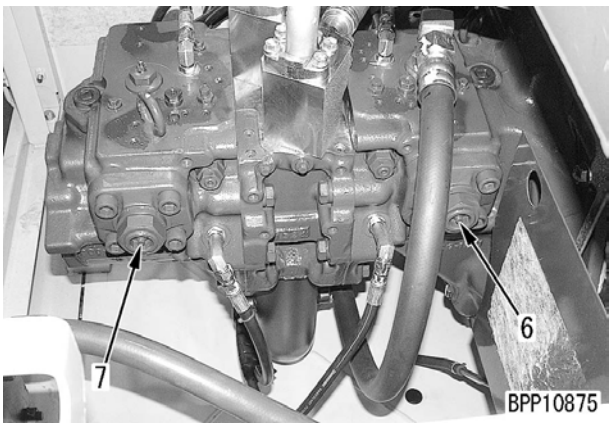


4) Measure the hydraulic oil pressure with all the control levers kept in the NEUTRAL position and the engine running at high idle and at low idle.
   ★ You can assume that the PC-EPC valve output pressure is normal when the following changes are observed.

Engine speed	Control lever	Hydraulic oil pressure
Low idle	Neutral	2.9 MPa {30 kg/cm^2}
High idle		0 MPa {0 kg/cm^2}

Adjustment

★ When a trouble on the PC valve is suspected because of the following phenomena, adjust PC valves (6) and (7) in the following manner.
- As workload increases, the engine rpm sharply drops.
- The engine rpm is normal but the work equipment speed is low.

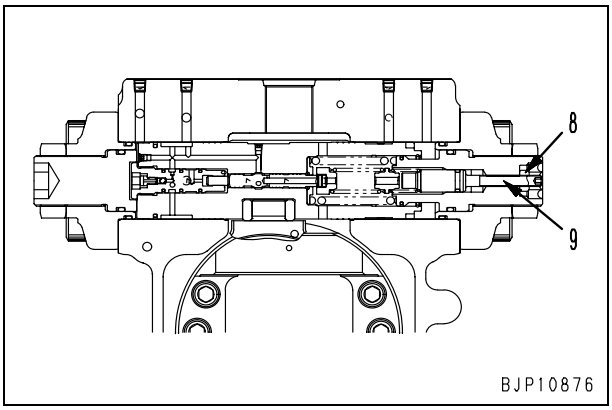


3. Loosen locknut (8) and turn holder (9) to adjust the pump absorption torque.
   ★ Turning the holder clockwise increases the pump absorption torque. Turning the holder counterclockwise decreases the pump absorption torque.
   ★ Following indicates the range of adjustment available from the adjusting screw.

   Counterclockwise: Within 1 turn

   Clockwise: Within 1/2 turn (Within 180°)

   Locknut: **27 – 34 Nm {2.8 – 3.5 kgm}**

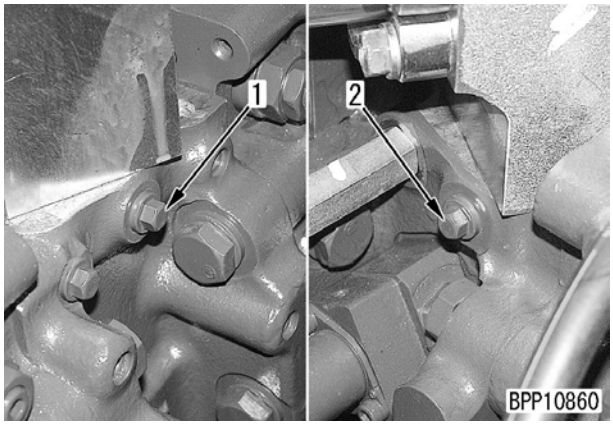


4. After the adjustment, make sure that the PC valve output pressure (servo piston inlet pressure) is normal using the measurement steps explained earlier.

Checking and adjusting pump LS control circuit oil pressure

★ Pump LS control circuit oil pressure checking and adjusting tools

Symbol		Part No.	Part name
M	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5220	Nipple (10 x 1.25 mm)
		07002-11023	O-ring
	3	799-401-1340	Differential pressure gauge



Measurement

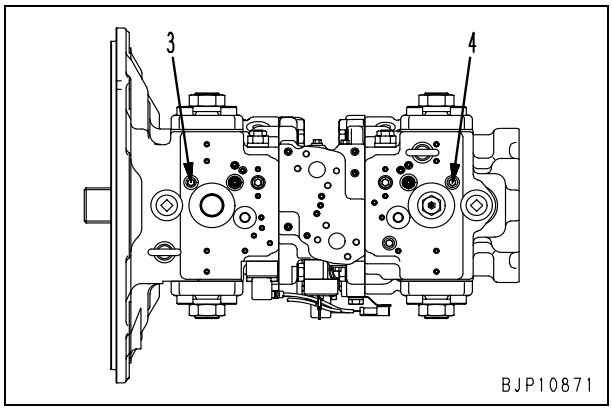
★ Measurement of the oil pressure in the pump LS control circuit shall be conducted after making sure that oil pressure of the work equipment, swing, and travel circuits as well as basic pressure of the control circuit is normal.

⚠ **Lower the work equipment to the ground and, after stopping the engine, release residual pressure in the piping by operating the control lever several times. Then loosen the oil filler cap gradually to release pressure inside the tank.**

1. Measurement of LS valve output pressure (servo piston inlet pressure)

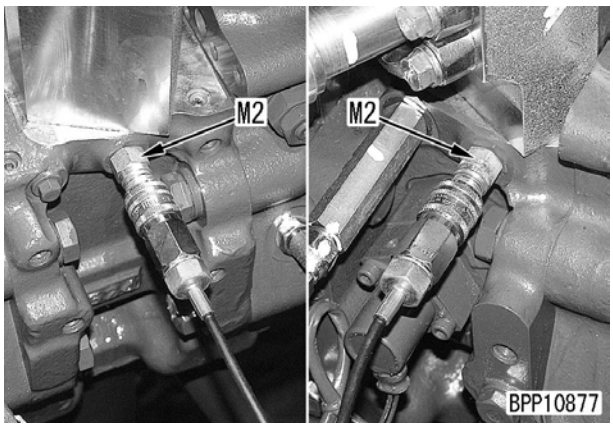
★ PC valve output pressure (servo piston inlet pressure) is measured along with that of the pump discharge pressure and the result of the two is compared to each other.

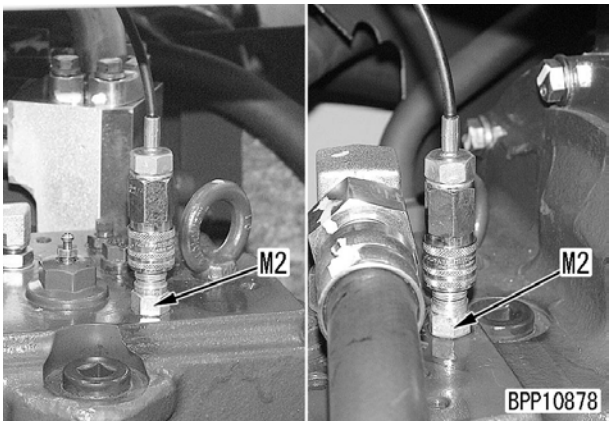
1) Remove oil pressure measurement plugs (1), (2), (3) and (4).
   - (1): For the front pump discharge pressure (situated in the rear side of the machine)
   - (2): For the rear pump discharge pressure (situated in the front side of the machine)
   - (3): For the front pump LS valve output pressure
   - (4): For the rear pump LS valve output pressure



2) Fit nipple **M2** and connect it to oil pressure gauge [1] of hydraulic tester **L1**.

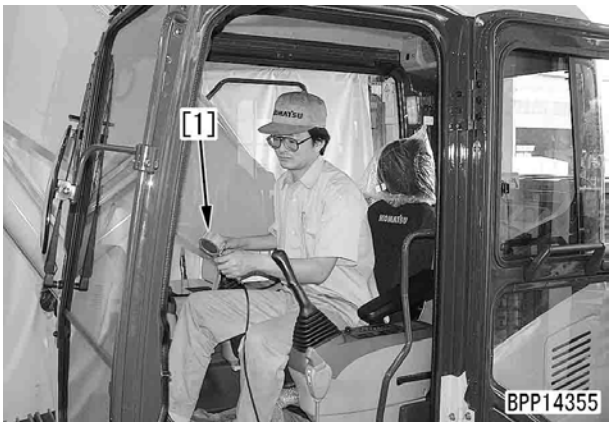
★ Use the oil pressure gauge with capacity 58.8 MPa {600 kg/cm^2}.





3) Start the engine and push up the track shoe on the measurement side using work equipment.
   - When measuring the front circuit: Left track shoe
   - When measuring the rear circuit: Right track shoe

   ⚠ **Provide a working area of sufficient space, as the raised track shoe will be idly rotated.**
4) Increase the hydraulic oil temperature to the operating range.



5) Measure the pump discharge pressure and LS valve output pressure (pressure at servo piston output) at the same time after setting following conditions with the engine running at high idle.

   - Working mode: P-mode
   - Work equipment, swing and travel: When all levers are at neutral and when travel lever is at half stroke (one side of travel is at idle)

   ★ Let the raised track shoe idly rotate, paying enough attention to the surroundings for safety.

   ★ Judgement method:
   When the ratio between the pump discharge pressure and LS valve output pressure (servo piston output pressure) reaches the following values, both pressures are judged normal.

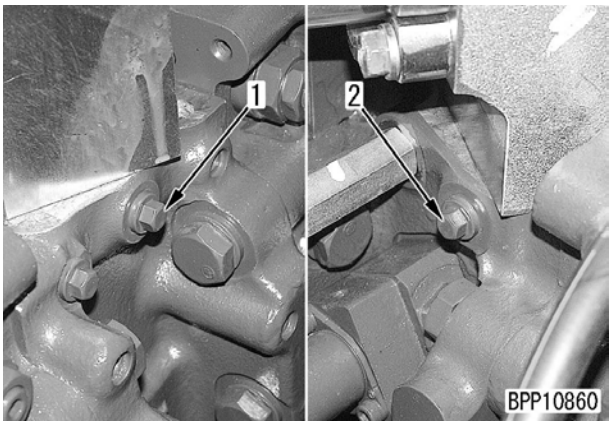
Measured oil pressure	Ratio between oil pressures	
	All at neutral	Travel lever at half stroke
Pump discharge pressure	Almost the same pressure	1
LS valve output pressure		Approx. 3/5

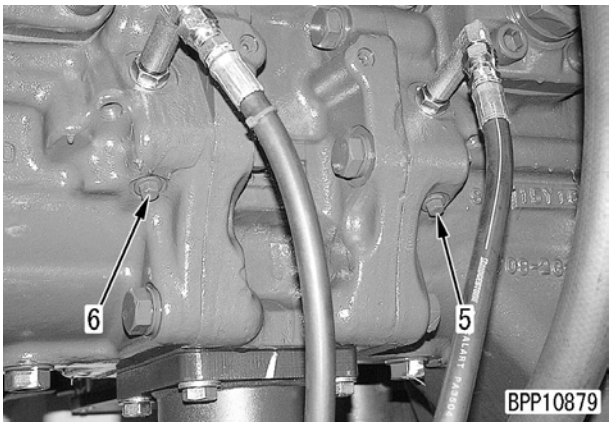
6) Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

2. Measurement of LS differential pressure

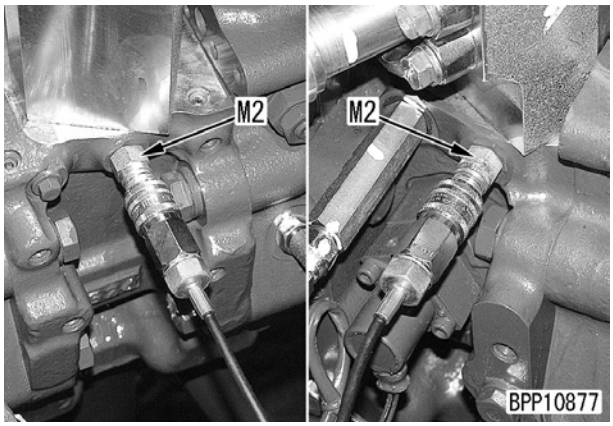
★ LS differential pressure can be obtained by measuring the pump discharge pressure and LS pressure (actuator load pressure) at the same time and computing the difference between the two pressures.

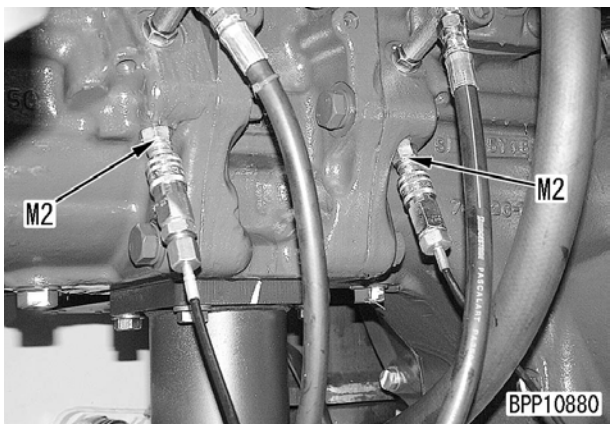
1) Remove oil pressure measurement plugs (1), (2), (5) and (6).
   - (1): For the front pump discharge pressure (situated in the rear side of the machine)
   - (2): For the rear pump discharge pressure (situated in the front side of the machine)
   - (5): For the front pump LS pressure (situated in the rear side of the machine)
   - (6): For the rear pump LS pressure (situated in the rear side of the machine)





2) Fit nipple **M2** and connect it to oil pressure gauge [1] or differential pressure gauge **M3** of hydraulic tester **M1**.
   ★ When using a differential pressure gauge:
   Connect pump discharge pressure to the high pressure side and LS pressure to the low pressure side. A differential pressure gauge requires DC 12V power. Connect it with one battery.
   ★ When using an oil pressure gauge:
   Use the oil pressure gauge with capacity 58.8 MPa {600 kg/cm^2}. The max. differential pressure is no more than approx. 3.9 MPa {40 kg/cm^2}. So the same gauge may be used throughout the measurement.

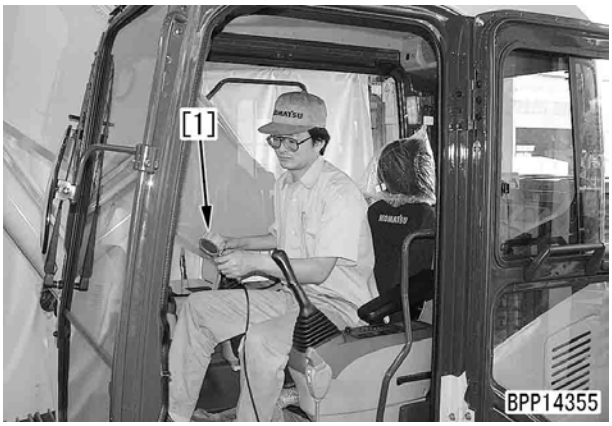




3) Start the engine and push up the track shoe on the measurement side using work equipment.
   - When measuring the front circuit: Left track shoe
   - When measuring the rear circuit: Right track shoe

   ⚠ **Provide a working area of sufficient space, as the raised track shoe will be idly rotated.**

4) Increase the hydraulic oil temperature to the operating range.



5) Measure the pump discharge pressure and LS pressure (actuator load pressure) at the same time after setting the following conditions with the engine running at high idle.
   - Working mode: P-mode
   - Travel speed: Hi
   - Work equipment, swing and travel: When all levers are at neutral and when travel lever is at half stroke (one side of travel is at idle)

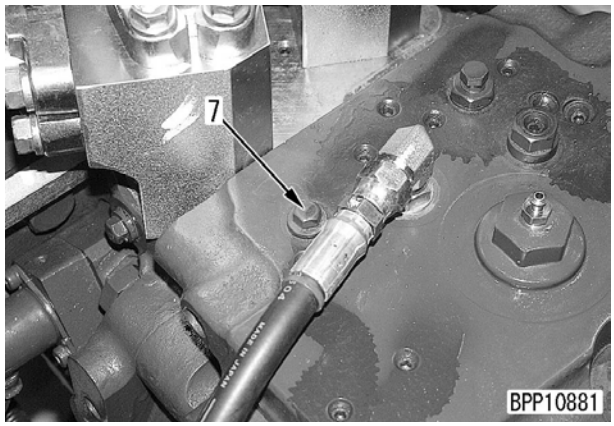
   ★ Let the raised track shoe idly rotate, paying enough attention to the surroundings for safety.
   ★ Calculation of LS differential pressure: LS differential pressure = Pump discharge pressure – LS pressure
   ★ If LS differential pressure is in the following conditions, it is judged normal.

Lever operation	LS differential pressure
When all levers are set to neutral	Unload pressure (Refer to the standard value table)
Travel lever set at half stroke	Maximum LS differential pressure (Refer to the standard value table)

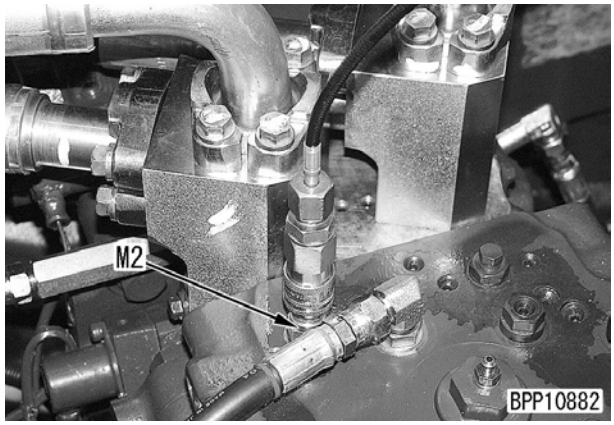
6) Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

3. Measurement of LS-EPC valve output pressure

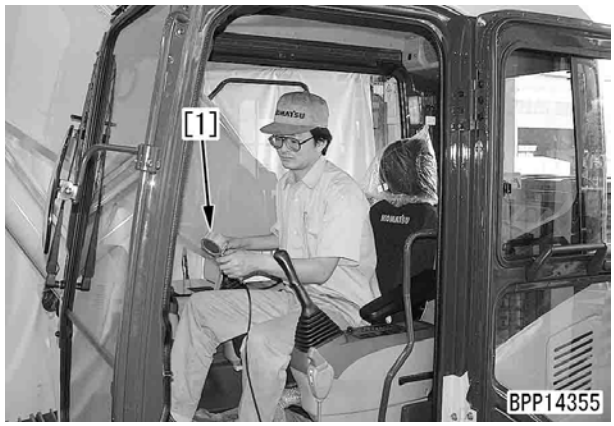
1) Remove oil pressure measurement plug (7).
   ★ The plug is installed on the rear pump.



2) Fit nipple **M2** and connect it to oil pressure gauge [1] of hydraulic tester **M1**.
   ★ Use the oil pressure gauge with capacity 5.9 MPa {60 kg/cm^2}.



3) Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.



4) Measure the oil pressure when the engine is running at high idle and the travel speed switch and travel control lever are operated.
   ★ If LS-EPC valve output pressure changes to the following values, the pressure is normal.

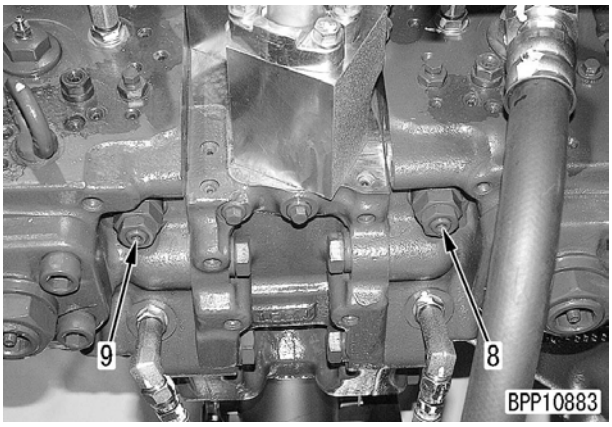
Travel speed	Travel control lever	Oil pressure
Lo	Neutral	Approx. 1.4 MPa {approx. 14 kg/cm^2}
Hi	Fine operation (Note)	0 MPa {0 kg/cm^2}

   Note: Operate the travel control lever slightly to the extent that the PPC oil pressure switch is turned ON (Stop the operation short of starting the machine).

5) Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

Adjustment

★ When the LS differential pressure is not normal, adjust LS valves (8) and (9) in the following procedure.

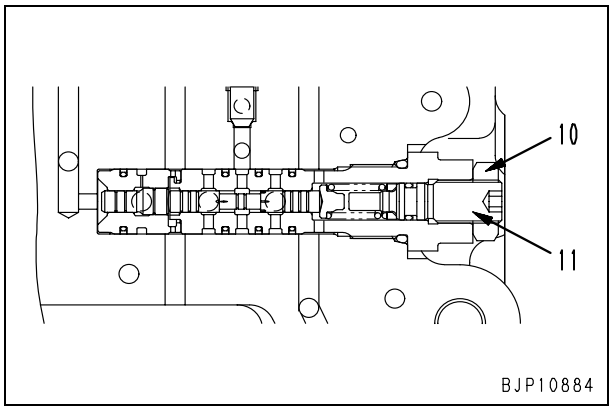


1. Loosen locknut (10) and turn holder (11) to adjust the differential pressure.
   ★ Adjustment screw
   - Turned to the right, the differential pressure is increased.
   - Turned to the left, the differential pressure is decreased.

   ★ Quantity of adjustment per turn of adjusting screw:

   Quantity of pressure adjustment (LS differential pressure) 1.3 MPa {13.3 kg/cm^2}

   Lock nut: **49 – 64 Nm {5 – 7 kgm}**



2. After the adjustment, confirm that LS differential pressure is normal, following the steps for measurement explained earlier.

Measuring solenoid valve output pressure

★ Solenoid valve output pressure measurement tools

Symbol		Part No.	Part name
N	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-401-3100	Nipple (02 size)
		02896-11008	O-ring
	3	799-401-3200	Nipple (03 size)
		02896-11009	O-ring

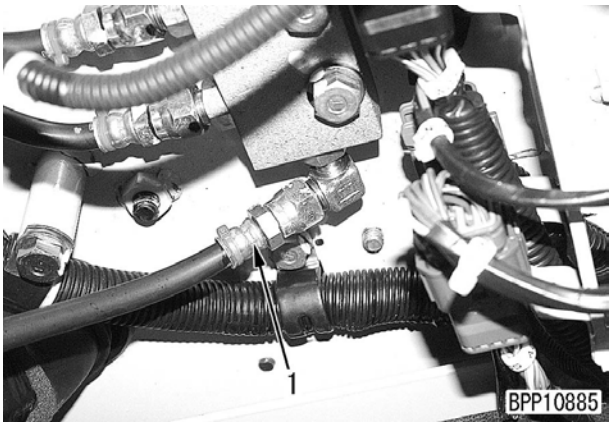
★ Measure the solenoid valve output pressure after confirming that the control circuit source pressure is normal.

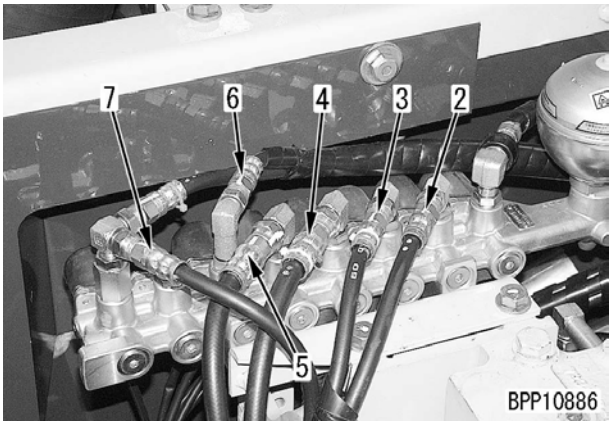
⚠ **Lower the work equipment to the ground and, after stopping the engine, release residual pressure in the piping by operating the control lever several times. Then loosen the oil filler cap gradually to release pressure inside the tank.**

1. Disconnect the hoses of solenoid valve to be measured at the outlet side.

No.	Target solenoid valves of measurement
1	PPC lock solenoid valve
2	Travel junction solenoid valve
3	Merge-divider solenoid valve
4	Travel speed switching solenoid valve
5	Swing holding brake solenoid valve
6	Machine push up solenoid valve
7	2-stage relief solenoid valve

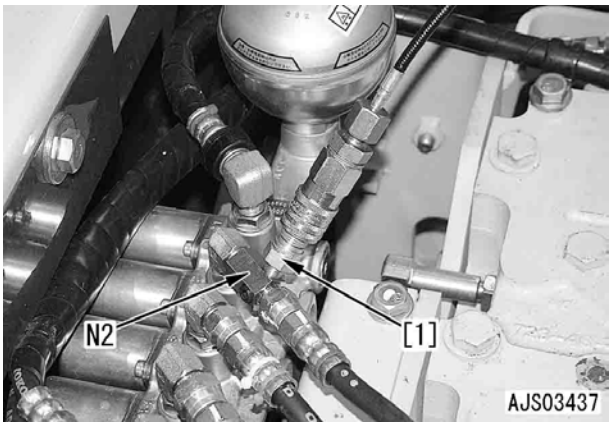
★ Hose (1) is installed in the back side of operator's cab, and hoses (2) through (7) are installed at the center of revolving frame.





2. Fit adapter **N2** or **N3** and then connect hose currently disconnected.

3. Fit nipple [1] of hydraulic tester **N1** and then connect it to oil pressure gauge [2].
★ Use the oil pressure gauge with capacity 5.9 MPa {60 kg/cm^2}.



4. Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.



5. Run the engine at full throttle, then turn each solenoid valve ON or OFF by operating the control levers and switches, and measure the pressure.
   - ★ For conditions for turning each solenoid valve ON or OFF, refer to the ensuing “Table for functioning conditions” for each solenoid valve.
   - ★ You can check operation of the solenoid valves from the monitoring function of the monitor panel (Special Function of Machine Monitor).
   - ★ When each output pressure shows the following values, it is judged normal.

Solenoid valve	Output pressure
OFF (De-energized)	0 MPa {0 kg/cm^2}
ON (Energized)	3 MPa {30 kg/cm^2}

6. Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

Table for functioning conditions – PPC lock solenoid valve

Functioning conditions		Function
Lock lever	Lock	OFF
	Released	ON

Table for functioning conditions – Machine push up solenoid valve

Operating condition		Operation
Machine push-up switch	ON	ON
	OFF	OFF

Table for functioning conditions – Swing holding brake solenoid valve

Functioning conditions		Function
Signal of work equipment, swing and travel	When all signals are turned OFF	OFF
	When one of the signals is turned ON	ON

Table for functioning conditions – Travel junction solenoid valve

Functioning conditions			Function
When the travel steering signal is ON			ON
When the travel steering signal is OFF	When travel steering independently operated	When F or R pump pressure is 34.3 MPa {350 kg/cm^2}	
	Any other condition than above		OFF

Table for functioning conditions – Travel speed shifting solenoid valve

Functioning conditions			Function
When the overheat 2nd setting is ON			OFF
When the fuel dial is at 1,200 rpm or lower			
When the travel speed switch is at Lo			
When the travel speed switch is at Mi or Hi	When signal of the travel is OFF		
	When signal of the travel is ON	When F or R pump pressure is 32.3 MPa {330 kg/cm^2}	
		When F or R pump pressure is 18.6 MPa {190 kg/cm^2}	ON
Any other condition than above			

Table for functioning conditions – 2-stage relief solenoid valve

Operating condition			Operation
Overheat 1st setting is ON			OFF
All of work equipment, swing, and travel signals are OFF			
Swing lock switch is ON			ON
Travel signal is ON			
L mode is selected			
Boom LOWER signal is ON			
P or E mode is selected	Left knob switch is ON	Signals other than swing independent signal are ON	
		Swing independent signal is ON	OFF
Other than above conditions			

Table for functioning conditions – Merge-divider solenoid valve

<table>
<tr><th colspan="4">Functioning conditions</th><th>Function</th></tr>
<tr><td>When B mode is turned on</td><td colspan="3">When the service signal is ON</td><td rowspan="3">ON</td></tr>
<tr><td colspan="4">When independent signal of the travel is ON</td></tr>
<tr><td rowspan="4">When signal of the travel is OFF</td><td rowspan="4">When signals of the work equipment and swing are ON</td><td rowspan="2">When any mode other than L mode is turned on</td><td>When F or R pump pressure is 19.6 MPa {200 kg/cm^2} or above</td></tr>
<tr><td>When F or R pump pressure is 14.7 MPa {150 kg/cm^2} or lower</td><td>OFF</td></tr>
<tr><td rowspan="2">L mode</td><td>When F or R pump pressure is 16.7 MPa {170 kg/cm^2} or above</td><td>ON</td></tr>
<tr><td>When F or R pump pressure is 11.8 MPa {120 kg/cm^2} or lower</td><td rowspan="2">OFF</td></tr>
<tr><td colspan="4">Any other condition than above</td></tr>
</table>

Measuring PPC valve output pressure

★ PPC valve output pressure measurement tools

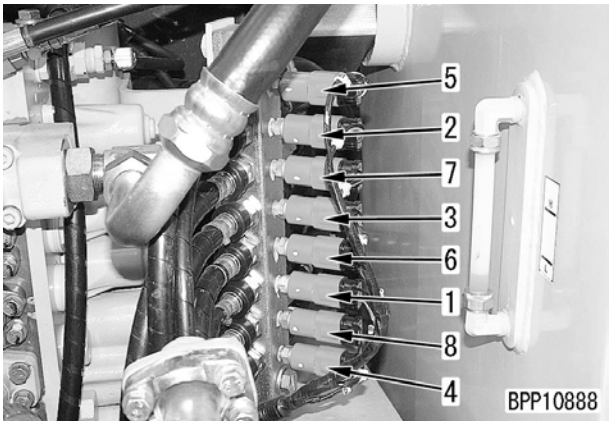
Symbol		Part No.	Part name
P	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-401-3100	Nipple (02 size)
	3	799-401-3200	Nipple (03 size)

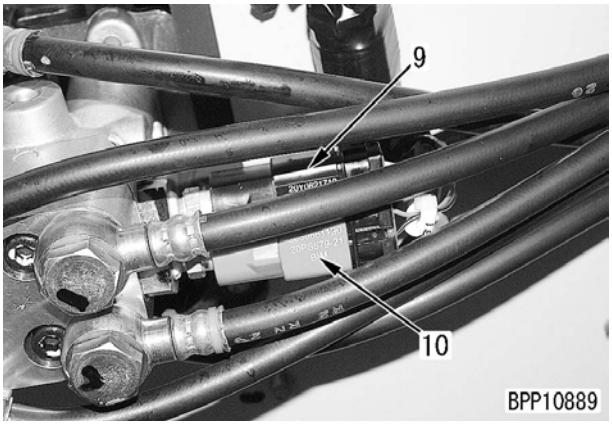
★ Measure PPC valve output pressure after confirming that control circuit original pressure is normal.

1. Remove PPC hydraulic switches (1) to (10) of the target circuit of measurement.

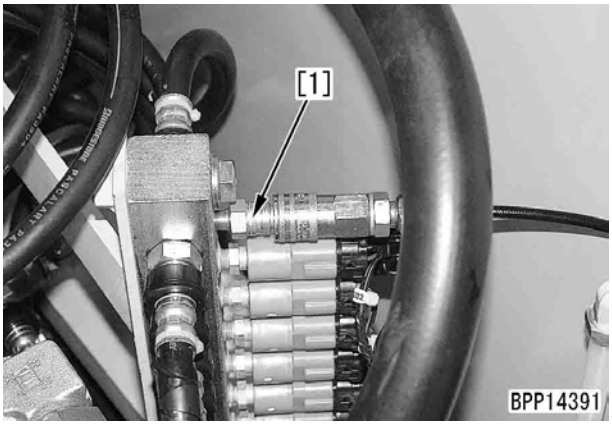
No.	Circuit to be measured	No.	Circuit to be measured
1	Boom RAISE	6	Bucket DUMP
2	Boom LOWER	7	Swing left
3	Arm IN	8	Swing right
4	Arm OUT	9	Travel (black)
5	Bucket CURL	10	Steering (red)

★ (1) through (8) are installed in the PPC relay block, and (9) and (10) are installed in the back side of operator cab.





2. Fit nipple [1] of the hydraulic tester **P** and then connect it to oil pressure gauge [2].
   ★ Use the oil pressure gauge with capacity 5.9 MPa {60 kg/cm^2}.



3. Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.



4. Measure the pressure when the engine is running at high idle and the control lever of the circuit to be measured is kept in the NEUTRAL position and at the full stroke.
   ★ If PPC valve output pressure is at the level shown below, it is judged normal.

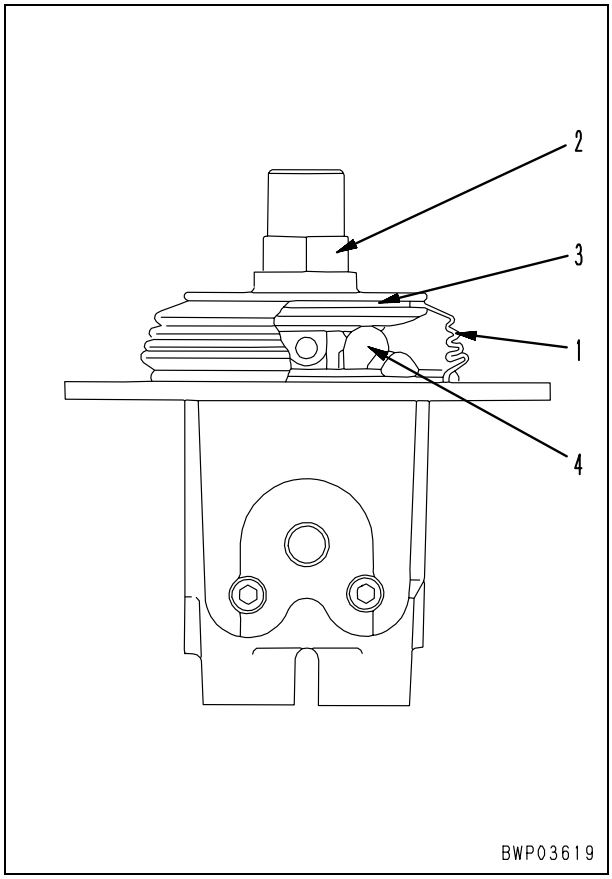
Lever operation	Hydraulic oil pressure
When set to NEUTRAL	0 MPa {0 kg/cm^2}
At full stroke	Almost the same with the control circuit source pressure (refer to the standard value table)

5. Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

Adjusting play of work equipment and swing PPC valves

★ If there is excessive play in the work equipment or swing lever, adjust it in the following manner.

1. Remove work the equipment and swing PPC valve assembly.
2. Remove boot (1).
3. Loosen locknut (2) and screw in disc (3) until it contacts the heads of 4 pistons (4).
   ★ Do not move the piston while doing this work.
4. Keep disc (3) in place and tighten locknut (2) to the specified tightening torque.
   Locknut: **98 – 127 Nm {10 – 13 kgm}**
5. Install boot (1).
6. Install the work equipment and swing PPC valve assembly.

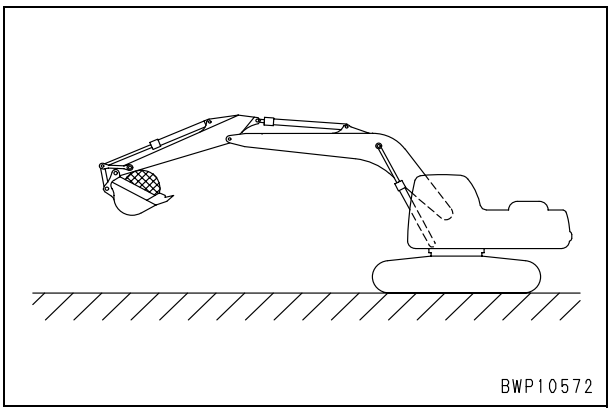


Inspecting locations of hydraulic drift of work equipment

★ If hydraulic drift occurred on the work equipment (cylinder), check to see if the cause is on the cylinder packing side or control valve side according to the following procedure.

1. Inspection of boom and bucket cylinders

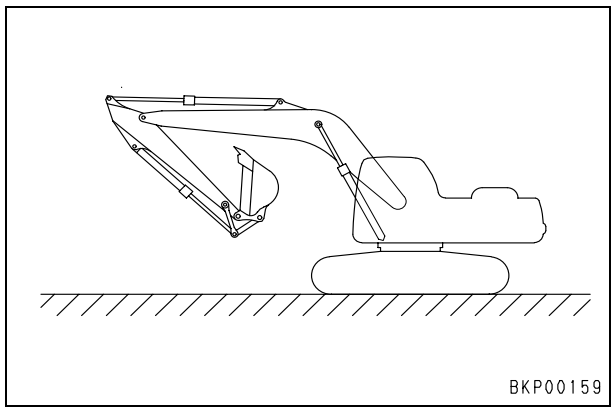
1) Set the work equipment in the same posture as when measuring hydraulic drift, and stop the engine.
   ★ Fill the bucket with earth or apply the rated load to the bucket.



2) When inspecting the boom cylinder, shift the boom control lever to RAISE side and when inspecting the bucket cylinder, shift the bucket control lever to CURL side.
   If, as the result, drifting speed increases, failure on the cylinder packing should be suspected.
   If the speed remains unchanged, failure on the control valve should be suspected.
   ★ 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) Shit the arm control lever to IN side.
   If, as the result, drifting speed increases, failure on the cylinder packing should be suspected.
   If the speed remains unchanged, failure on the control valve should be suspected.
   ★ 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.

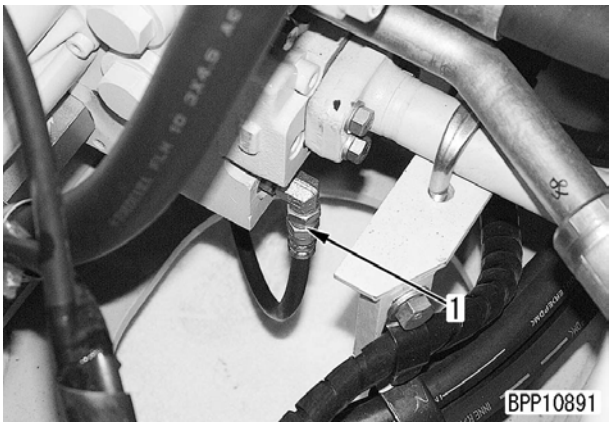
[Reference] When the cause of the hydraulic drift is in the defective packing, following explains why such occurred.

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) If the internal pressure of the head end increases, the pressure at the bottom end also rises in proportion to this and balanced at certain level (this level depends on the volume of leakage). As the pressure is balanced, the drifting speed is decreased.
3) 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.

3. Inspection of boom lock valve

1) Set the work equipment at the maximum reach and the boom top horizontal. Then stop the engine.
   ⚠ **Lock the work equipment control levers and release the pressure inside the hydraulic tank.**
   ⚠ **Do not allow anyone to come under the work equipment during the work.**
2) Disconnect drain hose (1) of the control valve, and install an oil stopper plug in the hose.
   - Oil stopper plug: 07376-70210
   ★ Leave the control valve end open.
   ★ If oil leaks out the opened port accompanying hydraulic drift of the work equipment, failure on the boom lock valve should be suspected (loose contact).



4. Inspection of PPC valve

Measure the amount of hydraulic drift of the work equipment when the accumulator is charged with pressure and the lock lever is put to the LOCK and FREE positions.
★ 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.
★ If the lock and free position cause any difference in the hydraulic drift volume, the PPC valve is defective (internal failure).

Releasing remaining pressure in hydraulic circuit

⚠ **When disconnecting the piping routed from the hydraulic cylinder and the hydraulic motor to the control valve, release the residual pressure in the circuit according to the following procedure.**

★ The swing motor circuit and travel motor circuit are free from residual pressure. However, since these circuits are affected by the pressure inside the hydraulic tank, the operation up to opening of the hydraulic tank cap must be implemented.

1. Stop the engine and then gradually loosen the oil filler cap of the hydraulic tank to release the pressure in the tank.

2. Turn the engine starting switch to the ON position and operate the control levers several times.
   - ★ Power must be conducted to PPC lock valve, thus the starting switch must be set to ON position prior to the lever operation.
   - ★ When the levers are operated 2 – 3 times, the pressure stored in the accumulator is removed.

3. Start the engine, run at low idle for approx. 10 seconds to accumulate pressure in the accumulator, then stop the engine.

4. Repeat the steps in Item 2 to 3 above several times.

Measuring oil leakage amount

1. Measurement of oil leakage amount from boom cylinder

1) Start the engine and keep it running until the hydraulic oil temperature rises to the operating range. Then extend the boom cylinder to the stroke end.
   ⚠ **Release the pressure remaining in the piping referring to "Releasing remaining pressure in hydraulic circuit".**
2) Disconnect hose (1) on the cylinder head end and block the hose end with a plate.
   ⚠ **Be careful not to disconnect the hose at the cylinder bottom end.**
3) Run the engine at high idle and relieve the boom circuit by raising the boom.
4) Continue this condition for 30 seconds, then measure the oil leakage amount for one minute.

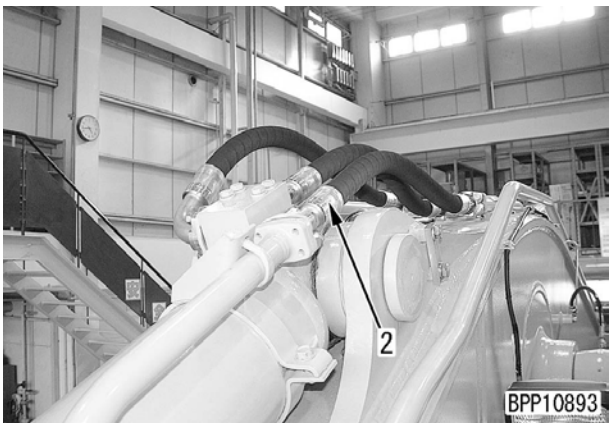


5) Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

2. Measurement of oil leakage amount from arm cylinder

1) Start the engine and keep it running until the hydraulic oil temperature rises to the operating range. Then extend the arm cylinder to the IN stroke end.
   ⚠ **Release the pressure remaining in the piping referring to "Releasing remaining pressure in hydraulic circuit".**
2) Disconnect hose (2) on the cylinder head end and block the hose end with a plate.
   ⚠ **Be careful not to disconnect the hose at the cylinder bottom end.**
3) Run the engine at high idle and relieve the arm circuit by moving the arm IN.

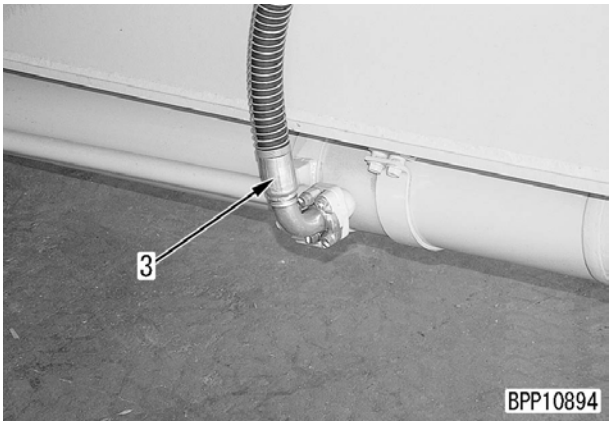
4) Continue this condition for 30 seconds, then measure the oil leakage amount for one minute.



5) Remove the measurement tool after the measurement, and make sure that the machine is back to normal condition.

3. Measurement of oil leakage amount from bucket cylinder

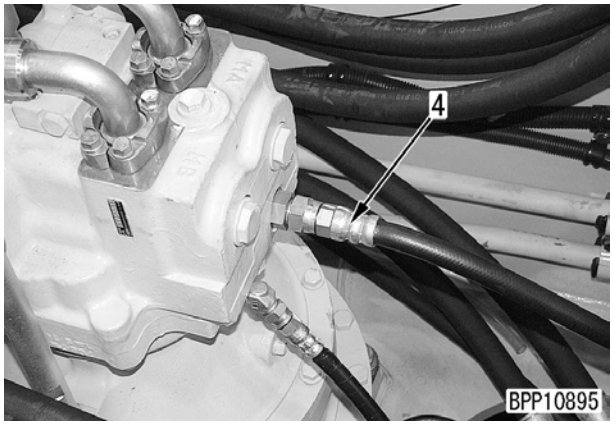
1) Start the engine and keep it running until the hydraulic oil temperature rises to the operating range. Then extend the bucket cylinder to the CURL stroke end.
   ⚠ **Release the pressure remaining in the piping referring to "Releasing remaining pressure in hydraulic circuit".**
2) Disconnect hose (3) on the cylinder head end and block the hose end with a plate.
   ⚠ **Be careful not to disconnect the hose at the cylinder bottom end.**
3) Run the engine at high idle and relieve the bucket circuit by moving the bucket CURL.
4) Continue this condition for 30 seconds, then measure the oil leakage amount for one minute.



5) After the measurement, make sure that the machine is back to normal condition.

4. Measurement of oil leakage amount from swing motor

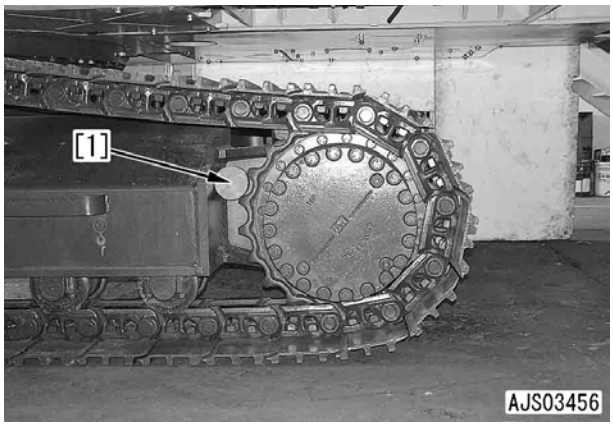
1) Disconnect drain hoses (4) and install the oil stopper plug in the hoses.
2) Turn the swing lock switch to the ON position.
3) Run the engine at high idle, relieve the swing circuit, and measure the oil leakage.
   ★ Start measuring the oil leakage 30 seconds after relieving is started and measure for 1 minute.
   ★ After measurement 1 time, swinging 180°, and then measure again.



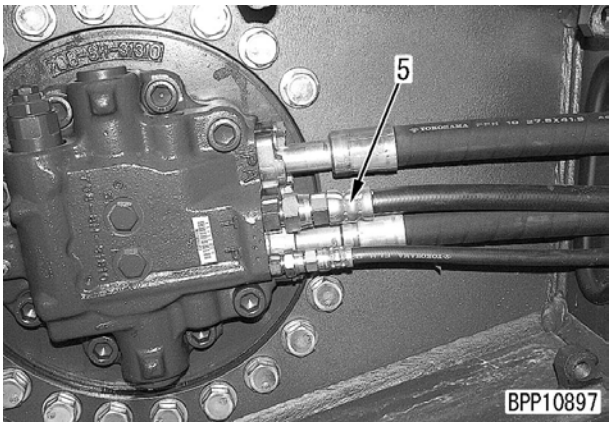
4) After the measurement, make sure that the machine is back to normal condition.

5. Measurement of oil leakage amount from travel motor

1) Take off the travel motor cover.
2) Start the engine, and lock the travel.
   ⚠ **Insert pin [1] between the sprocket and the track frame to positively lock the travel circuit.**



3) Disconnect drain hose (5) of the travel motor and fit an oil stopper plug in the hose end.
4) Run the engine at high idle, relieve the travel circuit, and measure the oil leakage.
   ⚠ **Wrong operation of the lever can cause an accident. Accordingly, make signs and checks securely.**
   ★ Start measuring the oil leakage 30 seconds after relieving is started and measure for 1 minute.
   ★ Measure several times, moving the motor a little (changing the position of the valve plate and cylinder and that of the cylinder and piston) each time.



5) After the measurement, make sure that the machine is back to normal condition.

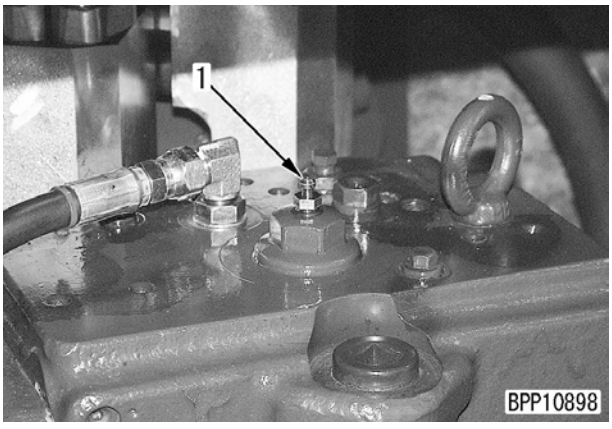
Bleeding air from various parts

Air bleeding items / 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	Operation
• Replacement of hydraulic oil • Cleaning of strainer	●	●	●	● (See note)	● (See note)	●
• Replacement of return filter element		●	→	→	→	●
• Replacement and repair of hydraulic pump • Removal of suction piping	●	●	●	→	→	●
• Replacement and repair of control valve		●	●	→	→	●
• Replacement of cylinder • Removal of cylinder piping		●	●	→	→	●
• Replacement of swing motor • Removal of swing motor pipe		●	→	●	→	●
• Replacement of travel motor and swivel • Removal of travel motor and swivel piping		●	→	→	●	●

Note: Bleed air from the swing motor and travel motor only when oil in the casing is drained.

1. Bleeding air from hydraulic pump

1) Loosen air bleeder (1) and check that oil oozes out through the air bleeder.
2) If the oil seepage is confirmed, tighten air bleeder (1).
   Air bleeder:
   7.8 – 9.8 Nm {0.8 – 1.0 kgm}
   ★ Precautions on starting engine:
   When starting the engine after above operations, be sure to run the engine at low idle for 10 minutes. If the engine coolant temperature is low and an automatic engine warming-up function is relied on, use the fuel dial, when it becomes necessary to cancel it.



2. Bleeding air from hydraulic cylinder

1) Start the engine and keep running at low idle for 5 minutes.
2) Raise and lower the boom 4 to 5 times with the engine running at low idle.
   ★ Stop the piston approximately 100 mm in front of the stroke end so that it may not be relieved.
3) While running the engine at high idle, perform step 2).
4) Set the piston rod to the stroke end at low idle and allow it to relieve.
5) For bleeding air from the arm cylinder and bucket cylinder, follow the same steps explained in Item 2) through 4) above.
   ★ In case a cylinder is replaced with new one, it is advised to bleed air from the new one before mounting the work equipment. It is especially so with the boom cylinder, because its rod does not extend to the stroke end of LOWER side, after the work equipment is mounted.

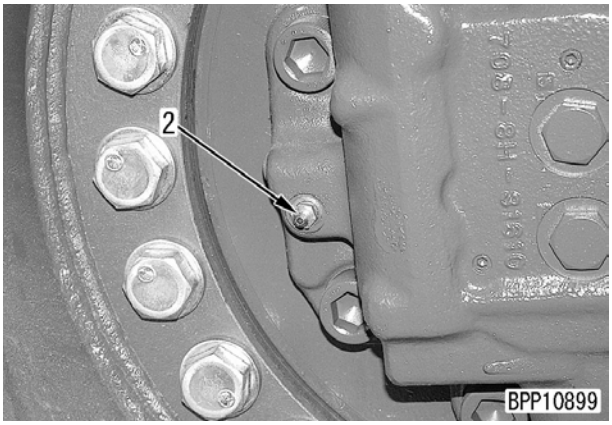
3. Bleeding air from swing motor

1) Start the engine and run it at low idle.
2) Swing slowly to bleed air.

4. Bleeding air from travel motor

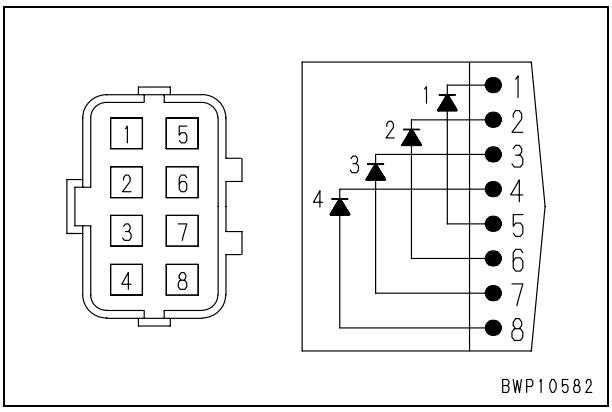
1) Start the engine and run it at low idle.
2) Loosen air bleeder (2) and confirm that oil seeps out from the plug.
3) If the oil seepage is confirmed, tighten air bleeder (2).

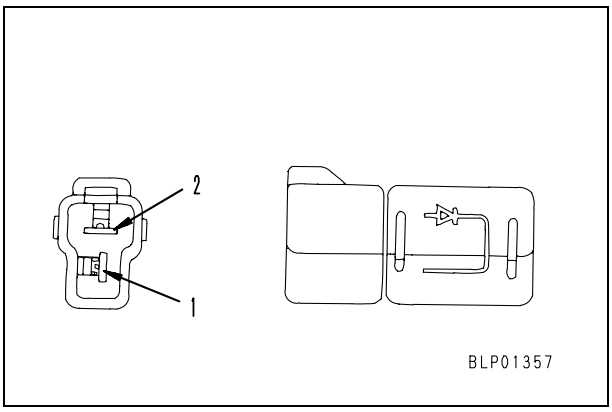
Air bleeder:
27.5 – 35.3 Nm {2.8 – 3.6 kgm}



Diode inspection procedures

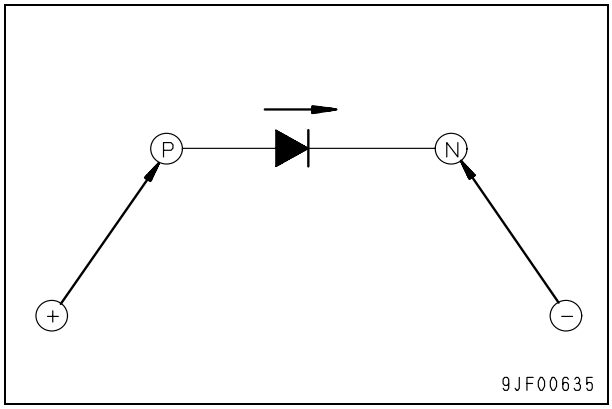
★ Check an assembled-type diode (8 pins) and independent diode (2 pins) in the following manner.
★ The conduction direction of an assembled-type diode is as shown in the diagram below.
★ The conduction direction of an independent diode is shown on the diode surface.





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) of and the black probe (–) to the cathode (N) of diode, and confirm the indicated value.
3) Determine acceptability of the diode from the indicated value.
   - Indicated value remains unchanged: Conduction is absent (Failure)
   - Indicated value changes: Conduction is present (Normal) (See Note)
     Note: A value between 0.46 V to 0.60 V is indicated for silicon diodes.
   ★ A value between 460 to 600 is indicated for silicon diodes.



2. When using analog type circuit tester

★ When the diode range is set, the testing method is the same as that done by use of the digital type circuit tester.
1) Switch the testing mode to resistance range.
2) Apply the leads of the tester as explained below and check the movement of the pointer.
   1] Put the red probe (+) of the test lead to the anode (P) and the black probe (–) to the cathode (N) of diode.
   2] Put the red probe (+) of the test lead to the cathode (N) and the black probe (–) to the anode (N) of diode.
3) Determine if a specific diode is good or no good by the way the pointer swings.
   - With the connection 1] above, the pointer is not moved. It swings, however, when the connection 2] is employed. Normal (However, magnitude of the pointer's move (indicating the resistance value) varies depending on the given tester model and the measurement range selected).
   - The pointer swings with both the connections of 1] and 2]: Defective (Internal short circuit)
   - The pointer does not swing with both the connections of 1] and 2]: Defective (Internal breaking of wire)

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00536-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

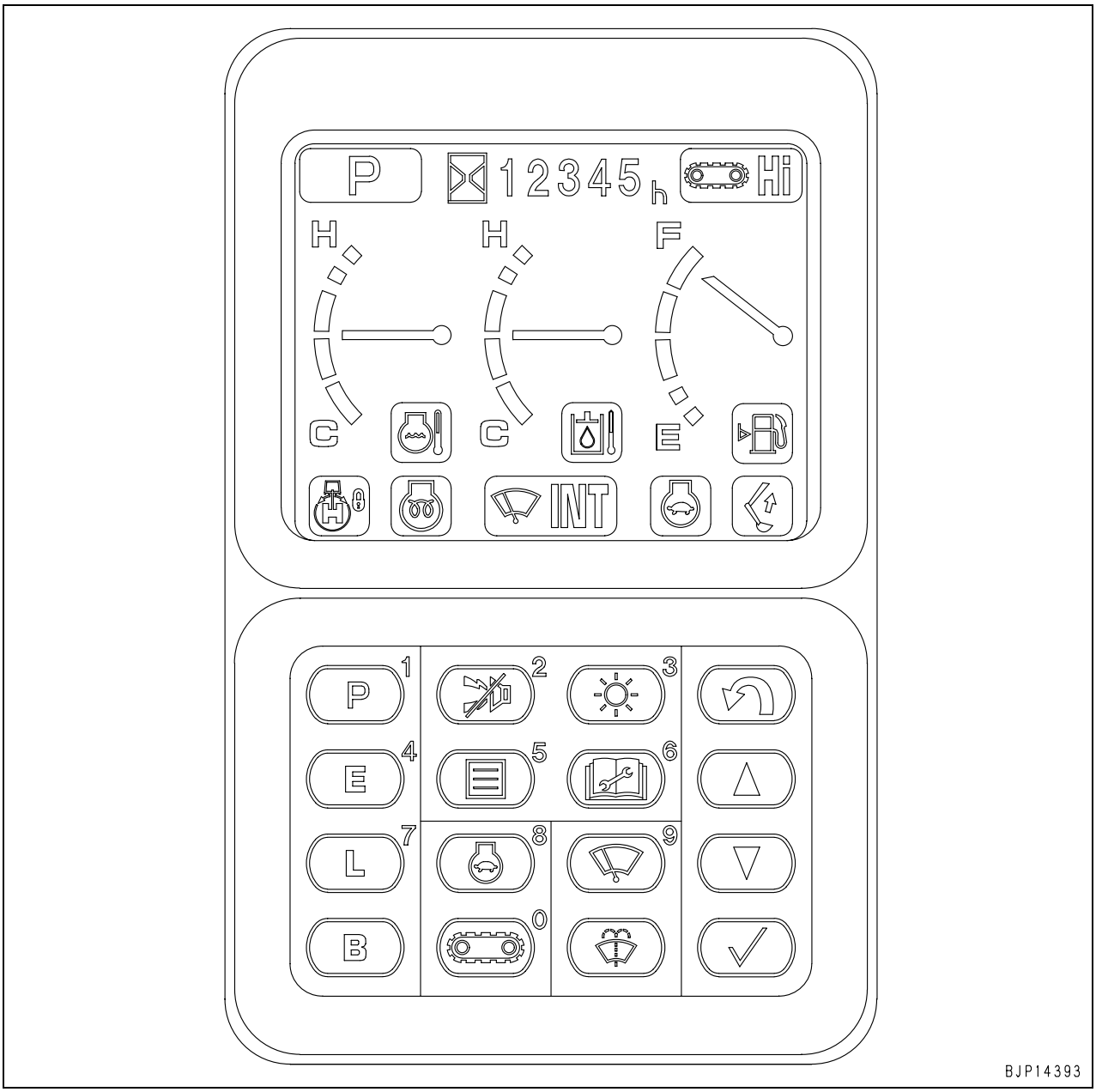
30 Testing and adjusting

Testing and adjusting, Part 2

Testing and adjusting, Part 2 2
Special functions of machine monitor 2
Handling voltage circuit of engine controller 29
Procedure for turning on KOMTRAX terminal 30
KOMTRAX terminal lamp indications 33
Preparation work for troubleshooting of electrical system 36
Pm clinic service 39

Testing and adjusting, Part 2

Special functions 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

Ordinary functions and special functions of machine monitor

The machine monitor has the ordinary function and special functions and displays information of various types on the multi-display.
Some items are displayed automatically and others are displayed through the switch operations according to the internal setting of the machine monitor.

- **Ordinary functions: Operator menu**
  The functions in this mode are displayed ordinarily. Display and setting of these functions are available from the operator's switch operations.
- **Special functions: Service menu**
  The functions in this mode are not ordinarily displayed. Display and setting of these functions are available from the serviceman's operations of the special switches.
  This mode is used for special setting, testing, adjusting or troubleshooting.

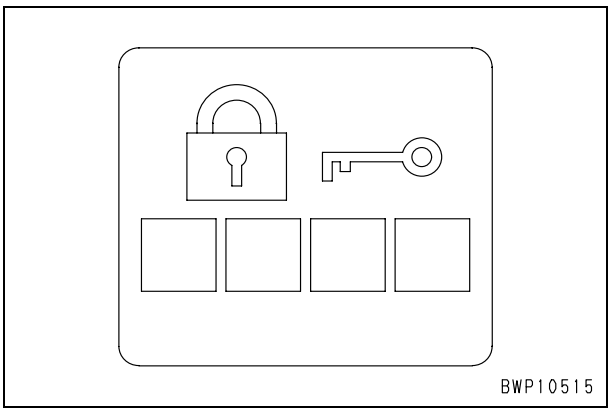
Operator menu	
1	Password input and setting function
2	KOMATSU logo display screen
3	Check before starting function
4	Maintenance display function
5	Caution items display function
6	Check of working mode and travel speed function
7	Ordinary screen display function
8	Display's brightness and contrast adjustment function
9	E-mode adjustment and pump flow rate adjustment function when breaker or attachment is used
10	Check of maintenance information function
11	Service meter display function
12	Check of display LCD function
13	Caution generation display function
14	Action code display function
15	Failure code display function

Service menu		
16	Function of monitoring [01]	
17	Function of abnormality record [02]	Electrical systems
		Mechanical systems
18	Function of maintenance record [03]	
19	Function of maintenance mode change [04]	
20	Function of phone number entry [05]	
21	Function of default [06]	Mode with key ON
		Language
		Unit
		With/Without attachment
22	Function of adjustment [07]	Pump absorption torque
		Adjustment of flow to attachment in compound operation
23	Function of cylinder cut-out operation [08]	
24	Function of no injection cranking [09]	

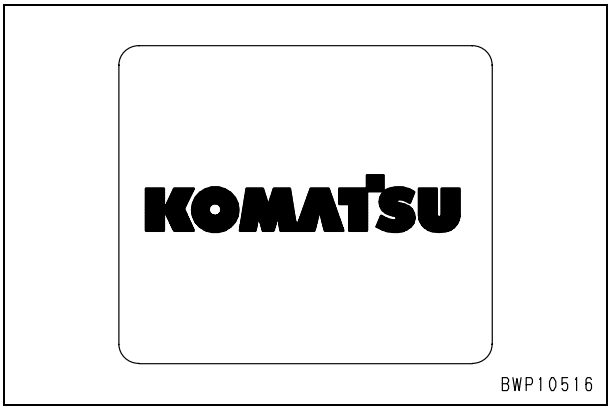
Operation of operator menu and display (outline)

★ This section introduces only the outline of the operator menu. For details on the contents and operation steps of each menu, refer to the operation and maintenance manual or the chapter of “Structure, function and maintenance standard” in this shop manual.

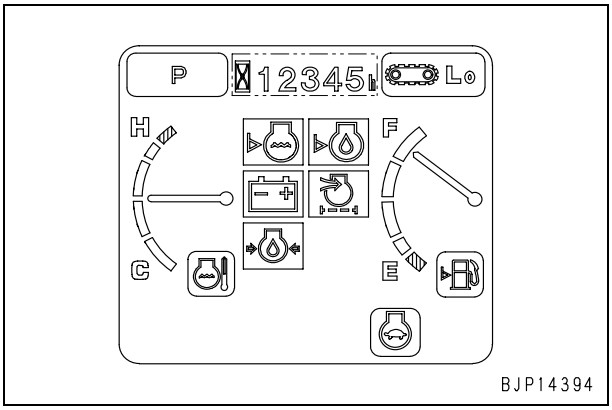
1. Password input and setting function
Displays the password input screen as the starting switch is turned ON.
★ Above display is available only when the password function is selected.



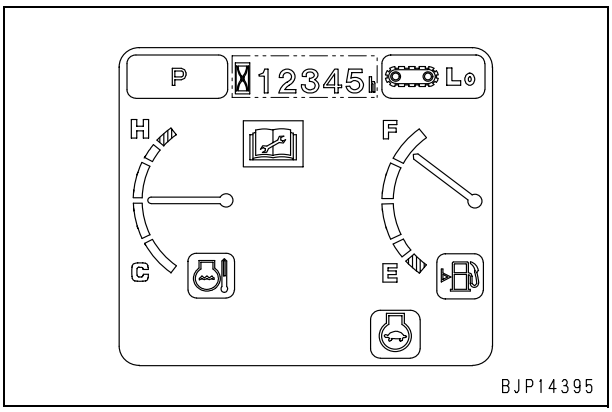
2. KOMATSU logo display screen
KOMATSU logo is displayed for 2 seconds as a password is entered (as a password is specified) or the starting switch is turned ON.



3. Check before starting function
Check before starting screen is displayed for 2 seconds succeeding to display of KOMATSU logo.

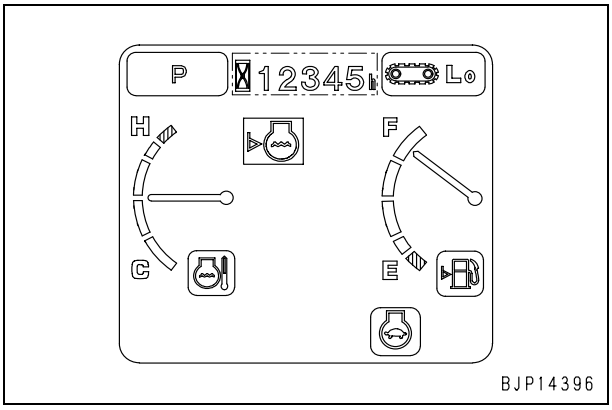


4. Maintenance display function
Succeeding to display of the check before starting screen, a maintenance mark appears for 30 seconds pointing the oil or filter whose specified maintenance time has already expired or going to expire soon.
★ Above display is available only when the maintenance function is selected.



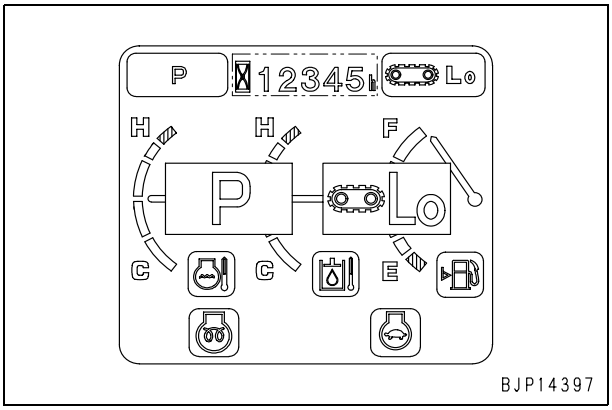
5. Caution items display function

Succeeding display of the check before starting screen, an applicable caution mark appears pointing a check before starting item on which a problem was found.



6. Check of working mode and travel speed function

Succeeding to display of the check before starting screen, symbol marks of the working mode and travel speed appear sizably on the screen to alert the operator attention to the setting.

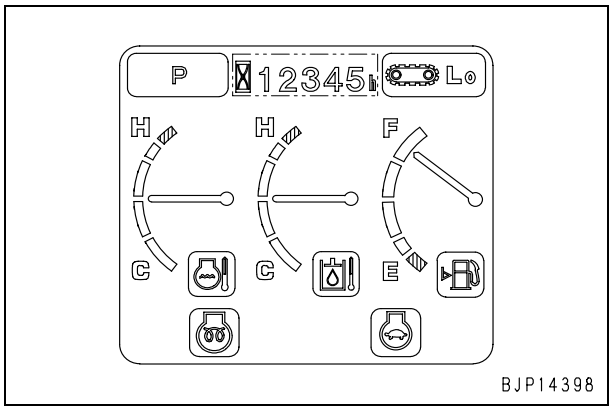


7. Ordinary screen display function

The ordinary display is turned on succeeding to display of the check of working mode and travel speed screen.

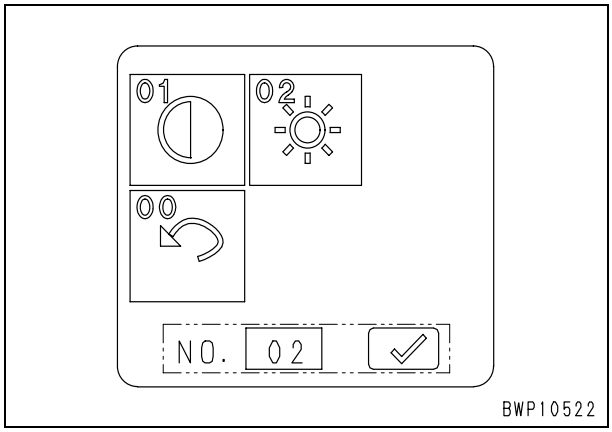
★ If the currently set working mode or travel speed is changed or if setting of the auto-deceleration or wiper is enabled from the ordinary screen, an applicable symbol mark is displayed large for 2 seconds.

★ The engine pre-heating monitor is displayed only when the pre-heating operation is turned on.



8. Display's brightness and contrast adjusting function

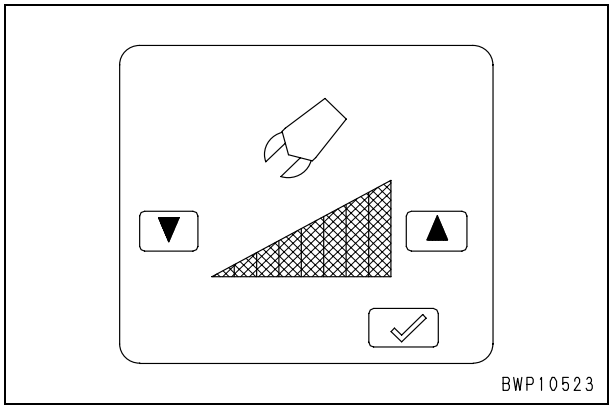
The screen adjustment switches allow adjusting the display brightness and contrast.



9. E-mode adjustment, flow rate adjustment function when breaker or attachment is used (for a machine equipped with breaker and attachment)

The select switch allows adjusting E-mode and also adjusting the pump flow rate when the breaker or attachment is used.

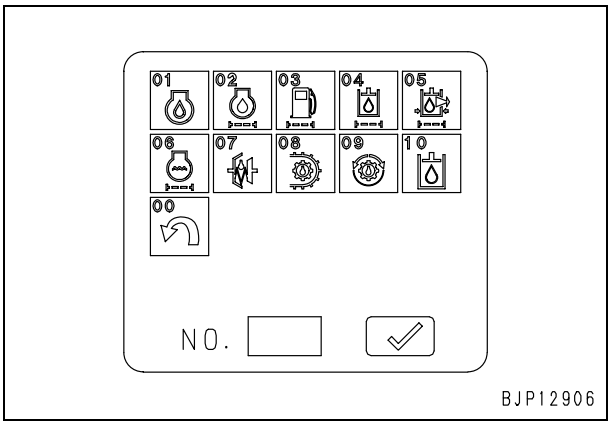
★ There are some differences between the symbol mark of the breaker and attachment displayed on the screen as well as in the messages displayed.



10. Check of maintenance information function

The maintenance switch allows checking detailed information of the maintenance items (specified maintenance time and elapsed time). It also allows resetting after the maintenance.

★ Setting and resetting of the maintenance function as well as setting of the maintenance time is done from the service menu.

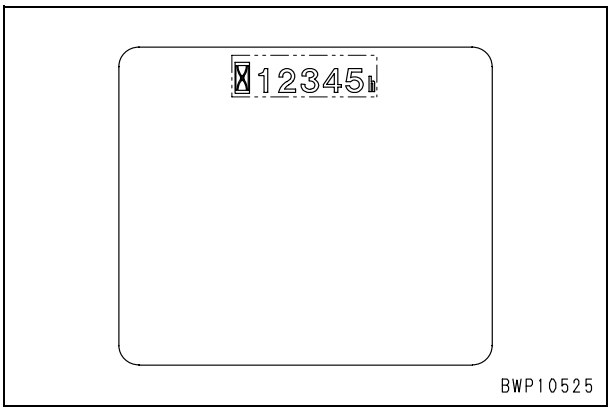


BJP12906

11. Service meter display function

Display of the service meter alone becomes available by operating the following switches after the starting switch is turned OFF.

- Switch operation: [↶] + [△] (Simultaneous operation)



BWP10525

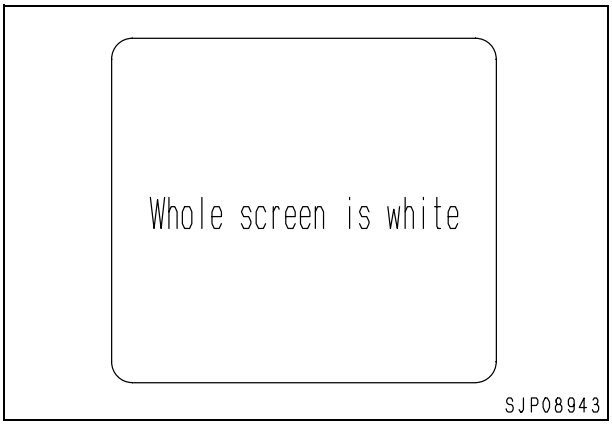
12. Check of display LCD function

Display of the display LCD can check by operating the following switches from the password input screen or ordinary screen.

- Switch operation: [↶] + [A] (Simultaneous operation)

★ The entire LCD should come on, turning the screen to white. The display is, therefore, acceptable if it is free from any black spot.

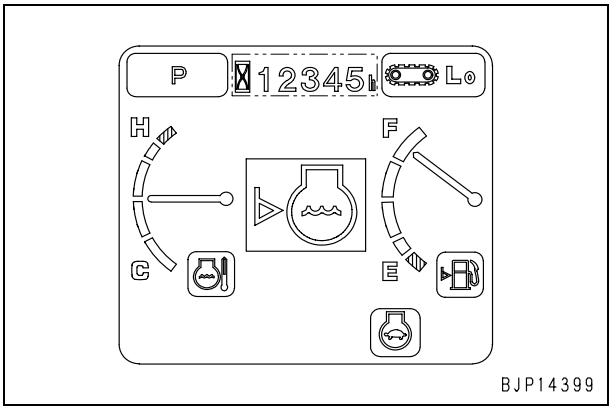
★ Operating any switch from the checkup display restores the immediately preceding screen.



SJP08943

13. Caution generation display function

If a caution is warned for a caution item, applicable symbol mark is displayed large for 2 seconds and then it remains on the screen in a smaller size until the trouble is eliminated.

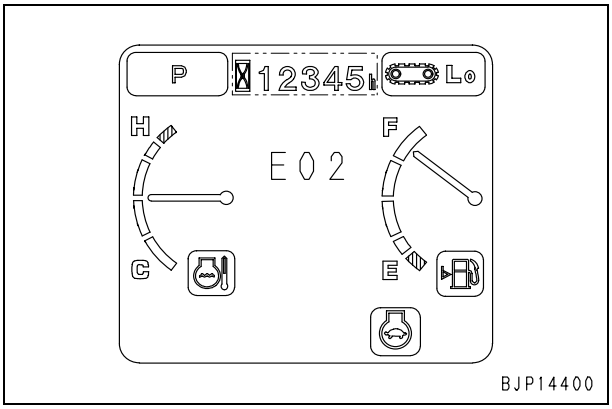


BJP14399

14. Action code display function

If a trouble occurs on the machine, an applicable action code is automatically displayed depending on the seriousness of the trouble in order to alert the operator to take an appropriate action.

★ Operating any switch while an action code is on the screen, switch the failure code display screen (see Item 15).



★ Action codes and actions requested to operator

Action code	Failure mode	Action
E02	Pump control system error	When emergency pump drive switch is at the up (emergency) position, normal operations become possible, but have inspection carried out immediately.
E03	Swing brake system error	Move the swing brake cancel switch up to release the brake. When applying the swing brake, operate the swing lock switch manually. Depending on the cause of the problem, it may not be possible to release it. In any case, have inspection carried out immediately.
E10	Engine controller power source error Engine controller drive system circuit error (engine stopped)	Have inspection carried out immediately.
E11	Engine controller system error (Output reduced to protect engine)	Operate machine to a safe posture and have inspection carried out immediately.
E14	Throttle system error	Operate machine to a safe posture and have inspection carried out immediately.
E15	Engine sensor (coolant temperature, fuel temperature and oil pressure) system error	Operations are possible, but have inspection carried out immediately.
E0E	Network error	Operate machine to a safe posture and have inspection carried out immediately.

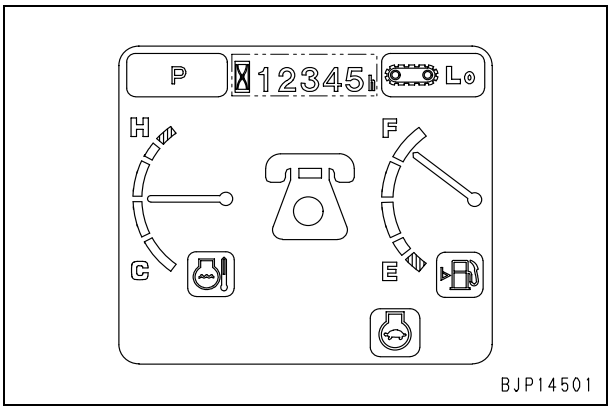
15. Failure code display function

Operating any switch while an action code is on the screen, sequentially displays the phone mark (if registered), phone number (if registered) and failure code.

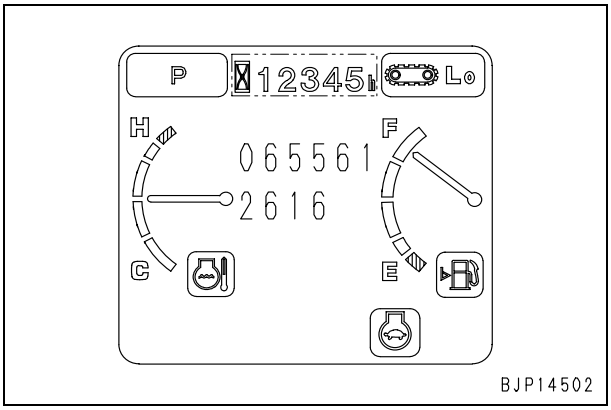
- Switching operation: (✓) (keep the switch depressed)

★ The screen display sequentially changes as shown below as long as the switch is being depressed.

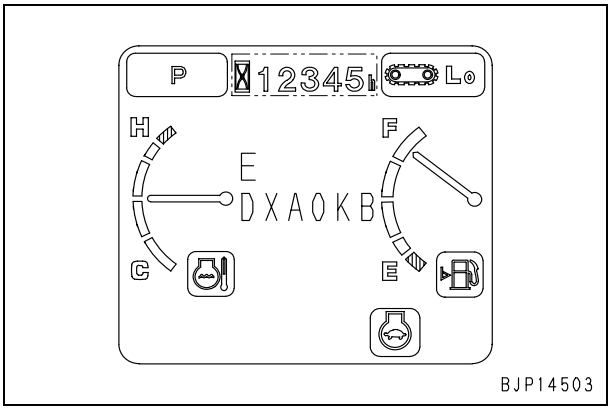
(1) Telephone symbol mark



(2) Telephone number



(3) Failure code



★ The telephone mark and telephone number are displayed only when the telephone number is registered to the machine monitor.
Registration, correction or deletion of a telephone number is done from the service menu.

★ For detailed information of failure codes, 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**	Air cleaner Clogging	MON	Mechanical system
—	**AB00KE**	Charge Voltage Low	MON	Mechanical system
—	**B@BAZG**	Eng. Oil Press. Low Speed Derate	MON	Mechanical system
—	**B@BAZG**	Eng. Oil Press. Low Torque Derate	MON	Mechanical system
—	**B@BAZK**	Eng Oil Level Low	MON	Mechanical system
—	**B@BCNS**	Eng. Overheat	MON	Mechanical system
—	**B@BCZK**	Eng. Water Lvl Low	MON	Mechanical system
E02	**B@HANS**	Hydr. Oil Overheat	MON	Mechanical system
E10	**CA111**	EMC Critical Internal Failure	ENG	Electrical system
E11	**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	**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

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
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
E11	**CA271**	IMV/PCV1 Short Error	ENG	Electrical system
E11	**CA272**	IMV/PCV1 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
E15	**CA428**	Water in Fuel Sensor High Error	ENG	Electrical system
E15	**CA429**	Water in Fuel Sensor Low Error	ENG	Electrical system
E10	**CA441**	Engine Controller Battery Voltage Low Error	ENG	Electrical system
E10	**CA442**	Engine Controller 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
E15	**CA559**	Rail Press Low Error	ENG	Electrical system

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
E11	**CA689**	Ne Speed Sensor Error	ENG	Electrical system
E11	**CA731**	Bkup Speed Sens Phase Error	ENG	Electrical system
E10	**CA757**	All Persistent Data Lost Error	ENG	Electrical system
E11	**CA778**	Bkup Speed Sensor Error	ENG	Electrical system
E0E	**CA1633**	KOMNET Datalink Timeout 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
E15	**CA2265**	Electric Lift Pump High Error	ENG	Electrical system
E15	**CA2266**	Electric Lift Pump 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
—	**D110KB**	Battery Relay Output	PUMP	Electrical system
—	**D196KA**	Service Return Relay Disc.	PUMP	Electrical system
—	**D196KB**	Service Return Relay S/C	PUMP	Electrical system
E02	**DA25KP**	Press. Sensor Power Volt Low	PUMP	Electrical system
E0E	**DA2RMC**	Comm. Error (Pump Controller)	PUMP	Electrical system
—	**DA2SKQ**	Model Selection Signal For Model Code Input Mismatch	PUMP	Electrical system
E0E	**DAFRMC**	Comm. Error (Machine Monitor)	PUMP	Electrical system
—	**DHPAMA**	F Pump P.Sensor Error	PUMP	Electrical system
—	**DHPBMA**	R Pump P.Sensor Error	PUMP	Electrical system
—	**DHS3MA**	Arm Curl PPC Sen. Error	PUMP	Electrical system
—	**DHS4MA**	Bucket Curl PPC Sen. Error	PUMP	Electrical system
—	**DW43KA**	Travel Speed Sol. Disc.	PUMP	Electrical system
—	**DW43KB**	Travel Speed Sol. S/C	PUMP	Electrical system

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
E03	**DW45KA**	Swing Brake Sol. Disc.	PUMP	Electrical system
E03	**DW45KB**	Swing Brake Sol. S/C	PUMP	Electrical system
—	**DW91KA**	Travel Junction Sol. Disc.	PUMP	Electrical system
—	**DW91KB**	Travel Junction Sol. S/C	PUMP	Electrical system
—	**DWJ0KA**	Merge-divider Sol. Disc.	PUMP	Electrical system
—	**DWJ0KB**	Merge-divider 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
E02	**DXA0KA**	PC-EPC Sol. Disc.	PUMP	Electrical system
E02	**DXA0KB**	PC-EPC Sol. S/C	PUMP	Electrical system
—	**DXE0KA**	LS-EPC Sol. Disc.	PUMP	Electrical system
—	**DXE0KB**	LS-EPC Sol. S/C	PUMP	Electrical system
—	**DXE4KA**	Service Current EPC Solenoid Disc.	PUMP	Electrical system
—	**DXE4KB**	Service Current EPC Solenoid S/C	PUMP	Electrical system
—	**DY20KA**	Wiper Working Disc.	MON	Electrical system
—	**DY20MA**	Wiper Parking Error	MON	Electrical system
—	**DY2CKB**	Washer Drive S/C	MON	Electrical system
—	**DY2DKB**	Wiper Drive (For) S/C	MON	Electrical system
—	**DY2EKB**	Wiper Drive (Rev) S/C	MON	Electrical system

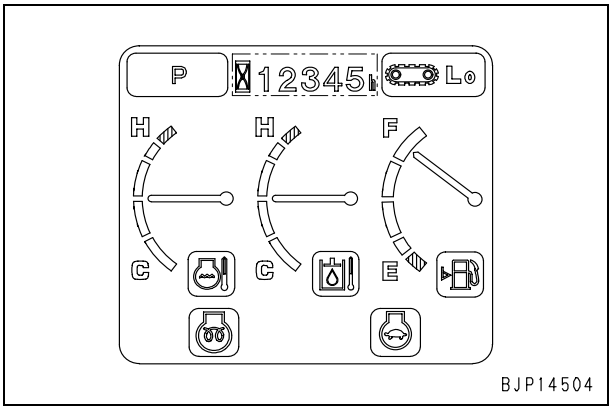
★ This table lists the failed sections in the order of the failure code.
★ Those failure codes to which the corresponding number is not indicated in the action code space are not displayed on the ordinary screen if a failure is found. They are just recorded in the abnormality record (electrical system 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.

Service menu operation and display

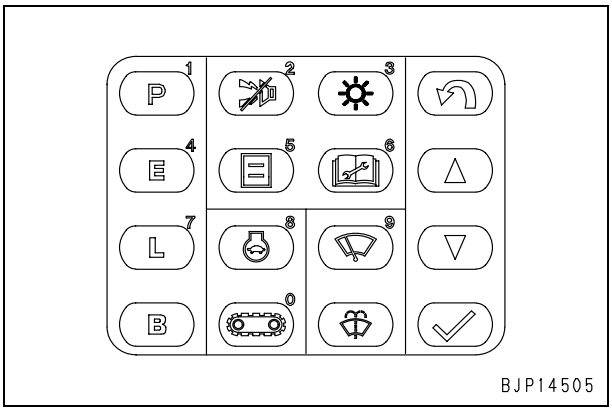
Switching to service menu

★ When using the service menu, switch the screen through the following special operation.

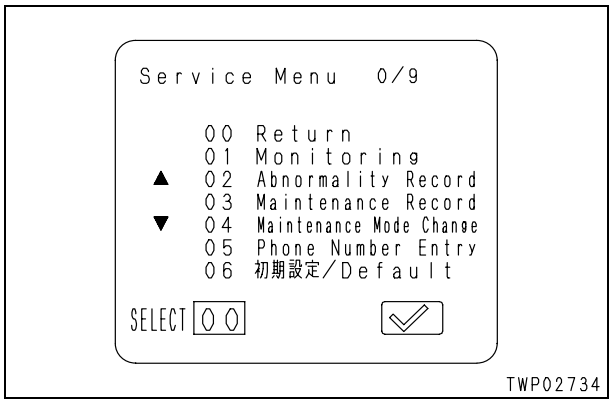
1) Confirmation of display
Make sure that the conventional display is turned on.
★ Changing to Service Menu is usually available only from this conventional display.



2) Switch operation
Do the following switch operation.
- Switch operation:
[△] + [1] → [2] → [3]
(Enter the numbers while holding △ down)



3) Displaying menu screen
The display is changed to the initial display of Service Menu program. Select an appropriate item from among the menu.



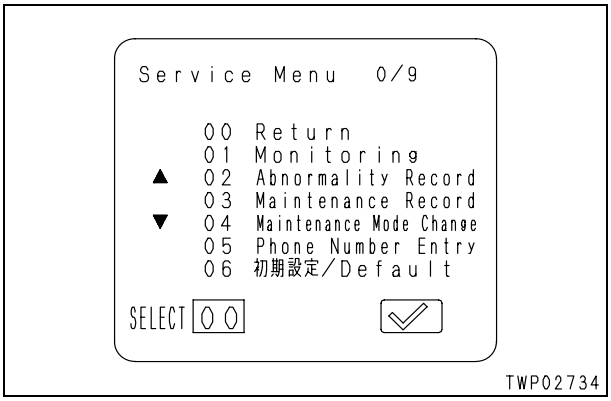
No.	Service menu
00	Return (Ends the service menu)
01	Monitoring
02	Abnormality record
03	Maintenance record
04	Maintenance mode change
05	Phone number entry
06	Default
07	Adjustment
08	Cylinder cut out
09	No injection cranking

4) Ending the menu and function
When ending the operation from the service menu screen or respective menu screens, select either of the following operations.
- Press [↩] switch (enables every screen).
- When “RETURN” switch is displayed, press the applicable switch.
- When “Return” menu is displayed, select the menu and press [✓] switch.

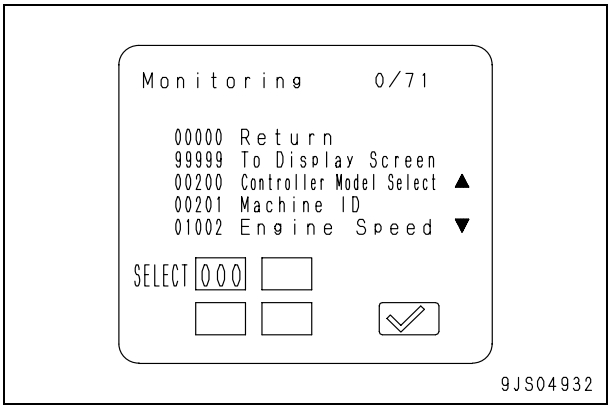
16. Monitoring [01] function

The machine monitor monitors signals from the switch sensor actuators on various machine parts. It allows displaying and checking the monitored information through following operations.

1) Menu selection
Select “01 Monitoring” in the initial display of Service Menu and depress [✓] switch.



2) Setting a monitoring item
Select and register an item to be monitored through the following switch operation.
- [△] switch: Selection
- [▽] switch: Selection
- [✓] switch: Registration



★ A monitoring item can be set from 1 to 4 at maximum (Depending upon the selected item, the max. number can be less than four)

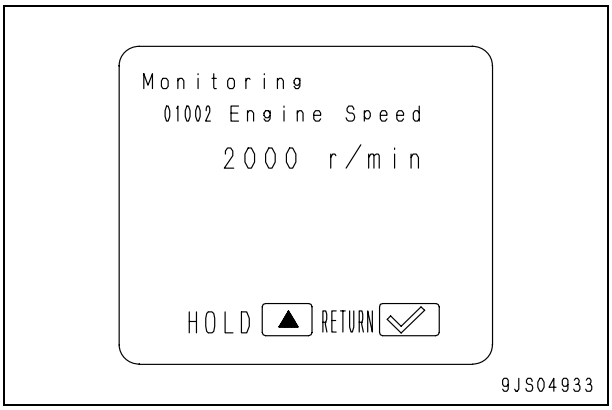
★ In case of monitoring 1 to 3 items, move to the monitoring information screen through any of the following switch operations after the registration work has been completed.
- [Hold down [✓] switch (for about 3 seconds).
- Select menu “99999” and press [✓] switch.

★ When you have registered all the items that can be registered, the screen will be automatically switched to the monitoring information screen.

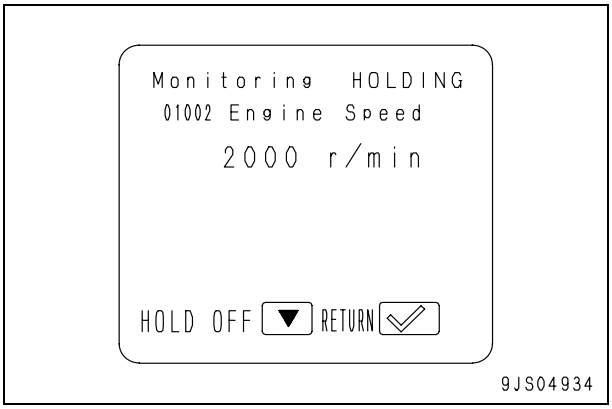
★ Monitored information are transmitted via communication circuits. Thus the number of selected items can impact the communication speed. If truly real time monitoring is required, reduce the selected items to the minimum.

★ For details on the monitoring items, display unit, etc., refer to the Table for Monitoring Items.

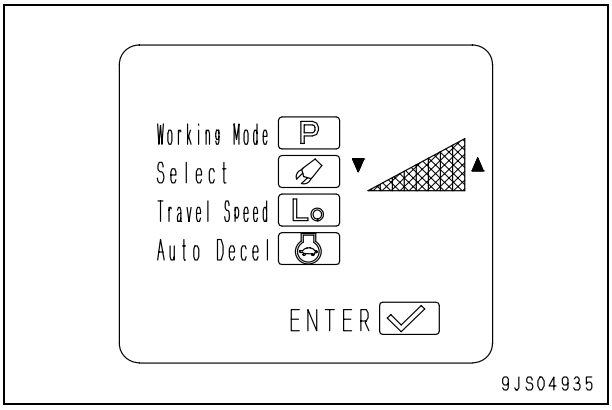
3) Operation for monitoring
As the monitoring information screen is displayed, confirm the monitored information operating the machine.



4) Monitored information holding function
You can hold every monitored information by pressing [△] while monitoring is continued.
If you press [▽] switch again in this condition, the currently held information will be released.



5) Machine setup mode switching function
If it becomes necessary to change settings of working mode, select mode, travel speed and auto-decel while monitoring, depress the corresponding switch, then the mode confirmation display is shown.



★ Above figure shows the screen display in P-and E-mode (in B-mode, part of the symbol mark shape is different from above).
★ After confirming the setting, press [✓] switch to return to the monitoring screen.
★ If the setting was changed during monitoring, the new setting is held even after the operator menu is restored from the service menu after the monitoring is finished.

List of Monitoring Items

Code No.	Monitoring item	Unit (Default: ISO)			Remarks
		ISO	meter	inch	
00000	Return	(Not display)			End menu
99999	Display execution	(Not display)			Display execution menu
00200	Controller Model Select	Numbers			
00201	Machine ID	Numbers			
01002	Engine Speed	r/min	rpm	rpm	
01601	2nd Eng. Speed Command				
01100	F Pump Pressure	MPa	kg/cm^2	psi	
01101	R Pump Pressure	↑	↑	↑	
07200	Arm IN PPC Pressure	↑	↑	↑	
07300	Bucket Curl PPC Pressure	↑	↑	↑	
04107	Coolant Temperature	°C	°C	°F	
04401	Hydr. Oil Temperature	↑	↑	↑	
01300	PC-EPC Sol. Curr.	mA	mA	mA	
01500	LS-EPC Sol. Curr.	↑	↑	↑	
01700	Service Sol. Curr.	↑	↑	↑	
03200	Battery Voltage	V	V	V	
03203	Battery Power Supply	V	V	V	
04300	Battery Charge Vol.	V	V	V	
01006	Engine Seed	r/min	rpm	rpm	
36400	Rail Pressure	MPa	kg/cm^2	psi	
37400	Ambient Pressure	kPa	↑	↑	
18500	Charge Temperature	°C	°C	°F	
36500	Boost Pressure	kPa	kg/cm^2	psi	
36700	Engine Torque Ratio	%	%	%	
18700	Engine Output Torque	Nm	kgm	lbft	
03000	Fuel Dial Pos Sens Volt	V	V	V	
04200	Fuel Level Sensor Vol.	V	↑	V	
04105	Eng. Water Temp. Vol. Lo	V	↑	V	
04402	Hydr. Temp. Sonser Vol.	V	↑	V	
37401	Ambient Press Sens Volt	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	
17500	Engine Power Mode	—	—	—	
31701	Throttle Position	%	%	%	
31706	Final Throttle Position	%	%	%	
18600	Inject Fueling Command	mm^3/st	mm^3/st	mm^3/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	%	%	%	
13113	Main Pump Absorb Torque	Nm	kgm	lbft	

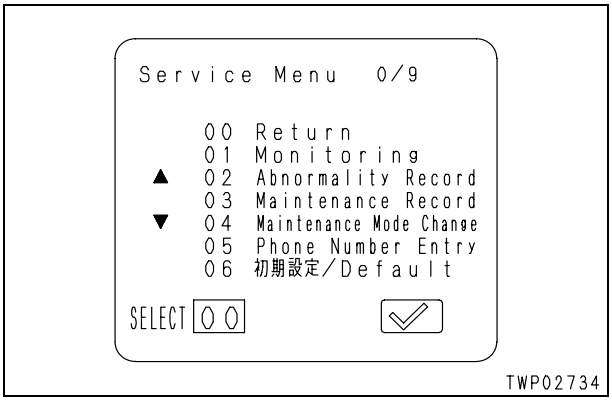
Code No.	Monitoring item		Unit (Default: ISO)			Remarks
			ISO	meter	inch	
01900	Pressure Switch 1	Swing	ON/OFF			
		Travel	ON/OFF			
		Boom Lower	ON/OFF			
		Boom Raise	ON/OFF			
		Arm Curl	ON/OFF			
		Arm Dump	ON/OFF			
01901	Pressure Switch 2	Bucket Curl	ON/OFF			
		Bucket Dump	ON/OFF			
		Service	ON/OFF			
		Travel Steering	ON/OFF			
02300	Solenoid Valve 1	Travel Junction	ON/OFF			
		Swing Brake	ON/OFF			
		2-Stage Relief	ON/OFF			
		Travel Speed	ON/OFF			
02301	Solenoid Valve 2	Service Return	ON/OFF			
02200	Switch Input 1	Lever Sw.	ON/OFF			
		Swing Release Sw.	ON/OFF			
		Swing Brake SW.	ON/OFF			
02201	Switch Input 2	Model Select 1	ON/OFF			
		Model Select 2	ON/OFF			
		Model Select 3	ON/OFF			
		Model Select 4	ON/OFF			
		Model Select 5	ON/OFF			
		Low Viscosity Fuel Mode	ON/OFF			
02202	Switch Input 3	Key Switch (ACC)	↑			
03700	Controller Output 1	Battery Relay Output	↑			
04500	Monitor Input 1	Key Switch	ON/OFF			
		Start	ON/OFF			
		Preheat	ON/OFF			
		Light	ON/OFF			
		Rad. Level	ON/OFF			
04501	Monitor Input 2	Air cleaner	ON/OFF			
		Eng. Oil Level	ON/OFF			
		Spare Open (Full-tank sensor)	ON/OFF			
		Battery Charge	ON/OFF			
04502	Monitor Input 3	Swing Brake Sw.	ON/OFF			
		Bzzr Cancel Sw.	ON/OFF			
		Window Limit Sw.	ON/OFF			
		W Limit Sw.	ON/OFF			
		P Limit Sw.	ON/OFF			
18800	Water In Fuel		—	—	—	
20216	ECM Build Version		—	—	—	
20217	ECM CAL Data Ver		—	—	—	
18900	ECM Internal Temp		°C	°C	°F	

Code No.	Monitoring item	Unit (Default: ISO)			Remarks
		ISO	meter	inch	
20400	ECM Serial No	—	—	—	
20200	Monitor Prog. Version	—	—	—	
20212	Pump Con. Prog. Version	—	—	—	

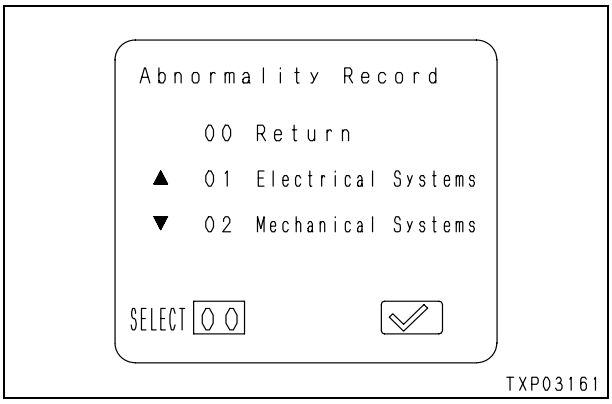
17. Function of abnormality record [02]

The monitor panel records and classifies the past failure information as into the electrical and mechanical failures. It allows displaying and checking the information through the following operations.

1) Menu selection
Select “02 Abnormality Record” in the initial display of Service Menu and depress [✓] switch.

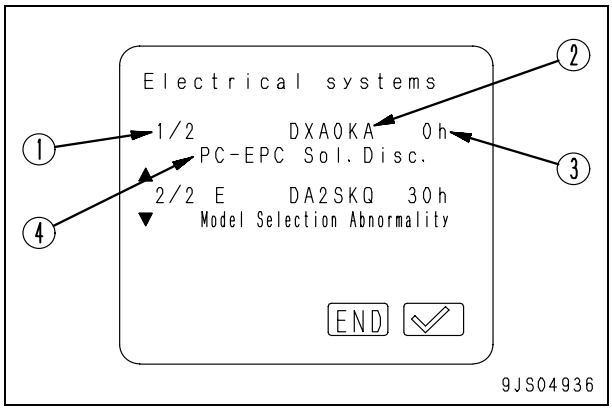


2) Sub menu selection
Select the sub menu from the abnormality record menu screen and then press [✓] switch.

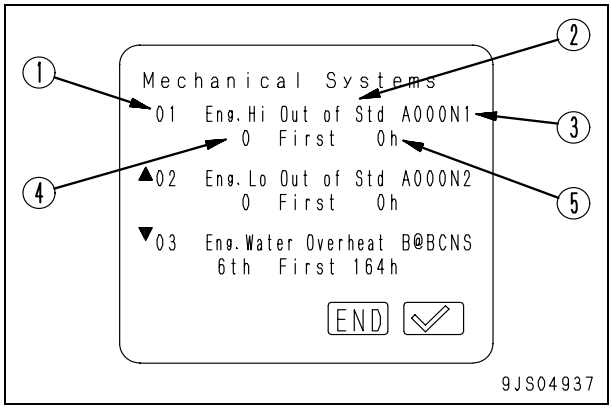


Number	Sub menu of abnormality record
00	Return (End of abnormality record)
01	Electrical systems
02	Mechanical systems

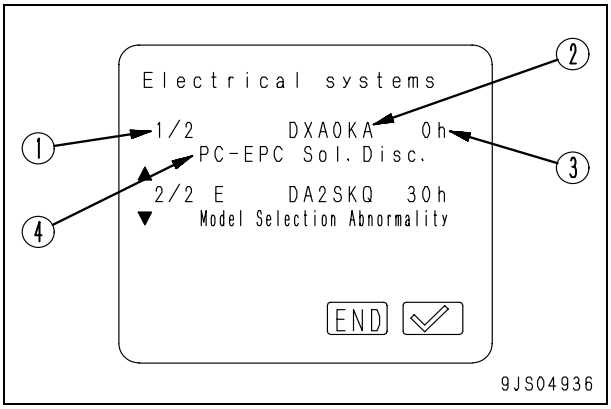
3) Contents of display of electrical system abnormality record information screen
(1): Occurrence order of abnormalities from latest one/Total number of records
(2): Failure code (Equipment: 4 digits, Phenomena: 2 digits)
(3): Elapsed time on service meter from the first occurrence
(4): Contents of trouble
★ See the operator menu “Failure codes table”.



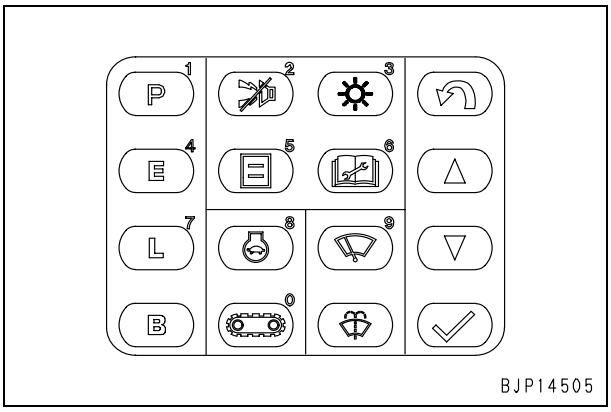
4) Contents of display of mechanical system abnormality record information screen
(1): Record number
(2): Contents of trouble
(3): Failure code (Equipment: 4 digits, Pheomena: 2 digits)
(4): Total number of occurrences
(5): Service meter reading at first occurrence
★ See the operator menu “Failure codes table”.



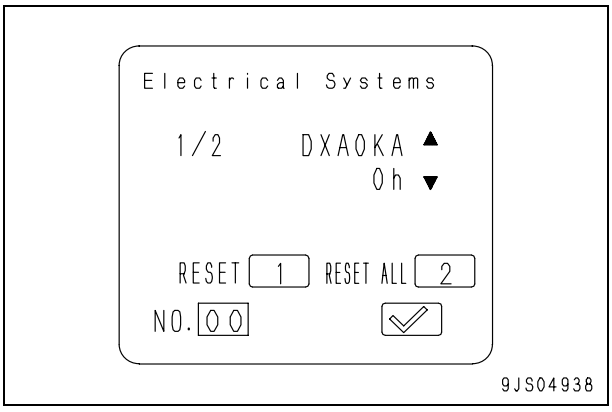
5) Resetting electrical systems abnormality record
   ★ Resetting abnormality record (deletion) is possible only with the electrical system. The abnormality record in the mechanical system cannot be reset.
   ★ When resetting individual or all information in the abnormality record of the electrical systems, implement the following procedure.



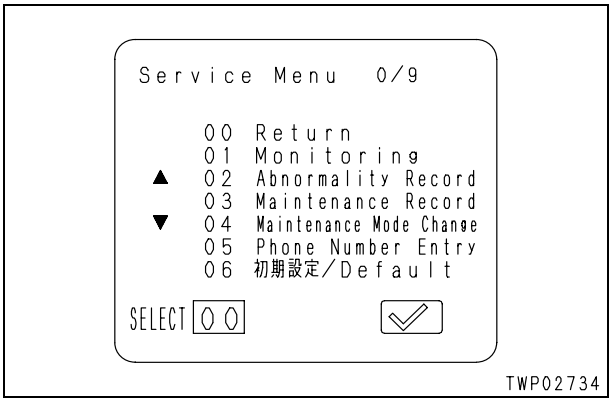
1] Following switch operation from the electrical system abnormality record screen opens the reset screen.
   ● Switch operation:
   [△] + [1] → [2] → [3]
   ★ Above is the same as that done when switching to the service menu.



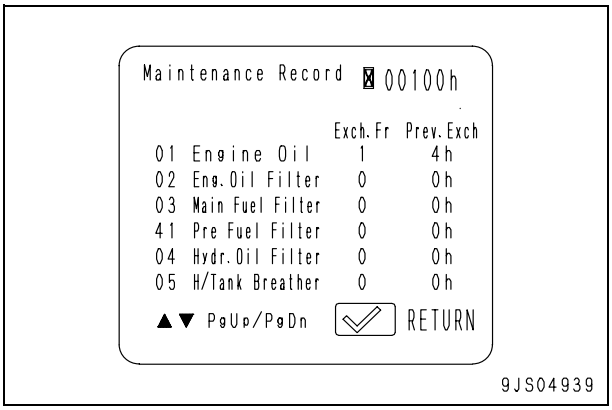
2] From the reset screen, do the switch operation according to the screen instructions.
   ★ When a specific individual information alone is to be reset, be sure to display the subject information on the screen using [△] switch or [▽] switch.
   ★ When resetting all information, the information to be displayed on the screen can be any.



18. Function of maintenance record [03]
The machine monitor records the maintenance information of the filters, oils, etc., which the operator can display and check by the following operations.
1) Menu selection
   Select “03 Maintenance Record” from the initial display of Service Menu and then depress [✓] switch.



2) Information to be displayed
   ● Oil and filter names
   ● Replacement time elapsed up to present
   ● Time elapsed on service meter up to the last replacement

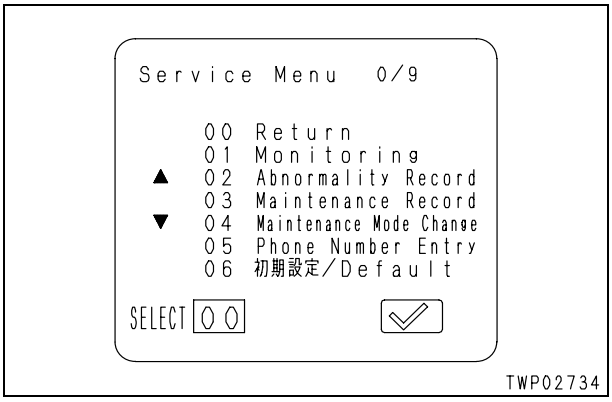


19. Function of maintenance mode change [04]

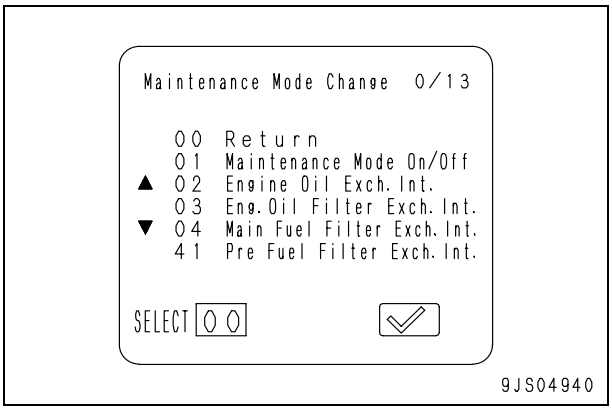
Following procedure allows changing the currently set operating conditions of the maintenance display function.

- Set function effective or ineffective
- Change set replacement interval

1) Menu selection
Select “04 Maintenance Mode Change” from the Service Menu and then depress [✓] switch.



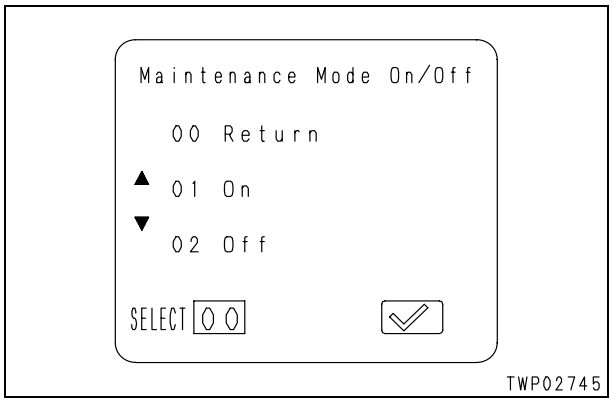
2) Selection of item to be changed
Select the item to be changed from the Maintenance Mode Change Selection Menu screen.



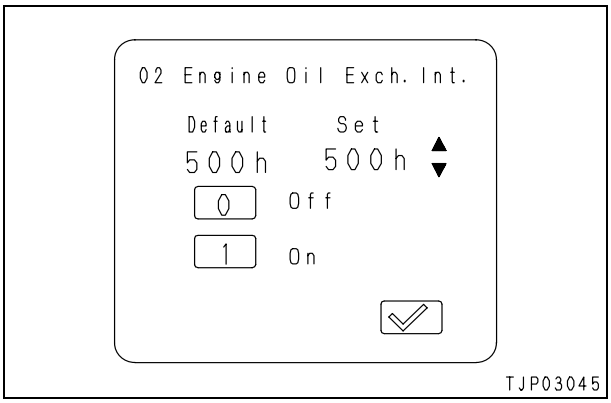
Number	Items of the maintenance mode change
00	Return (End of change in the maintenance mode)
01	Maintenance mode on/off
02	Engine oil change int.
03	Engine oil filter change int.
04	Fuel main filter change int.
41	Fuel pre filter change int.
06	Hyd oil filter change int.
07	Hyd tank breather change int.
08	Corrosion resistor change int.
09	Damper case service int.
10	Final drive case oil change int.
11	Machinery case oil change int.
12	Hydraulic oil change int.
13	Initialize all items

★ 01 and 12 menus are provided for setting the whole maintenance mode, while those from 02 through 11 are for setting individual items.

3) Contents of Maintenance Mode On/Off
- Use (On): 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)
- Not use (Off): The maintenance display function of all oils and filter-related items is disabled (precedence is given to this setting over the “On” or “Off” selected for an individual items).



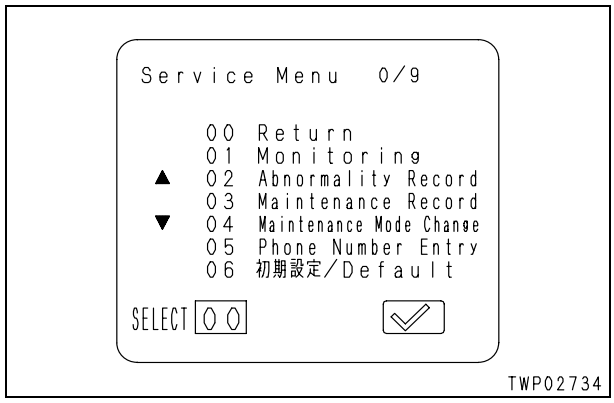
4) Description of individual setting items
(1): Default value: The maintenance time set in the monitor (recommended by the manufacturer and cannot be changed).
(2): Set value: Denotes the maintenance time that can be freely set. The maintenance mode operates based on this time (the time can be increased or decreased in multiple of 50 hours by use of [△] and [▽] switches).
(3): Use (On): Maintenance display function for this item is enabled.
(4): Not use (Off): Maintenance display function for this item is disabled.
★ The lower limit of this setting is 50 hours.



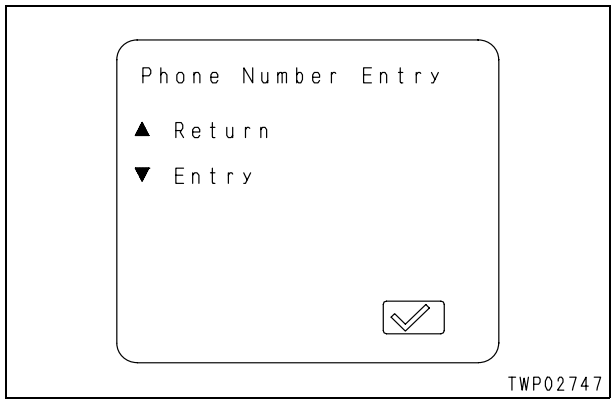
5) Description of “Initialize all items”
Select this menu and then press [✓] switch to restore the default value for the individually set information.

20. Function of phone number entry [05]
When the action code is displayed, following procedure allows entering or correcting the phone numbers to be displayed alternately with the failure code.
★ If a telephone number is not input, the phone number screen is not displayed.

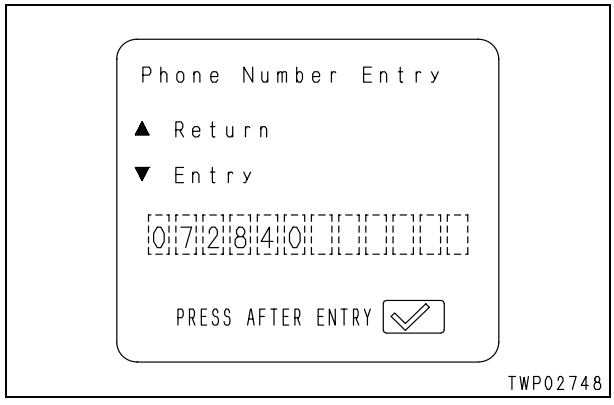
1) Menu selection
Select “05 Phone Number Entry” menu from the Service Menu initial screen and then depress [✓] switch.



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 if you switch the “Phone Number Entry” screen.



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)



1] Using the numerical keypad, enter the number starting with the cursor position situated at the left end.
★ Numbers can be entered up to the max. 12 digits, but omit unnecessary digits.
★ When entered a wrong number, depress [B] switch to return the cursor by one digit.

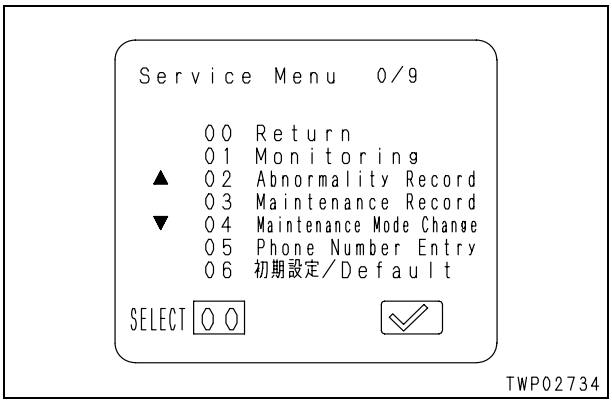
2] Depress [✓] switch when all the numbers have been entered.
★ As the input is finished, the screen changes to entry screen shown above. If the entered phone number is shown on this display, the input is normal.

21. Function of default [06]

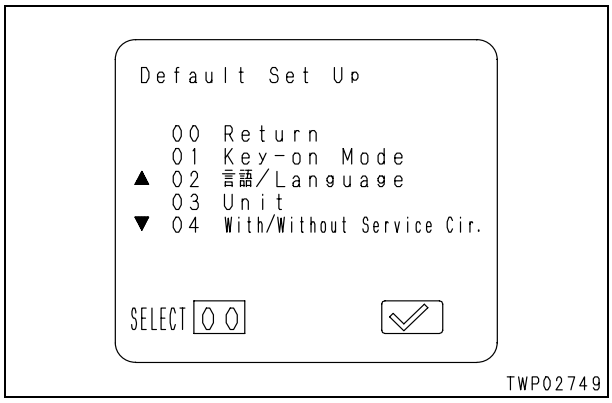
Following machine monitor- or machine-related settings are modifiable. Do necessary modifications as needed.

- Working mode as starting switch is turned ON
- Language used in the service menu
- Unit to be displayed in relation to the monitoring function
- With/Without attachment

1) Menu selection
Select “06 Default” menu from the Service Menu initial screen and then press [✓] switch.

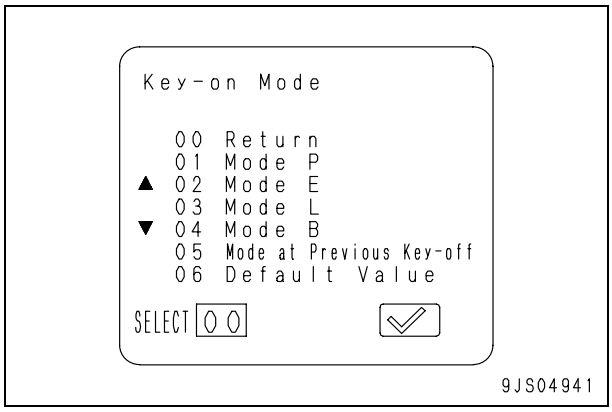


2) Selecting sub menu
Select the target sub menu of setting change and then press [✓] switch.



Number	Sub menu of default value
00	Return (End of default)
01	Mode to be selected as key is turned on
02	Language
03	Unit
04	Presence or absence of attachments

3) Mode to be selected as key is turned ON
Following operation allows specifying the working mode to be displayed on the machine monitor as the starting key is turned ON.



- P-mode, E-mode, L-mode and B-mode: If any of above modes is specified, that mode will be constantly turned ON as the starting switch is pressed.
- The mode that had been selected as the starting key was turned off in the last operation: This setting turns ON the last used mode as the starting switch is pressed.
- Default: This setting turns ON the delivered default mode (P-mode) as the starter switch is pressed.

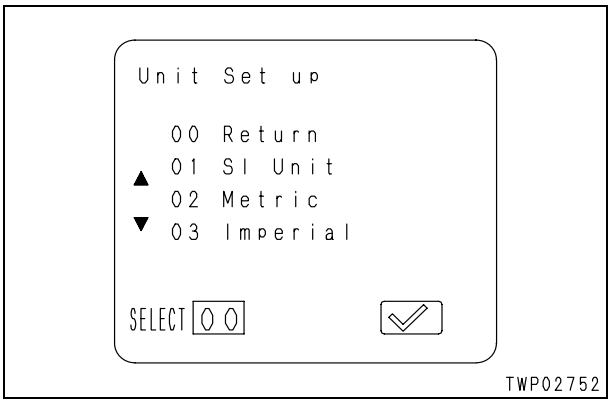
★ If the engine is stopped from B-mode on a machine equipped with the attachment, this mode will be invariably selected as the starter switch is turned ON the next time independent of above setting.

4) Language setting function
Service Menu allows switching the language between Japanese and English.

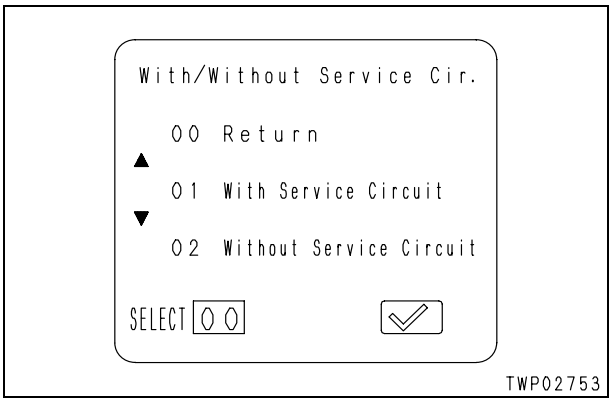


★ The default language of the machine monitor is English.
★ When using the machine monitor, which is a spare part, in the Japanese-speaking sphere, switch this function from English to Japanese.

5) Unit selection function
You can select one from the three units to be used in the monitoring function display of Service Menu.
★ SI unit system is the default setting of the machine monitor.



6) Function for selecting distinction of “With/ Without Service Cir”.
It is possible in this function to set a distinction between with or without attachment.
- With Service Circuit: When an attachment is installed.
- Without Service Circuit: When no attachment is installed.

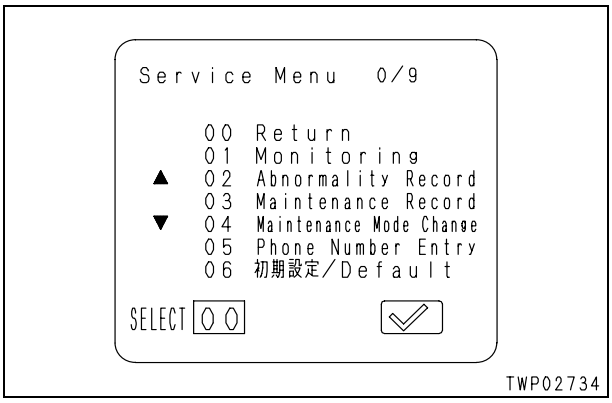


★ When the attachment is installed, you must select “With Service Circuit” from this screen. Otherwise, the selection function (the function for sharing the attachment) won't be available from the operator mode.

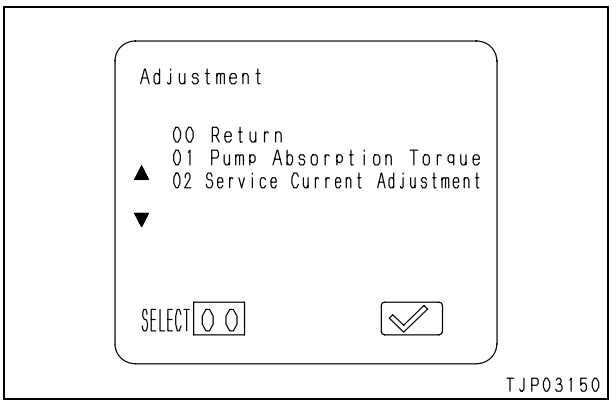
22. Function of adjustment [07]

The operator can adjust various items related to the machine with the machine monitor.

1) Menu selection
Select “07 Adjustment” menu from the Service Menu initial screen and then depress [✓] switch.

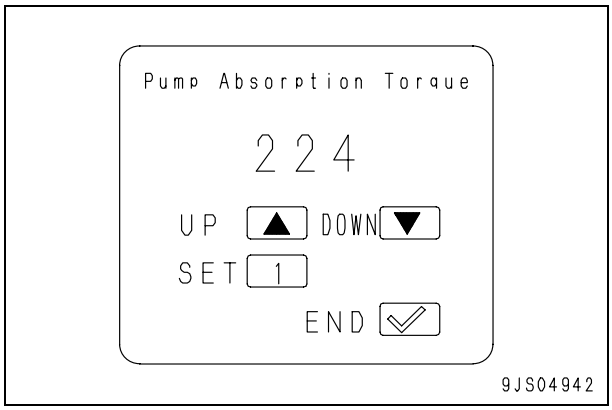


2) Sub menu selection
Select the sub menu on which setting change is to be done and then press [✓] switch.



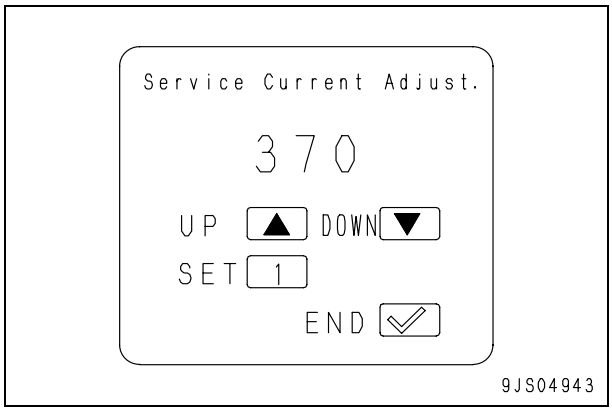
Number	Adjustment of sub menu
00	Return (Ends the adjustment)
01	Pump absorption torque
02	Adjustment of flow to attachment in compound operation

3) Function for Pump Absorption Torque adjustment
The pump absorption torque can be adjusted within the range shown in the table below.



Adjustment value	Torque adjustment value	Adjustment value	Torque adjustment value
220	+4.0 kgm	225	–1.0 kgm
221	+3.0 kgm	226	–2.0 kgm
222	+2.0 kgm	227	–3.0 kgm
223	+1.0 kgm	228	–4.0 kgm
224	0.0 kgm		

4) ATT flow rate adjustment function at compound operation
In the compound operation of attachments, you can adjust the flow rate allocation of the pump within the range shown in the table below.

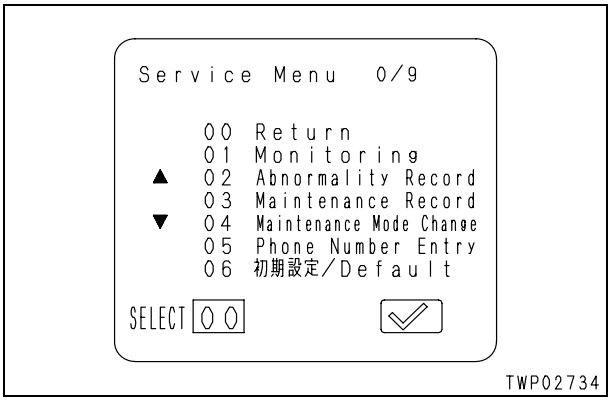


Adjustment value	Flow rate allocation to ATT
370	0.5 times
371	0.7 times
372	1.0 times
373	0.4 times

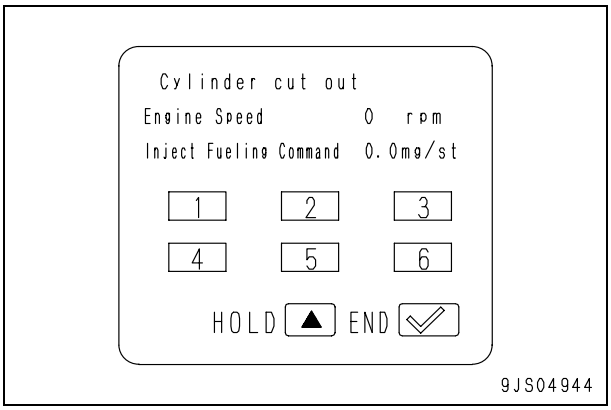
23. Function of cylinder cut out operation [08]

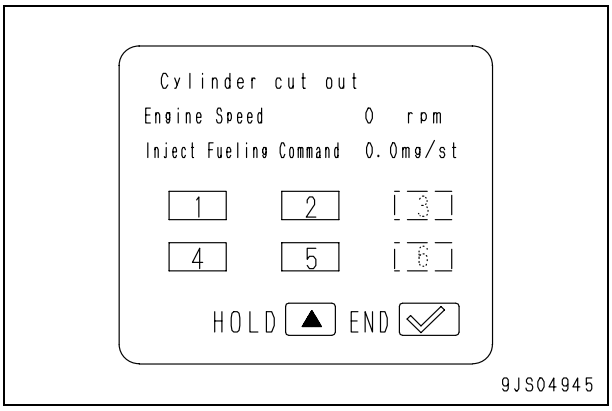
The operator can perform the engine on cylinder cut out operation with the machine monitor. “Cylinder cut out” operation means to run the engine with 1 or more fuel injectors disabled electrically to reduce the number of effective cylinders. This operation is used to find out a cylinder which does not output power normally (combustion in it is abnormal).

1) Selecting menu
Select “08 Cylinder cut out” menu from the service menu initial screen and press [✓] switch.

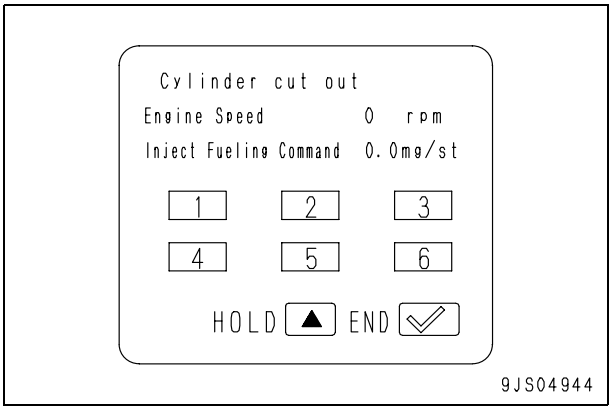


2) Selecting cylinder to be disabled
Press a switch corresponding to the cylinder No. to be disabled from switches [1] to [6] of the machine monitor.
★ If pressing the switch changes the cylinder number on the screen to a white letter enclosed in the white frame, the cylinder is disabled (when a wrong number is selected, press the correct switch again).
★ Number of cylinders to be reduced is any.

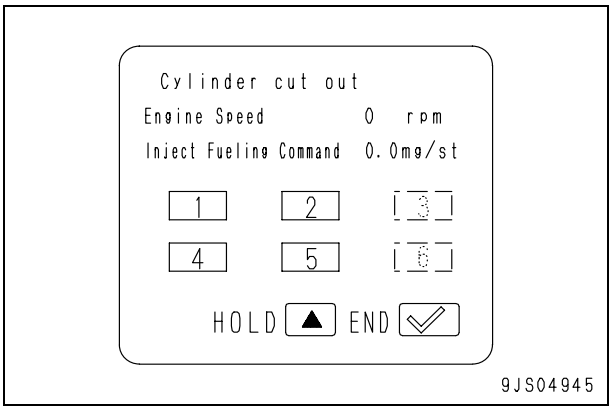


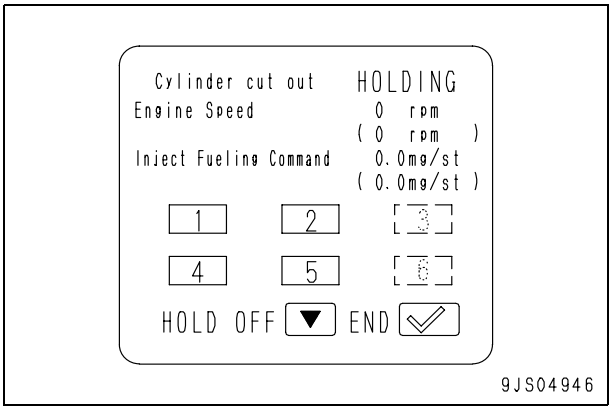


3) Resetting cut out cylinder
Press the switch corresponding to the disabled cylinder number from switches [1] to [6] of the machine monitor to be reset.
★ If pressing the switch changes the cylinder number on the screen to a black letter enclosed in the black frame, the cylinder is reset.



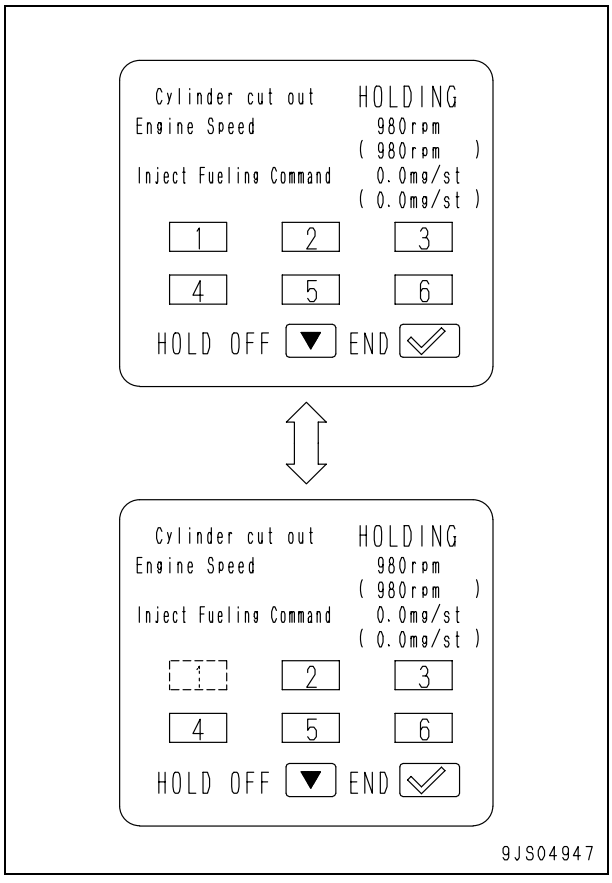
4) Engine speed holding function
Pressing [△] switch while the engine operation on cylinder cut out screen is turned on holds the engine speed and its speed is newly displayed in the lower space.
Pressing [▽] switch during holding cancels the holding function and deletes the display in the lower space.
★ If the holding function is used, the held speed is displayed in the lower space along with ( ) and the upper space continuously displays the current speed.
★ The holding function is usable independent of the currently set mode – the cylinder cut out or not.





[Reference]: Using the holding function effectively
The engine speed being displayed on the screen through the holding function remains on it until the holding is cancelled. In other words, enabling or disabling of the cylinder cut out mode does not affect the display.
Thus, when identifying a failed cylinder quicker, following operation is effective.

(1) Run the engine from the normal operation mode (no cylinder cut out) and then hold the speed of that time.
(2) Specify the cylinder to be diagnosed as the cut out.
(3) Run the engine under the same condition as that for (1). Then compare the engine speed at that time and the held speed being displayed to diagnose the cylinder.
(4) Reset a cut out cylinder independent of the fluctuations in the engine speed.
(5) Repeat above steps (2) to (4) and then compare the results against that obtained from other cylinders.
★ If the diagnosis identified a cylinder on which there was no decrease in the engine speed or the decrease was small, it can be safely judged that there must be some abnormalities in its fuel.



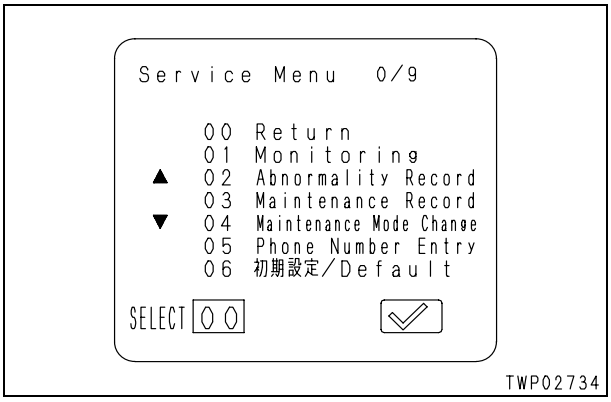
24. Function of no injection cranking [09]

No injection cranking of the engine is available from the machine monitor.

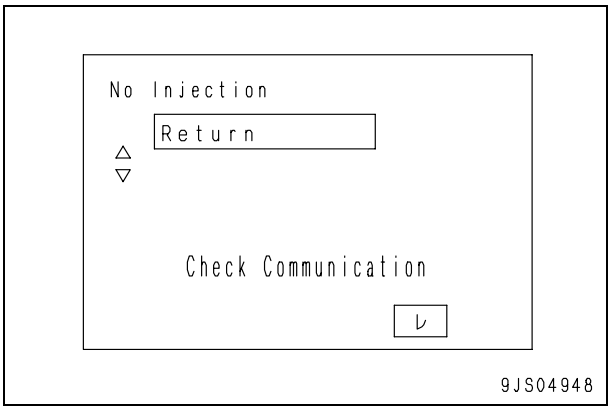
No injection cranking denotes stopping injection of fuel from the injector even if the engine is run from the starting motor. This mode is used, for instance, for measurement of compressive pressure.

★ This setting must be done after stopping the engine.

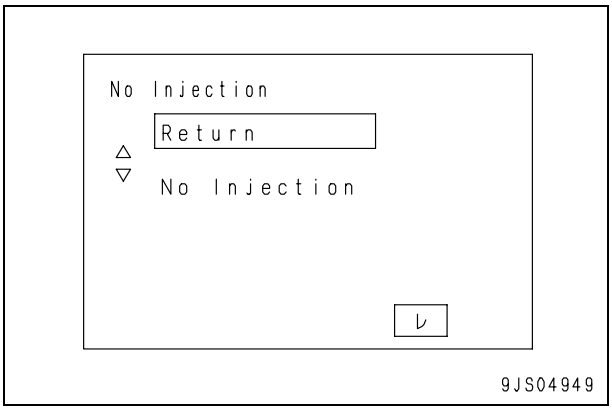
1) Selecting menu
Select “09 No Injection Cranking” from the service menu initial screen and press [✓] switch.



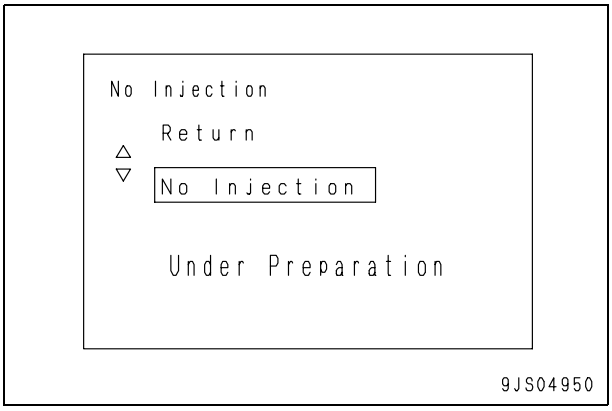
2) The initial screen for the no injection cranking will appear.
★ “Check Communication” will be displayed in red.



3) As the checkup is over, following screen appears.

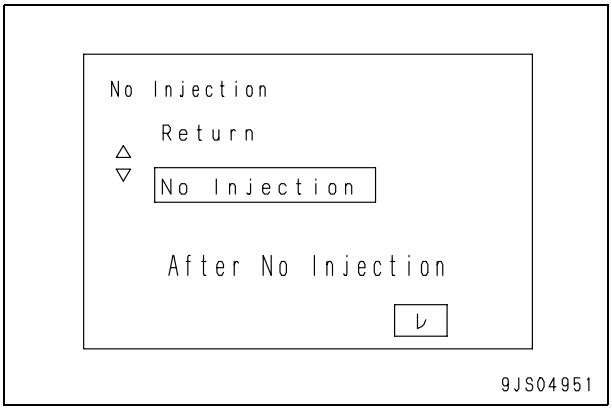


4) Select “No Injection” and press [✓] switch. “Under Preparation” will be displayed on the screen.
★ The letters “Under Preparation” are displayed in red.

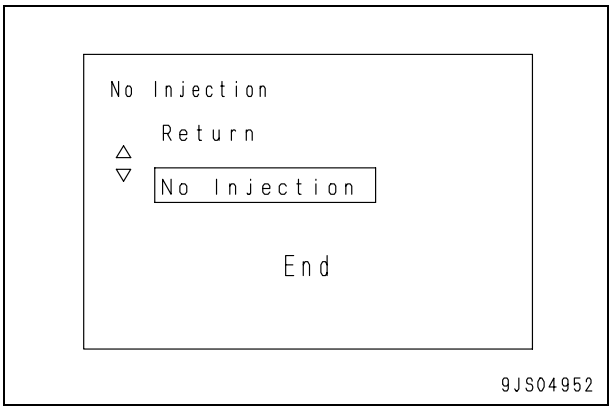


5) As the preparation for no injection cranking is completed, display of “Under Preparation” is replaced with “After No Injection”.
★ The letters “After No Injection” are displayed in green.

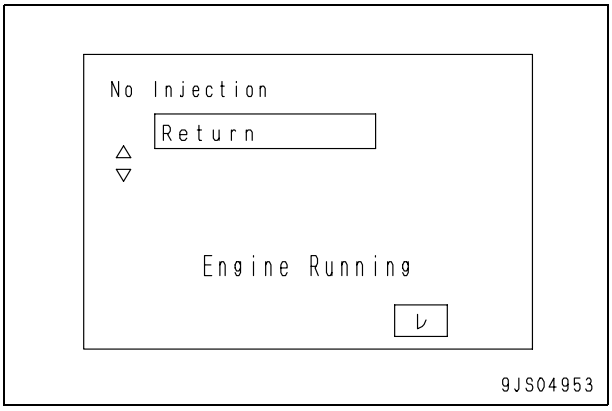
6) From this state, crank the engine using the starting motor.
★ Limit the cranking time to 20 seconds to protect the starting motor.



7) After the no injection cranking is over, press [✓] switch from the previous screen and the letters “End” will be displayed for 3 seconds.
   ★ The letters “End” are displayed in green.
8) 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 voltage circuit of engine controller

1. The starting switch must be turned OFF before disconnecting or connecting the connector across the engine controller and engine.

2. It is prohibited to start the engine for diagnosis purpose when a T-adapter is inserted in or connected to the connector across the engine controller and engine.
   ★ You may turn the starting switch to the OFF or ON position but must not turn it to the START position.

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:

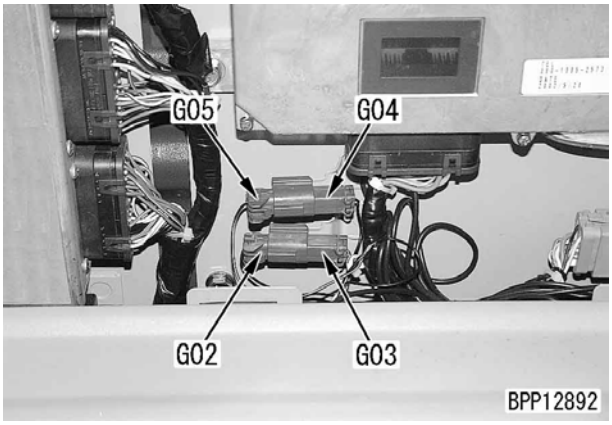
★ When installing KOMTRAX terminal after the machine is delivered (machine with the retrospective equipment), implement the following procedure.

1. Station opening inspection

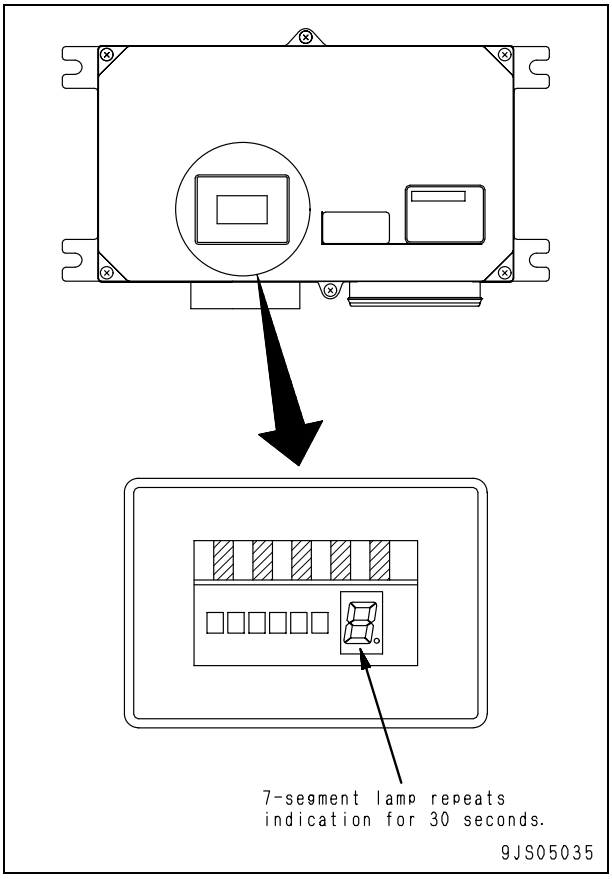
★ Referencing “Preparation work for troubleshooting of electrical system”, confirm the position of KOMTRAX terminal and the inspecting connector (the inspecting connector is provided at the bottom of KOMTRAX terminal).

★ Finish the operations of steps 4) to 7) within 30 seconds.

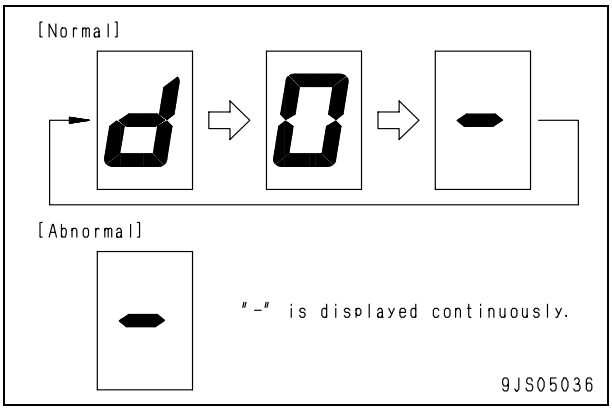
1) Turn OFF the starting switch and then, after making sure 5 seconds have elapsed, proceed to the next step.
2) Make sure visually that the inspecting connectors 1 and 2 are connected.
   - Inspecting connector 1:
     G02 (female) and **G03** (male)
   - Inspecting connector 2:
     G04 (female) and **G05** (male)



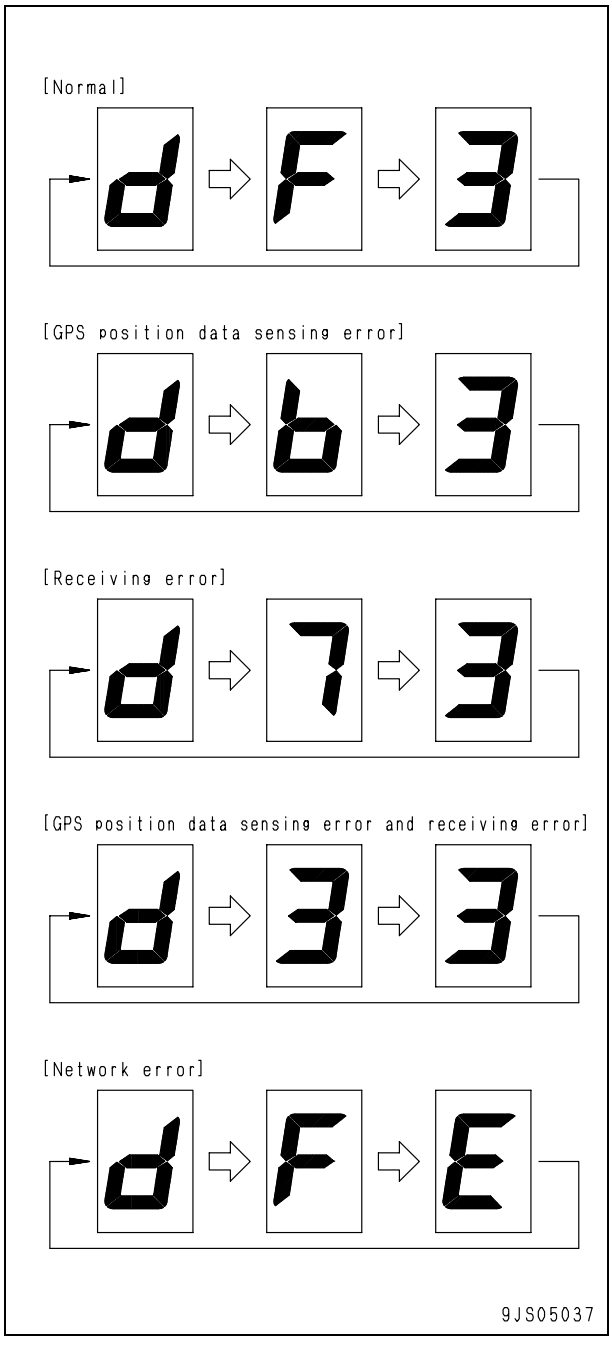
3) Disconnect the inspecting connector 1 and maintain that state for 5 seconds.
4) Turn ON the starting switch and maintain that state for 5 seconds.
5) Disconnect the inspecting connector 2 and maintain that state for 5 seconds.
6) Connect the inspecting connector 1 again and maintain that state for 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 lamp is normally turned on.



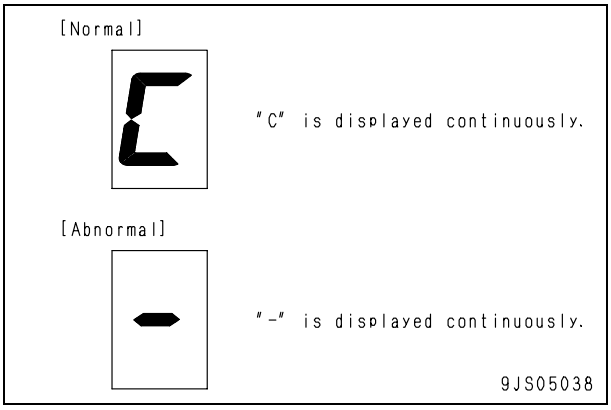
★ As [Normal] is indicated, proceed to the next step.
★ If [Abnormal] is indicated, repeat the procedure from step 1).



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 indicator lamps are normally turned on.
Note: The third number on the display can be “2” or “3” though “3” is displayed in above figure (both for the normal state and when trouble is present).
★ 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)).



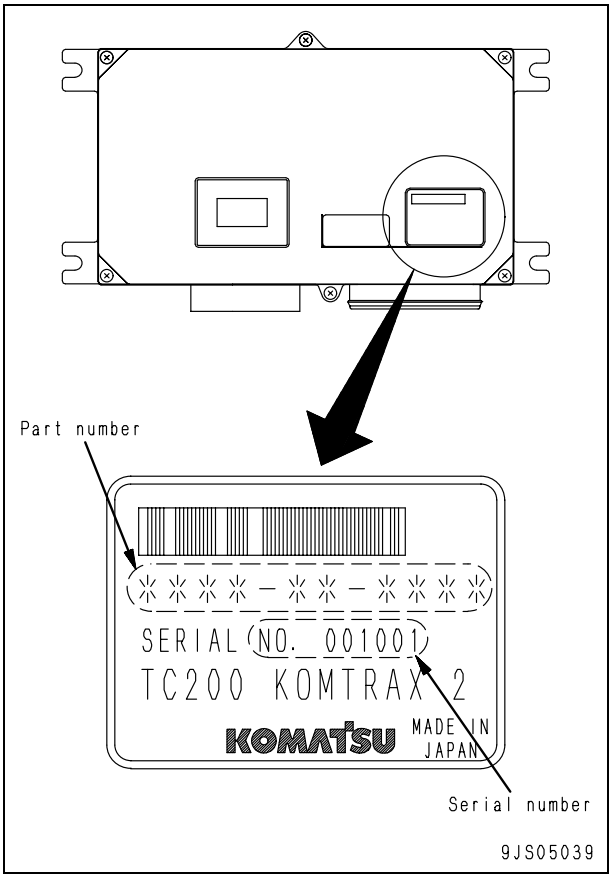
13) Turn the starting switch OFF.
14) Make sure that the 7-segment indicator lamp (a) comes on normally in 10 seconds.
    ★ As [Normal] is displayed, the station opening inspection is complete.
    ★ If [Abnormal] is displayed, the inspection is incomplete and must be repeated from step 1).



2. Application for start of use

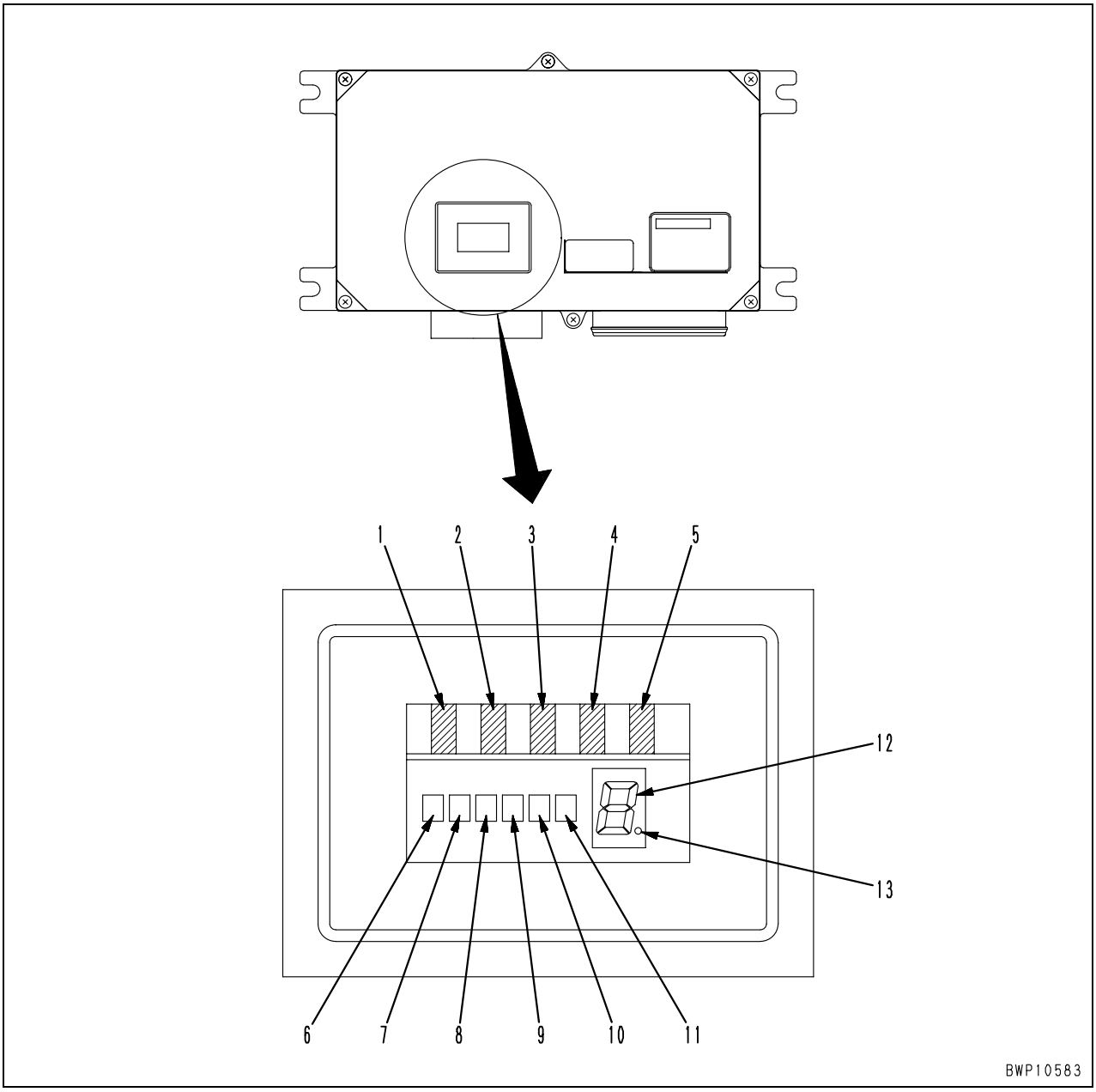
★ The application for start of use is allowed only after the terminal station opening inspection has been successfully ended.

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 communication module

1. LED-A1 (Power lamp)
2. LED-A2 (Within communication range lamp)
3. LED-A2 (Communication in progress lamp)
4. LED-A2 (Internal transmitting lamp)
5. LED-A2 (Internal receiving lamp)

LED for CPU

6. LED-C1 (R signal and ACC signal)
7. LED-C2 (Initial output state)
8. LED-C3 (S-NET and C signal state)
9. LED-C4 (CAN state)
10. LED-C5 (Download writing state)
11. LED-C6 (Download writing state)

7-segment and dot for CPU

12. 7-segment (Number of mails not transmitted yet)
13. 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.
When above is not completed, all LEDs for the communication module are turned off. It does not indicate the machine trouble.

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 be broken and shall be appropriately connected to KOMTRAX terminal.

Checking terminal LED indication

1. Display contents of LED for communication module

★ Turn ON the starting switch prior to inspection of LED display.

No.	LED	Name and function	Display	Contents of display
1	LED-A1	Power lamp	ON OFF	LED stays turned on as long as power is supplied normally
2	LED-A2	Within communication range lamp	ON OFF	LED comes on as the machine body moves inside the communication range of KOMTRAX system.
3	LED-A3	Communication in progress lamp	ON OFF	LED stays turned on as long as KOMTRAX terminal is connected to KOMTRAX server. (Connection is made only needed)
4	LED-A4	Internal transmitting lamp	ON OFF	LED stays turned on as long as data transmission is continued from CPU to the communication module. (Transmission is made only needed)
5	LED-A5	Internal receiving lamp	ON OFF	LED stays turned on as long as the communication module is receiving data from CPU. (Receiving is made only needed)

2. 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	Contents of display
6	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: ON, Alternator R signal: OFF
			Slow flashing	Starting switch ACC signal: OFF, Alternator R signal: ON
			OFF	Starting switch ACC signal: OFF, Alternator R signal: OFF
7	LED-C2	State of engine control signal	ON	Engine control signal: ON
			OFF	Engine control signal: OFF
8	LED-C3	State of S-NET connection and starting switch C signal	ON	S-NET: Connection and starting switch C signal: OFF
			Quick flashing	Starting switch C signal: ON
			Slow flashing	(Not used)
			OFF	S-NET: Non-connection and starting switch C signal: OFF
9	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)
10	LED-C5	Download writing state	Single side ON	Download writing mode (Special function for system administrator)
11	LED-C6		Both sides OFF	Normal working mode

★ Types of flashing and flashing duration
Quick flashing: Flashing of approximately 1 second cycle
Slow flashing: Flashing of approximately 4 seconds cycle

3. 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	Contents of display
12	7-segment	Number of mails not transmitted yet	0 – 9	Number of mails not transmitted yet
13	Dot	State of positioning with GPS	ON	Positioning with GPS complete (Position is recognized See * mark)
			OFF	Positioning with GPS incomplete (Position is not recognized See * mark)

* 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 of electrical system

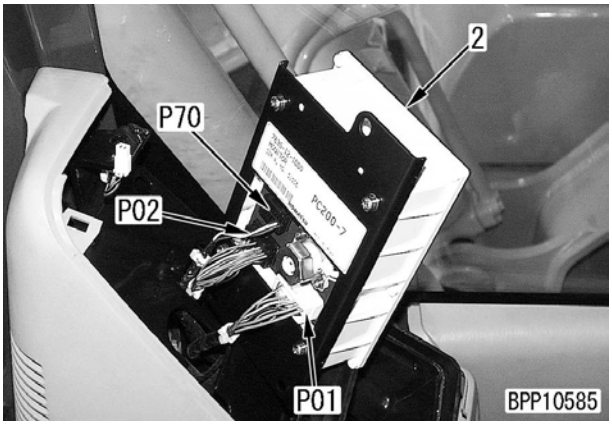
★ When troubleshooting the electric circuit related to the machine monitor, pump controller, engine controller or KOMTRAX terminal, expose the related connectors according to the following procedure.

