

# Shop Manual

WHEEL LOADER

**WA1200-6**

SERIAL NUMBERS 70001 and up

**KOMATSU**

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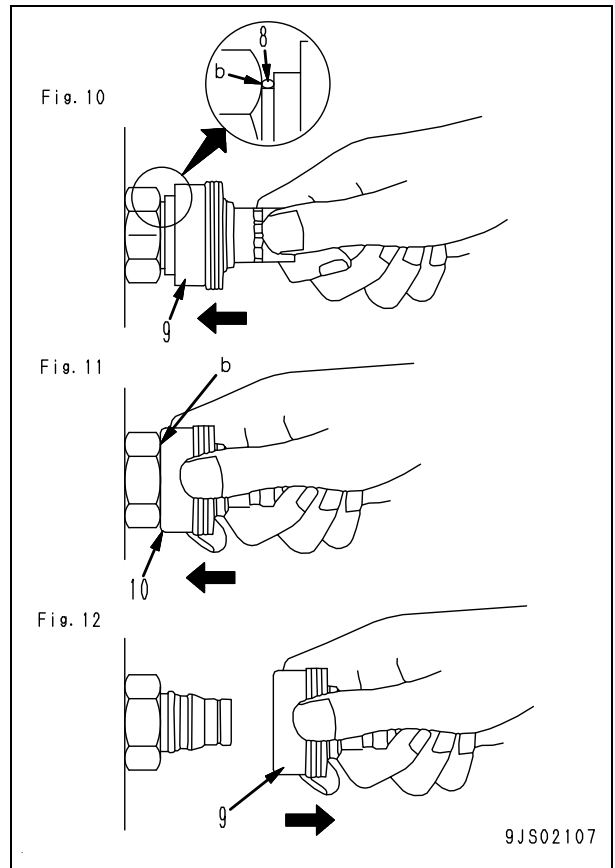
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## Type 3

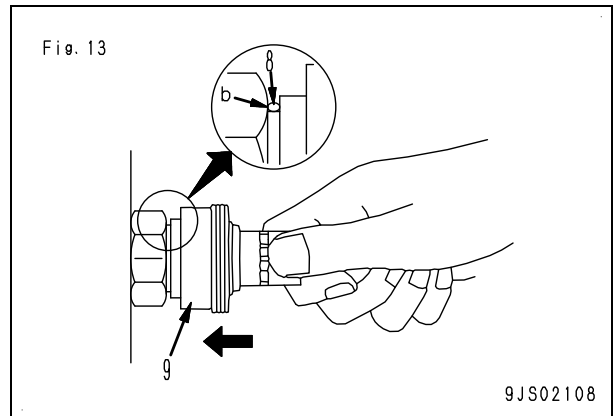
### 1. Disconnection

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



### 2. Connection

- Hold the tightening portion and push body (9) straight until sliding prevention ring (8) contacts contact surface (b) of the hexagonal portion at the male end. (Fig. 13)



## List of abbreviation

(Rev. 2010/03)

- 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 that appear infrequently are marked in the text with an \*.
- This list of abbreviations consists of two parts. The first part is a list of abbreviations used in the text of the manual, and the second part is a list of abbreviations used in circuit diagrams.

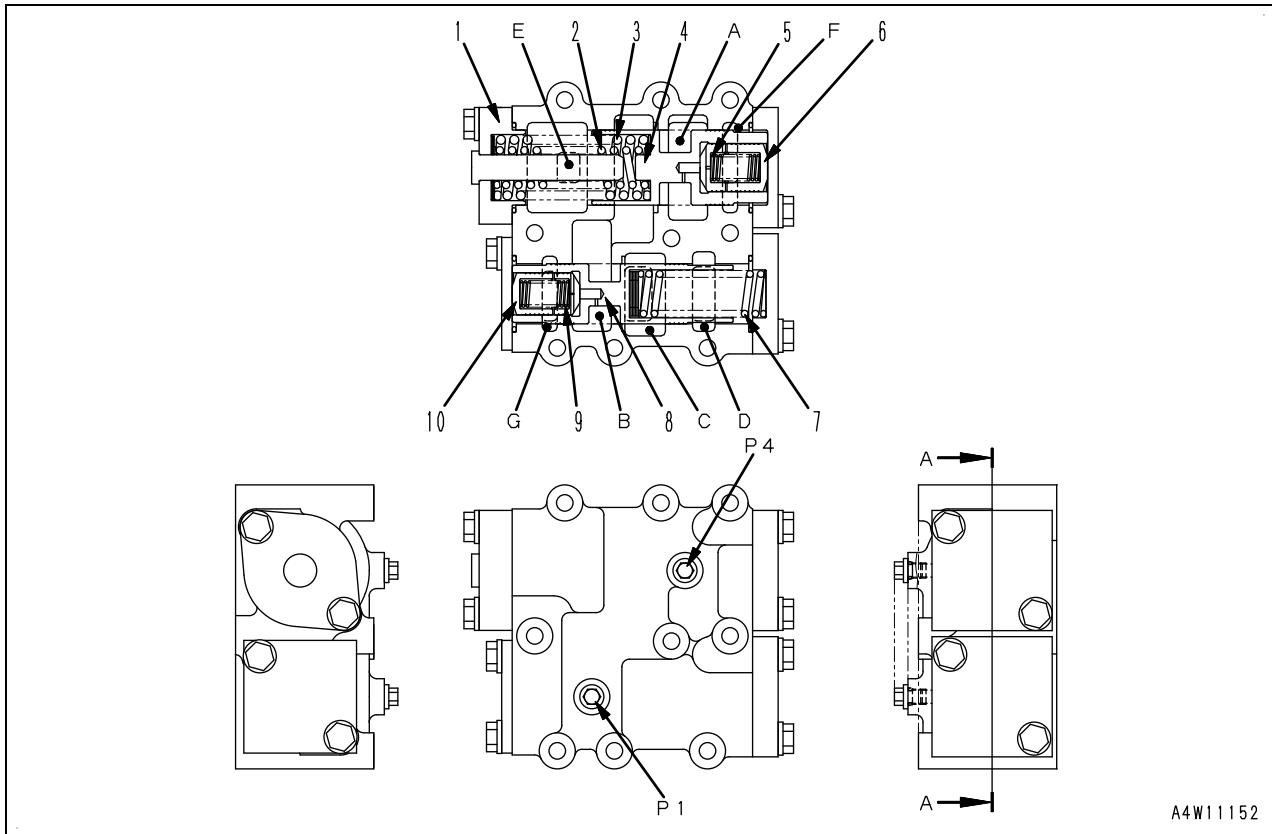
### List of abbreviations used in the shop manual

Abbreviation	Full Spelling	Purpose of use (major applicable machine (*), or component/system)	Explanation
A.B.S.	Anti-skid Brake System	Travel and brake (HD, HM)	With this function, when the tires skid (wheels stop rotating), the brakes are released, and when the wheels start to rotate, the brakes are applied again.
A.I.S.S.	Automatic Idling Setting System	Engine	This function automatically sets the idle speed.
A.J.S.S.	Advanced Joystick Steering System	Steering (WA)	Instead of a steering wheel, a lever is used to perform the steering operations as well as to shift gear and change direction (forward or reverse).
A.R.A.C.	Automatic Retarder Accelerator Control	Travel and brake (HD, HM)	When the machine is traveling downhill, if the accelerator pedal is released, this function automatically applies the retarder with a constant braking force.
A.R.S.C.	Automatic Retarder Speed Control	Travel and brake (HD, HM)	When the machine is traveling downhill, if the accelerator pedal is released, this function automatically applies the retarder to ensure that the machine speed does not accelerate above the speed set by the operator.
A.S.R.	Automatic Spin Regulator	Travel and brake (HD, HM)	When the rear wheels spin on soft ground surfaces, this function automatically uses the optimum braking force to drive both wheels.
ATT.	Attachment	Work equipment	A device that can be fixed onto a machine in order to enable it to do different jobs.
B.C.V.	Brake Cooling oil control Valve	Brake (HD)	When the retarder is not being used, this valve bypasses part of the brake cooling oil to reduce the load on the hydraulic pump.
C.A.N.	Controller Area Network	Communication and electronic control	Communications standard standardized as ISO11898.
C.L.S.S.	Closed-center Load Sensing System	Hydraulic	System that can simultaneously actuate multiple actuators regardless of the load (provides better ease of combined operation than O.L.S.S.).
C.R.I.	Common Rail Injection	Engine	Uses engine controller to perform electronic control of supply pump, common rail, and injector. Functions to maintain optimum fuel injection amount and fuel injection timing.
E.C.M.	Electronic Control Module	Electronic control system	Electronic control device that uses the signals from the sensors on the machine to indicate to the actuators the optimum actuation. (same as ECU)
E.C.M.V.	Electric Control Modulation Valve	Transmission (D, HD, WA, etc.)	Proportional electromagnetic valve that gradually increases oil pressure to engage clutch and reduces transmission shock.
E.C.S.S.	Electronically Controlled Suspension System	Travel (WA)	System that ensures smooth high-speed travel by using hydraulic spring effect of accumulator to absorb vibration of machine during travel
E.C.U.	Electronic Control Unit	Electronic control system	Electronic control device that uses the signals from the sensors on the machine to indicate to the actuators the optimum actuation. (same as ECM)
E.G.R.	Exhaust Gas Recirculation	Engine	Functions to recirculate part of exhaust gas to combustion chamber in order to reduce combustion temperature, controls emission of Nox.

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## Main relief valve and torque converter relief valve



A: From pump

B: To torque converter

C: To transmission lubrication circuit

D: Drain

E: Drain

F: Drain

G: Drain

P1: Oil pressure pickup port at torque converter inlet

P4: Main oil pressure pickup port

1. Valve body

2. Valve spring (small)

3. Valve spring (large)

4. Main relief valve spool

5. Piston spring

6. Piston

7. Valve spring

8. Torque converter relief valve spool

9. Piston spring

10. Piston

### Outline

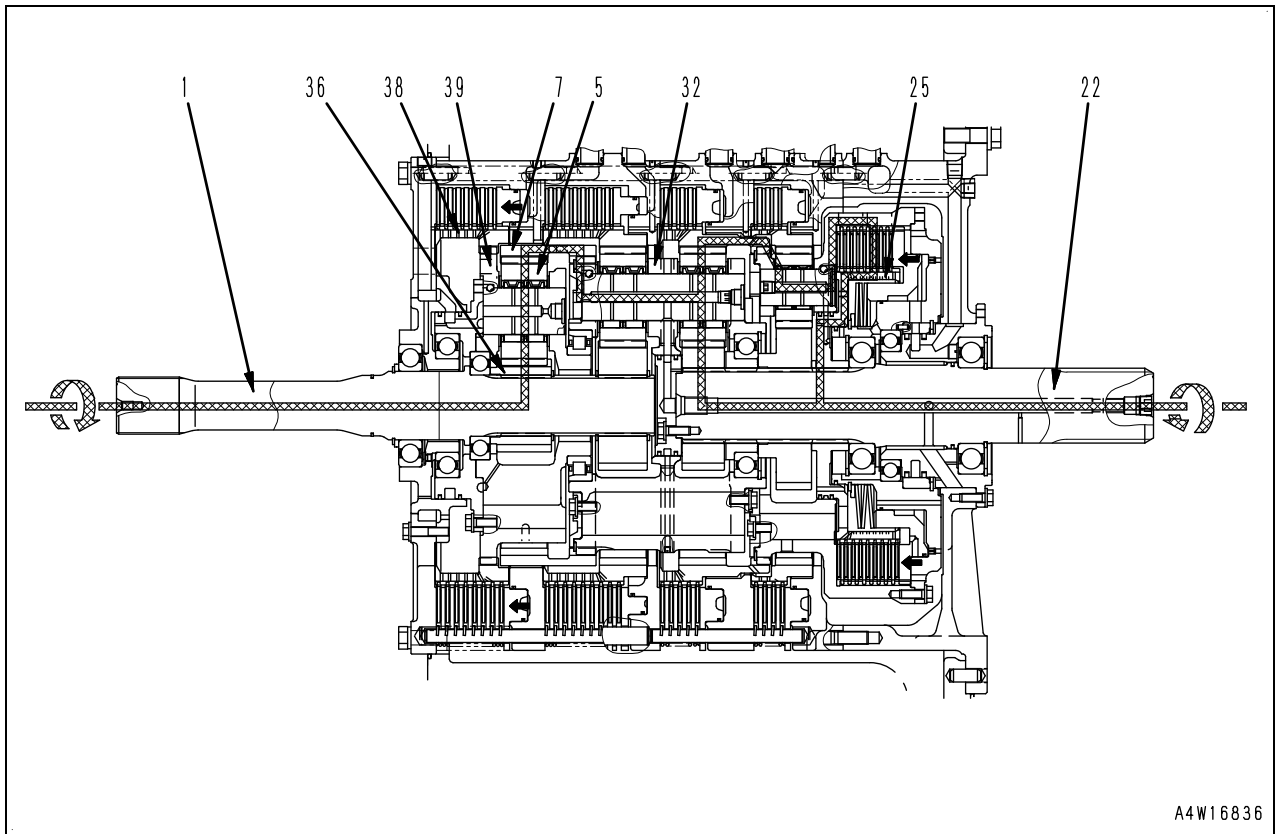
#### Main relief valve

- The main relief valve holds a transmission oil pressure in the set pressure.  
Set pressure: 2.65 MPa {27 kg/cm<sup>2</sup>} (at rated rotation of engine)

#### Torque converter relief valve

- The torque converter relief valve is attached to the torque converter inlet circuit so that the oil pressure of torque converter inlet circuit is always kept to the set pressure or lower in order to protect the torque converter against unusual high-pressure.  
Set pressure : 1.10 MPa {11.2 kg/cm<sup>2</sup>} (cracking pressure)

Reverse 1st



A4W16836

- Reverse ring gear (38) in the reverse clutch and 1st clutch hub (25) are engaged by using an oil pressure.

Power from torque converter

↓  
Input shaft (1)

↓  
R sun gear (37)

↓  
R Planetary pinion (5)

↓  
R ring gear (7)

↓  
F, 3rd carrier (32)

↓  
3rd clutch planetary pinion (12)

→ 3rd sun gear (29)

↓  
3rd clutch ring gear (13)

↓

↓  
2nd carrier, 1st clutch drum (24)

↓

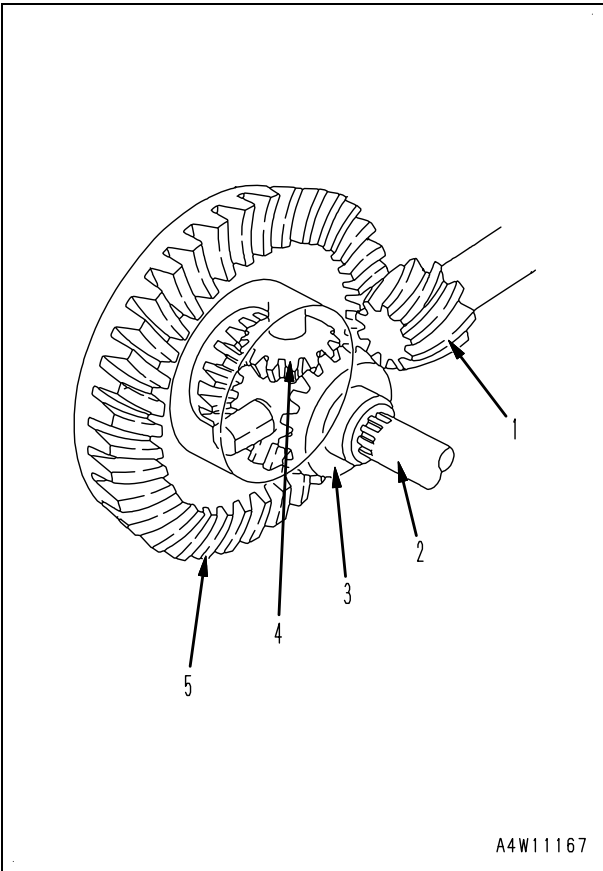
↓  
1st clutch hub (25)

↓  
Output shaft (22)

← ←

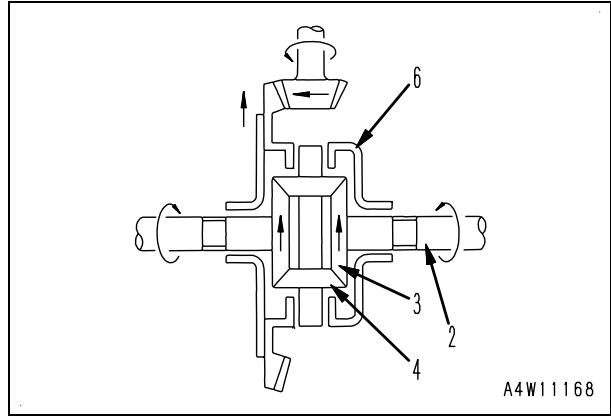
**Outline**

- The power from the engine is transmitted through the damper, upper drive shaft, modulation clutch, torque converter, transmission, and drive shaft to the front and rear axles.
- In the axle, the power is transmitted from pinion gear (1) to bevel gear (5), then the transmission of the power changes 90 degrees in direction, reduces speed, and is transmitted through differential (4) to axle shaft (2).
- The power in the axle shaft is decelerated by the planetary gear type final drive and is transmitted to wheels.



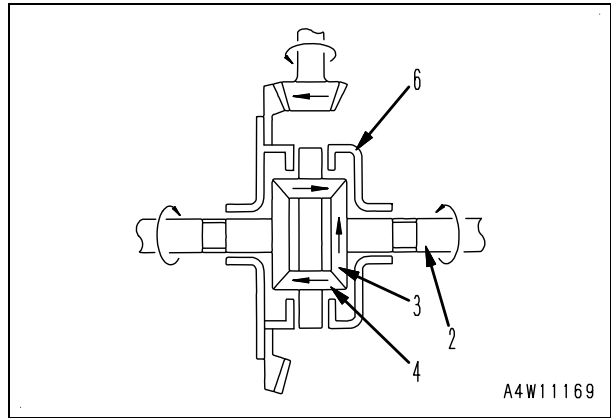
**At straight-travel**

- When traveling straight, the speeds of right and left wheels are the same, so pinion gear (4) in differential Ass'y does not rotate, but the power of carrier (6) is evenly transmitted through pinion gear (4) and side gear (3) to right and left axle shafts (2).

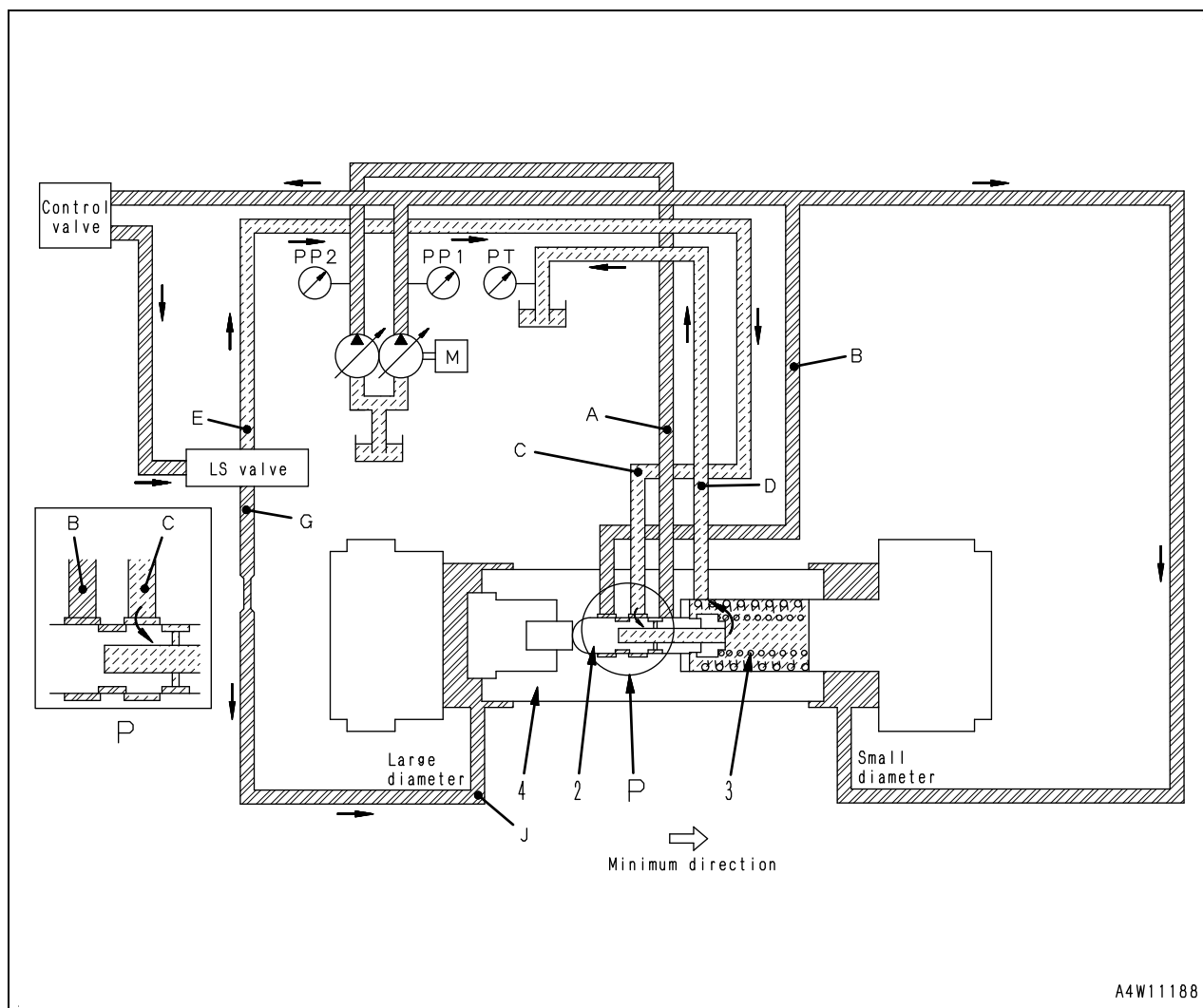


**At swing**

- When turning, the speeds of right and left wheels are different from each other, so pinion gear (4) and side gear (3) in the differential transmits the power of carrier (6) to the axle shaft (2) according to the difference between right and left speeds.



**(2) When load on actuator is large and pump delivery pressure (PP) is high**



A4W11188

**Outline**

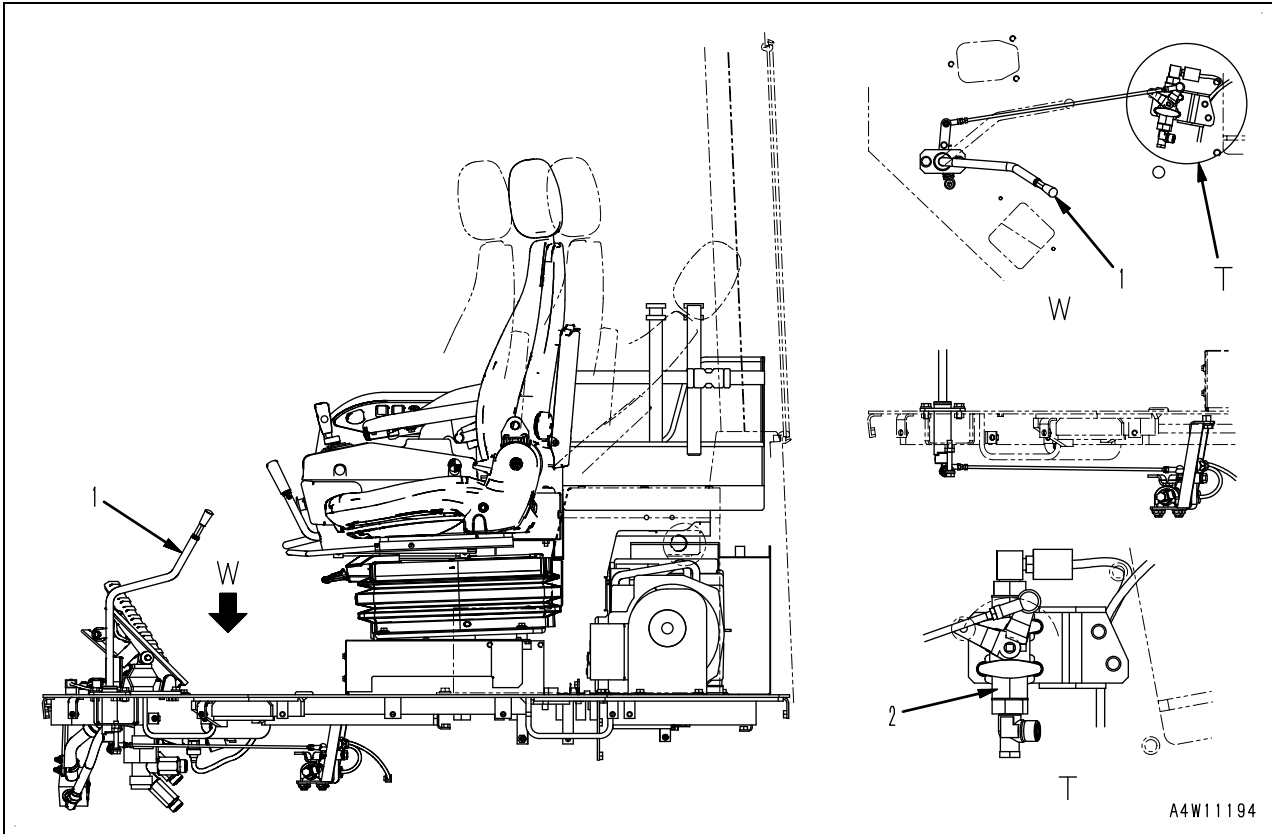
- When a load is large and pump delivery pressures (PP1) and (PP2) are high, the force to push spool (2) to the right increases, and spool (2) is in the position shown in the figure above.
- As a part of pressure from port (B) flows through LS valve and port (C) into port (D), as shown in the figure above, the pressure flowing from port (C) into LS valve becomes about a half of pump pressure (PP2).

