WENBM00230

# Shop Manual

COMPACT HYDRAULIC EXCAVATOR

**PC45MR-5E0** SERIAL NUMBERS F20001 and up

**PC55MR-5E0** SERIAL NUMBERS F40001 and up

KOMATSU

# ABBREVIATION LIST

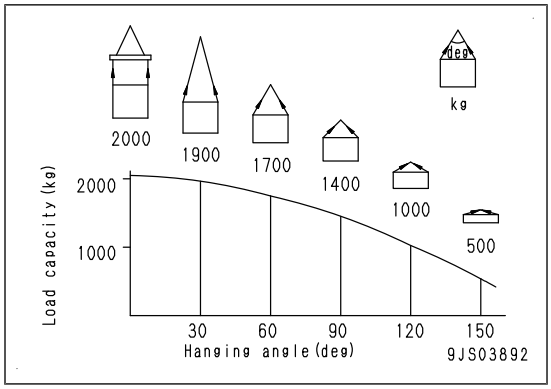
- This list of abbreviations includes the abbreviations used in the text of the shop manual for parts, components, and functions whose meaning is not immediately clear. The spelling is given in full with an outline of the meaning.
- Abbreviations that are used in general society may not be included.
- Special abbreviations which appear infrequently are noted in the text.
- This list of abbreviations consists of two parts. The first part is a list of the abbreviations used in the text of the manual, and the second part is a list of the abbreviations used in the circuit diagrams.

## List of abbreviations used in the text

| Abbreviation | Actual word spelled out | Purpose of use (major applicable machine (*1), or component/system) | Explanation |
|---|---|---|---|
| ABS | Antilock Brake System | Travel and brake<br>(HD, HM) | This is a function that releases the brake when the tires skid (tires are not rotated). This function applies the brake again when the tires rotate. |
| AISS | Automatic Idling Setting System | Engine | This is a function that automatically sets the idle speed. |
| AJSS | Advanced Joystick Steering System | Steering<br>(WA) | This is a function that performs the steering operations with a lever instead of using a steering wheel. This function performs gear shifting and changing forward and reverse direction. |
| ARAC | Automatic Retarder Accelerator Control | Travel and brake<br>(HD, HM) | This is a function that automatically operates the retarder with a constant braking force when letting go of the accelerator pedal on the downhill. |
| ARSC | Automatic Retarder Speed Control | Travel and brake<br>(HD, HM) | This is a function that automatically operates the retarder to ensure that the machine speed does not accelerate above the speed set by the operator when letting go of the accelerator pedal on the downhill. |
| ASR | Automatic Spin Regulator | Travel and brake<br>(HD, HM) | This is a function that drives both wheels automatically using the optimum braking force when the tire on one side spins on the soft ground surfaces. |
| ATT | Attachment | Work equipment | A function or component that can be added to the standard specification. |
| BCV | Brake cooling oil control valve | BRAKE<br>(HD) | This is a valve that bypasses a part of the brake cooling oil to reduce the load applied to the hydraulic pump when the retarder is not being used. |
| CAN | Controller Area Network | Communication and electronic control | This is one of communication standards that are used in the network on the machine. |
| CDR | Crankcase Depression Regulator | Engine | This is a regulator valve that is installed to KCCV ventilator. It is written as CDR valve and is not used independently. |
| CLSS | Closed-center Load Sensing System | Hydraulic system | This is a system that can actuate multiple actuators simultaneously regardless of the load (provides better combined operation than OLSS). |

**REMARK**

When slinging a load with 2 or more ropes, the force subjected to each rope increases with the hanging angle. The figure below shows the variation of allowable load in kN {kg} when slinging is made with 2 ropes, each of which is allowed to sling up to 9.8 kN {1000 kgf} vertically, at various hanging angles. When the 2 ropes sling a load vertically, they can sling up to 2000 kg of total weight. This weight is reduced to 1000 kg when the 2 ropes make a hanging angle of 120 °. If the 2 ropes sling a 2000 kg load at a hanging angle of 150 °, each rope is subjected to a force as large as 39.2 kN {4000kgf} .



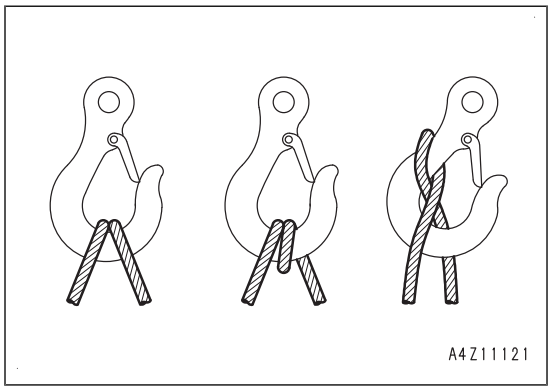

- When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
- Use the specified eye bolts and fix wire ropes, chains, etc. to them with shackles, etc.
- Apply wire ropes to the middle part of the hook.

  **⚠ Do not use hooks if it does not have a latch system.**

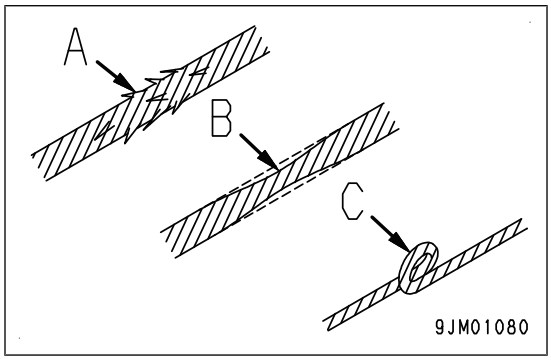
  **⚠ Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting.**

  **REMARK**

  The strength of the hook is maximum at its central part.




- Never use a wire rope which has breaks in strands (A), reduced diameter (B), or kinks (C). There is a danger that the rope may break during the towing operation.




Precautions for slinging up

- 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 at an angle.

Precautions for slinging down

- When slinging 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.

## Precautions for using mobile crane

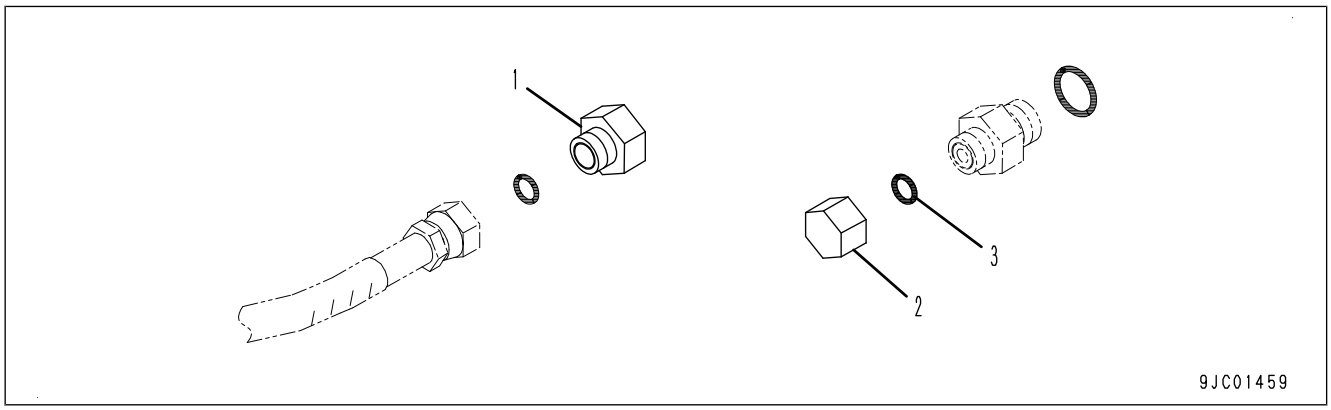
**REMARK**

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

## Precautions for using overhead traveling crane

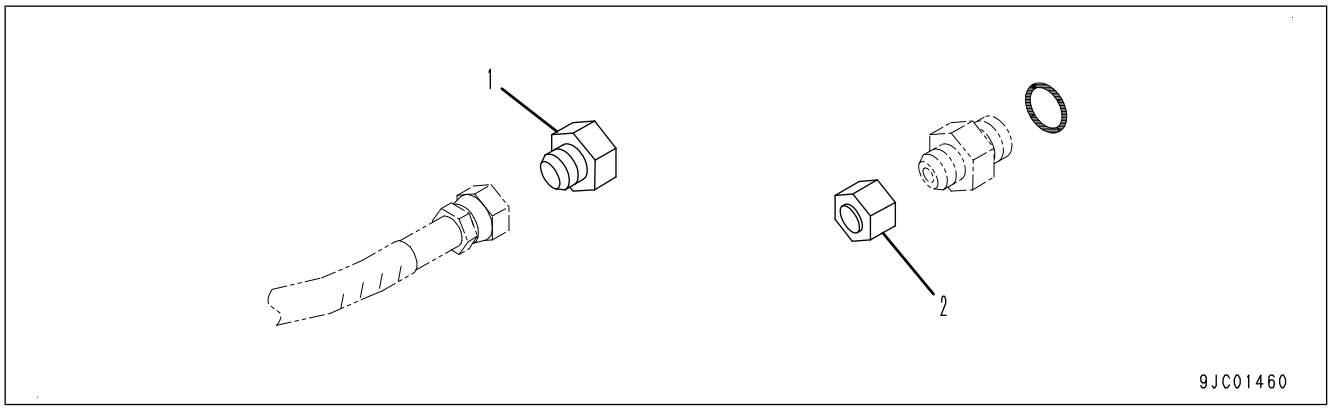
**⚠ When raising a heavy component (heavier than 25 kg), use a hoist or crane.**

## Introduction of parts for the disassembly of the face seal type hoses and tubes




| Nominal No. | Hose side | Pipe joint side | O-ring (3) |
|---|---|---|---|
| | Plug (1) | Nut (2) | |
| 02 | 07376-70210 | 02789-00210 | 02896-11008 |
| 03 | 07376-70315 | 02789-00315 | 02896-11009 |
| 04 | 07376-70422 | 02789-00422 | 02896-11012 |
| 05 | 07376-70522 | 02789-00522 | 02896-11015 |
| 06 | 07376-70628 | 02789-00628 | 02896-11018 |

## Introduction of parts for the disconnection of the taper seal type hoses and tubes

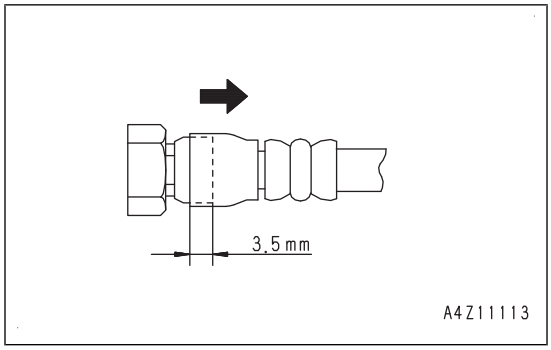



| Nominal No. | Hose side | Pipe joint side |
|---|---|---|
| | Plug (1) | Nut (2) |
| 02 | 07376-50210 | 07222-00210 |
| 03 | 07376-50315 | 07222-00312 |
| 04 | 07376-50422 | 07222-00414 |
| 05 | 07376-50522 | 07222-00515 |
| 06 | 07376-50628 | 07222-00616 |
| 10 | 07376-51034 | 07222-01018 |
| 12 | 07376-51234 | 07222-01219 |
| 14 | 07376-51443 | 07222-01422 |

2. After inserting the hose in the mating adapter perfectly, pull it back to check the connecting condition.

   **REMARK**

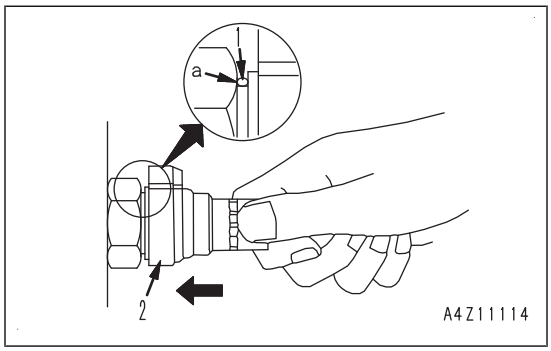
   When the hose fitting is pulled back, the rubber cap moves approximately 3.5 mm toward the hose, but it is not a problem.



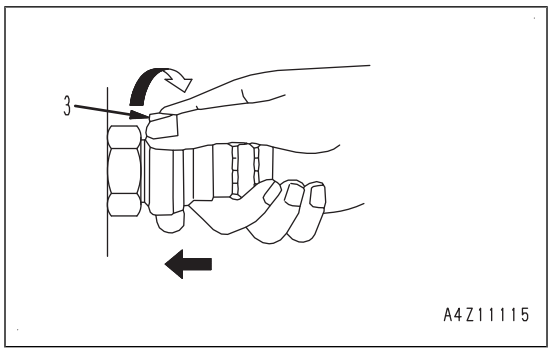

## METHOD FOR DISCONNECTING AND CONNECTING TYPE 2 PUSH-PULL TYPE COUPLER

### Disconnection

1. Hold the tightening adapter part and push body (2) straight until sliding prevention ring (1) contacts contact surface (a) of the hexagonal part at the male end.



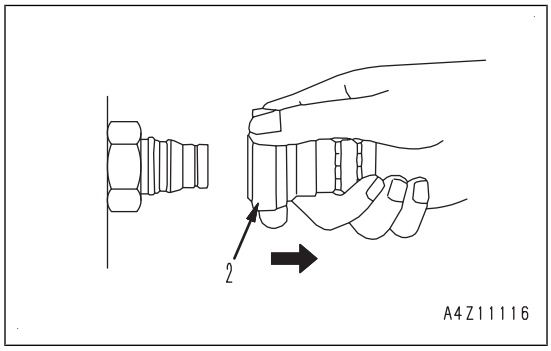

2. While keeping the condition of step 1, turn lever (3) to the right (clockwise).




3. While keeping the conditions of steps 1 and 2, pull out whole body (2) to disconnect it.

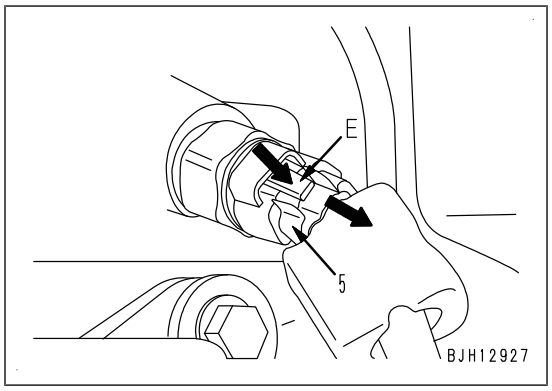
   **REMARK**

   Provide an container to receive a quantity of hydraulic oil which may flow out.



## Method for disconnecting connector with lock to push (AMP-3)

While pressing lock (E), pull out connector (5) in the direction of the arrow.




## Method for connecting connector with lock to push (AMP-3)

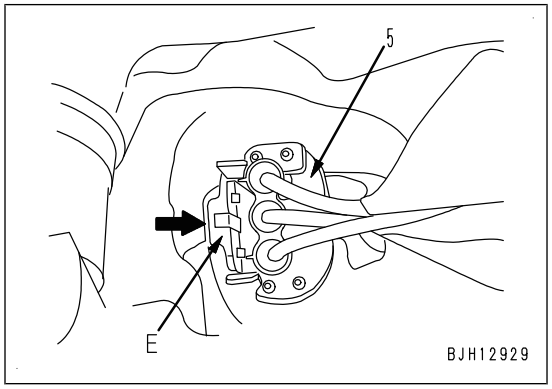
Insert it straight until it clicks.

## Method for disconnecting connector with lock to push (SUMITOMO-3)

While pressing lock (E), pull out connector (5) in the direction of the arrow.

**REMARK**

Pull up the connector straight.

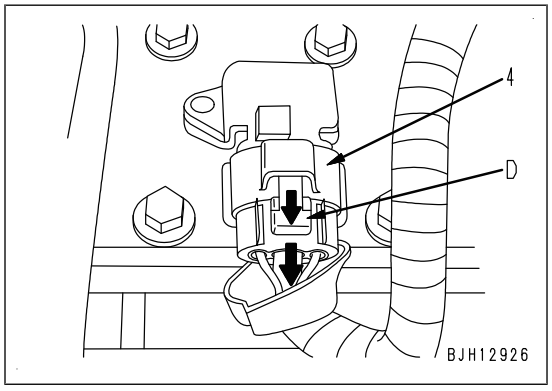



## Method for connecting connector with lock to push (SUMITOMO-3)

Insert it straight until it clicks.

## Method for disconnecting connector with lock to push (SUMITOMO-4)

While pressing lock (D), pull out connector (4) in the direction of the arrow.



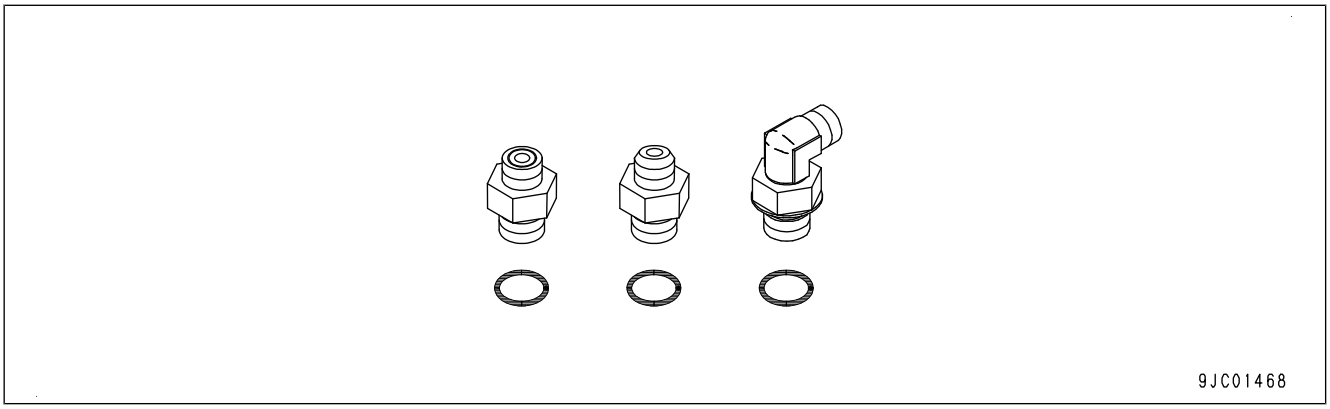

## Method for connecting connector with lock to push (SUMITOMO-4)

Insert it straight until it clicks.

## Table of tightening torque for O-ring boss piping joints

**REMARK**

Tighten the pipe joint for O-ring boss to the torque shown in the table below unless otherwise specified.

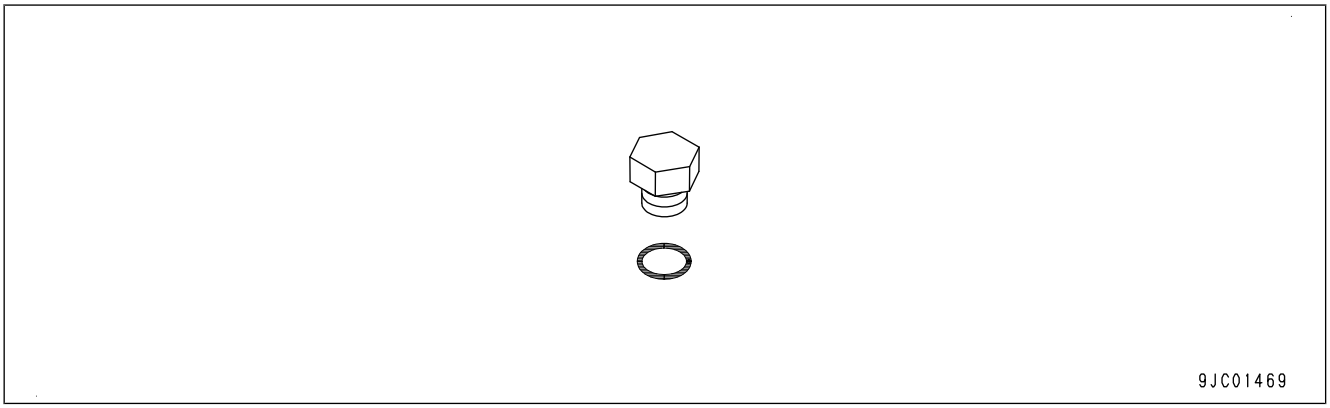



| Nominal No. | Thread diameter (mm) | Width across flats (mm) | Tightening torque (Nm {kgfm} ) | |
|---|---|---|---|---|
| | | | Range | Target |
| 02 | 14 | Varies depending on type of connector. | 35 to 63 {3.5 to 6.5} | 44 {4.5} |
| - | 18 | | 59 to 98 {6.0 to 10.0} | 78 {8.0} |
| 03, 04 | 20 | | 84 to 132 {8.5 to 13.5} | 103 {10.5} |
| 05, 06 | 24 | | 128 to 186 {13.0 to 19.0} | 157 {16.0} |
| 10, 12 | 33 | | 363 to 480 {37.0 to 49.0} | 422 {43.0} |
| 14 | 42 | | 746 to 1010 {76.0 to 103} | 883 {90.0} |

## Table of tightening torque for O-ring boss plugs

**REMARK**

Tighten the plug for O-ring boss to the torque shown in the table below unless otherwise specified.




| Nominal No. | Thread diameter (mm) | Width across flats (mm) | Tightening torque (Nm {kgfm} ) | |
|---|---|---|---|---|
| | | | Range | Target |
| 08 | 8 | 14 | 5.88 to 8.82 {0.6 to 0.9} | 7.35 {0.75} |
| 10 | 10 | 17 | 9.8 to 12.74 {1.0 to 1.3} | 11.27 {1.15} |
| 12 | 12 | 19 | 14.7 to 19.6 {1.5 to 2.0} | 17.64 {1.8} |
| 14 | 14 | 22 | 19.6 to 24.5 {2.0 to 2.5} | 22.54 {2.3} |
| 16 | 16 | 24 | 24.5 to 34.3 {2.5 to 3.5} | 29.4 {3.0} |

# ABBREVIATION LIST

- This list of abbreviations includes the abbreviations used in the text of the shop manual for parts, components, and functions whose meaning is not immediately clear. The spelling is given in full with an outline of the meaning.
- Abbreviations that are used in general society may not be included.
- Special abbreviations which appear infrequently are noted in the text.
- This list of abbreviations consists of two parts. The first part is a list of the abbreviations used in the text of the manual, and the second part is a list of the abbreviations used in the circuit diagrams.

## List of abbreviations used in the text

| Abbreviation | Actual word spelled out | Purpose of use (major applicable machine (*1), or component/system) | Explanation |
|---|---|---|---|
| ABS | Antilock Brake System | Travel and brake<br>(HD, HM) | This is a function that releases the brake when the tires skid (tires are not rotated). This function applies the brake again when the tires rotate. |
| AISS | Automatic Idling Setting System | Engine | This is a function that automatically sets the idle speed. |
| AJSS | Advanced Joystick Steering System | Steering<br>(WA) | This is a function that performs the steering operations with a lever instead of using a steering wheel. This function performs gear shifting and changing forward and reverse direction. |
| ARAC | Automatic Retarder Accelerator Control | Travel and brake<br>(HD, HM) | This is a function that automatically operates the retarder with a constant braking force when letting go of the accelerator pedal on the downhill. |
| ARSC | Automatic Retarder Speed Control | Travel and brake<br>(HD, HM) | This is a function that automatically operates the retarder to ensure that the machine speed does not accelerate above the speed set by the operator when letting go of the accelerator pedal on the downhill. |
| ASR | Automatic Spin Regulator | Travel and brake<br>(HD, HM) | This is a function that drives both wheels automatically using the optimum braking force when the tire on one side spins on the soft ground surfaces. |
| ATT | Attachment | Work equipment | A function or component that can be added to the standard specification. |
| BCV | Brake cooling oil control valve | BRAKE<br>(HD) | This is a valve that bypasses a part of the brake cooling oil to reduce the load applied to the hydraulic pump when the retarder is not being used. |
| CAN | Controller Area Network | Communication and electronic control | This is one of communication standards that are used in the network on the machine. |
| CDR | Crankcase Depression Regulator | Engine | This is a regulator valve that is installed to KCCV ventilator. It is written as CDR valve and is not used independently. |
| CLSS | Closed-center Load Sensing System | Hydraulic system | This is a system that can actuate multiple actuators simultaneously regardless of the load (provides better combined operation than OLSS). |

# SPECIFICATIONS

## SPECIFICATIONS: PC45MR-5E0

| Item | Unit | PC45MR-5E0 | |
|---|---|---|---|
| | | Canopy specifications | Cab specifications |
| Bucket capacity | m³ | 0.14 | |
| Machine weight | | | |
| Rubber shoe specification | kg | 4750 | 4870 |
| Steel shoe specification | | 4820 | 4940 |
| Performance | | | |
| Working ranges | | | |
| Maximum digging depth | mm | 3625 | |
| Maximum vertical wall digging depth | mm | 3070 | |
| Maximum digging reach | mm | 6040 | |
| Maximum digging reach at ground level | mm | 5895 | |
| Maximum digging height | mm | 5730 | |
| Maximum dumping height | mm | 4000 | |
| Offset of bucket (Left side/right side) | mm | 630/880 | |
| Maximum raising distance of the blade | mm | 430 | |
| Maximum lowering distance of the blade | mm | 330 | |
| Maximum digging force | kN {kg} | 33.9 {3460} | 33.9 {3460} |
| Continuous swing speed | rpm | 9.0 | 9.0 |
| Swing operation max. slope angle | Degrees | 19.0 | 19.0 |
| Travel speed (Lo/Hi) | | | |
| Rubber shoe specification | km/h | 2.6/4.6 | 2.6/4.6 |
| Steel shoe specification | | 2.4/4.3 | 2.4/4.3 |
| Gradeability | Degrees | 30 | 30 |
| Ground pressure | | | |
| Rubber shoe specification | kPa {kg/cm²} | 26.6 {0.27} | 27.3 {0.28} |
| Steel shoe specification | | 27.4 {0.28} | 28.1 {0.29} |
| Dimensions | | | |
| Overall length (for transport) | mm | 5330 | 5330 |
| Overall width | mm | 1960 | 1960 |
| Overall height (for transport) | mm | 2550 | 2590 |
| Ground clearance of upper structure bottom | mm | 608 | 608 |
| Minimum ground clearance | mm | 290 | 290 |

# TABLE OF FUEL, COOLANT, AND LUBRICANTS

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

| Reservoir | Fluid type | Recommended Komatsu Fluids | Ambient temperature | |
|---|---|---|---|---|
| | | | °C | |
| | | | Min | Max |
| Engine oil pan | Engine oil | EO10W30-LA (KES Diesel Engine Oil) | -20 | 40 |
| | | EO15W40-LA CK4 (KES Diesel Engine Oil) | -15 | 50 |
| | | EO30-DH (KES Diesel Engine Oil) | 0 | 40 |
| Final drive case | Power train oil | TO30 (KES) | -30 | 50 |
| Hydraulic system | Hydraulic oil | HO56-HE (KES) | -20 | 50 |
| | | HO46-HM (KES) | -10 | 50 |
| | Power train oil | TO10 (KES) | -10 | 50 |
| Grease fitting | Hyper grease (Note.1) | G2-TE (KES) | -20 | 50 |
| | Lithium EP grease | G2-LI (KES) | -10 | 50 |
| Cooling system | Non-Amine Engine Coolant (AF-NAC) (Note.2) | AF-NAC (KES) | -30 | 50 |
| Fuel tank | Diesel fuel | EN 590 Class2 | -30 | 20 |
| | | EN 590 Grade D | 0 | 50 |

Unit: ℓ

| Places to supply oil, coolant, etc. | Specified amount | Refill capacity |
|---|---|---|
| Engine oil pan | 8.1 | 7.5 |
| Final drive case (each on right and left sides) | 0.7 | 0.7 |
| Hydraulic oil system | 55 | 20 |
| Cooling system | 8.8 | - |
| Fuel tank | 65 | - |

| Status | | Elapsed time (*1) | Machine monitor | | | | | Engine deration (*4) |
|---|---|---|---|---|---|---|---|---|
| | | | Message of NOx control system Information | Caution lamp (Action level) | Tone of audible alert | Failure code for abnormality (*2) | Failure code for Inducement strategy status (*3) | |
| 2 | Low-Level Inducement (Inducement 1) | 64 hours | 3: EGR system inspection and maintenance. | Red  APP14416<br>Red  G0004354<br>Red L03 APP14414 | Intermittently | #B1675 | AS00R3 (Inducement 1 (NOx Control Device Abnormality)) | Torque reduction rate: 25% or more |
| 4 | Severe Inducement (Inducement 2) | Until abonormality is repaired | 4: Engine power is under heavy deration. | Red  APP14416<br>Red  G0004354<br>Red L04 APP14413 | Continuously | #B1675 | AS00R4 (Inducement 2 (NOx control Device Abnormality)) | Torque: over 50% or more<br>Engine speed reduction rate: Min. 60% |

*1:Elapsed time of each stage describes an accumulated time advancing to the next stage after starting “Warning” stage is started.

*2: These failure codes are displayed on “Current Abnormality” in the operator mode, or “Abnormality Record” in the service mode. The failure code shown here is an example of failure code which is displayed on the machine monitor when an abnormality occurs. For the failure codes, see TROUBLESHOOTING.

*3:These failure codes are displayed on “Current Abnormality” in the operator mode, or “Abnormality Record” in the service mode.

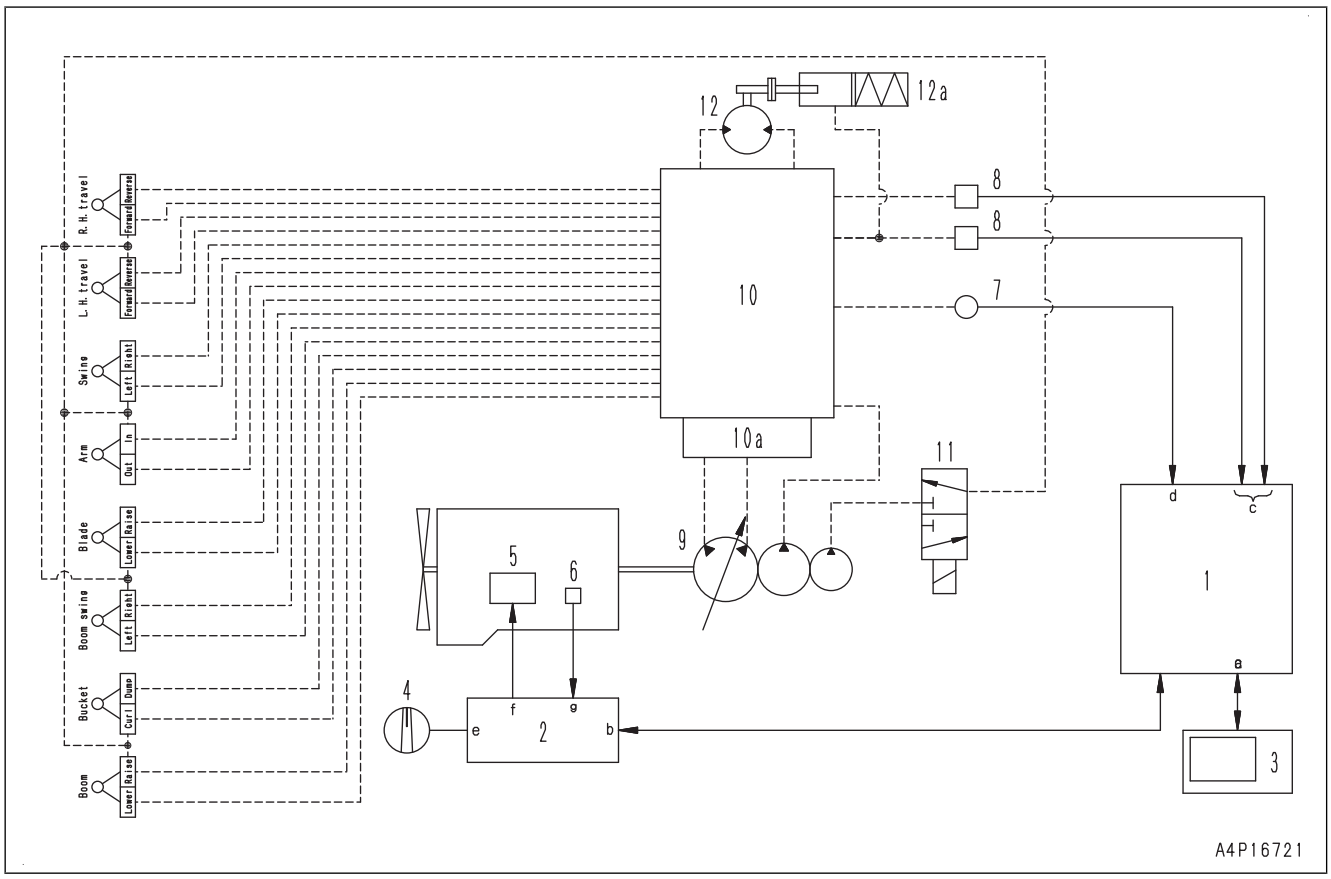
*4: These percentages show a torque reduction ratio from the full torque curve, and a speed reduction ratio from the rated speed.

## INDUCEMENT STRATEGY FOR ABNORMALITY RECURRENCE

- The NOx control system continuously monitors its operation conditions and stores information on inappropriate operations including malfunctions.
- The stored information is utilized to monitor recurrences of abnormalities. Those information are required by the authorities. The abnormality counting spans 40 hours and it monitors the abnormalities that trigger Inducement.