1. Machine monitor

1) Take off cover (1).
   ★ The cover is fixed with two upper and lower clips. Pull it up for the removal.
   ★ If the sunlight sensor is equipped for an air conditioner, disconnect **P15** connector at the cover rear side.



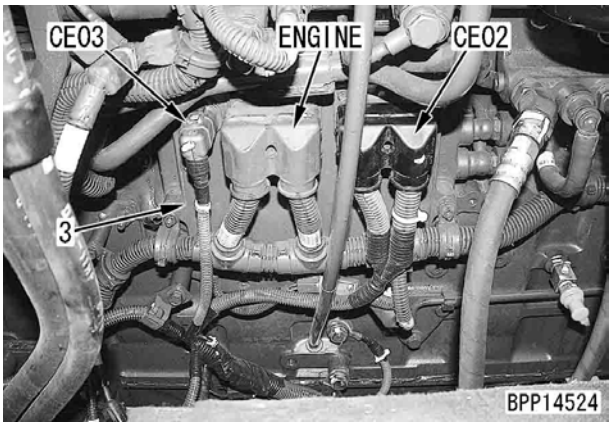
2) Remove the 3 mounting screws to disconnect machine monitor (2) from the mount.
   ★ Use care so that the screws may not fall into the console.
3) Insert or connect troubleshooting T-adapter in or to connectors **P01**, **P02**, and **P70** of machine monitor.



2. Engine controller

★ The engine controller is installed in the left side of the engine.

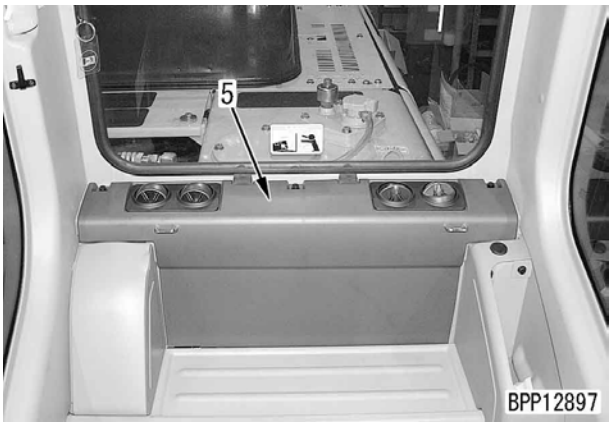
1) Open the engine hood.
2) Insert or connect troubleshooting T-adapter in or to connectors ENGINE, CE02 and CE03 of engine controller (3).
   ★ Connectors are fixed with screw. Loosen the screws before disconnecting them.
   ★ When returning the connectors back to their position, tighten them to the specified torque.
   Screw: **2.82 Nm {0.288 kgm}**



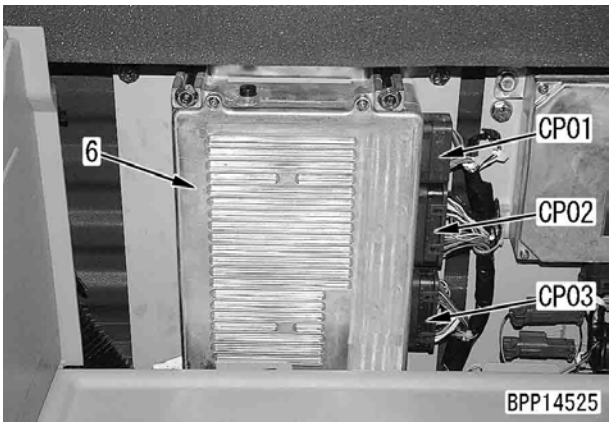
3. Pump controller

★ The engine throttle and pump controller are installed in the cover situated in the rear side of the operator seat.

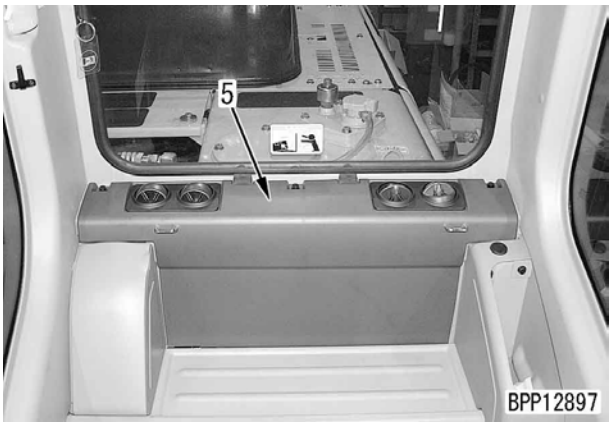
1) Remove cover (5).



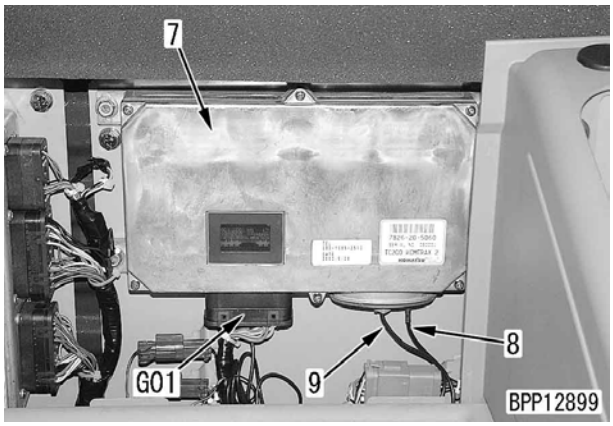
2) Insert or connect troubleshooting T-adapter in or to connectors **CP01**, **CP02** and **CP03** of pump controller (6).
   ★ Connectors are fixed with screws. Loosen the screws before disconnecting them.
   ★ When returning the connectors back to their position, tighten them to the specified torque.
   Screw: **2.82 Nm {0.288 kgm}**



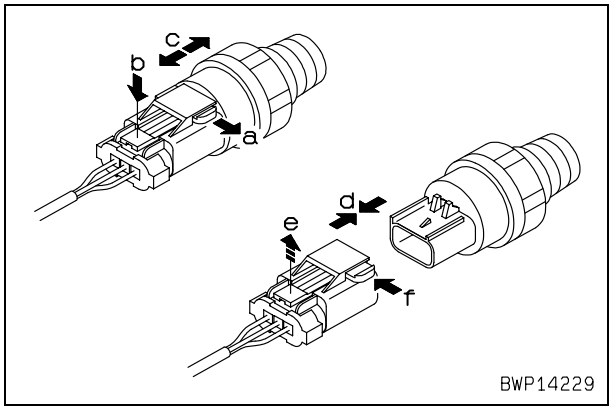
4. KOMTRAX terminal
★ KOMTRAX terminal is installed in the cover situated in the rear side of the operator seat.
1) Remove cover (5).



2) Insert or connect troubleshooting T-adapter in or to connector **G01** of KOMTRAX terminal (7).
   ★ The connectors are fixed with screws. 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 (8) is used for the communication antenna (2 systems).
   ★ Cable (9) is used for the GPS antenna.



5. Removing and installing the atmospheric pressure and temperature sensor, the engine oil pressure switch, and position sensor (cam and crank)
- Removal
  Shift the lever in the arrowhead direction (a) and pull it out while pushing lock (b).
- Installation
  Insert the connector and then shift the lever in the arrowhead direction (f).



Pm clinic service

Machine model	Model number	Service meter
☐ PC340LC-7E0 ☐ PC340NLC-7EO		h
User name	**Date of execution**	**Inspector**
	/ /	

Specifications		
Main components	**Attachments**	**Shoe width**
Boom ☐ Standard ☐ ( ) Arm ☐ Standard ☐ ( ) Bucket ☐ Standard ☐ ( )	☐ Breaker ☐ ( ) ☐ ( )	☐ 600 mm ☐ 700 mm ☐ ( )

Check of oil/coolant level		
☐ Radiator coolant ☐ Engine oil ☐ Hydraulic oil	When necessary ☐ Damper case oil ☐ Final drive case oil	☐ Machinery case oil ☐ ( )

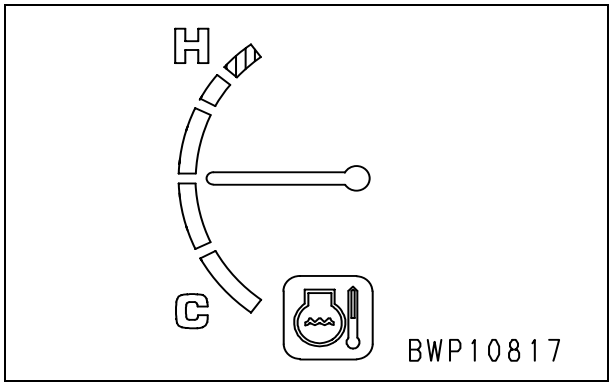
Ambient temperature	Altitude
°C	m

Operator's opinion

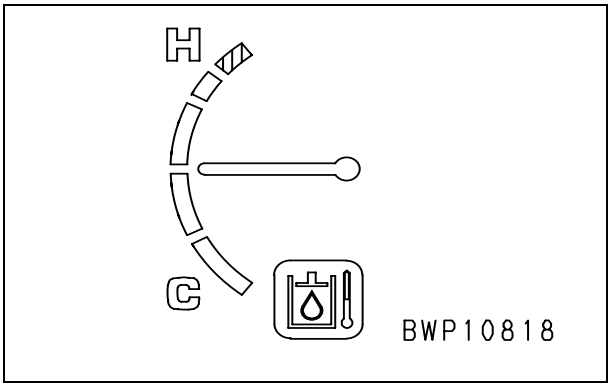
Result of visual inspection

Mechanical systems abnormality record				Electrical systems abnormality record			
A000N1	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h
AA10NX	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h
AB00KE	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h
B@BAZG	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h
B@BAZK	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h
B@BCNS	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h
B@BCZK	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h
B@HANS	Times/1st time	h/Latest	h		Times/1st time	h/Latest	h

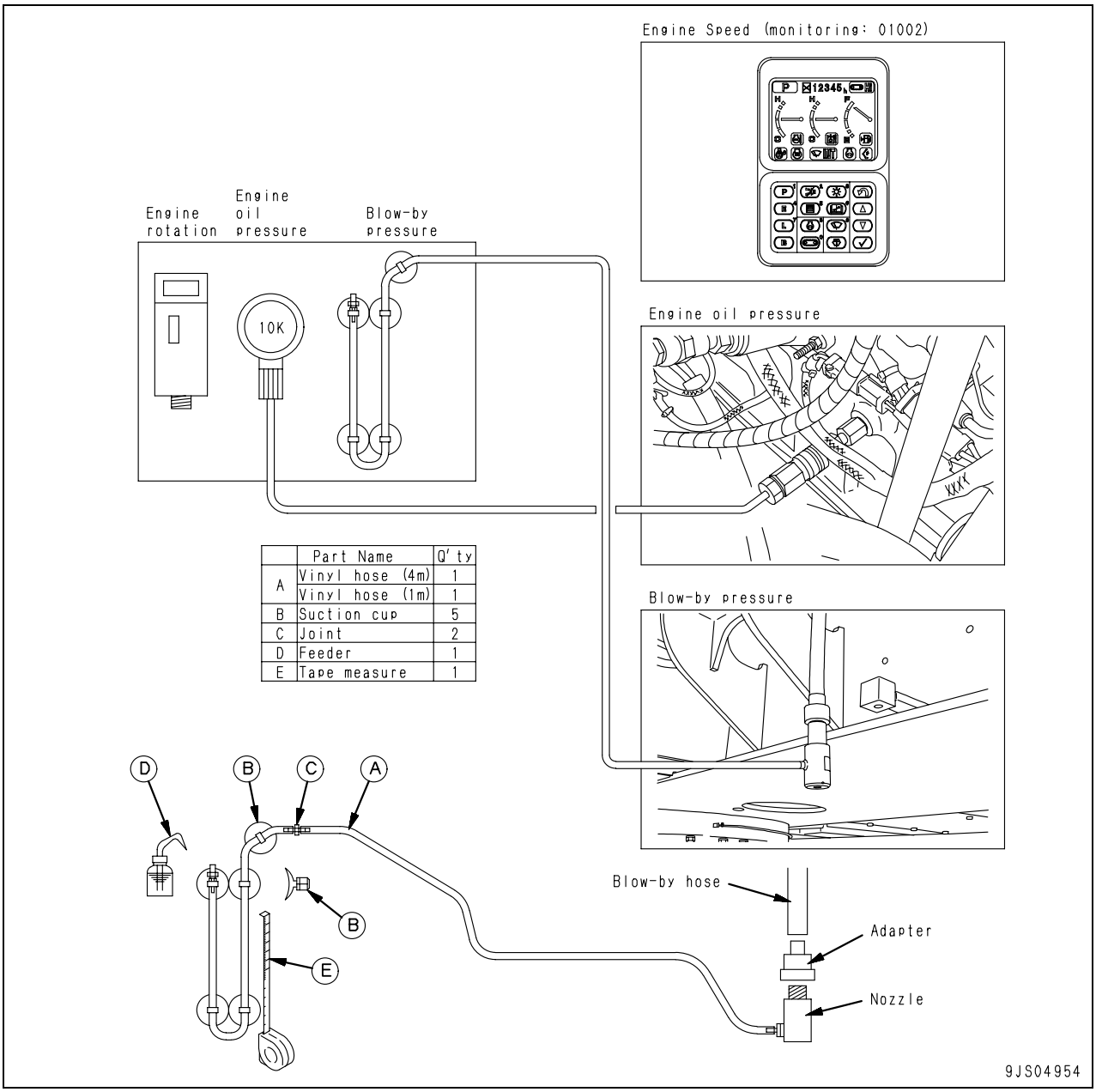
Max. range of engine coolant temperature gauge



Max. range of hydraulic oil temperature gauge

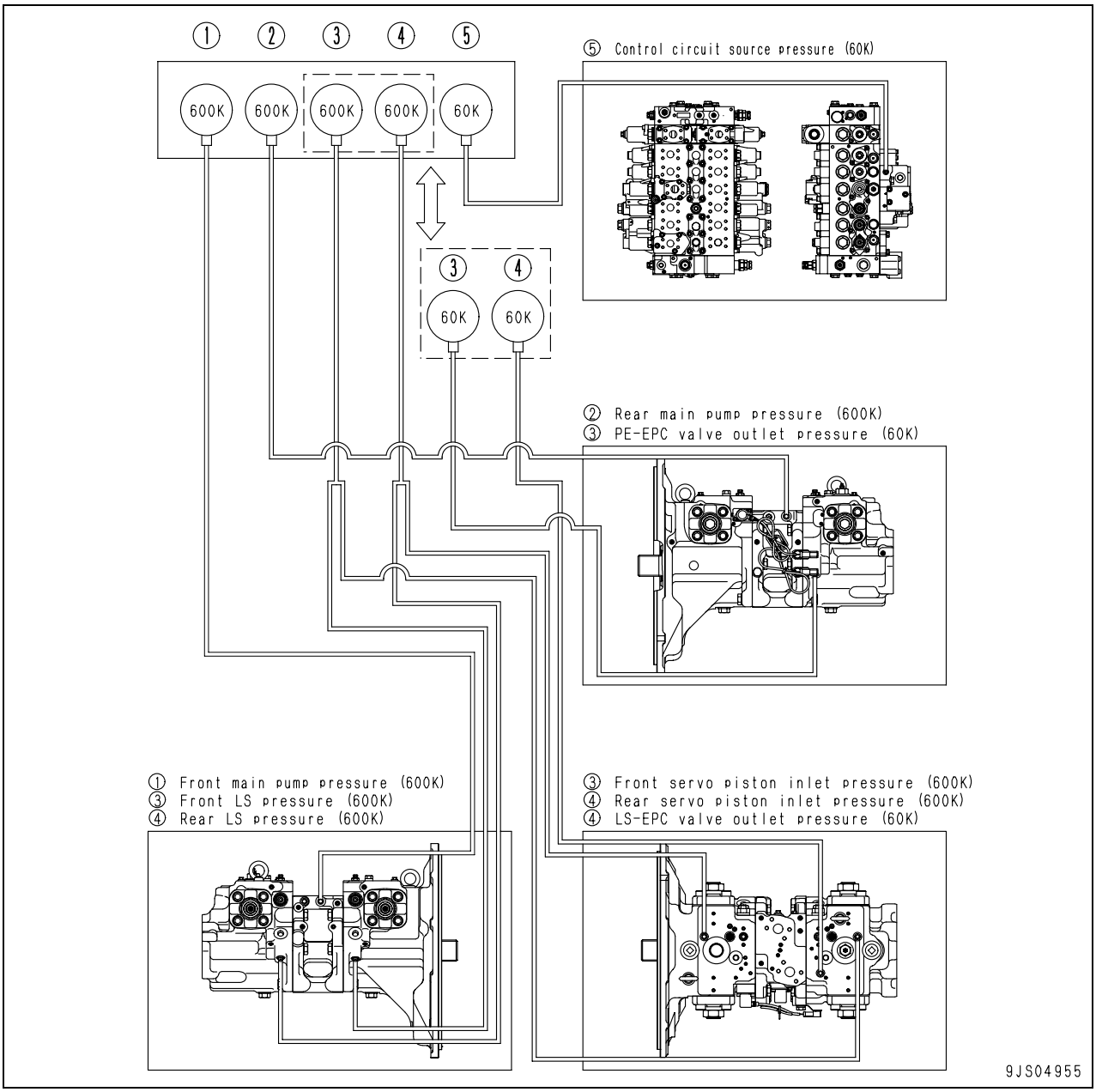


Items related to engine



	Part Name	Q'ty
A	Vinyl hose (4m)	1
	Vinyl hose (1m)	1
B	Suction cup	5
C	Joint	2
D	Feeder	1
E	Tape measure	1

Items related to oil pressure



Model	Serial No.	Service meter reading	Client user's name	Implemented on:	Inspected by:

1. Engine

No.	Condition setting					Measurement item	Unit	Standard value		Measured value	Judgement
	Fuel dial	Working mode	Auto decelerator	One-touch power max. switch	Work equipment operation			New machine	Failure judgement		
1	Full	P	OFF	OFF	Operating travel control lever (Do not travel machine)	Engine rotation	rpm	1,930 – 2,130	—		Good / No good
2						Engine oil pressure	MPa{kg/cm²}	0.36 – 0.61{3.5– 6.0}	0.18{1.8}		Good / No good
3	Low				All control levers in NEUTRAL	Engine rotation	rpm	950 – 1,050	—		Good / No good
4						Engine oil pressure	MPa{kg/cm²}	Min. 0.10{Min. 1.0}	0.07{0.7}		Good / No good
5	Full			ON	Arm (extended) relief	Engine rotation	rpm	1,770 – 1,970	—		Good / No good
6						Blow-by pressure	kPa{mmH$_2$O}	Max. 1.0{Max. 100}	2.0{200}		Good / No good
7			ON	OFF	All control levers in NEUTRAL	Engine rotation	rpm	1,300 – 1,500	—		Good / No good

2. Work equipment speed

Hydraulic oil temperature (45 – 55°C)

No.	Condition setting			Measurement item			Unit	Standard value				Measured value	Judgement
								PC300, 300LC-7E0		PC350, 350LC-7E0			
	Fuel dial	Working mode	Work equipment posture					New model	Failure judgement	New model	Failure judgement		
1	Full	P	No load, fully extended	Boom RAISE			Sec.	3.3 – 4.1	Max. 4.5	3.4 – 4.2	Max. 4.6		Good / No good
2			Boom held level	Arm DUMPING				2.6 – 3.2	Max. 3.5	2.9 – 3.5	Max. 3.7		Good / No good
3				Arm DIGGING				3.4 – 4.2	Max. 4.5	3.4 – 4.2	Max. 4.5		Good / No good
4		E						3.6 – 4.6	Max. 4.9	3.5 – 4.5	Max. 4.8		Good / No good
5		(※L)						4.4 – 5.4	Max. 5.7	4.4 – 5.4	Max. 5.7		Good / No good
6		P	Boom and arm held level	Bucket DIGGING				2.9 – 3.5	Max. 3.8	2.9 – 3.5	Max. 3.8		Good / No good
7			Fully extended	Swing (5 turns)		Right		28.7 – 34.5	Max. 38	28.7 – 34.5	Max. 38		Good / No good
						Left							Good / No good
8			Track shoe raised at one side	Travel (5 turns)	Lo	Right		44.0 – 66.0 LC: 46.5 – 69.5	42.0 – 70.0 LC: 45.0 – 74.5	44.0 – 66.0 LC: 46.5 – 69.5	42.0 – 70.0 LC: 45.0 – 74.5		Good / No good
						Left							Good / No good
					(※Mi)	Right		33.5 – 44.5 LC: 35.5 – 47.5	31.5 – 48.5 LC: 34.0 – 51.5	33.5 – 44.5 LC: 35.5 – 47.5	31.5 – 48.5 LC: 34.0 – 51.5		Good / No good
						Left							Good / No good
					Hi	Right		30.0 – 34.0 LC: 32.0 – 36.0	28.0 – 39.0 LC: 32.0 – 41.5	30.0 – 34.0 LC: 32.0 – 36.0	28.0 – 39.0 LC: 32.0 – 41.5		Good / No good
						Left							Good / No good

※ : The "Mi" and "L" modes are on the multi-monitor specification machine only.

3. Work equipment hydraulic drift amount

Hydraulic oil temperature (45 – 55°C)

No.	Condition setting			Measurement item	Unit	Standard value				Measured value	Judgement
						PC300, 300LC-7E0		PC350, 350LC-7E0			
	Fuel dial	Working mode	Work equipment posture			New model	Failure judgement	New model	Failure judgement		
1	Engine stop		Boom and arm held level, Bucket loaded	Hydraulic drift amount at bucket tooth tip (15 min.)	mm	450	Max. 675	550	Max. 825		Good / No good

4. Inspection of hydraulic circuit

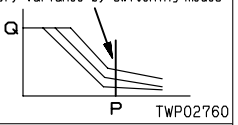
No.	Part to be checked	Condition setting						① 600 kg/cm² F main pump	② 600 kg/cm² R main pump	③ 600 kg/cm² F pump LS	④ 600 kg/cm² R pump LS	⑤ 60 kg/cm² Control circuit pressure	Remarks
		Fuel dial	Working mode	Auto-decelerator	One-touch power max. switch	Work equipment operation							
1	Self-decompression valve	Full	P	OFF	OFF	Arm dumping relief		■		■	■	→	Circuit pressure 3.2 MPa {33 kg/cm²}
2	Main relief valve											■	34.8 → 37.3 MPa
3	(When power increased)				ON			↓	↓	↓	↓	■	{355 → 380 kg/cm²}
4	LS valve (LS differential pressure valve)				OFF	Neutral						■	Main–LS=2.9 MPa{30 kg/cm²} (LS differential pressure ≒ Unload pressure)
						Travel without load, engine at Hi idling and control lever at half stroke	Right		■		■	■	Main–LS=2.5 MPa{25.0 kg/cm²} (LS pressure)
							Left	■		■		■	
5	Swing safety valve					Swing lock switch ON	Right relief			■	■	■	30.9 MPa {315 kg/cm²}
							Left relief			■	■	■	
6	Main relief valve, Travel safety valve, Travel interlocking valve					Track shoe locked	Right forward		■	■	■	■	38.2 MPa {390 kg/cm²}
							Right reverse		■	■	■	■	
							Left forward	■		■	■	■	
							Left reverse	■		■	■	■	

■ Connection to be changed to hoses ③ and ④

No.	Part to be checked	Condition setting					① 600 kg/cm² F main pump	② 600 kg/cm² R main pump	③ 600 kg/cm² F pump servo	④ 600 kg/cm² R pump servo	⑤ 60 kg/cm² Control circuit pressure	Remarks
		Fuel dial	Working mode	Auto-decelerator	One-touch power max. switch	Work equipment operation						
7	Servo	Full	P	OFF	OFF	Arm dumping relief					■	Main servo pressure balance ③ / ① ≒ ④ / ② ≒ 3/5

■ Connection to be changed to hoses ③ and ④, and gauge to be replaced with one with 60 K capacity.

No.	Part to be checked	Condition setting						① 600 kg/cm² F main pump	② 600 kg/cm² R main pump	③" 60 kg/cm² PC EPC	④" 60 kg/cm² LS EPC	⑤ 60 kg/cm² Control circuit pressure	Remarks <Reference value: kg/cm²>
		Fuel dial	Working mode	Auto-decelerator	One-touch power max. switch	Work equipment operation	Travel lever						
8	PC-EPC valve	Low	P	OFF	OFF	Neutral	Neutral	■	■		■	■	<32> Delivery variance by switching modes
		Full						■	■		■	■	< 0>
			E					■	■		■	■	<10>
			(※ L)					■	■		■	■	<11>
			B					■	■		■	■	<10>
9	LS-EPC valve	Full	P	OFF	OFF	Neutral	Neutral			■		←	At neutral: 2.9 MPa {30 kg/cm²}
						Arm dumping relief	Neutral			■		←	When 2 pumps relieved: 0 MPa {0 kg/cm²}
			(※ L)				Right lever at halfway position			■		■	When one pump relieved: 1.5 MPa {15 kg/cm²}
							Left lever at halfway position			■		■	
						Arm IN relief	Right lever at halfway position			■		■	
							Left lever at halfway position			■		■	



※ : The "L" mode is on the multi-monitor specification machine only

Do not travel the machine.

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00537-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

40 Troubleshooting

General information on troubleshooting

Information related to troubleshooting 2
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

Information related to 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?

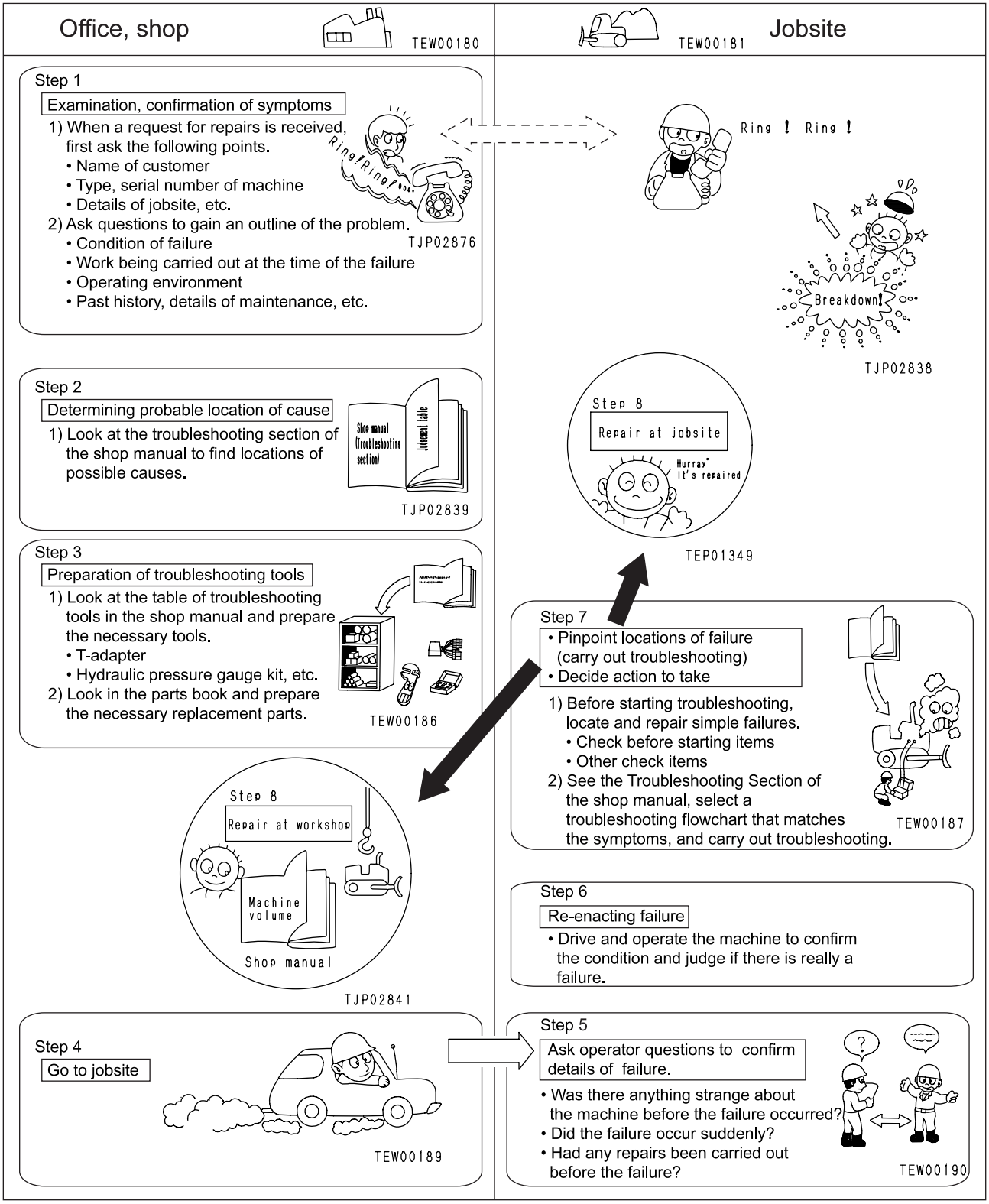
3. Check before troubleshooting
   1) Is there any sign of irregularities of the machine?
   2) Make checks before starting day's work.
   3) Make checks of other items.
   4) Other maintenance items can be checked externally, so check any item that is considered to be necessary.

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 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 for 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.
   Carry out the troubleshooting for the corresponding [**Display of code**] according to the displayed failure code.

2. **Procedure for troubleshooting to be taken when failure code is recorded in abnormality record:**
   If an action code is not displayed on the machine monitor, check a failure code with the abnormality record function of the machine monitor.
   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**“.

Possible problems and troubleshooting No.

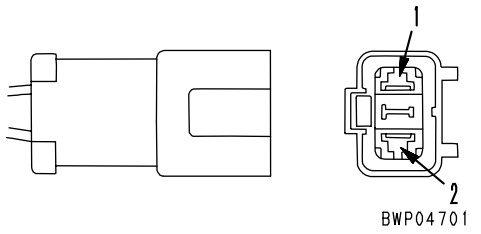
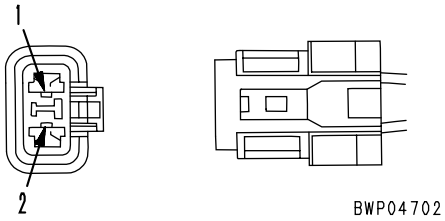
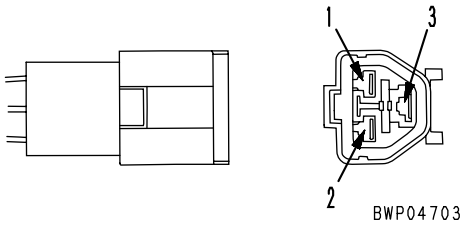
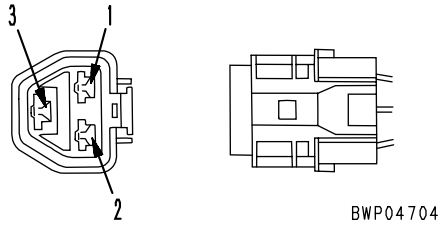
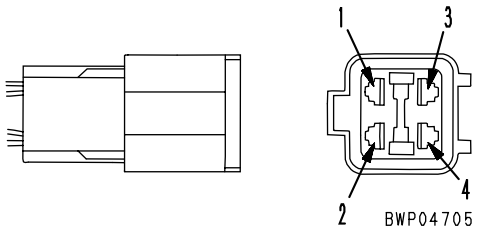
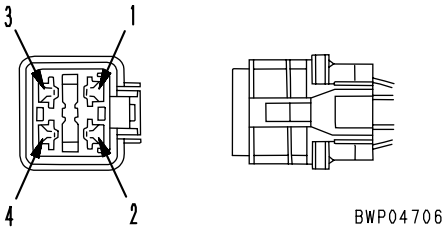
No.	Phenomena looking like troubles		Troubleshooting			
			Display of code	E-mode	H-mode	S-mode
Phenomena related to action code/failure code						
1	An action code is displayed on machine monitor.		**According to displayed code**			
2	When abnormality record is checked, failure code is displayed in electrical system abnormality record					
3	When abnormality record is checked, failure code is displayed in mechanical system abnormality record					
Phenomena related to engine						
4	Starting performance is poor (it always starts up slowly)					**S-1**
5	Engine does not start	Engine does not rotate		**E-1**		**S-2 a)**
6		Engine rotates, but exhaust gas does not come out				**S-2 b)**
7		Engine emits exhaust gas, but it does not start				**S-2 c)**
8	Engine does not pick up smoothly (follow-up performance is poor)					**S-3**
9	Engine stops during operations				**H-2**	**S-4**
10	Engine rotation is unstable (it hunts).					**S-5**
11	Engine lacks output or power				**H-1**	**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, coolant spurts back or coolant level goes down					**S-11**
17	Oil pressure drops					**S-12**
18	Oil level rises (Entry of coolant or fuel)					**S-13**
19	Coolant temperature becomes too high (overheating)					**S-14**
20	Abnormal noise is made					**S-15**
21	Vibration is excessive					**S-16**
22	Auto-decelerator does not operate			**E-2**	**H-5**	
23	Automatic warm-up system does not operate			**E-3**		
24	Preheater does not operate			**E-4**		
Phenomena related to work equipment, swing, and travel						
25	Speed or power of whole work equipment, travel, and swing is low				**H-1**	**S-6**
26	Engine speed lowers extremely or engine stalls				**H-2**	**S-4**
27	Work equipment, swing, and travel mechanism do not move			**E-5**	**H-3**	
28	Abnormal sound comes out from around hydraulic pump				**H-4**	
29	Fine control performance or response is low				**H-6**	
Phenomena related to work equipment						
30	Speed or power of boom is low			**E-18,19**	**H-7**	
31	Speed or power of arm is low			**E-20,21**	**H-8**	
32	Speed or power of bucket is low			**E-22,23**	**H-9**	
33	Work equipment does not move singly				**H-10**	
34	Hydraulic drift of work equipment is large				**H-11**	
35	Time lag of work equipment is large				**H-12**	
36	When part of work equipment is relieved singly, other parts of work equipment move				**H-13**	

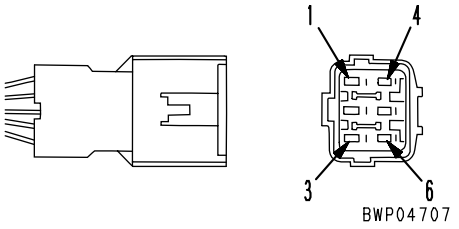
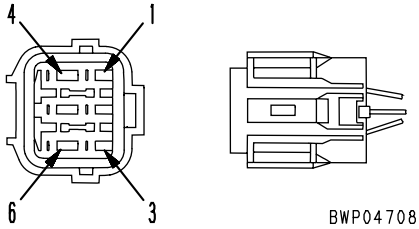
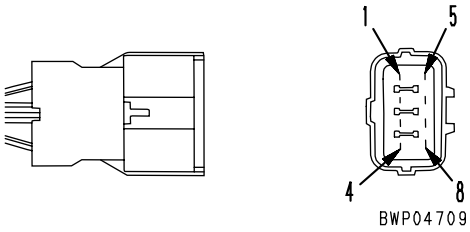
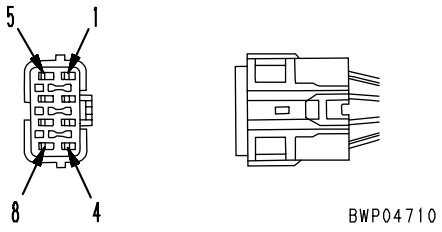
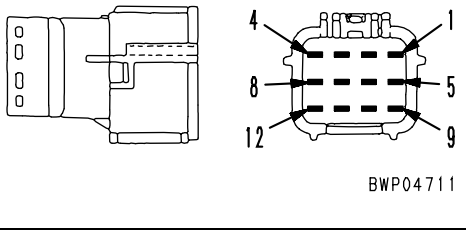
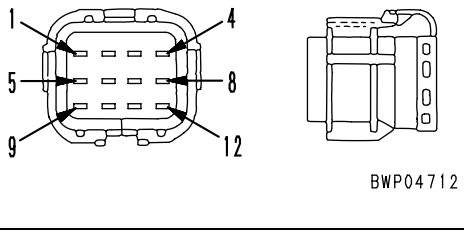
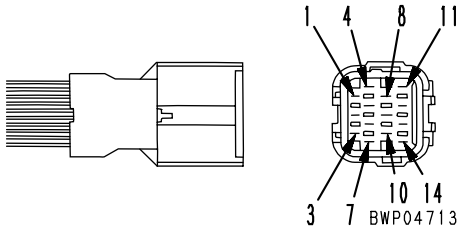
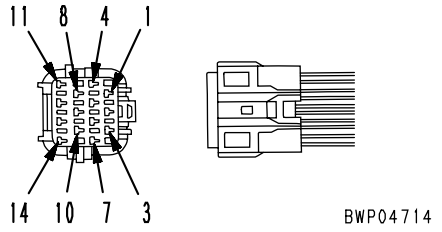
No.	Phenomena looking like troubles	Troubleshooting			
		Display of code	E-mode	H-mode	S-mode
37	Power maximizing function does not work.	**E-6, 18 - 23**		**H-14**	
Phenomena related to compound operation					
38	In compound operation of work equipment, speed of part loaded more is low			**H-15**	
39	When machine swings and raises boom simultaneously, boom rising speed is low			**H-16**	
40	When machine swings and travels simultaneously, travel speed lowers largely			**H-17**	
Phenomena related to travel					
41	Machine deviates during travel			**H-18**	
42	Travel speed is low		**E-25**	**H-19**	
43	Machine is not steered well or steering power is low		**E-25,26**	**H-20**	
44	Travel speed does not change or travel speed is low or high		**E-25**	**H-21**	
45	Travel system does not move (only one side)			**H-22**	
Phenomena related to swing					
46	Upper structure does not swing		**E-24**	**H-23**	
47	Swing acceleration or swing speed is low			**H-24**	
48	Upper structure overruns remarkably when it stops swinging			**H-25**	
49	Large shock is made when upper structure stops swinging			**H-26**	
50	Large sound is made when upper structure stops swinging			**H-27**	
51	Hydraulic drift of swing is large			**H-28**	
Phenomena related to machine monitor (Operator menu: ordinary screen)					
52	Machine monitor does not display any items		**E-7**		
53	Machine monitor does not display some items		**E-8**		
54	Contents of display by machine monitor are different from applicable machine		**E-9**		
55	Radiator coolant level monitor lights up in red during check before starting	**B@BCZK**			
56	Engine oil level monitor lights up in red during check before starting	**B@BAZK**			
57	Maintenance interval monitor lights up in red during check before starting	**See the Operation and Maintenance Manual.**			
58	Charge level monitor lights up in red while engine is running	**AB00KE**			
59	Fuel level monitor lights up in red while engine is running		**E-10**		
60	Air cleaner clogging monitor lights up in red while engine is running	**AA10NX**			
61	Engine coolant temperature monitor lights up in red while engine is running	**B@BCNS**			
62	Hydraulic oil temperature monitor lights up in red while engine is running	**B@HANS**			
63	Engine coolant temperature gauge does not indicate normally		**E-11**		
64	Hydraulic oil temperature gauge does not indicate normally		**E-12**		
65	Fuel level gauge does not indicate normally		**E-13**		
66	Swing lock monitor does not indicate normally		**E-14**		
67	Machine monitor display anything even when operated on monitor switch section		**E-15**		
68	Windshield wiper and window washer do not operate		**E-16**		
69	Machine push-up function does not work normally		**E-17**		

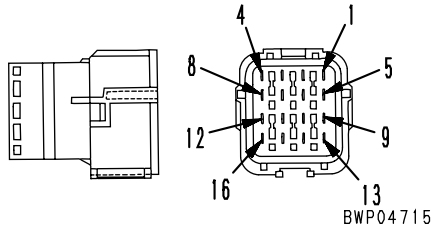
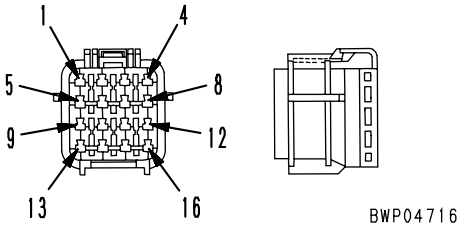
No.	Phenomena looking like troubles	Troubleshooting			
		Display of code	E-mode	H-mode	S-mode
Phenomena related to machine monitor (Service menu: special functions screen)					
70	Monitoring function does not display “Boom RAISE“ normally		**E-18**		
71	Monitoring function does not display “Boom LOWER“ normally		**E-19**		
72	Monitoring function does not display “Arm IN“ normally		**E-20**		
73	Monitoring function does not display “Arm OUT“ normally		**E-21**		
74	Monitoring function does not display “Bucket CURL“ normally		**E-22**		
75	Monitoring function does not display “Bucket DUMP“ normally		**E-23**		
76	Monitoring function does not display “Swing“ normally		**E-24**		
77	Monitoring function does not display “Travel“ normally		**E-25**		
78	Monitoring function does not display “Travel Steering“ normally		**E-26**		
79	Monitoring function does not display “Service“ normally		**E-27**		
Phenomena related to KOMTRAX					
80	KOMTRAX system does not operate normally		**E-28**		
Other phenomena					
81	Air conditioner does not operate		**E-29**		
82	Travel alarm does not sound or does not stop sounding		**E-30**		
83	Horn does not sound		**E-31**		

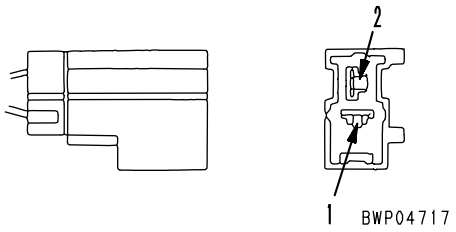
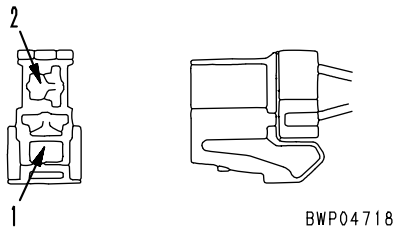
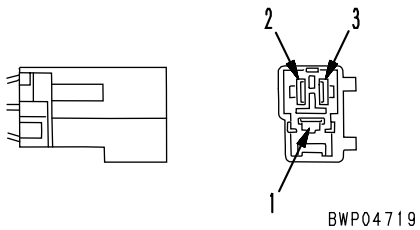
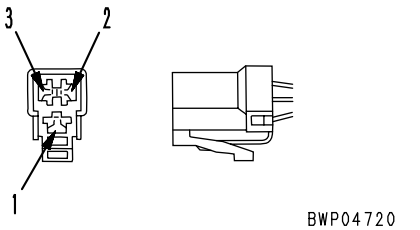
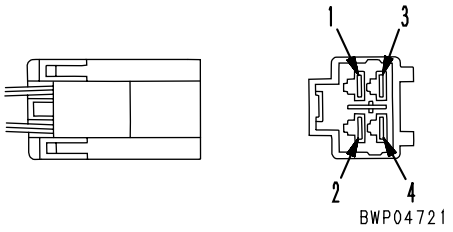
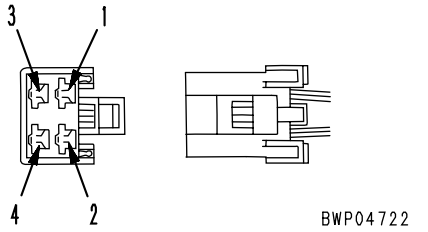
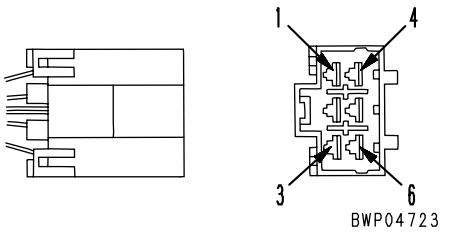
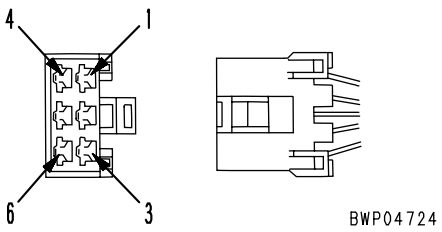
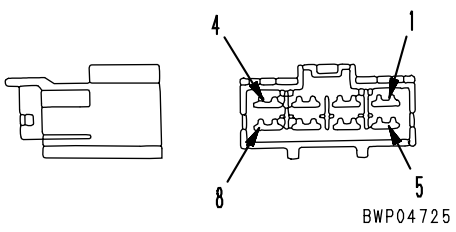
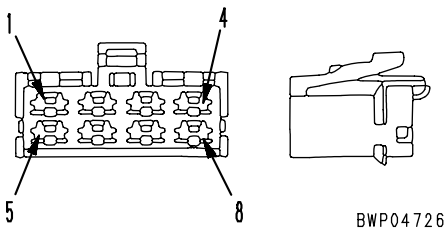
Connection table for connector pin numbers

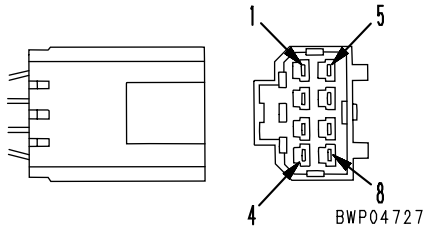
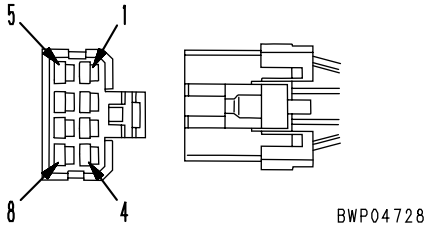
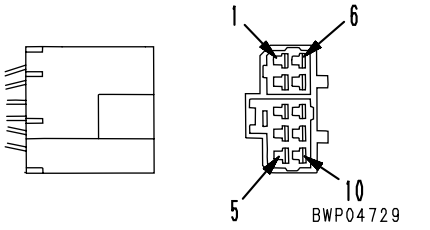
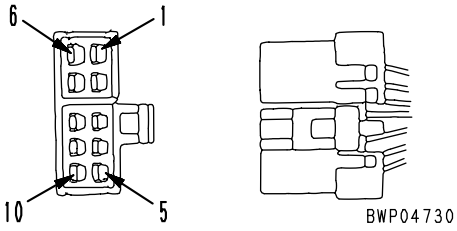
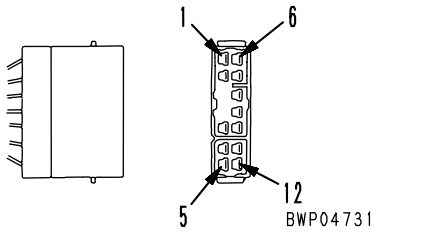
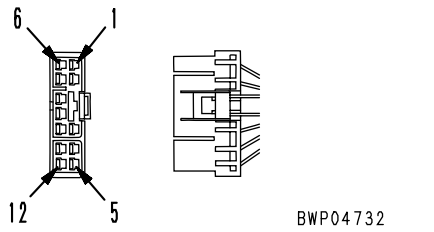
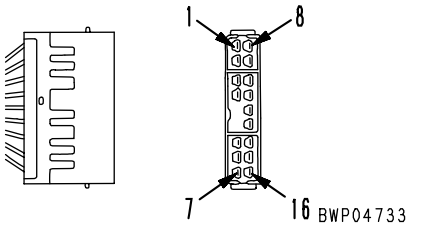
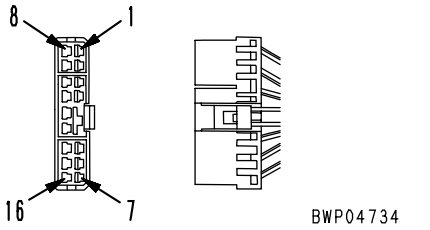
★ The terms male and female refer to the pins, while the terms male housing and female housing refer to the mating portion of the housing.

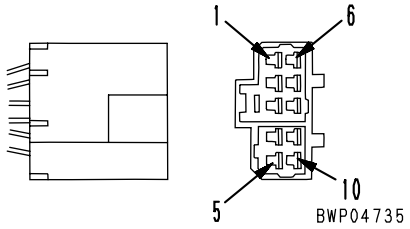
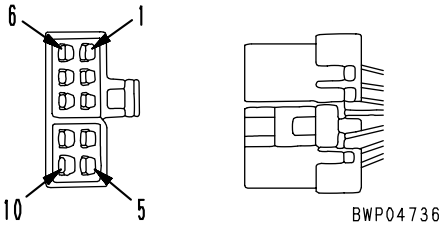
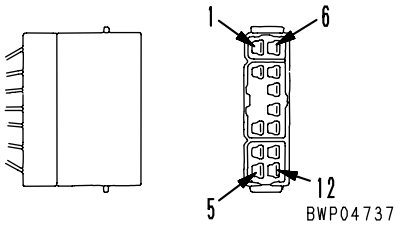
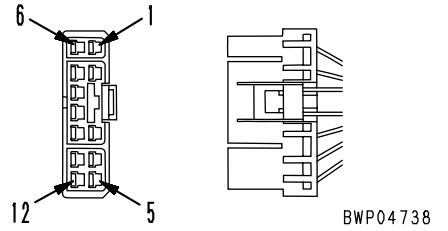
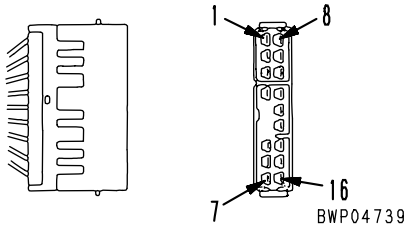
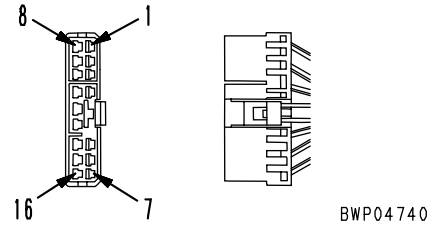
No.of pins	X type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
1	Part No.: 08055-00181	Part No.: 08055-00191	799-601-7010
2			799-601-7020
	Part No.: 08055-00282	Part No.: 08055-00292	
3			799-601-7030
	Part No.: 08055-00381	Part No.: 08055-00391	
4			799-601-7040
	Part 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	—

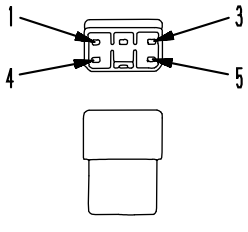
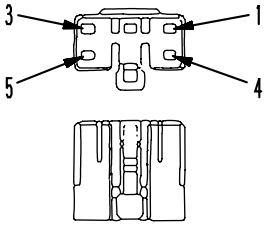
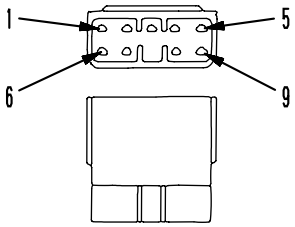
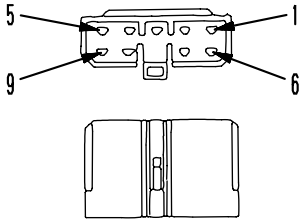
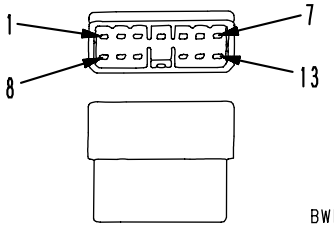
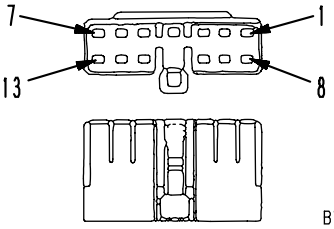
No.of pins	SWP type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
6			799-601-7050
	Part No.: 08055-10681	Part No.: 08055-10691	
8			799-601-7060
	Part No.: 08055-10881	Part No.: 08055-10891	
12			799-601-7310
	Part No.: 08055-11281	Part No.: 08055-11291	
14			799-601-7070
	Part No.: 08055-11481	Part No.: 08055-11491	

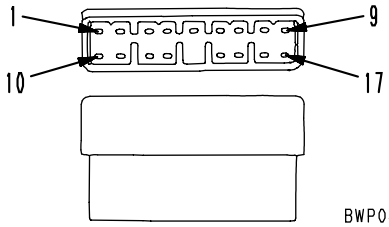
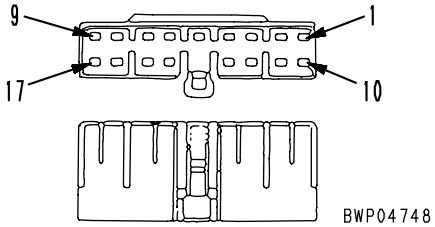
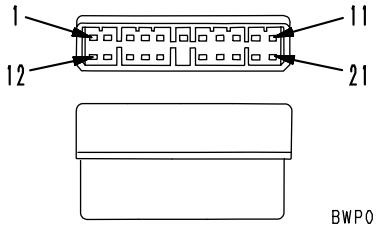
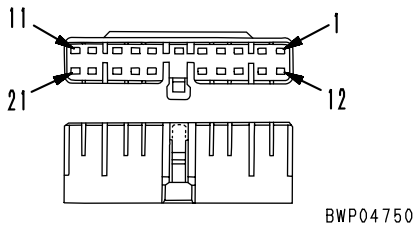
No. of pins	SWP type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
16			799-601-7320
	Part No.: 08055-11681	Part No.: 08055-11691	
—	Terminal part No.: • Electric wire size: 0.85 • Grommet: Black • Q'ty: 20	Terminal part No.: • Electric wire size: 0.85 • Grommet: Black • 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	—

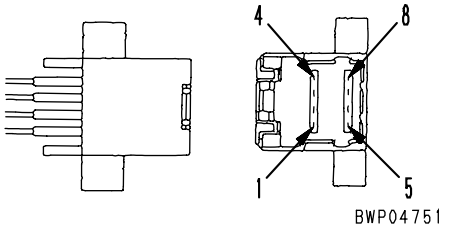
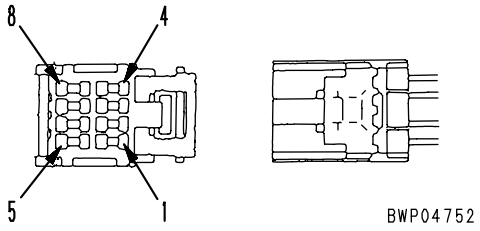
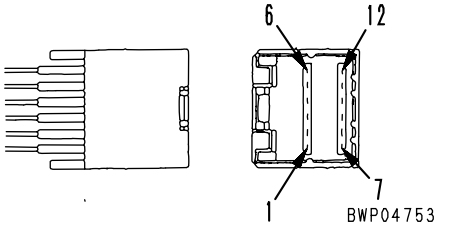
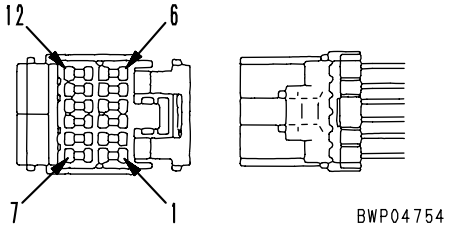
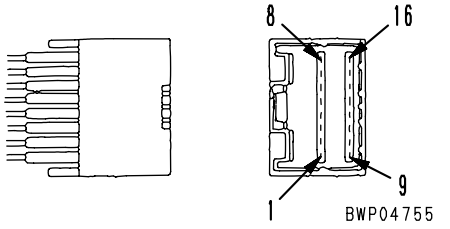
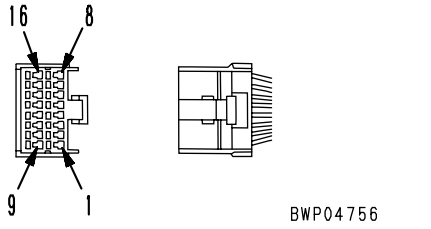
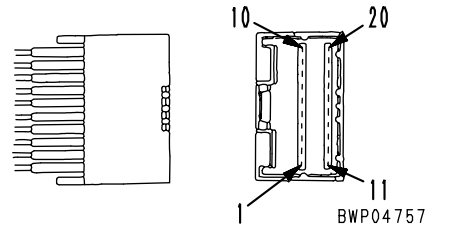
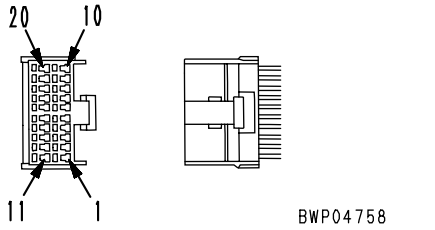
No.of pins	M type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
1	Part No.: 08056-00171	Part No.: 08056-00181	799-601-7080
2			799-601-7090
	Part No.: 08056-00271	Part No.: 08056-00281	
3			799-601-7110
	Part No.: 08056-00371	Part No.: 08056-00381	
4			799-601-7120
	Part 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	

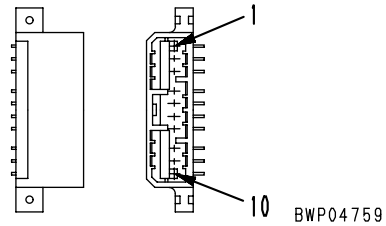
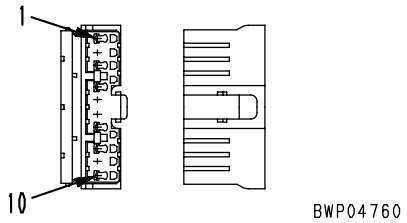
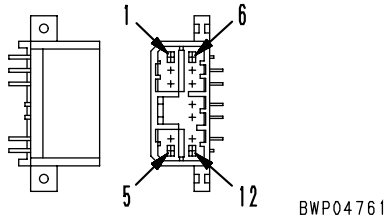
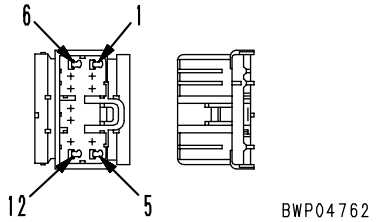
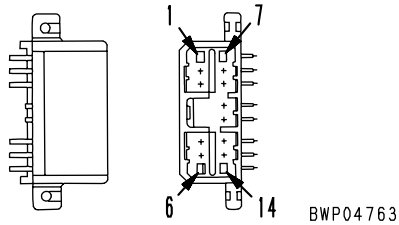
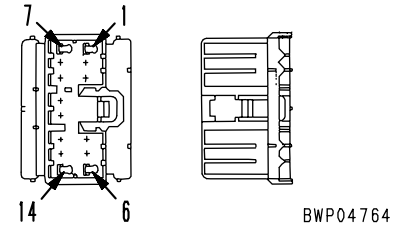
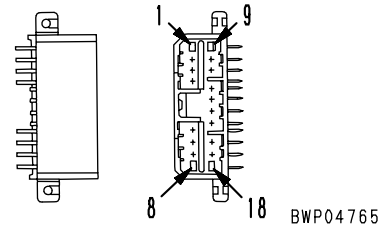
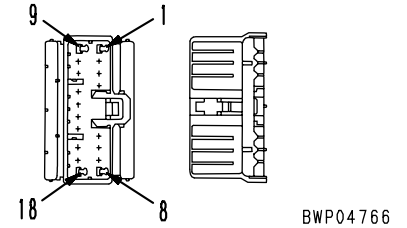
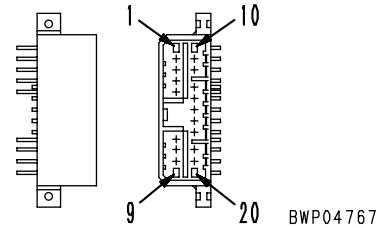
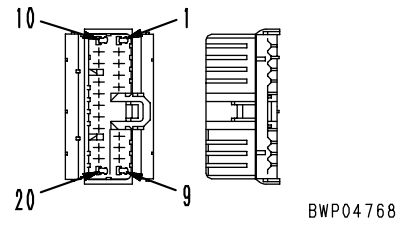
No.of pins	S type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10 (Blue)			—
	—	—	
12 (Blue)			799-601-7160
	Part No.: 08056-11272	Part No.: 08056-11282	
16 (Blue)			799-601-7170
	Part No.: 08056-11672	Part No.: 08056-11682	

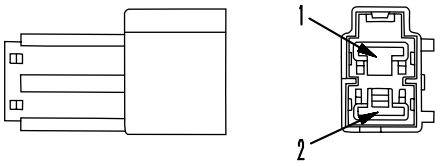
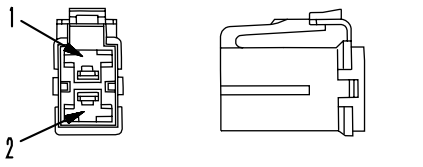
No.of pins	MIC type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
7	Body part No.: 79A-222-2640 (Q'ty: 5)	Body part No.: 79A-222-2630 (Q'ty: 5)	—
11	Body part No.: 79A-222-2680 (Q'ty: 5)	Body part No.: 79A-222-2670 (Q'ty: 5)	—
5	 BWP04741	 BWP04742	799-601-2710
	Body part 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)	

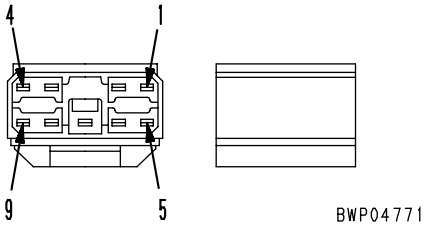
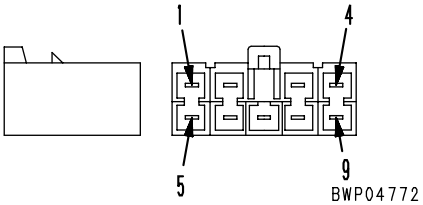
No.of pins	MIC type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
17			799-601-2730
	Body part No.: 79A-222-2730 (Q'ty: 2)	Body part No.: 79A-222-2720 (Q'ty: 2)	
21			799-601-2740
	Body part No.: 79A-222-2750 (Q'ty: 2)	Body part No.: 79A-222-2740 (Q'ty: 2)	
	Terminal part No.: 79A-222-2770 (Q'ty: 50)	Terminal part No.: 79A-222-2760 (Q'ty: 50)	—

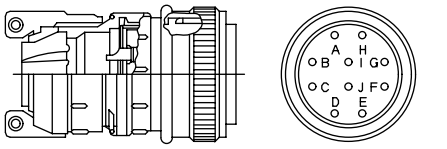
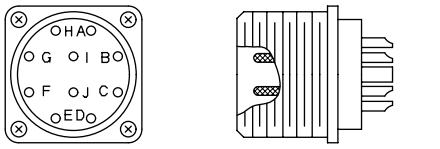
No.of pins	AMP040 type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			799-601-7180
	—	Housing part No.: 79A-222-3430 (Q'ty: 5)	
12			799-601-7190
	—	Housing part No.: 79A-222-3440 (Q'ty: 5)	
16			799-601-7210
	—	Housing part No.: 79A-222-3450 (Q'ty: 5)	
20			799-601-7220
	—	Housing part No.: 79A-222-3460 (Q'ty: 5)	

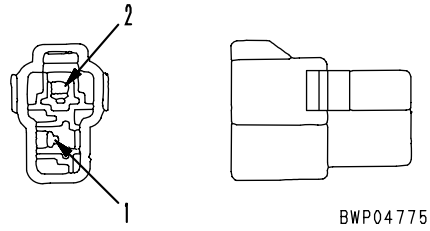
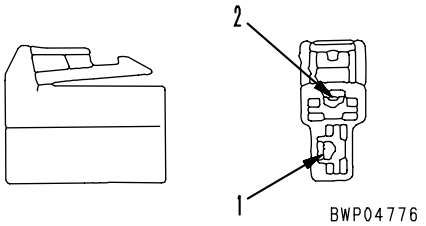
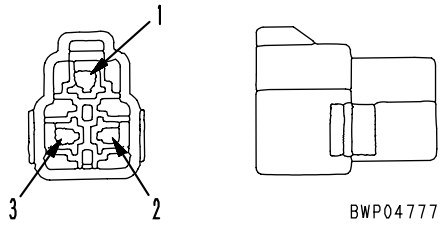
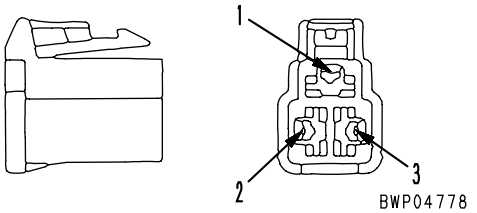
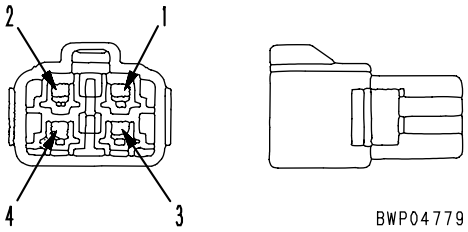
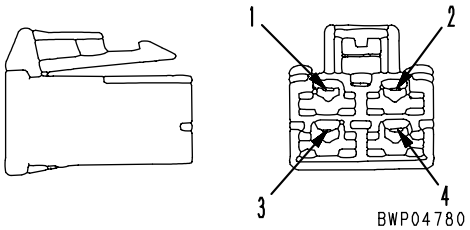
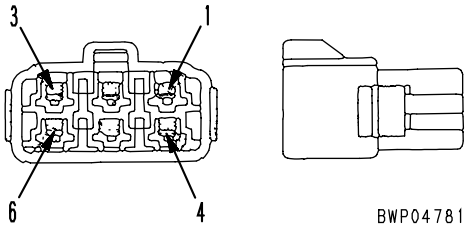
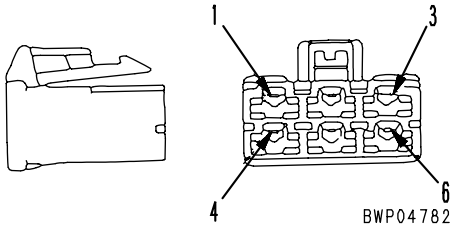
★ Terminal part No.: 79A-222-3470 (No relation with number of pins)

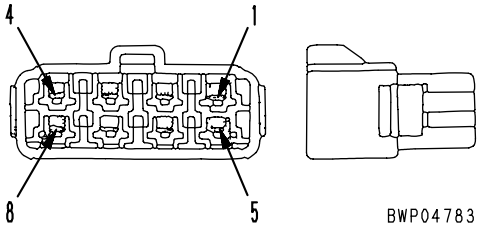
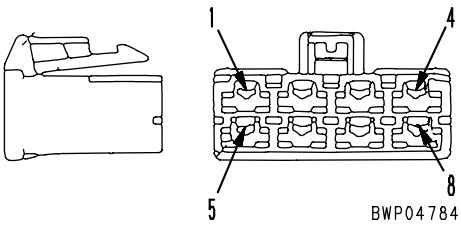
No.of pins	AMP070 type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10			799-601-7510
	—	Part No.: 08195-10210	
12			799-601-7520
	—	Part No.: 08195-12210	
14			799-601-7530
	—	Part No.: 08195-14210	
18			799-601-7540
	—	Part No.: 08195-18210	
20			799-601-7550
	—	Part No.: 08195-20210	

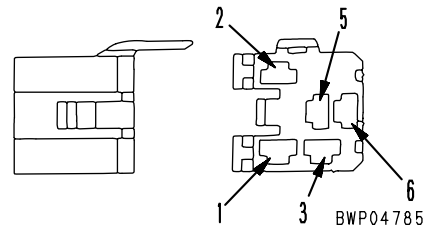
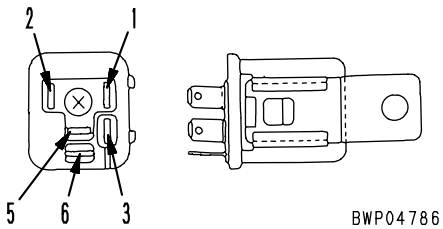
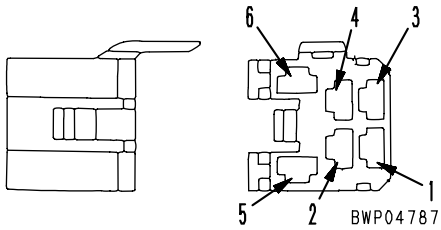
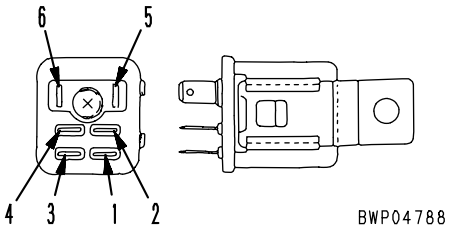
No.of pins	L type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
2	 BWP04769	 BWP04770	—
	—	—	

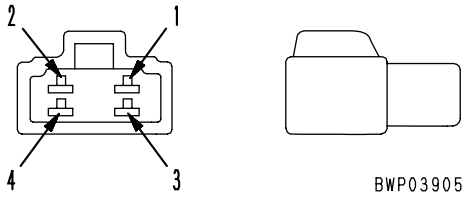
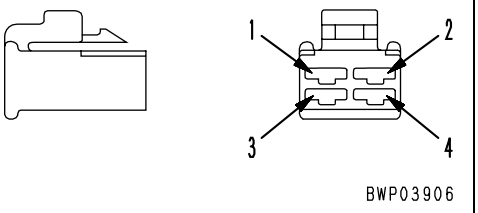
No.of pins	Connector for PA		
	Male (female housing)	Female (male housing)	T-adapter Part No.
9	 BWP04771	 BWP04772	—
	—	—	

No.of pins	Bendix MS connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10	 BWP04773	 BWP04774	799-601-3460
	—	—	

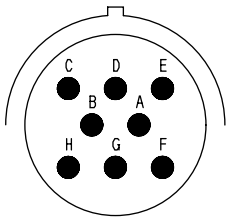
No.of pins	KES 1 (Automobile) connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
2			—
	Part No.: 08027-10210 (Natural color) 08027-10220 (Black)	Part No.: 08027-10260 (Natural color) 08027-10270 (Black)	
3			—
	Part No.:08027-10310	Part No.:08027-10360	
4			—
	Part No.: 08027-10410 (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)	

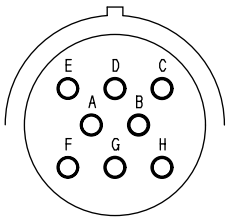
No.of pins	KES 1 (Automobile) connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			—
	Part No.: 08027-10810 (Natural color) 08027-10820 (Black)	Part No.: 08027-10860 (Natural color) 08027-10870 (Black)	

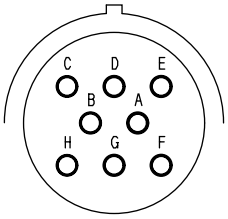
No.of pins	Connector for relay (Socket type)		
	Male (female housing)	Female (male housing)	T-adapter Part No.
5			799-601-7360
	—	—	
6			799-601-7370
	—	—	

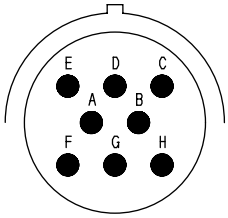
No.of pins	F type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
4	 BWP03905	 BWP03906	—
	—	—	

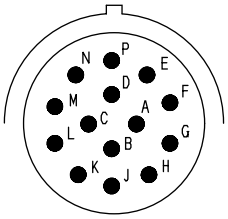
[The pin No. is also marked on the connector (electric wire insertion end)]

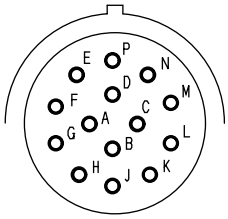
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<tr><td>Body (plug)</td><td>Body (receptacle)</td><td>T-adapter Part No.</td></tr>
<tr><td rowspan="4">18-8 (1)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="2">799-601-9210</td></tr>
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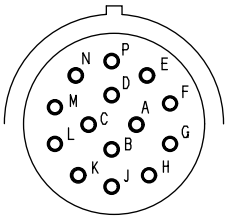
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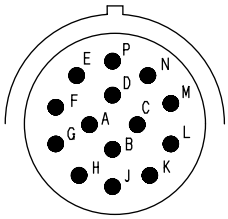
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<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td><td rowspan="2">799-601-9210</td></tr>
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BWP05003</td><td> 

BWP05004</td></tr>
<tr><td>Part No.: 08191-12201, 08191-12202, 08191-12205, 08191-12206</td><td>Part No.: 08191-13101, 08191-13102, 08191-13105, 08191-13106</td></tr>
<tr><td rowspan="4">18-14 (2)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="2">799-601-9220</td></tr>
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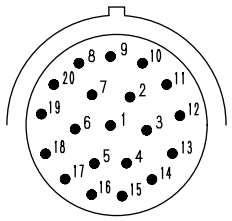
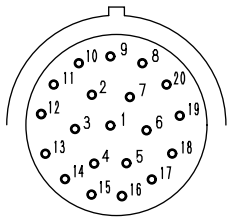
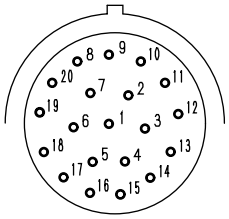
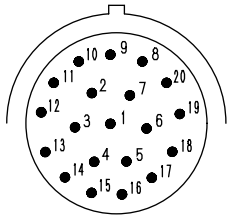
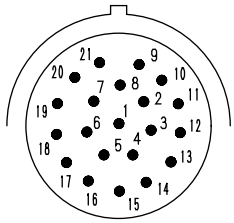
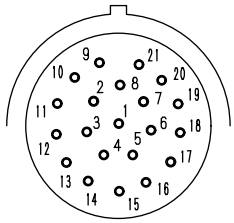
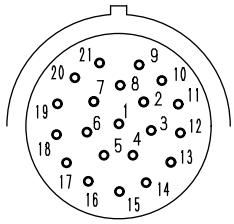
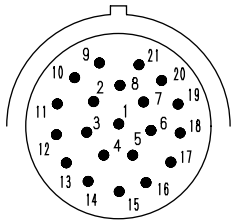
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<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td><td rowspan="2">799-601-9220</td></tr>
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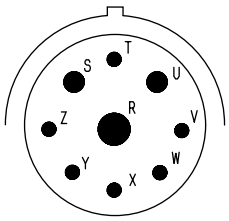
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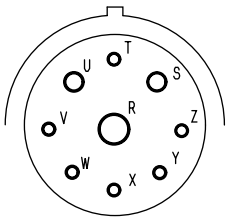
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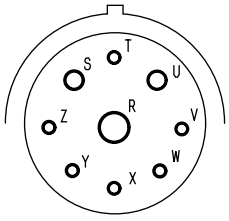
[The pin No. is also marked on the connector (electric wire insertion end)]

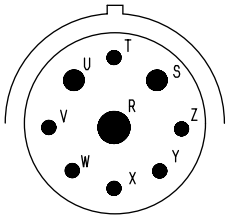
Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
18-20 (3)	Pin (male terminal)	Pin (female termial)	799-601-9230
	 BWP05009	 BWP05010	
	Part No.:08191-31201, 08191-31202	Part No.:08191-34101, 08191-34102	
	Pin (female terminal)	Pin (male termial)	799-601-9230
	 BWP05011	 BWP05012	
	Part No.:08191-32201, 08191-32202	Part No.:08191-33101, 08191-33102	
18-21 (4)	Pin (male terminal)	Pin (female termial)	799-601-9240
	 BWP05013	 BWP05014	
	Part No.:08191-41201, 08191-42202	Part No.:08191-44101, 08191-44102	
	Pin (female terminal)	Pin (male termial)	799-601-9240
	 BWP05015	 BWP05016	
	Part No.:08191-42201, 08191-42202	Part No.:08191-43101, 08191-43102	

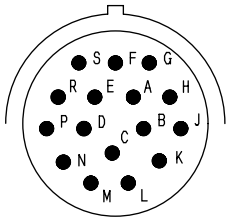
[The pin No. is also marked on the connector (electric wire insertion end)]

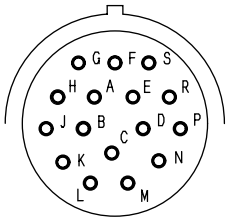
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<tr><td>Body (plug)</td><td>Body (receptacle)</td><td>T-adapter Part No.</td></tr>
<tr><td rowspan="4">24-9 (5)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="2">799-601-9250</td></tr>
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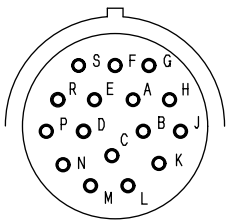
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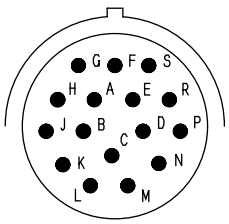
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<tr><td>Part No.:08191-51201, 08191-51202</td><td>Part No.:08191-54101, 08191-54102</td></tr>
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BWP05020</td></tr>
<tr><td rowspan="4">24-16 (6)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="2">799-601-9260</td></tr>
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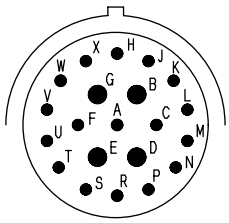
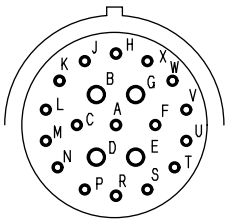
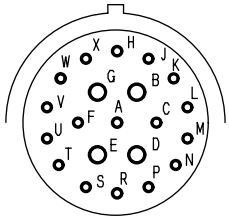
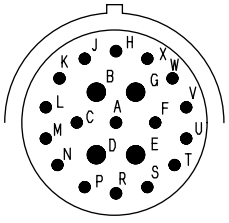
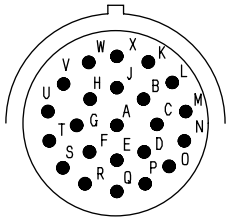
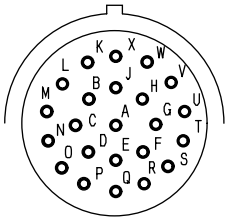
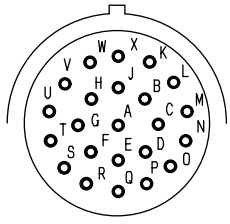
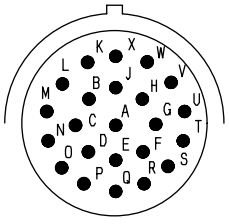
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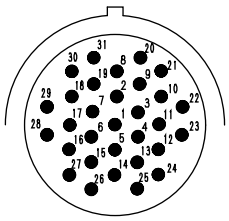
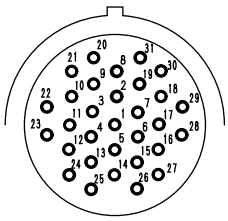
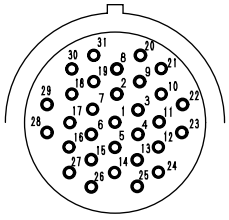
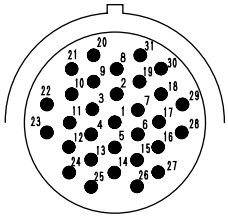
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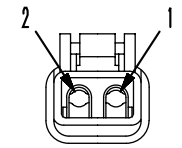
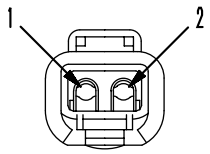
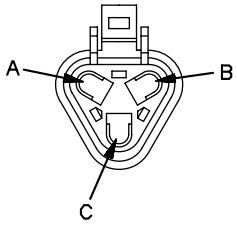
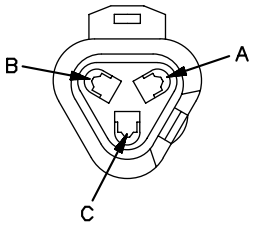
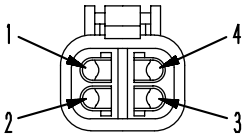
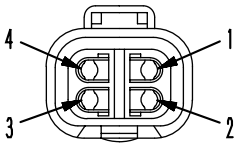
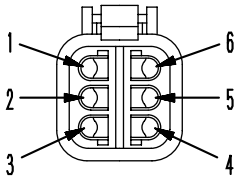
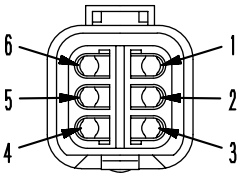
[The pin No. is also marked on the connector (electric wire insertion end)]

<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 termial)</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><td rowspan="2">799-601-9270</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td></tr>
<tr><td> 
BWP05027</td><td> 
BWP05028</td><td>Part No.: 08191-72201, 08191-72202,
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 termial)</td><td rowspan="2">799-601-9280</td></tr>
<tr><td> 
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><td rowspan="2">799-601-9280</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td></tr>
<tr><td> 
BWP05031</td><td> 
BWP05032</td><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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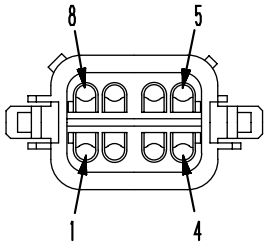
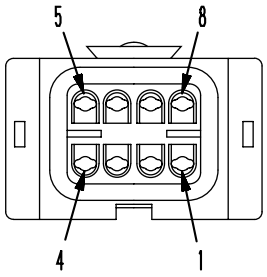
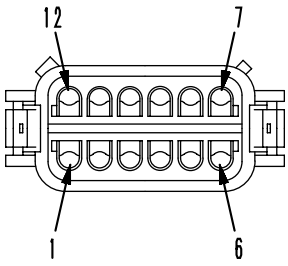
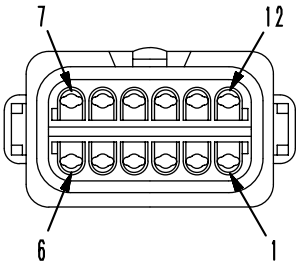
[The pin No. is also marked on the connector (electric wire insertion end)]

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
24-31 (9)	Pin (male termial)	Pin (female terminal)	799-601-9290
	 BWP05033	 BWP05034	
	Part No.: 08191-91203, 08191-91204, 08191-91205, 08191-91206	Part No.: 08191-94103, 08191-94104, 08191-94105, 08191-94106	
	Pin (female terminal)	Pin (male termial)	799-601-9290
	 BWP05035	 BWP05036	
	Part No.: 08191-92203, 08191-92204, 08191-92205, 08191-92206	Part No.: 08191-93103, 08191-93104, 08191-93105, 08191-93106	

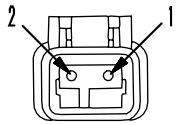
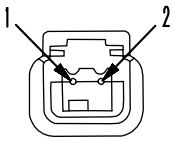
[The pin No. is also marked on the connector (electric wire insertion end)]

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)	

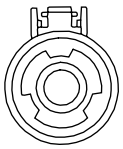
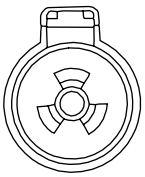
[The pin No. is also marked on the connector (electric wire insertion end)]

No.of pins	DT Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
8	 BWP05045	 BWP05046	8GR: 799-601-9060 8B: 799-601-9070 8G: 799-601-9080 8BR: 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	12GR:799-601-9110 12B: 799-601-9120 12G: 799-601-9130 12BR: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)	

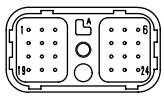
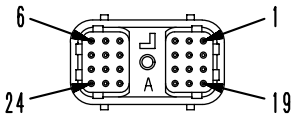
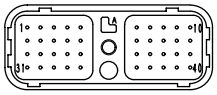
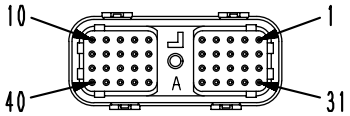
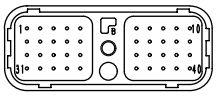
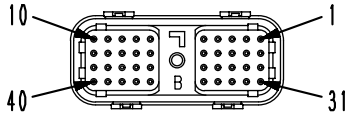
[The pin No. is also marked on the connector (electric wire insertion end)]

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.
2	 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		
	Body (plug)	Body (receptacle)	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																		●

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	
799-601-7070	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									●	●	●		●					
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														●	●			

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	
799-601-9240	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															●	●		●	
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	Adapter for engine (HPI-T2)	3																			●
795-799-5470	Adapter for engine (HPI-T2)	3																			●
795-799-5480	Adapter 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																		●

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00539-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

40 Troubleshooting

Troubleshooting by failure code (Display of code), Part 1

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Failure code [CA115] Eng Ne and Bkup Speed Sens Error 24

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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**	Air cleaner 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
E02	**B@HANS**	Hydr. Oil Overheat	MON	Mechanical system
E10	**CA111**	EMC Critical Internal Failure	ENG	Electrical system
E11	**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	**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
E11	**CA271**	IMV/PCV1 Short Error	ENG	Electrical system
E11	**CA272**	IMV/PCV1 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
E15	**CA428**	Water in Fuel Sensor High Error	ENG	Electrical system
E15	**CA429**	Water in Fuel Sensor Low 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

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
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
E15	**CA559**	Rail Press Low Error	ENG	Electrical system
E11	**CA689**	Ne Speed Sensor Error	ENG	Electrical system
E11	**CA731**	Bkup Speed Sens Phase Error	ENG	Electrical system
E10	**CA757**	All Persistent Data Lost Error	ENG	Electrical system
E11	**CA778**	Bkup Speed Sensor Error	ENG	Electrical system
E0E	**CA1633**	KOMNET Datalink Timeout 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
E15	**CA2265**	Electric Lift Pump High Error	ENG	Electrical system
E15	**CA2266**	Electric Lift Pump 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
—	**D110KB**	Battery Relay Drive S/C	PUMP	Electrical system
—	**D196KA**	Service Return Relay Disc.	PUMP	Electrical system
—	**D196KB**	Service Return Relay S/C	PUMP	Electrical system
E02	**DA25KP**	Press. Sensor Power Abnormality	PUMP	Electrical system
E0E	**DA2RMC**	Pump Comm. Abnormality	PUMP	Electrical system
—	**DA2SKQ**	Model Selection Abnormality	PUMP	Electrical system
E0E	**DAFRMC**	Monitor Comm. Abnormality	PUMP	Electrical system
—	**DHPAMA**	F Pump Press Sensor Abnormality	PUMP	Electrical system
—	**DHPBMA**	R Pump Press Sensor Abnormality	PUMP	Electrical system
—	**DHS3MA**	Arm Curl PPC Sen. Abnormality	PUMP	Electrical system
—	**DHS4MA**	Bucket Curl PPC Press Sensor Abnormality	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
—	**DW91KA**	Travel Junction Sol. Disc.	PUMP	Electrical system
—	**DW91KB**	Travel Junction Sol. S/C	PUMP	Electrical system
—	**DWJ0KA**	Merge-divider Sol. Disc	PUMP	Electrical system
—	**DWJ0KB**	Merge-divider 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
E02	**DXA0KA**	PC-EPC Sol. Disc.	PUMP	Electrical system
E02	**DXA0KB**	PC-EPC Sol. S/C	PUMP	Electrical system
—	**DXE0KA**	LS-EPC Sol. Disc.	PUMP	Electrical system
—	**DXE0KB**	LS-EPC Sol. S/C	PUMP	Electrical system
—	**DXE4KA**	Service Current EPC Disc.	PUMP	Electrical system
—	**DXE4KB**	Service Current EPC S/C	PUMP	Electrical system
—	**DY20KA**	Wiper Working Abnormality	MON	Electrical system

Action code	Failure code	Trouble (Displayed on screen)	Device in charge	Category of record
—	**DY20MA**	Wiper Parking Abnormality	MON	Electrical system
—	**DY2CKB**	Washer Drive S/C	MON	Electrical system
—	**DY2DKB**	Wiper Drive (For) S/C	MON	Electrical system
—	**DY2EKB**	Wiper Drive (Rev) S/C	MON	Electrical system

★ 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 displayed

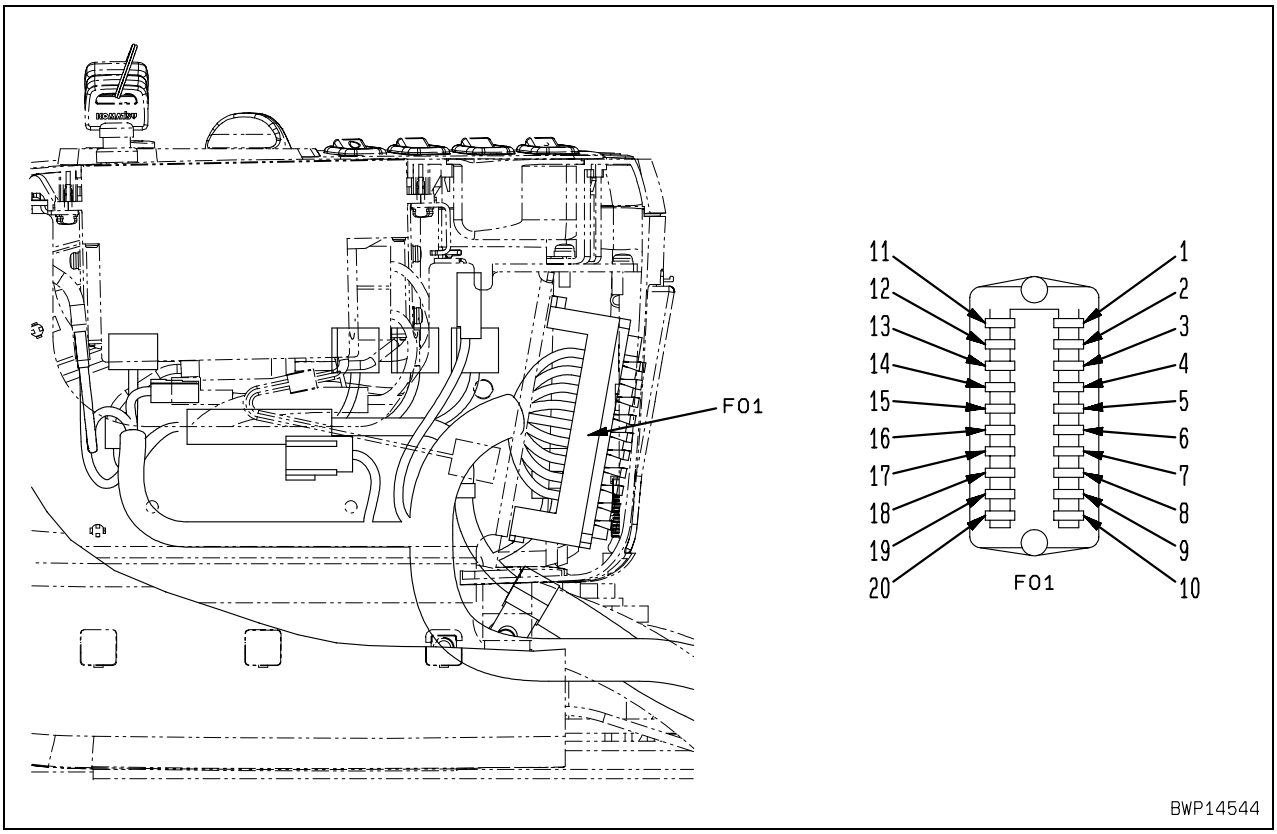
Connection table of fuse box

★ This connection table shows the devices to which each power supply of the fuse box supplies power (A switch power supply is a device which supplies power while the starting switch is in the ON position and a constant power supply is a device which supplies power while the starting switch is in the OFF and ON positions).

★ When carrying out troubleshooting related to the electrical system, you should check the fuses and fusible links to see if the power is supplied normally.

Type of power supply	Fusible link	Fuse No.	Fuse capacity	Destination of power
Switch power supply	F04 (65A)	1	10A	Pump controller
		2	20A	Pump controller (Solenoid power supply)
		3	20A	PPC oil pressure lock solenoid valve
				Machine monitor
				Wiper drive
		4	10A	Cigarette lighter
				Windshield washer motor
		5	10A	Horn relay, horn
Switch power supply	F04 (65A)	6	10A	Intake air heater
		7	10A	Rotary lamp
		8	20A	Right headlamp, working lamp (boom), working lamp (rear)
		9	10A	Radio
				Left knob switch (pump controller input)
		10	10A	(Spare)
Switch power supply	F04 (65A)	11	20A	Air conditioner unit
				Air conditioner compressor electromagnetic clutch
		12	20A	(Spare)
		13	20A	Headlamp
		14	10A	Optional power supply (1)
		15	10A	Travel alarm
				Optional power supply (2)
Constant power supply	F05 (30A)	16	10A	Radio (backup power supply)
				Room lamp
		17	20A	Starting switch
				Machine monitor
		18	10A	(Spare)
		19	30A	Engine controller
Switch power supply	Starting switch ACC	20	5A	Engine controller (ACC signal)

Location of fuse box and fuse Nos.



Troubles that occur when controller power supply of pump controller is defective

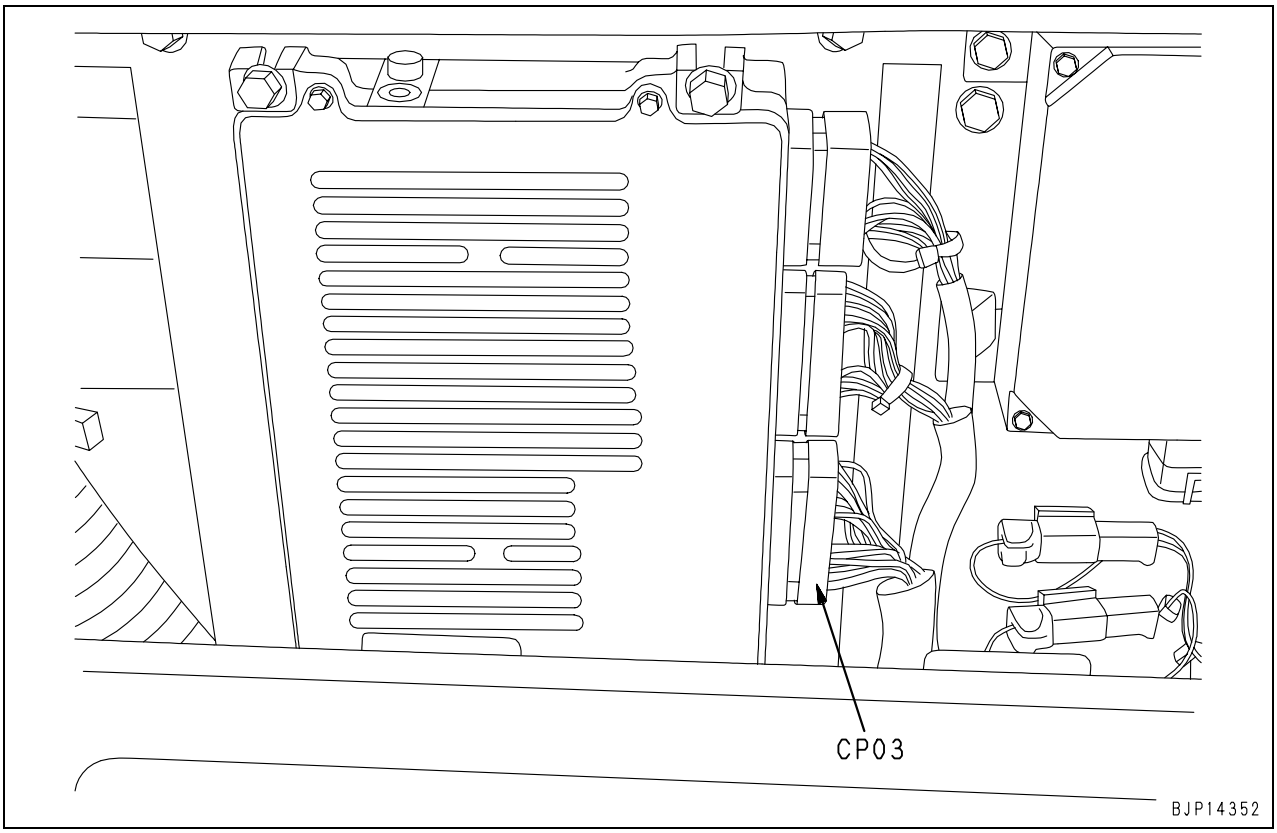
★ The controller power supply (F01-1) of the pump controller drives the controller system. Accordingly, if it is turned off, the controller cannot control the system and the troubles shown below occur simultaneously (The following is an example of the troubles).
- The working mode cannot be changed.
- The auto-decelerator does not work or is not reset.
- The travel speed does not change.
- The power maximizing function does not work.
- The swing holding brake cannot be reset automatically.
- The machine deviates during travel.

Troubles that occur when solenoid power supply of pump controller is defective

★ The solenoid power supply (F01-2) of the pump controller is used by the controller to drive the solenoids and relays. Accordingly, if the solenoid power supply is turned off, when the controller outputs the power to the solenoids or relays, the power is not supplied to any of the solenoids and relays and all or some of the following failure codes are displayed simultaneously.
- [DW43KA], [DW43KB]: Travel speed solenoid system
- [DW45KA], [DW45KB]: Swing holding brake solenoid system
- [DW4WKA], [DW4WKB]: Bucket dump prohibit solenoid system
- [DW91KA], [DW91KB]: Travel junction solenoid system
- [DWA2KA], [DWA2KB]: Service solenoid system
- [DWK0KA], [DWK0KB]: 2-stage relief solenoid system
- [DXA8KA], [DXA8KB]: PC-EPC (F) solenoid system
- [DXA9KA], [DXA9KB]: PC-EPC (R) solenoid system
- [DXE0KA], [DXE0KB]: LS-EPC solenoid system
- [DXE4KA], [DXE4KB]: Service current EPC system (if attachment is installed)
- [DXE5KA], [DXE5KB]: Merge-divider main solenoid system
- [DXE6KA], [DXE6KB]: Merge-divider LS solenoid system

★ If the above problems occur, check the related fuse (F01-2) and inlet voltage of the pump controller.
1) Disconnect connector CP03 of the controller and connect a T-adapter to the wiring harness side.
2) Turn the starting switch ON.
3) Measure the voltage between each of pins (2), and (12) and each of pins (27), (32), and (33).
* Pins (2) and (12) are the power supply and pins (27), (32), and (33) are the chassis ground.
* If the voltage is 20 – 30 V, it is normal.

★ Power supply connector (CP03) of pump controller



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**	Trouble	**Trouble name displayed in abnormality record machine monitor**
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 2 3 4	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.** **• Short circuit** **Independent wiring harnesses are in contact with each other abnormally.** **<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.**

Related circuit diagram

This drawing is a part of the electric circuit diagram related to trouble-shooting.

- Connector No.: Indicates (Model – Number of pins) and (Color).
- “Connector No. and pin No.” from each branching/merging point: Shows the ends of branch or source of merging within the parts of the same wiring harness.
- Arrow (⇔): Roughly shows the location on the machine.

Failure code [A000N1] Eng. Hi Out of Std

Action code	Failure code	Trouble	Engine high idle out of standard (Mechanical system)
—	**A000N1**		
Contents of trouble	• While the engine was running, engine speed exceeded 2,350 rpm for more than 10 seconds.		
Action of controller	• None in particular. • If cause of failure disappears, system resets itself.		
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 010: Engine speed)		

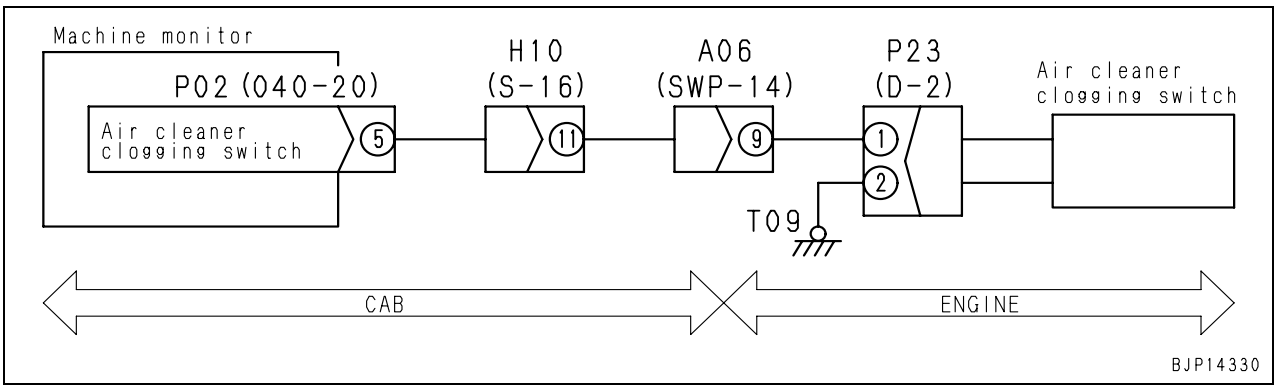
	Cause		Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	Defective engine mechanical system	Check for any internal or external factor that might cause the excessive engine high idle speed for troubleshooting of engine mechanical system.
	2	Defective engine controller	Since trouble is in system, troubleshooting cannot be carried out. (If no visible error appears on the machine, the controller can be continuously used as it is.)

Failure code [AA10NX] Air cleaner Clogging

Action code	Failure code	Trouble	Air cleaner 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 caution symbol appears on the machine monitor 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 046: Monitor Input 2)		

	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)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P23 (male)	Air cleaner	Resistance	
			Between (1) – (2)	Value in normal state	Max. 1 Ω	
				Value when clogged	Min. 1MΩ	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			Wiring harness between P02 (female) (5) – P23 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between P23 (female) (2) – chassis ground		Resistance	Max. 1 Ω
	4	Defective machine monitor	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P02	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

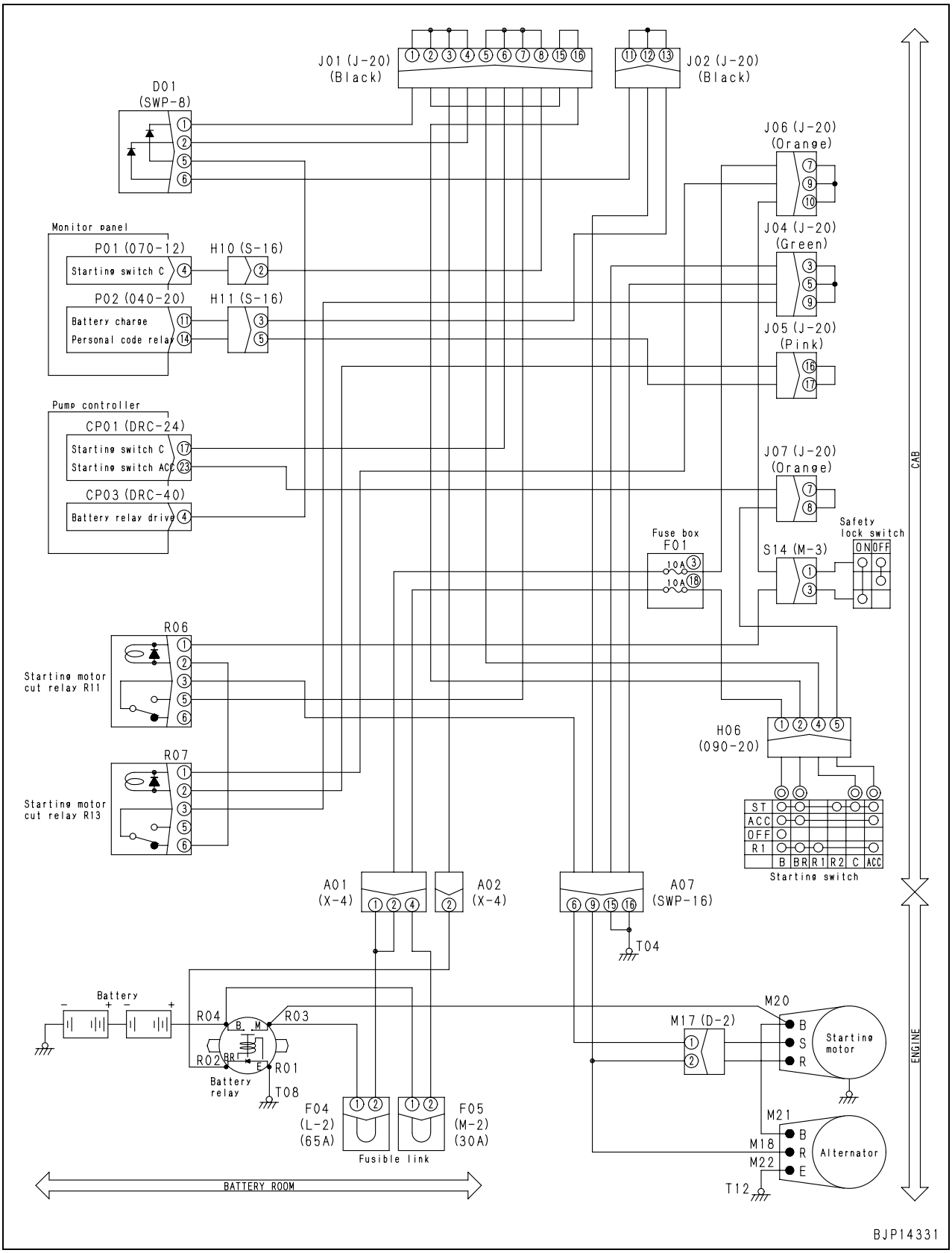


Failure code [AB00KE] Charge Voltage Low

Action code	Failure code	Trouble	Charge voltage low (mechanical system)
—	**AB00KE**		
Contents of trouble	• While engine is running, power generation signal from the alternator is not input.		
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 caution symbol appears on the machine monitor while the engine is running, this failure code will be recorded. • Input from alternator (voltage) can be checked with monitoring function. (Code: 043 Charge voltage)		

	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 speed	Voltage	
			R terminal – chassis ground	Min. medium speed	27.5 – 29.5 V	
	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 P02 (female) (11) – J02 – Alternator R terminal		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between P02 (female) (11) – J02 – Alternator R terminal, between P02 (female) (11) – J02 – D01 (female) (6) and between P02 (female) (11) – J02 – M17 (female) (2)		Resistance	Min. 1MΩ
	4	Defective machine monitor	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P02	Engine speed	Voltage	
			Between (11) – chassis ground	Min. medium speed	27.5 – 29.5 V	

Circuit diagram related to starting and charge of machine monitor

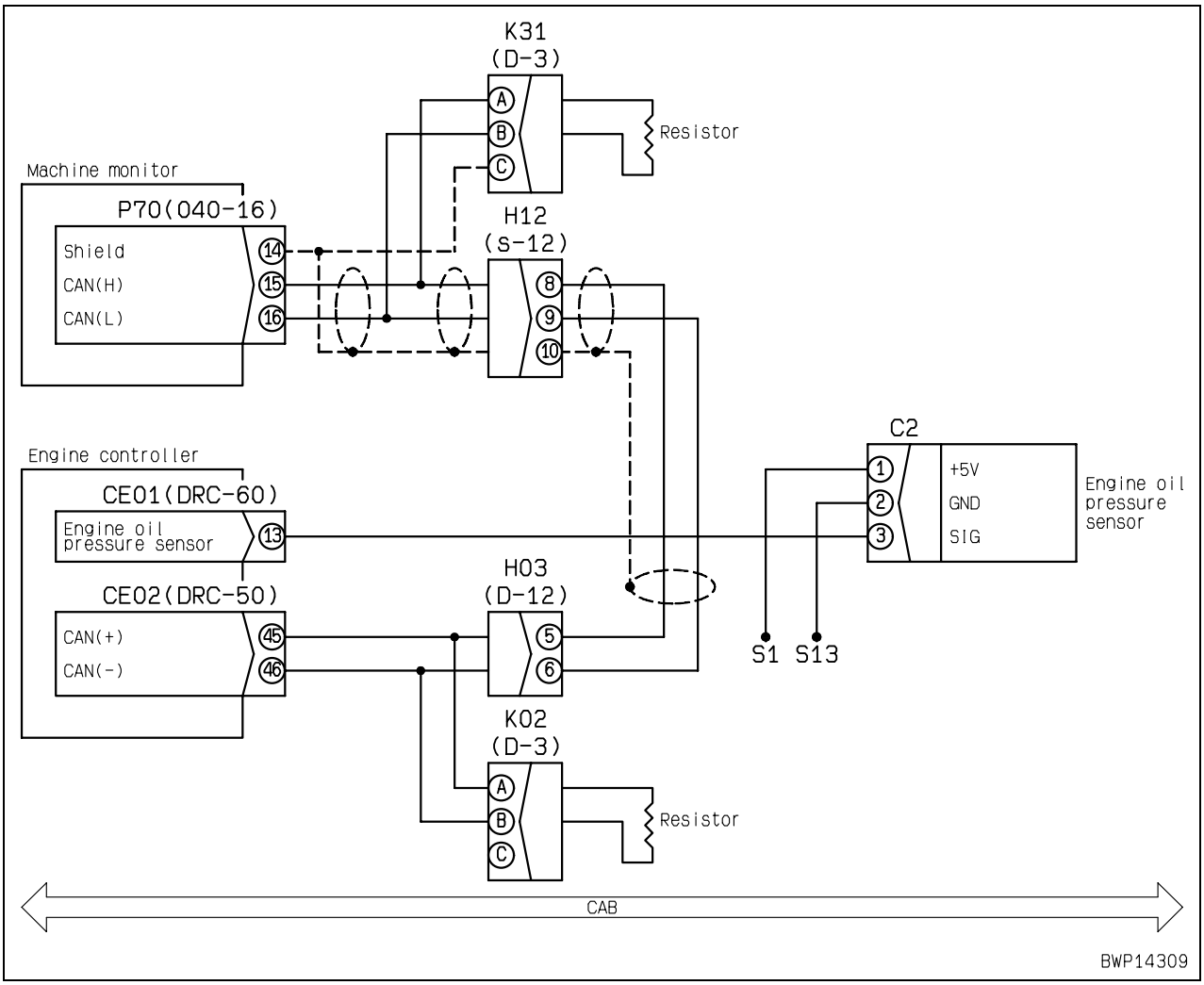


Failure code [B@BAZG] Eng Oil Press. Low

Action code	Failure code	Trouble	Engine oil pressure low (Engine controller system)
—	**B@BAZG**		
Contents of trouble	• While engine was running, signal circuit of engine oil pressure switch detected low engine oil pressure (sensor contact opened).		
Action of controller	• Displays engine oil pressure monitor on machine monitor. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• If machine is operated as it is, engine may be damaged.		
Related information	• Engine oil pressure switch signal is input to engine controller and then transmitted to machine monitor. • 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	Lowering of engine oil pressure (when system is normal)	★ Determine the cause and check the damage to the engine and then modify it.			
	2	Defective engine oil pressure sensor (Internal defect)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			OIL	Engine	Resistance	
			Between (1) – chassis ground	When started	Min. 1MΩ	
				When stopped	Max. 1 Ω	
	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 ENGINE (female) (17) – OIL (female) (1)		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 ENGINE (female) (17) – OIL (female) (1) and chassis ground (when engine is started)		Resistance	Min. 1MΩ
	5	Defective engine controller	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			ENGINE	Engine	Resistance	
			Between (17) – chassis ground	When started	Min. 1MΩ	
				When stopped	Max. 1 Ω	

Circuit diagram related to engine oil pressure of machine monitor

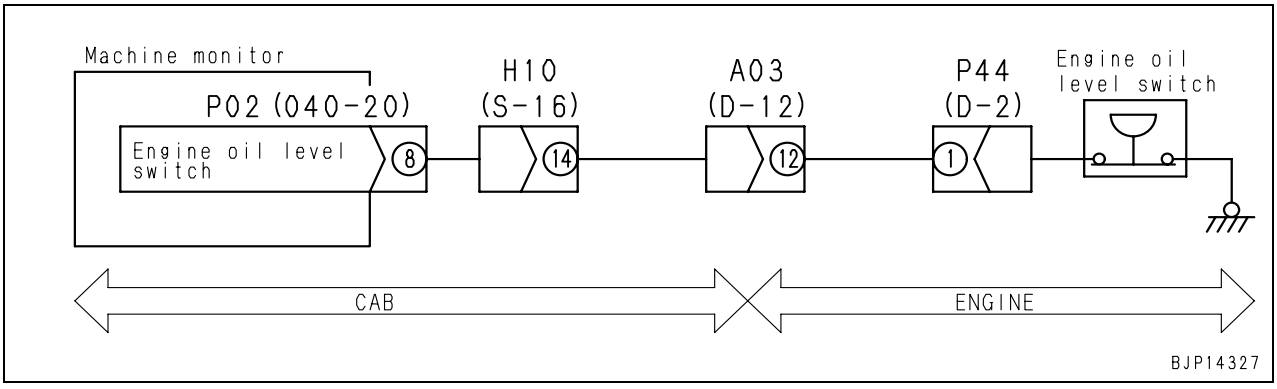


Failure code [B@BAZK] Eng Oil Level Low

Action code	Failure code	Trouble	Engine oil level low (Machine monitor system)
—	**B@BAZK**		
Contents of trouble	• When starting switch is turned ON (but engine is not started), signal circuit of engine oil level switch detected low engine oil level (sensor contact opened).		
Action of machine monitor	• Displays engine oil level monitor on machine monitor. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• If machine is operated as it is, engine may be damaged.		
Related information	• Engine oil level switch signal can be checked with monitoring function. (Code 04501: Monitor Input 2) • 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	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	Value in normal state	Max. 1 Ω	
				Value when oil level is low	Min. 1MΩ	
	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 P02 (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.			
			P02	Engine oil level	Voltage	
			Between (8) – chassis ground	Value in normal state	Max. 1 V	
				Value when oil level is low	20 – 30 V	

Circuit diagram related to engine oil level switch of machine monitor

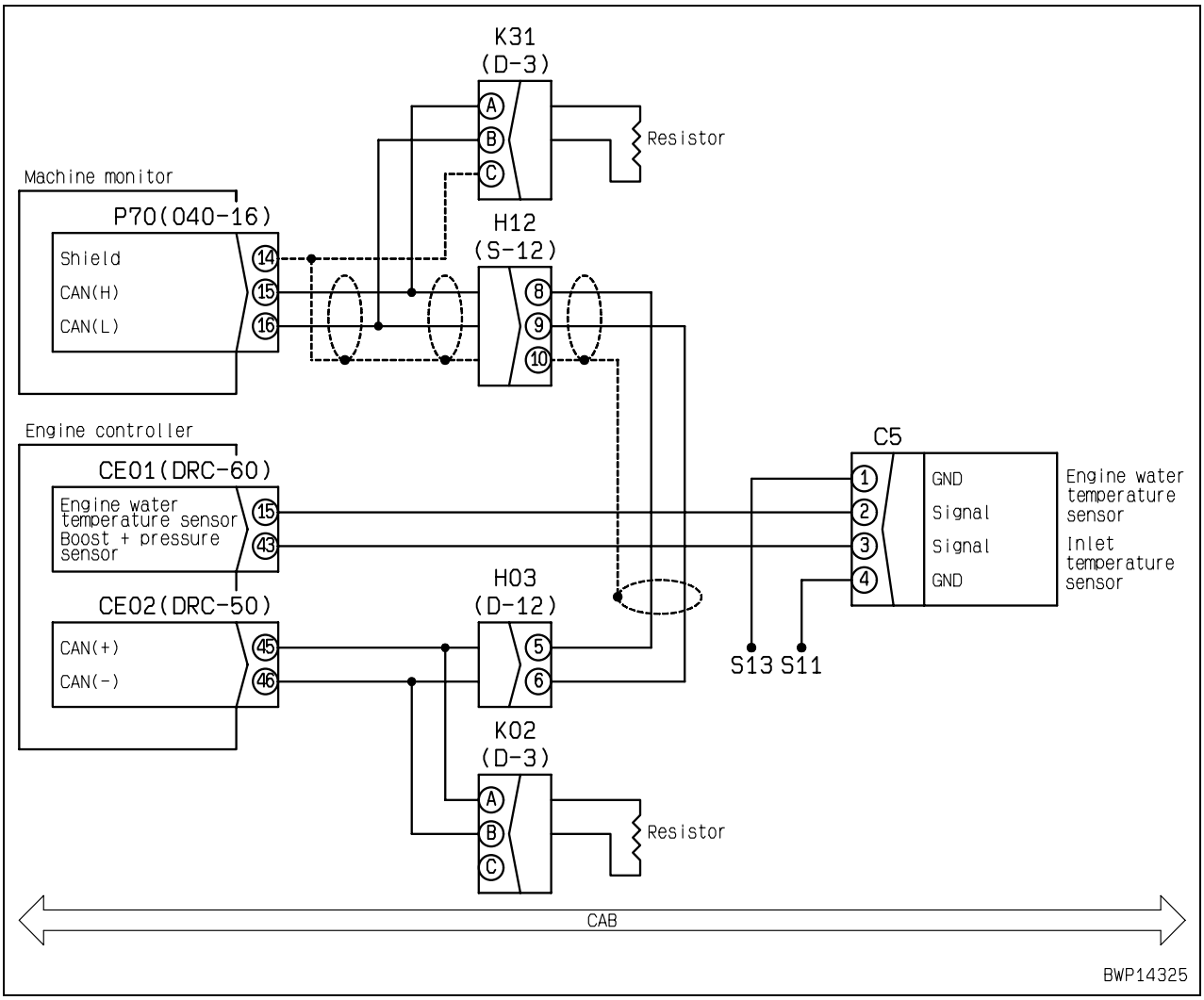


Failure code [B@BCNS] Eng. Water Overheat

Action code	Failure code	Trouble	Engine coolant overheat (Engine controller system)
—	**B@BCNS**		
Contents of trouble	• While engine was running, signal circuit of engine coolant temperature sensor detected overheating of engine coolant (above 102°C).		
Action of machine monitor	• Displays engine coolant temperature monitor with red on machine monitor. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• If machine is operated as it is, engine may be seized.		
Related information	• Engine coolant temperature sensor signal is input to engine controller and then transmitted to machine monitor. • Engine coolant temperature can be checked with monitoring function (Code: 04107 Engine coolant temperature) • 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	Overheating of engine (when system is normal)	★ Determine the cause and check the damage to the engine and then modify it.			
	2	Defective engine coolant temperature sensor (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			COOLANT (male)	Engine coolant temperature	Resistance	
			Between (2) – (1)	10 – 100°C	90 – 3.5 kΩ	
			Between (2) – chassis ground		Min. 1MΩ	
	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 ENGINE (female) (15) – COOLANT (female) (2) and chassis ground		Resistance	Min. 1MΩ
	4	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Engine coolant temperature	Resistance	
			Between (15) – chassis ground	10 – 100°C	90 – 3.5 kΩ	

Circuit diagram related to engine coolant temperature sensor of machine monitor

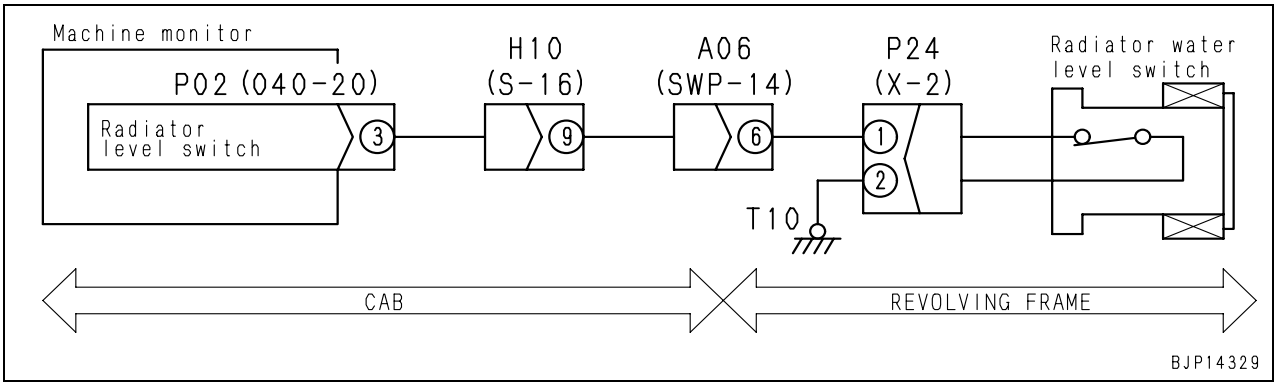


Failure code [B@BCZK] Eng Water Level Low

Action code	Failure code	Trouble	Engine coolant level 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 radiator coolant level caution symbol appears on the machine monitor while the engine is running, this failure code will be recorded. • Input from the radiator coolant level switch (ON/OFF) can be checked with monitoring function. (Code 045: Monitor Input 1)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Lowering of radiator coolant level (when system is normal)	★ Check the coolant level and add coolant. (If this phenomenon frequently occurs, investigate the cause.)			
	2	Defective radiator coolant level switch (internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P24 (male)	Radiator coolant level	Resistance	
			Between (1) – (2)	Value in normal state	Max. 1 Ω	
				Value when coolant level is low	Min. 1MΩ	
	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 P02 (female) (3) – P24 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between P24 (female) (2) – chassis ground		Resistance	Max. 1 Ω
	4	Defective machine monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			P02	Engine coolant temperature	Voltage	
			Between (3) – chassis ground	Value in normal state	Max. 1 V	
				Value when coolant level is low	20 – 30 V	

Circuit diagram related to radiator coolant level switch of machine monitor

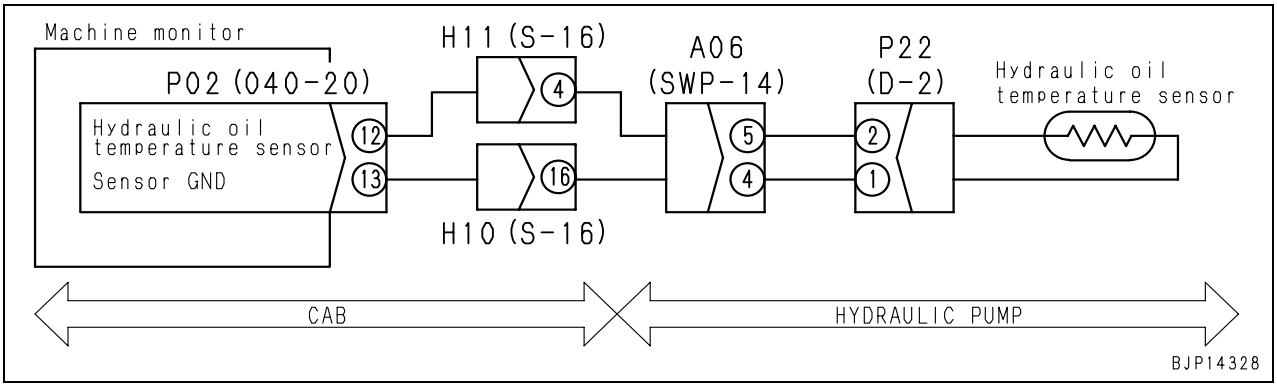


Failure code [B@HANS] Hydr Oil Overheat

Action code	Failure code	Trouble	Hydraulic oil overheat (Mechanical system)
E02	**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 gauge enters red range on the machine monitor 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 044:Engine oil temperature)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Overheating of hydraulic oil (when system is normal)	★ Determine the cause and check the damage to the hydraulic components and then modify it.			
	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. 1MΩ	
	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) (2) and chassis ground		Resistance	Min. 1MΩ
	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. 1MΩ	

Circuit diagram related to hydraulic oil temperature sensor of machine monitor



Failure code [CA111] EMC Critical Internal Failure

Action code	Failure code	Trouble	EMC critical internal failure (Engine controller system)
E10	**CA111**		
Contents of trouble	• Memory or power supply circuit in engine controller is defective.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine does not start.		
Related information			

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective engine controller	Engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)

Failure code [CA115] Eng Ne and Bkup Speed Sens Error

Action code	Failure code	Trouble	Engine Ne and Bkup speed sensor error (Engine controller system)
E11	**CA115**		
Contents of trouble	• Both signals of engine Ne speed sensor and engine Bkup speed sensor are abnormal.		
Action of controller			
Problem that appears on machine	• Engine stops. • Engine does not start.		
Related information	• Method of reproducing failure code: Start engine		

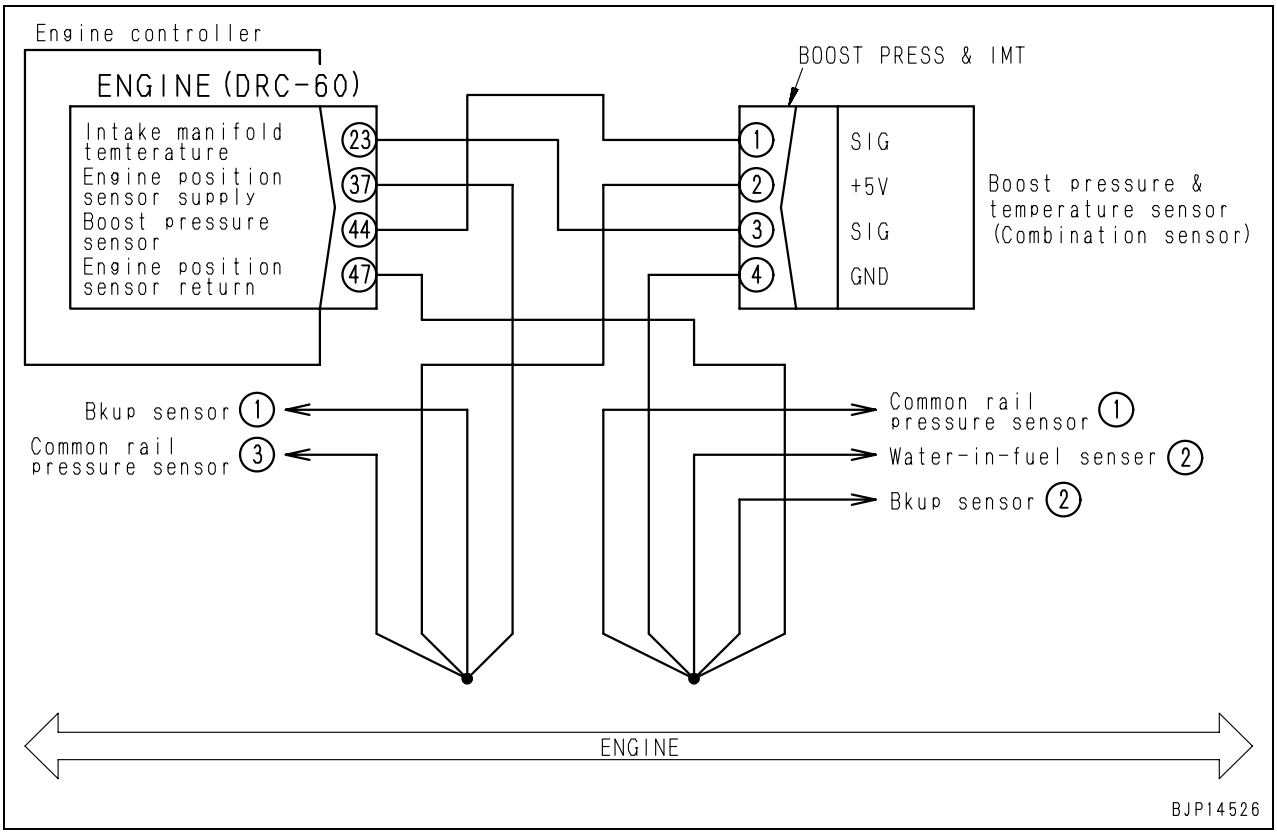
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective connection of sensor connector	Connectors of Ne speed sensor and Bkup speed sensor may be connected defectively (or connected to wrong parts). Check them directly.

Failure code [CA122] Chg Air Press Sensor High Error

Action code	Failure code	Trouble	Charge air pressure sensor high error (Engine controller system)
E11	**CA122**		
Contents of trouble	• Pressure signal circuit of boost pressure, temperature sensor detected high voltage.		
Action of controller	• Fixes charge pressure value and continues operation.		
Problem that appears on machine	• Engine output lowers.		
Related information	• 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 sensor power supply 2 system	If failure code [**CA227**] is also indicated, carry out troubleshooting for it first.			
	2	Defective boost pressure, temperature sensor [pressure signal system]	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			BOOST PRESS & IMT		Voltage	
			Between (1) – (4)	Power supply	4.75 – 5.25 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	Hot short in wiring harness (Short circuit with 5V/24V circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between ENGINE (female) (44) – BOOST PRESS & IMT (female) (1) and chassis ground		Voltage	Max. 1 V
	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 ENGINE (female) (44) – BOOST PRESS & IMT (female) (1) and between ENGINE (female) (37) – BOOST PRESS & IMT (female) (2)		Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between boost pressure, temperature sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			ENGINE		Voltage	
			Between (37) – (47)	Power supply	4.75 – 5.25 V	

Circuit diagram related to boost pressure, temperature sensor (combination sensor)

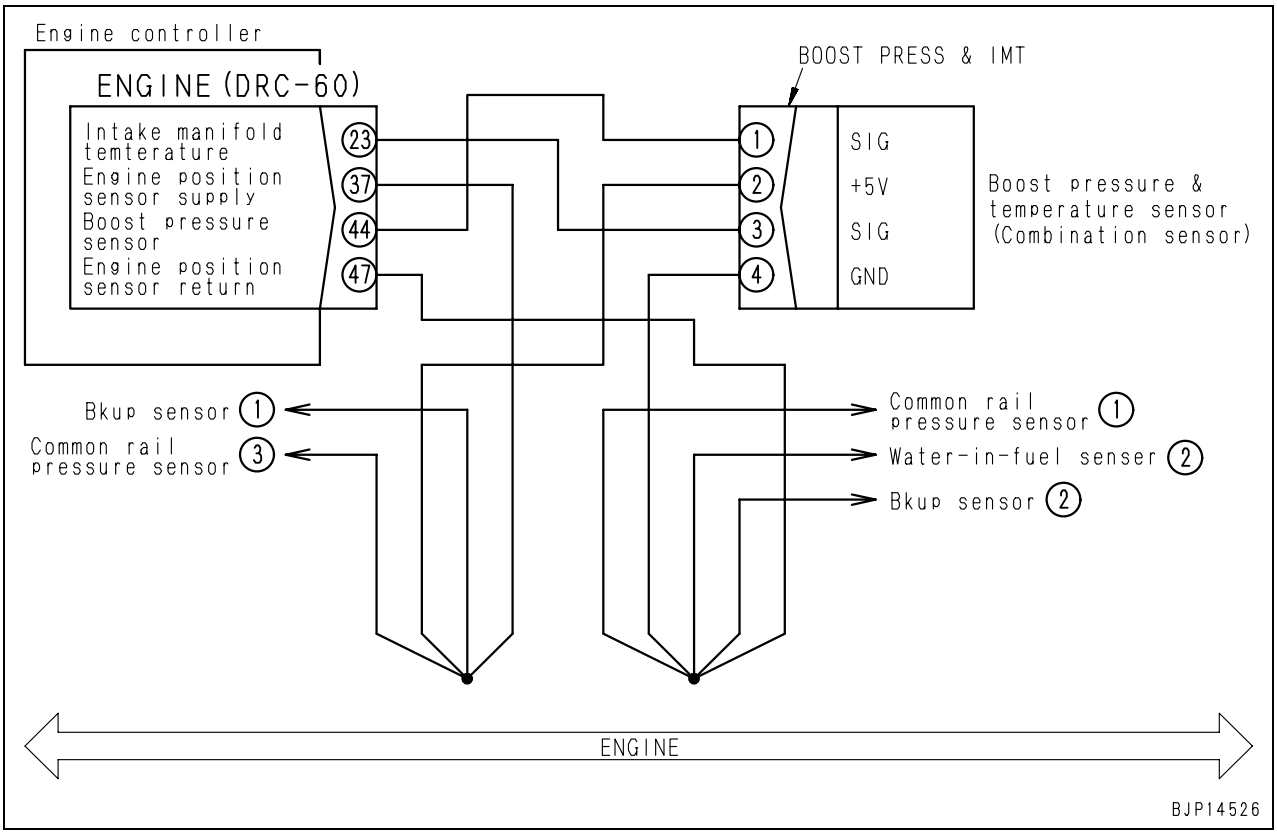


Failure code [CA123] Chg Air Press Sensor Low Error

Action code	Failure code	Trouble	Charge air pressure sensor low error (Engine controller system)
E11	**CA123**		
Contents of trouble	• Pressure signal circuit of boost pressure, temperature sensor detected low voltage.		
Action of controller	• Fixes charge pressure value and continues operation.		
Problem that appears on machine	• Engine output lowers.		
Related information	• 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 sensor power supply 2 system	If failure code [**CA187**] is also indicated, carry out troubleshooting for it first.			
	2	Defective boost pressure, temperature sensor [pressure signal system]	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			BOOST PRESS & IMT		Voltage	
			Between (1) – (4)	Power supply	4.75 – 5.25 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	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 ENGINE (female) (44) – BOOST PRESS & IMT (female) (1) and chassis ground		Resistance	Min. 100 kΩ
	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 ENGINE (female) (44) – BOOST PRESS & IMT (female) (1) and between ENGINE (female) (47) – BOOST PRESS & IMT (female) (2)		Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between boost pressure, temperature sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			ENGINE		Voltage	
			Between (37) – (47)	Power supply	4.75 – 5.25 V	

Circuit diagram related to boost pressure, temperature sensor (combination sensor)

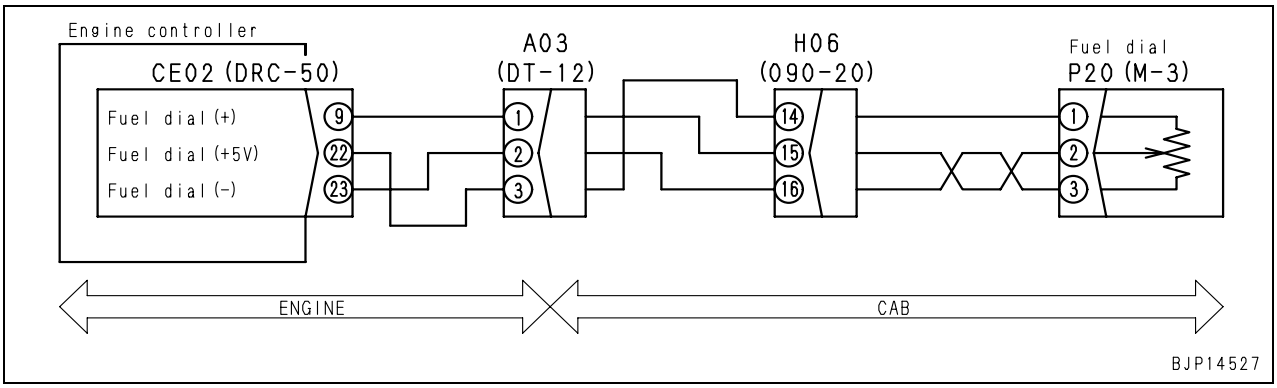


Failure code [CA131] Throttle Sensor High Error

Action code	Failure code	Trouble	Throttle sensor high error (Engine controller system)
E14	**CA131**		
Contents of trouble	• Signal circuit of fuel control dial detected high voltage.		
Action of controller	• Action to be taken varies depending on applicable machine.		
Problem that appears on machine	• Action to be taken varies depending on applicable machine.		
Related information	• 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 throttle sensor power supply system	If failure code [**CA2185**] is also indicated, carry out troubleshooting for it first.		
	2	Defective fuel control dial	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			P20		Voltage
			Between (1) – (3)	Power supply	4.75 – 5.25 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	Hot short in wiring harness (Short circuit with 5V/24V circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between CE02 (female) (9) – P20 (female) (2) and chassis ground	Voltage	Max. 1 V
	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) (9) – P20 (female) (2) and between CE02 (female) (22) – P20 (female) (1)	Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between fuel control dial – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CE02		Voltage
			Between (22) – (23)	Power supply	4.75 – 5.25 V

Circuit diagram related to fuel control dial

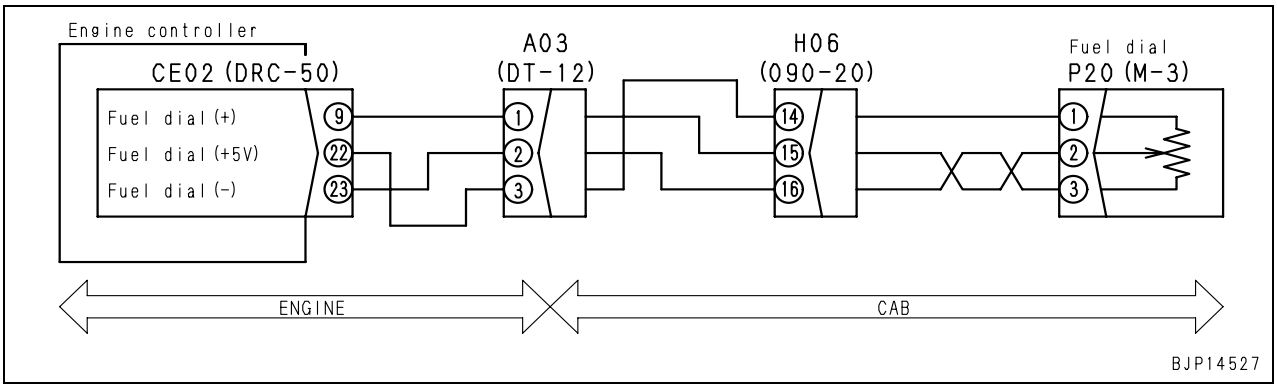


Failure code [CA132] Throttle Sensor Low Error

Action code	Failure code	Trouble	Throttle sensor low error (Engine controller system)
E14	**CA132**		
Contents of trouble	• Signal circuit of fuel control dial detected low voltage.		
Action of controller	• Action to be taken varies depending on applicable machine.		
Problem that appears on machine	• Action to be taken varies depending on applicable machine.		
Related information	• 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 throttle sensor power supply system	If failure code [**CA2186**] is also indicated, carry out troubleshooting for it first.		
	2	Defective fuel control dial	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			P20		Voltage
			Between (1) – (3)	Power supply	4.75 – 5.25 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	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) (9) – P20 (female) (2) and chassis ground	Voltage	Min. 100 kΩ
	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) (9) – P20 (female) (2) and between CE02 (female) (23) – P20 (female) (3)	Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between fuel control dial – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CE02		Voltage
			Between (22) – (23)	Power supply	4.75 – 5.25 V

Circuit diagram related to fuel control dial

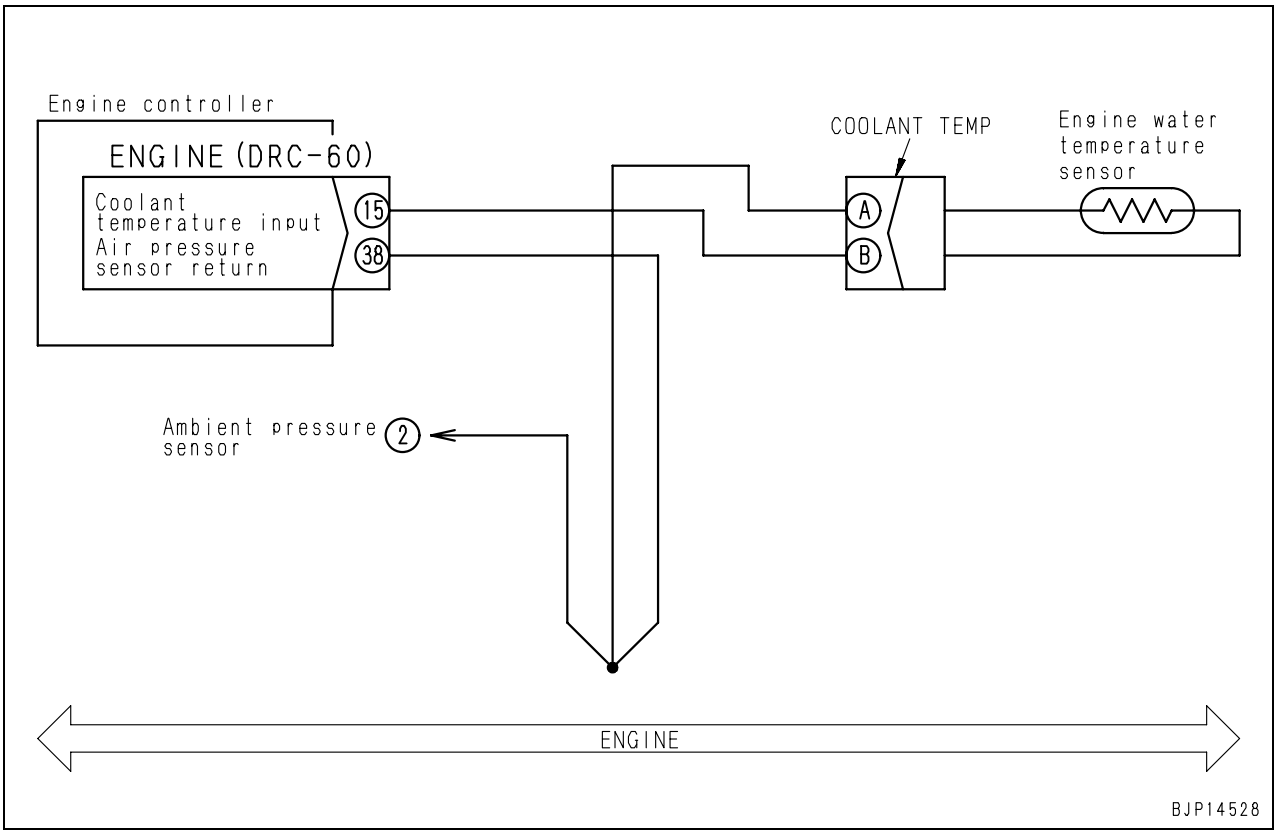


Failure code [CA144] Coolant Temp Sens High Error

Action code	Failure code	Trouble	Coolant temperature sensor high error (Engine controller system)
E15	**CA144**		
Contents of trouble	• Signal circuit of coolant temperature sensor detected high voltage.		
Action of controller	• Fixes coolant temperature value and continues operation.		
Problem that appears on machine	• Exhaust gas becomes white. Overheat prevention function does not work.		
Related information	• 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 coolant temperature sensor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			COOLANT TEMP (male)	Resistance		
			Between (A) – (B)	0.18 – 160 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 ENGINE (female) (15) – COOLANT TEMP (female) (B)	Voltage	Max. 10 Ω	
			Wiring harness between ENGINE (female) (38) – COOLANT TEMP (female) (A)	Voltage	Max. 10 Ω	
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (15) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	4	Defective wiring harness connector	Connecting parts between coolant temperature sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	5	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			ENGINE (female)	Resistance		
			Between (15) – (38)	0.18 – 160 kΩ		

Circuit diagram related to engine coolant temperature sensor

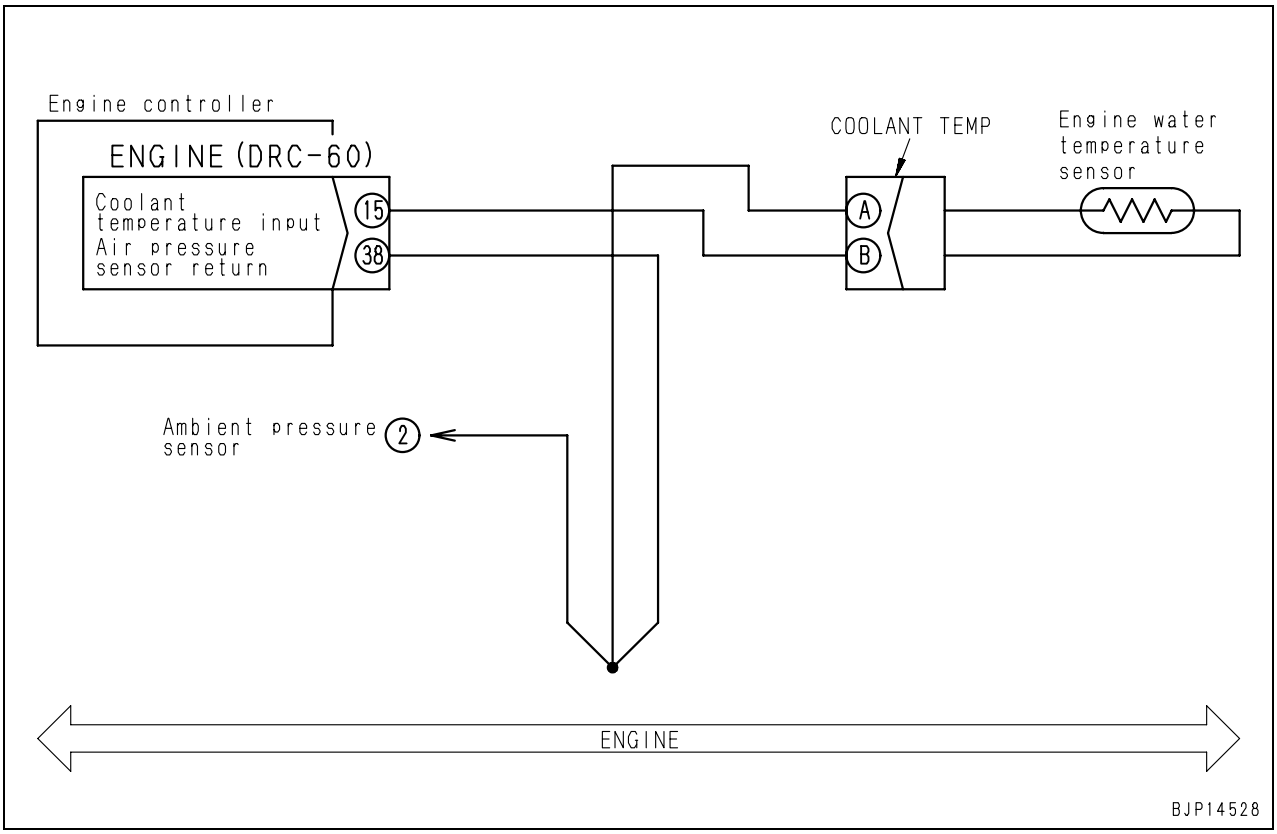


Failure code [CA145] Coolant Temp Sens Low Error

Action code	Failure code	Trouble	Coolant temperature sensor low error (Engine controller system)
E15	**CA145**		
Contents of trouble	• Signal circuit of coolant temperature sensor detected low voltage.		
Action of controller	• Fixes coolant temperature value and continues operation.		
Problem that appears on machine	• Exhaust gas becomes white. • Overheat prevention function does not work.		
Related information	• 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 coolant temperature sensor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			COOLANT TEMP (male)	Resistance	
			Between (A) – (B)	0.18 – 160 kΩ	
			Between (B) – chassis ground	Min. 100 kΩ	
	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 ENGINE (female) (15) – COOLANT TEMP (female) (B) and chassis ground	Resistance	Min. 100 kΩ
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between ENGINE (female) (15) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
	4	Defective wiring harness connector	Connecting parts between coolant temperature sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	5	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			ENGINE (female)	Resistance	
			Between (15) – (38)	0.18 – 160 kΩ	
			Between (15) – chassis ground	Min. 100 kΩ	

Circuit diagram related to engine coolant temperature sensor

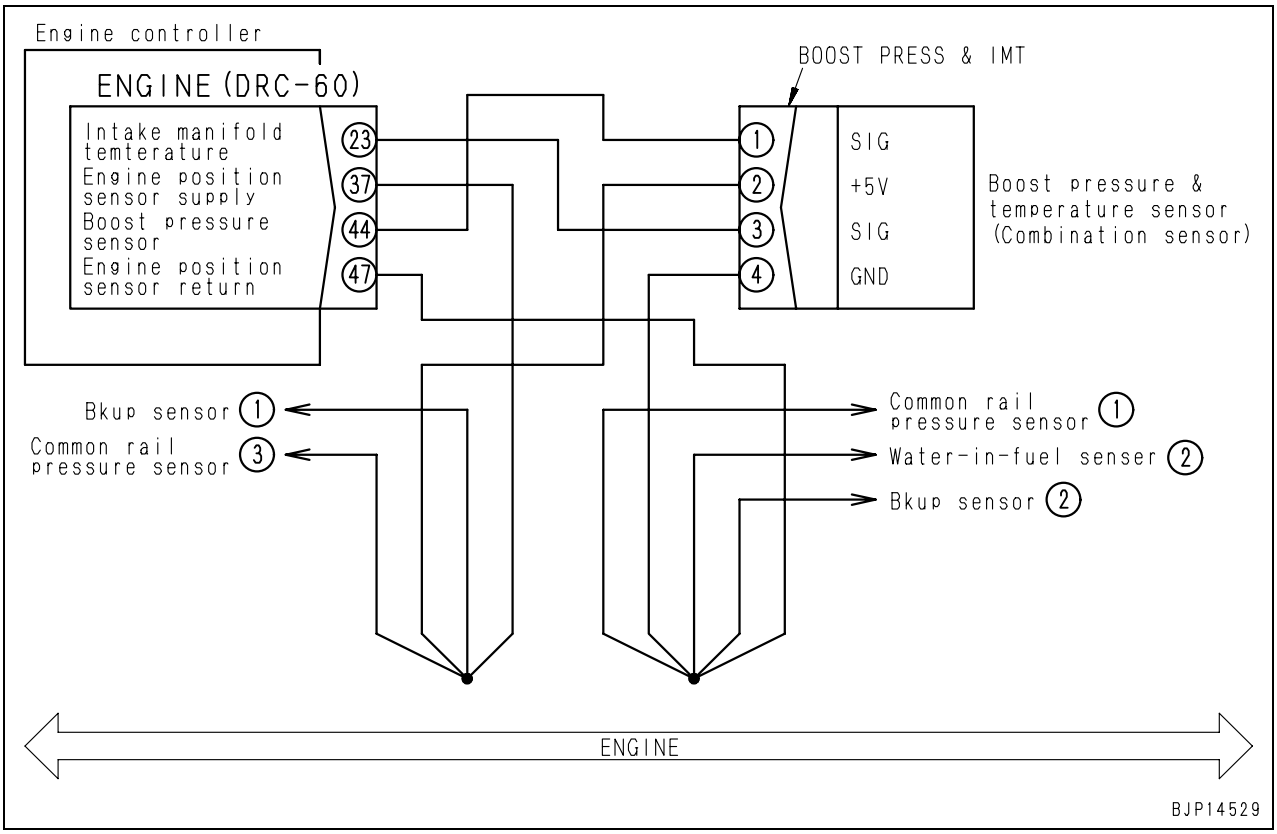


Failure code [CA153] Chg Air Temp Sensor High Error

Action code	Failure code	Trouble	Charge air temperature sensor high error (Engine controller system)
E15	**CA153**		
Contents of trouble	• Temperature signal circuit of boost pressure, temperature sensor detected high voltage.		
Action of controller	• Fixes charge temperature value and continues operation.		
Problem that appears on machine	• Exhaust gas becomes white. • Engine protection function based on boost temperature does not work		
Related information	• 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 boost pressure, temperature sensor [temperature signal system]	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			BOOST PRESS & IMT (male)	Resistance		
			Between (3) – (4)	0.18 – 160 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 ENGINE (female) (23) – BOOST PRESS & IMT (female) (4)	Resistance	Max. 10 Ω	
			Wiring harness between ENGINE (female) (47) – BOOST PRESS & IMT (female) (4)	Resistance	Max. 10 Ω	
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (23) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	4	Defective wiring harness connector	Connecting parts between boost pressure, temperature sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (23) – (47)	0.18 – 160 kΩ		

Circuit diagram related to boost pressure, temperature sensor (combination sensor)

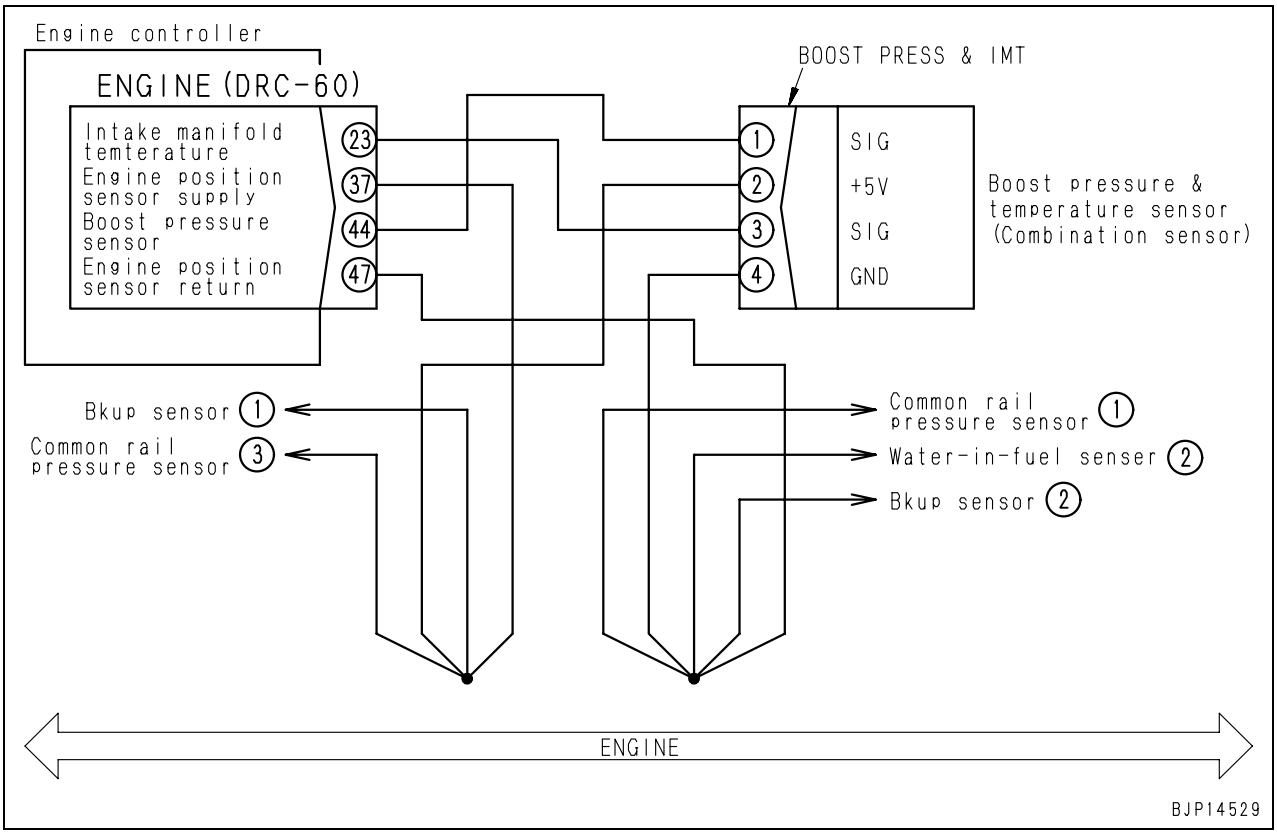


Failure code [CA154] Chg Air Temp Sensor Low Error

Action code	Failure code	Trouble	Charge air temperature sensor low error (Engine controller system)
E15	**CA154**		
Contents of trouble	• Temperature signal circuit of boost pressure, temperature sensor detected low voltage.		
Action of controller	• Fixes charge temperature value and continues operation.		
Problem that appears on machine	• Exhaust gas becomes white. • Engine protection function based on boost temperature does not work		
Related information	• 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 boost pressure, temperature sensor [temperature signal system]	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			BOOST PRESS & IMT (male)	Resistance		
			Between (3) – (4)	0.18 – 160 kΩ		
			Between (3) – chassis ground	Min. 100 kΩ		
	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 ENGINE (female) (23) – BOOST PRESS & IMT (female) (3) and chassis ground	Resistance	Min. 100 Ω	
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (23) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	4	Defective wiring harness connector	Connecting parts between boost pressure, temperature sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (23) – (47)	0.18 – 160 kΩ		
			Between (23) – chassis ground	Min.100 Ω		

Circuit diagram related to boost pressure, temperature sensor (combination sensor)

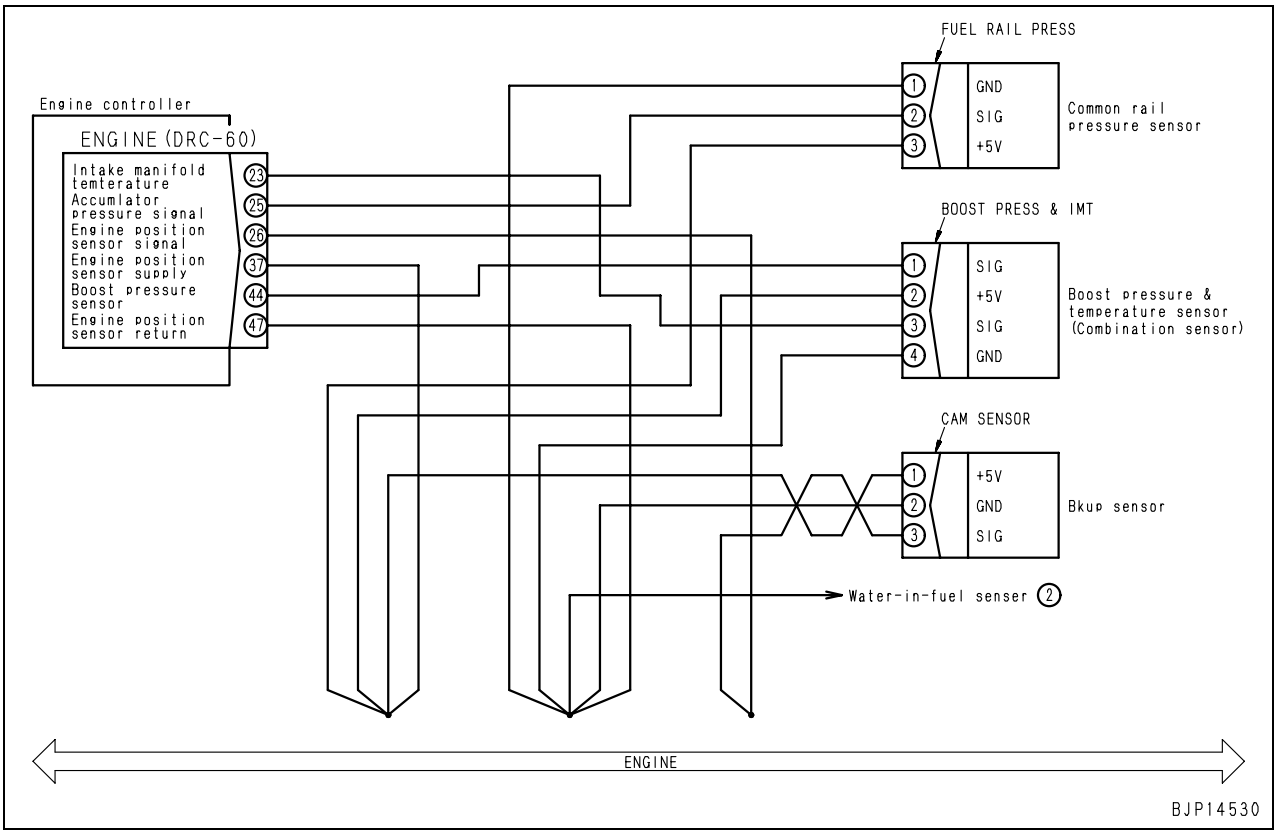


Failure code [CA187] Sens Supply 2 Volt Low Error

Action code	Failure code	Trouble	Sensor power supply 2 voltage low error (Engine controller system)
E15	**CA187**		
Contents of trouble	• Low voltage was detected in sensor power supply 2 circuit.		
Action of controller	• Fixes charge pressure and charge temperature values and continues operation. • Limits output and continues operation.		
Problem that appears on machine	• Engine output lowers.		
Related information	• 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 sensor or wiring harness	★ Disconnect connector with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Disconnect sensor and wiring harness at right in order and carry out operation to reproduce trouble. If “E” of failure code goes off when sensor or wiring harness is disconnected, that sensor or wiring harness is defective.	Boost pressure, temperature sensor	BOOST PRESS & IMT
				Common rail pressure sensor	FUEL RAIL PRESS
				Bkup sensor	CAM SENSOR
				Engine wiring harness	ENGINE
	2	Defective wiring harness connector	Connecting parts between each sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	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.)		