**Operation**

- When ports (E) and (G) of LS valve are connected to each other, this pressure from port (J) enters into large diameter piston side in servo piston (4) to stop servo piston (4).
- When pump pressures (PP1) and (PP2) increase further, and spool (2) moves rightward, pump pressure (PP1) is transmitted to port (C), and this moves piston (4) so that the pump delivery decreases to minimum.
- When servo piston (4) moves to the right, spring (3) is compressed to push back spool (2).

- When spool (2) moves to the left, the opening of ports (C) and (D) increases further.
- The pressure (= J) of port (C) decreases, and the movement to the right of servo piston (4) stops.
- At this time, servo piston (4) stops at the further right position than that when pump pressures (PP1) and (PP2) are low.
- The bent line graph shows the positional relations between average pump pressure  $(PP1 + PP2)/2$  and servo piston (4).
- The relation between the average pump pressure  $(PP1+PP2)/2$  and average pump delivery (Q) is shown below.

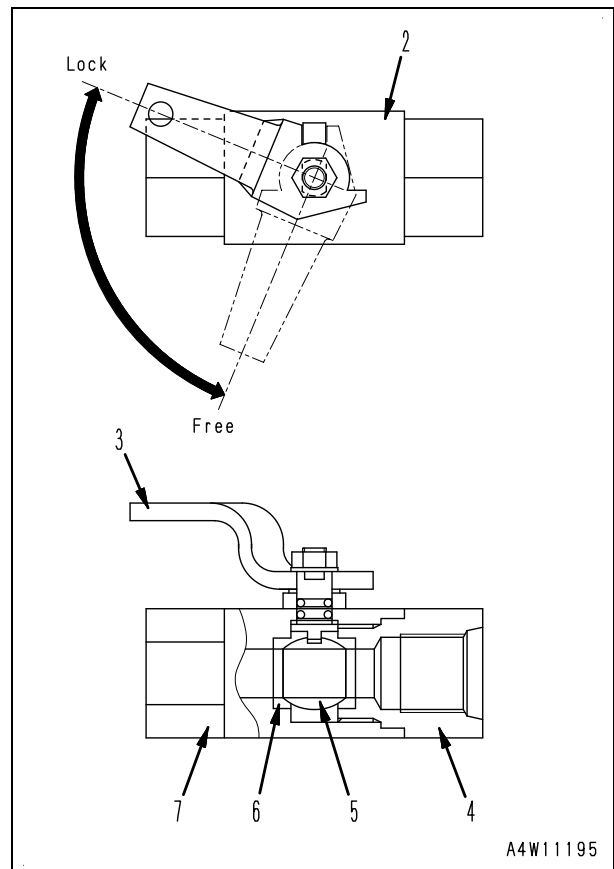
## Steering lock valve



1. Steering lock lever
2. Steering lock valve Ass'y
3. Lever
4. End cap
5. Ball
6. Seat
7. Body

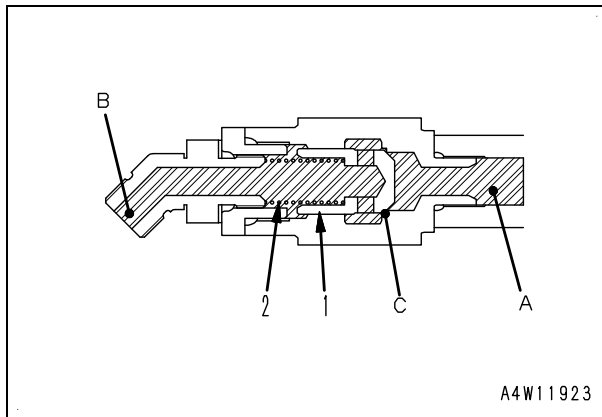
### Outline

- The steering lock valve is installed between EPC valve and rotary valve. When steering lock lever (1) is moved in "lock" position steering lock valve Ass'y (2) works, in conjunction with steering lock lever (1) and the oil in EPC circuit is shut off and the steering operation is disabled.



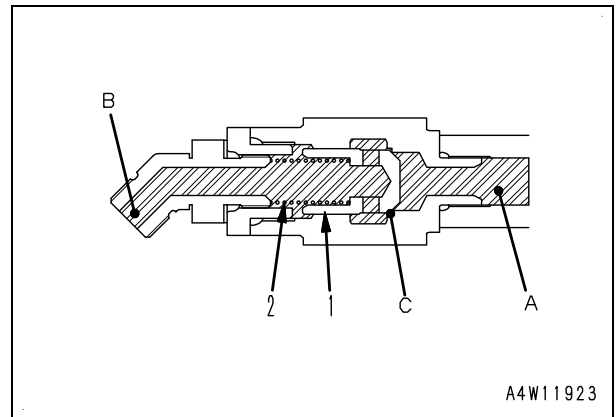
4. **When parking brake is activated (OFF → ON operation)**

- When the parking brake switch is turned ON, the parking brake solenoid valve is energized, the circuit which leads oil pressure **A** in the main transmission circuit to the parking brake spring cylinder closes and the drain circuit in the parking brake spring cylinder opens.
- When the pressurized oil in the parking brake spring cylinder is drained, the parking brake is activated by the parking brake spring force.
- As the oil pressures of ports **A** and **B** in the check valve Ass'y of the parking brake circuit are equal to each other, valve (1) is pressed rightward by the tension of spring (2) to close port **C**.

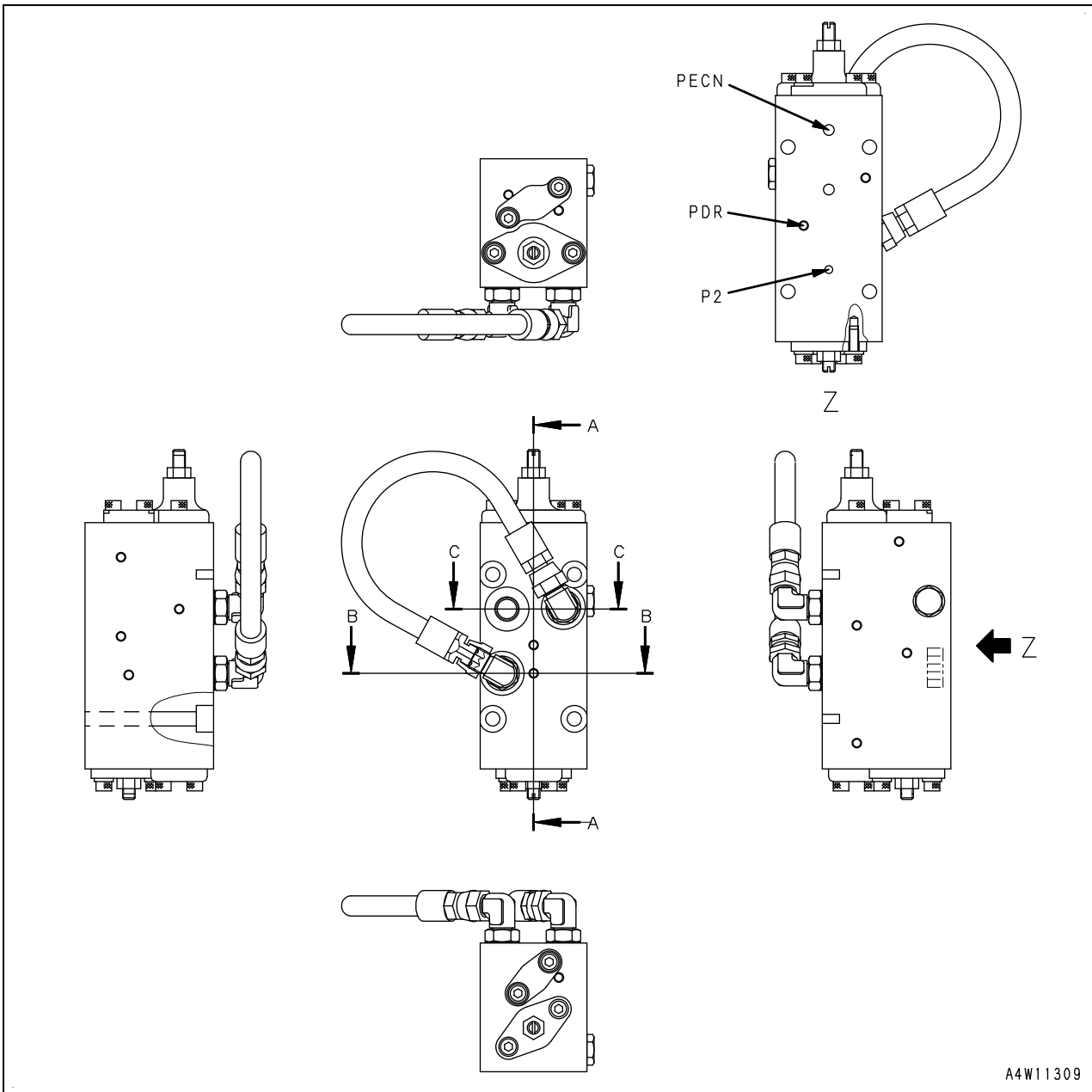


5. **When engine is stopped**

- When the engine is stopped, the supply of oil pressure **A** to the main transmission circuit is stopped.
- As this time, port **C** is still closed and in parking brake circuit **B** between the check valve Ass'y of the parking brake circuit and parking brake solenoid valve, the oil pressure is in the main transmission circuit **A** before the engine stoppage is kept.  
**⚠ When removing a hose in the parking brake circuit, be careful because the oil pressure remains inside even when the engine is stopped. (Loosen the hose fitting a little, fully release internal oil pressure, and then disconnect the hose.)**



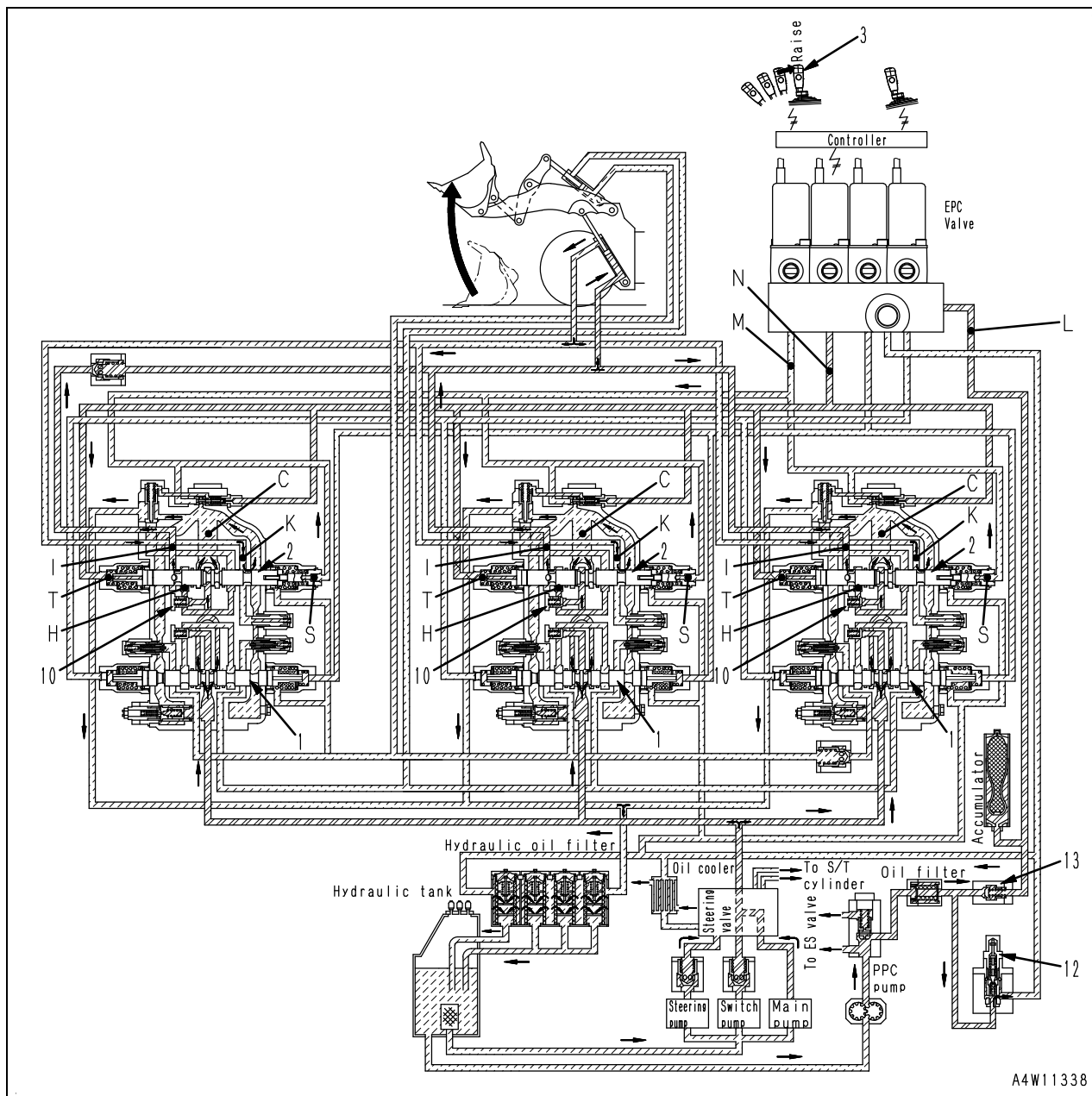
## 2. CO + NC valve (rear)



P2: Main pump pressure IN port  
PDR: CO + NC valve drain OUT port  
PECN: CO + NC valve output pressure OUT port



### Lift arm spool in raise position



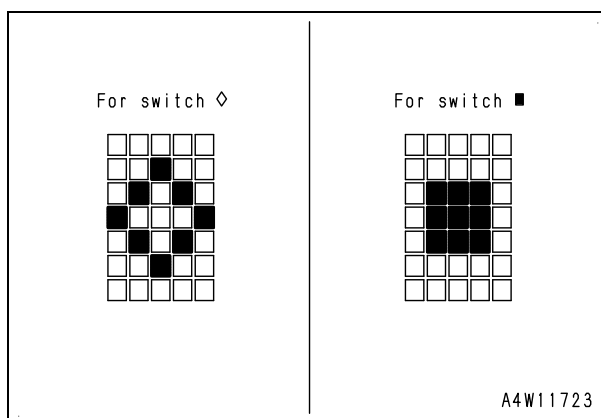
#### Operation

- When lift arm lever (3) is pulled, the oil flows from port (L) in EPC valve to ports (N) and (T). Also, the oil in port (S) flows through port (M) into the drain circuit. The pressurized oil in port (T) pushes lift arm spool (2) to put it in raise position.
- The oil from steering valve goes through the bypass circuit in bucket spool (1) into the bypass circuit in lift arm spool (2). As the bypass circuit is closed by the spool, the oil pushes and opens check valve (10). The oil flows through ports (H) and (I) into the cylinder bottom.
- On the other hand, the oil in the cylinder head returns from port (K) through drain port (C) to the tank. Consequently, the lift arm rises.

## 2. Flow of menu operation

### Operations common to all screens

- 1) "Full blank" screen appears for 0.3 second before each screen change (for notice of screen change). The character display remains full blank while waiting data.
- 2) While you are displaying a screen, if the starting switch is turned to OFF position, the screen (setting operation if you are in the screen (setting operation if you are in the process of configuring settings) is regarded as cancelled. The standard screen is displayed on the character display next time the starting switch is turned to ON position.
- 3) While you are in the service mode, the alarm functions work as usual, but no caution is displayed on the character display.  
(The service functions can be used even if an alarm is raised.)  
After finishing the service functions, an alarm display proper to the alarm item appears on the screen if the alarm is raised.
- 4) The service functions can be used even while the engine is running and the machine is traveling.  
(The service functions are not restricted depending on the machine conditions.)
- 5) While the machine monitor is performing CAN communications, no switch operation is accepted until CAN communications is finished. The character display remains full blank.  
(To prevent accumulation of S-NET communication requests caused by consecutive switch operations.)
- 6) Display of switch mark  $\diamond$  and  $\blacksquare$  on the character display.



- 7) Mode switch operations are not accepted while the self-check is performed.

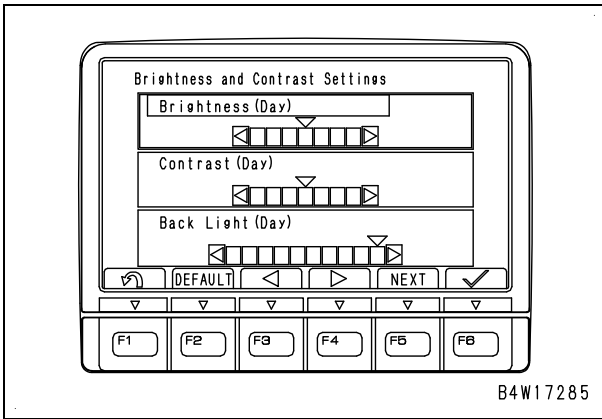
**1) Brightness and contrast, settings**

- Use this menu to adjust the brightness, contrast, and backlight of the multi-function monitor.

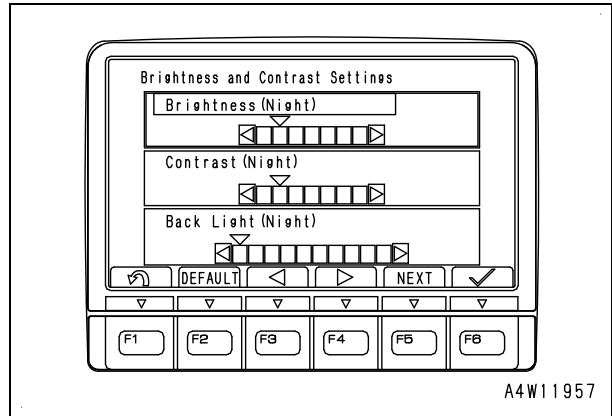
	Adjust-ment level	Default (Day)	Default (Night)
Brightness	1 to 7	4	2
Contrast	1 to 7	4	2
Backlight	1 to 10	10	1

- This menu allows for adjusting the brightness, contrast, and backlight of the multi-function monitor for each of the day and night modes, and saving them. Press [F1] to return to the standard screen, applying the settings accepted before moving to this screen. Press [F2] to return the current settings of brightness, contrast, and backlight to the default values. Press [F3] to reduce the level of the setting item highlighted. Press [F4] to raise the level of the setting item highlighted. Press [F5] to highlight the next setting item. (brightness→contrast→backlight→brightness...)  
Press [F6] to accept the settings made in this screen and return to the standard screen.

Day mode



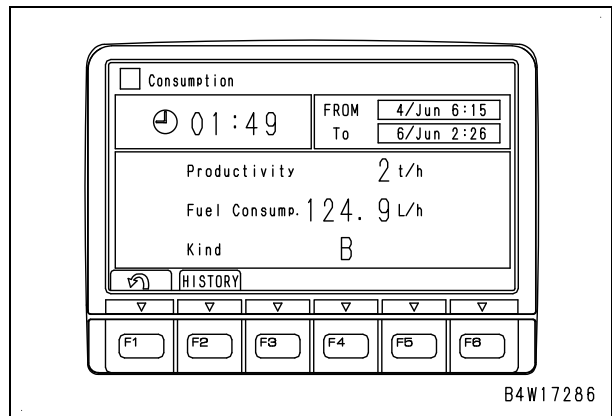
Night mode



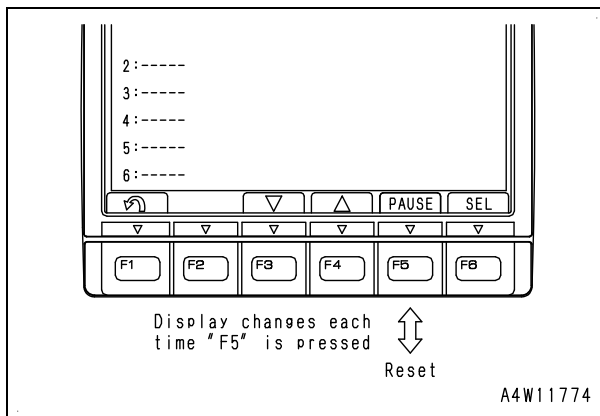
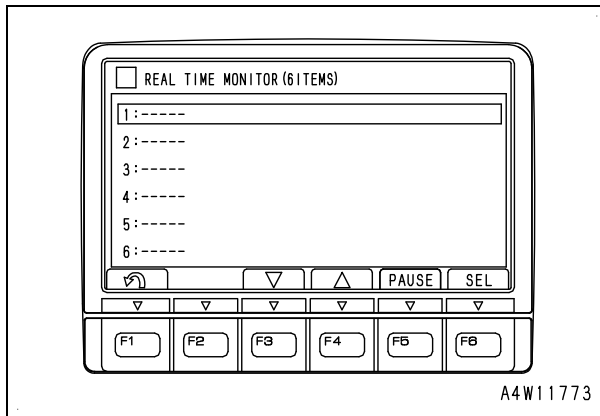
**2) Consumption**

- Use this menu to displays the type of selected materials, productivity (t/h), and fuel consumption (L/h) for the specified period, and the start and end dates of the calculation of them as well.
- When the display setting of the load meter is "Non-display", "----" is displayed for the Kind (of material) and Productivity, and only the value of Fuel Consumption and start and end dates are displayed.
- Even if the selected kind of material is changed or the display setting of the load meter is switched between "Display" and "Non-display", the calculated data is not reset. Press [F1] to return to the standard screen. Press [F2] to move to the PRODUCTIVITY HISTORY screen.

Consumption screen

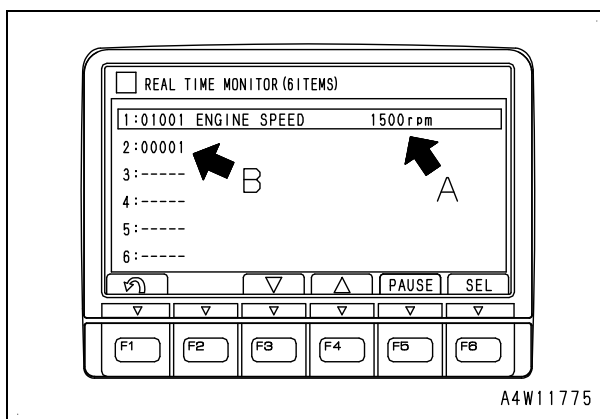


### 6 ITEMS screen



The data is displayed only when the ID entered has a corresponding monitoring item.

If the ID entered has no corresponding monitoring item, only the ID entered is displayed. The ID entered once is held in that place until the starting switch is turned to OFF position or the ID is changed.



A: When correct ID is entered  
B: When wrong ID is entered

Press [F1] to cancel the ID entry and return to the previous screen.

(The ID displayed on the previous screen is value before moving to this screen.)

Press [F2] to move the highlighted input place to the left by one.

If the foremost place is highlighted, the highlighted place does not move.

Press [F3] to change the figure in the highlighted place in the order of:

9→8→7→6→5→4→3→2→1→0→9...

Press [F4] to change the figure in the highlighted place in the order of:

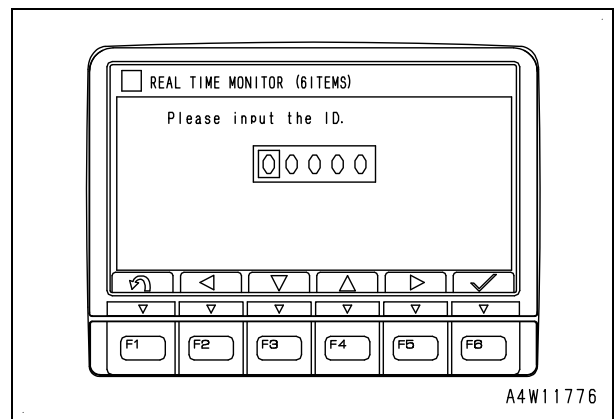
1→2→3→4→5→6→7→8→9→0→1...

Press [F5] to move the highlighted input place to the right by one.

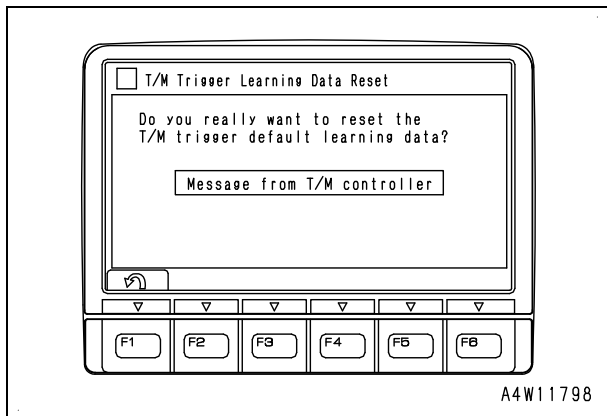
If the last input place is highlighted, pressing [F5] does not move the highlighted place.

Press [F6] to accept the ID entry and return to the previous screen.

### ID input screen



T/M Trigger Learning Data Reset screen  
(setting completion screen)

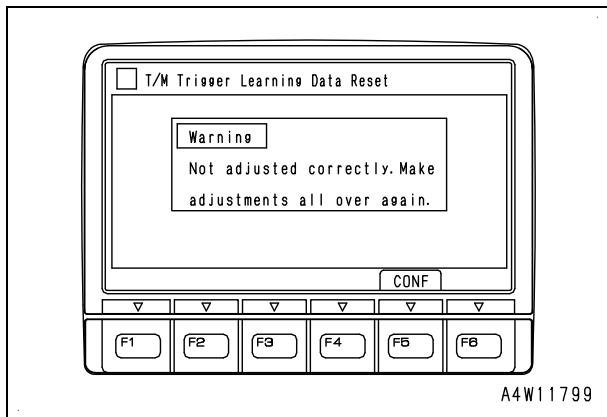


The main monitor issues the command to the multi-function monitor to move to this screen when aborted. After the transition, the multi-function monitor (KOMTRAX Plus) performs the processing.

After reading the message, press [F5] to move to the Adjustment Menu (4) T/M screen.

When the communication error with the controller continues for 0.5 second or more during the adjustment, the screen returns to the Service Menu screen without going through the abort screen.

Abort confirmation screen of transmission relevant setting



6) Option setting

When this screen (Option Setting screen) is displayed first, the menu of "boom Specification" is highlighted.

the settings currently selected are displayed on the screen according to the information from the main monitor. (The main monitor records all option settings.)

Press [F3] to highlight the lower item.

If the lowermost item is highlighted, pressing [F3] highlights the uppermost item.