# AUTO-DECELERATION SYSTEM

## AUTO-DECELERATION SYSTEM DIAGRAM




Input and output signals

a: CAN signal
b: CAN signal
c: Oil pressure sensor signal
d: Oil pressure switch signal
1: Machine controller
2: Engine controller
3: Machine monitor
4: Fuel control dial
5: Fuel supply pump
6: Various sensors
7: Oil pressure switch
e: 1st throttle signal
f: Fuel supply pump control signal
g: Various sensor signals
8: Oil pressure sensor
9: Main pump
10: Control valve
10a: Merge-divider valve
11: PPC lock solenoid valve
12: Swing motor
12a: Swing parking brake

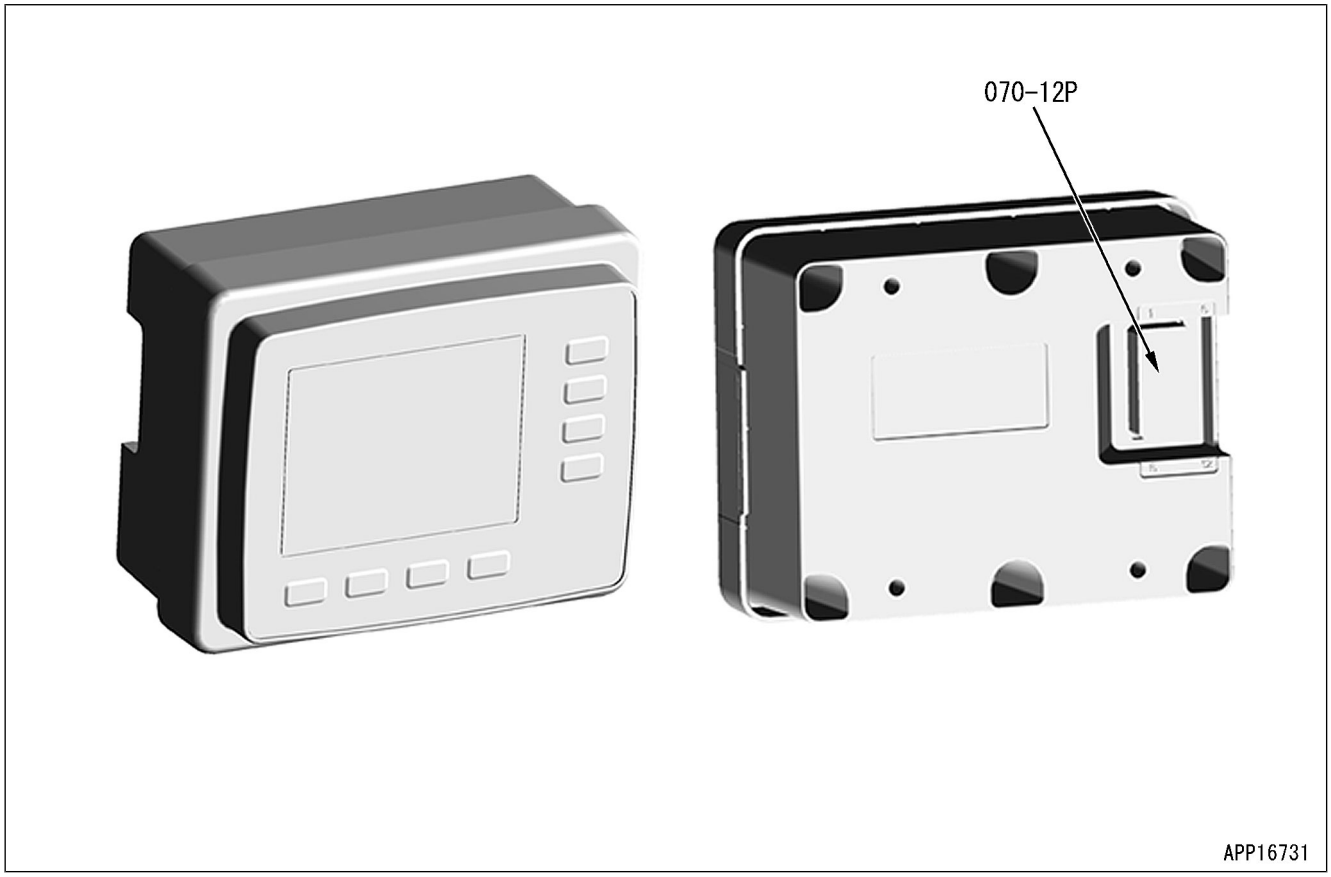
## FUNCTION OF AUTO-DECELERATION SYSTEM

- When all the control levers are set to NEUTRAL positions while waiting for a dump truck or next work, the engine speed decreases to the control speed automatically to improve the fuel economy and reduce the noise.
- If any control lever is operated, the engine speed returns immediately to the speed set with the fuel control dial.

# COMPONENT PARTS OF CONTROL SYSTEM

## MACHINE MONITOR

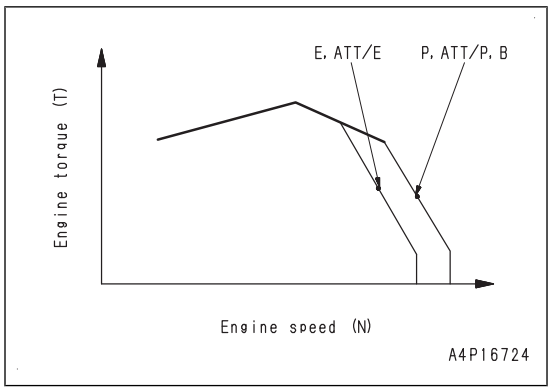
## FUNCTION OF MACHINE MONITOR

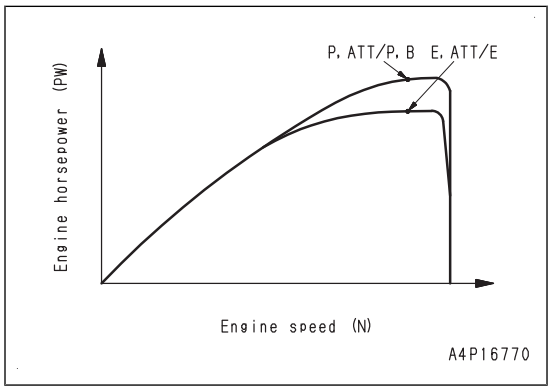


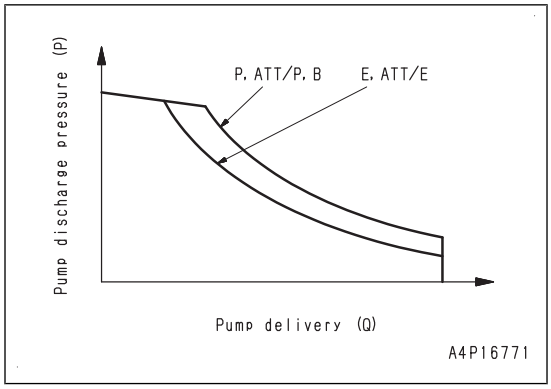

- The machine monitor has monitor display function and mode selection function.
- CPU (Central Processing Unit) is installed inside the machine monitor, and it processes, displays, and outputs the information.
- The monitor system monitors the machine state by obtaining the information with the sensors and switches installed in various parts of the machine, processes the information instantly. It displays the information on the machine monitor to inform the operator of the machine condition.
  The followings are categories which contents displayed on the machine monitor are broadly divided into.
  - Alarms when the machine has a trouble
  - Machine state (engine coolant temperature, fuel level, etc.)
- The switches on the machine monitor have functions to control the machine.

| Pin No. | Signal name | Input and output signals |
|---|---|---|
| 16 | Service pressure sensor 2 | Input |
| 17 | Starting switch ACC signal | Input |
| 18 | (*1) | - |
| 19 | (*1) | - |
| 20 | (*1) | - |
| 21 | Work equipment PPC pressure sensor | Input |
| 22 | PPC lock lever cancel signal | Input |
| 23 | Starting switch C signal | Input |
| 24 | External starting signal | Input |
| 25 | (*1) | - |
| 26 | CAN_L_0 | Input and output |
| 27 | (*1) | - |
| 28 | (*1) | - |
| 29 | Travel PPC pressure sensor | Input |
| 30 | R.H. attachment lever sub | Input |
| 31 | (*1) | - |
| 32 | GND (analog signal) | Input |
| 33 | Terminating resistor | Input and output |
| 34 | Terminating resistor | Input and output |
| 35 | Service pressure sensor 1 | Input |
| 36 | Breaker switch (main) | Input |
| 37 | (*1) | - |
| 38 | (*1) | - |
| 39 | (*1) | - |
| 40 | (*1) | - |
| 41 | PPC lock lever signal | Input |
| 42 | Working lamp switch | Input |
| 43 | (*1) | - |
| 44 | (*1) | - |
| 45 | CAN_H_1 | Input and output |
| 46 | GND (analog signal) | Input |
| 47 | GND (analog signal) | Input |
| 48 | Swing parking brake cancel PPC pressure | Input |
| 49 | (*1) | - |
| 50 | (*1) | - |
| 51 | GND (analog signal) | Input |
| 52 | GND (analog signal) | Input |
| 53 | (*1) | - |

- In mode P, E, ATT/P, or ATT/E, B, the engine speed is kept around the matching point set in each mode.
- As the load of the pump increases, and the pump discharged pressure increases, the engine speed decreases.
- The machine controller raises the engine speed to near the matching point in order to reduce the discharged volume of the pump.
- As the load of the pump decreases and the pump discharged pressure decreases, the pump discharged volume increases until the engine speed comes to near the matching point.




## Control function when pump secondary drive switch is ON

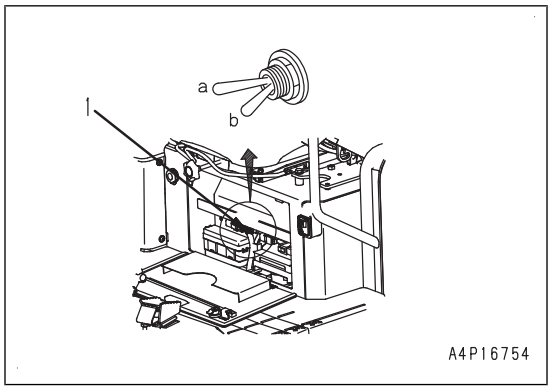
When the main pump does not operate normally, and machine does not work due to an abnormality occurring in the controller, etc., operate the pump drive secondary switch (1). With this operation, temporary work can be performed with absorption torque to mode E. At this time, only PC-EPC valve senses the oil pressure since a constant current flows from the battery to PC-EPC valve.

**REMARK**

Pump drive secondary switch (1) is an alternative type. If the machine is operated with this switch at emergency (a) position while the machine is normal, action level L03 appears on the display.

a: Emergency (when abnormal)

b: Normal (when normal)



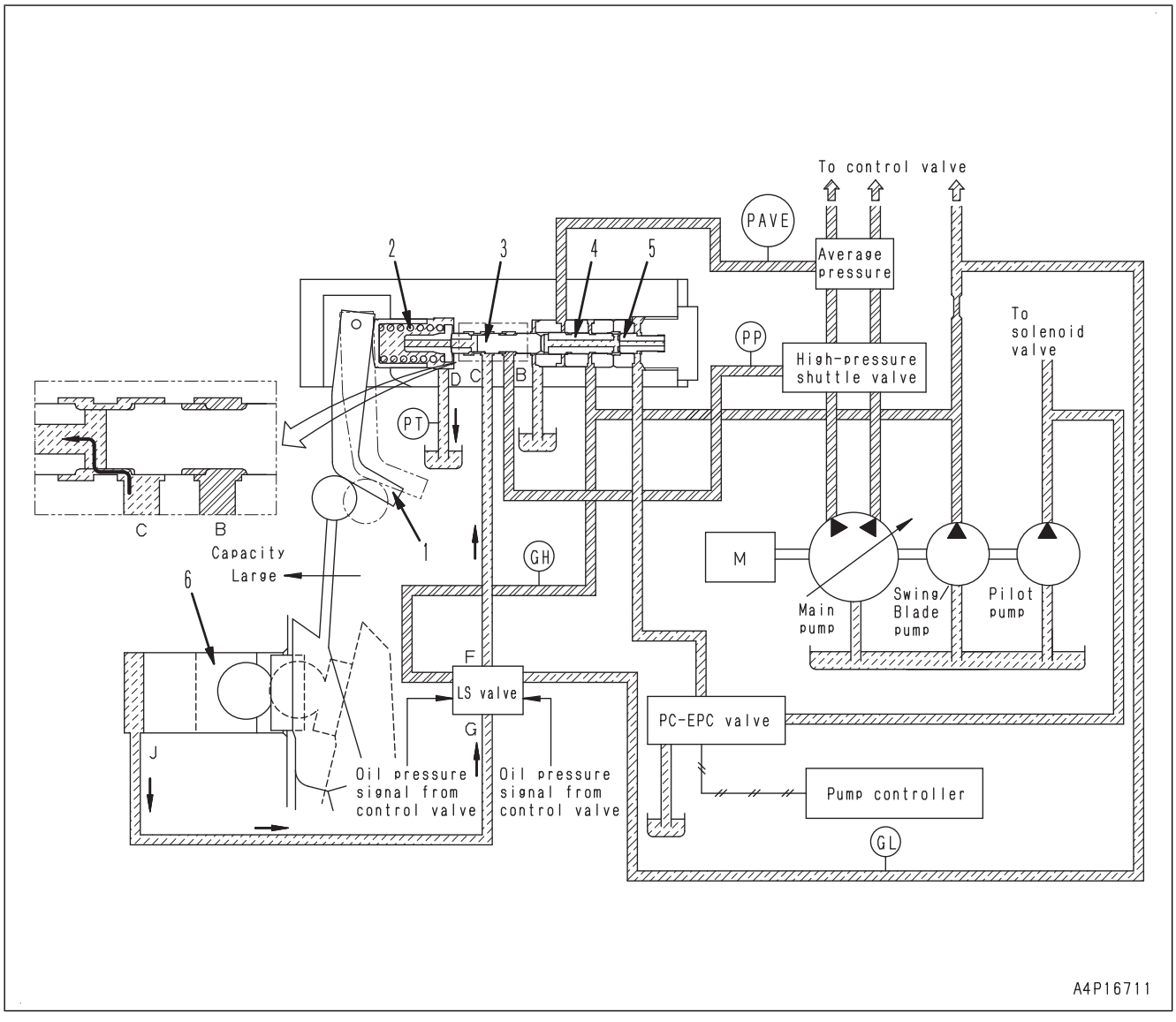
1: Lever
2: Spool
3: Plug
4: Sheet
5: Piston
6: Sleeve
7: PC valve
8: LS valve
9: Plug
10: Lock nut
11: Spring (LS valve)
12: PC-EPC valve
13: Spool
14: Ball
15: Plug
16: PC mode selector power supply connector
17: Spring (PC valve)
18: Retainer

## OPERATION OF MAIN PUMP SERVO VALVE

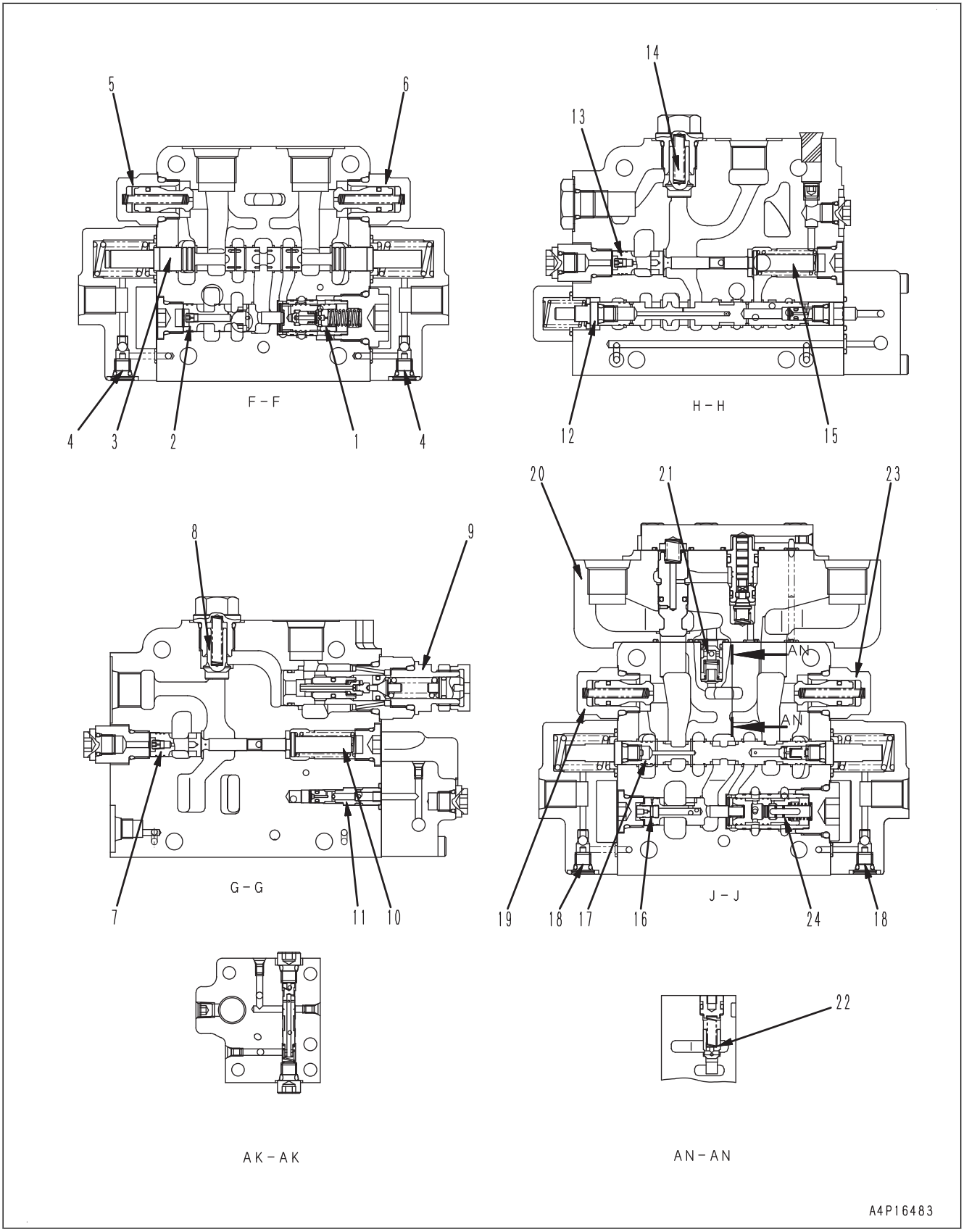
### Action of spring

1. The spring force of spring (2) in PC valve is determined by the position of the swash plate.
2. If servo piston (6) moves to the right, spring (2) is compressed through lever (1), and the spring force changes. The spring has characteristics that the spring constant changes into 2 stages depending on the height of the spring.

### Operation when pump pressure (PAVE) is low (load is light)



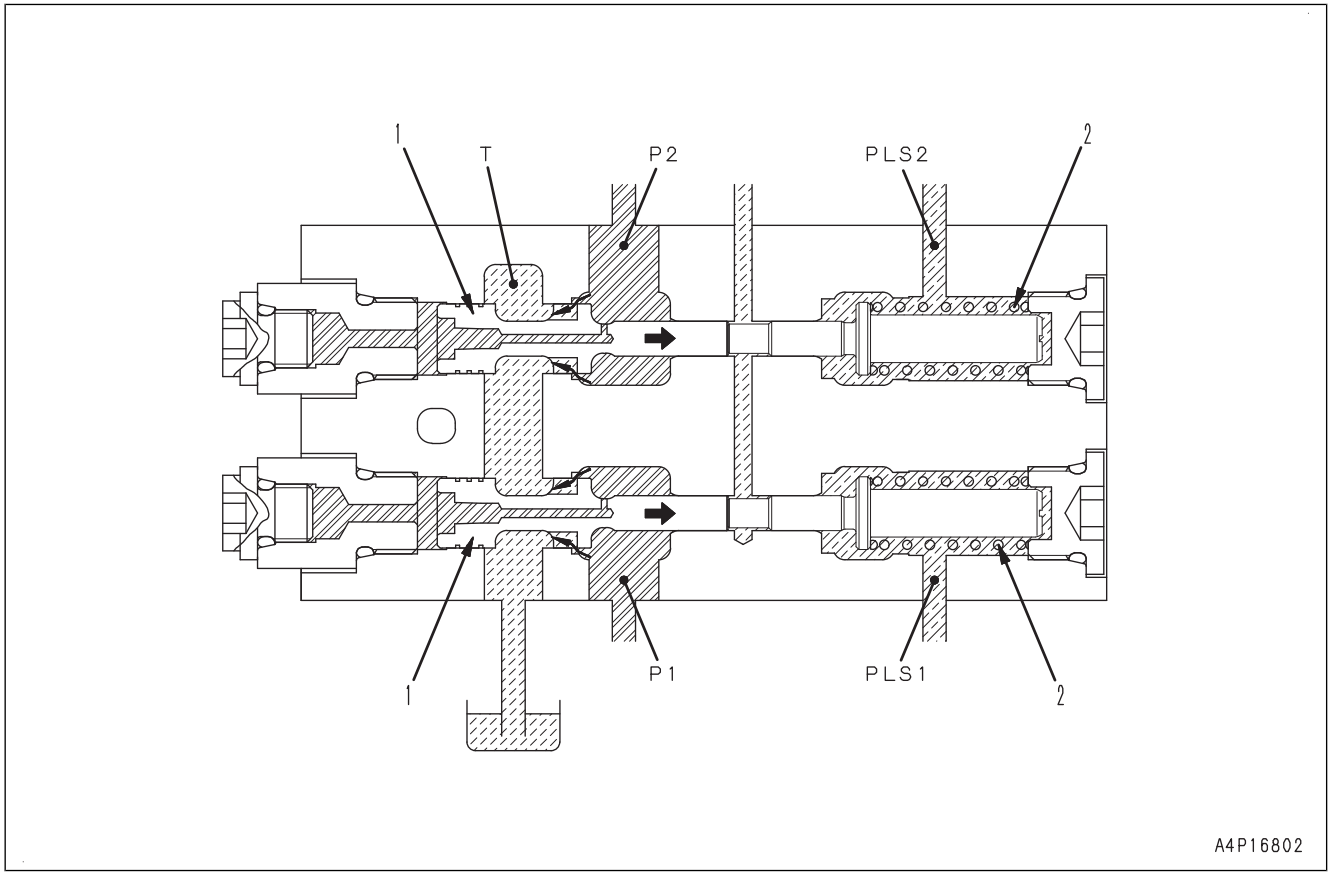
## Sectional views (F-F, G-G, H-H, J-J, AK-AK, AN-AN)




## R.H. travel valve

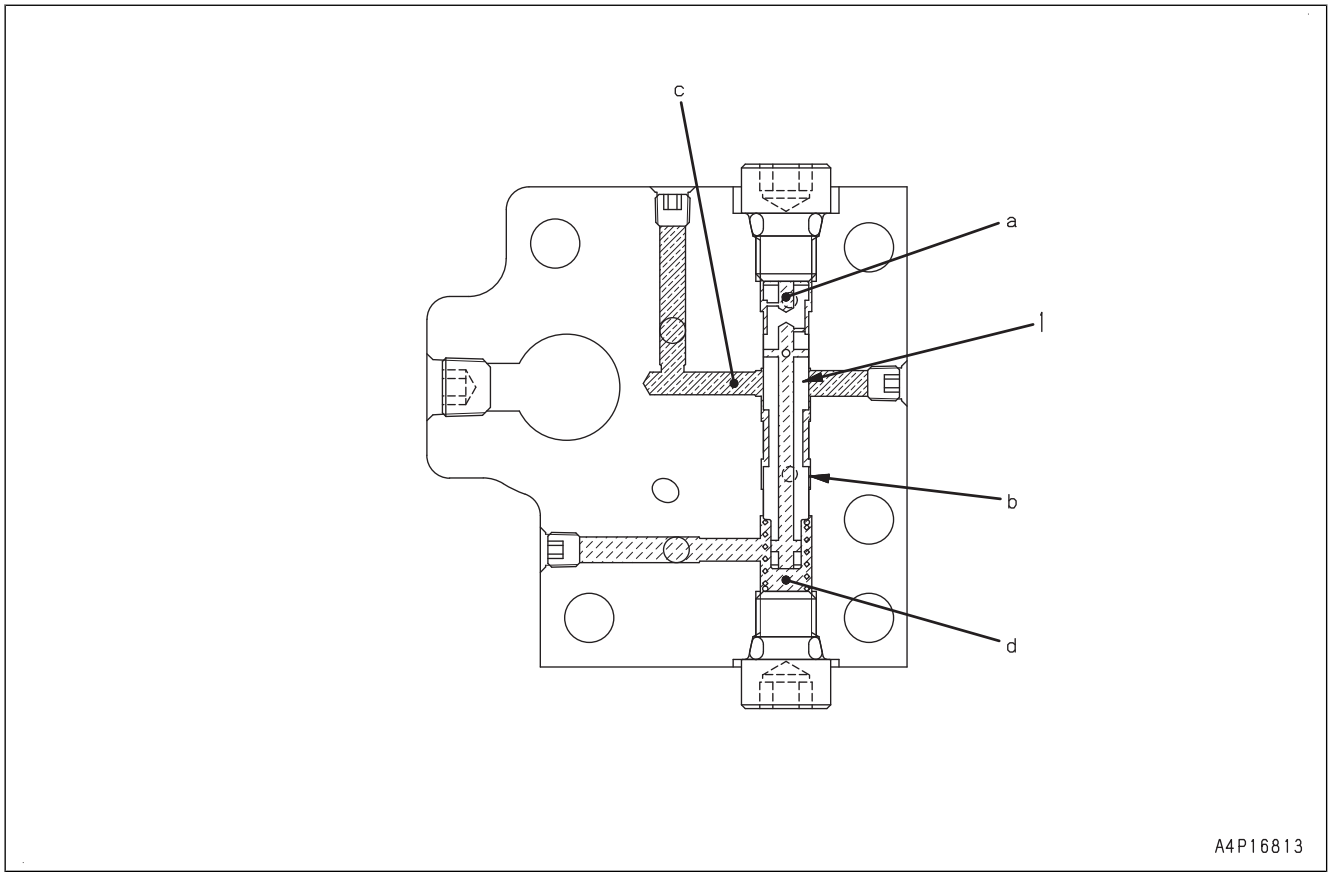
1: Pressure compensation valve (*2) (right travel)

## When operating the work equipment with fine control




1. When operating the work equipment with fine control, LS pressures of (PLS1) and (PLS2) are generated and they act on the right side of spool (1).
2. The differential pressure between LS pressures of (PLS1) and (PLS2) and pump discharged pressures of (P1) and (P2) is large since the open area of the control valve spool is small.
3. The differential pressure between pump discharged pressures of (P1) and (P2) and LS pressures of (PLS1) and (PLS2) reaches the set pressure of spring (2).
4. Spool (1) moves to the right, and pump circuits (P1) and (P2) are connected to tank circuit (T).
5. Pump discharged pressures of (P1) and (P2) are set to the set pressure of spring (2) + LS pressures of (PLS1) and (PLS2).
6. LS differential pressure (ΔPLS) becomes the set pressure of spring (2).

# OPERATION OF LOGIC VALVE OF CONTROL VALVE




## Operation in dividing mode

1. Only travel PPC pressure acts on port (b).
2. Travel PPC pressure acts on output port (c) of the merge-divider valve as it is.
3. This pressure sets the merge-divider valve to the dividing mode.

## Operation in merging mode

1. Work equipment PPC pressure (excluding the swing pressure) acts on port (a).
2. The pressure in output port (c) of the merge-divider valve is connected through spool (1) to spring chamber (d) and used as seal drain pressure.
3. The merge-divider valve is not changed but kept in the merging mode.

**REMARK**

Even if travel PPC pressure acts while work equipment PPC pressure (excluding the swing pressure) is acting, spool (1) is kept pressed and the merge-divider valve is kept in the merging mode.

When the work equipment is operated, the pilot pressures of the boom, arm, bucket, boom swing, blade, and attachment are outputted to auto-deceleration sensor port (PW) through the check valves and shuttle valves in their respective spring cases.

## TRAVEL PILOT PRESSURE DETECTION CIRCUIT OF CONTROL VALVE

## FUNCTION OF TRAVEL PILOT PRESSURE DETECTION CIRCUIT OF CONTROL VALVE

This circuits collects the pilot pressures for R.H. travel and L.H. travel, and outputs oil pressure signals through the auto-deceleration sensor port.

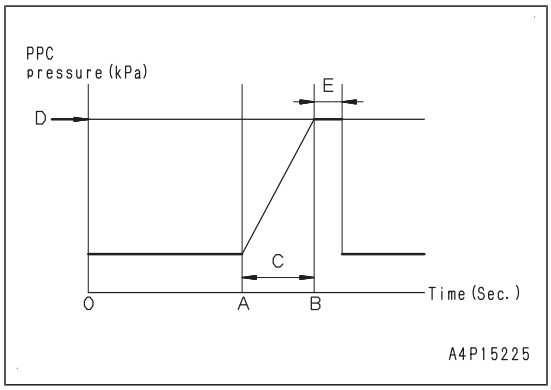
# WORK EQUIPMENT AND TRAVEL AUTOMATIC LOCK SYSTEM

## FUNCTION OF WORK EQUIPMENT AND TRAVEL AUTOMATIC LOCK SYSTEM

This function automatically sets the lock lever in the same state as when it is locked to prevent the work equipment or the machine continues its operation when the lock lever is unlocked while the work equipment control lever or the travel lever is operated.

## OPERATION OF WORK EQUIPMENT AND TRAVEL AUTOMATIC LOCK SYSTEM

This system recognizes an abnormality when either one or more of the oil pressure switches or sensors detect the pressure higher than specified pressure (D), or if the attachment drive signal is input in time period (C) after the lock lever is canceled (A).




The machine controller outputs the lock lever automatic lock relay drive signal to shut off the current to PPC lock solenoid and set the machine to lock state (B).

A: Lock lever is canceled

B: Lock lever automatic lock is in operation

C: Within 0.4 seconds

D: 5 kPa

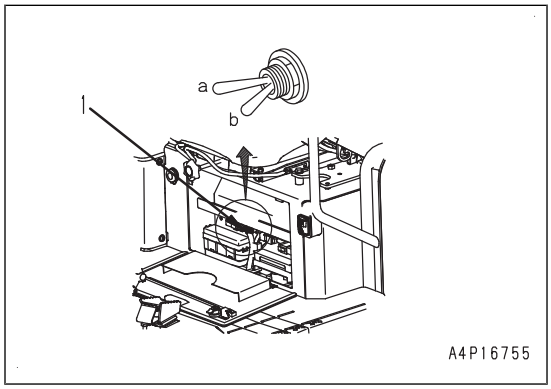
E: 0.1 seconds

**REMARK**

The pressure may not increase within time (C) and the lock lever automatic lock control may not operate when the hydraulic oil temperature is low or high-viscosity hydraulic oil used.

### Control when lock lever automatic lock cancel switch is “ON”

you can operate the machine by operating lock lever automatic lock cancel switch (1) if an abnormality occurs in the controller, etc., and the main pump does not operate normally, and machine does not work.




At this time, the lock lever automatic lock control function does not work.

a: Emergency (when abnormal)

b: Normal (when normal)

**REMARK**

- Lock lever automatic lock cancel switch (1) is an alternate type switch. The lock lever automatic lock cancel pilot lamp lights up on the display if it is set to “EMERGENCY (a)” position when PPC lock lever is in the free state.
- The following failure code is displayed when this switch is “ON”.

| Action level | Failure code | Failure (displayed on screen) |
|---|---|---|
| L00 | DDNS00 | Lock Lever Auto Lock Release SW On |

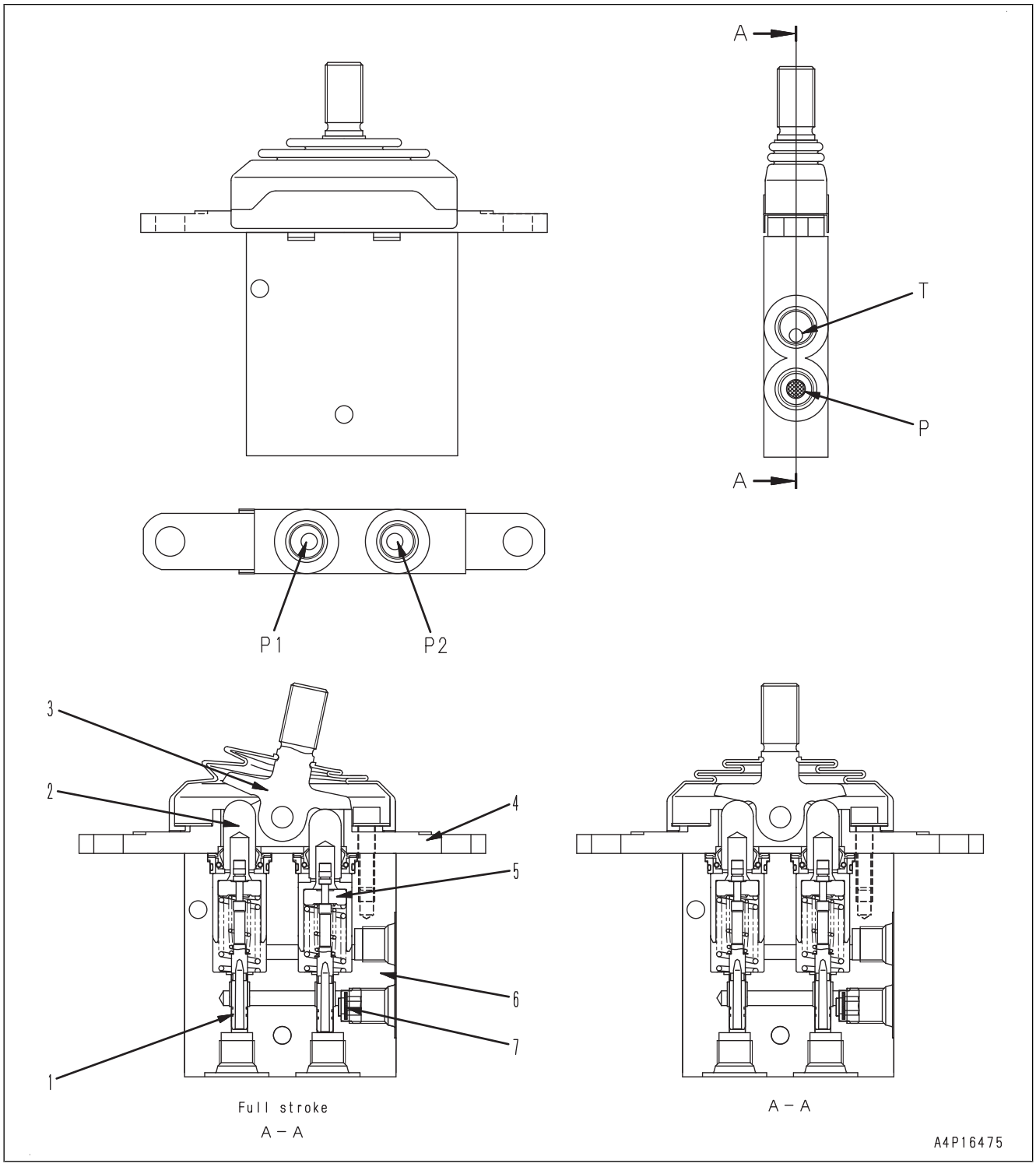
## BOOM SWING PPC VALVE

**PPC**

Abbreviation for Proportional Pressure Control

## STRUCTURE OF BOOM SWING PPC VALVE

### General view and sectional view




P: From pilot pump

P1: Control valve (to boom swing right port)

1: Spool

P2: Control valve (to boom swing left port)

T: To hydraulic tank

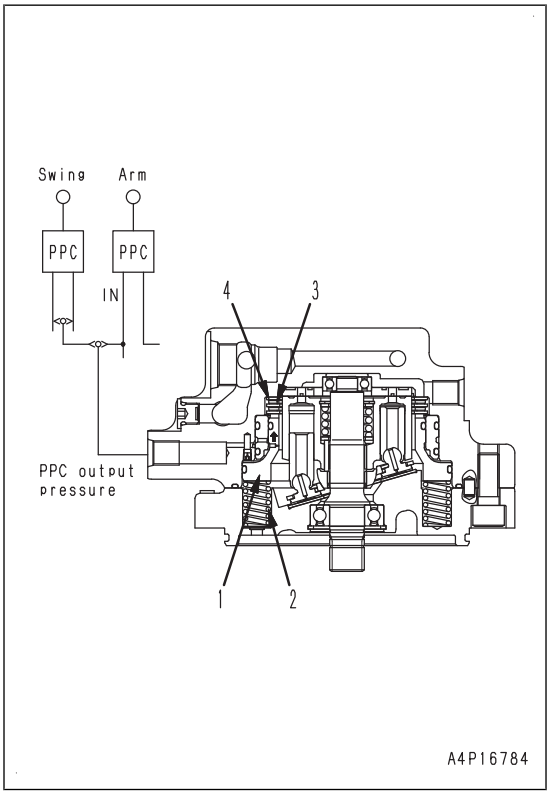
2: Piston

# SWING PARKING BRAKE OF SWING MOTOR

## OPERATION OF SWING PARKING BRAKE OF SWING MOTOR

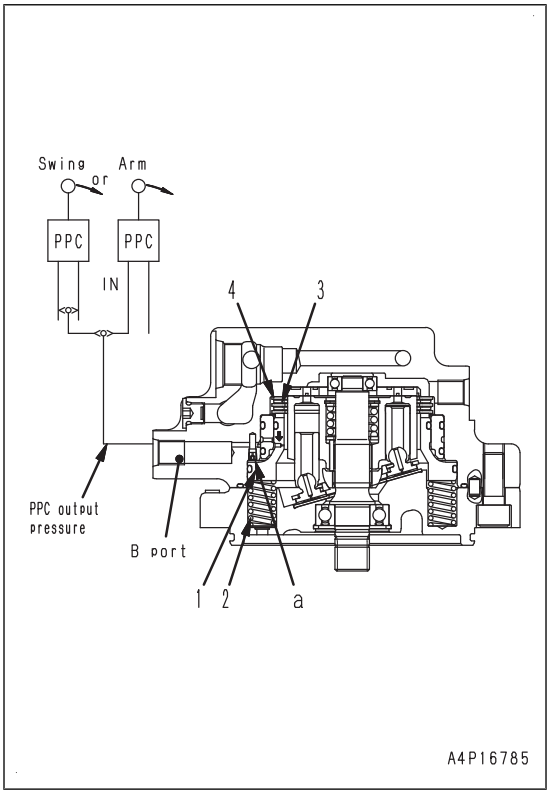
### Operation when swing or arm control lever are in NEUTRAL

1. Brake piston (1) is pushed up by brake spring (2) since PPC output pressure is 0 MPa {0 kgf/cm$^2$} .
2. Disc (3) and plate (4) are pressed, and the brake operates.