Circuit diagram related to sensor power supply 2

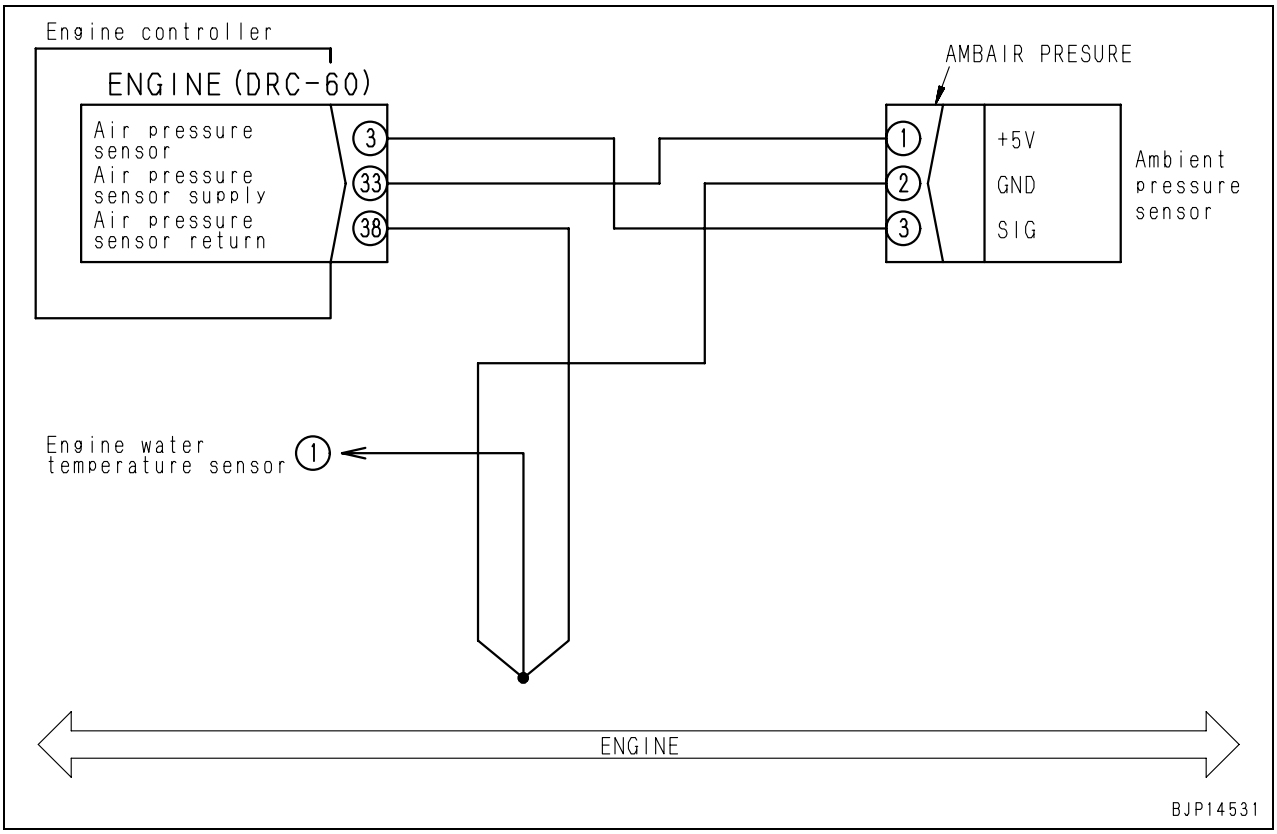


Failure code [CA221] Ambient Press Sens High Error

Action code	Failure code	Trouble	Ambient pressure sensor high error (Engine controller system)
E15	**CA221**		
Contents of trouble	• High voltage was detected in signal circuit of ambient pressure sensor.		
Action of controller	• Fixes ambient pressure value and continues operation.		
Problem that appears on machine	• Engine output lowers. • Engine starting performance becomes deteriorated.		
Related information	• 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 sensor power supply 1 system	If failure code [**CA386**] is also indicated, carry out troubleshooting for it first.			
	2	Defective ambient pressure sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			AMBAIR PRESSURE		Voltage	
			Between (1) – (2)	Power supply	4.75 – 5.25 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	Hot short (Short circuit with 5V/24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between ENGINE (female) (3) – AMBAIR PRESSURE (female) (3) and chassis ground		Voltage	Max. 1 V
	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 ENGINE (female) (3) – AMBAIR PRESSURE (female) (3) and between ENGINE (female) (33) – AMBAIR PRESSURE (female) (1)		Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between ambient pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			ENGINE		Voltage	
			Between (33) – (38)	Power supply	4.75 – 5.25 V	

Circuit diagram related to atmospheric pressure sensor

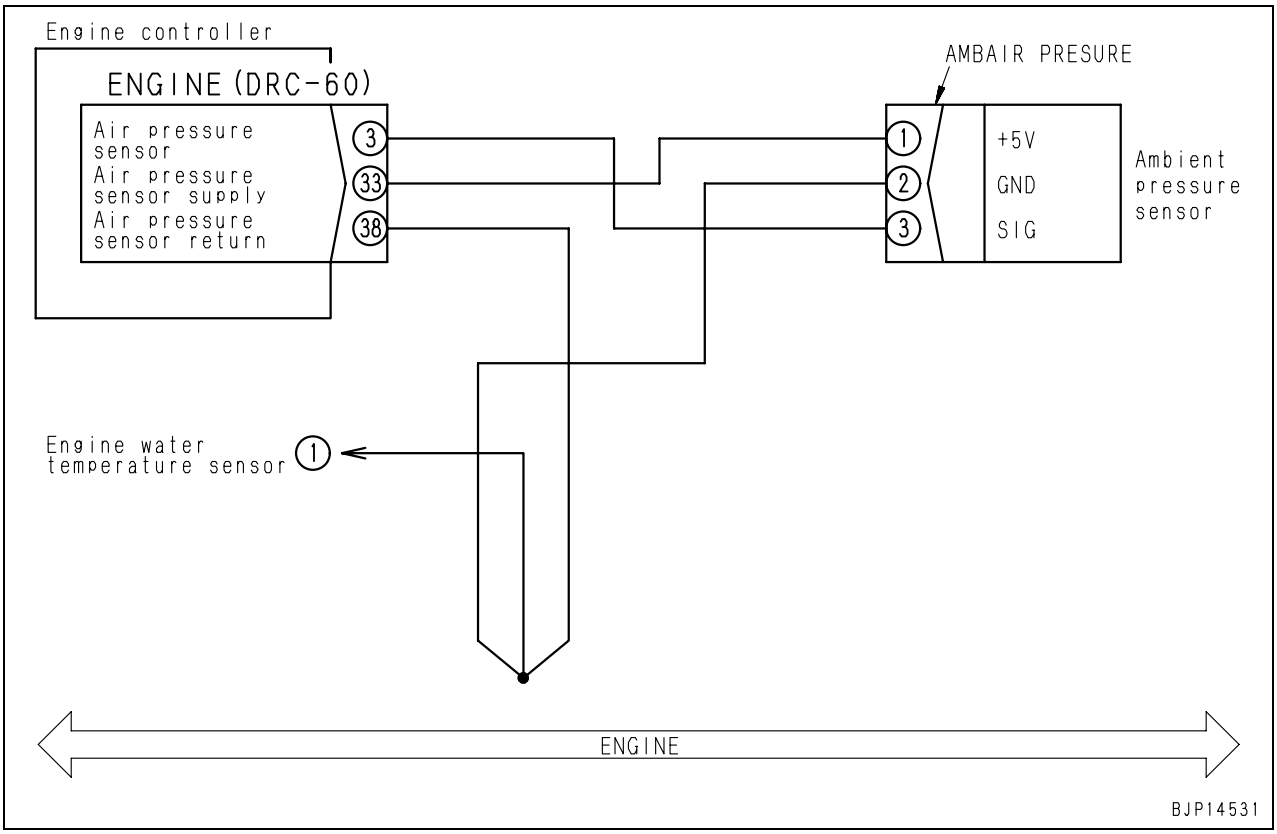


Failure code [CA222] Ambient Press Sens Low Error

Action code	Failure code	Trouble	Ambient pressure sensor low error (Engine controller system)
E15	**CA222**		
Contents of trouble	• Low voltage was detected in signal circuit of ambient pressure sensor.		
Action of controller	• Fixes ambient pressure value and continues operation.		
Problem that appears on machine	• Engine output lowers. • Engine starting performance becomes deteriorated.		
Related information	• 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 sensor power supply 1 system	If failure code [**CA352**] is also indicated, carry out troubleshooting for it first.		
	2	Defective ambient pressure sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			AMBAIR PRESSURE		Voltage
			Between (1) – (2)	Power supply	4.75 – 5.25 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	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 ENGINE (female) (3) – AMBAIR PRESSURE (female) (3) and chassis ground	Resistance	Min. 100 kΩ
	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 ENGINE (female) (3) – AMBAIR PRESSURE (female) (3) and between ENGINE (female) (38) – JC03 – AMBAIR PRESSURE (female) (2)	Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between ambient pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			ENGINE		Voltage
			Between (33) – (38)	Power supply	4.75 – 5.25 V

Circuit diagram related to atmospheric pressure sensor

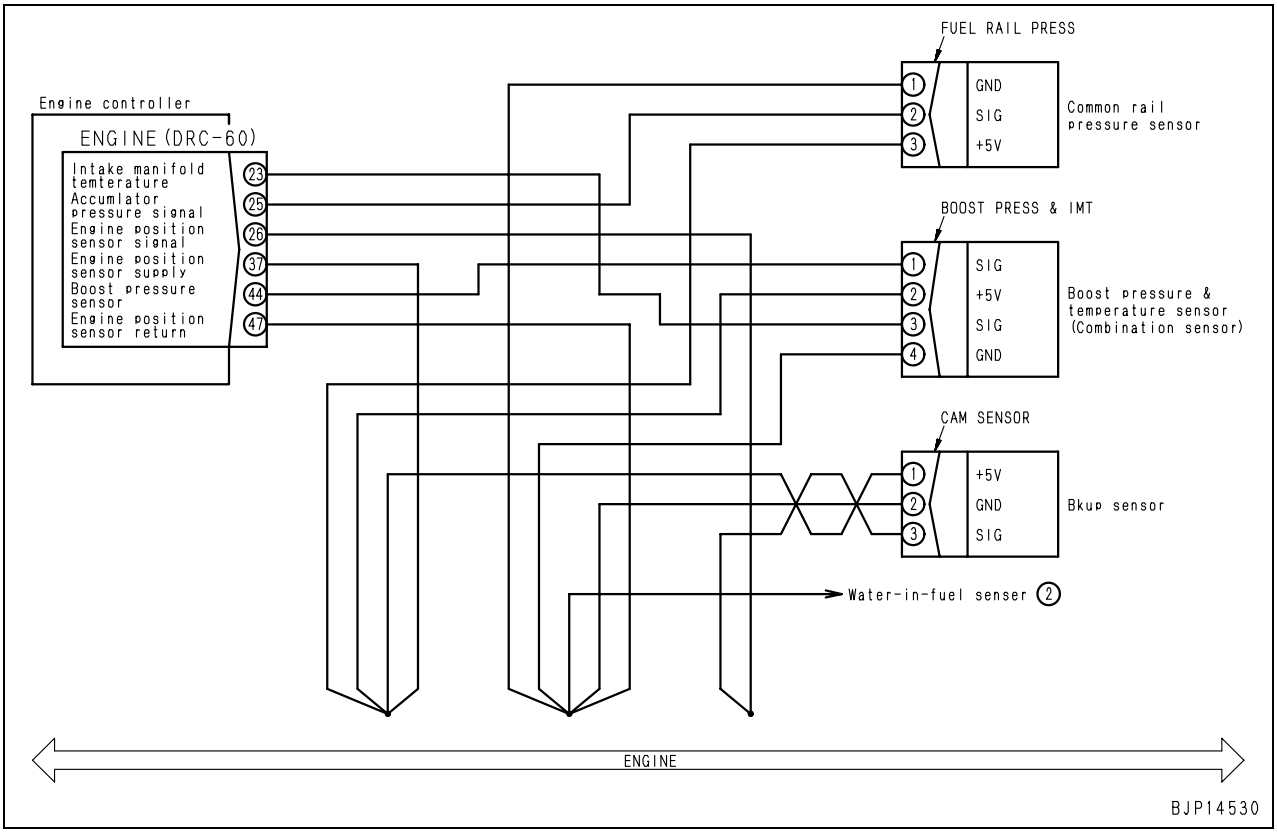


Failure code [CA227] Sens Supply 2 Volt High Error

Action code	Failure code	Trouble	Sensor power supply 2 voltage high error (Engine controller system)
E15	**CA227**		
Contents of trouble	• High voltage was detected in sensor power supply 2 circuit.		
Action of controller	• Fixes charge pressure and charge temperature values and continues operation. • Limits output and continues operation.		
Problem that appears on machine	• Engine output lowers.		
Related information	• 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 wiring harness connector	Connecting parts between each sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation
	2	Defective engine controller	If cause 1 is not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)

Circuit diagram related to sensor power supply 2



Failure code [CA234] Eng Overspeed

Action code	Failure code	Trouble	Engine overspeed (Engine controller system)
—	**CA234**		
Contents of trouble	• Engine speed exceeded control upper speed limit.		
Action of controller	• Stops injection until engine speed lowers to normal level.		
Problem that appears on machine	• Engine speed fluctuates.		
Related information	• Method of reproducing failure code: Run engine at high idle.		

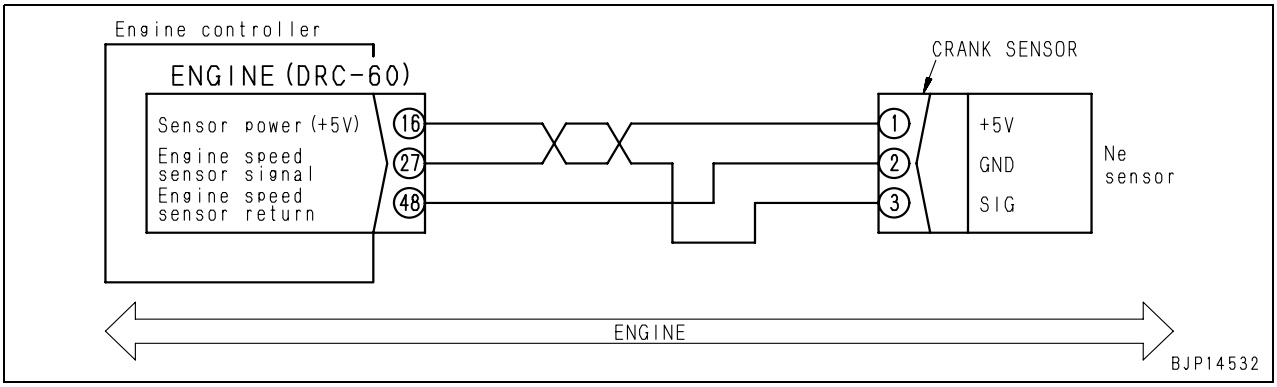
		Cause	Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	Use of improper fuel	Fuel used may be improper. Check it directly.
	2	Improper use	Machine may be used improperly. Teach operator proper using method.
	3	Defective engine controller	If cause 1 is 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 sensor supply power voltage error (Engine controller system)
E15	**CA238**		
Contents of trouble	• Low voltage was detected in power supply circuit of engine Ne speed sensor.		
Action of controller	• Controls the engine with signal from engine Bkup speed sensor.		
Problem that appears on machine	• Engine does not start easily. • Engine hunts.		
Related information	• 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 sensor or wiring harness	★ Disconnect connector with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Disconnect sensor and wiring harness at right in order and carry out operation to reproduce trouble. If “E” of failure code goes off when sensor or wiring harness is disconnected, that sensor or wiring harness is defective.	Ne speed sensor	CRANK SENSOR
				Engine wiring harness	ENGINE
	2	Defective wiring harness connector	Connecting parts between each sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		

Circuit diagram related to engine Ne speed sensor

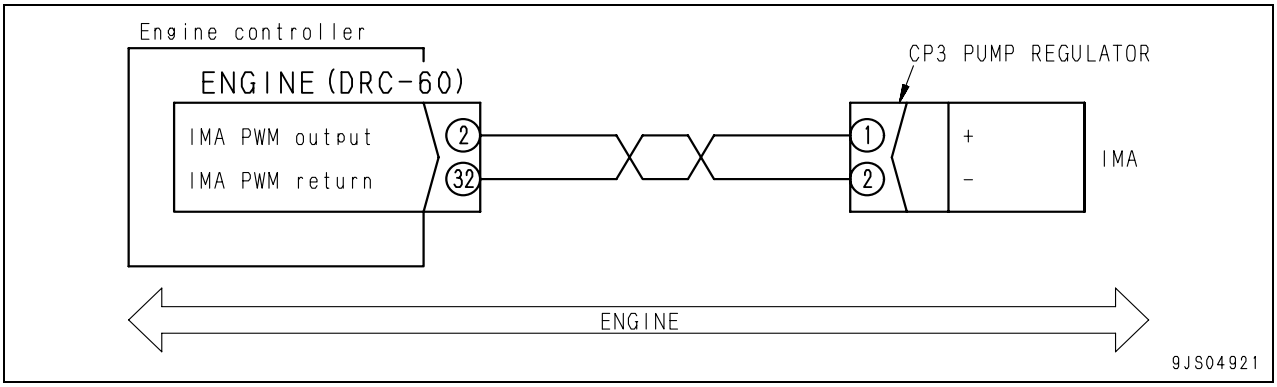


Failure code [CA271] IMV/PCV1 Short Error

Action code	Failure code	Trouble	IMV/PCV1 short error (Engine controller system)
E11	**CA271**		
Contents of trouble	• Short circuit was detected in drive circuit of supply pump actuator.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine speed does not rise from low idle. • Engine output lowers. • Common rail fuel pressure rises above command value.		
Related information	• 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 supply pump actuator	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CP3 PUMP REGULATOR (male)	Resistance	
			Between (1) – chassis ground	Min. 100 kΩ	
	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 ENGINE (female) (2) – CP3 PUMP REGULATOR (female) (1) and chassis ground	Resistance	Min. 100 kΩ
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between ENGINE (female) (2) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
	4	Defective wiring harness connector	Connecting parts between supply pump actuator – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENGINE (female)	Resistance	
			Between (2) – chassis ground	Min. 100 kΩ	

Circuit diagram related to supply pump actuator (metering unit)

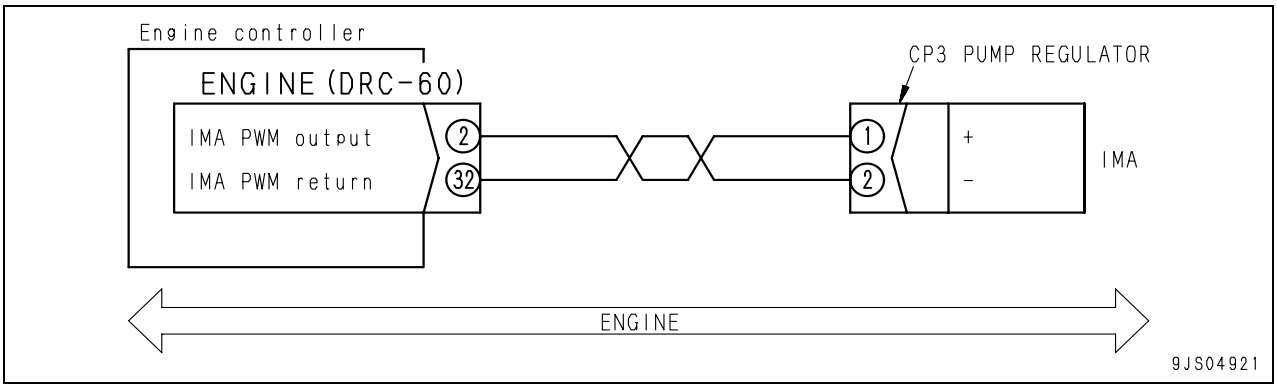


Failure code [CA272] IMV/PCV1 Open Error

Action code	Failure code	Trouble	IMV/PCV1 open error (Engine controller system)
E11	**CA272**		
Contents of trouble	• Opening was detected in drive circuit of supply pump actuator.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine runs but its operation is unstable. • Common rail fuel pressure rises above command value.		
Related information	• 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 supply pump actuator	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP3 PUMP REGULATOR (male)	Resistance		
			Between (1) – (2)	Max. 5 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 ENGINE (female) (2) – CP3 PUMP REGULATOR (female) (1) and chassis ground	Resistance	Max. 10 Ω	
			Wiring harness between ENGINE (female) (32) – CP3 PUMP REGULATOR (female) (2)	Resistance	Max. 10 Ω	
	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 ENGINE (female) (2) – CP3 PUMP REGULATOR (female) (1) and chassis ground	Voltage	Max. 3 V	
	4	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (2) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	5	Defective wiring harness connector	Connecting parts between supply pump actuator – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	6	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (2) – (32)	Max. 5 Ω		

Circuit diagram related to supply pump actuator (metering unit)

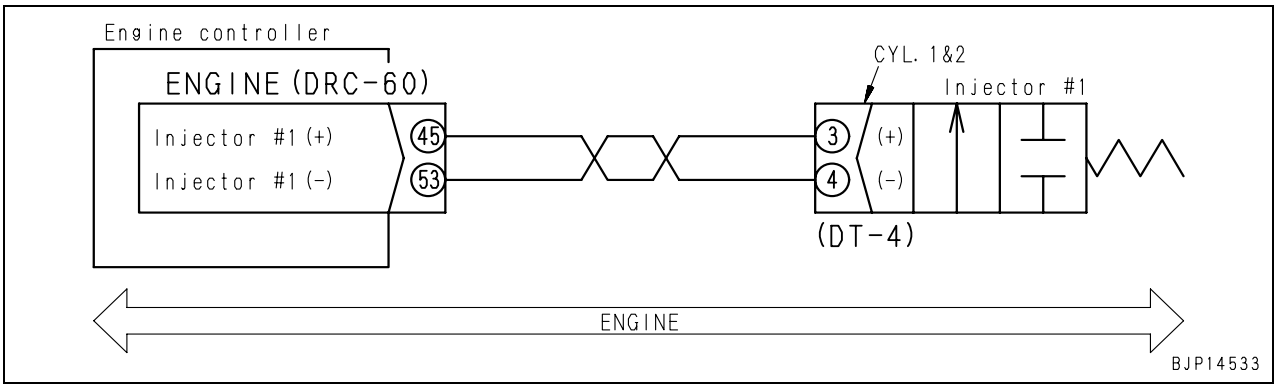


Failure code [CA322] Inj #1 Open/Short Error

Action code	Failure code	Trouble	Injector #1 open/short circuit error (Engine controller system)
E11	**CA322**		
Contents of trouble	• Opening or short circuit was detected in drive circuit of No. 1 injector.		
Action of controller	• None in particular.		
Problem that appears on machine	• Combustion becomes irregular or engine hunts. • Engine output lowers.		
Related information	• 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 engine controller	If following failure codes are also displayed, trouble is in engine controller: [**CA322**], [**CA324**], [**CA331**]			
	2	Defective No. 1 injector	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CYL 1 & 2 (male)	Resistance		
			Between (3) – (4)	Max. 2 Ω		
			Between (3) – chassis ground	Min. 100 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 ENGINE (female) (45) – CYL 1 (female) (3)	Resistance	Max. 2 Ω	
			Wiring harness between ENGINE (female) (53) – CYL 1 (female) (4)	Resistance	Max. 2 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 ENGINE (female) (45) – CYL 1 & 2 (female) (3) and chassis ground	Resistance	Max. 2 Ω	
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (45) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
			Between ENGINE (female) (53) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	6	Defective wiring harness connector	Connecting parts between No. 1 injector – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	7	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (45) – (53)	Max. 2 Ω		
			Between (45) – chassis ground	Min. 100 kΩ		

Circuit diagram related to injector No. 1

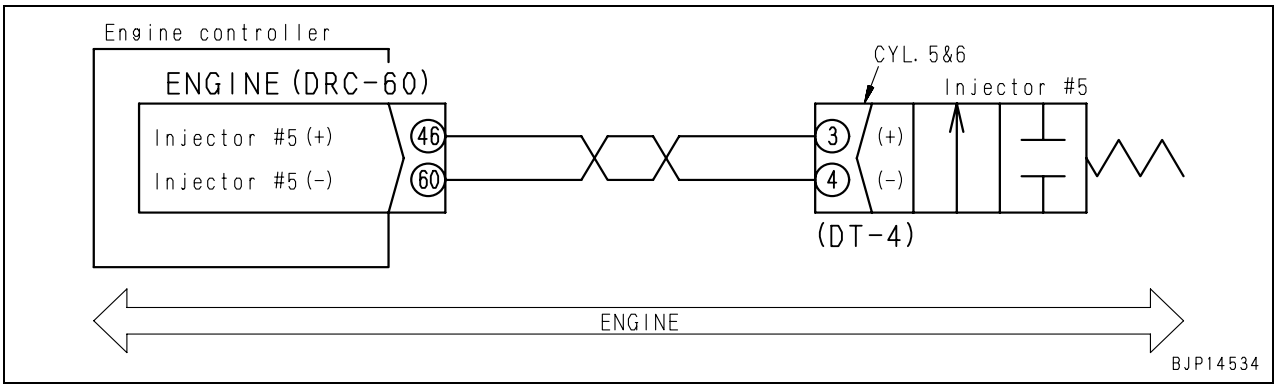


Failure code [CA323] Inj #5 Open/Short Error

Action code	Failure code	Trouble	Injector #5 open/short circuit error (Engine controller system)
E11	**CA323**		
Contents of trouble	• Opening or short circuit was detected in drive circuit of No. 5 injector.		
Action of controller	• None in particular.		
Problem that appears on machine	• Combustion becomes irregular or engine hunts. • Engine output lowers.		
Related information	• 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 engine controller	If following failure codes are also displayed, trouble is in engine controller: [**CA323**], [**CA325**], [**CA332**]		
	2	Defective No. 5 injector	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CYL 5 & 6 (male)	Resistance	
			Between (3) – (4)	Max. 2 Ω	
			Between (3) – chassis ground	Min. 100 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 ENGINE (female) (46) – CYL 5 & 6 (female) (3)	Resistance	Max. 2 Ω
			Wiring harness between ENGINE (female) (60) – CYL 5 & 6 (female) (4)	Resistance	Max. 2 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 ENGINE (female) (46) – CYL 5 & 6 (female) (3) and chassis ground	Resistance	Max. 2 Ω
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between ENGINE (female) (46) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
			Between ENGINE (female) (60) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
	6	Defective wiring harness connector	Connecting parts between No. 5 injector – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	7	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENGINE (female)	Resistance	
			Between (46) – (60)	Max. 2 Ω	
			Between (46) – chassis ground	Min. 100 kΩ	

Circuit diagram related to injector No. 5

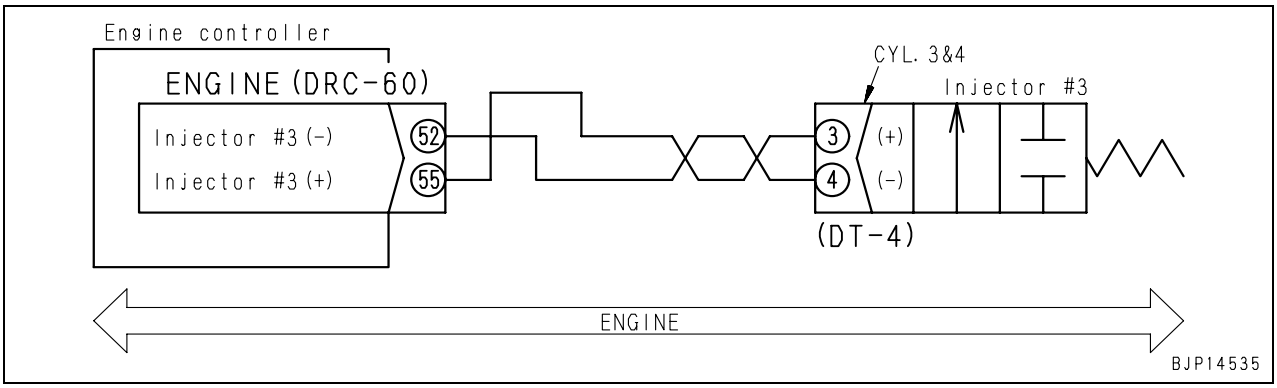


Failure code [CA324] Inj #3 Open/Short Error

Action code	Failure code	Trouble	Injector #3 open/short circuit error (Engine controller system)
E11	**CA324**		
Contents of trouble	• Opening or short circuit was detected in drive circuit of No. 3 injector.		
Action of controller	• None in particular.		
Problem that appears on machine	• Combustion becomes irregular or engine hunts. • Engine output lowers.		
Related information	• 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 engine controller	If following failure codes are also displayed, trouble is in engine controller: [**CA322**], [**CA324**], [**CA331**]		
	2	Defective No. 3 injector	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CYL 3 & 4 (male)	Resistance	
			Between (3) – (4)	Max. 2 Ω	
			Between (3) – chassis ground	Min. 100 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 ENGINE (female) (55) – CYL 3 & 4 (female) (3)	Resistance	Max. 2 Ω
			Wiring harness between ENGINE (female) (52) – CYL 3 & 4 (female) (4)	Resistance	Max. 2 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 ENGINE (female) (55) – CYL 3 & 4 (female) (3) and chassis ground	Resistance	Max. 2 Ω
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between ENGINE (female) (55) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
			Between ENGINE (female) (52) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
	6	Defective wiring harness connector	Connecting parts between No. 3 injector – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	7	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENGINE (female)	Resistance	
			Between (55) – (52)	Max. 2 Ω	
			Between (55) – chassis ground	Min. 100 kΩ	

Circuit diagram related to injector No. 3

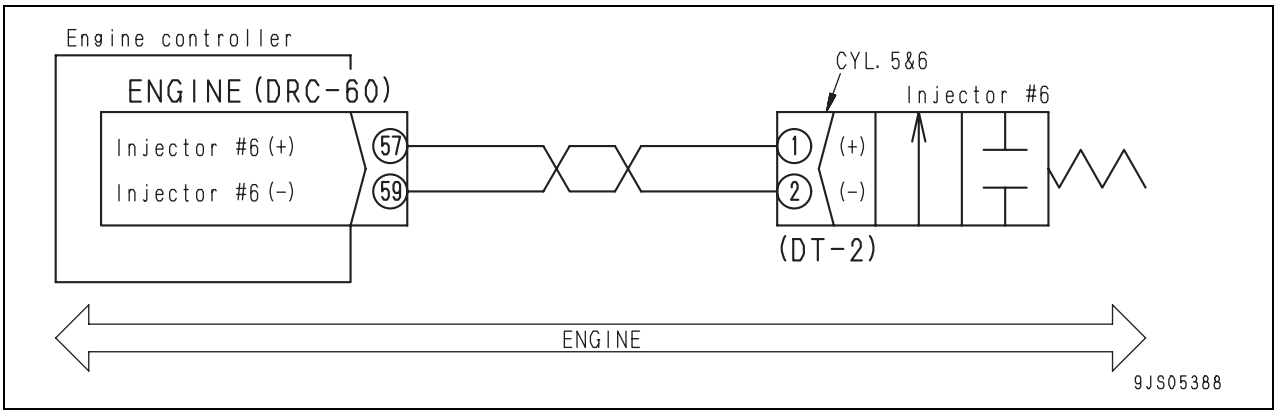


Failure code [CA325] Inj #6 Open/Short Error

Action code	Failure code	Trouble	Injector #6 open/short circuit error (Engine controller system)
E11	**CA325**		
Contents of trouble	• Opening or short circuit was detected in drive circuit of No. 6 injector.		
Action of controller	• None in particular.		
Problem that appears on machine	• Combustion becomes irregular or engine hunts.		
Related information	• 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 engine controller	If following failure codes are also displayed, trouble is in engine controller: [**CA323**], [**CA325**], [**CA332**]			
	2	Defective No. 6 injector	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CYL 5 & 6 (male)	Resistance		
			Between (5) – (6)	Max. 2 Ω		
			Between (6) – chassis ground	Min. 100 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 ENGINE (female) (57) – CYL 5 & 6 (female) (2)	Resistance	Max. 2 Ω	
			Wiring harness between ENGINE (female) (59) – CYL 5 & 6 (female) (2)	Resistance	Max. 2 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 ENGINE (female) (57) – CYL 5 & 6 (female) (2) and chassis ground	Resistance	Max. 2 Ω	
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (57) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
			Between ENGINE (female) (59) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	6	Defective wiring harness connector	Connecting parts between No. 6 injector – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	7	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (57) – (59)	Max. 2 Ω		
			Between (57) – chassis ground	Min. 100 kΩ		

Circuit diagram related to injector No. 6

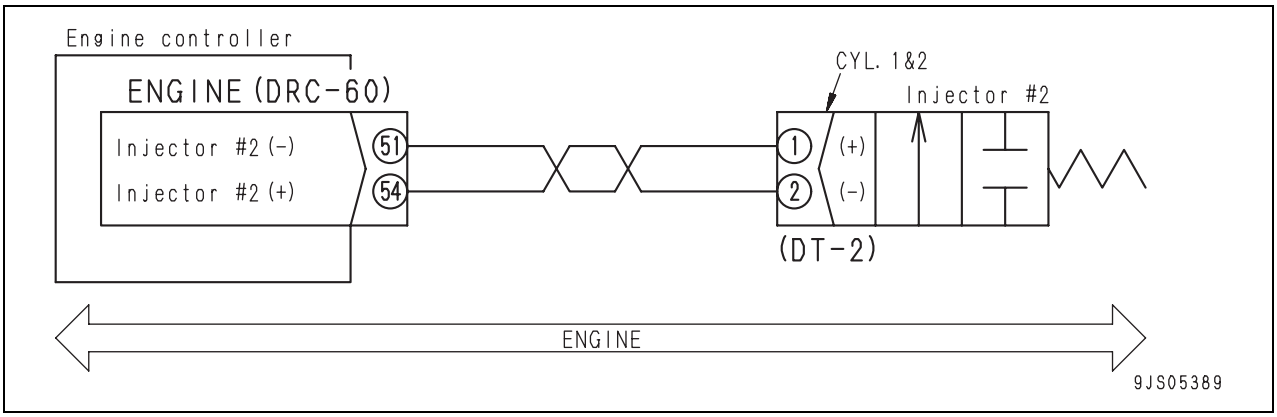


Failure code [CA331] Inj #2 Open/Short Error

Action code	Failure code	Trouble	Injector #2 open/short circuit error (Engine controller system)
E11	**CA331**		
Contents of trouble	• Opening or short circuit was detected in drive circuit of No. 2 injector.		
Action of controller	• None in particular.		
Problem that appears on machine	• Combustion becomes irregular or engine hunts. • Engine output lowers.		
Related information	• 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 engine controller	If following failure codes are also displayed, trouble is in engine controller: [**CA322**], [**CA324**], [**CA331**]			
	2	Defective No. 2 injector	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CYL 1 & 2 (male)	Resistance		
			Between (1) – (2)	Max. 2 Ω		
			Between (2) – chassis ground	Min. 100 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 ENGINE (female) (54) – CYL 1 & 2 (female) (2)	Resistance	Max. 2 Ω	
			Wiring harness between ENGINE (female) (51) – CYL 1 & 2 (female) (1)	Resistance	Max. 2 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 ENGINE (female) (54) – CYL 1 & 2 (female) (2) and chassis ground	Resistance	Max. 2 Ω	
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (54) – each of ENGINE1 (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
			Between ENGINE (female) (51) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	6	Defective wiring harness connector	Connecting parts between No. 2 injector – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	7	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (54) – (51)	Max. 2 Ω		
			Between (54) – chassis ground	Min. 100 kΩ		

Circuit diagram related to injector No. 2

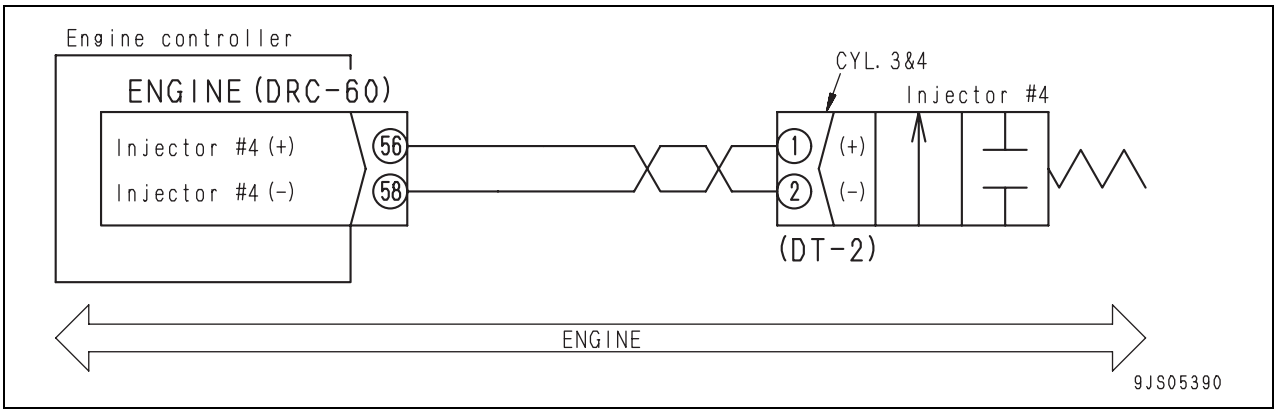


Failure code [CA332] Inj #4 Open/Short Error

Action code	Failure code	Trouble	Injector #4 open/short circuit error (Engine controller system)
E11	**CA332**		
Contents of trouble	• Opening or short circuit was detected in drive circuit of No. 4 injector.		
Action of controller	• None in particular.		
Problem that appears on machine	• Combustion becomes irregular or engine hunts. • Engine output lowers.		
Related information	• 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 engine controller	If following failure codes are also displayed, trouble is in engine controller: [**CA323**], [**CA325**], [**CA332**]			
	2	Defective No. 4 injector	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CYL 3 & 4 (male)	Resistance		
			Between (3) – (4)	Max. 2 Ω		
			Between (4) – chassis ground	Min. 100 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 ENGINE (female) (56) – CYL 3 & 4 (female) (2)	Resistance	Max. 2 Ω	
			Wiring harness between ENGINE (female) (58) – CYL 3 & 4 (female) (1)	Resistance	Max. 2 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 ENGINE (female) (56) – CYL 3 & 4 (female) (2) and chassis ground	Resistance	Max. 2 Ω	
	5	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (56) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
			Between ENGINE (female) (58) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	6	Defective wiring harness connector	Connecting parts between No. 4 injector – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	7	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (56) – (58)	Max. 2 Ω		
			Between (56) – chassis ground	Min. 100 kΩ		

Circuit diagram related to injector No. 4



KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00540-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

40 Troubleshooting

Troubleshooting by failure code (Display of code), Part 2

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Troubleshooting by failure code (Display of code), Part 2

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	• Normal operation, engine stopped, or start disabled		
Related information	• Method of reproducing failure code: Turn starting switch ON.		

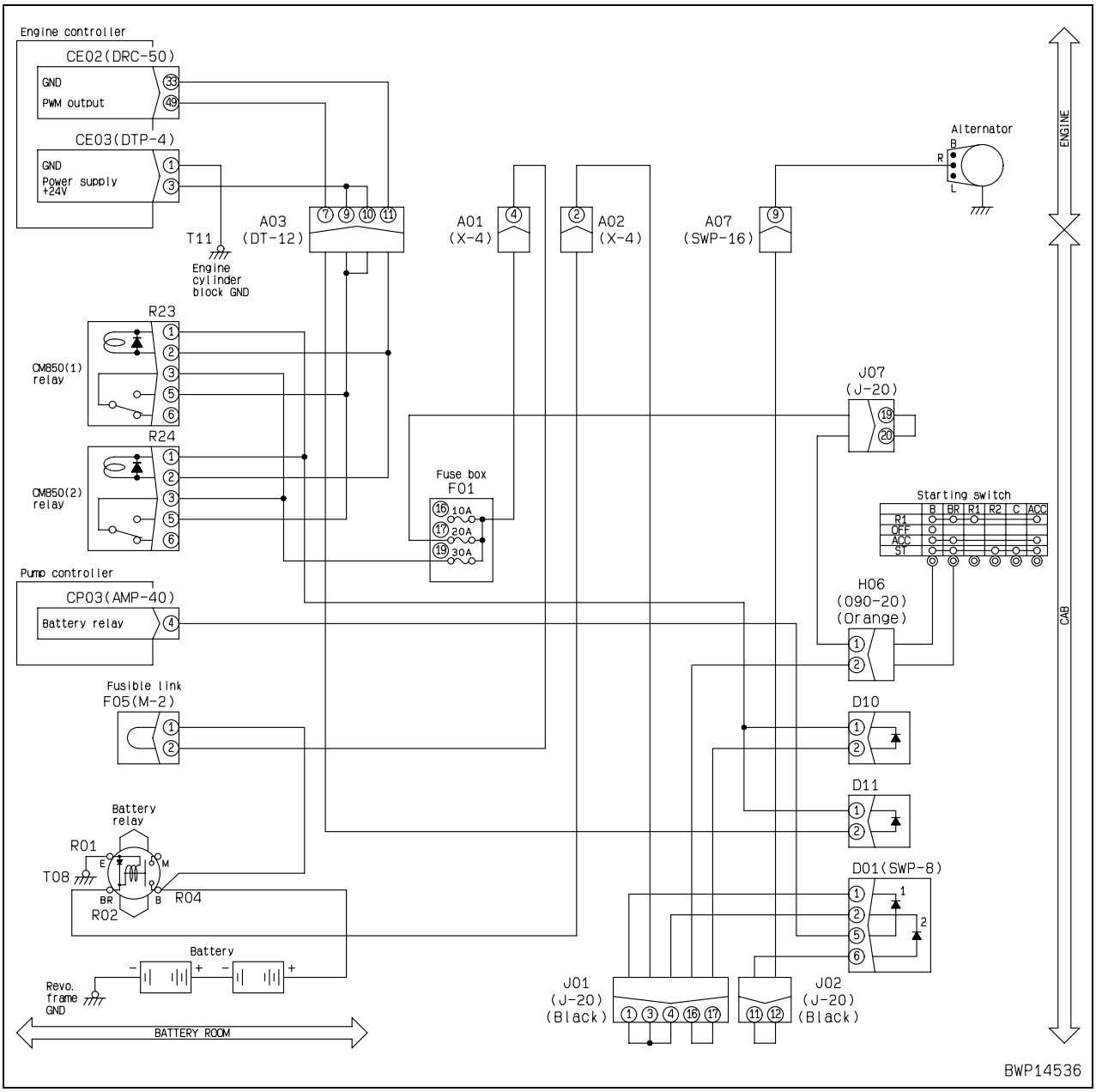
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.
	2	Defective engine controller	Engine controller may be defective. (Troubleshooting cannot be carried out.)

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 drive power circuit of injector.		
Action of controller	• Limits output and continues operation.		
Problem that appears on machine	• Exhaust gas becomes black. • Combustion becomes irregular. • Engine output lowers. • Engine cannot be started.		
Related information	• 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	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.		
	2	Defective fuse No. 19	If fuse is broken, circuit probably has ground fault.		
	3	Defective relay for engine controller power supply	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Replace relay (R23, R24) for engine controller with another relay and perform reproducing operation. If “E” of failure code goes off at this time, replaced relay is defective.		
	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 F01-19 – R23, R24 (female) (3)	Resistance	Max. 0.5 Ω
			Wiring harness between R23, R24 (female) (5) – CE03 (female) (3)	Resistance	Max. 0.5 Ω
			Wiring harness between CE03 (female) (1) – chassis ground (11)	Resistance	Max. 10 Ω
	5	Defective engine controller	If causes 1 – 4 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to engine controller power supply

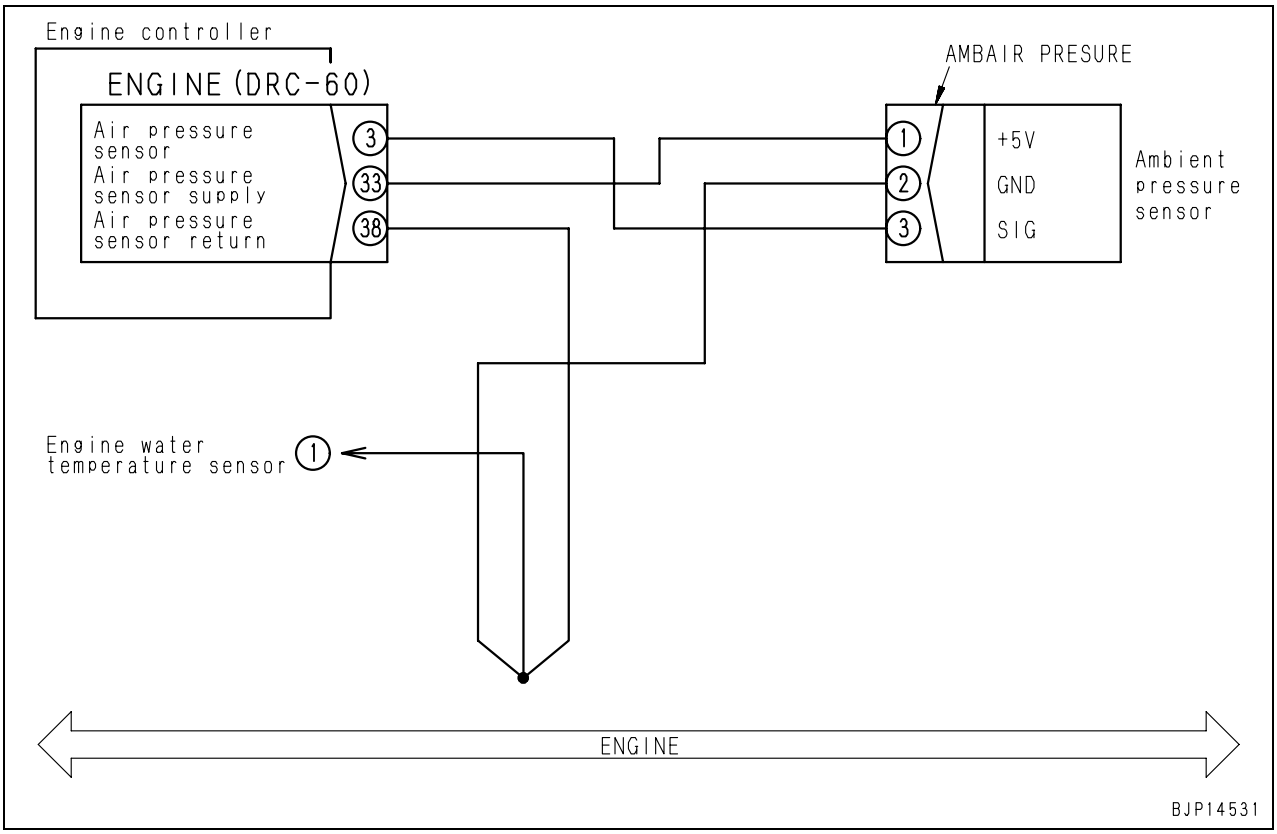


Failure code [CA352] Sens Supply 1 Volt Low Error

Action code	Failure code	Trouble	Sensor power supply 1 voltage low error (Engine controller system)
E15	**CA352**		
Contents of trouble	• Low voltage was detected in sensor power supply 1 circuit.		
Action of controller	• Fixes ambient pressure value and continues operation.		
Problem that appears on machine	• Engine output lowers. • Engine does not start easily.		
Related information	• 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 sensor or wiring harness	★ Disconnect connector with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Disconnect sensor and wiring harness at right in order and carry out operation to reproduce trouble. If “E” of failure code goes off when sensor or wiring harness is disconnected, that sensor or wiring harness is defective.	Ambient pressure sensor	AMBAIR PRESSURE
				Engine wiring harness	ENGINE
	2	Defective wiring harness connector	Connecting parts between ambient pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	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.)		

Circuit diagram related to sensor power supply 1

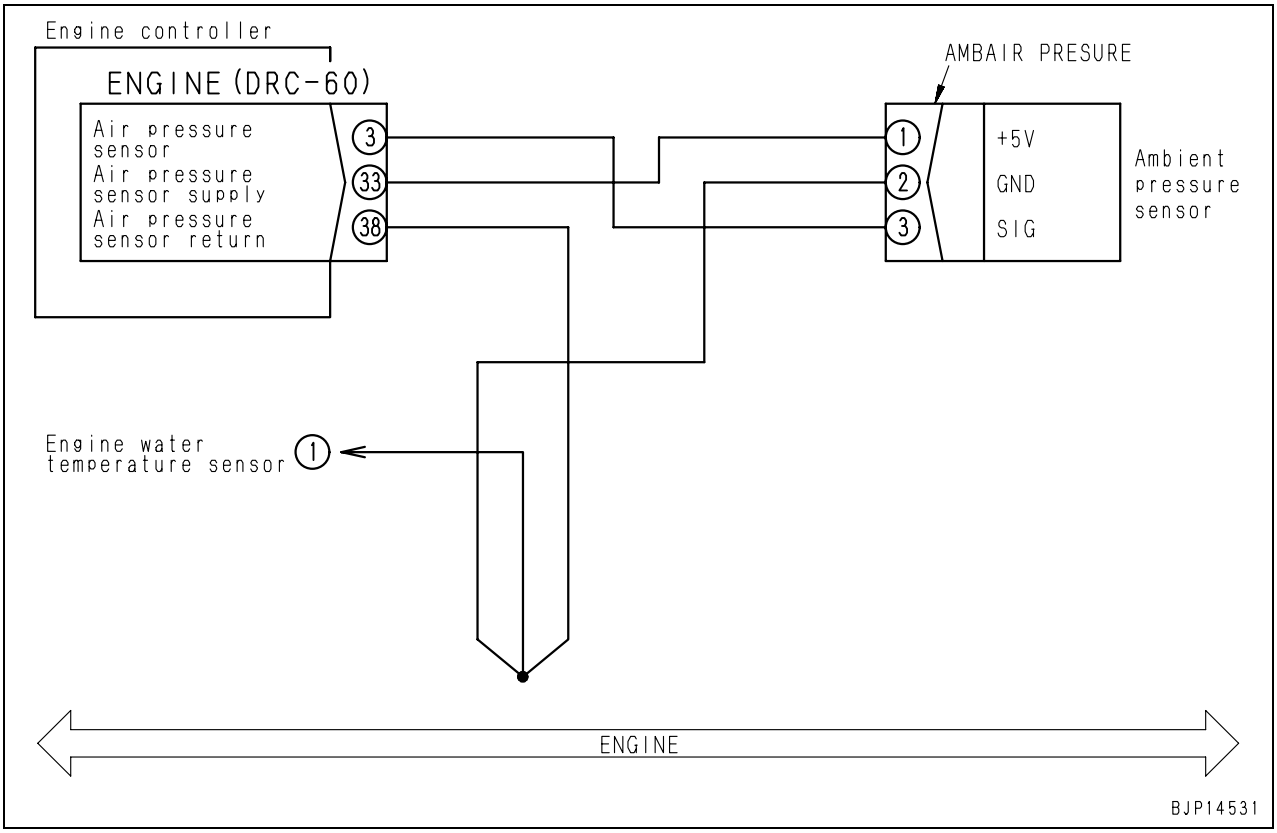


Failure code [CA386] Sens Supply 1 Volt High Error

Action code	Failure code	Trouble	Sensor power supply 1 voltage high error (Engine controller system)
E15	**CA386**		
Contents of trouble	• High voltage was detected in sensor power supply 1 circuit.		
Action of controller	• Fixes ambient pressure value and continues operation.		
Problem that appears on machine	• Engine output lowers. • Engine does not start easily.		
Related information	• 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 wiring harness connector	Connecting parts between ambient pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation
	2	Defective engine controller	If cause 1 is not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)

Circuit diagram related to sensor power supply 1

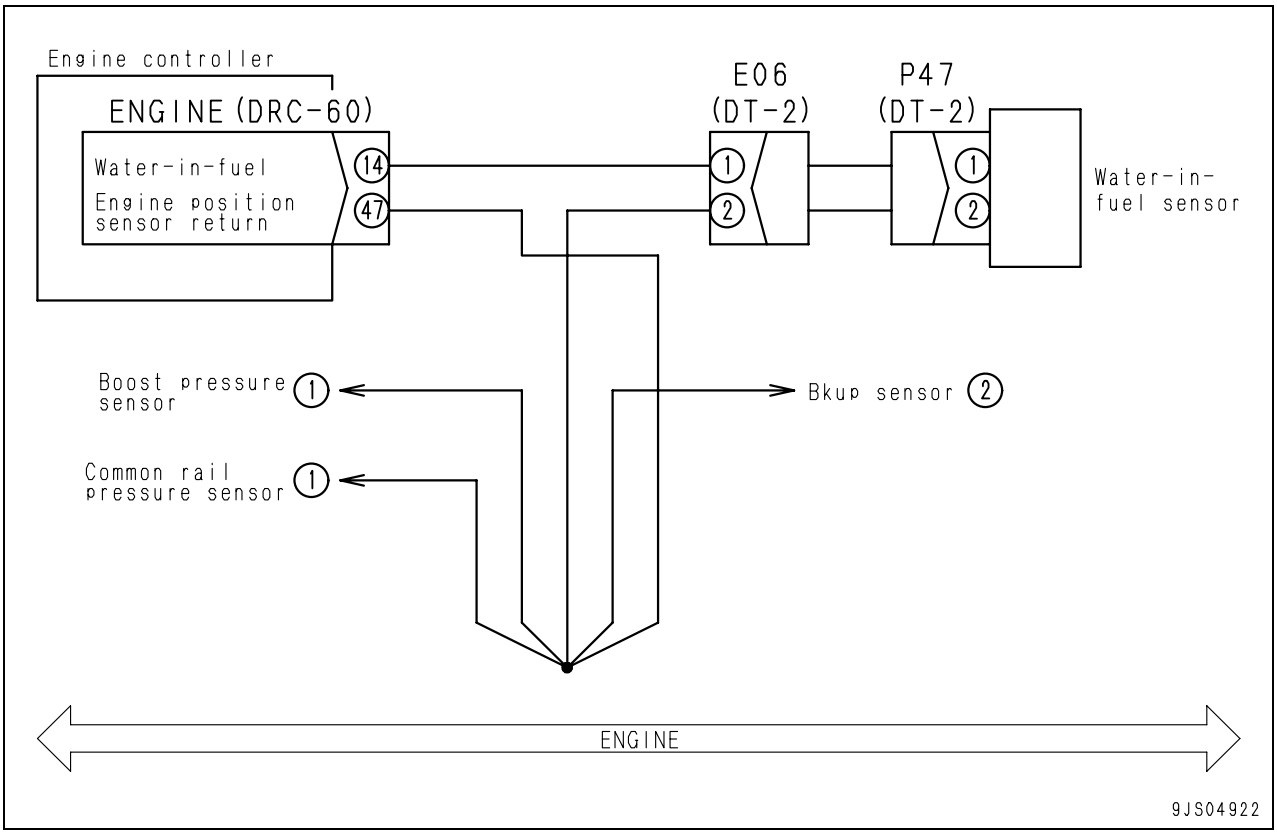


Failure code [CA428] Water in Fuel Sensor High Error

Action code	Failure code	Trouble	Water-in-fuel sensor high error (Engine controller system)
E15	**CA428**		
Contents of trouble	• High voltage was detected in signal circuit of water-in-fuel sensor.		
Action of controller	• None in particular.		
Problem that appears on machine	• Water separator monitor does not display normally.		
Related information	• 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 water-in-fuel sensor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			P47 (female)	Resistance	
			Between (1) – (2)	Max. 10 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 ENGINE (female) (14) – P47 (male) (1)	Resistance	Max. 10 Ω
			Wiring harness between ENGINE (female) (47) – P47 (male) (2)	Resistance	Max. 10 Ω
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between ENGINE (female) (14) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
	4	Defective wiring harness connector	Connecting parts between water-in-fuel sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENGINE (female)	Resistance	
			Between (14) – (47)	Max. 10 Ω	

Circuit diagram related to water-in-fuel sensor

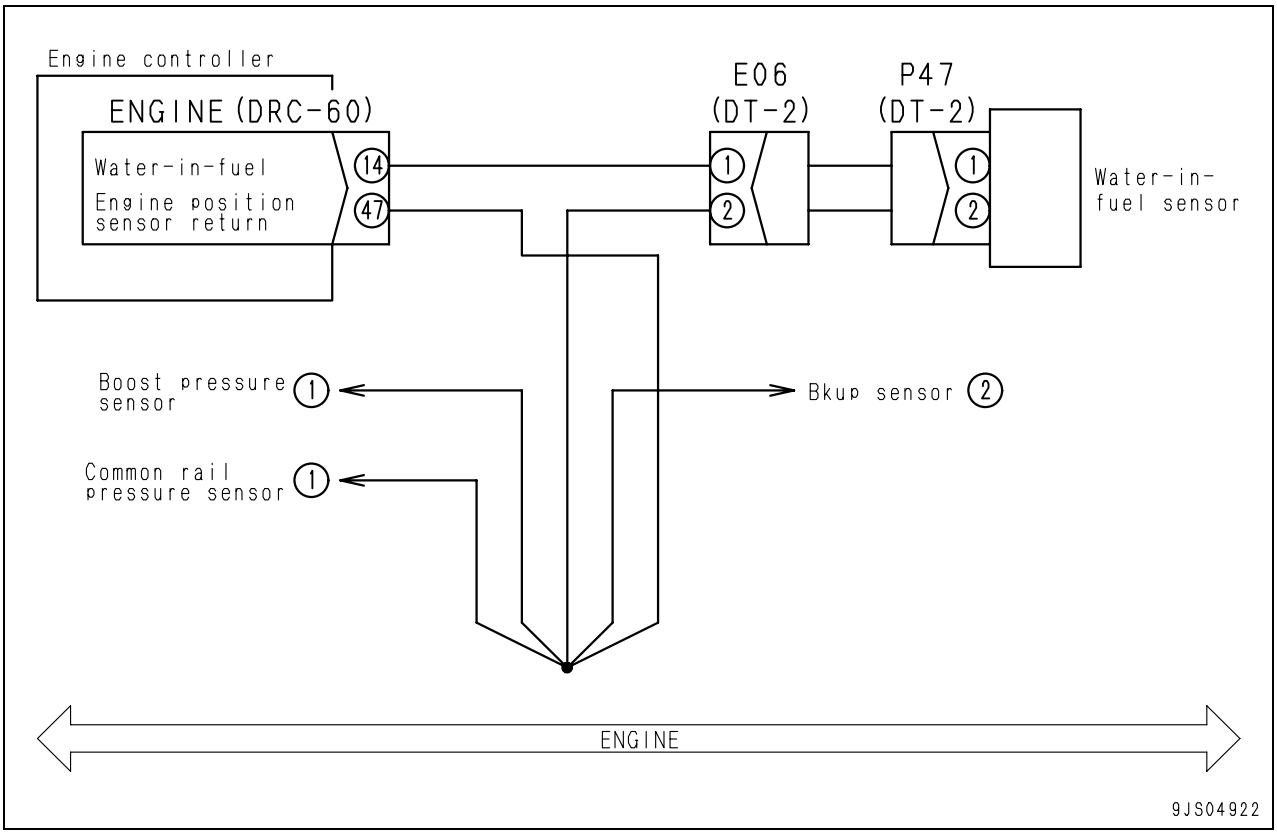


Failure code [CA429] Water in Fuel Sensor Low Error

Action code	Failure code	Trouble	Water-in-fuel sensor low error (Engine controller system)
E15	**CA429**		
Contents of trouble	• Low voltage was detected in signal circuit of water-in-fuel sensor.		
Action of controller	• None in particular.		
Problem that appears on machine	• Water separator monitor does not display normally.		
Related information	• 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 water-in-fuel sensor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P47 (female)	Resistance		
			Between (1) – (2)	Max. 10 Ω		
			Between (1) – chassis ground	Min. 100 kΩ		
	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 ENGINE (female) (14) – P47 (male) (1) and chassis ground	Resistance	Min. 100 kΩ	
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between ENGINE (female) (14) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ	
	4	Defective wiring harness connector	Connecting parts between water-in-fuel sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENGINE (female)	Resistance		
			Between (14) – (47)	Max. 10 Ω		
			Between (14) – chassis ground	Min. 100 kΩ		

Circuit diagram related to water-in-fuel sensor



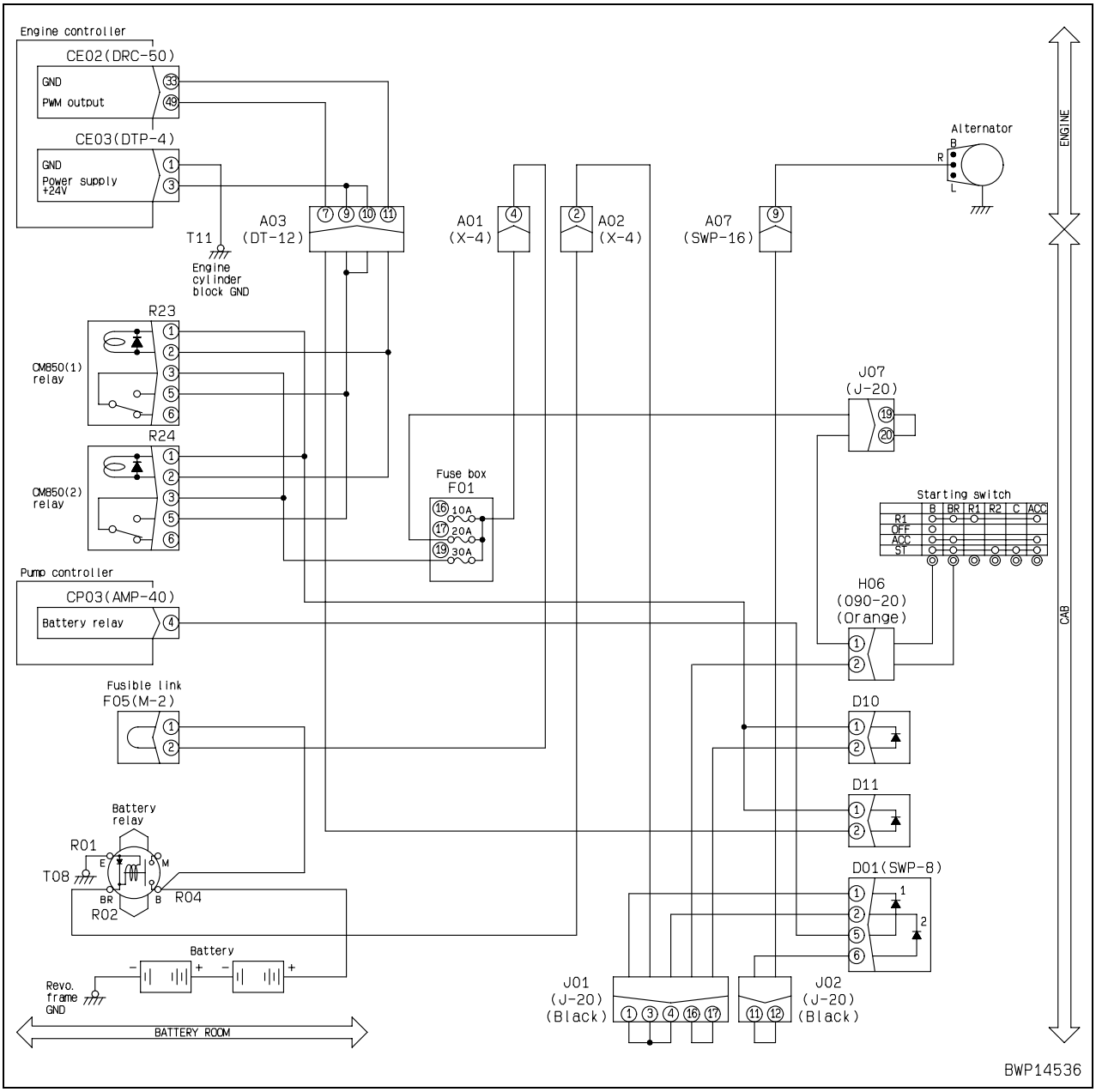
Failure code [CA441] Battery Voltage Low Error

Action code	Failure code	Trouble	Battery voltage low error (Engine controller system)
E10	**CA441**		
Contents of trouble	• There is low voltage in controller power supply circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine stops. • Engine does not start easily.		
Related information	• 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	Looseness or corrosion of battery terminal	Battery terminal may be loosened or corroded. Check it directly.		
	2	Defective battery voltage	★ Prepare with starting switch OFF, then keep starting switch OFF and turn it to START and carry out troubleshooting in each case.		
			Battery (1 piece)	Starting switch	Voltage
			Between (+) – (–) terminals	OFF	Min. 12 V
				START	Min. 6.2 V
	3	Defective fuse No. 19	If fuse is broken, circuit probably has ground fault. (See Cause 6)		
	4	Defective relay for engine controller power supply	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Replace relay (R23, R24) for engine controller with another relay and perform reproducing operation. If “E” of failure code goes off at this time, replaced relay is defective.		
	5	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 F01-19 – R23, R24 (female) (3)	Resistance	Max. 10 Ω
			Wiring harness between R23, R24 (female) (5) – CE03 (female) (3)	Resistance	Max. 10 Ω
			Wiring harness between J3 (female) (1) – chassis ground (T11)	Resistance	Max. 10 Ω
	6	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 F01-19 – R23, R24 (female) (3) and chassis ground	Resistance	Min. 100 kΩ
			Wiring harness between R23, R24 (female) (5) – CE03 (female) (3) and chassis ground	Resistance	Max. 10 Ω
	7	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between CE03 (female) (3) – CE03 (female) (1) pins (With battery terminal disconnected)	Resistance	Min. 100 kΩ
			Between CE03 (female) (3) – each of CE02 (female) pins (With battery terminal disconnected)	Resistance	Min. 100 kΩ
			Between CE03 (female) (1) – each of CE02 (female) pins (With battery terminal disconnected)	Resistance	Min. 100 kΩ

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
	8	Defective wiring harness connector	Connecting parts between fuse No. 19 – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	9	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and start engine and carry out troubleshooting in each case.		
			CE03 (female)	Starting switch	Voltage
			Between (3) – (1)	ON	Min. 24 V
				START	Min. 12 V

Circuit diagram related to engine controller power supply

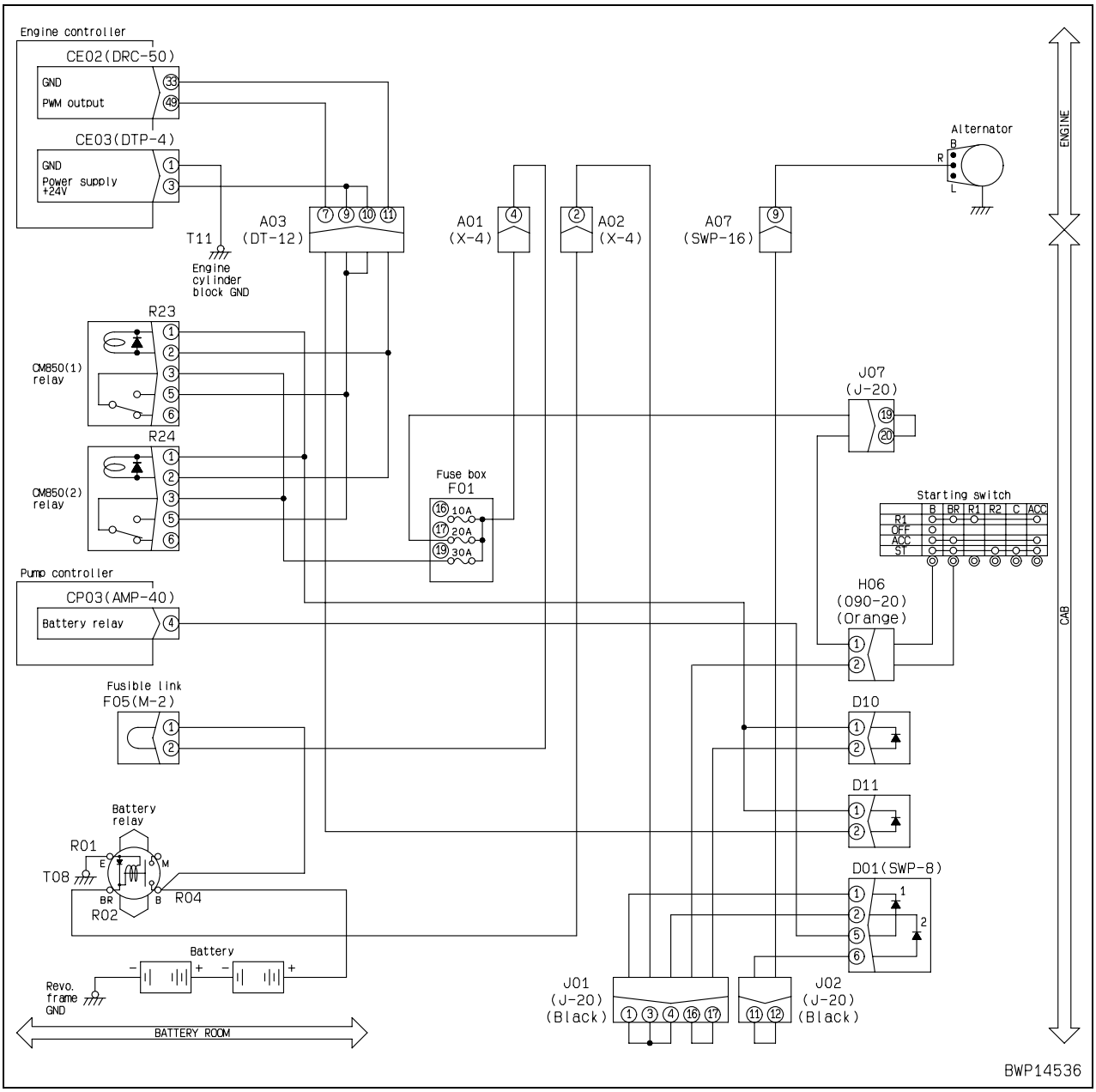


Failure code [CA442] Battery Voltage High Error

Action code	Failure code	Trouble	Battery voltage high error (Engine controller system)
E10	**CA442**		
Contents of trouble	• There is high voltage (36 V or higher) in controller power supply circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine may stop.		
Related information	• 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 battery voltage	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Battery		Voltage
			Between (+) – (–) terminals		Max. 32 V
	2	Defective alternator	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.		
			Alternator	Engine speed	Voltage
			R terminal – chassis ground	Medium or higher	27.5 – 29.5 V
	3	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CE03 (female)		Voltage
			Between (3) – (1)		Max. 32 V

Circuit diagram related to engine controller power supply



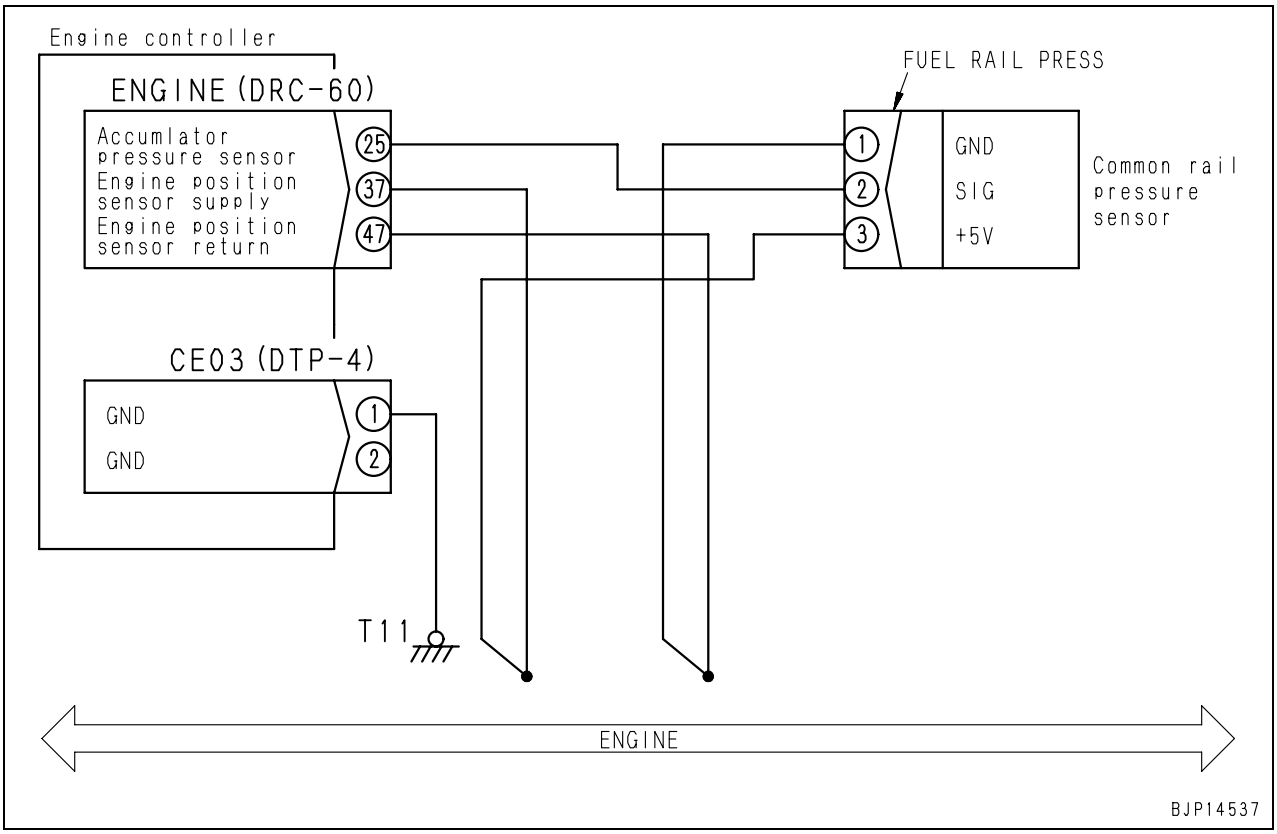
Failure code [CA449] Rail Press Very High Error

Action code	Failure code	Trouble	Common rail pressure very high error (Engine controller system)
E11	**CA449**		
Contents of trouble	• There is high pressure error (2) in common rail circuit.		
Action of controller	• Limits output and continues operation.		
Problem that appears on machine	• Engine output lowers.		
Related information	• 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	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.		
	2	Air in low pressure circuit	There may be air in low pressure circuit. Check it directly according to the following procedure. 1) Remove pressure pickup plug (outlet side) of fuel main filter. 2) Operate feed pump of fuel pre-filter. 3) Check pressure pickup plug for leakage of fuel and air. • If this error occurs during air bleeding after the fuel filter was replaced, air may remain in the fuel circuit. Keep running the engine at low idle for about three minutes. As air is bled from the fuel circuit, the engine speed will be stabilized, erasing the error indication.		
	3	Defect in fuel low pressure circuit parts	★ For check of pressure in fuel low pressure circuit, see Testing and adjusting, Checking fuel pressure. • Measured in fuel filter outlet side.		
			Pressure in fuel low-pressure circuit	During high idle (if engine can be started)	Max. 0.48 MPa {Max. 4.9 kg/cm^2}
			★ For check of pressure in fuel low pressure circuit, see Testing and adjusting, Checking fuel pressure. • Measured in fuel filter inlet and outlet sides. • Pressure drop in fuel low-pressure circuit = Fuel filter inlet pressure — Fuel filter outlet pressure		
			Pressure drop in fuel low-pressure circuit	During high idle	Max. 0.14 MPa {Max. 1.4 kg/cm^2}
			★ For check of fuel suction pressure, see Testing and adjusting, Checking fuel pressure. • Measured in gear pump fuel inlet side of supply pump.		
			Fuel suction circuit pressure (gear pump side)	During high idle	Max. 33.9 kPa {Max. 254 mmHg}
			★ For check of fuel return circuit pressure, see Testing and adjusting, Checking fuel pressure.		
			Fuel suction circuit pressure (fuel connector side)	During high idle	Max. 27.1 kPa {Max. 203 mmHg}
	4	Defective fuel cooler	★ Directly check for fuel leakage from fuel tube of fuel cooler, O-ring, seal washer damage, and check valve clogging or damage.		

<table>
<tr><td rowspan="14">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Defective common rail pressure sensor</td><td colspan="3">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>Monitoring by machine monitor</td><td colspan="2">Monitoring code: 36400</td></tr>
<tr><td>Common rail pressure</td><td>While engine is stopped</td><td>0 ± 0.39 MPa
{0 ± 4 kg/cm^2}</td></tr>
<tr><td>6</td><td>Defective O-ring of supply pump actuator</td><td colspan="3">★ Directly check that O-ring of supply pump actuator is not damaged.</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Defective supply pump actuator</td><td colspan="3">★ Prepare with starting switch OFF (INSITE connection), then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>Monitoring by machine monitor</td><td colspan="2">Monitoring code: 36400</td></tr>
<tr><td>Common rail pressure</td><td>While engine is stopped</td><td>0 ± 0.39 MPa
{0 ± 4 kg/cm^2}</td></tr>
<tr><td colspan="3">★ Prepare with starting switch OFF (INSITE connection), then start engine and carry out troubleshooting.
• Measured after one minute or more lapsed at idle.</td></tr>
<tr><td>Monitoring by machine monitor</td><td colspan="2">Monitoring code: 36400</td></tr>
<tr><td>8</td><td>Defective wiring harness connector</td><td colspan="3">The common rail fuel pressure sensor connector and supply pump actuator may be defective. Check them directly.
• Looseness of connector, breakage of lock, or breakage of seal
• Corrosion, bend, breakage, push-in, or expansion of pin
• Moisture or dirt in connector or defective insulation</td></tr>
<tr><td rowspan="3">9</td><td rowspan="3">Defective engine controller ground wiring harness</td><td colspan="3">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">CE03 (female)</td><td>Resistance</td></tr>
<tr><td colspan="2">Between (1), (2) – chassis ground</td><td>Max. 10 Ω</td></tr>
<tr><td>10</td><td>Defective supply pump</td><td colspan="3">If causes 1 – 10 are not detected, supply pump may be defective.</td></tr>
</table>

Circuit diagram related to common rail pressure sensor and engine controller ground line

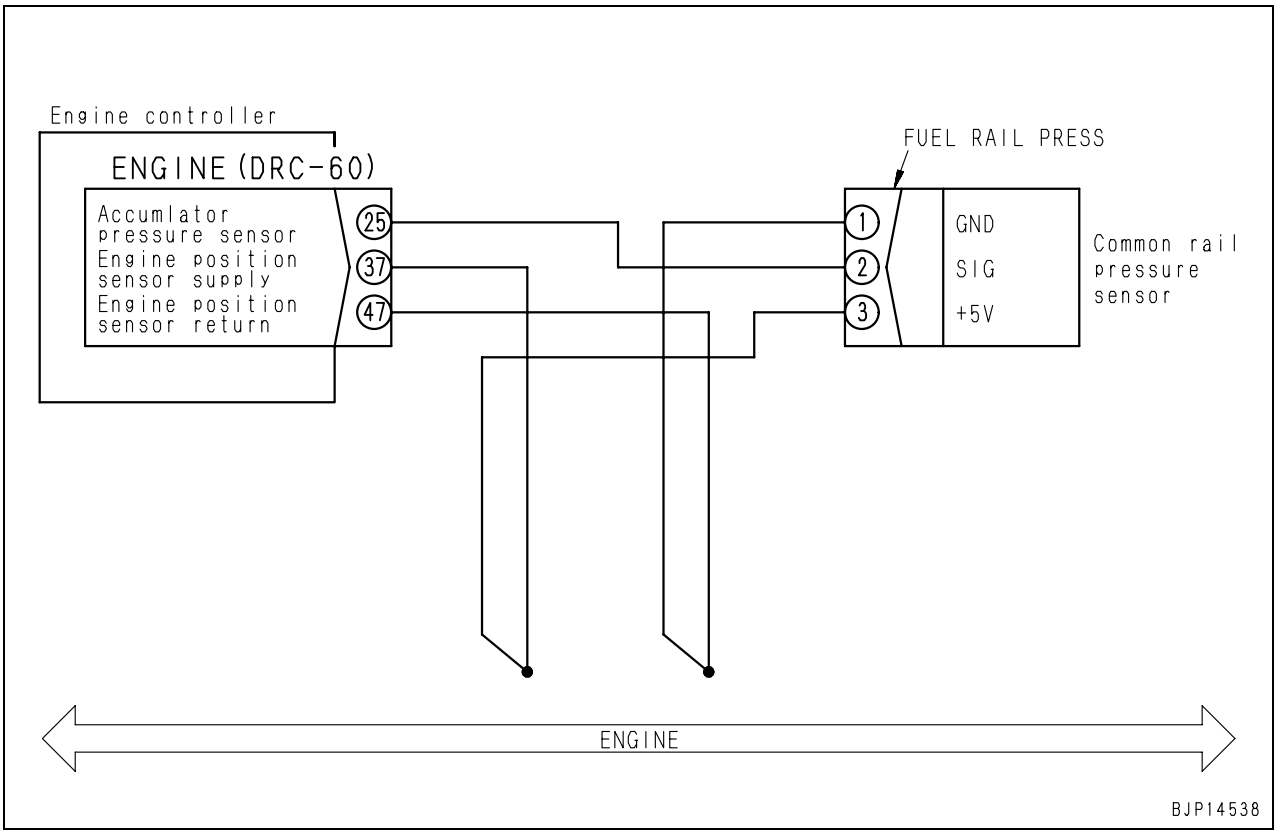


Failure code [CA451] Rail Press Sensor High Error

Action code	Failure code	Trouble	Common rail pressure sensor high error (Engine controller system)
E11	**CA451**		
Contents of trouble	• There is high voltage in signal circuit of common rail pressure sensor.		
Action of controller	• Limits output and continues operation.		
Problem that appears on machine	• Engine speed or output lowers. • Engine does not start.		
Related information	• 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 sensor power supply 2 system	If failure code [**CA227**] is also indicated, carry out troubleshooting for it first.			
	2	Defective common rail pressure sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			FUEL RAIL PRESS		Voltage	
			Between (3) – (1)	Power supply	4.75 – 5.25 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	Hot short (Short circuit with 5V/24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between ENGINE (female) (25) – FUEL RAIL PRESS (female) (2) and chassis ground		Voltage	Max. 1 V
	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 harnesses between ENGINE (female) (25) – FUEL RAIL PRESS (female) (2) and between ENGINE (female) (37) – FUEL RAIL PRESS (female) (3)		Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between common rail pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			ENGINE		Voltage	
			Between (37) – (47)	Power supply	4.75 – 5.25 V	

Circuit diagram related to common rail pressure sensor

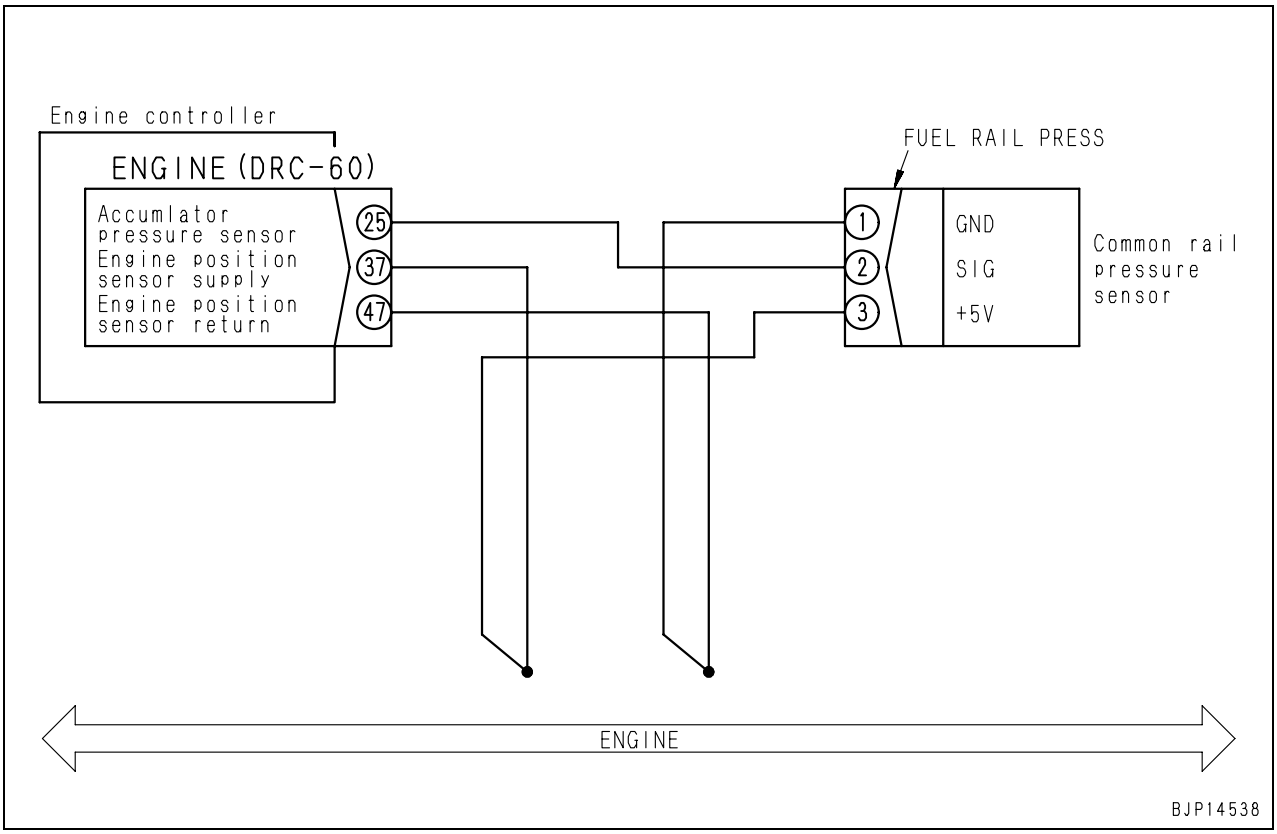


Failure code [CA452] Rail Press Sensor Low Error

Action code	Failure code	Trouble	Common rail pressure sensor low error (Engine controller system)
E11	**CA452**		
Contents of trouble	• There is low voltage in signal circuit of common rail pressure sensor.		
Action of controller	• Limits output and continues operation.		
Problem that appears on machine	• Engine speed or output lowers. • Engine does not start.		
Related information	• 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 sensor power supply 2 system	If failure code [**CA187**] is also indicated, carry out troubleshooting for it first.		
	2	Defective common rail pressure sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			FUEL RAIL PRESS		Voltage
			Between (3) – (1)	Power supply	4.75 – 5.25 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	Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between ENGINE (female) (25) – FUEL RAIL PRESS (female) (2) and chassis ground	Resistance	Min. 100 kΩ
	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 ENGINE (female) (25) – FUEL RAIL PRESS (female) (2) and between ENGINE (female) (47) – FUEL RAIL PRESS (female) (1)	Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between common rail pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			ENGINE		Voltage
			Between (37) – (47)	Power supply	4.75 – 5.25 V

Circuit diagram related to common rail pressure sensor



Failure code [CA553] Rail Press High Error

Action code	Failure code	Trouble	Common rail pressure high error (Engine controller system)
E15	**CA553**		
Contents of trouble	• There is high pressure error (1) in common rail circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine sound becomes large when no or light load is applied. • Engine output lowers.		
Related information	• 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	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.
	2	Defective connection of ground terminal	Ground terminal may be connected defectively. Check following terminals directly. • Ground terminal of machine ((–) terminal of battery) • Ground terminal of engine • Ground terminal of engine controller • Ground terminal of starting motor
	3	Defective O-ring of supply pump actuator	O-ring of supply pump actuator may be broken. Check it directly.

Failure code [CA559] Rail Press Low Error

Action code	Failure code	Trouble	Common rail pressure low error (Engine controller system)
E15	**CA559**		
Contents of trouble	• There is low pressure error (1) in common rail circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine does not start at all or does not start easily. • Exhaust gas becomes black. • Engine output lowers.		
Related information	• 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	Fuel leakage to outside	Fuel may be leaking to outside. Check it directly (Check visually while running engine at low idle).		
	2	Defect in low pressure circuit parts	★ For check of pressure in fuel low pressure circuit, see Testing and adjusting, Checking fuel pressure. • Measured in fuel filter inlet side. • Cranking speed: Min. 150 rpm		
			Pressure in fuel low-pressure circuit	During cranking	Min. 0.14 MPa {Min. 1.4 kg/cm^2}
			★ For check of pressure in fuel low pressure circuit, see Testing and adjusting, Checking fuel pressure. • Measured in fuel filter outlet side.		
			Pressure in fuel low-pressure circuit	During high idle	Min. 0.48 MPa {Min. 4.9 kg/cm^2}
			★ For check of pressure in fuel low pressure circuit, see Testing and adjusting, Checking fuel pressure. • Measured in fuel filter inlet and outlet sides. • Pressure drop in fuel low-pressure circuit = Fuel filter inlet pressure — Fuel filter outlet pressure		
			Pressure drop in fuel low-pressure circuit	During high idle	Max. 0.14 MPa {Max. 1.4 kg/cm^2}
			★ For check of fuel suction pressure, see Testing and adjusting, Checking fuel pressure. • Measured in gear pump fuel inlet side of supply pump.		
			Fuel suction circuit pressure (gear pump side)	During high idle	Max. 33.9 kPa {Max. 254 mmHg}
			★ For check of fuel suction pressure, see Testing and adjusting, Checking fuel pressure. • Measured in fuel connector side.		
			Fuel suction circuit pressure (fuel connector side)	During high idle	Max. 27.1 kPa {Max. 203 mmHg}

<table>
<tr><td rowspan="11">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Defective injector (including high pressure piping in head)</td><td colspan="3">★ For check of return rate from injector, see Testing and adjusting, Checking fuel return rate and leakage.</td></tr>
<tr><td rowspan="2">Return rate from injector</td><td>During cranking (if engine cannot be started)</td><td>Max. 100 cc/30 sec.</td></tr>
<tr><td>During low idle (if engine can be started)</td><td>Max. 300 cc/45 sec.</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective supply pump</td><td colspan="3">★ For check of return rate from supply pump, see Testing and adjusting, Checking fuel return rate and leakage.</td></tr>
<tr><td rowspan="2">Return rate from supply pump</td><td>During cranking (if engine cannot be started)</td><td>Max. 100 cc/30 sec.</td></tr>
<tr><td>During low idle (if engine can be started)</td><td>Max. 300 cc/45 sec.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Defective pressure limiter</td><td colspan="3">★ For check of leakage through pressure limiter, see Testing and adjusting, Checking fuel return rate and leakage.</td></tr>
<tr><td>Leakage through pressure limiter</td><td>During cranking</td><td>Max. 30 cc/min</td></tr>
<tr><td>6</td><td>Defective supply pump plunger</td><td colspan="3">★ Remove the supply pump head, and directly check that the plunger is not damaged.</td></tr>
<tr><td>7</td><td>Air in low pressure circuit</td><td colspan="3">There may be air in low pressure circuit. Check it directly according to the following procedure.
1) Remove pressure pickup plug (outlet side) of fuel main filter.
2) Operate feed pump of fuel pre-filter.
3) Check pressure pickup plug for leakage of fuel and air.
• If this error occurs during air bleeding after the fuel filter was replaced, air may remain in the fuel circuit. Keep running the engine at low idle for about three minutes. As air is bled from the fuel circuit, the engine speed will be stabilized, erasing the error indication.</td></tr>
</table>

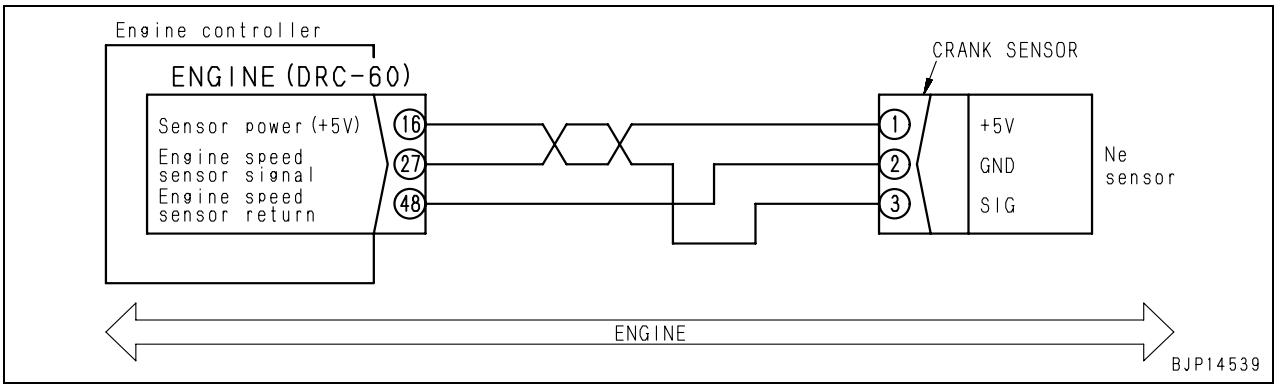
Failure code [CA689] Eng Ne Speed Sensor Error

Action code	Failure code	Trouble	Engine Ne speed sensor error (Engine controller system)
E11	**CA689**		
Contents of trouble	• There is error in signal from engine Ne speed sensor.		
Action of controller	• Continues control with signal from engine Bkup speed sensor.		
Problem that appears on machine	• Engine hunts. • Engine does not start easily. • Engine output lowers.		
Related information	• 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 Ne speed sensor power supply system	If failure code [**CA238**] is also indicated, carry out troubleshooting for it first.			
	2	Defective engine Ne speed sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CRANK SENSOR		Voltage	
			Between (1) – (2)	Power supply	4.75 – 5.25 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	Breakage or improper clearance of engine Ne speed sensor	Engine Ne speed sensor may be broken or may have improper clearance. Check it directly.			
	4	Breakage of rotation sensor wheel	Rotation sensor wheel may be broken. Check it directly.			
	5	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) (27) – CRANK SENSOR (female) (3)		Resistance	Max. 10 Ω
	6	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 ENGINE (female) (27) – CRANK SENSOR (female) (3) and chassis ground		Resistance	Min. 100 kΩ
	7	Hot short (Short circuit with 5V/24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between ENGINE (female) (27) – CRANK SENSOR (female) (3) and chassis ground		Voltage	Max. 1 V

<table>
<tr><td rowspan="5">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="2">8</td><td rowspan="2">Short circuit in wiring harness
(with another wiring harness)</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 ENGINE (female) (27) – CRANK SENSOR (female) (3) and between ENGINE (female) (16) – CRANK SENSOR (female) (1)</td><td>Resistance</td><td>Min. 100 kΩ</td></tr>
<tr><td>9</td><td>Defective wiring harness connector</td><td colspan="4">Wiring harness between ENGINE (female) (27) – CRANK SENSOR (female) (3) and between ENGINE (female) (48) – CRANK SENSOR (female) (2)</td><td>Resistance</td><td>Min. 100 kΩ</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Defective engine controller</td><td colspan="4">Connecting parts between engine Ne speed sensor – engine wiring harness – engine controller may be defective. Check them directly.
• Looseness of connector, breakage of lock, or breakage of seal
• Corrosion, bend, breakage, push-in, or expansion of pin
• Moisture or dirt in connector or defective insulation</td></tr>
<tr><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">ENGINE</td><td>Voltage</td></tr>
<tr><td colspan="2">Between (16) – (48)</td><td>Power supply</td><td>4.75 – 5.25 V</td></tr>
</table>

Circuit diagram related to engine Ne speed sensor



Failure code [CA731] Eng Bkup Speed Sens Phase Error

Action code	Failure code	Trouble	Engine Bkup speed sensor phase error (Engine controller system)
E11	**CA731**		
Contents of trouble	• Phase error was detected in signals from engine Ne speed sensor and engine Bkup speed sensor		
Action of controller	• Controls the engine with signal from engine Ne speed sensor.		
Problem that appears on machine	• Engine does not start at all or does not start easily. • Idle speed is unstable. • Exhaust gas becomes black.		
Related information	• Method of reproducing failure code: Start engine.		

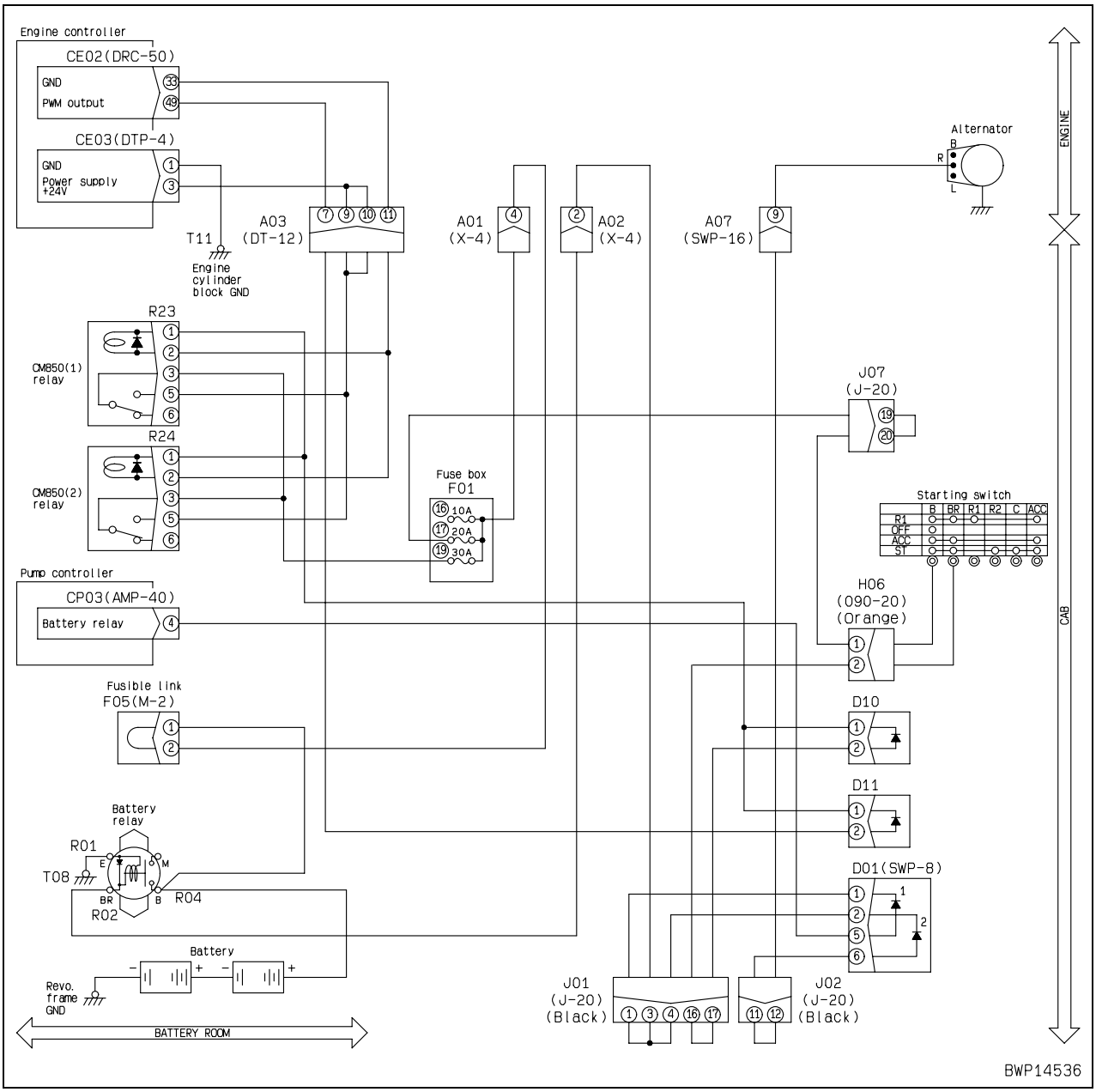
	Cause		Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	Breakage of engine Ne speed sensor	Engine Ne speed sensor may be broken. Check it directly.
	2	Breakage of engine Bkup speed sensor	Engine Bkup speed sensor may be broken. Check it directly.
	3	Defective installation or breakage of rotation sensor wheel on crankshaft side	Rotation sensor wheel on crankshaft side may be installed defectively or broken. Check it according to the following procedure. 1) Set No. 1 cylinder at compression top dead center (Match stamped mark). 2) If center of oblong hole of rotation sensor wheel is at tip of Ne speed sensor, rotation sensor wheel is installed normally.
	4	Defective installation or breakage of rotation sensor ring on camshaft side	Rotation sensor ring on camshaft side may be installed defectively or broken. Check it according to the following procedure. 1) Set No. 1 cylinder at compression top dead center (Match stamped mark). 2) Remove Bkup speed sensor. 3) If 2 grooves (1 crest) of rotation sensor ring are seen through sensor mounting hole, rotation sensor ring is installed normally.
	5	Defective timing of crankshaft and camshaft	Timing of crankshaft and camshaft may be defective. Check it directly.
	6	Defective connection of ground terminal	Ground terminal may be connected defectively. Check following terminals directly. • Ground terminal of machine ((–) terminal of battery) • Ground terminal of engine • Ground terminal of engine controller • Ground terminal of starting motor

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	• Engine may stop and may not be started again. • Monitoring function of machine monitor (engine controller system) may not work normally.		
Related information	• 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	Defect in related system	If another failure code is displayed, carry out troubleshooting for it.			
	2	Looseness or corrosion of battery terminal	Battery terminal may be loosened or corroded. Check it directly.			
	3	Defective battery voltage	★ Prepare with starting switch OFF, then keep starting switch OFF and turn it to START and carry out troubleshooting in each case.			
			Battery (1 piece)	Starting switch	Voltage	
			Between (+) – (–) terminals	OFF	Min. 12 V	
				START	Min. 6.2 V	
	4	Defective fuse No. 19	If fuse is broken, circuit probably has ground fault.			
	5	Defective relay for engine controller power supply	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Replace relay (R23, R24) for engine controller with another relay and perform reproducing operation. If “E” of failure code goes off at this time, replaced relay is defective.			
	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 F01-19 – R23, R24 (female) (3)	Resistance	Max. 10 Ω	
			Wiring harness between R23, R24 (female) (5) – CE03 (female) (3)	Resistance	Max. 10 Ω	
			Wiring harness between CE03 (female) (1) – chassis ground (T11)	Resistance	Max. 10 Ω	
	7	Defective wiring harness connector	Connecting parts between fuse No. 19 – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	8	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and start engine and carry out troubleshooting in each case.			
			CE03 (female)	Starting switch	Voltage	
			Between (3) – (1)	ON	Min. 24 V	
				START	Min. 12 V	

Circuit diagram related to engine controller power supply



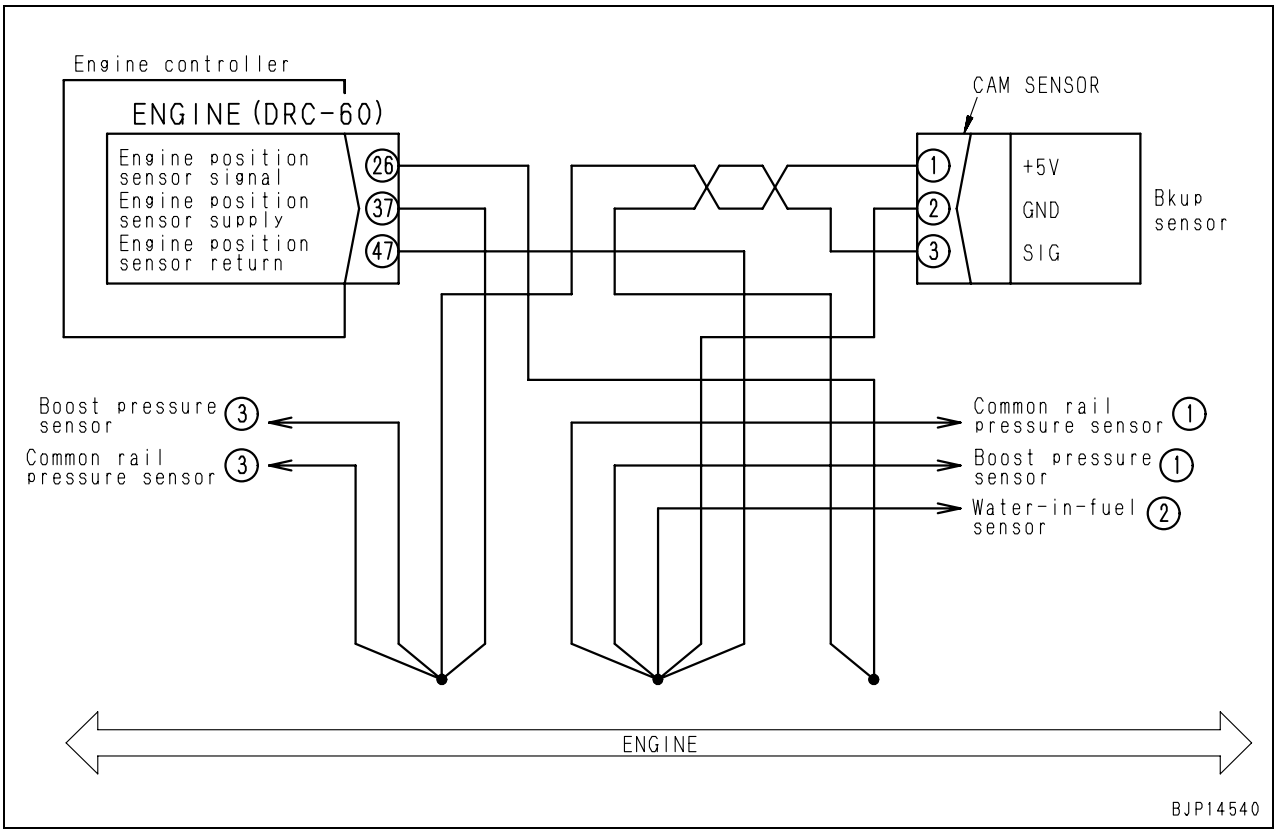
Failure code [CA778] Eng Bkup Speed Sensor Error

Action code	Failure code	Trouble	Engine Bkup speed sensor error (Engine controller system)
E11	**CA778**		
Contents of trouble	• There is error in signal from engine Bkup speed sensor.		
Action of controller	• Continues control with signal from engine Ne speed sensor.		
Problem that appears on machine	• Engine does not start easily. • Engine output lowers.		
Related information	• 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 2 system	If failure code [**CA187**] is also indicated, carry out troubleshooting for it first.			
	2	Defective engine Bkup speed sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CAM SENSOR		Voltage	
			Between (1) – (2)	Power supply	4.75 – 5.25 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	Breakage or improper clearance of engine Bkup speed sensor	Engine Bkup speed sensor may be broken or may have improper clearance. Check it directly.			
	4	Breakage of rotation sensor ring	Rotation sensor ring may be broken. Check it directly.			
	5	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) (26) – CAM SENSOR (female) (3)		Resistance	Max. 10 Ω
	6	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 ENGINE (female) (26) – CAM SENSOR (female) (3) and chassis ground		Resistance	Min. 100 kΩ
	7	Hot short (Short circuit with 5V/24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between ENGINE (female) (26) – CAM SENSOR (female) (3) and chassis ground		Voltage	Max. 1 V
	8	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 ENGINE (female) (26) – CAM SENSOR (female) (3) and between ENGINE (female) (37) – CAM SENSOR (female) (1)		Resistance	Min. 100 kΩ
			Wiring harness between ENGINE (female) (26) – CAM SENSOR (female) (3) and between ENGINE (female) (47) – CAM SENSOR (female) (2)		Resistance	Min. 100 kΩ

<table>
<tr><td rowspan="4">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td>9</td><td>Defective wiring harness connector</td><td colspan="3">Connecting parts between engine Bkup speed sensor – engine wiring harness – engine controller may be defective. Check them directly.
• Looseness of connector, breakage of lock, or breakage of seal
• Corrosion, bend, breakage, push-in, or expansion of pin
• Moisture or dirt in connector or defective insulation</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Defective engine controller</td><td colspan="3">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">ENGINE</td><td>Voltage</td></tr>
<tr><td>Between (37) – (47)</td><td>Power supply</td><td>4.75 – 5.25 V</td></tr>
</table>

Circuit diagram related to engine Bkup speed sensor

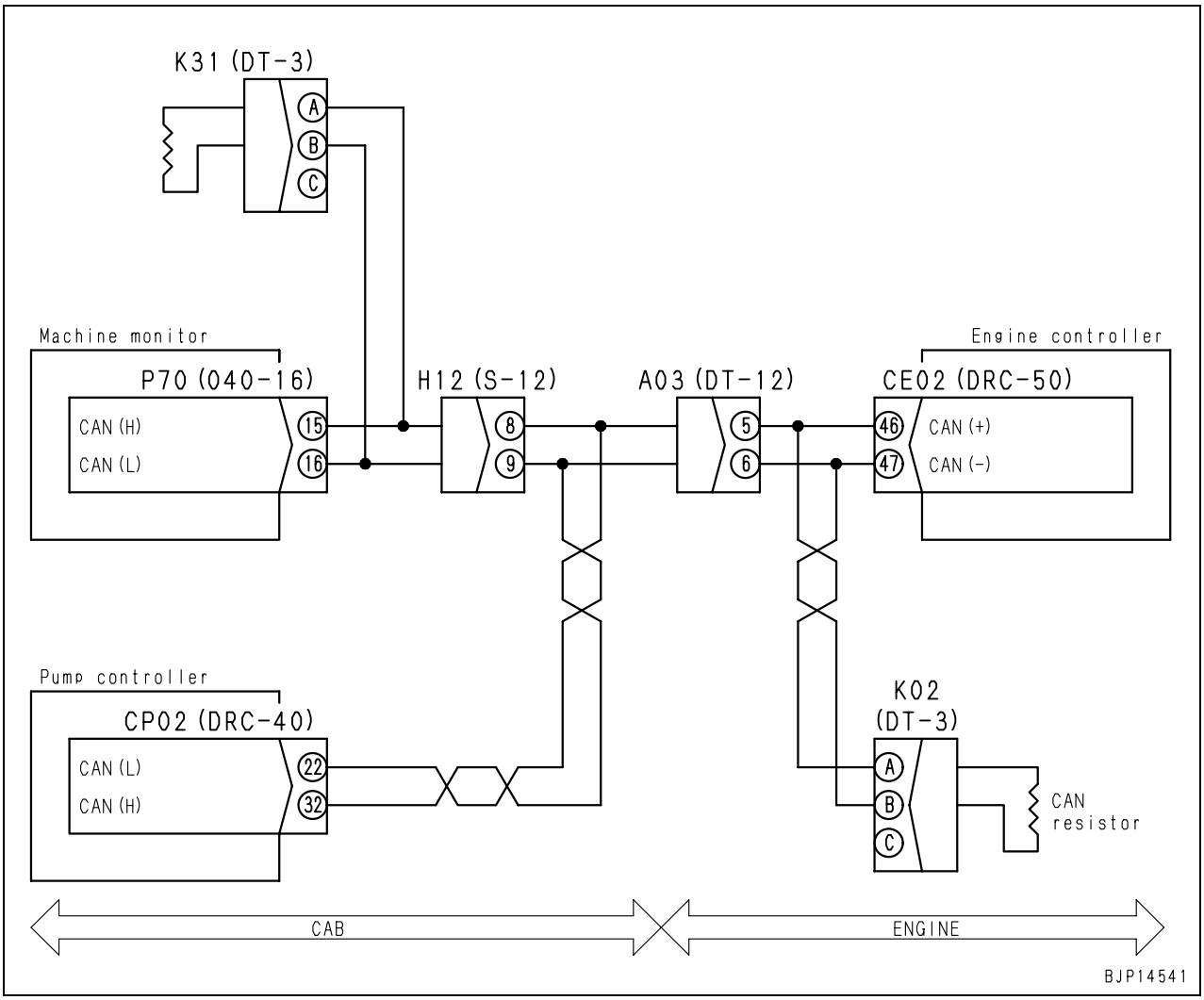


Failure code [CA1633] KOMNET Datalink Timeout Error

Action code	Failure code	Trouble	KOMNET Datalink timeout error (Engine controller system)
E0E	**CA1633**		
Contents of trouble	• Engine controller detected communication error in KOMNET communication circuit between pump controller and machine monitor.		
Action of controller	• Action to be taken varies depending on applicable machine. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Information may not transmitted normally by KOMNET communication and machine may not operate normally. (Trouble phenomenon depends on failed section.)		
Related information	• 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	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 P70 (female) (15) – K31 (female) (A) – CP02 (female) (32), – CE02 (female) (46), – K02 (female) (A)	Resistance	Max. 1 Ω
			Wiring harness between P70 (female) (16) – K31 (female) (B) – CP02 (female) (22), – CE02 (female) (47), – K02 (female) (B)	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 P70 (female) (15) – K31 (female) (A) – CP02 (female) (32), – CE02 (female) (46), – K02 (female) (A) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between P70 (female) (16) – K31 (female) (B) – CP02 (female) (22), – CE02 (female) (47), – K02 (female) (B) 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 P70 (female) (15) – K31 (female) (A) – CP02 (female) (32), – CE02 (female) (46), – K02 (female) (A) and chassis ground	Voltage	Max. 5.5 V
			Wiring harness between P70 (female) (16) – K31 (female) (B) – CP02 (female) (22), – CE02 (female) (47), – K02 (female) (B) and chassis ground	Voltage	Max. 5.5 V
	4	Defective CAN terminal resistance (Internal short circuit or disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			K31, K02 (male)	Resistance	
			Between (A) – (B)	47 – 67 Ω	
	5	Defective pump controller	If causes 1 – 4 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to KOMNET communication

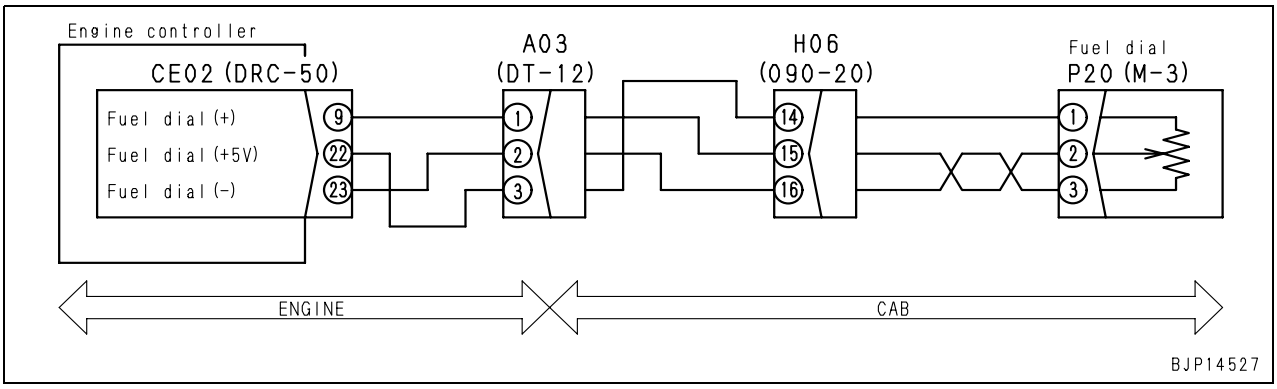


Failure code [CA2185] Throt Sens Sup Volt High Error

Action code	Failure code	Trouble	Throttle sensor supply voltage high error (Engine controller system)
E14	**CA2185**		
Contents of trouble	• High voltage (5.25 V or higher) was detected in throttle sensor power supply circuit.		
Action of controller	• If trouble occurs while starting switch is in ON position, controller fixes voltage value to level just before detection of trouble and continues operation. • If starting switch is turned ON while voltage is abnormally high, controller continues operation with voltage at 100% value.		
Problem that appears on machine	• Engine speed cannot be controlled with fuel control dial.		
Related information	• 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	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between CE02 (female) (22) – each of CE02 (female) pins (With P20 disconnected)	Resistance	Min. 100 kΩ
			Between CE02 (female) (22) – CE03 (female) (3) (With P20 disconnected)	Resistance	Min. 100 kΩ
	2	Defective wiring harness connector	Connecting parts between fuel control dial – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	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.)		

Circuit diagram related to fuel control dial

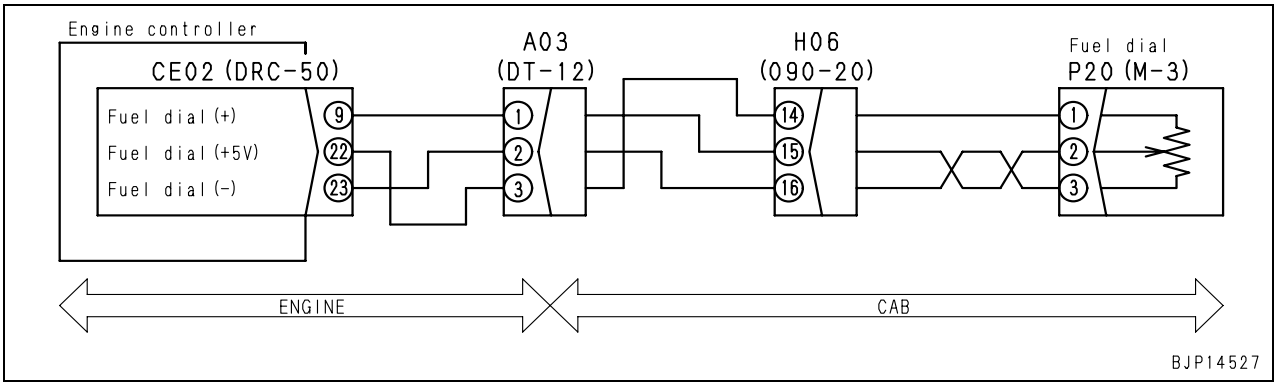


Failure code [CA2186] Throt Sens Sup Volt Low Error

Action code	Failure code	Trouble	Throttle sensor supply voltage low error (Engine controller system)
E14	**CA2186**		
Contents of trouble	• Low voltage was detected in throttle sensor power supply circuit.		
Action of controller	• If trouble occurs while starting switch is in ON position, controller fixes voltage value to level just before detection of trouble and continues operation. • If starting switch is turned ON while voltage is abnormally high, controller continues operation with voltage at 100% value.		
Problem that appears on machine	• Engine speed cannot be controlled with fuel control dial.		
Related information	• 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	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. 100 kΩ
	2	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between CE02 (female) (9) – each of CE02 (female) pins (With P20 disconnected)	Resistance	Min. 100 kΩ
	3	Defective wiring harness connector	Connecting parts between fuel control dial – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	4	Defective engine controller	If causes 1 and 3 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related to fuel control dial



Failure code [CA2249] Rail Press Very Low Error

Action code	Failure code	Trouble	Common rail pressure very low error (Engine controller system)
E11	**CA2249**		
Contents of trouble	• There is low pressure error (2) in common rail circuit.		
Action of controller	• Limits output and continues operation.		
Problem that appears on machine	• Engine does not start easily. • Exhaust gas becomes black. • Engine output lowers.		
Related information	• Method of reproducing failure code: Start engine.		

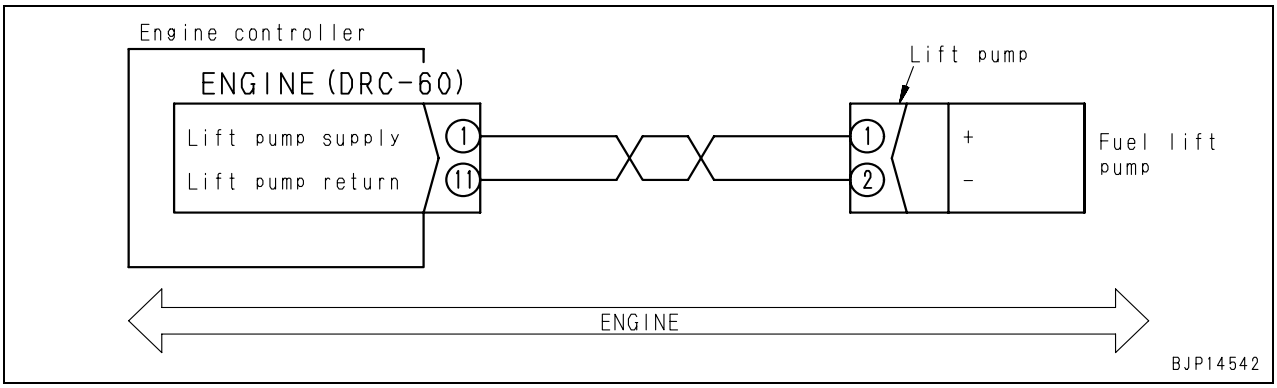
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	1	Carry out troubleshooting for failure code [**CA559**].

Failure code [CA2265] Electric Lift Pump High Error

Action code	Failure code	Trouble	Electric lift pump high error (Engine controller system)
E15	**CA2265**		
Contents of trouble	• Opening was detected in drive circuit of electric lift pump actuator.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine does not start easily.		
Related information	• 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 electric lift pump (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			LIFT PUMP (female)	Resistance	
			Between (1) – (2)	Max. 20 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 ENGINE (female) (1) – LIFT PUMP (female) (1)	Resistance	Max. 10 Ω
			Wiring harness between ENGINE (female) (11) – LIFT PUMP (female) (2)	Resistance	Max. 10 Ω
	3	Hot short (Short circuit with 12V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between ENGINE (female) (1) – LIFT PUMP (female) (1) and chassis ground	Voltage	Max. 6 V
	4	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between ENGINE (female) (1) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 1 MΩ
	5	Defective wiring harness connector	Connecting parts between common rail pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	6	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENGINE (female)	Resistance	
			Between (1) – (11)	Max. 20 Ω	

Circuit diagram related to electric lift pump actuator

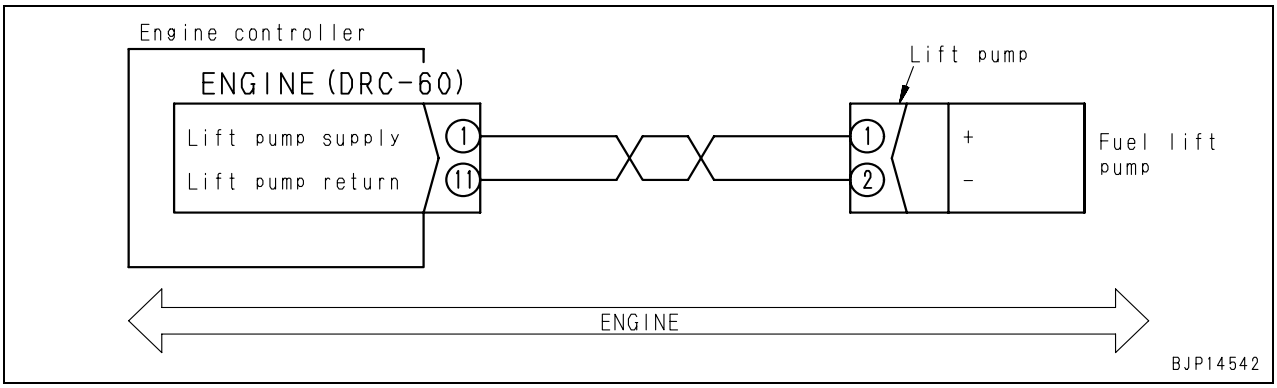


Failure code [CA2266] Electric Lift Pump Low Error

Action code	Failure code	Trouble	Electric lift pump low error (Engine controller system)
E15	**CA2266**		
Contents of trouble	• Opening was detected in electric lift pump actuator.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine does not start easily.		
Related information	• 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 electric lift pump (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			LIFT PUMP (female)	Resistance	
			Between (1) – (2)	Max. 20 Ω	
			Between (1) – chassis ground	Min. 100 kΩ	
	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 ENGINE (female) (1) – LIFT PUMP (female) (1) and chassis ground	Resistance	Max. 100 kΩ
	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 ENGINE (female) (1) – LIFT PUMP (female) (1) and chassis ground	Voltage	Max. 6 V
	4	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between ENGINE (female) (1) – each of ENGINE (female) pins (With all wiring harness connectors disconnected)	Resistance	Min. 100 kΩ
	5	Defective wiring harness connector	Connecting parts between common rail pressure sensor – engine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	6	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENGINE (female)	Resistance	
			Between (1) – (11)	Max. 20 Ω	
			Between (1) – chassis ground	Min. 100 kΩ	

Circuit diagram related to electric lift pump actuator

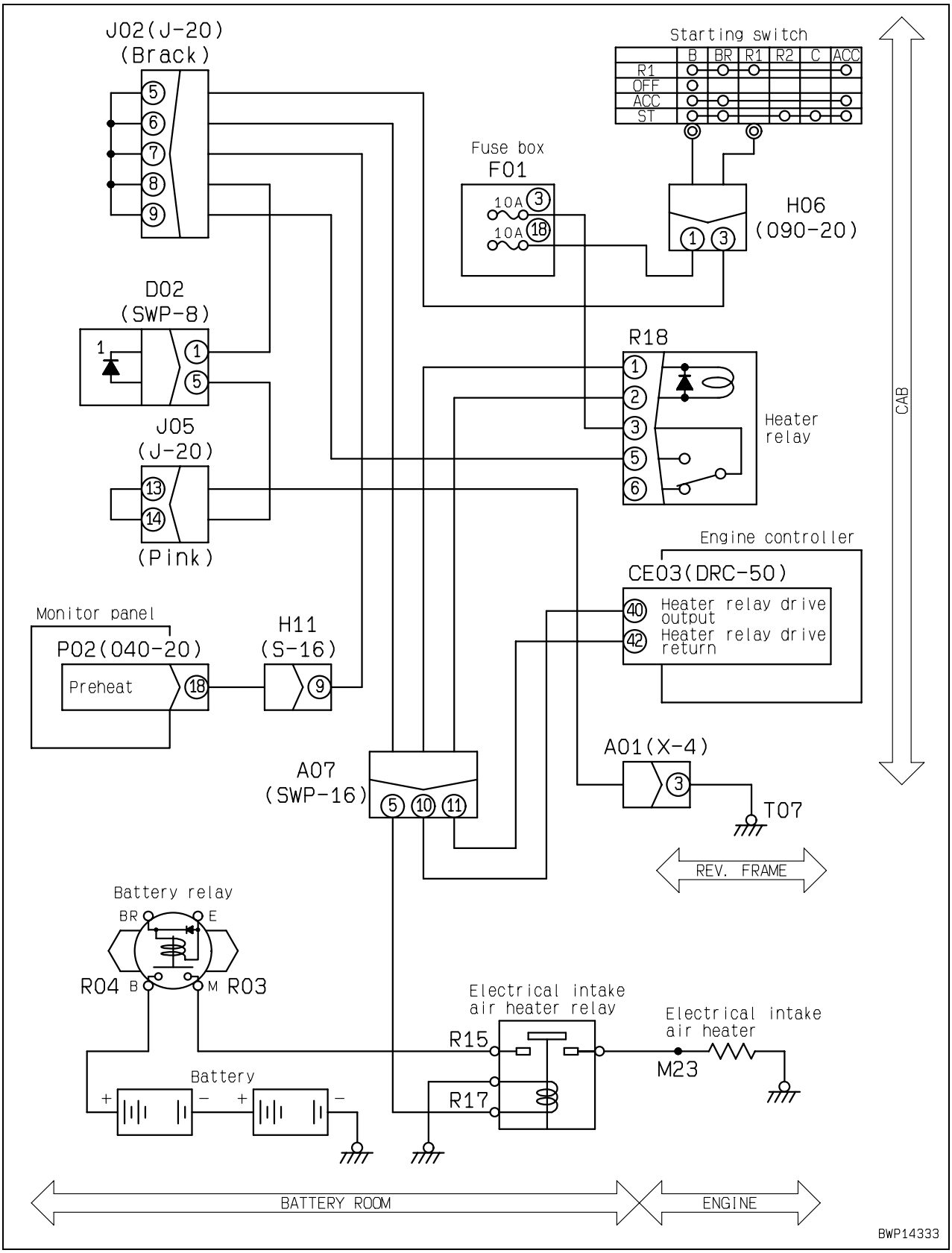


Failure code [CA2555] Grid Htr Relay Volt High Error

Action code	Failure code	Trouble	Grid heater relay volt high error (Engine controller system)
E15	**CA2555**		
Contents of trouble	• Disconnection was detected in drive circuit of intake air heater relay.		
Action of controller	• None in particular.		
Problem that appears on machine	• Intake air heater does not work (Engine does not start easily and exhaust gas becomes white at low temperature).		
Related information	• Method of reproducing failure code: Turn starting switch ON when engine coolant temperature is below –4°C.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective automatic preheater relay (Internal disconnection).	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. (Troubleshooting for relay unit)			
			R18 (male)	Resistance		
			Between (1) – (2)	300 – 600 Ω		
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting. (Troubleshooting by replacement)			
			Replace automatic preheater relay (R18) with another relay and perform reproducing operation. If “E” of failure code goes off at this time, replaced relay is defective.			
	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) (40) – R18 (female) (1)	Resistance	Max. 10 Ω	
			Wiring harness between CE03 (female) (42) – R18 (female) (2)	Resistance	Max. 10 Ω	
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between CE03 (female) (40) – each of CE03 (female) pins (With R18 disconnected)	Resistance	Min. 100 kΩ	
	4	Defective wiring harness connector	Connecting parts between automatic preheater relay – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation			
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CE03 (female)	Resistance		
			Between (40) – (42)	300 – 600 Ω		

Circuit diagram related to preheating, starting and charging engine

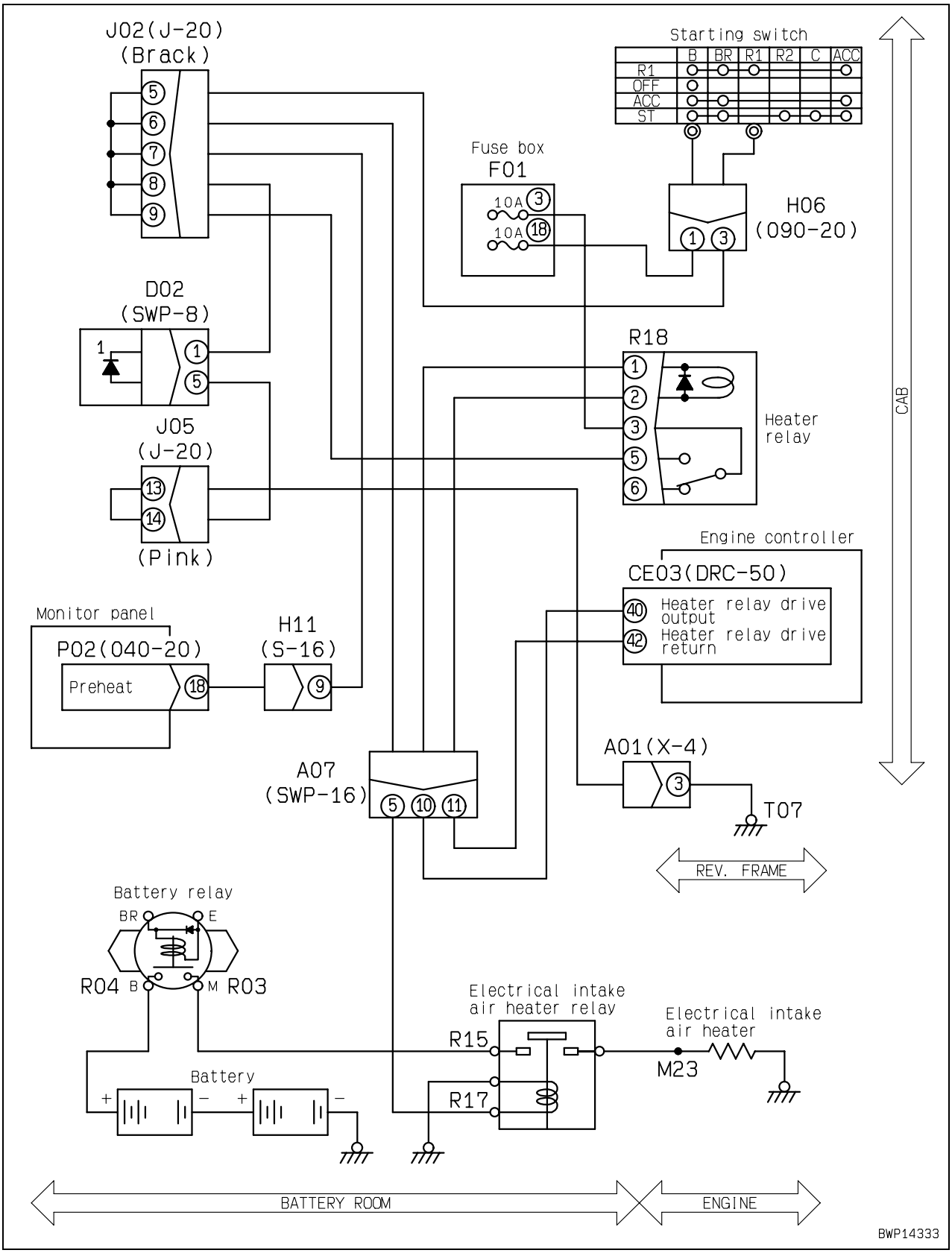


Failure code [CA2556] Grid Htr Relay Volt Low Error

Action code	Failure code	Trouble	Grid heater relay volt low error (Engine controller system)
E15	**CA2556**		
Contents of trouble	• Short circuit was detected in drive circuit of intake air heater relay.		
Action of controller	• None in particular.		
Problem that appears on machine	• Intake air heater does not work (Engine does not start easily and exhaust gas becomes white at low temperature).		
Related information	• Method of reproducing failure code: Turn starting switch ON when engine coolant temperature is below –4°C.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective automatic preheater relay (Internal disconnection).	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. (Troubleshooting for relay unit)		
			R18 (male)	Resistance	
			Between (1) – (2)	300 – 600 Ω	
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting. (Troubleshooting by replacement)		
			Replace automatic preheater relay (R18) with another relay and perform reproducing operation. If “E” of failure code goes off at this time, replaced relay is defective.		
	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 CE03 (female) (40) – R18 (female) (1) and chassis ground	Resistance	Min. 100 kΩ
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between CE03 (female) (40) – each of CE03 (female) pins (With R18 disconnected)	Resistance	Min. 100 kΩ
	4	Defective wiring harness connector	Connecting parts between automatic preheater relay – machine wiring harness – engine controller may be defective. Check them directly. • Looseness of connector, breakage of lock, or breakage of seal • Corrosion, bend, breakage, push-in, or expansion of pin • Moisture or dirt in connector or defective insulation		
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CE03 (female)	Resistance	
			Between (40) – (42)	300 – 600 Ω	

Circuit diagram related to preheating, starting and charging engine

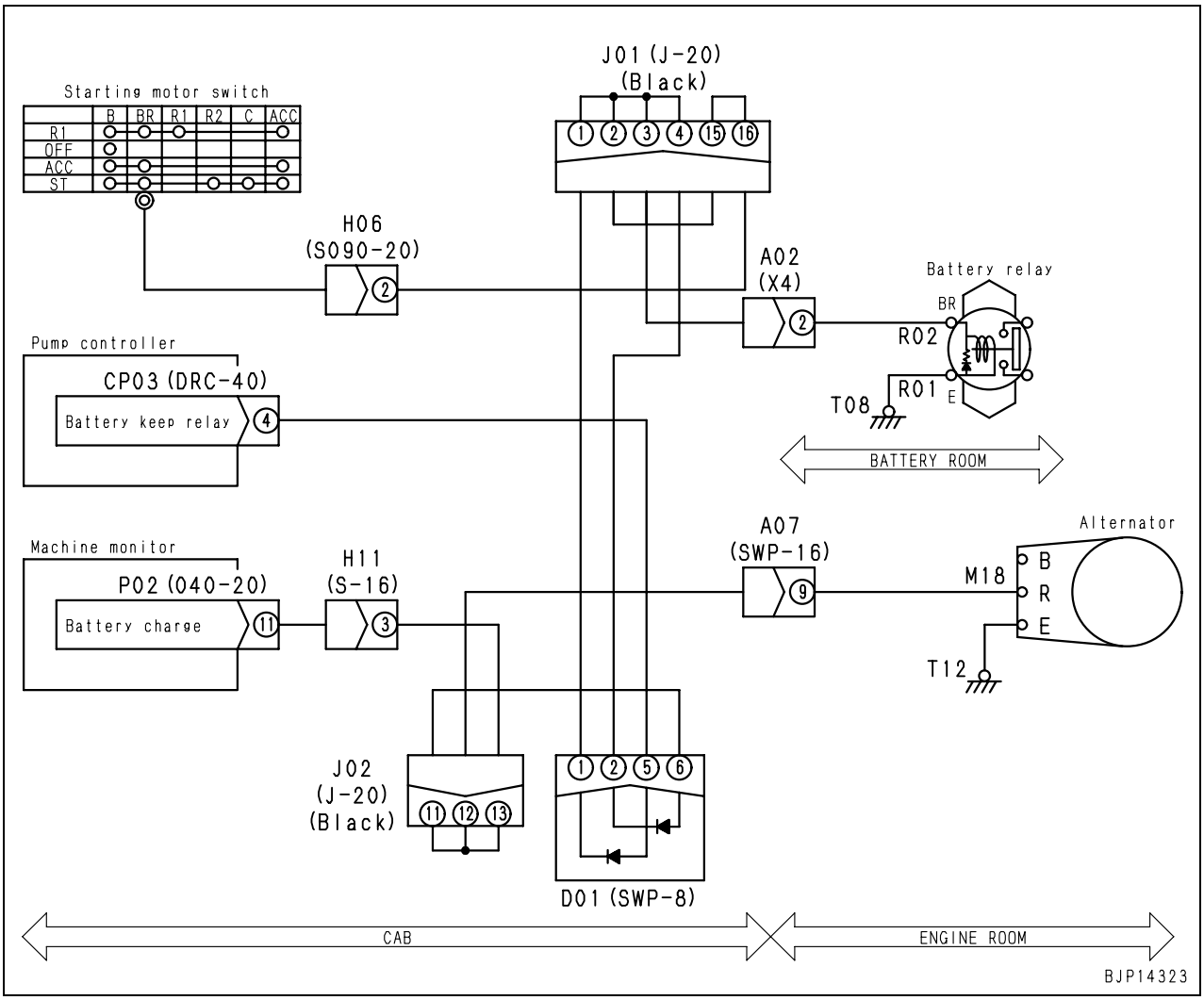


Failure code [D110KB] Battery Relay Drive S/C

Action code	Failure code	Trouble	Battery relay drive short (Pump controller system)
—	**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. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Engine does not stop.		
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 defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Battery relay	Resistance		
			Between R02 (terminal BR) – R01 (terminal E)	There is continuity		
			Between R02 (terminal 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 – R02 (terminal BR) 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 (female)	Turn starting switch OFF.	Voltage	
			Between (4) – chassis ground	ON → OFF	20 – 30 V (4 – 7 sec.)	

Circuit diagram related to battery relay drive

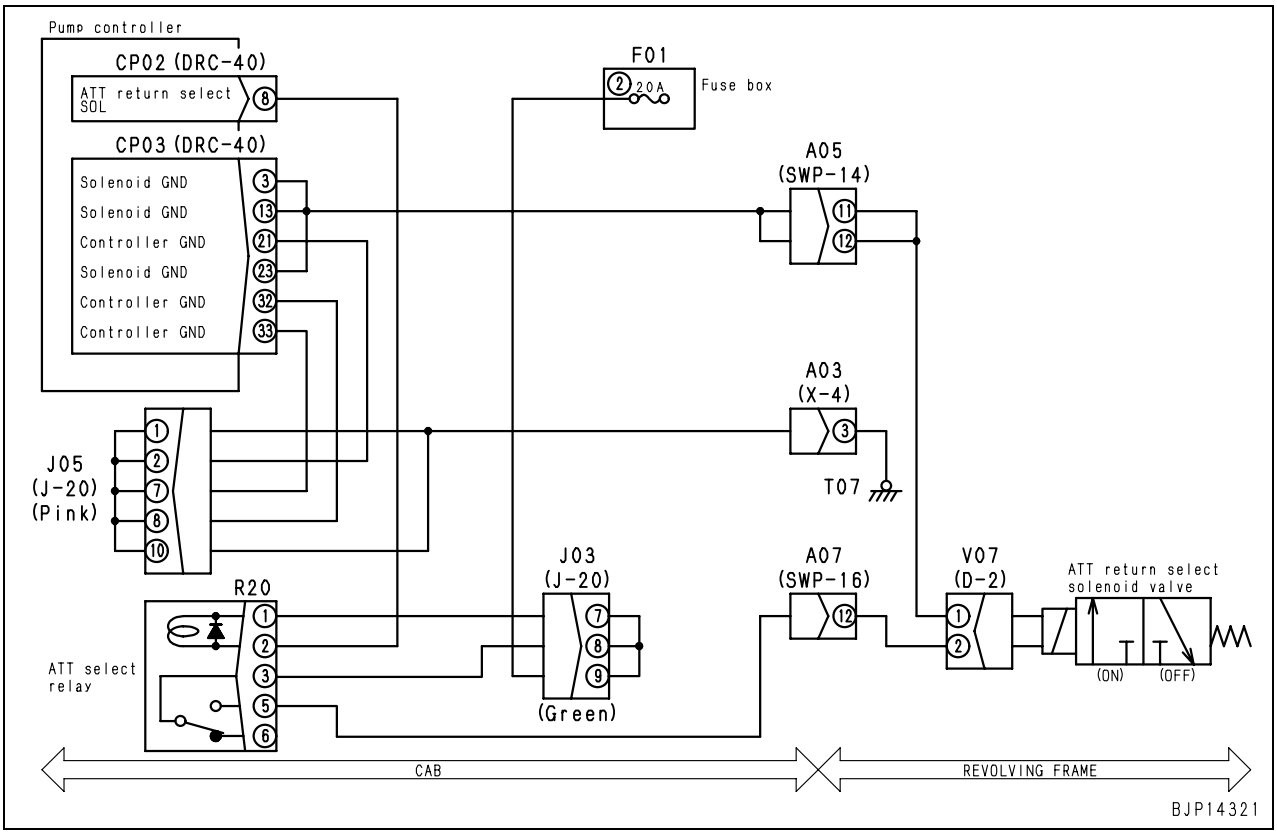


Failure code [D196KA] Service Return Relay Disc.