Press [F4] to highlight the upper item.

If the uppermost item is highlighted, pressing [F4] highlights the lowermost item.

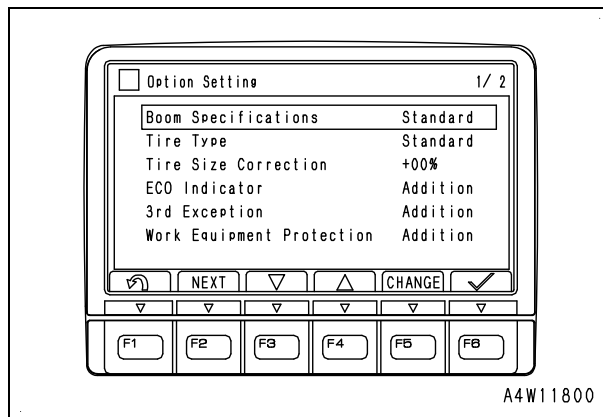
Press [F1] to return to the Service Menu screen for menu selection.

Press [F6] to change the option setting of the item highlighted at present. (If the setting is changed, the change is sent through the network.)

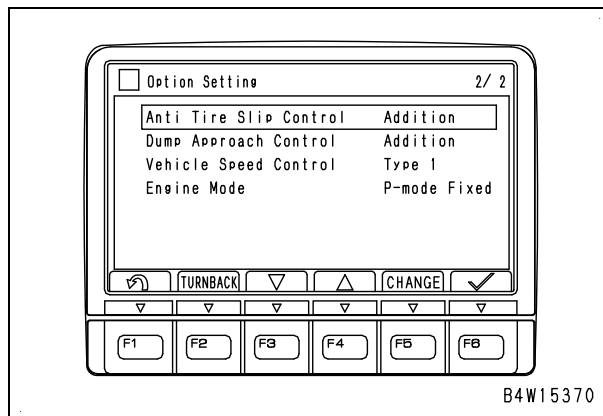
The main monitor also saves all option settings so that it can detect disagreement between the option settings and actual machine conditions.

Press [F2] to move to the next page of the Option Setting screen.

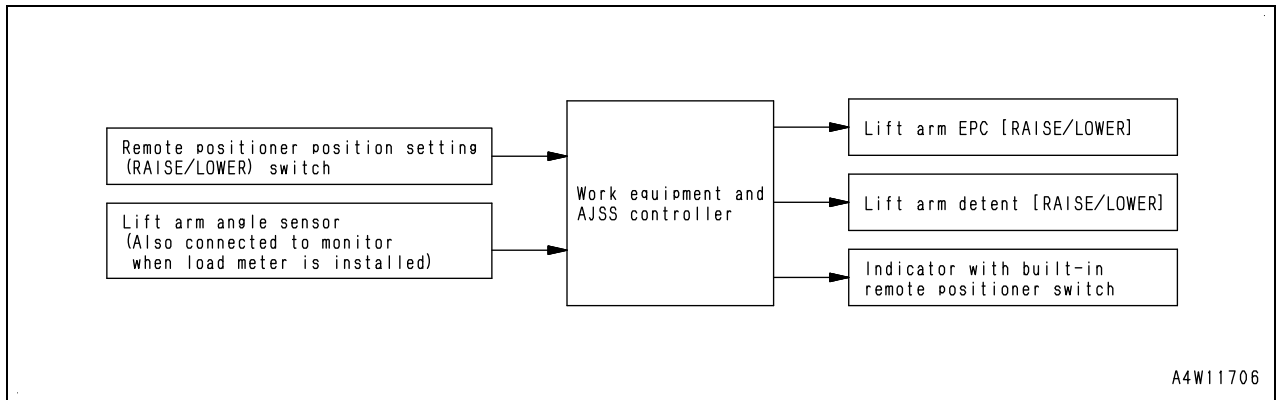
Option Setting screen (1/2)



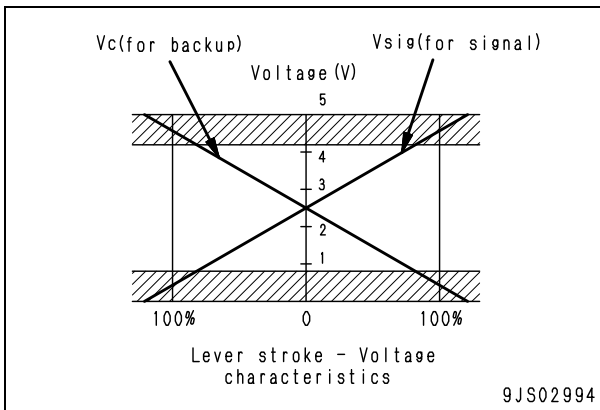
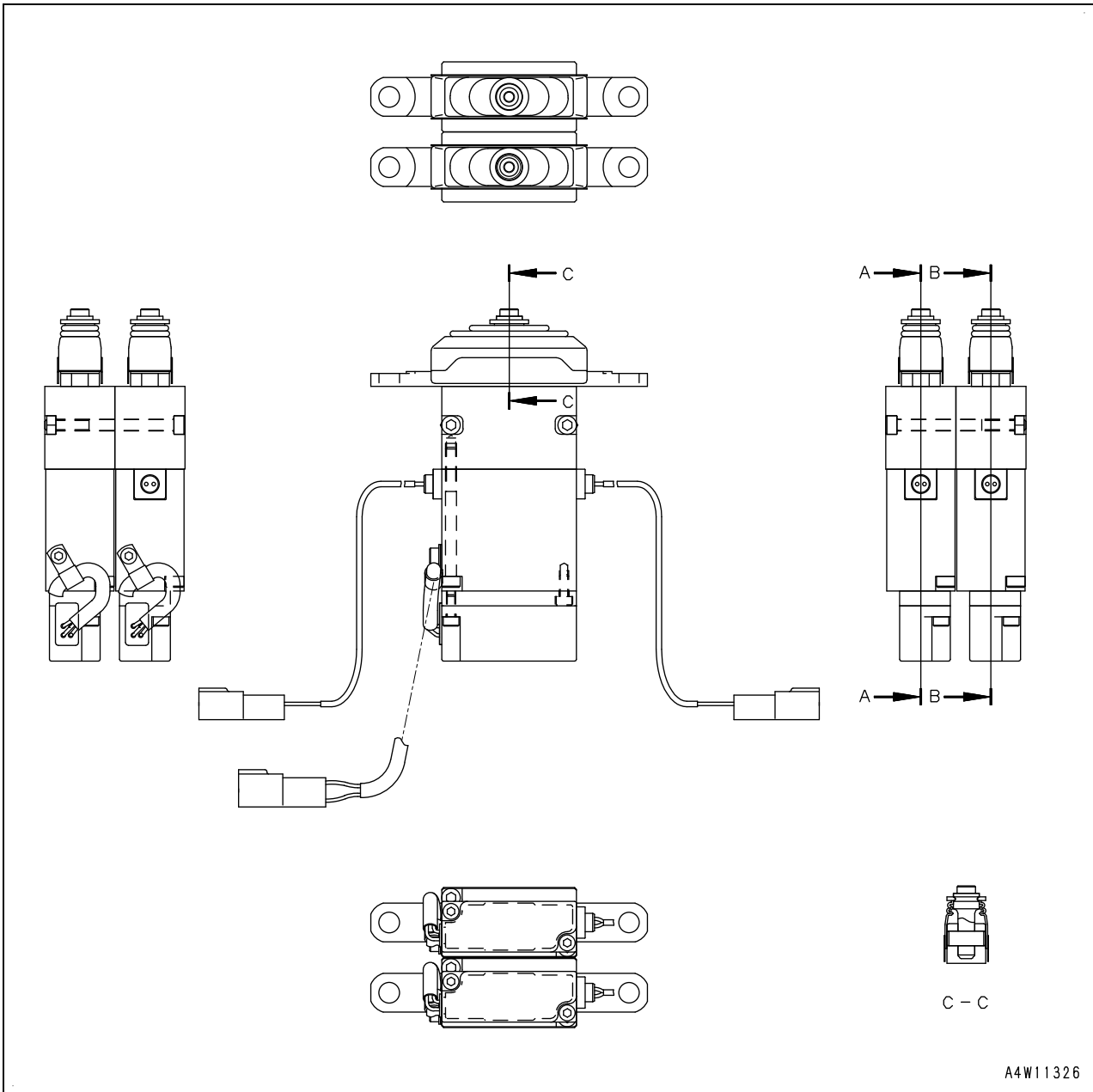
Option Setting screen (2/2)



## 2) Input/output

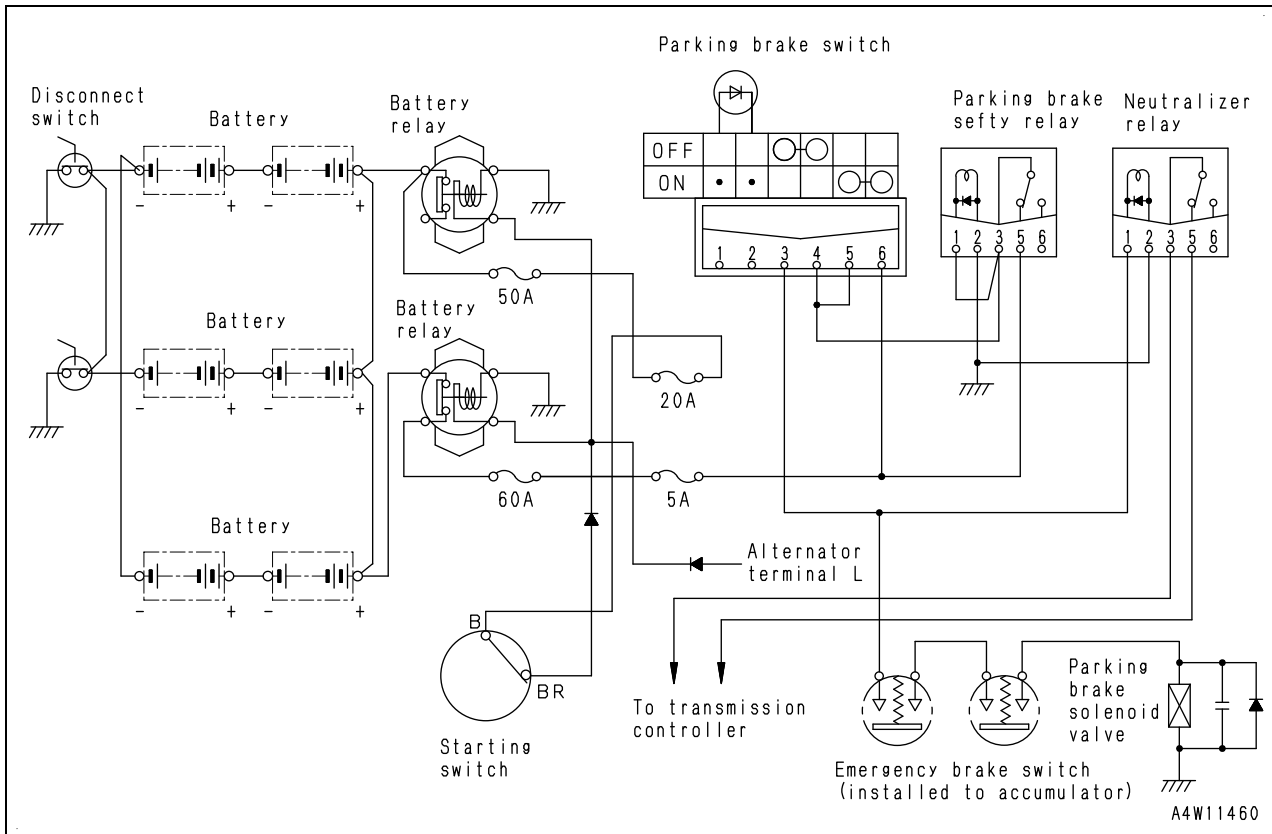


## Work equipment control lever



List of components	Throttle lock function switch	Throttle lock SET/ACCEL switch	Throttle lock RESUME/DECEL switch	Right brake pedal Control switch	Throttle lock display lamp
Switch composition	Alternate 3 position switch	Momentary seesaw switch		Momentary proximity switch	In-switch LED
Switch theory	ON(24 V) OFF(OPEN)	ON(GND) OFF(OPEN)		Brake operation (GND) Brake not operated (OPEN)	Performed through electrical circuit
Function	<p>When the upper part of this switch is pressed, "Without throttle lock auto deceleration function" is set.</p> <p>When the lower part of this switch is pressed, "With throttle lock auto deceleration function" is set.</p> <p>When the middle part of this switch is pressed, the throttle lock function is OFF.</p>	<p>Throttle position setting function The throttle amount is stored when it is ON (lock accelerator opening ratio) It is controlled with the edge of the input signal.</p> <p>Accelerator function When the switch is pressed and held for 0.5 seconds, the throttle opening set value rises in accordance with the time the switch is pressed.</p>	<p>Resume function When this switch is pressed while the throttle lock function is cancelled with the right brake pedal (cancellation), the throttle lock function is recovered. It is controlled with the edge of the input signal.</p> <p>Deceleration function When the switch is pressed and held for 0.5 second, the throttle opening set value lowers in accordance with the time the switch is pressed.</p>	When the right brake pedal is depressed, the throttle lock function is temporarily cancelled.	Lights when the throttle lock function switch is ON.

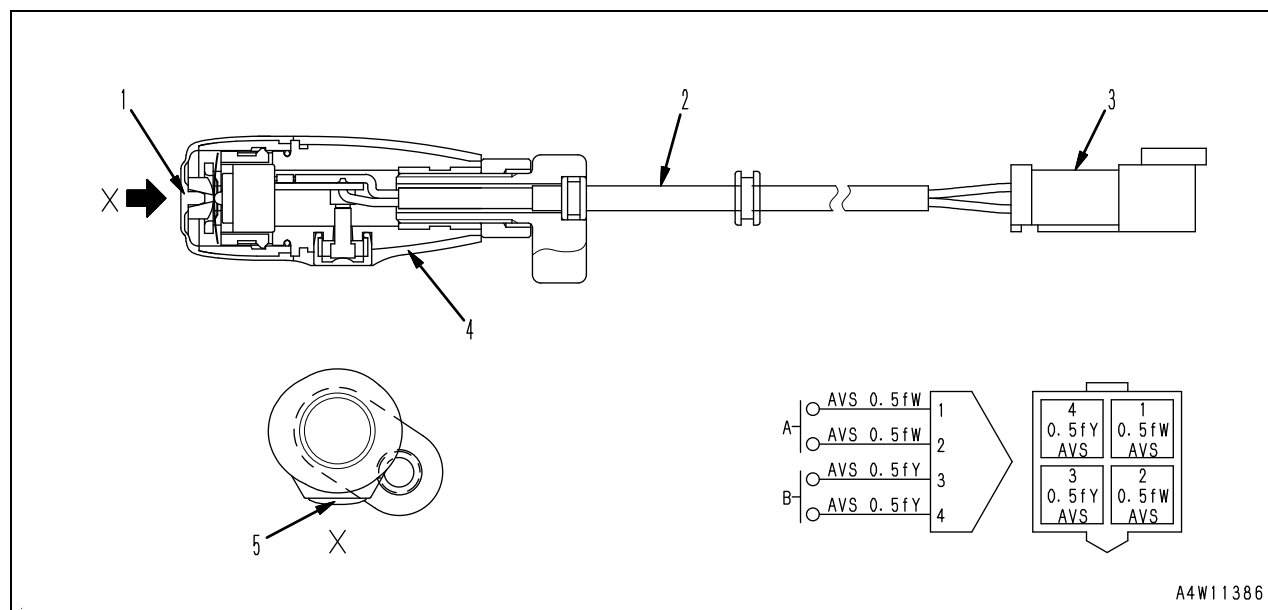
**5. When the oil pressure of main brake decreases (emergency brake is activated)**



**Operation**

- When the oil pressure of the main brake line decreases, the emergency brake switch installed to the accumulator becomes open. Therefore, the current does not flow in the parking brake solenoid valve, so the pressurized oil in the parking brake cylinder is drained and the parking brake is activated. But, in this case, unlike when the parking brake switch is turned ON, the coil in the neutralizer relay is live with electricity.
- Therefore, the signal flows into the transmission controller and the transmission clutch becomes connectable. Thus, the engine brake is also available when the emergency brake is working, so the braking distance can be shorter. In case the machine needs to be moved while the emergency brake is working (in the case that the emergency brake is activated when traveling a crossing), it becomes possible to move the machine by operating the transmission switch.

## Kickdown, speed control ON/OFF switches



1. Switch A (White wiring harness)
2. Wiring harness
3. Connector
4. Knob
5. Switch B (Yellow wiring harness)

### Function

- Switch A (1) installed on knob (4) of the lift arm control lever is a kickdown switch, and switch B (5) is a speed control ON/OFF switch.
- Switch A (1) installed on knob (4) of the bucket control lever is a cancel switch of the load meter, and switch B (5) is a sub total switch.
- Both switches A (1) and B (5) are automatic return type whose contact points close only while an operator pushing the switches.

### Kickdown switch

#### Operation

- The kickdown switch is installed on the lift arm lever. When the switch is pushed while the conditions of the travel mode, gear speed, and travel speed are met, the gear speed is shifted down to 1st gear.
- In the manual shift mode, the kickdown switch works only when the gear speed is forward 2nd. When the switch is pushed the gear speed is shifted down to 1st gear.
- In the auto shift mode, when the travel speed is less than 13 km/h in forward or reverse mode, the gear speed is shifted down to 1st gear if the switch is pressed.

### Release

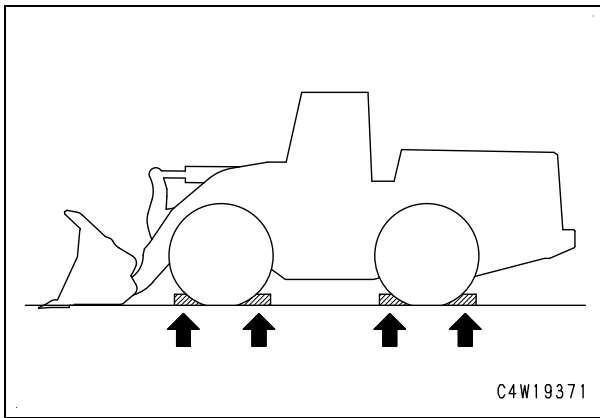
(in manual shift mode)

- When the directional switch is in "N" or "R"
- When the upshift or downshift switch is pushed (forward 1st unchanged when downshift switch is pushed)
- When the starting switch is turned OFF

(in auto shift mode)

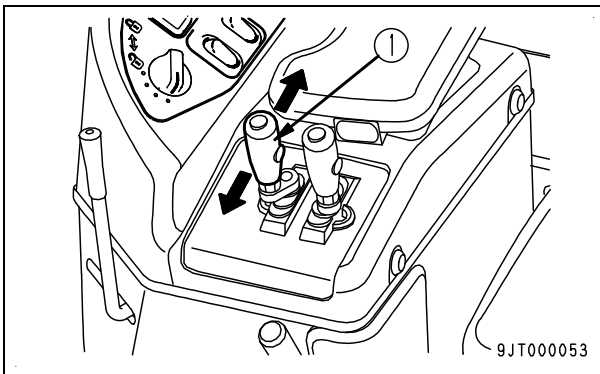
- When the directional switch is "N"
- When the directional switch is changed between forward and reverse
- When the upshift or downshift switch is pushed
- When the travel speed increases
- When the starting switch is turned OFF

7) Place blocks under the wheels.

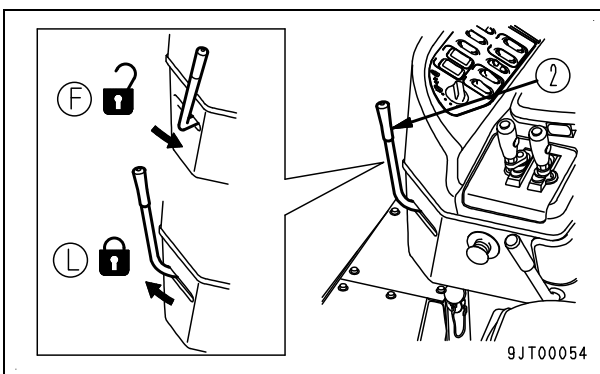


**2. Release the remaining pressure in the hydraulic circuit.**

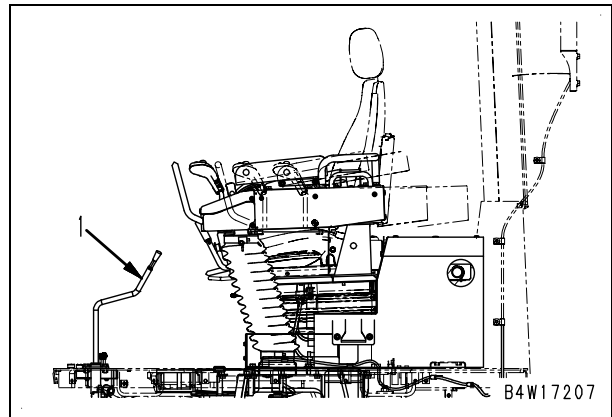
- 1) Operate the work equipment control levers (1) (lift arm and bucket) back and forth slowly two or three times in full strokes.  
 ★ Hydraulic sound will cease when there is no more pressure remaining in the circuit.



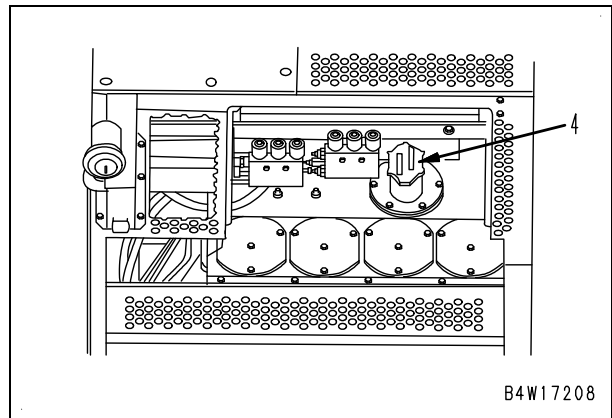
2) Move work equipment lock lever (2) to the "LOCK" position.



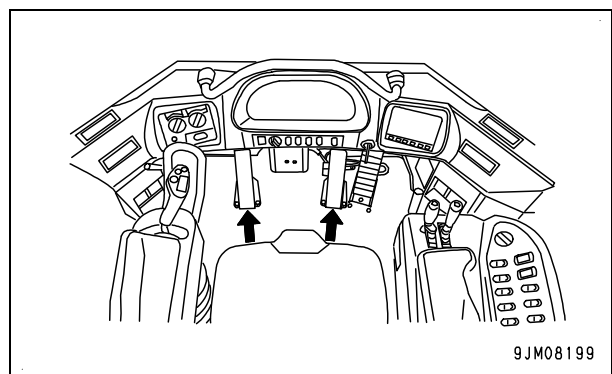
3) Move joystick lever (lock lever) (1) to the "LOCK" position.



- 4) Loosen hydraulic tank cap (4).  
 (Hold the cap at a position where a hissing sound is heard.)



5) Depress the brake pedal ten times in full strokes. (Until no hydraulic sound is heard.)



## Testing additional cooler fan speed

### ★ Testing tools

Symbol	Part No.	Part name
C 1	799-101-5002	Hydraulic tester (analog) 40 MPa (400 kg/cm <sup>2</sup> )
	790-261-1204	Hydraulic tester (digital)
7	790-261-1331	Adapter (M22)
T	799-205-1100	Tachometer kit

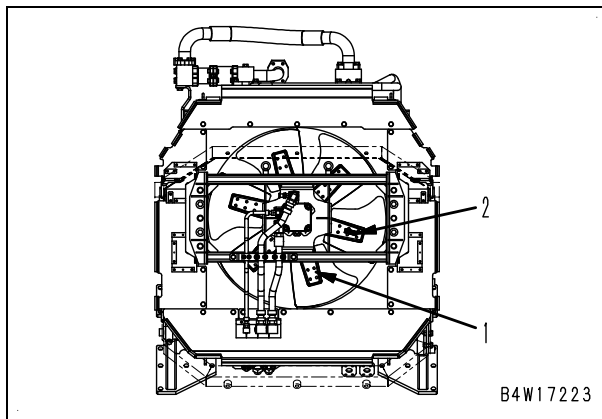
- Run the engine at high idle and measure the fan speed.

Specifications	Standard value (rpm)	
	P mode fixed	E mode fixed
Engine speed	1,850 to 1,950	1,850 to 1,950
Fan speed	2,000 ± 100	

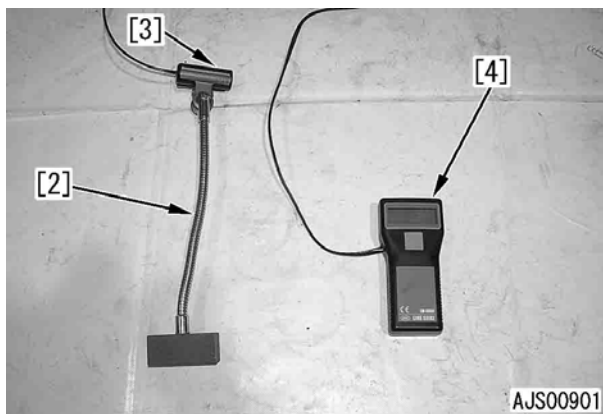
### Testing conditions

- Hydraulic oil temperature: 45 to 55 °C
- ⚠ Be sure to follow "Safety precautions to follow before starting work".**

- Stick reflection tape (2) of tachometer kit T to fan (1) of the additional cooler.



- Set probe [3] with stand [2], matching it to reflection tape (2), and connect it to tachometer [4].