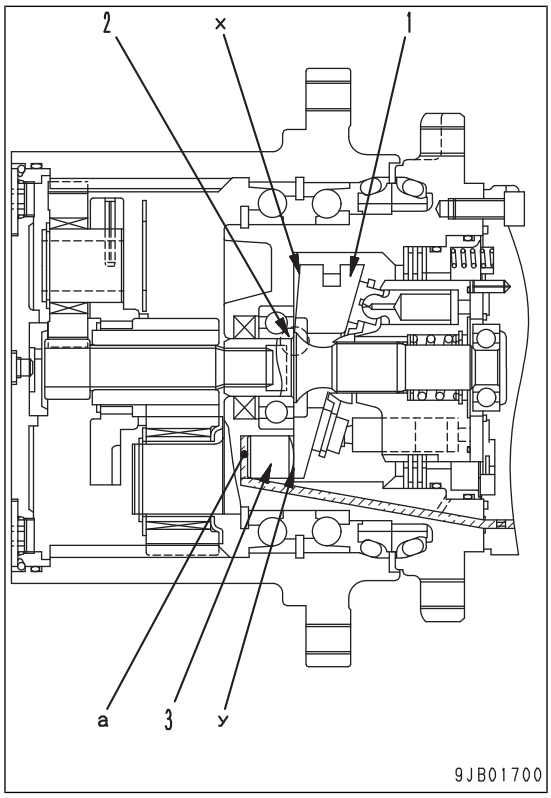

### Operation when swing or arm control lever are operated

1. PPC output pressure flows through port (B) into brake chamber (a).
2. The pressurized oil in chamber (a) presses down brake spring (2).
3. Brake piston (1) moves downward and disc (3) and plate (4) are separated, and the brake is released.



## Structure

- Swash plate (1) has 2 planes of x and y, and is supported on ball (2).
- The travel speed is changed by setting the angle of swash plate (1) to the maximum or minimum with the pressurized oil from control chamber (a) which acts on control piston (3).




## SPECIFICATIONS OF TRAVEL MOTOR

Model: PHV-4B-60C-PT-9480Z3

Theoretical displacement (Lo): 24.7 $cm^3$/rev

Theoretical displacement (Hi): 14.3 $cm^3$/rev

Rated speed (Lo): 2227 rpm

Rated speed (Hi): 3846 rpm

Brake releasing pressure: 1.13 MPa {11.5 $kgf/cm^2$}

Travel speed selector pressure: 0.86 MPa {8.8 $kgf/cm^2$}

Automatic gear shift selecting pressure (Lo→Hi): 21.6 MPa {221 $kgf/cm^2$}

Automatic gear shift selecting pressure (Hi→Lo): 23.1 MPa {236 $kgf/cm^2$}

Reduction ratio: 63.80

## FUNCTION OF TRAVEL MOTOR

The travel motor converts the fluid energy of hydraulic oil into rotational mechanical energy, and travels the machine.

# FUNCTION OF WORK EQUIPMENT

- The boom is operated by the boom cylinder. The boom moves the whole work equipment upward and downward.
- The arm is operated by the arm cylinder. The boom pulls in or pushes out the bucket.
- The bucket is operated by the bucket cylinder and the bucket link.
- The bucket link increases the moving range of the bucket.
- The blade is operated by the blade cylinder.
- The boom swing bracket can swing the boom swing direction to the right or left by the boom swing cylinder.

# STANDARD VALUE TABLE FOR ENGINE

## STANDARD VALUE TABLE FOR ENGINE: PC45MR-5E0

**Performance**

| Machine model | | | | PC45MR-5E0 | |
|---|---|---|---|---|---|
| Engine | | | | 4D88E-7 | |
| Item | Measurement condition | | Unit | Standard value for new machine | Repair limit |
| Engine speed at high idle | • Engine coolant temperature: 60 to 100 °C<br>• Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MAX (High idle) position<br>• Working mode: P (Power Mode)<br>• Travel speed: Hi<br>• Auto-deceleration switch: OFF | | rpm | 2550±50<br>(When the maximum value for turning and traveling) | 2550±50<br>(When the maximum value for turning and traveling) |
| | | | | 2430±50<br>(When the position of the operating lever is in neutral) | 2430±50<br>(When the position of the operating lever is in neutral) |
| Engine speed at low idle | • Engine coolant temperature: 60 to 100 °C<br>• Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MIN (Low idle) position<br>• Working mode: P (Power Mode)<br>• Auto-deceleration switch: OFF | | rpm | 1225±50 | 1225±50 |

**Air intake and exhaust system**

| Machine model | | | | PC45MR-5E0 | |
|---|---|---|---|---|---|
| Engine | | | | 4D88E-7 | |
| Item | Measurement condition | | Unit | Standard value for new machine | Repair limit |
| Exhaust gas color | • Engine coolant temperature: 60 to 100 °C<br>• After keeping it at normal condition for 5 seconds<br>• Fuel control dial: MAX (High idle) position<br>• Auto-deceleration switch: OFF | | Bosch index | Max. 0.5 | Max. 1.5 |
| Valve clearance | Engine coolant temperature: Normal temperature | Intake valve | mm | 0.20±0.05 | 0.20±0.05 |
| | | Exhaust valve | | 0.20±0.05 | 0.20±0.05 |

**Main body**

| Machine model | | | PC45MR-5E0 | |
|---|---|---|---|---|
| Engine | | | 4D88E-7 | |
| Item | Measurement condition | Unit | Standard value for new machine | Repair limit |
| Compression pressure | • Engine coolant temperature: 40 to 60 °C<br>• At cranking (engine speed): 250 rpm (reference) | MPa<br>{kg/cm²} | 3.14 to 3.43<br>{32 to 35} | 2.45 to 2.65<br>{25 to 28} |

**Work equipment speed**

| Machine model | | | | PC45MR-5E0 | |
|---|---|---|---|---|---|
| Engine | | | | 4D88E-7 | |
| Item | Measurement condition | | Unit | Standard value for new machine | Repair limit |
| Boom speed | • Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MAX (High idle) position<br>• Working mode: P (Power Mode)<br>• Time required to move bucket teeth from ground to RAISE stroke end<br>• Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 8”. | RAISE | Sec. | 2.8±0.3 | Max. 3.4 |
| | | LOWER | | 2.8±0.3 | Max. 3.4 |
| Arm speed | • Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MAX (High idle) position<br>• Working mode: P (Power Mode)<br>• Time required for operation between dump stroke end and arm IN stroke end<br>• Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 9”. | Arm IN | Sec. | 3.0±0.3 | Max. 3.6 |
| | | DUMP | | 2.5±0.3 | Max. 3.0 |
| Bucket speed | • Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MAX (High idle) position<br>• Working mode: P (Power Mode)<br>• Time required for operation between dump stroke end and arm IN stroke end<br>• Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 10”. | Bucket CURL | Sec. | 2.9±0.3 | Max. 3.5 |
| | | DUMP | | 2.0±0.3 | Max. 2.4 |

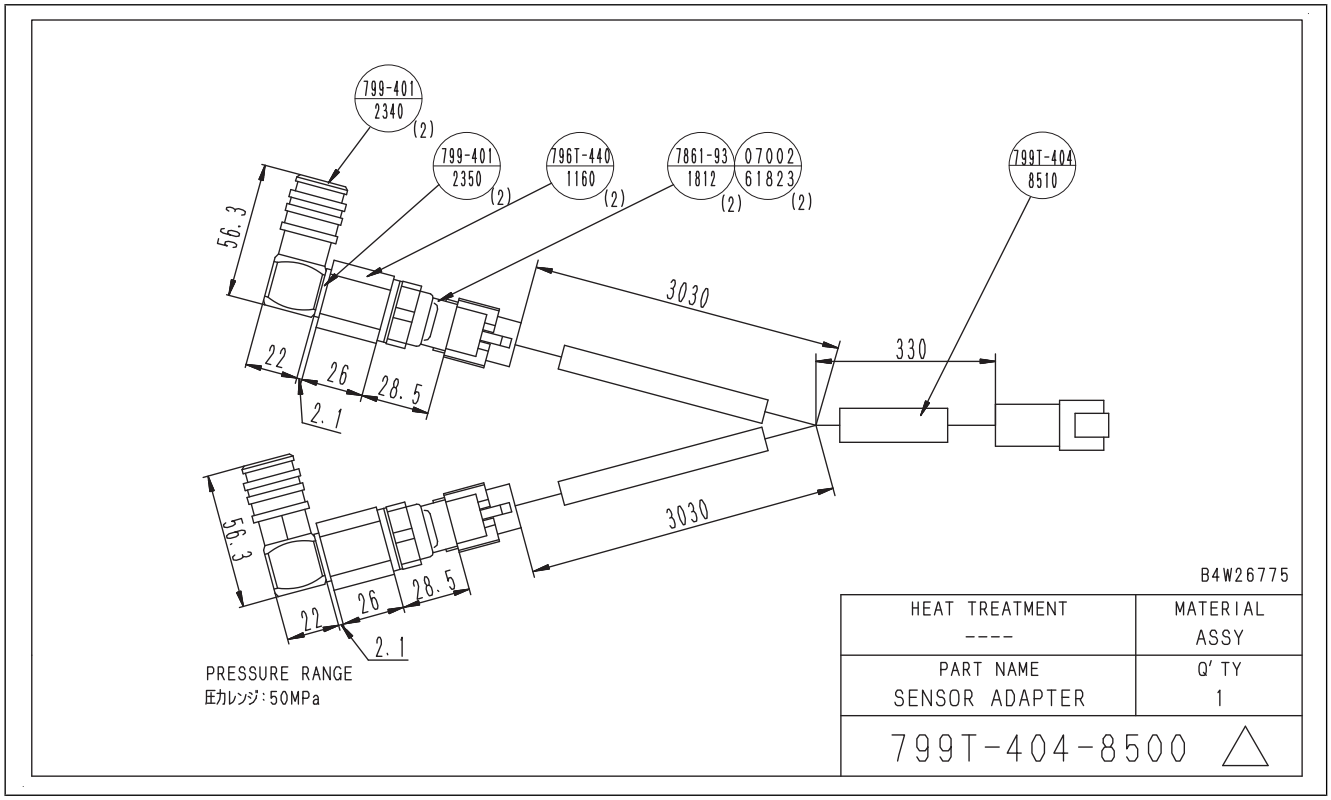
**Work equipment speed**

| Machine model | | | | PC55MR-5E0 | |
|---|---|---|---|---|---|
| Engine | | | | 4D88E-7 | |
| Item | Measurement condition | | Unit | Standard value for new machine | Repair limit |
| Boom speed | • Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MAX (High idle) position<br>• Working mode: P (Power Mode)<br>• Time required to move bucket teeth from ground to RAISE stroke end<br>• Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 8”. | RAISE | Sec. | 2.9±0.3 | Max. 3.5 |
| | | LOWER | | 2.8±0.3 | Max. 3.4 |
| Arm speed | • Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MAX (High idle) position<br>• Working mode: P (Power Mode)<br>• Time required for operation between dump stroke end and arm IN stroke end<br>• Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 9”. | Arm IN | Sec. | 3.1±0.3 | Max. 3.7 |
| | | DUMP | | 2.5 (+0.4/-0.2) | Max. 3.0 |
| Bucket speed | • Hydraulic oil temperature: 45 to 55 °C<br>• Fuel control dial: MAX (High idle) position<br>• Working mode: P (Power Mode)<br>• Time required for operation between dump stroke end and arm IN stroke end<br>• Measurement posture: See “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, “Fig. 10”. | Bucket CURL | Sec. | 2.8±0.3 | Max. 3.4 |
| | | DUMP | | 2.0±0.3 | Max. 2.4 |

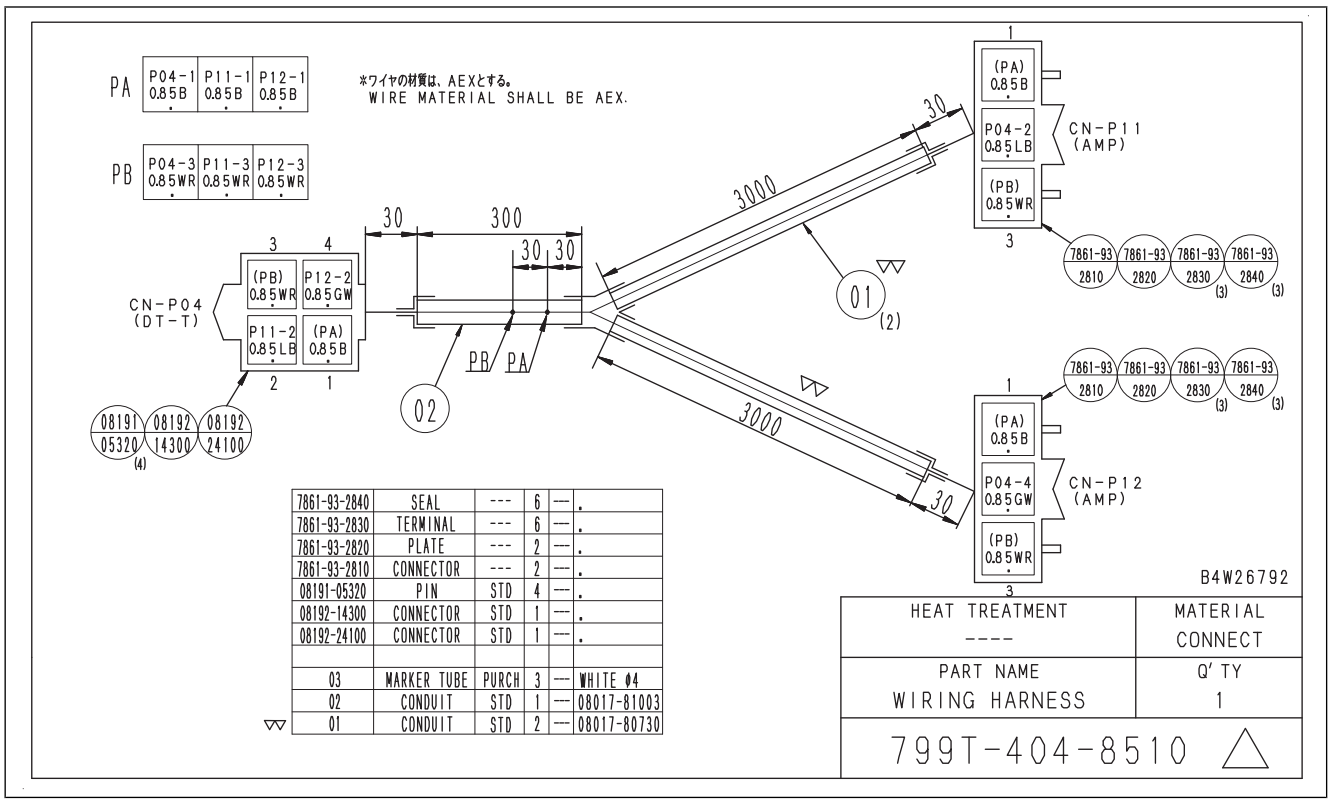
# SKETCH OF TOOLS FOR TESTING AND ADJUSTING

Note: Komatsu does not take any responsibility for special tools manufactured according to these sketches.

Sensor adapter




Wiring harness




| | | | | | | |
|---|---|---|---|---|---|---|
| 7861-93-2840 | SEAL | --- | 6 | --- | . | |
| 7861-93-2830 | TERMINAL | --- | 6 | --- | . | |
| 7861-93-2820 | PLATE | --- | 2 | --- | . | |
| 7861-93-2810 | CONNECTOR | --- | 2 | --- | . | |
| 08191-05320 | PIN | STD | 4 | --- | . | |
| 08192-14300 | CONNECTOR | STD | 1 | --- | . | |
| 08192-24100 | CONNECTOR | STD | 1 | --- | . | |
| | | | | | | |
| 03 | MARKER TUBE | PURCH | 3 | --- | WHITE φ4 | |
| 02 | CONDUIT | STD | 1 | --- | 08017-81003 | |
| ▽▽ 01 | CONDUIT | STD | 2 | --- | 08017-80730 | |

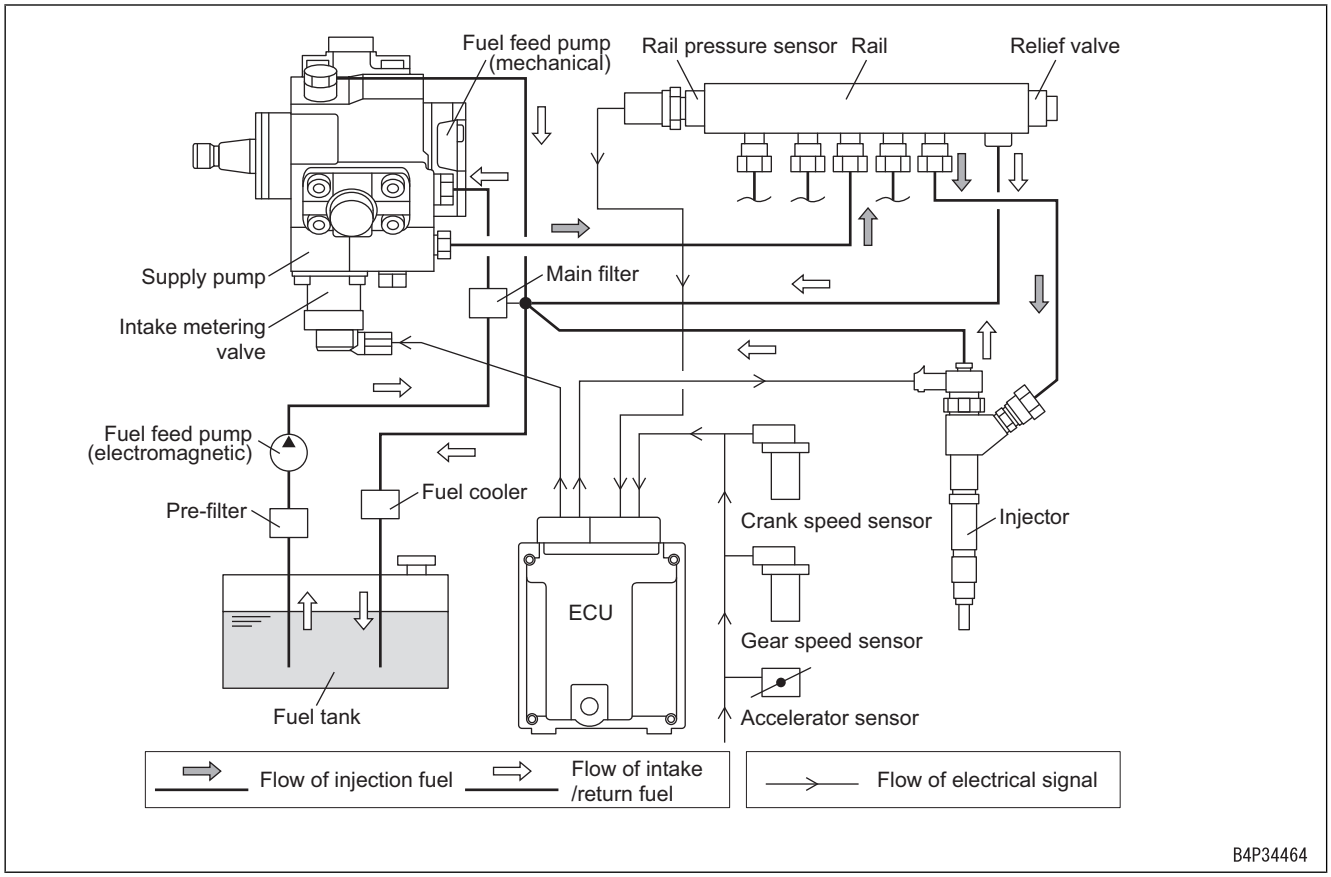
# BLEED AIR FROM FUEL SYSTEM

⚠ **Place the machine on a level ground, lower the work equipment to the ground so that it is stable, set the lock lever to LOCK position, and stop the engine.**

⚠ **Immediately after the engine is stopped, its parts and oil are still very hot, and may cause burn injury. Accordingly, wait until all parts have cooled down before starting the work.**

Air bleeding route of fuel system

fuel tank→ prefilter→ feed pump→ main filter→ fuel cooler→ fuel tank




For bleeding air from fuel system to perform troubleshooting or periodic maintenance, refer to this section.

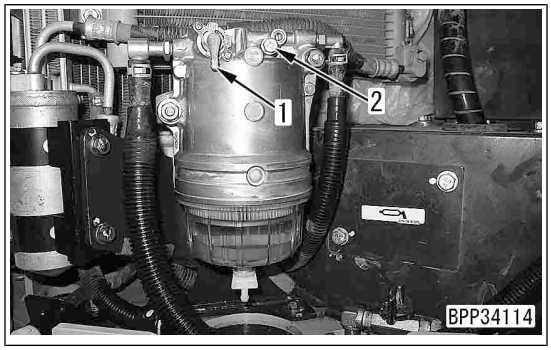
## METHOD FOR BLEEDING AIR FROM FUEL SYSTEM

In the following cases, bleed air according to this procedure.

- When the fuel filter is replaced
- When fuel has run out

1. Fill the fuel tank with fuel.
2. Open the cover at the rear right of the machine.
3. Set filter vale (1) as shown in the figure.
4. Loosen air bleeding bolt (2) of the fuel prefilter by 2 to 3 turns.
5. Tighten air bleeding bolt (2) when the fuel including no air bubbles comes out from air bleeding bolt (2).

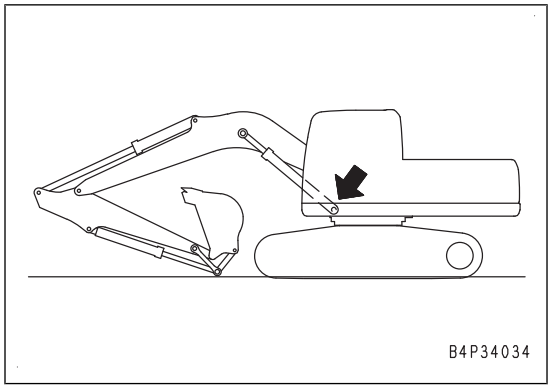
   bleeder bolt (2):
   2.5±0.5 Nm {0.25±0.05 kgfm}
6. Turn the engine starting switch to ON position.



3. Extend the arm cylinder and bucket cylinder to the end (to the maximum CURL position) or retract them to the end (to the maximum DUMP position), and lower the work equipment to the ground.

   **REMARK**

   Since the anti-drop valve is attached to boom cylinder bottom side, hydraulic oil on bottom side of boom cylinder is drained when work equipment is lowered to the ground, and remaining pressure drops.




4. Turn the starting switch to OFF position.
5. Loosen the oil filler cap of the hydraulic tank gradually, and release the air in the tank.

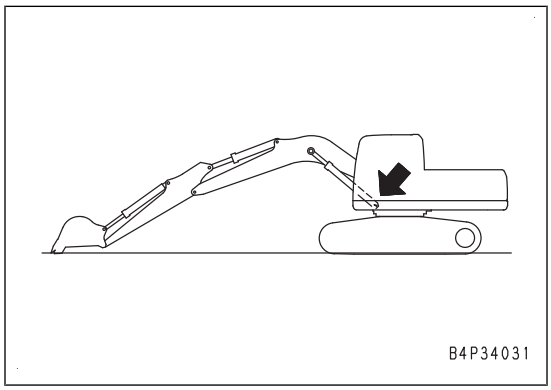
   **REMARK**

   Leave the oil filler cap of the hydraulic tank removed.

6. Release the remaining pressure in hydraulic cylinder circuit
   1) Turn the starting switch to ON position.
   2) Set the lock lever to FREE position, and operate the right and left work equipment control levers forward, backward, rightward, and leftward.

      **REMARK**

      The work equipment is operated by the pressure in PPC accumulator. Pressure in PPC accumulator is lost by operating the work equipment control levers 2 or 3 times.




   3) Set the lock lever in LOCK position.
   4) Start the engine and run it with the fuel control dial at MIN (Low idle) position for approximately 10 seconds to increase the pressure in PPC accumulator.
7. Repeat steps 1) and 4) 4 or 5 times to release the remaining pressure from the hydraulic cylinder circuit.

**⚠ When disassembling the anti-drop valve, loosen anti-drop valve mounting bolts gradually. Make sure that hydraulic oil pressure is released, then disassemble.**

## Method for releasing remaining pressure from machine with anti-drop valve for arm in arm maximum IN posture

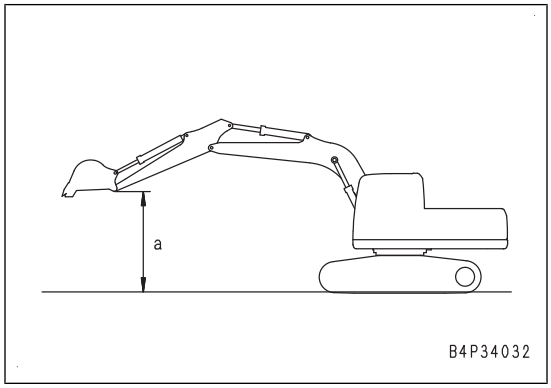
**⚠ Place the machine on a level ground.**

**⚠ When disassembling the anti-drop valve, always release the remaining pressure in the cylinder circuit.**

The following is the procedure for releasing the remaining pressure in the arm maximum IN posture.

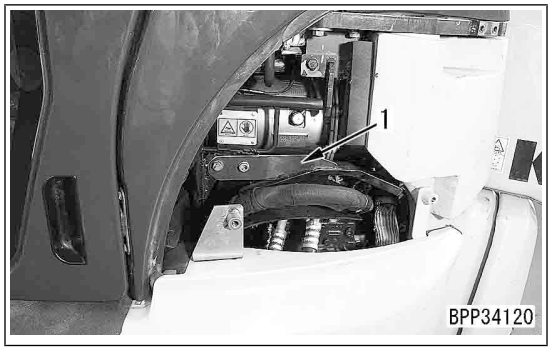
1. Check the function of PPC accumulator
   1) Retract arm cylinder and bucket cylinder to the stroke ends (to set the machine in maximum reach posture), and hold the work equipment at height (a) above the ground.

      (a) : 1.5 m




   2) Keep the arm cylinder and bucket cylinder retracted to the stroke ends, turn the starting switch to OFF position, and stop the engine.
   3) Turn the starting switch to ON position.
   4) Set the lock lever to FREE position.

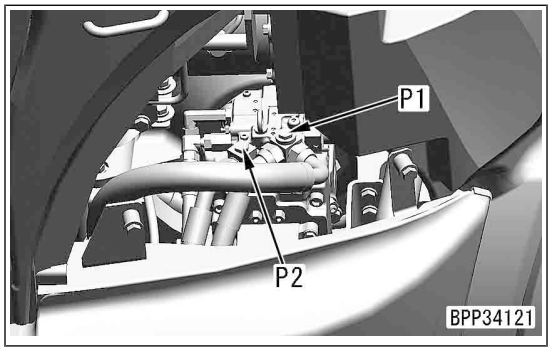
3. Remove the cover (1).

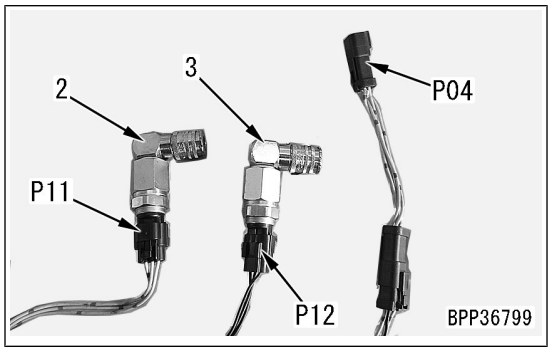



4. Remove the plug of pump discharge pressure pickup port (P1) or (P2).
5. Install nipple C to pump discharged pressure pickup port (P1) or (P2),and connect the coupling (2) or (3) of sensor adapter F.

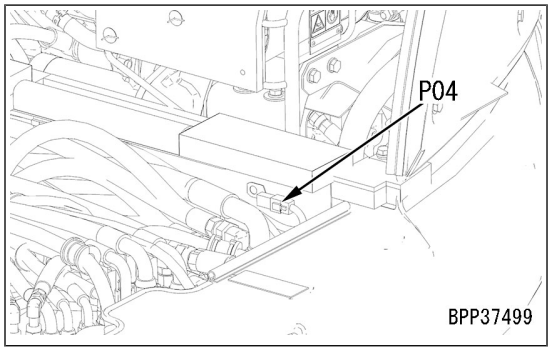
   **REMARK**

   - Connector (P11) side is displayed by monitoring code: 01141 “Service Press. Sens1”.
   - Connector (P12) side is displayed by monitoring code: 01142 “Service Press. Sens2”.



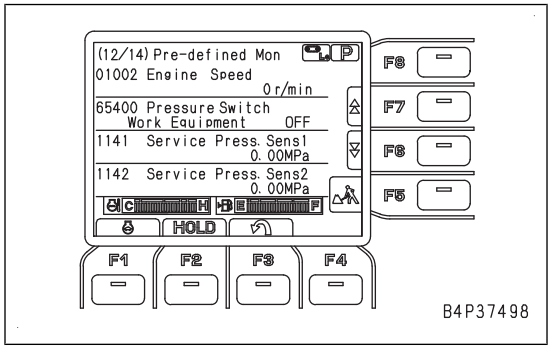

6. Open the floor. For details, see TESTING AND ADJUSTING, “METHOD FOR OPENING AND CLOSING FLOOR”.
7. Connect the connector (P04) of the sensor adapter F to the service pressure connector (P04).
8. Close the floor. For details, see TESTING AND ADJUSTING, “METHOD FOR OPENING AND CLOSING FLOOR”.
9. Start the engine.




10. Select and display (12/14) “Predefined Mon” or following monitoring item on “SET AND OPERATE MACHINE MONITOR”.

    Monitoring code: 01141“ Service Press. Sens1”

    Monitoring code: 01142“ Service Press. Sens2”
11. Adjust the hydraulic oil temperature within the specified range.
12. Set the working mode to P (“Power Mode”).
13. Depress the boom swing control pedal, and move the boom swing cylinder to the stroke end.




14. Turn the fuel control dial in MAX (High idle) position and check the oil pressure at swing relief.

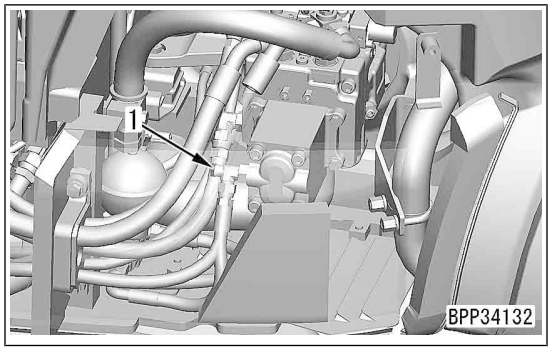
4. Install nipple C to pilot pump pressure output port (1), and connect gauge A1 of hydraulic tester A.

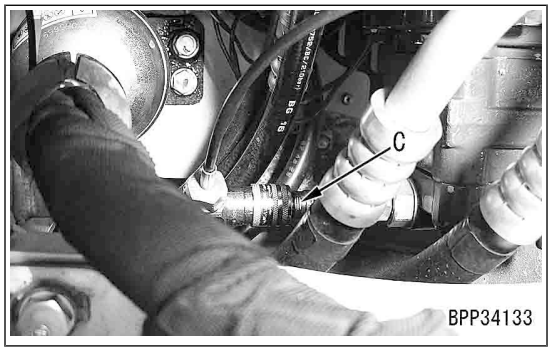
   **REMARK**

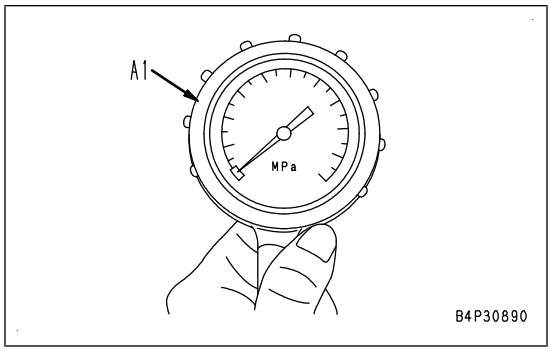
   Gauge in digital hydraulic tester B can also be used in place of gauge A1.