Action code	Failure code	Trouble	Service return relay disconnection (Pump controller system)
—	**D196KA**		
Contents of trouble	• When service return relay circuit was disconnected with GND (when output was turned OFF), 24V was not generated.		
Action of controller	• None in particular. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• Hydraulic circuit for attachment does not change to single operation circuit.		
Related information	• Carry out troubleshooting only for setting with ATT. (Confirm settings on monitor panel.) ★ This code detects only a trouble in the primary side (coil side) of service return relay. When service return solenoid may be in defective operation, check the power supply, wiring harness, and solenoid in the secondary side (Limit SW side) of the relay. • Operating condition of service return relay (ON/OFF) can be checked with monitoring function. (Code 02301: Solenoid 2)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective fuse No.2	If fuse is broken, circuit probably has ground fault.			
	2	Defective service return relay (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			R20 (male)		Resistance	
			Between (1) – (2)		100 – 500 Ω	
	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 CP02 (female) (8) – R20 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between R20 (female) (1) – J03 – F01-2 outlet		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 CP02 (female) (8) – R20 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between R20 (female) (1) – J03 – F01-2 outlet and chassis ground		Resistance	Min. 1 MΩ
	5	Defective pump controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CP02	Working mode	Voltage	
			Between (8) – chassis ground	When B-mode is not selected	20 – 30 V	
				When B-mode is selected	Max. 1 V	

Circuit diagram related to service return relay and solenoid of pump controller

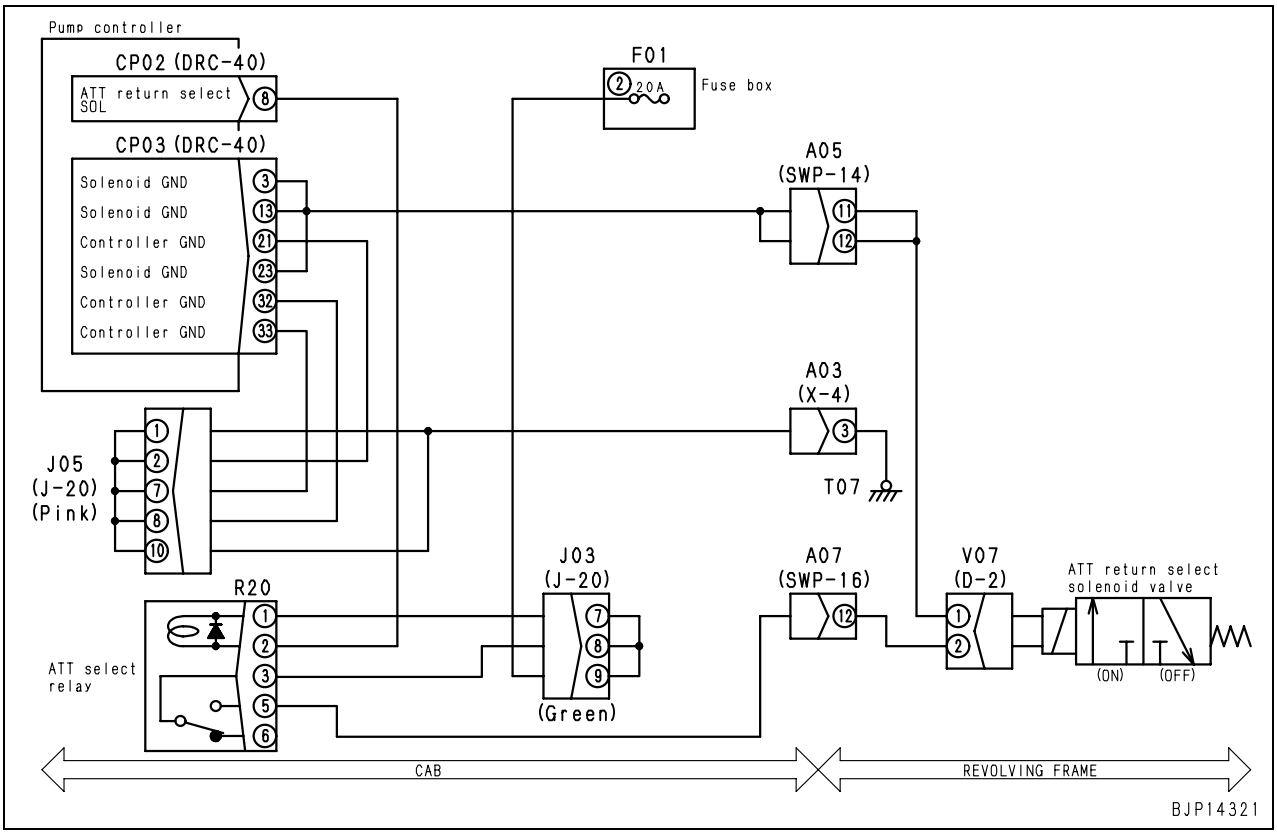


Failure code [D196KB] Service Return Relay S/C

Action code	Failure code	Trouble	Service return relay short (Pump controller system)
—	**D196KB**		
Contents of trouble	• When service return relay circuit was connected to GND (when output was turned ON), abnormal current flowed.		
Action of controller	• Turns output to service return relay circuit OFF. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Hydraulic circuit for attachment does not change to single operation circuit.		
Related information	• Carry out troubleshooting only for setting with ATT. (Confirm settings on monitor panel.) ★ This code detects only a trouble in the primary side (coil side) of service return relay. When service return solenoid may be in defective operation, check the power source, wiring harness, and solenoid in the secondary side (Limit SW side) of the relay. • Operating condition of service return relay (ON/OFF) can be checked with monitoring function. (Code 02301: Solenoid 2)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective service return relay (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			R20 (male)		Resistance	
			Between (1) – (2)		100 – 500 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 harness between CP02 (female) (8) – R20 (female) (2) and chassis ground		Voltage	Max. 1 V
	3	Defective pump controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CP02	Working mode	Voltage	
			Between (8) – chassis ground	When B-mode is not selected	20 – 30 V	
				When B-mode is selected	Max. 1 V	

Circuit diagram related to service return relay and solenoid of pump controller

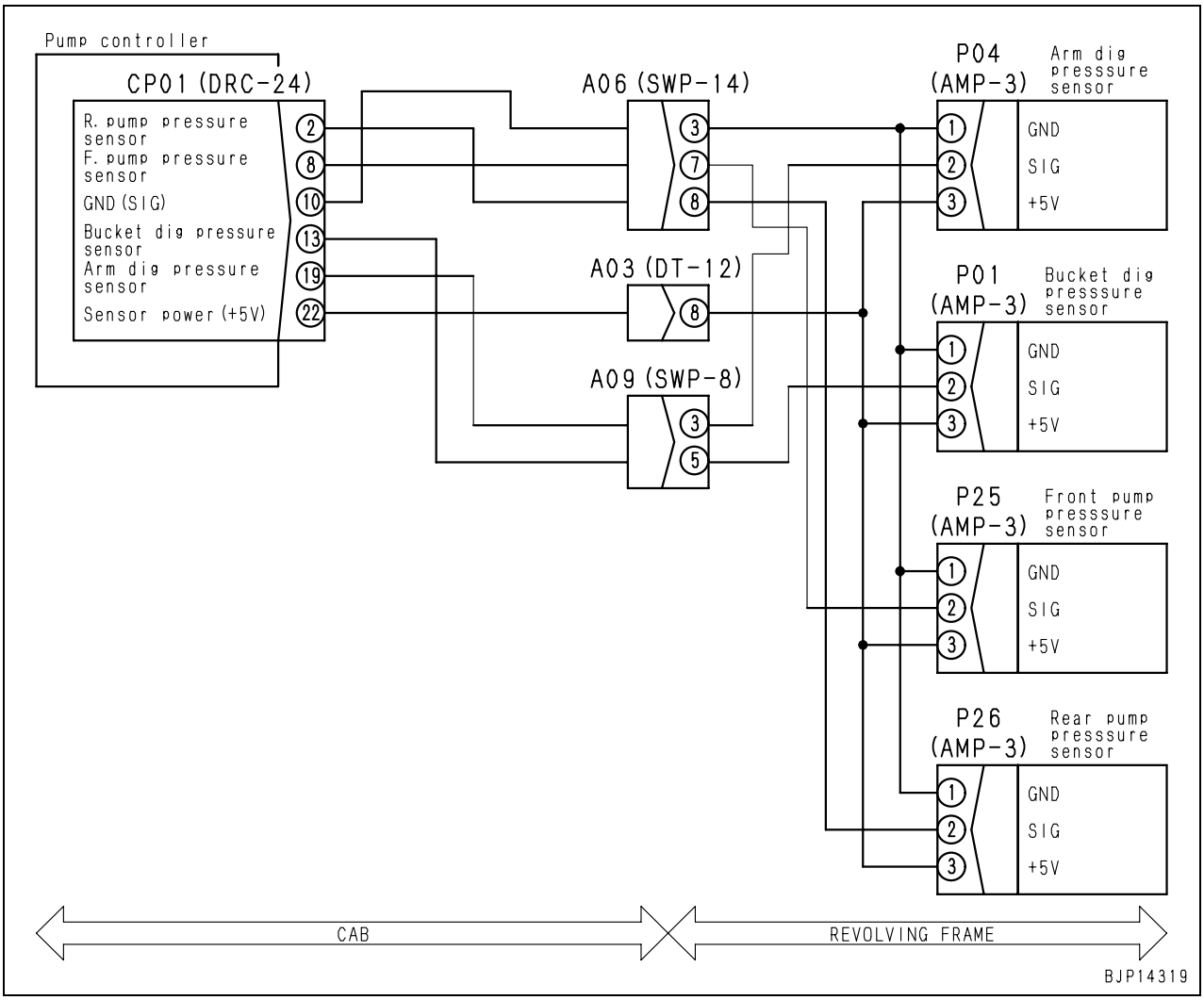


Failure code [DA25KP] Press. Sensor Power Abnormality

Action code	Failure code	Trouble	Pressure sensor power abnormality (Pump controller system)
E02	**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 sensor and wiring harness at right in order. If no failure code is displayed, that sensor is defective.	F pump pressure sensor	P25 connector	
				R pump pressure sensor	P26 connector	
				Bucket curl pressure sensor	P01 connector	
				R pump pressure sensor	P31 connector	
				Arm IN pressure sensor	P04 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) – A03 – P25 (female) (3) and chassis ground [F pump pressure sensor system]		Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (22) – A03 – P26 (female) (3) and chassis ground [R pump pressure sensor system]		Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (22) – A03 – P01 (female) (3) and chassis ground [Bucket CURL pressure sensor system]		Resistance	Min. 1 MΩ
			Wiring harness between CP01 (female) (22) – A03 – P04 (female) (3) and chassis ground [Arm IN 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

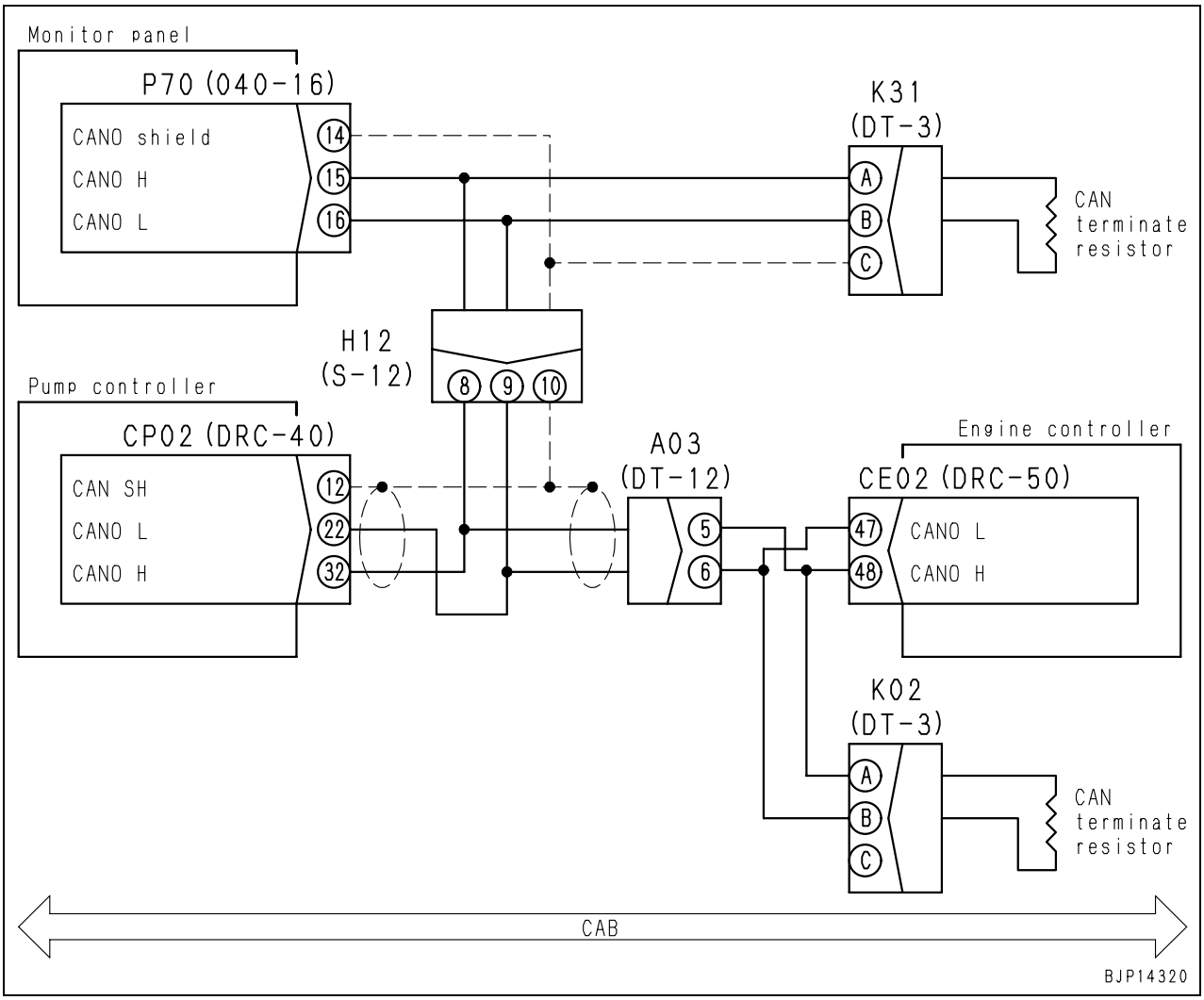


Failure code [DA2RMC] Pump Comm. Abnormality

Action code	Failure code	Trouble	Pump communication 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 P70 (female) (16) – CE02 (female) (47), – CP02 (female) (22)	Resistance	Max. 1 Ω
			Wiring harness between P70 (female) (15) – CE02 (female) (48), – 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 P70 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between P70 (female) (15) – CE02 (female) (48), – 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 P70 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Voltage	Max. 1 V
			Wiring harness between P70 (female) (15) – CE02 (female) (48), – 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), K31 (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

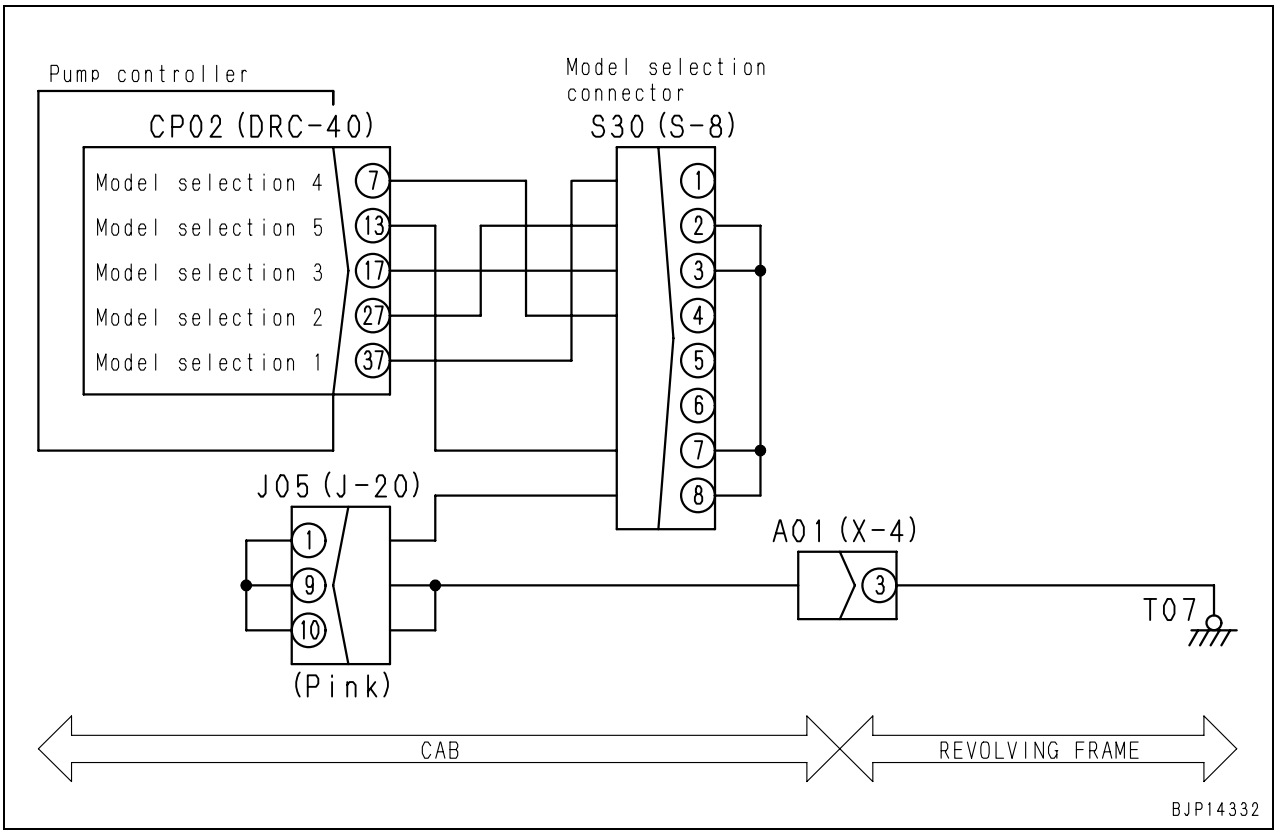


Failure code [DA2SKQ] Model Selection Abnormality

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 (PC340) 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.		
Related information	• Controller-recognized model name (digits) can be checked with monitoring function. (Code: 00200) • Input of model selection signal (ON/OFF) can be checked with monitoring function. (Code 02200: 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), (7) – (8)	Max. 1 Ω		
			Between (1), (5), (6) – (8)	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 CP02 (female) (7) – S30 (male) (4) and chassis ground	Resistance	Max. 1 Ω	
			Wiring harness between CP02 (female) (17) – S30 (male) (3)	Resistance	Max. 1 Ω	
			Wiring harness between CP02 (female) (27) – S30 (male) (2)	Resistance	Max. 1 Ω	
			Wiring harness between CP02 (female) (13) – S30 (male) (7)	Resistance	Max. 1 Ω	
			Wiring harness between S30 (male) (8) – J05 – A01 – 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) (7) – S30 (male) (4) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between CP02 (female) (13) – S30 (male) (7) 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) (37) – S30 (male) (1) 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), (13), (27), (37) – chassis ground	20 – 30 V		
			Between (13), (17) (27) – chassis ground	Max. 1 V		

Circuit diagram related to model selection connector of pump controller



KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00541-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

40 Troubleshooting

Troubleshooting by failure code (Display of code), Part 3

Troubleshooting by failure code (Display of code), Part 3 4
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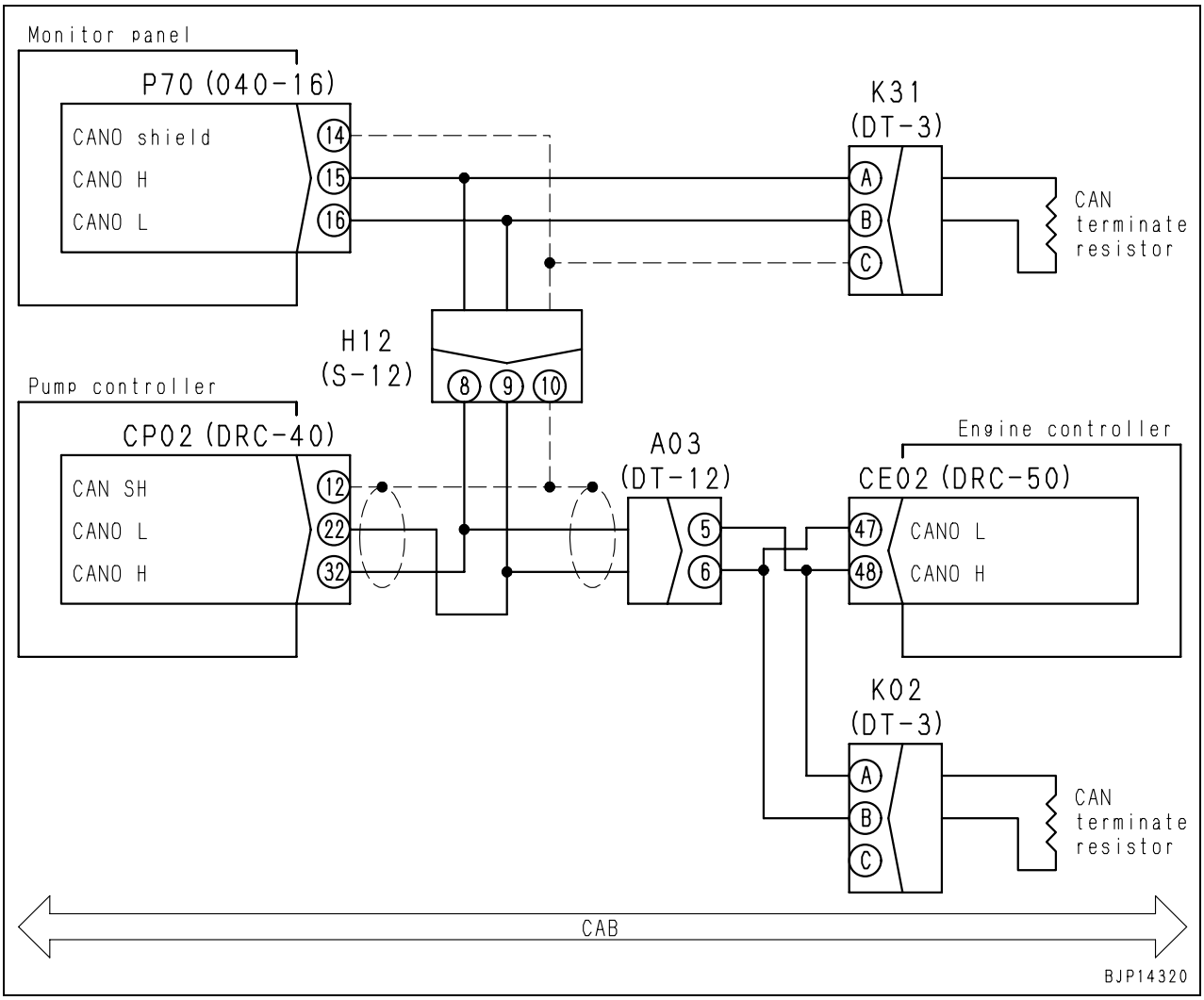
Troubleshooting by failure code (Display of code), Part 3

Failure code [DAFRMC] Monitor Comm. Abnormality

Action code	Failure code	Trouble	Monitor communication abnormality (Machine monitor)
E0E	**DAFRMC**		
Contents of trouble	• Machine monitor detected communication error in CAN communication circuit between pump controller 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 P70 (female) (16) – CE02 (female) (47), – CP02 (female) (22)	Resistance	Max. 1 Ω
			Wiring harness between P70 (female) (15) – CE02 (female) (48), – 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 P70 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between P70 (female) (15) – CE02 (female) (48), – 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 P70 (female) (16) – CE02 (female) (47), – CP02 (female) (22), – other related circuit and chassis ground	Voltage	Max. 1 V
			Wiring harness between P70 (female) (15) – CE02 (female) (48), – 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), K31 (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

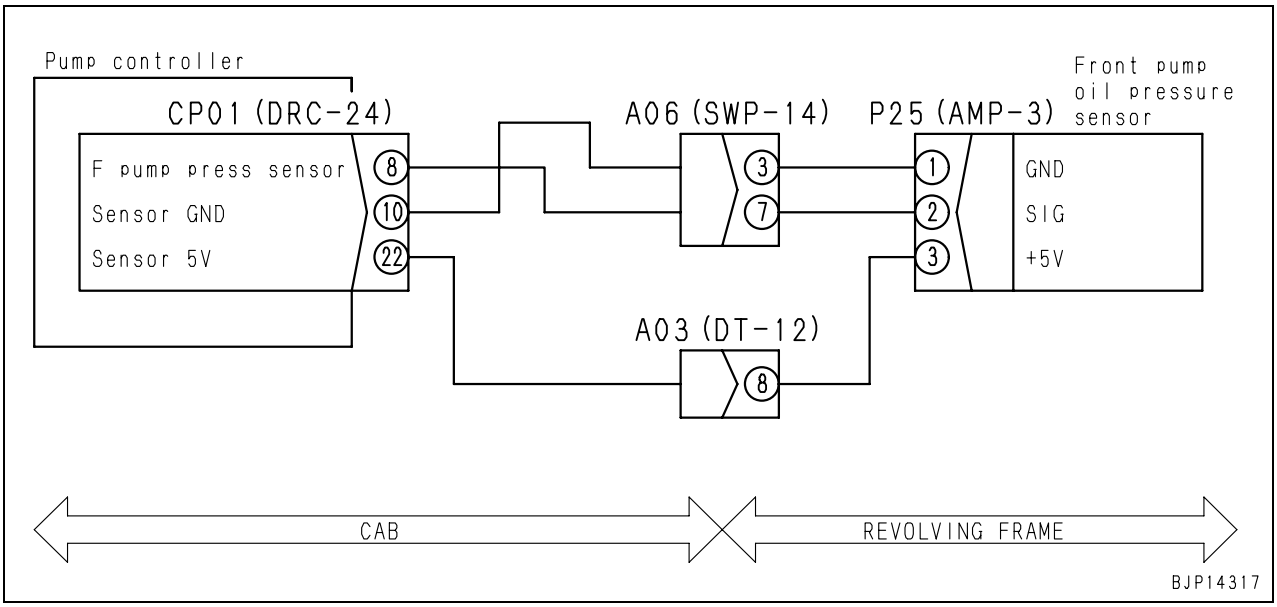


Failure code [DHPAMA] F Pump Press Sensor Abnormality

Action code	Failure code	Trouble	F pump press sensor abnormality (Pump controller system)
—	**DHPAMA**		
Contents of trouble	• Signal voltage from F pump pressure sensor is below 0.3 V or above 4.42 V.		
Action of controller	• 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	• No automatic gear shifting		
Related information	★ If 5V circuit (3) and ground circuit (1) of pressure sensor are connected inversely, pressure sensor will be broken. Accordingly, take extreme care when checking. • Input from F pump pressure sensor (pressure) can be checked with monitoring function. (Code 01112: F pump pressure		

	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 [**DA25KP**] is also displayed, carry out troubleshooting for it first.			
	2	Defective F pump pressure sensor (Internal defect)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P25	Voltage		
			Between (3) – (1)	4.5 – 5.5 V		
			Between (2) – (1)	0.5 – 4.5 V		
	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) – A03 – P25 (female) (3)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (10) – A06 – P25 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (8) – A06 – P25 (female) (2)	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 CP01 (female) (8) – A06 – P25 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	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 CP01 (female) (22) – A03 – P25 (female) (3) and chassis ground	Voltage	Max. 1 V	
			Wiring harness between CP01 (female) (8) – A06 – P25 (female) (2) and chassis ground	Voltage	Max. 1 V	
	6	Defective pump controller	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			CP01	Voltage		
			Between (22) – (10)	4.5 – 5.5 V		
			Between (8) – (10)	0.5 – 4.5 V		

Circuit diagram related to F pump pressure sensor of pump controller

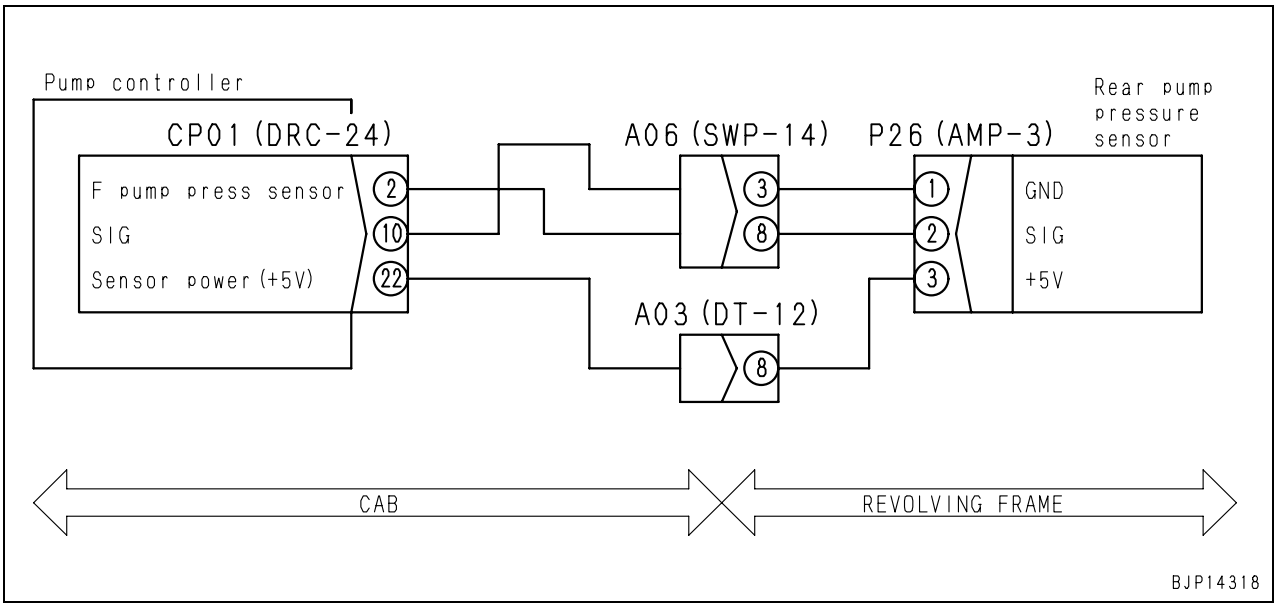


Failure code [DHPBMA] R Pump Press Sensor Abnormality

Action code	Failure code	Trouble	R pump pressure sensor abnormality (Pump controller system)
—	**DHPBMA**		
Contents of trouble	• Signal voltage from R pump pressure sensor is below 0.3 V or above 4.42 V.		
Action of controller	• 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	• No automatic gear shifting		
Related information	★ If 5V circuit (3) and ground circuit (1) of pressure sensor are connected inversely, pressure sensor will be broken. Accordingly, take extreme care when checking. • Input from R pump pressure sensor (pressure) can be checked with monitoring function. (Code 01113: R pump pressure		

	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 [**DA25KP**] is also displayed, carry out troubleshooting for it first.			
	2	Defective R pump pressure sensor (Internal defect)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P26	Voltage		
			Between (3) – (1)	4.5 – 5.5 V		
			Between (2) – (1)	0.5 – 4.5 V		
	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) – A03 – P26 (female) (3)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (10) – A06 – P26 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (2) – A06 – P26 (female) (2)	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 CP01 (female) (2) – A06 – P25 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	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 CP01 (female) (22) – A03 – P25 (female) (3) and chassis ground	Voltage	Max. 1 V	
			Wiring harness between CP01 (female) (2) – A06 – P26 (female) (2) and chassis ground	Voltage	Max. 1 V	
	6	Defective pump controller	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			CP01	Voltage		
			Between (22) – (10)	4.5 – 5.5 V		
			Between (2) – (10)	0.5 – 4.5 V		

Circuit diagram related to R pump pressure sensor of pump controller

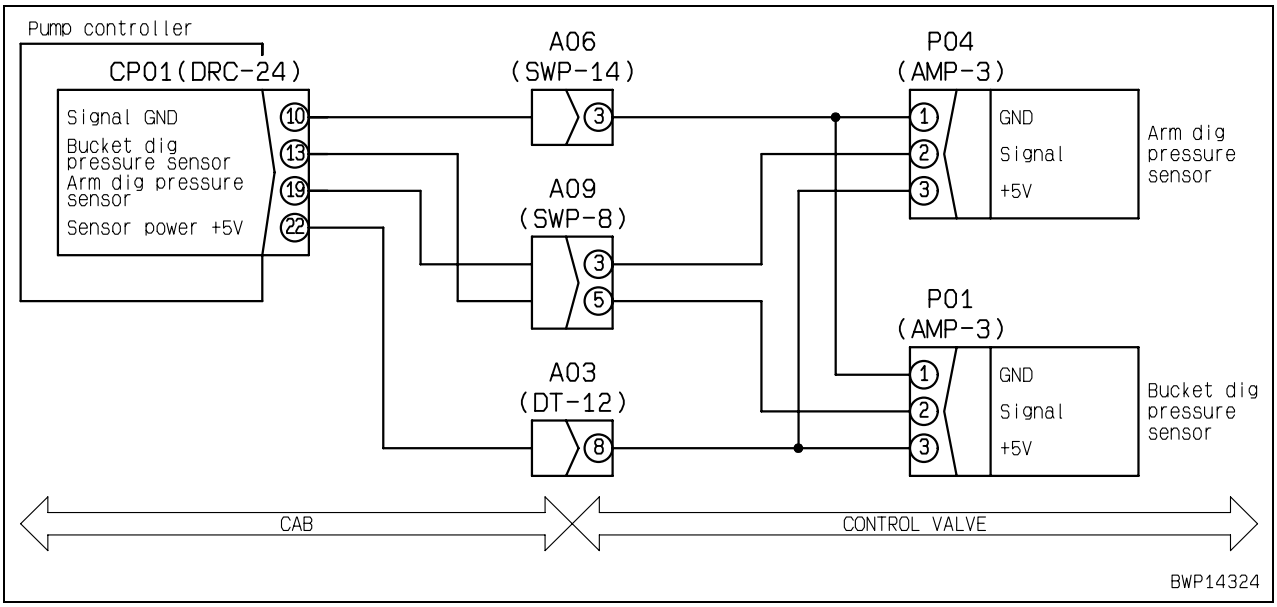


Failure code [DHS3MA] Arm Curl PPC Sen. Abnormality

Action code	Failure code	Trouble	Arm IN PPC pressure sensor abnormality (Pump controller system)
—	**DHS3MA**		
Contents of trouble	• Signal voltage from arm IN PPC pressure sensor is below 0.3 V or above 4.72 V.		
Action of controller	• Fixes arm IN PPC pressure at 0 MPa {0 kg/cm^2} and continues control. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• No automatic gear shifting		
Related information	★ If 5V circuit (3) and ground circuit (1) of pressure sensor are connected inversely, pressure sensor will be broken. Accordingly, take extreme care when checking. • Input from arm IN PPC pressure sensor (pressure) can be checked with monitoring function. (Code 07200: Arm IN PPC pressure		

	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 [**DA25KP**] is also displayed, carry out troubleshooting for it first.			
	2	Defective arm IN PPC pressure sensor (Internal defect)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P01	Voltage		
			Between (3) – (1)	4.5 – 5.5 V		
			Between (2) – (1)	0.5 – 4.5 V		
	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) – A06 – P01 (female) (3)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (10) – A06 – P01 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (19) – P01 (female) (2)	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 CP01 (female) (19) – P01 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	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 CP01 (female) (22) – A03 – P01 (female) (3) and chassis ground	Voltage	Max. 1 V	
			Wiring harness between CP01 (female) (19) – A09 – P04 (female) (2) and chassis ground	Voltage	Max. 1 V	
	6	Defective pump controller	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			CP01	Voltage		
			Between (22) – (10)	4.5 – 5.5 V		
			Between (19) – (10)	0.5 – 4.5 V		

Circuit diagram related to arm IN PPC pressure sensor of pump controller

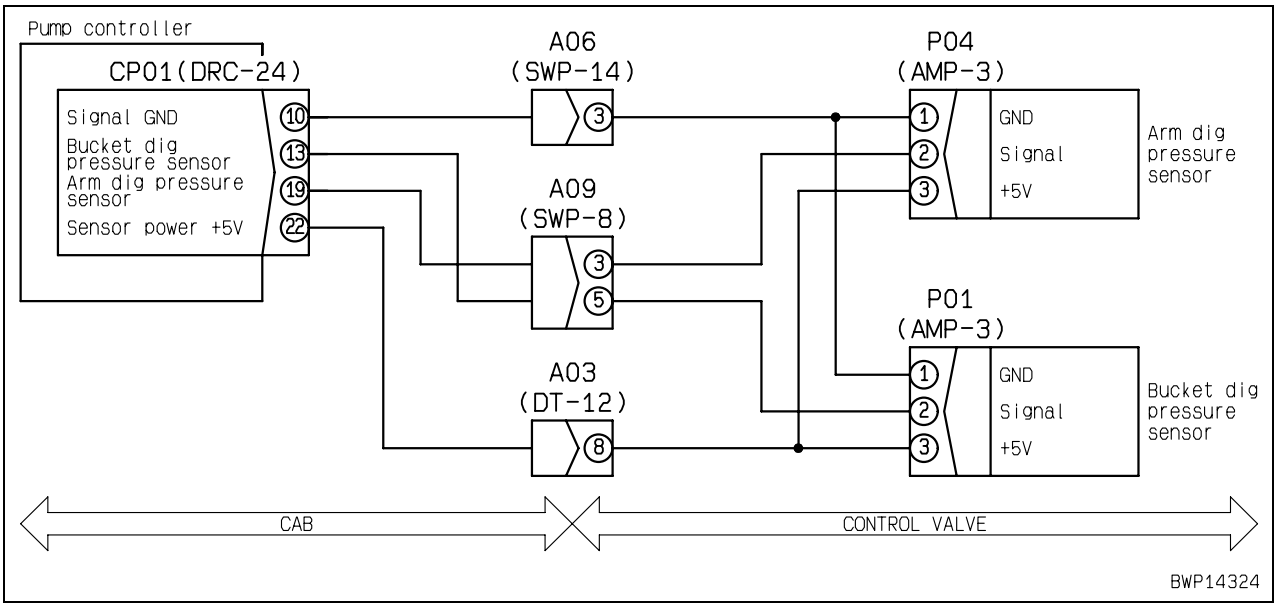


Failure code [DHS4MA] Bucket Curl PPC Press Sensor Abnormality

Action code	Failure code	Trouble	Bucket CURL PPC press sensor abnormality (Pump controller system)
—	**DHS4MA**		
Contents of trouble	• Signal voltage from bucket curl PPC pressure sensor is below 0.3 V or above 4.42 V.		
Action of controller	• Fixes bucket curl PPC pressure at 0 MPa {0 kg/cm^2} and continues control. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• No automatic gear shifting		
Related information	★ If 5V circuit (3) and ground circuit (1) of pressure sensor are connected inversely, pressure sensor will be broken. Accordingly, take extreme care when checking. • Input from bucket curl PPC pressure sensor (pressure) can be checked with monitoring function. (Code 07300: Bucket Curl PPC pressure)		

	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 [**DA25KP**] is also displayed, carry out troubleshooting for it first.			
	2	Defective bucket curl PPC pressure sensor (Internal defect)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P04	Voltage		
			Between (3) – (1)	4.5 – 5.5 V		
			Between (2) – (1)	0.5 – 4.5 V		
	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) – A06 – P04 (female) (3)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (10) – A06 – P04 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between CP01 (female) (13) – P04 (female) (2)	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 CP01 (female) (13) – P04 (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
	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 CP01 (female) (22) – A06 – P04 (female) (3) and chassis ground	Voltage	Max. 1 V	
			Wiring harness between CP01 (female) (13) – P04 (female) (2) and chassis ground	Voltage	Max. 1 V	
	6	Defective pump controller	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			CP01	Voltage		
			Between (22) – (10)	4.5 – 5.5 V		
			Between (13) – (10)	0.5 – 4.5 V		

Circuit diagram related to bucket curl PPC pressure sensor of pump controller

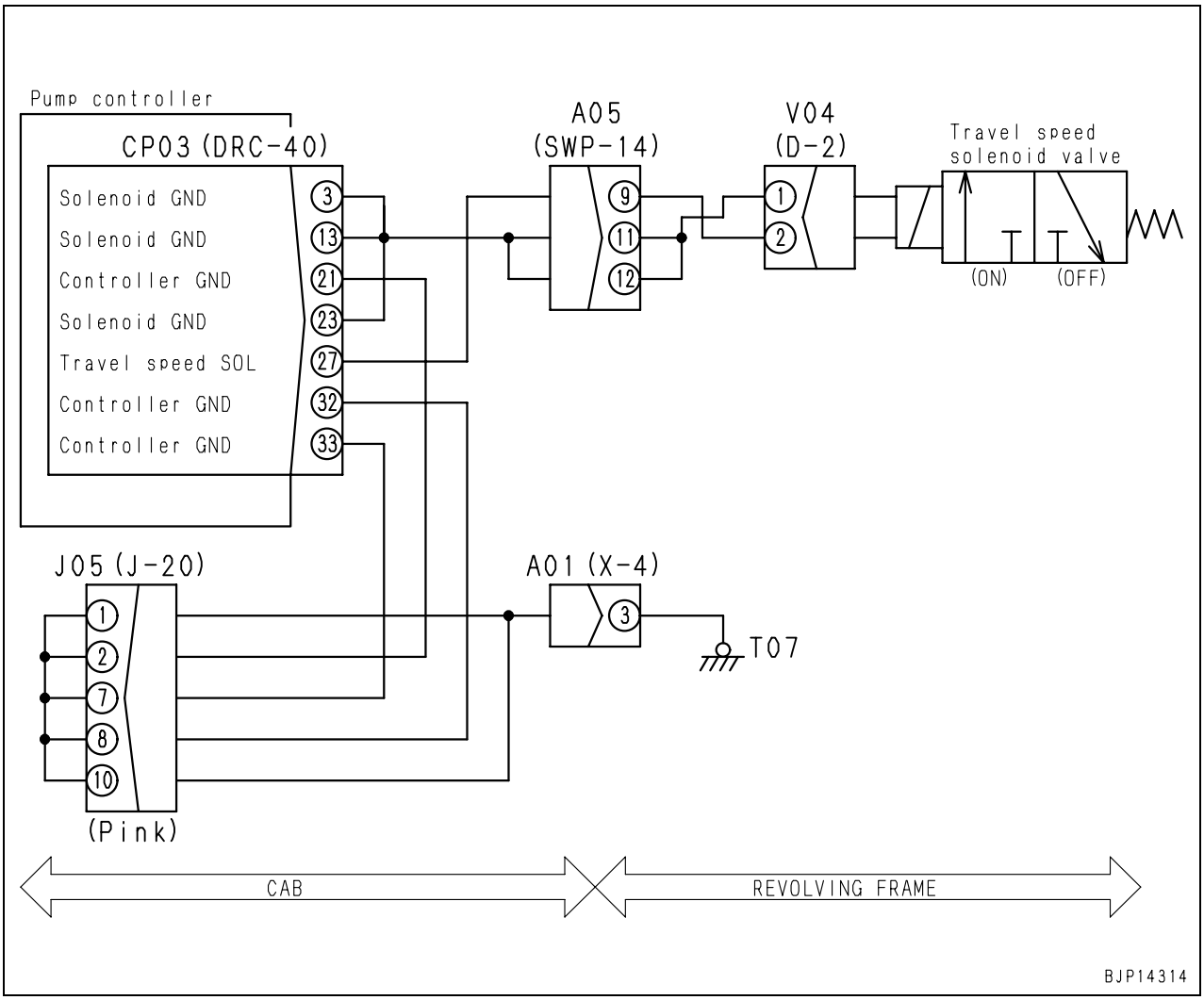


Failure code [DW43KA] Travel Speed Sol. Disc.

Action code	Failure code	Trouble	Travel speed solenoid disconnection (Pump controller system)
—	**DW43KA**		
Contents of trouble	• No current flows at output to travel speed 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 speed does not change to Hi. (Machine monitor changes to the normal state.)		
Related information	• Operating condition of travel speed 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 [**DW43KB**].)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective travel speed solenoid (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V04 (male)	Resistance		
			Between (1) – (2)	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) – A05 – V04 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between V04 (female) (1) – 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) – A05 – 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

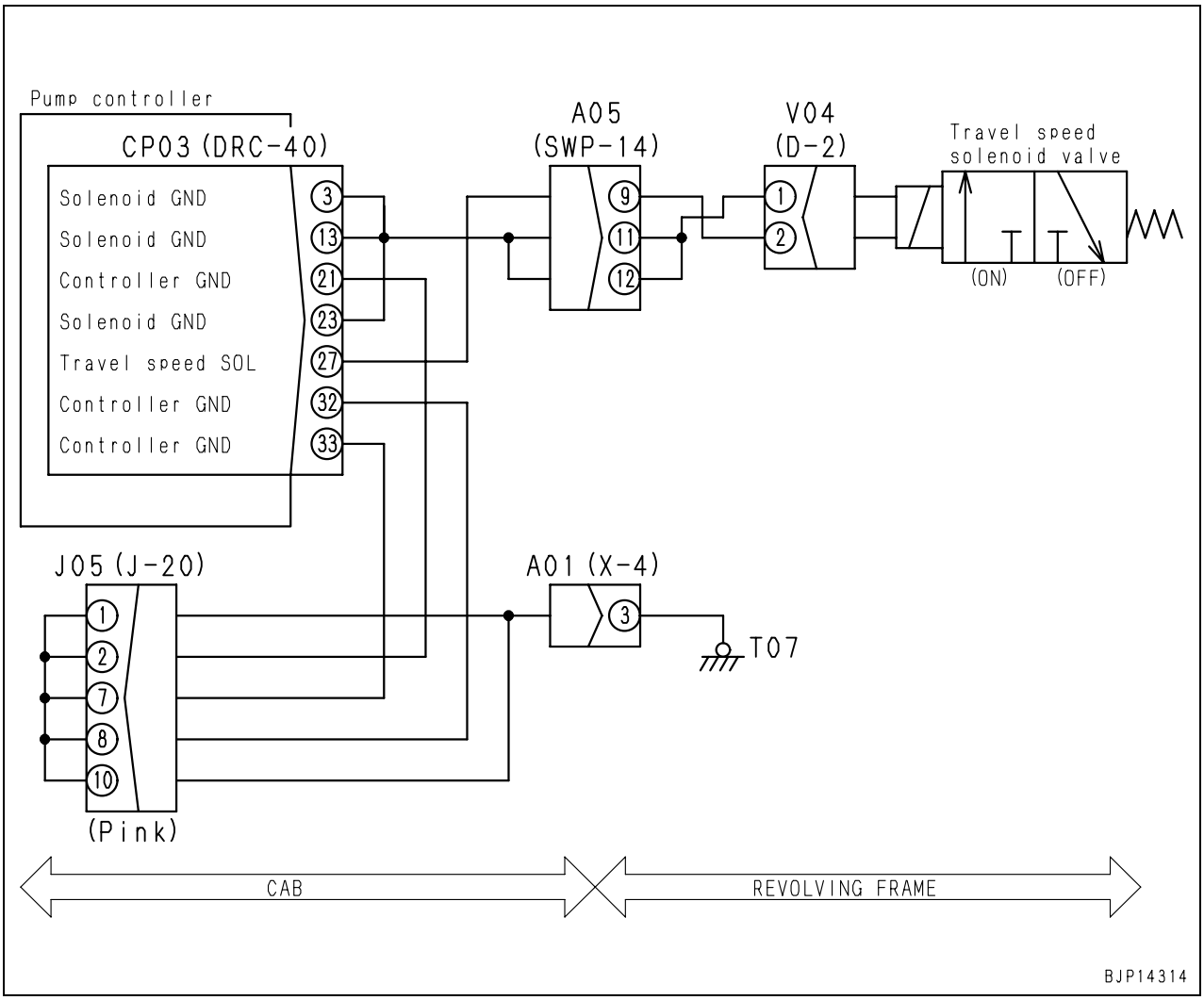


Failure code [DW43KB] Travel Speed Sol. S/C

Action code	Failure code	Trouble	Travel speed solenoid short (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. (Machine monitor changes to the normal state.)		
Related information	• Operating condition of travel speed 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 travel speed solenoid (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V04 (male)		Resistance	
			Between (1) – (2)		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) – A05 – 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 + Travel operation	20 – 30 V	

Circuit diagram related to travel speed solenoid of pump controller



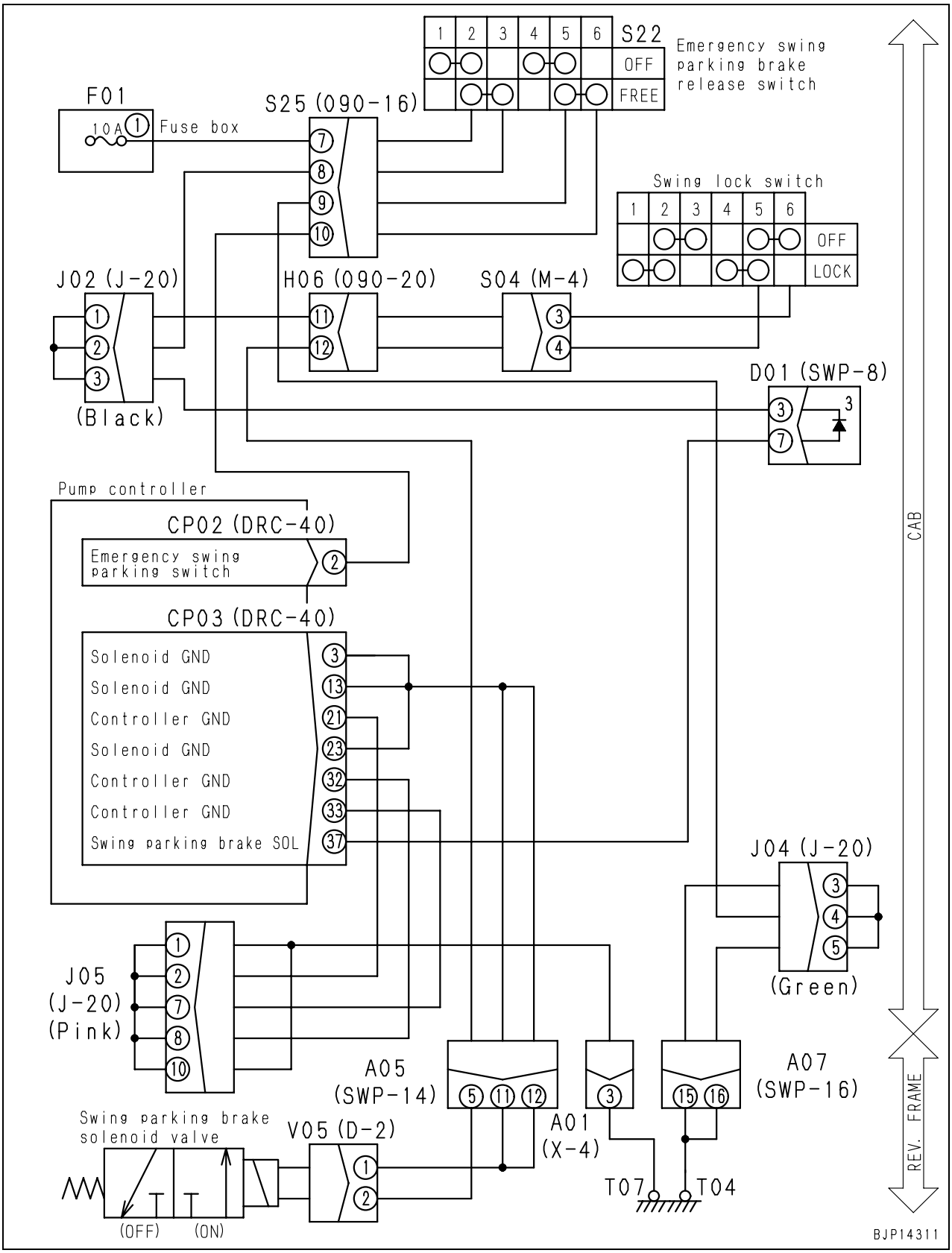
Failure code [DW45KA] Swing Brake Sol. Disc.

Action code	Failure code	Trouble	Swing holding brake solenoid disconnection (Pump controller system)
E03	**DW45KA**		
Contents of trouble	• No current flows at output to swing holding 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.		
Related information	• Operating condition of swing holding 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). • Turn both of swing lock and emergency swing release switches OFF during troubleshooting. • 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 [**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.			
			V05 (male)		Resistance	
			Between (1) – (2)		20 – 60 Ω	
	2	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	Min. 1 MΩ	
	3	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	
	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) – J02 – S04 (male) (3)		Resistance	Max. 1 Ω
			Wiring harness between S04 (female) (4) – A05 – V05 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between V05 (female) (1) – CP03 (female) (3), (13), (23)		Resistance	Max. 1 Ω

<table>
<tr><td rowspan="6">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">5</td><td rowspan="3">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between CP03 (female) (37) – D01 – H06 – S04 (male) (3) and chassis ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
<tr><td colspan="2">Wiring harness between V05 (female) (2) – A05 – H06 – S04 (male) (4) and chassis ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
<tr><td rowspan="3">6</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>CP03 (female)</td><td rowspan="2">Disconnect D01 and connect pins (3) and (7) on male side directly.</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (37) – chassis ground</td><td colspan="2">20 – 60 Ω</td></tr>
</table>

Circuit diagram related to swing holding brake solenoid of pump controller

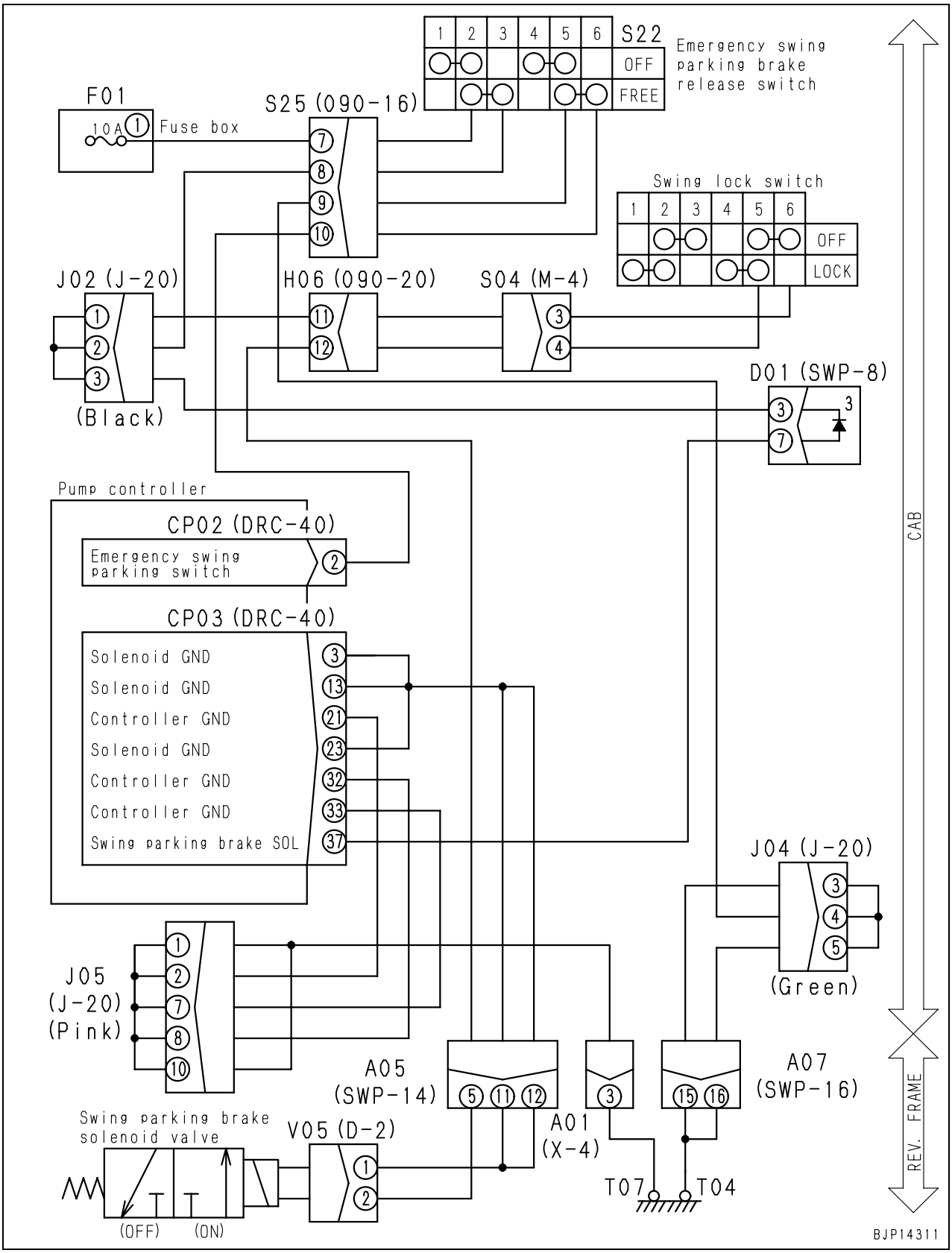


Failure code [DW45KB] Swing Brake Sol. S/C

Action code	Failure code	Trouble	Swing holding brake solenoid short (Pump controller system)
E03	**DW45KB**		
Contents of trouble	• Abnormal current flowed at output to swing holding brake solenoid circuit.		
Action of controller	• Turns output to swing holding 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.		
Related information	• Operating condition of swing holding 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).		

	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.			
			V05 (male)	Resistance		
			Between (1) – (2)	20 – 60 Ω		
			Between (2) – chassis ground	Min. 1 MΩ		
	2	Defective assembled-type diode D01 (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			D01 (male)	Resistance		
			Between (3) – (7)	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) (37) – D01 – J02 – H06 – S04 (male) (3) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between V05 (female) (2) – A05 – H06 – S04 (male) (4) and chassis ground	Resistance	Min. 1 MΩ	
	4	Defective pump controller	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			CP03	Swing lever	Voltage	
			Between (37) – chassis ground	At neutral	Max. 1 V	
				At swing	20 – 30 V	

Circuit diagram related to swing holding brake solenoid of pump controller

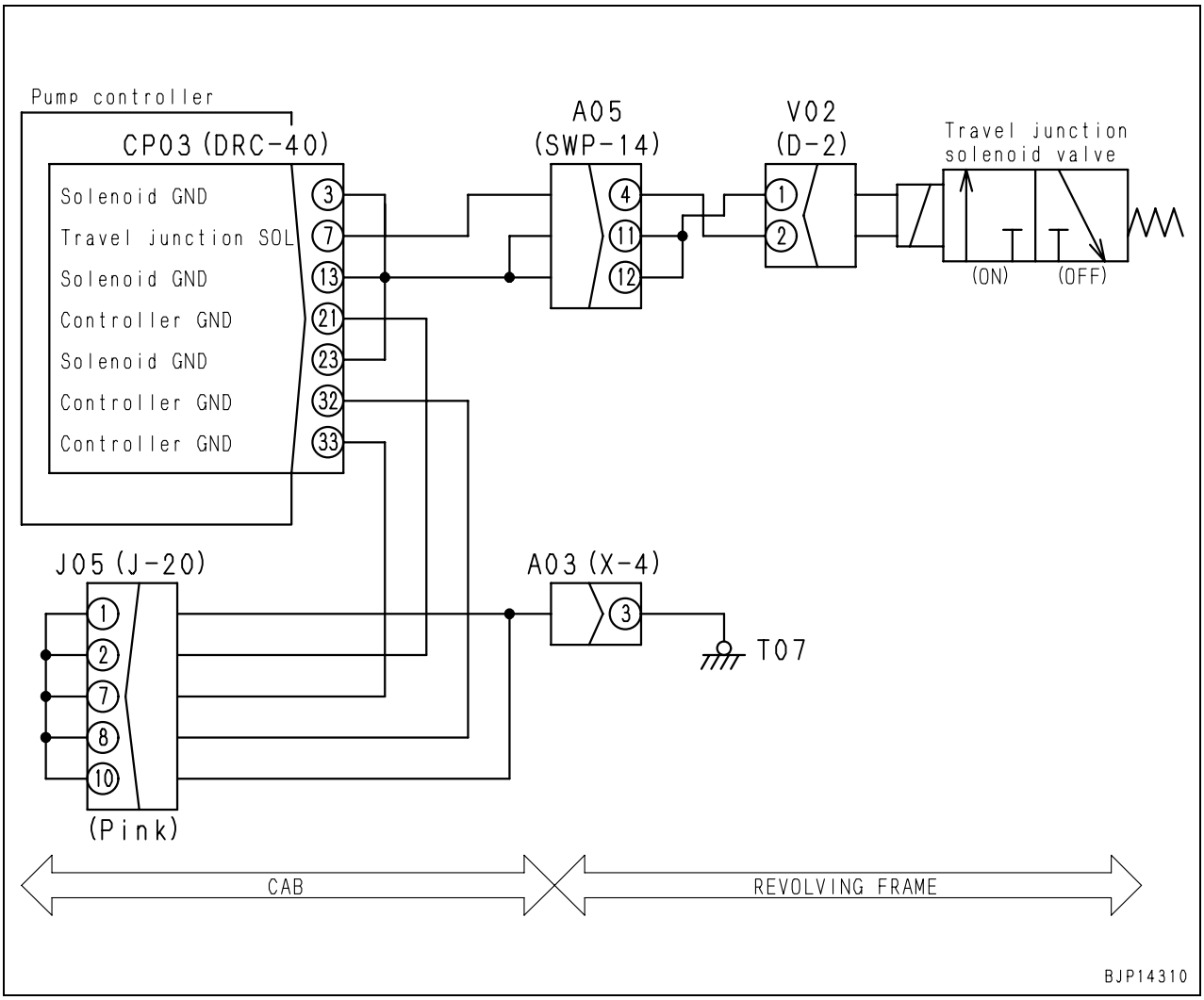


Failure code [DW91KA] Travel Junction Sol. Disc.

Action code	Failure code	Trouble	Travel junction solenoid disconnection (Pump controller system)
—	**DW91KA**		
Contents of trouble	• No current flows at output to travel junction 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	• Hard to turn when operating travel steering.		
Related information	• Operating condition of travel junction 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 [**DW91KB**].)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective travel junction solenoid (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V02 (male)	Resistance		
			Between (1) – (2)	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) (7) – A05 – V02 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between V02 (female) (1) – A05 – CP03 (female) (3), (13), (23) and 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) (7) – A05 – V02 (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 (7) – (3), (13), (23)	20 – 60 Ω		

Circuit diagram related to travel junction solenoid of pump controller

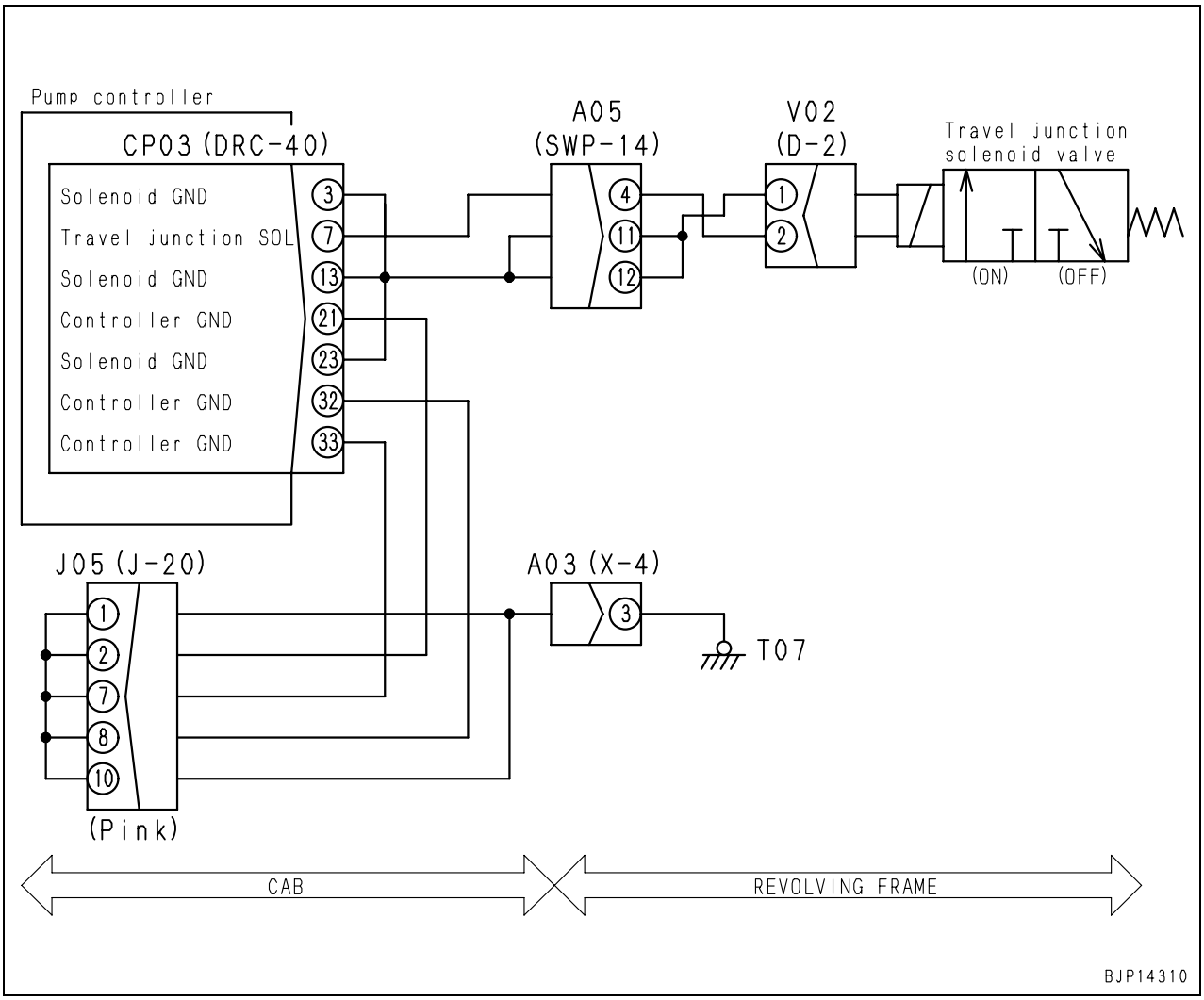


Failure code [DW91KB] Travel Junction Sol. S/C

Action code	Failure code	Trouble	Travel junction solenoid short (Pump controller system)
—	**DW91KB**		
Contents of trouble	• Abnormal current flowed at output to travel junction solenoid circuit.		
Action of controller	• Turns output to travel junction solenoid OFF. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Hard to turn when operating travel steering.		
Related information	• Operating condition of travel junction 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 travel junction solenoid (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V02 (male)		Resistance	
			Between (1) – (2)		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) (7) – A05 – V02 (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 lever	Voltage	
			Between (7) – (3), (13), (23)	At straight-travel	Max. 1 V	
				At steering	20 – 30 V	

Circuit diagram related to travel junction solenoid of pump controller

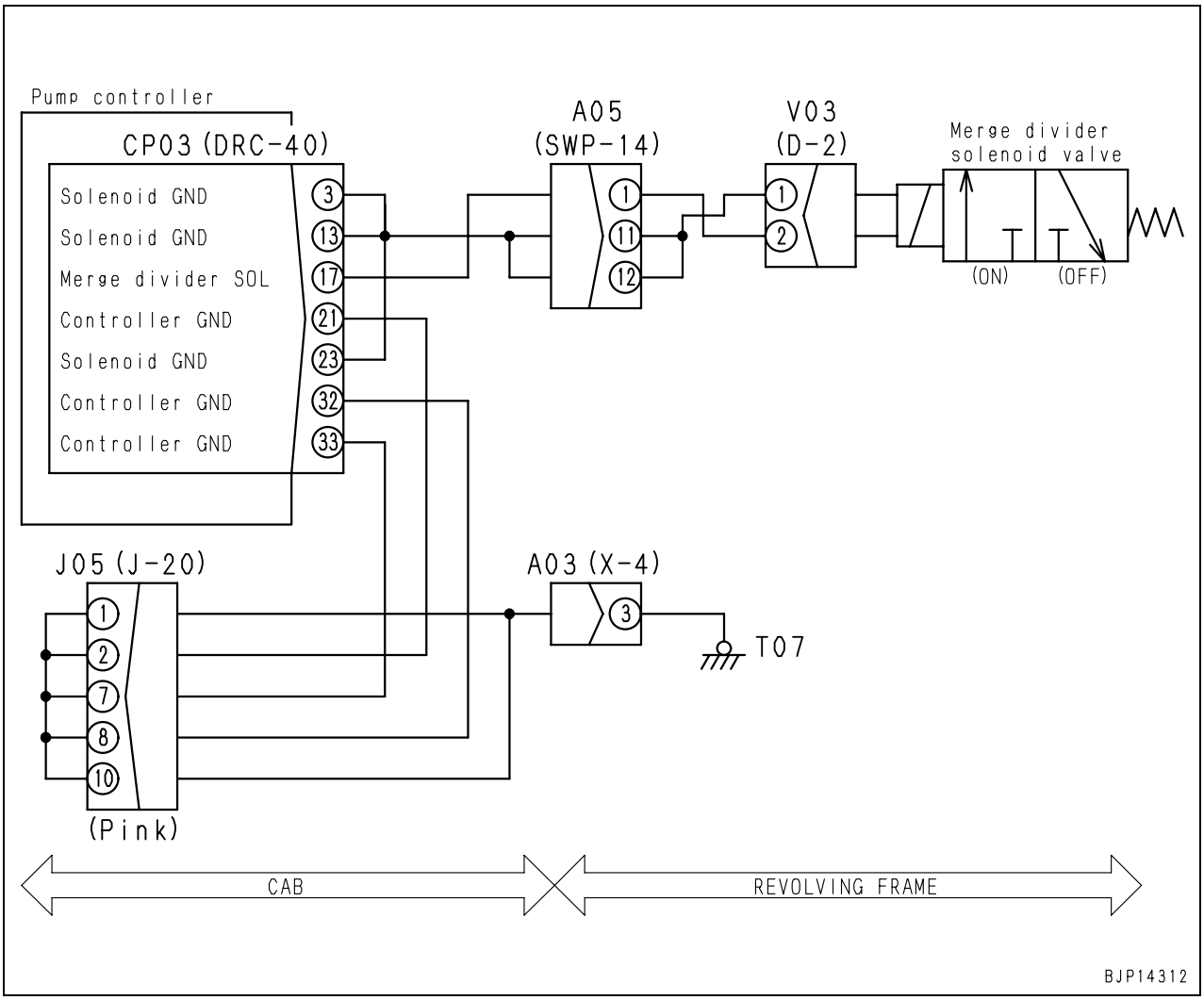


Failure code [DWJ0KA] Merge-divider Sol. Disc

Action code	Failure code	Trouble	Merge-divider solenoid disconnection (Pump controller system)
—	**DWJ0KA**		
Contents of trouble	• No current flows at output to merge-divider 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	• Single operation speed of work equipment and swing is high in lifting mode (L).		
Related information	• Operating condition of merge-divider 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 [DWJOKB].)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective merge-divider solenoid (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V03 (male)	Resistance		
			Between (1) – (2)	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) – A05 – V03 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between V03 (female) (1) – A05 – CP03 (female) (3), (13), (23) and 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) (17) – A05 – V03 (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) – (3), (13), (23)	20 – 60 Ω		

Circuit diagram related to merge-divider solenoid of pump controller

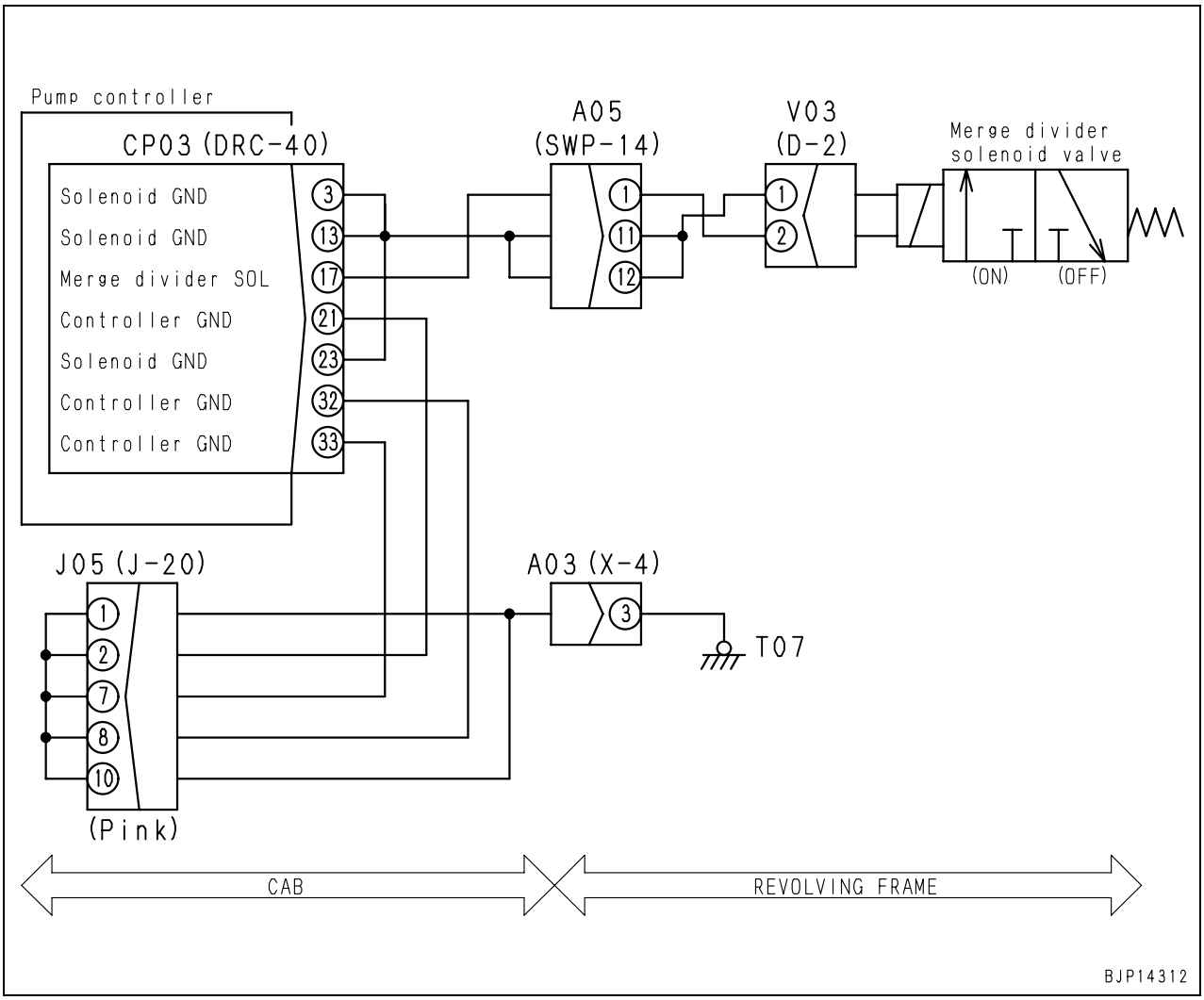


Failure code [DWJ0KB] Merge-divider Sol. S/C

Action code	Failure code	Trouble	Merge-divider solenoid short (Pump controller system)
—	**DWJ0KB**		
Contents of trouble	• Abnormal current flowed at output to merge-divider solenoid circuit.		
Action of controller	• Turns output to merge-divider 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	• Single operation speed of work equipment and swing is high in lifting mode (L).		
Related information	• Operating condition of merge-divider 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 merge-divider solenoid (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V03 (male)		Resistance	
			Between (1) – (2)		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) – A05 – V03 (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 lever	Voltage	
			Between (17) – (3), (13), (23)	At neutral	Max. 1 V	
				When either side is operated	20 – 30 V	

Circuit diagram related to merge-divider solenoid of pump controller

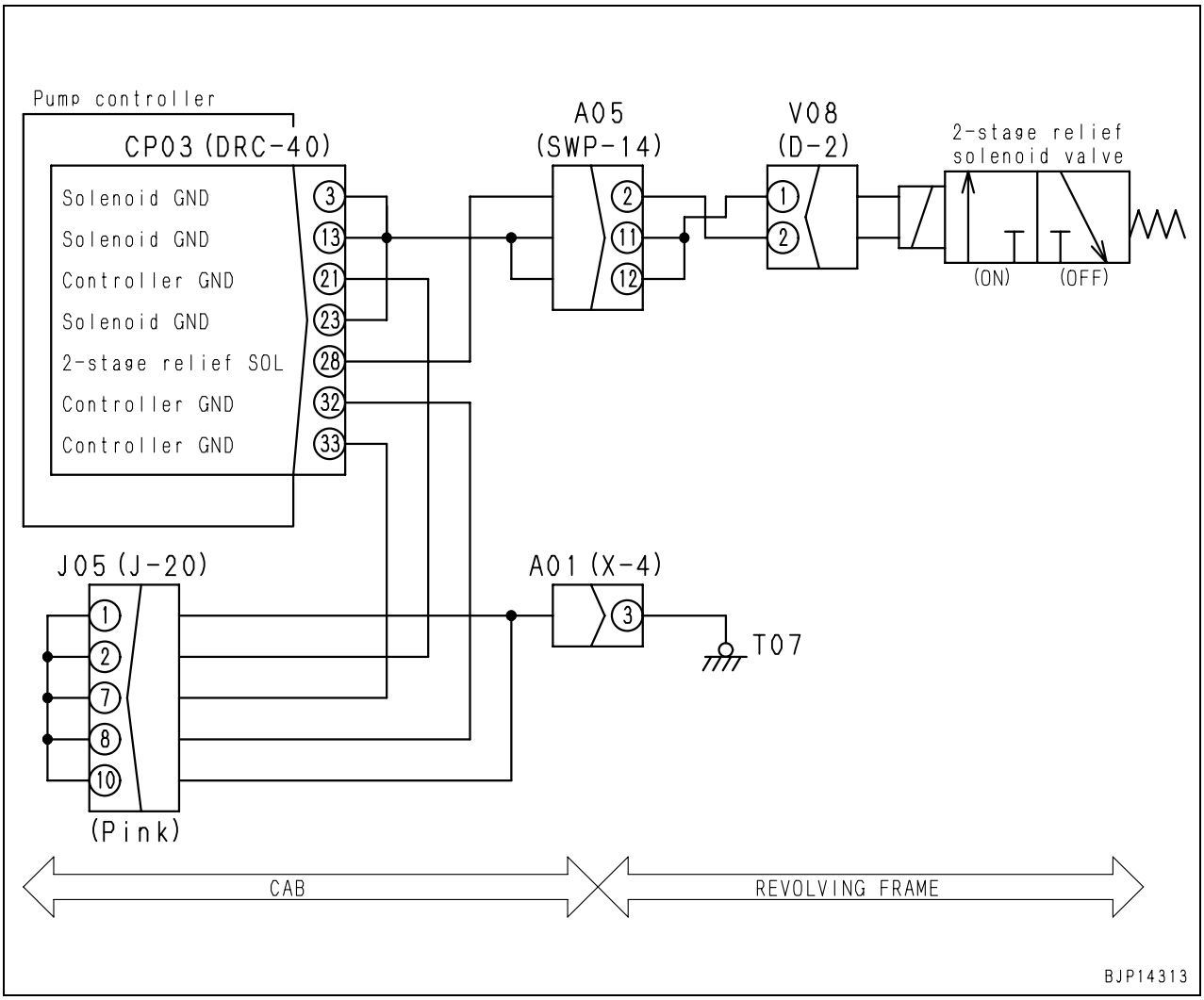


Failure code [DWK0KA] 2-stage Relief Sol. Disc.

Action code	Failure code	Trouble	2-stage relief solenoid disconnection (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	• Power maximizing function does not work.		
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 (1) – (2)	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) (28) – A05 – V08 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between V08 (female) (1) – A05 – 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) (28) – A05 – 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 (28) – chassis ground	20 – 60 Ω		

Circuit diagram related to 2-stage relief solenoid of pump controller

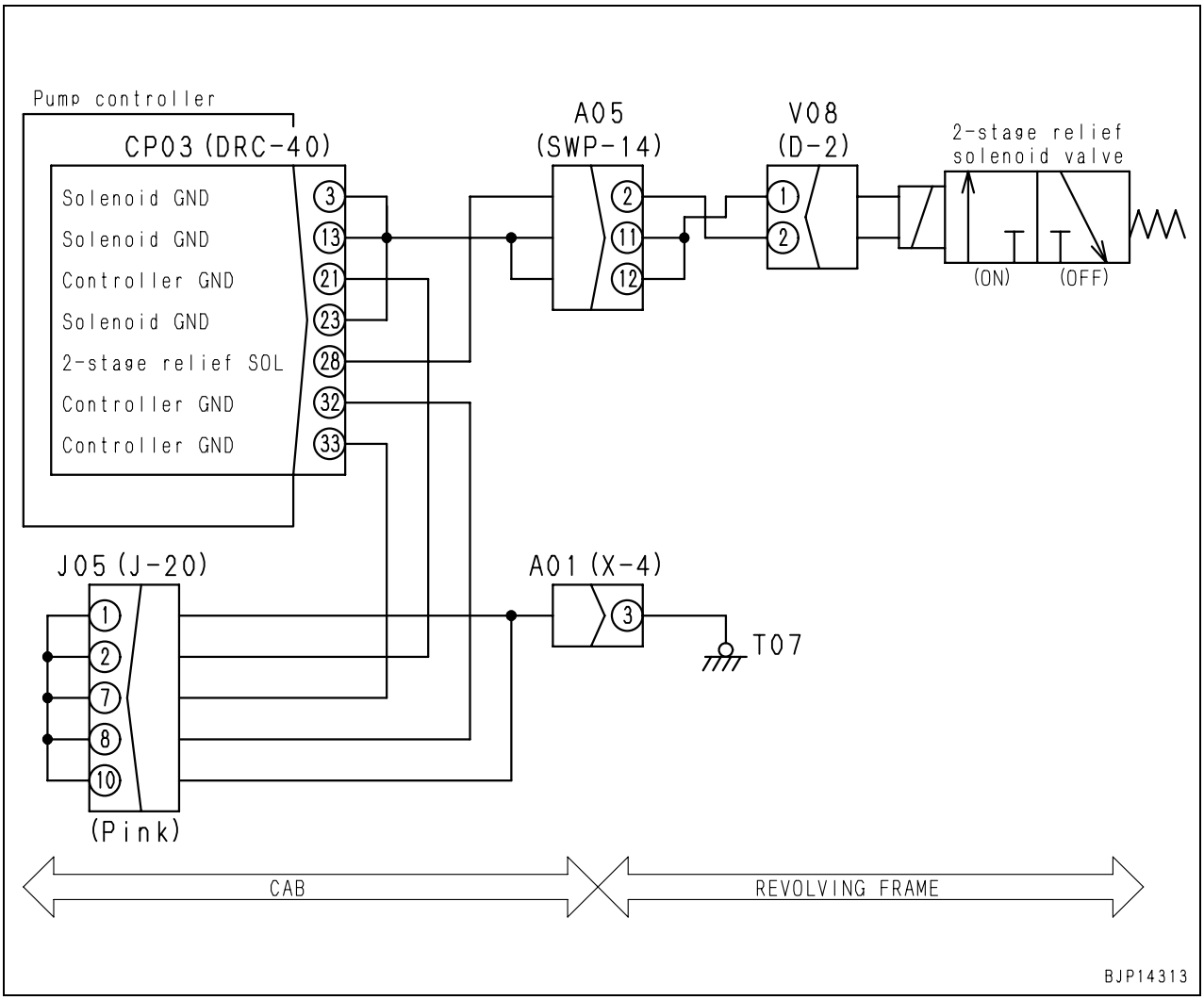


Failure code [DWK0KB] 2-stage Relief Sol. S/C

Action code	Failure code	Trouble	2-stage relief solenoid short (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	• Power maximizing function does not work.		
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 (1) – (2)		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) (28) – A05 – V08 (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	Working mode	Voltage	
			Between (28) – chassis ground	When L-mode is not selected	Max. 1 V	
				When L-mode is selected	20 – 30 V	

Circuit diagram related to 2-stage relief solenoid of pump controller

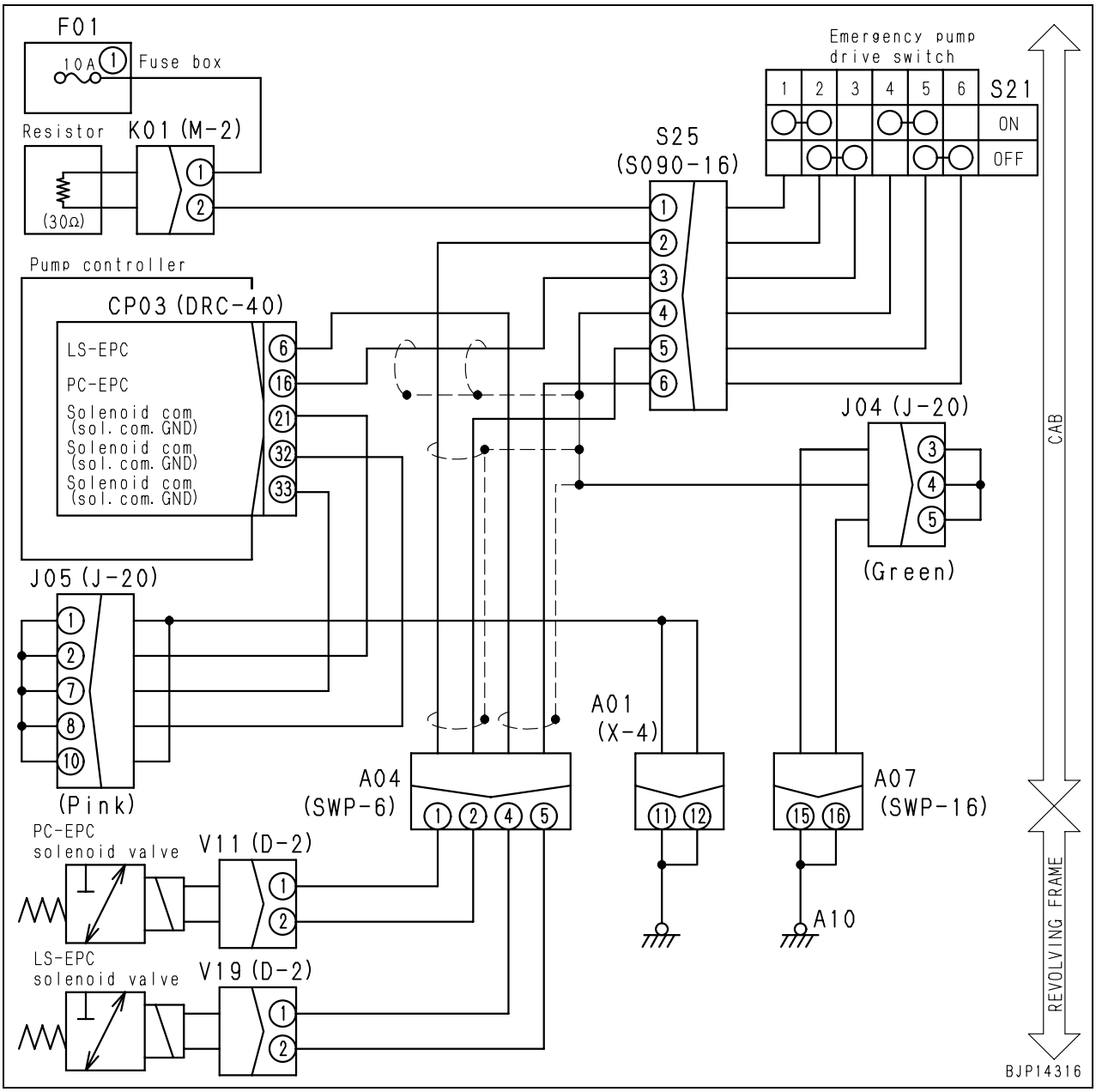


Failure code [DXA0KA] PC-EPC Sol. Disc.

Action code	Failure code	Trouble	PC-EPC solenoid disconnection (Pump controller system)
E02	**DXA0KA**		
Contents of trouble	• No current flows to PC-EPC 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	• If pump load increases, engine speed lowers largely and engine may stall.		
Related information	• Output to PC-EPC solenoid (current value) can be checked with monitoring function. (Code 01300: PC-EPC solenoid current) • If solenoid and wiring harness are not defective, turn emergency drive switch on; the operator can operate the machine with output equivalent to E-mode. (Failure code [**DXA0KA**] is then displayed, but it is not defective.)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective PC-EPC 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.			
			S21	Switch	Resistance	
			Between (2) – (3)	OFF	Max. 1 Ω	
				ON	Min. 1 MΩ	
			Between (5) – (6)	OFF	Max. 1 Ω	
				ON	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) (16) – S21 (3)		Resistance	Max. 1 Ω
			Wiring harness between S21 (2) – V11 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between CP03 (female) (21), (32), (33) – J05 – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between S21 (5) – V11 (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 CP03 (female) (16) – S21 (3) and chassis ground		Voltage	Max. 1 V
			Wiring harness between S21 (2) – V11 (female) (1) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)		Resistance	
			Between (16) – (21), (32), (33)		7 – 14 Ω	

Circuit diagram related to LS-EPC and PC-EPC solenoids of pump controller

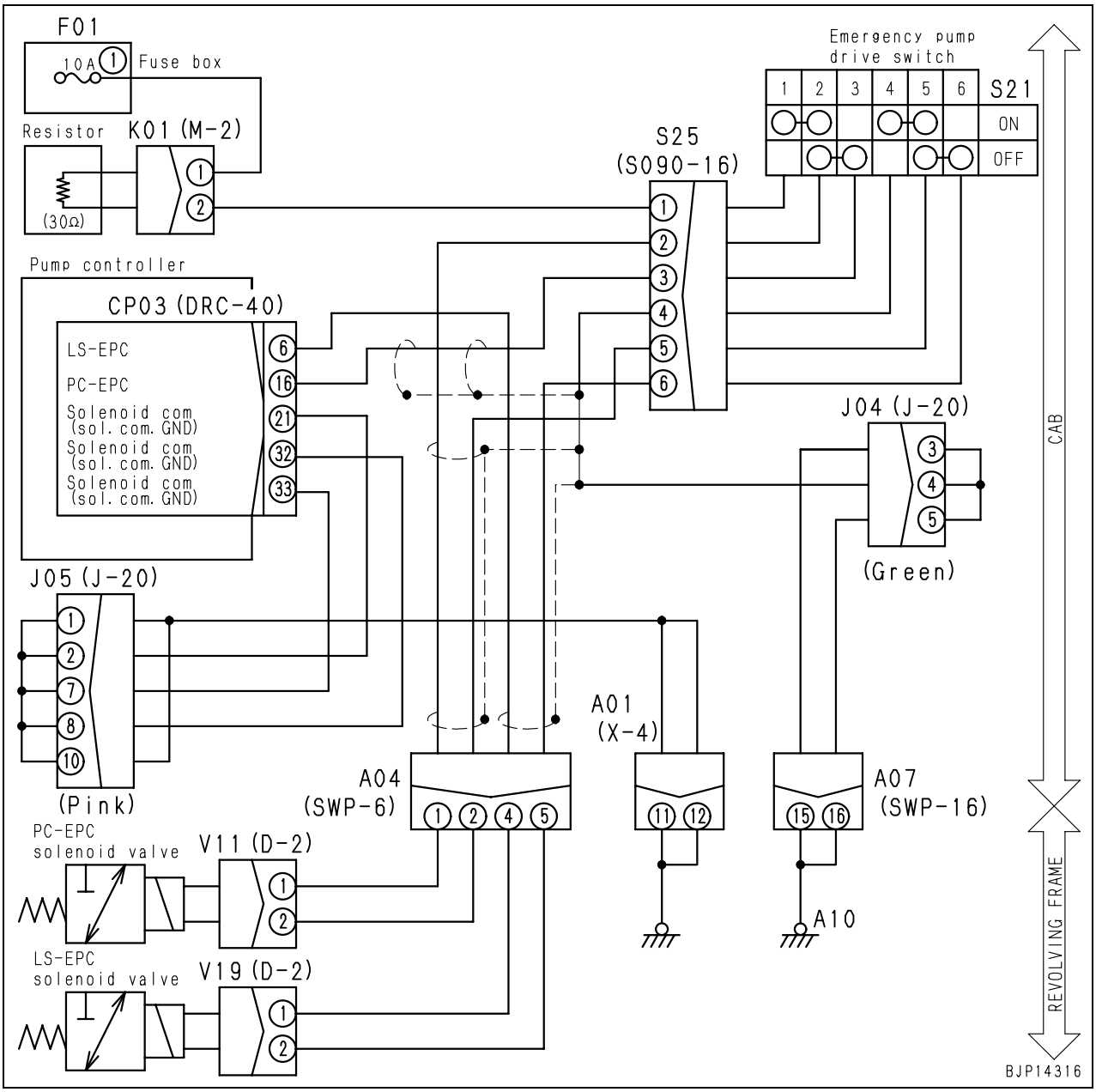


Failure code [DXA0KB] PC-EPC Sol. S/C

Action code	Failure code	Trouble	PC-EPC solenoid short (Pump controller system)
E02	**DXA0KB**		
Contents of trouble	• Abnormal current flowed to PC-EPC solenoid circuit.		
Action of controller	• Sets output to PC-EPC solenoid circuit to 0. • Even if cause of failure disappears, 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	• Output to PC-EPC solenoid (current value) can be checked with monitoring function. (Code 01300: PC-EPC solenoid current) • If solenoid and wiring harness are not defective, turn emergency drive switch on; the operator can operate the machine with output equivalent to E-mode. (Failure code [**DXA0KA**] is then displayed, but it is not defective.) ★ Turn emergency pump drive switch OFF during troubleshooting.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective PC-EPC 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 (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 CP03 (female) (16) – S21 – V11 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
	3	Defective pump controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)	Resistance		
			Between (16) – (21), (32), (33)	7 – 14 Ω		
			Between (16) – chassis ground	Min. 1 MΩ		

Circuit diagram related to LS-EPC and PC-EPC solenoids of pump controller

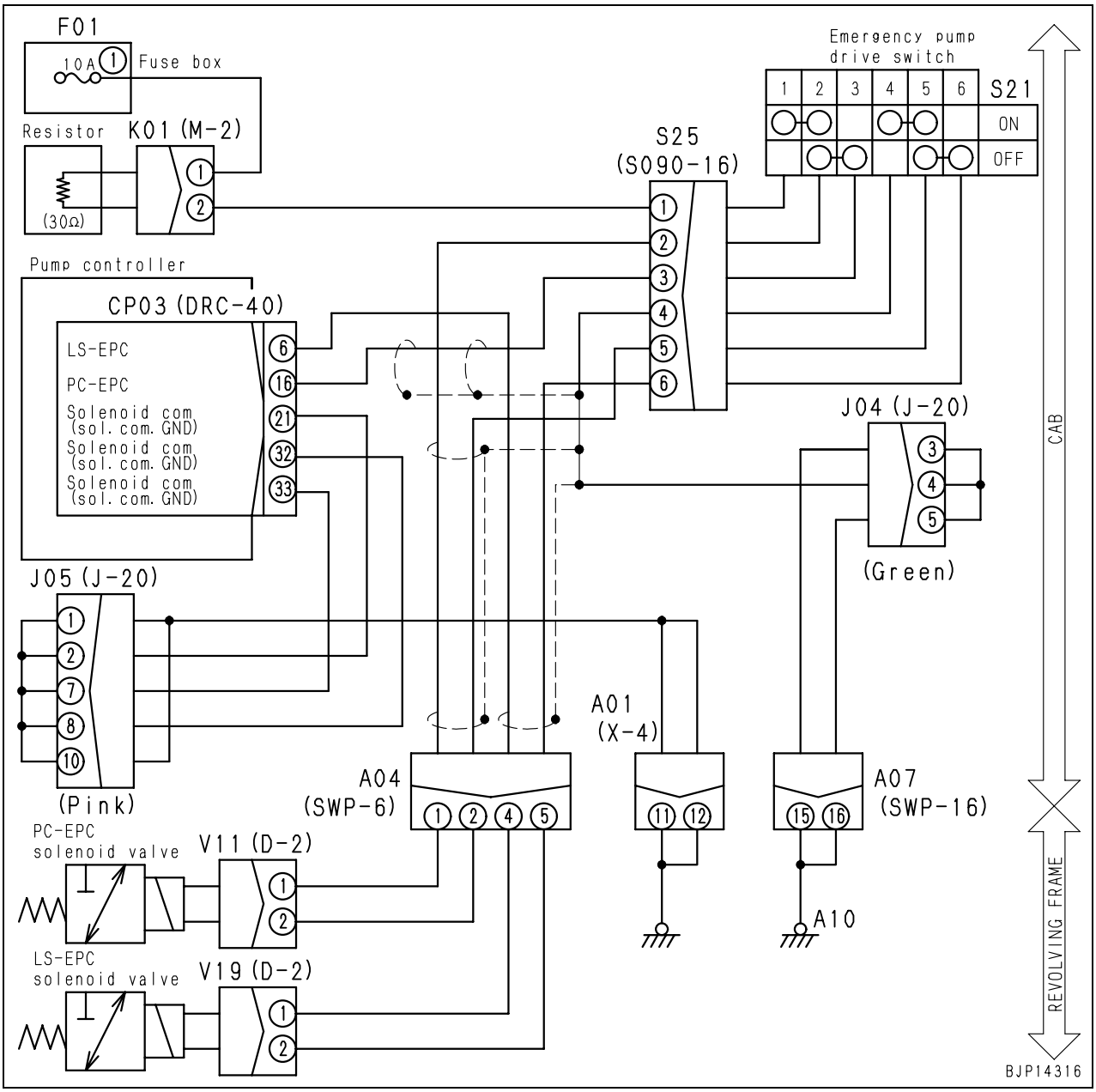


Failure code [DXE0KA] LS-EPC Sol. Disc.

Action code	Failure code	Trouble	LS-EPC solenoid disconnection (Pump controller system)
—	**DXE0KA**		
Contents of trouble	• No current flows to LS-EPC 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 speed Mi or Lo is high. • Speed of work equipment and swing is high in lifting mode (L).		
Related information	• Output to LS-EPC solenoid (current value) can be checked with monitoring function. (Code 01500: LS-EPC solenoid current)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective LS-EPC solenoid (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			V19 (male)	Resistance	
			Between (1) – (2)	7 – 14 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) (6) – A04 – V19 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between CP03 (female) (21), (32), (33) – J05 – V19 (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 CP03 (female) (6) – A04 – V19 (female) (1) 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 (6) – (21), (32), (33)	7 – 14 Ω	

Circuit diagram related to LS-EPC and PC-EPC solenoids of pump controller

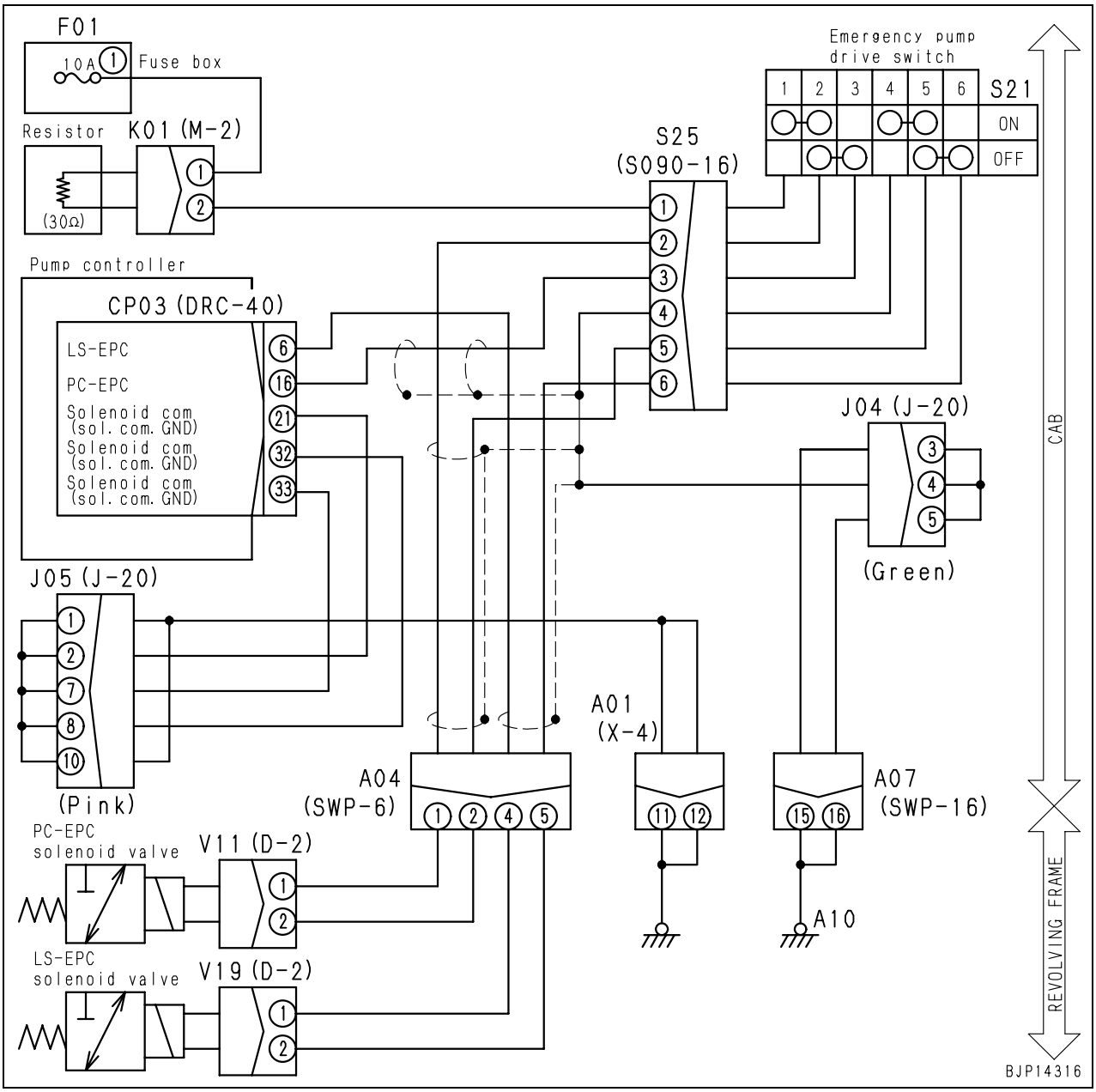


Failure code [DXE0KB] LS-EPC Sol. S/C

Action code	Failure code	Trouble	LS-EPC solenoid short (Pump controller system)
—	**DXE0KB**		
Contents of trouble	• Abnormal current flowed to LS-EPC solenoid circuit.		
Action of controller	• Sets output to LS-EPC solenoid circuit to 0. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Travel speed Mi or Lo is high. • Work equipment speed and swing speed are high in lifting mode (L).		
Related information	• Output to LS-EPC solenoid (current value) can be checked with monitoring function. (Code 01500: LS-EPC solenoid current)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective LS-EPC solenoid (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			V19 (male)	Resistance	
			Between (1) – (2)	7 – 14 Ω	
			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 CP03 (female) (6) – A04 – V19 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
	3	Defective pump controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CP03 (female)	Resistance	
			Between (6) – (21), (32), (33)	7 – 14 Ω	
			Between (6) – chassis ground	Min. 1 MΩ	

Circuit diagram related to LS-EPC and PC-EPC solenoids of pump controller

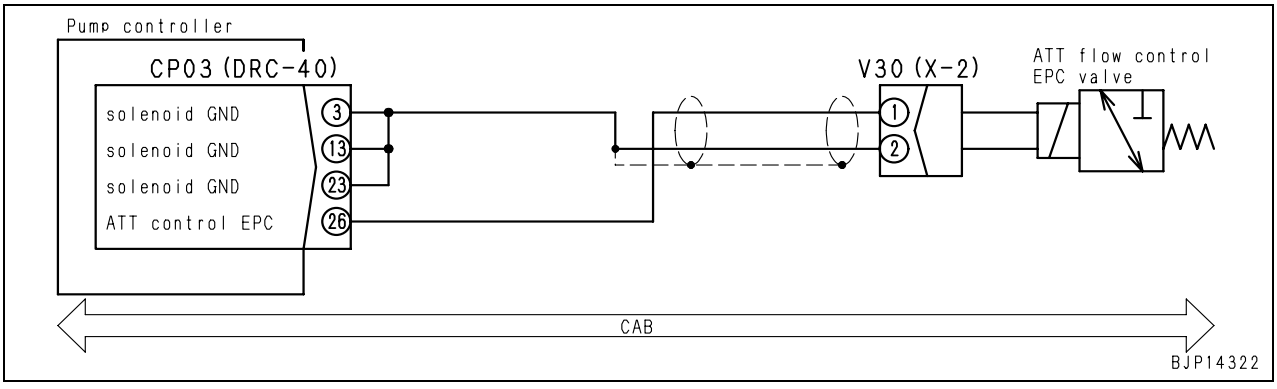


Failure code [DXE4KA] Service Current EPC Disc.

Action code	Failure code	Trouble	Service current EPC solenoid disconnection (Pump controller system)
—	**DXE4KA**		
Contents of trouble	• No current flows to service current EPC 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	• Attachment does not move.		
Related information	• Carry out troubleshooting only for setting with ATT. (Confirm settings on the monitor panel.) • Output to service current EPC solenoid (current value) can be checked with monitoring function. (Code 01700: Service solenoid current)		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective service current EPC solenoid (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			V30 (male)	Resistance	
			Between (1) – (2)	7 – 14 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) (26) – V30 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between CP03 (female) (3), (13), (23) – V30 (female) (2)	Resistance	Max. 1 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 harness between CP03 (female) (26) – V30 (female) (1) and chassis ground	Voltage	Max. 1 V
	3	Defective pump controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CP03 (female)	Resistance	
			Between (26) – (3), (13), (23)	7 – 14 Ω	

Circuit diagram related to service current EPC solenoid of pump controller

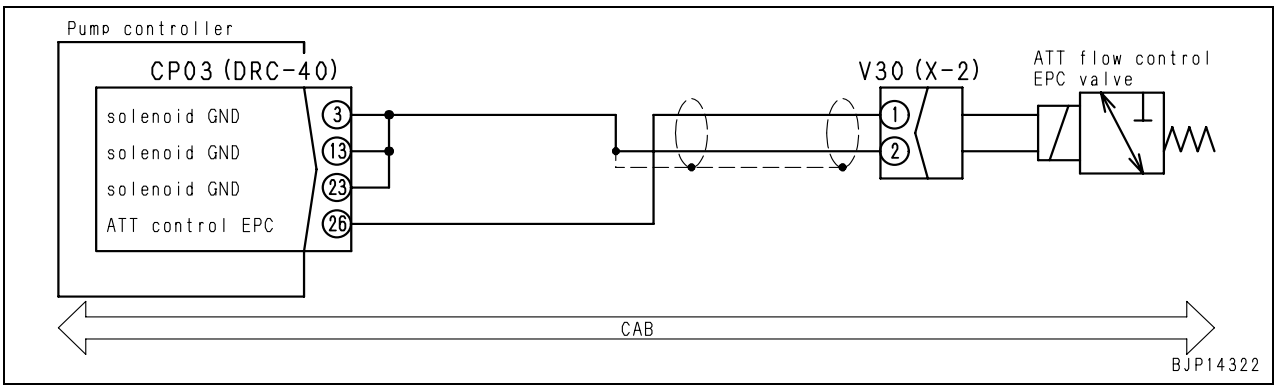


Failure code [DXE4KB] Service Current EPC S/C

Action code	Failure code	Trouble	Service current EPC solenoid short (Pump controller system)
—	**DXE4KB**		
Contents of trouble	• Abnormal current flowed to service current EPC solenoid circuit.		
Action of controller	• Sets output to service current EPC solenoid circuit to 0. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Attachment does not move.		
Related information	• Carry out troubleshooting only for setting with ATT. (Confirm settings on the monitor panel.) • Output to service current EPC solenoid (current value) can be checked with monitoring function. (Code 01700: Service solenoid current)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective service current EPC solenoid (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V30 (male)	Resistance		
			Between (1) – (2)	7 – 14 Ω		
			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 CP03 (female) (26) – V30 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
	3	Defective pump controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CP03 (female)	Resistance		
			Between (26) – (3), (13), (23)	7 – 14 Ω		
			Between (26) – chassis ground	Min. 1 MΩ		

Circuit diagram related to service current EPC solenoid of pump controller

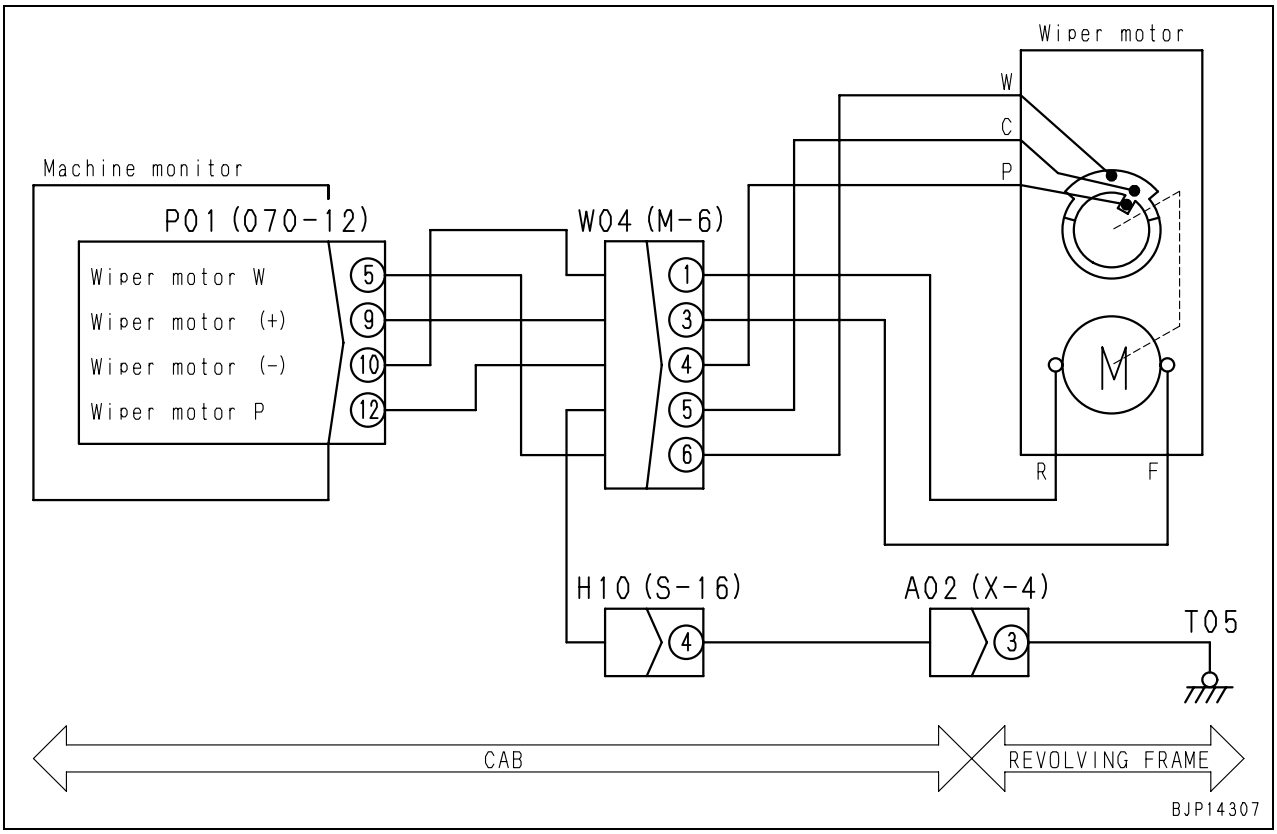


Failure code [DY20KA] Wiper Working Abnormality

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 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.			
			W04 (female)	Wiper blade	Resistance	
			Between (6) – (5)	Operating range top	Max. 1 Ω	
				Other than operating range top	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 P01 (female) (5) – W04 (male) (6)		Resistance	Max. 1 Ω
			Wiring harness between W04 (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.			
			P01	Wiper blade	Voltage	
			Between (5) – chassis ground	Operating range top	Max. 1 V	
				Other than operating range top	20 – 30 V	

Circuit diagram related to wiper motor of machine monitor

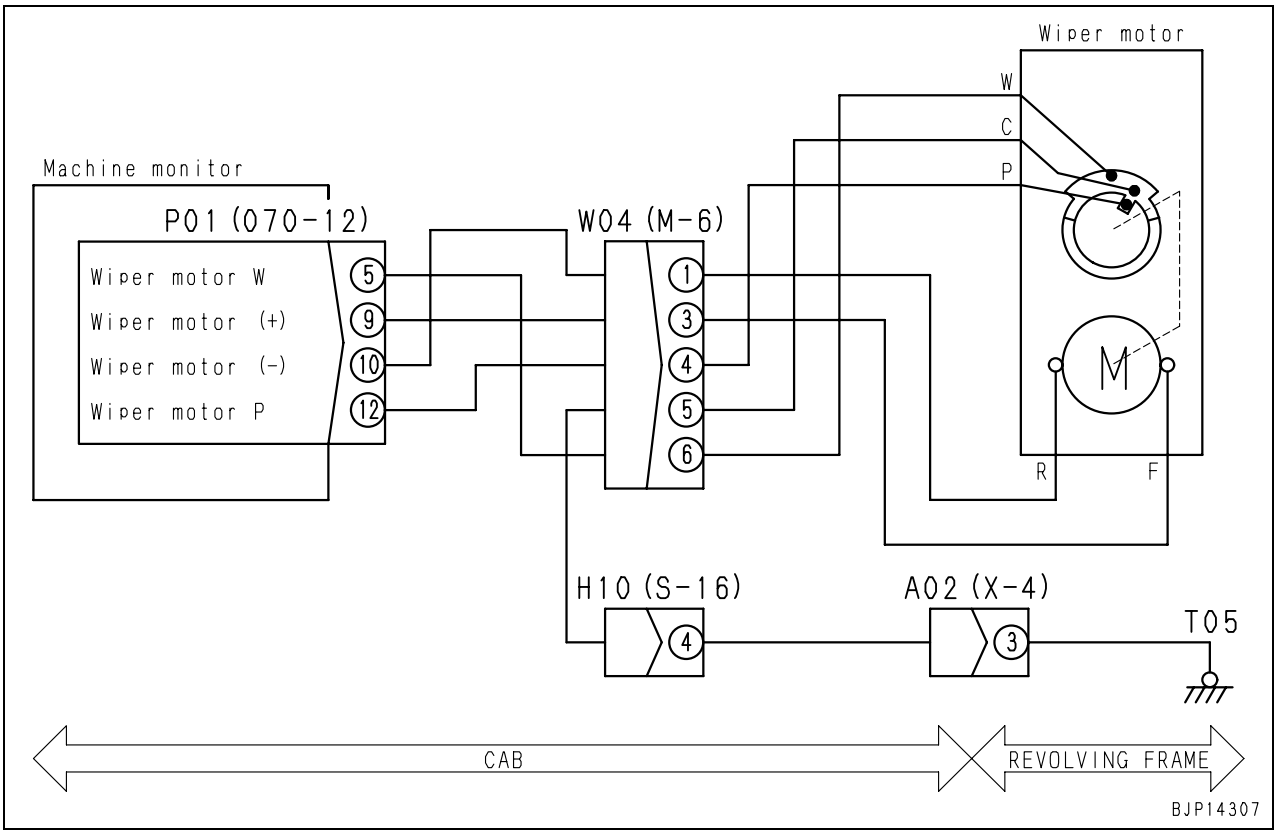


Failure code [DY20MA] Wiper Parking Abnormality

Action code	Failure code	Trouble	Wiper parking abnormality (Machine monitor system)
—	**DY20MA**		
Contents of trouble	• When windshield wiper parks, P signal of storage area is not input.		
Action of monitor panel	• Turns parking output to wiper motor OFF.		
Problem that appears on machine	• Windshield wiper does not park.		
Related information	• Input of P signal in 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.			
			W04 (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 P01 (female) (12) – W04 (male) (4)		Resistance	Max. 1 Ω
			Wiring harness between W04 (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.			
			P01	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

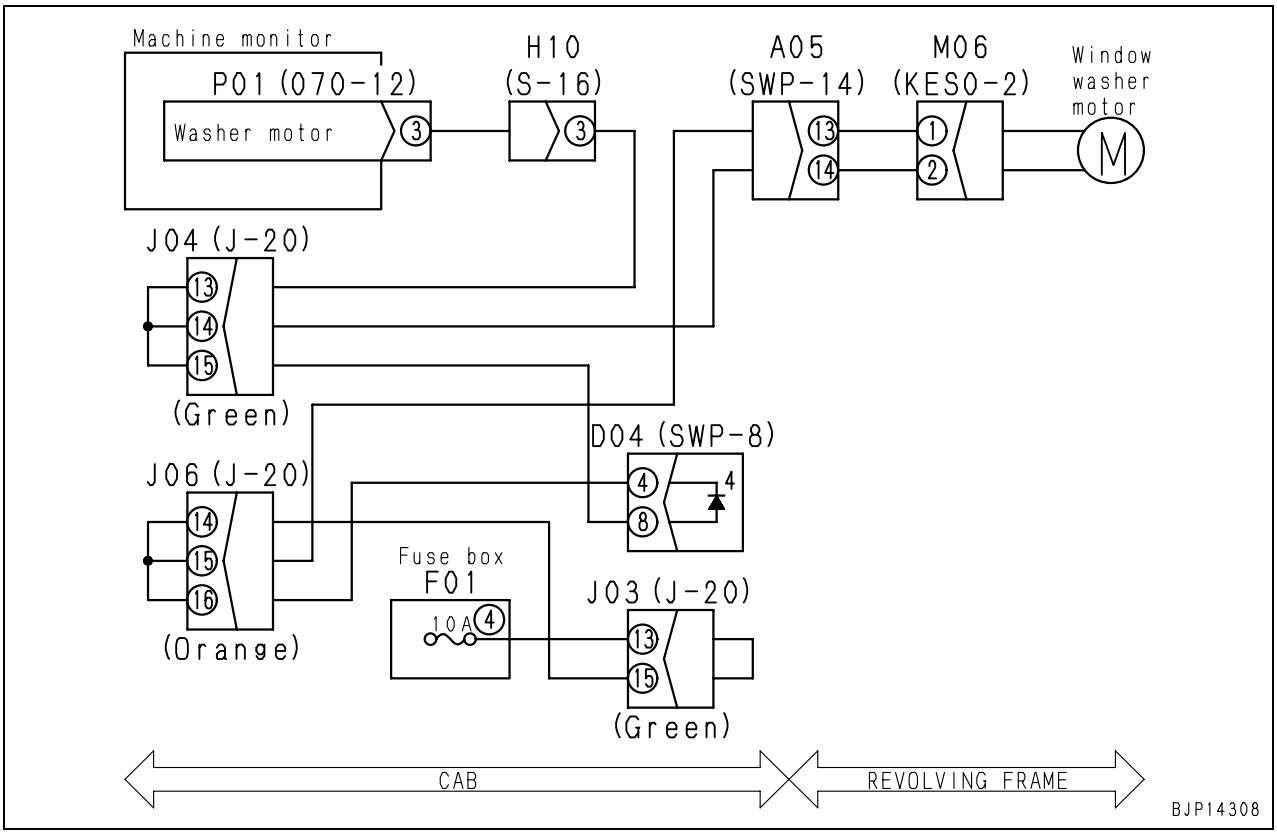


Failure code [DY2CKB] Washer Drive S/C

Action code	Failure code	Trouble	Window washer drive system short (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 (1) – (2)	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 P01 (female) (3) – J04 – M06 (female) (2), – D04(female) (8) 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.		
			P01	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

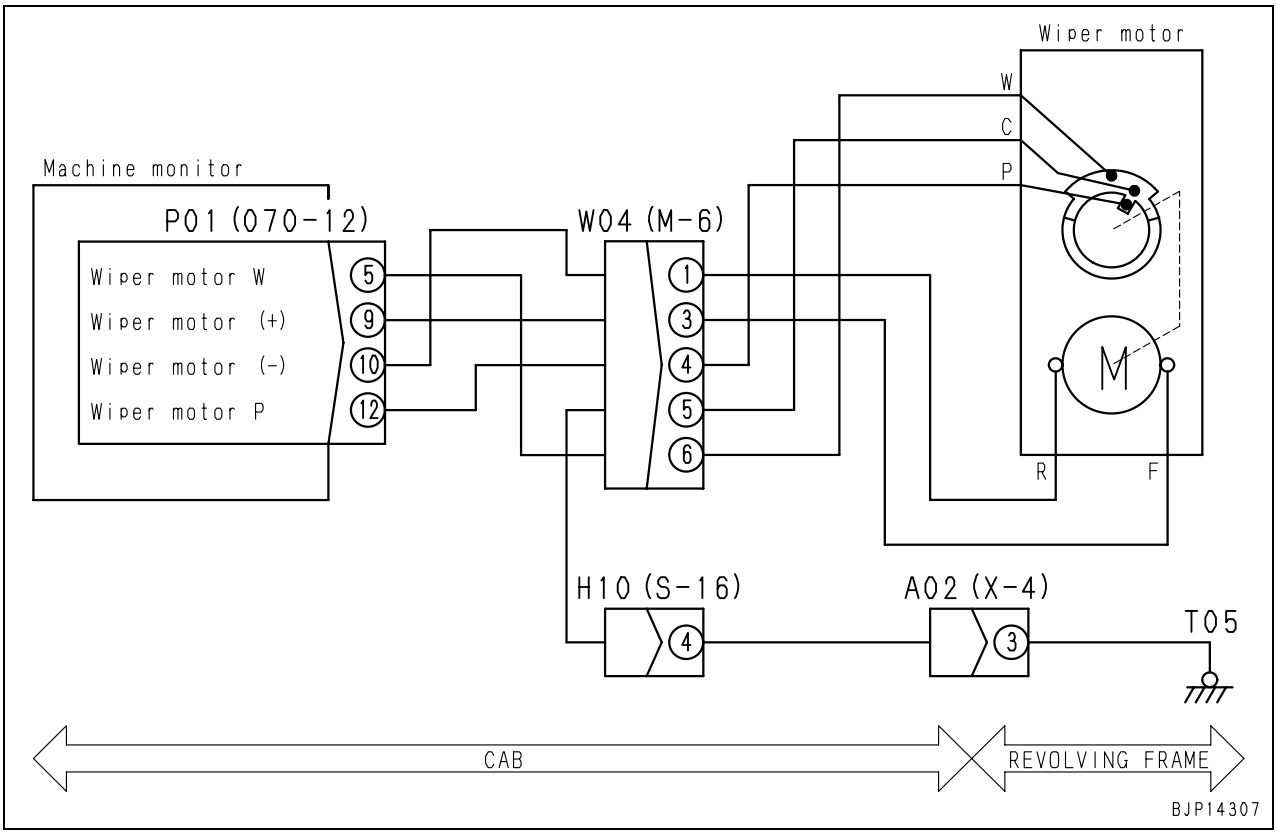


Failure code [DY2DKB] Wiper Drive (For) S/C

Action code	Failure code	Trouble	Wiper motor drive forward system short (Machine monitor system)
—	**DY2DKB**		
Contents of trouble	• Abnormal current flowed at output to wiper motor drive forward circuit.		
Action of monitor panel	• Turns output to wiper motor drive forward 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 wiper motor (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			W04 (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 P01 (female) (9) – W04 (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.			
			P01	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

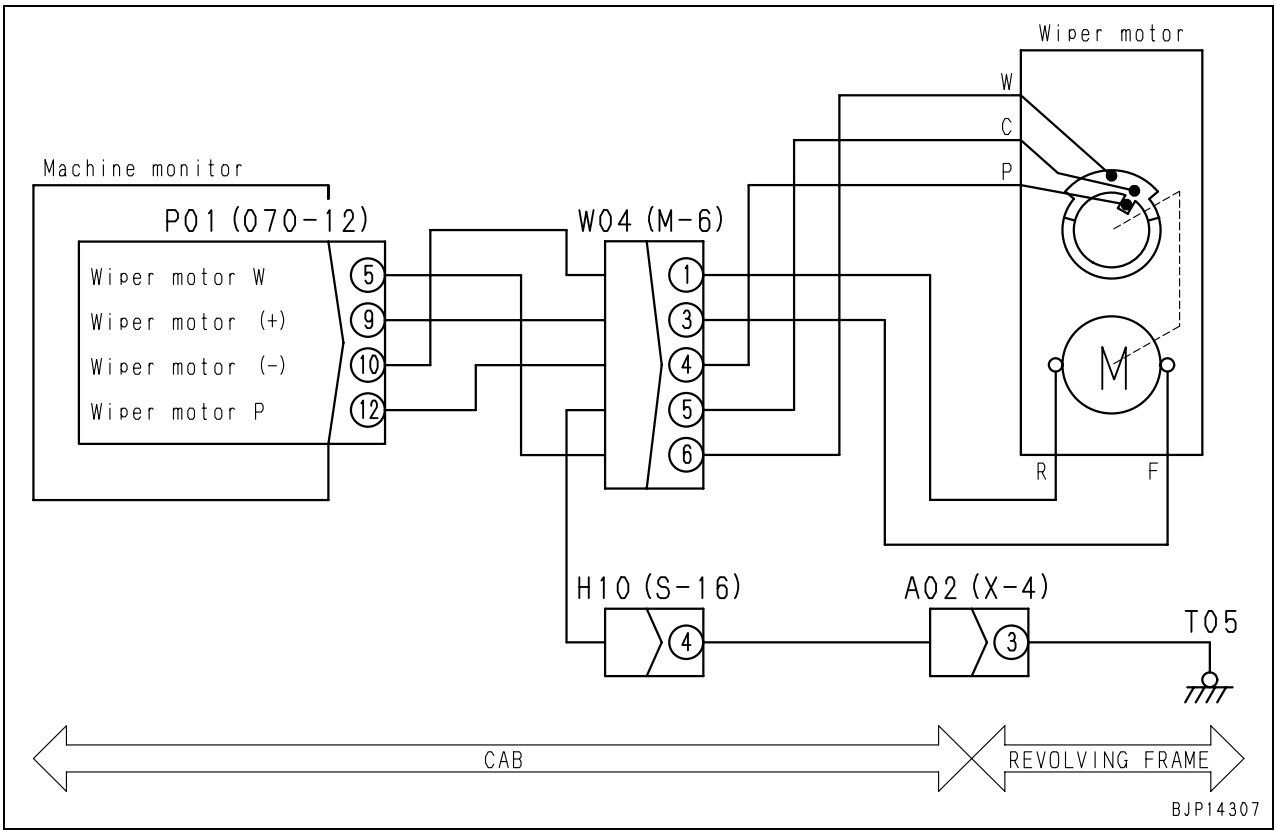


Failure code [DY2EKB] Wiper Drive (Rev) S/C

Action code	Failure code	Trouble	Wiper motor drive reverse system short (Machine monitor system)
—	**DY2EKB**		
Contents of trouble	• Abnormal current flowed at output to wiper motor drive reverse circuit.		
Action of monitor panel	• Turns output to wiper motor drive reverse 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 wiper motor (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			W04 (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 P01 (female) (10) – W04 (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.			
			P01	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



KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00542-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

40 Troubleshooting

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Troubleshooting of electrical system (E-mode)

Before carrying out troubleshooting of electrical system

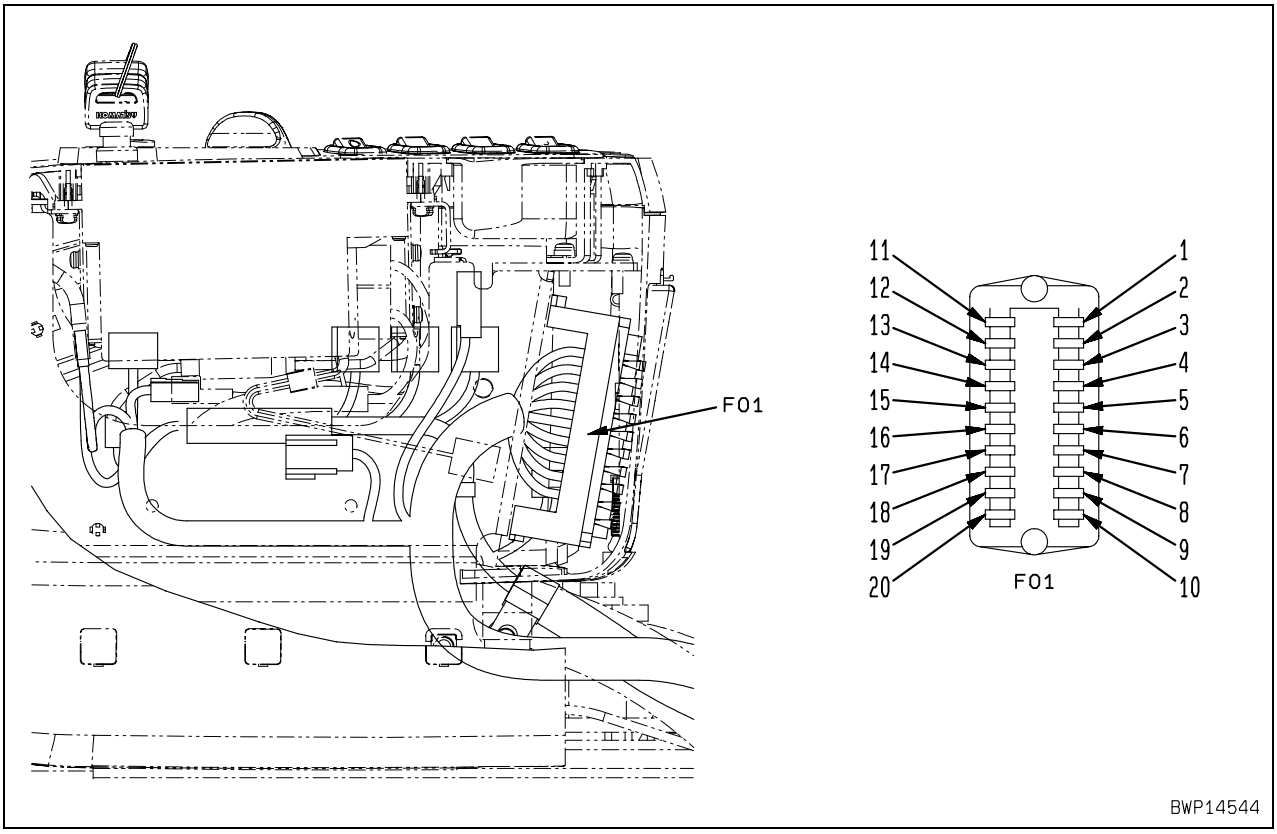
Connection table of fuse box

★ This connection table shows the devices to which each power supply of the fuse box supplies power (A switch power supply is a device which supplies power while the starting switch is in the ON position and a constant power supply is a device which supplies power while the starting switch is in the OFF and ON positions).

★ When carrying out troubleshooting related to the electrical system, you should check the fuses and fusible links to see if the power is supplied normally.

Type of power supply	Fusible link	Fuse No.	Fuse capacity	Destination of power
Switch power supply	F04 (65A)	1	10A	Pump controller
		2	20A	Pump controller (Solenoid power supply)
		3	20A	PPC oil pressure lock solenoid valve
				Machine monitor
				Wiper motor
		4	10A	Cigarette lighter
				Windshield washer motor
		5	10A	Horn relay, horn
Switch power supply	F04 (65A)	6	10A	Intake air heater
		7	10A	Rotary lamp
		8	20A	Right headlamp, working lamp (boom), working lamp (rear)
		9	10A	Radio
				Left knob switch (pump controller input)
		10	10A	(Spare)
Switch power supply	F04 (65A)	11	20A	Air conditioner unit
				Air conditioner compressor electromagnetic clutch
		12	20A	(Spare)
		13	20A	Headlamp
		14	10A	Optional power supply (1)
		15	10A	Travel alarm
				Optional power supply (2)
Constant power supply	F05 (30A)	16	10A	Radio (backup power supply)
				Room lamp
		17	20A	Starting switch
				Machine monitor
		18	10A	(Spare)
		19	30A	Engine controller
Switch power supply	Starting switch ACC	20	5A	Engine controller (ACC signal)

Location of fuse box and fuse Nos.



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 2 3 4	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.** **• Short circuit** **Independent wiring harnesses are in contact with each other abnormally.** **<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.**

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.

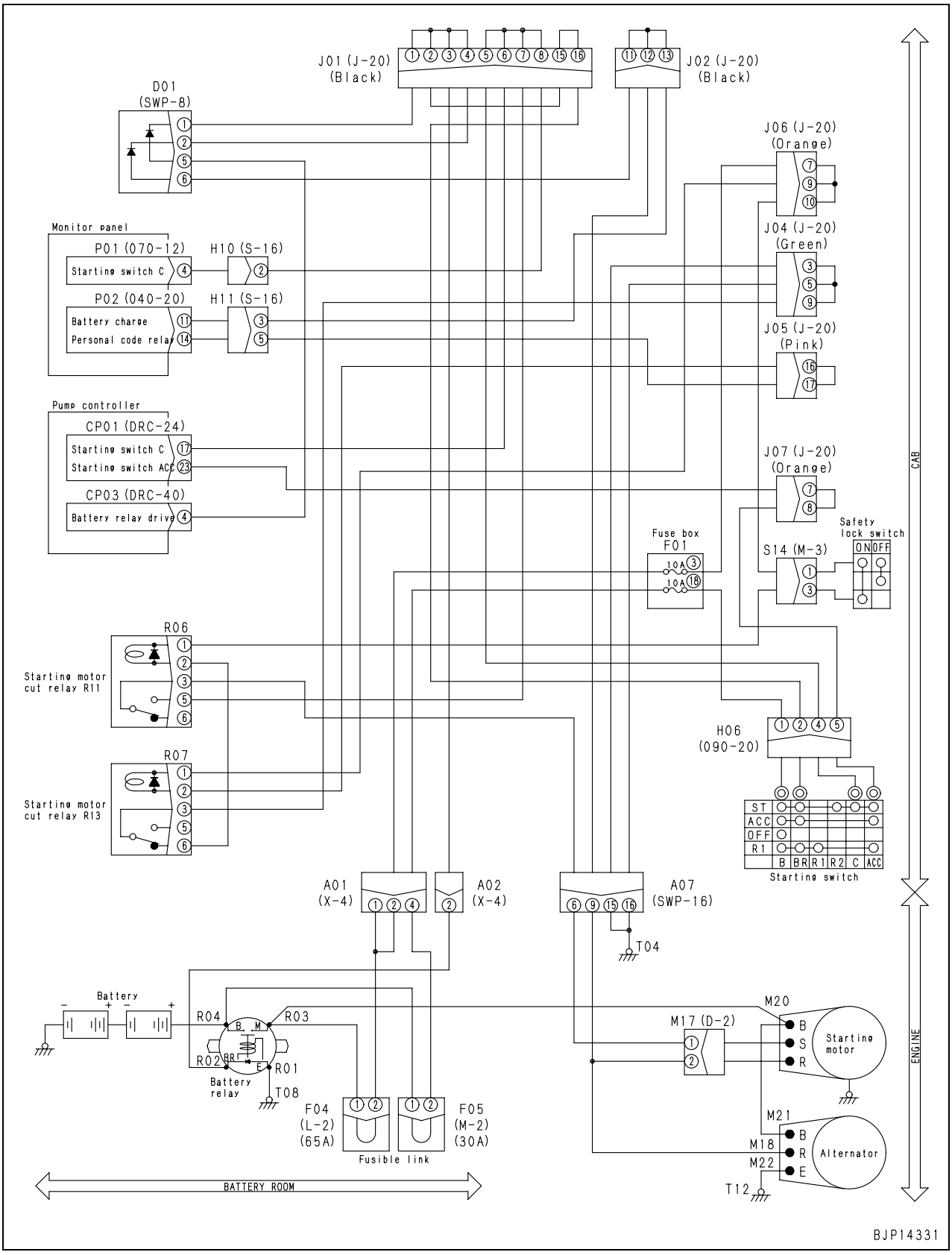
E-1 Engine does not start

Trouble	• Engine does not start (Engine does not turn).
Related information	• Engine starting circuit has following 2 start lock mechanisms: 1) Start lock by the machine monitor password 2) Start lock by the lock lever • In the case no error code for the engine controller mechanism is indicated

<table>
<tr><td rowspan="20">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="2">1</td><td rowspan="2">Low charge level of battery</td><td colspan="2">Battery voltage</td><td colspan="2">Specific gravity of battery</td></tr>
<tr><td colspan="2">Min. 24 V</td><td colspan="2">Min. 1.26</td></tr>
<tr><td>2</td><td>Defective fuse No. 3, No. 18 or fusible link F04 and F05</td><td colspan="4">If fuse or fusible link is burnt out, the circuit probably has ground fault.
In the case the machine monitor does not light up, check the power circuit between the battery and the fuse.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Defective starting 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>H06 (male)</td><td>Position</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (1) – (4)</td><td>OFF</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td></td><td></td><td>START</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective safety lock switch (internal short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>S14 (female)</td><td>Lock lever</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (1) – (3)</td><td>Free</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td></td><td></td><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 R06 or R07 (Internal short circuit or ground fault)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">R06 (female), R07 (female)</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="3">Between (1) – (2)</td><td colspan="2">100 – 500 Ω</td></tr>
<tr><td colspan="3">Between (3) – (5)</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td colspan="3">Between (3) – (6)</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Defective starting motor (Internal disconnection or breakage)</td><td colspan="4">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.
(If power supply and starting input and output are normal but starting motor does not turn, starting motor is defective.)</td></tr>
<tr><td colspan="2">Starting motor</td><td>Starting switch</td><td>Voltage</td></tr>
<tr><td colspan="2">Power supply: Between terminal B and chassis ground</td><td rowspan="2">When started</td><td>20 – 30 V</td></tr>
<tr><td colspan="2">Starting input: Terminal C – chassis ground</td><td>20 – 30 V</td></tr>
<tr><td rowspan="3">7</td><td rowspan="3">Defective alternator (Internal short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.</td></tr>
<tr><td colspan="3">Alternator</td><td colspan="2">Voltage</td></tr>
<tr><td colspan="3">Terminal R – chassis ground</td><td colspan="2">Max. 1 V</td></tr>
</table>

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	8	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 F01-18 outlet – 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) – M17 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between F01-3 outlet – S14 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between S14 (female) (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) – J04 – chassis ground	Resistance	Max. 1 Ω
	9	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 battery relay terminal B (R04) – F05 – F01-18 inlet and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between F01-18 outlet – 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) – M17 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between F01-3 outlet – S14 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between S14 (female) (3) – R06 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between R07 (female) (2) – J05 – P02 (female) (14) and chassis ground	Resistance	Min. 1 MΩ
	10	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 P02 (female) (11) – J02 – M17 (female) (2), – D01 (female) (6), – alternator terminal R and chassis ground	Voltage	Max. 1 V

Circuit diagram related to engine start and battery charging



E-2 Auto-decelerator does not operate

Trouble	• Auto-decelerator does not operate.
Related information	• Set speed of auto-decelerator is 1,300 rpm. Accordingly, set the fuel control dial to a higher rpm than this speed. If set speed is under 1,300 rpm, the auto-decelerator will not operate. • Check all the monitoring indications after starting the engine.

<table>
<tr><td rowspan="22">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective boom RAISE signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-21.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01900</td><td>Boom RAISE</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective boom LOWER signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-22.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01900</td><td>Boom LOWER</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Defective arm IN signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-23.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01900</td><td>Arm IN</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective arm OUT signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-24.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01900</td><td>Arm OUT</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Defective bucket CURL signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-26.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01901</td><td>Bucket CURL</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td rowspan="3">6</td><td rowspan="3">Defective bucket DUMP signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-27.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01901</td><td>Bucket DUMP</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td rowspan="3">7</td><td rowspan="3">Defective swing signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-28.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01900</td><td>Swing</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
</table>

<table>
<tr><td rowspan="6">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">8</td><td rowspan="3">Defective travel signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to trouble-shooting No. E-29.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01900</td><td>Travel</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td rowspan="3">9</td><td rowspan="3">Defective attachment signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to trouble-shooting No. E-30.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>01901</td><td>Service</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td>10</td><td>Defective pump controller</td><td colspan="3">Since trouble is in system, troubleshooting cannot be carried out. (If causes 1 – 9 above are not detected, engine controller may be defective.)</td></tr>
</table>

E-3 Automatic warming-up system does not operate

Trouble	• Automatic warming-up system does not operate
Related information	• When engine coolant temperature is below 30°C, automatic warm-up system raises engine speed to 1,250 rpm. • If fuel control dial is opened more than 70% for 3 seconds or longer when starting switch is turned ON or after engine is started, automatic warm-up system is turned OFF.

<table>
<tr><td rowspan="4">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Defective engine coolant temperature signal</td><td colspan="3">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-14.</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>04102</td><td>Engine coolant temperature</td><td>Compare with actual engine coolant temperature</td></tr>
<tr><td>2</td><td>Defective pump controller</td><td colspan="3">Since trouble is in system, troubleshooting cannot be carried out. (If causes stated above are not detected, engine controller may be defective.)</td></tr>
</table>

E-4 Preheater does not operate

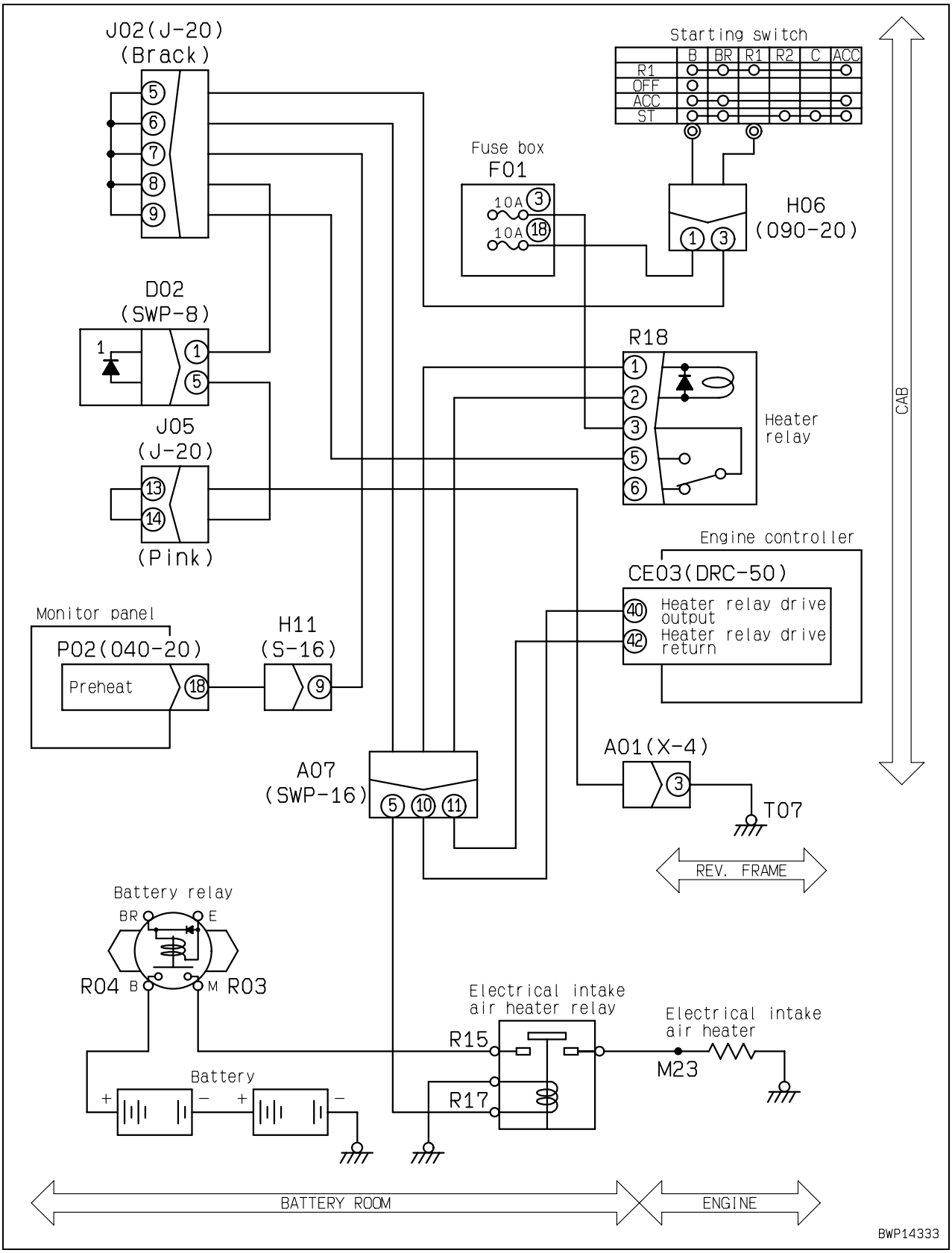
Trouble (1)	When starting switch is turned to HEAT position, preheating monitor does not light up.
Related information	Input of preheating signal (ON/OFF) can be checked with monitoring function. (Code 04500: Monitor Input 1)

<table>
<tr><td rowspan="6">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td>1</td><td>Defective starting switch system</td><td colspan="5">If preheating fails to operate (the heater does not warm up), refer to Trouble (2)</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Disconnection in wiring harness
(Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between P02 (female) (18) – J02 (male) (7)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Defective machine monitor</td><td colspan="5">★ Prepare with starting switch OFF</td></tr>
<tr><td>P02</td><td colspan="2">Starting switch</td><td colspan="2">Voltage</td></tr>
<tr><td rowspan="2">Between (18) – chassis ground</td><td colspan="2">OFF</td><td colspan="2">Max. 1 V</td></tr>
<tr><td colspan="2">HEAT</td><td colspan="2">20 – 30 V</td></tr>
</table>

Trouble (2)	• When starting switch is turned to HEAT position, preheater does not warm up.
Related information	• During low temperature (coolant temperature below 30°C), pump controller drives the heater relay for 100 sec. after engine start to automatically preheat.

<table>
<tr><td rowspan="11">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective starting switch (Internal disconnection)</td><td colspan="5">★ Prepare with starting switch OFF</td></tr>
<tr><td>H06 (male)</td><td colspan="2">Starting switch</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (3)</td><td colspan="2">OFF</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td colspan="2">HEAT</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Defective heater relay (Internal disconnection)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Heater relay</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="3">Coil terminal – chassis ground</td><td colspan="2"></td></tr>
<tr><td colspan="3">Between contact terminals</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Defective intake air heater (Internal disconnection).</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Between heater terminals</td><td colspan="2">Normal if conductive</td></tr>
<tr><td></td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Disconnection in wiring harness
(Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between H06 (female) (3) – J02 – Heater relay terminal R17</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between battery relay terminal M (R03) – Heater relay terminal R15</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
</table>

Circuit diagram related to engine preheater

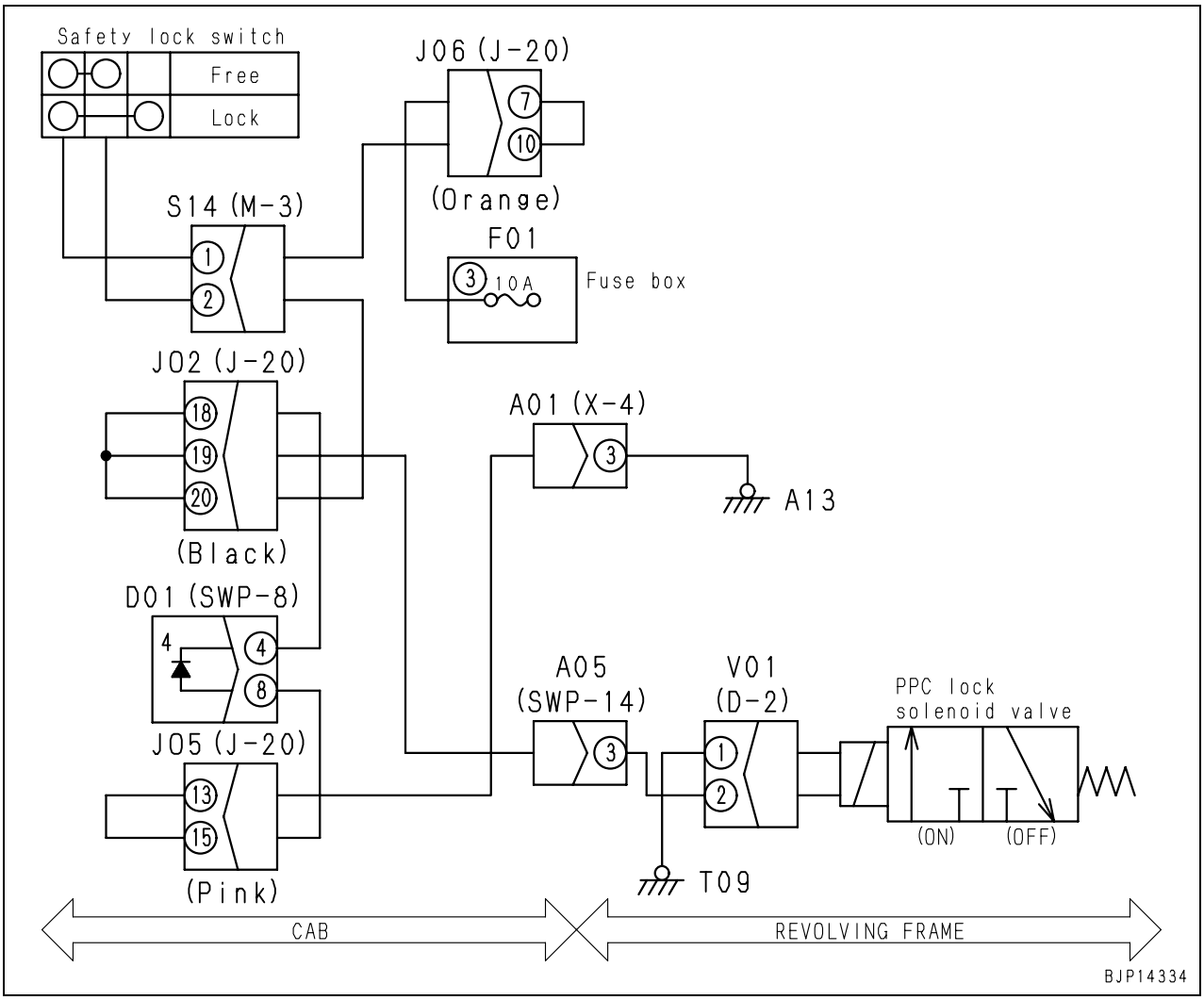


E-5 All work equipment, swing, and travel mechanism do not move

Trouble	• All travel, swing, and work equipment mechanism do not move.
Related information	—

<table>
<tr><td rowspan="15">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td>1</td><td>Defective fuse No. 3</td><td colspan="5">If fuse is burnt out, the circuit probably has ground fault.</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective safety lock switch (internal disconnection)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>S14 (female)</td><td colspan="2">Lock lever</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (1) – (2)</td><td colspan="2">Lock</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Defective PPC lock solenoid (Internal disconnection or short circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">Free</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td colspan="2">V01 (male)</td><td colspan="3">Resistance</td></tr>
<tr><td colspan="2">Between (1) – (2)</td><td colspan="3">20 – 60 Ω</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Defective assembled-type diode D01 (Internal short circuit)</td><td colspan="2">Between (2) – chassis ground</td><td colspan="3">Min. 1 MΩ</td></tr>
<tr><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">D01 (male)</td><td colspan="3">Resistance</td></tr>
<tr><td colspan="2">Between (8) – (4)</td><td colspan="3">Min. 1 MΩ</td></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between F01-3 outlet – J06 – S14 (male) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between S14 (male) (2) – J02 – V01 (male) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between V01 (female) (1) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Ground fault in wiring harness (Short circuit with GND circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between F01-3 outlet – J06 – S14 (male) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="3">Wiring harness between S14 (male) (2) – J02 – V01(female) (2), – D01(female) (8) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
</table>

Circuit diagram related to PPC lock solenoid

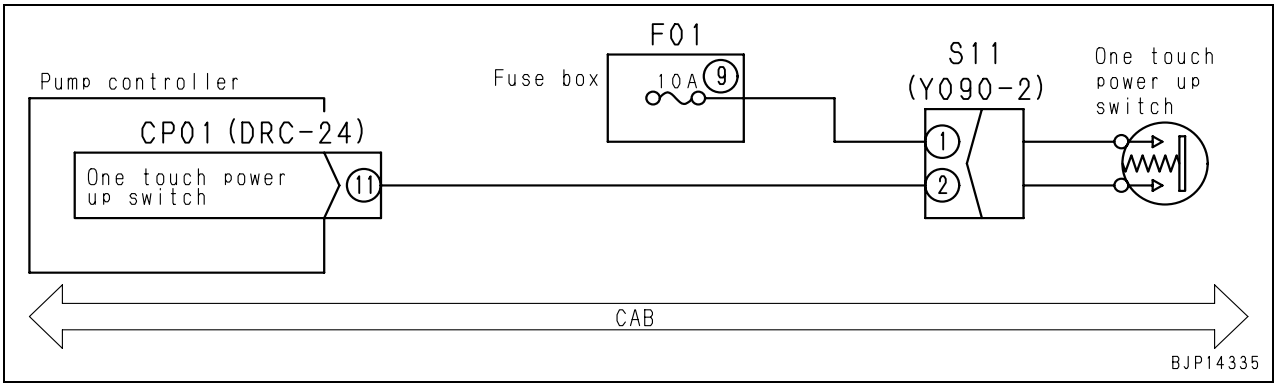


E-6 Power maximizing function does not operate

Trouble	• Power maximizing function does not work.
Related information	• Symbol mark is indicated on the machine monitor when the power maximizing switch is depressed during work equipment operation while the engine is running in P- or E-mode. • Input state of power maximizing switch (left knob switch) can be checked with monitoring function (Code 02200: Switch Input 1)

<table>
<tr><td rowspan="12">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>1</td><td>Defective fuse No. 9</td><td colspan="4">If fuse is burnt out, the circuit probably has ground fault.</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective power maximizing 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>S11(male)</td><td>Switch</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (1) – (2)</td><td>Released</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td></td><td></td><td>Pressed</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">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 F01-9 outlet – S11 (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between S11 (female) (2) – CP01 (female) (11)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Ground fault in wiring harness
(Short circuit with GND circuit)</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 F01-9 outlet – S11 (female) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Wiring harness between S11 (female) (2) – CP01 (female) (11) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Defective pump controller</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>CP01</td><td>Switch</td><td colspan="2">Voltage</td></tr>
<tr><td>Between (11) – chassis ground</td><td>Released</td><td colspan="2">Max. 1 V</td></tr>
<tr><td></td><td></td><td>Pressed</td><td colspan="2">20 – 30 V</td></tr>
</table>

Circuit diagram related to power max. switch

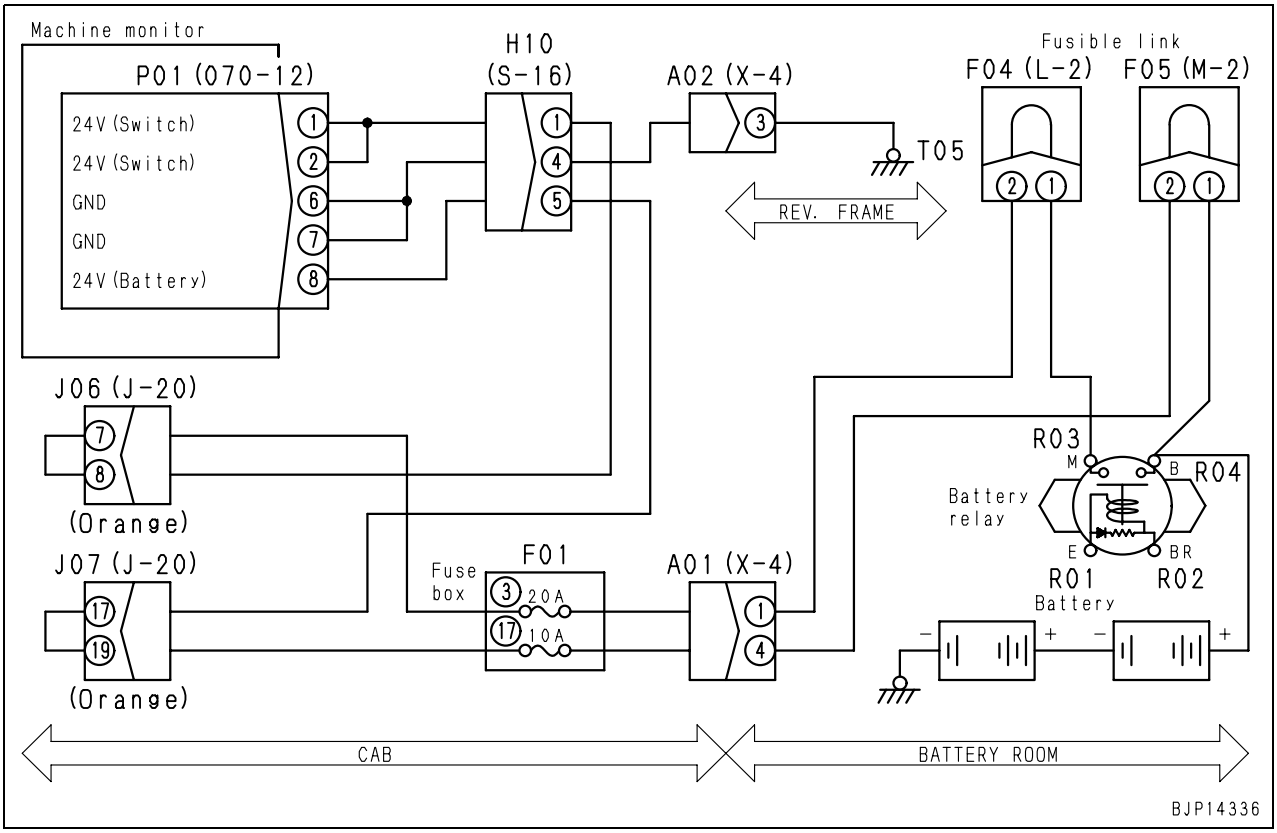


E-7 Machine monitor does not display at all

Trouble	• Machine monitor does not display at all when starting switch is turned ON
Related information	—

		Cause	Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective fuse No. 3	If fuse is burnt out, the 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 P01(female) (1) (2) – J06 – F01-3 outlet	Resistance	Max. 1 Ω
			Wiring harness between P01 (female) (6), (7) – 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 P01(female) (1), (2) – J06 – F01-3 outlet and chassis ground	Resistance	Min. 1 MΩ
	4	Defective machine monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			P01 (female)	Voltage/Resistance	
			Between (1), (2) – chassis ground	Voltage: 20 – 30 V	
			Between (6), (7) – chassis ground	Resistance: Max. 1 Ω	

Circuit diagram related to power source in monitor panel



E-8 Machine monitor does not display some items

Trouble	• Machine monitor does not display some items when starting switch is turned ON
Related information	—

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor LCD	When following switches are operated, if all LCD panel is lighted up (all surface becomes white), LCD panel is normal. • Switch operation: [↶] + [A] (Simultaneous operation)
	2	Defective machine monitor	Since trouble is in system, troubleshooting cannot be carried out. (If causes stated above are not detected, engine controller may be defective.)

E-9 Contents of display by machine monitor are different from applicable machine

Trouble	• Contents of display by machine monitor are different from applicable machine.
Related information	—

<table>
<tr><td rowspan="5">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Defective model code signal (Internal defect)</td><td colspan="3">In the case monitoring display is not normal, proceed to failure code [DA2SKQ].</td></tr>
<tr><td>Monitoring code</td><td>Item</td><td>Normal display</td></tr>
<tr><td>00200

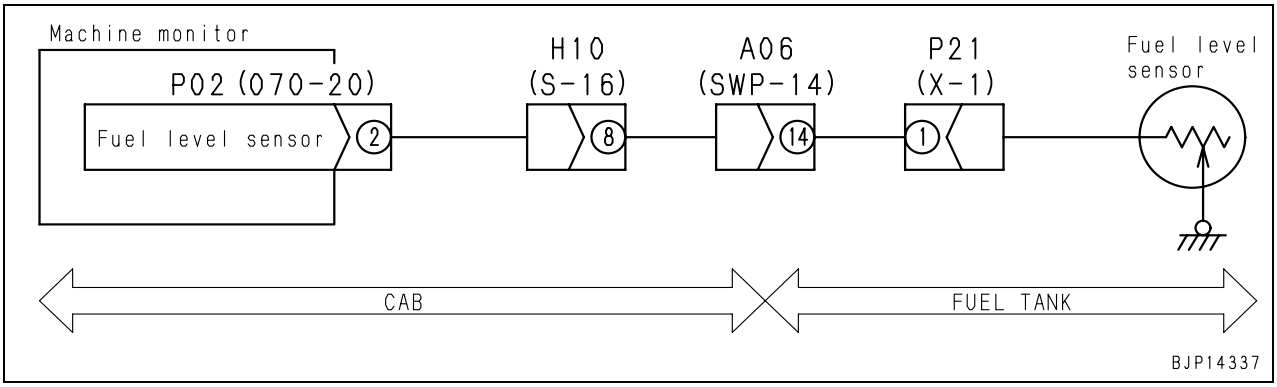
00201</td><td>Controller model code
Select model</td><td>300</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Defective machine monitor</td><td colspan="3">Since trouble is in system, troubleshooting cannot be carried out. (If causes stated above are not detected, engine controller may be defective.)</td></tr>
</table>

E-10 Fuel level monitor was lighted in red while engine running

Trouble	• Fuel level monitor was lighted in red while the engine running
Related information	• If fuel level gauge on the machine monitor indicates red range, fuel level monitor turns red. • Input signal (voltage) from the fuel level sensor can be checked with monitoring function. (Code 04200: Fuel level sensor voltage)

<table>
<tr><td rowspan="11">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>1</td><td>Low fuel level
(When system is normal)</td><td colspan="4">★ Add fuel</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Defective fuel level sensor
(Internal disconnection)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>P21 (male)</td><td>Fuel level</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) and 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>
<tr><td rowspan="2">3</td><td rowspan="2">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 P02 (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">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>P02 (female)</td><td>Fuel level</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (2) and 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

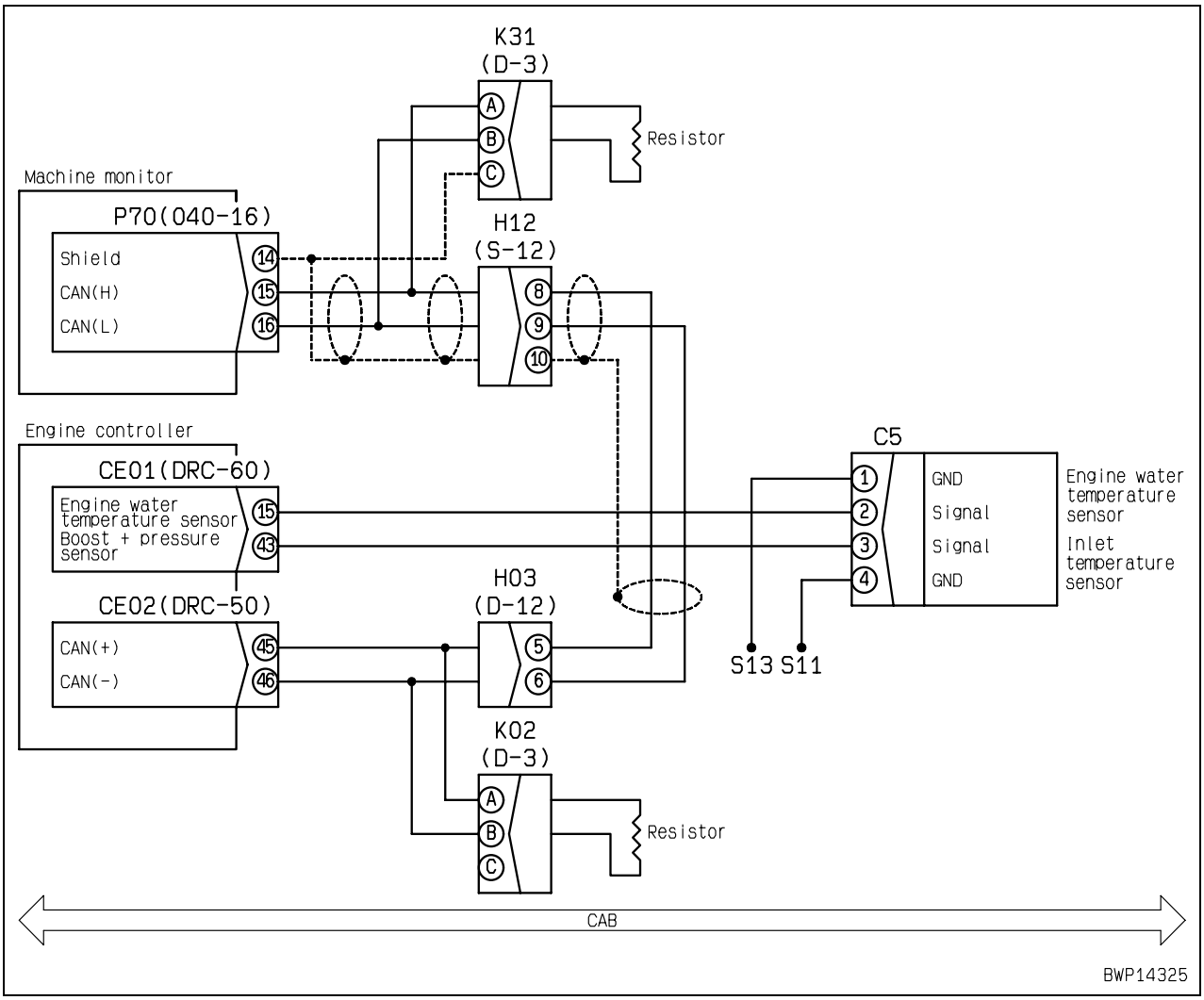


E-11 Engine coolant temperature gauge does not indicate normally

Trouble	• While engine coolant temperature is rising normally, temperature gauge does not rise from white range (C). • While engine coolant temperature is stabilized normally, temperature gauge rises to red range (H).
Related information	• Input from the engine coolant temperature sensor (temperature) can be checked with monitoring function. (Code: 04105: Engine coolant temperature) • Check if failure code for abnormal communication (machine monitor) system [**DAFRMC**] is indicated (if yes, diagnose that failure first.)

<table>
<tr><td rowspan="16">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Defective coolant temperature sensor
(Internal disconnection or short circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>C5 (male)</td><td>Engine coolant temperature</td><td colspan="3">Resistance</td></tr>
<tr><td>Between (2) – (1)</td><td rowspan="2">10 – 100°C</td><td colspan="3">90 – 3.5 kΩ</td></tr>
<tr><td>Between (2) – chassis ground</td><td colspan="3">Min. 1 MΩ</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Disconnection in wiring harness
(Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CE01 (female) (15) – C5 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between C5 (female) (1) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness
(Short circuit with GND circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CE01 (female) (15) – C5 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="3">Wiring harness between CE01 (female) (15) – C5 (female) (2) and chassis ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Defective engine controller</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>CE01 (female)</td><td>Engine coolant temperature</td><td colspan="3">Resistance</td></tr>
<tr><td>Between (15) – chassis ground</td><td>10 – 100°C</td><td colspan="3">90 – 3.5 kΩ</td></tr>
</table>

Circuit diagram related to engine coolant temperature sensor

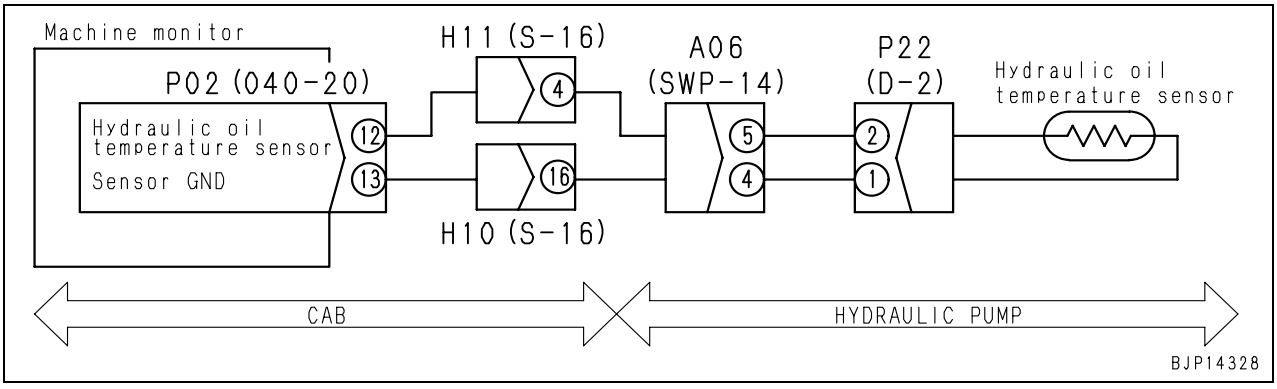


E-12 Hydraulic oil temperature gauge does not indicate normally

Trouble	• While hydraulic oil temperature is rising normally, temperature gauge does not rise from white range (C). • While hydraulic oil temperature is stabilized normally, temperature gauge rises to red range (H).
Related information	• Input from the hydraulic oil temperature sensor (temperature) can be checked with monitoring function. (Code 04402: Hydraulic oil temperature)

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective hydraulic oil temperature sensor (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P22	Engine coolant temperature	Resistance	
			Between (1) – (2)	10 – 100°C	90 – 3.5 kΩ	
			Between (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 P02 (female) (12) – P22 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P02 (female) (13) – P22 (female) (1)		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 P02 (female) (12) – P22 (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 P02 (female) (12) – P22 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective machine monitor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			P02	Engine coolant 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

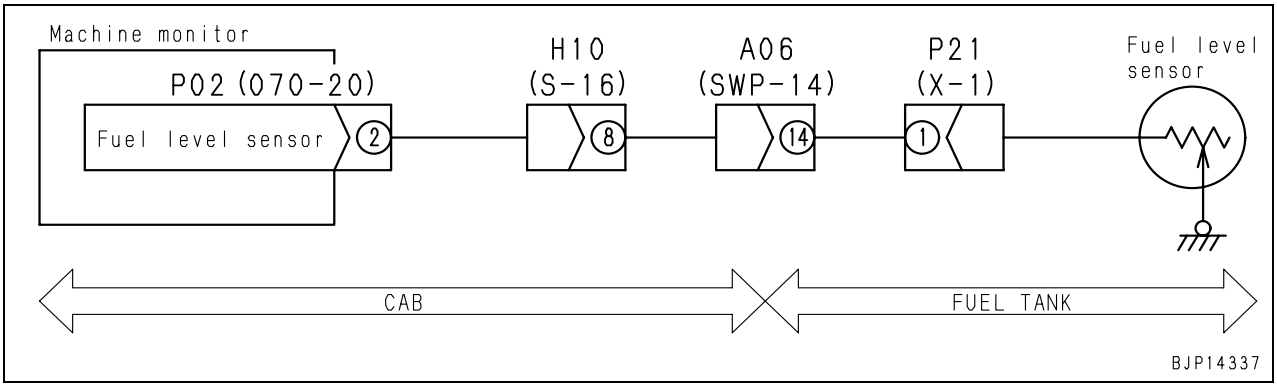


E-13 Fuel level gauge does not indicate normally

Trouble	• While fuel is added, fuel level gauge does not rise from red range (E). • While fuel level is low, fuel level gauge does not lower from green range (F)
Related information	• Input signal (voltage) from the fuel level sensor can be checked with monitoring function. (Code 04200: Fuel level sensor voltage)

<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 fuel level sensor (Internal disconnection or short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>P21 (male)</td><td>Fuel level</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – 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>
<tr><td rowspan="2">2</td><td rowspan="2">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 P02 (female) (2) – P21 (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness (Short circuit with GND circuit)</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 P02 (female) (2) – P21 (female) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between P02 (female) (2) – P21 (female) (1) and chassis ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Defective machine monitor</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>P02</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

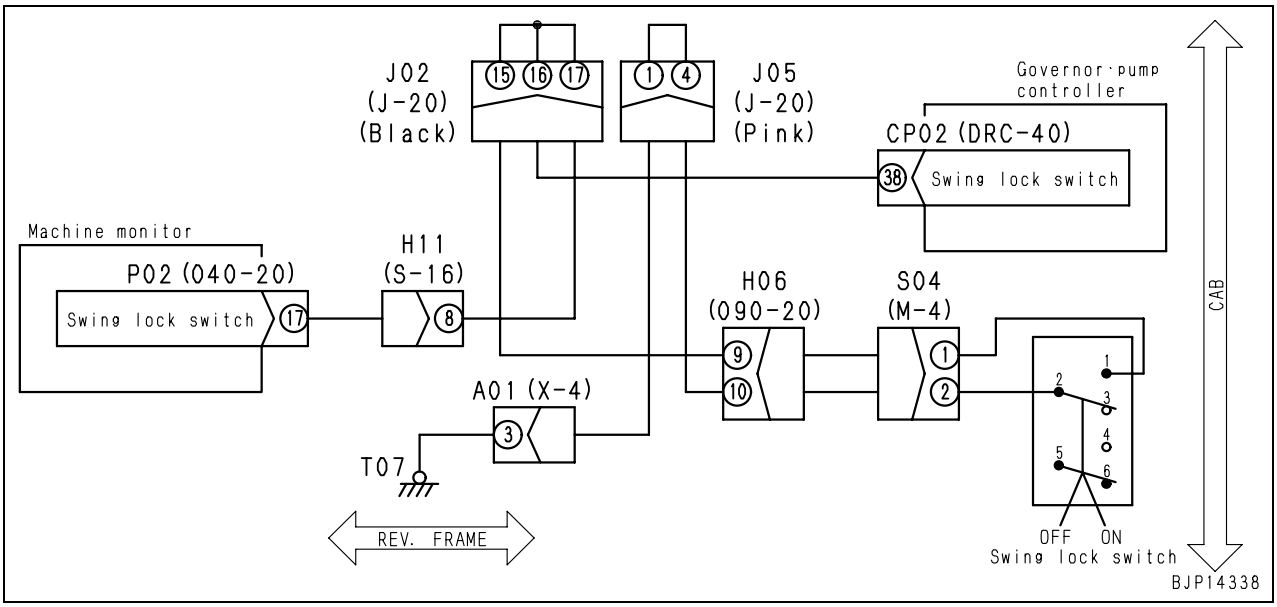


E-14 Swing lock monitor does not indicate normally

Trouble	• When swing lock switch is turned ON, swing lock monitor does not light up. • When swing lock switch is turned OFF, swing lock monitor lights up.
Related information	• Input from swing lock switch (ON/OFF) can be checked with monitoring function. (Code 04502: Monitor Input 3)

<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 swing lock switch (Internal disconnection or short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>S04 (female)</td><td>Swing lock switch</td><td colspan="2">Resistance</td></tr>
<tr><td>Between (1) – (2)</td><td>OFF</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">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 P02 (female) (17) – J02 – S04 (male) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between S04 (male) (2) – J05 – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Ground fault in wiring harness (Short circuit with GND circuit)</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 P02 (female) (17) – J02 – S04 (male) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between P02 (female) (17) – J02 – S04 (male) (1) and chassis ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Defective machine monitor</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>P02</td><td>Swing lock switch</td><td colspan="2">Voltage</td></tr>
<tr><td>Between (17) – chassis ground</td><td>OFF</td><td colspan="2">20 – 30 V</td></tr>
<tr><td></td><td></td><td></td><td>ON</td><td colspan="2">Max. 1 V</td></tr>
</table>

Circuit diagram related to swing lock switch



E-15 When monitor switch is operated, monitor displays nothing

Trouble (1)	• Operating the working mode select switch fails to display working mode monitor.
Related information	—

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor	Since trouble is in system, troubleshooting cannot be carried out.