## Testing and adjusting steering surge cut valve oil pressure

### ★ Testing tools

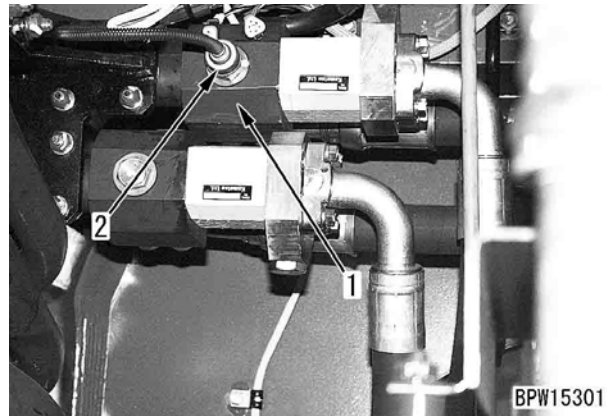
Symbol	Part No.	Part name
C	1	799-101-5002 Oil pressure gauge kit (analog) (Pressure gauge: 60 MPa {600 kg/cm <sup>2</sup> })
		790-261-1204 Oil pressure gauge kit (digital)
	2	799-101-5160 ● Nipple
	5	799-203-2440 Nipple

### Testing condition

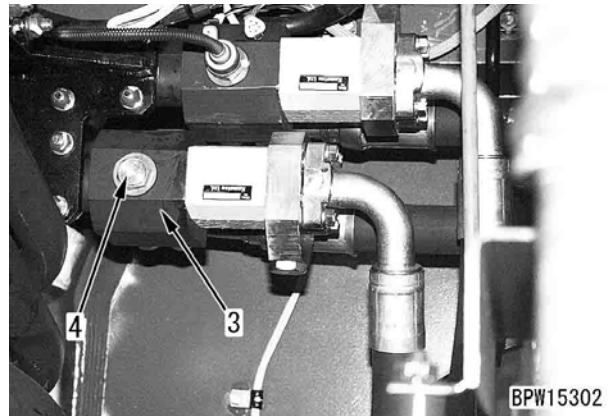
- Hydraulic oil temperature: 45 to 55 °C
- ▲ **Be sure to follow "Safety precautions to follow before starting work".**
- ▲ **Park the machine on a level ground, apply the parking brake, lower the bucket to the ground, and reserve a safe area.**
- ▲ **Chock the wheels to prevent the machine from moving.**
- ▲ **Lock the front frame and rear frame by using frame lock bars.**
- ▲ **Loosen the oil filler cap of the hydraulic tank to release the pressure inside the hydraulic tank, then operate the steering lever two or three times to release the remaining pressure in the piping.**
- ★ The procedure is common for both sides except for the location of the hydraulic pressure measuring points.
- ★ An oil pressure sensor (2) is installed on the left steering valve.

### Testing

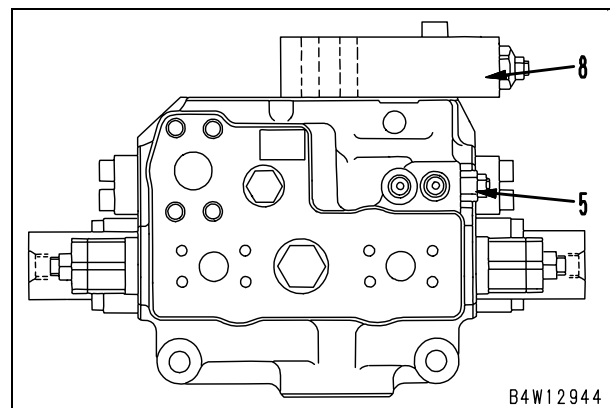
1. Steering surge cut valve oil pressure must be measured at the pump inlet side circuit of the steering valve.
  - ★ Since the right and left steering valve pressures are merged at the outlet side of the steering valve, right and left pressures cannot be measured separately at the outlet side.
- 1) When measuring the left steering valve oil pressure, remove steering oil pressure sensor (2) from tube (1) between the steering pump and steering valve, install nipples **C5** and **C2**, and then install oil pressure gauge **C1** (60 MPa {600 kg/cm<sup>2</sup>}) to nipple **C2**.

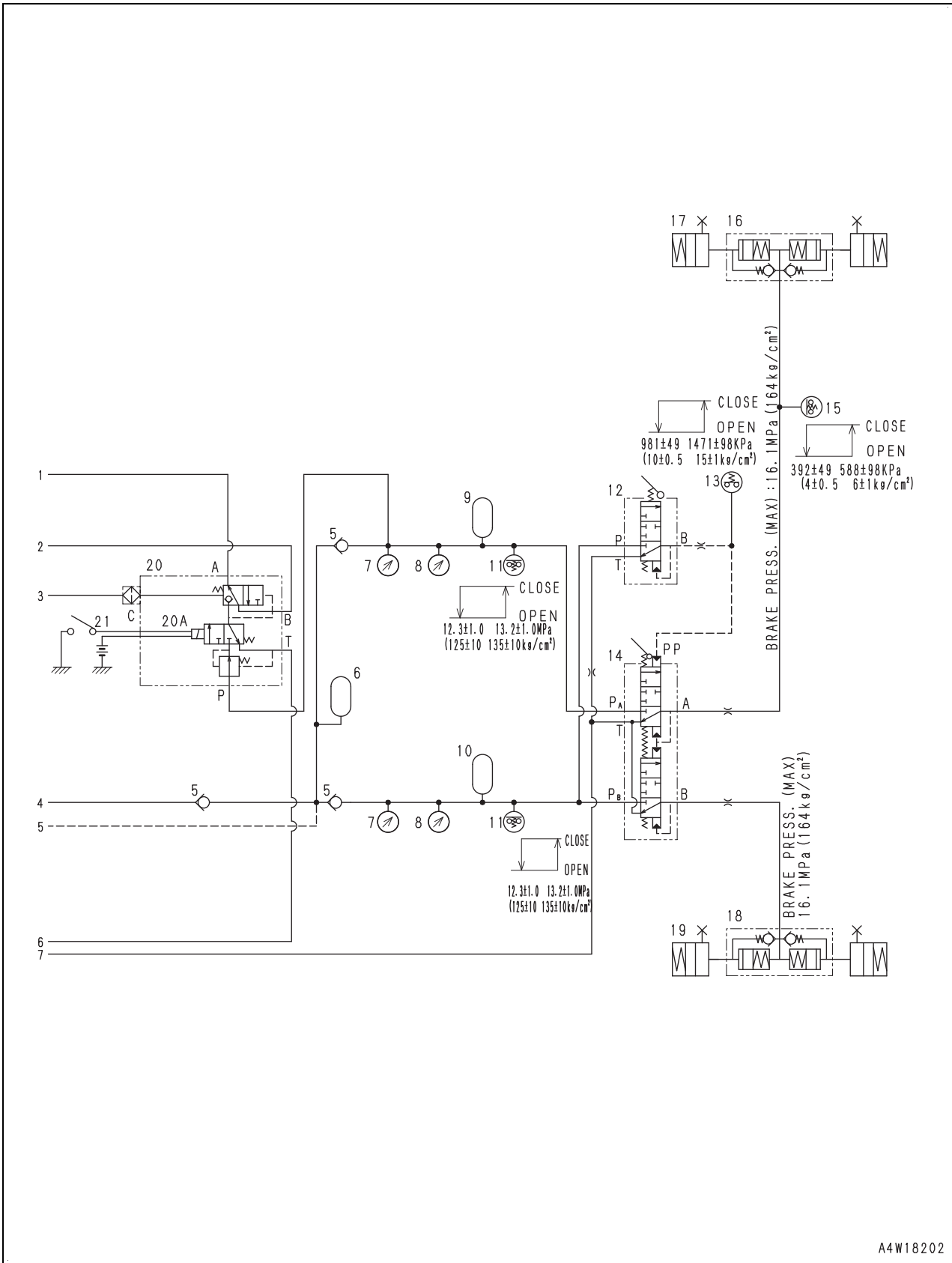


- 2) When measuring the right steering valve oil pressure, remove plug (4) from tube (3) between the steering pump and steering valve, install nipples **C5** and **C2**, and then connect oil pressure gauge **C1** (60 MPa {600 kg/cm<sup>2</sup>}) to nipple **C2**.



2. Loosen lock nut (6) on steering main relief valve (5), and screw in the adjustment screw (7) half a turn.
  - ★ Ensure that only surge cut valve (8) is allowed to operate.
  - Steering main relief valve set pressure: 31.0 to 31.9 MPa {316 to 325 kg/cm<sup>2</sup>}
  - Surge cut valve set pressure: 33.3 to 34.3 MPa {340 to 350 kg/cm<sup>2</sup>}





A4W18202

## Adjusting

### 1. Adjusting PPC relief valve

**⚠ Stop the engine before adjusting the adjustment screw.**

- 1) Remove the cover at the top of the transmission.
- 2) Loosen lock nut (6) of PPC relief valve (5), then turn adjustment screw (7) to adjust.

★ If the adjustment screw is

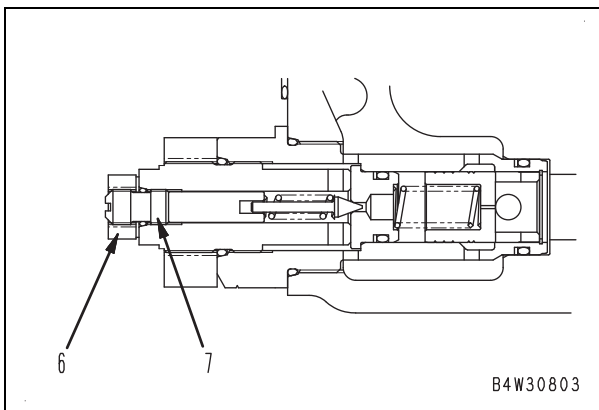
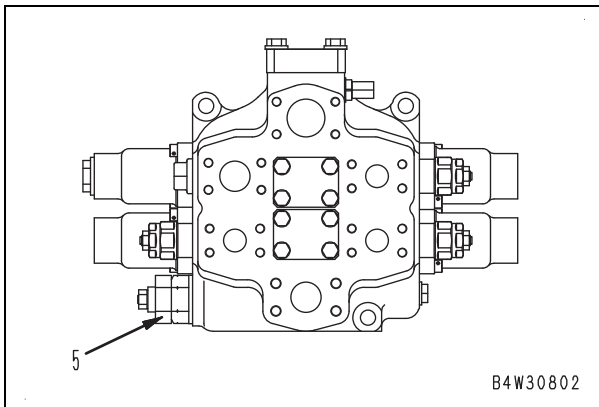
- Turned clockwise, the pressure is increased.
- Turned counterclockwise, the pressure is decreased.

★ Quantity of pressure adjustment per turn of adjustment screw:

19.6 MPa {200 kg/cm<sup>2</sup>}

🔧 **Locknut:**

**29.4 to 39.2 Nm {3 to 4 kgm}**

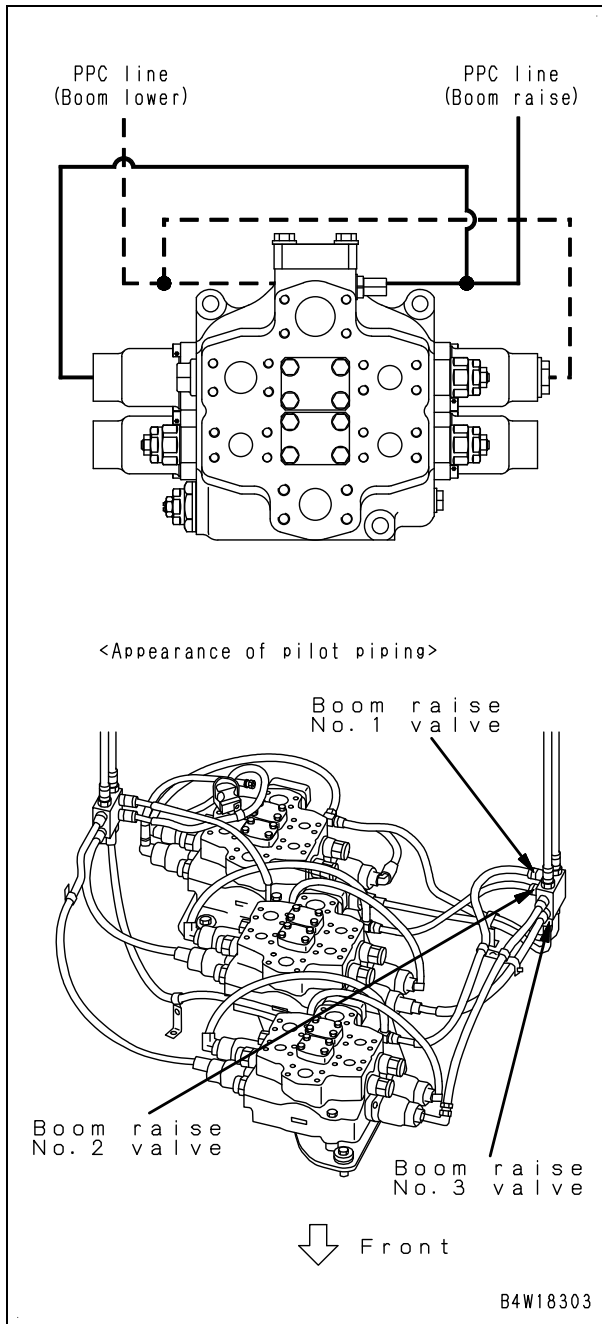


- 3) When completing adjustment, test the PPC oil pressure again on the multi monitor.

★ After the first adjustment, there is a possibility that the set pressure is too high. Therefore, raise the engine speed gradually to avoid generation of abnormal pressures in the circuit.

- 4) If the set pressure does not reach the specified value when the adjustment screw is tightened, the relief valve is worn on the inside. Replace the valve with a new one.

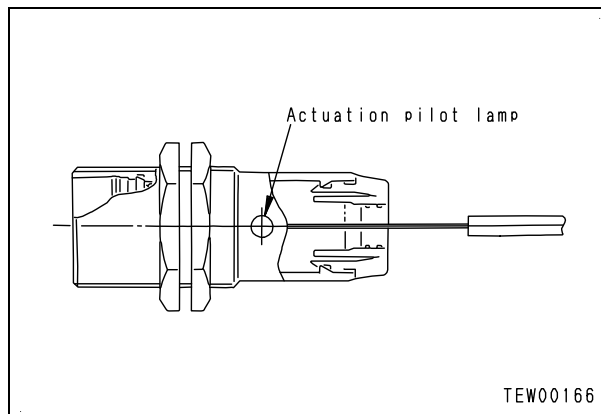
### Schematic of valves and pilot lines



## Checking proximity switch operation pilot lamp

### Proximity switch operation pilot lamp (Red)

- The proximity switch has a pilot lamp to indicate its operating condition. Use this pilot lamp when adjusting the proximity switch.
- ★ Status of proximity switch operation pilot lamp
  - When object of sensing is at (in vicinity of) the sensing face of proximity switch: Lights up
  - When object of sensing is apart from the sensing face of proximity switch: Goes out



Proximity switch actuation pilot lamp	Lights up	Goes out
Detector position	When detector is positioned at detection surface of proximity switch	When detector has moved away from detection surface of proximity switch
Bucket positioner	<p style="text-align: center;">Detector                      Proximity switch</p>	<p style="text-align: center;">Detector                      Proximity switch</p>

B4W28289

- 3) To change the setting of [Satellite Setting], follow the procedure below.
  - 1) Press the [Edit] button (6) in the [Satellite Setting] block to display the setting screen.
  - 2) Bring GCC Code to the applicable area and then press the [OK] button.

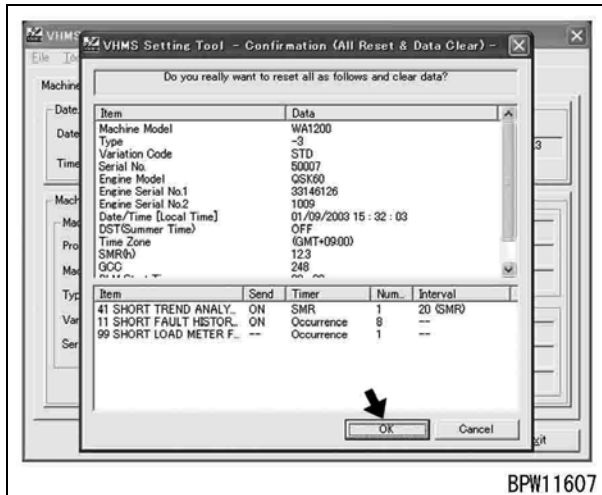


BPP11585

GCC codes and applicable areas	
Code	Applicable area
1	USA
120	Italy
121	Malaysia
122	Korea
123	Brazil
130	Japan

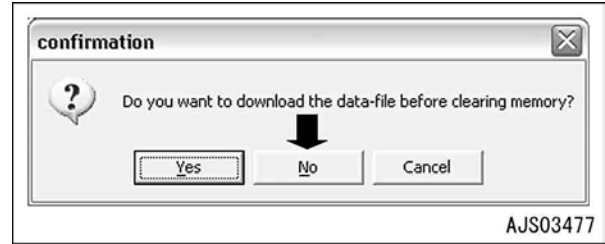
- 4) After checking and changing all the data in [Communication Setting], press the [Apply] button (7) to settle the setting.

★ If the [Apply] button is pressed, the screen for checking the setting appears. Check the setting again and press the [OK] button when the setting is correct.



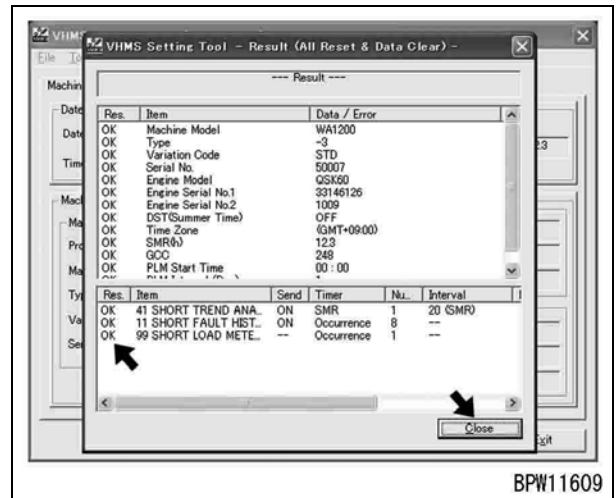
BPW11607

- 1) When the data are cleared, the system asks you if you will download the current data file. Since the file is not necessary for setting up, press the [No] button.



AJS03477

- 2) Check that OK is displayed at the left end and confirm that setting is finished normally, and then press the [Close] button.



BPW11609

**5. Measurement procedure by downloading data in KOMTRAX Plus controller**

Operating conditions and sequence	Engine	1. 800 rpm	2. Eng Low idle	3. Engine Full Bucket Tilt Back Relief	4. Engine Full Steering Relief	5. Eng High Idle	6. Engine Full T/C Stall	7. Eng Low idle	8. Eng High Idle	9. Engine Full Full Stall	10. Eng Low idle	
	T/M Shift switch	N	N	N	N	N	F3	N	N	F3	N	
Operating conditions	(Minutes)	0.0	0.5	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
	(Minutes)	-5.5	-5.0	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0
1-1	Engine speed	1/4	1/4	1/4		1/4	1/4			1/4	★	
1-2	Engine oil pressure	1/4					1/4					
1-3	Blow-by Pressure						2/4	★				
1-4	Boost pressure						2/4					
1-5	Ambient Temperature	2/4										
2-1	T/C Inlet Pressure					3/4						
2-2	T/C Outlet Pressure					3/4						
3-1	T/M Main Relief Pressure					3/4						
3-2	T/M Lubricating Oil Pressure					3/4						
3-3	T/M Mod Oil Pressure					3/4						
4/1	Steering circuit relief pressure				4/4							
5-3	Brake Charge Cut-in (*1)							4/4				
5-3	Brake Charge Cut-out (*1)							4/4				
6-1	Work equipment relief pressure			4/4								
6-2	PPC Oil Pressure			4/4								

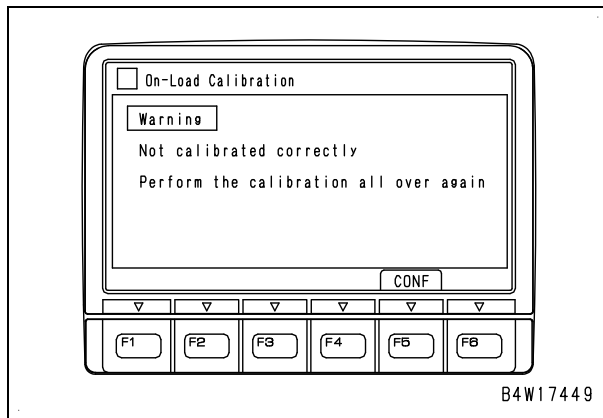
(\*1) Depress the brake pedal for more than 10 times to lower the brake accumulator circuit pressure to below the cut-in pressure before measuring the brake accumulator charge cut-in and cut-out oil pressures while running the engine at low idle.

**⚠ The range of error in operation condition switching time is ±5 seconds.**

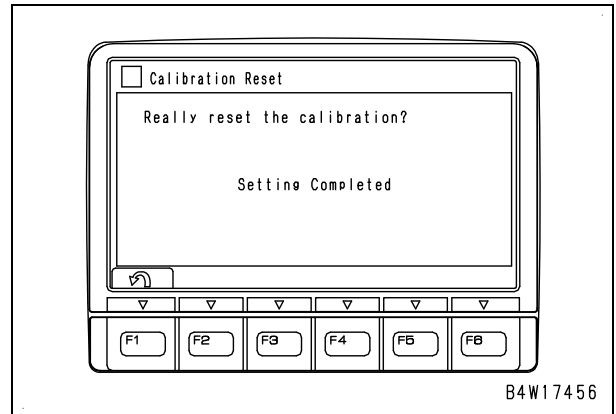
**Value: Indicates the page number of the Pm Clinic display on the multi monitor.**

★ Read when a PC is not used.

- 7] If the calibration is not normally terminated, a warning screen appears. Press the [F5] switch to return to the "Load meter menu" screen and start the procedure over.

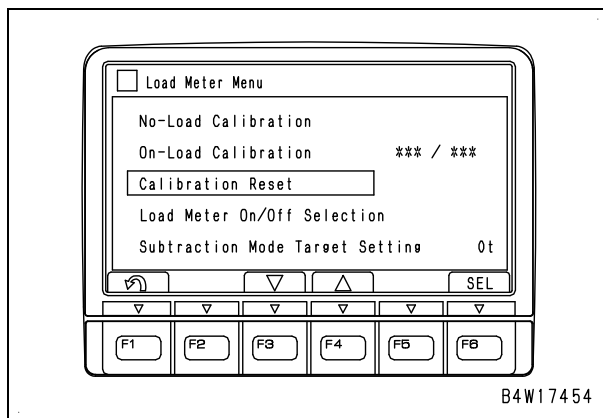


- 3] When the resetting is normally completed, a message of resetting completed appears. After verification, press the [F1] switch located at the lower left corner of the screen. The "Load meter menu" screen reappears.

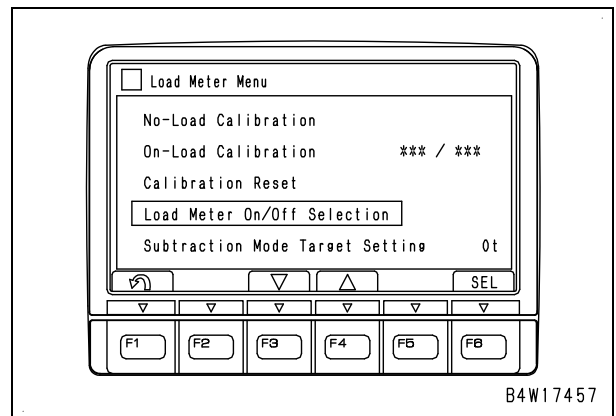


6) Reset of calibration

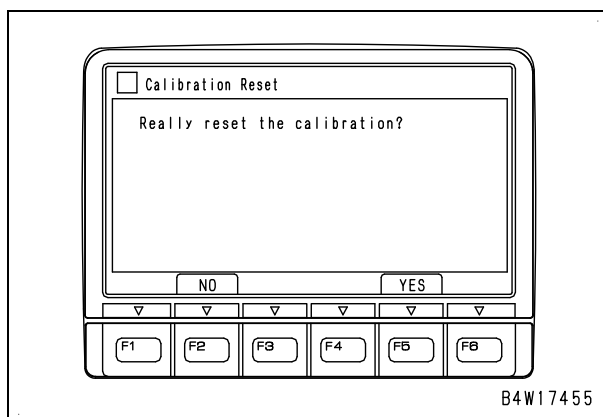
- 1] Select "Calibration reset" shown on the screen by pressing the [F3] or [F4] switch and validate the selection using the "Select" [F6] switch.



- 7) Selecting display/nondisplay of load meter  
1] Select "Load meter show/hide selection" shown on the screen by pressing the [F3] or [F4] switch and validate the selection using the "Select" [F6] switch.



- 2] To reset the calibration, press the [F5] switch. To not reset the calibration, press the [F2] switch.



- 2] Each press of the "Change" switch alternates the machine monitor between display and nondisplay. After setting, press the [F1] switch located at the lower left corner of the screen to return to the "Load meter menu" screen.

Press the [F4] switch to increment the value by 1[t].

- Threshold setting range

Metric tons: 20 to 99 [t]

US tons: 22 to 99 [t]

If 99 [t] is specified in metric tons or US tons, a special mode is set in which no alarm is issued for any payload.

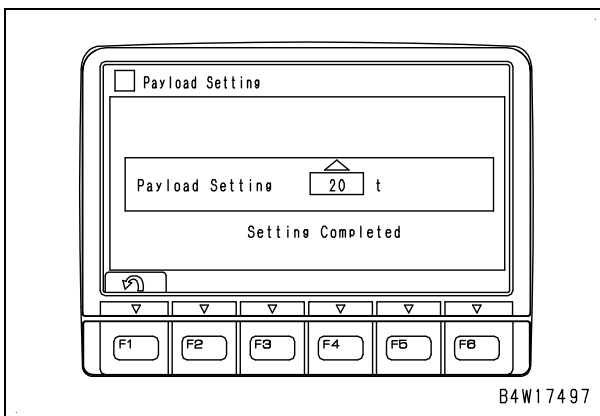
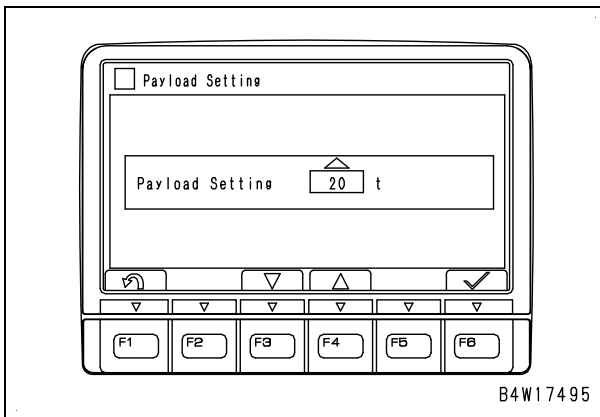
- When the metric tons or US tons is changed, the previous setting value is stored in memory and a value is displayed corresponding to the set tonnage.