5. Set working mode to P (“Power Mode”), turn off auto-deceleration.
6. Start the engine to increase the hydraulic oil temperature to 45 to 55 °C.
7. Set the fuel control dial to MAX (High idle) position and check the oil pressure when all the control levers and pedals are in NEUTRAL.

   For standard values, see STANDARD VALUE TABLE, “STANDARD VALUE TABLE FOR MACHINE”.



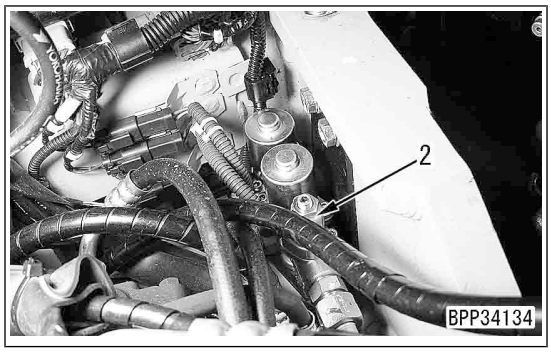




After finishing the test, remove the testing tools and restore the machine.

## METHOD FOR ADJUSTING OIL PRESSURE OF CONTROL CIRCUIT

If the oil pressure in the control circuits is abnormal, adjust control relief valve (2) according to the following procedure.




1. Tilt open the floor frame. For details, see “HOW TO OPEN AND CLOSE FLOOR”.

3. R.H. PPC valve
4. L.H. PPC valve
5: Boom swing PPC valve
6: Blade PPC valve
7: Attachment 1 EPC valve
8: Attachment 2 EPC valve
9: Junction block

**PPC valve piping table**

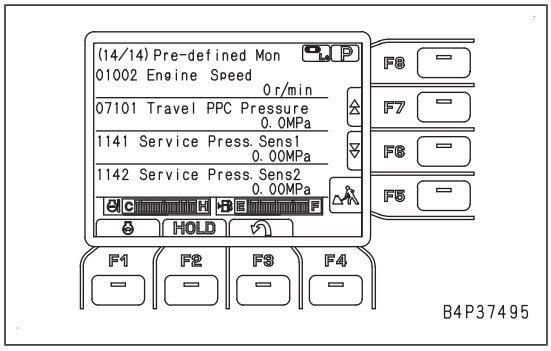
| Circuit testing and operation | Port names on control valve side | Band color |
|---|---|---|
| L.H. travel (forward) | PA1 | Brown/Yellow |
| L.H. travel (reverse) | PB1 | Orange/Yellow |
| R.H. travel (forward) | PA2 | Black/Yellow |
| R.H. travel (reverse) | PB2 | Green/Yellow |
| Boom LOWER | PA3 | Black |
| Boom RAISE | PB3 | Yellow |
| Arm OUT | PA4 | Orange |
| Arm IN | PB4 | Green |
| Bucket DUMP | PA5 | Red |
| Bucket CURL | PB5 | Blue |
| Boom swing RIGHT | PA6 | White/Blue |
| Boom swing LEFT | PB6 | White/Red |
| Blade RAISE | PA7 | Red/Yellow |
| Blade LOWER | PB7 | Blue/Yellow |
| Turn LEFT | PA8 | White |
| Turn RIGHT | PB8 | Brown |
| Attachment 1 LEFT | PA9 | White/White |
| Attachment 1 RIGHT | PB9 | Red/Red |
| Attachment 2 LEFT | PA10 | White |
| Attachment 2 RIGHT | PB10 | Red |

The travel PPC valve outlet pressure can be monitored on the machine monitor.

Select and display (14/14) “Predefined Mon” or monitoring code: 07101 “Travel PPC Pressure” in “SET AND OPERATE MACHINE MONITOR”, and perform testing.

**REMARK**

PPC valve outlet pressures other than the travel PPC valve outlet pressure can be monitored by using the sensor adapter D. For the method of using sensor adapter D, see the following procedure.




1. Release the remaining pressure in the hydraulic cylinder circuit. See “RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM”.
2. Open the floor. See “METHOD FOR OPENING AND CLOSING FLOOR”.
3. Disconnect the hoses of PPC circuit to be tested on PCC valve side or control valve side.

## METHOD FOR TESTING THE PARTS CAUSING HYDRAULIC DRIFT OF PPC VALVE

Measure the hydraulic drift of the work equipment when the lock lever is in LOCK and FREE positions with the accumulator charged fully.
In case there is a difference of hydraulic drift between LOCK and FREE positions, the PPC valve is defective (internal defect).

**NOTICE**

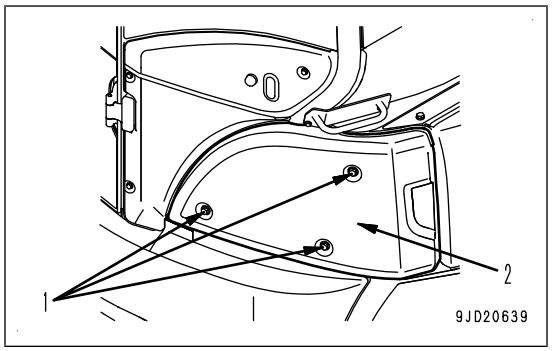
**Operate the lock lever when the starting switch is turned to ON position.**

**REMARK**

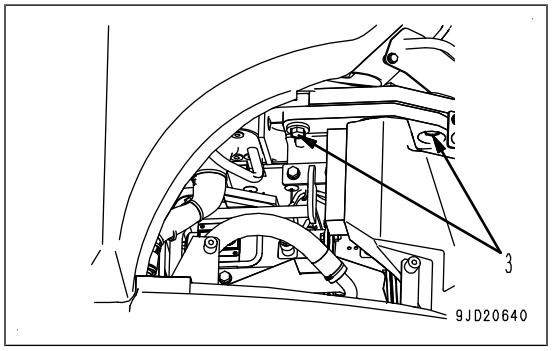
If the accumulator pressure decreases, run the engine for approximately 10 seconds to accumulate the pressure.

## METHOD FOR OPENING FLOOR UNIT: CAB SPEC

1. Remove the triangle cover fixing bolts (1) (M10, 3 pieces), and remove the triangle cover (2).

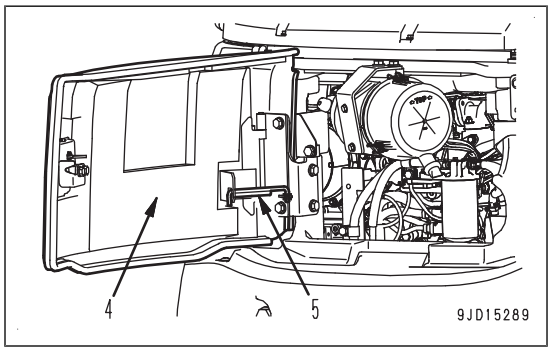



2. Remove the floor tilt fixing bolts (3) (M14, 2 pieces).




3. Pull the engine rear cover (4) backward to open it.

   Open the engine rear cover (4) fully and it is secured by rod (5).

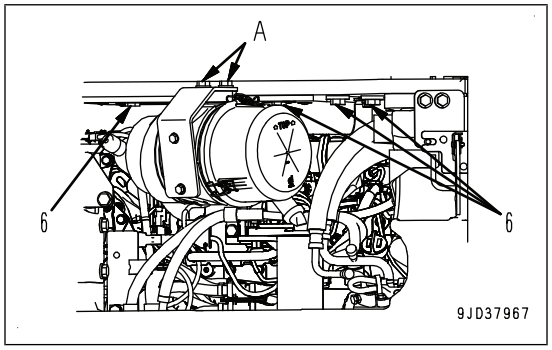



4. Remove the floor tilt fixing bolts (6) (M14, 4 pieces).

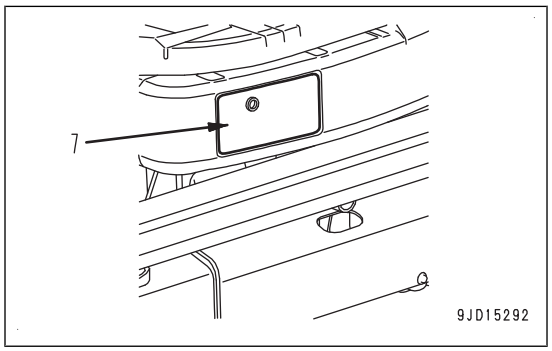
   **REMARK**

   If the floor tilt fixing bolts (6) are hard to be removed, remove the bolts (A) of air cleaner mounting bracket to move the air cleaner downward.

5. Close the engine rear cover (4).




6. Open the inspection window (7).



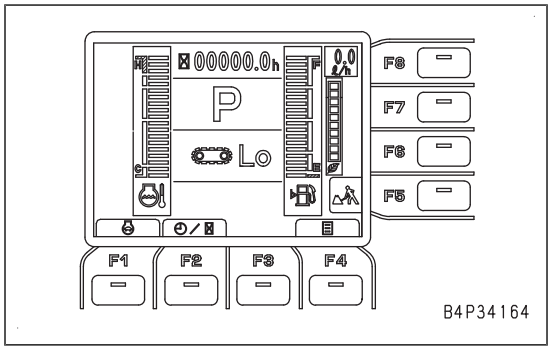
# SERVICE MODE

## METHOD FOR OPERATING SERVICE MODE

To change the mode of the machine monitor to the service mode from the operator mode, perform the following operation.

This operation is always required when you use the service mode.

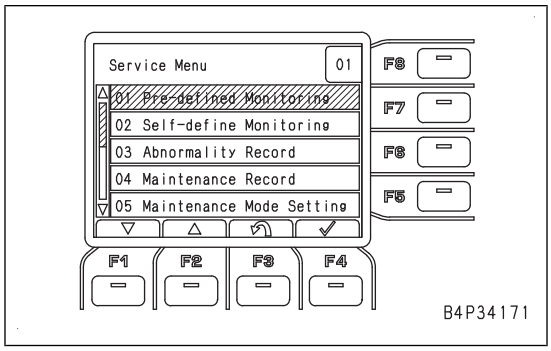
1. While displaying the standard screen, press the function switch F8 to select following switches (F8 + F1 → F2 → F3).




**REMARK**

Switch operations which use SERVICE MODE are accepted only while the standard screen is displayed.

2. When “Service Menu” screen is displayed, the service mode is selected. Select a service menu you use.




F1: Moves the selection down by one item

F2: Moves the selection up by one item

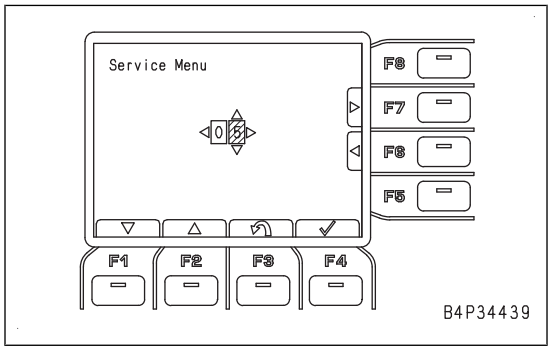
F3: Returns the screen to the “standard” screen (operator mode)

F4: Enters the selection

F8: Changes the screen to Code Input screen.

**REMARK**

- If you press the function switch and input the code on Input Code screen, the menu is selected directly.




  F1: Decreases the number by 1

  F2: Increases the number by 1

  F3: Cancels the input and returns the screen to “Service Menu” screen

  F4: Enters the input code

  F6: Moves the input position leftward

  F7: Moves the input position rightward

- Items with 2-digit codes are the menus displayed on “Service Menu” screen. The items on the right are the menus on the next hierarchy.

The following shows the items selectable with “Service Menu” (including some items which need special switching operations).

**The menu items which can be selected in “Service Menu”**

| Code | Item | Reference page |
|---|---|---|
| 01 | Pre-defined Monitoring | METHOD FOR CHECKING PRE-DEFINED MONITORING INFORMATION |
| 02 | Self-define Monitoring | METHOD FOR CHECKING SELF-DEFINE MONITORING INFORMATION |

# ABNORMALITY RECORD MENU

## METHOD FOR CONFIRMING ABNORMALITY RECORD (MECHANICAL SYSTEMS)

The machine monitor logs the failures that occurred in the past and is occurring currently. It classifies them into the mechanical system abnormality and electrical system abnormality.

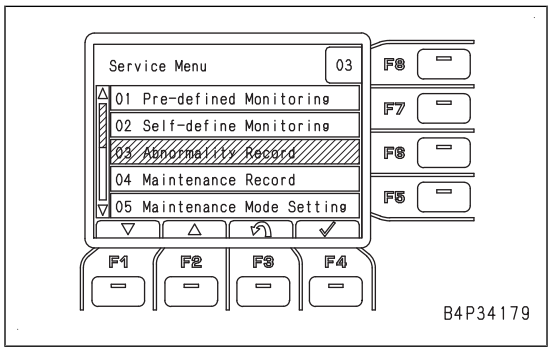
Check the information about “Mechanic Sys Error Record” by performing the following procedures.

For the failure code list, see “FAILURE CODES TABLE” for troubleshooting.

1. Select “Abnormality Record” on “Service Menu” screen.

   **REMARK**

   For the selection method, see “Operating method of service mode” in “SERVICE MODE”.




2. On “Abnormality Record” screen, select “Mechanic Sys Error Record” with the function switch.

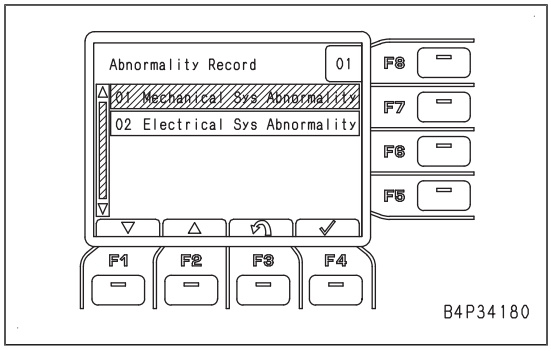
   F1: Moves the selected item down by one item

   F2: Moves the selected item up by one item

   F3: Returns the display to the “Service Menu” screen

   F4: Enters the selected item

   F8: Moves to the code entry screen




3. Check the following information on “Mechanic Sys Error Record” screen.

   a: Occurrence order from the latest one/ Total number of records

   b: Failure code

   c: Detail of failure

   d: Number of occurrences (displayable range: 0 to 65535 times)

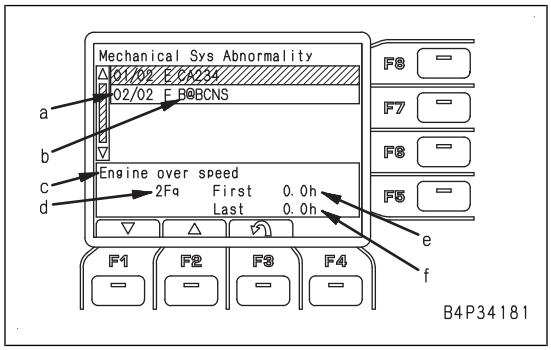
   e: Service meter reading at the first occurrence

   f: Service meter reading at the last occurrence

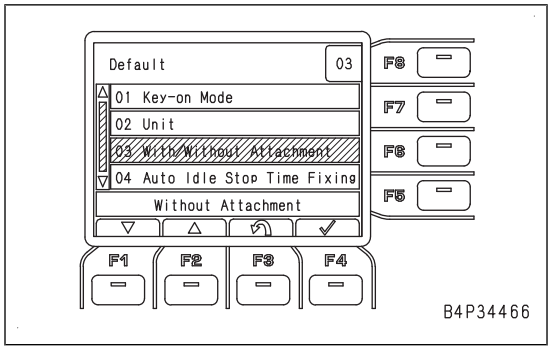
   F1: Moves the selected item down by one item

   F2: Moves the selected item up by one item

   F3: Returns to “Abnormality Record” screen



2. On “Default” screen, select “With/Without Attachment” with the function switch.




   F1: Moves the selected item down by one item

   F2: Moves the selected item up by one item

   F3: Returns the display to the “Service Menu” screen

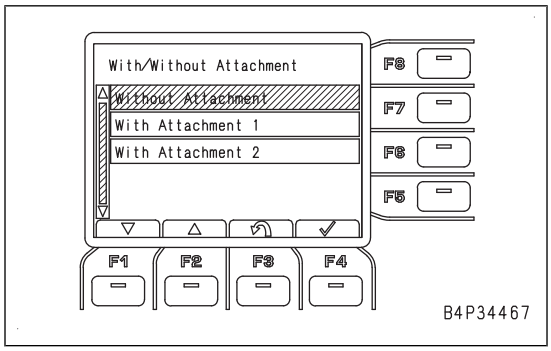
   F4: Enters the selected item

   F8: Moves to the code entry screen

   **REMARK**

   Attachment function does not appear on the screen except for machine equipped with proportional lever.

3. On “With/Without Attachment” screen, select a setting with the function switch.




   Without attachment: When attachment is not installed

   With 1 attachment: When 1 attachment is installed

   With 2 attachment: When 2 attachment is installed

   F1: Moves the selected item down by one item

   F2: Moves the selected item up by one item

   F3: Cancels the selection and returns the screen to “Default” screen

   F4: Enters the selected item and returns the screen to “Default” screen

   **REMARK**

   When an attachment is installed, if this setting is not configured correctly, the attachment setting in the operator mode cannot be performed. As a result, the attachment may not work normally or the hydraulic components may be damaged.

## METHOD FOR SETTING WITH DEFAULT SETTING MENU (AUTO IDLE STOP TIMER FIXING)

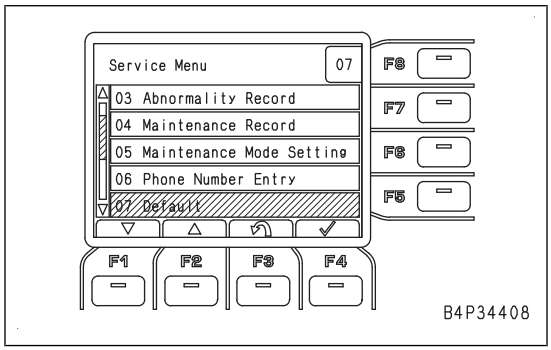
Default menu is used to check or change default values of the machine monitor and machine.

Auto idle stop timer fixing function sets the selectable time on “Auto Idle Stop Timer Set” in the operator mode.

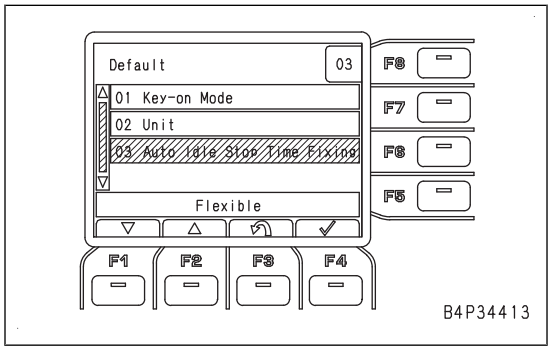
1. Select “Default” from the “Service Menu” screen.

   **REMARK**

   For the selection method, see “Operating method of service mode” in “SERVICE MODE”.




2. On “Default” screen, select “Auto Idle Stop Time Fixing” with the function switch.




   F1: Moves the selected item down by one item

   F2: Moves the selected item up by one item

   F3: Returns the display to the “Service Menu” screen

   F4: Enters the selected item

   F8: Moves to the code entry screen

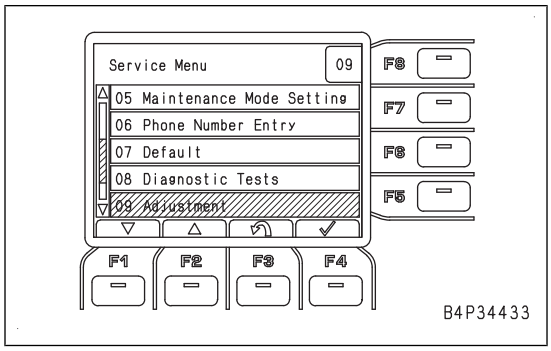
# ADJUSTMENT MENU

## METHOD FOR ADJUSTING WITH ADJUSTING MENU (PUMP ABSORPTION TORQUE)

Adjustment menu is used to check the various settings of the machine or to adjust the value.

Function of Pump Absorption Torque adjusts the absorption torque of the main pump.

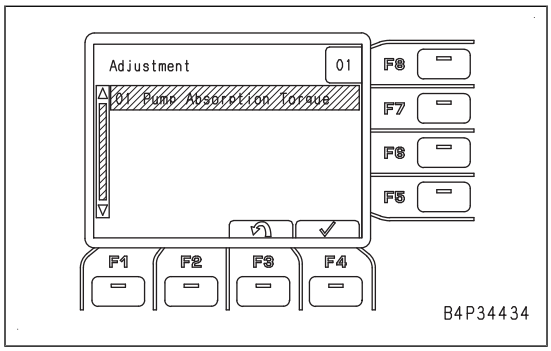
1. Select “Adjustment” on “Service Menu” screen.




2. On “Adjustment” screen, use the function switch to select “Pump Absorption Torque”.

   **REMARK**

   Method of selecting is similar to “Service Menu” screen.




3. After the “Pump Absorption Torque” screen is displayed, select the desired value at the right side by using the function switches.

   Set value: For the actual torque adjustment value, see table.

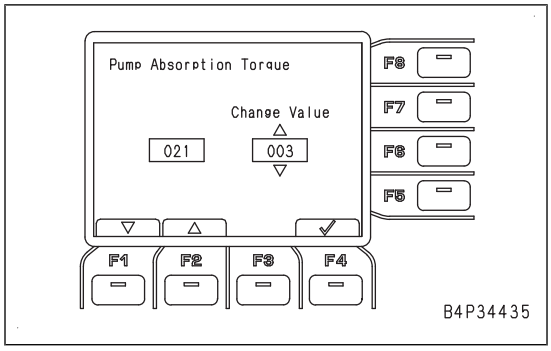
   F1: Decreases the set value

   F2: Increases the set value

   F4: Checks and enters setting. Returns to “Adjustment” screen.

   **REMARK**

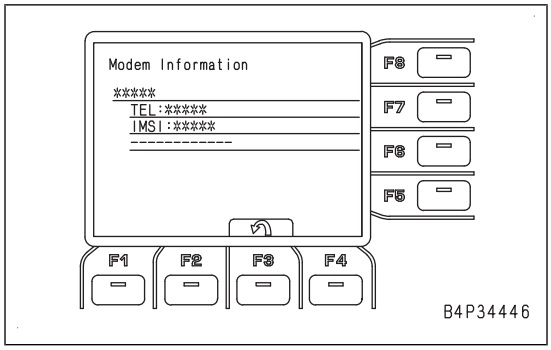
   The 3-digit number in the left column does not change since it is the code of this function.




**Relation between set value and torque adjustment value**

| Code | Set value | Torque adjustment value |
|---|---|---|
| 021 | 000 | +14.7 Nm {+1.5 kgfm} |
| | 001 | +9.8 Nm {+1 kgfm} |
| | 002 | +4.9 Nm {+0.5 kgfm} |
| | 003 | 0 Nm {0 kgfm} |
| | 004 | -4.9 Nm {-0.5 kgfm} |
| | 005 | -9.8 Nm {-1 kgfm} |
| | 006 | -14.7 Nm {-1.5 kgfm} |

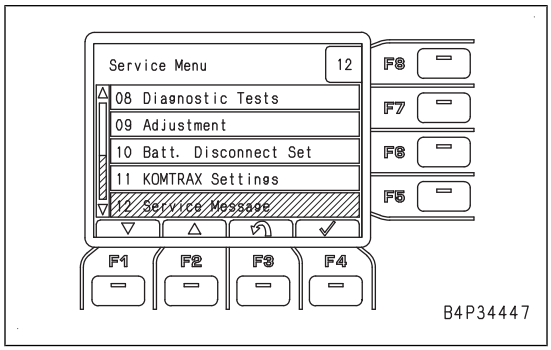
3. Display the phone number and IMSI.
   F3: Returns the screen to “KOMTRAX Settings” screen




## METHOD FOR DISPLAYING SERVICE MESSAGE

Special messages for the technician sent from KOMTRAX base station (a distributor, etc.) can be checked with this function.

1. Select “Service Message” on “Service Menu” screen.




2. Displaying message
   - Displaying message (read only)

     If there is a message, its contents are displayed. If there is no message, “No message.” is displayed.

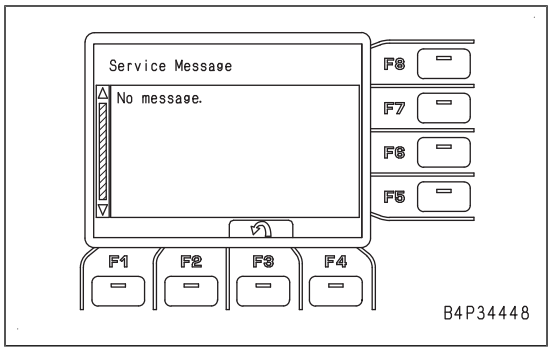
     F1: Moves to the next page (when a message is more than 2 pages long)

     F2: Moves to the previous page (when a message is more than 2 pages long)

     F3: Returns the screen to “Service Menu” screen

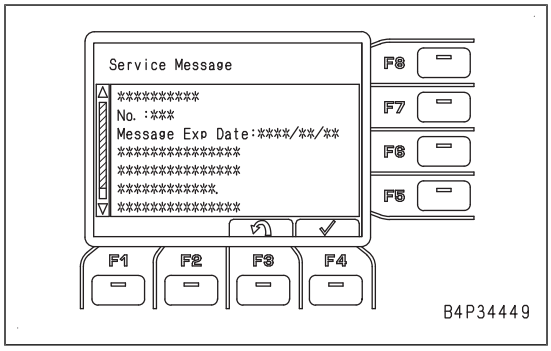
     **REMARK**

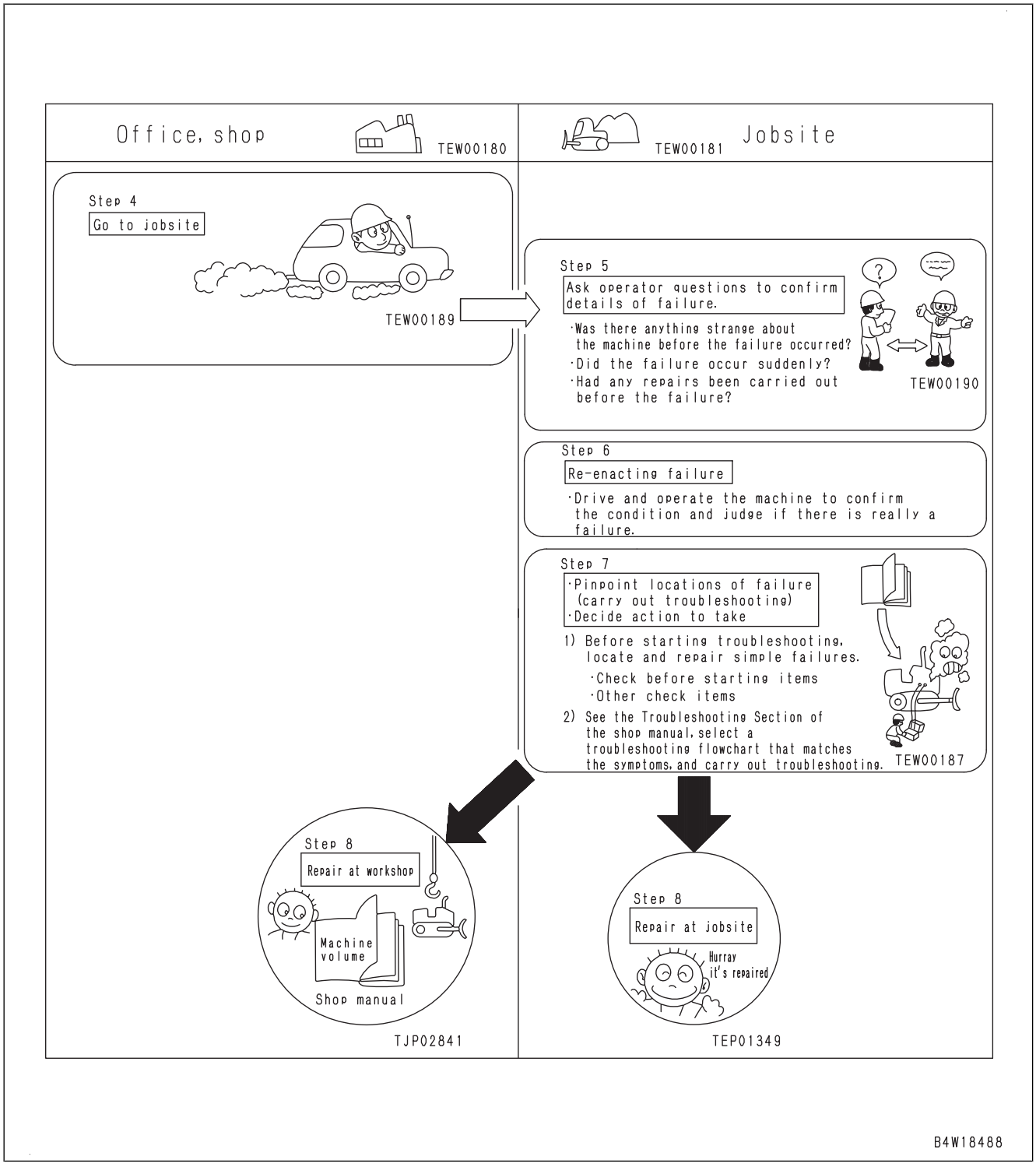
     - The message is different from that sent to the operator in the operator mode.
     - This message is only for the technician. Even if a message is received, the message monitor is not displayed in the same way as the display in the operator mode.




   - Display of message (with message return function)

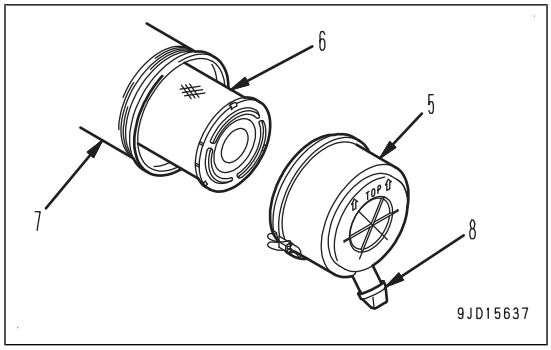
     When the guidance icon of F4 is displayed, press F4 and display the message reply screen.



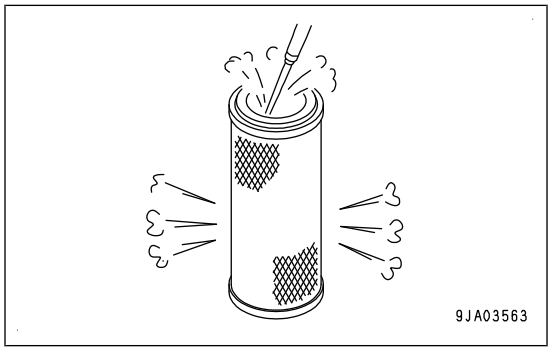

Office, shop
TEW00180
TEW00181
Jobsite
Step 4
Go to jobsite
TEW00189
Step 5
Ask operator questions to confirm details of failure.
·Was there anything strange about the machine before the failure occurred?
·Did the failure occur suddenly?
·Had any repairs been carried out before the failure?
TEW00190
Step 6
Re-enacting failure
·Drive and operate the machine to confirm the condition and judge if there is really a failure.
Step 7
·Pinpoint locations of failure (carry out troubleshooting)
·Decide action to take
1) Before starting troubleshooting, locate and repair simple failures.
·Check before starting items
·Other check items
2) See the Troubleshooting Section of the shop manual, select a troubleshooting flowchart that matches the symptoms, and carry out troubleshooting.
TEW00187
Step 8
Repair at workshop
Machine volume
Shop manual
TJP02841
Step 8
Repair at jobsite
Hurray it's repaired
TEP01349
B4W18488

- Check of gauges and monitors for abnormality
  Check gauges and monitors in the operator's cab for abnormality. If any abnormality is found, replace it with a new one.
  Clean up the surfaces.
- Check of seat belt and mounting hardware
  Check the hook, the lock, and hook mounting part for damage. If any abnormality is found, repair it.

4. Hold outer element (6), rock it lightly up and down and to the right and left, and pull it out while turning it clockwise and counterclockwise.
5. After removing outer element (6), cover the air connector side at the bottom of air cleaner body (7) with a clean cloth or tape to prevent dirt or dust from entering.
6. Clean dust sticking inside air cleaner body (7) and on cover (5) by using a clean cloth or brush.
7. If any dust is attached to vacuator valve (8) installed to cover (5), remove it.

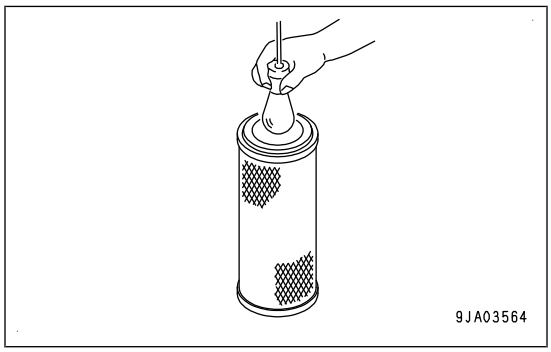



8. When outer element (6) has been cleaned 5 times or used for 1 year, replace it.
9. Blow dry compressed air (max. 0.2 MPa {max. 2.1 kgf/cm$^2$} ) from the inside of outer element (6) along the pleats.
10. Blow along the pleats from the outside, then blow again from the inside.




11. After cleaning, illuminate the inside of the element with an electric bulb to check.

    If any holes or thin places are found, replace the outer element with a new one.
12. Remove the cover of cloth or tape attached to the air connector side at the bottom of air cleaner body (7).




**NOTICE**

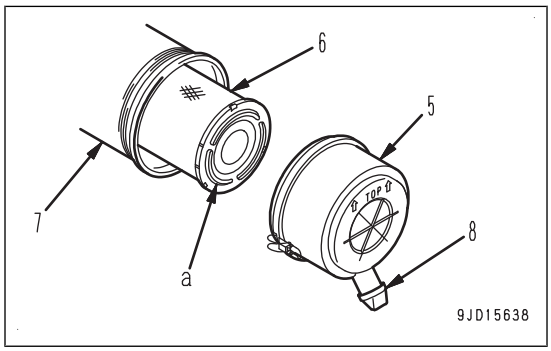
- **Do not use the outer element with damaged pleats or a damaged gasket or seal.**
- **If the outer element and O-ring are cleaned and used again after they are used for more than 1 year, it will cause problems. Do not use them again.**

13. Check the seal of cleaned or new outer element (6) for adhesion of dusts and oil.

    If there is adhesion of dusts and oil, wipe them off.