Trouble (2)	• When auto-decelerator switch is operated, auto-decelerator monitor is not displayed.
Related information	★ If auto-decelerator fails to operate, proceed with troubleshooting No. E-2.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor	Since trouble is in system, troubleshooting cannot be carried out.

Trouble (3)	• Operating the travel speed select switch fails to display travel speed monitor.
Related information	★ If travel speed selection fails, proceed with troubleshooting No. H-21.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor	Since trouble is in system, troubleshooting cannot be carried out.

Trouble (4)	• When wiper switch is operated, wiper monitor is not displayed.
Related information	★ If wiper fails to operate, proceed with troubleshooting No. E-16.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor	Since trouble is in system, troubleshooting cannot be carried out.

Trouble (5)	• When select switch is operated, adjust screen is not displayed. • When LCD monitor adjust switch is operated, adjust screen is not displayed. • When maintenance switch is operated, maintenance item screen is not displayed.
Related information	—

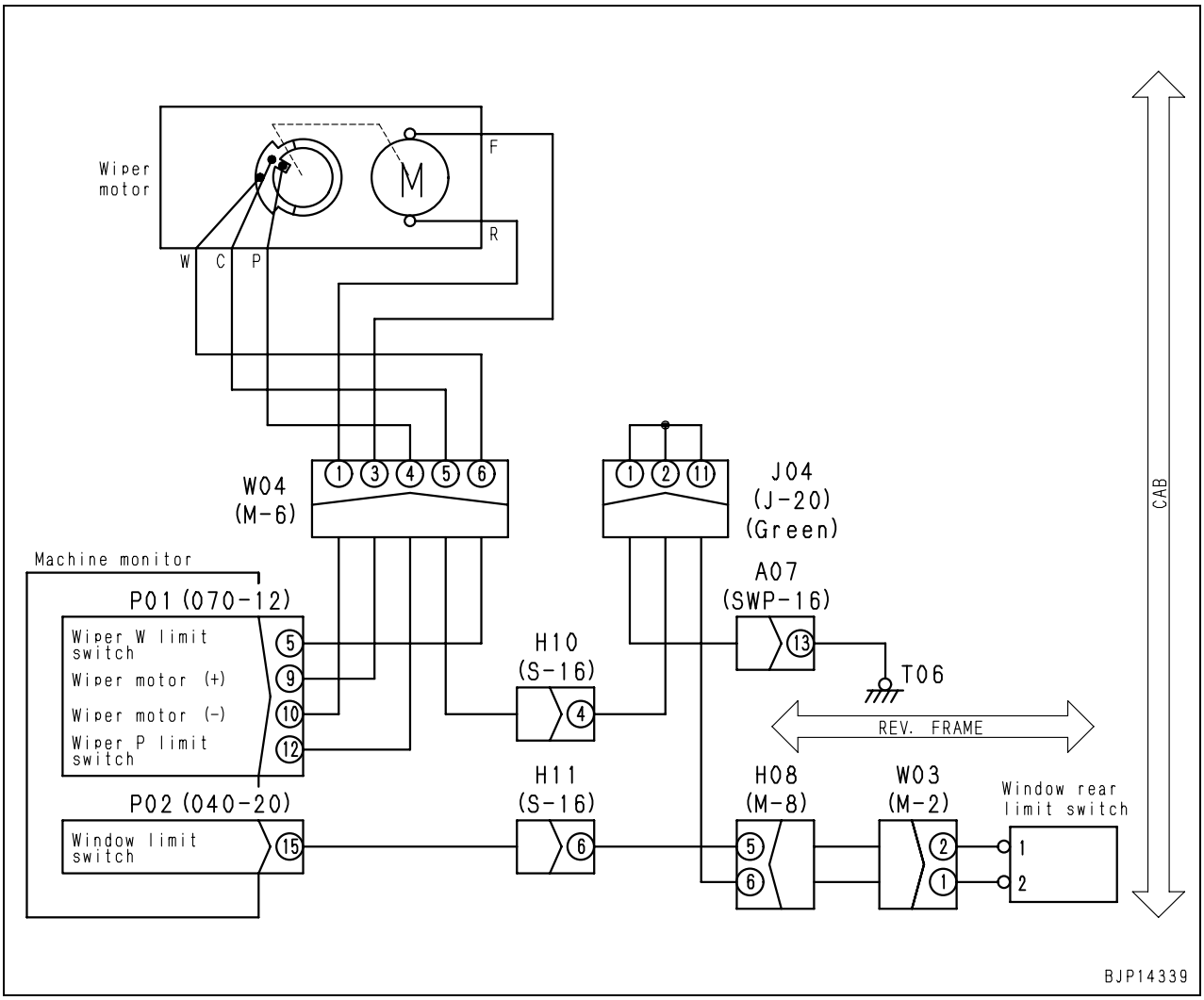
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor	Since trouble is in system, troubleshooting cannot be carried out.

E-16 Windshield wiper and window washer do not operate

Trouble	• Windshield wiper and window washer do not operate	(1) Windshield wiper does not operate.
Related information	• Input from window limit switch (ON/OFF) can be checked with monitoring function. (Code 049: Monitor Input 3)	

<table>
<tr><td rowspan="20">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="4">1</td><td rowspan="4">Defective swing lock switch (Internal disconnection or short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>W03 (male)</td><td>Front window</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (2)</td><td>When installed to front</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td>When retracted to rear</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Defective wiper motor (Internal disconnection or short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">W04 (male)</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="2">Between (3) – (1)</td><td colspan="2"></td></tr>
<tr><td colspan="2">Between (3), (1) – chassis ground</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">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="3">Wiring harness between P01 (female) (9) – W04 (female) (3)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between P01 (female) (10) – W04 (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Ground fault in wiring harness (Short circuit with GND circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between P02 (female) (15) – W03 (male) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="6">5</td><td rowspan="3">Defective machine monitor (window limiter switch system)</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>P02</td><td>Front window</td><td colspan="2">Voltage</td></tr>
<tr><td>Between (15) – chassis ground</td><td>When installed to front</td><td colspan="2">20 – 30 V</td></tr>
<tr><td></td><td>When retracted to rear</td><td colspan="2">Max. 1 V</td></tr>
<tr><td rowspan="3">Defective machine monitor (Wiper motor system)</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>P02</td><td>Wiper switch</td><td colspan="2">Voltage</td></tr>
<tr><td>Between (9) – chassis ground
Between (3) – chassis ground</td><td>OFF</td><td colspan="2">Max. 3 V</td></tr>
<tr><td></td><td>ON</td><td colspan="2">Max. 3 V ⇔ 20 – 30 V (Constant cycle)</td></tr>
</table>

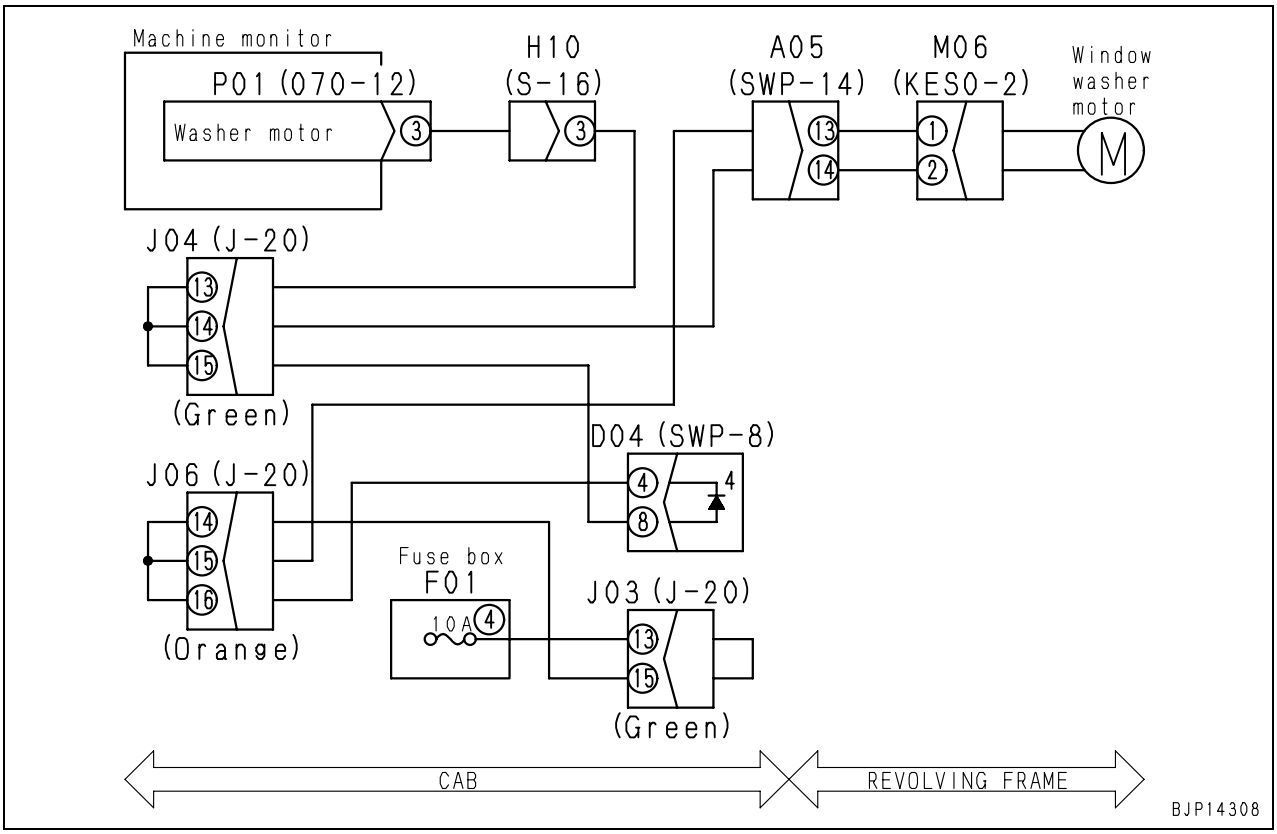
Circuit diagram related to windshield wiper motor



Trouble	• Windshield wiper and window washer do not operate	(2) Window washer does not operate.
Related information		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective fuse No. 4	If fuse is broken, circuit probably has ground fault (See cause 4).			
	2	Defective washer motor (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M06 (male)		Resistance	
			Between (1) – (2)		5 – 20 Ω	
			Between (1) – chassis ground		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 F01-4 – J03 – J06 – M06 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between M06 (female) (2) – J04 – P01 (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 F01-4 – J03 – J06 – M06 (female) (1), – D04 (female) (4), – other harnesses between related circuits and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between M06 (female) (2) – J04 – P01 (female) (3), – D04 (female) (8) and chassis ground		Resistance	Min. 1 MΩ
	5	Defective machine monitor (window limiter switch system)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			P01	Windshield 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



E-17 Machine push-up function does not operate normally

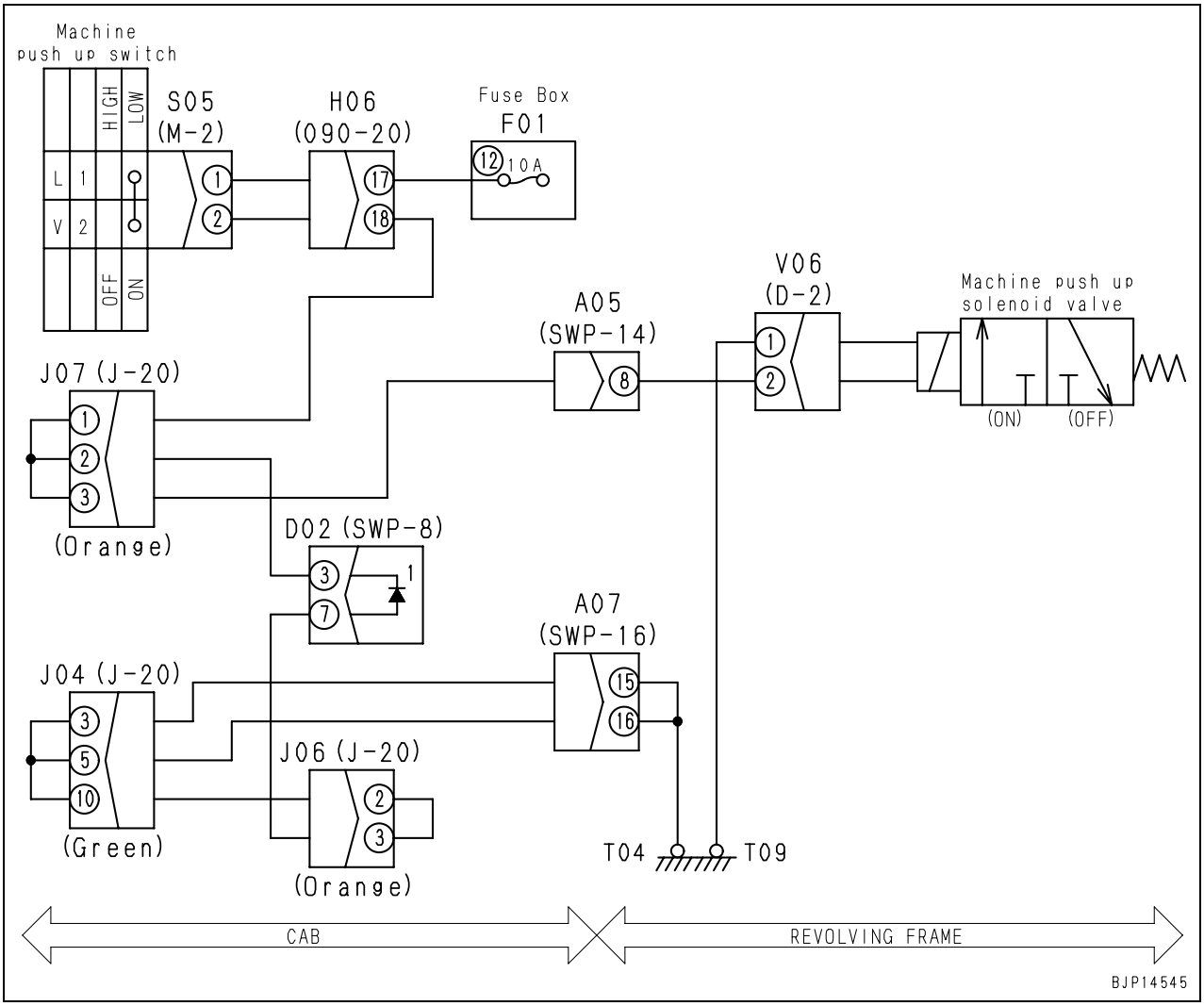
Trouble	• Machine push-up function does not operate normally	(1) Machine push-up function does not operate.
Related information	• When machine push-up function is set to high pressure, solenoid is de-energized.	

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting			
	1	Defective fuse No.2	If fuse is broken, circuit probably has ground fault. (See Cause 6)			
	2	Defective machine push-up switch (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			S05 (female)	Machine push-up switch	Resistance	
			Between (1) – (2)	Low pressure set	Max. 1 Ω	
				High pressure set	Min. 1 MΩ	
	3	Defective machine push-up solenoid (Internal disconnection or short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			V06 (male)		Resistance	
			Between (1) – (2)		20 – 60 Ω	
			Between (2) – chassis ground		Min. 1 MΩ	
	4	Defective assembled-type diode D04 (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			D02 (male)		Resistance (Continuity)	
			Between (3) – (7)		Min. 1 MΩ (without continuity)	
	5	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 F01-2 outlet – S05 (male) (1)		Resistance	Max. 1 Ω
			Wiring harness between S05 (male) (2) – J07 – V06 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between V06 (female) (1) – chassis ground		Resistance	Max. 1 Ω
	6	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 F01-2 outlet – S05 (male) (1), – other harnesses between related circuits and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between S05 (male) (2) – J07 – V06 (female) (2), – D02 (female) (3) and chassis ground		Resistance	Min. 1 MΩ

Trouble	• Machine push-up function does not operate normally	(2) Machine push-up function does not release.
Related information	• When machine push-up function is set to low pressure, solenoid is energized.	

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective machine push-up switch (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			S05 (female)	Machine push-up switch	Resistance	
			Between (1) – (2)	Low pressure set	Max. 1 Ω	
				High pressure set	Min. 1 MΩ	
	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 harness between S05 (female) (2) – J07 – V06 (female) (2), – D02 (female) (3) and chassis ground		Voltage	Max. 1 V

Circuit diagram related to machine push-up solenoid

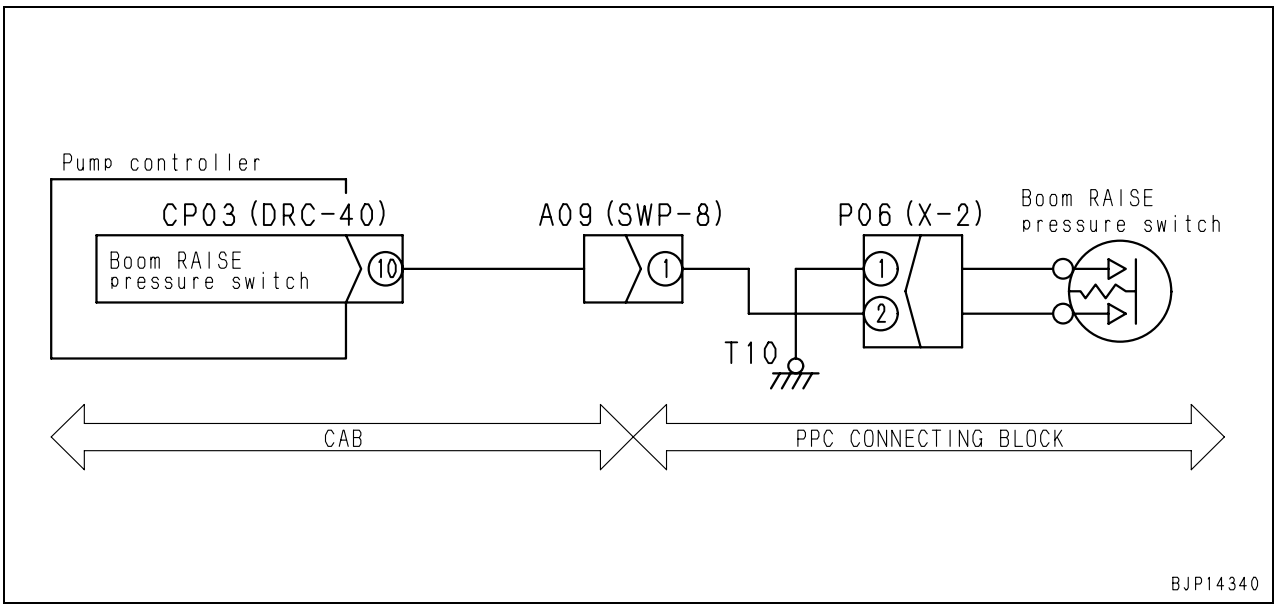


E-18 Monitoring function fails to display “boom raise” normally

Trouble	• Boom RAISE operation is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code: 01900 (Pressure Switch 1)

<table>
<tr><th colspan="2" rowspan="2">Possible causes and standard value in normal state</th><th colspan="2">Cause</th><th colspan="5">Standard value in normal state/Remarks on troubleshooting</th></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Defective boom RAISE PPC oil pressure switch (Internal disconnection or short circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.</td></tr>
<tr><td>P06 (male)</td><td>Boom lever</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>Boom RAISE</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP03 (female) (10) – P06 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between P06 (female) (1) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Ground fault in wiring harness (Short circuit with GND circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP03 (female) (10) – P06 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="3">Wiring harness between CP03 (female) (10) – P06 (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="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>CP03</td><td>Boom lever</td><td colspan="2">Voltage</td></tr>
<tr><td rowspan="2">Between (10) – chassis ground</td><td>Neutral</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Boom RAISE</td><td colspan="2">Max. 1 V</td></tr>
</table>

Circuit diagram related to boom RAISE PPC oil pressure switch

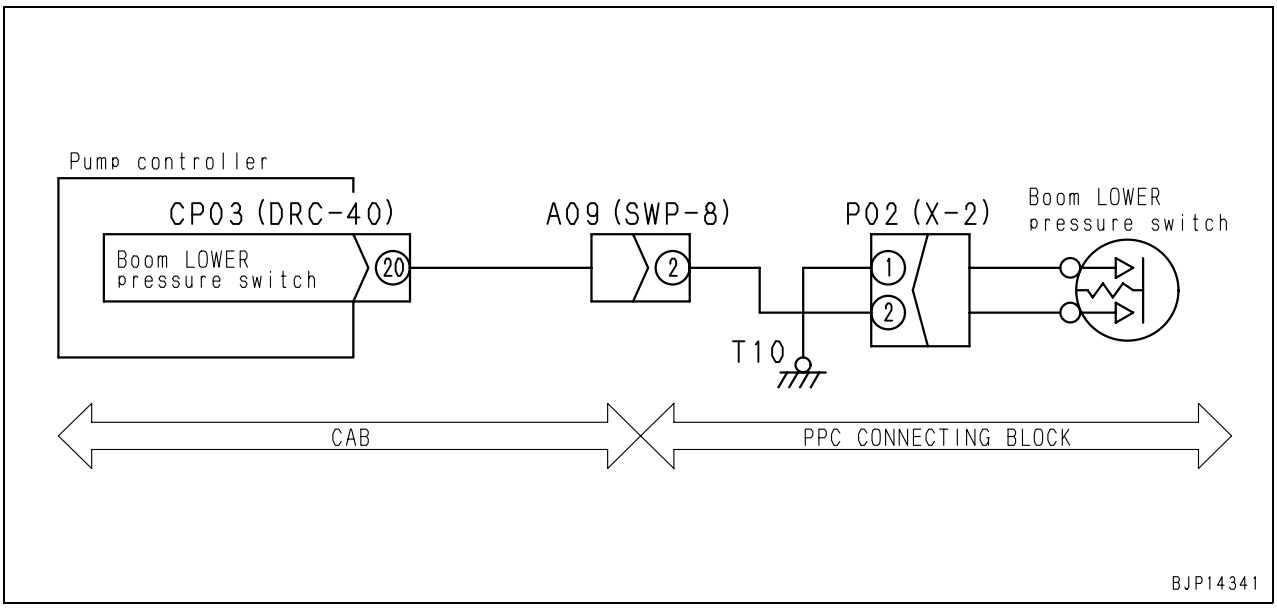


E-19 Monitoring function fails to display “boom lower” normally

Trouble	• Boom LOWER operation is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code: 01900 (Output Switch 1)

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective boom LOWER PPC oil pressure switch (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P02 (male)	Boom lever	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Boom LOWER	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 CP03 (female) (20) – P02 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P02 (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 CP03 (female) (20) – P02 (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 CP03 (female) (20) – P02 (female) (2) and chassis ground		Voltage	Max. 1 V
	5	Defective pump controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CP03	Boom lever	Voltage	
			Between (20) – chassis ground	Neutral	20 – 30 V	
				Boom LOWER	Max. 1 V	

Circuit diagram related to boom LOWER PPC oil pressure switch

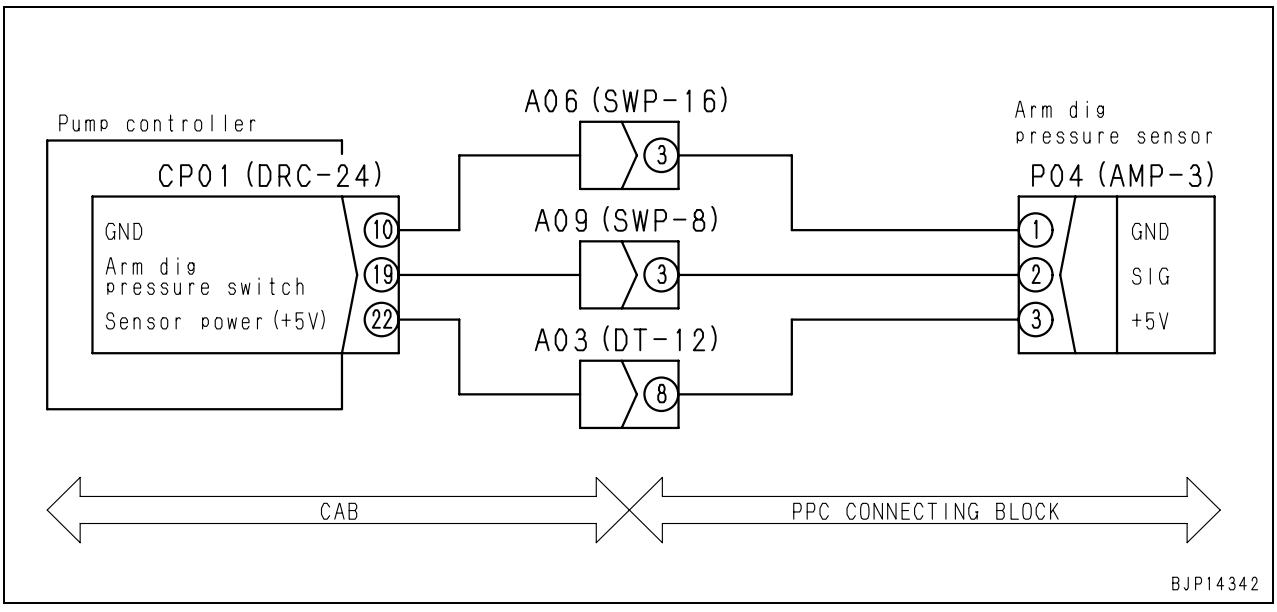


E-20 Monitoring function fails to display “arm IN” normally

Trouble	• Arm IN operation is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code: 01900 (Output Switch 1)

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective arm IN pressure sensor (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P04 (male)	Voltage		
			Between (3) – (1)	4.5 – 5.5 V		
			Between (2) – (1)	0.5 – 4.5 V		
	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) (19) – P04 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between P04 (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 CP01 (female) (19) – P04 (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 CP01 (female) (19) – P04 (female) (2) and chassis ground	Voltage	Max. 1 V	
	5	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		
			Between (19) – (10)	0.5 – 4.5 V		

Circuit diagram related to arm IN PPC oil pressure switch

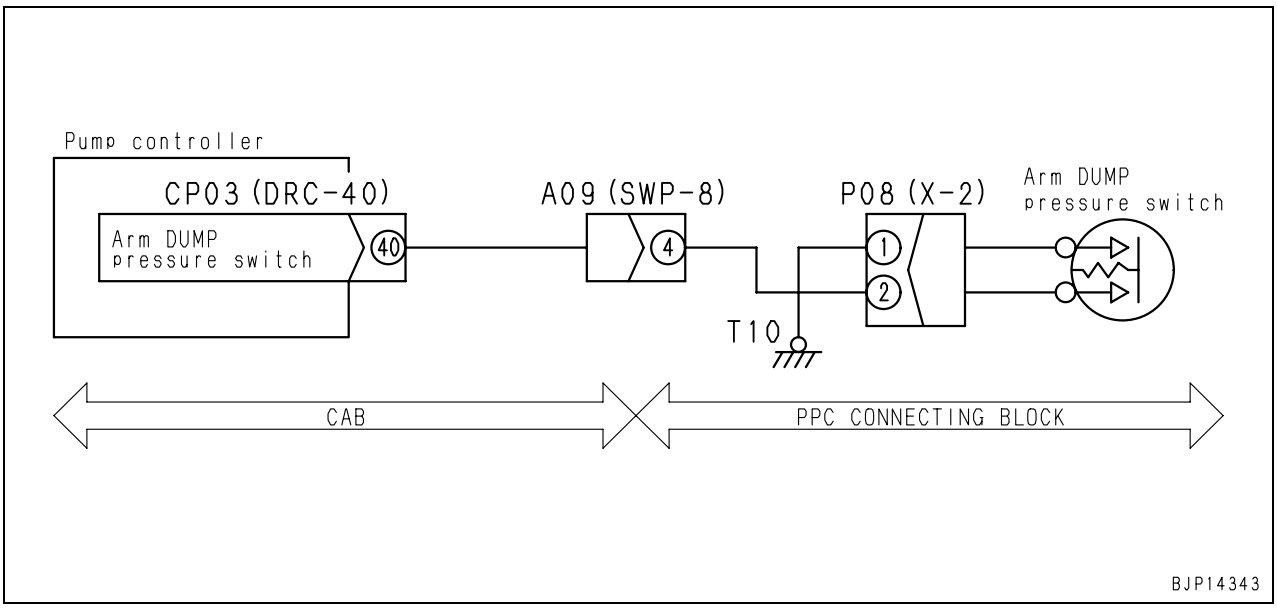


E-21 Monitoring function fails to display “arm OUT” normally

Trouble	• Arm OUT operation is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code: 01900 (Output Switch 1)

<table>
<tr><td rowspan="16">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Defective arm OUT PPC oil pressure switch (Internal disconnection or short circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.</td></tr>
<tr><td>P08 (male)</td><td colspan="2">Arm lever</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) – (2)</td><td colspan="2">Neutral</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td colspan="2">Arm OUT</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between C03 (female) (40) – P08 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between P08 (female) (1) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness (Short circuit with GND circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP03 (female) (40) – P08 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="3">Wiring harness between CP03 (female) (40) – P08 (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="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>CP03</td><td colspan="2">Arm lever</td><td colspan="2">Voltage</td></tr>
<tr><td rowspan="2">Between (40) – chassis ground</td><td colspan="2">Neutral</td><td colspan="2">20 – 30 V</td></tr>
<tr><td colspan="2">Arm OUT</td><td colspan="2">Max. 1 V</td></tr>
</table>

Circuit diagram related to arm OUT PPC oil pressure switch

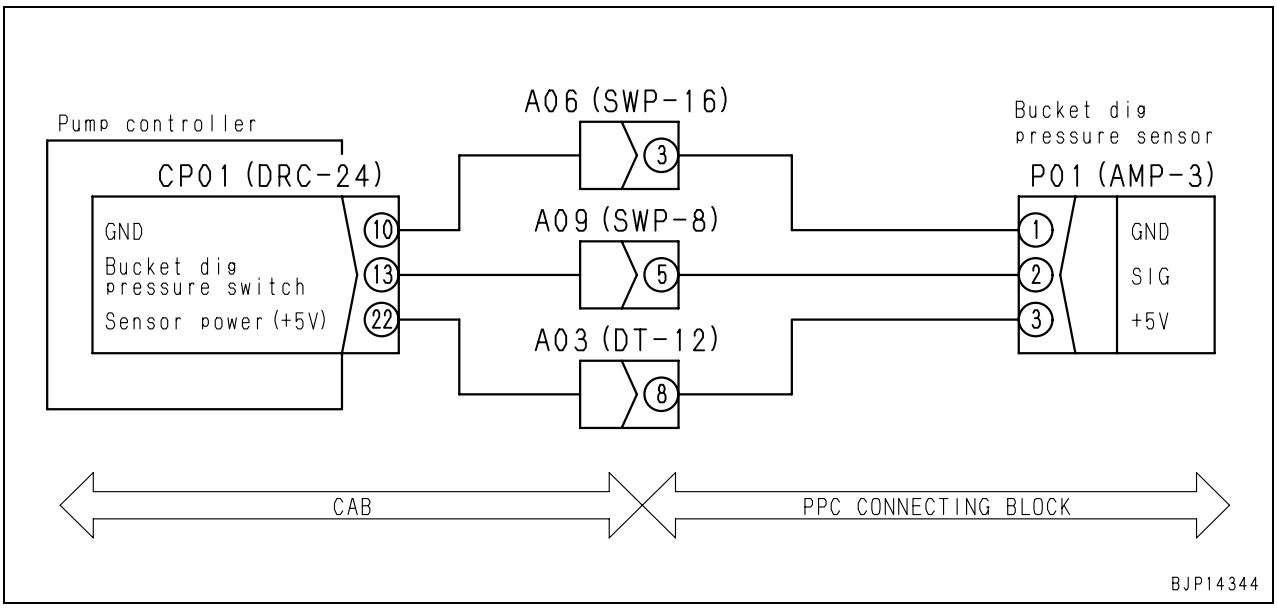


E-22 Monitoring function fails to display “bucket CURL” normally

Trouble	• Bucket CURL is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code:01901 (Output Switch 2)

<table>
<tr><th colspan="2" rowspan="2">Possible causes and standard value in normal state</th><th colspan="2">Cause</th><th colspan="5">Standard value in normal state/Remarks on troubleshooting</th></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Defective bucket CURL pressure sensor (internal disconnection or short circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.</td></tr>
<tr><td>P01 (male)</td><td colspan="2">Bucket lever</td><td colspan="2">Voltage</td></tr>
<tr><td>Between (3) – (1)</td><td colspan="2">Neutral</td><td colspan="2">4.5 – 5.5 V</td></tr>
<tr><td>Between (2) – (1)</td><td colspan="2">CURL</td><td colspan="2">0.5 – 4.5V</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP01 (female) (9) – P01 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between P01 (female) (1) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness (Short circuit with GND circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP01 (female) (13) – P01 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="3">Wiring harness between CP01 (female) (13) – P01 (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="5">★ :Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="3">CP01</td><td colspan="2">Voltage</td></tr>
<tr><td colspan="3">Between (22) – (10)</td><td colspan="2">4.5 – 5.5V</td></tr>
<tr><td colspan="3">Between (13) – (10)</td><td colspan="2">0.5 – 4.5V</td></tr>
</table>

Circuit diagram related to Bucket CURL PPC oil pressure switch

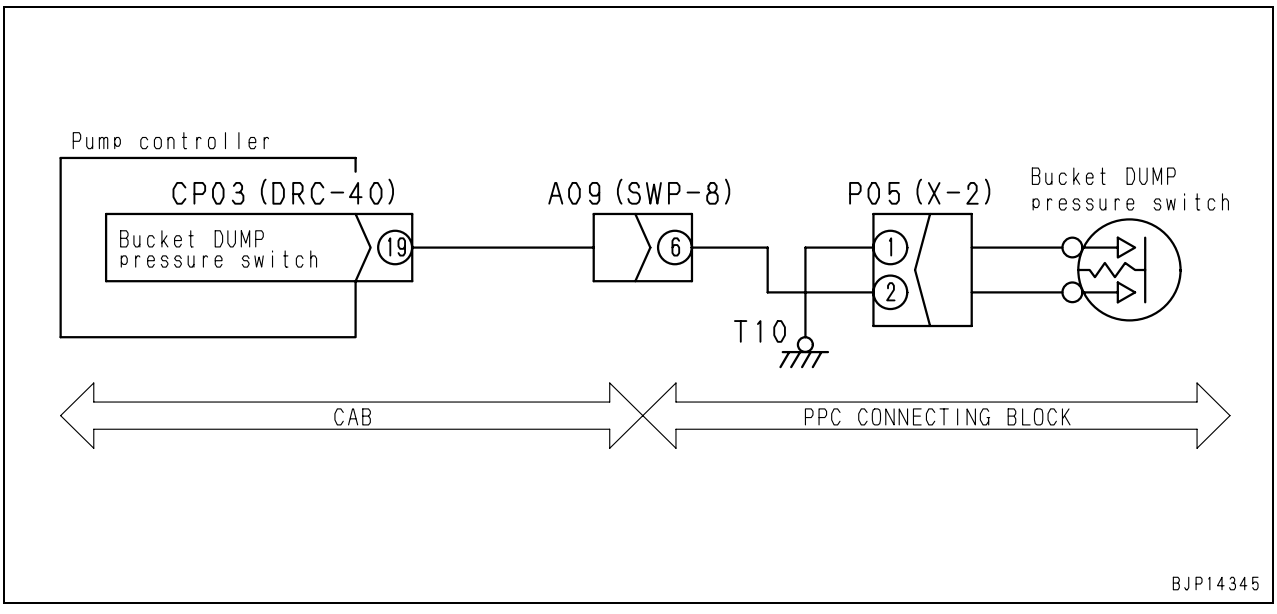


E-23 Monitoring function fails to display “bucket DUMP” normally

Trouble	• Bucket DUMP operation is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code: 01900 (Output Switch 2)

<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="4">1</td><td rowspan="4">Defective bucket DUMP PPC oil pressure switch (Internal disconnection or short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.</td></tr>
<tr><td>P05 (male)</td><td>Bucket lever</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>Bucket DUMP</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">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) (19) – P05 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between P05 (female) (1) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness (Short circuit with GND circuit)</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) (19) – P05 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Wiring harness between CP03 (female) (19) – P05 (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">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>CP03</td><td>Bucket lever</td><td colspan="2">Voltage</td></tr>
<tr><td rowspan="2">Between (19) – chassis ground</td><td>Neutral</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Bucket DUMP</td><td colspan="2">Max. 1 V</td></tr>
</table>

Circuit diagram related to bucket DUMP PPC oil pressure switch

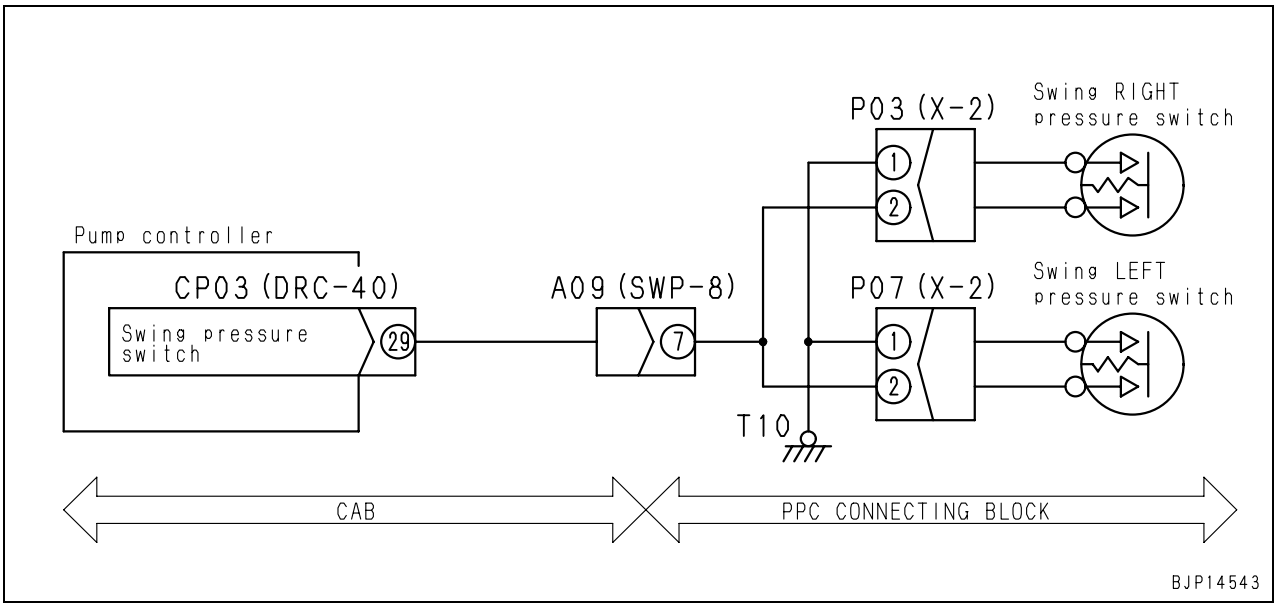


E-24 Monitoring function fails to display “swing” normally

Trouble	• Swing is not displayed normally by machine monitoring function (Special function)
Related information	• Monitoring code: 01900 (Output Switch 1)

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective swing left PPC oil pressure switch (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P07 (male)	Swing lever	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Left	Max. 1 Ω	
	2	Defective swing right PPC oil pressure switch (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			P03 (male)	Swing lever	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Right	Max. 1 Ω	
	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 harnesses between CP03 (female) (29) – P03 (male) (2), – P07 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between P03 (female) (1) – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between P07 (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 harnesses between CP03 (female) (29) – P03 (female) (2), – P07 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	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 harnesses between CP03 (female) (29) – P03 (female) (2), – P07 (female) (2) and chassis ground		Voltage	Max. 1 V
	6	Defective pump controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CP03	Bucket lever	Voltage	
			Between (29) – chassis ground	Neutral	20 – 30 V	
				Left or Right	Max. 1 V	

Circuit diagram related to right and left swing PPC oil pressure switches

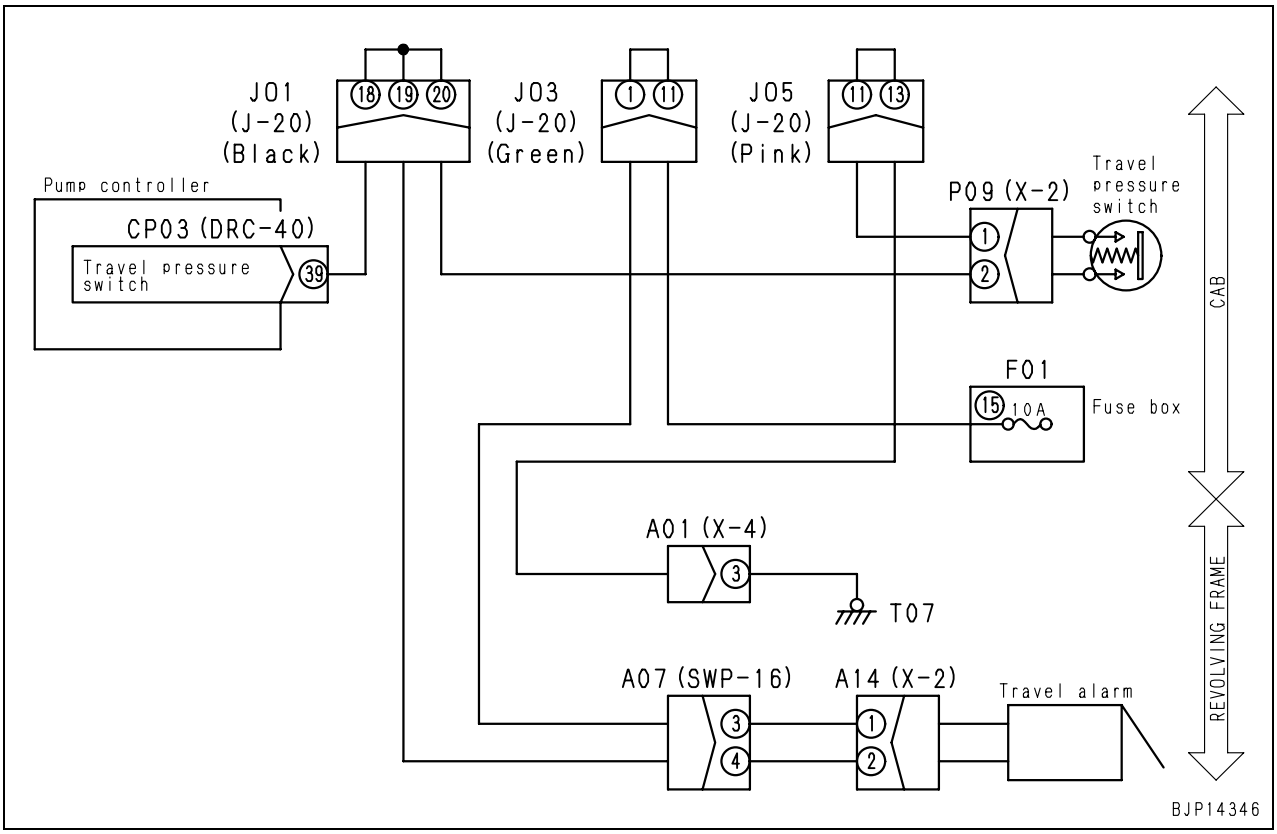


E-25 Monitoring function fails to display “travel” normally

Trouble	• Travel is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code: 01900 (Output Switch 1)

<table>
<tr><td rowspan="12">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Defective travel PPC oil pressure switch (Internal disconnection or short circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.</td></tr>
<tr><td>P09 (male)</td><td>Travel lever</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>Forward or reverse</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP03 (female) (39) – J01 – P09 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between P09 (female) (1) – J05 – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness (Short circuit with GND circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness of CP03 (female) (39) – J01 – P09 (female) (2), – A14 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="3">Wiring harness of CP03 (female) (39) – J01 – P09 (female) (2), – A14 (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="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td>CP03</td><td>Travel lever</td><td colspan="2">Voltage</td></tr>
<tr><td rowspan="2">Between (39) – chassis ground</td><td>Neutral</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Forward or reverse</td><td colspan="2">Max. 1 V</td></tr>
</table>

Circuit diagram related to travel PPC oil pressure switch and travel alarm

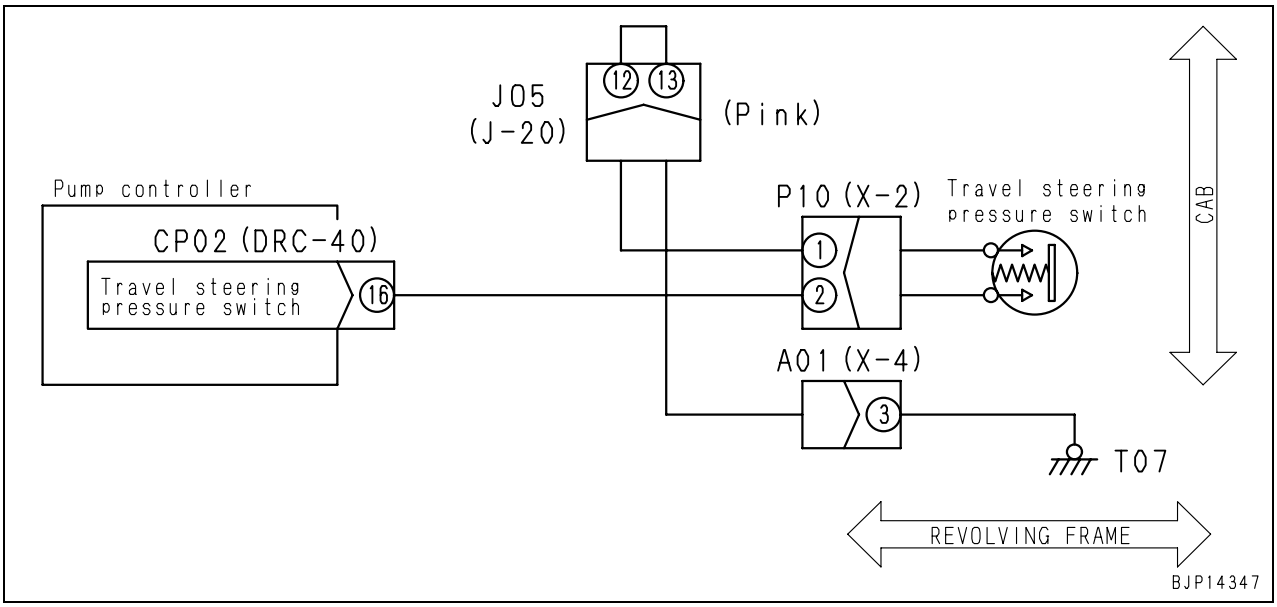


E-26 Monitoring function fails to display “travel differential pressure” normally

Trouble	• Travel differential pressure is not displayed normally by machine monitoring function (Special functions)
Related information	• Travel differential pressure is turned on as a pressure difference occurred between the right and left travel PPC circuits (during steering). • Monitoring code: 01901 (Output Switch 2)

<table>
<tr><td rowspan="15">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective travel steering PPC oil pressure switch (Internal disconnection or short circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.</td></tr>
<tr><td colspan="2">P10 (male)</td><td>Travel lever</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="2" rowspan="2">Between (1) – (2)</td><td>Neutral</td><td colspan="2">Min. 1 MΩ</td></tr>
<tr><td>Left or right only</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP02 (female) (16) – P10 (female) (2)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between P10 (female) (1) – J05 – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness (Short circuit with GND circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between CP02 (female) (16) – P10 (female) (2) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short (Short circuit with 24V circuit) in wiring harness</td><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="3">Wiring harness between CP02 (female) (16) – P10 (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="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">CP02</td><td>Travel lever</td><td colspan="2">Voltage</td></tr>
<tr><td colspan="2" rowspan="2">Between (16) – chassis ground</td><td>Neutral</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Left or right only</td><td colspan="2">Max. 1 V</td></tr>
</table>

Circuit diagram related to travel steering PPC oil pressure switch

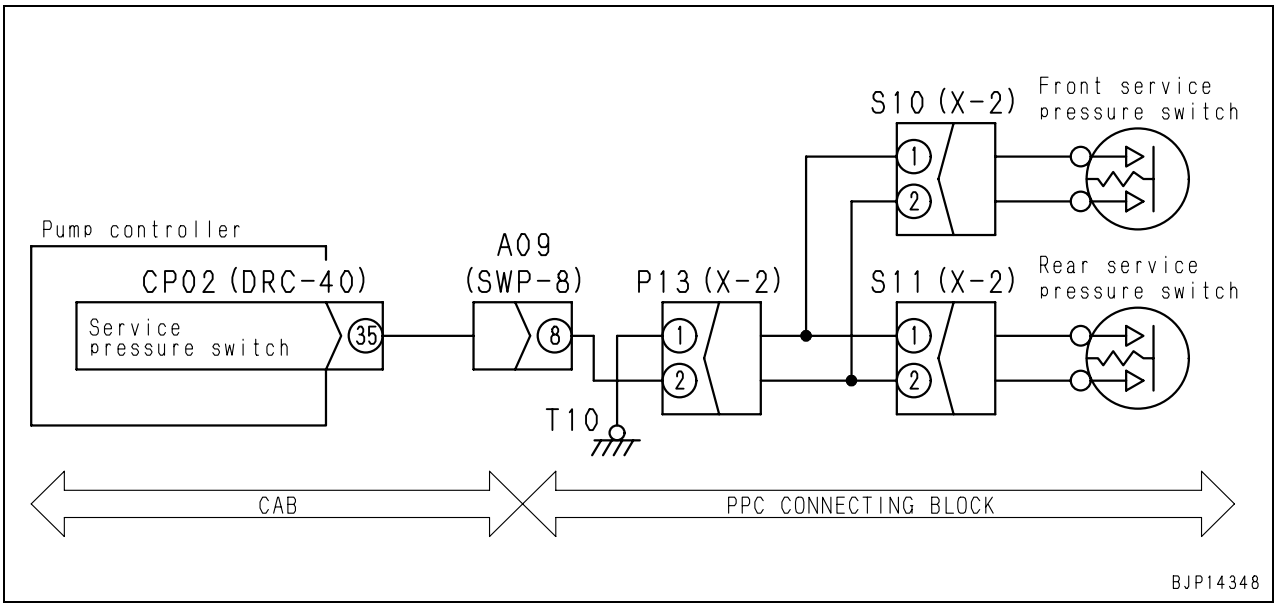


E-27 Monitoring function fails to display “service” normally

Trouble	• Service is not displayed normally by machine monitoring function (Special functions)
Related information	• Monitoring code: 01901 (Output Switch 2)

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting			
	1	Defective service (front) PPC oil pressure switch (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			S10 (male)	Service pedal	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Front	Max. 1 Ω	
	2	Defective service (rear) PPC oil pressure switch (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			S11(male)	Service pedal	Resistance	
			Between (1) – (2)	Neutral	Min. 1 MΩ	
				Rear	Max. 1 Ω	
	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 CP02 (female) (35) – S10 (female) (2), – S11 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between S10 (female) (1) – chassis ground		Resistance	Max. 1 Ω
			Wiring harness between S10 (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 CP02 (female) (35) – S10 (female) (2), – S11 (female) (2) and chassis ground		Resistance	Min. 1 MΩ
	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 CP02 (female) (35) – S10 (female) (2), – S11 (female) (2) and chassis ground		Voltage	Max. 1 V
	6	Defective pump controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			CP02	Service pedal	Voltage	
			Between (35) – chassis ground	Neutral	20 – 30 V	
				Front or rear	Max. 1 V	

Circuit diagram related to service PPC oil pressure switch



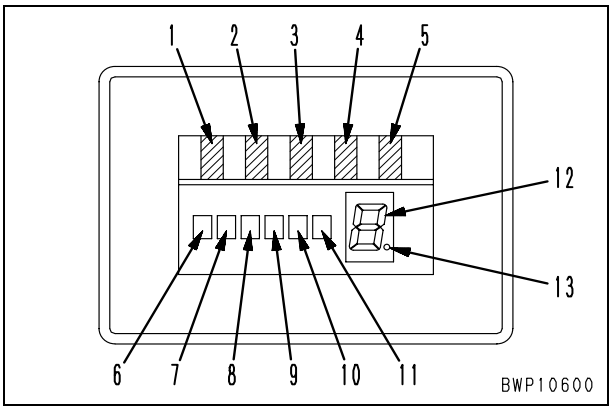
E-28 KOMTRAX system does not operate normally

Trouble	• 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.

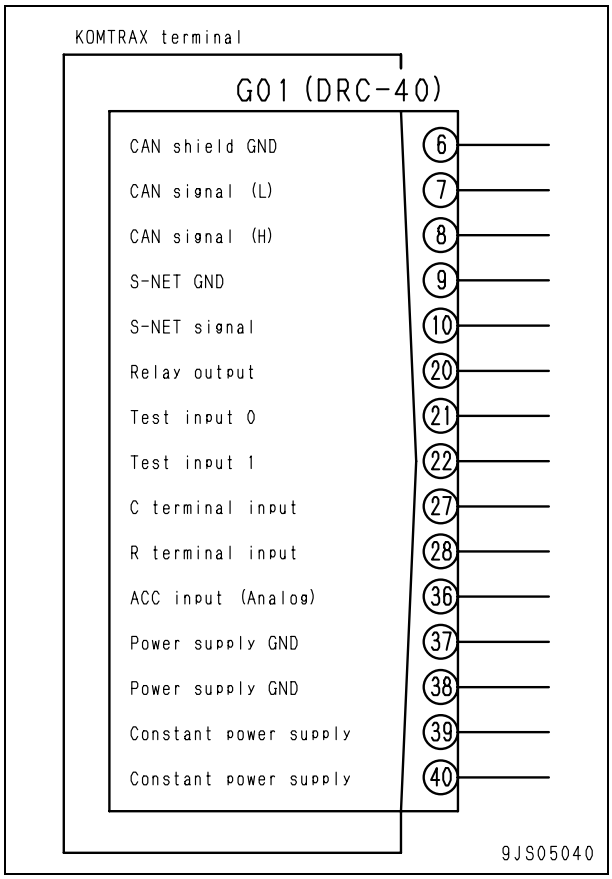
	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective power supply	★ Turn starting switch OFF, then carry out troubleshooting.		
			LED (1)	Normal state	
			LED-A1	Lighted up	
			★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			G01	Signal	Voltage
			Between (39), (40) – (37), (38)	Constant power supply	20 – 30 V
	2	Defective GPS	★ Turn starting switch ON and carry out troubleshooting.		
			LED (2)	Normal state	
			LED-A2	Lighted up	
	3	Defective starting switch ACC signal and alternator R signal	★ Start engine and carry out troubleshooting.		
			LED (6)	Normal state	
			LED-C1	Lighted up	
			★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.		
			G01	Signal	Voltage
			Between (36) – (37), (38)	Starting switch ACC	20 – 30 V
			Between (28) – (37), (38)	Alternator R	20 – 30 V
	4	Defective S-NET connection and starting switch C signal	★ Turn starting switch ON and carry out troubleshooting.		
			LED (8)	Normal state	
			LED-C3	Lighted up	
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			G01	Signal	Voltage
			Between (10) – (9)	S-NET	6 – 9 V
			Between (27) – (37), (38)	Starting switch C	Max. 1 V
	5	State of CAN connection	★ Turn starting switch ON and carry out troubleshooting.		
			LED (9)	Normal state	
			LED-C4	Lighted up	
			★ Prepare with starting switch OFF and carry out troubleshooting.		
			G01	Signal	Resistance
			Between (7) – (8)	CAN	40 – 80 Ω

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting	
	6	Number of mails not transmitted yet	★ Turn starting switch ON and carry out troubleshooting.	
			LED (12)	Normal state
			7-segment	0 – 9
	7	State of positioning with GPS	★ Turn starting switch ON and carry out troubleshooting (See *)	
			LED (13)	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



G01 connector

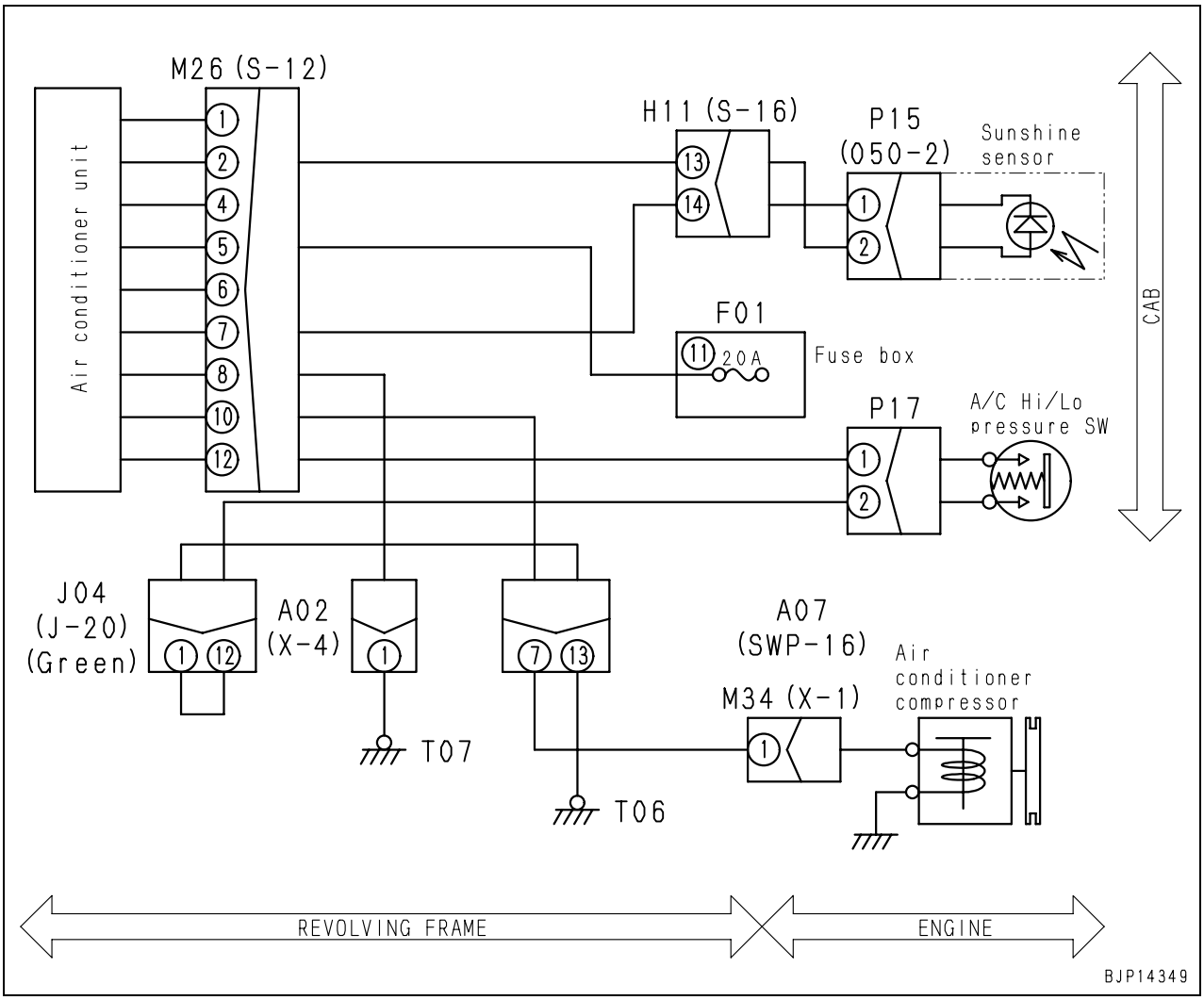


E-29 Air conditioner does not operate

Trouble	• Air conditioner does not start.
Related information	• For electrical circuit inside the air conditioner unit, refer to the structure, function and maintenance standard, “Air conditioner system.”

<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>1</td><td>Defective fuse No. 11</td><td colspan="4">If fuse is burnt, circuit probably has ground fault.</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective A/C Hi/Lo pressure switch
(Internal disconnection or defective contact)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">P17 (male)</td><td colspan="2">Resistance</td></tr>
<tr><td colspan="2">Between (1) – (2)</td><td colspan="2">Max. 1 Ω</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>Wiring harness between F01-11 outlet – M26 (male) (5)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td>Wiring harness between M26 (male) (12) – P17 (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td>Wiring harness between M26 (male) (8) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td>Wiring harness between P17 (female) (2) – J04 – A07 – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Ground fault in wiring harness
(Short circuit with GND circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td>Wiring harness between F01-11 outlet – M26 (male) (5) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td>Wiring harness between M26 (male) (12) – P17 (female) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Defective air conditioner unit</td><td colspan="4">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.
(The table indicates internal defect of an air conditioner)</td></tr>
<tr><td colspan="2">M26</td><td colspan="2">Voltage</td></tr>
<tr><td colspan="2">Between (5) – (8)</td><td colspan="2">20 – 30 V</td></tr>
</table>

Circuit diagram related to air conditioner

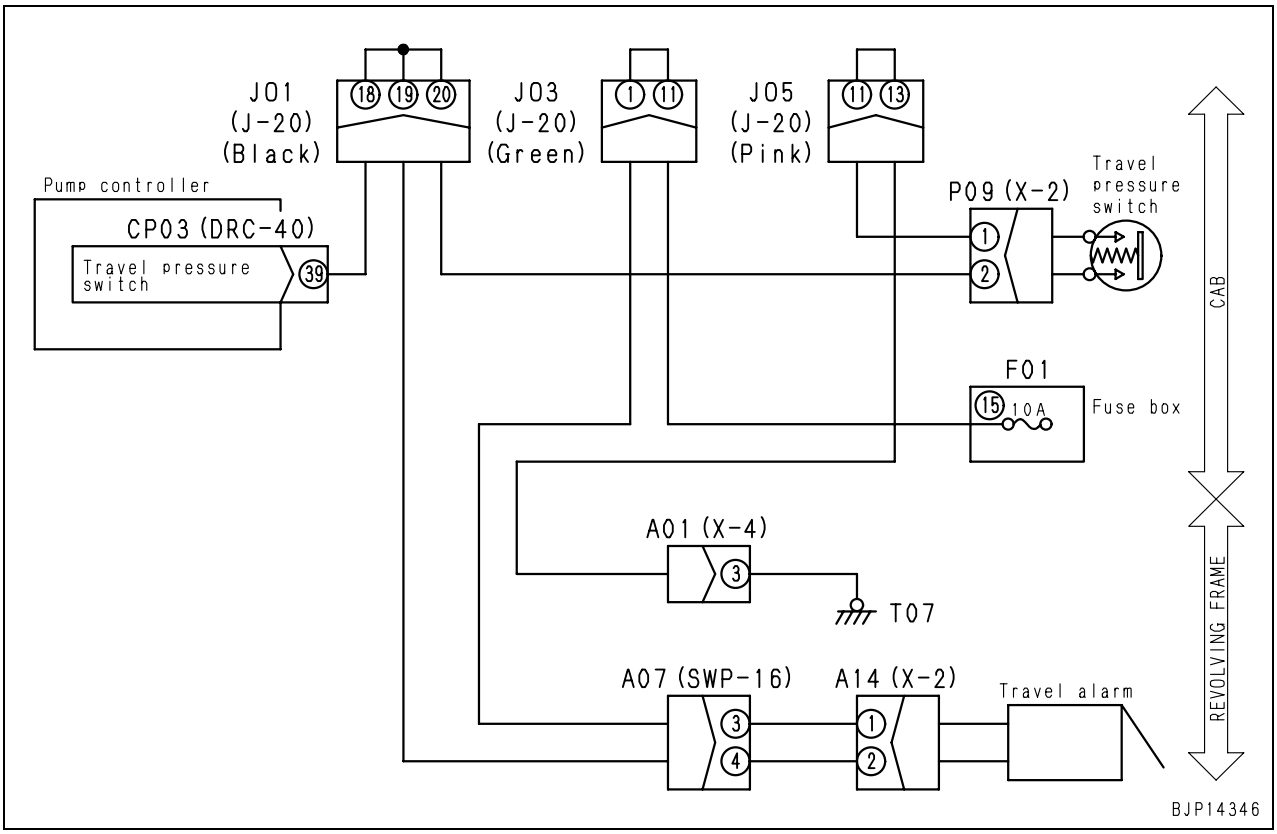


E-30 Travel alarm does not sound or does not stop sounding

Trouble	• Alarm does not sound during travel. • Alarm sounds in stopped state.
Related information	—

<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>1</td><td>Defective fuse No. 15</td><td colspan="4">If fuse is burnt out, the circuit probably has ground fault.</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Defective travel signal</td><td colspan="4">In the case monitoring is not normally indicated, proceed to troubleshooting No. E-21.</td></tr>
<tr><td>Monitoring code</td><td colspan="2">Item</td><td>Normal display</td></tr>
<tr><td>019</td><td colspan="2">Travel</td><td>Operation of lever: ON
Lever in neutral: OFF</td></tr>
<tr><td colspan="4">When the monitoring display is not correct, proceed to diagnosis for “'Travel is not normally indicated' in the monitoring function”</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Defective travel alarm (Internal disconnection or short circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then start engine and carry out troubleshooting (insert T-adapter).</td></tr>
<tr><td>A14</td><td>Travel lever</td><td colspan="2">Voltage</td></tr>
<tr><td rowspan="2">Between (1) – (2)</td><td>Neutral</td><td colspan="2">Max. 1 V</td></tr>
<tr><td>Operated</td><td colspan="2">20 – 30 V</td></tr>
<tr><td colspan="4">If above voltage is normal and travel alarm does not sound, travel alarm is defective.</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">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 F01-15 outlet – J03 – A07 – A14 (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between A14 (female) (2) – J01 (19)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Ground fault in wiring harness (Short circuit with GND circuit)</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 F01-15 outlet – J03 – A07 – A14 (female) (1) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td></td></tr>
<tr><td>6</td><td>Defective pump controller</td><td colspan="4">Since trouble is in system, troubleshooting cannot be carried out. (If causes 1 – 5 above are not detected, travel alarm may be defective.)</td></tr>
</table>

Circuit diagram related to travel PPC oil pressure switch and travel alarm

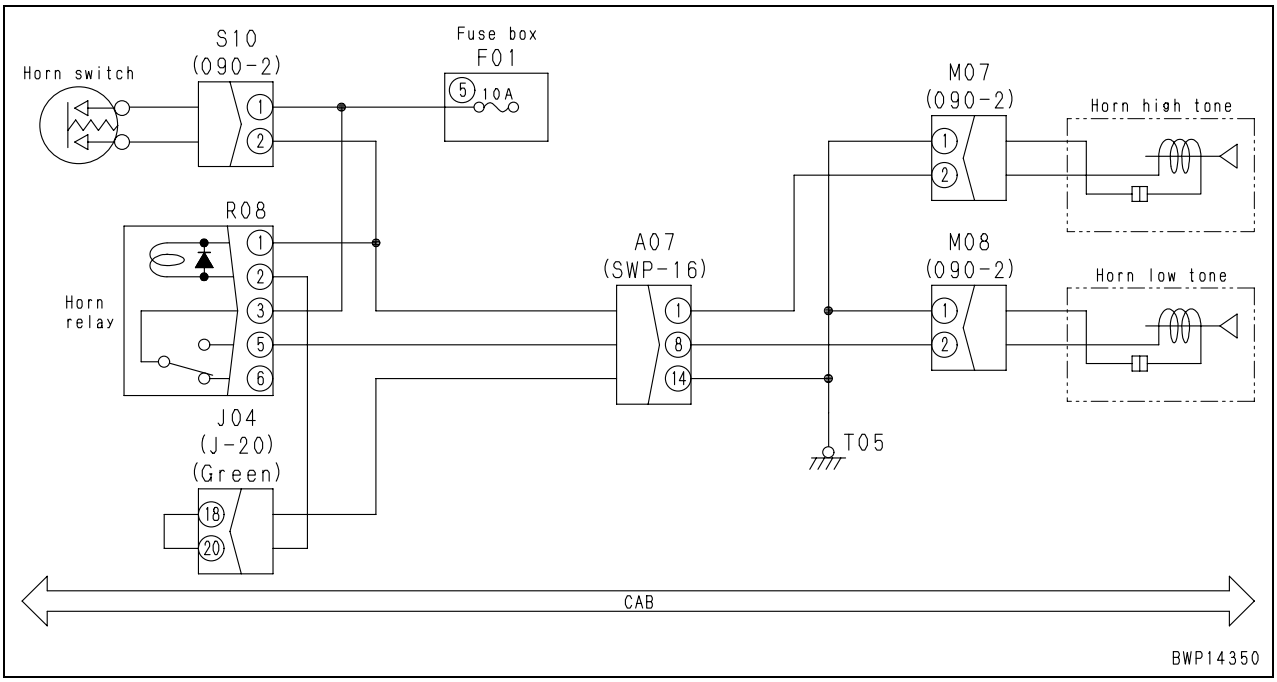


E-31 Horn does not sound

Trouble	Horn does not sound
Related information	

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective fuse F01-(5)	If fuse is broken, circuit probably has ground fault. (See Cause 6)		
	2	Defective horn relay	If the horn sounds after replacing the relay, the relay was defective		
	3	Defective high tone horn	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Between M07 (2) – chassis ground (with horn switch turned ON)	Voltage	20 – 30 V
			★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between M07 (female) (1) – chassis ground	Resistance	Max. 1 Ω
			If above is normal, the horn is defective		
	4	Defective low tone horn	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Between M08 (2) – chassis ground (with horn switch turned ON)	Voltage	20 – 30 V
			★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between M08 (female) (1) – chassis ground	Resistance	Max. 1 Ω
			If above is normal, the horn is defective		
	5	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 F01 (5) – S10 (female) – R08 (female) (3)	Resistance	Max. 1 Ω
			Wiring harness between S10 (female) (2) – R08 (female) – A07 – M07 (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between R08 (female) (5) – A07 – M08 (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between R08 (female) (2) – J04 (male) (18) – A07 – chassis ground	Resistance	Max. 1 Ω
	6	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 F01 (5) – S10 (female) – R08 (female) (3) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between S10 (female) (2) – R08 (female) – A07 – M07 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between R08 (female) (5) – A07 – M08 (female) (2) and chassis ground	Resistance	Min. 1 MΩ

Circuit diagram related to horn



KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00543-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

40 Troubleshooting

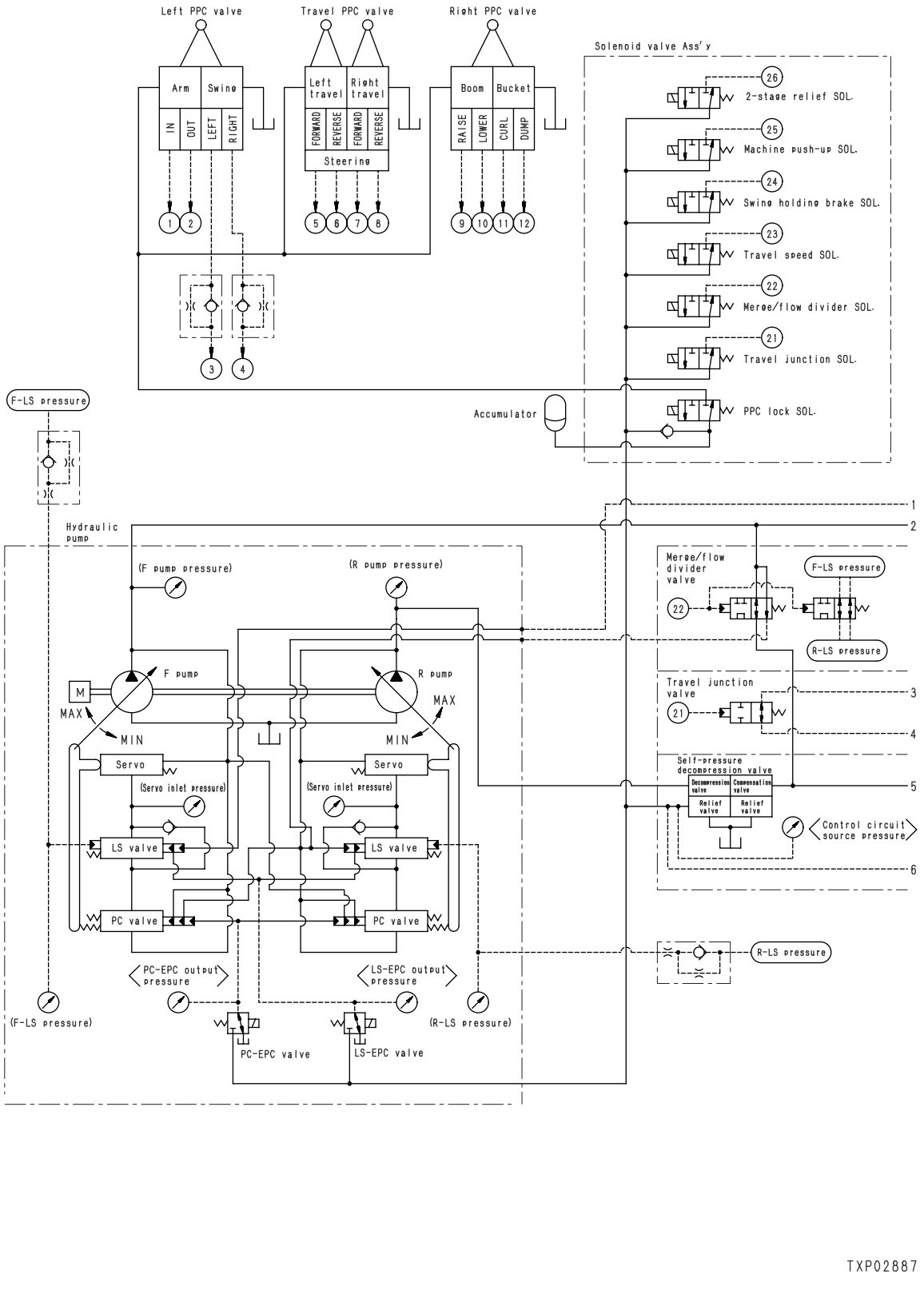
Troubleshooting of hydraulic and mechanical system (H-mode)

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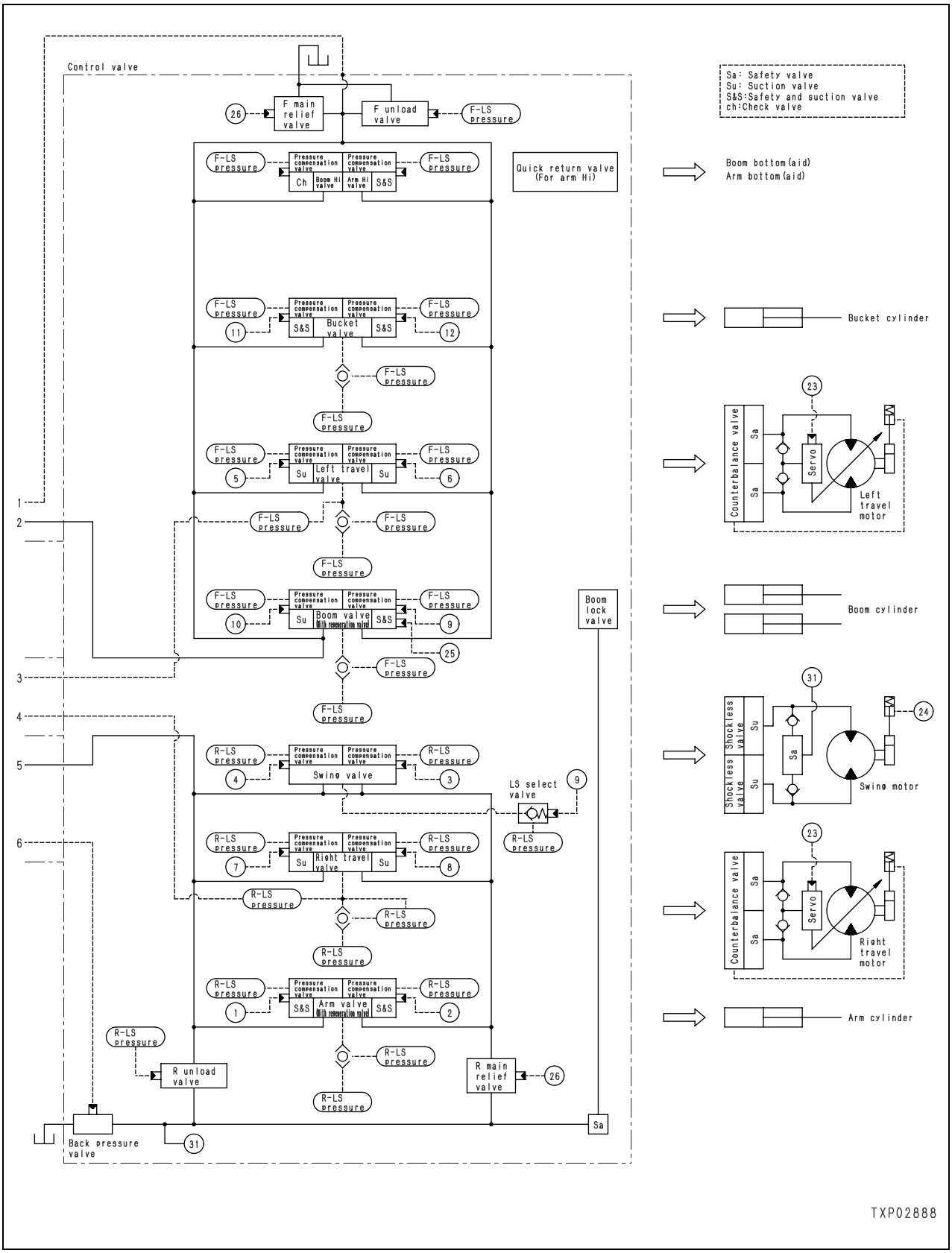
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Troubleshooting of hydraulic and mechanical system (H-mode)

System chart for hydraulic and mechanical system



★ This is a system chart that has been drawn up by simplifying the whole hydraulic circuit chart. Use it as a reference material when troubleshooting the hydraulic and mechanical system.



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 normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	**Cause for presumed failure (The attached No. is for filing and reference purpose only. It does not stand for any priority.)**	**[Contents]** • **The standard values in normalcy by which to judge "Good" or "No Good" about presumed causes.** • **References for making judgement of "good" or "No Good"**
	2		
	3		
	4		
	5		

H-1 All work equipment lack power, or travel and swing speeds are slow

Trouble	• Speed or power of whole work equipment, travel, and swing is low
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="16">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">Malfunction of unload valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Control lever</td><td colspan="2">Unload pressure</td></tr>
<tr><td colspan="2">All lever in neutral</td><td colspan="2">3.9 ± 1.0 MPa
{40 ± 10 kg/cm^2}</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective adjustment or malfunction of main relief valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Control lever</td><td colspan="2">Main relief pressure</td></tr>
<tr><td colspan="2">Arm IN</td><td colspan="2">33.34 – 36.77 MPa
{340 – 375 kg/cm^2}</td></tr>
<tr><td colspan="5">If oil pressure does not become normal after adjustment, main relief valve may have malfunction or internal defect. Check main relief valve directly.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Malfunction of self pressure reducing valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Control lever</td><td colspan="2">Control circuit basic pressure</td></tr>
<tr><td colspan="2">All levers in neutral</td><td colspan="2">2.83 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Defective adjustment or malfunction of PC valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Measured oil pressure</td><td>Measurement condition</td><td colspan="2">Oil pressure ratio</td></tr>
<tr><td>Pump discharge pressure</td><td rowspan="2">Swing lock: ON
Arm IN relief</td><td colspan="2">1</td></tr>
<tr><td>PC valve output pressure</td><td colspan="2">Approx. 3/5</td></tr>
<tr><td colspan="5">If oil pressure does not become normal after adjustment, PC valve may have malfunction or internal defect. Check PC valve directly.</td></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Malfunction of LS-EPC valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel speed</td><td>Travel lever</td><td colspan="2">LS-EPC output pressure</td></tr>
<tr><td>Lo</td><td>Neutral</td><td colspan="2">Approx. 1.4 MPa
{Approx. 14 kg/cm^2}</td></tr>
<tr><td>Hi</td><td>Operated</td><td colspan="2">0 MPa {0 kg/cm^2}</td></tr>
</table>

<table>
<tr><td rowspan="8">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="5">6</td><td rowspan="5">Defective adjustment or malfunction of LS valve</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td rowspan="2">Measured oil pressure</td><td colspan="2">Oil pressure ratio</td></tr>
<tr><td>All levers in neutral</td><td>Travel with no load (Lever operated halfway)</td></tr>
<tr><td>Pump discharge pressure</td><td rowspan="2">Almost same pressure</td><td>1</td></tr>
<tr><td>LS valve output pressure</td><td>Approx. 3/5</td></tr>
<tr><td colspan="3">If oil pressure does not become normal after adjustment, LS valve may have malfunction or internal defect. Check LS valve directly.</td></tr>
<tr><td>7</td><td>Malfunction of servo piston</td><td colspan="3">Servo piston may have malfunction. Check it directly.</td></tr>
<tr><td>8</td><td>Defective piston pump</td><td colspan="3">If any cause above is detected, cause may be lowering of performance, malfunction, or internal defect of piston pump.</td></tr>
</table>

H-2 Engine speed sharply drops or engine stalls

Trouble	• Engine speed lowers extremely or engine stalls.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="11">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 adjustment or malfunction of main relief valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Control lever</td><td colspan="2">Main relief pressure</td></tr>
<tr><td colspan="2">Arm IN</td><td colspan="2">33.34 – 36.77 MPa
{340 – 375 kg/cm^2}</td></tr>
<tr><td colspan="4">If oil pressure does not become normal after adjustment, main relief valve may have malfunction or internal defect. Check main relief valve directly.</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Defective adjustment or malfunction of PC valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Measured oil pressure</td><td>Measurement condition</td><td colspan="2">Oil pressure ratio</td></tr>
<tr><td>Pump discharge pressure</td><td rowspan="2">Swing lock: ON
Arm IN relief</td><td colspan="2">1</td></tr>
<tr><td>PC valve output pressure</td><td colspan="2">Approx. 3/5</td></tr>
<tr><td colspan="4">If oil pressure does not become normal after adjustment, PC valve may have malfunction or internal defect. Check PC valve directly.</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Defective adjustment or malfunction of LS valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td rowspan="2">Measured oil pressure</td><td colspan="2">Oil pressure ratio</td></tr>
<tr><td>All lever in neutral</td><td>Travel with no load (Lever operated halfway)</td></tr>
<tr><td>Pump discharge pressure</td><td rowspan="2">Almost same pressure</td><td colspan="2">1</td></tr>
<tr><td>LS valve output pressure</td><td colspan="2">Approx. 3/5</td></tr>
<tr><td colspan="4">If oil pressure does not become normal after adjustment, LS valve may have malfunction or internal defect. Check LS valve directly.</td></tr>
<tr><td>4</td><td>Clogging of orifice or filter in servo devices</td><td colspan="4">Orifices or filters in pump servo devices may be clogged. Check them directly.</td></tr>
<tr><td>5</td><td>Malfunction of servo piston</td><td colspan="4">Servo piston may have malfunction. Check it directly.</td></tr>
</table>

H-3 No work equipment, swing or travel move

Trouble	• All work equipment, swing, and travel mechanism do not move.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="8">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Malfunction of PPC lock solenoid valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Lock lever</td><td>Solenoid output pressure</td></tr>
<tr><td>Lock</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Malfunction of self pressure reducing valve</td><td>Released</td><td>2.84 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Control lever</td><td>Control circuit basic pressure</td></tr>
<tr><td>3</td><td>Defective piston pump</td><td>All levers in neutral</td><td>2.83 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td>4</td><td>Defective damper</td><td colspan="2">Piston pump may have malfunction or internal defect. Check it by following method.
• Crank the engine with oil pressure measurement plug removed. If oil flows out, the piston pump is normal.</td></tr>
<tr><td></td><td colspan="3">Pump shaft may not revolve because of defect in damper. Check damper directly.</td></tr>
</table>

H-4 Abnormal noise is heard from around hydraulic pump

Failure phenomenon	• An abnormal noise is heard from around hydraulic pump.
Relative information	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Hydraulic oil level lowered	Make a visual check.
	2	Quality of hydraulic oil bad	Air may have get mixed with the oil. Make a visual check.
	3	Hydraulic tank cap clogged	It is presumed that the cap of hydraulic tank is clogged, thereby causing negative pressure inside the tank. Make a visual check.
	4	Hydraulic tank strainer clogged	It is presumed that the strainer in the hydraulic tank is clogged, thereby causing negative pressure in the suction circuit. Make a visual check.
	5	Piston pump defective	The piston pump is suspected of an internal failure. Check the pump itself.

H-5 Auto-decelerator does not work

Trouble	• Auto-decelerator does not operate.
Related information	• Carry out this troubleshooting if auto-decelerator does not operate when travel lever is operated. (Shuttle valve (in PPC valve) is installed between PPC valve and oil pressure switch of only in travel circuit.) • Set the working mode in P-mode before start.

	Cause		Standard value in normal state/Remarks on troubleshooting	
Possible causes and standard value in normal state	1	Malfunction of travel PPC valve (shuttle valve)	★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.	
			Travel lever	PPC valve output pressure
			Neutral	0 MPa {0 kg/cm^2}
			Operated	Min. 2.7 MPa {Min. 28 kg/cm^2}

H-6 Fine control mode does not function or responds slow

Trouble	• Fine control performance or response is low.
Related information	• Set the working mode in P-mode before start.

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Malfunction of LS-EPC valve	★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.		
			Travel speed	Travel lever	LS-EPC output pressure
			Lo	Neutral	Approx. 1.4 MPa {Approx. 14 kg/cm^2}
			Hi	Operated	0 MPa {0 kg/cm^2}
	2	Clogging of LS circuit orifice	Orifice of LS circuit may be clogged. Check it directly.		
	3	Defective adjustment or malfunction of LS valve	★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.		
			Measured oil pressure	Oil pressure ratio	
				All levers in neutral	Travel with no load (Lever operated halfway)
			Pump discharge pressure	Almost same pressure	1
			LS valve output pressure		Approx. 3/5
			If oil pressure does not become normal after adjustment, LS valve may have malfunction or internal defect. Check LS valve directly.		
	4	Malfunction of servo piston	Servo piston may have malfunction. Check it directly.		

H-7 Boom moves slowly or lacks power

Trouble	• Speed or power of boom is low
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="20">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of right PPC valve (boom circuit)</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Boom lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Boom Raise or Boom Lower</td><td>Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Malfunction of merge-divider solenoid valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel lever</td><td>Solenoid output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Either side operated</td><td>2.84 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td>3</td><td>Malfunction of merge-divider valve (main/LS)</td><td colspan="2">Merge-divider valve (main/LS) may have malfunction. Check it directly.</td></tr>
<tr><td>4</td><td>Malfunction of boom control valve (spool)</td><td colspan="2">Spool of boom control valve (Lo/Hi) may have malfunction. Check it directly.</td></tr>
<tr><td>5</td><td>Malfunction of boom control valve (pressure compensation valve)</td><td colspan="2">Pressure compensation valve of boom control valve (Lo/Hi) may have malfunction. Check it directly.</td></tr>
<tr><td>6</td><td>Malfunction of boom control valve (regeneration valve)</td><td colspan="2">Regeneration valve of boom control valve (Lo) may have malfunction or defective seal. Check it directly.</td></tr>
<tr><td>7</td><td>Malfunction of boom control valve (lock valve)</td><td colspan="2">Lock valve of boom control valve (Lo) may have malfunction. Check it directly.</td></tr>
<tr><td>8</td><td>Malfunction of boom control valve (check valve)</td><td colspan="2">Check valve of boom control valve (Hi) may have malfunction. Check it directly.</td></tr>
<tr><td>9</td><td>Malfunction or defective seal of safety valve for lock valve</td><td colspan="2">Safety valve for lock valve may have malfunction or defective seal. Check it directly.</td></tr>
<tr><td>10</td><td>Malfunction or defective seal of boom control valve (suction valve)</td><td colspan="2">Suction valve of boom control valve (Lo) may have malfunction or defective seal. Check it directly.</td></tr>
<tr><td>11</td><td>Malfunction or defective seal of boom control valve (safety-suction valve)</td><td colspan="2">Safety-suction valve of boom control valve (Lo) may have malfunction or defective seal. Check it directly.</td></tr>
<tr><td>12</td><td>Malfunction of LS shuttle valve (left travel, bucket, or service)</td><td colspan="2">LS shuttle valve of left travel control valve, bucket control valve, or service control valve may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="3">13</td><td rowspan="3">Defective boom cylinder</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Boom lever</td><td>Leakage from cylinder</td></tr>
<tr><td>Raise relief</td><td>20 cc/min</td></tr>
</table>

H-8 Arm moves slowly or lacks power

Trouble	• Speed or power of arm is low
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="16">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of left PPC valve (arm circuit)</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Arm lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>IN or OUT</td><td>Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Malfunction of merge-divider solenoid valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel lever</td><td>Solenoid output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Either side operated</td><td>2.84 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td>3</td><td>Malfunction of pump merge-divider valve (main/LS)</td><td colspan="2">Pump merge-divider valve (main/LS) may have malfunction. Check it directly.</td></tr>
<tr><td>4</td><td>Malfunction of arm control valve (spool)</td><td colspan="2">Spool of arm control valve (Lo/Hi) may have malfunction. Check it directly.</td></tr>
<tr><td>5</td><td>Malfunction of arm control valve (pressure compensation valve)</td><td colspan="2">Pressure compensation valve of arm control valve (Lo/Hi) may have malfunction. Check it directly.</td></tr>
<tr><td>6</td><td>Malfunction of arm control valve (regeneration valve)</td><td colspan="2">Regeneration valve of arm control valve (Lo) may have malfunction or defective seal. Check it directly.</td></tr>
<tr><td>7</td><td>Malfunction or defective seal of arm control valve (safety-suction valve)</td><td colspan="2">Safety-suction valve of arm control valve (Lo/Hi) may have malfunction or defective seal. Check it directly.</td></tr>
<tr><td>8</td><td>Malfunction of arm control valve (quick return valve)</td><td colspan="2">Quick return valve of arm control valve (Hi) may have malfunction. Check it directly.</td></tr>
<tr><td>9</td><td>Malfunction of LS shuttle valve (right travel, boom, left travel, bucket, or service)</td><td colspan="2">LS shuttle valve of right travel control valve, boom control valve, left travel control valve, bucket control valve, or service control valve may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Defective arm cylinder</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Arm lever</td><td>Leakage from cylinder</td></tr>
<tr><td>IN relief</td><td>20 cc/min</td></tr>
</table>

H-9 Bucket moves slowly or lacks power

Trouble	• Speed or power of bucket is low
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="10">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of right PPC valve (bucket circuit)</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Bucket lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>CURL or DUMP</td><td>Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of bucket control valve (spool)</td><td colspan="2">Spool of bucket control valve may have malfunction. Check it directly.</td></tr>
<tr><td>3</td><td>Malfunction of bucket control valve (pressure compensation valve)</td><td colspan="2">Pressure compensation valve of bucket control valve may have malfunction. Check it directly.</td></tr>
<tr><td>4</td><td>Malfunction or defective seal of bucket control valve (safety-suction valve)</td><td colspan="2">Safety-suction valve of bucket control valve may have malfunction or defective seal. Check it directly.</td></tr>
<tr><td>5</td><td>Malfunction of LS shuttle valve (service)</td><td colspan="2">LS shuttle valve of service control valve may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="3">6</td><td rowspan="3">Defective bucket cylinder</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Bucket lever</td><td>Leakage from cylinder</td></tr>
<tr><td>CURL relief</td><td>20 cc/min</td></tr>
</table>

H-10 Work equipment does not move in its single operation

Trouble	• Boom does not move singly. • Arm does not move singly. • Bucket does not move singly.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="6">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of PPC valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Work equipment lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Operated</td><td>Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of control valve (spool)</td><td colspan="2">Spool of control valve may have malfunction. Check it directly.</td></tr>
</table>

H-11 Work equipment has a bit too fast hydraulic drift

Trouble (1)	• Hydraulic drift of boom is large.
Related information	• Set the working mode in P-mode before start.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting	
	1	Defective boom cylinder	★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.	
			Boom lever	Leakage from cylinder
			RAISE relief	20 cc/min
	2	Defective seal of boom control valve (lock valve)	Seal of lock valve of boom control valve (Lo) may be defective. Check it directly.	
	3	Defective seal of safety valve for lock valve	Seal of safety valve for lock valve may be defective. Check it directly.	

Trouble (2)	• Hydraulic drift of arm is large.
Related information	• Set the working mode in P-mode before start.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting	
	1	Defective arm cylinder	★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.	
			Arm lever	Leakage from cylinder
			IN relief	20 cc/min
	2	Defective seal of arm control valve (safety-suction valve)	Seal of safety-suction valve of arm control valve (Lo/Hi) may be defective. Check it directly. ★ This safety-suction valve may be checked by replacing it with another one and seeing change of condition. (However, do not use a safety-suction valve for lowering the boom or lock valve for this purpose because its set pressure is different.)	
	3	Defective seal of arm control valve (spool)	Seal of spool of arm control valve (Lo/Hi) may be defective. Check it directly.	
	4	Defective seal of arm control valve (pressure compensation valve)	Seal of pressure compensation valve of arm control valve (Lo/Hi) may be defective. Check it directly.	

Trouble (3)	• Hydraulic drift of bucket is large.
Related information	• Set the working mode in P-mode before start.

	Cause		Standard value in normal state/Remarks on troubleshooting	
Possible causes and standard value in normal state	1	Defective bucket cylinder	★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.	
			Bucket lever	Leakage from cylinder
			CURL relief	20 cc/min
	2	Defective seal of bucket control valve (safety-suction valve)	★ Seal of safety-suction valve of bucket control valve may defective. Check it directly. This safety-suction valve may be checked by replacing it with another one and seeing change of condition. (However, do not use a safety-suction valve for lowering the boom or lock valve for this purpose because its set pressure is different.)	
	3	Defective seal of bucket control valve (spool)	Seal of bucket control valve spool may be defective. Check it directly.	
	4	Defective seal of valve control valve (pressure compensation valve)	Seal of pressure compensation valve of bucket control valve may be defective. Check it directly.	

H-12 Work equipment has big time lag

Trouble	Time lag of work equipment is large.
Related information	Set the working mode in P-mode before start.

<table>
<tr><td rowspan="6">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of LS-EPC valve</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel speed</td><td>Travel lever</td><td>LS-EPC output pressure</td></tr>
<tr><td>Lo</td><td>Neutral</td><td>Approx. 1.4 MPa {Approx. 14 kg/cm^2}</td></tr>
<tr><td>Hi</td><td>Operated</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of control valve (regeneration valve) [boom and arm only]</td><td colspan="3">Regeneration valve of control valve may have malfunction. Check it directly.</td></tr>
<tr><td>3</td><td>Malfunction of control valve (safety-suction valve)</td><td colspan="3">Safety-suction valve of control valve may have malfunction. Check it directly.
★ The safety-suction valve of the arm or boom may be checked by replacing it with another one and seeing change of condition. (However, do not use a safety-suction valve for lowering the boom or lock valve for this purpose because its set pressure is different.)</td></tr>
<tr><td>4</td><td>Malfunction of control valve (pressure compensation valve)</td><td colspan="3">Pressure compensation valve of control valve may have malfunction. Check it directly.</td></tr>
</table>

H-13 Other work equipment moves when relieving single circuit

Trouble	• When part of work equipment is relieved singly, other parts of work equipment move
Related information	• Set the working mode in P-mode before start.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective seal of control valve (pressure compensation valve)	Seal of pressure compensation valve of control valve may be defective. Check it directly.

H-14 Power max. switch does not operate

Trouble	• The power maximizing function does not work.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="5">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Malfunction of 2-stage relief solenoid valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lock switch</td><td>Solenoid output pressure</td></tr>
<tr><td>OFF</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>ON</td><td>2.84 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of main relief valve</td><td colspan="2">Main relief valve may have malfunction. Check it directly.</td></tr>
</table>

H-15 In compound operation, work equipment with larger load moves slowly

Failure phenomenon	• In a compound operation, work equipment with larger load tends to move slowly.
Relative information	—

<table>
<tr><td rowspan="8">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="7">1</td><td rowspan="7">Malfunctioning of pressure compensation valve for work equipment with smaller load</td><td colspan="2">The pressure compensation valve for the work equipment with smaller load is presumed to malfunction. Check the valve itself.</td></tr>
<tr><td>Combination of compound operation</td><td>Work equipment with larger load</td></tr>
<tr><td>Boom RAISE + arm IN</td><td>Boom RAISE</td></tr>
<tr><td>Boom RAISE + arm OUT</td><td>Arm OUT</td></tr>
<tr><td>Boom RAISE + bucket CURL</td><td>Boom RAISE</td></tr>
<tr><td>Arm OUT + bucket CURL</td><td>Arm OUT</td></tr>
<tr><td>Boom LOWER + arm OUT</td><td>Arm OUT</td></tr>
</table>

H-16 In swing + boom RAISE operation, boom moves slowly

Trouble	• When machine swings and raises boom simultaneously, boom rising speed is low.
Related information	• If speed of single boom raise operation is also low, carry out troubleshooting **H-7** first.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Malfunction or defective seal of LS selector valve	LS selector valve may have malfunction or defective seal. Check it directly.

H-17 In swing + travel operation, travel speed drops sharply

Failure phenomenon	• In a compound operation of swing + travel, the travel speed drops sharply.
Relative information	• If the travel speed is slow in the single operation of travel, carry out the **H-19** check first.

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Malfunctioning of LS shuttle valve (left travel and swing)	The LS shuttle valve in the left travel control valve or the swing control valve is presumed to malfunction. Check the valves themselves.

H-18 Machine swerves in travel

Trouble	• Machine deviates during travel.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="20">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="4">1</td><td rowspan="4">Malfunction of travel PPC valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Travel lever</td><td colspan="2">PPC valve output pressure</td></tr>
<tr><td colspan="2">Travel forward or reverse</td><td colspan="2">Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td colspan="2">Difference between right and left outputs</td><td colspan="2">Within 0.4 MPa
{Within. 4 kg/cm^2}</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Malfunction of self pressure reducing valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Control lever</td><td colspan="2">Control circuit basic pressure</td></tr>
<tr><td colspan="2">All levers at neutral</td><td colspan="2">2.83 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Defective adjustment or malfunction of LS valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td rowspan="2">Measured oil pressure</td><td colspan="2">Oil pressure ratio</td></tr>
<tr><td>All lever in neutral</td><td>Travel with no load (Lever operated halfway)</td></tr>
<tr><td>Pump discharge pressure</td><td rowspan="2">Almost same pressure</td><td>1</td></tr>
<tr><td>LS valve output pressure</td><td>Approx. 3/5</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Malfunction of travel junction solenoid valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Travel lever</td><td colspan="2">Solenoid output pressure</td></tr>
<tr><td colspan="2">Either side operated</td><td colspan="2">0 MPa {0 kg/cm^2}</td></tr>
<tr><td colspan="2">Both sides operated</td><td colspan="2">2.84 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td>5</td><td>Malfunction of travel junction valve</td><td colspan="4">Travel junction valve may have malfunction. Check it directly.</td></tr>
<tr><td>6</td><td>Malfunction of travel control valve (spool)</td><td colspan="4">Spool of travel control valve may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="3">7</td><td rowspan="3">Defective travel motor</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Travel lever</td><td colspan="2">Leakage from travel motor</td></tr>
<tr><td colspan="2">Travel relief</td><td colspan="2">Max. 30 ℓ/min</td></tr>
<tr><td>8</td><td>Defective final drive</td><td colspan="4">Final drive may have internal defect. Check it directly.
★ It may be checked by abnormal sound, abnormal heating, metal chips in drain oil, etc.</td></tr>
</table>

H-19 Machine travels slowly

Trouble	• Travel speed is low.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="2">Cause</th><th colspan="4">Standard value in normal state/Remarks on troubleshooting</th></tr>
<tr><td rowspan="11">Possible causes and standard value in normal state</td><td rowspan="4">1</td><td rowspan="4">Malfunction of travel PPC valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Travel lever</td><td colspan="2">PPC valve output pressure</td></tr>
<tr><td colspan="2">Travel forward or reverse</td><td colspan="2">Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td colspan="2">Difference between right and left/ forward and reverse outputs</td><td colspan="2">Within 0.4 MPa
{Within. 4 kg/cm^2}</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Malfunction of self pressure reducing valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Control lever</td><td colspan="2">Control circuit basic pressure</td></tr>
<tr><td colspan="2">All levers at neutral</td><td colspan="2">2.83 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Malfunction of LS-EPC valve</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel speed</td><td>Travel lever</td><td colspan="2">LS-EPC output pressure</td></tr>
<tr><td>Lo</td><td>Neutral</td><td colspan="2">Approx. 1.4 MPa
{Approx. 14 kg/cm^2}</td></tr>
<tr><td>Hi</td><td>Operated</td><td colspan="2">0 MPa {0 kg/cm^2}</td></tr>
<tr><td>4</td><td>Malfunction of travel control valve (spool)</td><td colspan="4">Spool of travel control valve may have malfunction. Check it directly.</td></tr>
<tr><td>5</td><td>Malfunction of travel control valve (pressure compensation valve)</td><td colspan="4">Pressure compensation valve of travel control valve may have malfunction. Check it directly.</td></tr>
<tr><td>6</td><td>Malfunction of travel control valve (suction valve)</td><td colspan="4">Suction valve of travel control valve may have malfunction. Check it directly.</td></tr>
<tr><td>7</td><td>Malfunction of LS shuttle valve (bucket)</td><td colspan="4">LS shuttle valve of bucket control valve may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="3">8</td><td rowspan="3">Defective travel motor</td><td colspan="4">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Travel lever</td><td colspan="2">Leakage from travel motor</td></tr>
<tr><td colspan="2">Travel relief</td><td colspan="2">Max. 30 ℓ/min</td></tr>
<tr><td>9</td><td>Defective final drive</td><td colspan="4">Final drive may have internal defect. Check it directly.
★ It may be checked by abnormal sound, abnormal heating, metal chips in drain oil, etc.</td></tr>
</table>

H-20 Machine cannot be easily steered or lacks power

Trouble	• Machine is not steered well or steering power is low
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="15">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of travel PPC valve (steering spool)</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel lever</td><td>PPC valve output pressure (steering)</td></tr>
<tr><td>Both sides in neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Either side operated</td><td>Min. 2.7 MPa {Min. 28 kg/cm^2}</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Malfunction of travel junction solenoid valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel lever</td><td>Solenoid output pressure</td></tr>
<tr><td>Both sides operated</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Either side operated</td><td>2.84 – 3.43 MPa {29 – 35 kg/cm^2}</td></tr>
<tr><td>3</td><td>Malfunction of travel junction valve</td><td colspan="2">Travel junction valve may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Malfunction of merge-divider solenoid valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel lever</td><td>Solenoid output pressure</td></tr>
<tr><td>Both sides operated</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Either side operated</td><td>2.84 – 3.43 MPa {29 – 35 kg/cm^2}</td></tr>
<tr><td>5</td><td>Malfunction of merge-divider valve</td><td colspan="2">Merge-divider valve may have malfunction. Check it directly.</td></tr>
<tr><td>6</td><td>Malfunction of travel control valve (spool)</td><td colspan="2">Spool of travel control valve may have malfunction. Check it directly.</td></tr>
<tr><td>7</td><td>Malfunction of travel control valve (pressure compensation valve)</td><td colspan="2">Pressure compensation valve of travel control valve may have malfunction. Check it directly.</td></tr>
<tr><td>8</td><td>Malfunction of travel control valve (suction valve)</td><td colspan="2">Suction valve of travel control valve may have malfunction. Check it directly.</td></tr>
<tr><td>9</td><td>Malfunction of LS shuttle valve (bucket)</td><td colspan="2">LS shuttle valve of bucket control valve may have malfunction. Check it directly.</td></tr>
<tr><td>10</td><td>Defective seal of check valve of LS pressure sensing part</td><td colspan="2">Seal of check valve of LS pressure sensing part may be defective. Check it directly.</td></tr>
<tr><td>11</td><td>Malfunction of travel motor (safety valve)</td><td colspan="2">Seal of safety valve of travel motor may have malfunction. Check it directly.
★ Motors of same type on forward and reverse sides or on right and left sides may be checked by replacing them with each other and seeing change of condition.</td></tr>
<tr><td>12</td><td>Malfunction of travel motor (check valve)</td><td colspan="2">Seal of check valve of travel motor may have malfunction. Check it directly.
★ Motors of same type on forward and reverse sides or on right and left sides may be checked by replacing them with each other and seeing change of condition.</td></tr>
</table>

H-21 Travel speed does not shift, or it is too slow or fast

Trouble	• Travel speed does not change or travel speed is low or high
Related information	• Set the working mode in P-mode before start.

<table>
<tr><th rowspan="2">Possible causes and standard value in normal state</th><th colspan="2">Cause</th><th colspan="3">Standard value in normal state/Remarks on troubleshooting</th></tr>
<tr><td rowspan="8">1</td><td rowspan="8">Malfunction of LS-EPC valve</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel speed</td><td>Travel lever</td><td>Monitoring [15]</td></tr>
<tr><td>Lo</td><td rowspan="3">Fine control (such as releasing decelerator)</td><td>690 mA</td></tr>
<tr><td>Mi</td><td>740 mA</td></tr>
<tr><td>Hi</td><td>0 mA</td></tr>
<tr><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel speed</td><td>Travel lever</td><td>LS-EPC output pressure</td></tr>
<tr><td>Lo</td><td>Neutral</td><td>Approx. 1.4 MPa {Approx. 14 kg/cm^2}</td></tr>
<tr><td>Hi</td><td>Operated</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Malfunction of travel speed solenoid valve</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Travel speed</td><td>Travel lever</td><td>Solenoid valve output pressure</td></tr>
<tr><td>Lo</td><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Hi</td><td>Operated</td><td>2.84 – 3.43 MPa {29 – 35 kg/cm^2}</td></tr>
<tr><td>3</td><td>Malfunction of travel motor (speed shifting section)</td><td colspan="3">Speed shifting section of travel motor may have malfunction. Check it directly.</td></tr>
</table>

H-22 Track shoe does not turn (on one side only)

Trouble	• Travel system does not move (only one side).
Related information	• Set the working mode in P-mode before start.

	Cause		Standard value in normal state/Remarks on troubleshooting	
Possible causes and standard value in normal state	1	Defective seal of travel control valve (suction valve)	Suction valve of travel control valve may have defective seal. Check it directly.	
	2	Defective seal of travel motor (safety valve)	Safety valve of travel motor may have defective seal. Check it directly.	
	3	Defective seal of travel motor (check valve)	Check valve of travel motor may have defective seal. Check it directly.	
	4	Lowering of travel motor output	★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.	
			Travel lever	Leakage from travel motor
			Travel relief	Max. 30 ℓ/min
	5	Defective final drive	Final drive may have internal defect. Check it directly. ★ It may be checked by abnormal sound, abnormal heating, metal chips in drain oil, etc.	

H-23 Machine does not swing

Trouble (1)	• Upper structure does not swing in either direction.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="13">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of swing holding brake solenoid valve</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Swing</td><td>Solenoid valve</td></tr>
<tr><td colspan="2">Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td colspan="2">Operated</td><td>2.84 – 3.43 MPa
{29 – 35 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of swing motor (holding brake section)</td><td colspan="3">Holding brake section of swing motor may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Defective adjustment or malfunction of swing motor (safety valve)</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lock switch</td><td>Swing lever</td><td>Swing relief pressure</td></tr>
<tr><td>ON</td><td>Swing relief</td><td>27.95 – 32.85 MPa
{285 – 335 kg/cm^2}</td></tr>
<tr><td colspan="3">If oil pressure does not become normal after adjustment, safety valve may have malfunction or internal defect. Check safety valve directly.</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective swing motor</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Swing lever</td><td>Leakage from swing motor</td></tr>
<tr><td colspan="2">Swing relief</td><td>Max. 11 ℓ/min</td></tr>
<tr><td>5</td><td>Defective swing machinery</td><td colspan="3">Swing machinery may have internal defect. Check it directly.
★ It may be checked by abnormal sound, abnormal heating, metal chips in drain oil, etc.</td></tr>
</table>

Trouble (2)	• Upper structure swings only in one direction.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="6">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of swing PPC valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Left lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Swing</td><td>Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of swing control valve (spool)</td><td colspan="2">Spool of swing control valve may have malfunction. Check it directly.</td></tr>
<tr><td>3</td><td>Defective seal of swing motor (suction valve)</td><td colspan="2">Seal of suction valve of swing motor may be defective. Check it directly.
★ Suction valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
<tr><td>4</td><td>Defective seal of swing motor (check valve)</td><td colspan="2">Seal of check valve of swing motor may be defective. Check it directly.
★ Check valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
</table>

H-24 Swing acceleration is poor, or swing speed is slow

Trouble (1)	• Swing acceleration or swing speed is low in both directions.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="8">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td>1</td><td>Malfunction of LS shuttle valve (all control valves)</td><td colspan="3">LS shuttle valves of all control valves may have malfunction. Check them directly.</td></tr>
<tr><td>2</td><td>Malfunction of swing motor (holding brake)</td><td colspan="3">Holding brake section of swing motor may have malfunction. Check it directly.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Defective adjustment or malfunction of swing motor (safety valve)</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lock switch</td><td>Swing lever</td><td>Swing relief pressure</td></tr>
<tr><td>ON</td><td>Swing relief</td><td>27.95 – 32.85 MPa
{285 – 335 kg/cm^2}</td></tr>
<tr><td colspan="3">If oil pressure does not become normal after adjustment, safety valve may have malfunction or internal defect. Check safety valve directly.</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective swing motor</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Swing lever</td><td>Leakage from swing motor</td></tr>
<tr><td colspan="2">Swing relief</td><td>Max. 11 ℓ/min</td></tr>
</table>

Trouble (2)	• Swing acceleration or swing speed is low in only one direction.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="8">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of swing PPC valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Left or Right</td><td>Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of swing control valve (spool)</td><td colspan="2">Spool of swing control valve may have malfunction. Check it directly.</td></tr>
<tr><td>3</td><td>Malfunction of swing control valve (pressure compensation valve)</td><td colspan="2">Pressure compensation valve of swing control valve may have malfunction. Check it directly.</td></tr>
<tr><td>4</td><td>Defective seal of swing motor (suction valve)</td><td colspan="2">Seal of suction valve of swing motor may be defective. Check it directly.
★ Suction valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
<tr><td>5</td><td>Defective seal of swing motor (check valve)</td><td colspan="2">Seal of check valve of swing motor may be defective. Check it directly.
★ Check valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
</table>

H-25 Excessive overrun when stopping swing

Trouble (1)	• Upper structure overruns remarkably when it stops swinging in both directions.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="6">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective adjustment or malfunction of swing motor (safety valve)</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lock switch</td><td>Swing lever</td><td>Swing relief pressure</td></tr>
<tr><td>ON</td><td>Swing relief</td><td>27.95 – 32.85 MPa
{285 – 335 kg/cm^2}</td></tr>
<tr><td colspan="3">If oil pressure does not become normal after adjustment, safety valve may have malfunction or internal defect. Check safety valve directly.</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective swing motor</td><td colspan="3">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td colspan="2">Swing lever</td><td>Leakage from swing motor</td></tr>
<tr><td colspan="2">Swing relief</td><td>Max. 11 ℓ/min</td></tr>
</table>

Trouble (2)	• Upper structure overruns remarkably when it stops swinging in only one direction.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="8">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Malfunction of swing PPC valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>2</td><td>Clogging of swing PPC slow return valve</td><td colspan="2">Swing PPC slow return valve may be clogged. Check it directly.
★ Slow return valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
<tr><td>3</td><td>Malfunction of swing control valve (spool)</td><td colspan="2">Spool may have malfunction. Check it directly.</td></tr>
<tr><td>4</td><td>Defective seal of swing motor (suction valve section)</td><td colspan="2">Seal of suction valve of swing motor may be defective. Check it directly.
★ Suction valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
<tr><td>5</td><td>Defective seal of swing motor (check valve)</td><td colspan="2">Seal of check valve of swing motor may be defective. Check it directly.
★ Check valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
</table>

H-26 There is big shock when stopping swing

Trouble	• Large shock is made when upper structure stops swinging.
Related information	• Set the working mode in P-mode before start.

<table>
<tr><td rowspan="5">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of swing PPC valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lever</td><td>PPC valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Left or Right</td><td>Min. 2.7 MPa
{Min. 28 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of swing PPC slow return valve</td><td colspan="2">Swing PPC slow return valve may have malfunction. Check it directly.
★ Slow return valves on right side and left side may be checked by replacing them with each other and seeing change of condition.</td></tr>
</table>

H-27 Large sound is made when upper structure stops swinging.

Trouble	• Large sound is made when upper structure stops swinging.
Related information	• Set the working mode in P-mode before start.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Malfunction of back pressure valve	Back pressure valve of control valve may have malfunction. Check it directly.
	2	Malfunction of swing motor (safety valve)	Safety valve of swing motor may have malfunction. Check it directly.
	3	Malfunction of swing motor (suction valve)	Suction valve of swing motor may have malfunction. Check it directly. ★ Suction valves on right side and left side may be checked by replacing them with each other and seeing change of condition.
	4	Defective swing machinery	Swing machinery may have internal defect. Check it directly. ★ It may be checked by abnormal sound, abnormal heating, metal chips in drain oil, etc.

H-28 Swing hydraulic drift is too big

Trouble (1)	• Hydraulic drift of swing is large (when swing holding brake is applied).
Related information	• When swing emergency reset switch is turned OFF (normal position), swing holding brake operates and upper structure is fixed with disc brake.

<table>
<tr><td rowspan="4">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="2">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Malfunction of swing holding brake solenoid valve</td><td colspan="2">★ Prepare with engine stopped, then run engine at high idle and carry out troubleshooting.</td></tr>
<tr><td>Swing lever</td><td>Solenoid valve output pressure</td></tr>
<tr><td>Neutral</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>2</td><td>Malfunction of swing motor (holding brake)</td><td colspan="2">Holding brake section of swing motor may have malfunction or internal defect. Check it directly.</td></tr>
</table>

Trouble (2)	• Hydraulic drift of swing is large (when swing holding brake is released).
Related information	• When swing emergency reset switch is turned ON (in an emergency), swing holding brake is released and upper structure is secured by only hydraulic pressure.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Malfunction of swing control valve (spool)	Seal of spool of swing control valve may be defective. Check it directly.
	2	Malfunction of swing control valve (pressure compensation valve)	Seal of pressure compensation valve section of swing control valve may be defective. Check it directly.
	3	Defective seal of swing motor (safety valve)	Seal of safety valve of swing motor may be defective. Check it directly.
	4	Defective seal of swing motor (suction valve)	Seal of suction valve of swing motor may be defective. Check it directly.
	5	Defective seal of swing motor (check valve)	Seal of check valve of swing motor may be defective. Check it directly.

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00544-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

40 Troubleshooting

Troubleshooting of engine (S-mode)

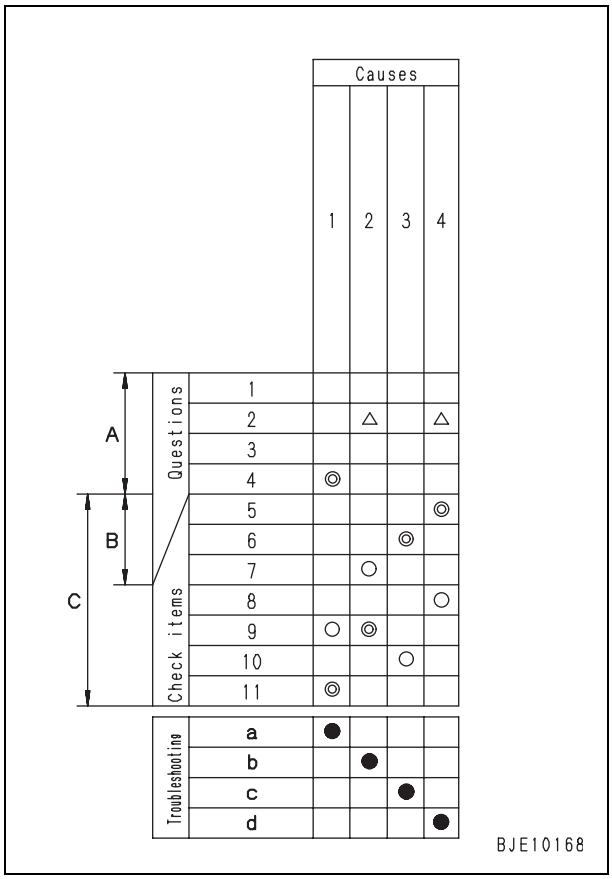
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Troubleshooting of engine (S-mode)

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]:
Items to be simply checked by the serviceman to narrow down causes.
They corresponds to C in the chart on the right.

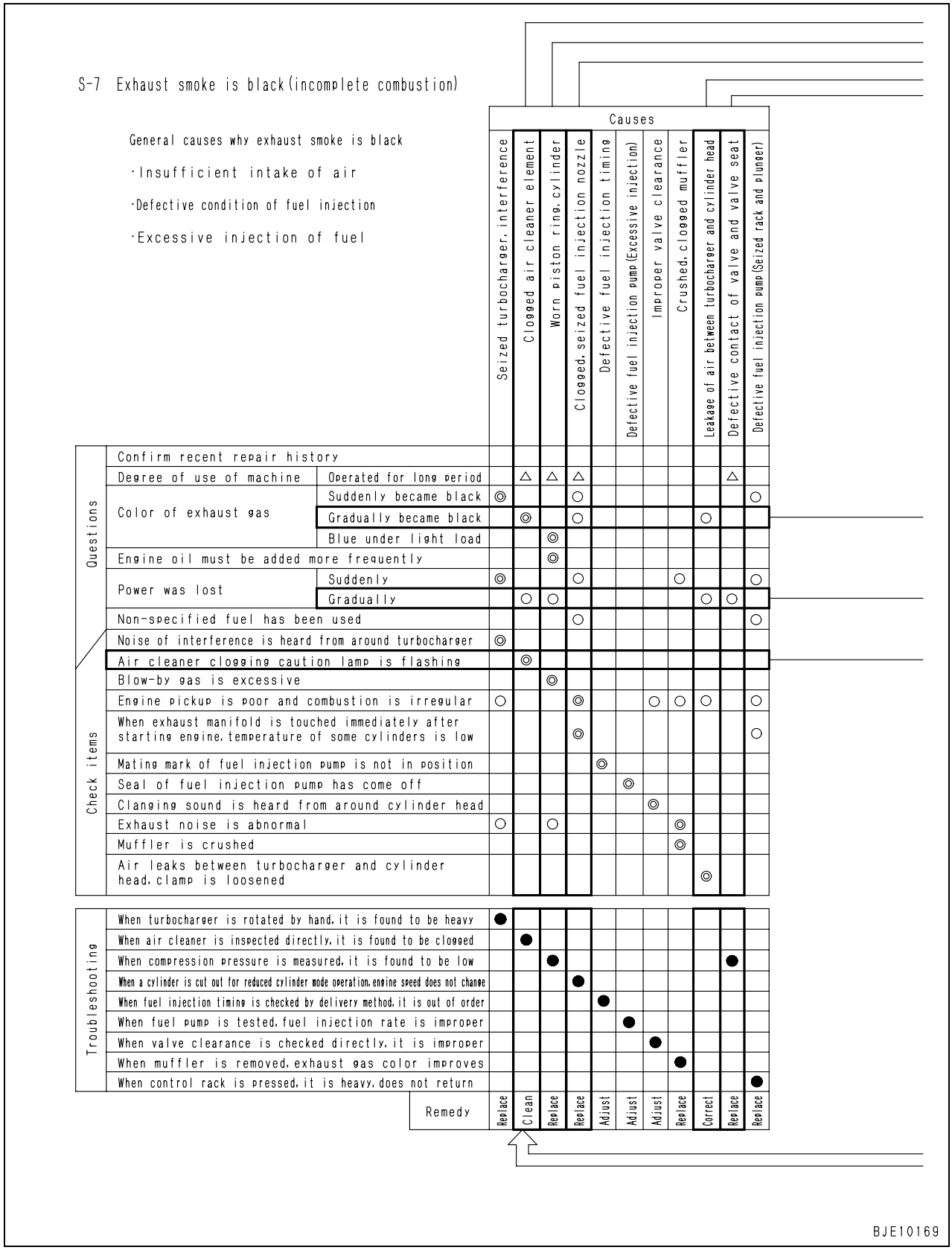
[Causes]:
Items to be narrowed from the questions and check items.
The serviceman narrows down the probable causes from A, B, and C.

[Troubleshooting]:
Items to finally verify whether the narrowed down causes are undoubtedly the real causes using the troubleshooting tools and direct inspections.

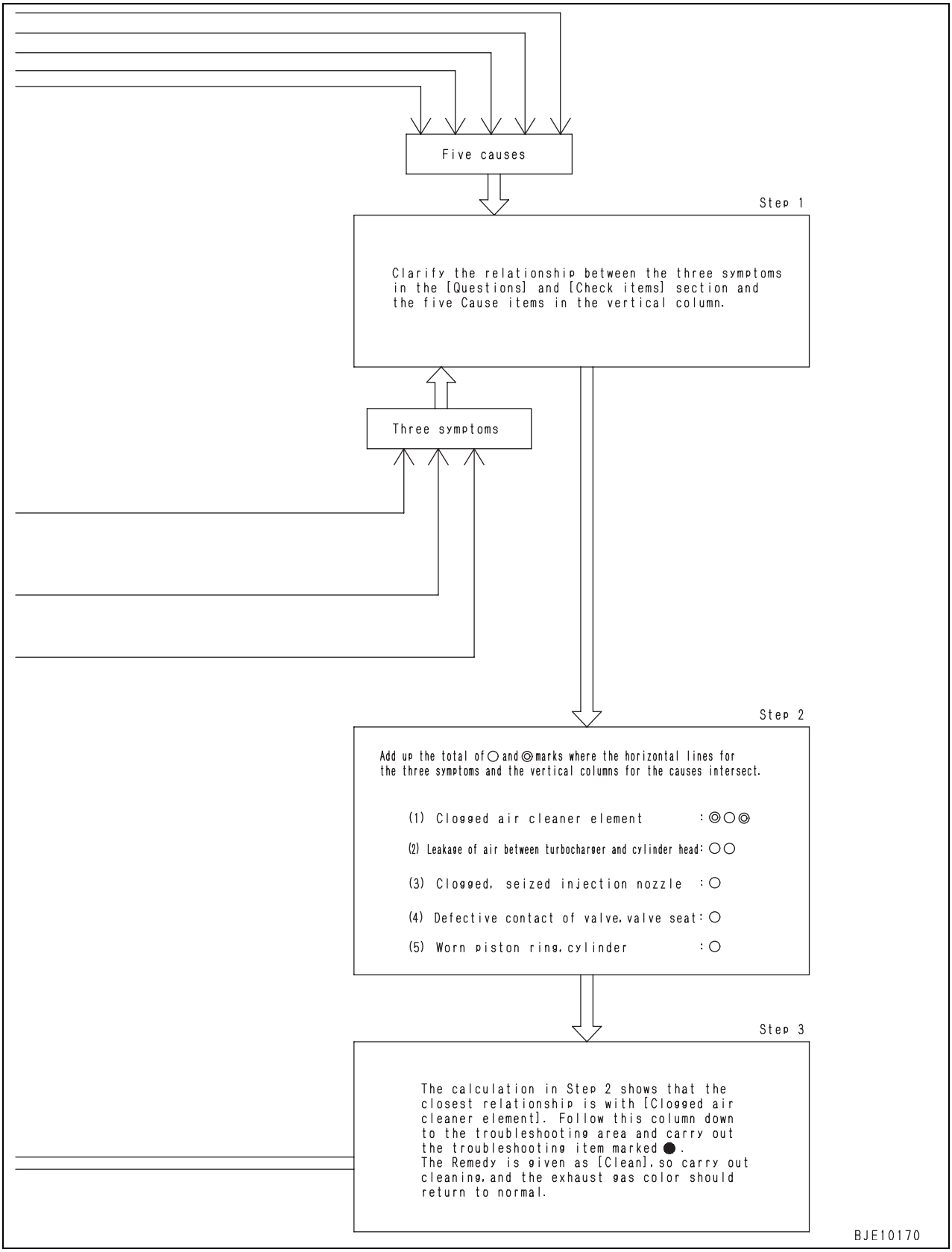
Items listed in the [Questions] and [Check items] and related to the [Causes] are marked with △, ○, or ◎.
△: Causes to be referred to for questions and check items
○: Causes related to questions and check items
◎: Causes highly probable among ones marked with ○

★ 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 smoke is black
Let us assume that [Clogged air cleaner] is taken to be the cause of black exhaust gas. 3 symptoms have causal relationship with this problem: [Color of exhaust gas gradually became black], [Power was lost gradually], and [Air cleaner clogging caution lamp is flashing].



If we look from these 3 symptoms to find the causes, we find that there is a relationship with 5 causes. Let us explain here the method of using this causal relationship to pinpoint the most probable cause.



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

★ 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.

			Cause													
			Clogged air cleaner element	Defective contact of valve and valve 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	Stuck, seized supply pump plunger	Defective electric lift pump	Defective injector	Defective intake air heater system	Defective alternator (regulator section)	Defective alternator (generator section)	Defective or 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						◎		○						
	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 compression pressure is measured, it is found to be low			●	●										
	Inspect fuel filter, strainer directly							●							
	Carry out troubleshooting for “Rail Press (Very) Low Error.” See *1 for failure code.								●						
	Carry out troubleshooting for “Power Lift Pump Error.” 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 20 – 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	Replace	Clean	Correct	Clean	Replace	Replace	Replace	Replace	Replace	Replace	Replace

*1: Failure codes [CA559] and [CA2249]
*2: Failure codes [CA2265] and [CA2266]

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”
- Defective electrical system
- Defective hydraulic pump

			Cause									
			Broken flywheel ring gear	Defective or deteriorated battery	Defective connection of battery terminal	Defective battery relay	Defective starting switch	Defective safety relay	Defective starting motor (motor section)	Defective starting circuit wiring	Defective hydraulic pump
Questions / Check items	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		◎							
	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	Inspect flywheel ring gear directly		●							Carry out troubleshooting in E-mode.	Carry out troubleshooting in H-mode.
	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							●		
		When safety switch terminal and terminal B of starting motor are connected, engine starts							●		
		Remedy	Replace	Replace	Correct	Replace	Replace	Replace	Replace	—	—

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)

			Cause													
			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	Seized, abnormally worn feed pump	Broken supply pump shaft	Stuck, seized supply pump plunger	Defective supply pump MPROP	Defective electric lift pump	Defective operation of overflow valve (Does not close)	Defective common rail pressure limiter	Defective fuel injector
Questions / Check items	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						◎			△					○
	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					◎									
	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	Inspect fuel filter directly						●								
	Inspect feed pump directly							●							
	Carry out troubleshooting for “Rail Press (Very) Low Error.” See *1 for failure code.								●	●					
	Carry out troubleshooting for “IMV/PCV1 Short (Open) Error.” See *2 for failure code.										●				
	Carry out troubleshooting for “Power Lift Pump Error.” See *3 for failure code.											●			
	Inspect overflow valve directly												●		
	Engine can be started in reduced cylinder mode.														●
	If pressure limiter return pipe is disconnected, fuel flows out													●	
		Remedy	Replace	Add	Correct	Correct	Replace	Replace	Replace	Replace	Replace	Replace	Replace	Replace	Replace

*1: Failure codes [CA559] and [CA2249]
*2: Failure codes [CA271] and [CA272]
*3: Failure codes [CA2265] and [CA2266]

c) Exhaust smoke comes 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

			Cause													
			Clogged air cleaner element	Worn dynamic valve system (Valve, rocker lever, etc.)	Excessive wear of 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	Stuck, seized supply pump plunger	Defective electric lift pump	Clogged injector, defective spray	Defective, deteriorated battery	Defective coolant temperature sensor, wiring harness	Defective intake air heater system
Questions / Check items	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)														◎
	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							◎							
	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 directly								●						
	Carry out troubleshooting for “Rail Press (Very) Low Error.” See *1 for failure code.									●					
	Carry out troubleshooting for “Power Lift Pump Error.” See *2 for failure code.										●				
	Engine can be started in reduced cylinder mode.											●			
	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	Replace	Replace	Replace	Replace	Replace	Replace

*1: Failure codes [CA559] and [CA2249]
*2: Failure codes [CA2265] and [CA2266]

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)

			Cause									
			Clogged air cleaner element	Defective contact of valve and valve seat	Improper valve clearance	Seized turbocharger, interference of turbocharger	Excessive wear of piston ring, cylinder liner	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter	Stuck, seized supply pump plunger	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 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		●									
	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									●		
	Carry out troubleshooting for “Rail Press (Very) Low Error.” See *1 for failure code.										●	
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change											●
		Remedy	Clean	Replace	Adjust	Replace	Replace	Clean	Correct	Clean	Replace	Replace

*1: 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

			Cause												
			Broken dynamic valve system (valve, rocker lever, 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	Broken, seized feed pump	Broken supply pump shaft	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									◎				
Check items	Fuel level monitor indicates low level (if monitor is installed)						◎							
	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								◎					
	Rust and water are found when fuel tank is drained									◎				
	Metal particles are found when oil pan 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										◎		
	Engine turns, but stops when load is applied to machine													◎
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 directly										●			
	Carry out troubleshooting for “Rail Press (Very) Low Error.” See *1 for failure code.											●	●	
		Remedy	Replace	Replace	Replace	Replace	Add	Clean	Correct	Clean	Replace	Replace	Replace	—

*1: Failure codes [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)

			Cause						
			Insufficient fuel in tank	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter	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				◎				
Troubleshooting	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.” See *1 for failure code.							●	
	Carry out troubleshooting for “Eng Bkup Speed Sensor Error.” See *2 for failure code.								●
		Remedy	Add	Clean	Replace	Replace	Replace	Replace	Replace

*1: Failure code [CA689]
*2: 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 condition of fuel spray
- Improper selection of fuel
- There is over heating
  ⇒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)

			Cause															
			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	Excessive wear of piston ring, cylinder liner	Clogged air breather hole of fuel tank cap	Leaking, clogged fuel piping	Clogged fuel filter	Stuck, seized supply pump plunger	Clogged injector, defective spray (dirt in injector)	Defective drive of injector (signal, solenoid)	Defective installation of boost pressure sensor (air leakage)	Defective boost pressure sensor, wiring harness	Clogged spill piping
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					○		○									
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									◎							
	Output becomes insufficient after short stop of operation			◎													
	Color of exhaust gas	Black			◎		◎										
		Blue under light load						◎									
	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 piping									●							
	Inspect fuel filter, strainer directly										●						
	Inspect spill port check valve directly																●
	Carry out troubleshooting for “Rail Press (Very) Low Error.” 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.” See *2 for failure code.															●	
		Remedy	Clean	Correct	Replace	Replace	Adjust	Replace	Clean	Correct	Replace	Replace	Replace	Replace	Correct	Replace	Replace

*1: Failure codes [CA559] and [CA2249]
*2: Failure codes [CA122] and [CA123]

S-7 Exhaust smoke is black (incomplete combustion)

General causes why exhaust smoke is black

- Insufficient intake of air
- Defective condition of fuel injection
- Improper selection of fuel
- There is over heating:
  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)

			Cause													
			Clogged air cleaner element	Seized turbocharger, interference of turbocharger	Defective contact of valve and valve seat	Improper valve clearance	Leakage of air between turbocharger and cylinder head	Crushed, clogged muffler	Excessive wear of piston ring, cylinder liner	Stuck, seized supply pump plunger	Clogged, seized injector	Abnormally worn injector	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 occurred 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			●											
	When compression pressure is measured, it is found to be low				●				●						
	Inspect valve clearance directly					●									
	When muffler is removed, exhaust gas color improves							●							
	Carry out troubleshooting for “Rail Press (Very) Low Error.” See *1 for failure code.									●		●			
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change										●				
	Carry out troubleshooting for “Coolant Temp Sens High (Low) Error.” See *2 for failure code.														●
	Confirm with INSITE or monitoring function on applicable machine side												●	●	
		Remedy	Clean	Replace	Replace	Adjust	Correct	Replace	Replace	Replace	Replace	Replace	Replace	Replace	Replace

*1: Failure codes [CA559] and [CA2249]
*2: Failure codes [CA144] and [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

			Cause														
			Dust sucked in from intake system	Worn, damaged valve (stem, guide, seal)	Turbocharger: Worn seal at turbocharger end	Turbocharger: Worn seal at blower end	Clogged breather, breather hose	Broken piston ring	Excessive wear of 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 clutch or damper chamber of applicable machine 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				●	●											
	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	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

			Cause									
			Defective seal at turbocharger turbine end	Worn valve, valve guide	Excessive wear of 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	
Check items / Questions	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				◎							
	Metal particles are found when oil filter is drained			○	○			◎				
	Inside of exhaust pipe is dirty with oil			◎								
	Engine oil temperature rises quickly						◎					
	Color of exhaust gas	Blue under light load			◎							
		Black									◎	
	Amount of blow-by gas	Excessive	○	○	◎					○		
		None				◎						
Troubleshooting	Excessive play of turbocharger shaft		●								See S-7	
	When compression pressure is measured, it is found to be low			●	●							
	Check 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	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

			Cause								
			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 occurred or pump relief speed is high								○		
	Color of exhaust gas	Black					○	○		○	○
		White	○								
Troubleshooting	Remove and inspect head cover directly		●								
	Inspect feed pump oil seal directly				●						
	Carry out troubleshooting for “Rail Press (Very) Low Error.” See *1 for failure code.					●					
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change							●			
	If spill tube from injector is disconnected, much fuel spills								●		
	Carry out troubleshooting for “Coolant Temp Sens High (Low) Error.” See *2 for failure code.										●
	Check with monitoring function of the machine monitor.						●			●	
		Remedy	Correct	Correct	Replace	Replace	Correct	Replace	Replace	Replace	Replace

*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

			Cause				
			Broken cylinder head, head gasket	Cracks inside cylinder block	Holes caused by pitting	Broken oil cooler core, O-ring	Broken hydraulic oil cooler or power train oil cooler
Questions / Check items	Confirm recent repair history						
	Degree of use of machine	Operated for long period			△	△	
	Increase of oil level	Sudden occurred	○			○	
		Gradually occurred		○	○		
	Hard water is being used as coolant				○	○	
	Oil level has risen, oil is milky			○	○	◎	
	There are excessive air bubbles in radiator, coolant spurts back		◎				
	Hydraulic oil or power train oil is milky						◎
	When hydraulic oil or power train oil is drained, water is found						◎
Troubleshooting	Pressure-tightness test of cylinder head shows there is leakage		●				
	Inspect cylinder block, 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 of lubrication system
- Defective oil pressure control
- Improper selection of fuel (improper viscosity)
- Deterioration of oil due to overheating

			Cause										
			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 regulator valve	Clogged oil filter	Leaking, crushed, clogged hydraulic piping	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									◎		
Check items	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							◎			○
	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 spring of regulator valve is fatigued, damaged								●			
	Inspect oil filter directly									●		
	If oil level sensor is replaced, oil level monitor indicates normally											●
		Remedy	Replace	Add	—	Clean	Clean	Replace	Adjust	Replace	Correct	Replace

S-13 Oil level rises (Entry of coolant or 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.”

			Cause						
			Broken cylinder head, head gasket	Broken injector O-ring	Cracks inside cylinder block	Holes caused by pitting	Worn, damaged rear oil seal	Broken oil cooler core, O-ring	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			○					
	Oil level in clutch or damper chamber of applicable machine is low						◎		
Troubleshooting	When compression pressure is measured, it is found to be low		●						
	Remove injector and inspect O-ring			●					
	Inspect cylinder block, liner directly				●	●			
	Inspect rear oil seal directly						●		
	Pressure-tightness test of oil cooler shows there is leakage							●	
	Remove and inspect supply pump directly								●
		Remedy	Replace	Correct	Replace	Replace	Correct	Replace	Replace

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

			Cause												
			Broken cylinder head, head gasket	Holes 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	Rise of oil temperature in hydraulic pump system
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 and oil is milky			◎	○									
	Fan belt tension is low											◎		
	When fan belt 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											◎		
	Hydraulic oil temperature gauge indicates red range faster than engine coolant temperature gauge does (if they are installed)													◎
Troubleshooting	When compression pressure is measured, it is found to be low		●											Carry out troubleshooting in H-mode.
	Inspect cylinder liner directly			●										
	Inspect oil cooler directly				●									
	Temperature difference between upper and lower tanks of radiator is large						●							
	When operation test 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	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 3 seconds. This does not indicate abnormality, however.

			Cause												
			Leakage of air between turbocharger and cylinder head	Interference of turbocharger, seized turbocharger	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 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 low temperature sensor, boost temperature sensor)
Questions	Confirm recent repair history													
	Degree of use of machine	Operated for long period						△						
	Condition of abnormal noise	Gradually occurred						○			○			
		Suddenly occurred		○	○					○				
	Non-specified fuel is being used											○		
	Oil must be added more frequently							◎						
Check items	Metal particles are found when oil filter is drained							◎		◎				
	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 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 found to be heavy			●										
	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	Correct	Replace	Adjust	Replace	Replace	Replace	Correct	Replace	Replace	Replace

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 trouble-shooting for “S-15 Abnormal noise is made”, too.

			Cause							
			Stuck dynamic valve system (valve, rocker lever)	Worn main bearing, connecting rod bearing	Improper gear train backlash	Worn camshaft bushing	Improper injection timing (Abnormality in coolant temperature sensor, boost temperature sensor)	Loose engine mounting bolts, broken cushions	Misalignment between engine and devices on applicable machine side	Broken output shaft, parts in damper on applicable machine side
Questions	Confirm recent repair history									
	Degree of use of machine	Operated for long period		△		△		△		
	Condition of vibration	Suddenly increased	○							○
		Gradually increased		○		○		○		
Check items	Non-specified oil is being used			○		○				
	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							●		
	When alignment is checked, radial runout or facial runout is detected								●	
	Inspect output shaft or inside of damper directly									●
		Remedy	Replace	Replace	Replace	Replace	Replace	Replace	Adjust	Replace

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00545-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

General information on disassembly and assembly

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General information on disassembly and assembly

How to read this manual

1. Removal and installation of assemblies

Special tools

- The special tools necessary for the removal and installation work are indicated by symbols as **A1 ••• X1** and their part Nos., part names, and quantity are described in the table.
- In the special tools table, the following information is described, as well as the above items.

1) Necessity
   - ■ : Special tools that cannot be substituted and should always be used (installed).
   - ● : Special tools that will be useful if available and are substitutable with commercially available tools.
2) Distinction of new and existing special tools
   - N : Tools newly developed for this model. They respectively have a new part number.
   - R : Tools with upgraded part numbers. They are remodeled from already available tools for other models.
   - Blank : Tools already available for other models. They can be used without any modification.
3) Circle mark ○ in sketch column:
   - The sketch of the special tool is presented in the section of "Sketches of special tools".
   - Part No. of special tools starting with 79*T-***-****:
     means that they can not be supplied from Komatsu in Japan (i.e. locally made parts).

★ General tools that are necessary for removal or installation are described as [1],[2]•••etc. and their part names, part numbers and quantities are not described.

Removal

- The [Removal] section contains procedures and precautions for implementing the work, know how and the amount of oil or coolant to be drained.
- The common tools necessary for the removal work are indicated [1],[2]••• and their part Nos., part names, and quantity are not described.
- Various symbols used in the Removal Section are explained and listed below.

⚠ : **This mark indicates safety-related precautions that must be followed when implementing the work.**

★ : Know-how or precautions for work

[*1] : This mark shows that there are instructions or precautions for installing parts.

: This mark shows the amount of oil or coolant to be drained.

: Weight of part or component

Installation

- Except where otherwise instructed, installation of parts is done in the reverse order of removal.
- Instructions and precautions for installing parts are shown with [*1] mark in the Installation Section, identifying which step the instructions are intended for.
- The common tools necessary for the installation work are indicated [1],[2]••• and their part Nos., part names, and quantity are not described.
- Marks shown in the Installation Section stand for the following.

⚠ : **Precautions related to safety in execution of work.**

★ : This mark gives guidance or precautions when doing the procedure.

: Type of coating material

: Tightening torque

: Quantity of oil or coolant to be added

Sketches of special tools

- Various special tools are illustrated for the convenience of local manufacture.

2. Disassembly and assembly of assemblies

Special tools

- The special tools necessary for the disassembly and assembly work are indicated by symbols as **A1 ••• X1** and their part Nos., part names, and quantity are described in the table.
- Also the following information is described in the special tool list.

1) Necessity
   - ■ : Special tools that cannot be substituted and should always be used (installed).
   - ● : Special tools that will be useful if available and are substitutable with commercially available tools.
2) Distinction of new and existing special tools
   - N : Tools newly developed for this model. They respectively have a new part number.
   - R : Tools with upgraded part numbers. They are remodeled from already available tools for other models.
   - Blank : Tools already available for other models. They can be used without any modification.
3) Circle mark ○ in sketch column:
   - The sketch of the special tool is presented in the section of "Sketches of special tools".
   - Part No. of special tools starting with 79∗T-∗∗∗-∗∗∗∗:
     means that they can not be supplied from Komatsu in Japan (i.e. locally made parts).

★ General tools that are necessary for removal or installation are described as [1],[2]•••etc. and their part names, part numbers and quantities are not described.

Disassembly

- In Disassembly section, the work procedures, precautions and know-how for carrying out those procedures, and quantity of the oil and coolant drained are described.
- The common tools necessary for the disassembly work are indicated [1],[2]••• and their part Nos., part names, and quantity are not described.
- The meanings of the symbols used in Disassembly section are as follows.

⚠ **: This mark indicates safety-related precautions that must be followed when implementing the work.**

★ : Know-how or precautions for work

: Quantity of oil or coolant drained

Assembly

- In Assembly section, the work procedures, precautions and know-how for carrying out those procedures, and quantity of the oil and coolant added are described.
- The common tools necessary for the assembly work are indicated [1],[2]••• and their part Nos., part names, and quantity are not described.
- The meanings of the symbols used in Assembly section are as follows.

⚠ **: Precautions related to safety in execution of work**

★ : This mark gives guidance or precautions when doing the procedure.

: Type of coating material

: Tightening torque

: Quantity of oil or coolant to be added

Sketches of special tools

- Various special tools are illustrated for the convenience of local manufacture.

Coating materials list

★ The recommended coating materials such as adhesives, gasket sealants, and greases used for disassembly and assembly are listed below.
★ For coating materials not listed below, use the equivalent of products shown in this manual.

Category	Komatsu code	Part number	Q'ty	Container	Main features and applications
Adhesive	LT-1A	790-129-9030	150 g	Tube	• Used to prevent rubber gaskets, rubber cushions, and cork plugs from coming out.
	LT-1B	790-129-9050	20 g (2 pcs.)	Polyethylene container	• Used for plastic (except polyethylene, polypropylene, tetrafluoroethylene and vinyl chloride), rubber, metal, and non-metal parts which require immediate and strong adhesion.
	LT-2	09940-00030	50 g	Polyethylene container	• Features: Resistance to heat and chemicals. • Used to fix and seal bolts and plugs.
	LT-3	790-129-9060 (Set of adhesive and hardener)	Adhesive: 1 kg Hardener: 500 g	Can	• Used to stick and seal metal, glass, and plastics.
	LT-4	790-129-9040	250 g	Polyethylene container	• Used to seal plugs.
	Holtz MH 705	790-129-9120	75 g	Tube	• Heat-resistant seal used to repair engines.
	ThreeBond 1735	790-129-9140	50 g	Polyethylene container	• Quick-setting adhesive. • Setting time: Within 5 sec. to 3 min. • Used mainly to stick metals, rubbers, plastics, and woods.
	Aron-alpha 201	790-129-9130	2 g	Polyethylene container	• Quick-setting adhesive. • Quick-setting type. (max. strength is obtained after 30 minutes) • Used mainly to stick rubbers, plastics, and metals.
	Loctite 648-50	79A-129-9110	50 cc	Polyethylene container	• Features: Resistance to heat and chemicals. • Used for fitted portions used at high temperatures.
Gasket sealant	LG-1	790-129-9010	200 g	Tube	• Used to stick or seal gaskets and packings of power train case, etc.
	LG-5	790-129-9080	1 kg	Polyethylene container	• Used to seal various threaded portions, pipe joints, and flanges. • Used to seal tapered plugs, elbows, and nipples of hydraulic piping.
	LG-6	790-129-9020	200 g	Tube	• Features: Silicon-based heat and cold-resistant sealant. • Used to seal flange surfaces and threaded portions. • Used to seal oil pan, final drive case, etc.
	LG-7	790-129-9070	1 kg	Tube	• Features: Silicon-based quick-setting sealant. • Used to seal flywheel housing, intake manifold, oil pan, thermostat housing, etc.
	ThreeBond 1211	790-129-9090	100 g	Tube	• Gasket sealant used to repair engine.
	ThreeBond 1207B	419-15-18131	100 g	Tube	• Features: Silicon-based, heat and cold-resistant, vibration-resistant, impact-resistant sealant. • Used to seal transfer case, etc.

Category	Komatsu code	Part number	Q'ty	Container	Main features and applications
Molybdenum disulfide lubricant	LM-G	09940-00051	60 g	Can	• Used to lubricate sliding portions. (to prevent squeaking)
	LM-P	09940-00040	200 g	Tube	• Used to prevent scuffing and seizure of press-fitted portions, shrink-fitted portions, and threaded portions. • Used to lubricate linkages, bearings, etc.
Grease	G2-LI	SYG2-400LI SYG2-350LI SYG2-400LI-A SYG2-160LI SYGA-160CNLI	Various	Various	• General purpose type.
	G2-CA	SYG2-400CA SYG2-350CA SYG2-400CA-A SYG2-160CA SYGA-160CNCA	Various	Various	• Used for bearings used at normal temperature under light load in contact with water or steam.
	Molybdenum disulfide grease LM-G (G2-M)	SYG2-400M SYG2-400M-A SYGA-16CNM	400 g x 10 400 g x 20 16 kg	Bellows-type container Can	• Used for parts under heavy load.
	Hyper White Grease G2-T, G0-T (*) *: For cold district	SYG2-400T-A SYG2-16CNT SYG0-400T-A (*) SYG0-16CNT (*)	400 g 16 kg	Bellows-type container Can	• Seizure resistance and heat resistance higher than molybdenum disulfide grease. • Not conspicuous on machine since color is white.
	Biograese G2-B, G2-BT (*) *: For use at high temperature and under high load	SYG2-400B SYGA-16CNB SYG2-400BT (*) SYGA-16CNBT (*)	400 g 16 kg	Bellows-type container Can	• Since this grease is decomposed by natural bacteria in short period, it has less effects on micro-organisms, animals, and plants.
Primer	SUNSTAR PAINT PRIMER 580 SUPER	417-926-3910	20 ml	Glass container	Adhesive for cab glass: • Used as primer for cab side. (Using limit: 4 months after date of manufacture)
	SUNSTAR GLASS PRIMER 580 SUPER		20 ml	Glass container	Adhesive for cab glass: • Used as primer for glass side. (Using limit: 4 months after date of manufacture)
	SUNSTAR PAINT PRIMER 435-95	22M-54-27230	20 ml	Glass container	Adhesive for cab glass: • Used as primer for painted surface on cab side. (Using limit: 4 months after date of manufacture)
	SUNSTAR GLASS PRIMER 435-41	22M-54-27240	150 ml	Can	Adhesive for cab glass: • Used as primer for black ceramic-coated surface on glass side and for hard polycarbonate-coated surface. (Using limit: 4 months after date of manufacture)
	SUNSTAR SASH PRIMER GP-402	22M-54-27250	20 ml	Glass container	Adhesive for cab glass: • Used as primer for sash (Almite). (Using limit: 4 months after date of manufacture)

Category	Komatsu code	Part number	Q'ty	Container	Main features and applications	
Adhesive	SUNSTAR PENGUINE SEAL 580 SUPER “S” or “W”	417-926-3910	320 ml	Polyethylene container	Adhesive for cab glass	• “S” is used for high-temperature season and “W” for low-temperature season as adhesive for glass. (Using limit: 4 months after date of manufacture)
	Sika Japan, Sikaflex 256HV	20Y-54-39850	310 ml	Polyethylene container		• Used as adhesive for glass. (Using limit: 6 months after date of manufacture)
	SUNSTAR PENGUINE SUPER 560	22M-54-27210	320 ml	Ecocart (Special container)		• Used as adhesive for glass. (Using limit: 6 months after date of manufacture)
Caulking material	SUNSTAR PENGUINE SEAL No. 2505	417-926-3920	320 ml	Polyethylene container		• Used to seal joints of glass parts. (Using limit: 4 months after date of manufacture)
	SEKISUI SILICONE SEALANT	20Y-54-55130	333 ml	Polyethylene container		• Used to seal front window. (Using limit: 6 months after date of manufacture)
	GE TOSHIBA SILICONES TOSSEAL 381	22M-54-27220	333 ml	Cartridge		• Used to seal joint of glasses. Translucent white seal. (Using limit: 12 months after date of manufacture)

Special tools list

★ Tools with part number 79○T-○○○-○○○○ cannot be supplied (they are items to be locally manufactured).

★ Necessity: ■ ..... Cannot be substituted, must always be installed (used)
● ..... Extremely useful if available or can be substituted with commercially available part

★ New/Remodel: N..... Tools with new part numbers, newly developed for this model
R:..... Tools with upgraded part numbers, remodeled from items already available for other models
Blank: ... Tools already available for other models, can be used without any modification

★ Tools marked ○ in the Sketch column are tools introduced in the sketches of the special tools (See Sketches of special tools).