Press the [F6] switch to validate the currently displayed payload setting value and notify it to the main monitor.

If the main monitor receives a change, the screen returns to the adjustment (1) load meter screen.

The main monitor issues a command to show this screen at an abnormal end, but once the screen appears, control is passed onto the multi monitor (KOMTRAX Plus).

After the message is confirmed, press the [F5] switch to go to the Adjustment (1) load meter screen.

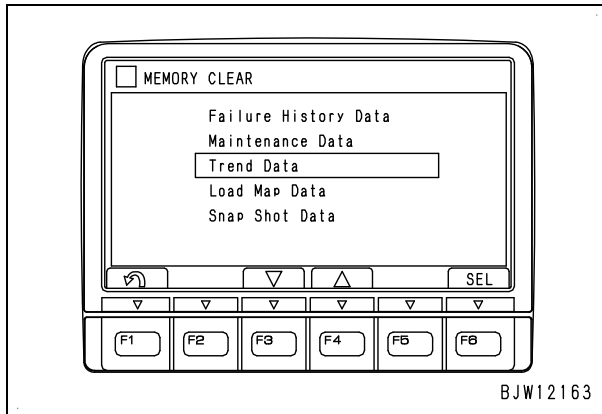


If no acknowledgement is received from the main monitor for 10 seconds or more after notification of the validation to the main monitor, an abnormal end screen appears.

Note, however, that no operation is acceptable until the main monitor sends the setting (while "---" is being displayed). If the [F1] switch is pressed, the setting is aborted and the Adjustment (1) load meter screen reappears.

### 3]-1 Trend memory clear

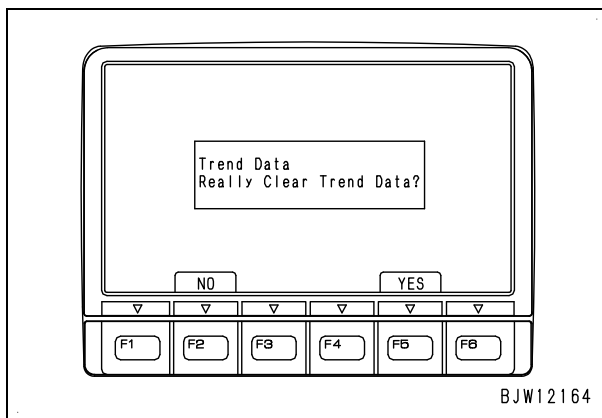
Select trend with [F3] or [F4] on the memory clear screen.



- Press the [F6] switch to move to the trend memory clear screen.

### 3]-2 Trend memory clear confirm screen

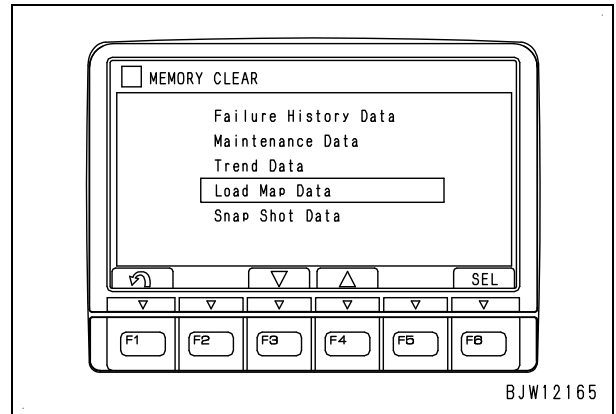
This screen prompts you to determine whether to erase trend memory or not. Confirm erasure with the [F2] or [F5] switch.



- If the [F5] switch is pressed, the trend memory is erased and the screen returns to the memory clear screen.
- If the [F2] switch is pressed, that trend memory is not erased and the screen returns to the memory clear screen.

### 4]-1 Load map memory clear

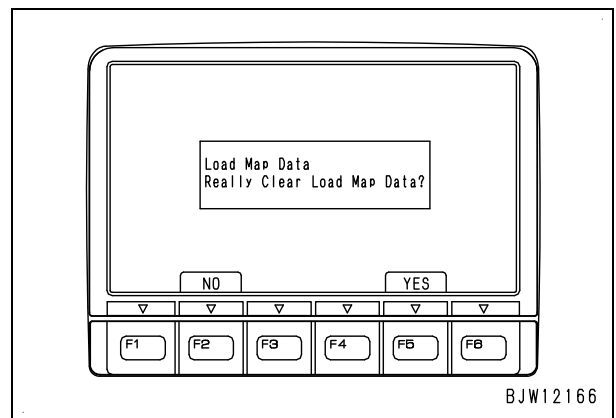
Select the load map with [F3] or [F4] on the memory clear screen.



- Press the [F6] switch to move to the load map memory clear confirm screen.

### 4]-2 Load map memory clear confirm screen

This screen prompts you to determine whether to clear load map memory or not. Confirm erasure with the [F2] or [F5] switch.



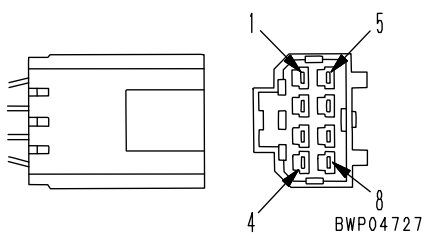
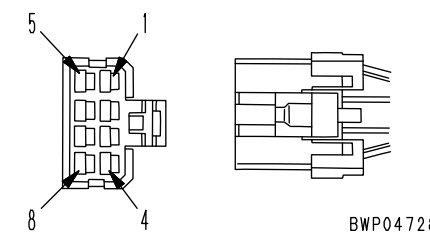
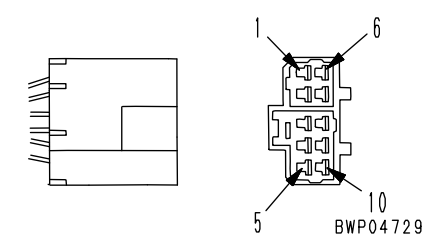
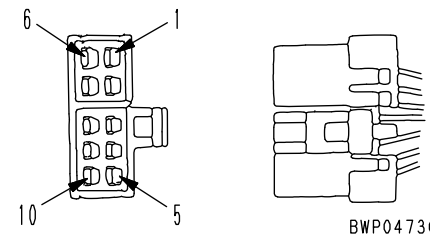
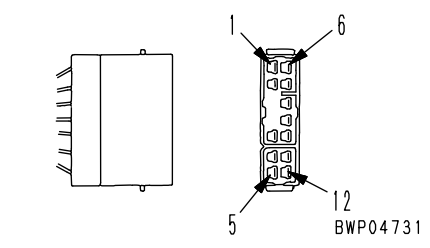
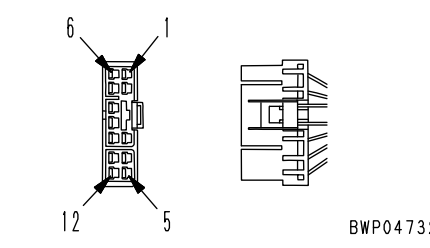
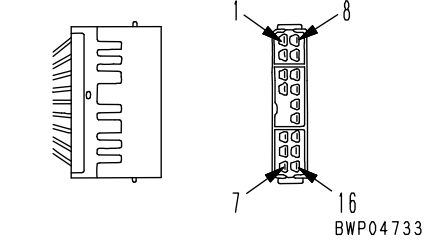
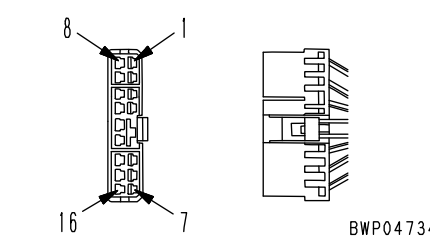
- If the [F5] switch is pressed, the load map memory is erased and the screen returns to the memory clear screen.
- If the [F2] switch is pressed, the load map memory is not erased and the screen returns to the memory clear screen.

## Check before troubleshooting

	No.	Item	Criterion	Remedy
a: Engine, lubricating oil and coolant	1	Check of unusual noise and smell	–	Repair
	2	Check of engine for dirt	–	Remove
	3	Check of engine for water leakage	–	Repair
	4	Check of engine for oil leakage	–	Repair
	5	Check of fuel line for leakage	–	Repair
	6	Check of radiator for clogging	–	Remove
	7	Check of fuel level and type	–	Refill with fuel
	8	Check of foreign material in fuel	–	Clean and drain
	9	Check of fuel filter	–	Replace
	10	Check of engine oil level (in oil pan) and type	Between H and L	Refill with oil
	11	Check of coolant level (in sub tank)	Between H and L	Refill with coolant
	12	Check of air cleaner for clogging	No clogging indication on monitor	Clean or replace
b: Hydraulic and mechanical equipment	1	Check for unusual noise and smell	–	Repair
	2	Check for oil leakage	–	Repair
	3	Check of hydraulic oil	Between H and L	Refill with oil
	4	Check of hydraulic oil strainer	–	Clean and drain
	5	Check of hydraulic oil filter	–	Replace
	6	Check of power train case oil level	Between H and L	Refill with oil
	7	Check of power train pump strainer	–	Clean and drain
	8	Check of transmission oil filter and torque converter oil filter	–	Clean and drain
	9	Check of damper case oil level	Between H and L	Refill with oil
	10	Check of final drive case oil level	Between H and L	Refill with oil
	11	Bleed air	–	Bleed air

Values marked ☆: See Cummins shop manual.

Failure code	Failure (Displayed on screen)	Component in charge	Action code	Category of record	Reference document page
CA1557	Injector Solenoid Driver Cyl 16 circuit failed Low	Engine (Cummins)	E01	Electrical system	☆
CA1638	Low intake manifold pressure Right bank Front	Engine (Cummins)	E01	Mechanical system	☆
CA1843	Crankcase pressure sensor circuit failed High	Engine (Cummins)	E01	Electrical system	☆
CA1844	Crankcase pressure sensor circuit failed Low	Engine (Cummins)	E01	Electrical system	☆
CA1845	Water in fuel sensor circuit failed High	Engine (Cummins)	E01	Mechanical system	☆
CA1846	Water in fuel sensor circuit failed Low	Engine (Cummins)	E01	Mechanical system	☆
CA1852	Water in fuel	Engine (Cummins)	E01	Mechanical system	☆
CA1889	Communication Lost (EMC) Remote Accelerator Pedal	Engine (Cummins)	–	Electrical system	☆
CA1911	High common rail pressure	Engine (Cummins)	E01	Mechanical system	☆
CA1984	High intake temp. - Right Bank Front	Engine (Cummins)	E02	Mechanical system	☆
CA1985	High intake temp. - Left Bank Rear	Engine (Cummins)	E02	Mechanical system	☆
CA1986	High intake temp. - Right Bank Rear	Engine (Cummins)	E02	Mechanical system	☆
CA2157	Rapid rise intake manifold temp. Right Bank Front	Engine (Cummins)	E02	Mechanical system	☆
CA2158	Rapid rise intake manifold temp. Right Bank Front	Engine (Cummins)	E02	Mechanical system	☆
CA2159	Rapid rise intake manifold temp. Right Bank Rear	Engine (Cummins)	E02	Mechanical system	☆
CA2185	Sensor supply 4 circuit failed High	Engine (Cummins)	E01	Electrical system	☆
CA2186	Sensor supply 4 circuit failed Low	Engine (Cummins)	E01	Electrical system	☆
CA2215	Low fuel pump delivery pressure	Engine (Cummins)	E01	Mechanical system	☆
CA2216	Fuel Pump Delivery Press High Error (Moderate severe level)	Engine (Cummins)	E01	Mechanical system	☆
CA2261	High fuel pump delivery pressure Least severe Level	Engine (Cummins)	E01	Mechanical system	☆
CA2262	Low fuel pump delivery pressure Least severe Level	Engine (Cummins)	E01	Mechanical system	☆
CA2265	Lift Pump Supply Circuit failed High	Engine (Cummins)	E01	Mechanical system	☆
CA2266	Lift Pump Supply Circuit failed Low	Engine (Cummins)	E01	Mechanical system	☆
CA2311	Fuel injection control valve circuit failed	Engine (Cummins)	E01	Mechanical system	☆
CA2474	Turbocharger speed failed	Engine (Cummins)	E01	Mechanical system	☆
CA2697	Accelerator pedal Idle validation circuit failed	Engine (Cummins)	E01	Mechanical system	☆
CA2727	Communication Lost (EMC) between Parent and Child	Engine (Cummins)	–	Mechanical system	☆
CA2734	Ether bottle empty	Engine (Cummins)	E01	Mechanical system	☆
CA2963	High engine coolant temp. Least severe level	Engine (Cummins)	–	Mechanical system	☆
CA2964	High Intake Manifold Temp. Left Bank Front - Least severe level	Engine (Cummins)	–	Mechanical system	☆

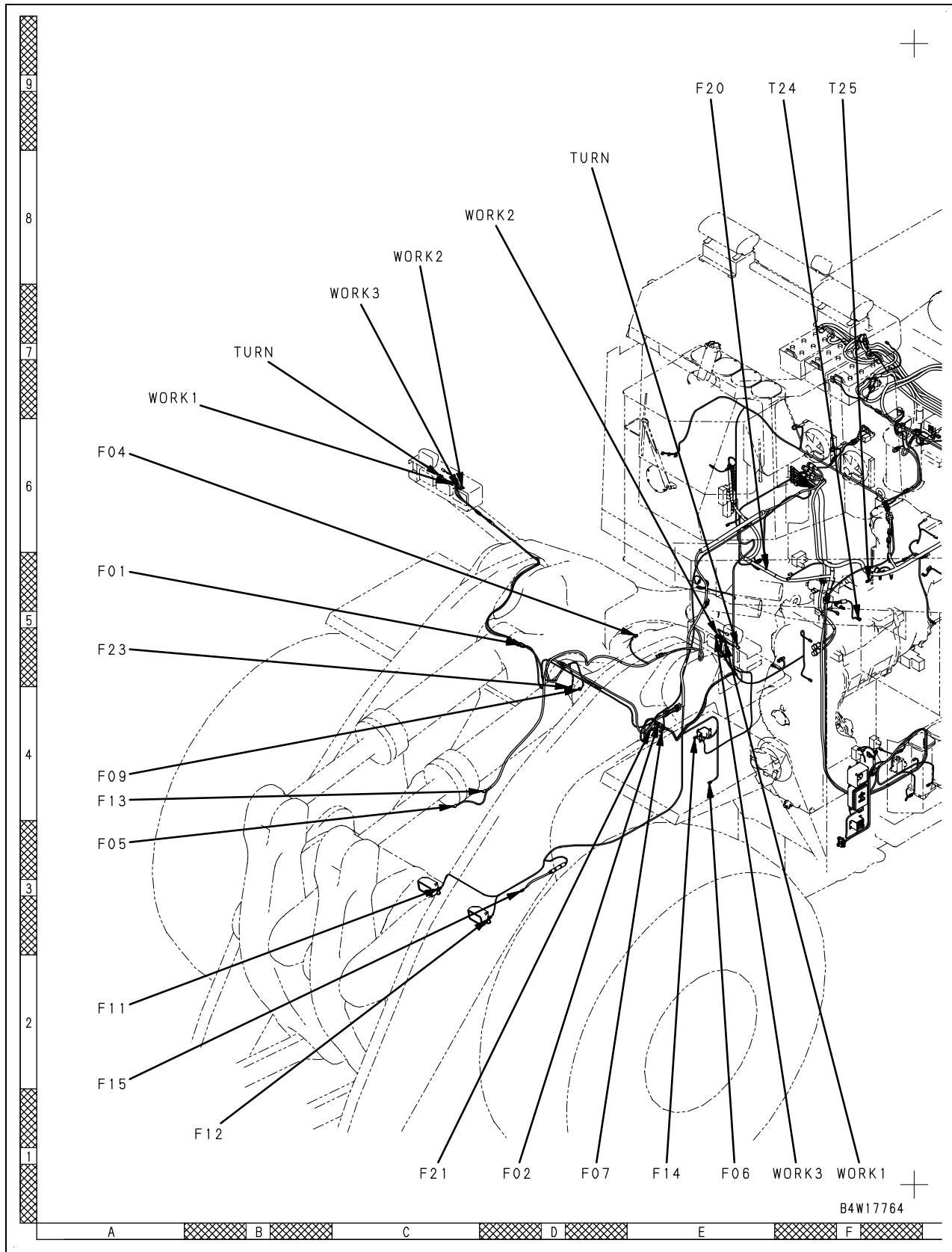
No. of pins	S type connector		
	Male (female housing)	Female (male housing)	Testing connection use special tool Part No.
8	 <p>BWP04727</p>	 <p>BWP04728</p>	799-601-7140 (T-adapter)
	Part No. : 08056-10871	Part No. : 08056-10881	
10 (White)	 <p>BWP04729</p>	 <p>BWP04730</p>	799-601-7150 (T-adapter)
	Part No. : 08056-11071	Part No. : 08056-11081	
12 (White)	 <p>BWP04731</p>	 <p>BWP04732</p>	799-601-7350 (T-adapter)
	Part No. : 08056-11271	Part No. : 08056-11281	
16 (White)	 <p>BWP04733</p>	 <p>BWP04734</p>	799-601-7330 (T-adapter)
	Part No. : 08056-11671	Part No. : 08056-11681	

B4D18194

[The pin No. is also marked on the connector (electric wire insertion end)]

No. of pins	DRC26 Series connector		
	Male pin (female housing)	Female pin (male housing)	Testing connection use special tool Part No.
60 -05※	<p>Key groove (05)</p> <p>1 10</p> <p>51 60</p> <p style="text-align: center;">BJD14063</p>	<p>Key (5)</p> <p>10 1</p> <p>60 51</p> <p style="text-align: center;">BJD14064</p>	799-601-4220 (T-adapter) (Kit:799-601-4101)
	-	Part No. 08194-04104	
	※-05:Key position		
60 -06※	<p>Key groove (06)</p> <p>1 10</p> <p>51 60</p> <p style="text-align: center;">BJD14063</p>	<p>Key (6)</p> <p>10 1</p> <p>60 51</p> <p style="text-align: center;">BJD14064</p>	799-601-4390 (Socket)
	-	-	
	※-06:Key position		

B4D18415





## Failure code [15SGL1] ECMV (3) Fill Switch Short Circuit

Action level	Failure code	Failure	Ground fault in E-POC fill switch 3 (Transmission controller system)
<b>E03</b>	<b>15SGL1</b>		
Detail of failure	<ul style="list-style-type: none"> <li>When 3rd ECMV solenoid output is de-energized, 3rd ECMV fill switch signal ON is input, and clutch is not released.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Judges that the 3rd ECMV fill switch signal is ON.</li> <li>Holds 1st and 2nd proportional solenoid outputs OFF.</li> <li>Turns the centralized warning lamp and alarm buzzer ON.</li> <li>Even if cause of failure disappears, machine does not become normal until directional selector switch is set to N (NEUTRAL).</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>The machine may be able to travel in 3rd, but not in 1st or 2nd.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>The output (current value) to the 3rd clutch ECMV solenoid can be checked with the monitoring function (Code: <b>31604, ECMV 3 DIR</b>).</li> <li>The input condition (ON/OFF) from the 3rd fill switch can be checked with the monitoring function (Code: <b>40908, D-IN-29</b>).</li> <li>Method of reproducing failure code: Start engine</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective 3rd ECMV fill switch (internal short circuit)	1. Prepare with starting switch at OFF position. 2. Disconnect connector T8 and connect T-adapter. 3. Start engine and perform troubleshooting. <ul style="list-style-type: none"> <li>Parking brake switch: OFF</li> <li>Keep depressing the brake pedal to prevent the machine from traveling.</li> </ul>		
		T8 (male)	Gearshift lever	Resistance
		Between (1) and ground	3rd	Max. 1 Ω
			Other than above	Min. 1 MΩ
2	Ground fault in wiring harness (contact with ground circuit)	1. Prepare with starting switch at OFF position. 2. Connect T-adapter to L03 connector and each connector to be disconnected in turn. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		Between ground and wiring harness from L03 (female) (3) to T8 (female) (1)	Resistance	Min. 1 MΩ
3	Defective transmission controller	1. Prepare with starting switch at OFF position. 2. Disconnect connector L03 and connect T-adapter. 3. Start engine and perform troubleshooting. <ul style="list-style-type: none"> <li>Parking brake switch: OFF</li> <li>Keep depressing the brake pedal to prevent the machine from traveling.</li> <li>Set the auto shift and manual shift selector switch to MANUAL.</li> <li>Set the directional lever to F or R position.</li> </ul>		
		L03	Gearshift lever	Voltage
		Between (3) and ground	3rd	Max. 1 V
			Other than above	8–10 V

## Failure code [989W00] Stationary steering (Brake: ON, Load: ON)

Action level	Failure code	Failure	Stationary steering detection alarm: alarm activated (KOMTRAX Plus controller)
–	<b>989W00</b>		
Detail of failure	<ul style="list-style-type: none"> <li>Stationary steering has been attempted</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Stationary steering detection conditions            Travel speed: below 1 km/h            Brakes: ON            Steering (frame angle deflection): Min. 10 deg/sec            Loaded (decided by boom bottom pressure and boom angle)</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>The failure code is recorded to KOMTRAX Plus controller.</li> </ul>		
Related information			

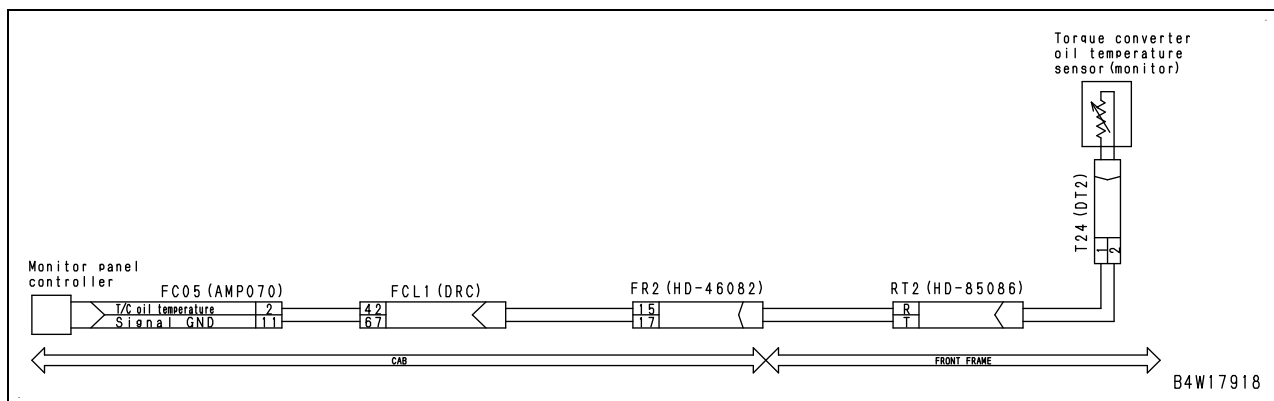
No.	Cause	Procedure, measuring location, criteria and remarks
1	Incorrect operation	(Instruct the operator on correct operation of the machine.)