**NOTICE**

- **Be sure to install the air cleaner element facing in the correct direction. Install so that the bottom of the air cleaner element (a) (face where no hole is drilled) comes to cover (5) end.**
  **If it is installed in wrong direction, it may cause breakage of the air cleaner element or serious damage to the engine.**
- **When inserting the element into the body, if the rubber at the tip is swollen or the outer element is not pushed in straight, and cover (5) is installed by force with hook (4), there is a danger that hook (4) and air cleaner body may be damaged, so be careful when installing.**




14. Push outer element (6) straight into air cleaner body (7) with your hand.

11) Close dirt cover (6).

6. Set rod (4) to FREE position (F), and close cooling cover (3).
7. Close engine rear cover (1).

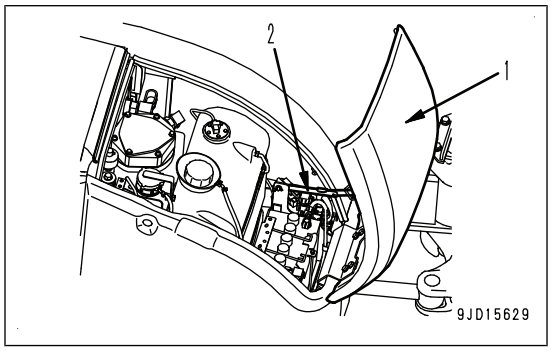
## CHECK HYDRAULIC OIL STRAINER

**⚠ Immediately after the engine is stopped, its parts and oil are still very hot, and may cause burn injury. Accordingly, wait until all parts have cooled down before starting the work.**

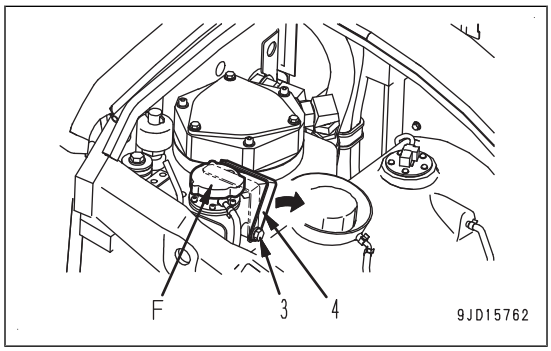
**⚠ When removing the oil filler cap, the oil may spout out. Turn it slowly to release the internal pressure, then remove it.**

1. Open dirt cover (1).

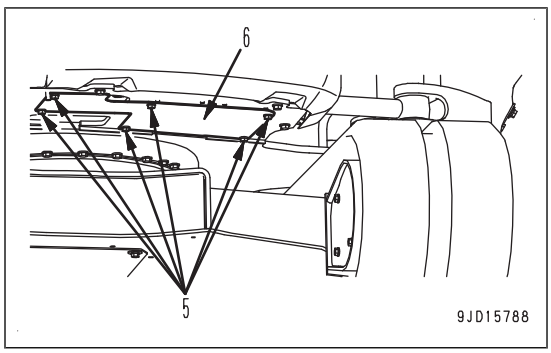
   Open dirt cover (1) fully and it will be secured by cover support lever (2).




2. Loosen bolt (3) of the hydraulic tank, move plate (4) on oil filler port (F), turn the cap of oil filler port (F) slowly to remove it, and release the internal pressure.



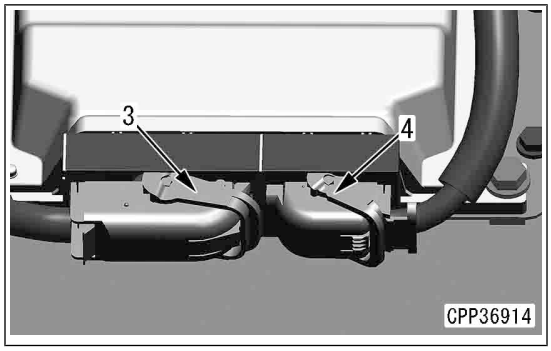

3. Loosen bolts (5) at the bottom of hydraulic tank, and remove undercover (6).

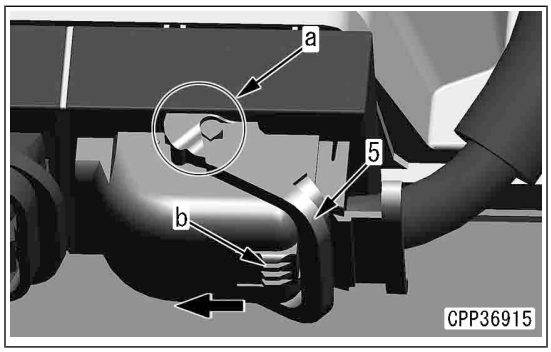


3. Connect the adapter for troubleshooting to connector CP01 (3) and connector CP02 (4).

   **REMARK**

   Pull up lever (5) of connector CP01 (3) and connector CP02 (4) in the direction of the arrow while pressing hook (b).

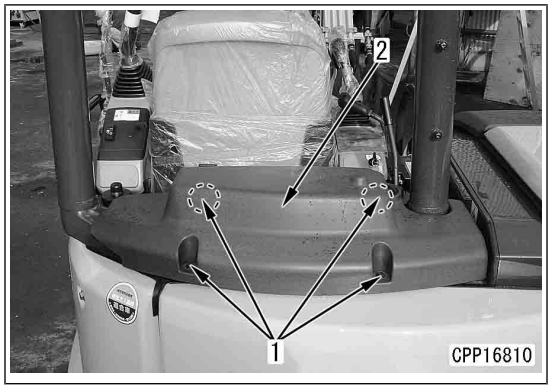


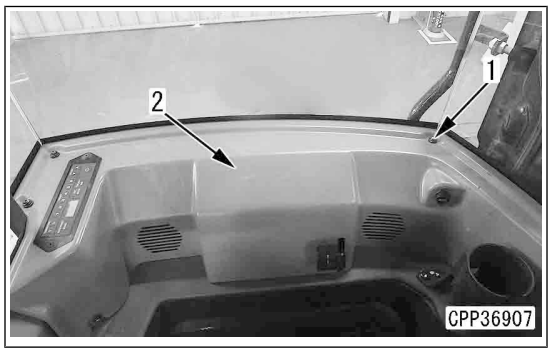

## KOMTRAX terminal

1. Remove bolts (1), and remove cover (2).

   (For the canopy spec)

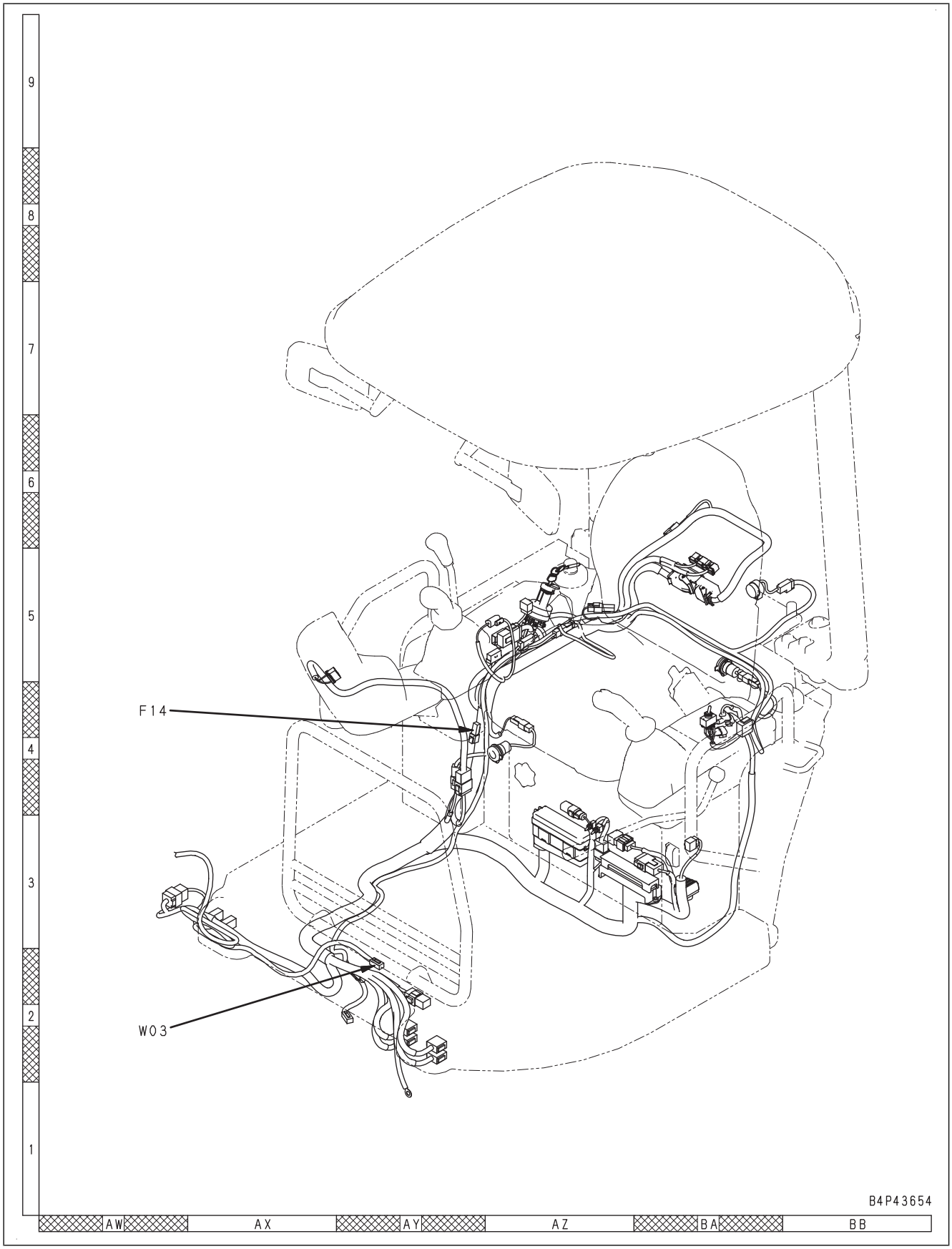



   (For the operator's cab spec)



| Connector No. | Connector type | Number of pins | Location | Three-dimensional drawing address |
|---|---|---|---|---|
| F21 | M | 2 | Cab revolving lamp (cab) (if equipped) | Q-9, AU-9 |
| F22 | M | 2 | Intermediate connector (cab) | P-9, AS-9 |
| F22A | DT | 2 | Cab travel lamp (cab) | AD-6, BH-6 |
| F22B | DT | 2 | Additional working lamp/Cab additional lamp (cab) (if equipped) | Z-8, BD-8 |
| F23 | M | 3 | Intermediate connector (cab) | O-9, AT-9 |
| F24 | M | 3 | Intermediate connector (cab) | Q-9, AU-9 |
| F25 | DT-A | 8 | Intermediate connector | N-1, AR-1 |
| F26 | DT-A | 12 | ATT switch lever (if equipped) | M-6, AQ-6 |
| F27 | DT | 4 | Wiper motor and switch (cab) | Z-1, BD-1 |
| F28 | YAZAKI | 2 | Buzzer | M-6, AQ-6 |
| F29 | DT-T | 12 | Attachment switch lever | AV-5 |
| F31 | - | 2 | Speaker (left) (cab) | AD-4, BH-4 |
| F32 | - | 2 | Speaker (right) (cab) | AD-3, BH-3 |
| F37 | DT | 12 | Service connector | Q-1, AU-1 |
| F38 | DT | 2 | Travel speed increase switch | M-5, AQ-5 |
| F50 | YAZAKI | 2 | Buzzer | AV-5 |
| F51 | DT | 2 | Quick coupler valve | AR-1 |
| F52 | DT | 2 | Revolving lamp | AU-9 |
| F53 | YAZAKI | 2 | Optional power supply | AR-9 |
| FB1 | Terminal | 15 | Fuse box | Q-1, AU-1 |
| HI PRESS PUMP | - | 2 | SUPPLY PUMP | BK-2 |
| INJECTOR#1 | - | 2 | Injector #1 | BK-8 |
| INJECTOR #2 | - | 2 | Injector #2 | BL-8 |
| INJECTOR #3 | - | 2 | Injector #3 | BM-8 |
| INJECTOR #4 | - | 2 | Injector #4 | BN-7 |
| INTAKE THROTTLE | - | 6 | Intake throttle | BI-3 |
| J01 | J | 20 | Junction connector | R-2, AV-2 |
| J02 | J | 20 | Junction connector | R-2, AV-2 |
| J03 | J | 20 | Junction connector | R-2, AV-2 |
| M01 | Y 090 2 | 2 | Horn | I-1, AL-1 |
| M01 | YAZAKI PA | 9 | Radio (if equipped) | AC-2, AL-1 |
| M01A | - | 3 | Radio (if equipped) | AB-1, BF-1 |
| M01B | M | 3 | AUX jack (if equipped) | AD-5, AD-5 |
| M02 | KES | 2 | Window washer motor (cab) | D-7, AH-7 |
| M05 | L | 2 | Fusible link | F-9, AJ-9 |
| M06 | SDD | 3 | Fuel level sensor | G-9, AK-9 |

9/11 (canopy specifications, quick coupler specifications)



| Part No. | Part name | Number of pins | ID marking | T-adapter kit | | | | | | Non-kit part |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 799-A65-4600 | 799-902-9300 | | | | | |
| 799-601-4620 | Adapter for controller (ENG-T4) | 4 | 799-601-4620 | ● | | | | | | |
| 799-601-4630 | Adapter for controller (ENG-T4) | 2 | 799-601-4630 | ● | | | | | | |
| 799-601-4640 | Adapter for controller (ENG-T4) | 2 | 799-601-4640 | ● | | | | | | |
| 799-601-4651 | Adapter for controller (ENG-T4) | 24 | 799-601-4651 | ● | | | | | | |
| 799-601-4660 | Adapter for controller (ENG-T4) | 3 | 799-601-4660 | ● | | | | | | |
| 799-902-9310 | Adapter for control box | 19 | 799-902-9310 | | ● | | | | | |
| 799-902-9320 | Adapter for IMU | 10 | 799-902-9320 | | ● | | | | | |
| 799-902-9330 | Adapter for MS cylinder | 6 | 799-902-9330 | | ● | | | | | |
| 799T-601-4611 | KDPF differential pressure sensor short socket adapter | 4 | 799T-601-4611 | ● | | | | | | |
| 799T-601-4670 | KDPF outlet pressure sensor short socket adapter | 4 | 799T-601-4670 | ● | | | | | | |
| 799T-601-4680 | KDPF dummy temperature sensor | 4 | 799T-601-4680 | ● | | | | | | |

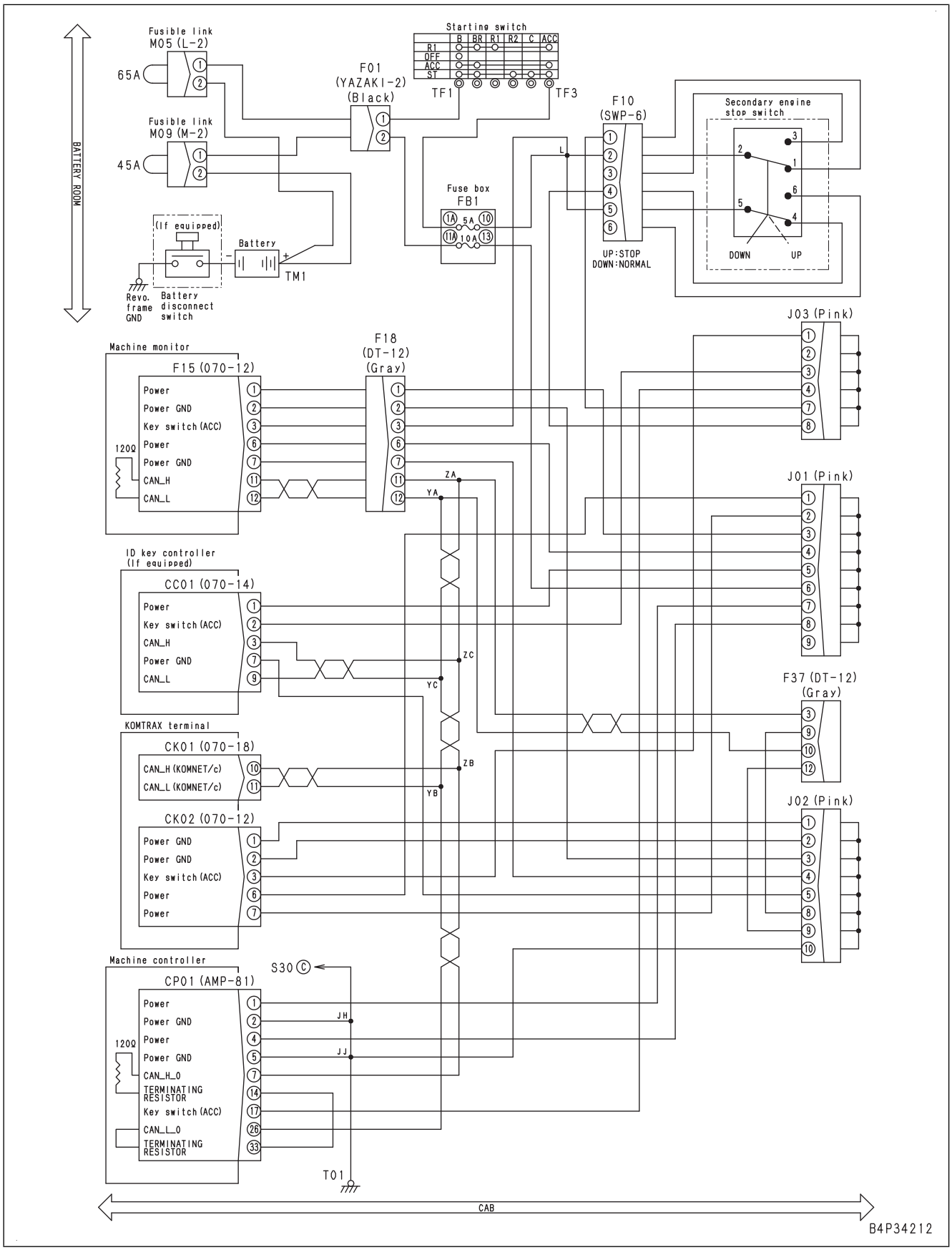
| Failure code | Failure (Displayed on screen) | Applicable component | Action level | History category | Remarks |
|---|---|---|---|---|---|
| #B1467 | Actuator Drive Circuit 3 Short to Ground | ENG | L01 | Electrical system | *1 |
| #B1469 | AD Converter Error 1 | ENG | L04 | Electrical system | *1 |
| #B1470 | AD Converter Error 2 | ENG | L04 | Electrical system | *1 |
| #B1471 | External Monitoring IC and CPU Error 1 | ENG | L04 | Electrical system | *1 |
| #B1472 | External Monitoring IC and CPU Error 2 | ENG | L04 | Electrical system | *1 |
| #B1473 | ROM Error | ENG | L04 | Electrical system | *1 |
| #B1474 | Shutoff Path Error 1 | ENG | L04 | Electrical system | *1 |
| #B1475 | Shutoff Path Error 2 | ENG | L04 | Electrical system | *1 |
| #B1476 | Shutoff Path Error 3 | ENG | L04 | Electrical system | *1 |
| #B1477 | Shutoff Path Error 4 | ENG | L04 | Electrical system | *1 |
| #B1478 | Shutoff Path Error 5 | ENG | L04 | Electrical system | *1 |
| #B1479 | Shutoff Path Error 6 | ENG | L04 | Electrical system | *1 |
| #B1480 | Shutoff Path Error 7 | ENG | L04 | Electrical system | *1 |
| #B1481 | Shutoff Path Error 8 | ENG | L04 | Electrical system | *1 |
| #B1482 | Shutoff Path Error 9 | ENG | L04 | Electrical system | *1 |
| #B1483 | Shutoff Path Error 10 | ENG | L04 | Electrical system | *1 |
| #B1484 | Recognition Error of Engine Speed | ENG | L04 | Electrical system | *1 |
| #B148A | EGR Stuck Open Valve Error | ENG | L03 | Electrical system | *1 |
| #B1562 | Charge Switch Open Circuit | ENG | L01 | Electrical system | *1 |
| #B1568 | Charge Alarm | ENG | L03 | Mechanical system | *1 |
| #B1608 | Excessive Voltage of Supply 1 | ENG | L04 | Electrical system | *1 |
| #B1609 | Sensor Supply Voltage Error 1 | ENG | L01 | Electrical system | *1 |
| #B160E | EEPROM Memory Read Error | ENG | L03 | Electrical system | *1 |

# FAILURE CODE [AS00R4]

| Action level | Failure code | Failure | Inducement 2 (NOx Device Abnormality) (Engine controller system) |
|---|---|---|---|
| L04 | AS00R4 | | |
| Detail of failure | • A certain time has passed since [AS00R3] occurs.<br>• An abnormality of NOx devices has occurred again within a certain time since abnormality repair of NOx device. | | |
| Action of controller | • Displays the information related to this failure code on the monitor screen.<br>• Derate engine power for operation largely. | | |
| Phenomenon on machine | • Engine output is lowered, work equipment speed and travel speed are lowered. | | |
| Related information | • From the machine monitor, it is possible to perform a “Temporary restoration from inducement” to cancel engine deration temporarily.<br>• This failure code is detected during engine operation.<br>• If this failure code remains displayed after NOx devices are repaired and the engine controller is shut down, run the engine for 1 minute to clear the failure code.<br>• After this failure code is cleared, engine power deration continues until the starting switch is turned to OFF position. | | |

| No. | Cause | Procedure, measuring location, criteria and remarks |
|---|---|---|
| 1 | NOx devices has an abnormality (EGR system) | Since the failure code of NOx device abnormality is displayed, perform troubleshooting for that failure code. |
| 2 | Abnormal engine system | If any other failure codes than NOx device abnormality are displayed, perform troubleshooting for the displayed failure code. |

## Circuit diagram related to CAN2 communication



# FAILURE CODE [DAFQKR]

| Action level | Failure code | Failure | CAN 2 Defective Communication (Monitor) (KOMTRAX system) |
|---|---|---|---|
| - | DAFQKR | | |
| Detail of failure | KOMTRAX terminal does not recognize machine monitor through CAN communication 2 line. | | |
| Action of controller | | | |
| Phenomenon on machine | System may not operate normally. | | |
| Related information | • After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.<br>• ACC signal of starting switch is the command to start CAN communication for each controller.<br>• Failure code is transmitted to and displayed on machine monitor by CAN communication. If CAN communication with machine monitor fails, failure code [DAFQKR] is not displayed on machine monitor. It can be observed only through KOMTRAX system.<br>• Since each controller and machine monitor are connected directly to the battery, they are supplied with power even after the starting switch is turned to OFF position.<br>• Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter. | | |

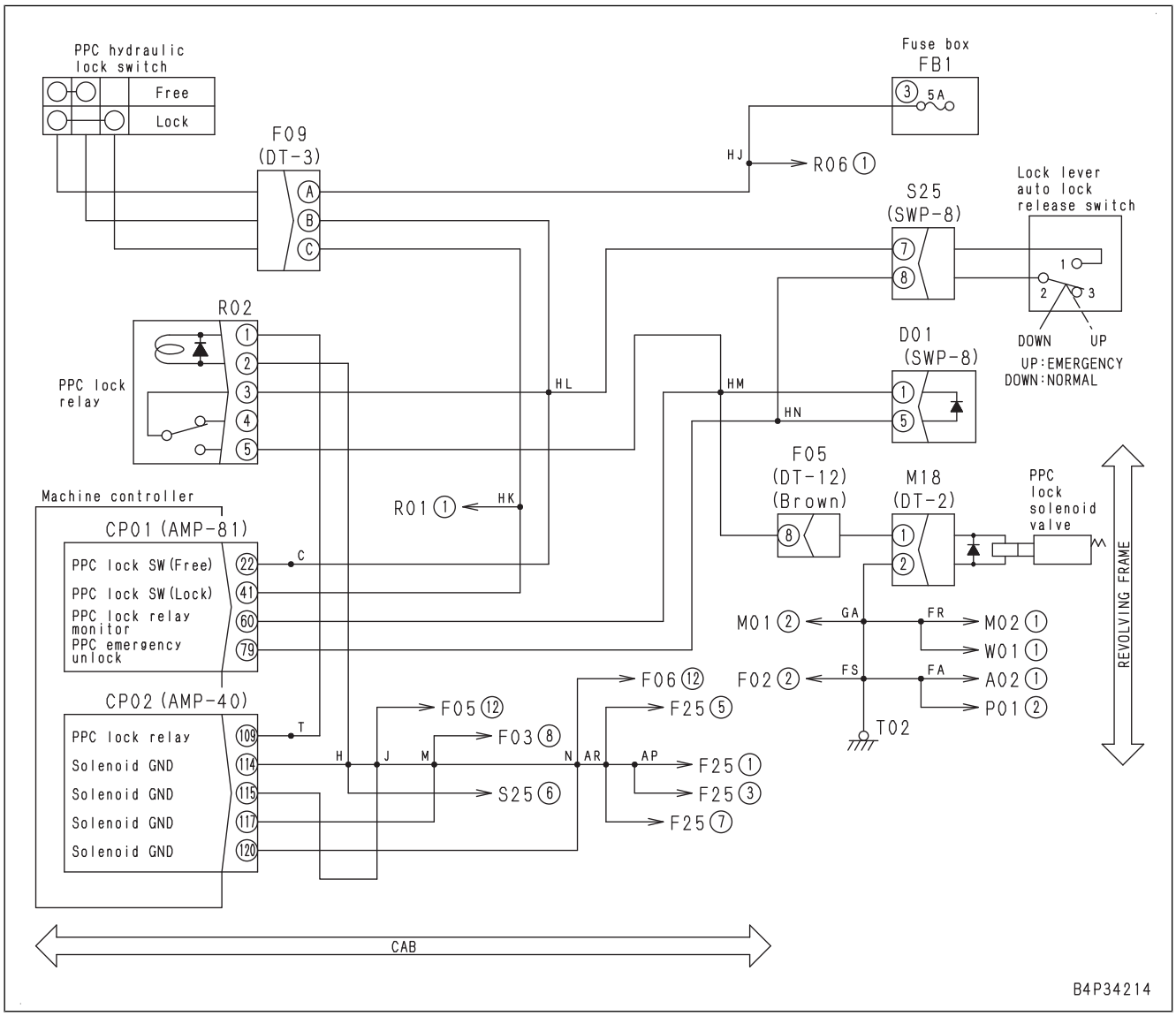
| No. | Cause | Procedure, measuring location, criteria and remarks |
|---|---|---|
| 1 | Defective power supply to machine monitor | Perform troubleshooting for “When starting switch is turned to ON position, machine monitor displays nothing” of E mode. |
| 2 | Defective CAN communication | Perform checks on cause 4 and subsequent causes in troubleshooting for failure code [DBHQKR]. |

# FAILURE CODE [DBH9KQ]

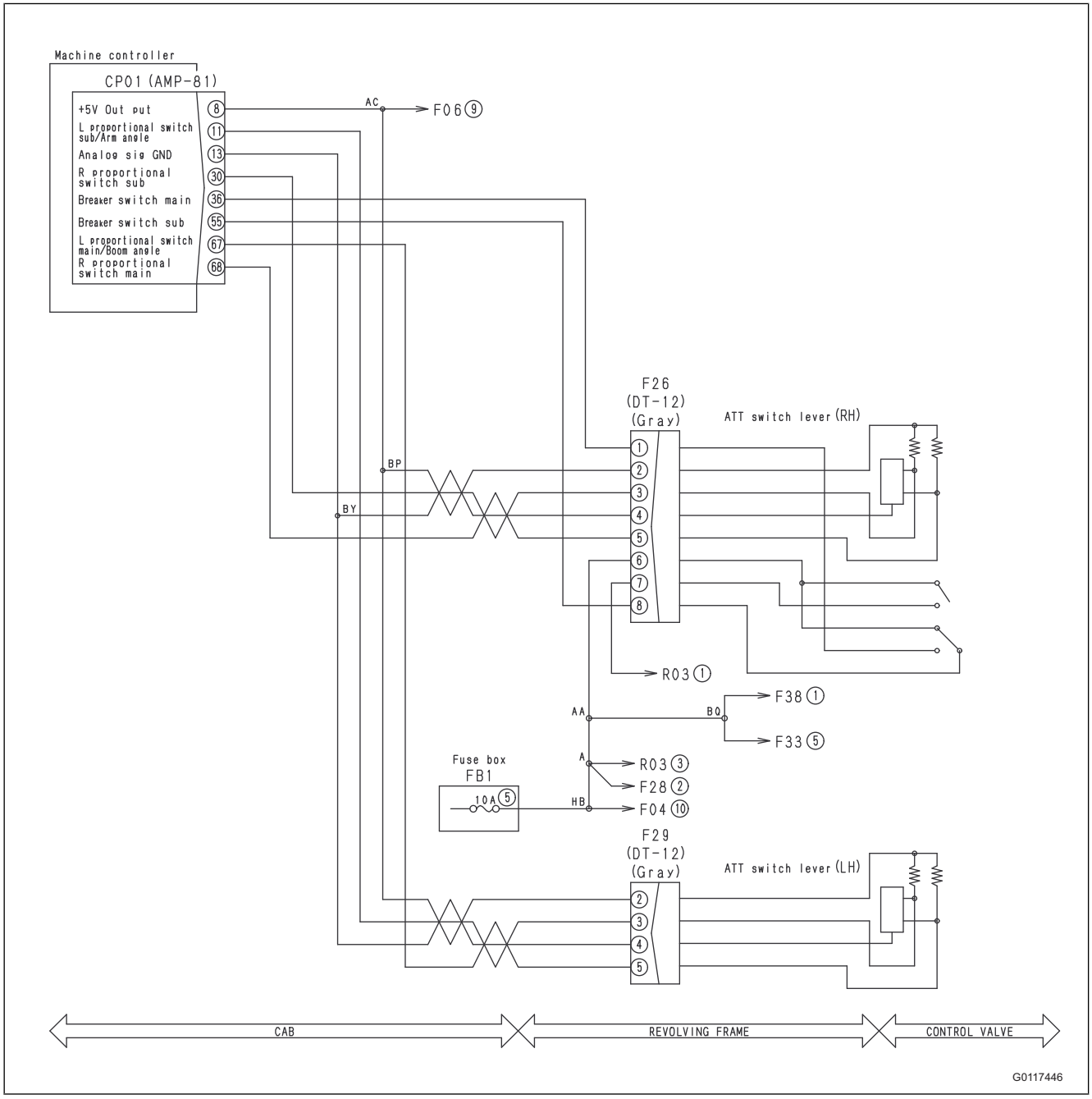
| Action level | Failure code | Failure | Model Selection Signal Mismatch (Machine Controller) (Machine controller system) |
|---|---|---|---|
| L01 | DBH9KQ | | |
| Detail of failure | Model code signal for model which is not registered in controller is input. | | |
| Action of controller | Controls machine by regarding it as default model (PC55MR standard specification machine).<br>Even if cause of failure disappears, machine does not become normal until the starting switch is turned to OFF position. | | |
| Phenomenon on machine | No problem appears if machine is PC55MR standard specification machine. | | |
| Related information | • Part number of machine controller assembly can be checked with monitoring function. (Code: 20294)<br>• Signal state (ON/OFF) of model selection signal can be checked with monitoring function. (Code: 02201)<br>• PC55MR-5<br>Model selection signal 1: ON<br>Model selection signal 2: OFF<br>• PC45MR-5<br>Model selection signal 1: OFF<br>Model selection signal 2: ON<br>• After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. | | |

| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 1 | Defective model selection connector (Internal open or short circuit) (PC55MR-5) | 1. Turn starting switch to OFF position.<br>2. Disconnect connector S30, and connect T-adapter to female side. | | |
| | | Resistance | Between S30 (female) (A) and (C) | Max. 1 Ω |
| | | | Between S30 (female) (A) and (B) | Min. 1 MΩ |
| | | | Between S30 (female) (B) and (C) | Min. 1 MΩ |
| 2 | Defective model selection connector (Internal open or short circuit) (PC45MR-5) | 1. Turn starting switch to OFF position.<br>2. Disconnect connector S30, and connect T-adapter to female side. | | |
| | | Resistance | Between S30 (female) (B) and (C) | Max. 1 Ω |
| | | | Between S30 (female) (A) and (B) | Min. 1 MΩ |
| | | | Between S30 (female) (A) and (C) | Min. 1 MΩ |
| 3 | Open circuit in wiring harness (Wire breakage or defective contact of connector) (PC55MR-5) | 1. Turn starting switch to OFF position.<br>2. Disconnect connector CP01 and connect T-adapter to female side. | | |
| | | Resistance | Between CP01 (female) (63) and ground | Max. 1 Ω |
| 4 | Open circuit in wiring harness (Wire breakage or defective contact of connector) (PC45MR-5) | 1. Turn starting switch to OFF position.<br>2. Disconnect connector CP01 and connect T-adapter to female side. | | |
| | | Resistance | Between CP01 (female) (57) and ground | Max. 1 Ω |