Component	Symbol		Part number	Part name	Necessity	Q'ty	New/remodel	Sketch	Nature of work, remarks
Removal and installation of fuel supply pump assembly	A	1	795-799-1390	Remover	●	1			Removal of fuel supply pump assembly
Removal and installation of engine front seal		2	795-799-8120	Installer	●	1			Installation of engine front seal
Removal and installation of engine rear seal		3	Commercially available	Dial gauge and stand	●	1			Measuring radial runout and facial runout of flywheel and flywheel housing
Removal and installation of cylinder head assembly	B	1	795-799-8150	Remover	●	1			Removal of fuel inlet connector
		2	795-799-6700	Puller	■	1			Removal of fuel injector assembly
		3	760-331-1110	Wrench	●	1			Tightening of cylinder head bolt
Engine and hydraulic pump assembly	C		796-460-1210	Oil stopper	●	1			Stopping oil flow
			796-770-1320	Adapter	●	1			
Final drive assembly	D	1	796-627-1610	Wrench assembly	■	1			Removal and installation of nut
			796-627-1620	• Wrench		1			
			796-427-1140	• Pin		3			
			01314-20612	• Screw		3			
		2	796T-627-1630	Push tool	■	1		○	Installation of bearing
			790-101-2510	Block	■	1			
			791-830-1320	Rod	■	2			
			01580-11613	Nut	■	2			
			790-101-2570	Washer	■	2			
			01643-31645	Washer	■	2			
			790-105-2100	Jack assembly	■	1			
			790-101-1102	Pump	■	1			
		3	790-580-1510	Installer	■	1			Installation of floating seal
		4	790-331-1110	Wrench	■	1			Tightening of cover mounting bolt

Component	Symbol		Part number	Part name	Necessity	Q'ty	New/remodel	Sketch	Nature of work, remarks
Swing motor and swing machinery assembly	E	1	796T-626-1110	Push tool	●	1		○	Press fitting of bearing
		3	790-201-2480	Push tool	■	1			Press fitting of bearing
		4	790-101-5401	Push tool kit	●	1			Press fitting of oil seal
			790-101-5521	• Plate		1			
			790-101-5421	• Grip		1			
			01010-51240	• Bolt		1			
		5	793T-815-1110	Push tool	■	1		○	Press fitting of bearing
Carrier roller assembly	F	1	791-430-3230	Installer	■	1			Oil refilling
		2	791-601-1000	Oil pump	■	1			
Track roller assembly	G	1	796-670-1010	Installer	■	1			
		2	791-601-1000	Oil pump	■	1			
Idler assembly	H	1	796-570-1020	Installer	■	1			
		2	791-601-1000	Oil pump	■	1			
Recoil spring assembly	J	1	791-685-8006	Compressor	■	1			Disassembly and assembly of recoil spring assembly
			791-635-3160	Extension	■	1			
			790-101-1600	Cylinder (686 kN {70 t})	■	1			
			790-101-1102	Pump	■	1			
		2	790-201-1500	Plate tool kit	■	1			Installation of dust seal
			790-201-1620	• Plate		1			
			790-101-5021	• Grip		1			
			01010-50816	• Bolt		1			
Track shoe assembly	K		791-630-3000	Remover & installer	■	1			Pulling out master pin
			790-101-1300	Cylinder (980 kN {100 t})	■	1			
			790-101-1102	Pump	■	1			
Center swivel joint assembly	L		790-101-2501	Push puller	■	1			Disassembly and assembly of center swivel joint assembly
			790-101-2510	• Block		1			
			790-101-2520	• Screw		1			
			791-112-1180	• Nut		1			
			790-101-2540	• Washer		1			
			790-101-2630	• Leg		2			
			790-101-2570	• Plate		4			
			790-101-2560	• Nut		2			
			790-101-2650	• Adapter		2			

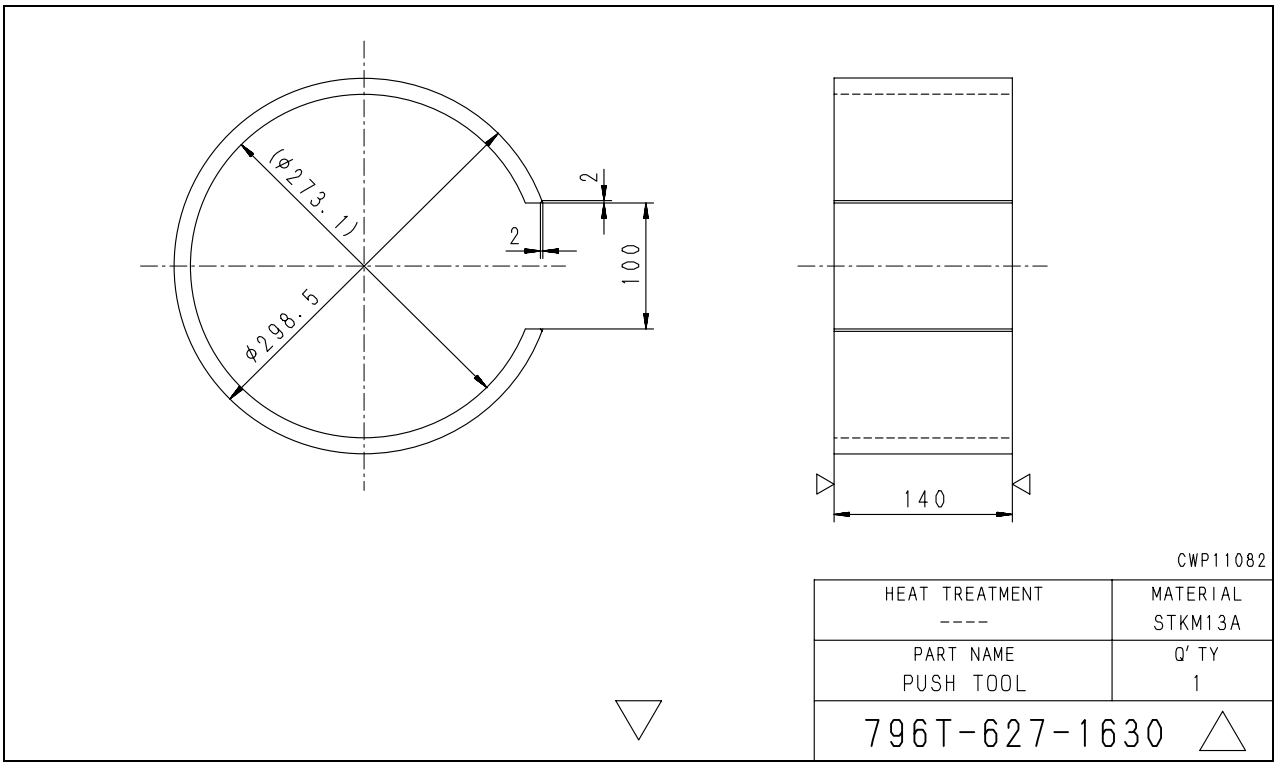
Component	Symbol		Part number	Part name	Necessity	Q'ty	New/remodel	Sketch	Nature of work, remarks
Control valve assembly	M	1	796-946-1310	Guide	■	1			Replacement of pressure compensation valve seal
			(For 723-46-40100, 723-46-40601)						
			796-946-1810	Guide	■	1			
			(For 723-46-43100, 723-46-43400)						
			796-946-2110	Guide	■	1			
			(For 723-46-44100)						
			796-946-2210	Guide	■	1			
			(For 723-46-45100)						
		2	796-946-1320	Guide	■	1			
			(For 723-46-40100, 723-46-40601)						
			796-946-1820	Guide	■	1			
			(For 723-46-43100, 723-46-43400)						
			796-946-2120	Guide	■	1			
			(For 723-46-44100)						
			796-946-2220	Guide	■	1			
			(For 723-46-45100)						
			796-946-1420	Guide	■	1			
			(For 723-46-42800)						
		3	796-946-1330	Sleeve	■	1			
			(For 723-46-40100, 723-46-40601)						
			796-946-1830	Sleeve	■	1			
			(For 723-46-43100, 723-46-43400)						
			796-946-2130	Sleeve	■	1			
			(For 723-46-44100)						
			796-946-2230	Sleeve	■	1			
			(For 723-46-45100)						
			796-946-1430	Sleeve	■	1			
			(For 723-46-42800)						

Component	Symbol		Part number	Part name	Necessity	Q'ty	New/remodel	Sketch	Nature of work, remarks
Hydraulic cylinder assembly	N	1	790-502-1003	Cylinder repair stand	■	1			Disassembly and assembly of hydraulic cylinder assembly
		2	790-102-4300	Wrench assembly	■	1			Removal and installation of piston assembly
			790-102-4310	Pin	■	2			
		3	790-720-1000	Expander	●	1			Installation of bearing
		4	796-720-1680	Ring	●	1			
			07281-01589	Clamp	●	1			
		5	790-201-1702	Push tool kit	■	1			Press fitting of bushing
			790-201-1851	Push tool (for bucket and boom)		1			
			790-201-1861	Push tool (for arm)		1			
			790-101-5021	Grip		1			
			01010-50816	Bolt		1			
		6	790-201-1500	Push tool kit	■	1			Press fitting of dust seal
			790-101-5021	Grip		1			
			01010-50816	Bolt		1			
			790-201-1660	Push tool (for boom and bucket)		1			
			790-201-1670	Plate (for arm)		1			Removal of foot pin
Work equipment assembly	P		796-670-1100	Remover	■	1			
			796-670-1110	• Sleeve		1			
			796-670-1120	• Plate		1			
			796-670-1130	• Screw		1			
			791-775-1150	• Adapter		1			
			01643-33080	• Washer		1			
			01803-13034	• Nut		1			
			790-101-4000	Puller (490 kN {50 t} long)	■	1			
			790-101-1102	Pump (294 kN {30 t})	■	1			
Air conditioner assembly	Q		799-703-1200	Service tool kit	■	1			Refilling of gas for air conditioner
			799-703-1100	Vacuum pump (100 V)	■	1			
			799-703-1111	Vacuum pump (220 V)	■	1			
			799-703-1121	Vacuum pump (240 V)	■	1			
			799-703-1401	Gas leak detector	■	1			
Operator's cab glass	Y	1	793-498-1210	Lifter (Suction cup)	■	2			Removal and installation of operator's cab glass
		2	20Y-54-13180	Adapter	■	2			

Sketches of special tools

Note: Komatsu cannot accept any responsibility for special tools manufactured according to these sketches.

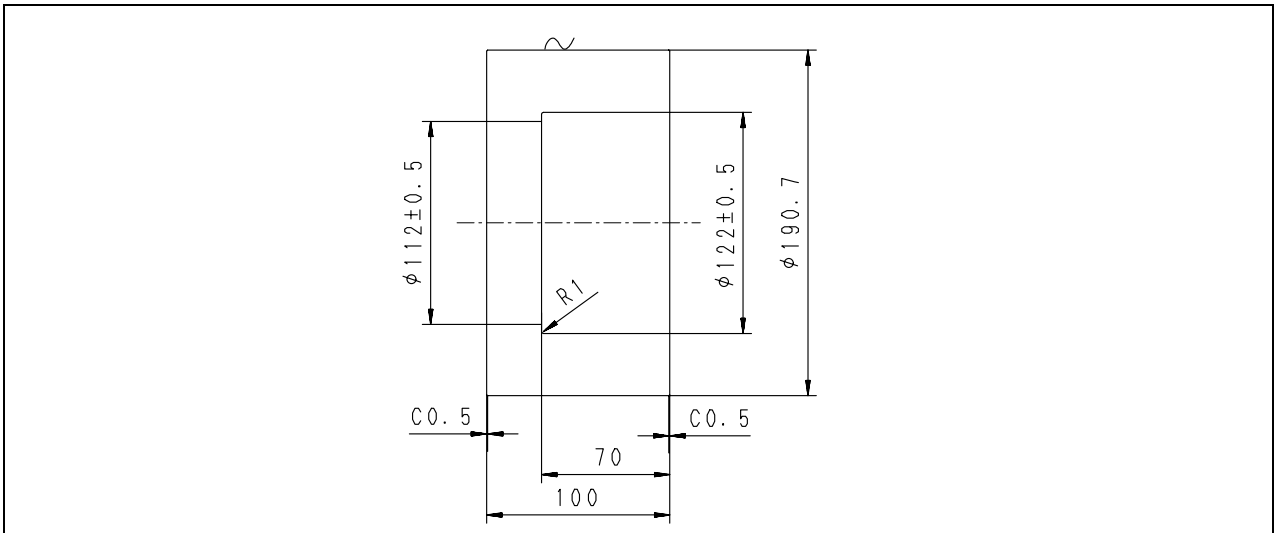
D2 push tool



CWP11082

HEAT TREATMENT	MATERIAL
----	STKM13A
PART NAME	Q'TY
PUSH TOOL	1
796T-627-1630 △	

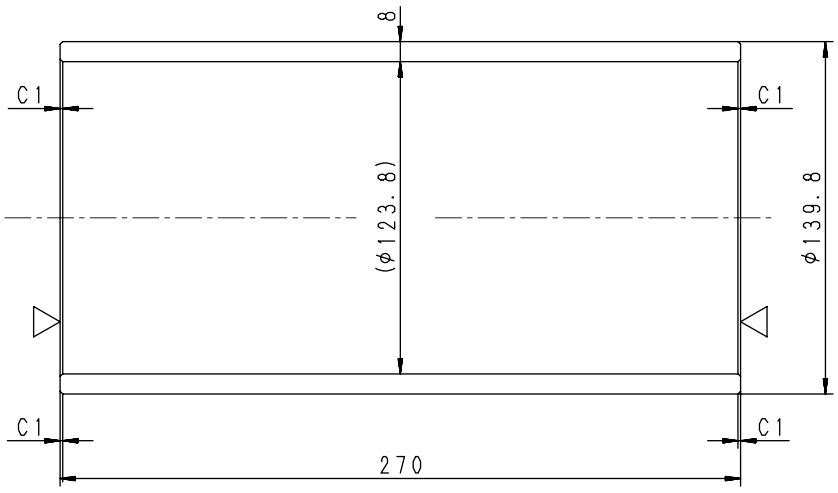
E1 push tool



CDP00506

HEAT TREATMENT	MATERIAL
----	STKM13A
PART NAME	Q'TY
PUSH TOOL	1
796T-626-1110 △	

E5 push tool



CWW03075

HEAT TREATMENT	MATERIAL
----	STKM13A
PART NAME	QTY
PUSH TOOL	----
793T-815-1110 △	

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00956-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

Engine and cooling system

Engine and cooling system 2
Removal and installation of fuel supply pump assembly 2
Removal and installation of engine front seal 5
Removal and installation of engine rear seal 7
Removal and installation of cylinder head assembly 12
Removal and installation of radiator assembly 22
Removal and installation of hydraulic oil cooler assembly 24
Removal and installation of aftercooler assembly 26
Removal and installation of engine and hydraulic pump assembly 27

Engine and cooling system

Removal and installation of fuel supply pump assembly

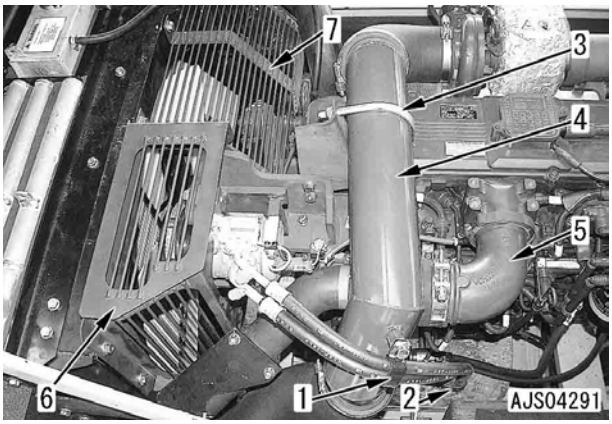
Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
A	1	795-799-1390	Remover	●	1		

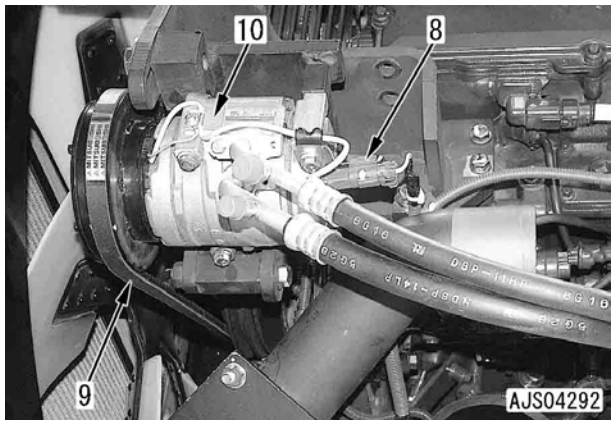
Removal

⚠ **Disconnect the cable from the negative (–) terminal of the battery.**

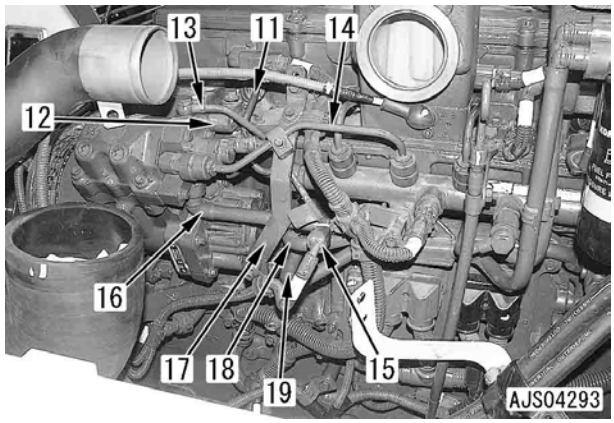
1. Open the engine hood.
2. Remove clamps (1) and (2), U-bolt (3), and air intake tube (4). [*1]
3. Remove air intake connector (5).
4. Remove belt cover (6) and fan guard (7).



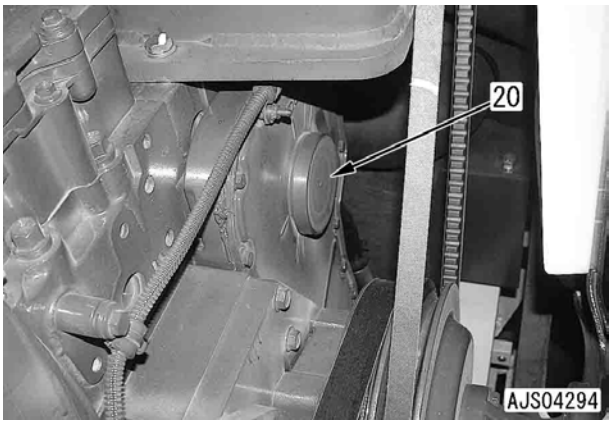
5. Disconnect connector M34 (8).
6. Loosen air conditioner compressor belt (9) and remove it. [*2]
7. Remove air conditioner compressor (10) and bracket together and move them to a place where they will not be obstacle to the work.



8. Remove No. 1 injector high-pressure pipe (11). [*3]
9. Remove bracket (12).
10. Remove overflow tube (13).
11. Remove supply pump outlet high-pressure pipe (14). [*3]
12. Disconnect connector CP3 (15).
13. Disconnect inlet hose (16). [*4]
14. Remove bracket (17).
15. Disconnect feed pump hoses (18) and (19). [*4]

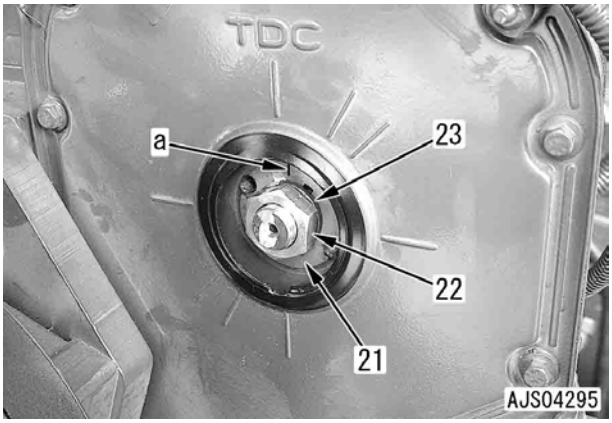


16. Remove front gear cover cap (20).

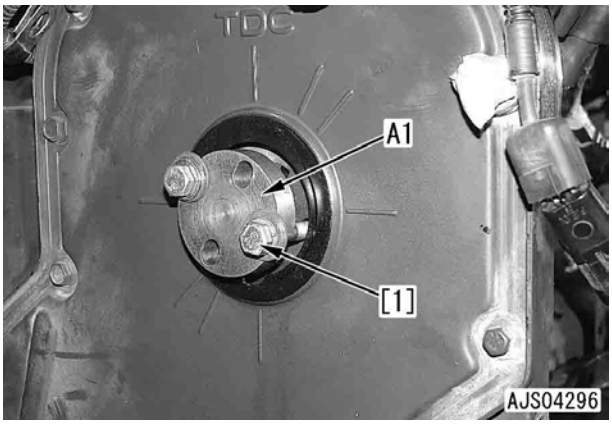


17. Rotate the crankshaft forward to set stamp (a) of supply pump drive gear (21) to the top and set the No. 1 cylinder to the compression top dead center (TDC).

18. Remove nut (22) and washer (23).

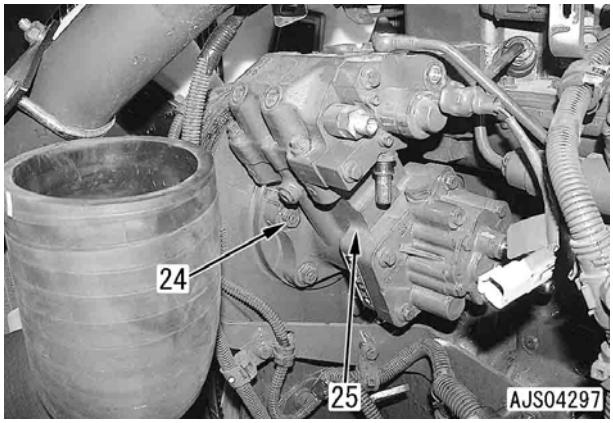


19. Install tool **A1** with bolts [1] (M8 x 1.25).



20. Remove 4 nuts (24).

21. Push in tool **A1** installed in step 19 and remove fuel supply pump assembly (25).



Installation

Carry out installation in the reverse order to removal.

[*1]

★ Tighten the hose clamps before and after the air intake tube to the following torque.

Hose clamp: **9.8 ± 0.5 Nm {1 ± 0.05 kgm}**

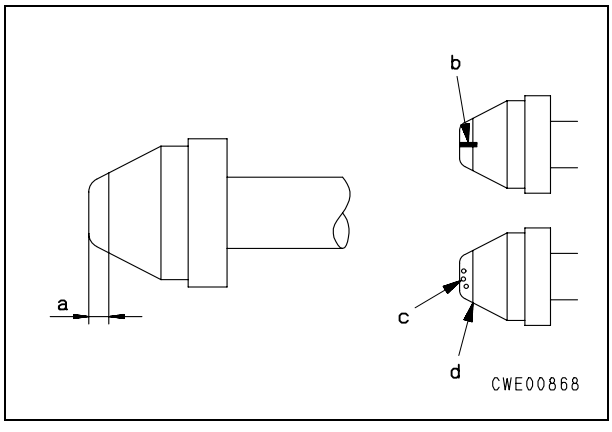
[*2]

★ Adjust the belt tension. For details, see Testing and adjusting, "Testing and adjusting air conditioner compressor belt".

[*3]

★ Before installing the high-pressure pipe, check it for the following defects. If there are any of these defects, it can cause fuel leakage. Accordingly, replace the high-pressure pipe.

- Check the taper seal of the connecting part (Part (a): Part of 2 mm from the end) for visible lengthwise slit (b) and dent (c).
- Check part (d) (end of the taper seal: Part at 2 mm from the end) for stepped-type wear (fatigue) which your nail can feel.

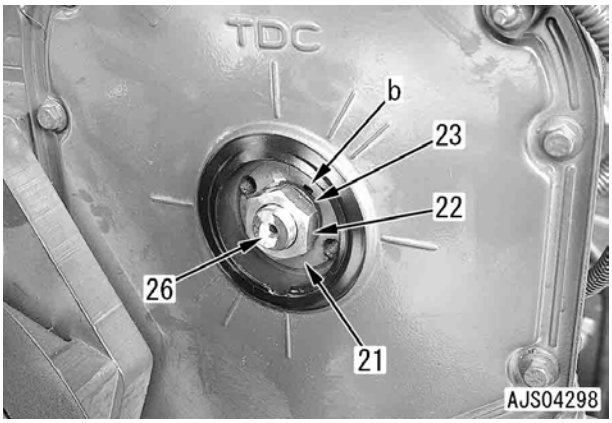


★ Tighten the No. 1 injector and outlet high-pressure pipe to the following torque.
Sleeve nut: **37.3 ± 4 Nm {3.8 ± 0.4 kgm}**

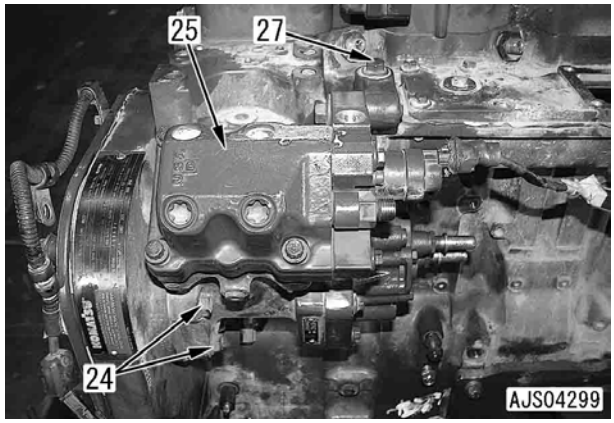
★ When installing the No. 1 injector high-pressure pipe and supply pump outlet high-pressure pipe, set the slits of the bellows at both ends of them in the following directions.
- No. 1 injector high-pressure pipe
  (injector side): Down
  (Common rail side): Up
- Supply pump outlet high-pressure pipe
  (supply pump side
  and common rail side): Out

[*4]
★ Clean the inside of the hose connector and insert the connector securely.

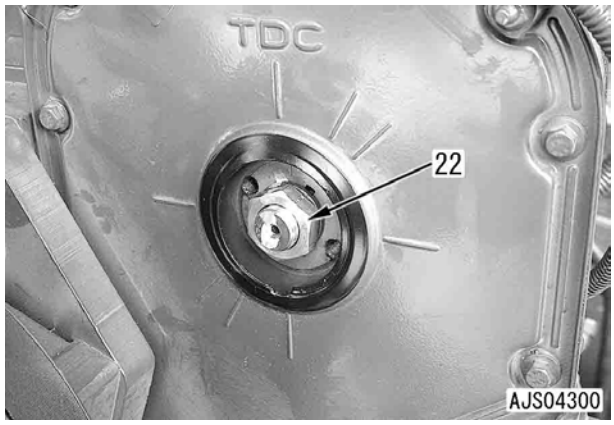
[*5]
★ Install the fuel supply pump assembly according to the following procedure.
1) Push in supply pump drive shaft (26), matching its pin to key way (b) of supply pump drive gear (21), and tighten nut (22) and washer (23) temporarily.



2) Install fuel supply pump assembly (25) with 4 mounting nuts (24) and bracket mounting bolts (27).
Mounting nut: **Adhesive (LT-2)**
Mounting nut and bolt:
43 ± 6 Nm {4.4 ± 0.6 kgm}



3) Tighten mounting nut (22)
Mounting nut:
180 ± 12.7 Nm {18.4 ± 1.3 kgm}



Removal and installation of engine front seal

Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
A	2	795-799-8120	Installer	●	1		

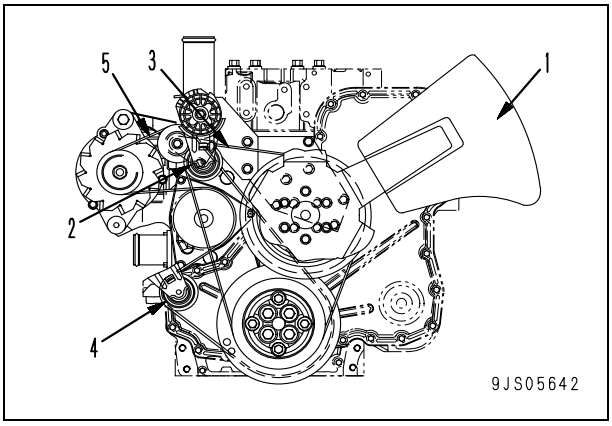
Removal

1. Remove the radiator assembly and hydraulic oil cooler assembly. For details, see "Removal and installation of radiator assembly" and "Removal and installation of hydraulic oil cooler assembly".

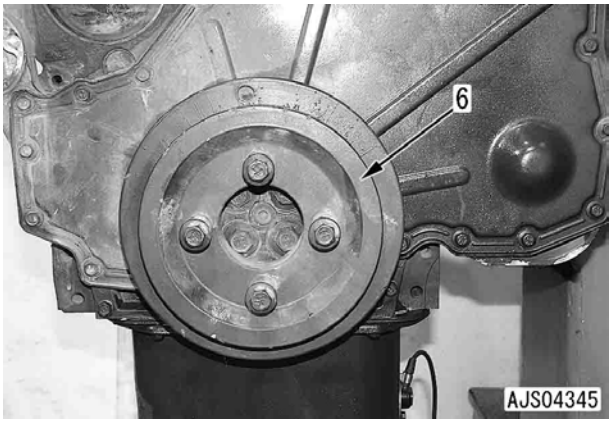
2. Remove radiator fan (1).

3. Loosen tensioner (2) to remove fan belt (3).

4. Loosen tensioner (4) to remove alternator belt (5).



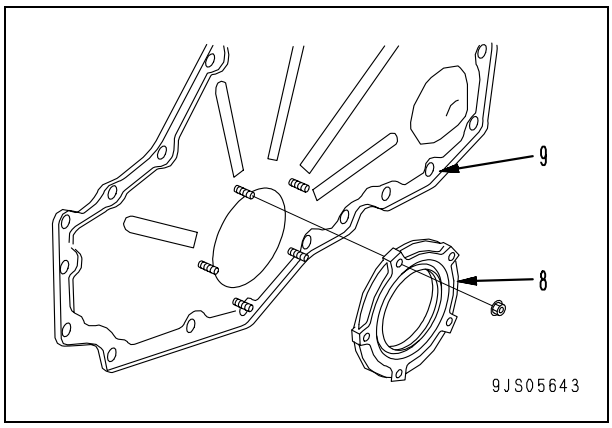
5. Remove pulley (6).



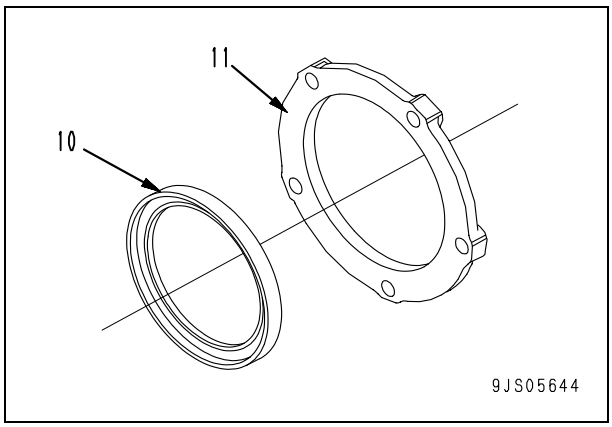
6. Remove vibration damper (7). [*1]



7. Remove front seal and carrier assembly (8) from front cover (9).



8. Remove front seal (10) from carrier (11).



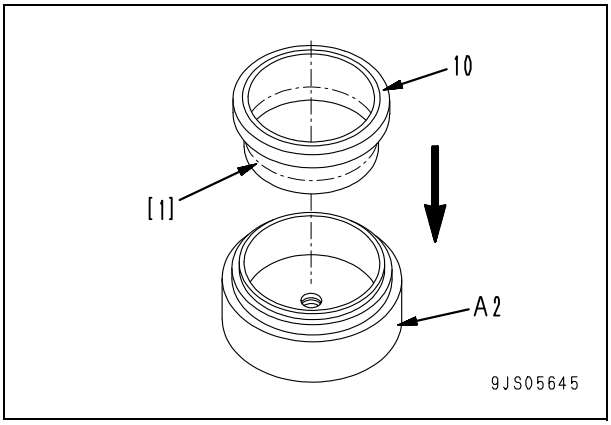
Installation

★ Since pilot tool [1] inside the front seal is used to guide the crankshaft, do not remove it from the front seal.
★ Pilot tool [1] is in the spare front seal.

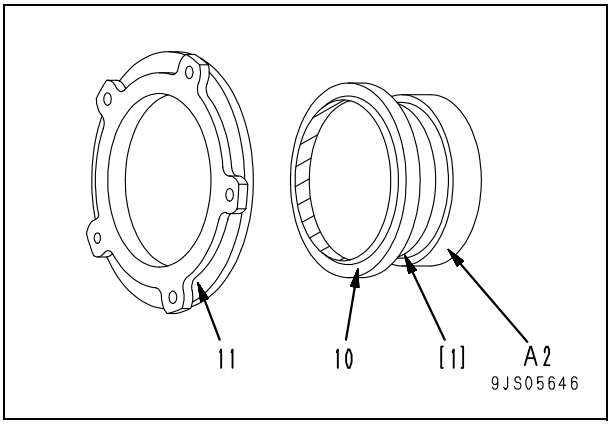
1. Clean the seal inserting part of the crankshaft.

2. Set front seal (10) to tool **A2** with its lip up.

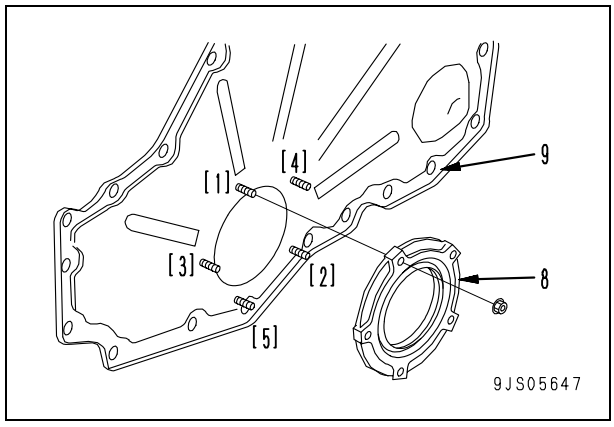
3. Apply neutral detergent to the periphery of the front seal.



4. Using **A2**, insert front seal (10) in carrier (11) from the front cover fitting face.
   ★ Insert front seal (10) so that the front cover fitting face of carrier (11) will be flush with the bottom of the front seal.



5. Install front seal and carrier assembly (8) to front cover (9).
   1) Apply gasket sealant to the mounting face of the carrier.
      Mounting face of carrier:
      Gasket sealant (LG-7)
   2) Apply the pilot tool of the front seal to the crankshaft and push in the whole carrier.
   3) Remove the pilot tool.
   4) Tighten the mounting nuts in the order of the numbers shown in the figure.
      Mounting nut:
      9.8 ± 2.0 Nm {1.0 ± 0.2 kgm}



6. Carry out the following installation in the reverse order to removal.

[*1]
★ Tighten the vibration damper to the following torque.
   Mounting bolt:
   200 ± 10 Nm {20 ± 1.0 kgm}

Removal and installation of engine rear seal

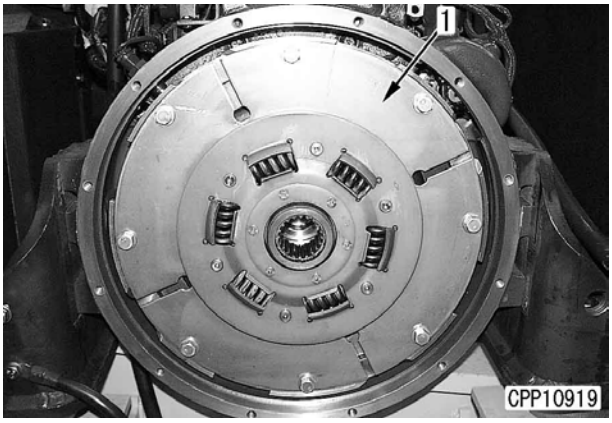
Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
A	3	Commercially available	Dial gauge and stand	●	1		

Removal

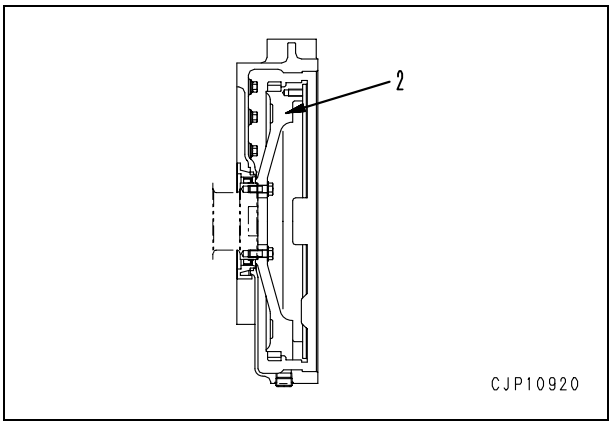
1. Remove the hydraulic pump assembly referring to the section "Removal and installation of hydraulic pump assembly".

2. Remove damper assembly (1). [*1]

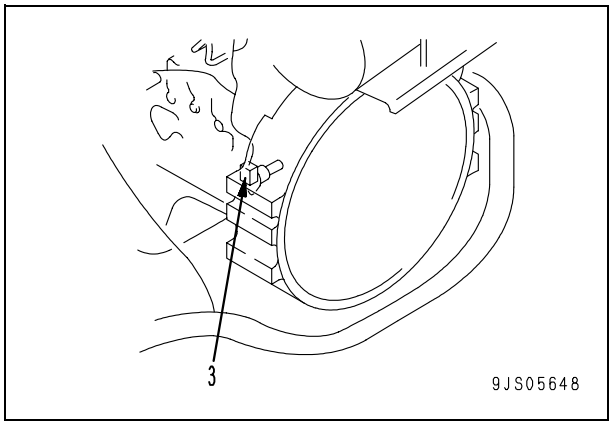


3. Install the sling to flywheel (2) and lift off the flywheel. [*2]

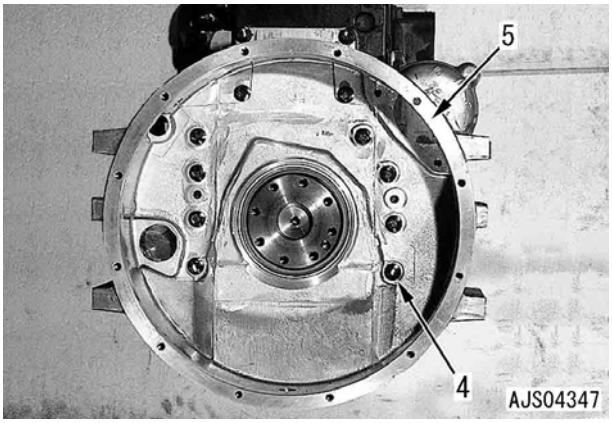
   Flywheel: **40 kg**



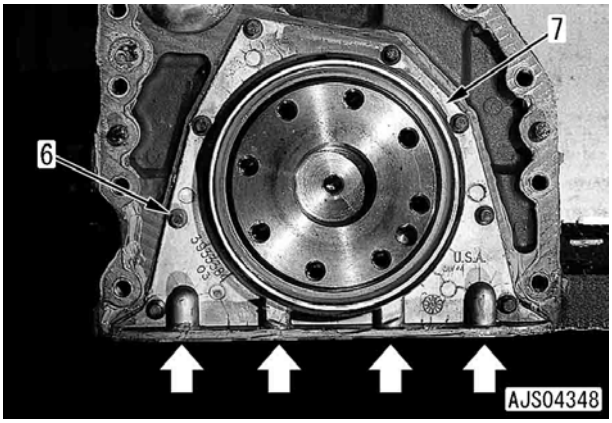
4. Disconnect connector CRANK (3).



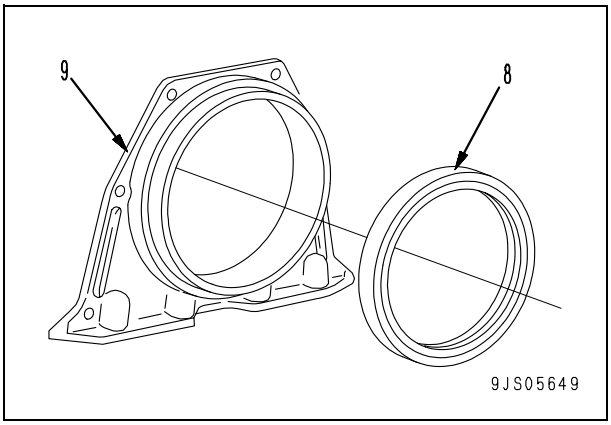
5. Remove 12 mounting bolts (4) and lift off flywheel housing (5). [*3]



6. Remove 4 mounting bolts (indicated by the arrows) of the oil pan, 8 mounting bolts (6), and rear seal and housing assembly (7).

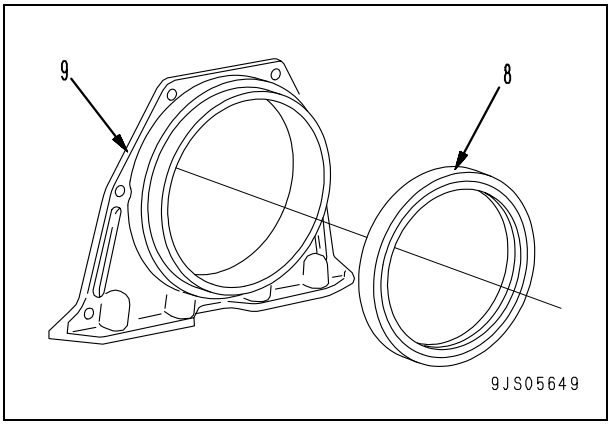


7. Remove rear seal (8) from seal housing (9).

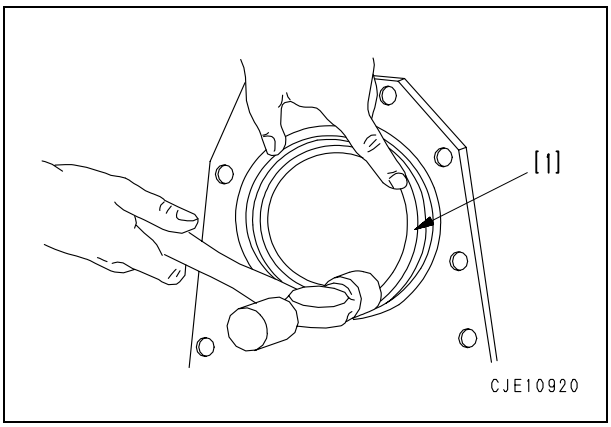


Installation

1. Press fit rear seal (8) to seal housing (9).



2. Using aligning tool [1], insert the rear seal until it is flush with the mounting flange of seal housing (9).
   - ★ While lightly hitting the top, bottom, right, and left of aligning tool [1] to check that the seal carrier does not slant, push in the rear seal until the outside of aligning tool [1] touches the housing.
   - ★ Do not remove the pilot tool from the rear seal.



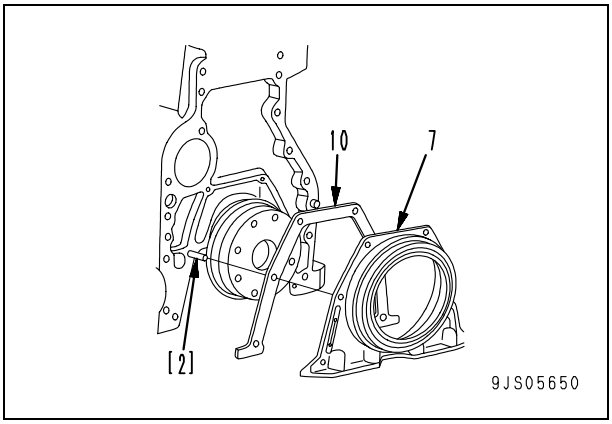
3. Check the ends and seal inserting parts of the crankshaft for burrs and rust and clean them thoroughly.

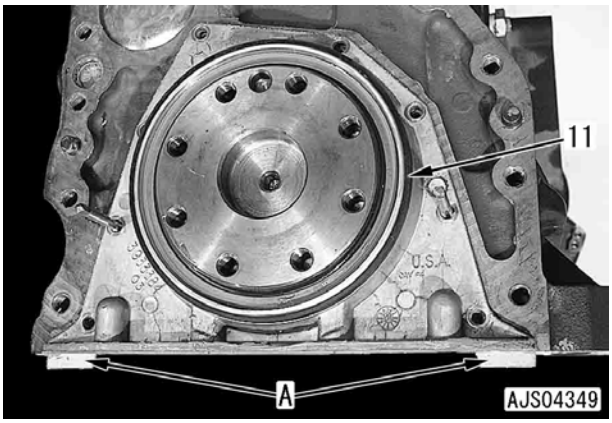
4. Apply gasket sealant to the seal housing.
   Mounting face and oil pan mating face of housing: **Gasket sealant (LG-7)**

5. Install guide pin [2] to the cylinder block and then install gasket (10) and rear seal and housing assembly (7).
   - ★ Cut bottom (A) of gasket (10) at the end of the seal housing (at both right and left sides).

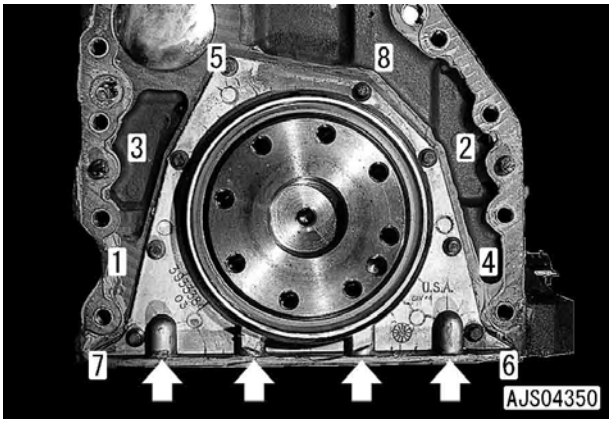
6. Install seal ring (11).

7. Remove guide pin [2].





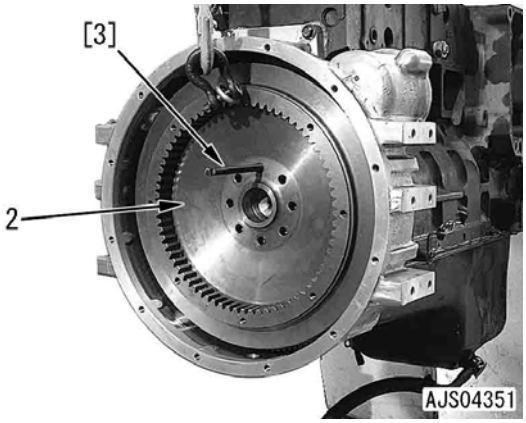
8. Tighten the mounting bolts according to the following procedure.
   1) Tighten the 4 oil pan mounting bolts (indicated by the arrows) temporarily.
   2) Tighten the seal housing mounting bolts in the order of the numbers shown in the figure.
      Mounting bolt:
      12.7 ± 2.0 Nm {1.3 ± 0.2 kgm}
   3) Tighten the 4 oil pan mounting bolts (indicated by the arrows) to the following torque.
      Mounting bolt:
      24 ± 4 Nm {2.4 ± 0.4 kgm}



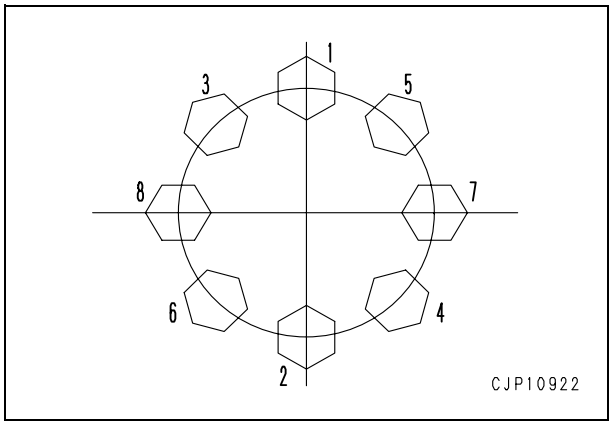
9. Carry out the following installation in the reverse order to removal.

[*1]
Damper assembly mounting bolt:
Adhesive (LT-2)
Spline of damper:
Molybdenum disulfide grease (LM-G)

[*2]
★ Install the flywheel according to the following procedure.
   1) Install guide bolt [3] and flywheel (2).
      ★ Apply a string of gasket sealant 1 – 3 mm in diameter around the bolt holes on the crankshaft mounting face (8 places).
      Mounting face of flywheel:
      Gasket sealant (LG-7)
      Flywheel: **40 kg**



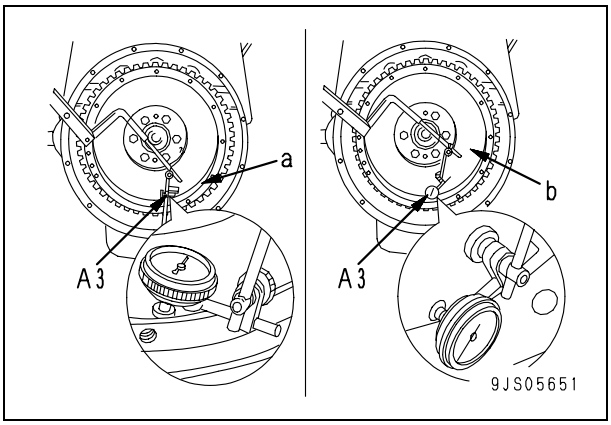
   2) Tighten the mounting bolts in the order of the numbers shown in the figure.
      Mounting bolt:
      137 ± 7 Nm {14.0 ± 0.7 kgm}



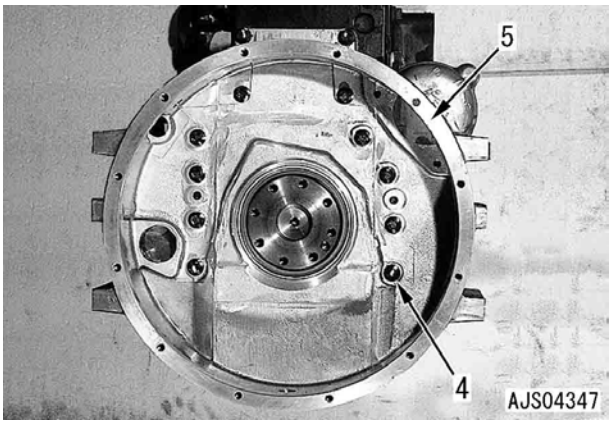
3) After installing the flywheel, measure the radial runout and facial runout with tool **A3**.
   ★ Radial runout: Max. 0.13 mm
   ★ Facial runout: Max. 0.20 mm

- Measuring radial runout
  1] Install tool **A3** to the flywheel housing.
  2] Set the probe of the dial gauge perpendicular to spigot joint portion (a) or periphery of the flywheel.
  3] Rotate the flywheel by 1 turn and measure the difference between the lowest and highest values indicated by the dial gauge.
  ★ After the flywheel is rotated by 1 turn, check that the dial gauge indicates the value at the start of rotation.

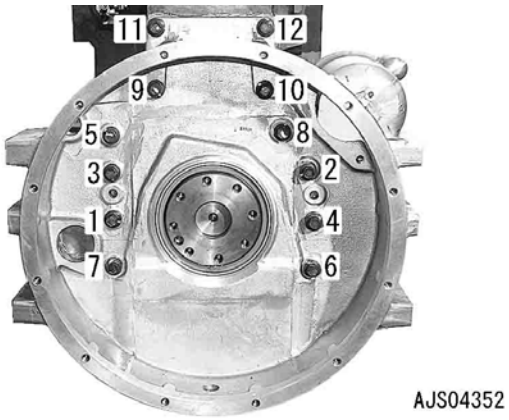
- Measuring facial runout
  1] Similarly to measurement of the radial runout, set the probe of the dial gauge perpendicular to end face (b) of the flywheel near the periphery.
  ★ When measuring, bring the crankshaft to the front or rear side so that an error will not be caused by the end play.
  2] Rotate the flywheel by 1 turn, and measure the difference between the lowest and highest values indicated by the dial gauge.



[*3]
★ Install the flywheel housing according to the following procedure.
1) Sling flywheel housing (5) and install it with mounting bolts (4).
   ★ Apply a string of gasket sealant 1 – 3 mm in diameter to the housing mounting flange face and around each mounting bolt hole.

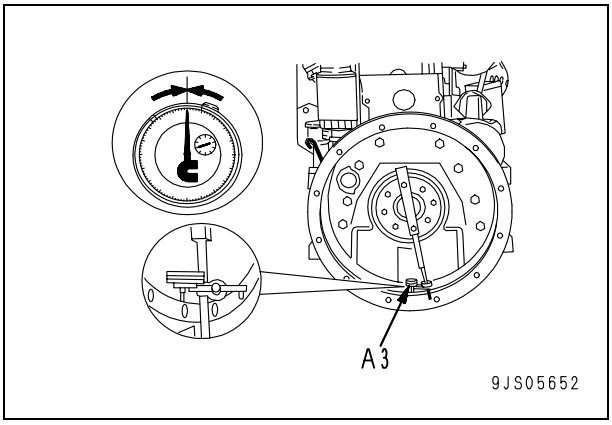


2) Tighten the mounting bolts in the order of the numbers shown in the figure.
   Mounting bolt:
   77 ± 12 Nm {7.9 ± 1.2 kgm}

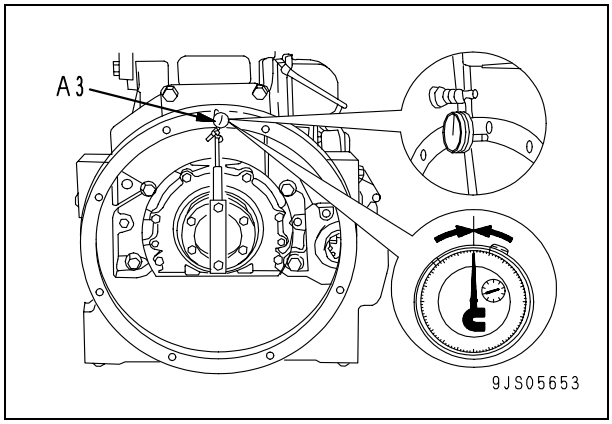


3) After installing the flywheel housing, measure the radial runout and facial runout with tool **A3**.
   ★ Radial runout: Max. 0.20 mm
   ★ Facial runout: Max. 0.20 mm

- Measuring radial runout
  1] Install tool **A3** to the crankshaft end.
  2] Set the probe of the dial gauge perpendicular to the spigot joint portion of the flywheel housing.
  3] Set the dial gauge reading to "0", rotate the crankshaft by 1 turn, and measure the difference between the lowest and highest values indicated by the dial gauge.
  ★ After the crankshaft is rotated by 1 turn, check that the dial gauge indicates the value at the start of rotation.



- Measuring facial runout
  1] Similarly to measurement of the radial runout, set the probe of the dial gauge perpendicular to the end face of the flywheel housing.
  ★ When measuring, bring the crankshaft to the front or rear side so that an error will not be caused by the end play.
  2] Set the dial gauge reading to "0", rotate the crankshaft by 1 turn, and measure the difference between the lowest and highest values indicated by the dial gauge.



Removal and installation of cylinder head assembly

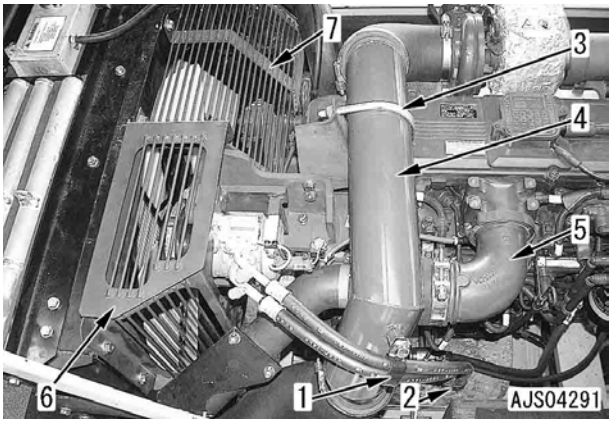
Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
B	1	795-799-8150	Remover	●	1		
	2	795-799-6700	Puller	■	1		
	3	760-331-1110	Wrench	●	1		

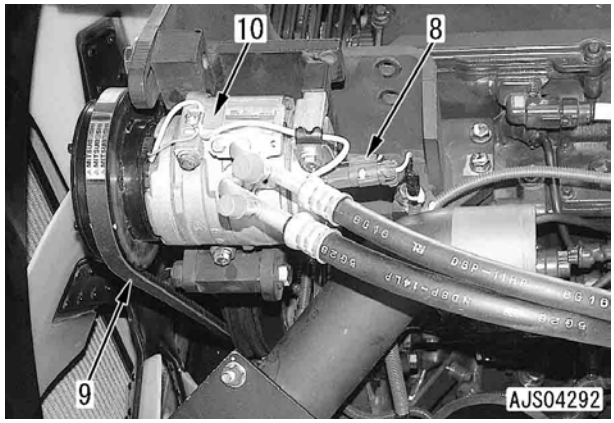
Removal

⚠ **Disconnect the negative terminal (–) of the battery before starting with the work.**

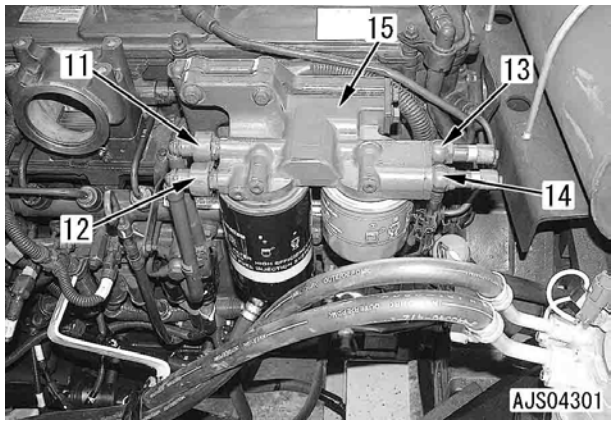
1. Drain the engine coolant.
   Coolant: **Approx. 36 ℓ**
2. Open the engine hood.
3. Remove clamps (1) and (2), U-bolt (3), and air intake tube (4). [*1]
4. Remove air intake connector (5).
5. Remove belt cover (6) and fan guard (7).



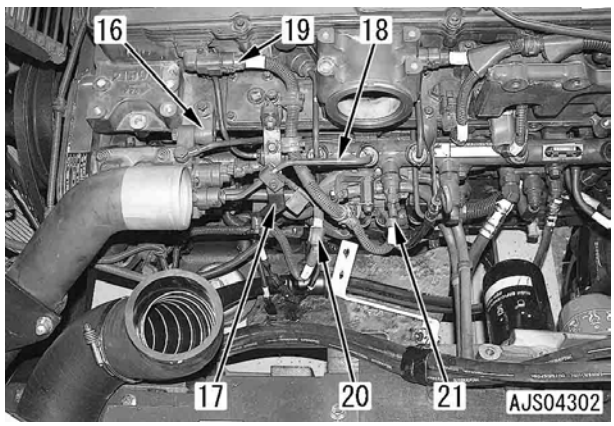
6. Disconnect connector M34 (8).
7. Loosen air conditioner compressor belt (9) and remove it. [*2]
8. Remove air conditioner compressor (10) and bracket together and move them to a place where they will not be obstacle to the work.



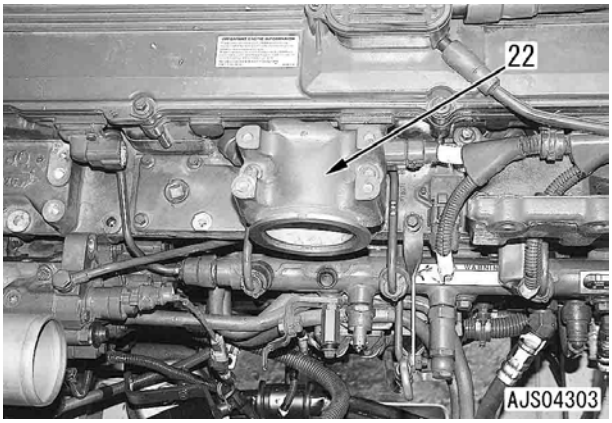
9. Disconnect hoses (11) and (12) and tubes (13) and (14). [*3]
10. Remove the fuel filter and corrosion resistor head assembly (15).



11. Remove brackets (16) and (17). [*4]
12. Remove supply pump outlet high-pressure pipe (18). [*5] [*6]
13. Disconnect connectors CYL1 and CYL2 (19), CP3 (20), and FUEL (21).

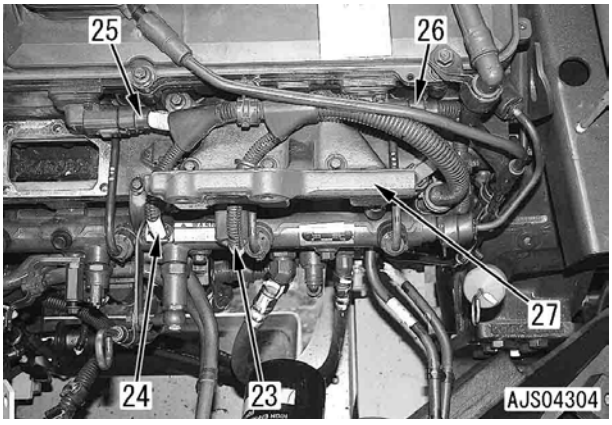


14. Remove air intake connector (22) and air heater together.



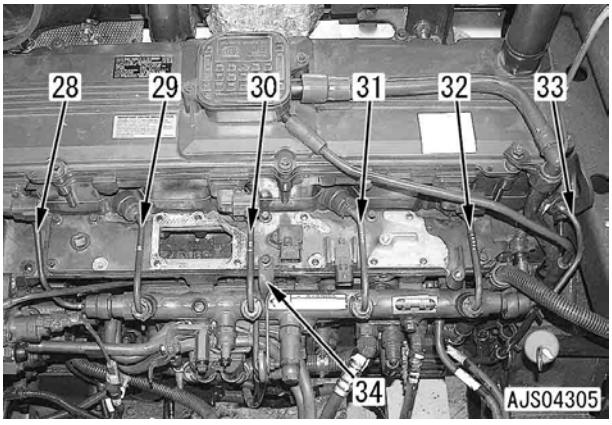
15. Disconnect connectors AMBAIR (23), BOOST (24), CLY3 and CYL4 (25), and CYL5 and CYL6 (26).

16. Remove bracket (27).



17. Remove high-pressure pipes (28) – (33). [*5] [*6]

18. Remove bracket (34).



19. Disconnect drain tube (35).

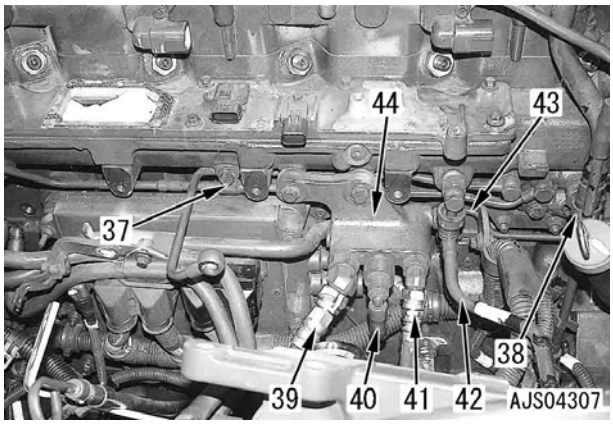
20. Remove common rail (36). [*5]



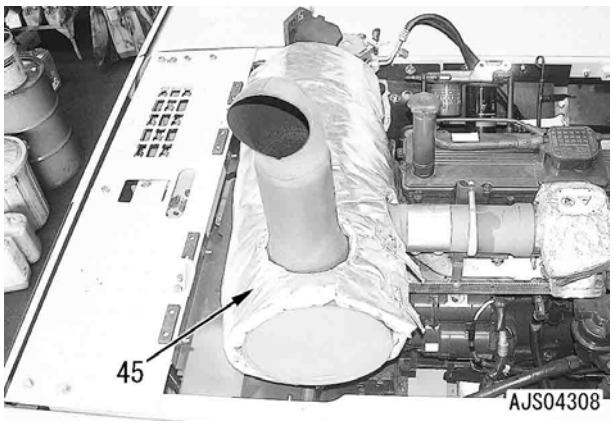
21. Remove clamps (37) and (38).

22. Disconnect hoses (39) – (42) and tube (43).

23. Remove block (44).



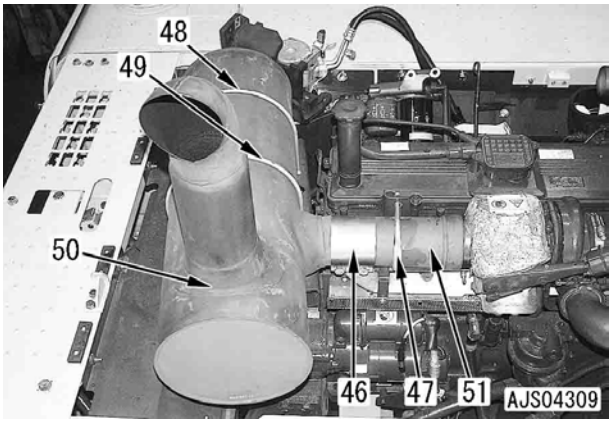
24. Remove cover (45).



25. Remove clamp (46). [*7]

26. Remove U-clamp (47) and U-bolts (48) and (49). [*8]

27. Remove muffler (50) and joint (51). [*9]



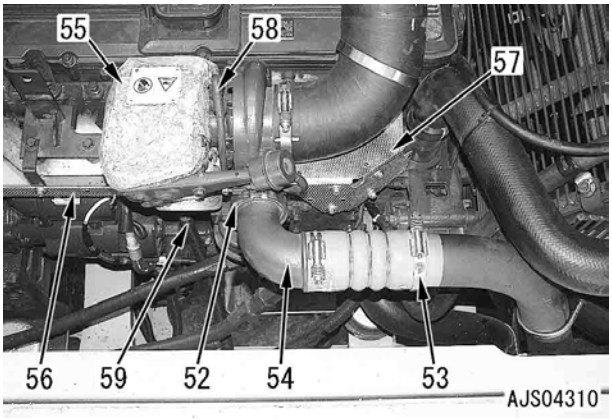
28. Remove clamp (52). [*10]

29. Loosen clamp (53). [*11]

30. Remove tube (54) and hose together.

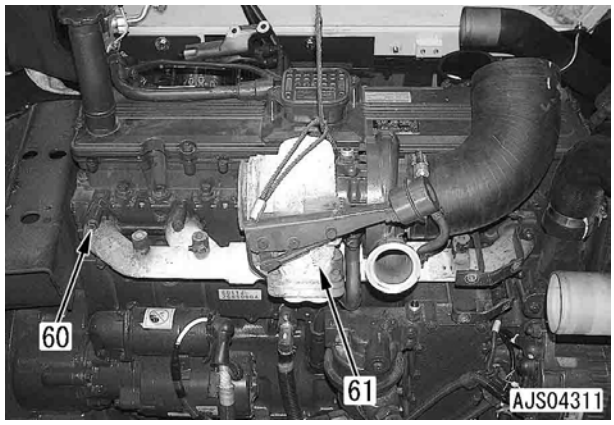
31. Remove heat insulation covers (55), (56), and (57).

32. Disconnect lubrication hoses (58) and lubrication tube (59). [*12]

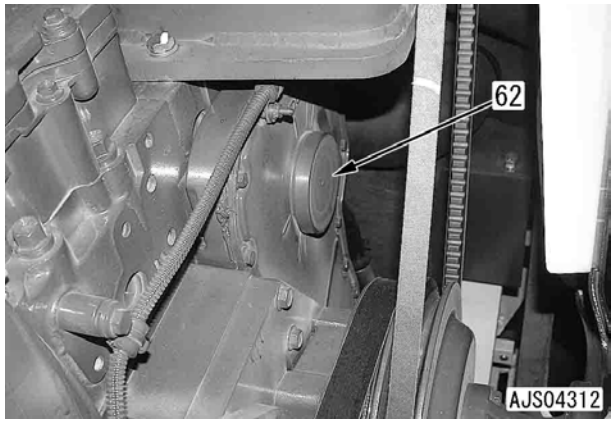


33. Sling the turbocharger and exhaust manifold assembly temporarily.

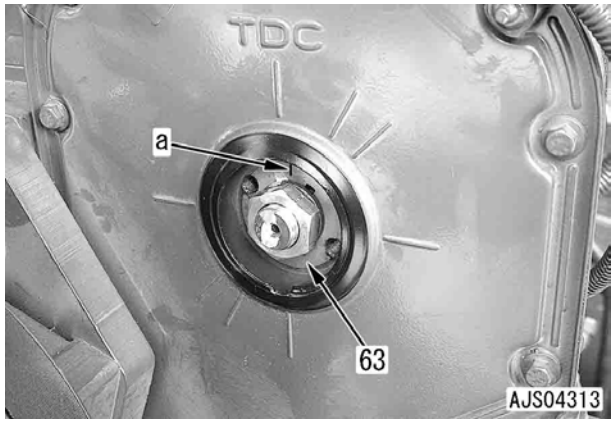
34. Remove 12 mounting bolts (60) and turbocharger and exhaust manifold assembly (61). [*13]
    Turbocharger and exhaust manifold assembly: **35 kg**



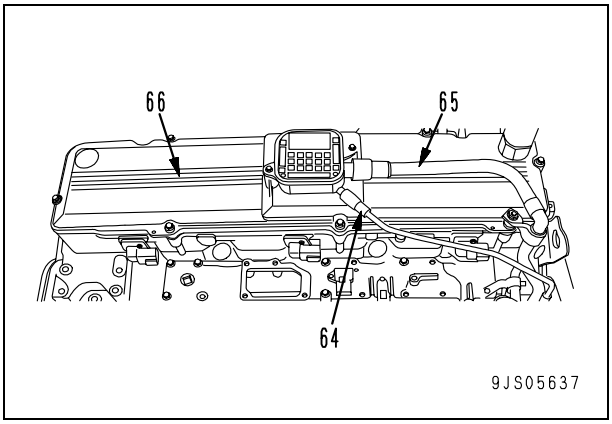
35. Remove front gear cap (62).



36. Rotate the crankshaft forward to set stamp (a) of supply pump drive gear (63) to the top and set the No. 1 cylinder to the compression top dead center (TDC).

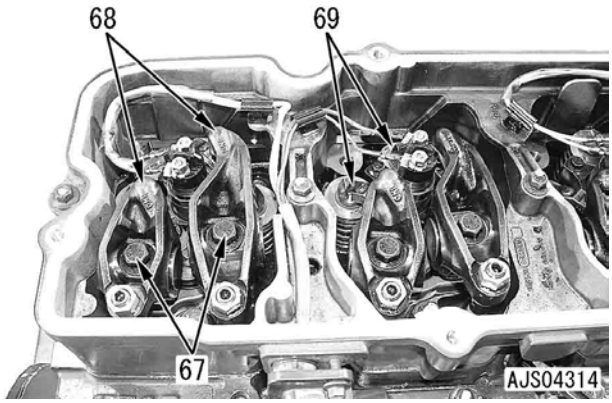


37. Disconnect hoses (64) and (65) and remove cylinder head cover (66).

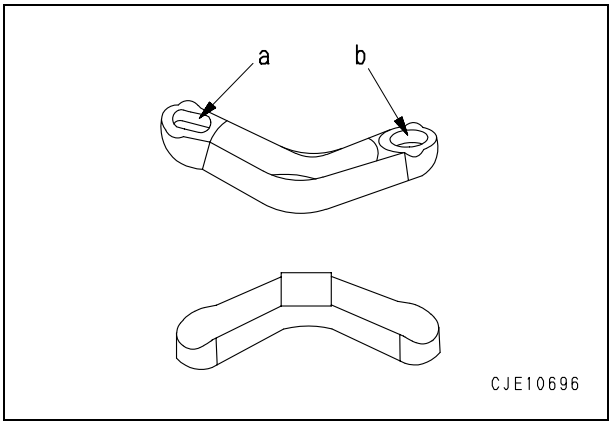


38. Remove 12 bolts (67) and rocker arm assembly (68). [*14]
    ★ Loosen the locknut and then loosen the adjustment screw by 2 – 3 turns so that an excessive force will not be applied to the push rod when the rocker arm is installed.

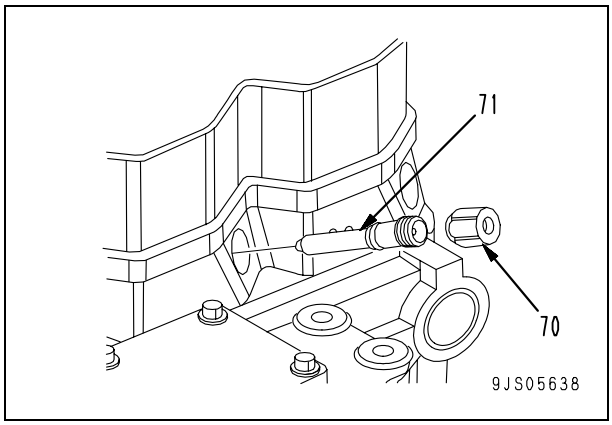
39. Remove crosshead (69). [*14]



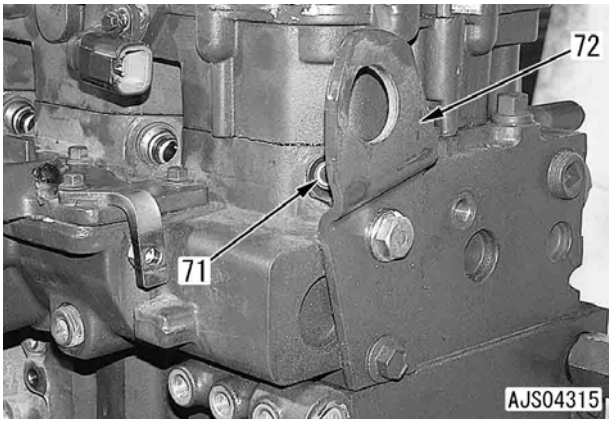
    ★ Record the position of each crosshead and the positions of holes (a) and (b) for the valve.



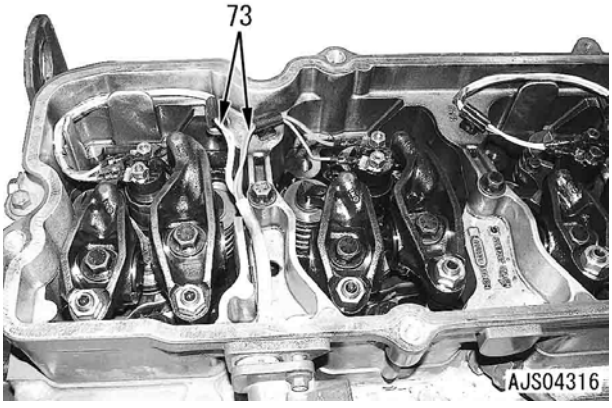
40. Remove the fuel injector assembly according to the following procedure. [*15]
    1) Clean the inlet connector carefully so that mud, etc. sticking around it will not enter its hole.
    2) Remove retainer (70).
    3) Tighten tool **B1** into inlet connector (71) and remove the inlet connector.



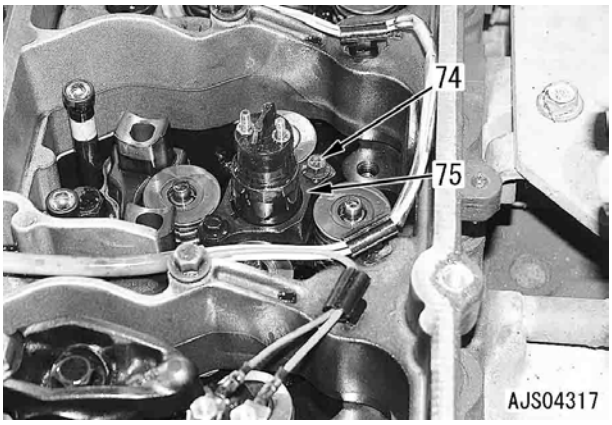
    ★ Before removing retainer (71) of the No. 6 cylinder, remove rear engine hanging plate (72).



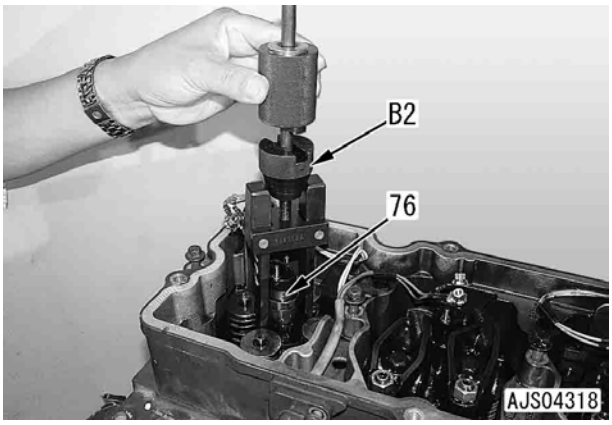
    4) Loosen the upper nut and disconnect injector wiring harness (73). [*16]



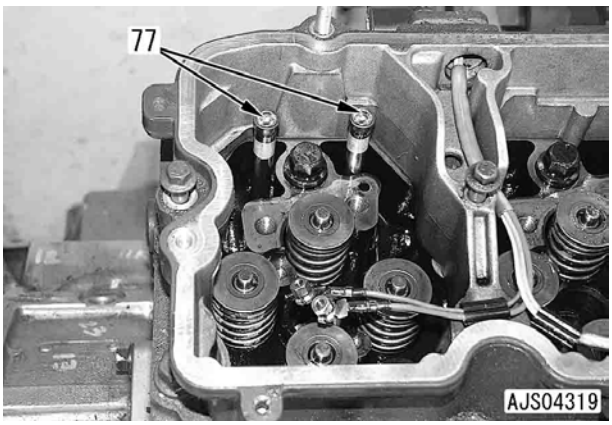
5) Remove bolt (74) and holder (75).



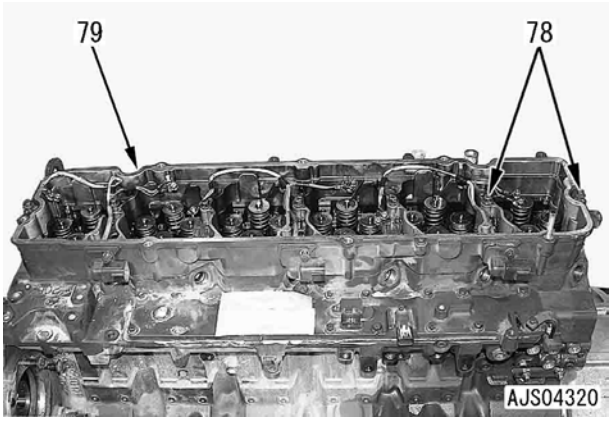
6) Using tool **B2**, pull up fuel injector assembly (76).
★ Do not pry up the injector top.



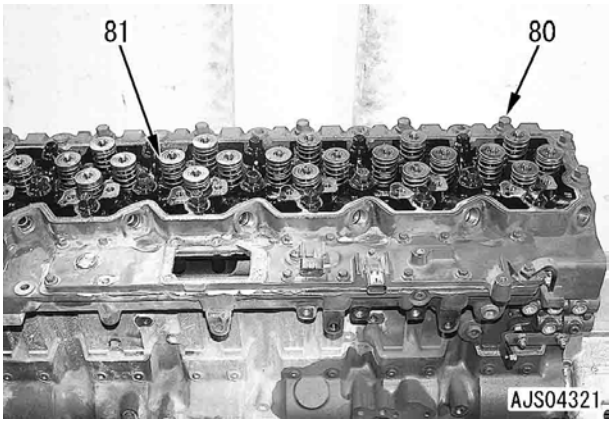
41. Remove 12 push rods (77). [*17]



42. Remove 7 mounting bolts (78) and rocker housing assembly (79). [*18]



43. Remove 26 mounting bolts (80) and cylinder head assembly (81). [*19]
Cylinder head assembly: **85 kg**



Installation

Carry out installation in the reverse order to removal.

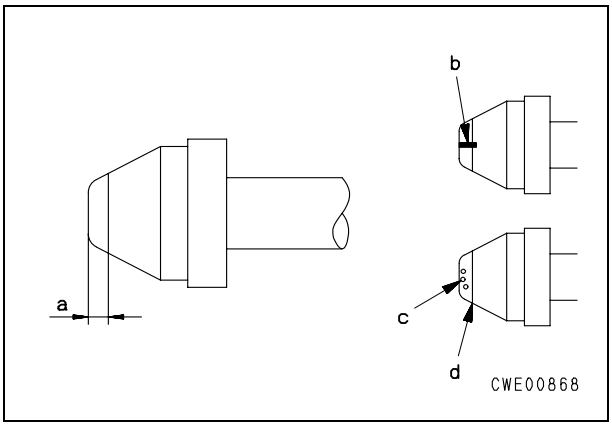
[*1]
★ Tighten the hose clamps before and after the air intake tube to the following torque.
Hose clamp:
9.8 ± 0.5 Nm {1 ± 0.05 kgm}

[*2]
★ Adjust the belt tension. For details, see Testing and adjusting, "Testing and adjusting air conditioner compressor belt."

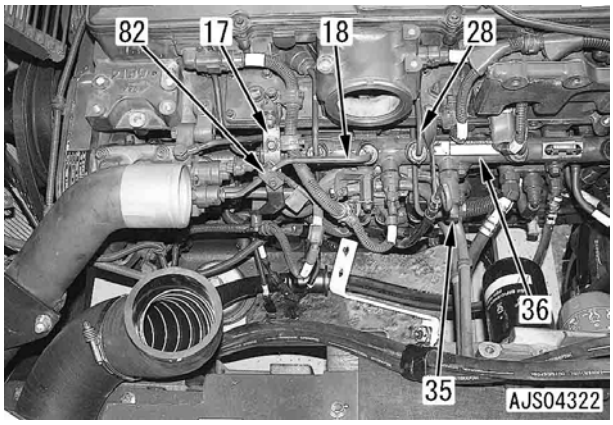
[*3]
★ Clean the inside of the hose connector and insert the connector securely.

[*4]
★ Tighten bracket (16) to the following torque.
Mounting bolt:
43 ± 6 Nm {4.4 ± 0.6 kgm}

[*5]
★ Before installing the high-pressure pipe, check it for the following defects. If there are any of these defects, it can cause fuel leakage. Accordingly, replace the high-pressure pipe.
- Check the taper seal of the connecting part (Part (a): Part of 2 mm from the end) for visible lengthwise slit (b) and dent (c).
- Check part (d) (end of the taper seal: Part at 2 mm from the end) for stepped-type wear (fatigue) which your nail can feel.



★ Install the common rail and high-pressure pipe according to the following procedure.
1) Tighten the mounting bolts of common rail (36) temporarily (with the fingers)
2) Tighten drain tube (35) temporarily.
3) Install supply pump outlet high-pressure pipe (18).
Sleeve nut:
37.3 ± 4 Nm {3.8 ± 0.4 kgm}
4) Install bracket (17) and tighten clamp (82) temporarily.
5) Install 6 high-pressure pipes (28) between the common rail and injectors.
★ Install the high-pressure pipes of the No. 1, No. 3, and No. 5 cylinders while the injector wiring harness connectors are disconnected.
Sleeve nut:
37.3 ± 4 Nm {3.8 ± 0.4 kgm}
6) Tighten drain tube (35) permanently.
Joint bolt:
24 ± 4Nm {2.4 ± 0.4 kgm}
7) Tighten the mounting bolts of common rail (36) permanently.
Mounting bolt:
43.1 ± 4.0 Nm {4.4 ± 0.4 kgm}
8) Tighten clamp (82) permanently.



[*6]
★ When installing the No. 1 – No. 6 injector high-pressure pipes and supply pump outlet high-pressure pipe, set the slits of the bellows at both ends of them in the following directions.
- No. 1 – No. 6 injector high-pressure pipes
(injector side): Down
(Common rail side): Up
- Supply pump outlet high-pressure pipe
(supply pump side and common rail side): Out

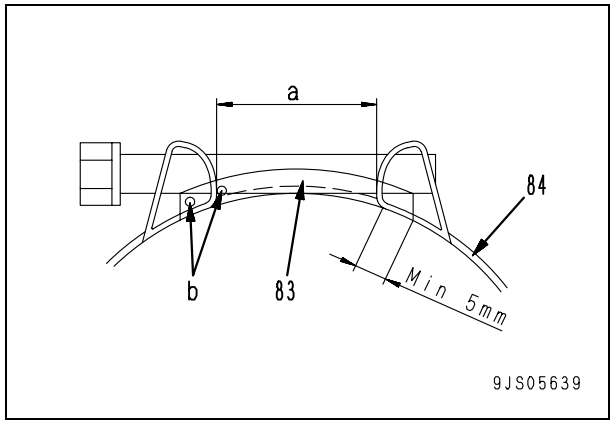
[*7]
★ Tighten the clamp to the following torque.
1st time: **39.2 – 49 Nm {4 – 5 kgm}**
2nd time: **68.6 – 122.5 Nm {7 – 12.5 kgm}**

[*8]
★ Tighten the U-clamp and U-bolt to the following torque.
U-clamp: **14.7 – 44.1 Nm {1.5 – 4.5 kgm}**
U-bolt: **9.8 – 14.7 Nm {1.0 – 1.5 kgm}**

[*9]
★ Tighten the clamp of the turbocharger connecting part of the joint to the following torque.
Clamp: **6.9 – 8.8 Nm {0.7 – 0.9 kgm}**

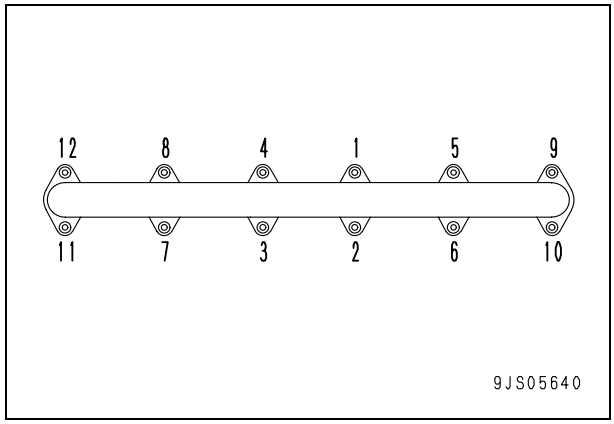
[*10]
★ Tighten the clamp to the following torque.
Clamp: **7 ± 1.1 Nm {0.7 ± 0.1 kgm}**

[*11]
★ Tighten the clamp according to the following procedure.
1) Set punch mark (a) as shown in the figure and set bridge (83) under band (84).
2) Tighten the bolt so that dimension (b) will be 8 – 10 mm.
3) Tighten the bolt to 16 – 17 Nm {1.6 – 1.7 kgm}.

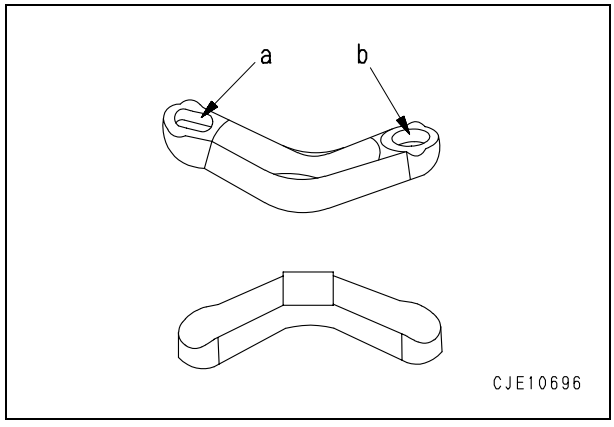


[*12]
★ Tighten the lubrication hose and lubrication tube to the following torque.
Lubrication hose flare nut:
19.6 – 28.4 Nm {2.0 – 2.9 kgm}
Lubrication tube mounting bolt:
7 ± 1.1 Nm {0.7 ± 0.1 kgm}

[*13]
★ Tighten the exhaust manifold mounting bolts according to the following procedure.
1st time: Tighten all the bolts to 23.5 ± 4 Nm {2.4 ± 0.41 kgm} in the order of the numbers shown in the figure.
2nd time: Tighten only bolts 1 – 4 in the figure to 23.5 ± 4 Nm {2.4 ± 0.41 kgm}.
3rd time: Tighten all the bolts to 43.1 ± 6 Nm {4.4 ± 0.61 kgm} in the order of the numbers shown in the figure.
4th time: Tighten only bolts 1 – 4 in the figure to 43.1 ± 6 Nm {4.4 ± 0.61 kgm}.

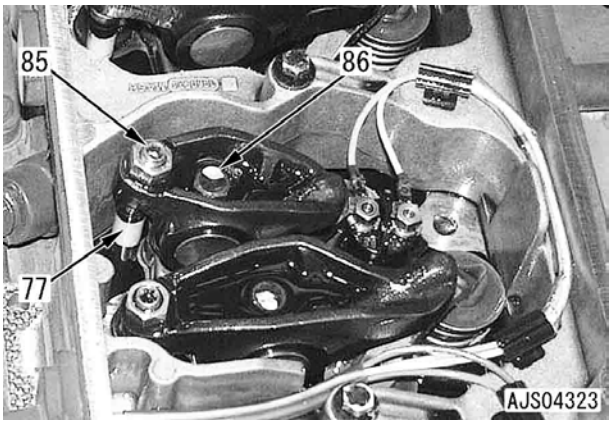


[*14]
★ When installing the crosshead and rocker arm assembly, observe the following precautions.
★ Install the crosshead so that parts (a) and (b) on its back side will be at the positions checked when removed.
★ When installing a new crosshead, you do not need to take care of the positions of parts (a) and (b).



★ After checking that the ball of adjustment screw (85) is set in the socket of push rod (77) securely, tighten mounting bolt (86).
Mounting bolt:
64.7 ± 4.9 Nm {6.6 ± 0.5 kgm}

★ After tightening the mounting bolt, adjust the belt tension. For details, see Testing and adjusting, “Testing and adjusting air conditioner compressor belt.”

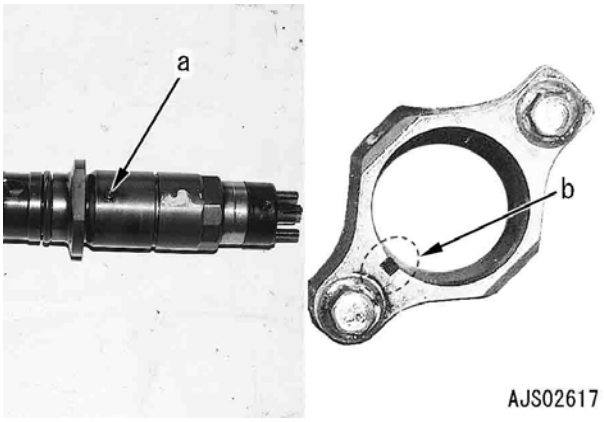


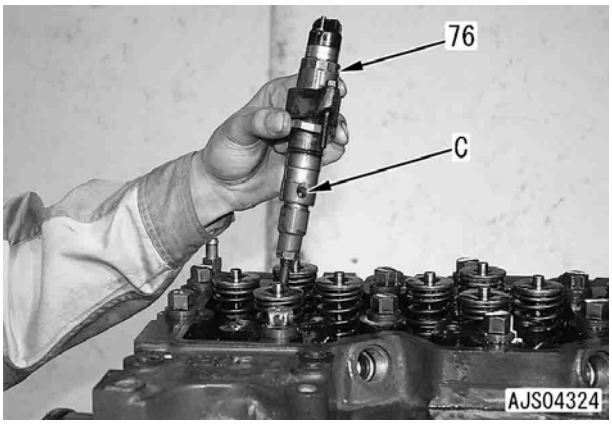
[*15]

★ Install the fuel injector assembly according to the following procedure.

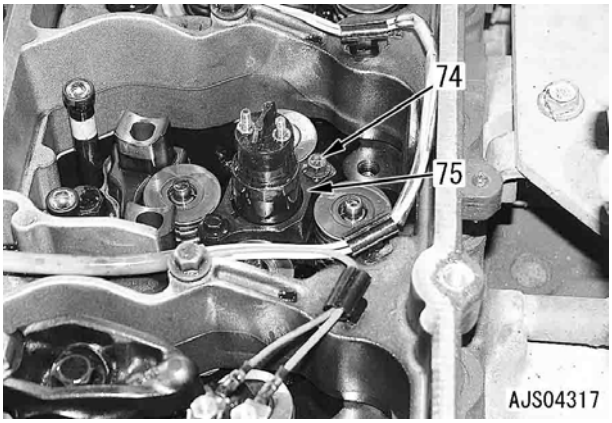
★ Check that the injector sleeve is free from flaw and dirt.

1) Fit the gasket and O-ring to the injector.
2) Apply engine oil (EO15W-40) to the O-ring of the injector and cylinder head side.
3) While matching projection (a) of injector (76) to notch (b) of the holder, insert injector (76) in the cylinder head.
★ Direct fuel inlet hole (c) of the injector toward the air intake manifold.

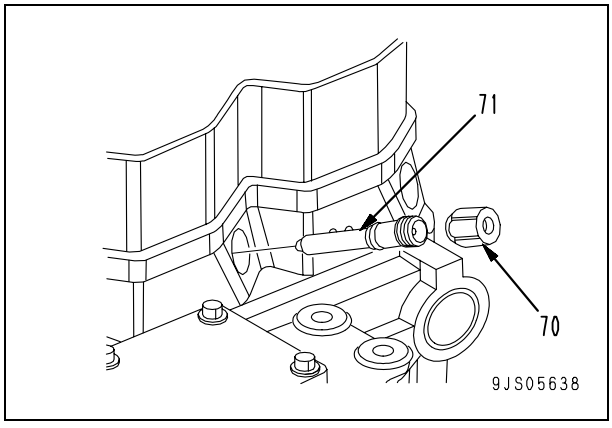




4) Install holder (75) and tighten bolts (74) by 3 – 4 turns with the fingers.



5) Apply engine oil (EO15W-40) to the O-ring of inlet connector (71) and cylinder head side.
6) Install inlet connector (71) temporarily with retainer (70) (Push it into the hole of the injector).
Retainer:
14.7 ± 5.0 Nm {1.5 ± 0.5 kgm}

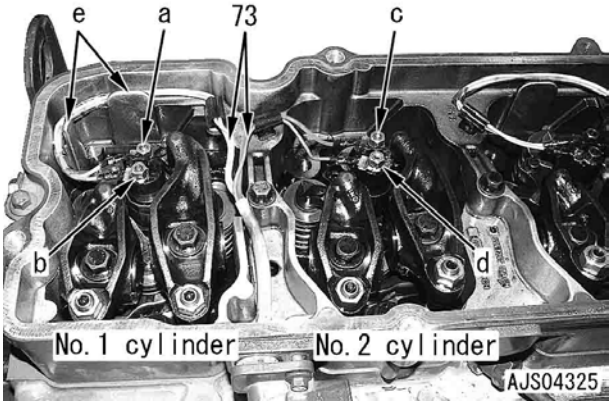


7) Tighten bolts (74) of holder (75) alternately.
   ★ The top of the holder must be in parallel with the top of the cylinder head.
      ● Allowable angle: **2.4°**
   Bolt: **9.8 ± 2.0 Nm {1.0 ± 0.2 kgm}**
8) Tighten inlet connector (71) permanently.
   Retainer:
   40.2 ± 3.9 Nm {4.1 ± 0.4 kgm}

[*16]
★ Take care that wiring harness (73) will not be pressed strongly against the inside wall of the housing, will not come off guide (e), or will not be bent sharply.
★ Setting positions of wiring harnesses

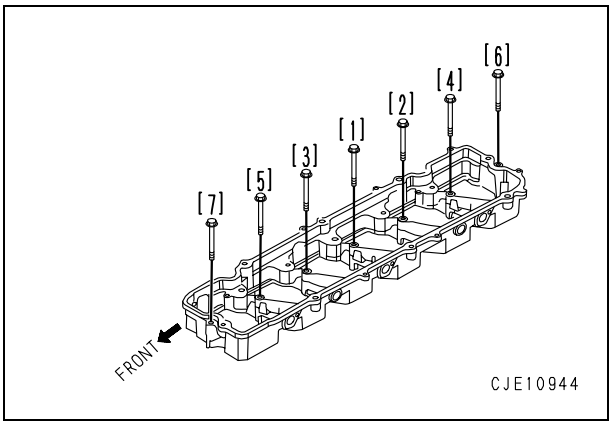
Cylinder No.	Setting position of wiring harness	Color of wiring harness
1, 3, 5	a	Yellow
	b	Orange
2, 4, 6	c	Red
	d	Brown

Mounting nut:
1.25 ± 0.25 Nm {0.10 ± 0.03 kgm}

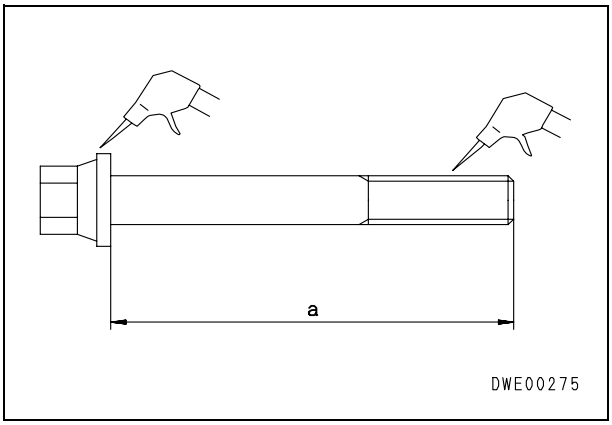


[*17]
★ Check that the push rod end is in the tappet.
Push rod: **Engine oil (EO15W-40)**

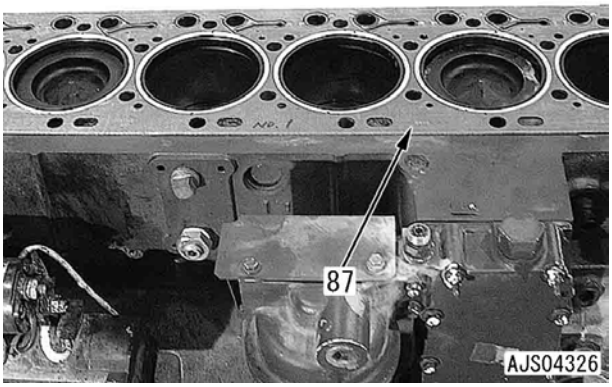
[*18]
★ Tighten the rocker housing mounting bolts in the order of the numbers shown in the figure.
Mounting bolt:
24 ± 4 Nm {2.4 ± 0.4 kgm}



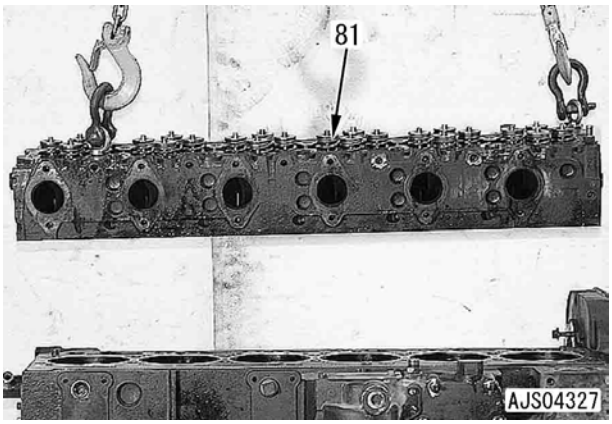
[*19]
★ Install the cylinder head assembly according to the following procedure.
1) Measure stem length (a) of each cylinder head mounting bolt and check that it is shorter than the using limit.
   ● Using limit length of bolt: **162.6 mm**
      ★ If a bolt is longer than the using limit, do not reuse it but replace it.



2) Check that there is no dirt and foreign matter on the cylinder head mounting surface and in the cylinders and then set cylinder head gasket (87).
   ★ Check that the gasket is set to the holes of the cylinder block.

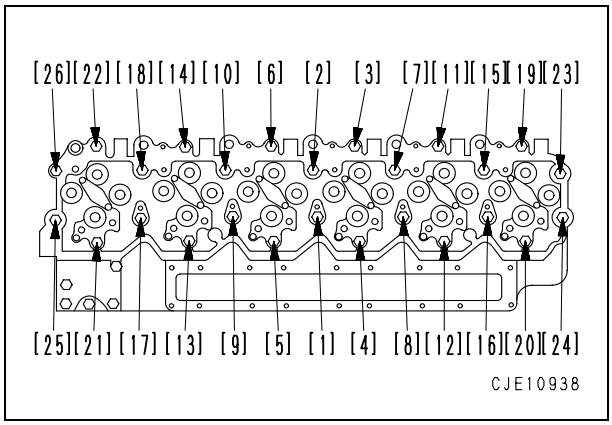


3) Install cylinder head assembly (81) to the cylinder block.

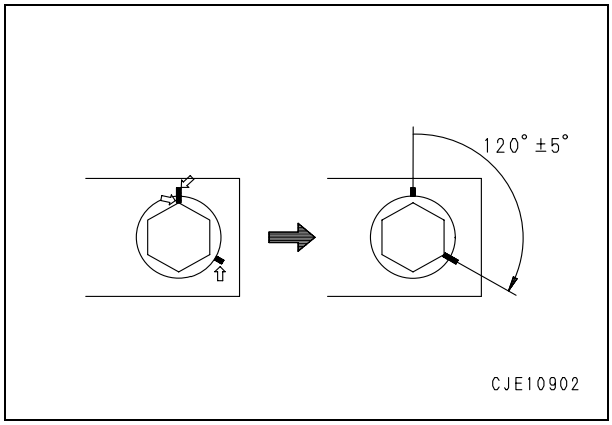


4) Tighten the mounting bolts at least 2 – 3 turns with the fingers.
   Threads and head seat of each bolt: **Engine oil (EO15W-40)**

5) Tighten the bolts in the order of the numbers shown in the figure.
   1st time: 150 ± 9.8 Nm {15.3 ± 1.0 kgm}
   2nd time: Return all bolts 360°
   3rd time: 115 ± 4.9 Nm {11.7 ± 0.5 kgm}
   4th time: Check tightening torque of 115 ± 4.9 Nm {11.7 ± 0.5 kgm}
   5th time: 120° ± 5° (Tighten with tool **B3**)



6) When not using tool **B3** at the 5th time, make a mark on the cylinder head and each bolt with paint and then tighten the bolt by 120° ± 5°.

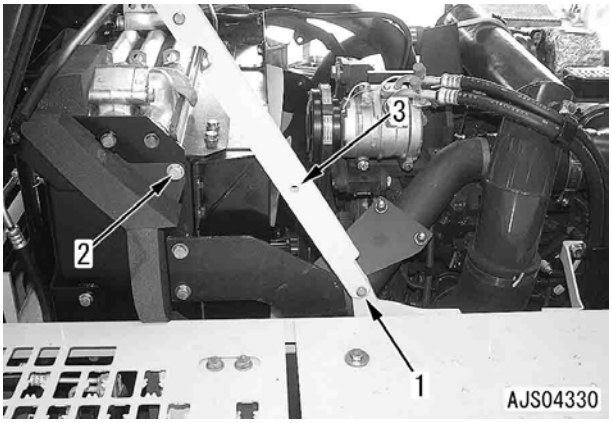


- **Refilling with coolant**
  Add coolant through the coolant filler to the specified level. Run the engine to circulate the coolant through the system. Then, check the coolant level again.
  Coolant: **36 ℓ**

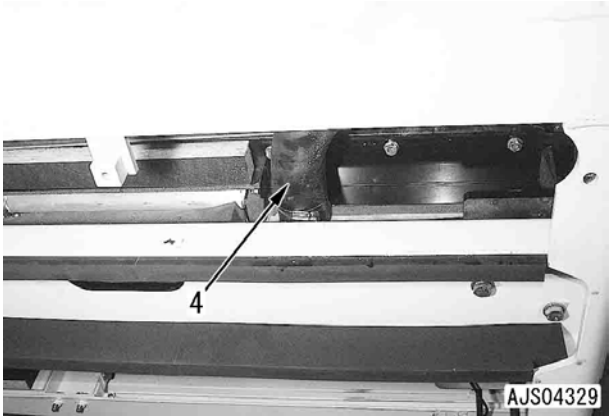
Removal and installation of radiator assembly

Removal

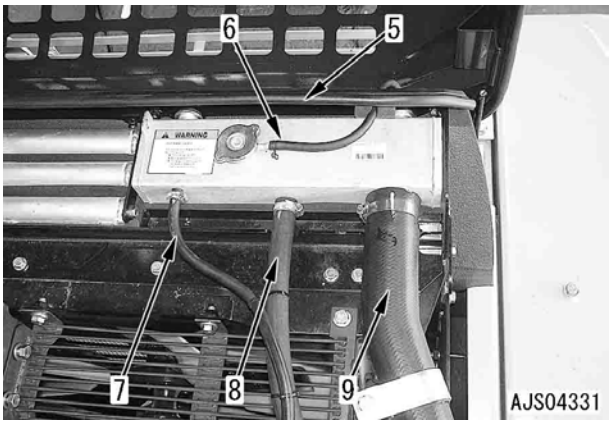
1. Open the engine hood and sling the radiator temporarily.
2. Pull out pin (1).
3. Remove bolt (2).
4. Set hole (3) to the position of bolt (2) to fix the engine hood.



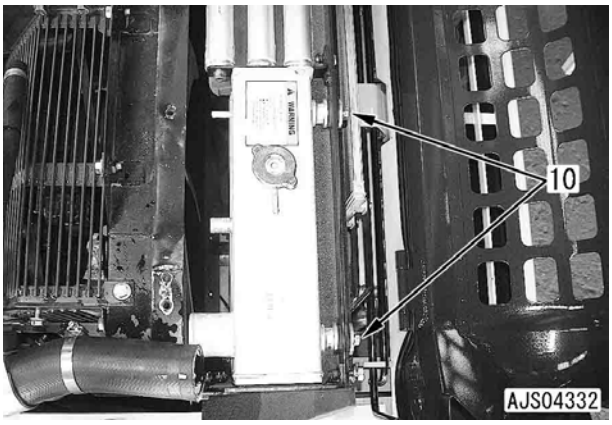
5. Remove the bottom cover of the radiator.
6. Drain the coolant.
   Coolant: **36 ℓ**
7. Disconnect hose (4) from the bottom of the radiator. [*1]



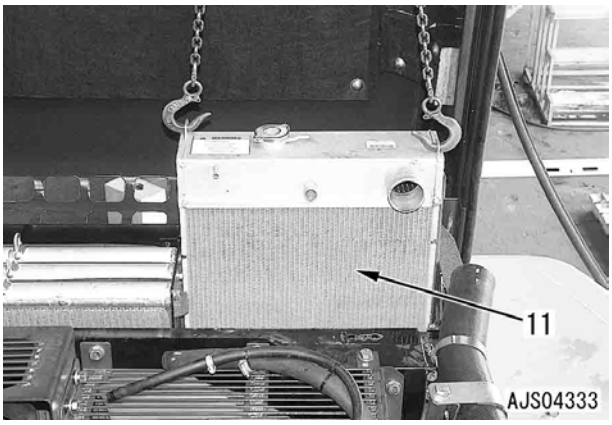
8. Remove seal (5).
9. Disconnect hoses (6) – (9) from the top of the radiator. [*1]



10. Remove 2 mounting bolts (10).



11. Lift off radiator assembly (11).
    Radiator assembly: **30 kg**



Installation

- Carry out installation in the reverse order to removal.

[*1]
★ Apply ThreeBond 4324 or equivalent to the adapters of hoses (4), (7), (8), and (9).

- **Refilling with coolant**
  Add coolant through the coolant filler to the specified level. Run the engine to circulate the coolant through the system. Then, check the coolant level again.

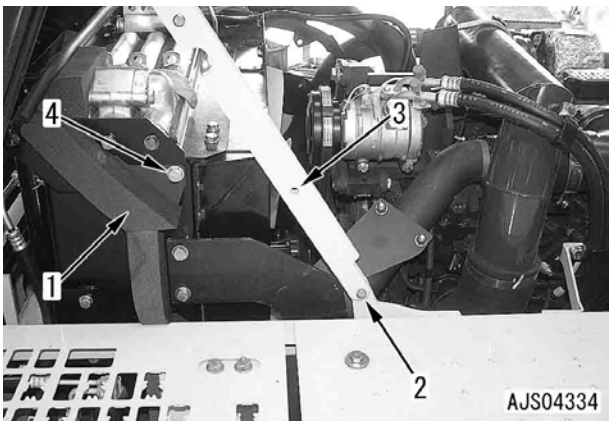
  Coolant: **36 ℓ**

Removal and installation of hydraulic oil cooler assembly

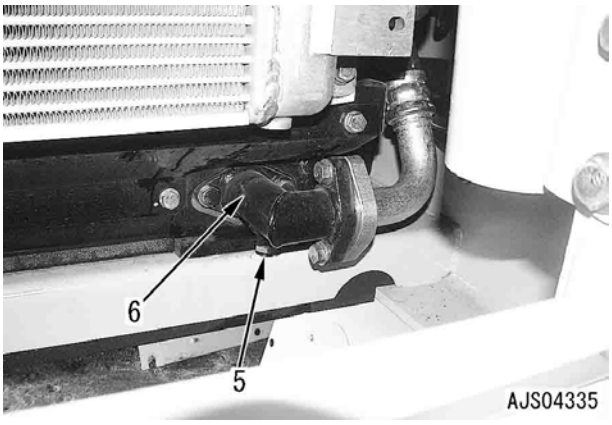
Removal

⚠ Lower the work equipment to the ground and stop the engine. Then, loosen the hydraulic oil filler cap slowly to release the internal pressure.

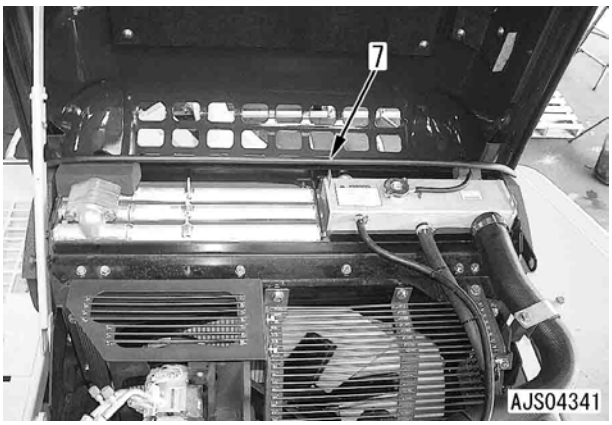
1. Drain the hydraulic oil.
   Hydraulic oil: **248 ℓ**
2. Remove the bottom cover of the hydraulic oil cooler.
3. Open the cover at the front of the hydraulic oil cooler.
4. Open the engine hood and sling the hydraulic oil cooler temporarily.
5. Remove the mounting bolts of cover (1) and move the cover down.
6. Pull out pin (2).
7. Set hole (3) to the position of bolt (4) to fix the engine hood.



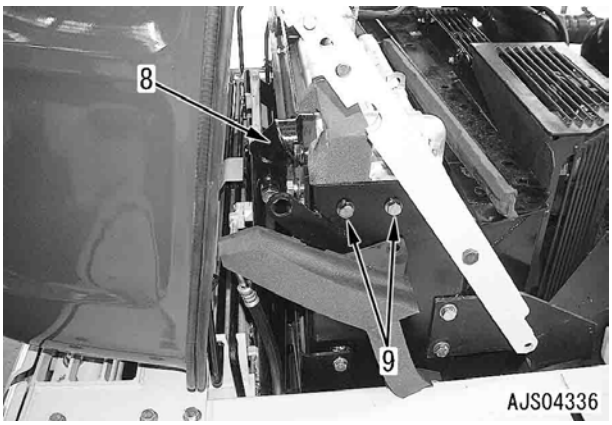
8. Remove drain plug (5) from the bottom of the hydraulic oil cooler to drain the oil from the piping.
9. Disconnect tube (6).



10. Remove seal (7).

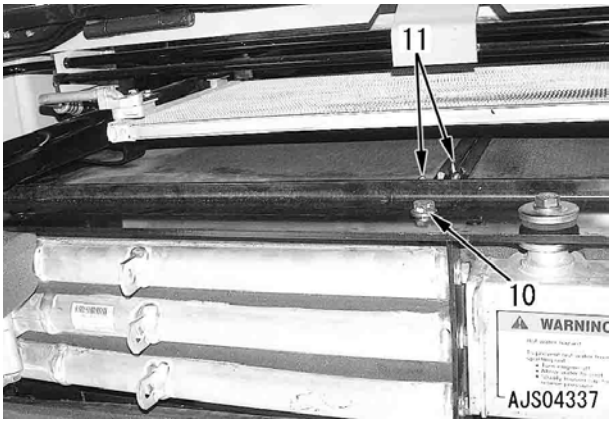


11. Disconnect tube (8) from the top of the hydraulic oil cooler.
12. Remove 2 mounting bolts (9).



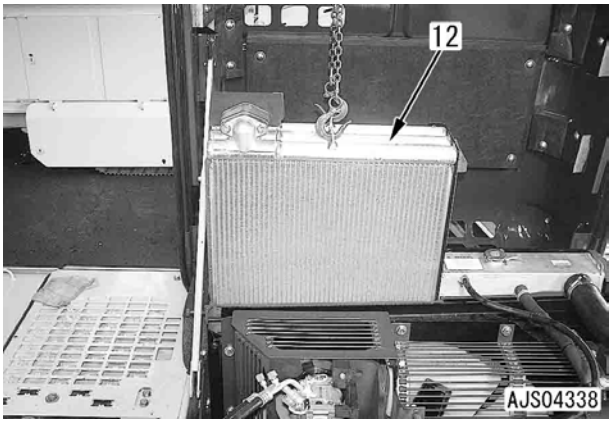
13. Remove mounting bolts (10).

14. Remove 2 wing screws (11) from the screen.



15. Lift off hydraulic oil cooler assembly (12).

Hydraulic oil cooler assembly: **50 kg**



Installation

- Carry out installation in the reverse order to removal.

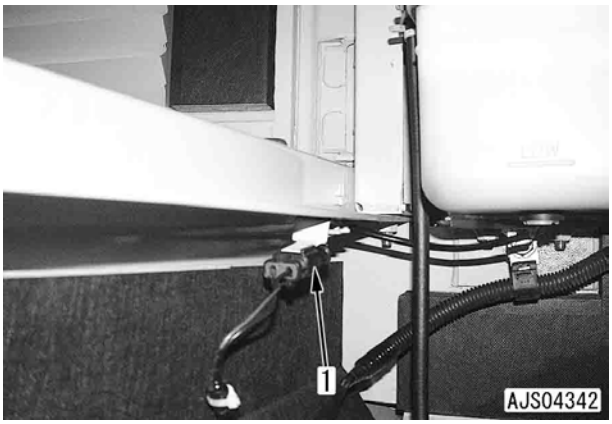
- **Refilling with oil**
  Add oil through the oil filler to the specified level. Run the engine to circulate the oil through the system. Then, check the oil level again.

  Hydraulic oil: **248 ℓ**

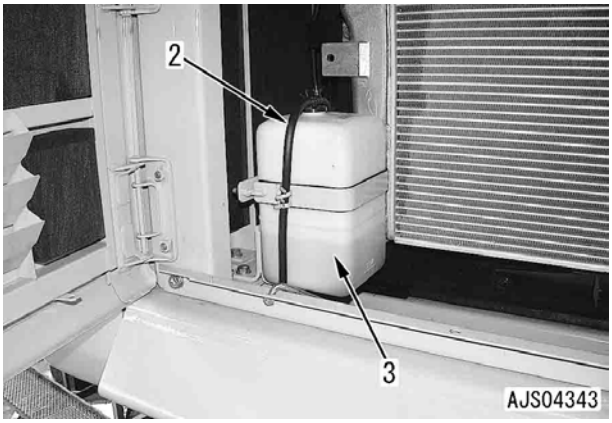
Removal and installation of aftercooler assembly

Removal

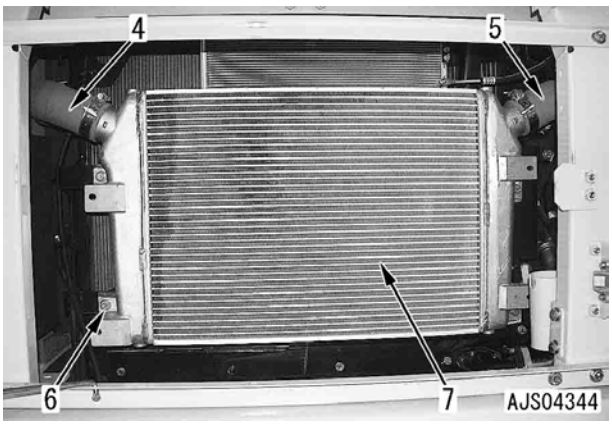
1. Open the front cover of the aftercooler.
2. Disconnect connector M06 (1).



3. Disconnect hose (2) and remove reservoir tank (3).



4. Disconnect hoses (4) and (5). [*1]
5. Remove 4 mounting bolts (6) and aftercooler assembly (7).



Installation

- Carry out installation in the reverse order to removal.

[*1]
★ Apply ThreeBond 2720F or equivalent to the adapters of hoses (4) and (5).

Removal and installation of engine and hydraulic pump assembly

Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
C	796-460-1210	Oil stopper	●	1		
	796-770-1320	Adapter	●	1		

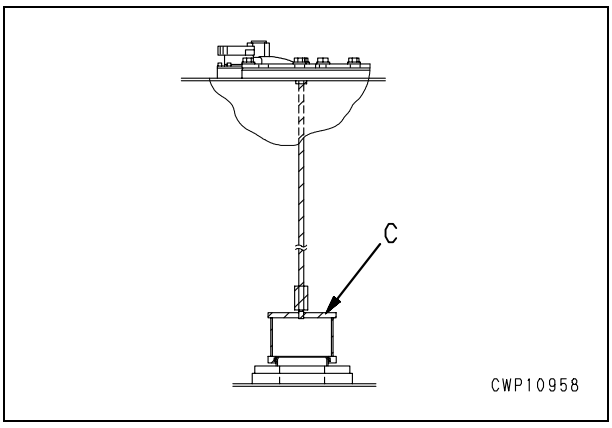
Removal

⚠ **Disconnect the negative terminal (–) of the battery.**

⚠ **Lower the work equipment to the ground and stop the engine. Then, loosen the hydraulic oil filler cap slowly to release the internal pressure.**

★ Attach an identification tag to each piping to avoid a mistake in the position of installation later.

1. Remove the hydraulic tank strainer and stop the flow of oil using tool **C**.
   ★ When not using tool **C**, remove the drain plug to drain oil from the hydraulic tank and piping.
   Hydraulic tank: **Approx. 248 ℓ**



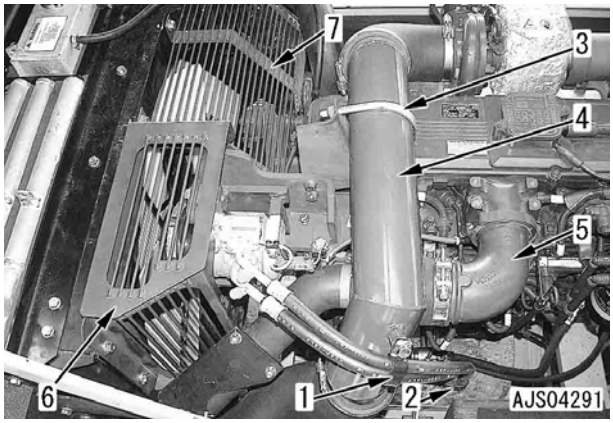
2. Drain the engine coolant.
   Coolant: **Approx. 36 ℓ**

3. Open the engine hood.

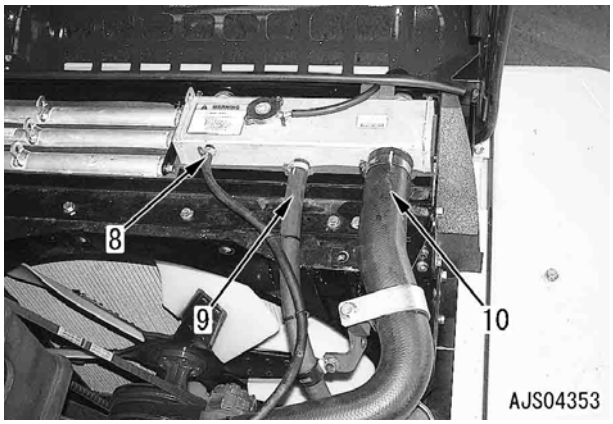
4. Remove clamps (1) and (2), U-bolt (3), and air intake tube (4). [*1]

5. Remove air intake connector (5).

6. Remove belt cover (6) and fan guard (7).



7. Disconnect hoses (8), (9), and (10) from the top of the radiator. [*2]

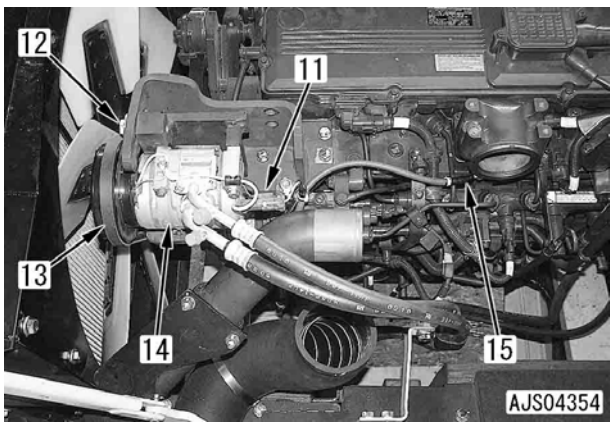


8. Disconnect connector M34 (11).

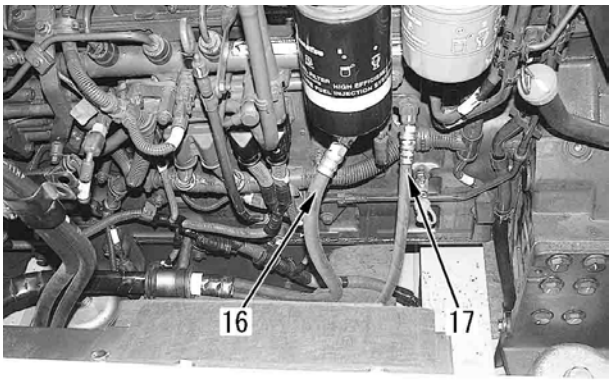
9. Loosen bolt (12) and remove air conditioner compressor belt (13). [*3]

10. Remove air conditioner compressor (14) and bracket together and move them to a place where they will not be obstacle to the work.

11. Disconnect terminal M23 (15).



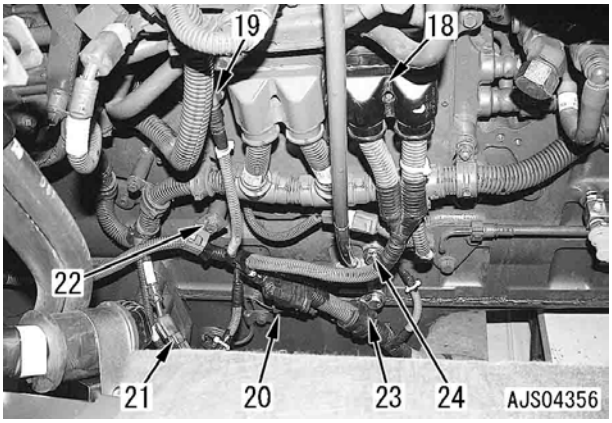
12. Disconnect fuel hoses (16) and (17).



13. Disconnect the following connectors.
    - CE02 (18)
    - CE03 (19)
    - P44 (20)
    - E06/WIF (21)

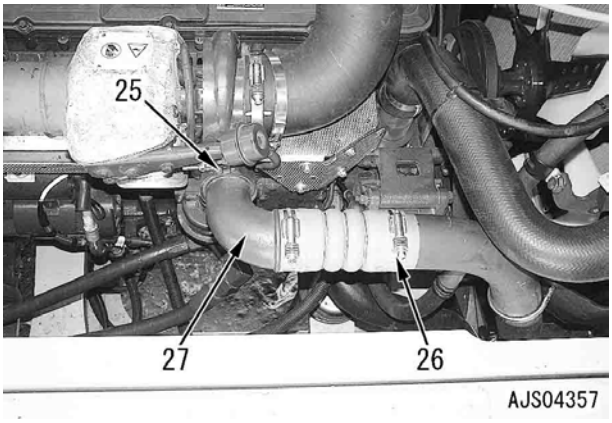
14. Remove clamps (22) and (23).

15. Disconnect ground wire (24).



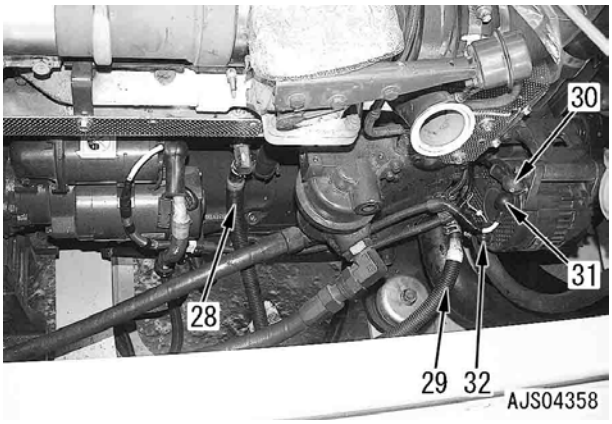
16. Remove clamp (25). [*4]

17. Loosen clamp (26) and remove tube (27) and hose together. [*5]

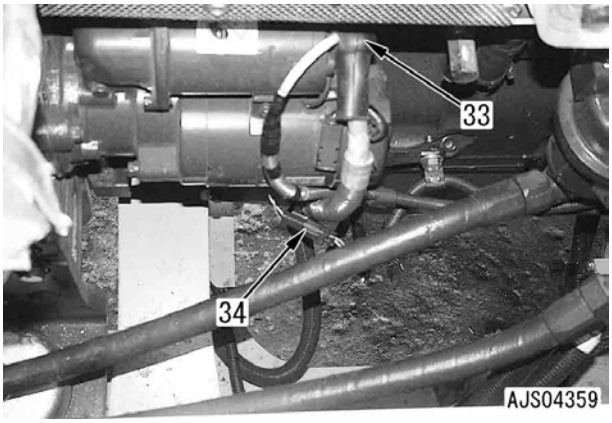


18. Disconnect heater hoses (28) and (29).

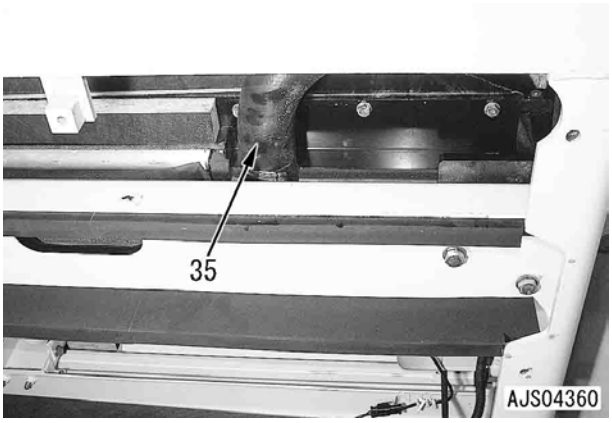
19. Disconnect B-terminal M21 (30), R-terminal M18 (31), and E-terminal M22 (32).



20. Disconnect B-terminal M20 (33) and connector M17 (34).



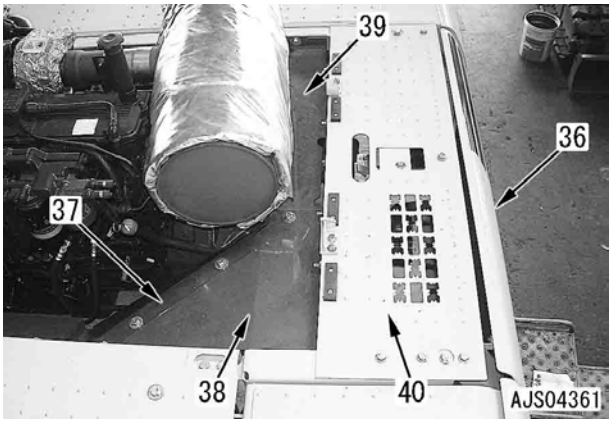
21. Remove the bottom cover of the radiator and disconnect hose (35). [*6]



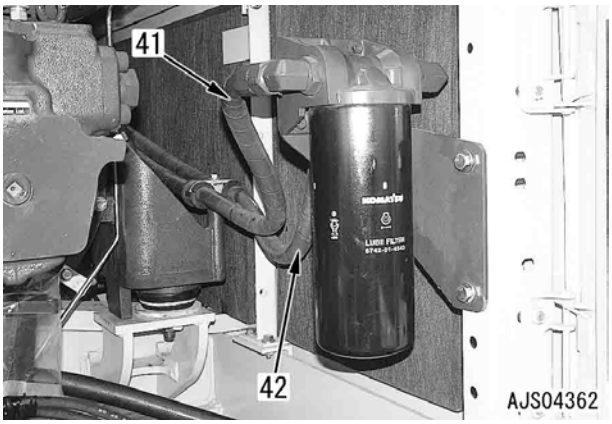
22. Open cover (36).

23. Remove the divider board between the engine and hydraulic pump.

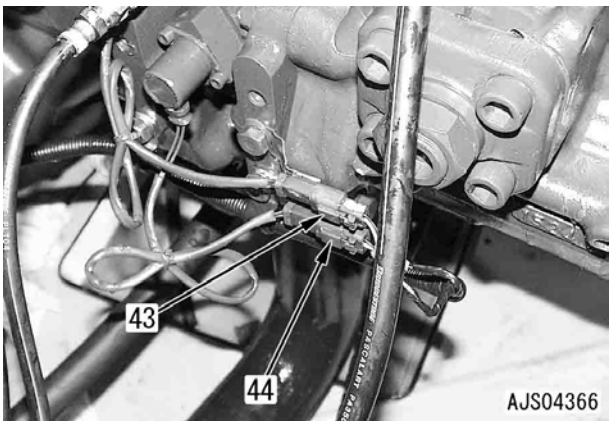
24. Remove covers (37) – (40).



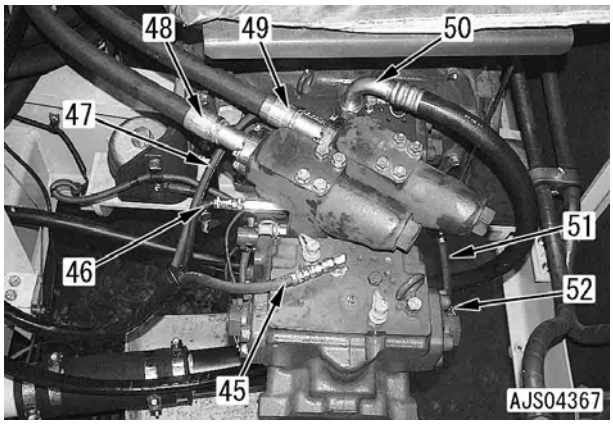
25. Disconnect hoses (41) and (42) from the engine oil filter.



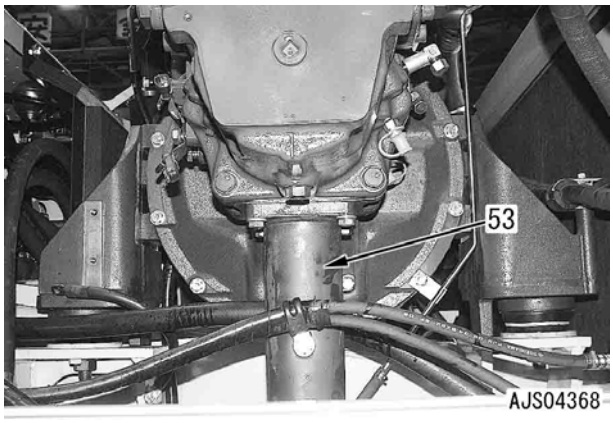
26. Disconnect connectors V19 (43) and V11 (44).



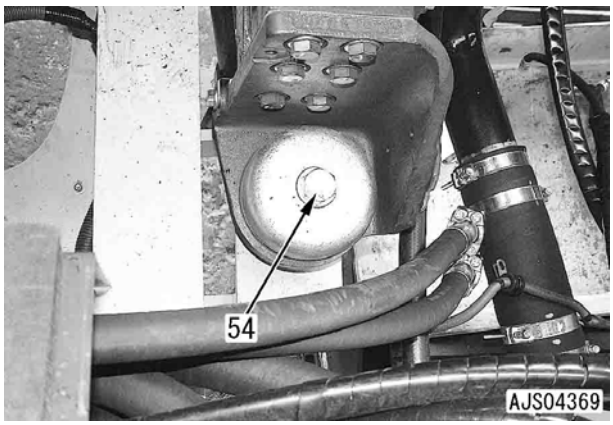
27. Disconnect hoses (45) – (52).



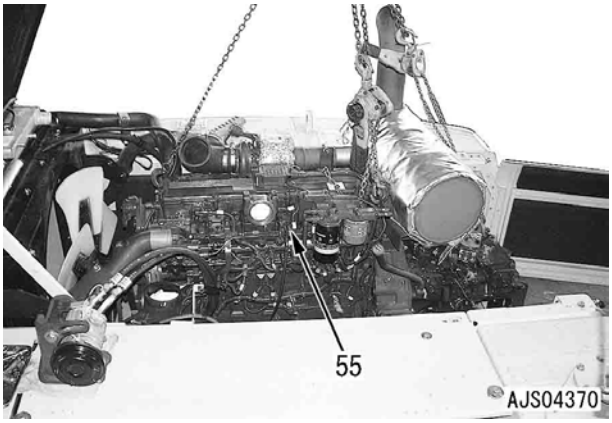
28. Disconnect tube (53).
    ★ Prepare a container to receive hydraulic oil which will leak.



29. Remove 4 engine mounting bolts (54).



30. Lift off engine and hydraulic pump assembly (55).
    ★ Check that all the wires and pipes between the chassis and the engine and hydraulic pump assembly are disconnected.
    ★ While removing the assembly, take care that it will not interfere with the chassis.
    Engine and hydraulic pump assembly: **1,200 kg**



Installation

Carry out installation in the reverse order to removal.

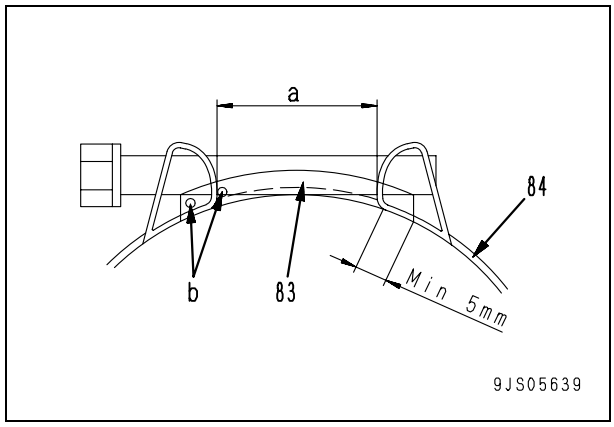
[*1]
★ Tighten the hose clamps before and after the air intake tube to the following torque.
Hose clamp:
9.8 ± 0.5 Nm {1 ± 0.05 kgm}

[*2] [*6]
★ Apply ThreeBond 4324 or equivalent to the adapter of the hose.

[*3]
★ Adjust the belt tension. For details, see Testing and adjusting, “Testing and adjusting air conditioner compressor belt”.

[*4]
★ Tighten the clamp to the following torque.
Clamp: **7 ± 1.1 Nm {0.7 ± 0.1 kgm}**

[*5]
★ Tighten the clamp according to the following procedure.
1) Set bridge (83) under band (84).
2) Tighten the bolt so that dimension (a) will be 8 – 10 mm.
3) Tighten the bolt to 16 – 17 Nm {1.6 – 1.7 kgm}.



- **Refilling with oil and coolant**
  Add oil and coolant through the oil filler and coolant filler to the specified level respectively. Run the engine to circulate the oil and coolant through the system. Then, check the oil and coolant levels again.
  Hydraulic oil: **248 ℓ**
  Coolant: **36 ℓ**

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00957-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

Power train

Power train 2
Removal and installation of final drive assembly 2
Disassembly and assembly of final drive assembly 3
Removal and installation of swing motor and swing machinery assembly 11
Disassembly and assembly of swing motor and swing machinery assembly 12
Removal and installation of swing circle assembly 19

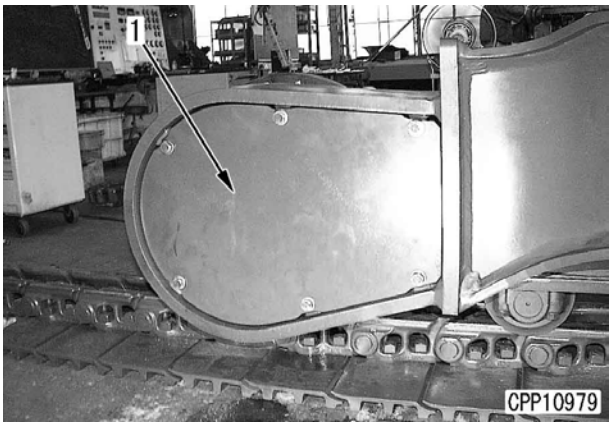
Power train

Removal and installation of final drive assembly

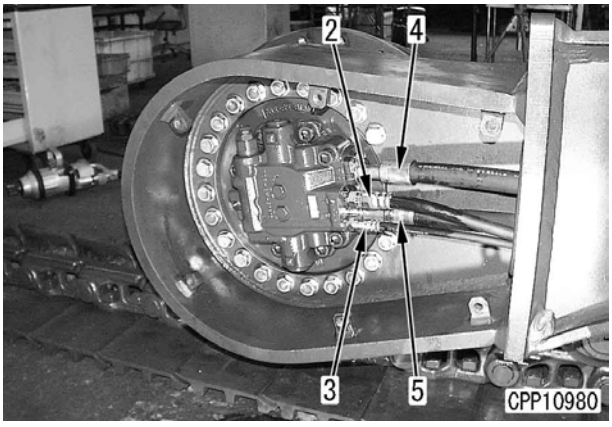
Removal

1. Remove the sprocket, referring to the "Removal and installation of sprocket" section in this manual.
   ⚠ **Lower the work equipment safely to the ground. Stop the engine and loosen the oil filler cap on the hydraulic tank to release pressure inside.**

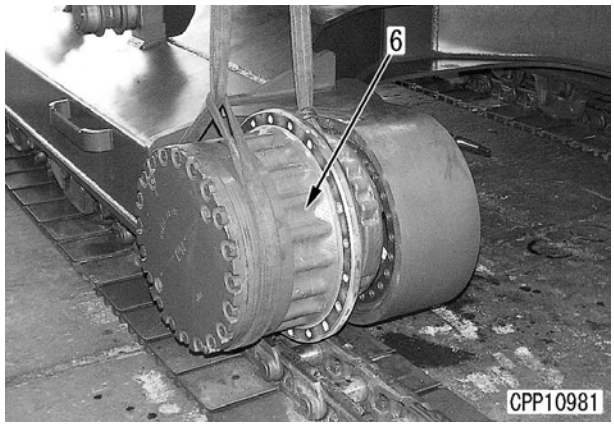
2. Remove cover (1).



3. Disconnect drain hose (2), travel speed shifting hose (3) and motor hoses (4) and (5).



4. Remove 21 mounting bolts and then lift off final drive assembly (6). [*1]
   ★ Be careful so that the nipple sealing surface on the hose mounting block may not be damaged.
   ★ When lifting off the final drive assembly, do not use a tapped hole for lifting the cover.
   Final drive assembly: **500 kg**



Installation

- Installation is done in the reverse order of removal.

[*1]
Mounting bolt: **490 – 608 Nm {50 – 62 kgm}**

- **Refilling with oil**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

- **Air bleeding**
  Refer to the "Bleeding air from various parts" section in the Testing and adjusting chapter of this manual.

Disassembly and assembly of final drive assembly

Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
D	1	796-627-1610	Wrench assembly	■	1		
		796-627-1620	Wrench		1		
		796-427-1140	Pin		3		
		01314-20612	Screw		3		
	2	796T-627-1630	Push tool	■	1		○
		790-101-2510	Block	■	1		
		791-830-1320	Rod	■	2		
		01580-11613	Nut	■	2		
		790-101-2570	Washer	■	2		
		01643-31645	Washer	■	2		
		790-101-2570	Jack assembly	■	1		
		790-101-1102	Pump	■	1		
	3	791-508-1510	Installer	■	1		
	4	790-331-1110	Wrench	●	1		

Disassembly

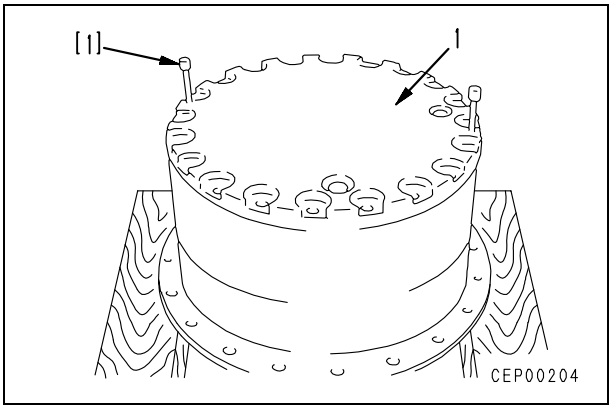
1. Oil draining

Remove drain plug and drain oil from final drive case.

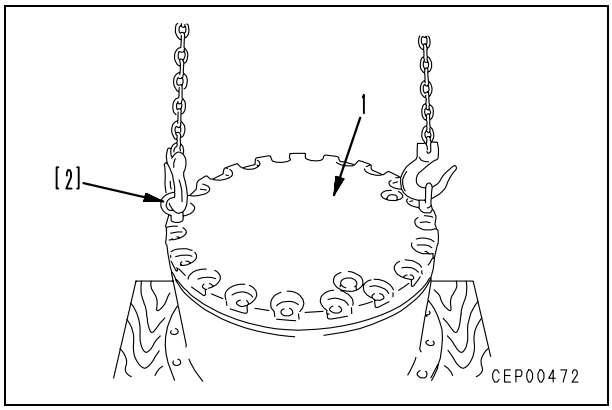
Final drive case: Approx. **8.5** ℓ

2. Cover

1) Remove the mounting bolts.
Then, using forcing screws [1], separate cover (1) from the case.

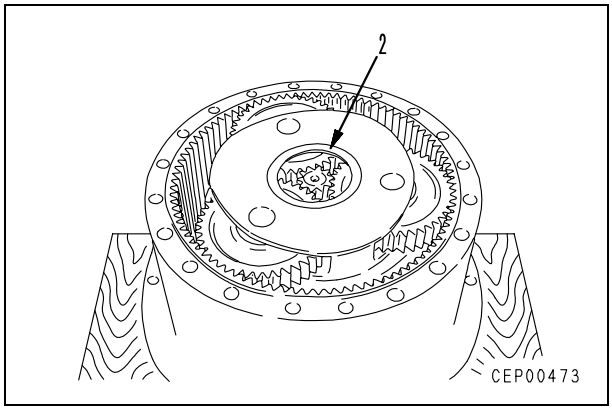


2) Remove cover (1) using eyebolt [2].



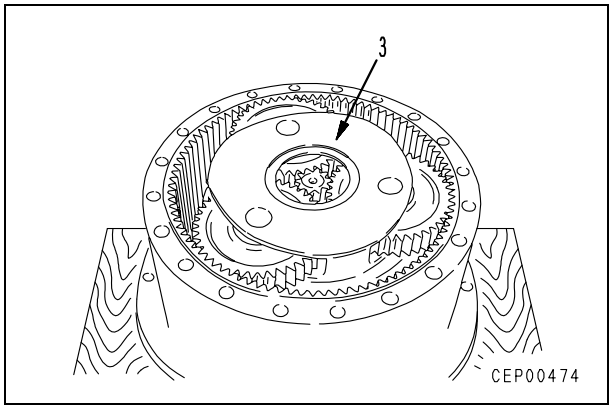
3. Spacer

Remove spacer (2).

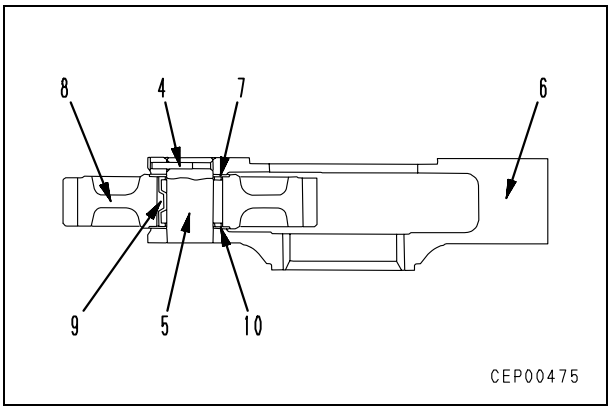


4. No.1 carrier assembly

1) Remove No.1 carrier assembly (3).

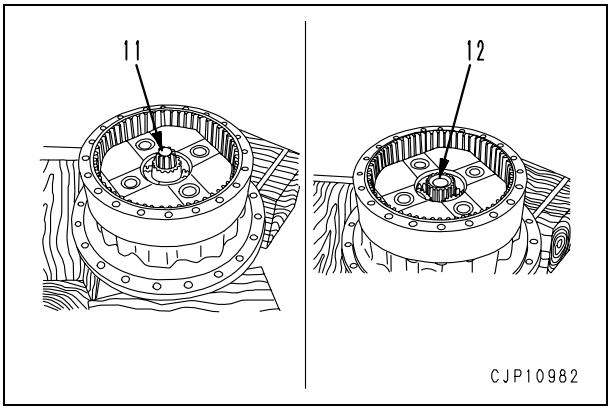


2) Disassemble No. 1 carrier assembly as follows.
★
1] Insert pin (4) and drive shaft (5) out of carrier (6).
★ After removing the shaft, remove pin (4).
2] Remove thrust washer (7), gear (8), bearing (9), and thrust washer (10).

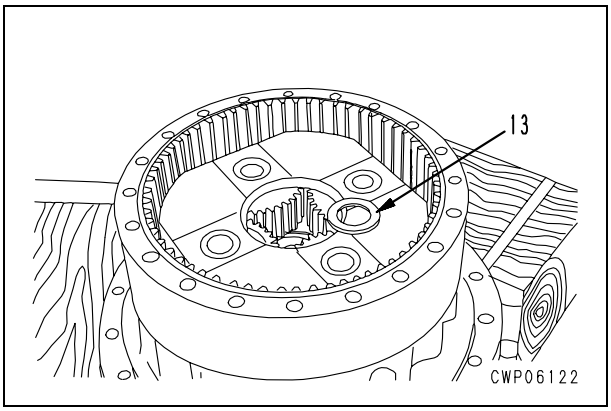


5. No.1 sun gear shaft
Remove No. 1 sun gear shaft (11).

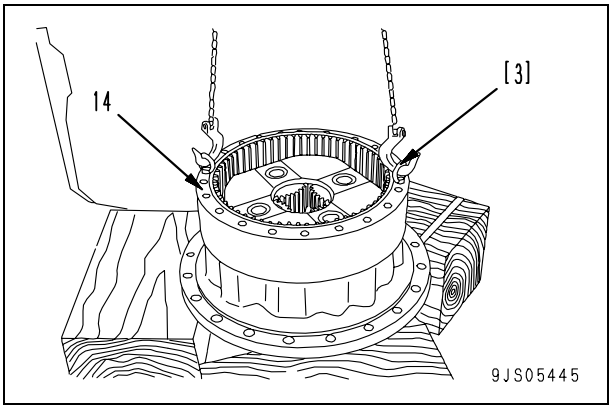
6. No.2 sun gear shaft
Remove No. 2 sun gear shaft (12).



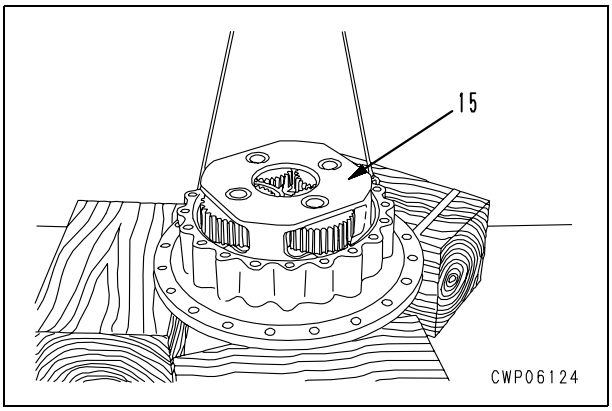
7. Thrust washer
Remove thrust washer (13).



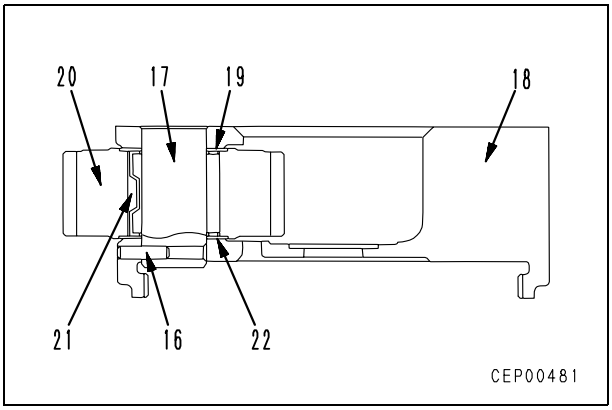
8. Ring gear
Remove ring gear (14) using eyebolt [3].



9. No.2 carrier assembly
1) Remove No.2 carrier assembly (15).

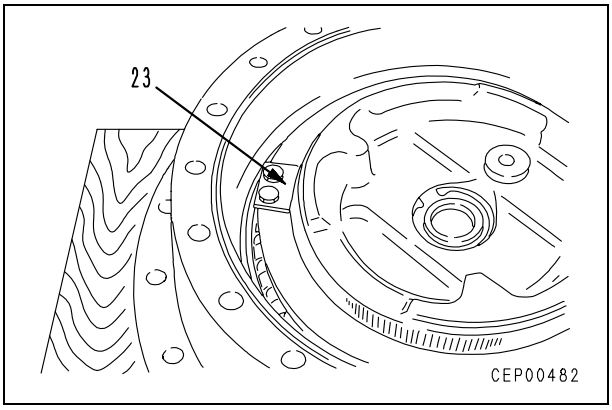


2) Disassemble No. 2 carrier assembly as follows.
1] Insert pin (16) and drive shaft (17) out of carrier (18).
★ After removing the shaft, remove pin (16).
2] Remove thrust washer (19), gear (20), bearing (21), and thrust washer (22).

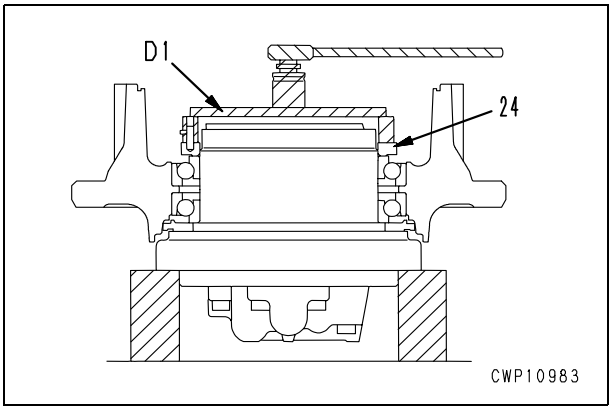


10. Nut

1) Remove lock plate (23).

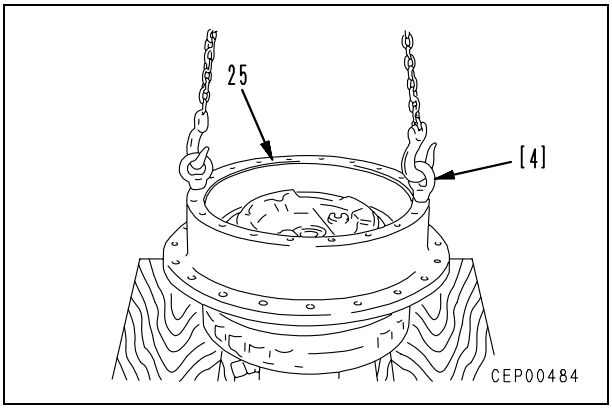


2) Use tool **D1** to remove nut (24).



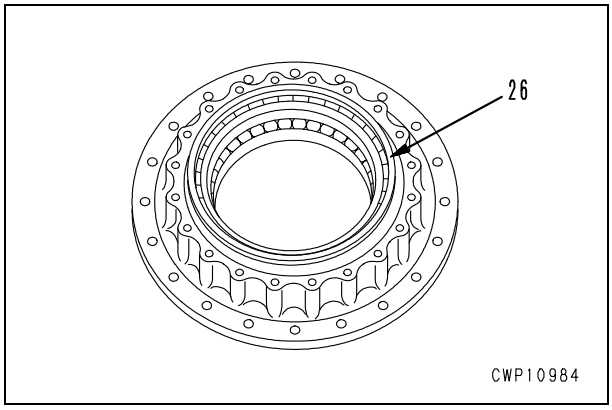
11. Hub assembly

1) Using eyebolts [4], remove hub assembly (25) from travel motor.

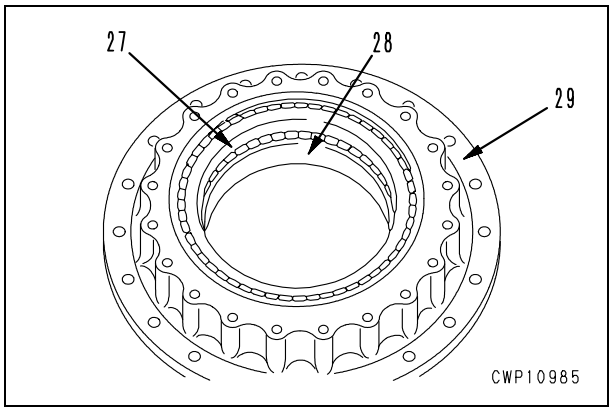


2) Disassemble the hub assembly as follows.

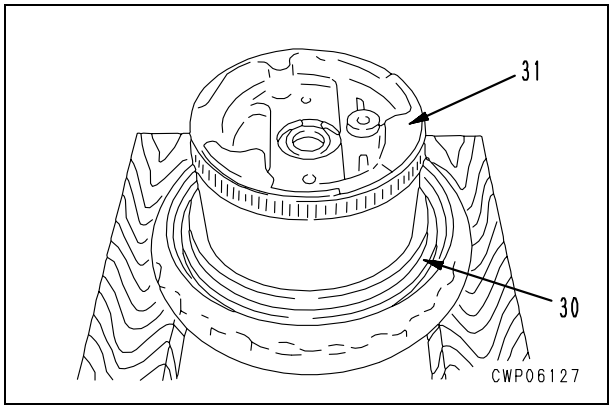
1] Remove floating seal (26).



2] Remove bearings (27) and (28) from hub (29).



3) Remove floating seal (30) from travel motor (31).

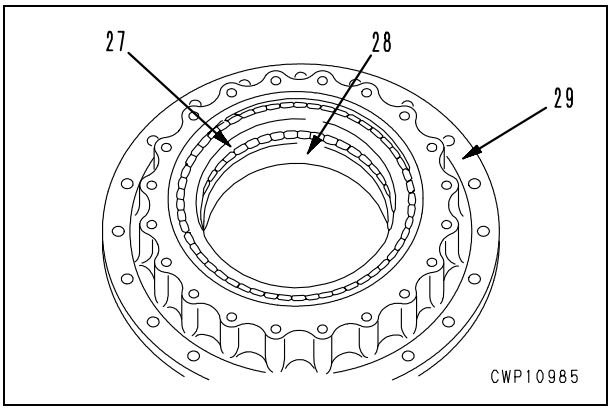


Assembly

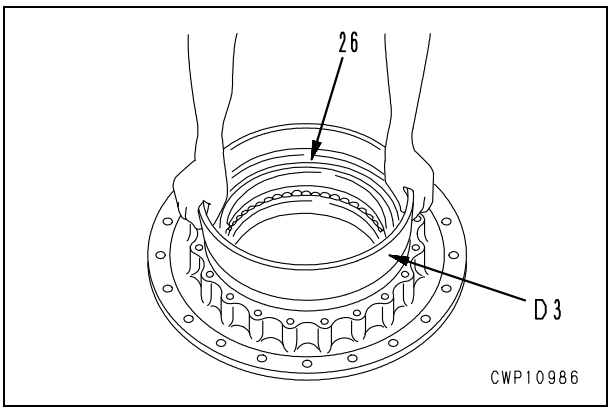
★ Clean all parts and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing.

1. Hub assembly

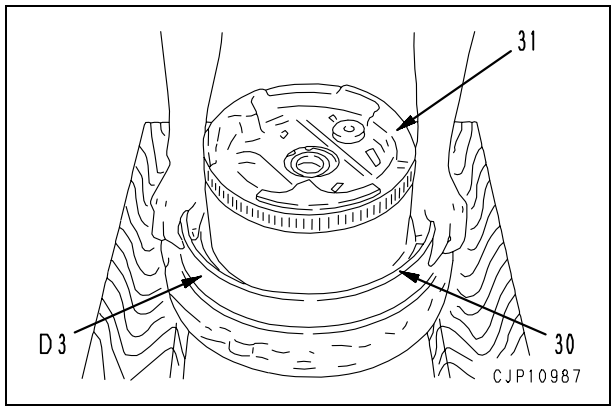
1) Using the push tool, press-fit bearings (27) and (28) to hub (29).



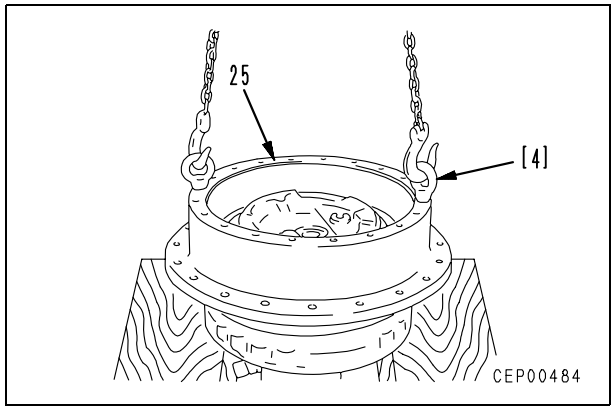
2) Use tool **D3** to install floating seal (26).
   ★ Remove all oil and grease from the O-ring and O-ring contact surface and dry up these sections before installing the floating seal.
   ★ After installing the floating seal, check that the angle of the floating seal is within 1 mm.
   ★ After installing the floating seal, coat the sliding surface thinly with engine oil (EO30).



3) Using tool **D3**, install floating seal (30) onto travel motor (31).
   ★ The procedure for installation is the same as in Step 2) above.

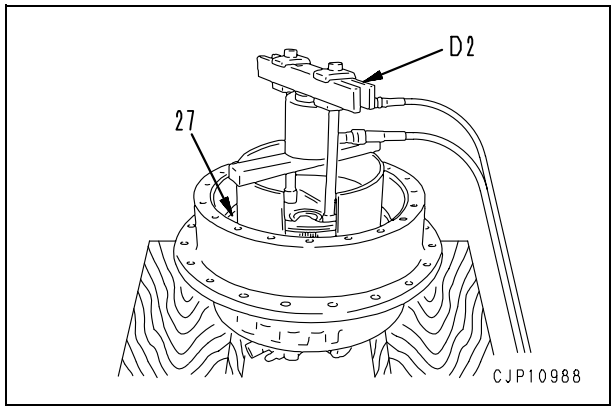


4) Using eyebolts [4], set hub assembly (25) onto the travel motor. Then tap the bearing using the push tool to press-fit it.

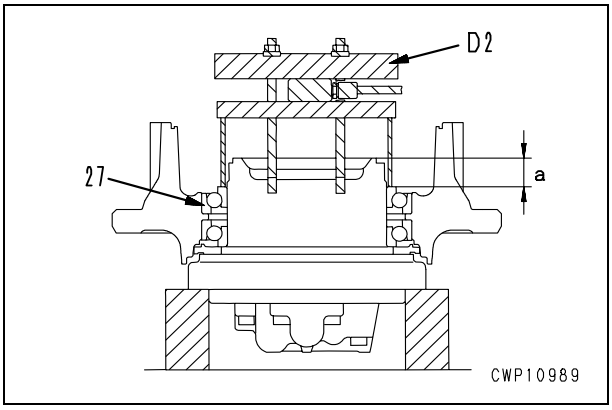


2. Nut

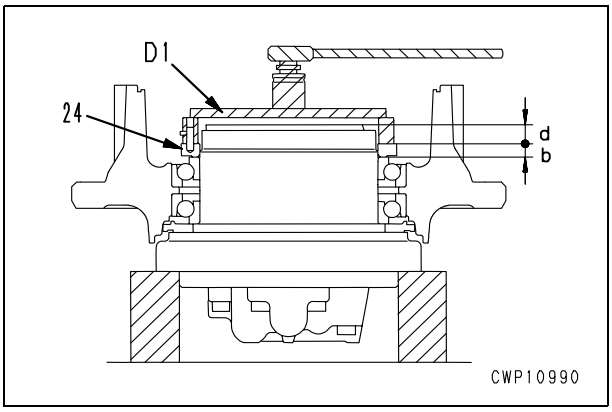
1) Install nut as follows.
   1] Use tool **D2** to press the inner lace of bearing (27).
      ★ Pressing force
      12.7 – 16.7 kN {1.3 – 1.7 ton}
      ★ Rotate the hub 2 – 3 turns before pressing the bearing inner race.



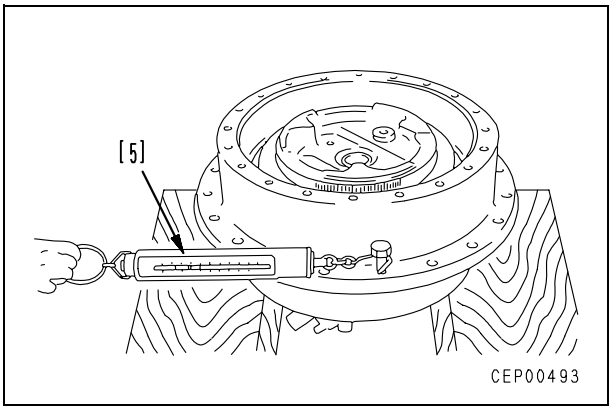
2] Under the above condition, measure dimension (a).