## Failure code [B@CENS] Very high torque converter oil temp.

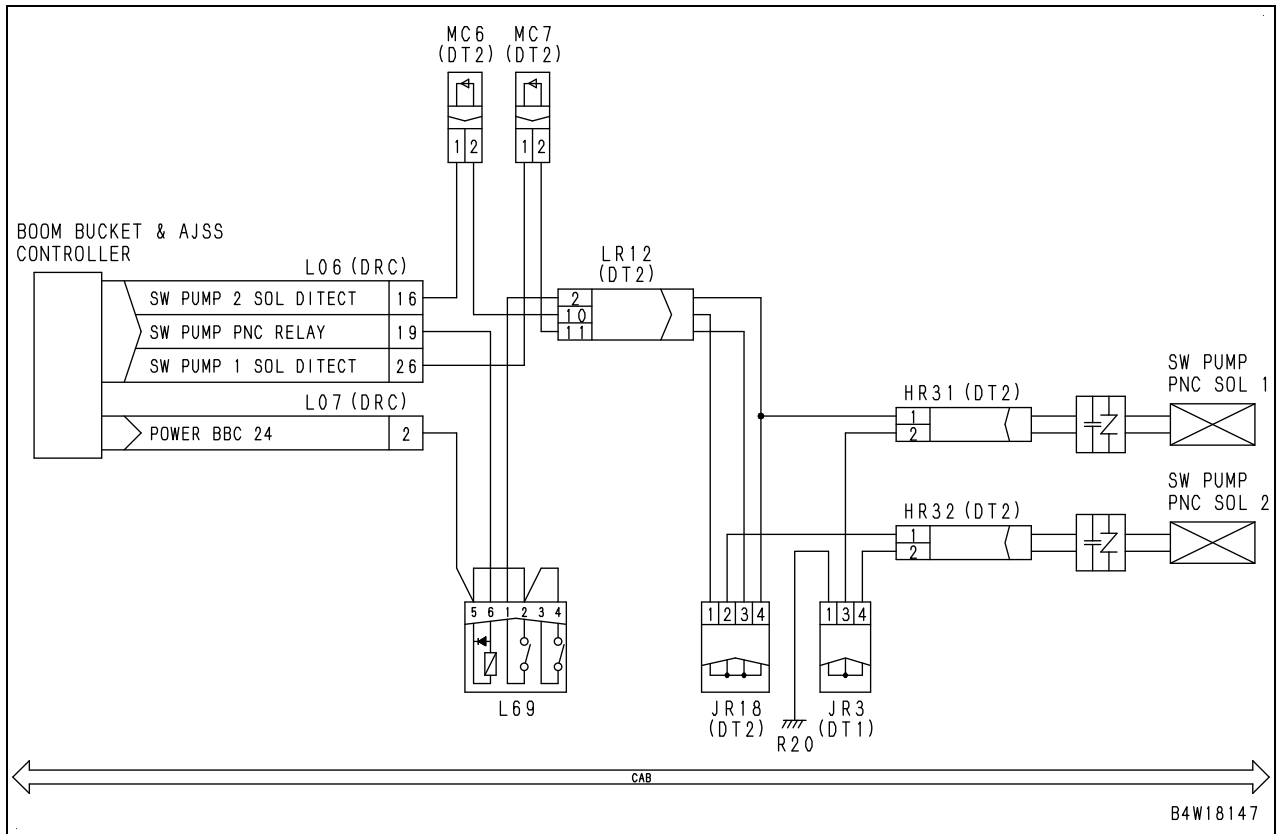
Action level	Failure code	Failure	Torque converter oil temperature is high (above 130 °C) (Monitor panel controller system)
<b>E02</b>	<b>B@CENS</b>		
Detail of failure	An overheat of torque converter oil temperature (above 130 °C) is indicated		
Action of controller	<ul style="list-style-type: none"> <li>Turns the centralized warning lamp and alarm buzzer ON.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Torque converter oil temperature gauge constantly indicates a temperature above 130 °C</li> <li>Alarm screen false output</li> </ul>		
Related information	★ Condition is restored when connector is disconnected and T-adapter is inserted for troubleshooting, or when T-adapter is removed, connector restored, and no failure code is displayed on the monitor		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Torque converter oil temperature is above 120 °C or defective torque converter oil temperature sensor	1. Turn starting switch to OFF position. 2. Disconnect connector T24 and connect T-adapter. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		T24 (male)	Engine oil temperature	Resistance
		Between (1) and (2)	Normal temperature (25 °C)	Approx. 40 Ω
		130 °C	Approx. 1.7 Ω	
2	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector FC05 and other connectors in turn, and connect T-adapter. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		Between ground and wiring harness from FC05 (female) (2) to T24 (female) (1)	Resistance	Min. 1 MΩ
3	Defective monitor panel controller	1. Turn starting switch to OFF position. 2. Disconnect connector FC05 and connect T-adapter. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		FC05 (female)	Resistance	
		Between (2) and ground	Min. 1 MΩ	

### Related circuit diagram



Related electrical circuit diagram

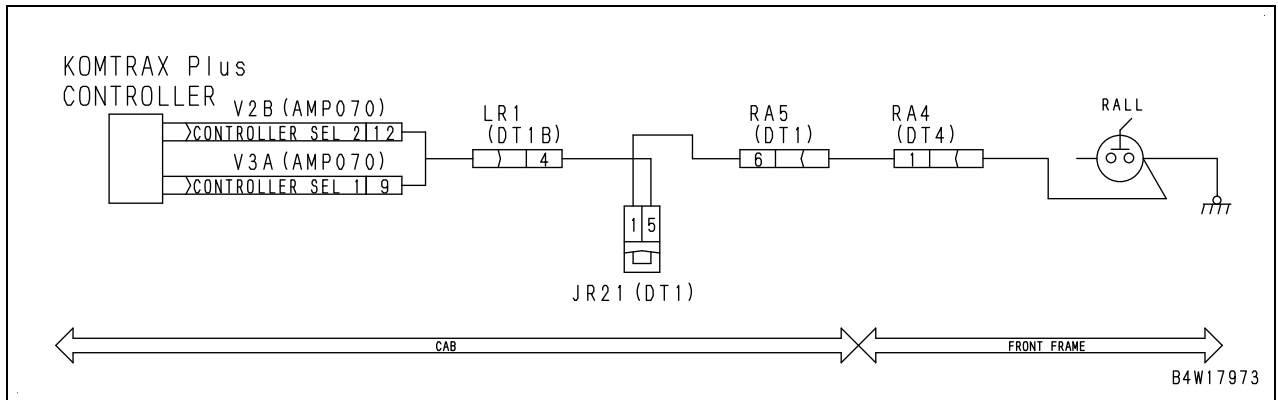


## Failure code [DAQRMA] Defective Option Selection Data in Transmission

Action level	Failure code	Failure	Option setting for transmission controller: Malfunction (Machine monitor - transmission controller)
<b>E03</b>	<b>DAQRMA</b>		
Detail of failure	<ul style="list-style-type: none"> <li>Option settings information sent from machine monitor when starting switch is turned to ON position differ from option settings stored in controller.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Gear speed is held in Neutral.</li> <li>Option settings stored in controller are used for control.</li> <li>Condition is not recovered until starting switch is turned to OFF position.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Gear speed is set to Neutral and restart becomes unable.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Perform initial setting and initial adjustments in the same way when replacing the transmission controller.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective setting of transmission controller	Defective setting of transmission controller options

Related circuit diagram

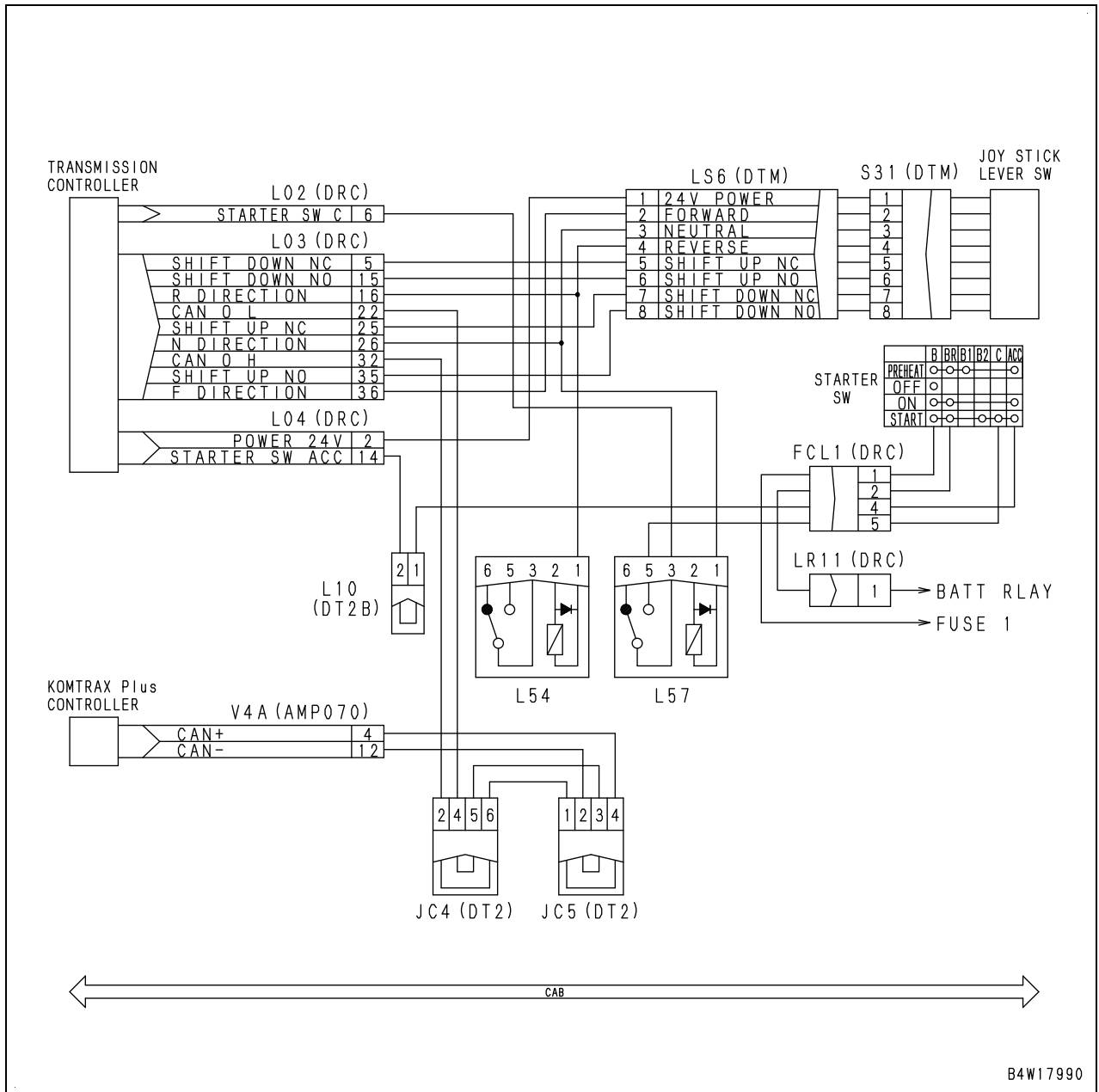


## Failure code [DDA7L4] Throttle Lock Input signal Short Circuit

Action level	Failure code	Failure	RPM set ON/OFF switch: ON/OFF signals disagree. (Transmission controller system)
<b>E01</b>	<b>DDA7L4</b>		
Detail of failure	<ul style="list-style-type: none"> <li>RPM set does not function because of a hot short circuit in RPM set ON/OFF switch system.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Turns RPM set function OFF.</li> <li>If cause of failure disappears, machine becomes normal by itself.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>RPM setting can not be made.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Input condition (ON/OFF) from RPM set ON/OFF switch (pressed upward) can be checked with monitoring function (Code: 44200 THROT LOCK A).</li> <li>Input condition (ON/OFF) from RPM set ON-OFF switch (pressed downward) can be checked with monitoring function (Code: 44201 THROT LOCK B).</li> <li>Method of reproducing failure code: Set the starting switch to ON position + Set the RPM set ON/OFF switch to ON position</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective RPM set ON/OFF switch (internal short circuit)	<ol style="list-style-type: none"> <li>Prepare with starting switch at OFF position.</li> <li>Disconnect connector S18 and connect T-adaptor.</li> <li>Turn the starting switch to OFF position, then perform troubleshooting.</li> </ol>		
		S18 (male)	RPM set ON/OFF switch	Resistance
		Between (4) and (5)	ON	Min. 1 MΩ
			OFF	Max. 1 Ω
		Between (5) and (6)	ON	Max. 1 Ω
OFF	Min. 1 MΩ			
Between (4), (5), (6) and ground	Ladder at any position	Min. 1 MΩ		
2	Hot short circuit in wiring harness (contact with 24 V circuit)	<ol style="list-style-type: none"> <li>Prepare with starting switch at OFF position.</li> <li>Disconnect connectors L02, S18 and connect T-adaptor.</li> <li>Turn starting switch to ON position and perform troubleshooting.</li> </ol>		
		Between ground and wiring harness from L02 (female) (13) to S18 (female) (4)	Voltage	Max. 1 V
		Between ground and wiring harness from L02 (female) (19) to S18 (female) (6)		Max. 1 V
3	Defective transmission controller	<ol style="list-style-type: none"> <li>Prepare with starting switch at OFF position.</li> <li>Disconnect connector L02 and connect T-adaptor.</li> <li>Turn starting switch to ON position and perform troubleshooting.</li> </ol>		
		L02	RPM set ON/OFF switch	Voltage
		Between (13) and ground	ON	Max. 1 V
			OFF	20 to 30 V
		Between (19) and ground	ON	20 to 30 V
OFF	Max. 1 V			

Related electrical circuit diagram



B4W17990

## Failure code [DGR2KX] Brake oil temp. sensor circuit failure

Action level	Failure code	Failure	Rear brake oil temperature sensor: Input signal is out of normal range (Machine monitor system)
<b>E01</b>	<b>DGR2KX</b>		
Detail of failure	<ul style="list-style-type: none"> <li>Signal voltage from rear brake oil temperature sensor is lower than normal range due to ground fault in rear brake oil temperature sensor signal circuit. (Rear brake oil temperature sensor signal voltage: Max. 0.97 V (Min. 150 °C))</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Takes it that the rear brake oil temperature is unusually high.</li> <li>If cause of failure disappears, machine becomes normal by itself.</li> </ul>		
Problem on machine	-		
Related information	<ul style="list-style-type: none"> <li>Input (temperature) from rear brake oil temperature sensor can be checked by using monitoring function. (Code: 30202 R BRAKE OIL)</li> <li>Input (voltage) from rear brake oil temperature sensor can be checked by using monitoring function. (Code: 30205 R BRAKE OIL)</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective rear brake oil temperature sensor (internal short circuit)	1. Prepare with starting switch at OFF position. 2. Disconnect connector HS6 and connect T-adaptor. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		HS6 (male)	Hydraulic oil temperature	Resistance
		Between (1) and ground	25 °C (normal temperature)	35–50 kΩ
100 °C	3.1–4.5 kΩ			
2	Ground fault in wiring harness (contact with ground circuit)	1. Prepare with starting switch at OFF position. 2. Disconnect connectors FC05, HS6 and connect T-adaptor. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		Between ground and wiring harness from FC05 (female) (8) to HS6 (female) (1)	Resistance	Min. 1 MΩ
3	Defective machine monitor	1. Prepare with starting switch at OFF position. 2. Disconnect connector FC05 and connect T-adaptor. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		FC05 (female)	Engine oil temperature	Resistance
		Between (8) and ground	25 °C (normal temperature)	35–50 kΩ
100 °C	3.1–4.5 kΩ			

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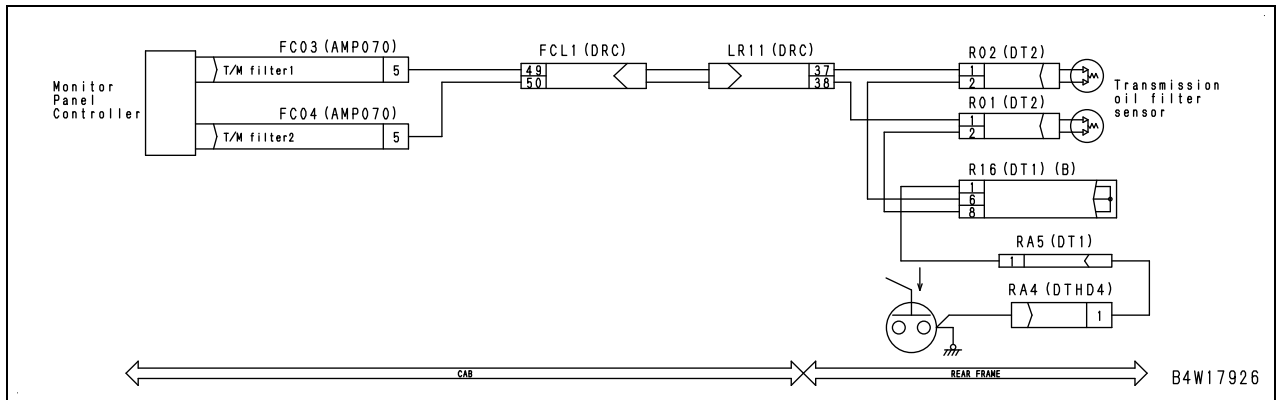
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Related circuit diagram

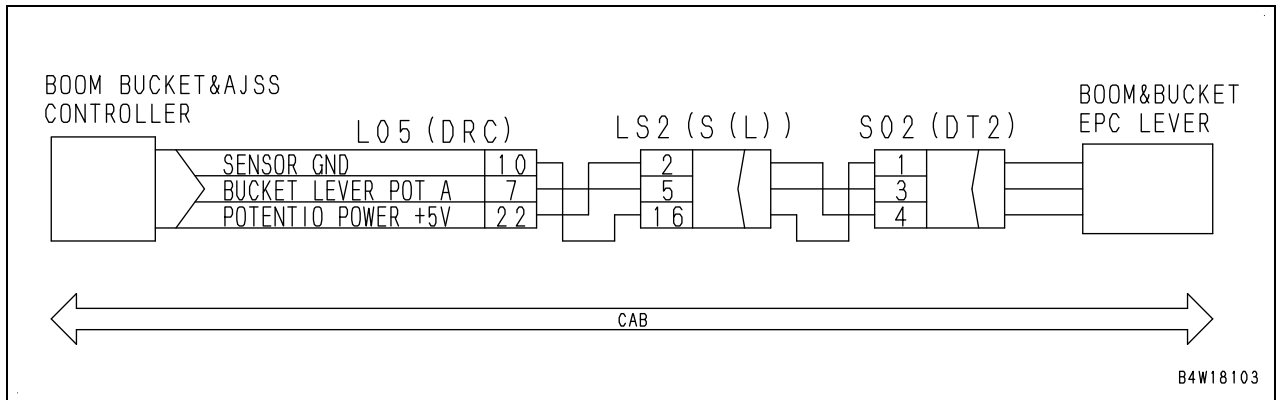


## Failure code [DHU3KA] R Brake Oil press Sensor Disconnect

Action level	Failure code	Failure	Rear brake oil pressure sensor system error (Transmission controller system)
<b>E01</b>	<b>DHU3KA</b>		
Detail of failure	An error has occurred in the rear brake oil pressure sensor circuit (input signal out of range)		
Action of controller	<ul style="list-style-type: none"> <li>Detail of failure is displayed in yellow on the multi-monitor screen.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Real-time monitor display: constantly detects minimum pressure (0 MPa {0 kg/cm<sup>2</sup>})</li> <li>Alarm false detected</li> </ul>		
Related information	If failure code <b>DH24KX</b> , <b>DHU2KX</b> , <b>DHT8KX</b> , or <b>DH20KX</b> is issued at the same time, there is an open circuit, defective contact, or ground fault in the wiring harness between V1 (female) (2) and JR14 (female) (1).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective rear brake oil pressure sensor (HR21)	<ol style="list-style-type: none"> <li>Prepare with starting switch at OFF position.</li> <li>Replace oil pressure sensor HR21 with a normally operating sensor</li> <li>Turn starting switch to ON position and perform troubleshooting.</li> </ol>		
		Check if normal condition is recovered when rear brake oil pressure sensor (HR21) is replaced with a normally operating oil pressure sensor		
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	<ol style="list-style-type: none"> <li>Prepare with starting switch at OFF position.</li> <li>Connect T-adaptor to connectors from L04 to HR21 and from L02 to HR21 in turn.</li> <li>Turn the starting switch to OFF position, then perform troubleshooting.</li> </ol>		
		Wiring harness between L04 (female) (34) and HR21 (female) (B)	Resistance	Max. 1 Ω
		Wiring harness between L02 (female) (18) and HR21 (female) (C)		Max. 1 Ω
		Wiring harness between HR21 (female) (A) and ground		Max. 1 Ω
3	Ground fault in wiring harness (Contact with ground circuit)	<ol style="list-style-type: none"> <li>Prepare with starting switch at OFF position.</li> <li>Disconnect connectors from L04 to HR20 and from L02 to HR20 in turn, and connect T-adaptor.</li> <li>Turn the starting switch to OFF position, then perform troubleshooting.</li> </ol>		
		Between ground and wiring harness from L04 (female) (34) to HR21 (female) (B)	Resistance	Min. 1 MΩ
		Between ground and wiring harness from L02 (female) (18) to HR21 (female) (C)		Min. 1 MΩ
4	Defective transmission controller	<ol style="list-style-type: none"> <li>Prepare with starting switch at OFF position.</li> <li>Disconnect connectors L02 and HR21 and connect T-adaptor.</li> <li>Turn the starting switch to OFF position, then perform troubleshooting.</li> </ol>		
		L04 (female), HR21 (female)	Resistance	
		Between L04 (34), HR21 (B) and ground	Min. 1 MΩ	

**Related circuit diagram**

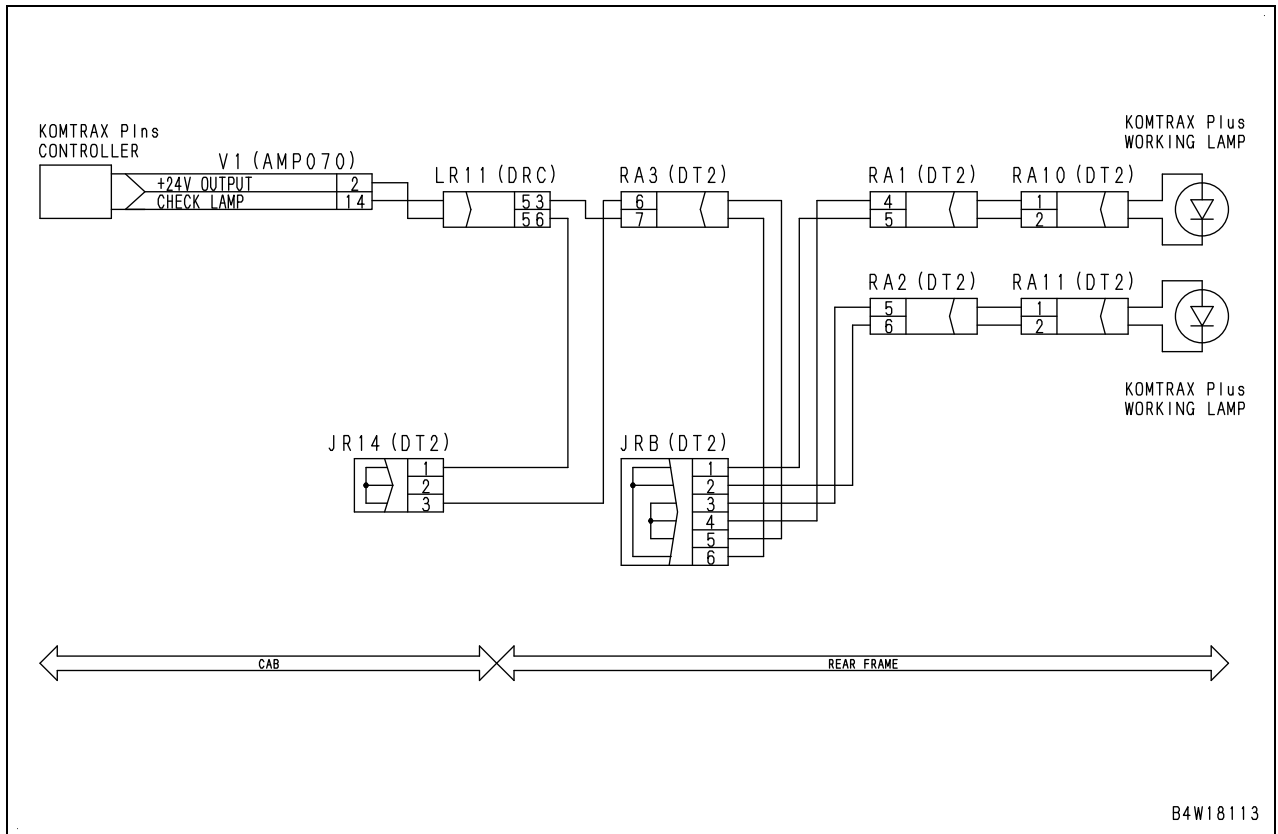


## Failure code [DKH1KA] Angle sensor circuit (LR) Disconnect

Action level	Failure code	Failure	Pitch angle sensor system error (input signal out of range) (Transmission controller system)
<b>E01</b>	<b>DKH1KA</b>		
Detail of failure	Open circuit or ground fault has occurred in the pitch angle sensor circuit		
Action of controller	<ul style="list-style-type: none"> <li>Detail of failure is displayed in yellow on the multi-monitor screen.</li> </ul>		
Problem on machine			
Related information	★ Condition is restored when connector is disconnected and T-adaptor is inserted for troubleshooting, or when T-adaptor is removed, connector restored, and no failure code is displayed on the monitor		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective frame angle sensor	1. Prepare with starting switch at OFF position. 2. Disconnect sensor L142 and replace with a normally operating sensor. 3. Turn starting switch to ON position and perform troubleshooting.		
		Replace with a normally operating sensor	Failure code disappears	
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Prepare with starting switch at OFF position. 2. Disconnect connectors L02, L142 and connect T-adaptor. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		Wiring harness between L28 (female) (1) and L142 (female) (1)	Resistance	Max. 1 Ω
		Wiring harness between L02 (female) (1) and L142 (female) (B)		Max. 1 Ω
		Wiring harness between L02 (female) (4) and L142 (female) (A)		Max. 1 Ω
		Wiring harness between L02 (female) (16) and L142 (female) (C)		Max. 1 Ω
3	Ground fault in wiring harness (contact with ground circuit)	1. Prepare with starting switch at OFF position. 2. Disconnect connectors L02, L142 and connect T-adaptor. 3. Turn the starting switch to OFF position, then perform troubleshooting.		
		Between ground and wiring harness from L28 (female) (1) to L142 (female) (B)	Resistance	Min. 1 MΩ
		Between ground and wiring harness from L02 (female) (1) to L142 (female) (B)		Min. 1 MΩ
		Between ground and wiring harness from L02 (female) (4) to L142 (female) (A)		Min. 1 MΩ
4	Defective transmission controller	1. Prepare with starting switch at OFF position. 2. Disconnect connector L02 and connect T-adaptor. 3. Turn starting switch to ON position and perform troubleshooting.		
		L02 (female)	Voltage	
		(1)–(4)	4.9–5.1 V	