## Circuit diagram related to PPC lock switch

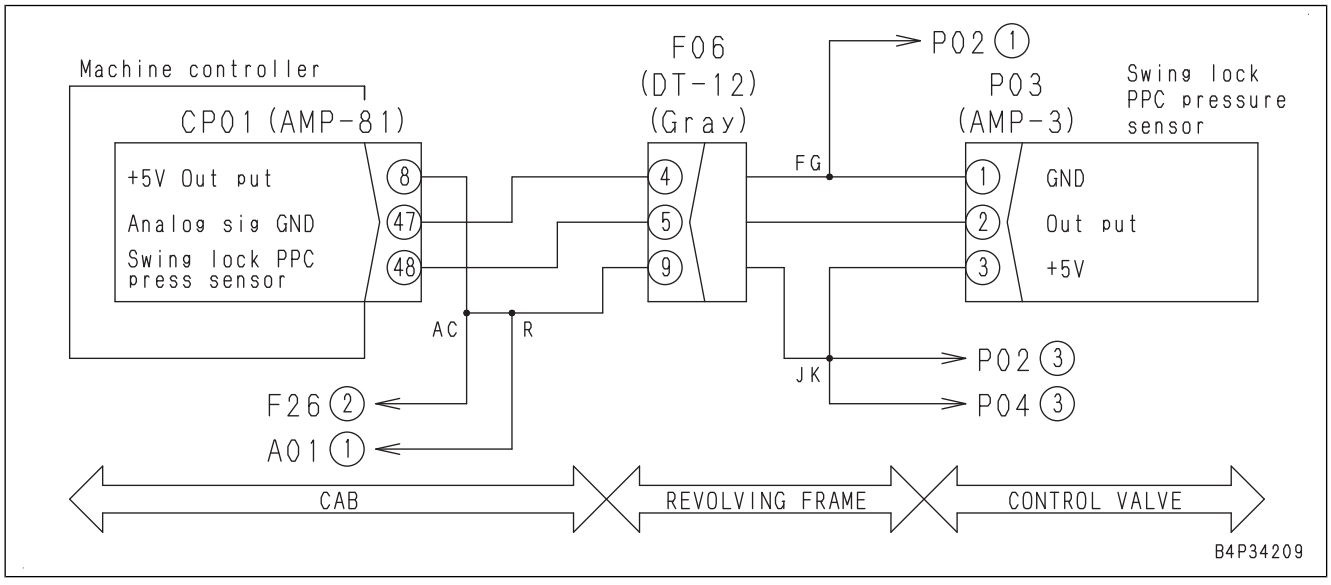


## Circuit diagram related to service lever potentio 2



| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 5 | Defective PPC pressure sensor for swing parking brake release | 1. Turn the starting switch to OFF position.<br>2. Insert the T-adapter into connector P03.<br>3. Turn the starting switch to ON position. | | |
| | | Voltage | Between P03 (2) and (1) | 0.5 to 4.5 V |
| | | **REMARK**<br>If power supply voltage is normal and sensor output voltage is abnormal, it is difficult to determine the failure between ground fault and hot short circuit in wiring harness. Check as follows.<br>1. Turn the starting switch to OFF position.<br>2. Replace connector P03 with connector of another PPC pressure sensor.<br>3. Turn the starting switch to ON position and display the Electrical Sys Abnormality Record screen of machine monitor.<br>4. If E mark is not displayed again in this failure code column, swing parking brake release PPC pressure sensor is defective.<br>**REMARK**<br>After the troubleshooting, always restore the connector. | | |
| 6 | Defective machine controller | If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.) | | |

## Circuit diagram related to swing PPC pressure sensor

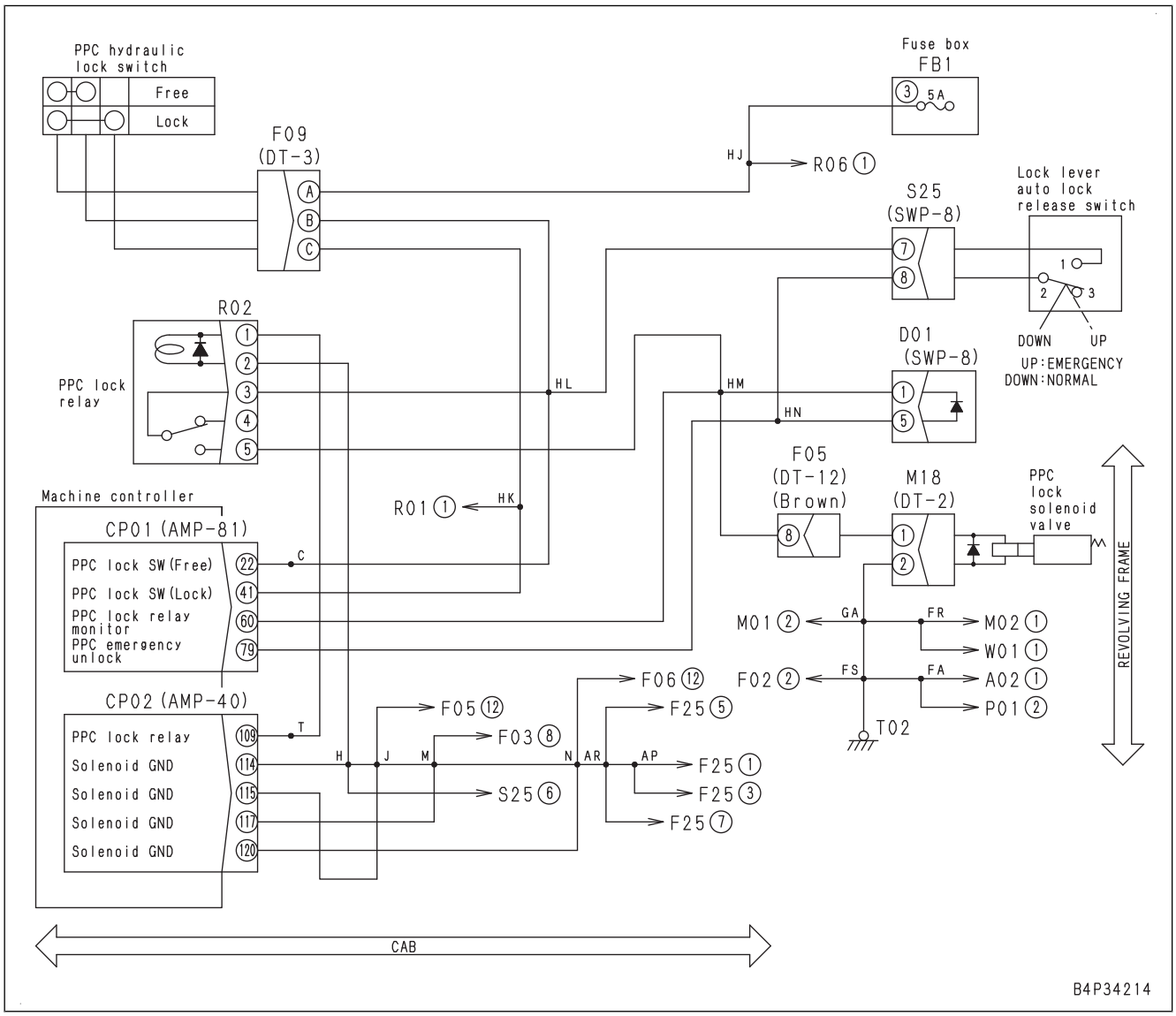


# FAILURE CODE [DV20KB]

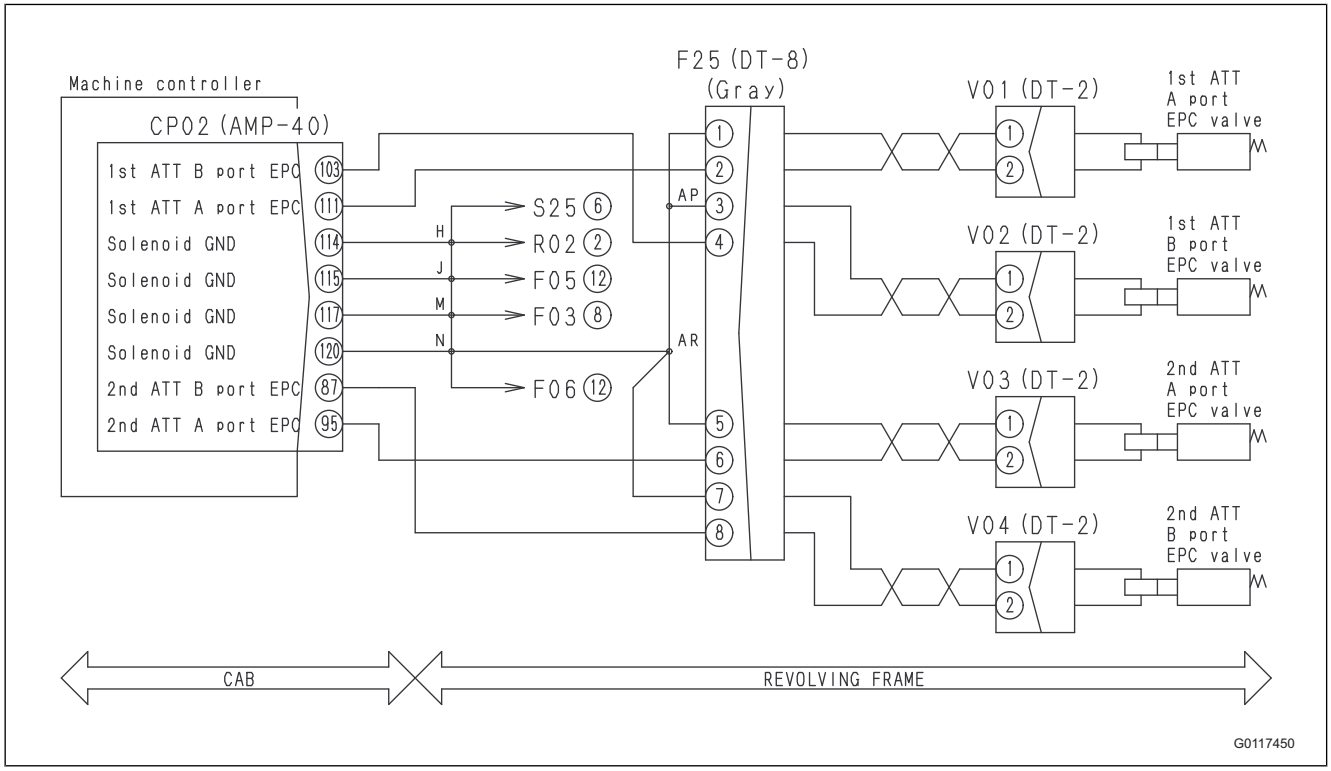
| Action level | Failure code | Failure | Travel Alarm Short Circuit (Machine controller system) |
|---|---|---|---|
| L01 | DV20KB | | |
| Detail of failure | Abnormal current flows when driving the travel alarm circuit. | | |
| Action of controller | • Stops driving the travel alarm circuit.<br>• Even if cause of failure disappears, machine does not become normal until starting switch is set to OFF position. | | |
| Phenomenon on machine | Travel alarm does not sound. | | |
| Related information | As T-adapter for machine controller connector is “socket-type box”, operating voltage cannot be measured at machine controller connector. | | |

| No. | Cause | Procedure, measuring location, criteria and remarks | | | |
|---|---|---|---|---|---|
| 1 | Defective travel alarm (Internal defect) | 1. Turn the starting switch to OFF position.<br>2. Disconnect connector M08, and connect T-adapter to female side.<br>3. Turn the starting switch to ON position.<br>4. Perform troubleshooting by control of travel lever.<br>⚠ **When driving machine, do not measure under the machine.**<br>**REMARK**<br>• When travel lever is set to the travel position, voltage is applied usually to the travel alarm connector before machine moves off.<br>• If the following voltage is normal but travel alarm does not sound, travel alarm is defective. | | | |
| | | Voltage | Between M08 (female) (1) and (2) | Travel lever: Neutral | Max. 1 V |
| | | | | Travel lever: Operated | 10 to 15 V |
| 2 | Ground fault in wiring harness (Contact with ground circuit) | 1. Turn the starting switch to OFF position.<br>2. Disconnect connectors CP02 and M08, and connect T-adapter to either female side. | | | |
| | | Resistance | Between CP02 (female) (86) and ground, or M08 (female) (1) and ground | | Min. 1 MΩ |
| 3 | Defective machine controller | 1. Turn the starting switch to OFF position.<br>2. Disconnect connector M08, and connect T-adapter to female side.<br>3. Turn the starting switch to ON position.<br>4. Perform troubleshooting by control of travel lever.<br>⚠ **When driving machine, do not measure under the machine.** | | | |
| | | Voltage | Between M08 (female) (1) and (2) | Travel lever: Neutral | Max. 1 V |
| | | | | Travel lever: Operated | 10 to 15 V |

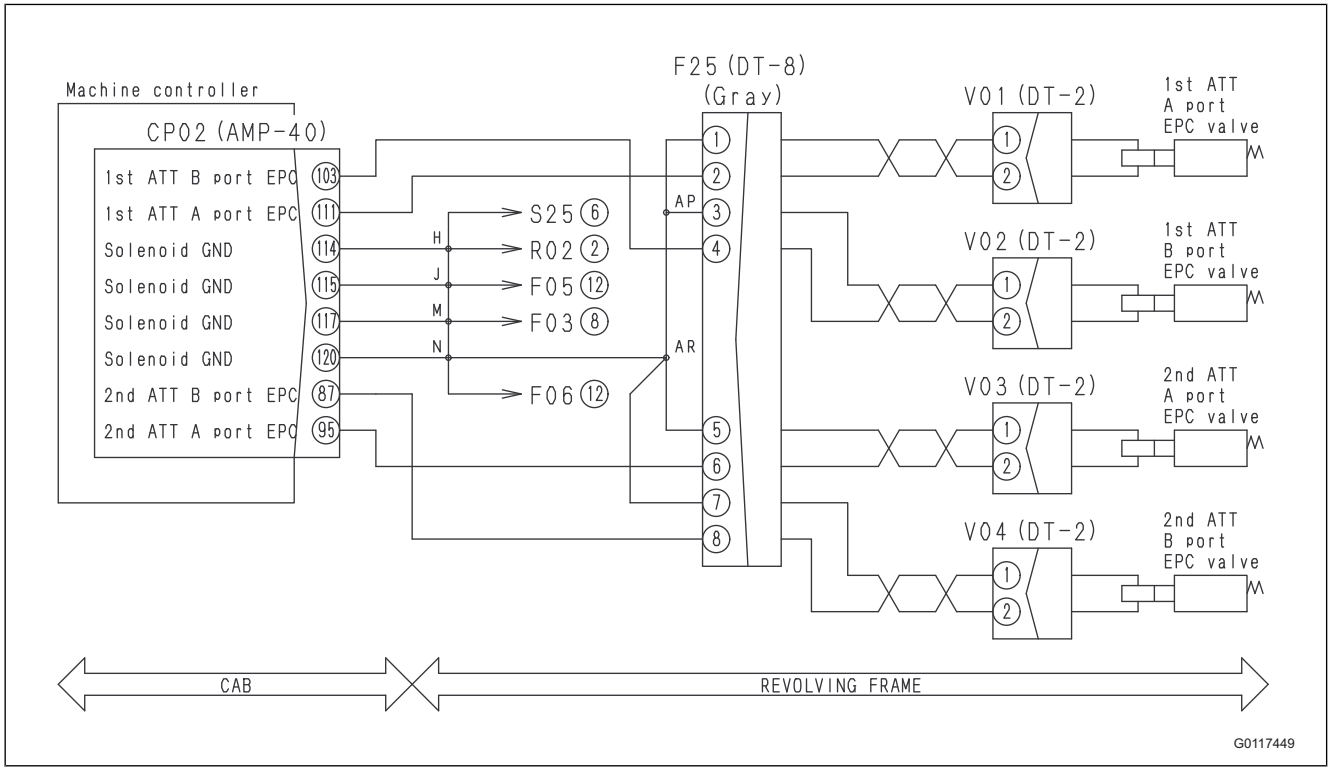
## Circuit diagram related to PPC lock switch



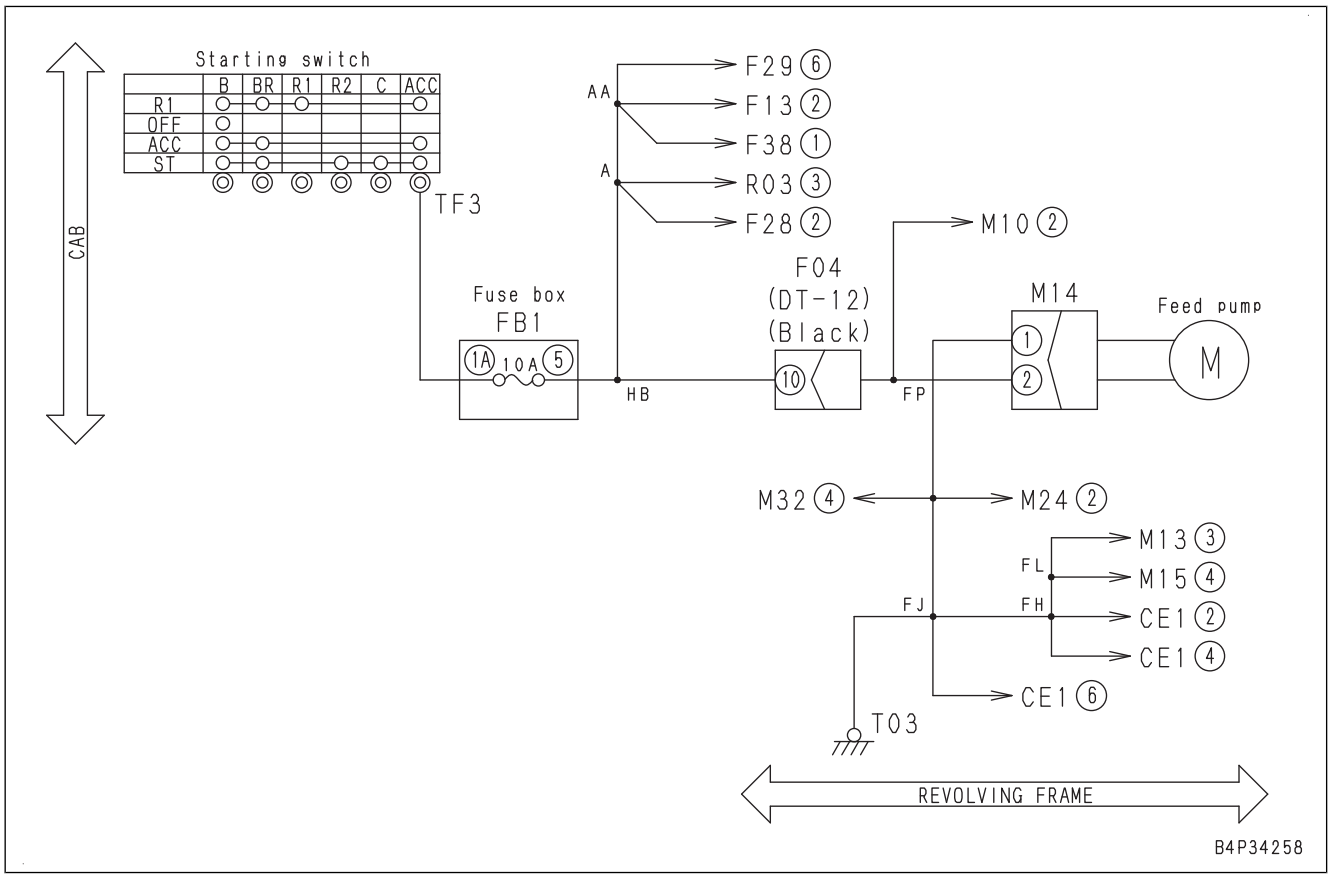
## Circuit diagram related to ATT flow rate adjustment EPC



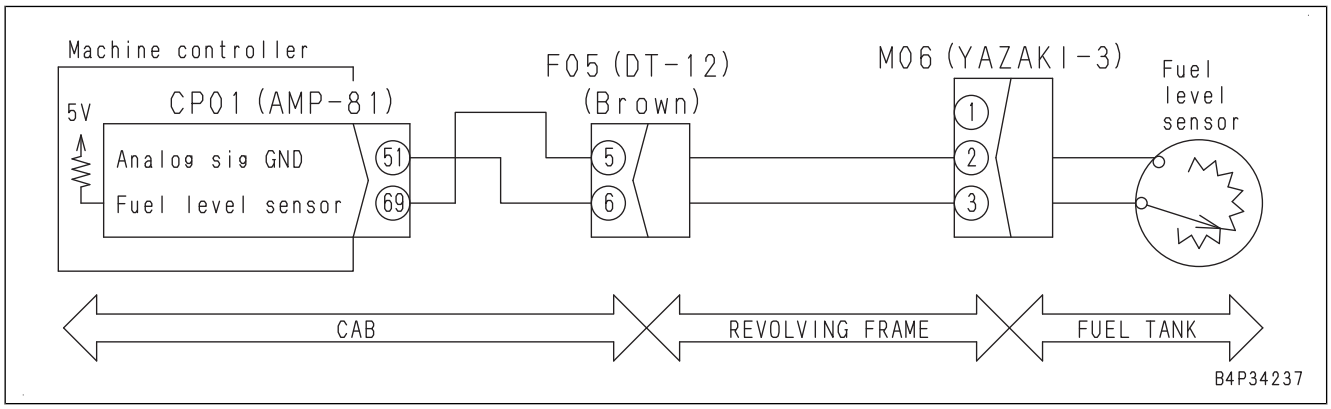
## Circuit diagram related to ATT flow rate adjustment EPC



## CIRCUIT DIAGRAM (ELECTRIC FUEL FEED PUMP SWITCH)



## Circuit diagram related to fuel level sensor



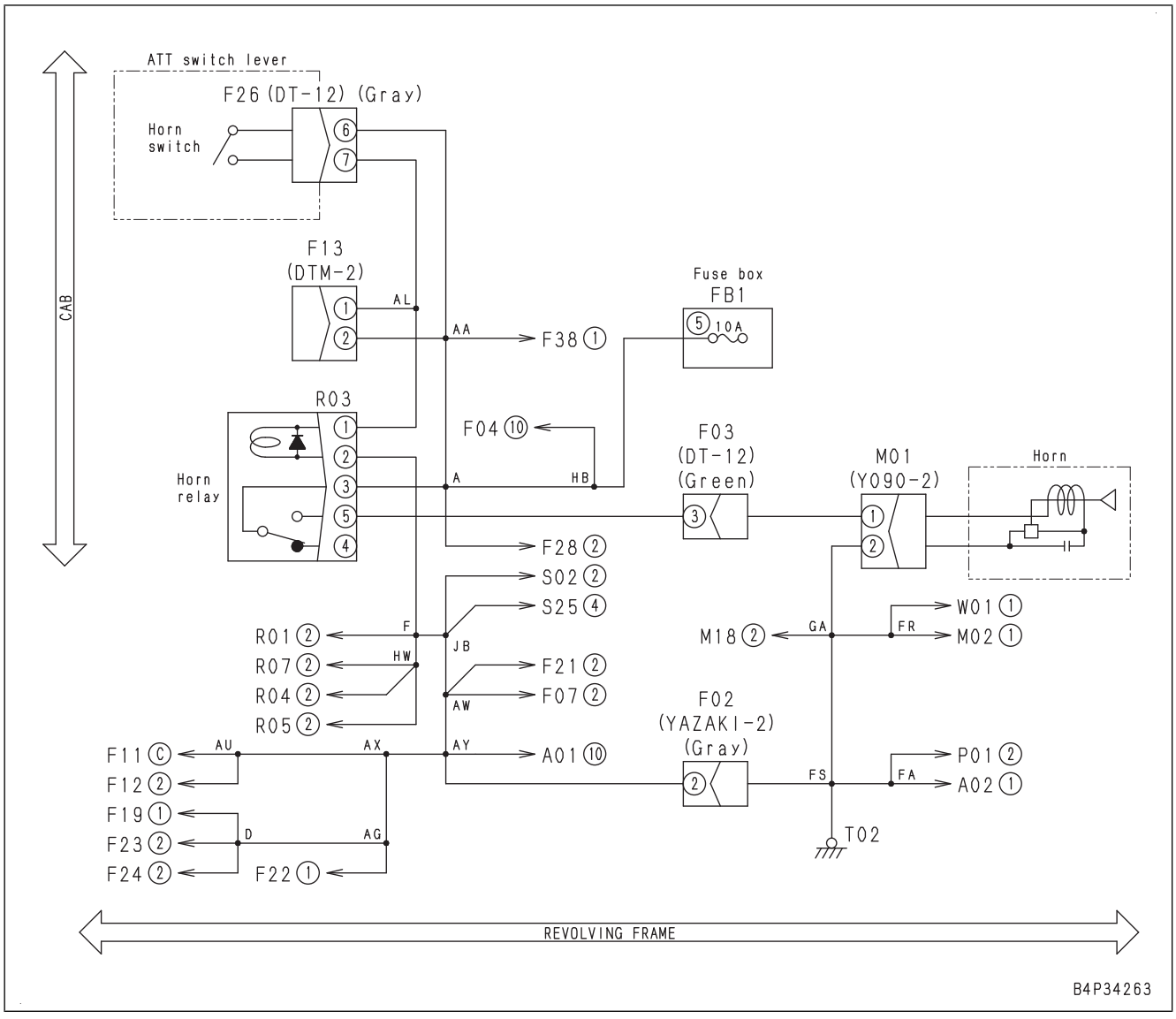
# E-21 SERVICE METER IS NOT DISPLAYED, WHILE STARTING SWITCH IS IN OFF POSITION

| | |
|---|---|
| Failure | Service meter is not displayed while starting switch is in OFF position. |
| Related information | • The following switch operation with the starting switch set to OFF position displays a service meter in the middle of the screen.<br>Operation of switches: [F2]+[F3] (pressed simultaneously) |

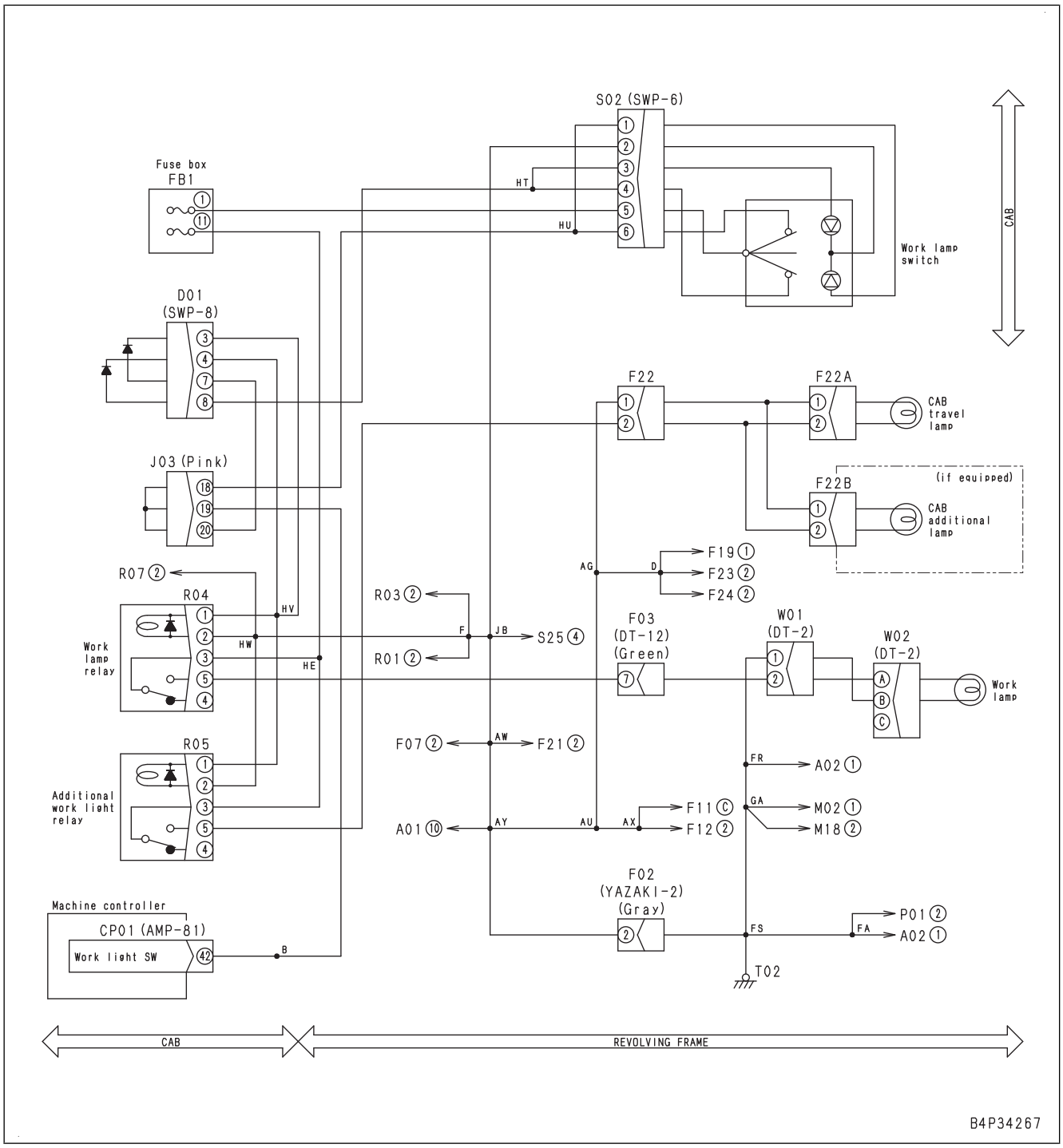
| No. | Cause | Procedure, measuring location, criteria and remarks |
|---|---|---|
| 1 | Defective backup power supply system | When starting switch is turned to ON position and machine monitor displays nothing, backup power supply system may be defective and perform the following troubleshooting:<br>• E-mode “WHEN STARTING SWITCH IS TURNED TO ON POSITION, MACHINE MONITOR DISPLAYS NOTHING” |
| 2 | Defective machine monitor | If failure code still displays after above checks on Cause 1, machine monitor may be defective.<br>(In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.) |

| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 7 | Ground fault in wiring harness<br>(Contact with ground circuit) | If fuse is not blown out, this check is not required.<br>1. Turn the starting switch to OFF position.<br>2. Remove fuse FB1-5.<br>3. Disconnect connectors F26, R03, and M01, and connect T-adapter to each female side. | | |
| | | Resistance | Between ground and F26 (female) (6) or R03 (female) (3) | Min. 1 MΩ |
| | | | Between ground and F26 (female) (7) or R03 (female) (1) | Min. 1 MΩ |
| | | | Between ground and R03 (female) (5) or M01 (female) (1) | Min. 1 MΩ |
| 8 | Defective horn (internal defect) | If no failure is found by above checks, horn may be defective. | | |

## Circuit diagram related to horn (for proportional lever spec)



## Circuit diagram related to working lamp, travel lamp, and additional lamp



# H-2 ALL WORK EQUIPMENTS OR TRAVEL DOES NOT OPERATE

| | |
|---|---|
| Failure | All work equipments or travel does not operate |
| Related information | • Set working mode to power mode (P), and perform all troubleshooting with power mode (P).<br>• Check that the oil level in hydraulic tank is correct.<br>• Perform troubleshooting with the hydraulic oil temperature at 45 to 55 °C.<br>• Check that swing and blade operations are normal. |

| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 1 | Improper adjustment or malfunction of main relief valve | When pressure cannot be adjusted to normal level, main relief valve may malfunction or may have internal defect. Check it. | | |
| | | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | Main relief pressure | • Arm IN relief<br>• Travel hydraulic relief | 26.5 ± 0.98 MPa {270 ± 10 kgf/cm$^2$} |
| 2 | Defective piston pump | Disconnect the discharge hose of main pump and crank the engine with starting motor, and check if the oil flows out from the discharge port.<br>**REMARK**<br>No-Injection cranking is required. For details of procedure, see TESTING AND ADJUSTING, “TEST COMPRESSION PRESSURE”. | | |

# H-13 ALL WORK EQUIPMENTS AND BLADE SPEED OR POWER IS LOW

| | |
|---|---|
| Failure | All work equipments and blade speed or power is low |
| Related information | • Set working mode to power mode (P), and perform all troubleshooting with power mode (P).<br>• Check that the oil level in hydraulic tank is correct.<br>• Perform troubleshooting with the hydraulic oil temperature at 45 to 55 °C.<br>• Check that travel and swing operations are normal.<br>• It is not abnormal that the phenomenon disappears by increasing the engine speed. |

| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 1 | Malfunction of centralized safety valve | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | Main pump relief pressure | • Work equipment control lever: Both directions<br>• Boom swing control pedal: Right swing | 26.5 ± 0.98 MPa {270 ± 10 kgf/cm$^2$} |
| | | Swing and blade pump relief pressure | Blade control lever: LOWER | 21.6 (+0.98/-0.49) MPa {220 (+10/-5) kgf/cm$^2$} |
| | | If the oil pressure in all hydraulic circuits is low in all the preceding checks, centralized safety valve may be defective. Check it.<br>**REMARK**<br>Centralized safety valve works on both sides of head and bottom for boom, arm, and bucket, and it works on head side for swing, and bottom side for blade. | | |

# H-23 HYDRAULIC DRIFT OF BOOM IS LARGE

| | |
|---|---|
| Failure | Hydraulic drift of boom is large. |
| Related information | • Set working mode to power mode (P), and perform all troubleshooting with power mode (P).<br>• Perform troubleshooting with the hydraulic oil temperature at 45 to 55 °C. |

| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 1 | Defective boom cylinder | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | Leakage of boom cylinder | Boom RAISE relief | 10 cc/min |
| 2 | Malfunction of boom control valve (lock valve) | • Check that pilot piston and puppet are seated on body in position (they should not be stuck halfway).<br>• Check if pilot piston and puppet are stuck or seized with lock valve body (they should move smoothly).<br>• Remove pilot piston and puppet from valve body, and check them for flaw and sticking of dirt.<br>• Check puppet spring for fatigue and deformation.<br>• When restoring, be careful about the dirt to enter. | | |
| 3 | Malfunction of boom control valve (spool) | Release the remaining pressure from hydraulic tank and pipes, and then perform troubleshooting with engine stopped. | | |
| | | • Check if boom spool is stuck or seized with control valve body. (Spool should move smoothly.)<br>• Remove boom spool from valve body, and check it for flaw and sticking of dirt.<br>When restoring, be careful about the dirt to enter. | | |
| 4 | Malfunction of centralized safety valve | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | Boom relief pressure | • Boom RAISE relief<br>• Boom LOWER relief | 26.5 ± 0.98 MPa {270 ± 10 kgf/cm$^2$} |
| | | If oil pressure does not become normal after adjustment, check safety valve for malfunction (fatigued spring), internal defect (defective valve seat or entry of dirt), etc. | | |

# H-32 TRAVEL SPEED IS LOW

| | |
|---|---|
| Failure | Travel speed is slow. |
| Related information | • Set working mode to power mode (P), and perform all troubleshooting with power mode (P).<br>• Check that the oil level in hydraulic tank is correct.<br>• Perform troubleshooting with the hydraulic oil temperature at 45 to 55 °C.<br>• Check that machine has no travel deviation.<br>• Travel PPC pressure can be checked on the monitor as well. Code: 07101) |

| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 1 | Malfunction of R.H. travel PPC valve | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | R.H. travel PPC valve outlet pressure | R.H. travel lever: NEUTRAL | 0 MPa {0 kgf/cm$^2$} |
| | | | R.H. travel lever: FORWARD/REVERSE | 2.94(+0.49/-0.1) MPa {30(+5/-1) kgf/cm$^2$} |
| | | Difference between R.H. and L.H. of PPC valve outlet pressure | Travel lever: FORWARD/REVERSE | Within. 0.4 MPa {Within. 4 kgf/cm$^2$} |
| 2 | Malfunction of L.H. travel PPC valve | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | L.H. PPC valve outlet pressure | L.H. travel lever: NEUTRAL | 0 MPa {0 kgf/cm$^2$} |
| | | | L.H. travel lever: FORWARD/REVERSE | 2.94(+0.49/-0.1) MPa {30(+5/-1) kgf/cm$^2$} |
| | | Difference between R.H. and L.H. of PPC valve outlet pressure | Travel lever: FORWARD/REVERSE | Within. 0.4 MPa {Within. 4 kgf/cm$^2$} |
| 3 | Malfunction of merge-divider main spool | Release remaining pressure from hydraulic tank and piping, and then perform troubleshooting with engine stopped. | | |
| | | • Check for stuck or seized main spool in merge-divider valve body (spool should move smoothly).<br>• Remove main spool from valve body and check it for defects and dirt.<br>When restoring, be careful about the dirt, etc. to enter. | | |
| 4 | Malfunction of unload valve | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | Unload pressure | All control levers in NEUTRAL | 2.9±0.49 MPa {30±5 kgf/cm$^2$} |