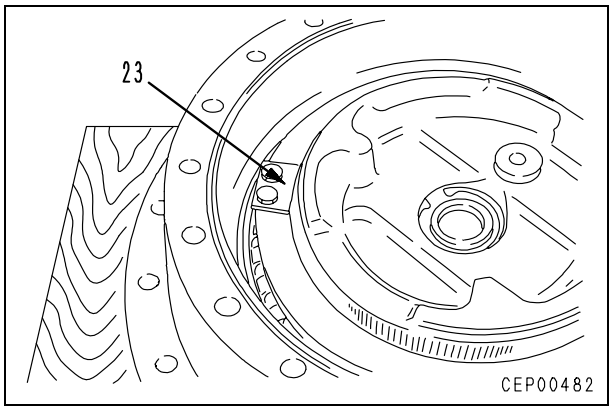
3] Measure thickness (b) off the independent nut (24).
4] Determine **Calculate a – b = c**
5] Using tool **D1**, tighten nut (24) until dimension (d) becomes the value of (c) calculated above.



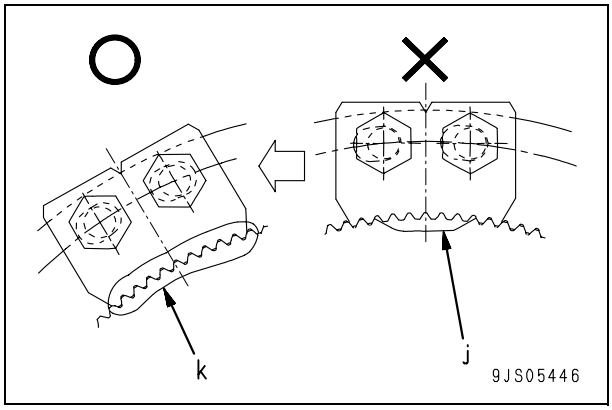
6] Using push-pull scale [5], measure tangential force of the hub to the motor case in the rotation direction.
★ Tangential force:
Max. 490 N {50 kg}
★ The tangential force denotes the maximum force at start of the rotation.



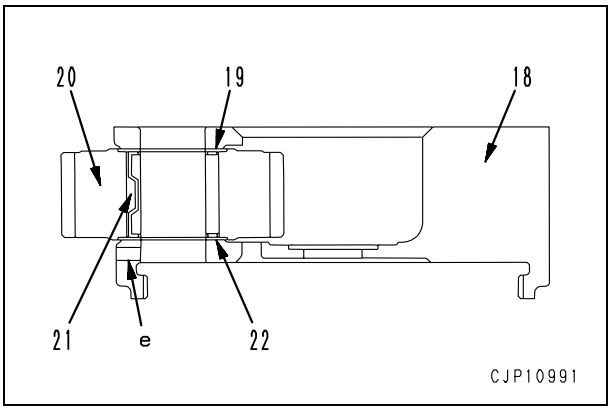
7] Install lock plate (23).



★ When installing the lock plate, avoid notch (j) of the travel motor and fit it to the spline totally (under the condition of (k))
Thread of mounting bolt:
Adhesive (LT-2)
Mounting bolt:
49 – 74 Nm {6 – 7.5 kgm}
★ Do not apply the adhesive (LT-2) to the tapped portion of the nut.

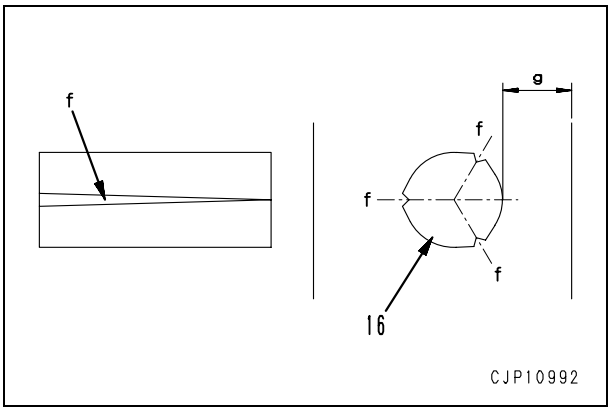


3. No.2 carrier assembly
1) Assemble No. 2 carrier assembly as follows.
★ Replace thrust washers (19) and (22) as well as pin (16) with new ones.
★ There are traces of expansion on the end surface of carrier side hole (e) which were originally caused when the pin was inserted. Make such the end surfaces are smooth enough before reassembly.
1] Assemble bearing (21) to gear (20), fit top and bottom thrust washers (19) and (22) and then set the gear assembly on carrier (18).

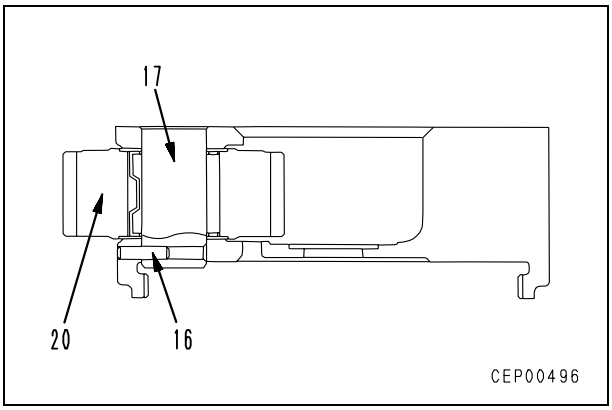


2] Align the position of pin holes on the shaft and carrier, then tap with a plastic hammer to install shaft (17).
★ Install the shaft, rotating the planetary gear. Take care so that thrust washer is not damaged.

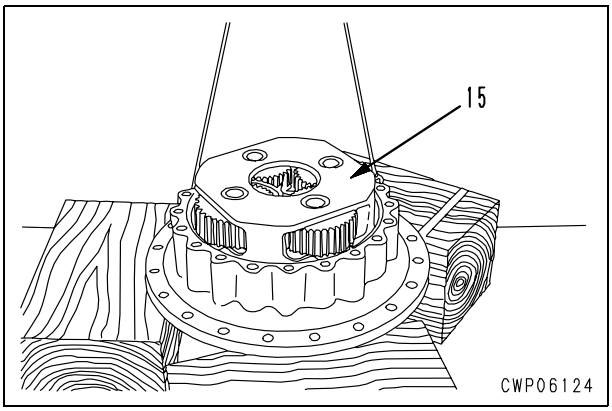
3] Insert pin (16).
★ When inserting the pin, take care that the 3 claws (parts (f)) on the periphery of the pin will not be placed on the thin parts of the carrier (parts (g)).
Since the thin parts may be on the opposite side, confirm them on each carrier.
If there is a groove, avoid placing the claws on that groove.



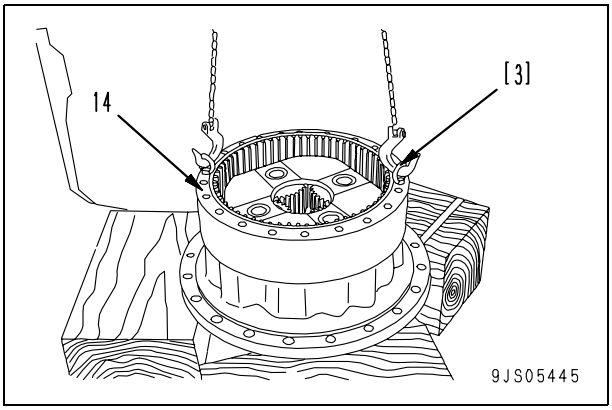
★ After inserting the pin, caulk the pin portion of the carrier.
★ After assembling the carrier assembly, check that gear (20) rotates smoothly.



2) Install No.2 carrier assembly (15).
★ Align the position so that the 3 tips of the gear shafts of carrier assembly (15) enter the 3 hollows in the end face of the motor case, then install.

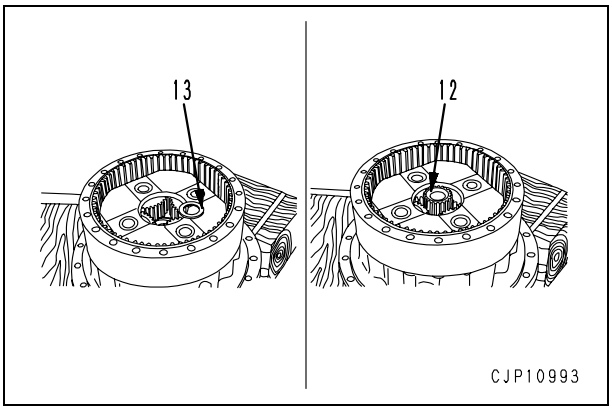


4. Ring gear
Fit the O-ring to the hub. Using eyebolts [3], sling ring gear (14) and install it to the hub, matching their bolt holes to each other.
★ Remove all grease and oil from the mating surface of the ring gear and hub.
★ Do not put any gasket sealant on the mating surface of the ring gear and hub under any circumstances.



5. Thrust washer
Install thrust washer (13).

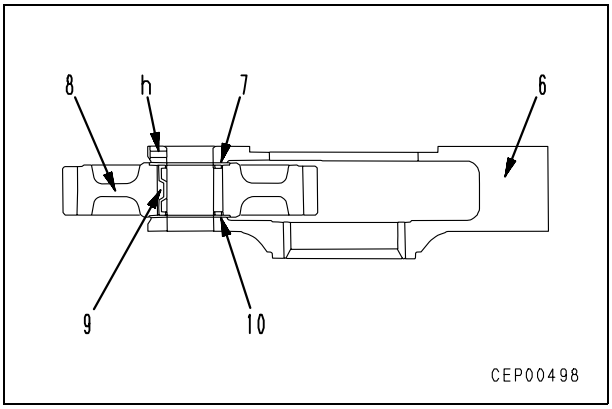
6. No.2 sun gear
Install No. 2 sun gear (12).



7. No.1 carrier assembly

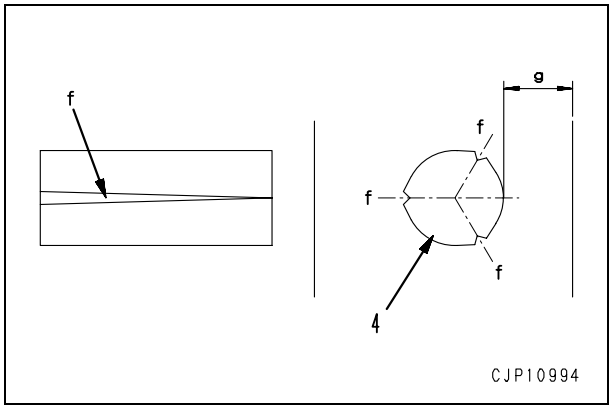
1) Assemble No. 1 carrier assembly as follows.
   - ★ Replace thrust washers (7) and (10) as well as pin (4) with new ones (For pin (4), see the next page).
   - ★ There are remains of caulking when the pin is inserted at the end face of hole (h) at the side of the carrier. Remove the caulked metal from the inside diameter of the hole before starting to assemble.

   1] Assemble bearing (9) to gear (8), fit top and bottom thrust washers (7) and (10) and then set the gear assembly on carrier (6).

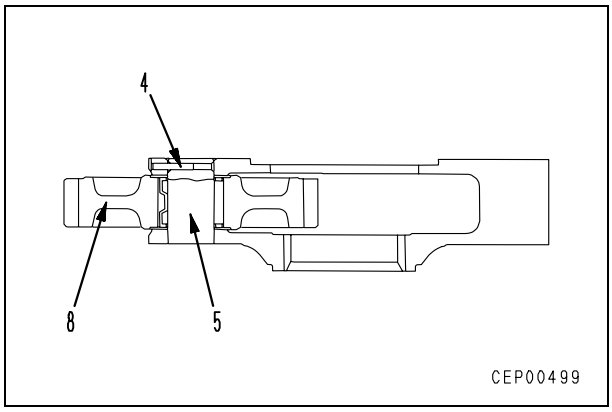


   2] Align the position of pin holes on the shaft and carrier, then tap with a plastic hammer to install shaft (5).
      - ★ Install the shaft, rotating the planetary gear. Take care so that thrust washer is not damaged.

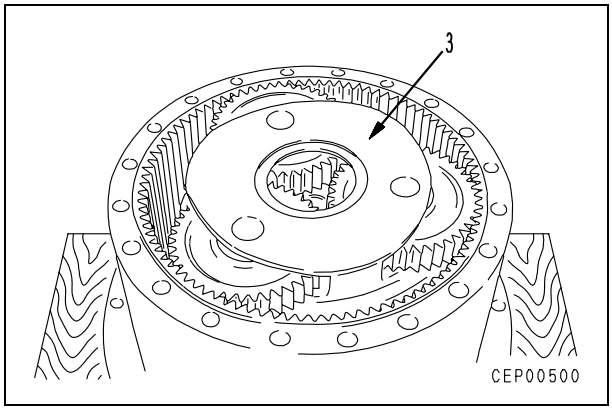
   3] Insert pin (4).
      - ★ When inserting the pin, take care that the 3 claws (parts (f)) on the periphery of the pin will not be placed on the thin parts of the carrier (parts (g)).
        Since the thin parts may be on the opposite side, confirm them on each carrier.
        If there is a groove, avoid placing the claws on that groove.



      - ★ After inserting the pin, caulk the pin portion of the carrier.
      - ★ After assembling the carrier assembly, check that gear (8) rotates smoothly.

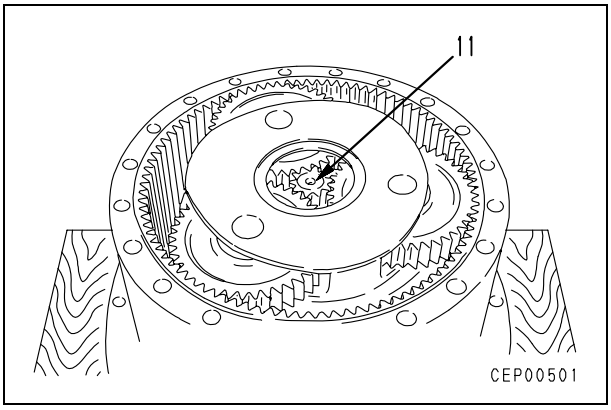


2) Install No.2 carrier assembly (3).



8. No.1 sun gear shaft

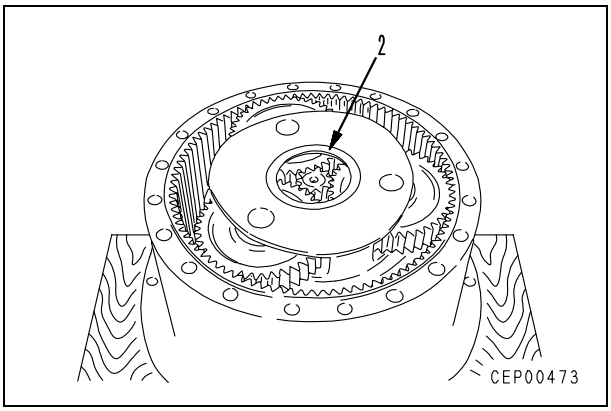
Assemble No. 1 sun gear shaft (11).

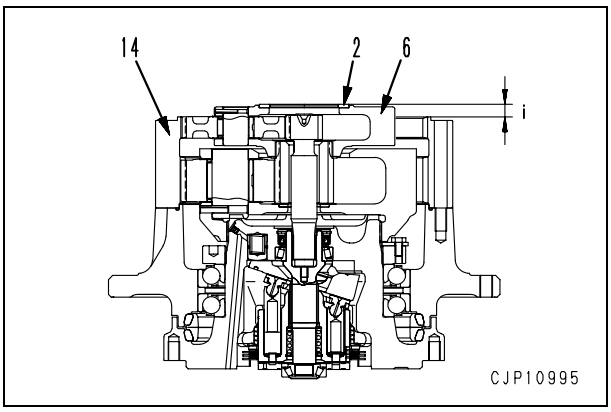


9. Spacer

Install spacer (2).

★ After installing the spacer, measure the dimension (i). If the dimension (i) is 15 mm or greater, the assembly is not done correctly. Check the assembly procedure again.

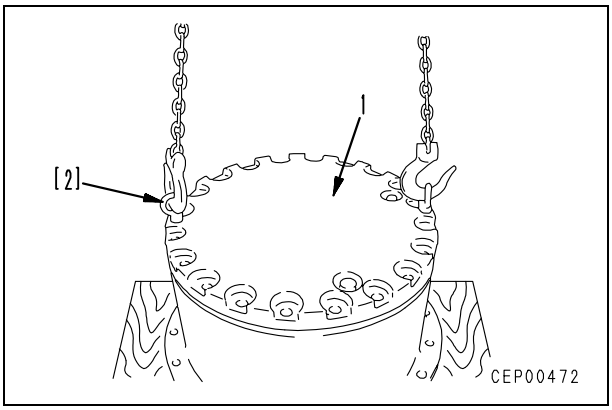




10. Cover

1) Using eyebolts [2], install cover (1).

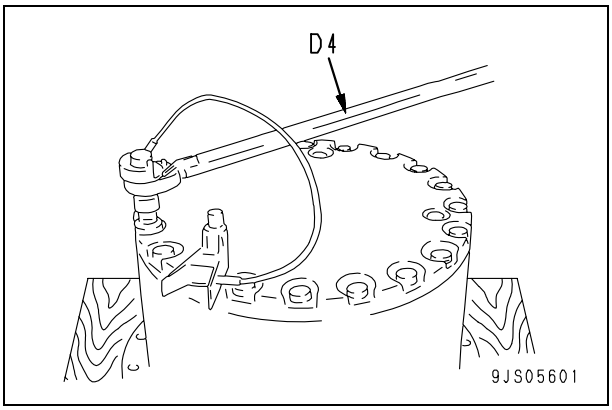
Cover mounting surface:
Gasket sealant (LG-6)



2) Tighten the mounting bolts according to the following procedure.

Mounting bolt:
1st step : **98 Nm {10 kgm}**
2nd step: **Using tool D4, retighten each mounting bolt by 100 – 110°.**

★ If tool **D4** is not available, make a match mark on the cover and the bolt with paint and then tighten the bolt by 100 – 110°.



11. Refilling with oil

Tighten the drain plug and feed engine oil through oil filler.

Final drive case: **12 ℓ**

★ Do a final check of the oil level at the determined position after installing the final drive assembly to the chassis.

Removal and installation of swing motor and swing machinery assembly

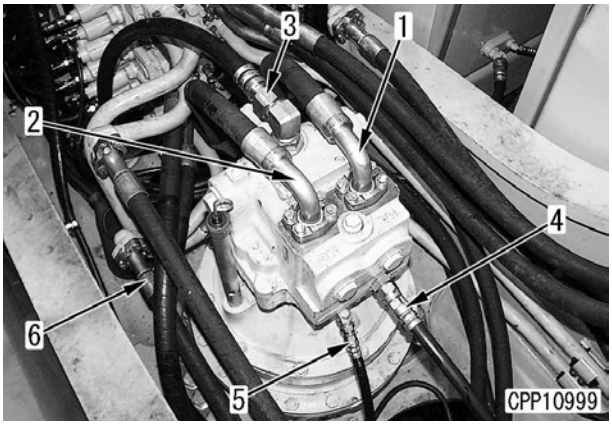
Removal

⚠ Release the remaining pressure in the hydraulic circuit. For details, see Testing and adjusting, "Release of remaining pressure in hydraulic circuit".

⚠ Lower the work equipment to the ground for safety. After stopping the engine, loosen the oil filler cap on the hydraulic tank to release the residual pressure inside the tank and move the work equipment lock lever to the LOCK position.

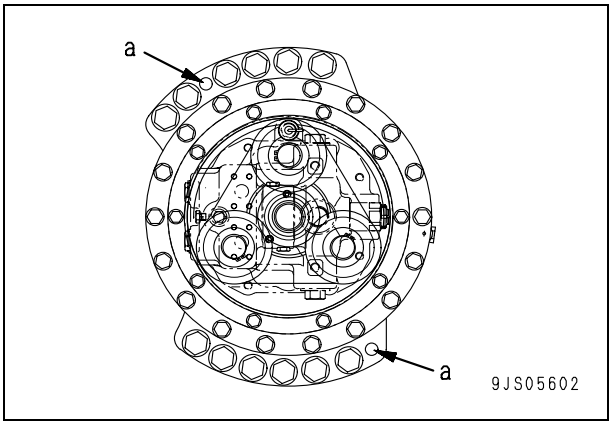
1. Disconnect 5 swing motor hoses (1) through (5).
   - (1): Between the swing motor and control valve (port MA)
   - (2): Between the swing motor and control valve (port MB)
   - (3): Suction hose (port S)
   - (4): Drain hose (port T)
   - (5): Pilot hose for relieving swing brake (port B)

2. Disconnect arm cylinder hoses (6).



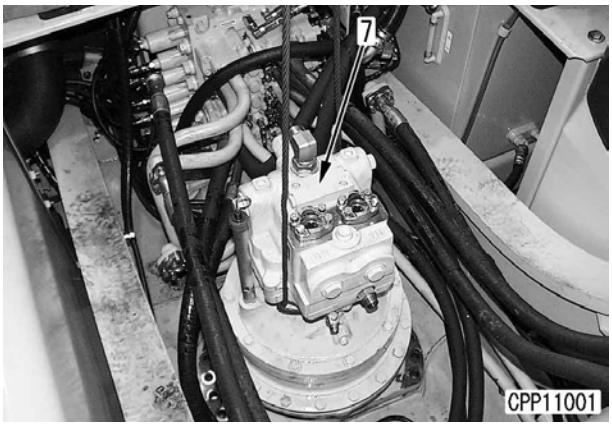
3. Remove the mounting bolts.

4. Tighten a forcing screw in position (a) shown in the following figure to separate the swing motor and swing machinery assembly. [*1]



5. Lift and remove swing motor and swing machinery assembly (7).
   - ★ When lifting off the swing motor and swing machinery assembly for removal, do so slowly so that the hoses and other parts may not be damaged.
   - ★ Use care in the lift until you can pull out the pilot.

   Swing motor and swing machinery assembly: **550 kg**



Installation

- Installation is done in the reverse order of removal.

[*1]

Mounting bolt:
824 – 1,030 Nm {84 – 105 kgm}

- **Refilling with oil (hydraulic tank)**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

- **Air bleeding**
  Bleed the air from the circuit between the valve and the hydraulic cylinder. For details, see Testing and adjusting, "Bleeding air from various parts".

Disassembly and assembly of swing motor and swing machinery assembly

Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
E	1	796T-626-1110	Push tool	●	1		○
	3	790-201-2480	Push tool	■	1		
	4	790-101-5401	Push tool kit	●	1		
		790-101-5521	• Plate		1		
		790-101-5421	• Grip		1		
		01010-51240	• Bolt		1		
	5	793T-815-1110	Push tool	■			○

Disassembly

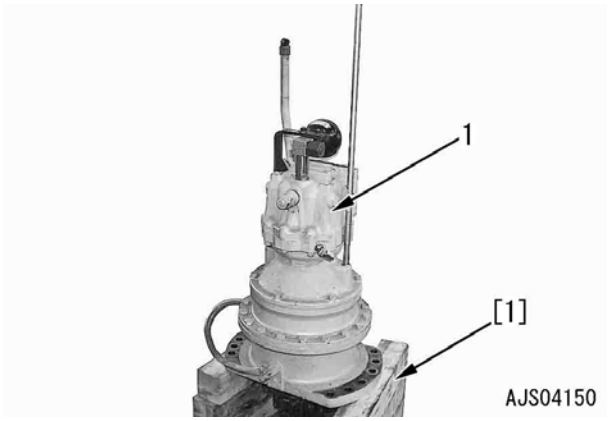
1. Oil drain

Loosen the drain plug and drain oil from the swing machinery case.

Swing machinery: **13.4** ℓ

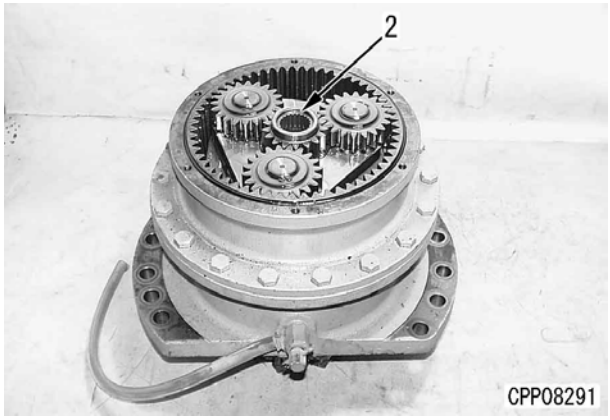
2. Swing motor assembly

1) Set the swing motor and swing machinery assembly on block [1].
2) Remove the 6 mounting bolts to remove swing motor assembly (1).



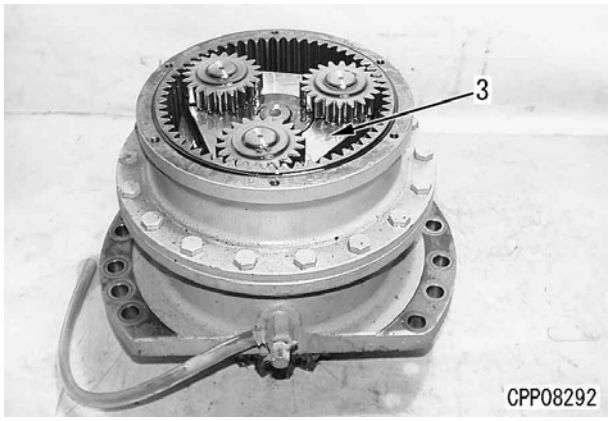
3. No.1 sun gear

Remove No. 1 sun gear shaft (2).

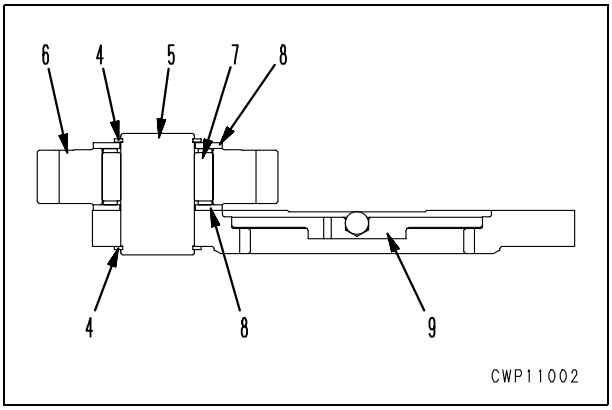


4. No.1 carrier assembly

1) Remove No.1 carrier assembly (3).

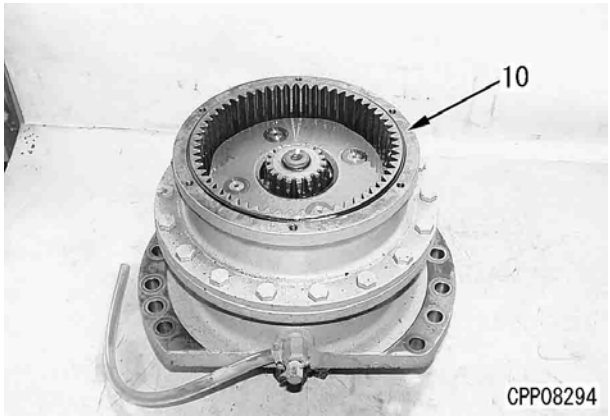


2) Disassemble No. 1 carrier assembly as follows. Remove snap ring (4) first, and then remove shaft (5), gear (6), bearing (7), thrust washer (8) and plate (9).



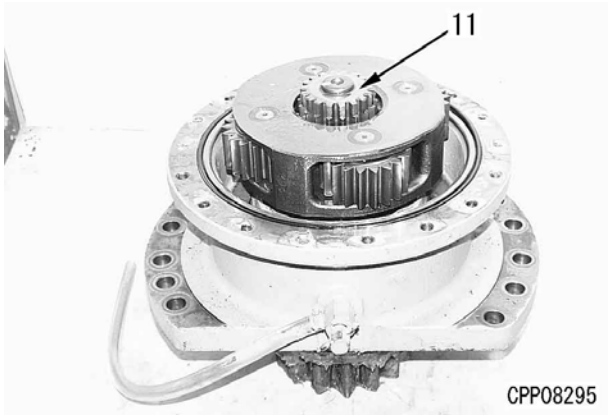
5. Ring gear

Remove the mounting bolts to remove ring gear (10).



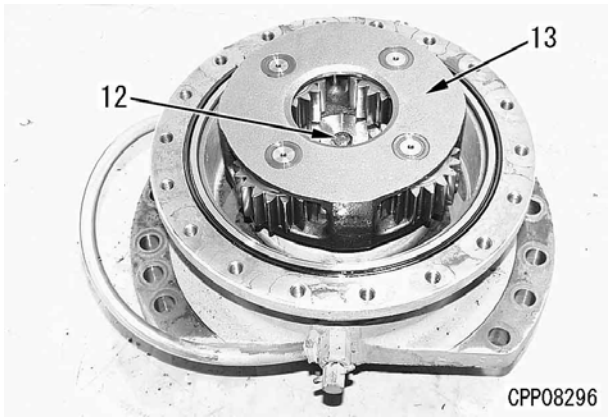
6. No.2 sun gear

Remove No. 2 sun gear (11).

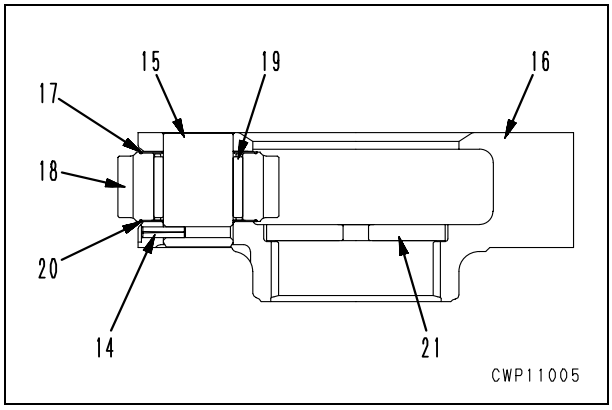


7. No.2 carrier assembly

1) Remove mounting bolt (12) and No. 2 carrier assembly (13).

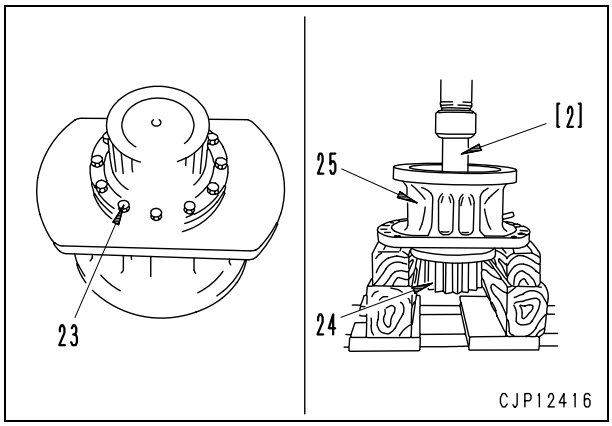


2) Disassemble No. 2 carrier assembly as follows.
   1] Insert pin (14) and drive shaft (15) out of carrier (16).
      ★ After removing the shaft, remove pin (14).
   2] Remove thrust washer (17), gear (18), bearing (19), and thrust washer (20).
   3] Remove plate (21).

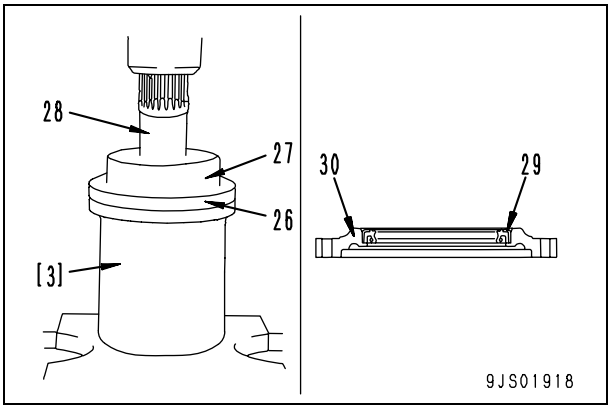


8. Shaft assembly

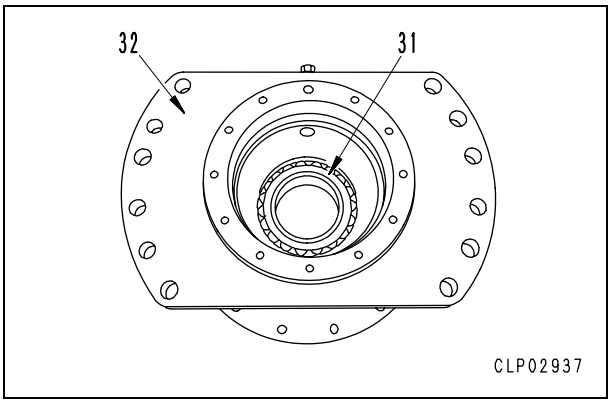
1) Remove 12 mounting bolts (23).
2) Set the shaft and case assembly on the press and then, using push tool [2], remove shaft assembly (24) from case assembly (25).



3) Disassemble the shaft assembly as follows.
   i) Using push tool [3], remove cover assembly (26) and bearing (27) from shaft (28).
   ii) Remove oil seal (29) from cover (30).



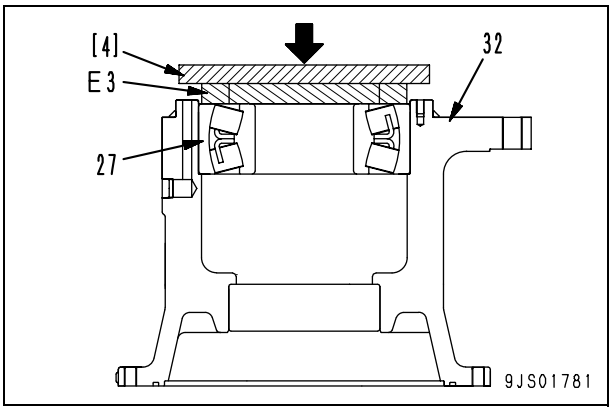
9. Bearing
Using push tool, take bearing (31) out of case (32).



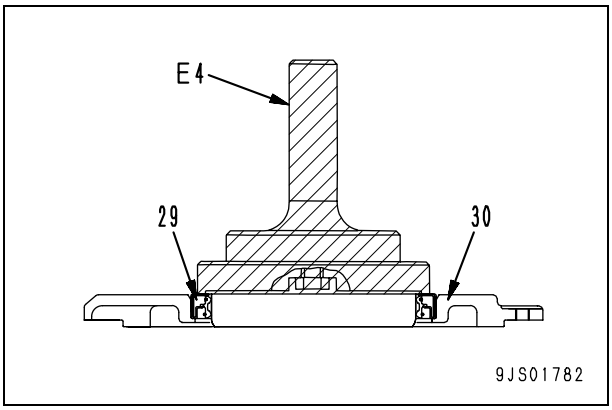
Assembly

★ Clean all related parts and check that there is no dust or damage on the surface. Coat sliding surfaces with engine oil and then assemble the parts.

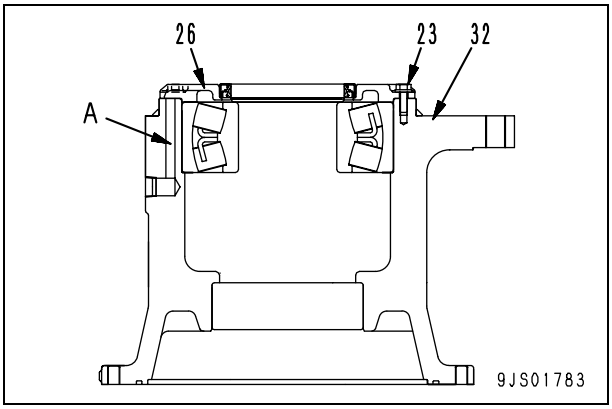
1. Bearing
Using push tool **E3** [4], press fit bearing (27) to case (32).
★ Use a new bearing.
★ Press fitting force (Reference value):
0 – 26.4 kN {0 – 2,690 kg}



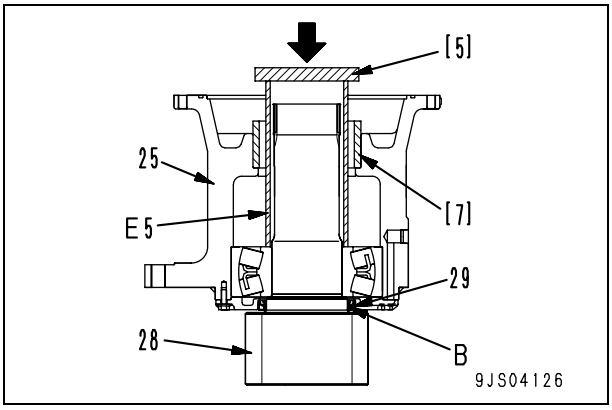
2. Cover assembly
1) Using push tool **E4**, press fit oil seal (29) to cover (30).
   ★ Use a new oil seal.
   ★ When not using push tool **E4**, use another push tool to push the frame around the oil seal evenly.
   ★ Take care that oil seal (29) will not slant.
   Periphery of oil seal:
   Gasket sealant (LG-6)
   ★ Take care that the gasket sealant (LG-6) will not stick to the oil seal lip and shaft.



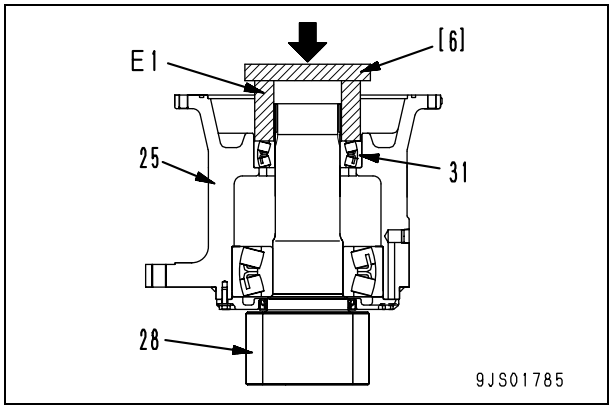
2) Install cover assembly (26) to case (32) and tighten mounting bolts (23).
★ Match the oil passage of cover assembly (26) to hole (A) of case (32).
Cover fitting face:
Gasket sealant (LG-6)
★ Take care that the gasket sealant will not stick to hole (A).
Mounting bolt:
59 – 74 Nm {6.0 – 7.5 kgm}
Oil seal lip: **Grease (G2-LI)**



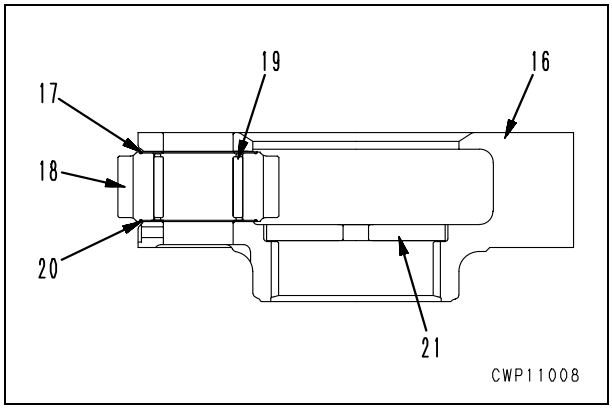
3. Case assembly
1) Reverse case assembly (25) and set it to shaft (28).
★ Take care extremely not to damage the oil seal.
2) Using push tool **E5** [5] and guide [7], press fit the bearing inner race.
★ First, using push tool **E5** [5], hit the bearing inner race with a hammer so that the shaft will not fall, and then set it to the press to press fit.
★ Press fitting force (Reference value):
39 – 110 kN {3,980 – 11,260 kg}
★ Use guide [7] to prevent case assembly (25) from slanting.
★ Hit the flange of case assembly (25) frequently and lightly to correct the lean of case assembly (25). In particular, adjust the flange so that oil seal mating face (B) of the shaft will be at the center oil seal (29).



3) Using push tool **E1** [6], press fit bearing (31).
★ Use a new bearing.
★ Press the bearing inner race and outer race simultaneously. Do not press only the inner race.
★ After press fitting the bearing, check that the case rotates smoothly.
★ Press fitting force (Reference value):
Inner race side:
15.3 – 43.2 kN {1,560 – 4,410 kg}
Outer race side:
0 – 16.2 kN {0 – 1,650 kg}



4. No.2 carrier assembly
1) Assemble No. 2 carrier assembly as follows.
★ There are traces of expansion on the end surface of carrier side hole (h) which were originally caused when the pin was inserted. Make such the end surfaces are smooth enough before reassembly.
1] Assemble plate (21) to carrier (16).
2] Assemble bearing (19) to gear (18), fit top and bottom thrust washers (17) and (20) and then set the gear assembly on carrier (16).

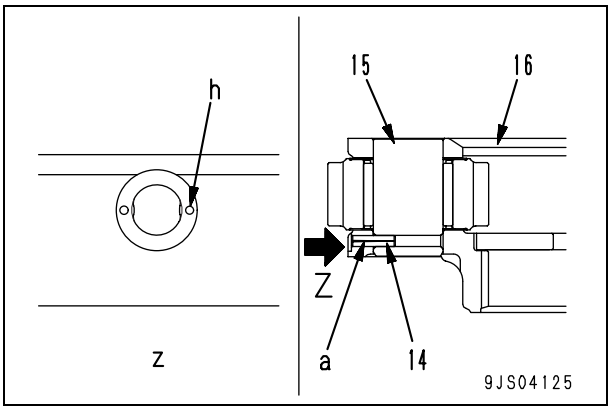


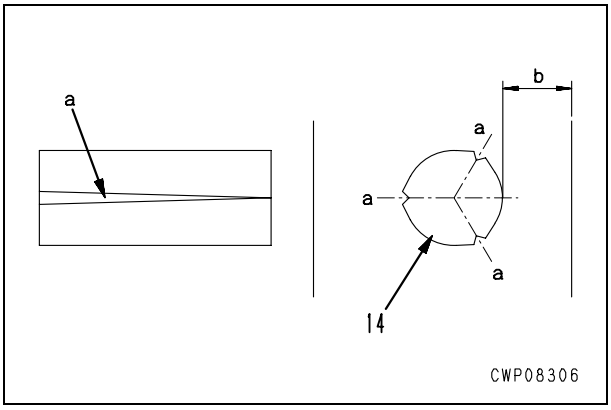
3] Match the pin hole of shaft (15) to that of the carrier and install the shaft by hitting it lightly with a plastic hammer, etc.
★ While rotating the planetary gear, install the shaft and take care not to damage the thrust washer.

4] Insert pin (14).
★ When inserting the pin, take care so that any of the 3 pawls on the circumference (Portion **a**) may not touch the thin-walled portion on the carrier (Portion **b**). Take care, however, that the thin-walled portion can be on the opposite side of the carrier, depending on actual individual items. Pay attention so that a pin pawl will not come to the slender side of the carrier any way.

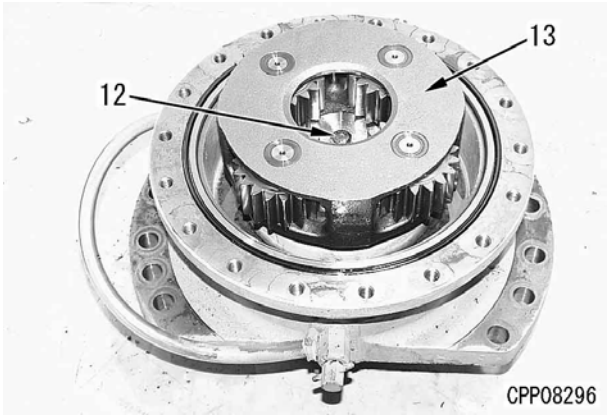
5] After inserting the pin, caulk 2 places (h) around the pin.

6] Check that all the gears rotate smoothly.

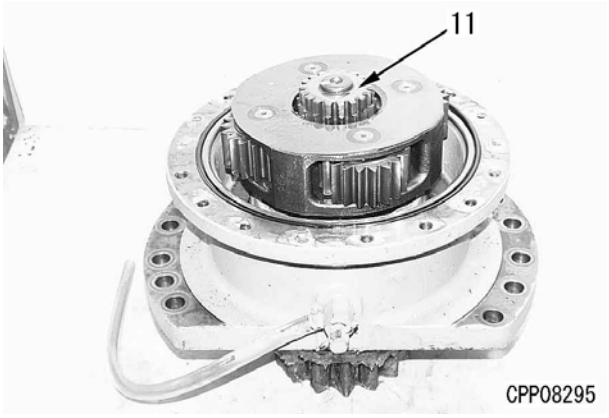




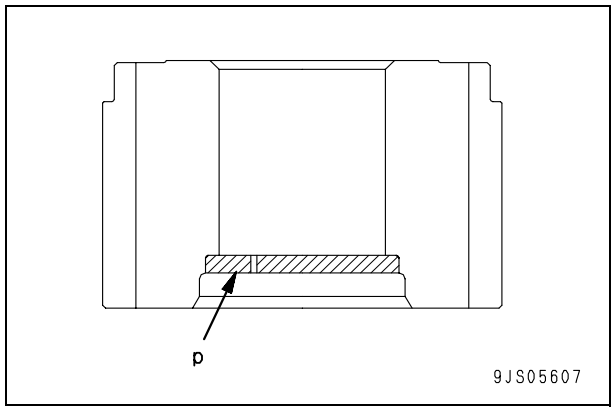
5. Set No. 2 carrier assembly (13) and tighten mounting bolt (12).
Thread of mounting bolt:
Adhesive (LT-2)
Mounting bolt:
343 – 427 Nm {34 – 43.5 kgm}



6. No.2 sun gear
Install No. 2 sun gear (11).



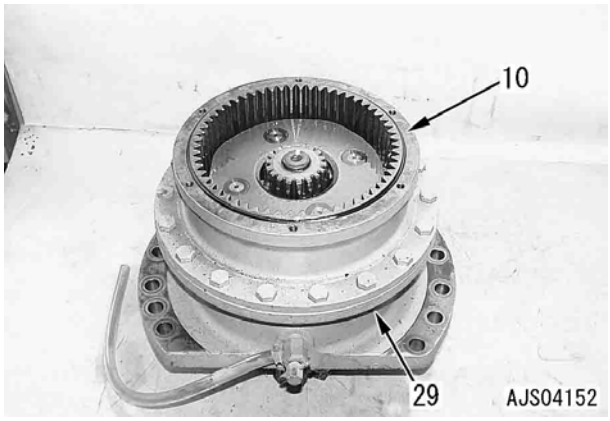
★ Install the No. 2 sun gear with press-fit plate (P) down.



7. Ring gear

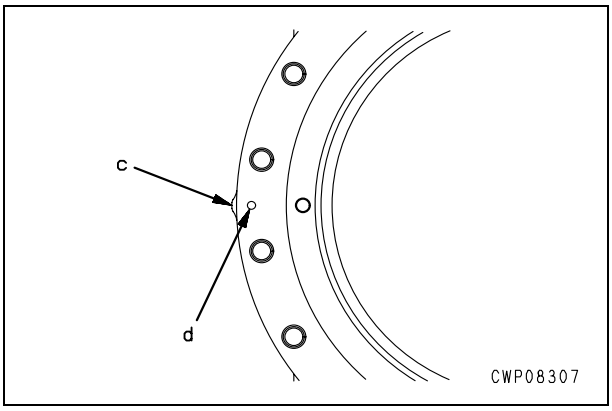
Install the O-ring to ring gear (10) using eyebolt attached to case (29).

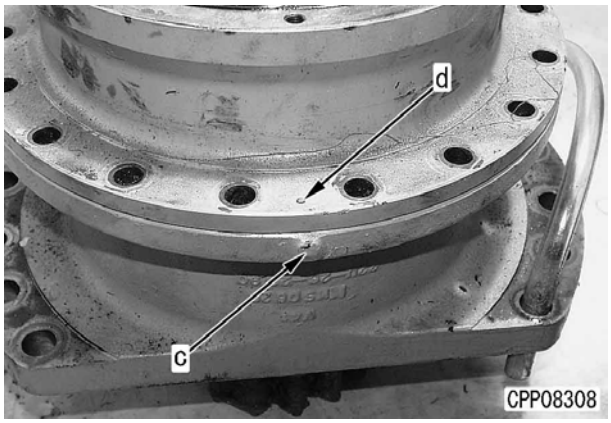
★ Degrease the mating faces of ring gear (10) and case (29).



★ Align the convex portion on the case flange (Portion **c**) and the counter mark on the ring gear (Portion **d**) in the position illustrated in the following figure, and then install it.

Final drive assembly mounting bolt:
245 – 309 Nm {25 – 31.5 kgm}





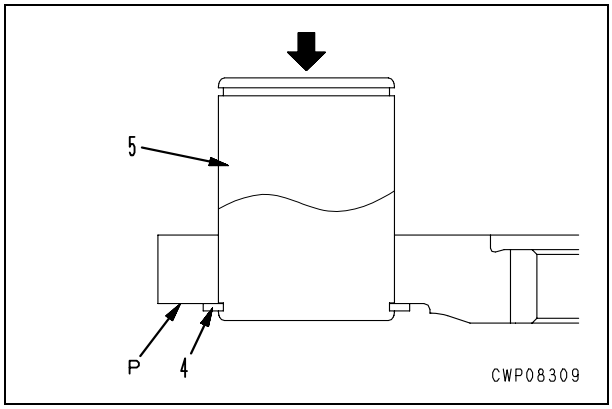
8. No.1 carrier assembly

1) Assemble No. 1 carrier assembly as follows.

1] Press-fit shaft (5) into the carrier in the direction of the arrow until the snap ring groove becomes visible.

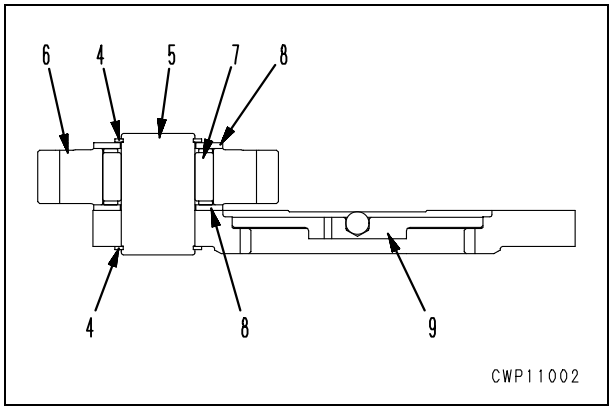
2] After installing snap ring (4), push it back from the opposite side until it is fitted to face (P) of the carrier.

★ At this time, take care not to push back the snap ring too much.

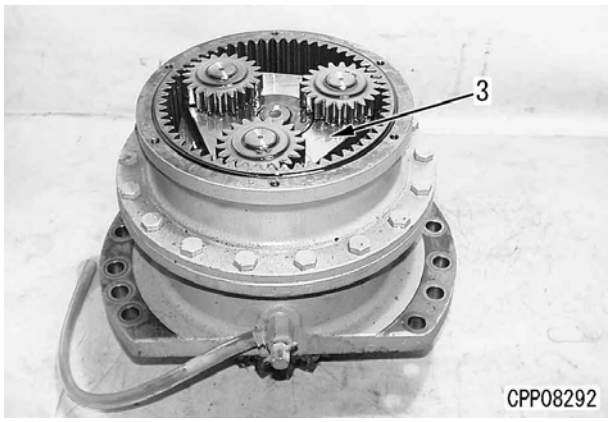


3] Install plate (9).

4] Install thrust washer (8), bearing (7), gear (6), and snap ring (4).

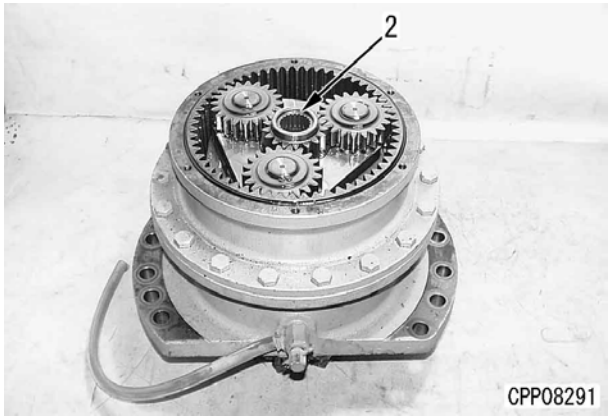


2) Install No.1 carrier assembly (3).

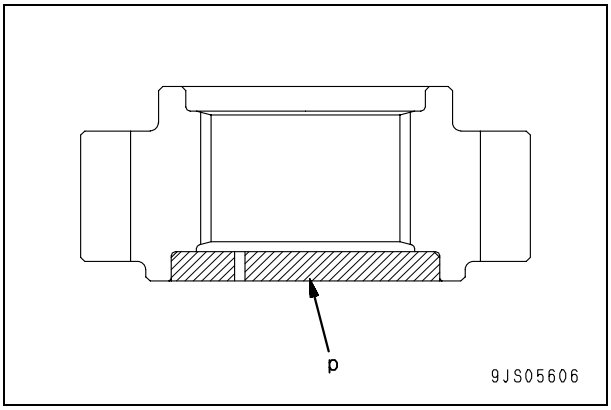


9. No.1 sun gear assembly

Assemble No. 1 sun gear (2).

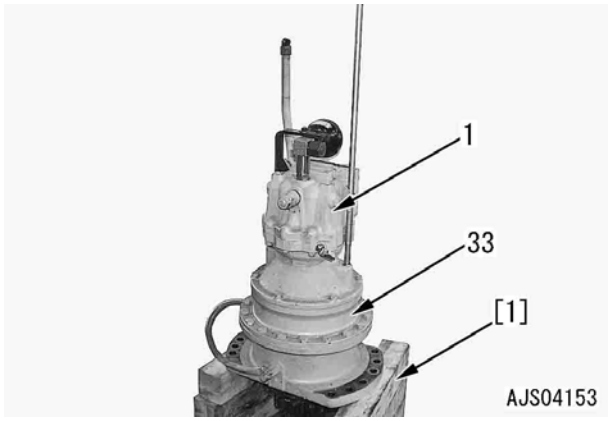


★ Install the No. 1 sun gear with press-fit plate (P) down.

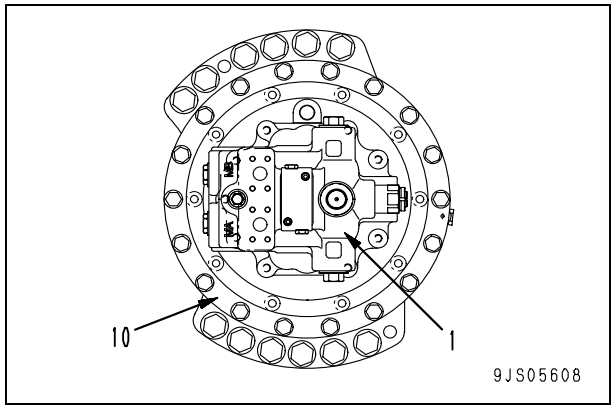


10. Swing motor assembly

1) Set swing machinery assembly (33) to block [1].
2) Install swing motor assembly (1).



3) Install ring gear (10) and swing motor assembly (1) to the following positions.



Swing motor mounting face:
Gasket sealant (LG-6)

Mounting bolt:
98 – 123 Nm {10 – 12.5 kgm}

11. Refilling with oil

Tighten the drain plug and add oil through the oil filler to the specified level.

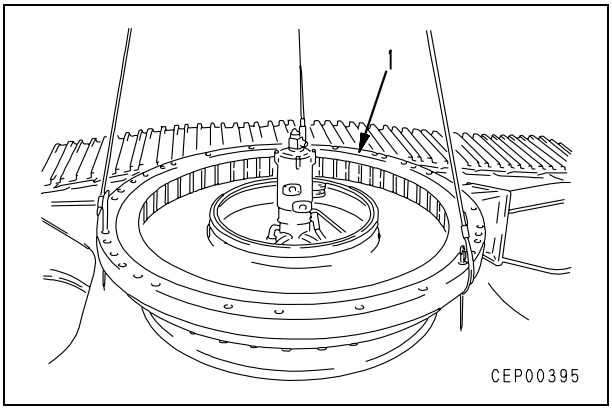
Swing machinery: **13.4 ℓ**

Removal and installation of swing circle assembly

Removal

1. Disassemble the revolving frame assembly referring to the "Removal and installation of revolving frame assembly" section in this manual.

2. Sling swing circle assembly (1) at 3 points and remove the mounting bolt to remove the assembly. [*1]
   Swing circle assembly: **500 kg**

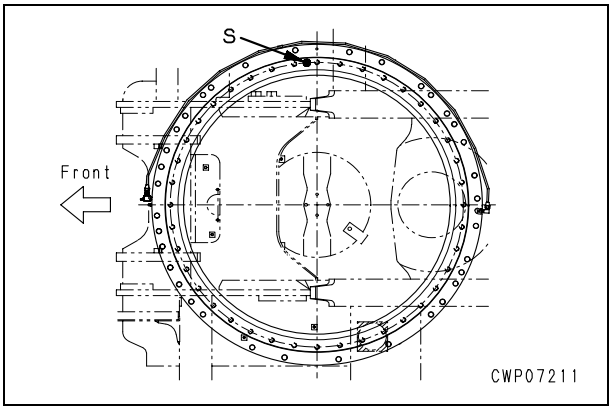


Installation

- Installation is done in the reverse order of removal.

[*1]
Threads of swing circle mounting bolt:
Adhesive (LT-2)
Swing circle mounting bolt:
926.7 ± 103 Nm {94.5 ± 10.5 kgm}

★ Set the soft zone S mark on the inside ring of the inner race facing the right side as shown in the diagram. Then install to the track frame.
Volume charged to grease bath:
Grease (G2-LI) 33 ℓ



KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00958-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

Undercarriage and frame

Undercarriage and frame 2
Disassembly and assembly of carrier roller 2
Disassembly and assembly of track roller assembly 3
Disassembly and assembly of idler assembly 4
Disassembly and assembly of recoil spring 7
Removal and installation of sprocket 9
Expansion and installation of track shoe assembly 10
Removal and installation of revolving frame assembly 11
Removal and installation of counterweight assembly 13

Undercarriage and frame

Disassembly and assembly of carrier roller

Special tools

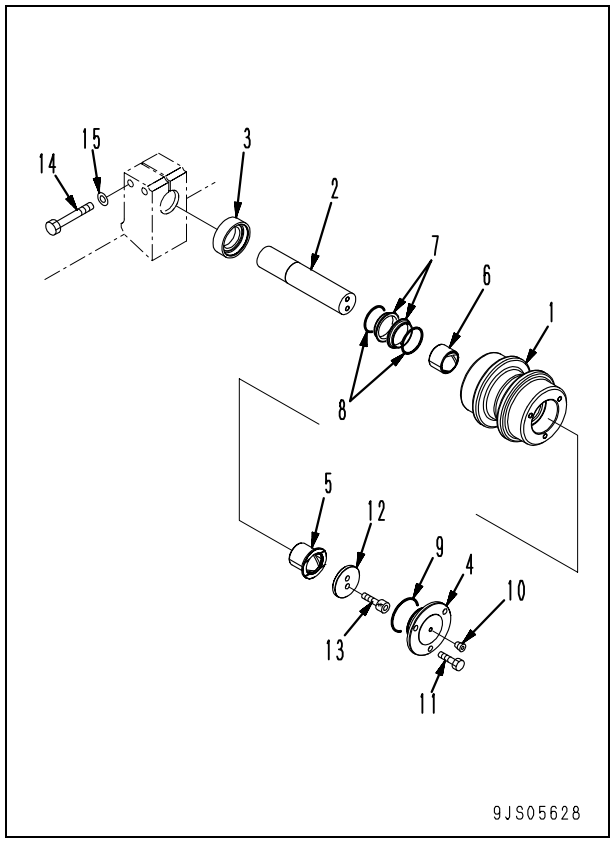
Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
F	1	791-430-3230	Installer	■	1		
	2	791-601-1000	Oil pump assembly	■	1		

Disassembly

★ Disassemble according to the following figure.

Assembly

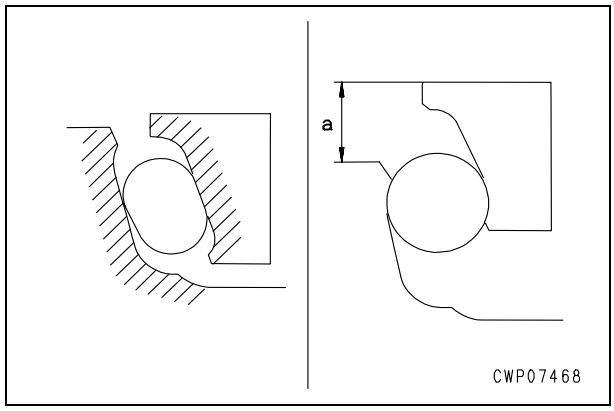
★ Assemble according to the following figure.
★ Only the precautions for assembly are described below.



- Floating seal

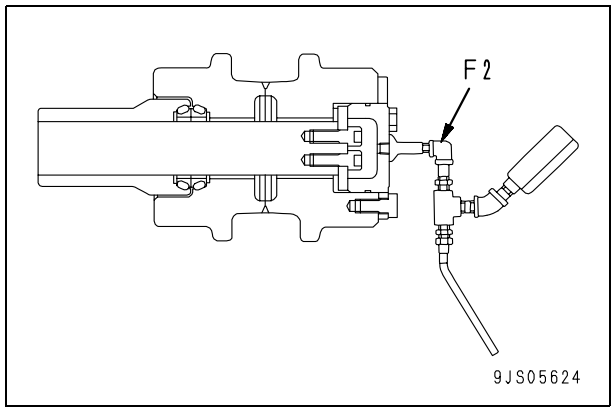
★ Before installing floating seals (7) and (8), completely degrease both contact surfaces of the O-ring and the floating seal (hatched area in the illustration). Furthermore, take care so that no dust will stick to the contact surface of the floating seal.

★ After inserting the floating seal with tool **F1**, check that its slant is less than 1 mm and its projection (a) is 5 – 7 mm.



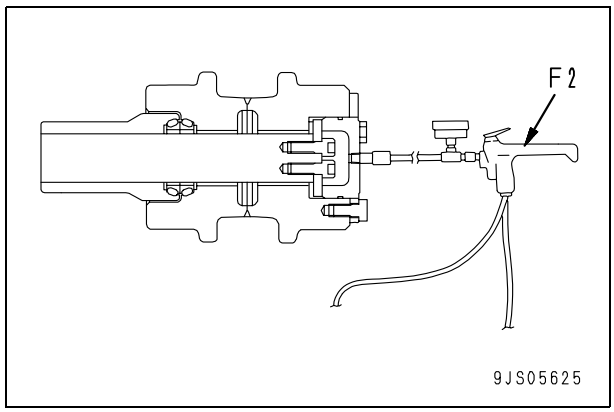
- Carrier roller

★ Check the amount of air leakage from the seal with tool **F2** by applying the standard pressure to the oil filler port.
★ Check that the gauge needle does not go down, when the following standard pressure is applied for 10 seconds.
Standard pressure: 0.1 MPa {1 kg/cm^2}



★ Fill the carrier roller assembly with oil, using tool **F2**, and then tighten the plug.

Carrier roller: **145 – 155 cc (EO30)**



Disassembly and assembly of track roller assembly

Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
G	1	796-670-1010	Installer	■	1		
	2	791-601-1000	Oil pump assembly	■	1		

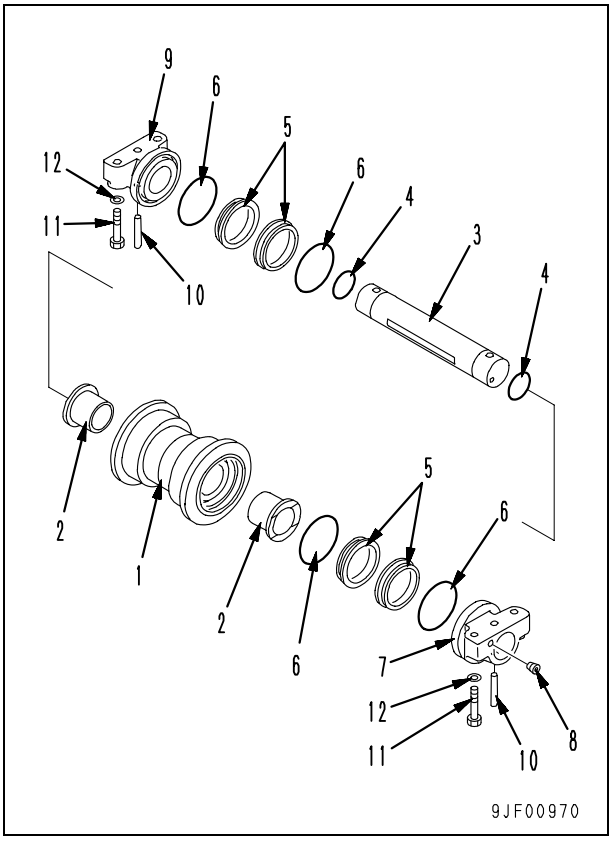
Disassembly

★ Disassemble according to the following figure.

Assembly

★ Assemble according to the following figure.

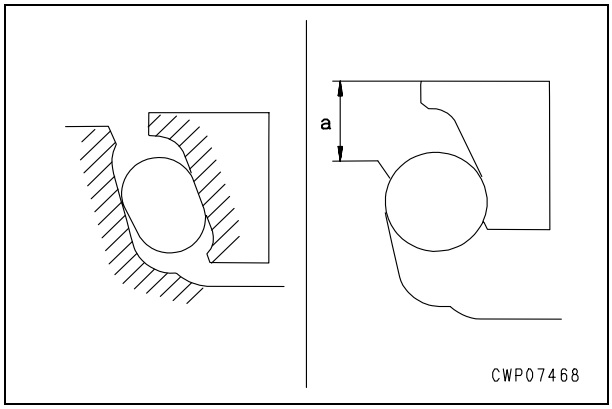
★ Only the precautions for assembly are described below.



- Floating seal

★ Before installing floating seals (5) and (6), completely degrease both contact surfaces of the O-ring and the floating seal (hatched area in the illustration). Furthermore, take care so that no dust will stick to the contact surface of the floating seal.

★ After inserting the floating seal with tool **F1**, check that its slant is less than 1 mm and its projection (a) is 5 – 7 mm.



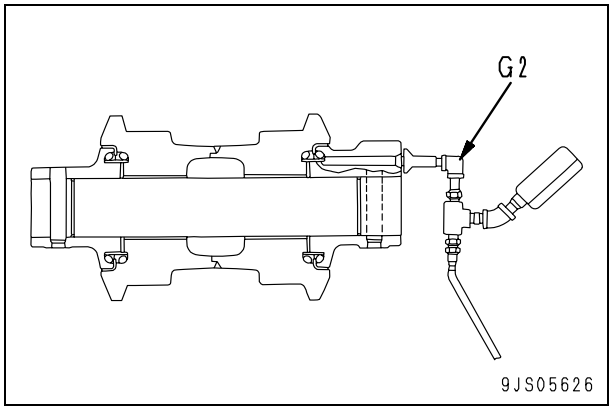
- Mounting roller cover mounting bolt

Track roller cover mounting bolt:
44.12 – 53.93 Nm {4.5 – 5.5 kgm}

- Track roller

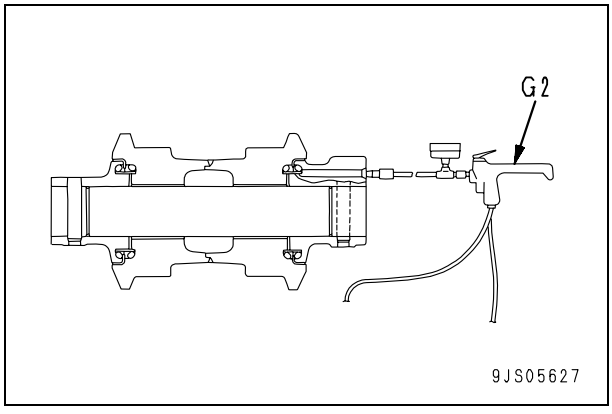
★ Check the amount of air leakage from the seal with tool **G2** by applying the standard pressure to the oil filler port.

★ Check that the gauge needle does not go down, when the following standard pressure is applied for 10 seconds.
Standard pressure: 0.1 MPa {1 kg/cm^2}



★ Fill the track roller assembly with oil, using tool **G2**, and tighten the plug.

Track roller: **250 – 280 cc (EO30)**
Plug: **10 – 20 Nm {1 – 2 kgm}**

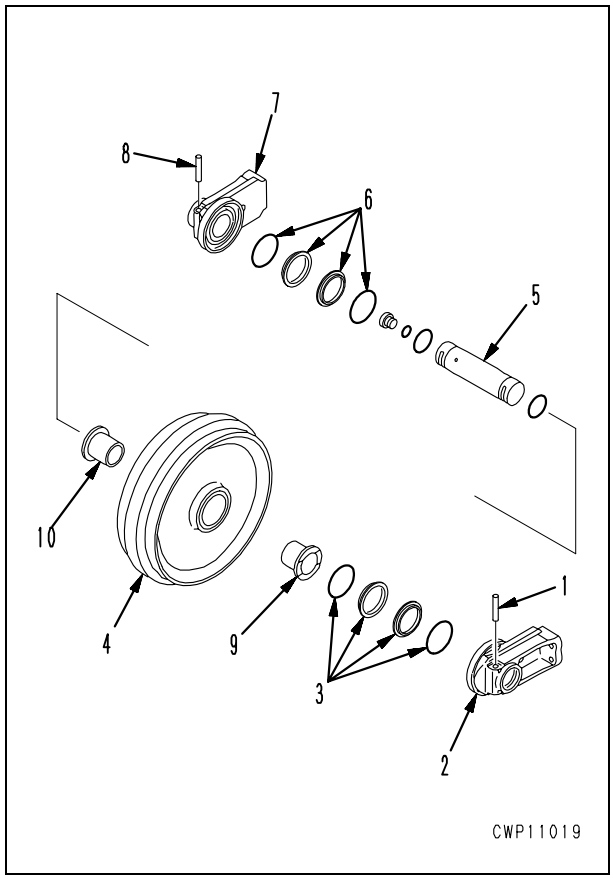


Disassembly and assembly of idler assembly

Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
H	1	796-570-1020	Installer	■	1		
	2	791-601-1000	Oil pump assembly	■	1		

Disassembly

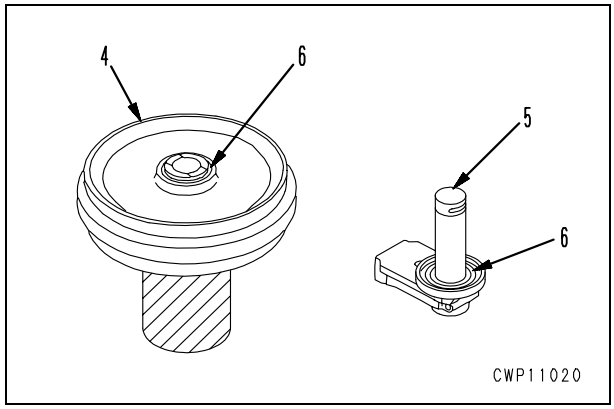


1. Remove dowel pin (1) to remove support (2).

2. Remove floating seal (3) from support (2) and idler (4).

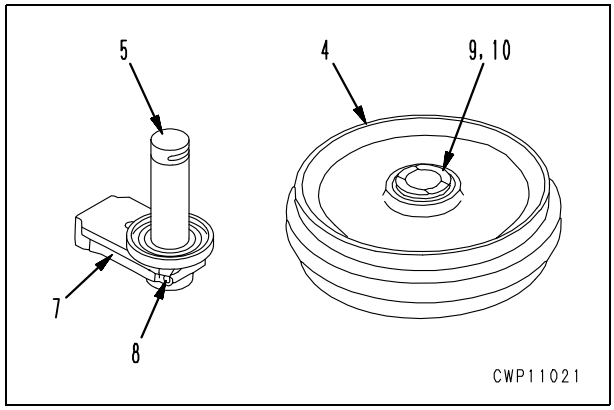
3. Remove idler (4) from shaft (5) and support assembly (7).
   ★ Oil of 230 ± 10 cc is in the idler. Drain it at this time or spread cloths to absorb it.

4. Remove floating seal (6) on the opposite side from idler (4), shaft (5) and support assembly (7).



5. Remove dowel pin (8) to remove support (7) from shaft (5).

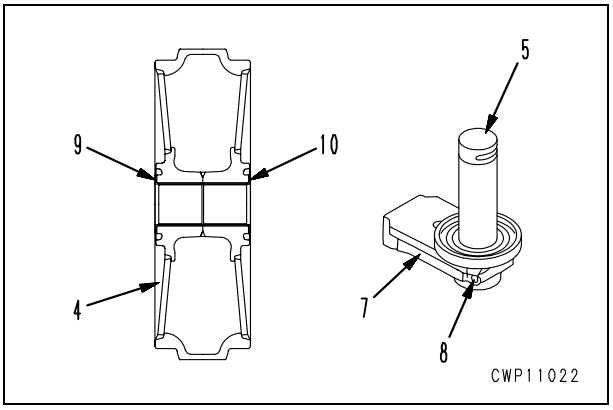
6. Remove bushings (9) and (10) from idler (4).



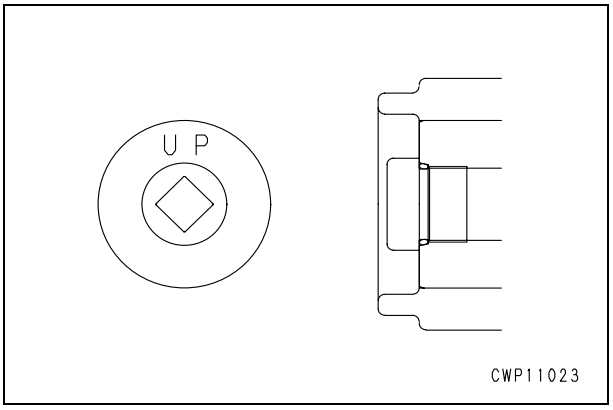
Assembly

1. Press fit bushings (9) and (10) to idler (4).

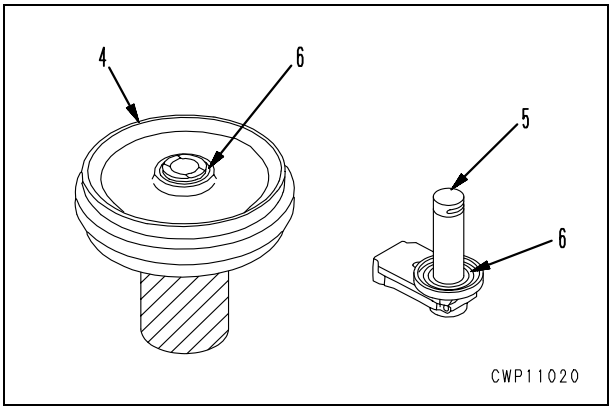
2. Fit O-ring and install support (7) to shaft (5) using dowel pin (8).



★ Be sure to assemble shaft (5) with the UP marking facing upward.

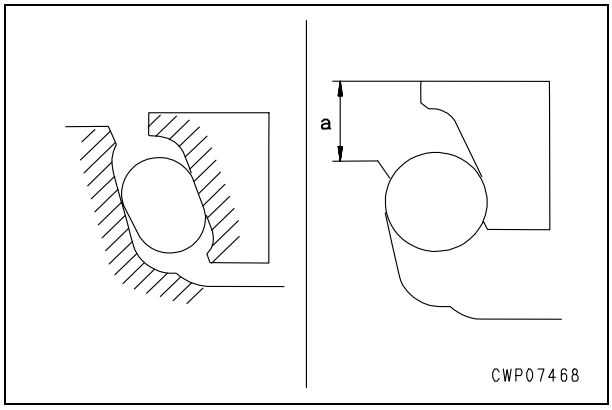


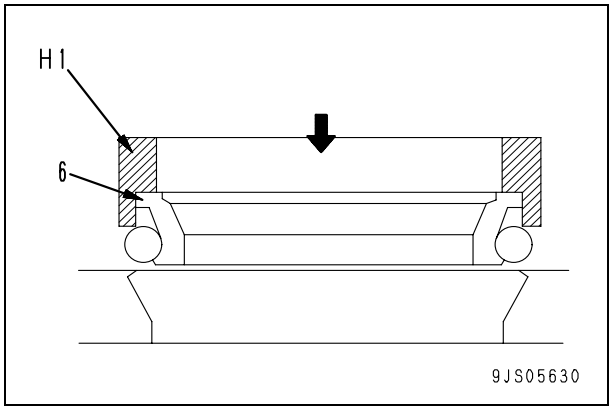
3. Using tool **H1**, install floating seal (6) to idler (4), shaft (5) and support (7) assembly.



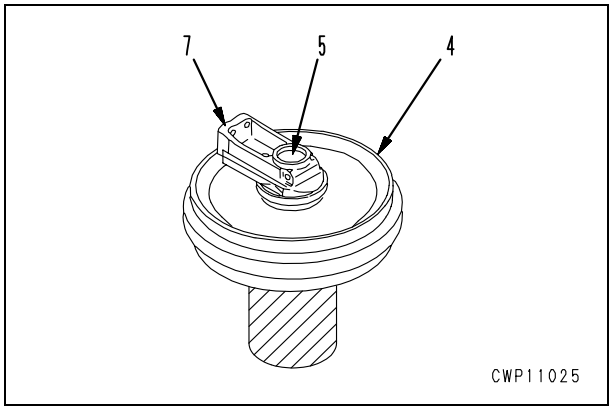
★ Before installing the floating seal, completely degrease both contact surfaces of the O-ring and the floating seal (hatched area in the illustration). Furthermore, take care so that no dust will stick to the contact surface of the floating seal.

★ After inserting the floating seal, check that inclination of the seal is less than 1 mm and that protrusion (a) of the seal remains within the range of 5 – 7 mm.

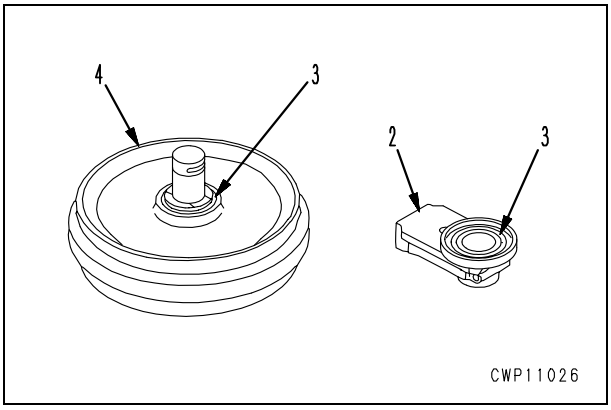




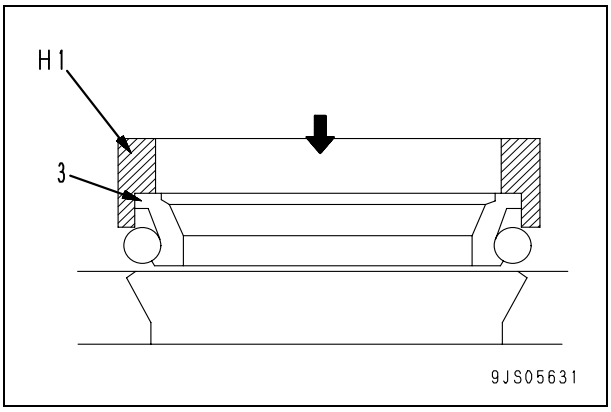
4. Assemble shaft (5) and support (7) assembly to idler (4).



5. Using tool **H1**, install floating seal (3) to idler (4), shaft (2) and support (7) assembly.



★ Coat the sliding surface of the floating seal with oil, and be careful not to let any dirt or dust get stuck to it.
★ Remove all grease and oil from the contact surfaces of the O-ring and the floating seal.



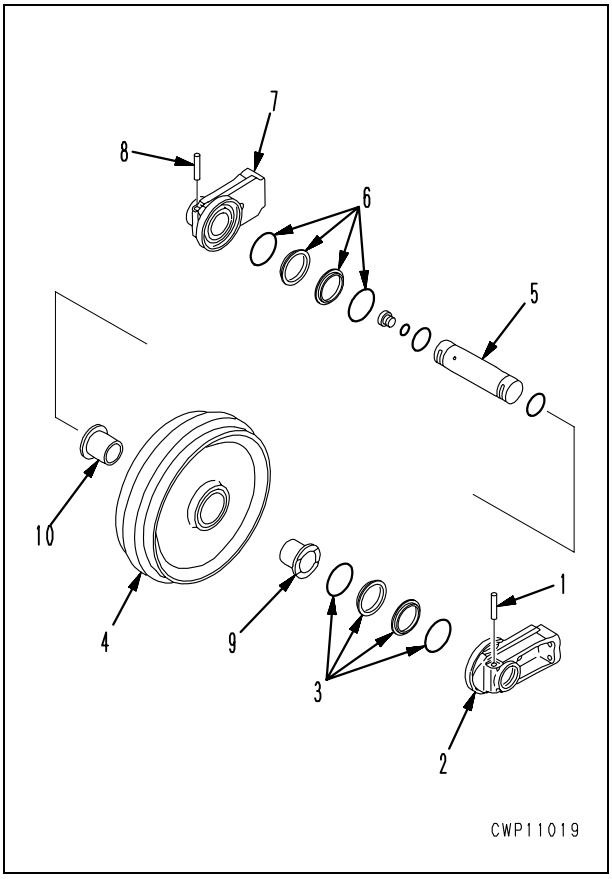
6. Install O-ring, then install support (2) using dowel pin (1).
★ Caulk the pin of the support after insertion.

7. Using tool **H2**, fill the idler assembly with oil and tighten the plug.

Idler:

Approximately 230 ± 10 cc (EO30)

Plug: **130 – 180 Nm {13 – 18 kgm}**

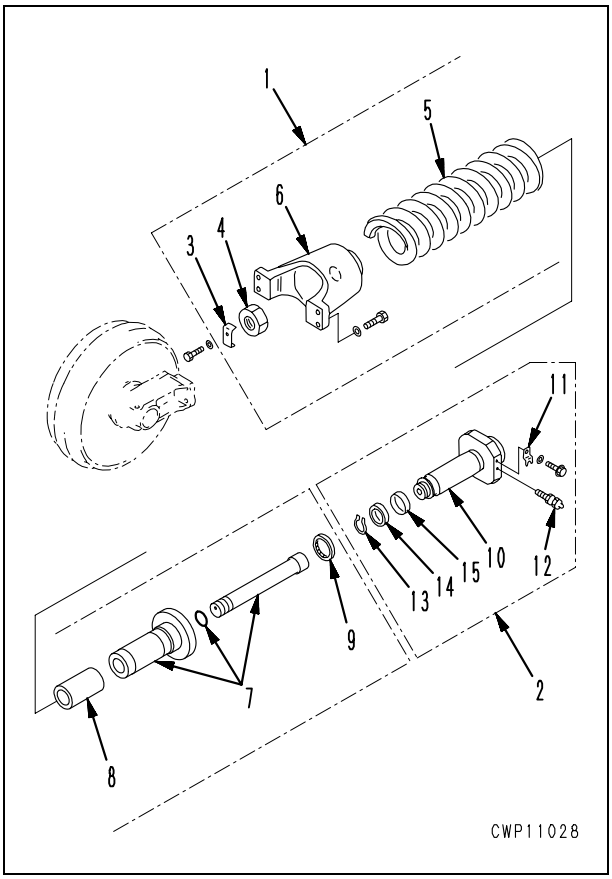


Disassembly and assembly of recoil spring

Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
J	1	791-685-8006	Compressor	■	1		
		791-635-3160	Extension	■	1		
		790-101-1600	Cylinder (686 kN {70 t})	■	1		
		790-101-1102	Pump	■	1		
	2	790-201-1500	Push tool kit	■	1		
		790-201-1620	• Plate		1		
		790-101-5021	• Grip		1		
		01010-50816	• Bolt		1		

Disassembly



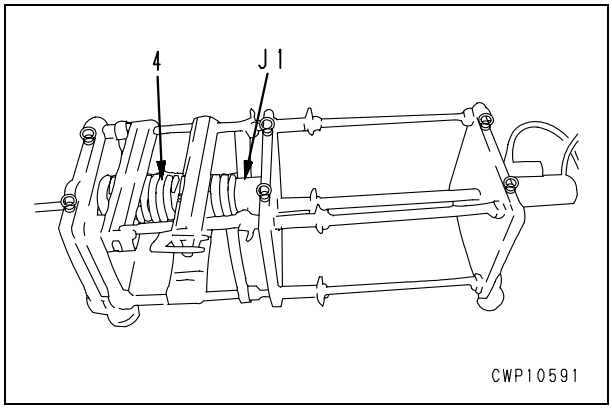
1. Remove piston assembly (2) from recoil spring assembly (1).

2. Disassembly of recoil spring assembly

1) Set recoil spring assembly (1) to tool.

⚠ **The spring is under large installed load, so be very sure to set the tool properly. Failure to do this is dangerous.**

★ Installed load of spring:
208.74 kN {21,287 kg}



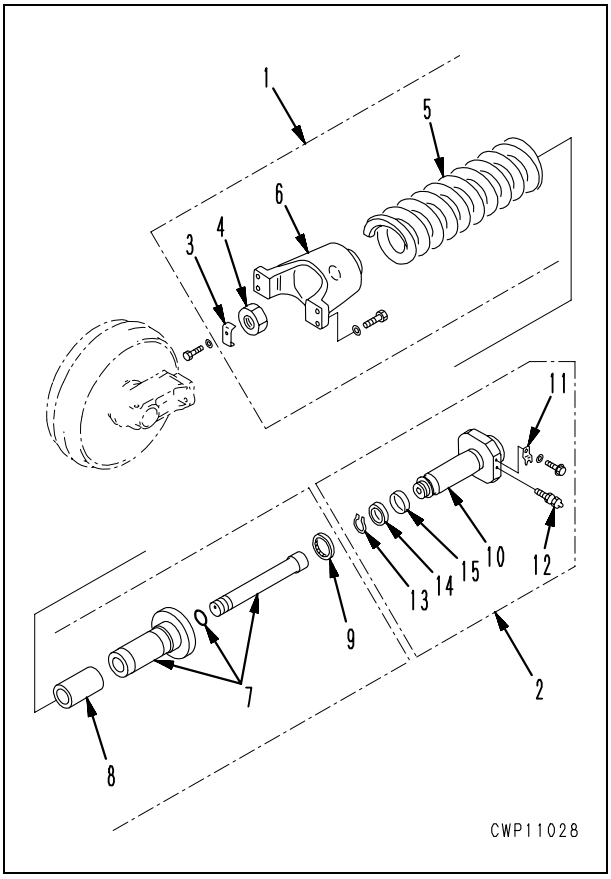
2) Apply hydraulic pressure gradually to remove lock plate (3) then nut (4).
★ Compress the spring until the nut becomes loose.
★ Release the hydraulic pressure slowly and release the tension of the spring.
★ Free length of spring: **811.5 mm**

3) Remove yoke (6), cylinder (7), collar (8) and dust seal (9) from spring (5).

3. Disassembly of piston assembly

1) Remove lock plate (11) from piston (10), then remove valve (12).
2) Remove snap ring (13), then remove U-packing (14) and ring (15).

Assembly

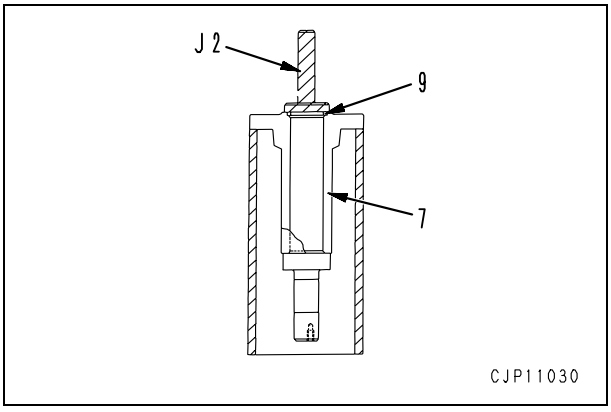


1. Disassembly of piston assembly

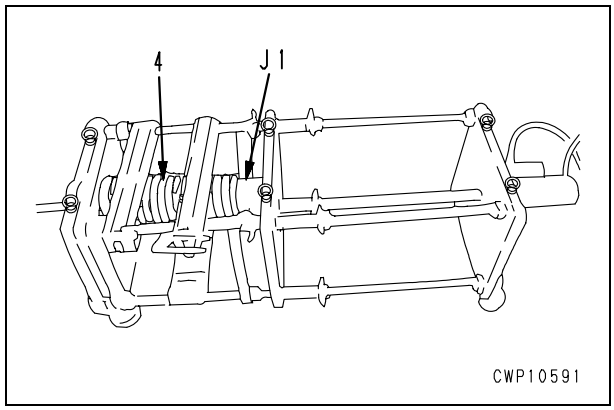
1) Assemble ring (15) and U-packing (14) to piston (10) and secure with snap ring (13).
2) Tighten valve (12) temporarily, and secure with lock plate (11).

2. Disassembly of recoil spring assembly

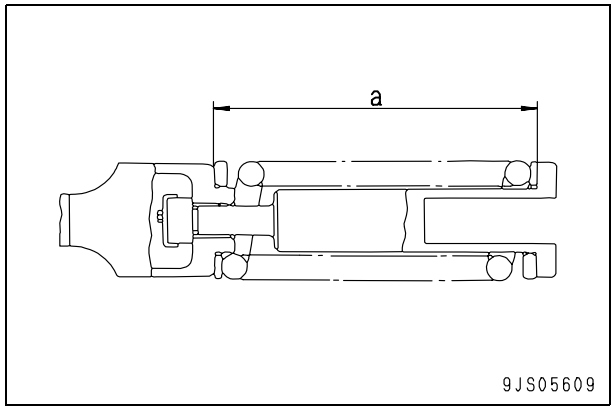
1) Using tool **J2**, install dust seal (9) to cylinder (7).



2) Assemble cylinder (7), collar (8) and yoke (6) to spring (5), and set it on tool **J1**.
   Cylinder sliding part:
   Grease (G2-LI)



3) Apply hydraulic pressure slowly to compress the spring, and then tighten nut (4) so that the installed length of the spring is dimension (a) and secure it with lock plate (3).
   ★ Installed length (a) of spring**: 655 mm**



4) Remove recoil spring assembly (1) from tool **J1**.

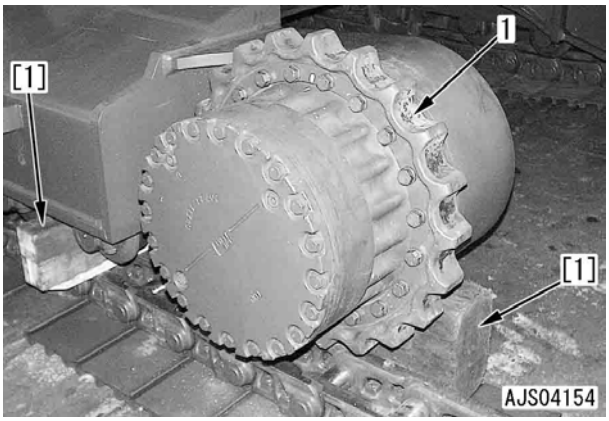
3. Assemble piston assembly (2) to recoil spring assembly (1).
   Sliding part of piston: **Grease (G2-LI)**
   Wear ring: **Grease (G2-LI)**
   ★ Install the piston assembly so the valve installing position is on the outside.
   ★ Fill the inside of the cylinder with 180 cc of grease (G2-LI), then bleed the air and check that grease comes out of the grease hole.

Removal and installation of sprocket

Removal

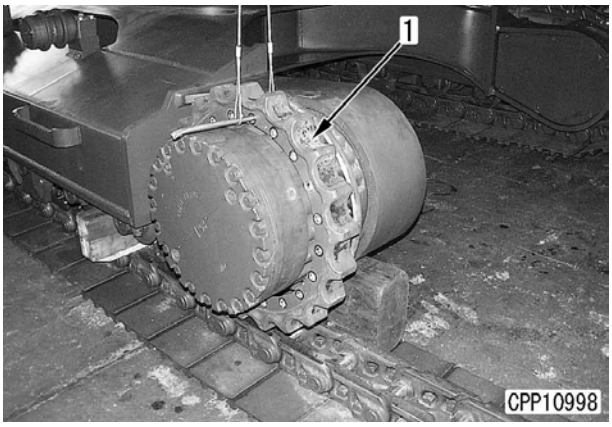
1. Expand the track shoe assembly referencing “Expansion and installation of track shoe assembly”.

2. Swing work equipment 90°, push up chassis with work equipment and place blocks [1] between track frame and track shoe.



3. Remove the mounting bolt and then lift off sprocket (1). [*1]

   Sprocket: **65 kg**



Installation

- Installation is done in the reverse order of removal.

[*1]

Threads of sprocket mounting bolt:
Adhesive (LT-2)

Sprocket mounting bolt:
640 – 785 Nm {65 – 80 kgm}

Expansion and installation of track shoe assembly

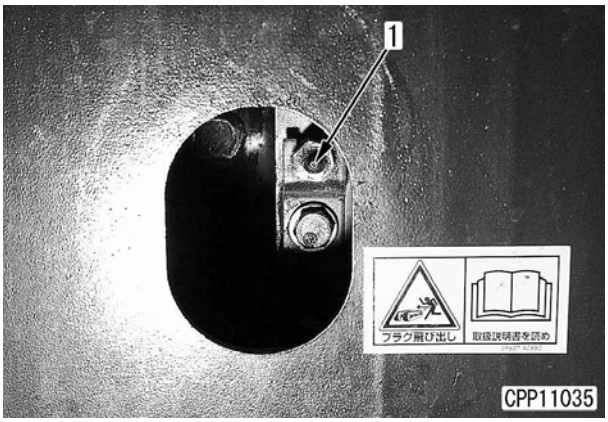
Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
K	791-630-3000	Remover and installer	■	1		
	790-101-1300	Cylinder (980 kN {100 t})	■	1		
	790-101-1102	Pump	■	1		

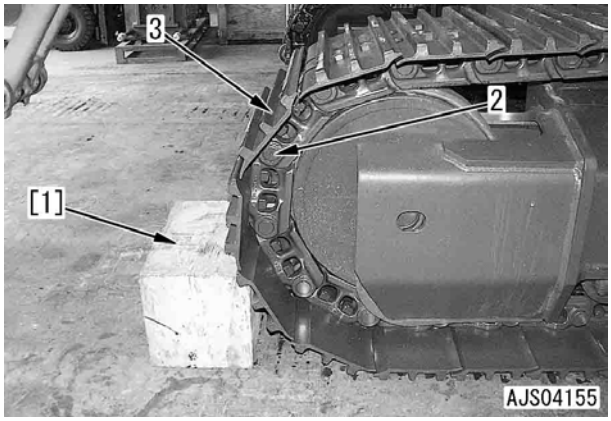
Expansion of track shoe

1. Set the master pin position.
   - ★ Start the engine and set the master pin position in front side of the idler.
   - ★ Set block [1] and other necessary parts previously at bottom of the track shoe situated in front of the idler.

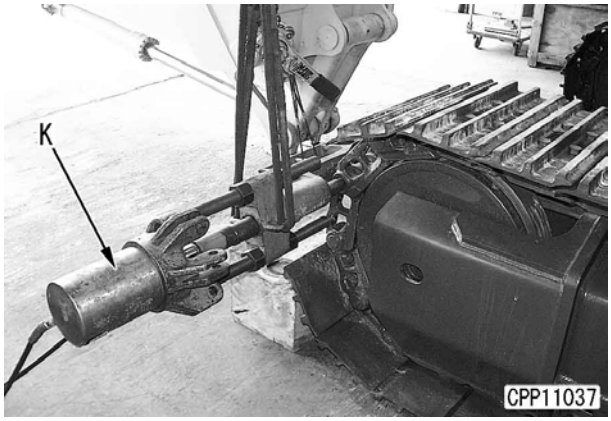
2. Lower the work equipment to the ground, and loosen lubricator (1) in order to loosen track shoe tension. [*1]
   - ⚠ **Inner pressure of the adjustment cylinder is extremely high. Never loosen the lubricator more than one turn. If the grease does not come out, move the machine backwards and forwards.**



3. Remove track shoe (3) on master pin (2). [*2]



4. Use tool **K** and remove nut (2). [*3]



5. Drive the machine gradually reverse to expand the track shoe.

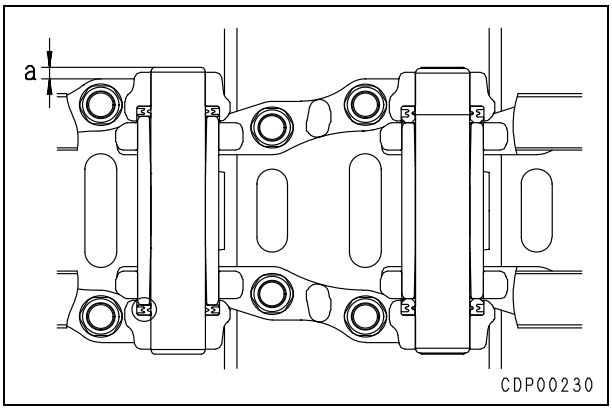
Installation of track shoe

- Installation is done in the reverse order of expansion.

[*1]
★ Refer to the “Checking and adjusting track shoe tension” section in the Testing and adjusting chapter of this manual.

[*2]
Mounting bolt: **Seizure prevention agent** (Maruzen Morimax No.2 or equivalent)
Mounting bolt: **393 ± 39 Nm {40 ± 4 kgm}**

[*3]
★ Press-fit the master pin, using tool **K** in such that the master pin protrusion becomes (a).
Master pin protrusion amount (a): **4.2 ± 2 mm**



Removal and installation of revolving frame assembly

Removal

⚠ **Extend the arm and bucket fully, lower the work equipment to the ground and then move the work equipment lock lever to the LOCK position.**

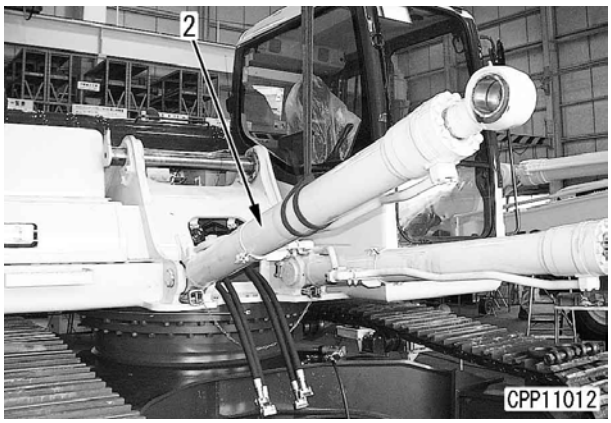
1. Remove the work equipment assembly For details, see “Removal and installation of work equipment assembly”.

2. Remove the counterweight assembly.
   For details, see “Removal and installation of work equipment assembly”.

3. Disconnect 4 boom cylinder hoses (1).
   ★ Plug the hose to stop oil flow-out.

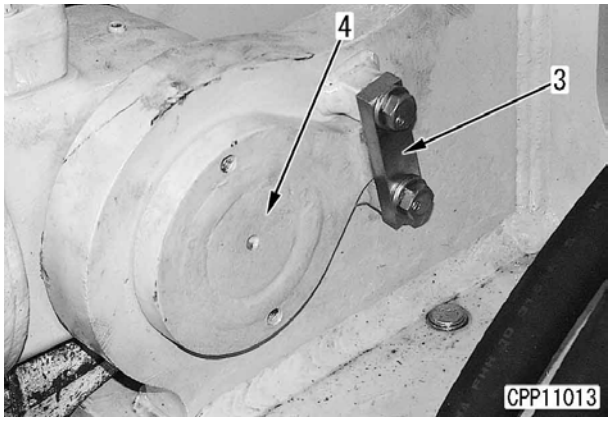


4. Sling boom cylinder assembly (2).

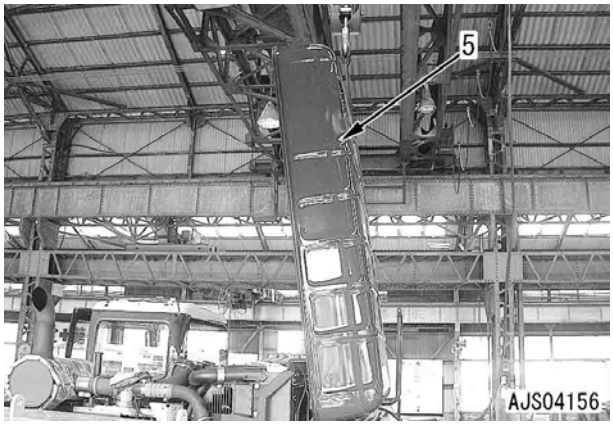


5. Remove plate (3) and pin (4), and then lift boom cylinder assembly (2) to remove.
   ★ Remove the boom cylinder assembly on the opposite side in the same manner.

   Boom cylinder assembly: **260 kg**

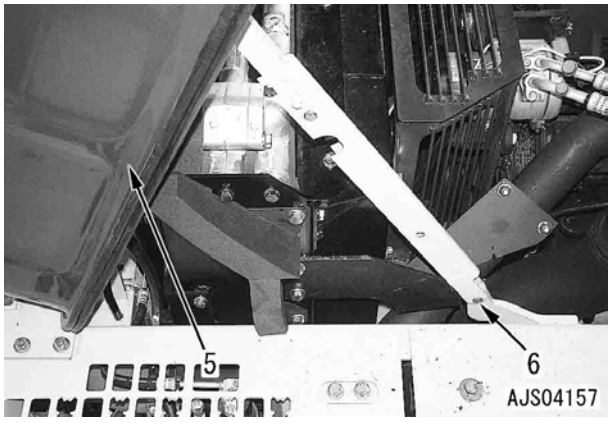


6. Sling engine hood (5) temporarily.
   ★ When slinging the engine hood, take care not to damage the rubber seal.



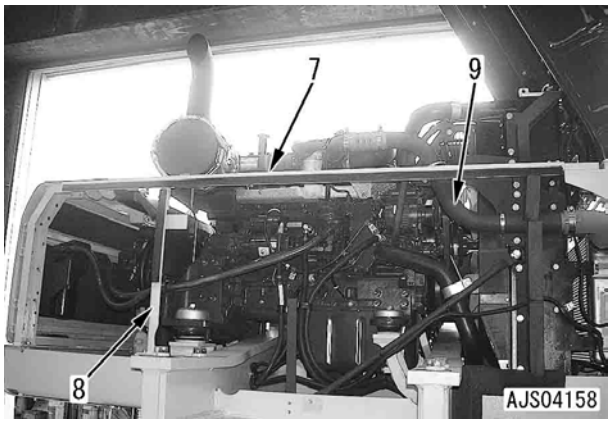
7. Remove the engine hood mounting bolt and then remove pin (6).

8. Lift off work equipment assembly (5).



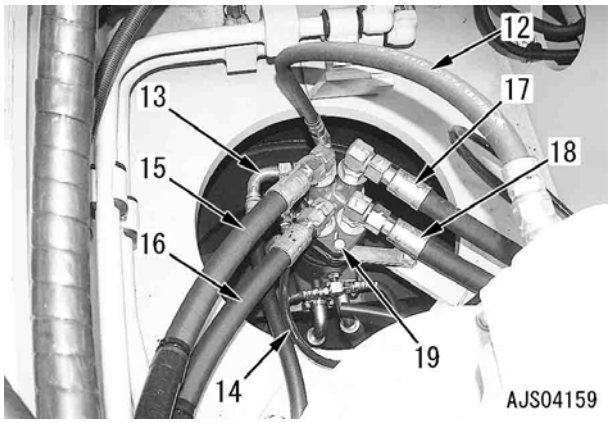
9. Remove plates (7) and (8).

10. Remove aftercooler tube (9).
    ★ When other parts can interfere with the lifting hook in removal of the revolving frame, such parts must be removed beforehand.

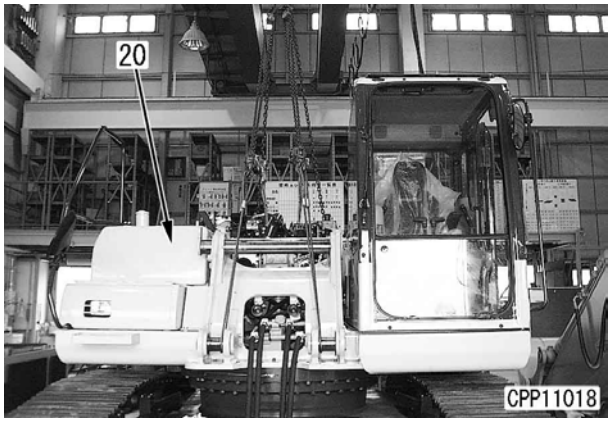


11. Disconnect 8 hoses (12) through (18).
    - (12): Center swivel joint (D port) – Swing motor (T port)
    - (13): Center swivel joint (D port) – Hydraulic oil tank
    - (14): Center swivel joint (E port) – Solenoid valve
    - (15): Center swivel joint (B port) – Control valve LH travel (B2 port)
    - (16): Center swivel joint (D port) – Control valve RH travel (B5 port)
    - (17): Center swivel joint (A port) – Control valve LH travel (A2 port)
    - (18): Center swivel joint (C port) – Control valve RH travel (A5 port)

12. Pull out pin (19) on the side of center swivel joint and remove the jam plate from the center swivel joint.



13. Remove 40 mounting bolts and then lift off revolving frame assembly (20). [*1]
    ★ Using the lever block, adjust fore and aft as well as right and left balance of the revolving frame assembly, with only 2 mounting bolts being left in the front and rear side of the assembly. After the adjustment, remove the remaining two bolts.
    ⚠ **When removing the revolving frame assembly, take care so that it does not hit the swivel joint assembly.**
    Revolving frame assembly: **6,000 kg**



Installation

- Installation is done in the reverse order of removal.

[*1]
Mating face of swing circle: **Gasket sealant (LG-6)**
Threads of revolving frame mounting bolt: **Adhesive (LT-2)**
Revolving frame mounting bolt : **926.7 ± 103 Nm {94.5 ± 10.5 kgm}**

- **Refilling with oil (Hydraulic tank)**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

- **Air bleeding**
  Bleed air from the travel motor referencing the “Bleeding air from various parts” section in the Testing and adjusting chapter of this manual.

Removal and installation of counterweight assembly

Removal

1. Install eyebolt [1] to counterweight assembly (1), and sling.

2. Remove 4 mounting bolts (2). [*1]
   ★ Record the locations where the shims were used.

3. Lift off counterweight (1) horizontally using wire or chain block. [*2]
   ★ Be careful not to bump it against the engine or radiator or cooler assembly.

   Counterweight assembly: **5,500 kg**



Installation

- Install in reverse order of removal.

[*1]
Counterweight mounting bolt:
1,715 – 1,911 Nm {175 – 195 kgm}

[*2]
★ Installing and adjusting counterweight
   1) Adjust the level difference from the exterior part (vertical clearance) with the shim between the counterweight and revolving frame.
      - Set shim thickness: 1.0 mm, 2.0 mm
   2) Install counterweight in such a way that clearance between the door and counterweight as well as clearance between the revolving frame and counterweight become 10 ± 5 mm.

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00959-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

Hydraulic system

Hydraulic system 2
Removal and installation of center swivel joint assembly 2
Disassembly and assembly of center swivel joint assembly 4
Removal and installation of hydraulic tank assembly 5
Removal and installation of control valve assembly 7
Disassembly and assembly of control valve assembly 10
Removal and installation of hydraulic pump assembly 12
Removal and installation of oil seal in hydraulic pump input shaft 15
Disassembly and assembly of work equipment PPC valve assembly 16
Disassembly and assembly of travel PPC valve assembly 17
Disassembly and assembly of hydraulic cylinder assembly 18

Hydraulic system

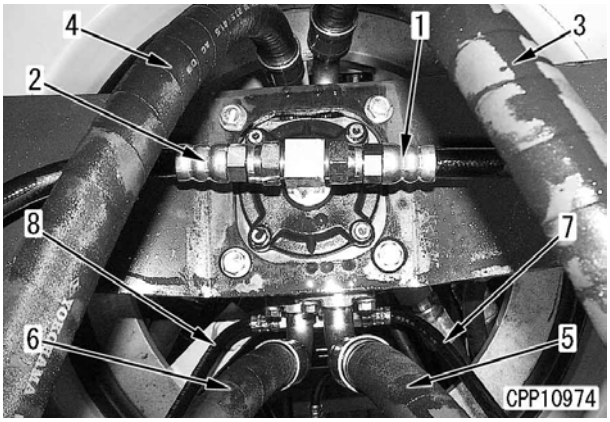
Removal and installation of center swivel joint assembly

Removal

⚠ **Release the remaining pressure in the hydraulic circuit. For details, see Testing and adjusting, "Releasing remaining pressure in hydraulic circuit".**

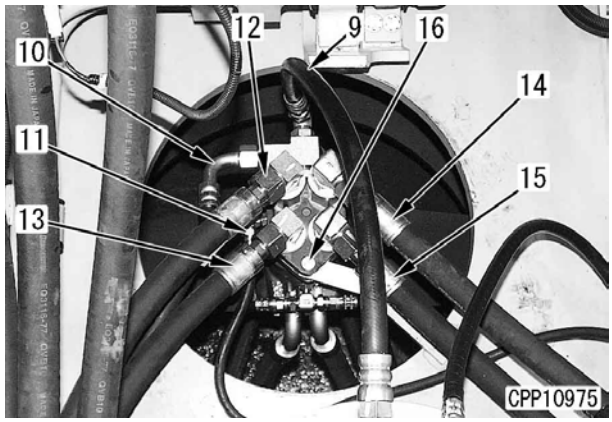
★ Attach an identification tag to each piping to avoid a mistake in the position of installation later.

1. Disconnect 8 hoses (1) through (8) of the travel motor center swivel joint.
   - (1): Center swivel joint (T port) – LH travel motor (T port)
   - (2): Center swivel joint (T port) – RH travel motor (T port)
   - (3): Center swivel joint (B port) – LH travel motor (PA port)
   - (4): Center swivel joint (D port) – RH travel motor (PB port)
   - (5): Center swivel joint (A port) – LH travel motor (PB port)
   - (6): Center swivel joint (C port) – RH travel motor (PA port)
   - (7): Center swivel joint (E port) – LH travel motor (P port)
   - (8): Center swivel joint (E port) – RH travel motor (P port)

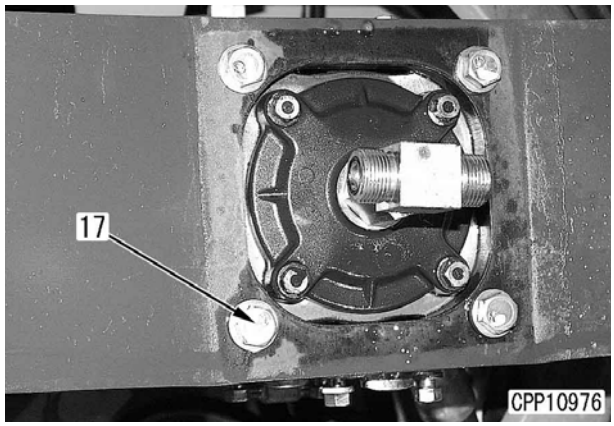


2. Disconnect 7 hoses (9) through (15).
   - (9): Center swivel joint (D port) – Swing motor (T port)
   - (10): Center swivel joint (D port) – Hydraulic oil tank
   - (11): Center swivel joint (E port) – Solenoid valve
   - (12): Center swivel joint (B port) – Control valve LH travel (B2 port)
   - (13): Center swivel joint (D port) – Control valve RH travel (B5 port)
   - (14): Center swivel joint (A port) – Control valve LH travel (A2 port)
   - (15): Center swivel joint (C port) – Control valve RH travel (A5 port)

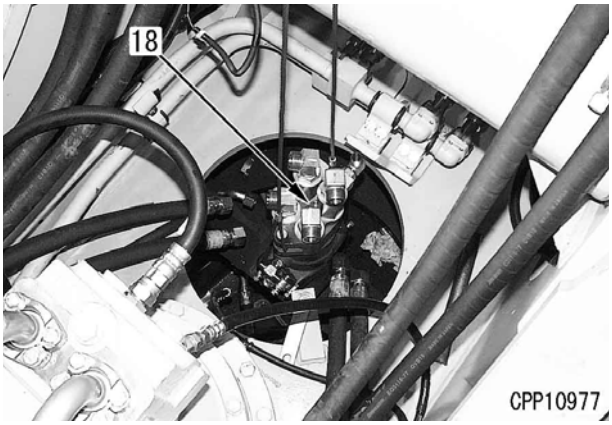
3. Pull out pin (16) on the side of center swivel joint and remove the jam plate from the center swivel joint.



4. Remove 4 mounting bolts (17).



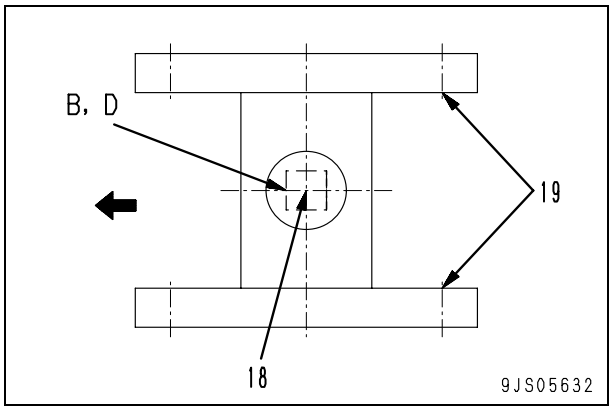
5. Lift and remove center swivel joint assembly (18). [*1]
   Center swivel joint assembly: **40 kg**



Installation

- Installation is done in the reverse order of removal.

[*1]
★ Install the center swivel joint assembly (18) with ports (B) and (D) directed to the front of the machine (in the direction of the arrow).
(Part (19) in the following figure is the sprocket.)



- **Refilling with oil (hydraulic tank)**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

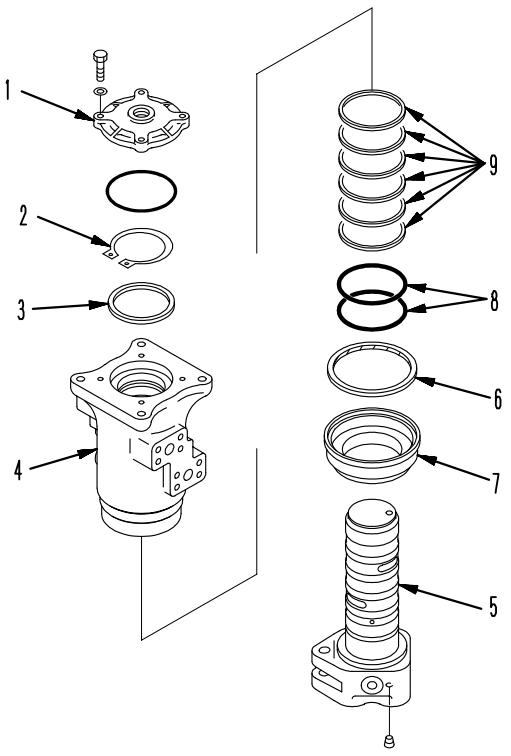
- **Air bleeding**
  Bleed the air from the circuit between the valve and the hydraulic cylinder. For details, see Testing and adjusting, “Bleeding air from various parts”.

Disassembly and assembly of center swivel joint assembly

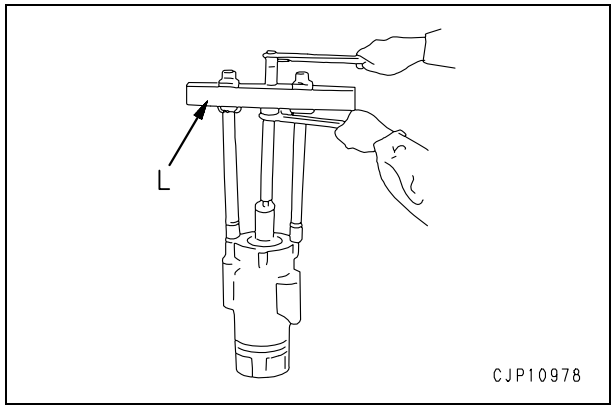
Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
L	790-101-2501	Push puller	■	1		
	790-101-2510	Block		1		
	790-101-2520	Screw		1		
	791-112-1180	Nut		1		
	790-101-2540	Washer		1		
	790-101-2630	Leg		2		
	790-101-2570	Plate		4		
	790-101-2560	Nut		2		
	790-101-2650	Adapter		2		

Disassembly



1. Remove cover (1).
2. Remove snap ring (2).
3. Using tool **L**, pull out swivel rotor (4) and ring (3) from swivel shaft (5).
4. Remove dust seal (6) from cover (7).
5. Remove O-ring (8) and slipper seal (9) from swivel rotor (4).



Assembly

1. Assemble slipper seal (9) and O-ring (8) to swivel rotor (4).
2. Install cover (7) to swivel shaft (5).
   Inside of cover:
   Grease (G2-LI) (Apply 2 – 3 cc)
3. Install dust seal (6) to cover (7).
   Lip of dust seal:
   Grease (G2-LI) (Apply 2 – 3 cc)
4. Set swivel shaft (5) to block, then using push tool, tap swivel rotor (4) with a plastic hammer to install.
   Contact surface of rotor and shaft:
   Grease (G2-LI)
   ★ When installing the rotor, use care not to damage the slipper seal and the O-ring.
5. Install ring (3) and secure it with snap ring (2).
6. Fit O-ring and install cover (1).
   Mounting bolt:
   31.4 ± 2.9 Nm {3.2 ± 0.3 kgm}

Removal and installation of hydraulic tank assembly

Removal

1. Remove covers (1) and (2).

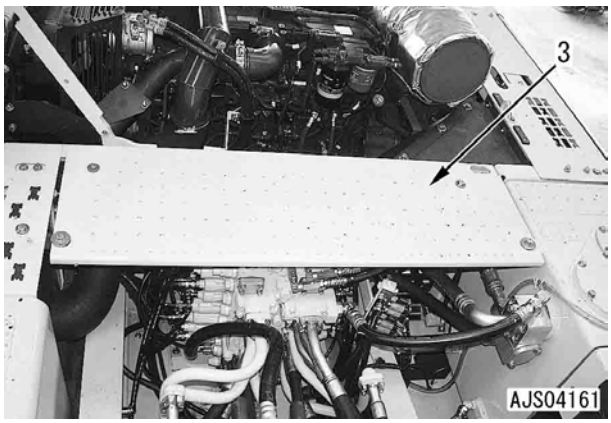


2. Drain oil from the hydraulic tank

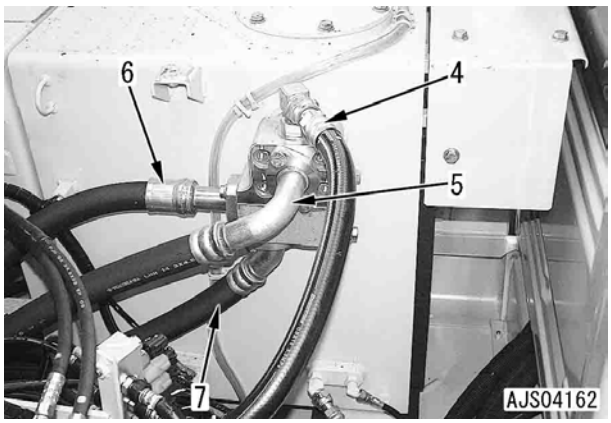
   Hydraulic tank: **248 ℓ**

3. Open the engine hood.

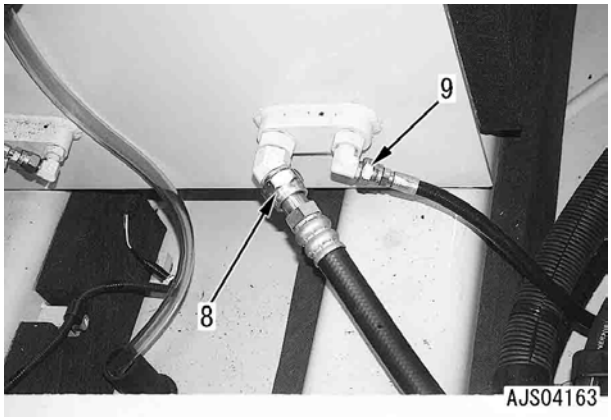
4. Remove control valve top cover (3).



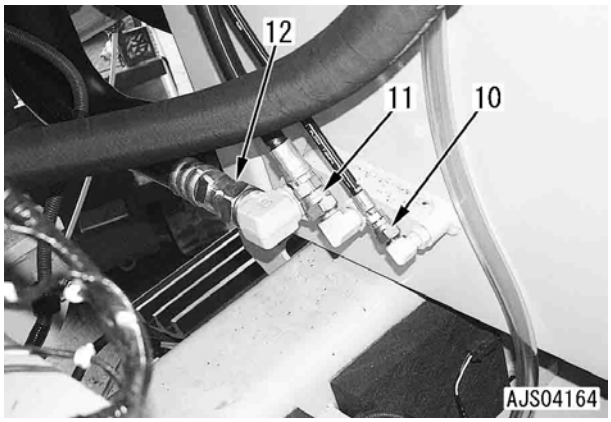
5. Disconnect hoses (4), (5), (6) and (7).



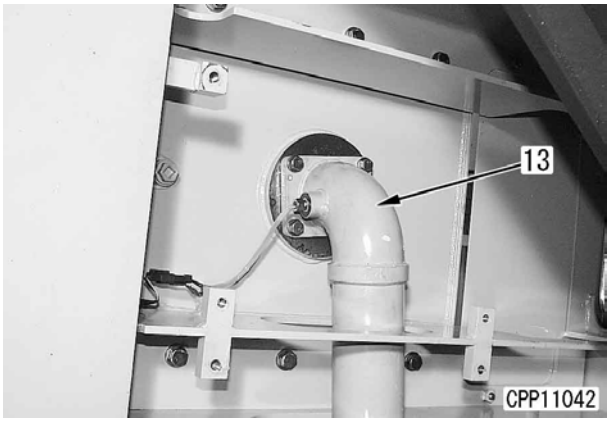
6. Disconnect hoses (8) and (9).



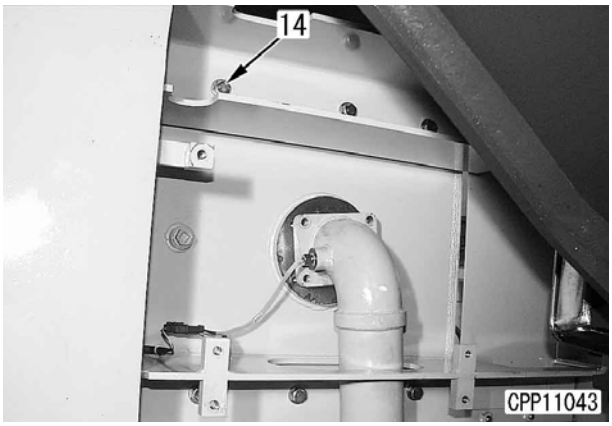
7. Disconnect hoses (10), (11) and (12).



8. Remove 4 mounting bolts to remove suction tube (13).

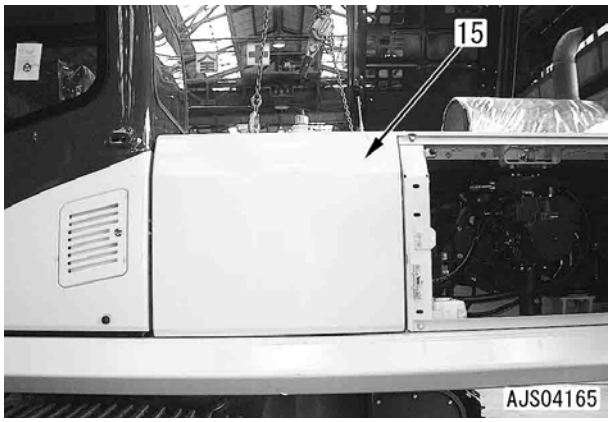


9. Sling the hydraulic oil tank assembly and remove 6 mounting bolts (14).



10. Lift and remove hydraulic oil tank assembly (15).

Hydraulic oil tank assembly: **200 kg**



Installation

- Installation is done in the reverse order of removal.

- **Refilling with oil (hydraulic tank)**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

  Hydraulic tank: **248 ℓ**

- **Air bleeding**
  Bleed the air from the circuit between the valve and the hydraulic cylinder. For details, see Testing and adjusting, “Bleeding air from various parts”.

Removal and installation of control valve assembly

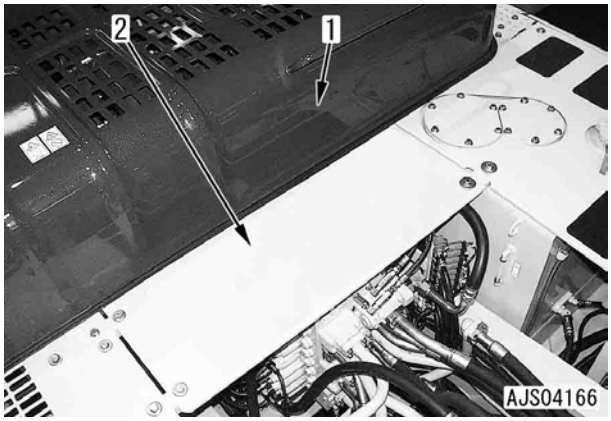
Removal

⚠ **Lower the work equipment to the ground for safety and stop the engine. Unscrew the oil filler cap on the hydraulic tank slowly to release pressure inside the tank. Then move the work equipment lock lever to the LOCK position.**

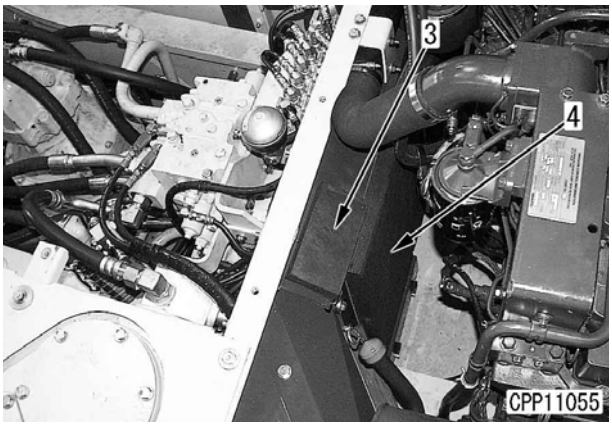
★ Attach an identification tag to each piping to avoid a mistake in the position of installation later.

1. Open up engine hood (1).

2. Remove top control valve cover (2).

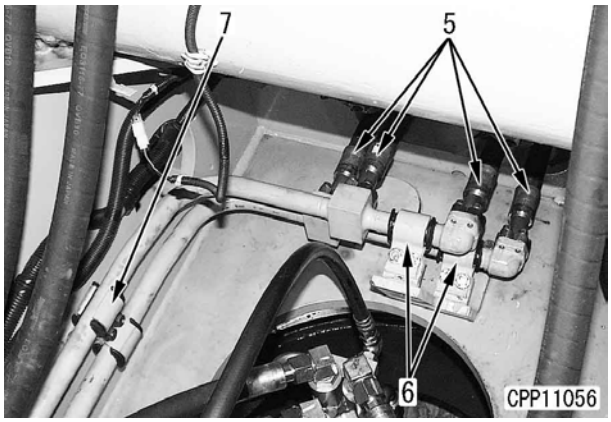


3. Remove partition covers (3) and (4) provided between the engine and control valve.

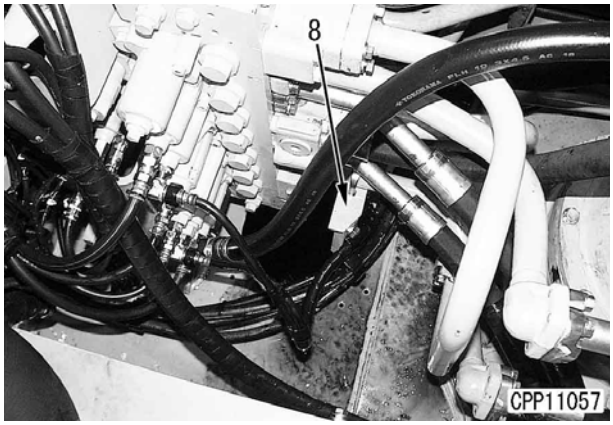


4. Disconnect 4 boom hoses (5).

5. Remove boom tube mounting clamps (6) and (7).



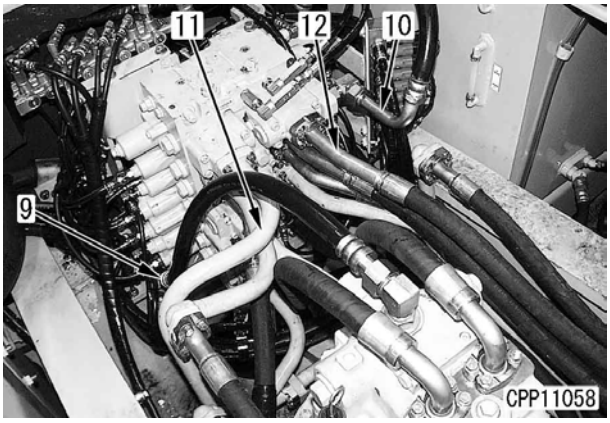
6. Remove plate (8).



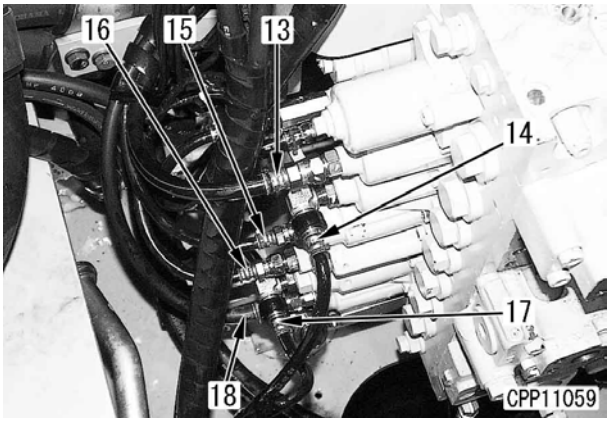
7. Disconnect 8 hoses and 8 tubes on the control valve.
   - (9): TSW port hose (Swing motor S port)
   - (10): T1 port hose (connected to the tank)
   - (11): From the top:

A1 port tube	(boom Hi bottom side)
A1 port tube	(bucket bottom side),
A2 port hose	(swivel joint A port)
A3 port tube	(boom bottom side),
A4 port hose	(swing motor MB port)
A5 port hose	(swivel joint C port),
A6 port tube	(arm head side)

- (12): From the top: B1 port tube (arm Hi bottom side)
  A1 port tube (bucket head side)
  A2 port hose (swivel joint B port)
  B3 port tube (boom head side)
  B4 port hose (swing motor MA port)
  B5 port hose (swivel joint D port)
  B6 port tube (arm bottom side)

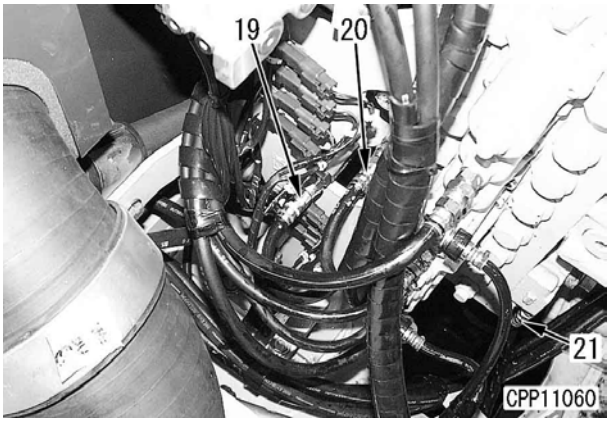


8. Disconnect the 6 PPC hoses at right.
   - (13): Bucket dump (Hose band: Black)
     (14): LH forward (Hose band: Red)
     (15): Boom (Hose band: Brown)
     (16): Right swing
     (17): RH forward (Hose band: Green)
     (18): Arm digging (Hose band: Blue)

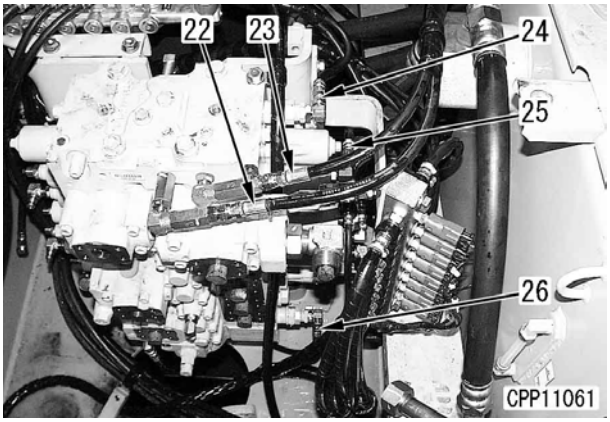


9. Disconnect 2 hoses and 8 tubes on the control valve.
   - (19): Bucket dump
     (Hose band: Yellow -Blue)
   - (20): PST port hose (Hose band: Brown)

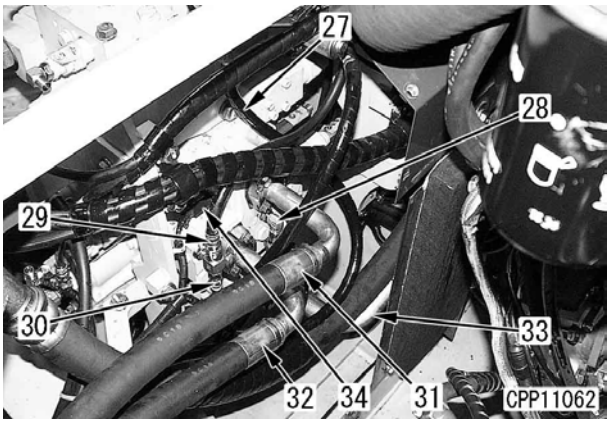
10. Disconnect drain hoses (21).



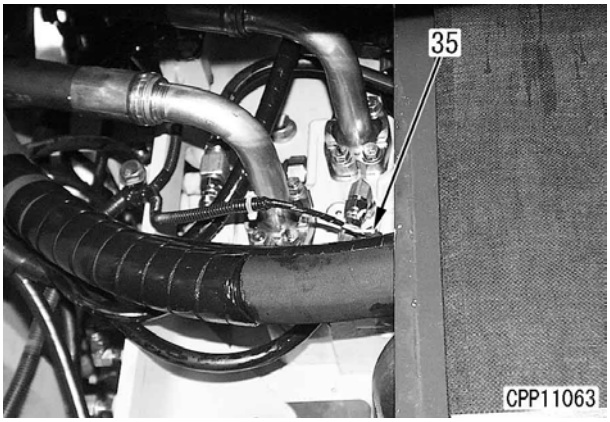
11. Disconnect 7 left side PPC hoses and 5 control valve hoses.
    - (22): PLS2 port hose (Hose band: Red)
    - (23): PLS1 port hose
    - (24): PLS2 port hose (Hose band: Blue)
    - (25): From the top: Bucket digging
      (Hose band: White)
      LH reverse
      Boom RAISE (Hose band: Green)
      Swing LS separator valve
      BP5 port hose (to solenoid)
      Left swing (Hose band: Red)
      RH reverse (Hose band: Blue)
      Arm dump (Hose band: Yellow)
    - (26): PX2 port hose



12. Disconnect the 7 hoses and the wiring connectors (2 locations).
    - (27): PPS1 port hose (Front pump)
    - (28): PPS2 port hose (Rear pump)
    - (29): PR port hose (Solenoid)
    - (30): PR port hose (Pump)
    - (31): PP1 port hose (Front pump)
    - (32): PP2 port hose (Rear pump)
    - (33): T port hose (Oil cooler)
    - (34): A51 (Front pump pressure sensor)

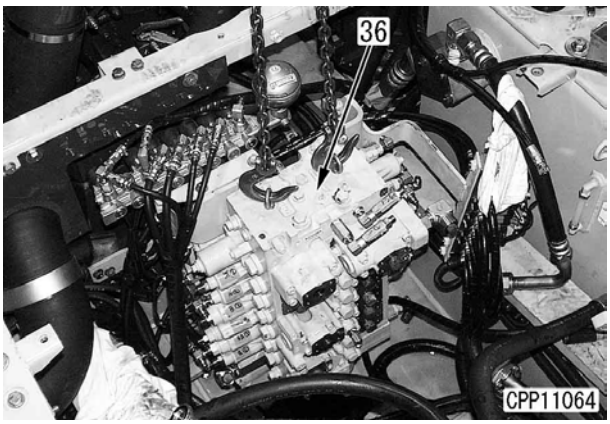


    - (35): A52 (Rear pump pressure sensor)



13. Remove the 3 mounting bolts, and then lift and remove control valve assembly (36).

    Control valve assembly: **250 kg**



Installation

- Installation is done in the reverse order of removal.

- **Refilling with oil (hydraulic tank)**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

- **Air bleeding**
  Bleed the air from the circuit between the valve and the hydraulic cylinder. For details, see Testing and adjusting, “Bleeding air from various parts”.

Disassembly and assembly of control valve assembly

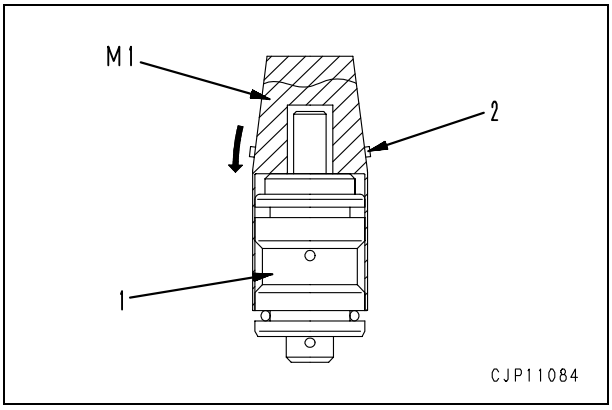
★ This section deals with only precautions to be followed when reassembling the control valve assembly.

Special tools

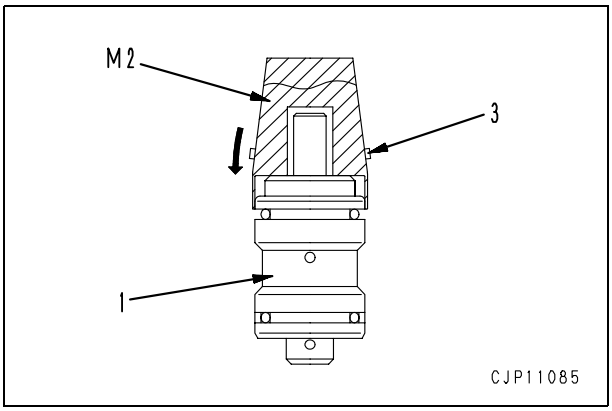
Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
M	1	796-946-1310	Guide	■	1		
		(For 723-46-40100 and 723-46-40601)					
		796-946-1810	Guide	■	1		
		(For 723-46-43100 and 723-46-43400)					
		796-946-2110	Guide	■	1		
		(For 723-46-44100)					
		796-946-2210	Guide	■	1		
		(For 723-46-45100)					
	2	796-946-1320	Guide	■	1		
		(For 723-46-40100 and 723-46-43601)					
		796-946-1820	Guide	■	1		
		(For 723-46-43100 and 723-46-43400)					
		796-946-2120	Guide	■	1		
		(For 723-46-44100)					
		796-946-2220	Guide	■	1		
		(For 723-46-45100)					
		796-946-1420	Guide	■	1		
		(For 723-46-42800)					
	3	796-946-1330	Sleeve	■	1		
		(For 723-46-40100 and 723-46-40601)					
		796-946-1830	Sleeve	■	1		
		(For 723-46-43100 and 723-46-43400)					
		796-946-2130	Sleeve	■	1		
		(For 723-46-44100)					
		796-946-2230	Sleeve	■	1		
		(For 723-46-45100)					
		796-946-1430	Sleeve	■	1		
		(For 723-46-42800)					

Procedures for replacing pressure compensation valve seal

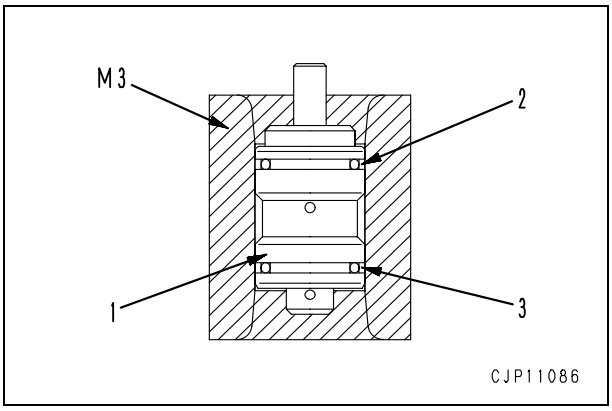
1. Remove the seal from the pressure compensation valve.
   ★ Clean the pressure compensation valve thoroughly, and then assemble the seal using the tool, as indicated in the diagram.
2. Install the O-ring to piston (1).
3. Set tool **M1** to piston (1) and push it in slowly by hand so that seal (2) may spread out evenly.
   ★ The seal may be also fitted by pushing it down to the flat surface of the tool and then pushing it in with the tool fitted to the piston.



4. Likewise, set tool **M2** to piston (1) in the same direction and push it slowly by hand so that another seal (3) may be spread out evenly.
   ★ The seal may be also fitted by pushing it down to the flat surface of the tool and then pushing it in with the tool fitted to the piston.



5. Set correction tool **M3** to piston (1) for about one minute in order to make seals (2) and (3) securely adhered to the piston.
   ★ Check that there is no protrusion or cut on the seal.



6. Assemble the piston in the sleeve.
   ★ If it is difficult to install the piston, do not push it in forcibly but install it to correcting tool **M3** again to fit the seal and then install it to the sleeve.
   ★ After the installation, push the piston by hand and check that the piston reacts only with spring force.

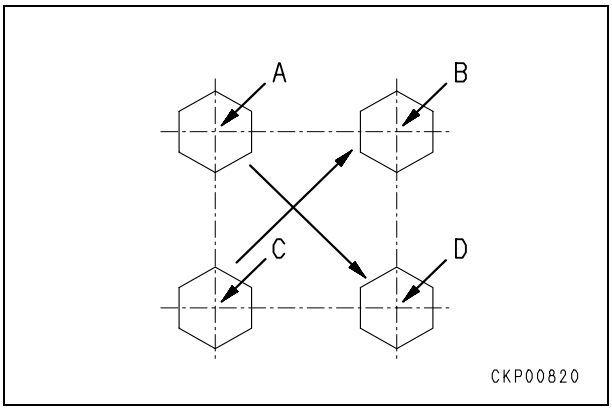
Assembly of control valve assembly

- Coat the sliding surface with engine oil and then reassemble the control valve assembly.
- Upper and lower control valve covers

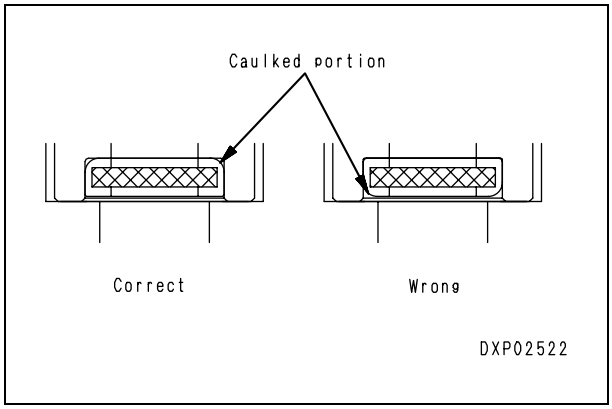
Mating face of the upper and lower control valve cover:
Seal End 242 or equivalent

- Tighten the mounting bolts for the upper and lower control covers in the sequence of **A**, **D**, **C**, **B** below.

Mounting bolt for the upper and lower control valve covers:
156.9 – 176.5 Nm {16 – 18 kgm}



- The filter installed on the valve assembly should be assembled in the direction shown in the following figure.



- Pump merge-divider valve

Mating face of the merge-divider valve:
Seal End 242 or equivalent

- Tighten the mounting bolts for the merge-divider valve in the same sequence as that for the control valve cover mounting bolts.

Merge-divider valve mounting bolt:
156.9 – 176.5 Nm {16 – 18 kgm}

- Back pressure valve

Back pressure valve mounting bolt:
58.8 – 73.8 Nm {6.0 – 7.5 kgm}

- Tighten the mounting bolts for the boom Hi check valve, quick return valve, lock valve and arm plate in the same sequence as that for the control valve cover mounting bolts.

Boom Hi check valve mounting bolt:
59 – 74 Nm {6 – 7.5 kgm}

Mounting bolt for quick return valve, lock valve and arm plate:
58.8 – 73.6 Nm {6 – 7.5 kgm}

- Pressure compensation valve

★ Install each pressure compensation valve, paying attention to the counter mark that was put when removing it.

Main relief valve assembly

Assemble the main relief valve assembly with the control valve and install them to the machine. Then, test and adjust the main relief pressure. For details, see Testing and adjusting, “Checking and adjusting oil pressure in work equipment, swing, and travel circuit”.

Removal and installation of hydraulic pump assembly

Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
C	796-460-1210	Oil stopper	●	1		
	796-770-1320	Adapter	●	1		

Removal

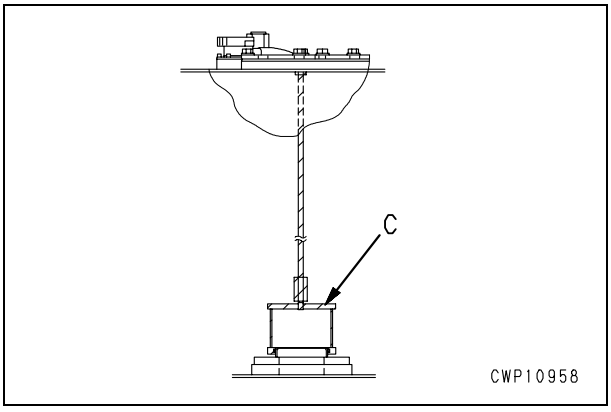
⚠ **Disconnect the cable from the negative (–) terminal of the battery.**

⚠ **Lower the work equipment to the ground and stop the engine. Then, loosen the hydraulic oil filler cap slowly to release the internal pressure of the hydraulic tank.**

★ Attach an identification tag to each piping to avoid a mistake in the position of installation later.

1. Remove the hydraulic tank strainer and stop the flow of oil using tool **C**.
   ★ When not using tool **C**, remove the drain plug to drain oil from the hydraulic tank and piping.

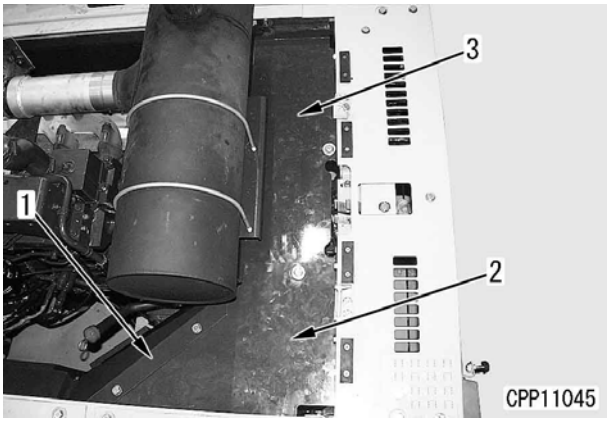
   Hydraulic tank: **248 ℓ**



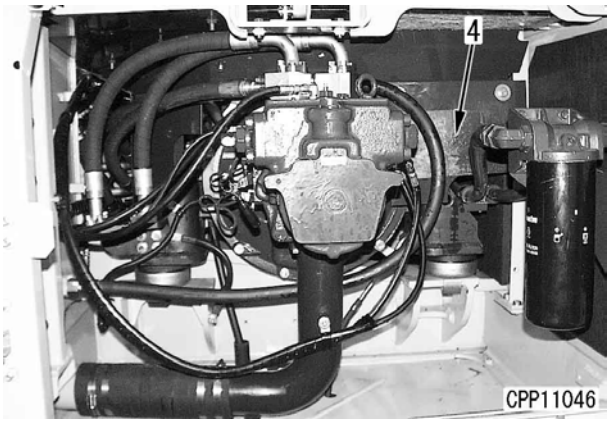
2. Drain oil from the damper case.

   Damper case: **Approx. 1.07 ℓ**

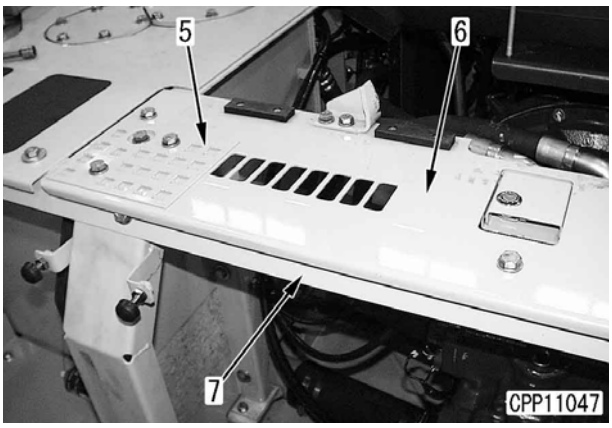
3. Remove covers (1), (2) and (3).



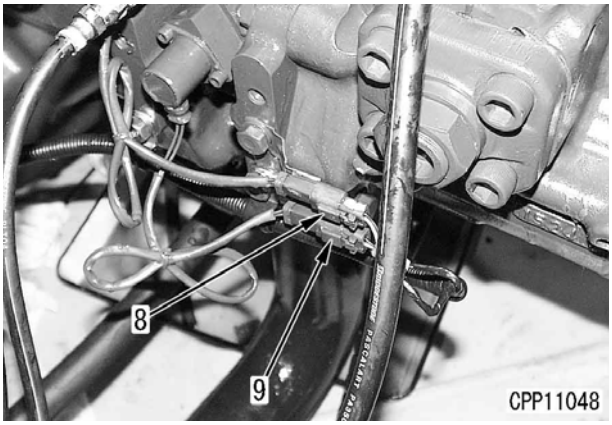
4. Remove cover (4).



5. Remove covers (5), (6) and (7).

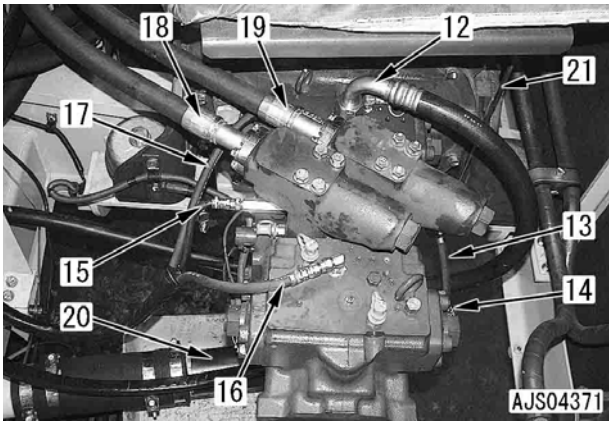


6. Disconnect the pump wiring connectors at the following two locations.
   - (8): V19 (LS-EPC solenoid valve)
   - (9): V11 (PC-EPC solenoid valve)



7. Disconnect 8 hoses and a tube.
   - (12): Drain port hose
   - (13): Front load pressure input port hose
   - (14): Front load pressure input port hose (Color band: Red)
   - (15): EPC source pressure port hose (Color band: Yellow)
   - (16): Rear pressure input port hose (Color band: Yellow)
   - (17): Front pressure input port hose
   - (18): Rear pump delivery port hose
   - (19): Front pump delivery port hose
   - (20): Pump suction port tube

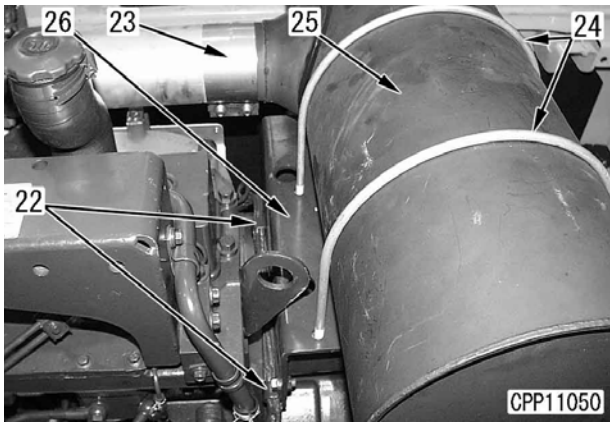
8. Remove muffler drain tube (21).



9. Disconnect wiring clamp (22) at two locations.

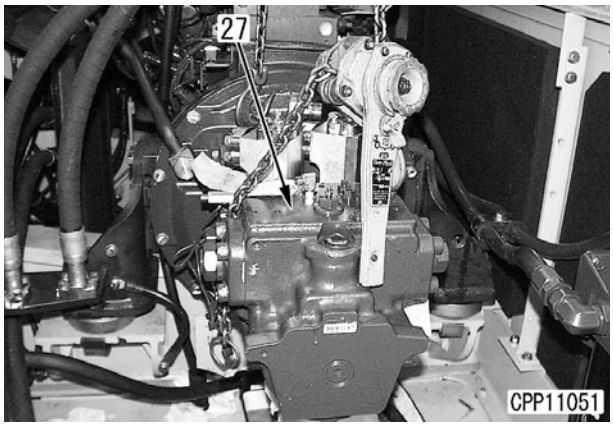
10. Remove muffler clamp (23) and two U-bolts (24) to remove muffler (25).

11. Remove muffler bracket (26).



12. Lift and remove hydraulic pump assembly (27). [*1]

    Hydraulic pump assembly: **220 kg**



Installation

- Installation is done in the reverse order of removal.

[*1]

Hydraulic pump involute spline:
Molybdenum disulfide grease (LM-G)

Mating face of hydraulic pump case:
Gasket sealant (LG-6)

- **Refilling with oil (damper case)**
  Refill hydraulic oil through the oil filler port to the specified level.

  Damper case: **1.07 ℓ**

- **Refilling with oil (hydraulic tank)**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

  Hydraulic tank: **2.48 ℓ**

- **Air bleeding**
  Bleed the air from the circuit between the valve and the hydraulic cylinder. For details, see Testing and adjusting, “Bleeding air from various parts”.

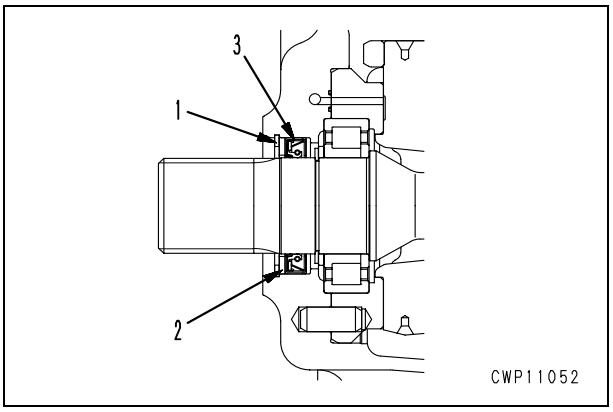
Removal and installation of oil seal in hydraulic pump input shaft

Removal

1. Remove the hydraulic pump assembly. For details, see “Removal and installation of hydraulic pump”.

2. Remove snap ring (1) and then remove spacer (2).

3. Pry off oil seal (3) with a screwdriver. [*1]
   ★ Use care in removing the oil seal so that the shaft may not be damaged.



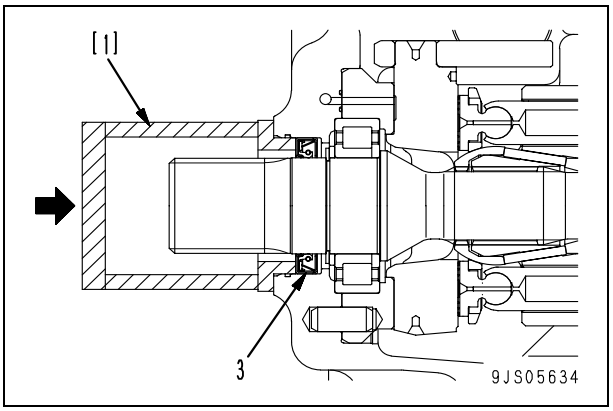
Installation

- Installation is done in the reverse order of removal.

[*1]

Oil seal lip portion and outer circumference:
Grease (G2-LI)

★ Coat the oil seal outer circumference thinly with grease.
★ Press-fit oil seal (3), using tool [1].



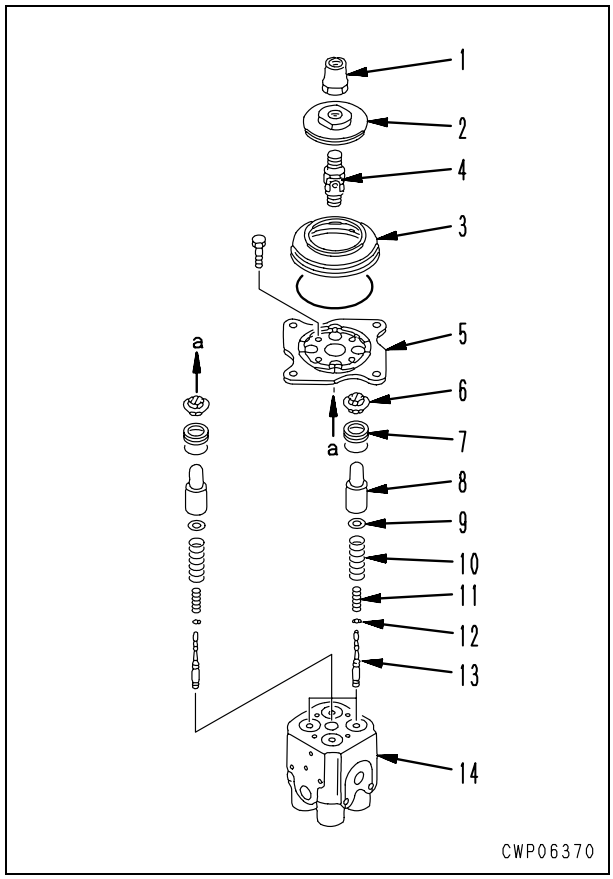
Disassembly and assembly of work equipment PPC valve assembly

Disassembly

★ Disassemble according to the following figure.

Assembly

★ Assemble according to the following figure.
★ Only the precautions for assembly are described below.