Related circuit diagram

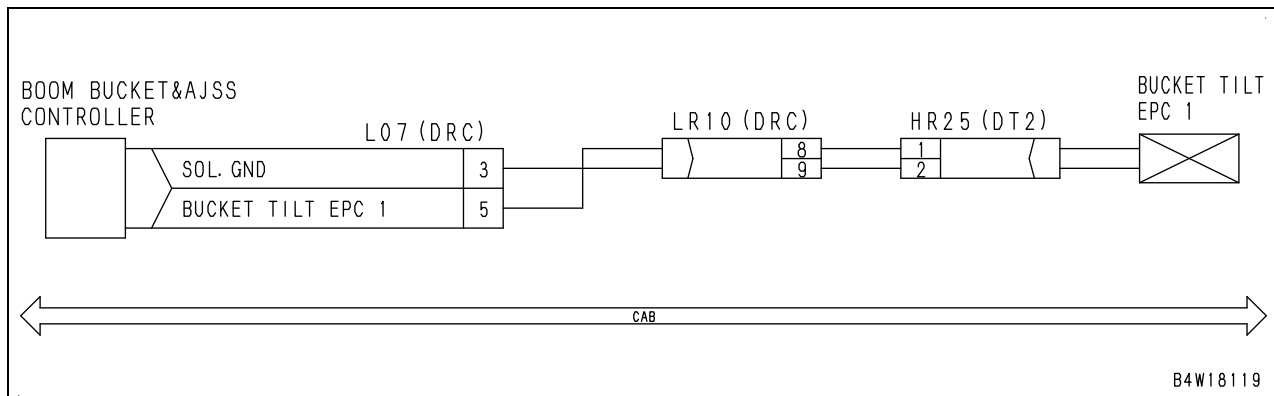


## Failure code [DW4RKB] Bucket tilt EPC solenoid (1) ground fault

Action level	Failure code	Failure	Bucket tilt EPC solenoid (1) system error (input signal out of range) (Boom bucket & AJSS controller system)
<b>E03</b>	<b>DW4RKB</b>		
Detail of failure	Ground fault occurs in bucket tilt EPC solenoid (1) circuit.		
Action of controller	<ul style="list-style-type: none"> <li>Turns the centralized warning lamp and alarm buzzer ON.</li> </ul>		
Problem on machine	Bucket tilt speed is slow.		
Related information	★ Condition is restored if no failure code is displayed on monitor when connector is disconnected and T-adaptor is inserted or when T-adaptor is removed and connector is restored as troubleshooting is performed while failure is appearing		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective bucket Tilt EPC solenoid (1)	1. Prepare with starting switch at OFF position.		
		2. Disconnect connector HR25 and connect T-adaptor.		
		3. Turn starting switch to OFF position, then perform troubleshooting.		
		HR25 (male)	Resistance	
	Between (1), (3) and ground	Min. 1 MΩ		
	Between (1) and (2)	5 to 15 kΩ		
2	Ground fault in wiring harness (contact with ground circuit)	1. Prepare with starting switch at OFF position.		
		2. Disconnect connectors L07, HR25 and connect T-adaptor.		
		3. Turn starting switch to OFF position, then perform troubleshooting.		
	Between ground and wiring harness between L07 (female) (5) and HR25 (female) (1)	Resistance	Min. 1 MΩ	
3	Defective boom bucket & AJSS controller	1. Prepare with starting switch at OFF position.		
		2. Disconnect connector L07 and connect T-adaptor.		
		3. Turn starting switch to ON position and perform troubleshooting.		
	L07 (female)	Voltage		
	(5) to (3)	4.9 to 5.1 V		

### Related circuit diagram

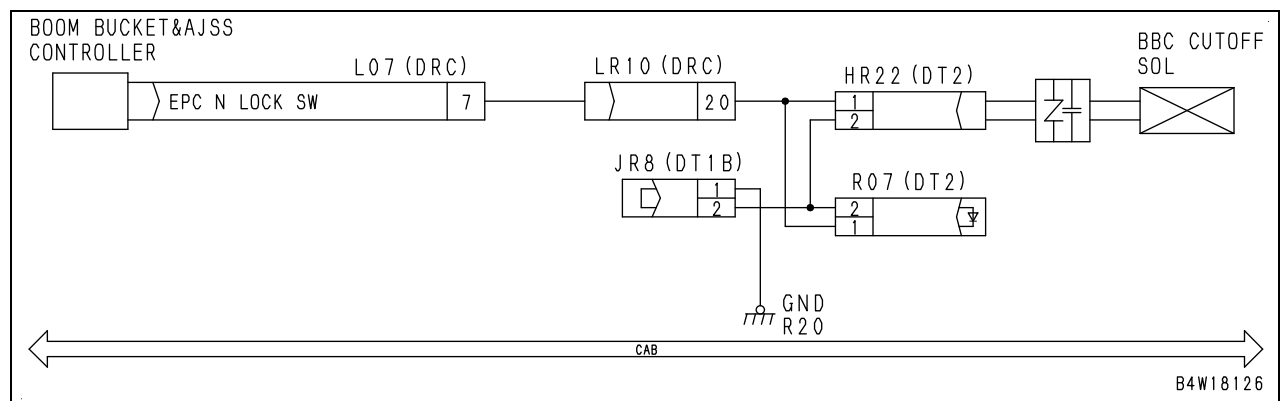


## Failure code [DWM1KB] Work equipment neutral lock solenoid short circuit

Action level	Failure code	Failure	Work equipment neutral lock solenoid: ground fault (Boom bucket & AJSS controller system)
<b>E03</b>	<b>DWM1KB</b>		
Detail of failure	<ul style="list-style-type: none"> <li>Due to ground fault in work equipment neutral lock solenoid system, no current flows when work equipment neutral lock solenoid is energized.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Stops outputting the signal from each work equipment EPC solenoid according to the input signal from the work equipment lock lever.</li> <li>If cause of failure disappears, machine becomes normal by itself.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Each work equipment EPC solenoid lock for the work equipment lock lever works normally.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Power output condition (ON/OFF) to work equipment neutral lock solenoid can be checked with monitoring function (Code: 40952, D-OUT-0).</li> <li>Method of reproducing failure code: Set the starting switch to ON position + Set the work equipment lock lever to LOCK position</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective work equipment neutral lock solenoid (Internal open circuit)	1. Prepare with starting switch at OFF position.		
		2. Disconnect connector HR22 and connect T-adaptor.		
		3. Turn the starting switch to OFF position, then perform troubleshooting.		
		HR22 (male)	Resistance	
		Between (1) and (2)	35–45 kΩ	
2	Ground fault in wiring harness (Contact with ground circuit)	1. Prepare with starting switch at OFF position.		
		2. Disconnect connectors L07, HR22 and connect T-adaptor.		
		3. Turn the starting switch to OFF position, then perform troubleshooting.		
		Between ground and wiring harness from L07 (female) (7) to HR22 (female) (1)	Resistance	Max. 1 Ω
3	Defective boom bucket & AJSS controller	1. Prepare with starting switch at OFF position.		
		2. Disconnect connector L07 and connect T-adaptor.		
		3. Turn the starting switch to OFF position, then perform troubleshooting.		
		L07 (female)	Resistance	
		Between (7) and ground	35–45 kΩ	

### Related circuit diagram

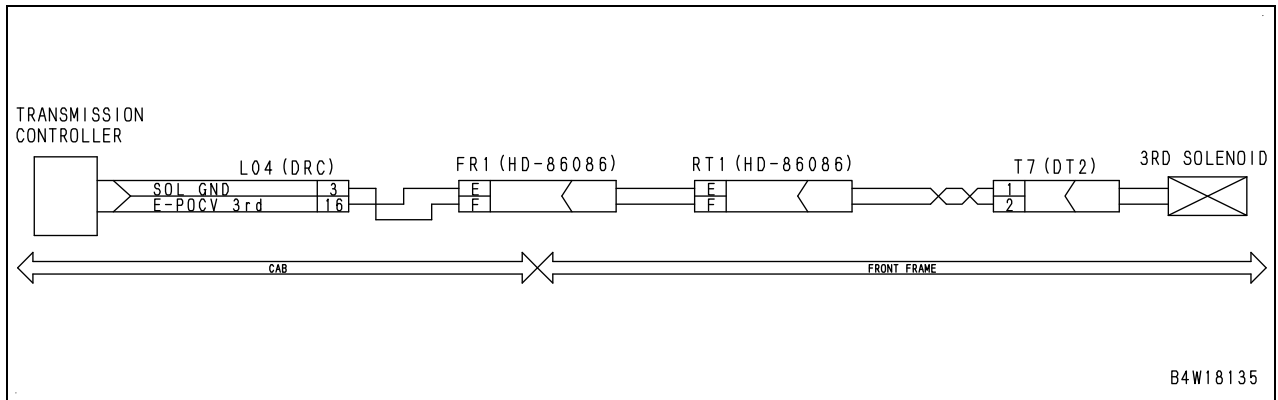


## Failure code [DXF0KA] AJSS EPC solenoid disconnection

Action level	Failure code	Failure	Steering source pressure EPC solenoid system error (Work equipment and joystick steering controller system)
<b>E03</b>	<b>DXF0KA</b>		
Detail of failure	Open circuit has occurred in steering source pressure control EPC solenoid circuit		
Action of controller	Steering source pressure control EPC solenoid output: OFF		
Problem on machine	<ul style="list-style-type: none"> <li>● Steering lever response becomes dull</li> <li>● Steering becomes slower</li> <li>● Steering lever response becomes sensitive</li> <li>● Steering becomes quicker</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>★ Condition is restored when connector is disconnected and T-adaptor is inserted for troubleshooting, or when T-adaptor is removed, connector restored, and no failure code is displayed on the monitor</li> <li>● Keep the joystick steering lever in the neutral position whenever it is not used.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks								
1	Defective steering source pressure control EPC solenoid	1. Prepare with starting switch at OFF position. 2. Disconnect R33 (solenoid) and connect T-adaptor. 3. Turn the starting switch to OFF position, then perform troubleshooting. Check if failure code is displayed when R33 is replaced with another EPC solenoid of the same type (Replace with another EPC solenoid of the same type)								
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Prepare with starting switch at OFF position. 2. Connect T-adaptor to connector L07 and each connector to R33 to be disconnected in turn. 3. Turn the starting switch to OFF position, then perform troubleshooting. Wiring harness between L07 (female) (23) and R33 (female) (2), and wiring harness between L07 (female) (26) and R33 (female) (1) <table border="1" style="width: 100%; margin-top: 5px;"> <tr> <td style="width: 60%;"></td> <td style="width: 20%;">Resistance</td> <td style="width: 20%;">Max. 1 Ω</td> </tr> </table>				Resistance	Max. 1 Ω			
	Resistance	Max. 1 Ω								
3	Defective work equipment and joystick steering controller	1. Prepare with starting switch at OFF position. 2. Disconnect connector L07 and connect T-adaptor. 3. Turn starting switch to ON position and perform troubleshooting. <table border="1" style="width: 100%; margin-top: 5px;"> <tr> <td style="width: 40%;">L07 (female)</td> <td style="width: 30%;"></td> <td style="width: 30%;">Current value</td> </tr> <tr> <td>(23)–(26)</td> <td></td> <td>600 ± 80 mA</td> </tr> </table> Check on multi monitor screen			L07 (female)		Current value	(23)–(26)		600 ± 80 mA
L07 (female)		Current value								
(23)–(26)		600 ± 80 mA								

### Related circuit diagram



## E-4 Turn signal lamp does not light up

Failure	a) Right turn signal lamp does not light up.
Related information	

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Prepare with starting switch OFF. 2. Connect T-adapters to connector FC02 and each connector to be disconnected in turn. 3. Turn the starting switch OFF, then carry out troubleshooting.		
		Between FC02 (female) (7) and FCL1 (female) (15)	Resistance	Max. 1 $\Omega$
2	Defective machine monitor	1. Prepare with starting switch OFF. 2. Disconnect connector FC02 and connect T-adapters. 3. Turn starting switch to ON position and perform troubleshooting.		
		Between FC02 (female) (7) and chassis ground	Right turn signal lamp: ON (voltage)	Voltage switches between 0 V and 20 to 30 V repeatedly.

Failure	b) Left turn signal lamp does not light up.
Related information	

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Prepare with starting switch OFF. 2. Connect T-adapters to connector FC02 and each connector to be disconnected in turn. 3. Turn the starting switch OFF, then carry out troubleshooting.		
		Between FC02 (female) (16) and FCL1 (female) (14)	Resistance	Max. 1 $\Omega$
2	Defective machine monitor	1. Prepare with starting switch OFF. 2. Disconnect connector FC02 and connect T-adapters. 3. Turn starting switch to ON position and perform troubleshooting.		
		Between FC02 (female) (16) and chassis ground	Left turn signal lamp: ON (voltage)	Voltage switches between 0 V and 20 to 30 V repeatedly.

### Measuring hydraulic stall speed

Relieve the boom (lift arm) cylinder or bucket cylinder on the extraction side with engine at full speed, and measure the engine speed.

### Measuring torque converter + hydraulic stall speed

- 1] In the same way as "Measuring low idle and high idle speeds", display item "Engine speed" on the real-time monitor screen.
- 2] Set transmission cut-off switch (1) to OFF and depress left brake (4) securely (make sure that the transmission cut-off pilot lamp is off).
- 3] Set transmission auto/manual shift selector switch (3) to "ON (Manual)".
  - ★ At this time, the gear shift mode is in "2nd".
- 4] Press upshift switch (6) to upshift to "3rd".
  - ★ In 2nd the machine will move because drive force is larger than braking force. Therefore, use 3rd in which the braking force becomes larger than the drive force.
- 5] Set direction selection (FNR) switch (7) in "F" or "R".
- 6] Set parking brake switch (5) to the OFF position to release the brake.
- 7] Relieve the boom (lift arm) cylinder or bucket cylinder on the extraction side with engine at full speed and torque converter stalled, and then measure the engine speed.

### ★ Engine speed standard values

Engine MODE: fixed to "AUTO" or "P"

(rpm)

Testing condition	Standard value for new machine	Repair limit
Low idle	625 to 675	575 to 725
High idle	1,850 to 1,950	1,800 to 2,000
Torque converter stall	1,800 to 2,000	1,700 to 2,000
Hydraulic stall	1,800 to 2,000	1,700 to 2,000
Full stall	1,650 to 2,000	1,550 to 2,000

Engine MODE: fixed to "E"

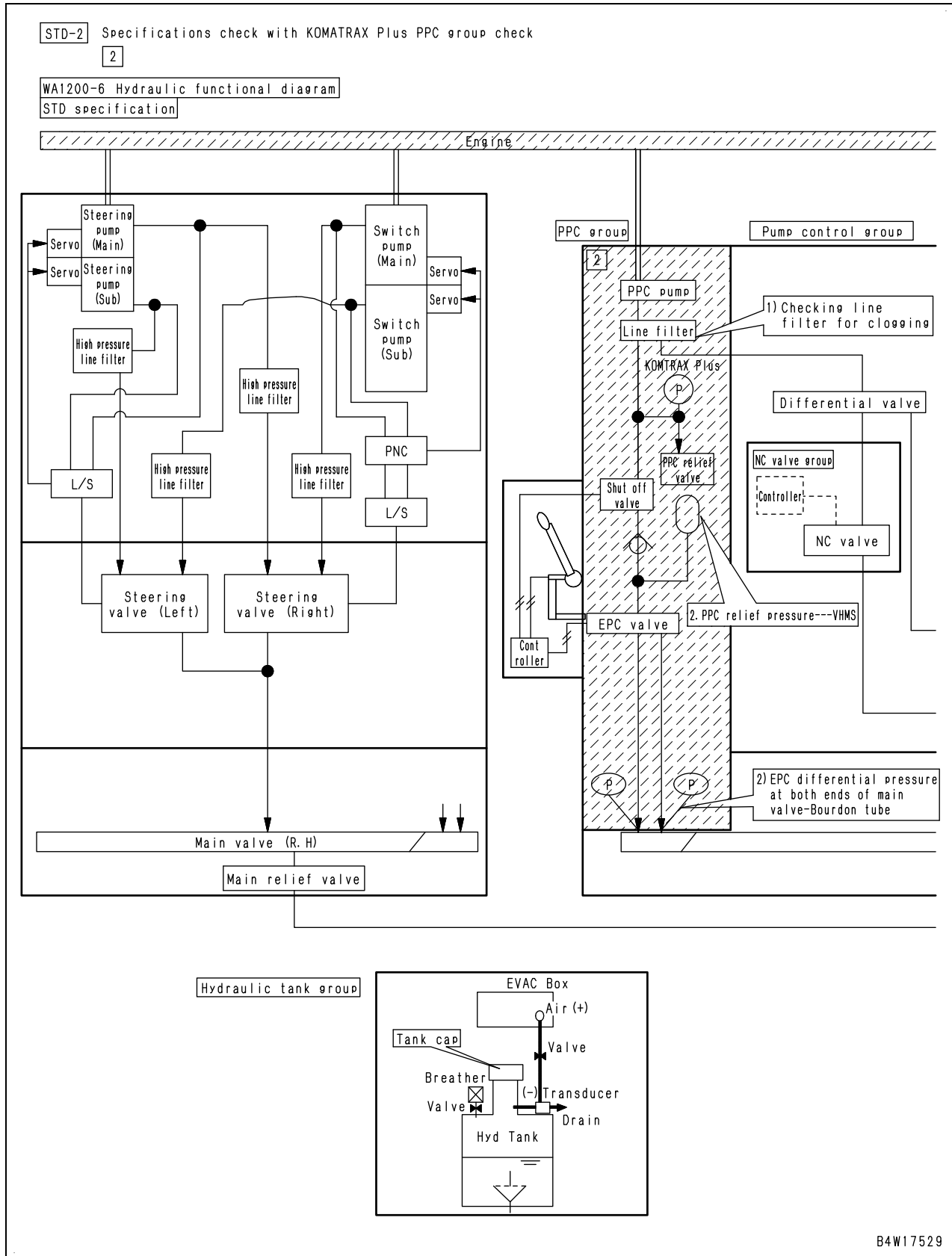
(rpm)

Testing condition	Standard value for new machine	Repair limit
Low idle	625 to 675	575 to 725
High idle	1,850 to 1,950	1,800 to 2,000
Torque converter stall	1,750 to 1,950	1,650 to 2,000
Hydraulic stall	1,750 to 1,950	1,650 to 2,000
Full stall	1,600 to 1,950	1,500 to 2,000

## 2. Checking standard values by using KOMTRAX Plus (checking work equipment valve PPC group)

### 1) Function diagram

★ Check portions shown with hatched lines in the drawing.



B4W17529

## Adjusting

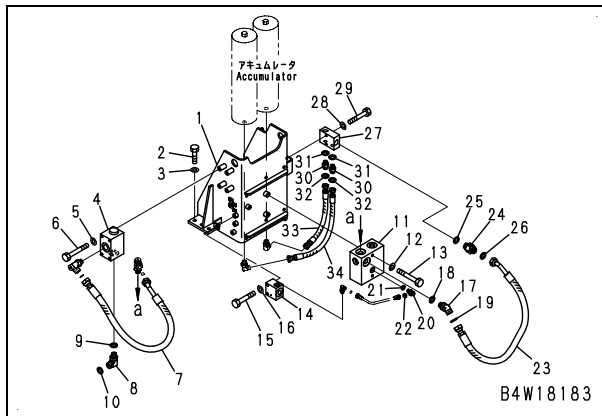
1. If the pressure difference is out of the standard value, replace the differential valve or follow the steps below to bring it in line with the standard value by adjusting the valve.

1) Stop the engine.

**▲ Operate the work equipment control lever to release the pressure from the work equipment PPC accumulator.**

2) Remove differential valve assembly (4).

★ Clean any oil, dirt, etc. off the valve and piping.

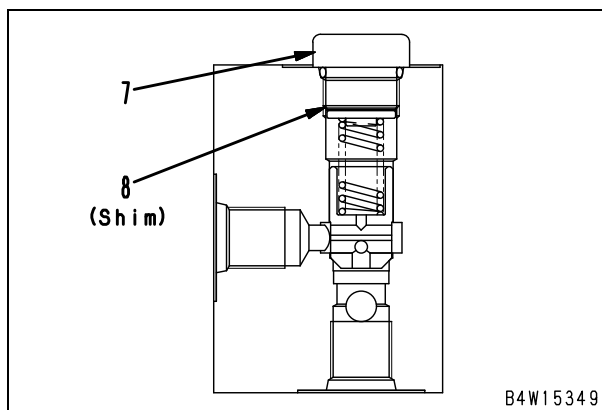


3) Remove plug (7), and add or remove shims (8).

★ When adjusting by using shims for the differential valve, set it with the plug facing up.

★ Shim part No.: 427 - 62 - 11710 (t 0.1)  
: 427-62-11720(t0.2)  
: 427-62-11730(t0.5)

★ The set pressure will increase by adding shims, and decrease by removing shims.



4) Install plug (7) and then install differential valve assembly (4).

## 5) Testing and adjusting work equipment pump CO (cut-off) valve oil pressure

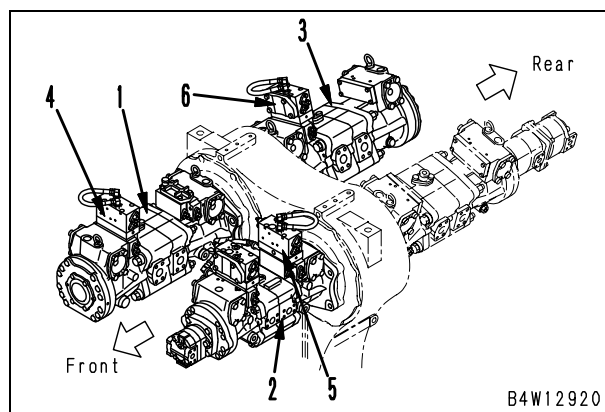
### ★ Testing tools

Symbol	Part No.	Part name
C	1	799-101-5002 Oil pressure gauge kit (analog) (Pressure gauge: 6 MPa {60 kg/cm <sup>2</sup> }, 40 MPa {400 kg/cm <sup>2</sup> })
		790-261-1204 Oil pressure gauge kit (digital)
	2	799-101-5160 ● Nipple
	3	790-301-1271 ● Joint
4	790-261-1311 ● Adapter	

### Testing condition

- Hydraulic oil temperature: 45 to 55 °C
- ⚠ **Be sure to follow "Safety precautions to follow before starting work".**
- ⚠ **Park the machine on a level ground, apply the parking brake, lower the bucket to the ground, and reserve a safe area.**
- ⚠ **Chock the wheels to prevent the machine from moving.**
- ⚠ **Stop the engine, then loosen the oil filler cap to release the pressure in the hydraulic tank.**

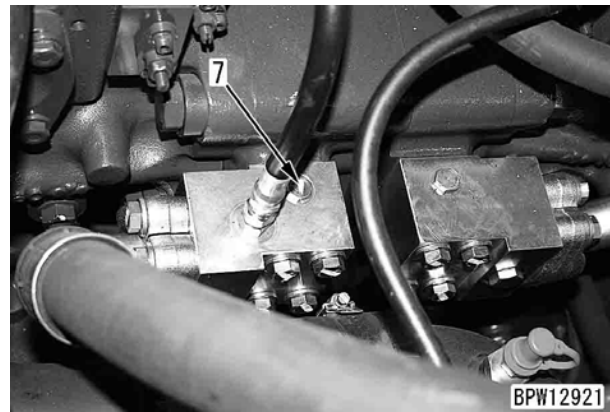
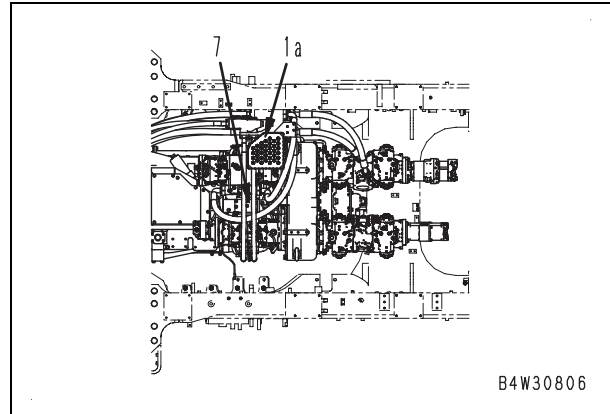
- ★ To test the oil pressures of the work equipment pump CO valves, measure the delivery pressures of No. 1 work equipment pump (1) and No. 2 work equipment pump (2), and the output pressures of CO valves (4), (5), and (6) installed on each pump at ports on the servo valve side.



### No. 1 work equipment pump

#### 1. Preparation

- 1) Remove cover (1a) at the top of No. 1 work equipment pump.
- 2) Remove the rear side pump delivery pressure pickup plug (7) on the No. 1 work equipment pump.
- 3) Install joint **C3** and nipple **C2** of the oil pressure gauge kit, and connect oil pressure gauge **C1** (40 MPa {400 kg/cm<sup>2</sup>}) to nipple **C2**.



Work equipment controller

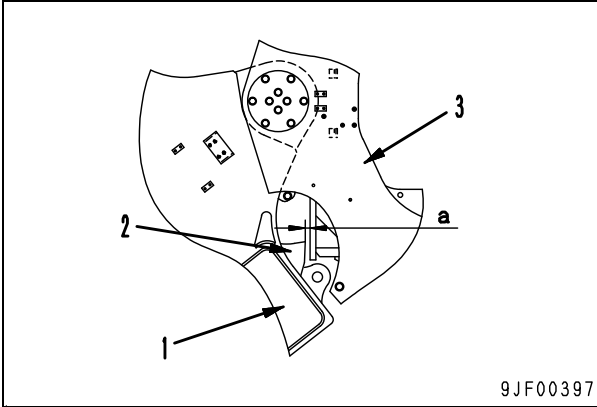
Displayed page	Signal name	Unit	Remarks
1/9	Software No.	---	---
1/9	Software application version	---	---
1/9	Software application data version	---	---
2/9	Boom (lift arm) Raise EPC Current 1	1 mA	0 to 1,000
2/9	Boom (lift arm) Raise EPC Current 2	1 mA	0 to 1,000
2/9	Boom (lift arm) Lower EPC Current 1	1 mA	0 to 1,000
2/9	Boom (lift arm) Lower EPC Current 2	1 mA	0 to 1,000
3/9	Bucket Tilt EPC Current 1	1 mA	0 to 1,000
3/9	Bucket Tilt EPC Current 2	1 mA	0 to 1,000
3/9	Bucket Dump EPC Current 1	1 mA	0 to 1,000
3/9	Bucket Dump EPC Current 2	1 mA	0 to 1,000
4/9	Lever potentiometer voltage boom (lift arm) 1	0.01 V	0.00 to 5.00
4/9	Lever potentiometer voltage boom (lift arm) 2	0.01 V	0.00 to 5.00
4/9	Lever potentiometer voltage bucket 1	0.01 V	0.00 to 5.00
4/9	Lever potentiometer voltage bucket 2	0.01 V	0.00 to 5.00
5/9	Boom (lift arm) angle	0.1 deg	-60 to +60
5/9	Boom (lift arm) angle	0.01 V	0.00 to 5.00
5/9	Boom (lift arm) lever operation frequency	---	0 to 256,000
5/9	Bucket lever operation frequency	---	0 to 256,000
5/9	Pump delivery	1 cc	0 to 500
6/9	AJSS lever operation angle	0.1 deg	-60 to +60
6/9	AJSS lever potentiometer voltage	0.01 V	0.00 to 5.00
6/9	Boom (lift arm) angle	0.1 deg	-60 to +60
6/9	AJSS frame potentiometer voltage	0.01 V	0.00 to 5.00
6/9	AJSS EPC Current	1 mA	0 to 1,000
7/9	Loader pump pressure	0.01 MPa	0 and 50
7/9	Loader pump pressure	0.001 V	0 to 5
7/9	Boom (lift arm) bottom pressure	0.01 MPa	0 and 50
7/9	Boom (lift arm) bottom pressure	0.001 V	0 to 5
7/9	AJSS S/T deviation angle	0.1 deg	0 to +120
7/9	Digging-in-progress flag	1: ON (digging) 0: OFF	---
8/9, 9/9	Input/Output signal	1: ON 0: OFF(OFFEN)	---

#### 4) Adjusting steering stopper bolt

⚠ Be sure to follow "Safety precautions to follow before starting work".