# H-39 SWING ACCELERATION PERFORMANCE IS POOR OR SWING SPEED IS SLOW IN ONLY ONE DIRECTION

| | |
|---|---|
| Failure | Swing acceleration performance is poor or swing speed is slow in only one direction. |
| Related information | • Set working mode to power mode (P), and perform all troubleshooting with power mode (P).<br>• Check that the oil level in hydraulic tank is correct.<br>• Perform troubleshooting with the hydraulic oil temperature at 45 to 55 °C.<br>• Swing PPC pressure can be checked with monitoring function. (Code: 09000)<br>• If blade speed is slow, perform troubleshooting for “SWING AND BLADE SPEED IS LOW OR POWER IS LOW” in H mode first. |

| No. | Cause | Procedure, measuring location, criteria and remarks | | |
|---|---|---|---|---|
| 1 | Malfunction of swing PPC valve | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | Swing PPC valve outlet pressure | L.H. work equipment control lever: In NEUTRAL | 0 MPa {0 kgf/cm$^2$} |
| | | | L.H. work equipment control lever: In swing RIGHT/LEFT direction | 2.94(+0.49/-0.1) MPa {30(+5/-1) kgf/cm$^2$} |
| 2 | Malfunction of swing control valve (spool) | Be ready with engine stopped, then perform troubleshooting with engine at high idle. | | |
| | | Swing PPC circuit pressure | L.H. work equipment control lever: Operate swing RIGHT/LEFT direction | 2.94 (+0.49/-0.1) MPa {30 (+5/-1) kgf/cm$^2$} |
| | | If no failure is found by preceding checks, the spool of swing control valve may malfunction. Check it. | | |
| 3 | Defective seat of swing motor (suction valve) | Replace the suction valves of R.H. and L.H. swing motor, and check whether failure symptom changes to make judgment. When taking out the valve, check it for sticking and flaw. | | |
| 4 | Defective sealing of swing motor (check valve) | Replace the check valves of R.H. and L.H. swing motor, and check whether failure symptom changes to make judgment. When taking out the valve, check it for sticking and flaw. | | |
| 5 | Malfunction of load check valve in the spool of control valve | Load check valve in the control valve may be defective. Check it. | | |

| No. | Cause | Point to check, remarks | Remedy |
|---|---|---|---|
| 13 | A crack on the EGR cooler (Reference: coolant contained in exhaust) | Disconnect the inlet and outlet gas piping of EGR cooler to check if water containing coolant is draining.<br>**REMARK**<br>Moisture in exhaust gas may be condensed, but this is not a failure. Check if it is coolant or not. | After EGR cooler replacement, drain the water in the engine cylinder. |
| 14 | Defective injector | • Some cylinder is found to be cool when exhaust manifolds are touched by hand immediately after engine is started.<br>• Perform cylinder cutout mode operation to identify cylinder that does not change in speed (see “TESTING AND ADJUSTING”, “HANDLING CYLINDER CUTOUT MODE OPERATION”). | Replace injector. |
| 15 | Defective engine controller | In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly. | Engine controller replacement |
| 16 | Defective contact of valve and valve seat | • Measure compression pressure (See Standard value table). (Reference: See Testing and adjusting, “Testing compression pressure”.)<br>• Check valve clearance (Reference: See Testing and adjusting, “Testing and adjusting valve clearance”). | Valve or valve seat repair or replacement |
| 17 | Defective piston ring | • Check exhaust gas color.(Reference: See “TESTING AND ADJUSTING”, “Checking exhaust gas color”).<br>• Measure compression pressure (See standard value table). (Reference: See “TESTING AND ADJUSTING”, “Testing compression pressure”.)<br>• Check piston ring and piston ring groove. | Piston ring and piston replacement |

# S-14 OIL PRESSURE DROPS

| | |
|---|---|
| Failure | Oil pressure drops. |
| Related information | • If any failure code is displayed, perform troubleshooting for that code first.<br>• Check if machine is operated on slopes steeper than angle specified in Operation and Maintenance Manual. |

| No. | Cause | Point to check, remarks | Remedy |
|---|---|---|---|
| 1 | Insufficient oil in oil pan | Oil level in oil pan is insufficient.<br>Oil pressure monitor indicates low oil pressure on slopes. | Oil refiling |
| 2 | Defective oil pressure sensor or wiring harness | Check oil pressure sensor, wiring harness, and connectors | Oil pressure sensor, wiring harness, and connectors replacement |
| 3 | Fuel mixed in oil | • Perform oil analysis and check for mixing of oil<br>• Oil smells of diesel fuel. | If fuel is mixed into oil, perform troubleshooting of “FUEL MIXES INTO ENGINE OIL” in S mode, and take corrective action. |
| 4 | Water mixed in oil | • Perform oil analysis and check for mixing of water<br>• Oil is milky. | If water is mixed into oil, perform troubleshooting of “WATER MIXES INTO ENGINE OIL (MILKY)” in S mode, and take corrective action. |
| 5 | Clogged oil filter | • Check oil filter.<br>(Reference: Oil filter is used for more than specified period, oil is deteriorated badly, etc.)<br>• Oil filter may be blocked by water. | Oil filter replacement |
| 6 | Clogged oil strainer | Check oil strainer. | Oil strainer cleaning |
| 7 | Flattened or clogged hydraulic piping | Hydraulic piping is flattened or clogged. | Hydraulic piping replacement |
| 8 | Defective oil pump | • Check oil pump (for wear or breakage of gear)<br>• Oil pump is heavy in turning or has play. | Oil pump replacement |
| 9 | Defective regulator valve | Check whether the valve spring is deformed and damaged | Regulator valve exchange |
| 10 | Defective oil pump relief valve | Valve and spring of oil pump relief valve are weakening and damaged. | Oil pump relief valve exchange |
| 11 | Cracking in oil pump suction piping | Check around oil pump suction piping (for cracking ing piping). | Oil pump suction piping replacement |
| 12 | Defective seal between oil pump and oil pump suction piping | Check sealing portion. | Seal replacement |
| 13 | Leakage from EGR hydraulic piping | Check EGR hydraulic piping. | EGR hydraulic piping replacement |
| 14 | Wear of main journal bearing | • Check main journal bearing.<br>• Metal particles are contained in oil drained from oil pan. | Bearing of main journal replacement |

# ABBREVIATION LIST

- This list of abbreviations includes the abbreviations used in the text of the shop manual for parts, components, and functions whose meaning is not immediately clear. The spelling is given in full with an outline of the meaning.
- Abbreviations that are used in general society may not be included.
- Special abbreviations which appear infrequently are noted in the text.
- This list of abbreviations consists of two parts. The first part is a list of the abbreviations used in the text of the manual, and the second part is a list of the abbreviations used in the circuit diagrams.

## List of abbreviations used in the text

| Abbreviation | Actual word spelled out | Purpose of use (major applicable machine (*1), or component/system) | Explanation |
|---|---|---|---|
| ABS | Antilock Brake System | Travel and brake<br>(HD, HM) | This is a function that releases the brake when the tires skid (tires are not rotated). This function applies the brake again when the tires rotate. |
| AISS | Automatic Idling Setting System | Engine | This is a function that automatically sets the idle speed. |
| AJSS | Advanced Joystick Steering System | Steering<br>(WA) | This is a function that performs the steering operations with a lever instead of using a steering wheel. This function performs gear shifting and changing forward and reverse direction. |
| ARAC | Automatic Retarder Accelerator Control | Travel and brake<br>(HD, HM) | This is a function that automatically operates the retarder with a constant braking force when letting go of the accelerator pedal on the downhill. |
| ARSC | Automatic Retarder Speed Control | Travel and brake<br>(HD, HM) | This is a function that automatically operates the retarder to ensure that the machine speed does not accelerate above the speed set by the operator when letting go of the accelerator pedal on the downhill. |
| ASR | Automatic Spin Regulator | Travel and brake<br>(HD, HM) | This is a function that drives both wheels automatically using the optimum braking force when the tire on one side spins on the soft ground surfaces. |
| ATT | Attachment | Work equipment | A function or component that can be added to the standard specification. |
| BCV | Brake cooling oil control valve | BRAKE<br>(HD) | This is a valve that bypasses a part of the brake cooling oil to reduce the load applied to the hydraulic pump when the retarder is not being used. |
| CAN | Controller Area Network | Communication and electronic control | This is one of communication standards that are used in the network on the machine. |
| CDR | Crankcase Depression Regulator | Engine | This is a regulator valve that is installed to KCCV ventilator. It is written as CDR valve and is not used independently. |
| CLSS | Closed-center Load Sensing System | Hydraulic system | This is a system that can actuate multiple actuators simultaneously regardless of the load (provides better combined operation than OLSS). |

# SPECIAL TOOLS LIST

## How to read the tool list

- Part No.
  Tools with part number 79*T-***-**** are not supplied (to be locally manufactured).
- Necessity:
  ■: Tools not substituted, must always be equipped.
  ●: Very useful tools which can be substituted with commercially available tools.
- New/Redesign:
  N: Tools with new part numbers, newly developed for this model.
  R: Tools, with advanced part numbers, developed by improving existing tools for other models.
  Blank: Tools already available for other models that can be used without any modification.
- Sketch:
  ○: Tools marked with ○ in the sketch column have the sketches.
  Sketches are introduced in “SKETCHES OF SPECIAL TOOLS”, and all sketches of “79*T-***-***”are described.

**Tools for removal and installation of supply pump assembly**

| Symbol | Part No. | Part name | Necessity | Q'ty | New/Redesign | Sketch | Remarks |
|---|---|---|---|---|---|---|---|
| A | Commercially available | Puller | ■ | 1 | | | Removal of gear |

**Tools for removal and installation of travel motor and final drive assembly**

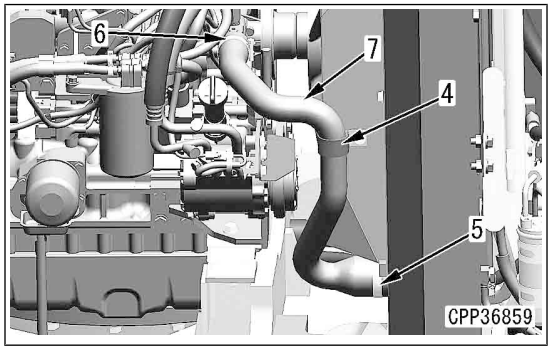
| Symbol | Part No. | Part name | Necessity | Q'ty | New/Redesign | Sketch | Remarks |
|---|---|---|---|---|---|---|---|
| A | Commercially available | Block | ● | 2 | | | Removal and installation of travel motor and final drive assembly |
| B | Commercially available | Lifting tool | ● | 1 | | | |

**Tools for removal and installation of swing motor and swing machinery assembly**

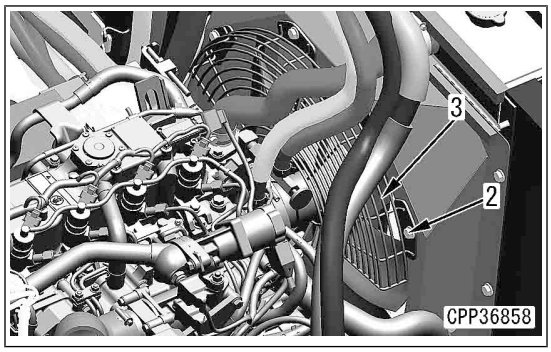
| Symbol | Part No. | Part name | Necessity | Q'ty | New/Redesign | Sketch | Remarks |
|---|---|---|---|---|---|---|---|
| A | Commercially available | Forcing screw | ■ | 2 | | | Removal of swing motor and swing machinery assembly |

**Cooling**

21. Fasten clamps (5) and (6) to install hose (7).
    - Clamp (5):
      5.9±0.49 Nm {0.6±0.05 kgfm}
    - Clamp (6):
      4.4±0.49 Nm {0.45±0.05 kgfm}
22. Install clamp (4).




23. Install fan guard (3) with bolts (2) (4 pieces).




**Counterweight assembly**

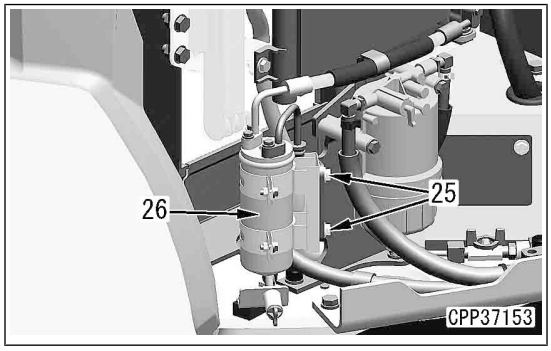
24. Install the counterweight assembly. For details, see “REMOVE AND INSTALL COUNTERWEIGHT ASSEMBLY”.

**Refilling radiator with coolant**

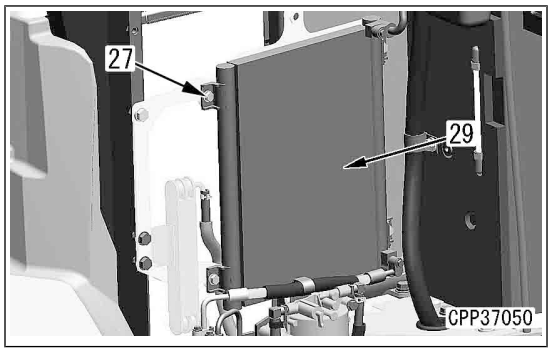
25. Refill the radiator with coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant, and then check the coolant level again.
    - Radiator:
      8.9 ℓ

**Air conditioner condenser assembly (machine with air conditioner only)**

13. Remove bolts (25) (2 pieces), and move receiver drier (26) aside so that it does not hinder the work.

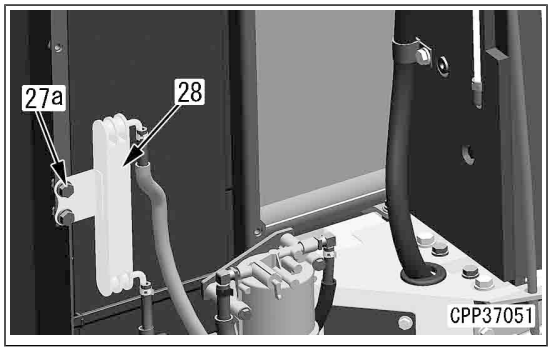



14. Remove bolts (27) (4 pieces), and move air conditioner condenser assembly (29) so that it does not hinder the work.

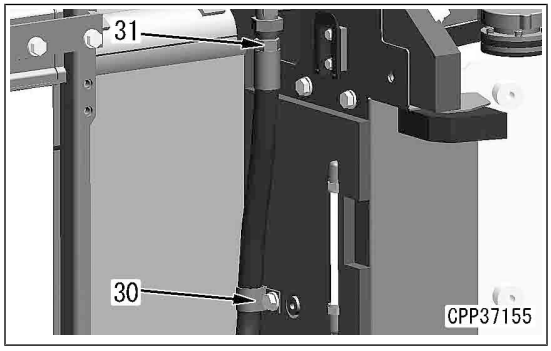



**Hydraulic oil cooler assembly, fuel cooler assembly**

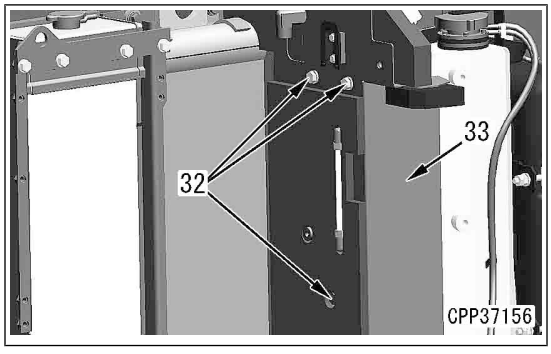
15. Remove bolts (27a) (2 pieces), and remove fuel cooler assembly (28).



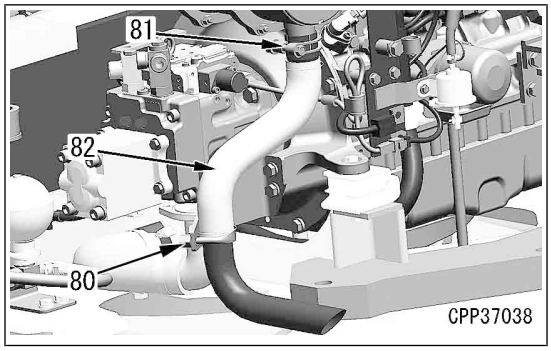

16. Remove clamp (30), and disconnect hose (31).




17. Remove bolts (32) (3 pieces), and remove bracket (33).

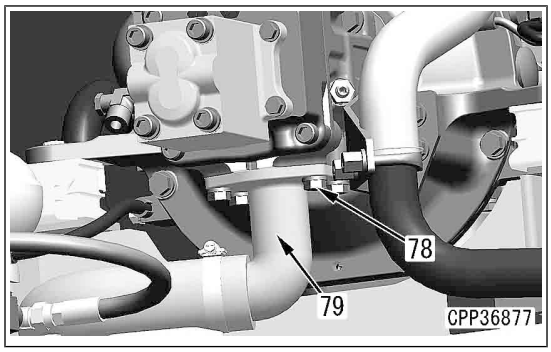


4. Install exhaust pipe (82) with clamp (81).
5. Fix exhaust pipe (82) with nuts (80) (4 places) and U-bolt.

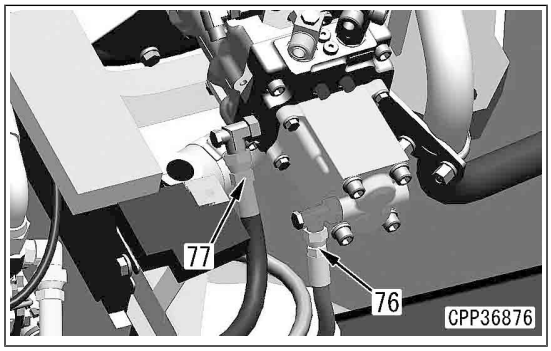



**Hydraulic hose**

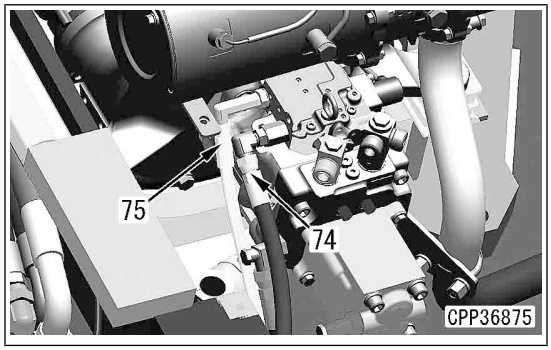
6. Connect suction hose (79) with bolts (78) (4 pieces).



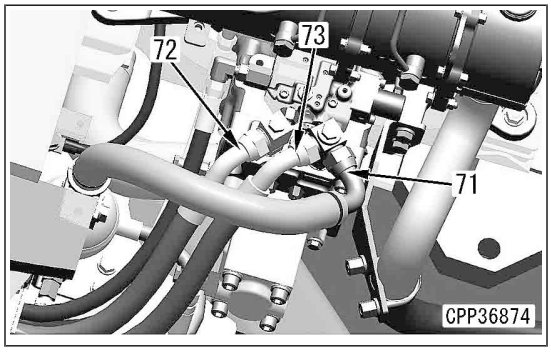

7. Connect hoses (76) and (77).




8. Connect hoses (74) and (75).




9. Connect hoses (73), (72) and (71).



# POWER TRAIN

## REMOVE AND INSTALL TRAVEL MOTOR AND FINAL DRIVE ASSEMBLY

**Tools for removal and installation of travel motor and final drive assembly**

| Symbol | Part No. | Part name | Necessity | Q'ty | New/Redesign | Sketch | Remarks |
|---|---|---|---|---|---|---|---|
| A | Commercially available | Block | ● | 2 | | | Removal and installation of travel motor and final drive assembly |
| B | Commercially available | Lifting tool | ● | 1 | | | |

⚠ **Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.**

⚠ **Set the lock lever to LOCK position.**

⚠ **Disconnect (-) terminal of the battery after 2 minutes or more of engine stop or after checking that the system operation lamp goes off.**

⚠ **Release the remaining pressure in the hydraulic system. For details, see TESTING AND ADJUSTING, "RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM".**

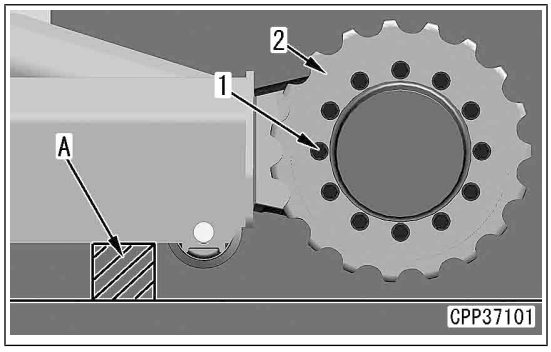
## METHOD FOR REMOVING TRAVEL MOTOR AND FINAL DRIVE ASSEMBLY

**Track shoe assembly**

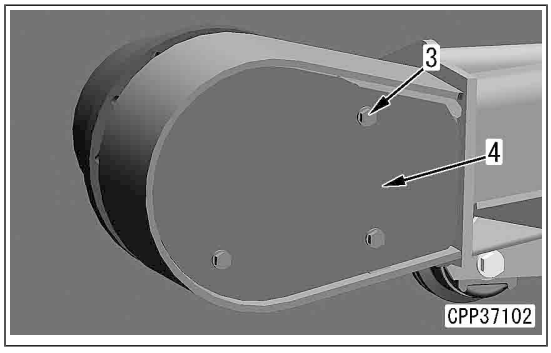
1. Separate the track shoe assembly. For details, see "SEPARATION AND CONNECTION OF TRACK ASSEMBLY".

**Sprocket**

2. Set block (A) under the track frame.
3. Remove bolts (1) (12 pieces), and remove sprocket (2).



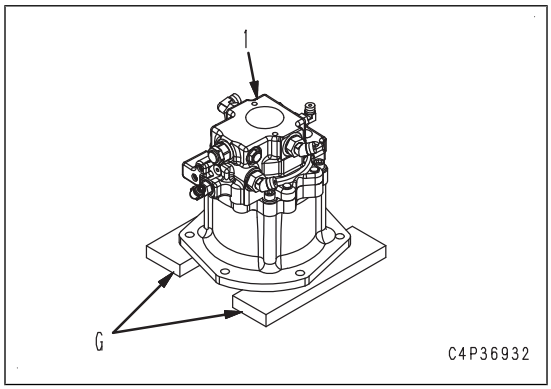

4. Remove bolts (3) (3 pieces), and remove cover (4).



Swing machinery case:
Approximately 1.3 ℓ (TO10)

**Swing motor assembly**

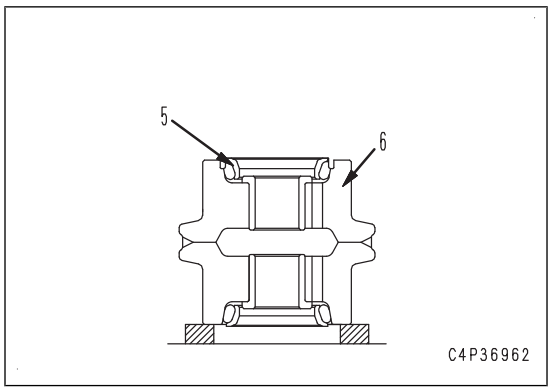
16. Fit the O-ring, and install swing motor assembly (1).
    Mounting bolt:
    98 to 123 Nm {10 to 12.5 kgfm}



6. Remove floating seals (5) (2 pieces) from roller (6).

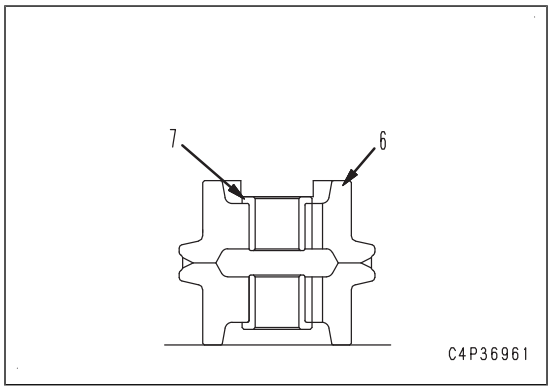
**REMARK**

- Clean, completely degrease and dry O-ring and the contacting surfaces of O-rings.
- Apply engine oil (EO30-CD) to the sliding surface of the floating seal, and take care that dust does not stick to it.




**Bushing**

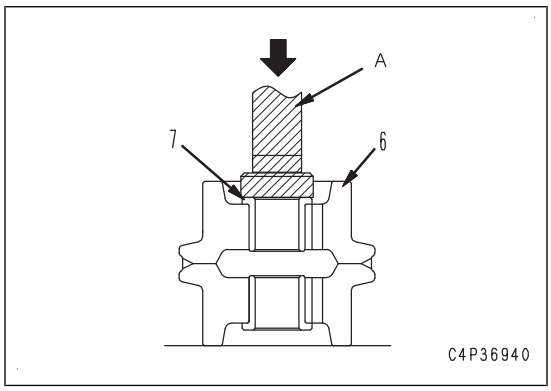
7. Remove bushings (7) (2 pieces) from roller (6).




## METHOD FOR ASSEMBLING TRACK ROLLER ASSEMBLY

**Bushing**

1. Press fit bushings (7) (2 pieces) to roller (6) by using push tool (A).

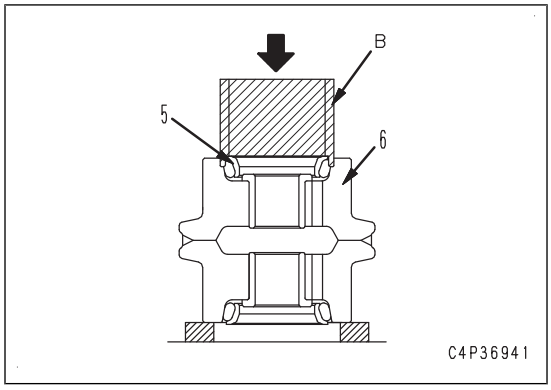



**Floating seal**

2. Install floating seals (5) (2 pieces) to roller (6) by using installer (B).

**REMARK**

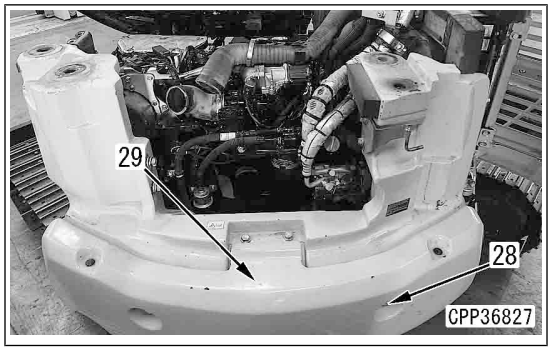
- Clean, completely degrease and dry O-ring and the contacting surfaces of O-rings.
- Apply engine oil (EO30-CD) to the sliding surface of the floating seal, and take care that dust does not stick to it.



3. Install additional counterweight (29) with bolts (28) (2 pieces). (machine with additional counterweight only)

   Additional counterweight (29):
   250 kg

   Bolt (28):
   455 to 565 Nm {46.5 to 58 kgfm}

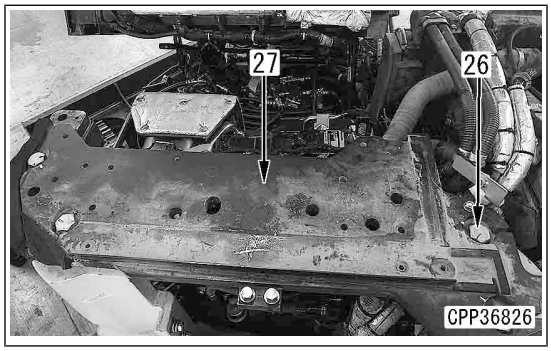



4. Sling bracket (27), and install it with bolts (26) (4 pieces).

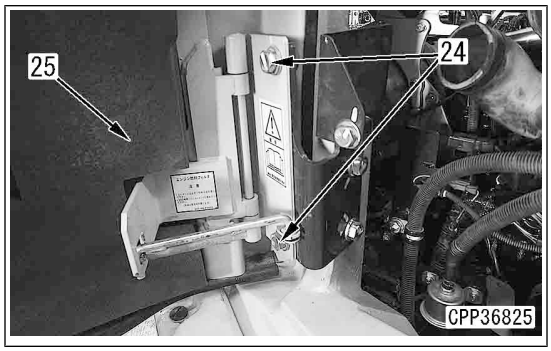
   Bracket (27):
   70 kg

   Bolt (26):
   Liquid adhesive (LT-2)

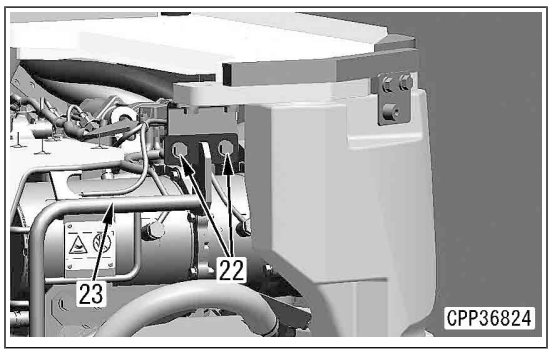
   Bolt (26):
   785 to 980 Nm {80 to 100 kgfm}



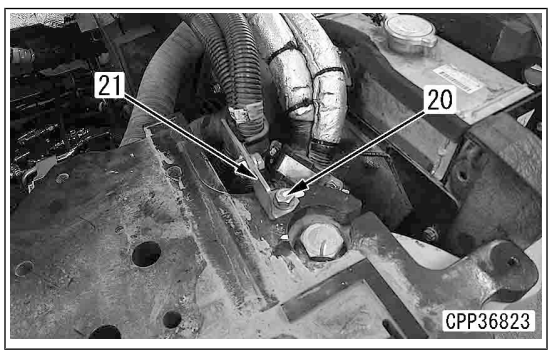

5. Install cover (25) with bolts (24) (2 pieces).



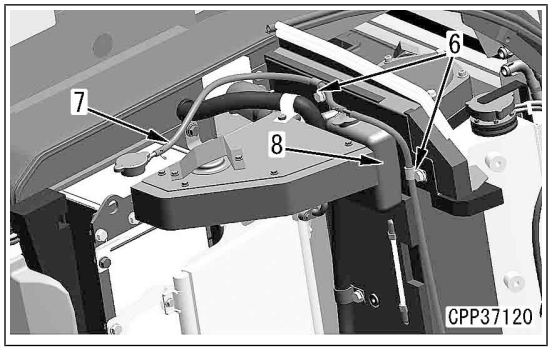

6. Install bracket (23) with bolts (22) (2 pieces).



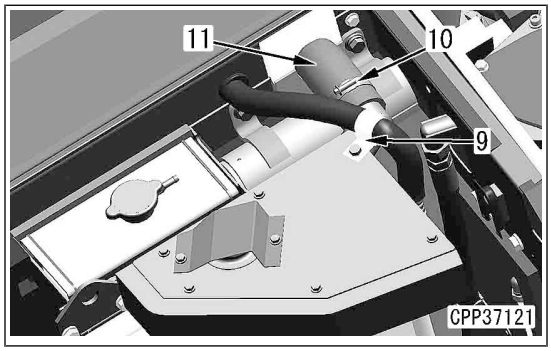

7. Install bracket (21) with bolt (20). (machine with air conditioner only)



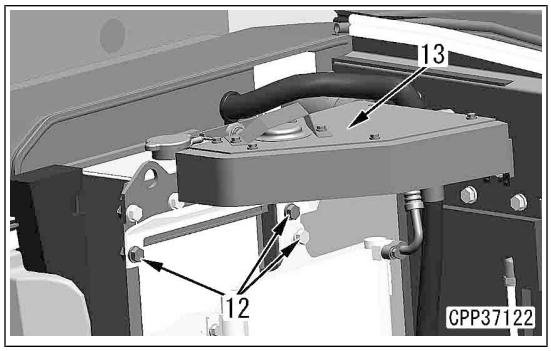
6. Remove clamps (6) (2 places).
7. Disconnect hose (7), and remove sub-tank (8).



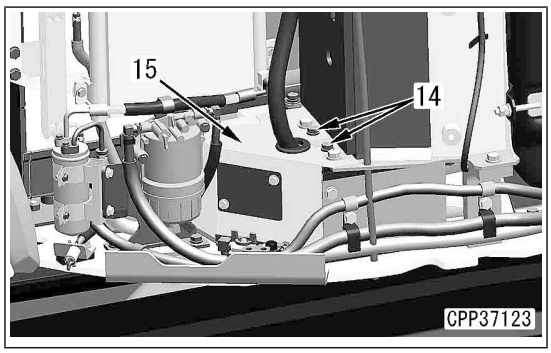

8. Remove clamp (9).
9. Loosen clamp (10), and disconnect hose (11).



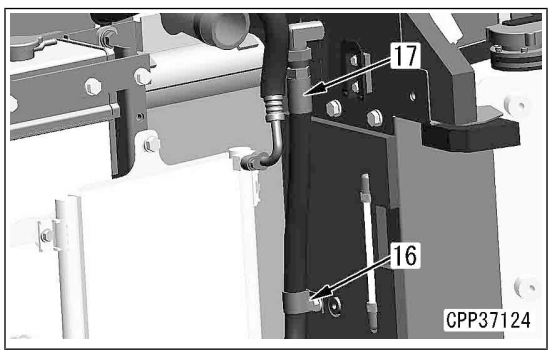

10. Remove bolts (12) (3 pieces), and remove chamber (13).



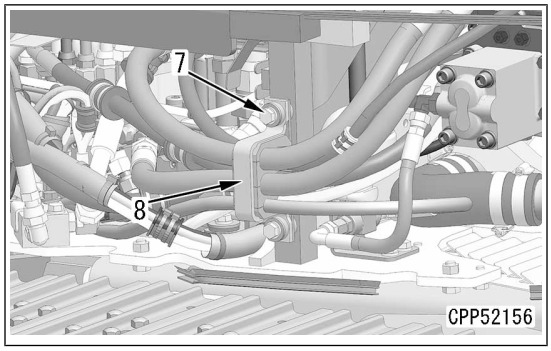

11. Remove bolts (14) (2 pieces), and remove cover (15).



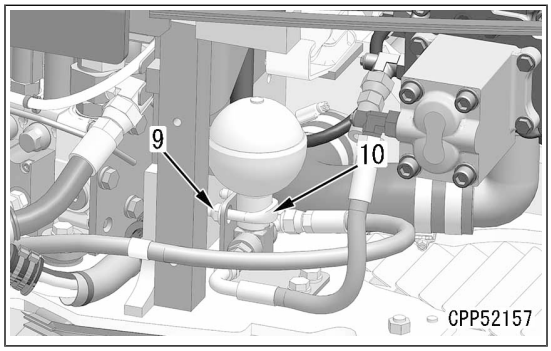

12. Remove clamp (16), and disconnect hose (17).



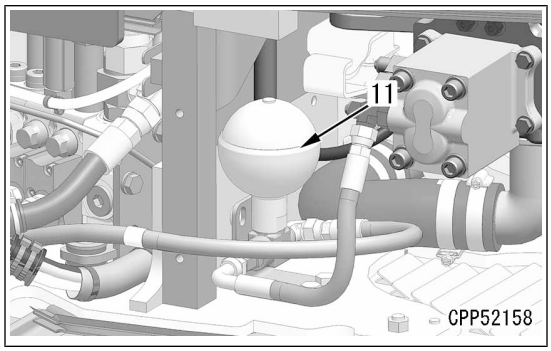
5. Remove the bolts (7) (2 pieces), and remove the clamp (8).
6. Move the hose aside so that it does not hinder the work.