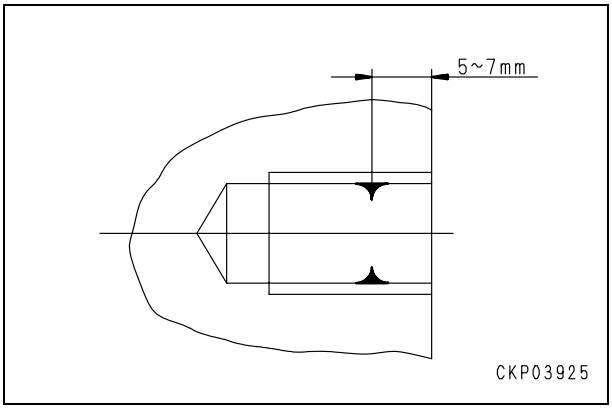
- Work equipment PPC valve reassembly

★ When assembling spring (11), be sure to face its smaller end turn (inner diameter) side toward shim (12).
★ Springs (10) in use differ in the number of turns according to hydraulic ports as classified in the table below. Hence take care when installing one.
★ The location of each port is stamped in the lower part of the valve body.

Port position	Spring free length
P1 and P2	44.45 mm
P3 and P4	42.48 mm

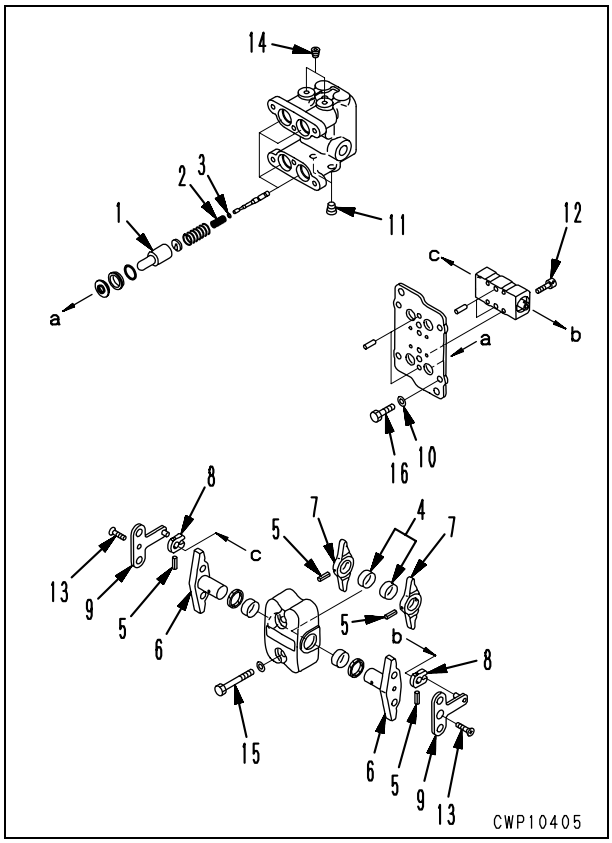
★ When assembling piston (8), coat the piston outer periphery and body hole inner periphery with grease.
Piston body: **Grease (G2-LI)**

★ Tighten plate (15) with the following torque.
Mounting bolt:
11.8 – 14.7 Nm {1.2 – 1.5 kgm}
★ When installing joint (4), apply a drop (approx. 0.02 g) of adhesive each to 2 places of the female threads of its body.
Body female screw:
Adhesive (Loctite No. 262)
Joint (4): **39 – 49 Nm {4 – 5 kgm}**
Joint (4): **39 – 49 Nm {4 – 5 kgm}**
Joint (4) sliding part:
Grease 2 – 4 cc (G2-LI)



★ Apply grease to the mating faces of piston (8) and disc (2).
Contact surface of piston and disc (2):
Grease 0.3 – 0.8 cc (G2-LI)
★ Tighten nut (1) to the following torque.
Nut (1): **98 – 127 Nm {10 – 13 kgm}**
★ After installing the disc, adjust the play of the lever. For details, see Testing and adjusting, “Adjusting play of work equipment and swing PPC valve”.

Disassembly and assembly of travel PPC valve assembly



Disassembly

★ Disassemble according to the following figure.

Assembly

★ Assemble according to the following figure.
★ Only the precautions for assembly are described below
★ Clean and check the parts so that dirt, rust, flaws, etc. will not cause a trouble and then assemble them with extreme care.
★ When installing piston (1), apply grease (G2-LI) to its outside and the inside of the hole of the body.
★ Install spring (2) with the small diameter seat end on shim (3) side.
  - Seat diameters of spring (inside diameter)
    Small diameter end: **4.9 mm**
    Large diameter end: **5.55 mm**
★ Do not drive in bushing (4) and pin (5) directly with a hammer, etc.
★ Apply grease (G2-LI) to the sliding parts of shaft (6), contact parts of lever (7) and piston (1), and pin contact parts of plate (8) and lever (9).
  Quantity of grease
  Sliding parts of shaft (6):
  6 – 8 cc/all periphery
  Contact parts of lever (7) and piston (1):
  0.3 – 0.8 cc/part
  Pin contact parts of plate (8) and lever (9):
  0.3 – 0.8 cc/part
★ After washer (10) (t = 1.6) is installed, if the difference between the strokes of the right and left levers is larger than 0.7°, replace the washer to reduce the difference to 0.7° or less. (If the washer thickness is reduced by 0.3 mm, the stroke angle is increased by 0.39°.)
  - Set washer thickness (t) = 1.0, 1.3, 1.6 mm
★ Tighten the parts according to the following torque.
  - Plug (11): 6 – 11 Nm {0.6 – 1.1 kgm}
  - Bolt (12): 3.9 – 4.9 Nm {0.4 – 0.5 kgm} (Apply LOCTITE #262)
  - Screw (13): 7.8 – 9.8 Nm {0.8 – 1.0 kgm}
  - Plug (14): 4 – 9 Nm {0.4 – 0.9 kgm}
  - Bolt (15): 25 – 31 Nm {2.5 – 3.2 kgm}
  - Bolt (16): 27 – 34 Nm {2.8 – 3.5 kgm}

Disassembly and assembly of hydraulic cylinder assembly

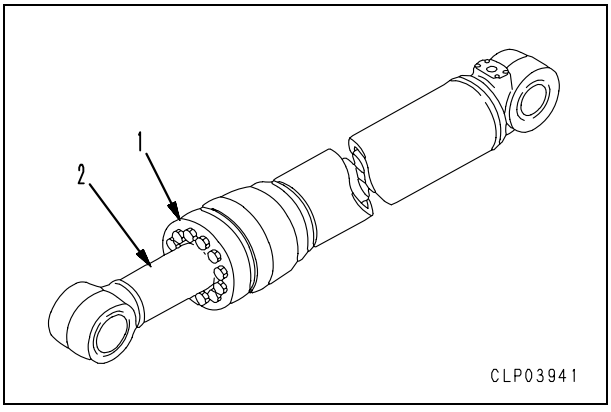
Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
N	1	790-502-1003	Cylinder repair stand	■	1		
	2	790-102-4300	Wrench assembly	■	1		
		790-102-4310	Pin	■	2		
	3	790-720-1000	Expander	●	1		
	4	796-720-1680	Ring	●	1		
		07281-01589	Clamp	●	1		
	5	790-201-1702	Push tool kit	■	1		
		790-201-1851	• Push tool (for bucket and boom)		1		
		790-201-1861	• Push tool (for arm)		1		
		790-101-5021	• Grip		1		
		01010-50816	• Bolt		1		
	6	790-201-1500	Push tool kit	■	1		
		790-101-5021	• Grip		1		
		01010-50816	• Bolt		1		
		790-201-1660	• Plate (for boom and bucket)		1		
		790-201-1670	• Plate (for arm)		1		

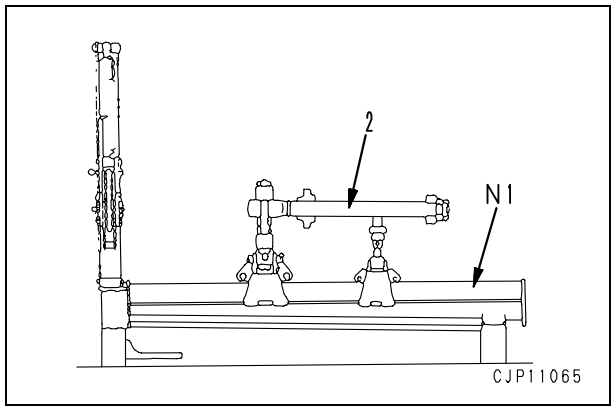
Disassembly

1. Piston rod assembly

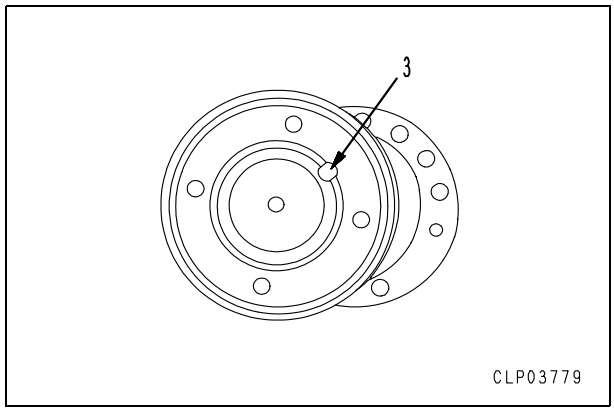
1) Remove piping from the cylinder assembly.
2) Remove the mounting bolts and then disconnect head assembly (1).
3) Pull out piston rod assembly (2).
   ★ Place a container under the cylinder to catch the oil.



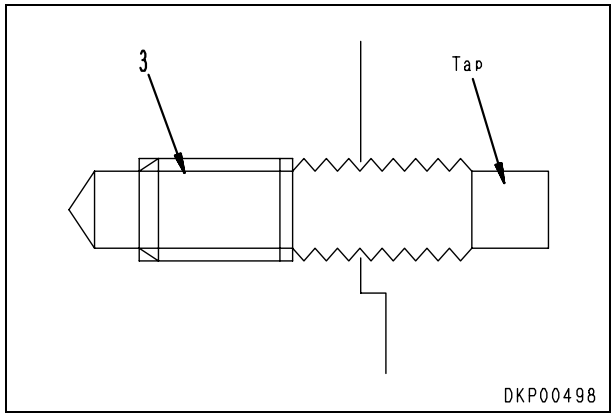
4) Disassemble the piston rod assembly as follows.
   1] Set piston rod assembly (2) on tool **N1**.



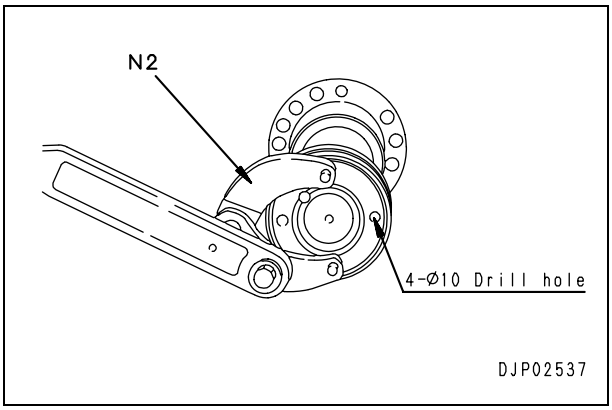
   2] Remove stopper screw (3) of piston assembly.
   ★ Common to the boom, arm and bucket cylinder.
   Screw size: **M12 × Pitch 1.75**



★ If the caulking of screw (3) is too strong and it cannot be removed, tighten the screw fully, then fit a tap to the thread and remove the screw.



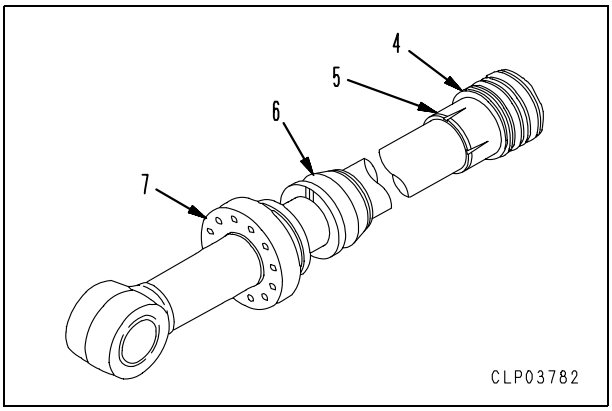
3] Use tool **N2** to remove piston assembly (4).
- When not using tool **N2**, use the drill holes (ϕ10 at 4 locations) to loosen the piston assembly.



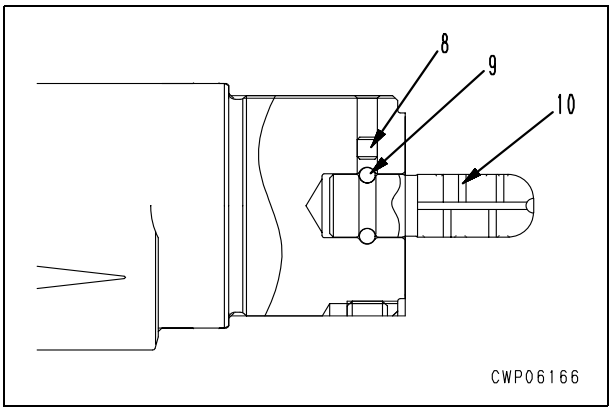
4] Remove plunger.
- Boom and arm cylinder only

5] Remove collar (6).
- Boom and arm cylinder only

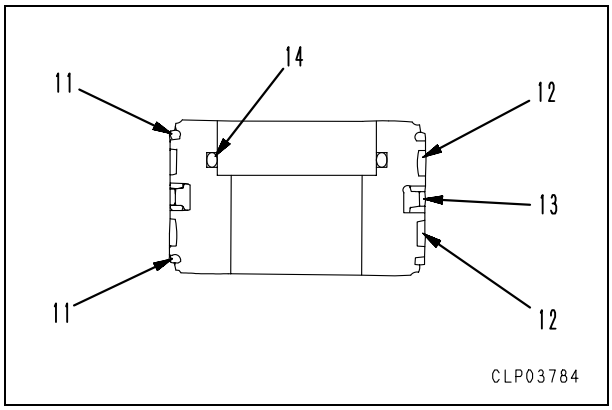
6] Remove head assembly (7).



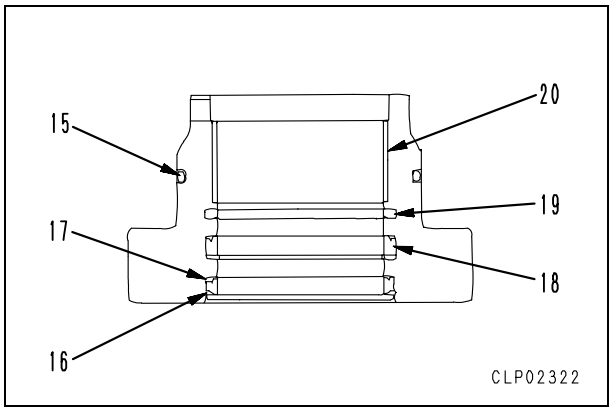
7] Remove cap (8), pull 12 balls (9) and then remove plunger (10).
- Arm cylinder only



2. Disassembly of piston assembly
1) Remove ring (11).
2) Remove wear ring (12).
3) Remove piston ring (13).
4) Remove O-ring and backup ring (14).

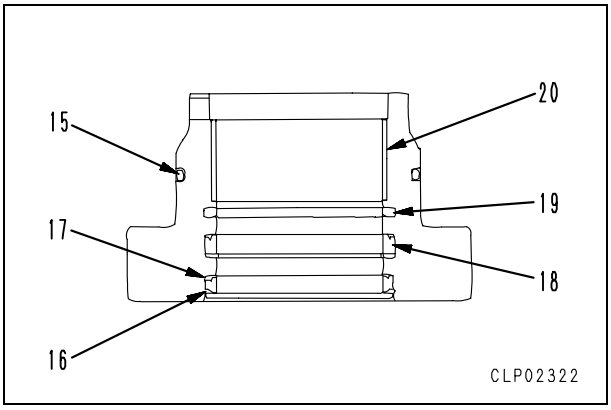


3. Disassembly of cylinder head assembly
1) Remove O-ring and backup ring (15).
2) Remove snap ring (16) and then remove dust seal (17).
3) Remove rod packing (18).
4) Remove buffer ring (19).
5) Remove busing (20).

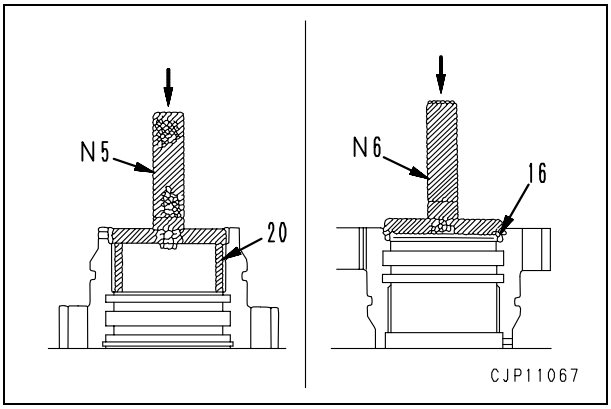


Assembly

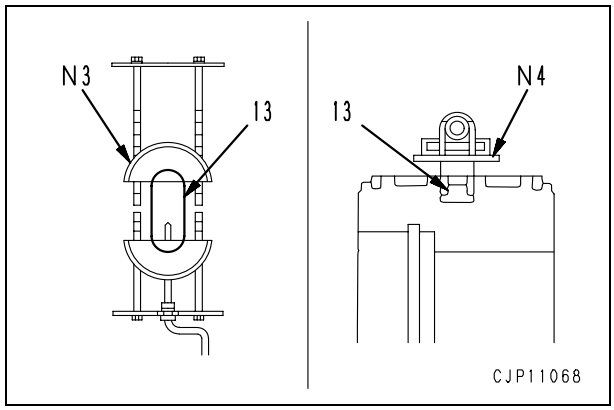
★ Be careful not to damage the packing, dust seal and O-ring.
★ Clean each part, then cover the piping ports and pin-inserting hole to prevent dust from entering them.
★ Do not try to force the backup ring into position. Warm it in warm water (50 – 60°C) before installing it.



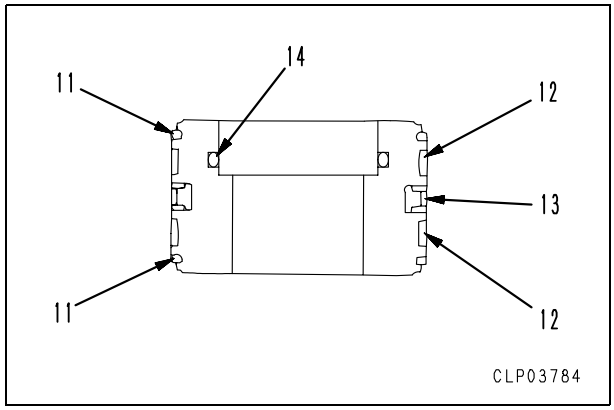
1. Disassembly of recoil spring assembly
1) Press-fit oil seal (20), using tool **N5**.
2) Assemble buffer ring (19).
3) Assemble rod packing (18).
4) Using tool **N6**, install dust seal (17) and then secure it with snap ring (16).
5) Install backup ring and O-ring (15).



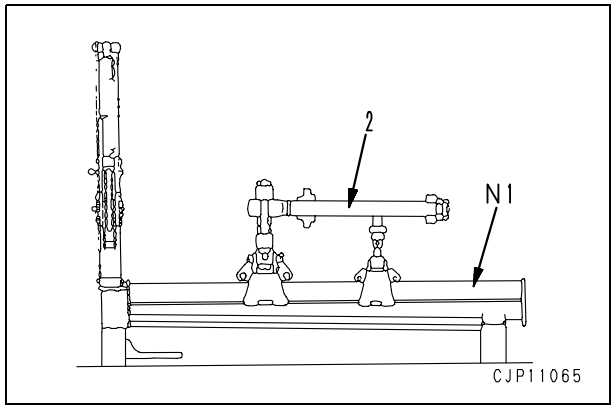
2. Disassembly of piston assembly
1) Press-fit oil seal (13), using tool **N3**.
★ Set the piston ring on tool **N3**, and turn the handle 8 – 10 times to expand the ring.
2) Tighten piston ring (13) by setting tool **N4**.



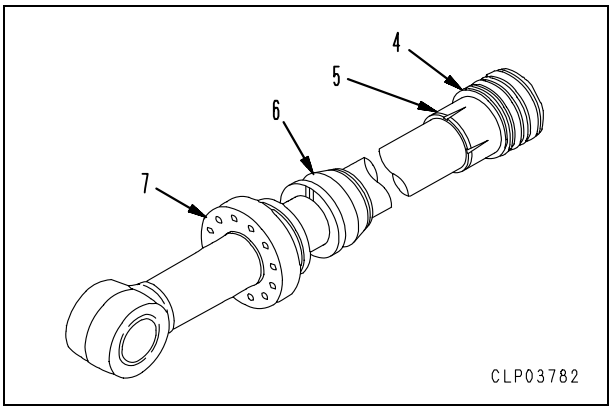
3) Install backup ring and O-ring (14).
4) Assemble wear ring (12).
5) Assemble ring (11).
★ Be careful not to open the end gap of the ring too wide.
Ring groove: **Grease (G2-LI)**



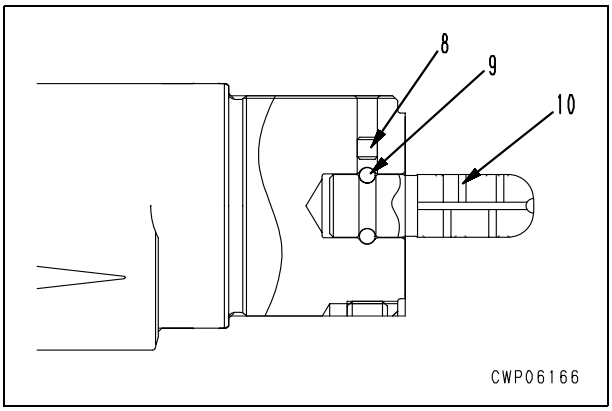
3. Piston rod assembly
1) Set piston rod assembly (2) on tool.



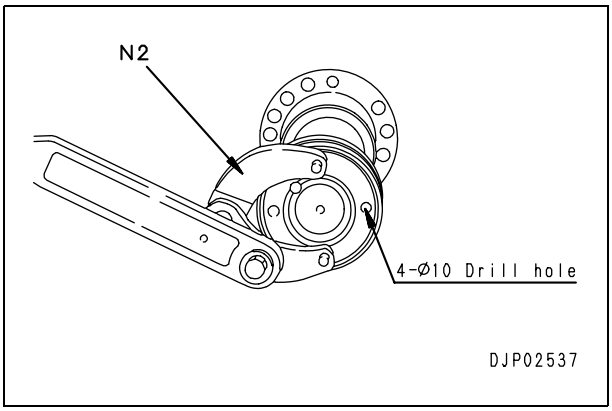
2) Assemble head assembly (7).
3) Assemble collar (6) after installing O-ring and backup ring to it.
● Boom and arm cylinder only
4) Assemble plunger (5).
● Boom and arm cylinder only



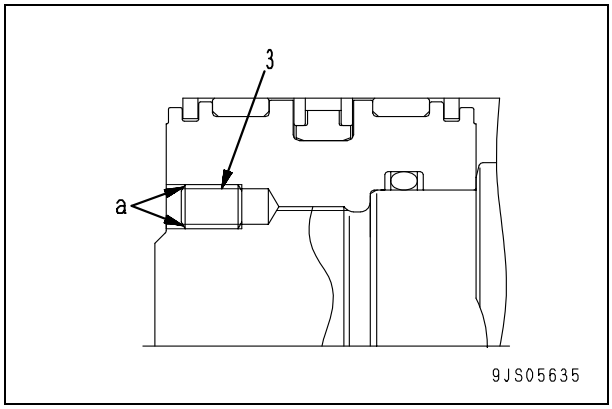
5) Set plunger (10) on the piston rod, assemble 12 balls (9) to it and secure with cap (8).
   ★ Check that there is a small amount of play at the tip of the plunger.
   ● Arm cylinder only



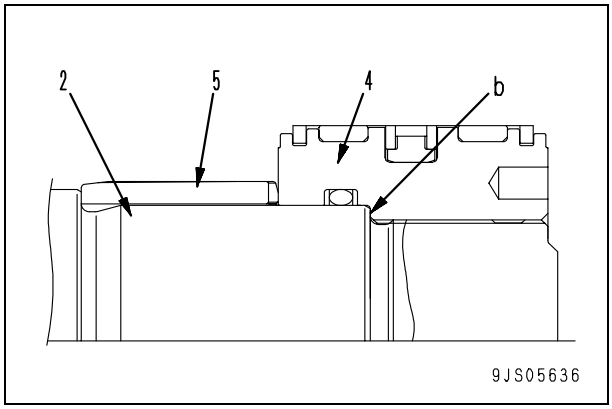
6) Assemble piston assembly (4) as follows.
   ● **When using rod and piston assembly (2) again**
   ★ Wash thoroughly to eliminate metal particles and dirt.
   1] Screw in piston assembly (4), then using tool **N2**, tighten piston assembly (2) until the position of the screw thread hole matches.
      ★ Remove all burrs and flashes using a file.



   2] Tighten screw (3).
      Screw thread: **Loctite No.262**
      Screw:
      58.9 – 73.6 Nm {6 – 7.5 kgm}
   3] Caulk 4 places of threaded part (a) with a punch.



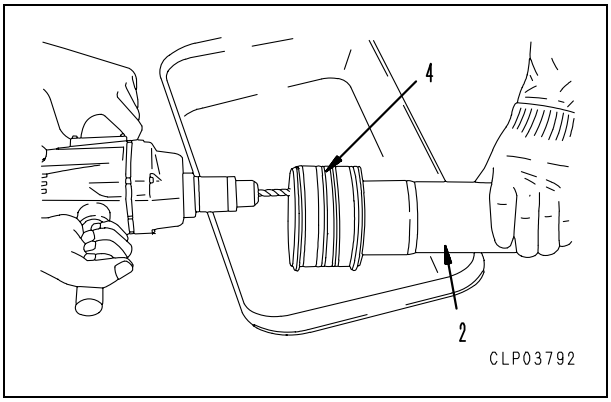
   ● **When the rod and/or piston assembly (2) is a new part**
   ★ For the rod with bottom cushion, mark the cushion plug position on the end of the rod.
   ● Arm cylinder only
   1] Screw in piston assembly (4) until rod (2) is contacted against end face (b) and then tighten the assembly using the tool.
      Piston assembly:
      294 ± 29.4 Nm {30 ± 3.0 kgm}
   ★ After tightening the piston, check that there is play in plunger (5).
   ● Boom and arm cylinder only



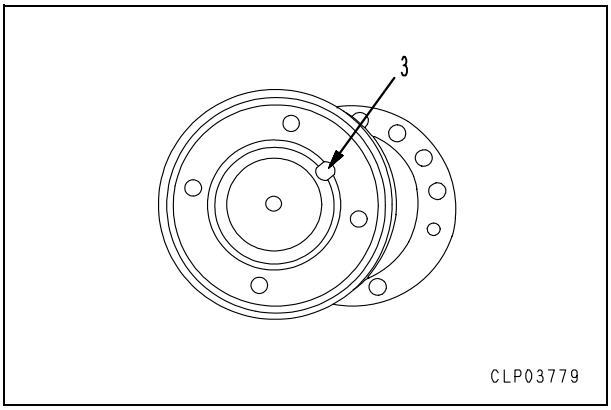
2] Machine one of the holes used to install screw (3).
★ Using a drill, level off V-groove between piston (4) and rod (3).
★ Machining of the cylinder with bottom cushion (arm cylinder) must not be done at the cushion plug position.
● Screw machining dimension (mm)

Prepared hole drilling diameter	Depth of prepared hole	Tap used	Tapping depth
10.3	27	12 x 1.75	20

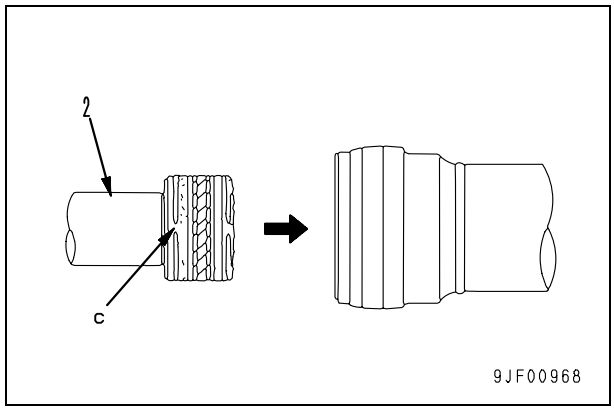
3] After machining, wash thoroughly to eliminate metal particles and dust.



4] Tighten screw (3).
Screw:
58.9 – 73.6 Nm {6 – 7.5 kgm}
5] Caulk thread at 4 places using a punch.

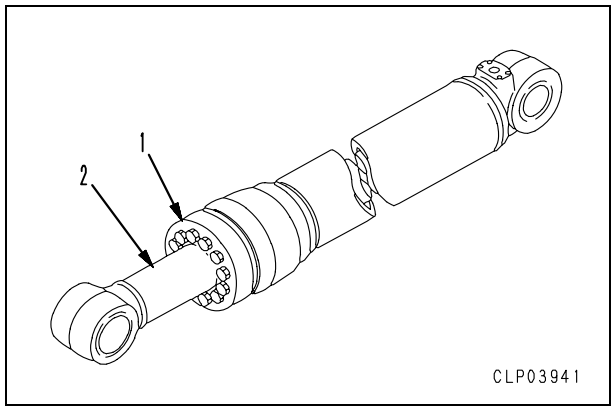


7) Assemble piston rod assembly (2).
★ Set the ring end gap (C) horizontally (sideways), and then insert it aligning the axial center of cylinder tube.
★ After inserting, make sure that the ring is not broken and is present in its place. Then push in the assembly fully.



8) Tighten head assembly (1) with mounting bolts.
Mounting bolt:

Cylinder name	Tightening torque
Bucket	373 ± 54 Nm {38.0 ± 5.5 kgm}
Arm	490 ± 49 Nm {50.0 ± 5.0 kg}
Boom	373 ± 54 Nm {38.0 ± 5.5 kgm}



9) Install piping.

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00960-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

Work equipment

Work equipment 2
Removal and installation of work equipment assembly 2

Work equipment

Removal and installation of work equipment assembly

Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
P	796-670-1100	Remover	■	1		
	796-670-1110	• Sleeve		1		
	796-670-1120	• Plate		1		
	796-670-1130	• Screw		1		
	791-775-1150	• Adapter		1		
	01643-33080	• Washer		1		
	01803-13034	• Nut		1		
	790-101-4000	Puller (490 kN {50 t} long)	■	1		
	790-101-1102	Pump (294 kN {30 t})	■	1		

Removal

⚠ **Extend the arm and bucket fully. Lower the work equipment to the ground and set the work equipment lock lever to the lock position.**

⚠ **Release the residual pressure. For details, see Testing and adjusting, "Releasing remaining pressure in hydraulic circuit".**

1. Disconnect grease hose (1).

2. Sling boom cylinder assembly (2), and remove lock bolt and nut (3). [*1]

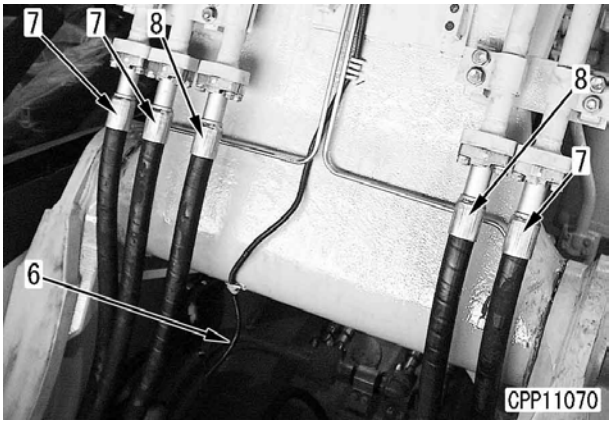
3. Remove plate (4), then remove head pin (5). [*2]
   ★ Check the number as well as locations of the shims used.



4. Start the engine and then retract the piston rod.
   ★ Fasten the piston rod with wire and place it on the stand so that it may not slip out, or place a support to prevent the cylinder from hanging toward the bottom.
   ★ In the latter case, remove the bottom side grease nipple.
   ★ Remove the boom cylinder on the other side in the same manner.
   ★ When the work equipment assembly is lifted up, if the sling touches the working lamp, remove the working lamp.

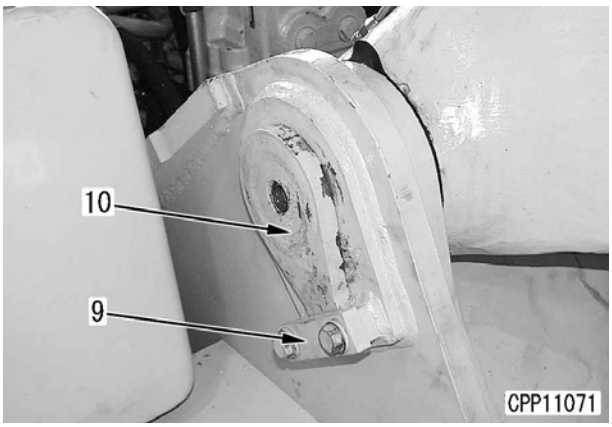
5. Disconnect intermediate connector A42 (6) for the working lamp.

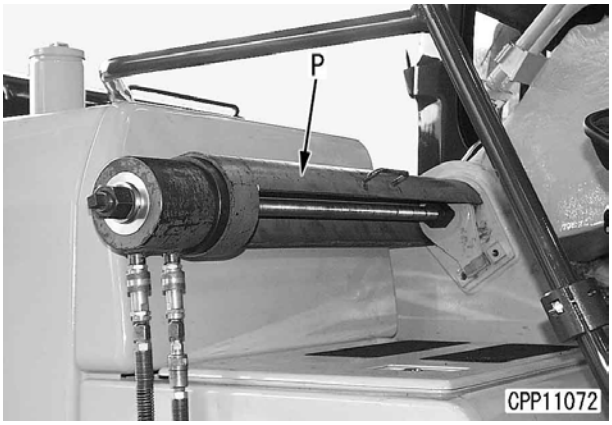
6. Disconnect 3 arm cylinder hoses (7) and 2 bucket cylinder hoses (8).
   ★ Apply the oil restraining plug and then fix the hoses to the valve side by use of ropes.



7. Lift the work equipment, and then remove plate (9).

8. Using tool **P**, remove foot pin (10) [*3]
   ★ Check the number as well as locations of the shims used.





9. Remove work assembly (11).
   Work equipment assembly: **5,800 kg**

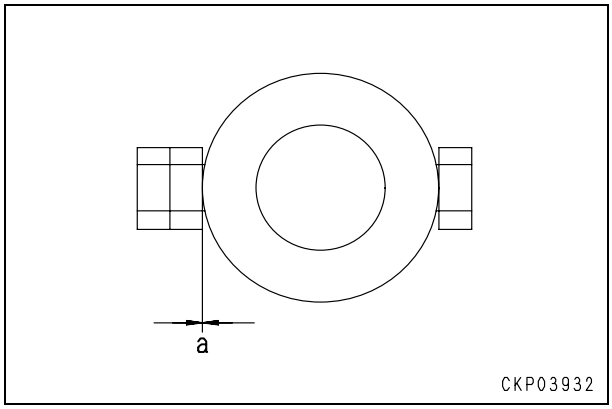


Installation

- Installation is done in the reverse order of removal.

[*1]

★ When tightening the locknut, make sure that 0.5 – 1.5 mm clearance (a) is maintained between the plate and nut after the tightening.



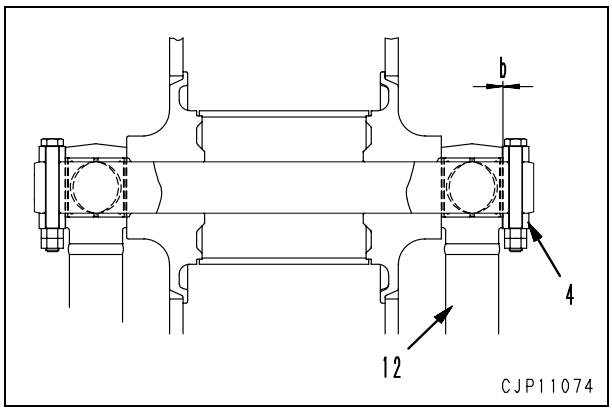
[*2]

Inside surface of bushing when assembling pin:
Antifriction agent (LM-P)

Feed grease after assembling pin:
Grease (LM-G)

⚠ **When aligning the position of the pin hole, never insert your fingers into the pin hole.**

★ Adjust the clearance (b) between cylinder rod (12) and plate (4) to 1.5mm or less using shims.
Thickness of standard shim: **1.0 and 2.0 mm**

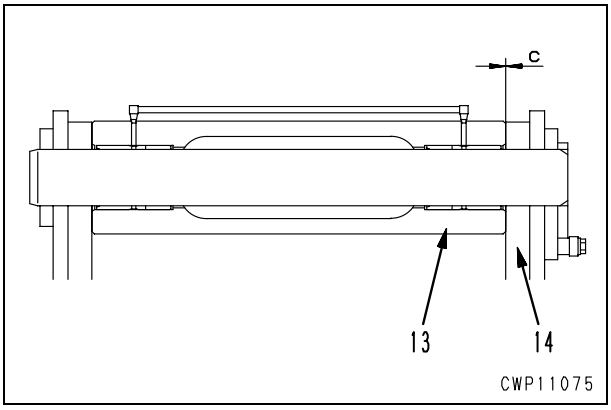


[*3]

Inside surface of bushing when assembling pin:
Antifriction agent (LM-P)

Feed grease after assembling pin:
Grease (LM-G)

★ Adjust the clearance (c) between the foot's end face of boom (13) and bracket (14) to 1 mm or less by use of shims.
Thickness of standard shim:
2.0, 2.5, 3.0 and 3.5 mm



- **Air bleeding**
  Bleed the air from the circuit between the valve and the hydraulic cylinder. For details, see Testing and adjusting, “Bleeding air from various parts”.

- **Refilling with oil (hydraulic tank)**
  Refill hydraulic oil through the oil filler port to the specified level. Let the oil circulate in the hydraulic system by starting the engine. Then check the oil level again.

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00961-00

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HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

Cab and its attachments

Cab and its attachments 2
Removal and installation of operator's cab assembly 2
Removal and installation of operator’s cab glass (stuck glass) 4
Removal and installation of front window assembly 13

Cab and its attachments

Removal and installation of operator's cab assembly

Removal

⚠ **Disconnect the negative terminal (–) of the battery before starting the work.**

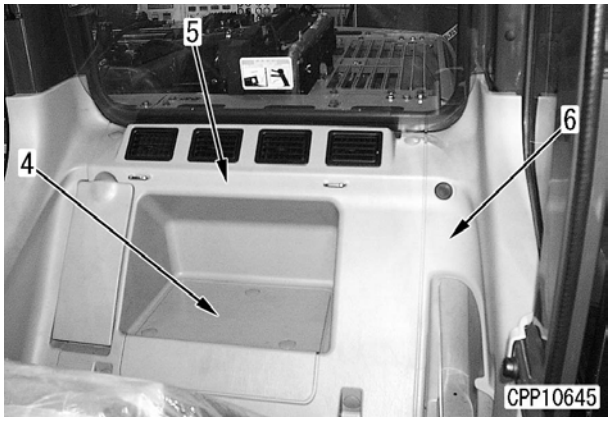
1. Remove floor mat (1).



2. Remove the bottom monitor panel covers (2) and (3).
   ★ Before removing cover (2), disconnect the cigarette lighter wiring **M19**.



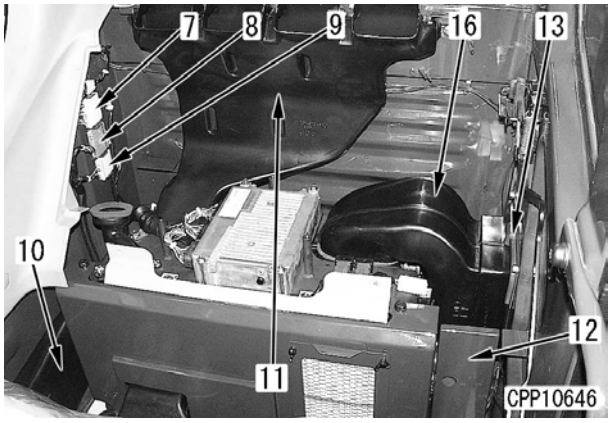
3. Remove rear covers (4), (5) and (6).



4. Disconnect the cab wiring intermediate connectors **H10** (7), **H11** (8) and **H12** (9).

5. Remove duct (10) on the right side and rear duct (11).

6. Remove left plates (12) and (13).



7. Pull down outside air filter cover opening-closing lever (14).

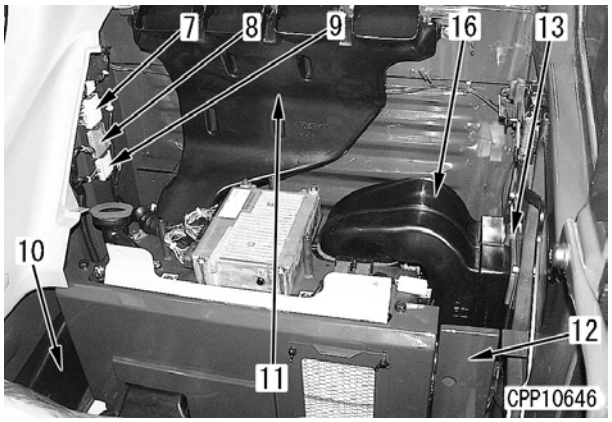


8. Remove outside air filter (15).



9. Remove duct (16).

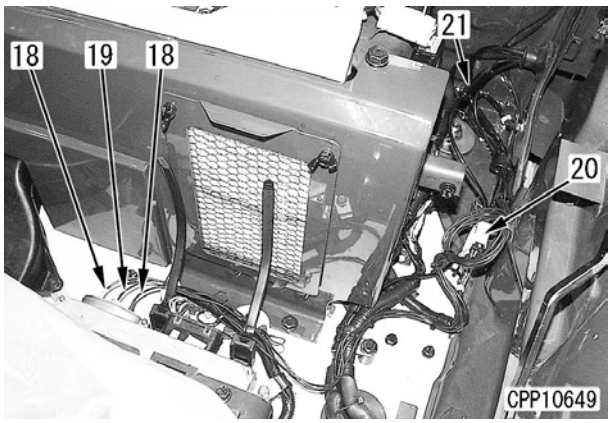
10. Remove cover (17).



11. Disconnect 2 KOMTRAX terminal antenna wires (18) and connector (19).

12. Disconnect cab wiring intermediate connectors (20) at the following two points.
    - **H09**: Upper side
    - **H08**: Lower side

13. Disconnect radio antenna (21).



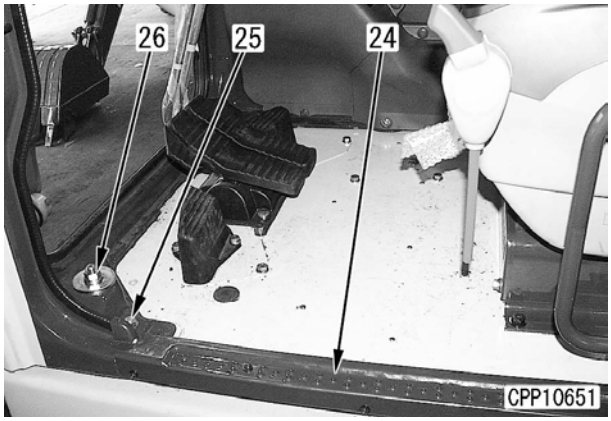
14. Remove duct (22) on the right side.

15. Disconnect window washer hose (23).



16. Remove step plate (24).

17. Remove 5 mounting bolts (25) and 4 mounting nuts (26).
    ★ Check the bolt length beforehand.



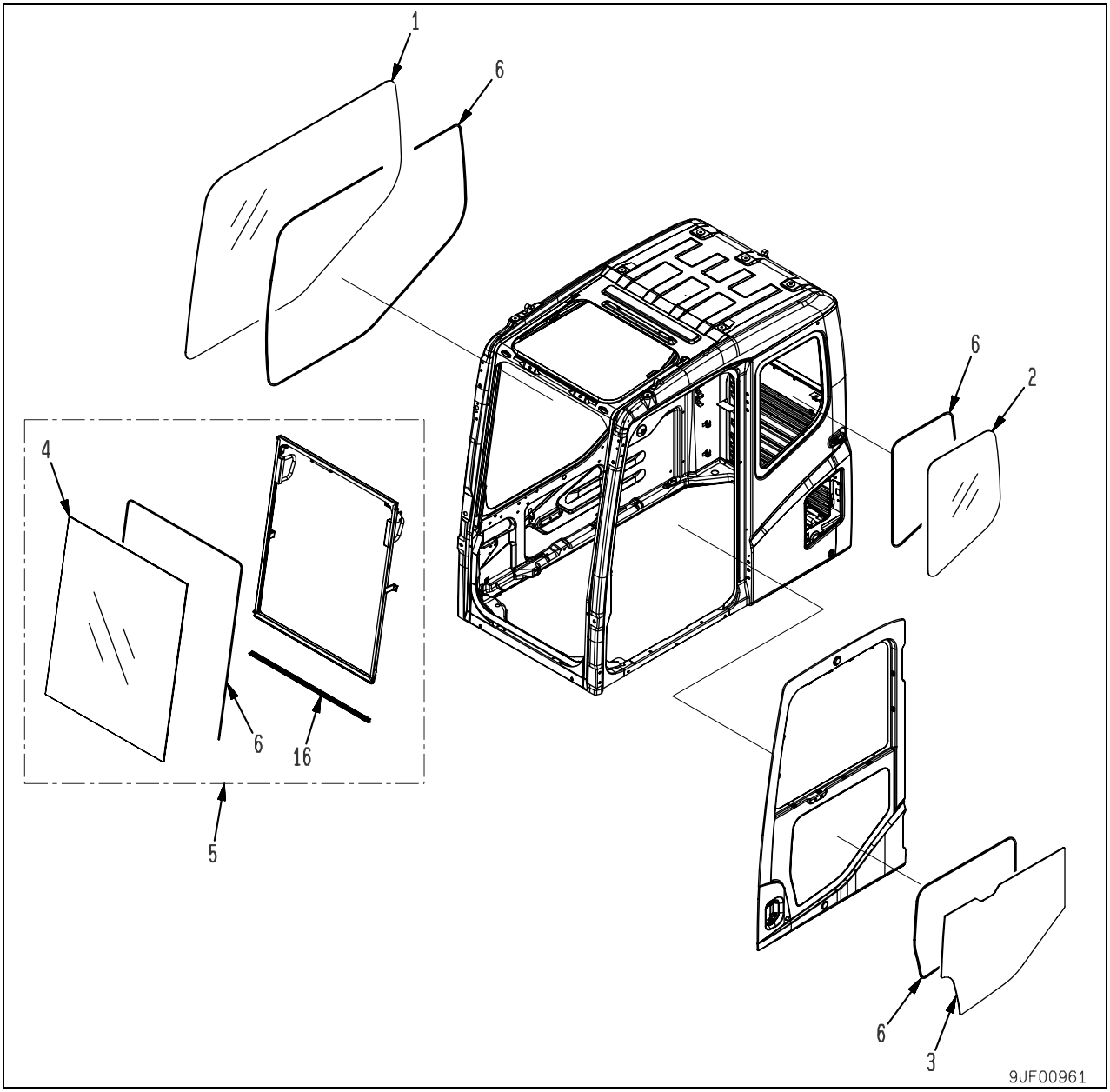
18. Lift and remove operator's cab assembly (27).
    Operator's cab assembly: **290 kg**



Installation

- Installation is done in the reverse order of removal.

Removal and installation of operator’s cab glass (stuck glass)



★ Among the panes of window glass on the 4 sides of the operator's cab, 4 panes (1) – (4) are stuck.
In this section, the procedure for replacing the stuck glass is explained.
When replacing front window glass (4), remove front window assembly (5). (It is impossible to replace only the front window glass while the front window assembly is installed to the operator's cab.)
For the procedure for replacing the front window assembly, see “Removal and installation of front window assembly”.

(1) : Right side window glass
(2) : Left side rear window glass
(3) : Door lower window glass
(4) : Front window glass
(5) : Front window assembly
(Front window glass + Front frame)
(6) : Both-sided adhesive tape
(16): Center trim seal

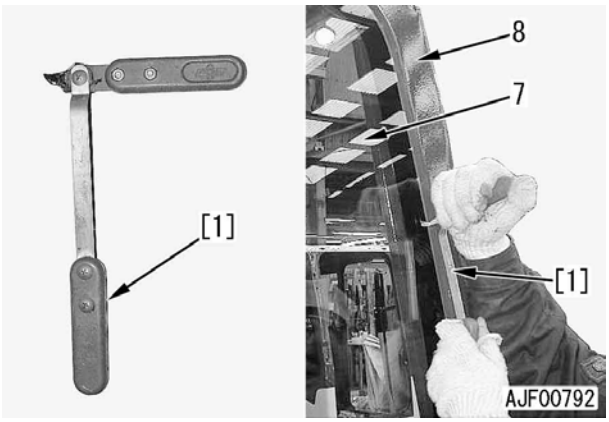
Special tools

Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
Y	1	793-498-1210	Lifter (Suction cup)	■	2		
	2	20Y-54-13180	Adapter	■	2		

Removal

★ Remove the window glass to be replaced according to the following procedure.

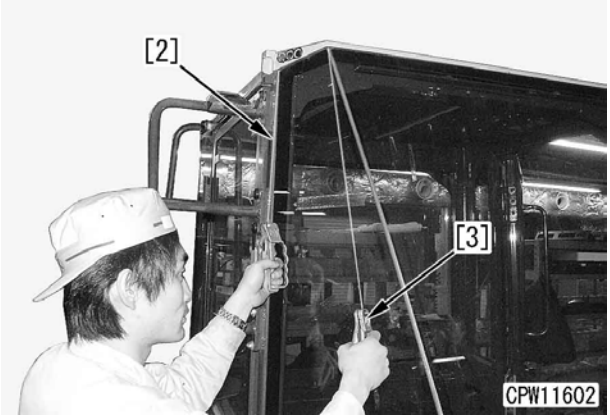
1. Using seal cutter [1], cut the adhesive between broken window glass (7) and operator's cab (metal sheet) (8).



★ If a seal cutter is not available, make holes on the adhesive and both-sided adhesive tape with a drill and pass a fine wire (piano wire, etc.) [2] through the holes. Grip the both ends of the wire with priors [3], etc. (or hold them by winding them onto something) and move the wire to the right and left to cut the adhesive and both-sided adhesive tape.

★ Since the wire may be broken by the frictional heat, apply lubricant to it.

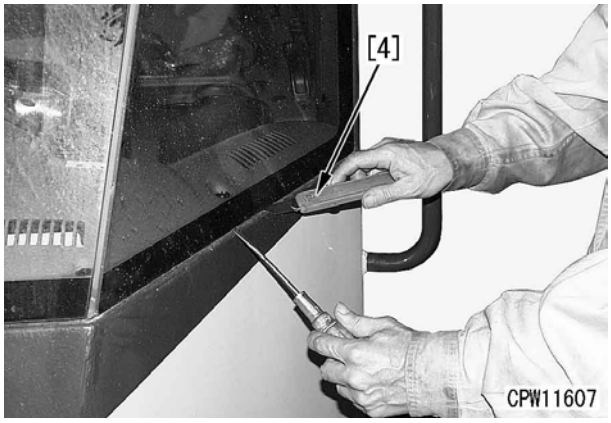
(The figure shows the operator's cab of a wheel loader.)



★ If the window glass is broken finely, it may be removed with knife [4] and a screwdriver.

★ Widening the cut with a screwdriver, cut the adhesive and both-sided adhesive tape with knife [4].

(The figure shows the operator's cab of a wheel loader.)



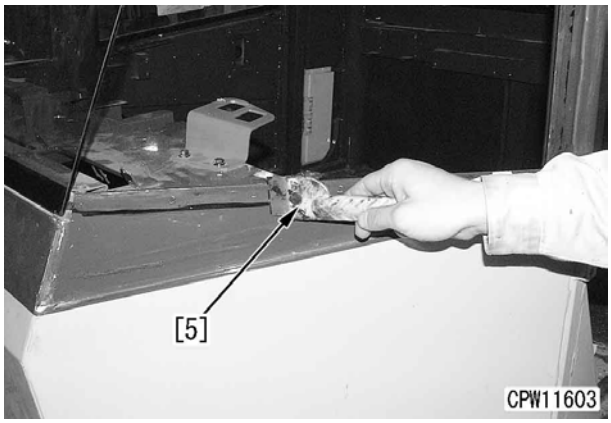
2. Remove the window glass.

Installation

1. Using a knife and scraper [5], remove the remaining adhesive and both-sided adhesive tape from the metal sheets (glass sticking surfaces) of the operator's cab.

★ Remove the adhesive and both-sided adhesive tape to a degree that they will not affect adhesion of the new adhesive. Take care not to scratch the painted surfaces. (If the painted surfaces are scratched, adhesion will be lowered.)

(The figure shows the operator's cab of a wheel loader.)



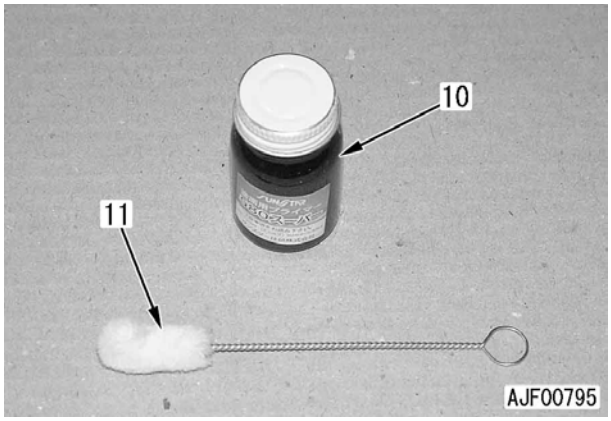
2. Remove oil, dust, dirt, etc. from the sticking surfaces of cab (8) and window glass (9) with white gasoline.
   - ★ If the sticking surfaces are not cleaned well, the glass may not be stuck perfectly.
   - ★ Clean the all black part on the back side of the window glass.
   - ★ After cleaning the sticking surfaces, leave them for at least 5 minutes to dry.
     (The figure shows the operator's cab of a wheel loader.)



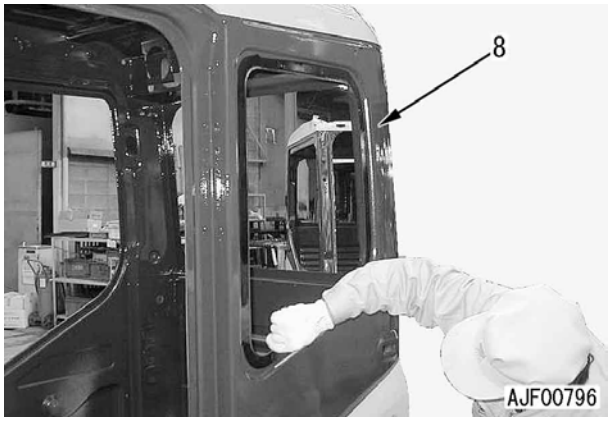
3. Apply primer (10).
   - ★ The using limit of primer (10) is 4 months after the date of manufacture. Do not use primer (10) after this limit.
   - ★ Use the primer within 2 hours after unpacking it.
   - ★ Even if the primer is packed again just after it is unpacked, use it within 24 hours after it is unpacked for the first time. (Discard the primer 24 hours after it is packed.)

   1) Stir the primers for paint and glass sufficiently before using them.
      - ★ If the primer has been stored in a refrigerator, leave it at the room temperature for at least half a day before stirring it. (If the primer is unpacked just after taken out of the refrigerator, water will be condensed. Accordingly, leave the primer at the room temperature for a sufficient time.)

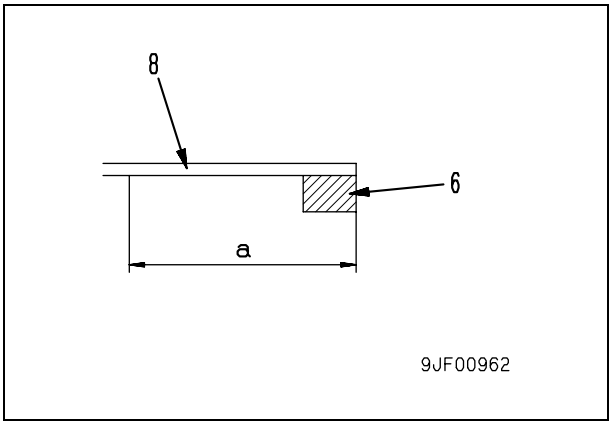
   2) When reusing primer brush (11), wash it in white gasoline.
      - ★ After washing the brush, check it again for dirt and foreign matter.
      - ★ Prepare respective brushes for the paint primer glass primer.



   3) Evenly apply paint primer to the surfaces to stick both-sided adhesive tapes and the surfaces out of those surfaces on operator's cab (8) which will be coated with the adhesive.
      Paint primer:
      SUNSTAR PAINT PRIMER 580 SUPER or equivalent
      - ★ Do not apply the primer more than 2 times. (If it is applied more than 2 times, its performance will be lowered.)

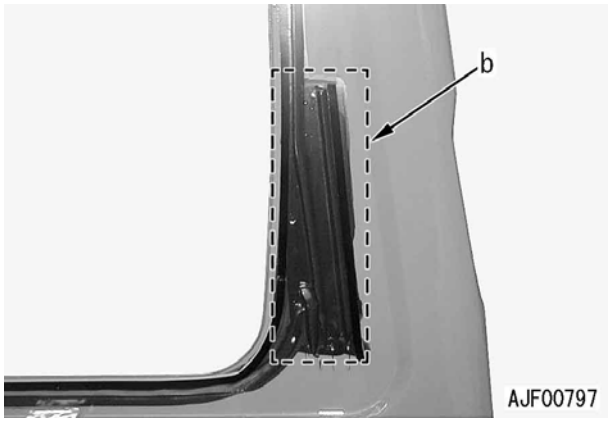


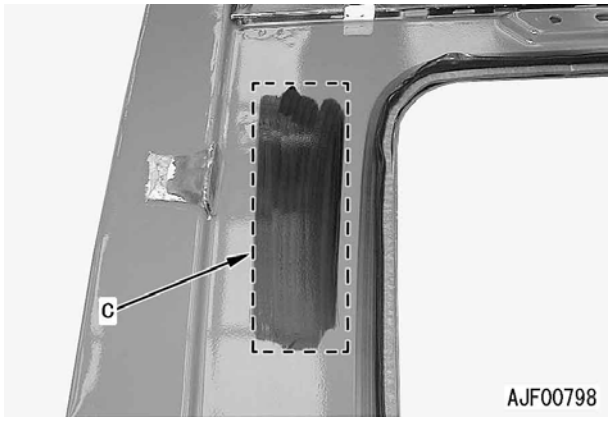
      - ★ Parts to be coated with primer: Apply the primer all over dimension (a).
      - ● Dimension to apply primer (a): **25 mm**



★ In addition to the above parts, apply the primer to right side window glass (1) and door lower window glass (3).
- Range to apply primer additionally for right side window glass (1): (b)
- Range to apply primer additionally for door lower window glass (3): (c)

★ After applying the primer, leave it for at least 5 minutes (within 8 hours) to dry.
★ Never apply wrong primer. If the glass primer is applied by mistake, wipe it off with white gasoline.

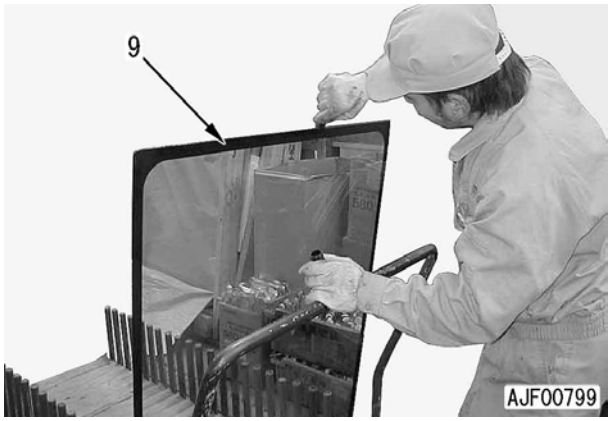




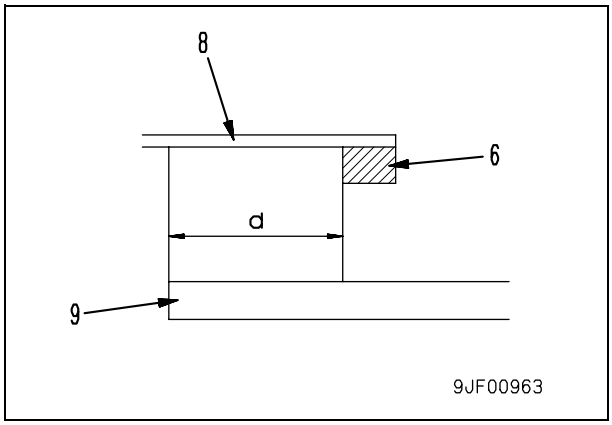
★ Never apply wrong primer. If the glass primer is applied by mistake, wipe it off with white gasoline.

4) Evenly apply glass primer to the sticking surfaces of window glass (9).
Glass primer:
SUNSTAR GLASS PRIMER 580 SUPER or equivalent

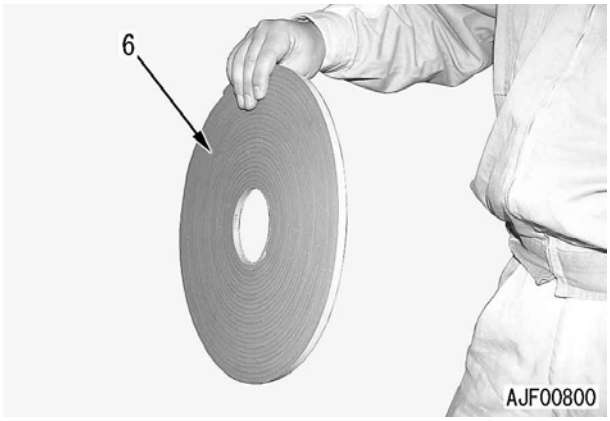
★ Do not apply the primer more than 2 times. (If it is applied more than 2 times, its performance will be lowered.)



★ Parts to be coated with primer: Apply the primer to the sticking surfaces of window glass (9) and all over dimension (d) which will be on both-sided adhesive tape (6) and operator's cab (8).
★ Do not apply the primer to the boarder about 5 mm wide between the black part and transparent part of the glass.
★ After applying the primer, leave it for at least 5 minutes (within 8 hours) to dry.
★ Never apply wrong primer. If the glass primer is applied by mistake, wipe it off with white gasoline.



4. Stick both-sided adhesive tape (6) along the inside edge of the glass sticking section.
★ Do not remove the release tape of the both-sided adhesive tape on the glass sticking side before sticking the glass.
★ When sticking the both-sided adhesive tape, do not touch the cleaned surface as long as possible.
★ Take that the both-sided adhesive tape will not float at each corner of the window frame.



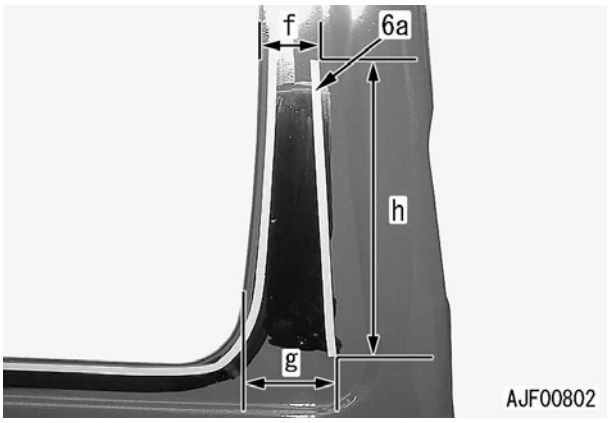
★ When sticking both-sided adhesive tape (6) around a frame, do not lap its finishing end over the starting end but make clearance (e) of about 5 mm between them.

1) Stick both-sided adhesive tape (6) for right side window glass (1) as shown in the figure.

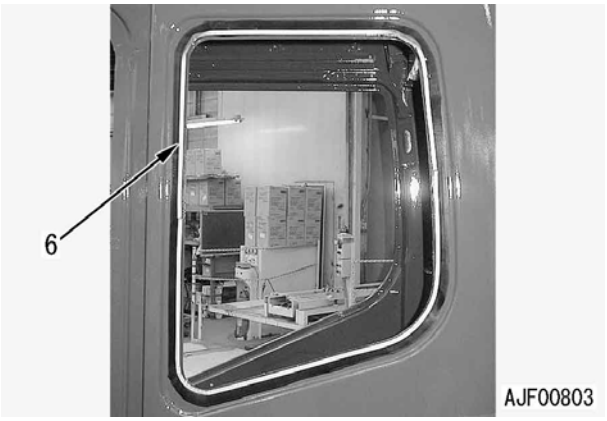


★ Stick both-sided adhesive tape (6a) additionally for right side window glass (1).

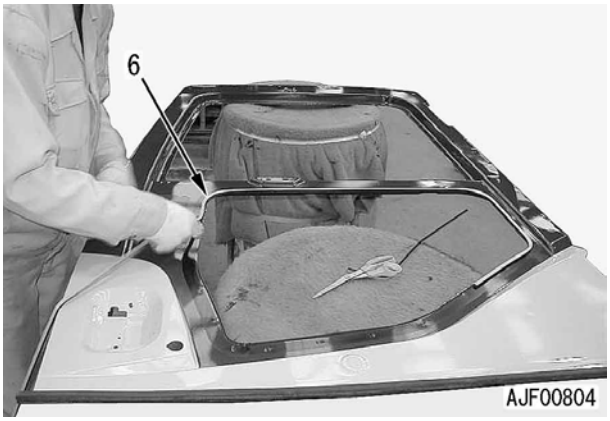
● Positions to stick additional both-sided adhesive tape for right side window glass:
(f) : **50 mm**
(g) : **90 mm**
(h) : **250 mm**



2) Stick both-sided adhesive tape (6) for left side rear window glass (2) as shown in the figure.

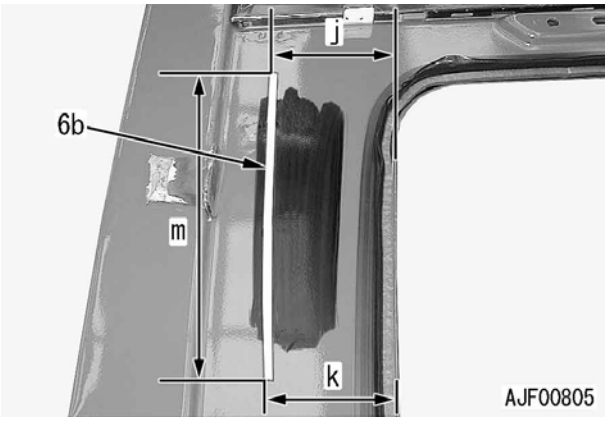


3) Stick both-sided adhesive tape (6) for door lower window glass (3) as shown in the figure.

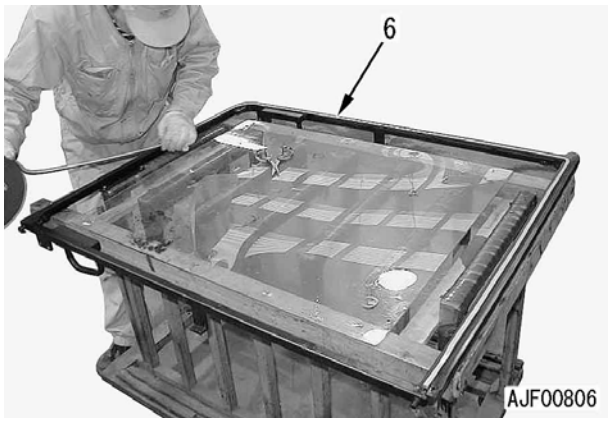


★ Stick both-sided adhesive tape (6b) additionally for door lower window glass (3).

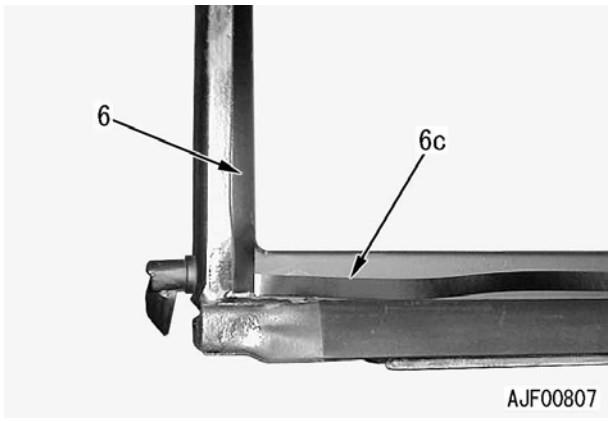
★ Positions to stick additional both-sided adhesive tape for door lower window glass:
(j) : **110 mm**
(k) : **90 mm**
(m) : **200 mm**



4) Stick both-sided adhesive tape (6) for front window glass (4) as shown in the figure.

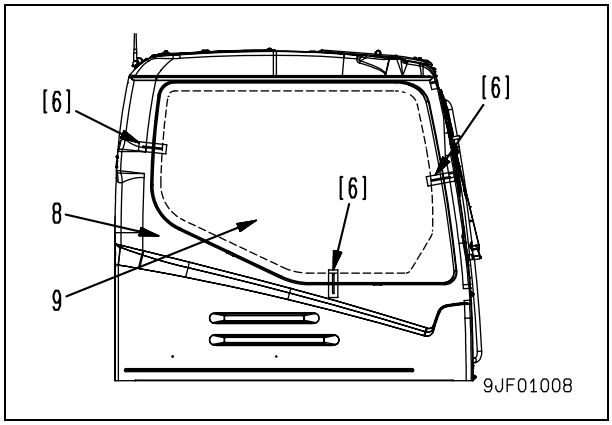


★ Stick both-sided adhesive tape (6c) of the lower side of the front window glass along the outside edge of the lower line, differently from other both-sided adhesive tapes (6). (If it is stuck along the inside, it will be seen through the transparent part of the glass.)

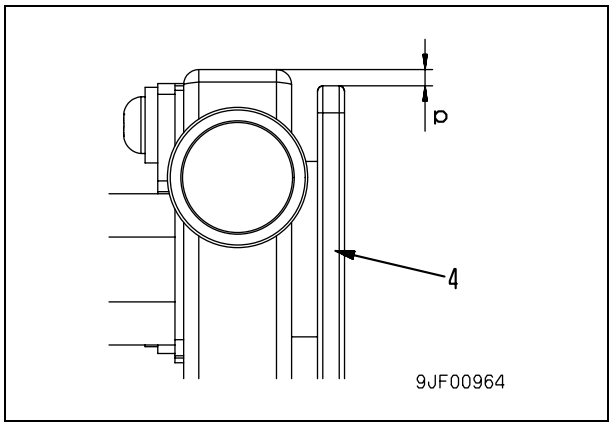


5. Position the new window glass.
   1) Check the clearance between the window glass and the operator's cab on the right, left, upper, and lower sides, and then adjust it evenly.
   2) Stick tapes [6] between window glass (9) and operator's cab (8) and draw positioning line (n).
      ★ Stick tapes [6] to the right, left, and lower parts of the right side window glass, left side rear window glass, and door lower window glass for accurate positioning.
   3) Cut the tape between window glass (9) and operator's cab (8) with a knife, and then remove the window glass.
      ★ Do not remove the tapes left on the window glass and operator's cab before installing the window glass.

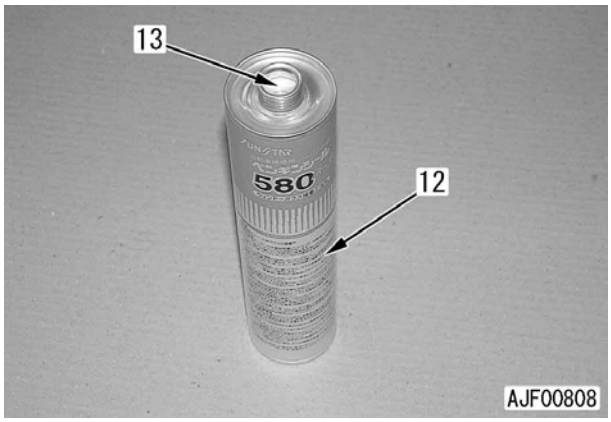




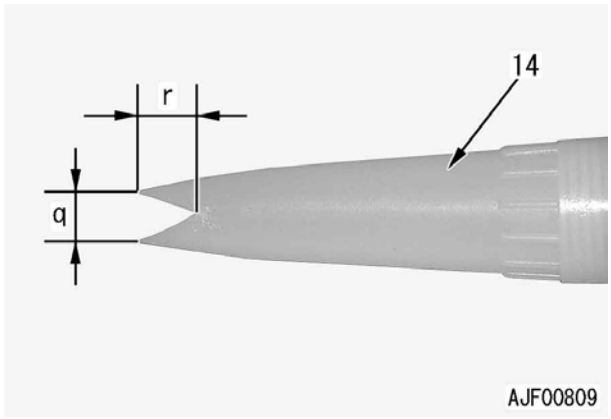
★ When positioning front window glass (4), set its horizontal position to the frame width and set its vertical position so that height difference (p) between it and the frame top will be 3 mm.



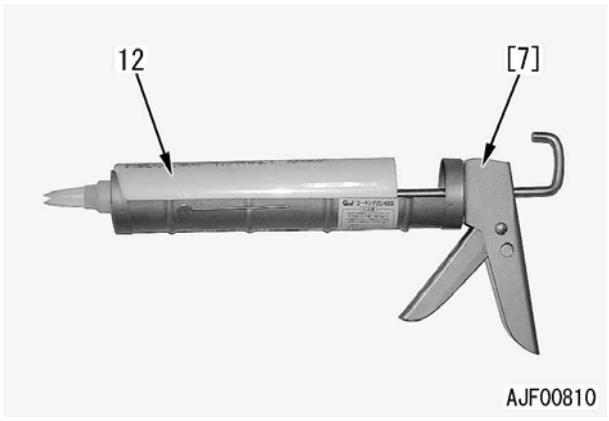
6. Apply adhesive.
   ★ Use either of the 2 types of the adhesive.
   Adhesive (Summer):
   SUNSTAR PENGUINE SEAL 580 SUPER "S"
   Adhesive (Winter):
   SUNSTAR PENGUINE SEAL 580 SUPER "W"
   ★ The using limit of the adhesive is 4 months after the date of manufacture. Do not use the adhesive after this limit.
   ★ Keep the adhesive in a dark place where the temperature is below 25°C.
   ★ Never heat the adhesive higher than 30°C.
   ★ When reusing the adhesive, remove the all hardened part from the nozzle tip.
   1) Break aluminum seal (13) of the outlet of adhesive cartridge (12) and install the nozzle.



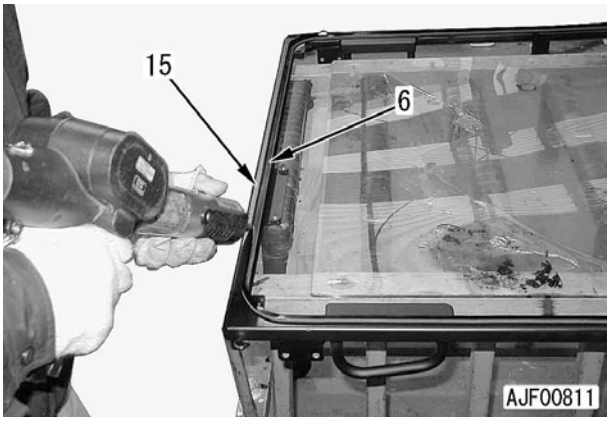
   2) Cut the tip of the adhesive nozzle (14) so that dimensions (q) and (r) will be as follows.
      - Dimension (q): **10 mm**
      - Dimension (r) : **15 mm**



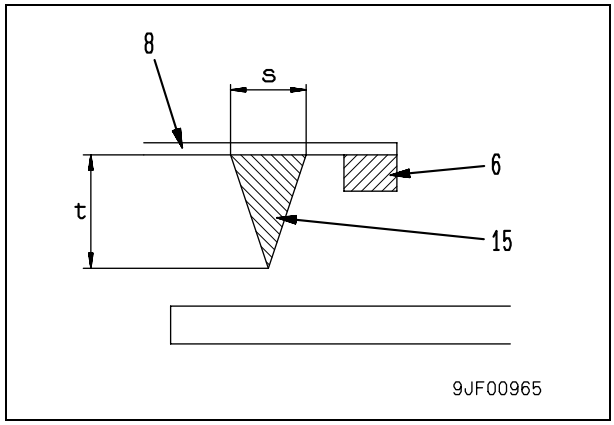
   3) Set adhesive cartridge (12) to caulking gun [7].
      ★ An electric caulking gun is more efficient.



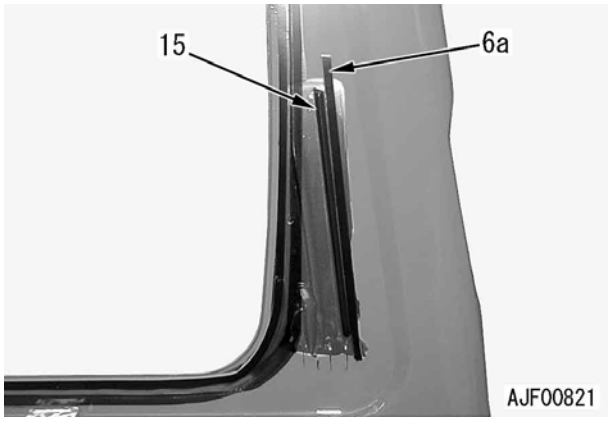
   4) Remove the release tape of the both-sided adhesive tape on the glass side.
   5) Apply adhesive (15) to the outside of both-sided adhesive tape (6) of the operator's cab.

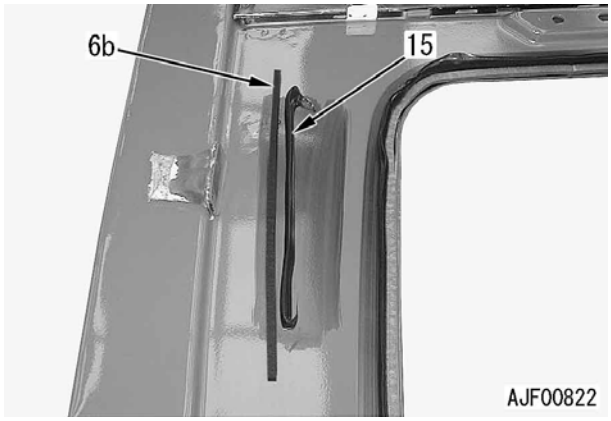


      ★ Apply adhesive (15) to dimensions (s) and (t) of both-sided adhesive tape (6) of operator's cab (8).
         - Dimension (s): **10 mm**
         - Dimension (t) : **15 mm**
      ★ Apply adhesive (15) higher than both-sided adhesive tape (6).
      ★ Apply the adhesive evenly.



★ Apply adhesive (15) additionally for additional both-sided adhesive tape (6a) of the right side window glass and additional both-sided adhesive tape (6b) of door lower window glass.

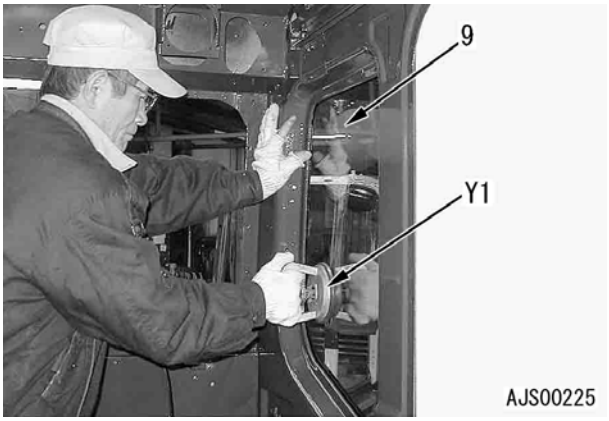




7. Install the window glass.
   1) Install window glass (9), matching it to the lines of the positioning tapes drawn in step 5.
      ★ Since the window glass cannot be removed and stuck again, stick it very carefully.
      ★ Stick the glass within 5 minutes after applying the adhesive.
   2) After sticking window glass (9), press all around it until it is stuck to the both-sided adhesive tape.
      ★ Press the corners of the window glass firmly.



★ You can perform this work efficiently by pulling window glass (9) from inside of the operator's cab with suction cup **Y1**.

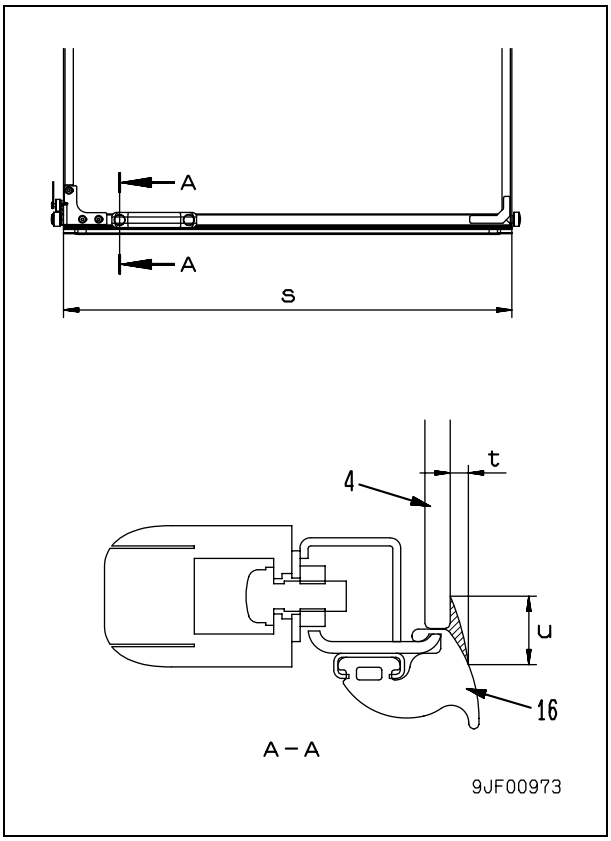


★ After installing front window glass (4), fill the clearances between it and center trim seal (16) with caulking material in range (s) to dimensions (t) and (u).
After applying the primer to glass (4) of section (A) – (A), apply adhesive as caulking material.
- Caulking dimension (t) : **2 mm**
- Caulking dimension (u) : **5 mm**

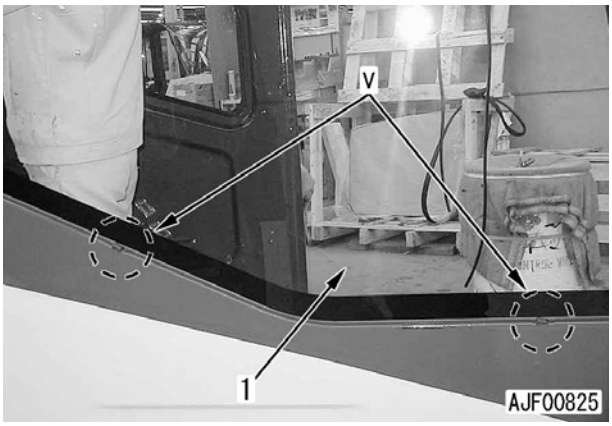
★ When caulking, mask the glass side and form the adhesive with a rubber spatula as shown in the figure.
★ Wipe off projected adhesive.

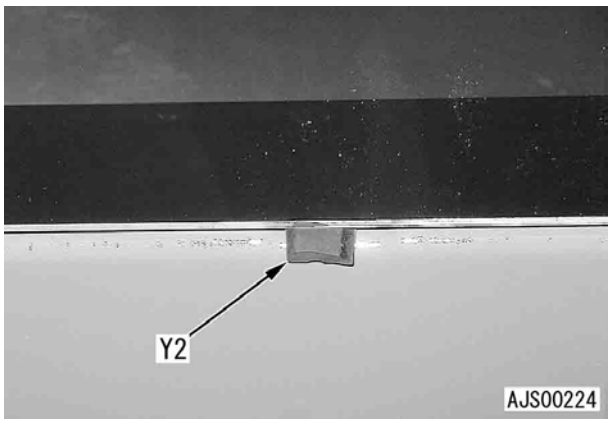
Glass primer:
SUNSTAR GLASS PRIMER 580 SUPER

Adhesive:
SUNSTAR PENGUINE SEAL 580 SUPER "S" or "W"



8. Fix the window glass.
   1) After installing right window glass (1) to the operator's cab, insert stopper rubbers **Y2** to 2 places (v) at the bottom of the glass to fix the glass.





   2) Using styrene foam blocks [9] and rubber bands [10], fix the window glass and both-sided adhesive tape to fit them completely.



9. After installing the window glass, remove the primer and adhesive from the operator's cab and window glass.
   ★ Using white gasoline, wipe off the adhesive before it is dried up.
   ★ When cleaning the glass, do not give an impact to it.

10. Protect the stuck window glass.
   1) Keep the stopper rubbers, styrene foam blocks, and rubber bands installed for 10 hours (at temperature of 20°C and humidity of 60%).
   2) After removing the stopper rubbers, styrene foam blocks, and rubber bands, wait at least 14 hours, at least 24 hours in total, before operating the machine actually.

Removal and installation of front window assembly

⚠ **Lower the work equipment to the ground and stop the engine.**

★ To replace the front window glass, the front window assembly must be removed from the operator's cab. The procedure for removing and installing the front window assembly (front frame and front window glass) is explained below.

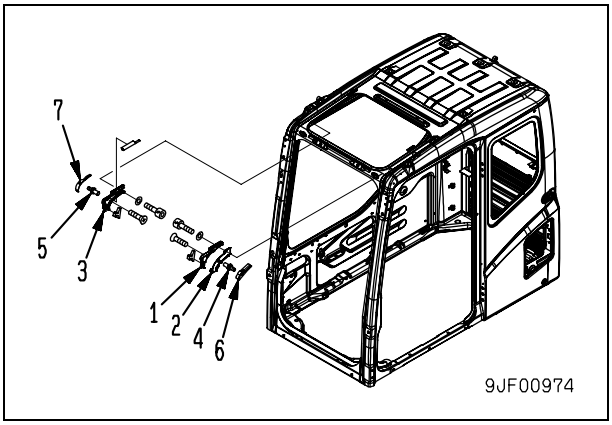
Removal

1. Raise the front window assembly to the ceiling and fix it with the rear locks (on both sides).

2. Remove left corner blocks (1) and (2) and right corner block (3). [*1]

3. Remove left striker bolt (4), right striker bolt (5), left corner block bracket, and right corner block bracket (7). [*2]

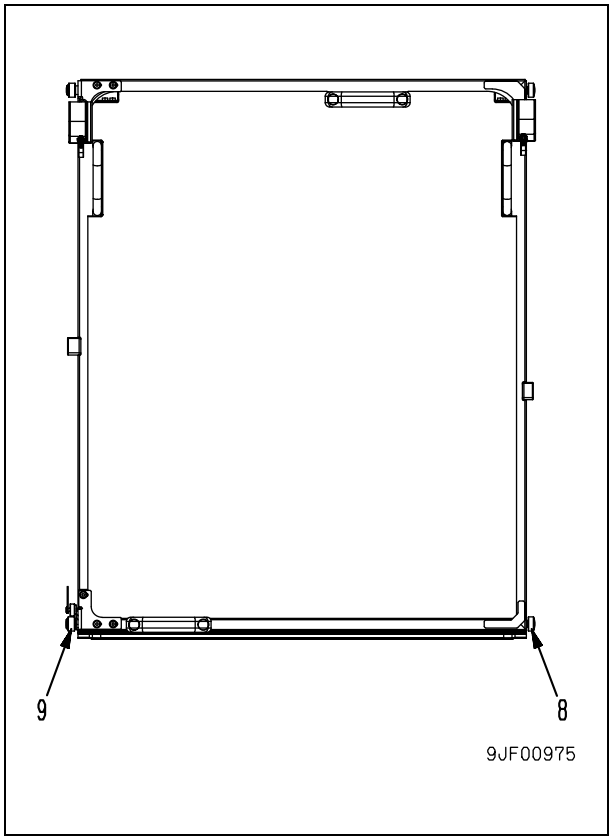
4. Install left striker bolt (4) to the operator's cab again and tighten it lightly.
   ★ This bolt will be used to hang the pull-up assist cable in step 8.



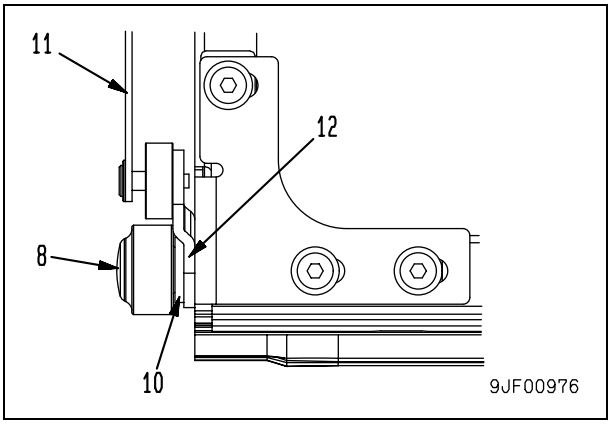
5. Release the rear locks.

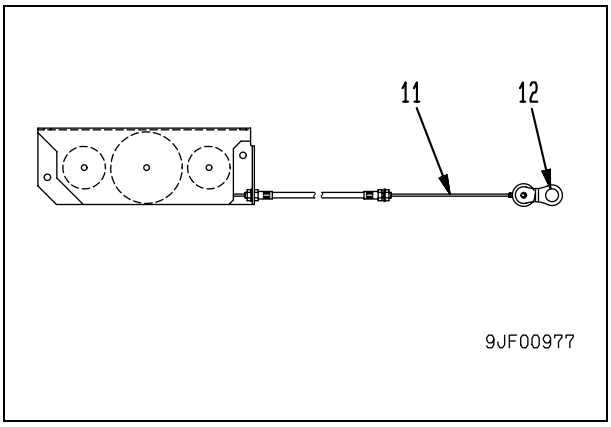
6. Lower the front window assembly carefully a little. Put out rollers (8) and (9) under the both sides of the front window through the portion from which the corner blocks were removed in step 3 (the portion where the rail is open) and hold them.

7. Remove rollers (8) and (9) under the both sides of the front window.

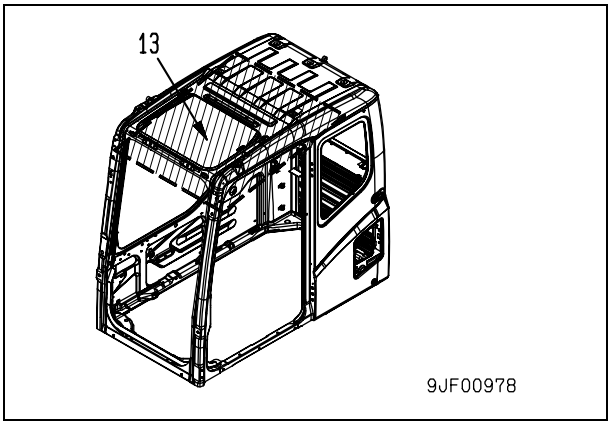


8. Remove left lower pin (10). [*3]
   ★ If left lower pin (10) is removed, plate (12) at the end of pull-up assist cable (11) comes off.
   ★ Hang plate (12) on the left striker bolt.
   ⚠ **The return load of 58.8 N {6 kg} is applied to the rear of the operator's cab. Accordingly, take care when removing left lower pin (10) to disconnect pull-up assist cable (11).**

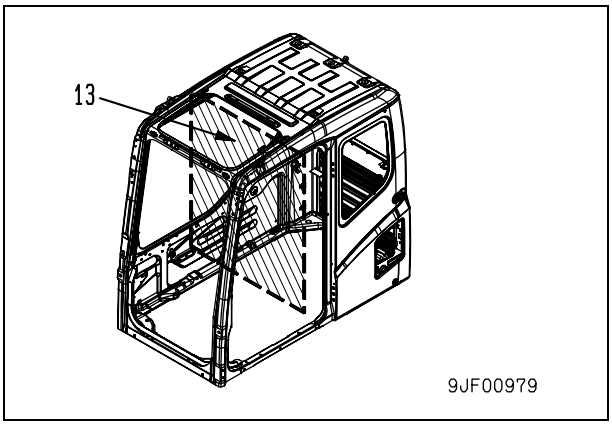




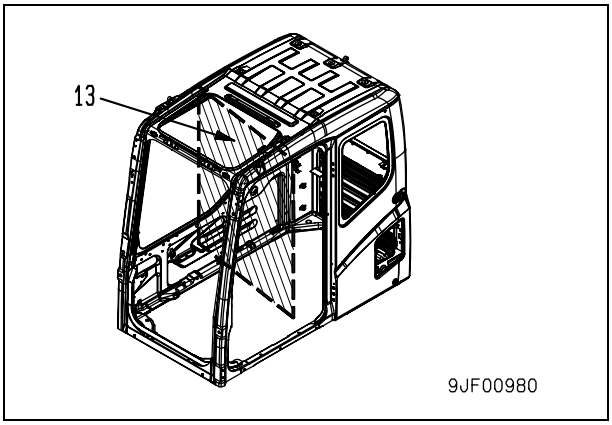
9. Put out the bottom of front window assembly (13) through the rail opening portion and lower it gradually.

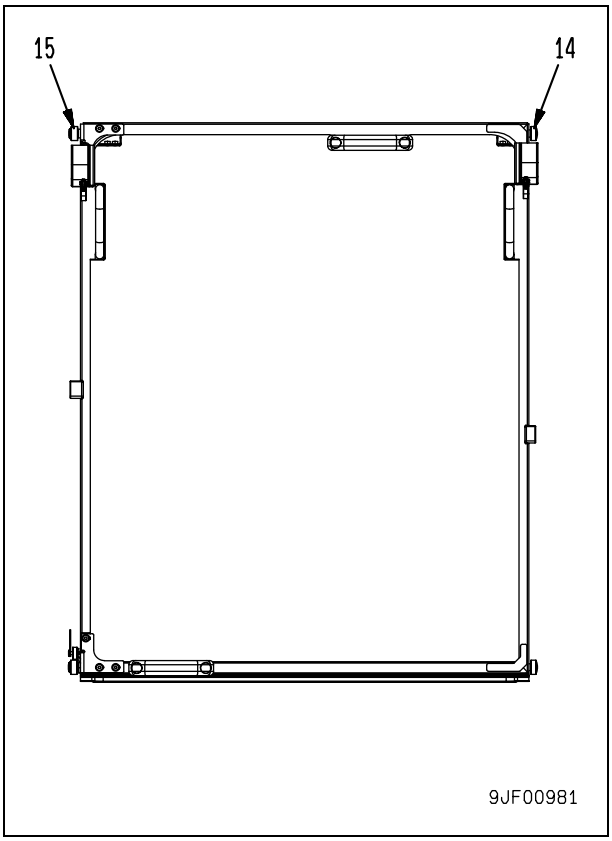


10. Lower front window assembly (13) completely.
    ★ Do not let the front window assembly touch the monitor.



11. Twist front window assembly (13) to the right and left to remove both upper rollers (14) and (15) from the rails, and then remove front window assembly (13).





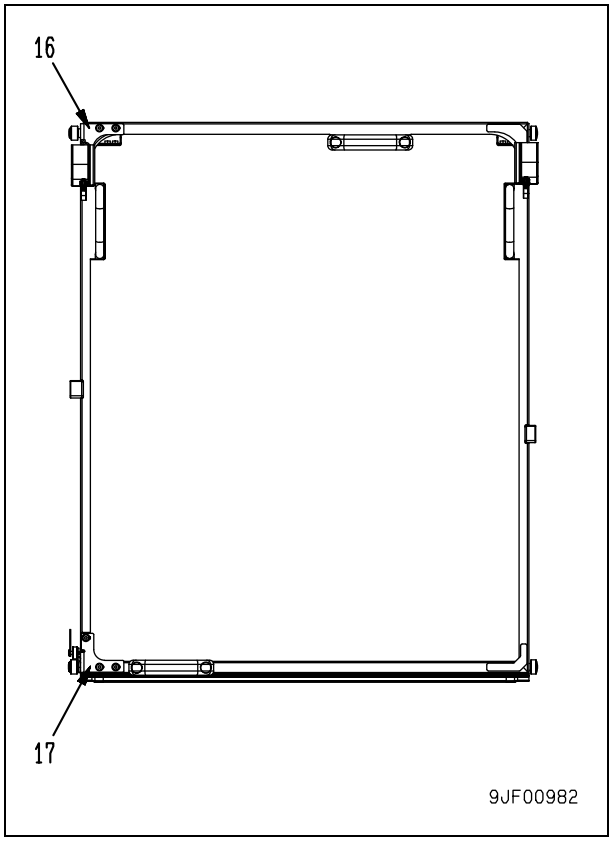
Installation

- Carry out installation in the reverse order to removal.

[*1] [*2]
- Adjust opening and closing of the front window assembly according to the following procedure.

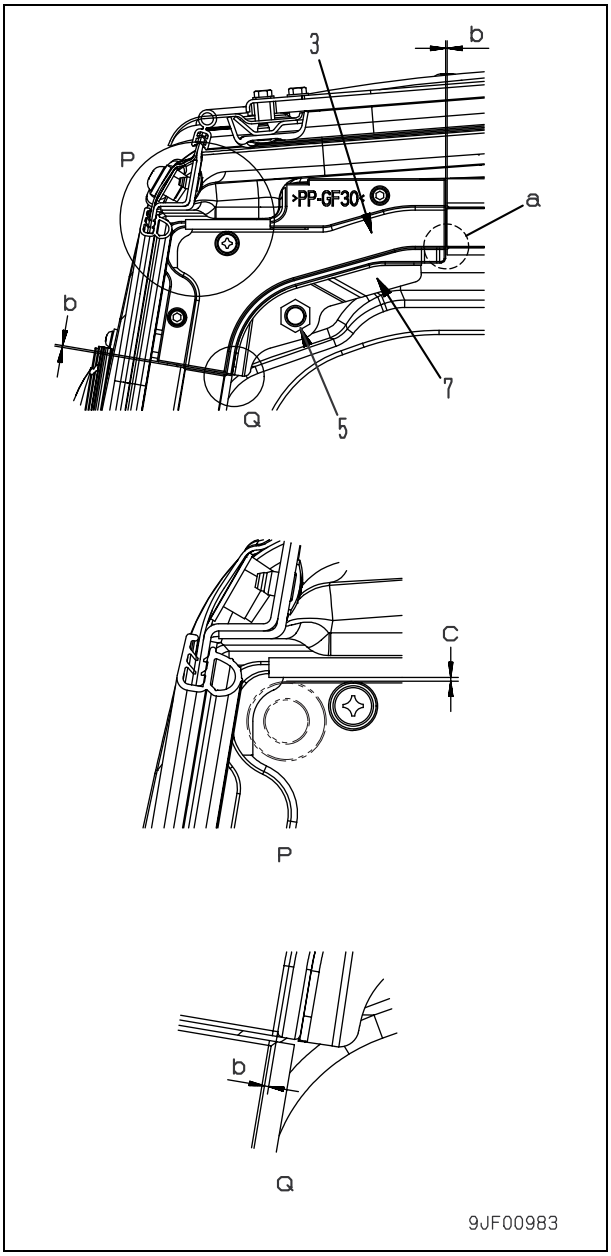
1. Open and close the front window to check that it does not interfere with the rails and the rollers are not hitch.

2. If there is any problem in opening or closing of the front window, loosen the mounting bolts of roller adjustment brackets (16) and (17) and adjust the condition of the front window, and then tighten the mounting bolts again.
   Mounting bolt: **9.8 Nm {1.0 kgm}**

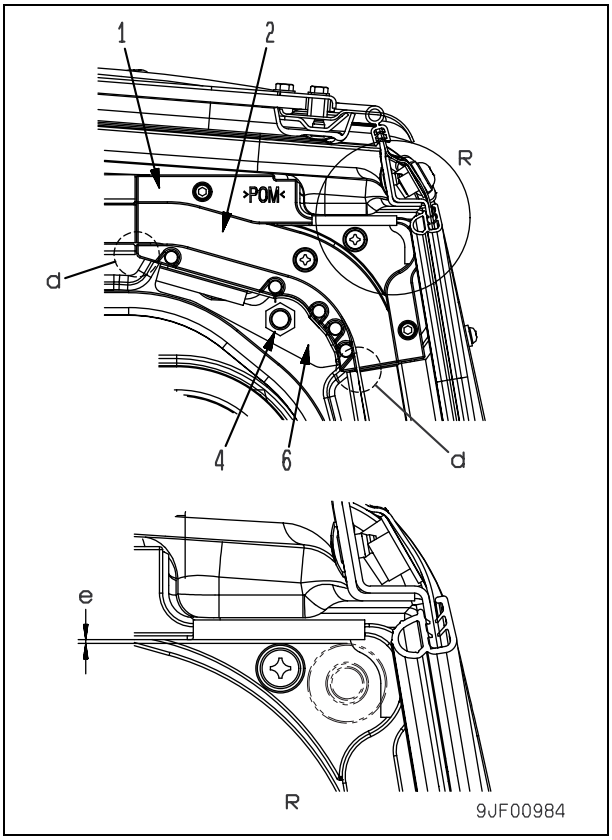


3. Raise the front window assembly and fix it with the rear locks (on both sides).
   ★ Check that the locks in the rear of the operator's cab are applied securely.

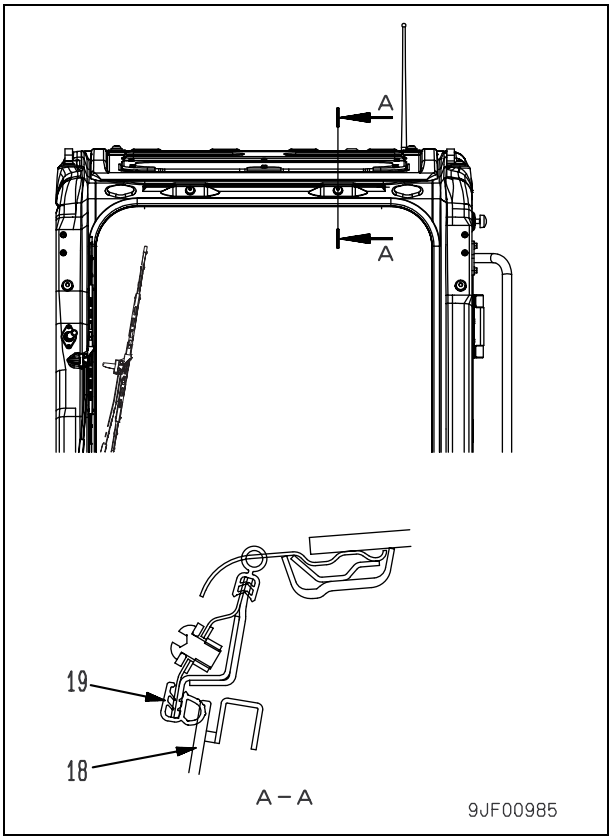
4. Install right corner block (3) and fix right corner block bracket (7) with right striker bolt (5).
   ★ Tighten the striker bolt securely after adjusting it in step 6.
   ★ Install the right corner block so that there will be no level difference at part (a).
   ★ Install the right corner block so that level difference (b) between the rail and right corner block (3) will be 0 – 1.0 mm. Check that the right corner block is not projected from the rail at the rolling surface of the roller.
   ★ Secure roller clearance (c) at part **P**.

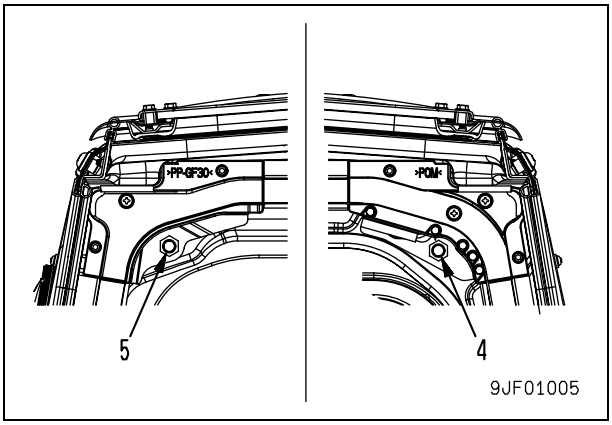


5. Install left corner blocks (1) and (2) and secure left corner bracket (6) with left striker bolt (4).
   ★ Tighten the striker bolt securely after adjusting it in step 6.
   ★ Install the left corner blocks so that there will be no level difference at 2 part (d).
   ★ Secure roller clearance (e).

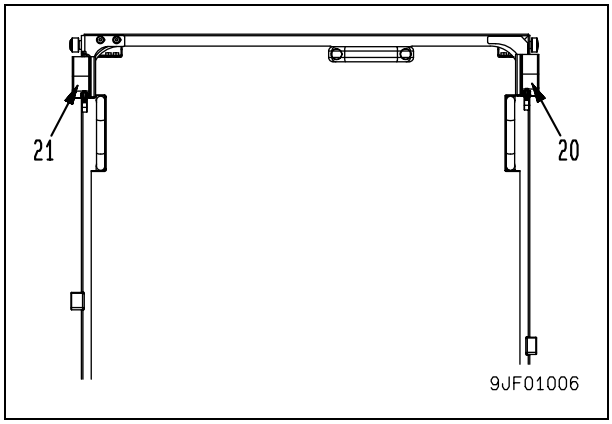


6. Adjust the striker bolts according to the following procedure (Adjust the "CLOSE" positions of the front window assembly locks).
   1) Tighten left striker bolt (4) and right striker bolt (5) at roughly right positions so that front window glass (18) will be fitted to cab-side trim seal (19).



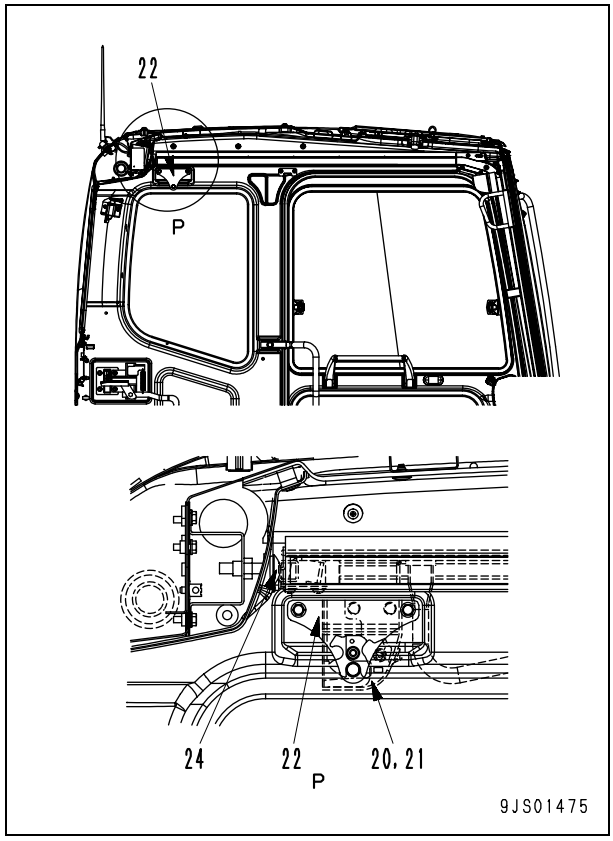


   2) Open and close the front window assembly and check the working condition of both locks (20) and (21).
      i) If both locks do not work normally, move the striker bolts toward the rear of the cab and tighten them again.
      ii) After moving the striker bolts, check the fitness of the front window glass and cab-side trim seal which was checked in step 6.
      iii) Repeat the work in i) and ii) until the fitness of the front window and the working condition of both locks (20) and (21) are acceptable, and then tighten the striker bolts.

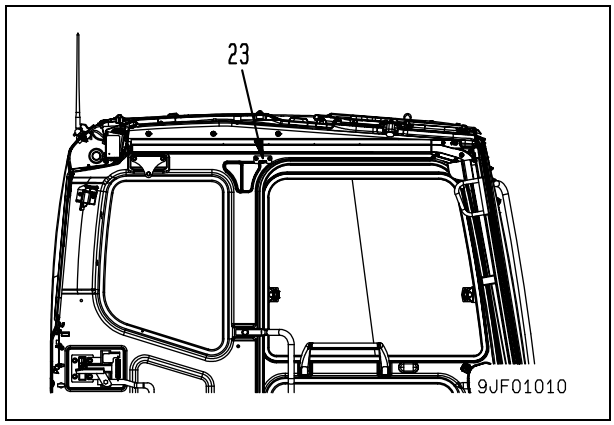


7. After adjusting the striker bolts, splash water heavily over the front window glass and check that the water does not leak into the cab.

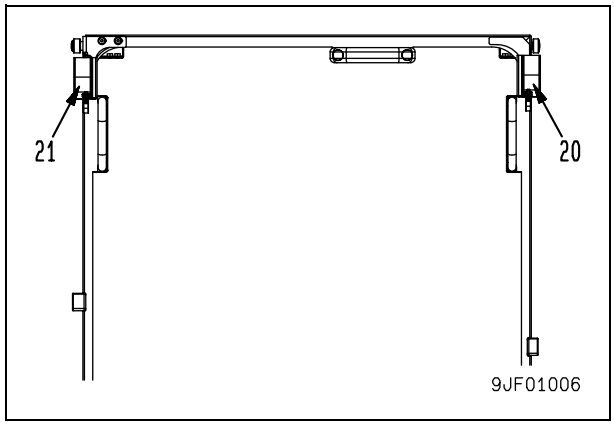
8. Adjust the "opening" lock of the front window assembly.
   1) After adjusting the "closing" lock of the front window in step 6, raise the front window assembly to the ceiling.
   2) Set the right and left front window assembly locks at the rear of the operator's cab to the "OPEN" positions, and then check the following items.
      - Check that right and left locks (20) and (21) are closed normally.
      - Check that right and left locks (20) and (21) are inserted in parallel in right and left striker plates (22).
      - Check that right and left rubber stoppers (24) are in contact with the front window assembly and their deflection allowance is 1.5 – 3.0 mm.
   3) After checking the above items, if necessary, adjust them by moving right and left striker plates (22) at the rear of the operator's cab.



9. Adjust the front window stoppers.
   1) After adjusting "closing" lock of the front window assembly in step 9, check the contact of both front window stoppers (23).
   2) If both stoppers (23) do not contact normally, adjust and fix them at places where they contact normally.



10. Check the latching effort of the front window assembly.
    1) After finishing steps 6 – 9, check that latching efforts of both locks (20) and (21) are even.
       ★ Check the latching efforts on both "closing" side (in the front of the operator's cab) and "opening" side (in the rear of the operator's cab).



[*3]
Left lower pin: **27 – 34 Nm {2.75 – 3.47 kgm}**
Mounting bolt: **Adhesive (LT-2)**

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00962-00

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Printed in Belgium 05-06 (00)

HYDRAULIC EXCAVATOR

PC340LC-7E0
PC340NLC-7E0

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

50 Disassembly and assembly

Electrical system

Electrical system 2
Removal and installation of work equipment assembly 2
Removal and installation of machine monitor 4
Removal and installation of pump controller 4
Removal and installation of KOMTRAX terminal 5
Removal and installation of engine controller 5

Electrical system

Removal and installation of work equipment assembly

Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
Q	799-703-1200	Service tool kit	■	1		
	799-703-1100	Vacuum pump (100 V)	■	1		
	799-703-1100	Vacuum pump (220 V)	■	1		
	799-703-1110	Vacuum pump (240 V)	■	1		
	799-703-1400	Gas leakage tester	■	1		

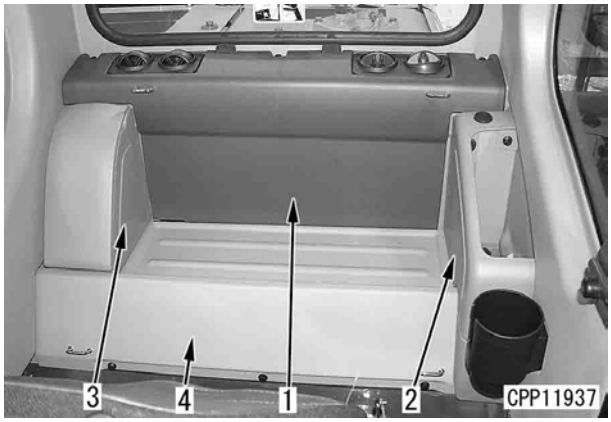
Removal

⚠ **Disconnect the negative terminal (–) of the battery before starting the work.**
⚠ **Collect the air conditioner refrigerant.**

1. Turn by 90°

2. Drain the engine coolant.
   Coolant: **Approx. 22.8 ℓ**

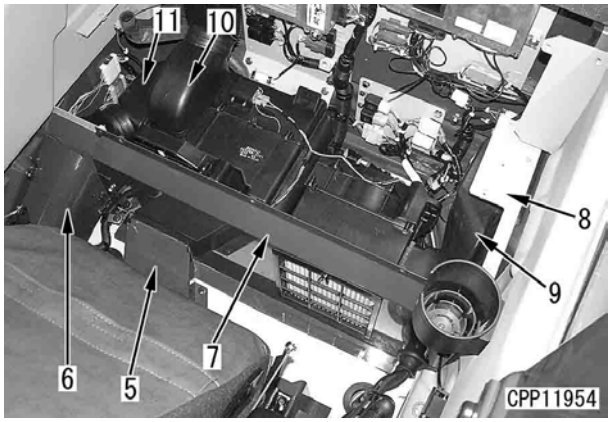
3. Remove rear covers (1), (2), (3), and (4).



4. Remove duct (5), cover (6) and plate (7).

5. Remove plate (8) and duct (9).
   ★ Remove the duct clip

6. Remove upper and lower ducts (10) and (11).

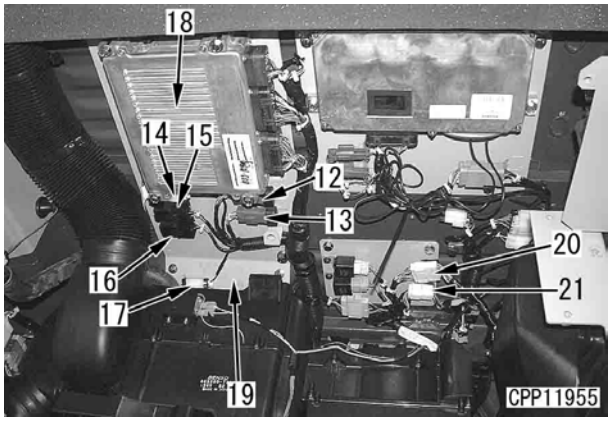


7. Disconnect connectors D01 (12), D02 (13), C09 (14), R22 (15), R20 (16) and K19 (17).

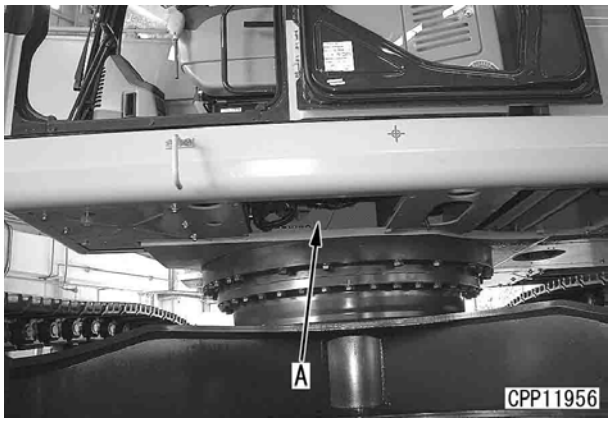
8. Remove pump controller (18).

9. Remove plate (19).

10. Disconnect air conditioner unit connectors M27 (20) and M33 (21).

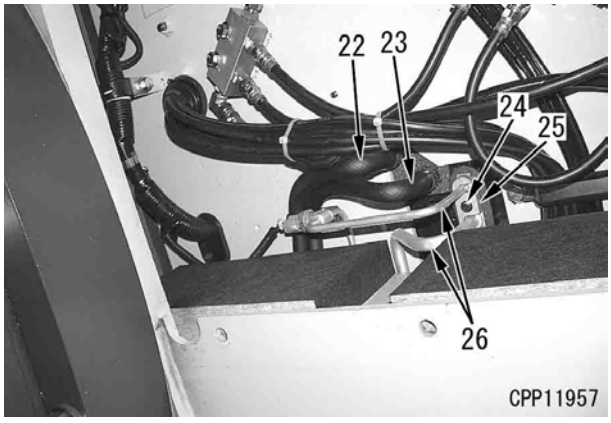


11. Remove the air conditioner unit undercover.
    ★ Part (A).

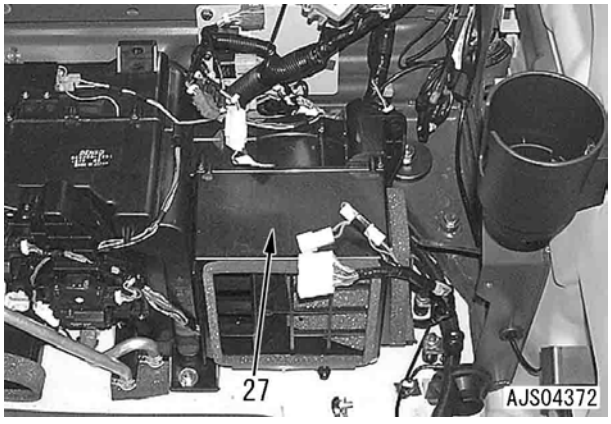


12. Remove mounting bolt (24) and connector (25). [*1]

13. Disconnect heater hoses (22) and (23) and air conditioner tube (26). [*1]
    ★ Put tags to the disconnected hoses to prevent a mistake.



14. Remove the 7 mounting bolts and air conditioner unit assembly (27).



Installation

- Installation is done in the reverse order of removal.

★ When installing the air conditioner circuit hoses, use care so that dirt, water, may not enter.

★ When connecting each air conditioner hose, check that the O-ring is fitted to the joint.

★ Check that each O-ring is free from flaws and deterioration.

[*1]

★ Apply compressor oil for R134a (DENSO: NDOIL8, ZEXEL: ZXL100PG (equivalent to PAG46) to the threads of the refrigerant piping and tighten each joint with a double spanner.)

Hose clamp (M6 bolt):
8 – 12 Nm {0.8 – 1.2 kgm}

Hose threads of M16 × 1.5:
12 – 15 Nm {1.2 – 1.5 kgm}

Hose threads of M22 × 1.5:
20 – 25 Nm {2.0 – 2.5 kgm}

Hose threads of M24 × 1.5:
30 – 35 Nm {3.0 – 3.5 kgm}

- **Filling air conditioner gas**
  Using tool **Q**, fill the air conditioner circuit with air conditioner refrigerant (HFC134a) from the compressor.
  ★ Quantity of refrigerant: **950 ± 50 g**

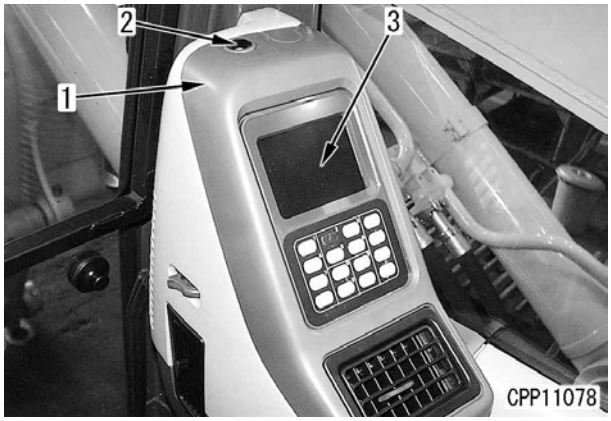
Removal and installation of machine monitor

Removal

⚠ Disconnect the negative terminal (–) of the battery before starting the work.

1. Remove cover (1) and then disconnect the wiring connector P15 for air conditioner sunlight sensor (2).
   ★ Lift the cover up to remove it.

2. Remove the 3 mounting screws to remove air conditioner unit assembly (3).
   ★ Disconnect monitor panel wiring connectors P01, P02 and P70, and then remove the monitor assembly.



Installation

- Installation is done in the reverse order of removal.

Removal and installation of pump controller

Removal

⚠ Disconnect the negative terminal (–) of the battery before starting the work.

1. Remove covers (1), (2) and (3).



2. Disconnect pump controller wiring connectors C01 (4), C02 (5) and C03 (6).

3. Remove the 4 mounting bolts to remove pump control assembly (7).



Installation

- Installation is done in the reverse order of removal.

Removal and installation of KOMTRAX terminal

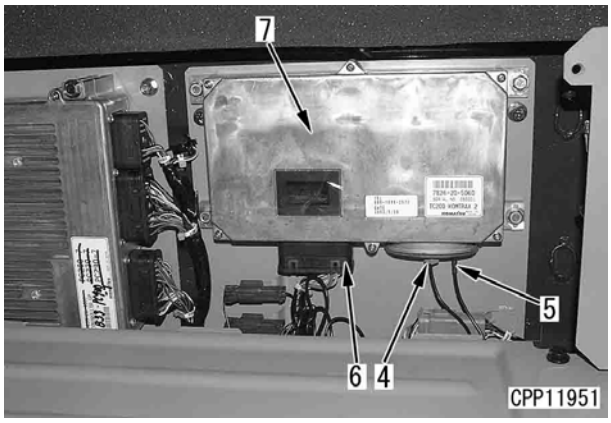
Removal

⚠ Disconnect the cable from the negative (–) terminal of the battery.

1. Remove covers (1), (2) and (3).



2. Disconnect GPS connector (4) and antenna wire (5).
3. Disconnect connector G01 (6).
4. Remove the 4 bolts and KOMTRAX terminal assembly (7).



Installation

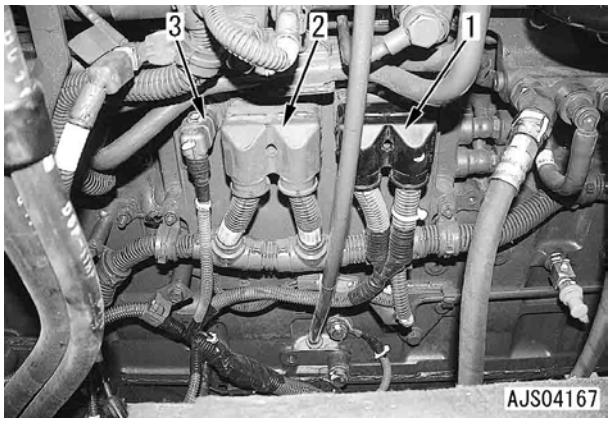
- Carry out installation in the reverse order to removal.

Removal and installation of engine controller

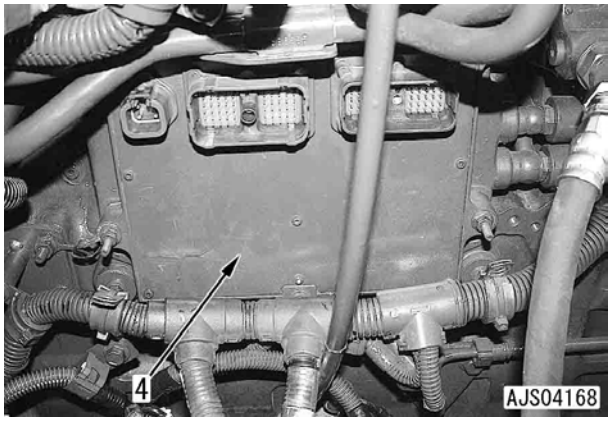
Removal

⚠ Disconnect the cable from the negative (–) terminal of the battery.

1. Open the engine hood.
2. Disconnect connectors EC01 (1), ENG (2), and CE03 (3).



3. Remove engine controller (4).



Installation

- Carry out installation in the reverse order to removal.

KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

Form No. UEN00963-00

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

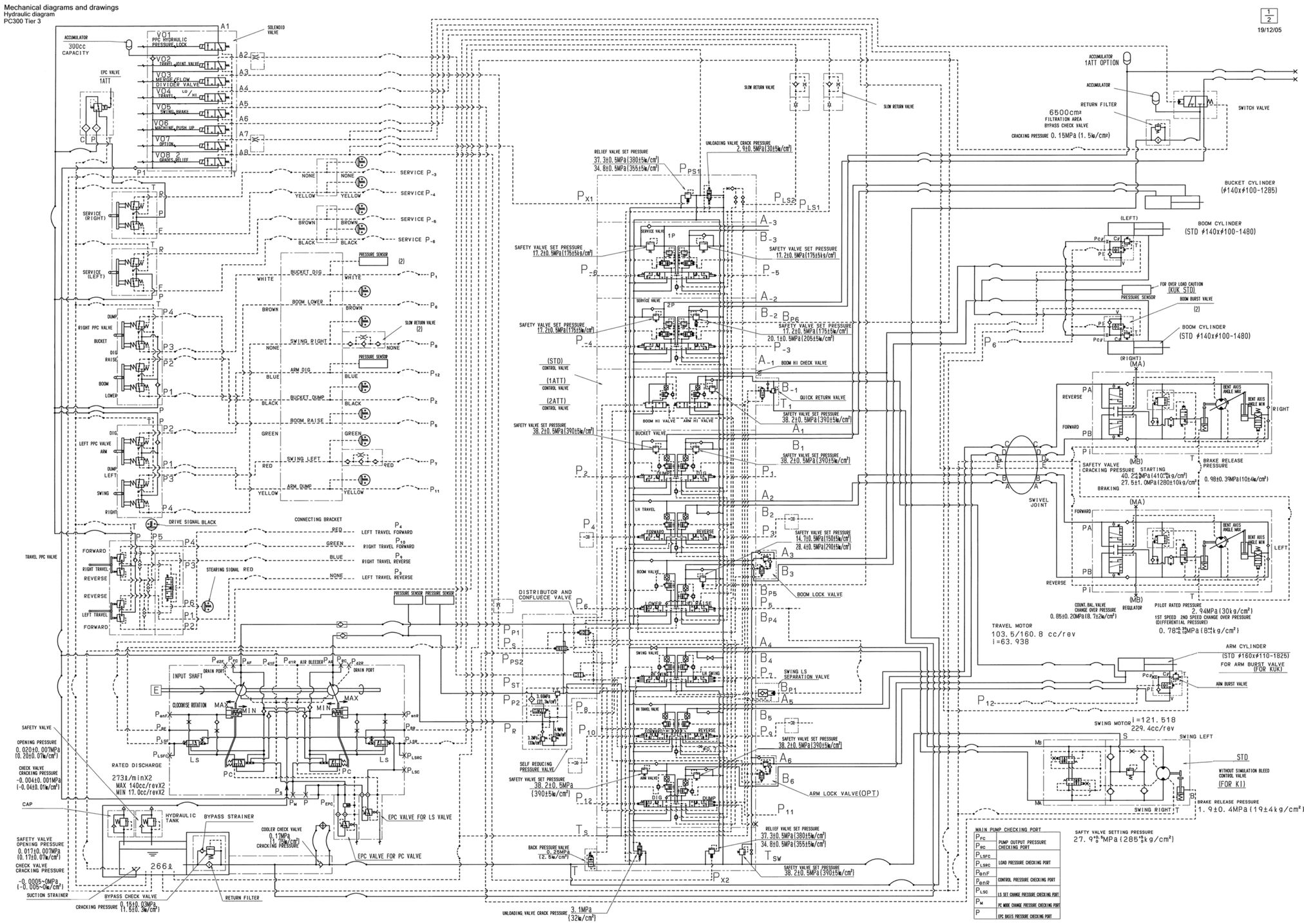
90 Diagrams and drawings

Hydraulic diagrams and drawings

Hydraulic diagrams and drawings 3
Hydraulic circuit diagram (1/2) 3
Hydraulic circuit diagram (2/2) 5

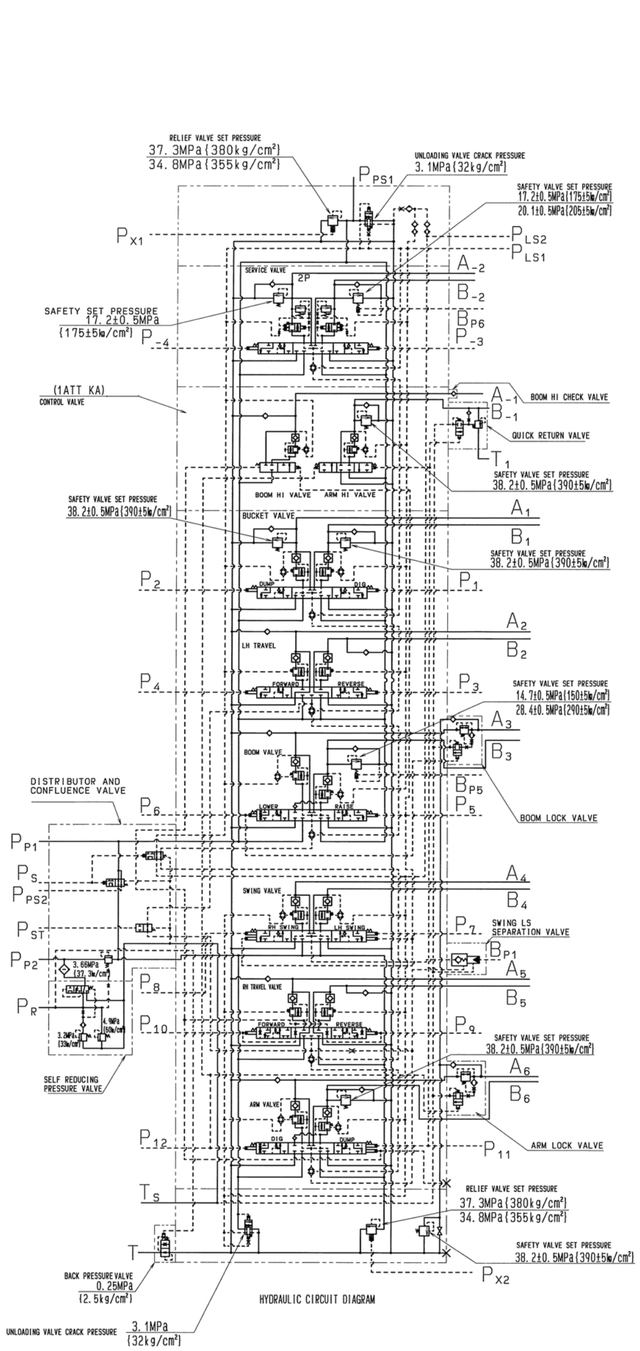
Hydraulic diagrams and drawings

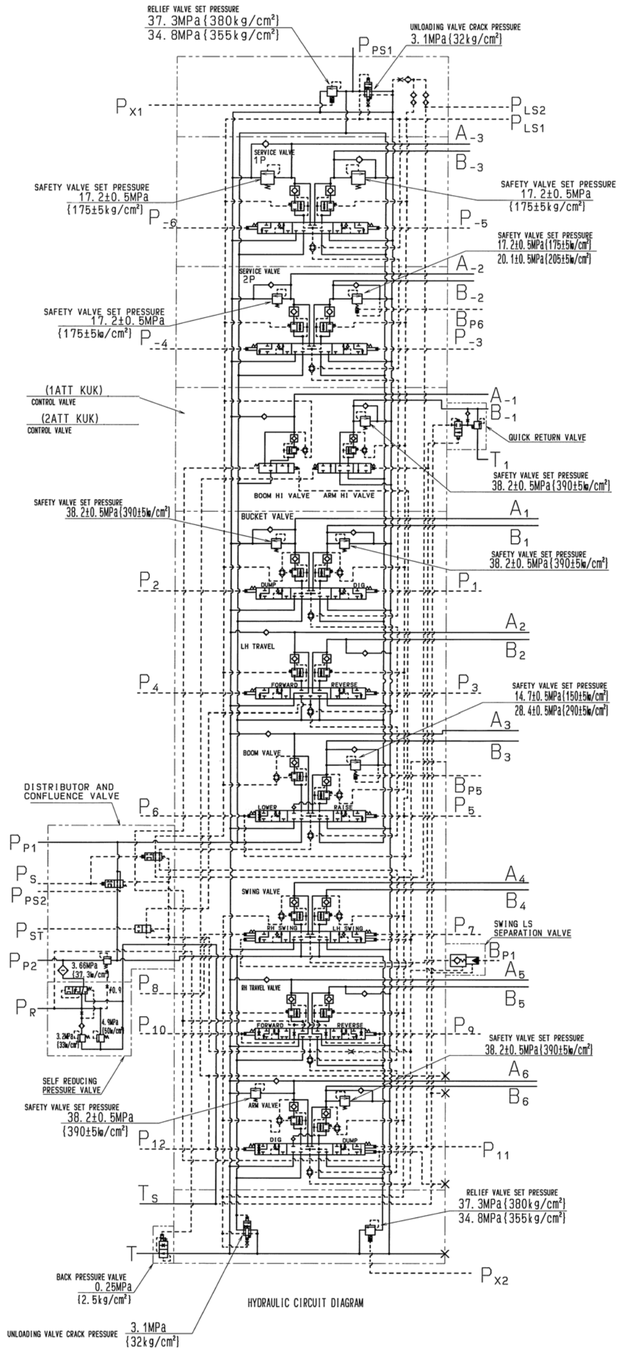
Hydraulic circuit diagram (1/2)



Hydraulic circuit diagram (2/2)

Mechanical diagrams and drawings
Hydraulic diagram
PC300 Tier 3





KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

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HYDRAULIC EXCAVATOR

PC340LC-7
PC340NLC-7

Machine model	Serial number
PC340LC-7E0	K45001 and up
PC340NLC-7E0	K45001 and up

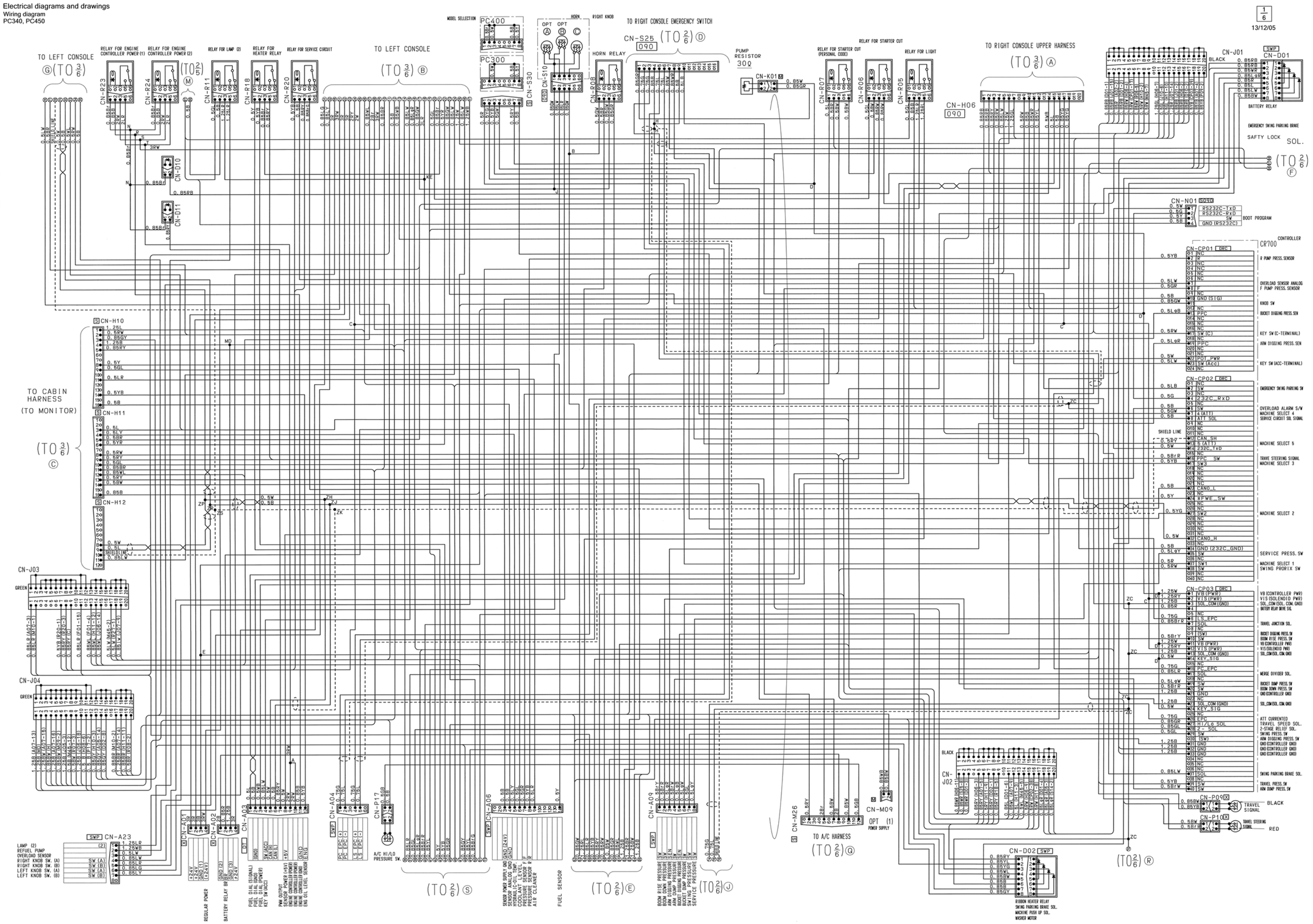
90 Diagrams and drawings

Electrical diagrams and drawings

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Electrical circuit diagram (1/6) 3
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Electrical circuit diagram (3/6) 7
Electrical circuit diagram (4/6) 9
Electrical circuit diagram (5/6) 11
Electrical circuit diagram (6/6) 13

Electrical diagrams and drawings

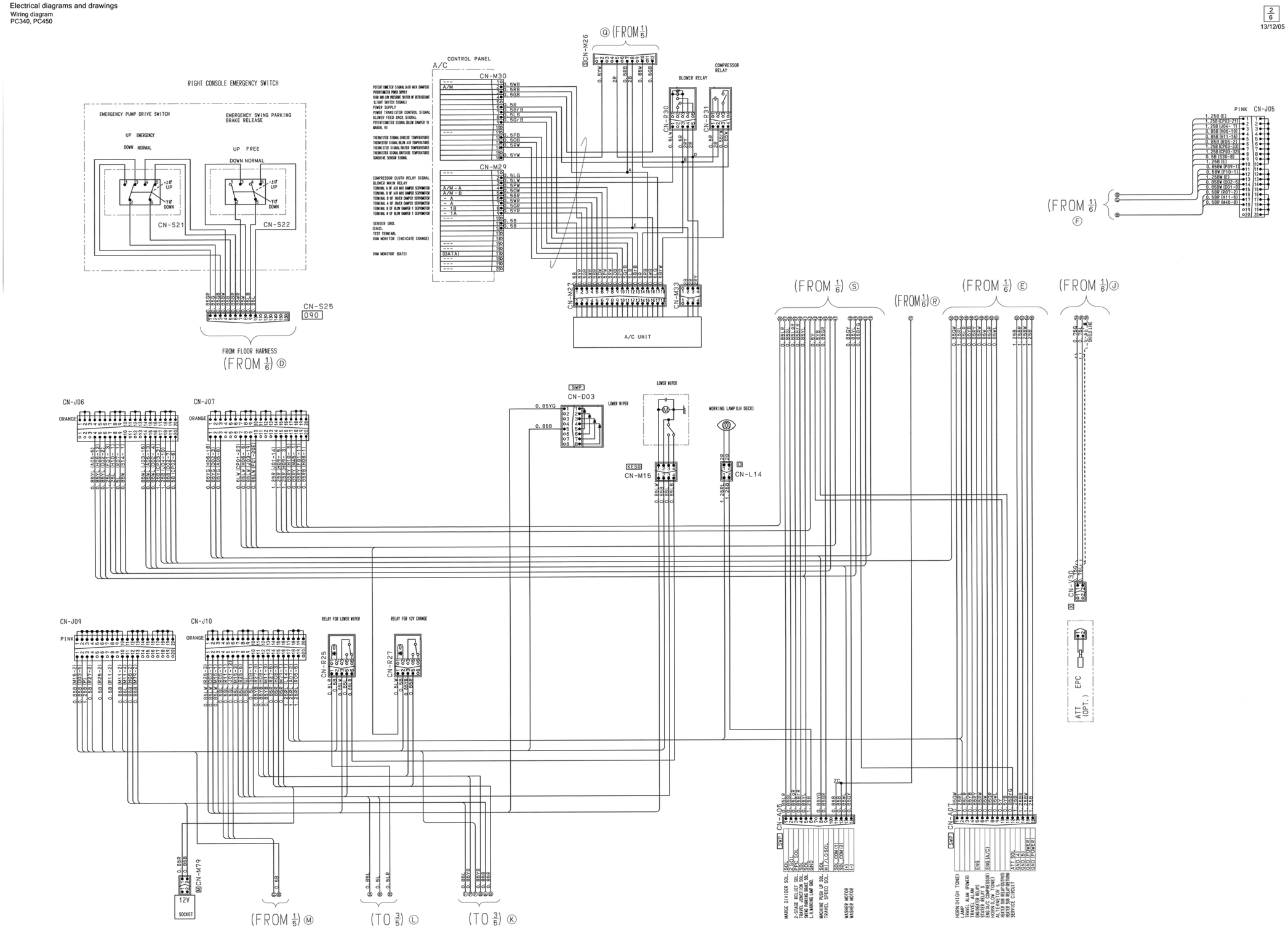
Electrical circuit diagram (1/6)



Electrical circuit diagram (2/6)

Electrical diagrams and drawings
Wiring diagram
PC340, PC450

2/6
13/12/05



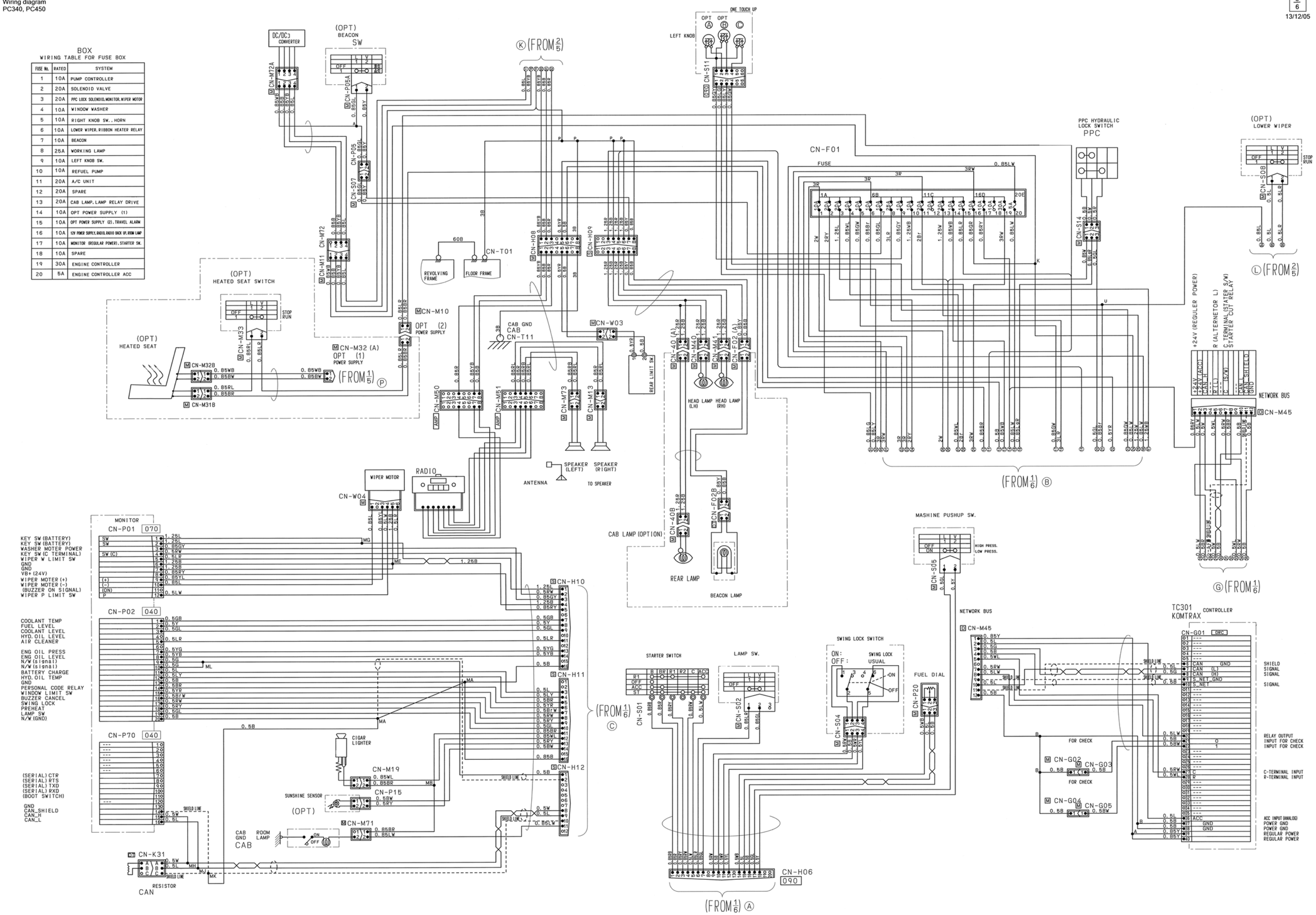
Electrical circuit diagram (3/6)

Electrical diagrams and drawings
Wiring diagram
PC340, PC450

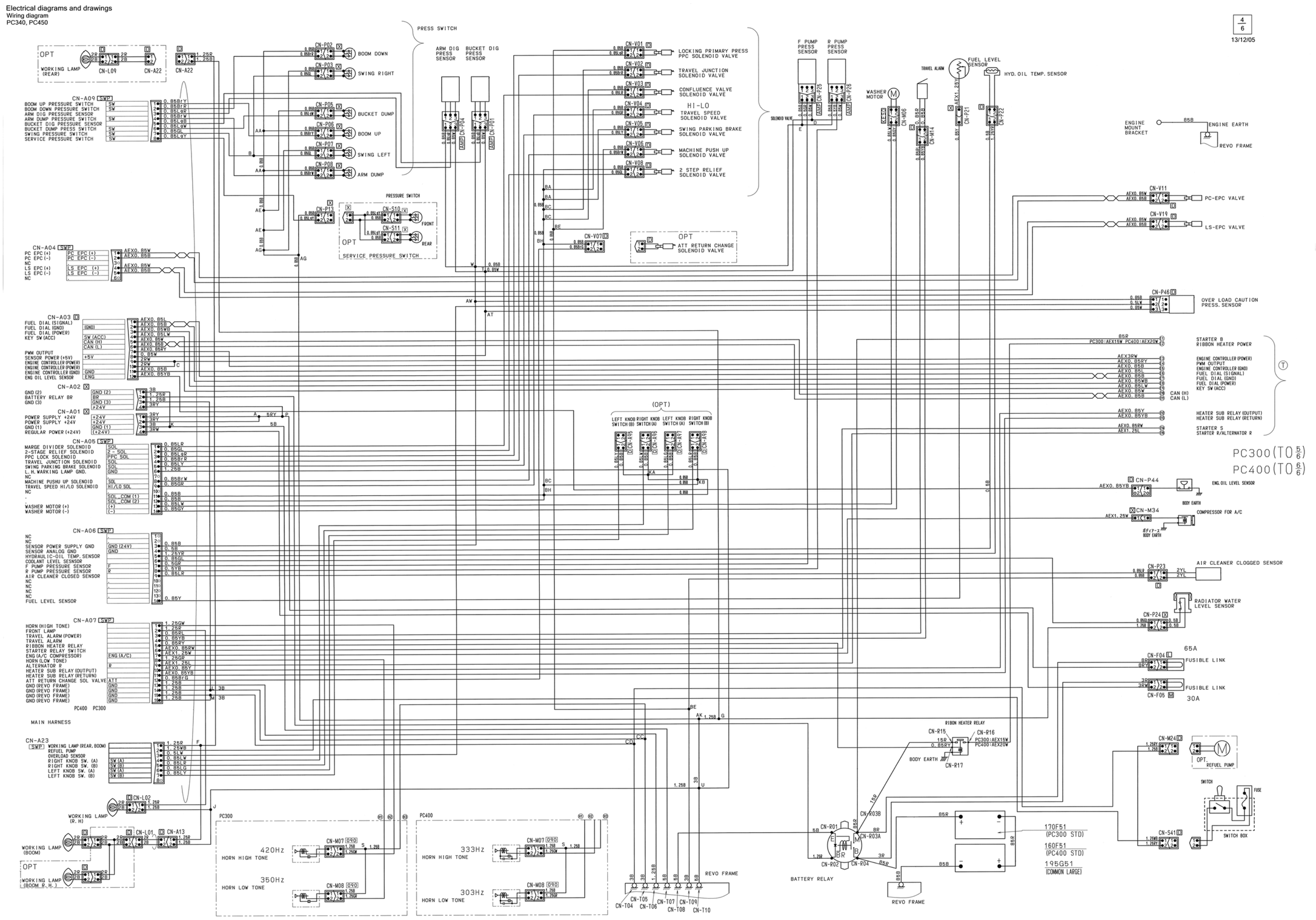
3/6
13/12/05

BOX
WIRING TABLE FOR FUSE BOX

FUSE No.	RATED	SYSTEM
1	10A	PUMP CONTROLLER
2	20A	SOLENOID VALVE
3	20A	PPC LOCK SOLENOID, MONITOR, WIPER MOTOR
4	10A	WINDOW WASHER
5	10A	RIGHT KNOB SW., HORN
6	10A	LOWER WIPER, RIBBON HEATER RELAY
7	10A	BEACON
8	25A	WORKING LAMP
9	10A	LEFT KNOB SW.
10	10A	REFUEL PUMP
11	20A	A/C UNIT
12	20A	SPARE
13	20A	CAB LAMP, LAMP RELAY DRIVE
14	10A	OPT POWER SUPPLY (1)
15	10A	OPT POWER SUPPLY (2), TRAVEL ALARM
16	10A	12V POWER SUPPLY, RADIO, RADIO BACK UP, ROOM LAMP
17	10A	MONITOR (REGULAR POWER), STARTER SW.
18	10A	SPARE
19	30A	ENGINE CONTROLLER
20	5A	ENGINE CONTROLLER ACC



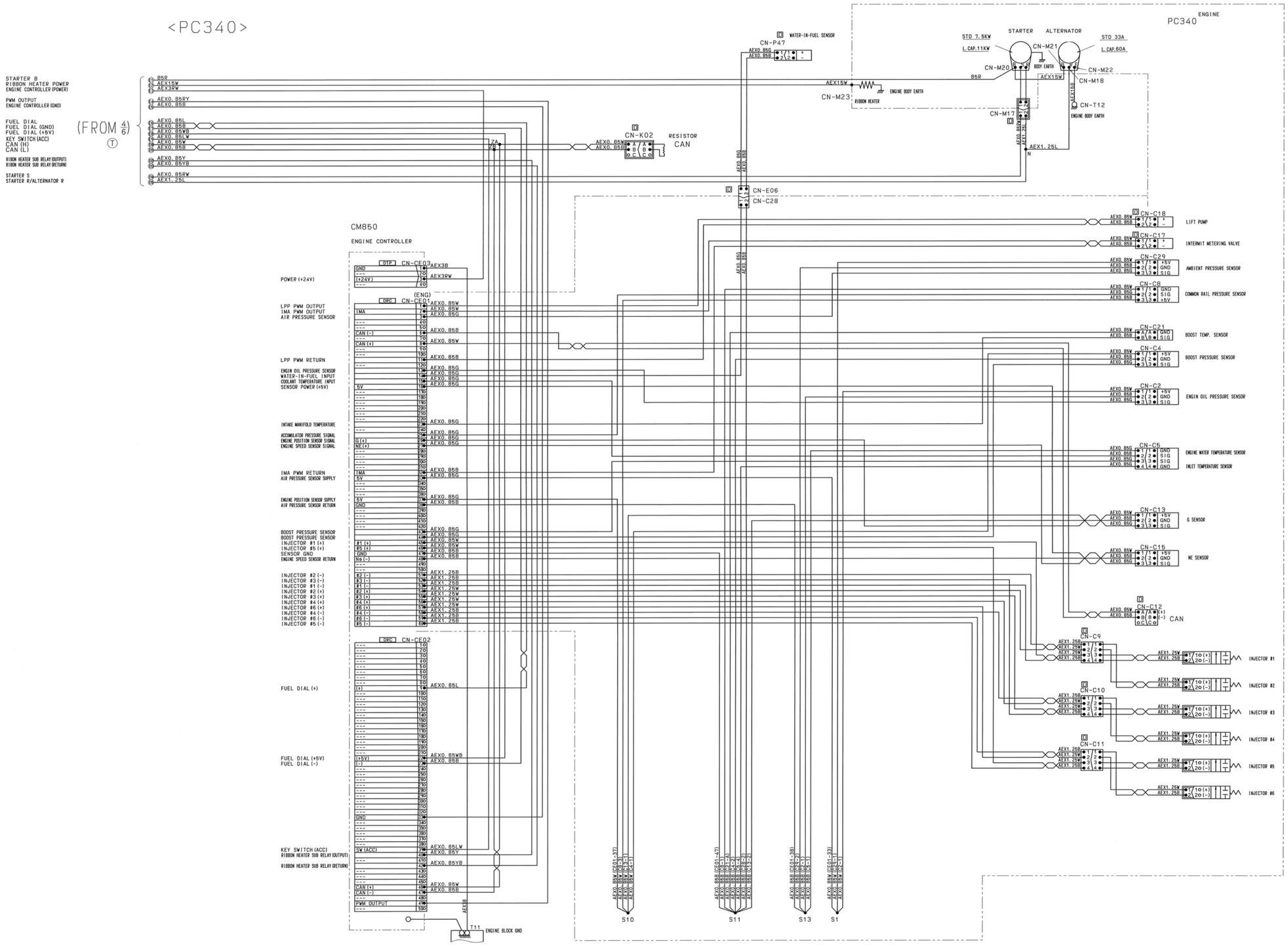
Electrical circuit diagram (4/6)



Electrical circuit diagram (5/6)

Electrical diagrams and drawings
Wiring diagram
PC340, PC450

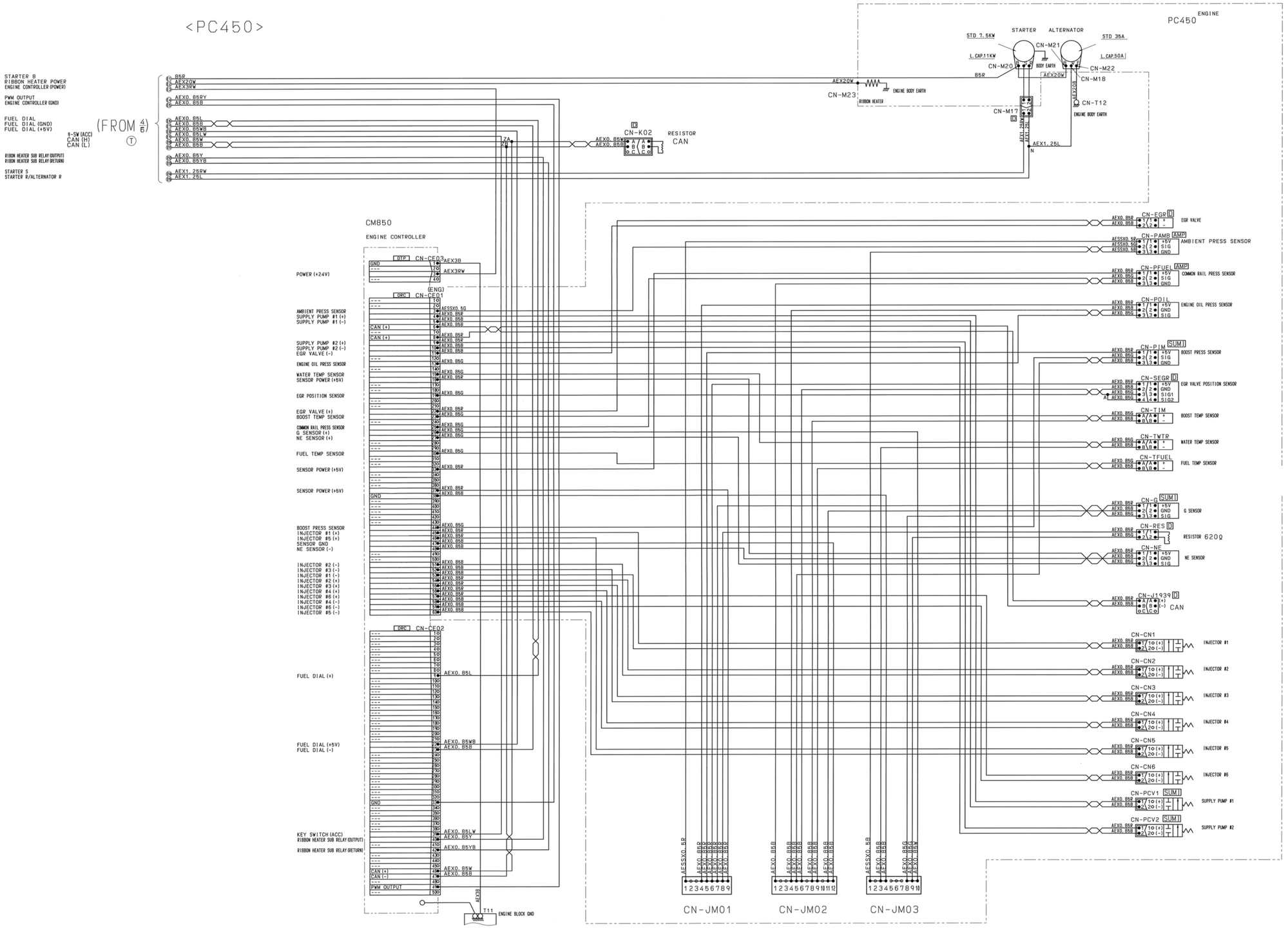
5/6
13/12/05



Electrical circuit diagram (6/6)

Electrical diagrams and drawings
Wiring diagram
PC340, PC450

6/6
13/12/05



KOMATSU PC340 (LC /NLC)-7 Hydraulic excavator

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