7. Remove the nuts (9) (2 pieces), and remove U-bolt (10).




8. Remove the accumulator (11).

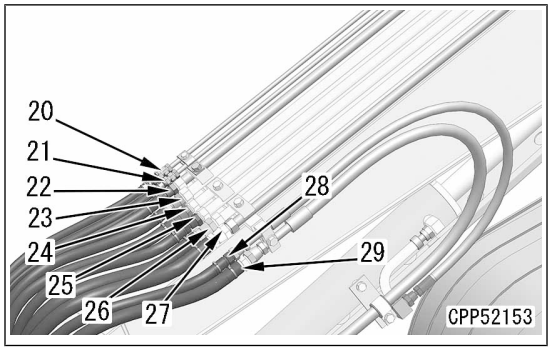



## METHOD FOR REMOVING ACCUMULATOR ASSEMBLY (NORTH AMERICA SPECIFICATION, FOR MACHINE WITH QUICK COUPLER)

**Accumulator assembly**

1. Release the remaining pressure from the hydraulic tank. See TESTING AND ADJUSTING, “METHOD FOR RELEASING REMAINING PRESSURE FROM HYDRAULIC TANK”.
2. Remove the bolts (1) (3 pieces), and remove the cover (2).

4. Disconnect the hoses (20), (21), (22), (23), (24), (25), (26), (27), (28), and (29) (10 pieces in total). (For the machines ready for installation of quick coupler)




**Work equipment assembly**

5. Sling boom cylinder (13), and hold it.

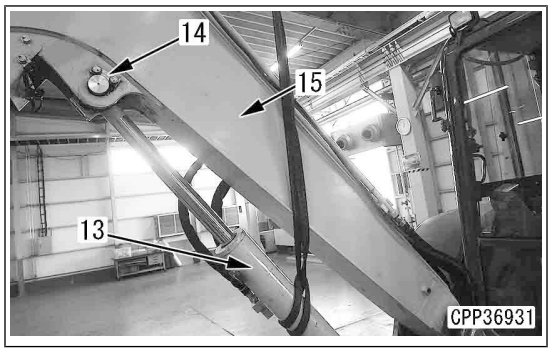
   Boom cylinder (13):
   45 kg

6. Remove plate (14), and remove head side pin (15).

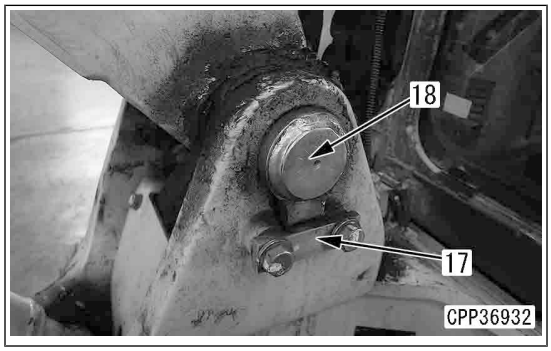
   **REMARK**

   Lower the boom cylinder onto block, etc.

7. Sling work equipment assembly (19), and hold it.

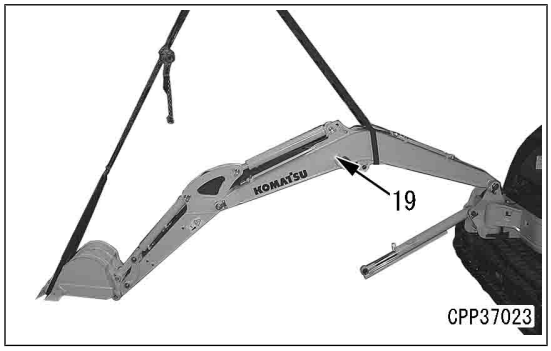



8. Remove plate (17), and remove boom foot pin (18).



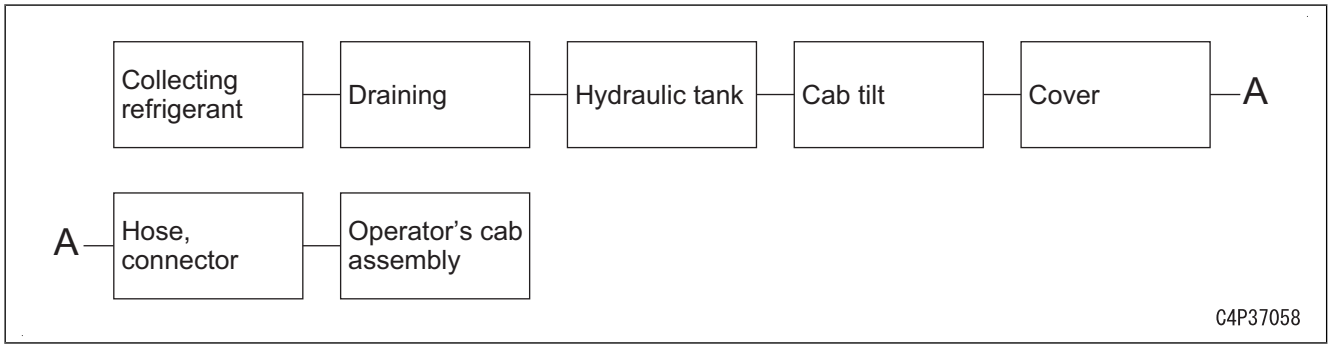

9. Sling work equipment assembly (19), and remove it from the machine body.

   Work equipment assembly (19):
   510 kg



# CAB AND ITS ATTACHMENTS

## REMOVE AND INSTALL OPERATOR'S CAB ASSEMBLY (CAB SPEC)




**⚠ Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.**

**⚠ Set the lock lever to LOCK position.**

**⚠ Disconnect (-) terminal of the battery after 2 minutes or more of engine stop or after checking that the system operation lamp goes off.**

**⚠ If you drain the radiator coolant when it is still hot, you may be scalded. Accordingly, wait for the coolant temperature to drop before draining.**

**⚠ If refrigerant gas (R134a) gets in your eyes, you may lose your sight. If it touches your skin, you may suffer from frostbite. Accordingly, put on the protective eyeglasses, gloves and working clothes with long sleeves while you are collecting or filling the refrigerant.**

**NOTICE**

- **Never release the refrigerant to the atmosphere.**
- **Ask a qualified person for collecting, adding and filling operations of the refrigerant (air conditioner gas: R134a).**
- **Check the connector numbers and installed positions before disconnecting wiring and hoses, and write them down.**
- **When disconnecting the wiring and hoses, take extreme care not to damage or deform the wiring and hoses.**

## METHOD FOR REMOVING OPERATOR'S CAB ASSEMBLY (CAB SPEC)

**Collecting refrigerant**

1. Collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit (machine with air conditioner).

   Quantity of refrigerant to be collected: 550±50 g

**Draining**

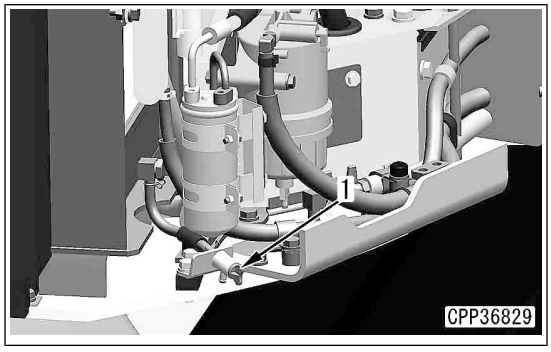
2. Loosen drain valve (1), and drain the coolant.

   Radiator:

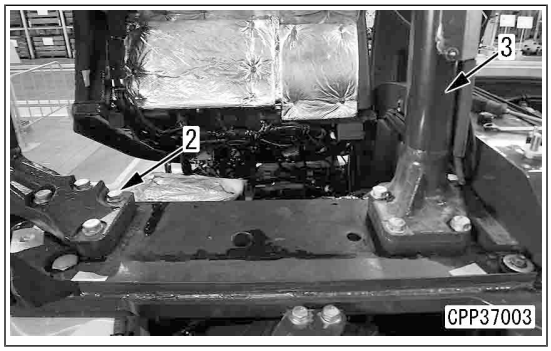
   8.9 ℓ

   **REMARK**

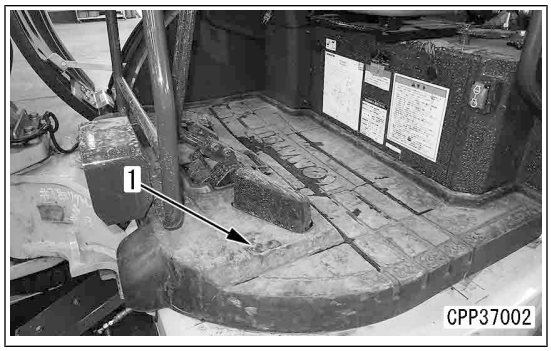
   Check that the coolant is completely drained, and tighten drain plug (1).



14. Sling canopy (2), hold it, and install right and left mounting bolts (3) (8 pieces).
15. Close the floor. For details, see TESTING AND ADJUSTING, “METHOD FOR OPENING AND CLOSING FLOOR”.

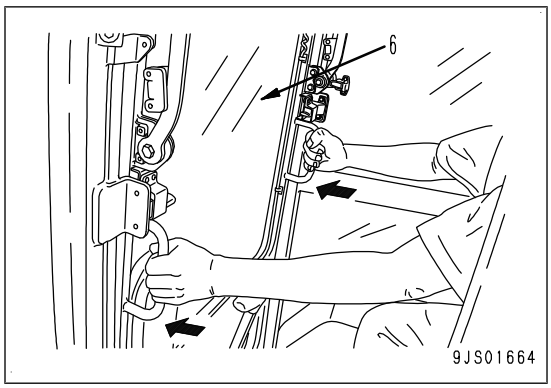

16. Install floor mat (1).




**Refilling with oil (hydraulic tank)**

17. Refill the hydraulic tank with Komatsu genuine oil to the specified level through the oil filler port. Start the engine to circulate the oil through the piping, and check the oil level again.

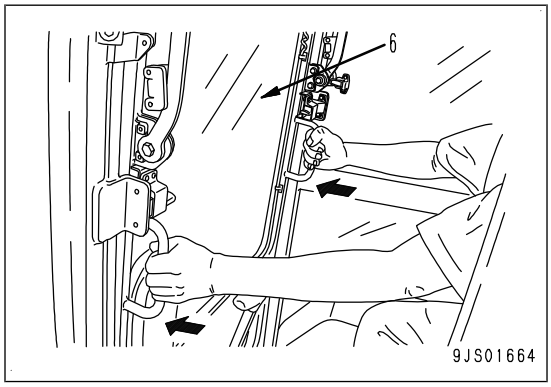
5. Hold the handles, remove the latches, and remove front window assembly (6).



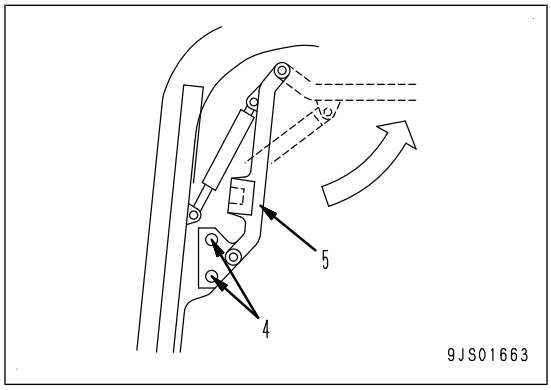

## METHOD FOR INSTALLING FRONT WINDOW ASSEMBLY

**Front window assembly**

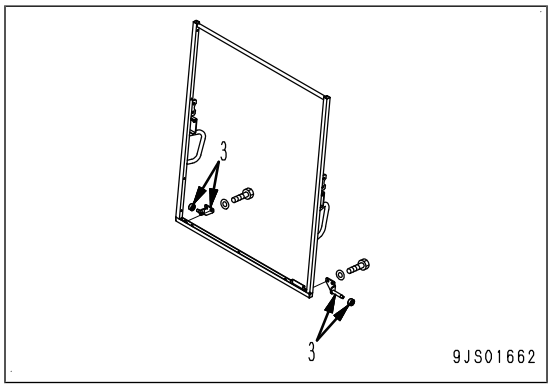
1. Install front window assembly (6), hold the handles to lock the assembly with latches.




2. Install pull-up link (5) jumping up toward the ceiling and sash with bolts (4).




3. Install rollers (3) (right and left) on the lower side of the sash.



3. Install mounting bolts (3) (4 pieces).

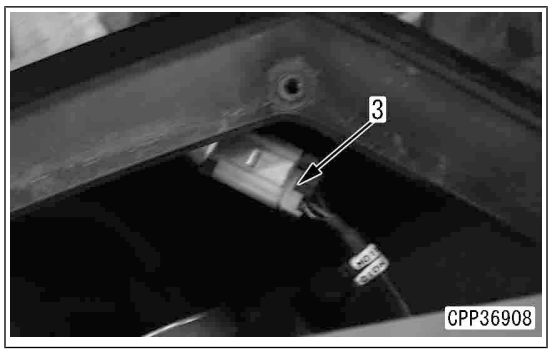
   **REMARK**

   Move the operator's seat forward, and install mounting bolts (2 pieces) at the rear.

4. Pull lever (1) backward and move operator's seat (2) to the original position.

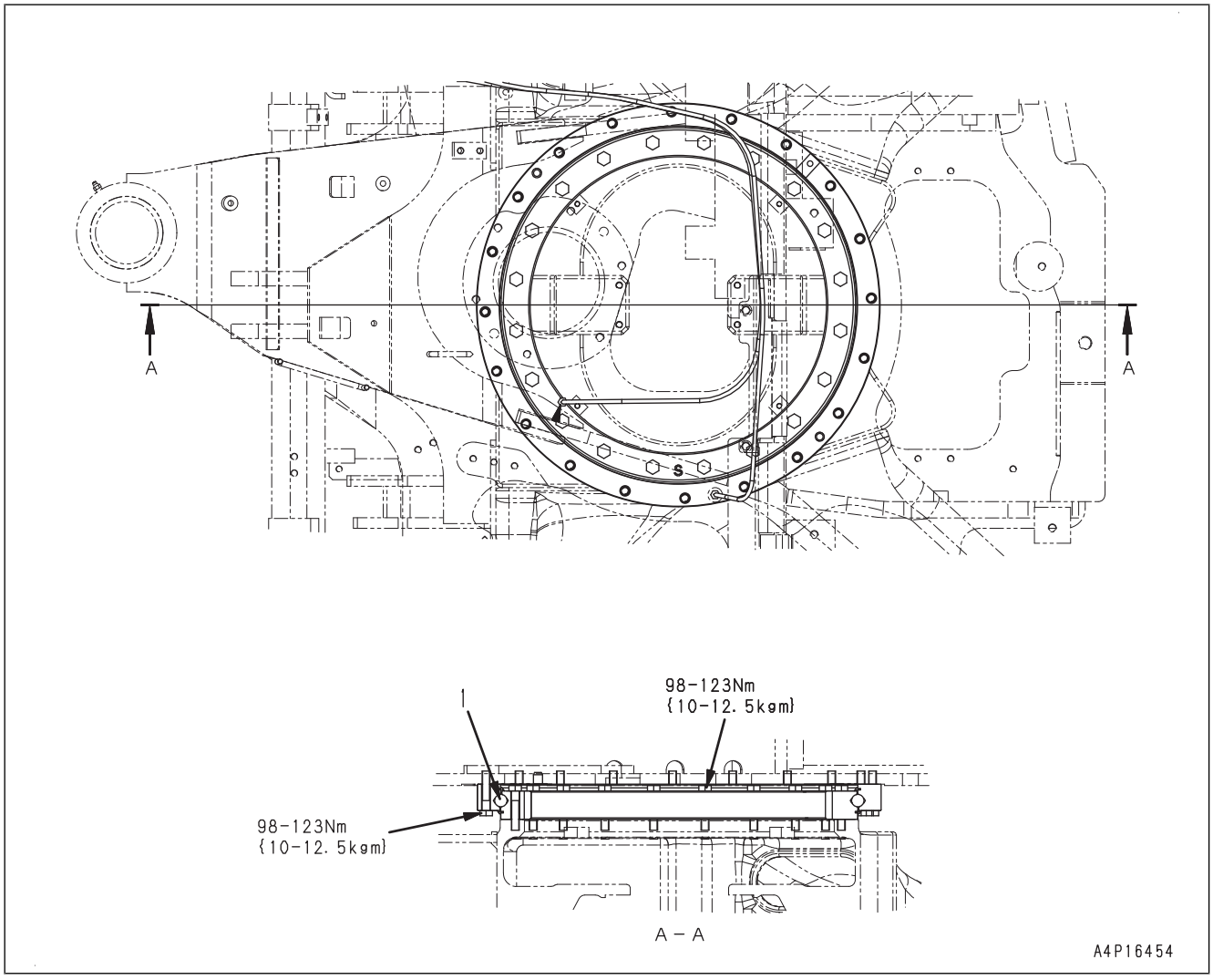
**REMARK**

For the cab specification, connect connector (3) on the back side of cover (1).



# POWER TRAIN

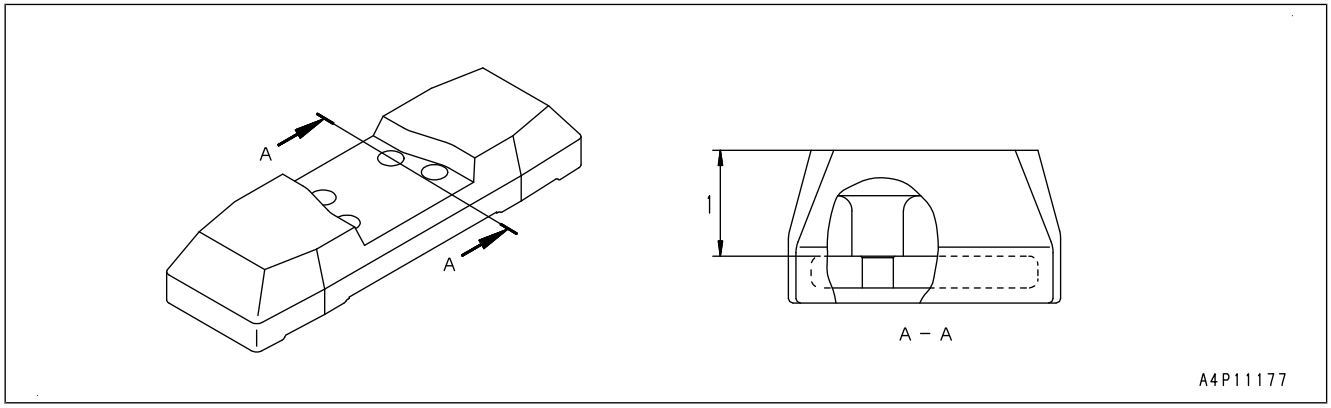
## MAINTENANCE STANDARD OF SWING CIRCLE




Unit: mm

| No. | Item | Judgment criteria | | Remedy |
|---|---|---|---|---|
| 1 | Clearance in bearing | Standard clearance | Allowable clearance | Replace |
| | | 0.20 to 0.70 | 1.7 | |

# MAINTENANCE STANDARD OF ROAD LINER



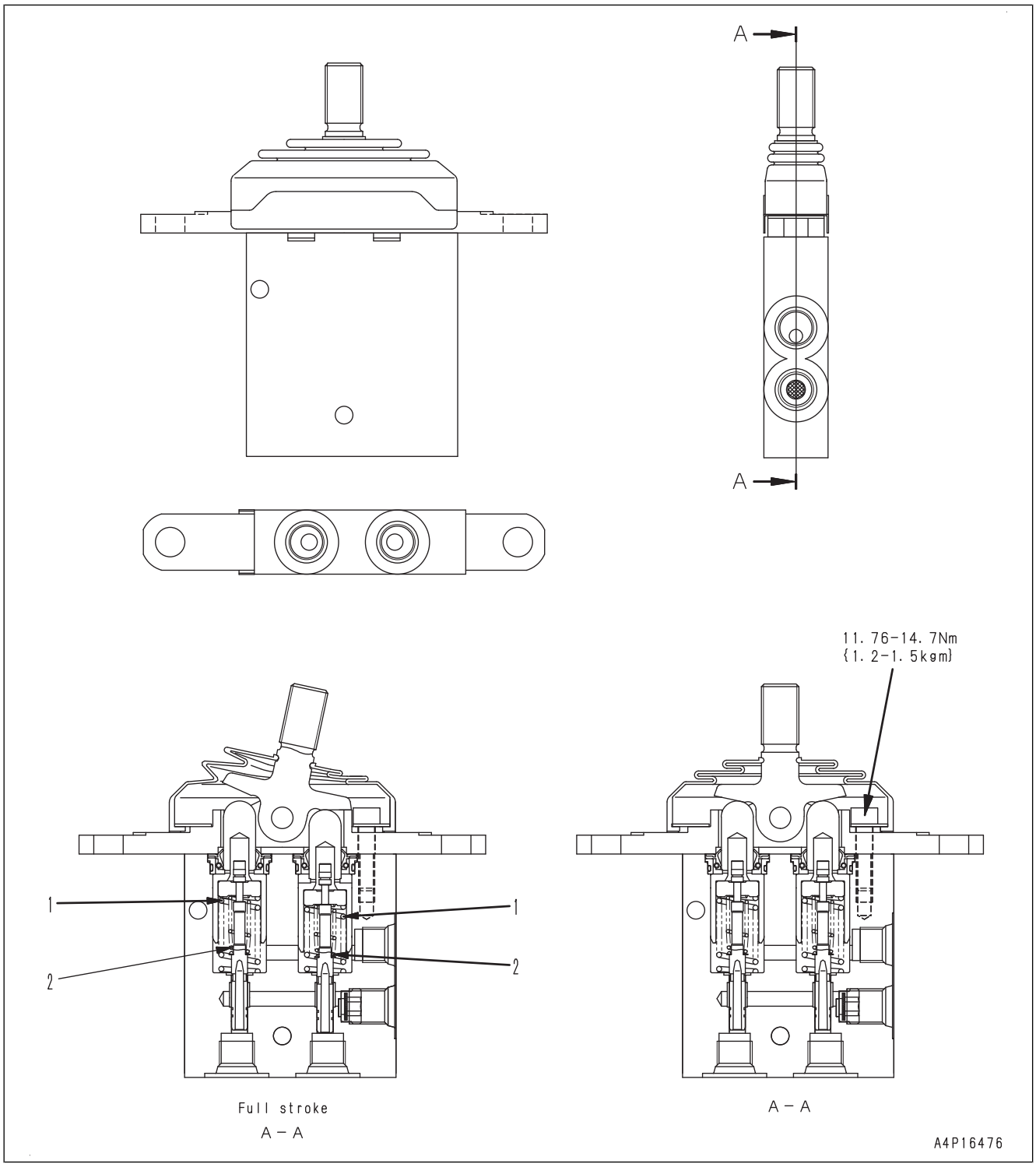

Unit: mm

| No. | Item | Judgment criteria | | Remedy |
|---|---|---|---|---|
| | | Standard dimension | Repair limit | |
| 1 | Height | 35 | 17 | Replace |

Unit: mm

| No. | Item | Judgment criteria | | | | | Remedy |
|---|---|---|---|---|---|---|---|
| 1 | Tightening torque of suction safety valve and suction valve plug | 39.2 to 49.0 Nm {4.0 to 5.0 kgfm} | | | | | Retighten |
| 2 | Tightening torque of main relief valve | 49.0 to 58.8 Nm {5.0 to 6.0 kgfm} | | | | | |
| 3 | Tightening torque of suction valve plug | 6.9 to 9.8 Nm {0.7 to 1.0 kgfm} | | | | | |
| 4 | Suction valve spring | Standard dimension | | | Repair limit | | Replace (Replace spring if damaged or deformed as well) |
| | | Free height x outside diameter | Installed height | Load at installed height | Free height | Load at installed height | |
| | | 39.2 x 4.45 | 33.5 | 5.1 N {0.52 kf} | - | 4.10 N {0.42 kf} | |
| 5 | Cooler by pass valve spring | 27.2x13.2 | 21.0 | 78.8 N {8.04 kf} | - | 63.0 N {6.43 kf} | |
| 6 | Spool return spring | 29 x 17.5 | 28.5 | 22.6 N {2.3 kf} | - | 18.1 N {1.84 kf} | |
| 7 | Spool return spring | 27.2 x 16.6 | 26.7 | 30.2 N {3.08 kf} | - | 24.2 N {2.46 kf} | |
| 8 | Spool return spring | 29 x 17.5 | 28.5 | 21.6 N {2.2 kf} | - | 17.3 N {1.76 kf} | |

# MAINTENANCE STANDARD OF BOOM SWING PPC VALVE



Unit: mm

| No. | Item | Judgment criteria | | | | | Remedy |
|---|---|---|---|---|---|---|---|
| | | Width of boss | | Width of hinge | | Standard clearance | |
| | | Standard dimension | Tolerance | Standard dimension | Tolerance | | |
| 17 | Joint of revolving frame and boom swing bracket | 276 | 0<br>-0.5 | 278.5 | +0.5<br>0 | 2.5 to 3.5 | Adjust the clearance to Max. 0.5 mm by using shims. |
| | | U17: Insert the shim of 0.8 mm thickness (1)<br>L17: Insert the shims of 0.8 mm thickness (2) and 0.5 mm thickness (2) | | | | | |
| 18 | Joint of boom swing bracket and boom | 250 | -0.5<br>-1.0 | 250 | +0.5<br>0 | 0.5 to 1.5 | Adjust the clearance to Max. 0.5 mm by using shims. |
| | | L18: Insert the shim of 0.5 mm thickness (1)<br>R18: - | | | | | |
| 19 | Joint of boom swing cylinder and swing bracket | 60 | 0<br>-0.5 | 60 | +1.5<br>+0.5 | 0.5 to 2.0 | Adjust the clearance to Max. 1.0 mm by using shims. |
| | | L19: -<br>R19: Insert the shim of 1.0 mm thickness (1) | | | | | |
| 20 | Joint of revolving frame and boom swing cylinder | 60 | 0<br>-0.5 | 64.5 | +2.0<br>0 | 4.5 to 7.0 | Adjust the clearance to Max. 0.5 mm by using shims. |
| | | L20: -<br>R20: Insert the shims of 1.0 mm thickness (4) and 0.5 mm thickness (1) | | | | | |
| 21 | Joint of boom swing bracket and boom cylinder | 60 | 0<br>-0.5 | 60 | +1.5<br>+0.5 | 0.5 to 2.0 | Adjust the clearance to Max. 1.0 mm by using shims. |
| | | L21: Insert the shim of 1.0 mm thickness (1)<br>R21: - | | | | | |
| 22 | Joint of boom and boom cylinder | 60 | 0<br>-0.5 | 60.5 | +1.0<br>0 | 0.5 to 2.0 | Adjust the clearance to Max. 0.5 mm by using shims. |
| | | L22: -<br>R22: Insert the shim of 1.0 mm thickness (1) | | | | | |
| 23 | Joint of boom and arm | 163 | -0.3<br>-1.0 | 163 | +0.5<br>0 | 0.3 to 1.5 | Adjust the clearance to Max. 0.5 mm by using shims. |
| | | L23: -<br>R23: Insert the shim of 0.5 mm thickness (1) | | | | | |
| 24 | Joint of boom and arm cylinder | 55 | 0<br>-0.5 | 55.5 | +1.0<br>0 | 0.5 to 2.0 | Adjust the clearance to Max. 1.0 mm by using shims. |
| | | L24: -<br>R24: Insert the shim of 1.0 mm thickness (1) | | | | | |
| 25 | Joint of arm cylinder and arm | 55 | 0<br>-0.5 | 55.5 | +1.0<br>0 | 0.5 to 2.0 | Adjust the clearance to Max. 1.0 mm by using shims. |
| | | L25: Insert the shim of 1.0 mm thickness (2)<br>R25: - | | | | | |

Unit: mm

| No. | Item | Judgment criteria | Remedy |
|---|---|---|---|
| 4 | Tightening torque of cylinder head | 863±86.5 Nm {88±8.8 kgfm} | Retighten |
| 5 | Tightening torque of cylinder piston nut | 1.08±0.11 kNm {110±11.0 kgfm} (Width across flats: 50 mm) | |

# AIR CONDITIONER SYSTEM

## PRECAUTIONS FOR REFRIGERANT

⚠ **If refrigerant gas (air conditioner gas: R134a) gets in your eyes, you may lose your sight. And if it touches your skin, you may suffer from frostbite. Put on protective eyeglasses, gloves and working clothes with long sleeves while collecting the refrigerant or filling the air conditioner circuit with the refrigerant.**

⚠ **When replacing the air conditioner unit, air conditioner compressor, condenser or receiver drier, etc., collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit before disconnecting the air conditioner hoses.**

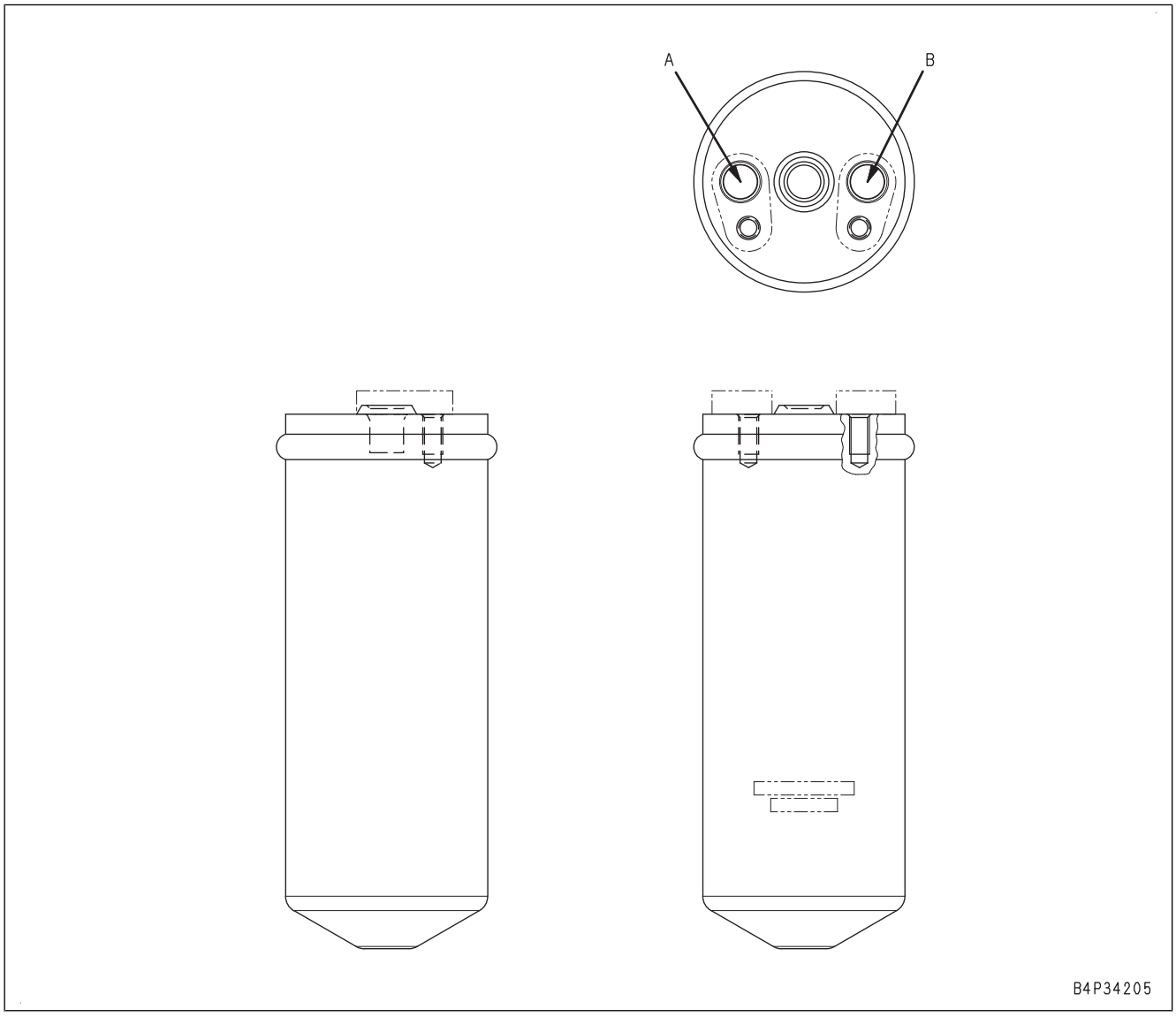
**NOTICE**

- **Never release the refrigerant (air conditioner gas: R134a) to the atmosphere.**
- **Ask a qualified person for collecting, adding and filling operations of the refrigerant (air conditioner gas: R134a).**

# RECEIVER DRIER

## STRUCTURE OF RECEIVER DRIER

### General view and sectional view




A: Refrigerant inlet (from condenser) B: Refrigerant outlet (to air conditioner unit)

## SPECIFICATIONS OF RECEIVER DRIER

Effective capacity: : 240 cc

Weight of desiccating agent: : 100 g

## FUNCTION OF RECEIVER DRIER

- The receiver drier temporarily stores the high pressure and high temperature liquid refrigerant from the condenser so that it can be supplied to the evaporator corresponding to the need of cooling.
- Even if bubbles are mixed in the refrigerant, depending on the heat radiation condition of the condenser, the refrigerant can be liquefied perfectly by sending out the accumulated refrigerant from the bottom to the evaporator.
- The built-in filter and desiccating agent remove foreign material in the circulation circuit and moisture contained in the refrigerant.