1. With the engine running at low idle, steer to the right or left. If clearance (a) between frame end stopper (2) of front frame (1) and rear frame (3) is out of the specified range, adjust it in the following procedure.

★ Clearance (a): 37 to 40 mm



- 1) Loosen lock nut (4) and turn steering angle adjustment bolt (5) to meet clearance (a) to the standard value.

⚠ With the engine running at low idle, slowly operate the joystick steering lever.

⚠ Use care in this operation so that your body or arm are not caught between the front and rear frames.

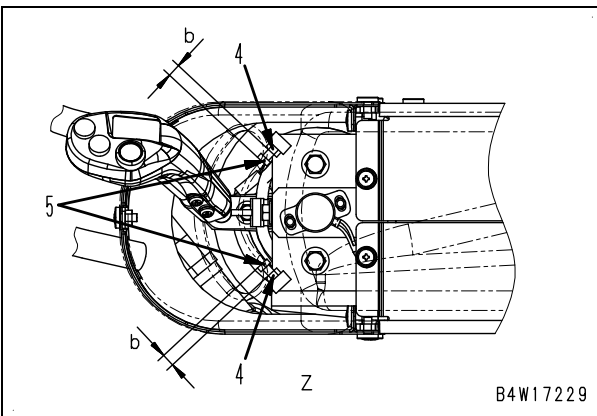
- 2) Start and run the engine at low idle. Slowly steer to full right or left, and make sure that the clearance (a) between frame end stopper (2) of front frame (1) and rear frame (3) is within the standard value range.

★ Fasten with a screw at center of the oblong hole.

- 3) When clearance adjustment is complete, tighten lock nut (4) of adjustment bolt (5).

🔑 Locknut:

8.8 to 10.8 Nm {0.9 to 1.1 kgm}

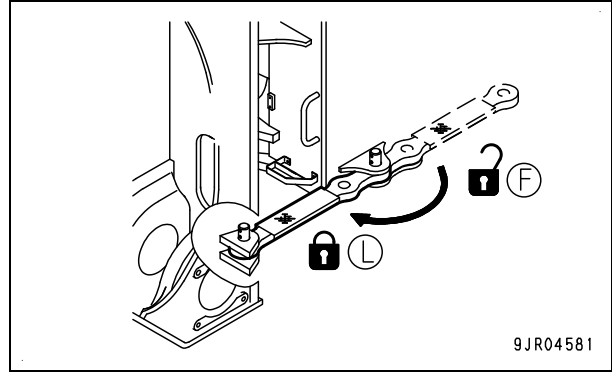


#### 5) Adjusting steering follow-up linkage

⚠ Be sure to follow "Safety precautions to follow before starting work".

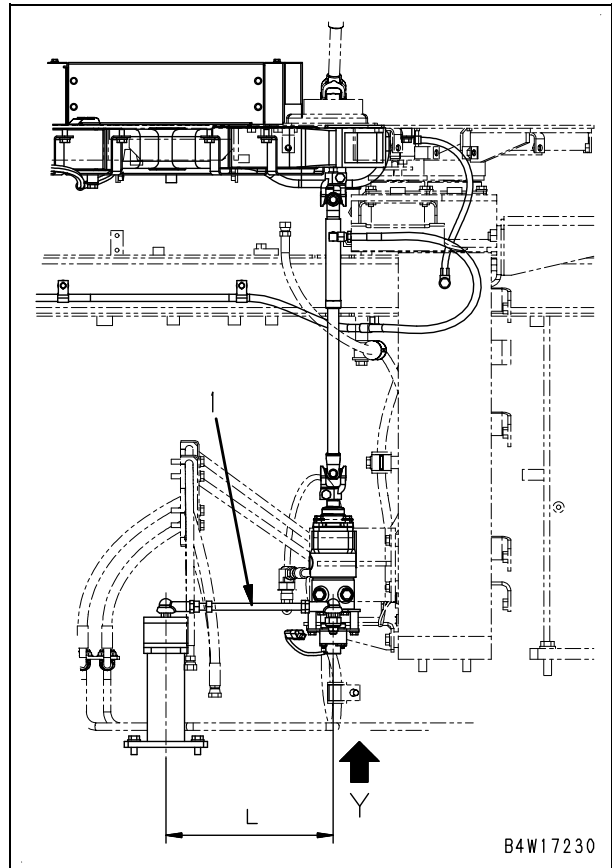
##### Adjusting

1. Move the frame lock bar to the "LOCK" position and set the machine in the straight travel position.



2. Adjust length "L" of steering follow up linkage (1) to the specified length.

★ Specified length L: 342 mm



★ Notes for connectors

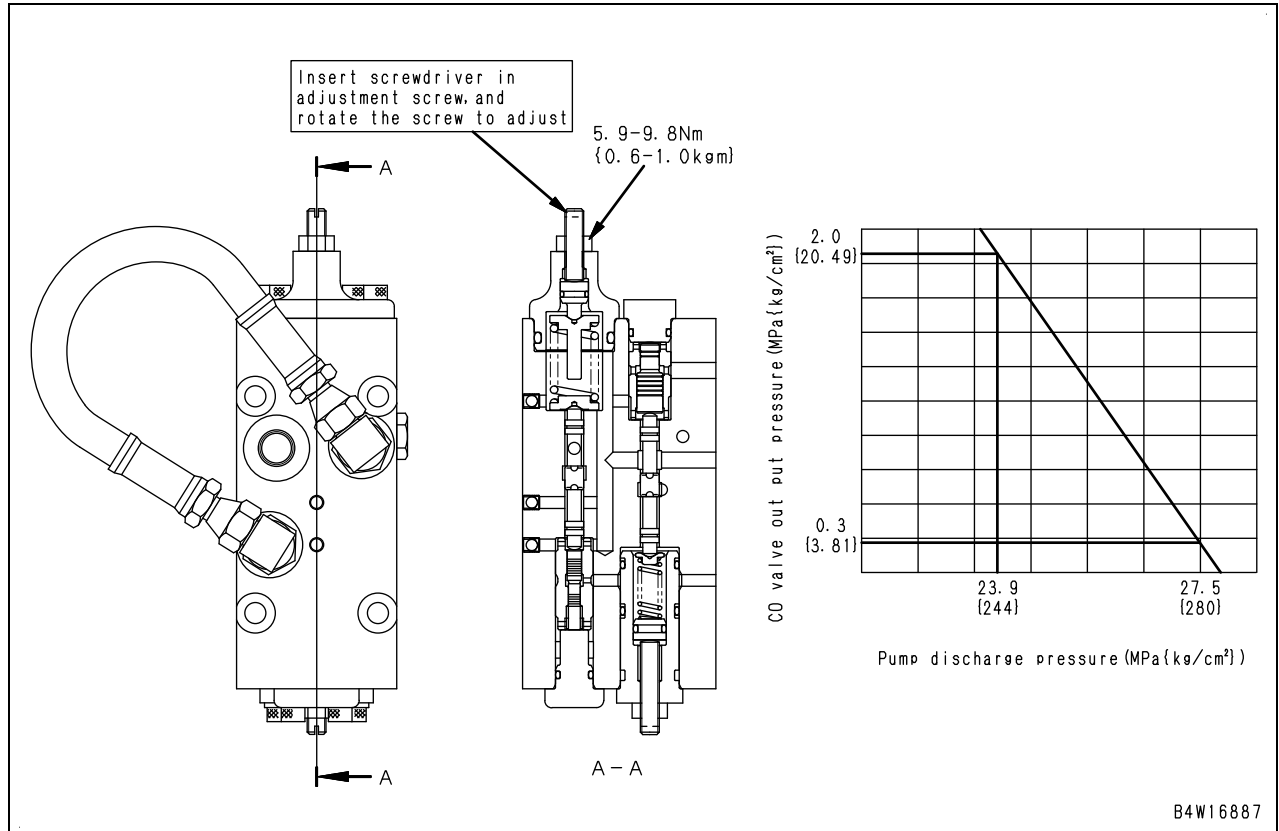
The connectors for the frame angle and lever angle potentiometers (56B-06-11630) are Deutsche connectors (08192-13810).

### 7) Pump checking procedure

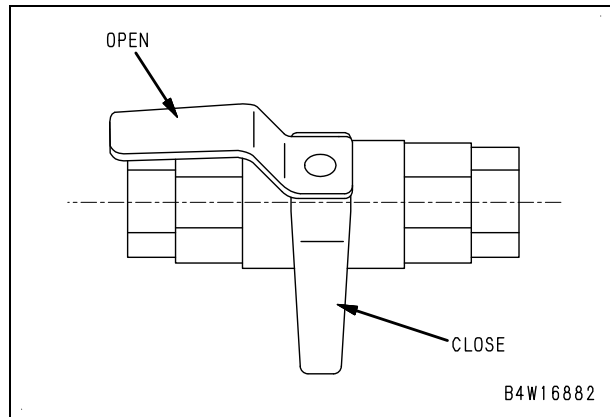
- (1) Measure lock-to-lock steering time with no load -- use a stopwatch
- (2) Screw in CO valve screw fully -- to create a pseudo delivery pressure  $280 \text{ kg/cm}^2$  or more (load, pump delivery minimum) → Measure lock-to-lock steering time with maximum load -- use a stopwatch
- (3) Finally, restore the CO valve output pressure characteristics.

CO + (NC)

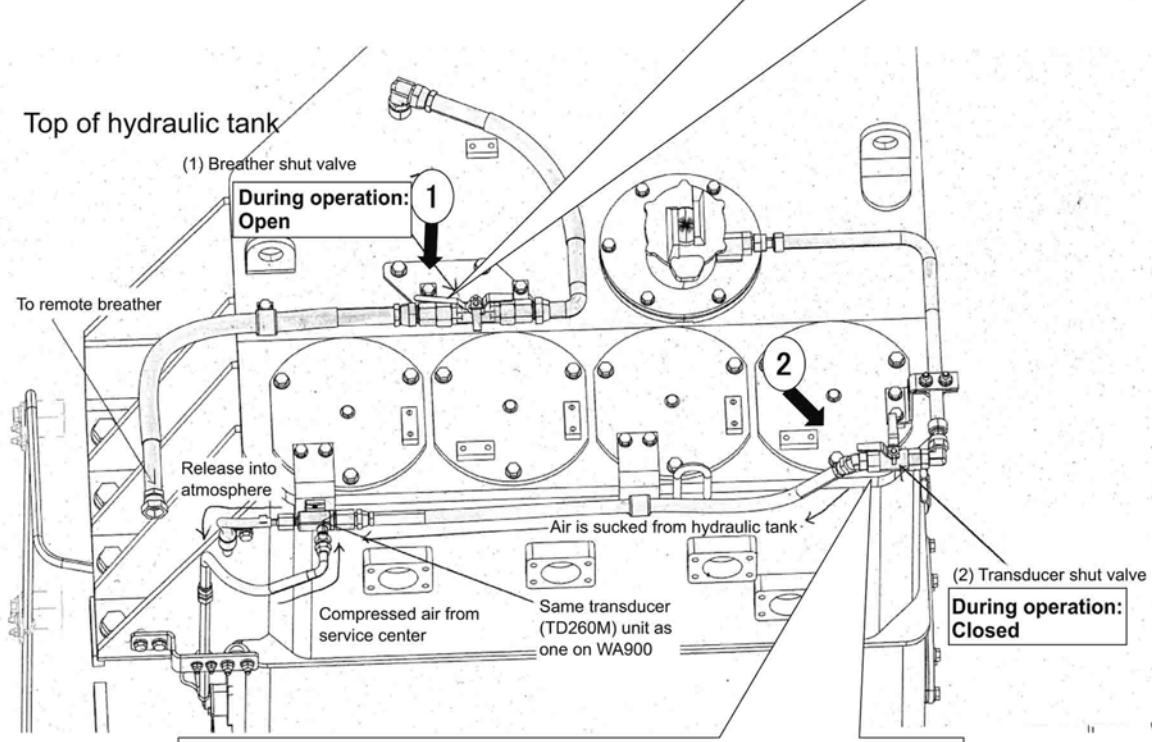
★ For the adjustment procedure, see page 40-597, 598



★ Opening and closing directions of valve



(1) Close the valve to prevent air from entering the tank during evacuation.  
 (2) There is a risk that the breather does not function when the valve is not relieved after maintenance is finished.  
 ⇒ The internal pressure increases to break the tank during operation.



(1) If the valve is opened and air is supplied to the air chuck which is connecting the transducer and tank during evacuation, the internal pressure of the tank becomes negative pressure because of the venturi tube.  
 (2) There is a risk that the tank is kept opened to the atmosphere when the valve is not closed after maintenance is finished.  
 1) Cavitation occurs in the pump because of insufficient pressurization ⇒ The pump is broken.  
 2) Dust may enter the tank.

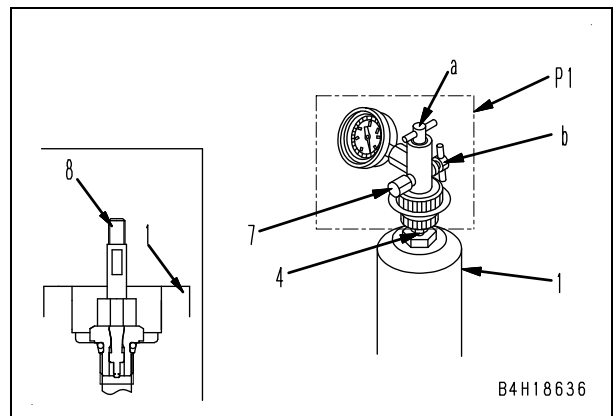
BPW17802

For PPC

Ambient temperature °C	Gas pressure		Remarks
	MPa	kg/cm <sup>2</sup>	
15	0.96	9.8	
16	0.96	9.8	
17	0.97	9.9	
18	0.97	9.9	
19	0.97	9.9	
20	0.98	10.0	Standard temperature Standard gas pressure
21	0.98	10.0	
22	0.98	10.0	
23	0.99	10.1	
24	0.99	10.1	
25	0.99	10.1	
26	1.00	10.2	
27	1.00	10.2	
28	1.00	10.2	
29	1.01	10.3	
30	1.01	10.3	
31	1.01	10.3	
32	1.02	10.4	
33	1.02	10.4	
34	1.02	10.4	
35	1.03	10.5	
36	1.03	10.5	
37	1.03	10.5	
38	1.04	10.6	
39	1.04	10.6	
40	1.04	10.6	
41	1.05	10.7	
42	1.05	10.7	
43	1.05	10.7	
44	1.06	10.8	
45	1.06	10.8	
46	1.06	10.8	
47	1.07	10.9	
48	1.07	10.9	
49	1.07	10.9	
50	1.08	11.0	

- ★ Compare the gauge gas pressure with the specified gas pressure in Table 1. When the gas pressure is too high, go to step 7, and adjust the gas pressure.
- ★ Compare the gauge gas pressure with the specified gas pressure in Table 1. If the gas pressure is insufficient, go to step 8, then perform adjustment according to "Procedure for charging accumulator with nitrogen gas".
- ★ When the gas pressure is normal, go to step 9.

7. When reducing the nitrogen gas pressure in the accumulator after testing it
  - ★ Initial state: Open handle (a)
  - 1) Slowly turn handle (b) counterclockwise, and gradually release the nitrogen gas through the threaded portion of handle (b). Immediately after the gauge of gas charging tool **P1** reaches the standard pressure in Table 1, turn handle (b) clockwise to close the valve, and adjust the nitrogen gas pressure in accumulator (1).
  - 2) Go to step 8.
8. When charging the accumulator with nitrogen gas after testing the nitrogen gas pressure in it
  - 1) Close the valve by turning handle (a) counterclockwise until it stops.
  - 2) Gradually turn handle (b) counterclockwise, and discharge the nitrogen gas remaining in charging tool **P1** through the threaded portion of handle (b), then keep the valve open.  
(To bleed air in the hose, open the piping between handle (b) and atmosphere)
  - 3) Go to "Procedure for charging accumulator with nitrogen gas", step 4.6), and charge the accumulator with nitrogen gas and adjust the gas pressure.
9. After testing, close the valve by turning handle (a) counterclockwise until it stops.
10. Remove gas charging tool **P1** from accumulator (1), and restore the machine.
  - 1) Turn handle (b) counterclockwise to open the valve, and discharge the nitrogen gas remaining in gas charging tool **P1** through the threaded portion of handle (b).
  - 2) Remove gas charging tool **P1**.
  - 3) Remove extension (8). (New type accumulator)



No.	Cause	Procedure, measuring location, criteria and remarks			
11	The steering pump is defective	★ If the work equipment is operating normally but steering is slow, judge that the switch pump is normal.			
		★ If unusual noise is heard from around the steering pump or no failure is found by checks on causes 1 to 10 above, measure the steering time.			
		● Hydraulic oil temperature: 45 to 55 °C	Engine speed	Steering time (sec.)	
		● Measure the time required for steering right (left) end to left (right) end.	Low idle	Max. 5.7	
		High idle	Max. 4.9		

## Special tool list

- ★ Tools with part number 79\*T-\*\*\*-\*\*\*\* means that they are not available from Komatsu Ltd. (i.e. tools to be made locally).
- ★ Tools marked with ○ in the sketch column are presented in the sketches of the special tools. (See "Sketches of special tools")
- ★ **Tool part No. SMT ○○○-○○○ means that the tool is to be made locally and not specified as a special tool (i.e., the price is not set). Therefore, such a tool is not available from Komatsu Ltd.**

### Special tools to be used when you removal and installation of radiator and hydraulic oil cooler assembly

Symbol	Part No.	Part name	Q'ty	Sketch	Remarks	
Z	2	07376-70315	Plug	2		Nominal 03
		02789-00315	Cap	2		Nominal 03
		02896-11009	O-ring	2		
	20	07379-02071	Flange	1		Nominal 20
		07378-12000	Head	1		Nominal 20
		07000-F2060	O-ring	1		
		07371-32076	Split flange	2		
		07375-21240	Bolt	4		

### Special tools to be used when you removal and installation of engine assembly

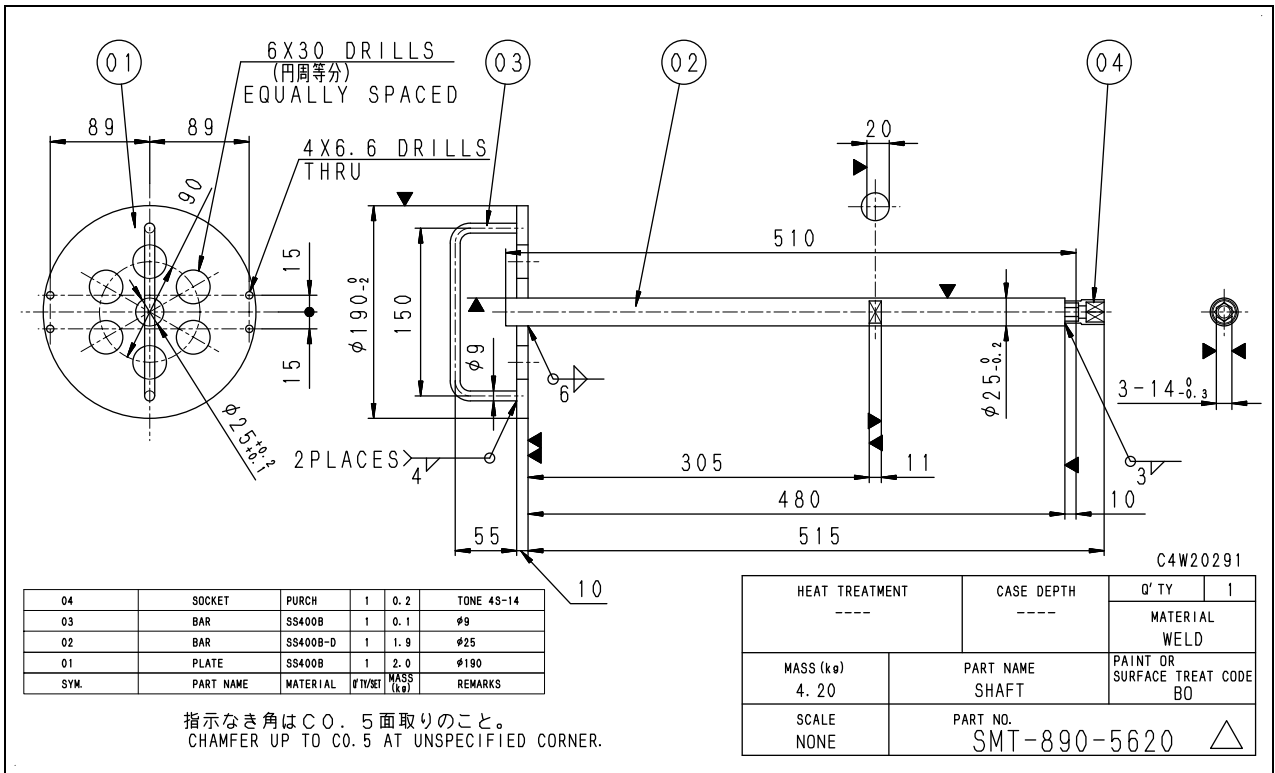
Symbol	Part No.	Part name	Q'ty	Sketch	Remarks	
A	1	SMT-890-5200	Lifting tool assembly	1		Sling for engine assembly (S-SLSL f10, L = 1.5m, manufactured by KITO) (GD-4N f12.5x4, L = 2m, manufactured by KITO)
	1-1	SMT-890-5210	● Frame	1	○	
	1-2	Commercially available	● Single sling	4		
	1-3	Commercially available	● Quad sling	1		
Z	2	07376-70315	Plug	2		Nominal 03
		02789-00315	Cap	2		Nominal 03
		02896-11009	O-ring	2		
	21	07379-02484	Flange	1		Nominal 24
		07378-12400	Head	1		Nominal 24
		07000-12070	O-ring	1		
		07371-32484	Split flange	2		
		07375-21240	Bolt	4		

### Special tools to be used when you removal and installation of air-cooled torque converter and transmission, and brake oil cooler assembly

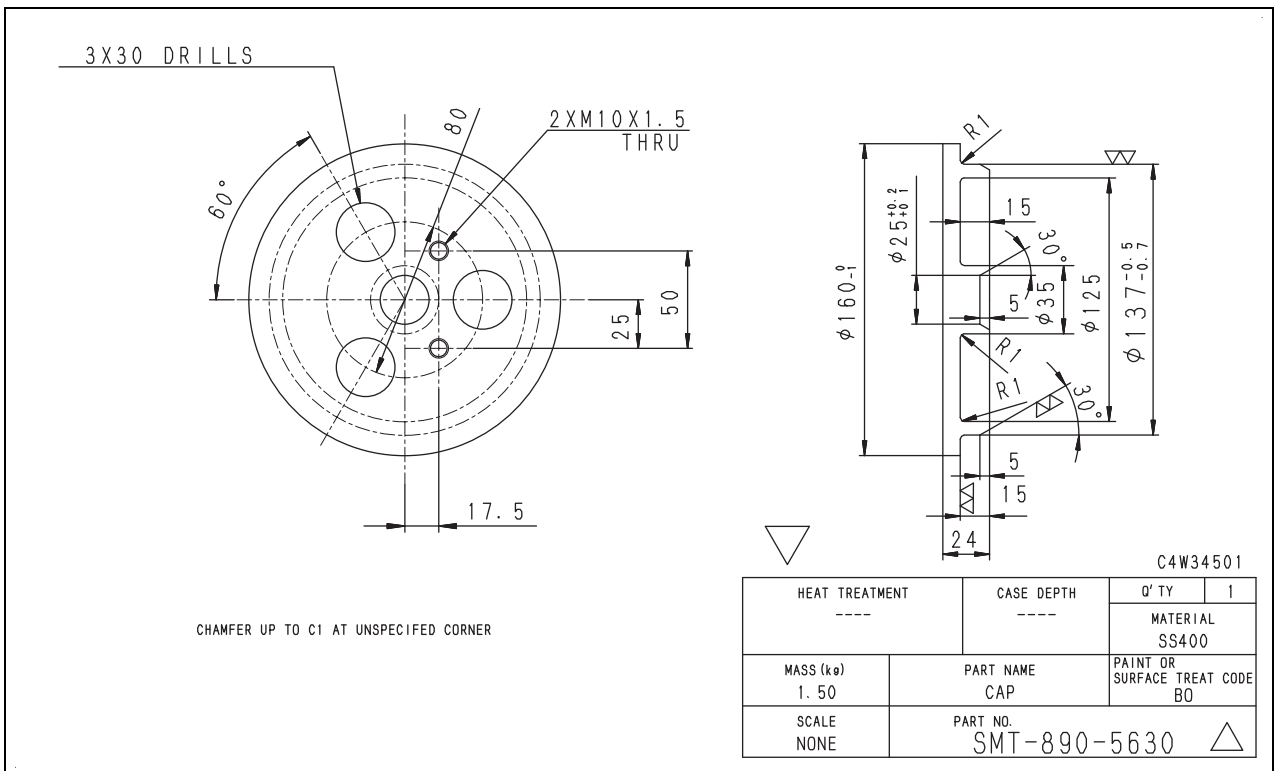
Symbol	Part No.	Part name	Q'ty	Sketch	Remarks	
Z	20	07379-02484	Flange	3		Nominal 20
		07378-12000	Head	3		Nominal 20
		07000-F2060	O-ring	3		
		07371-32076	Split flange	6		
		07375-21240	Bolt	12		

Note: Komatsu cannot accept any responsibility for special tools manufactured according to these sketches.

**C5 (3/5) Shaft**

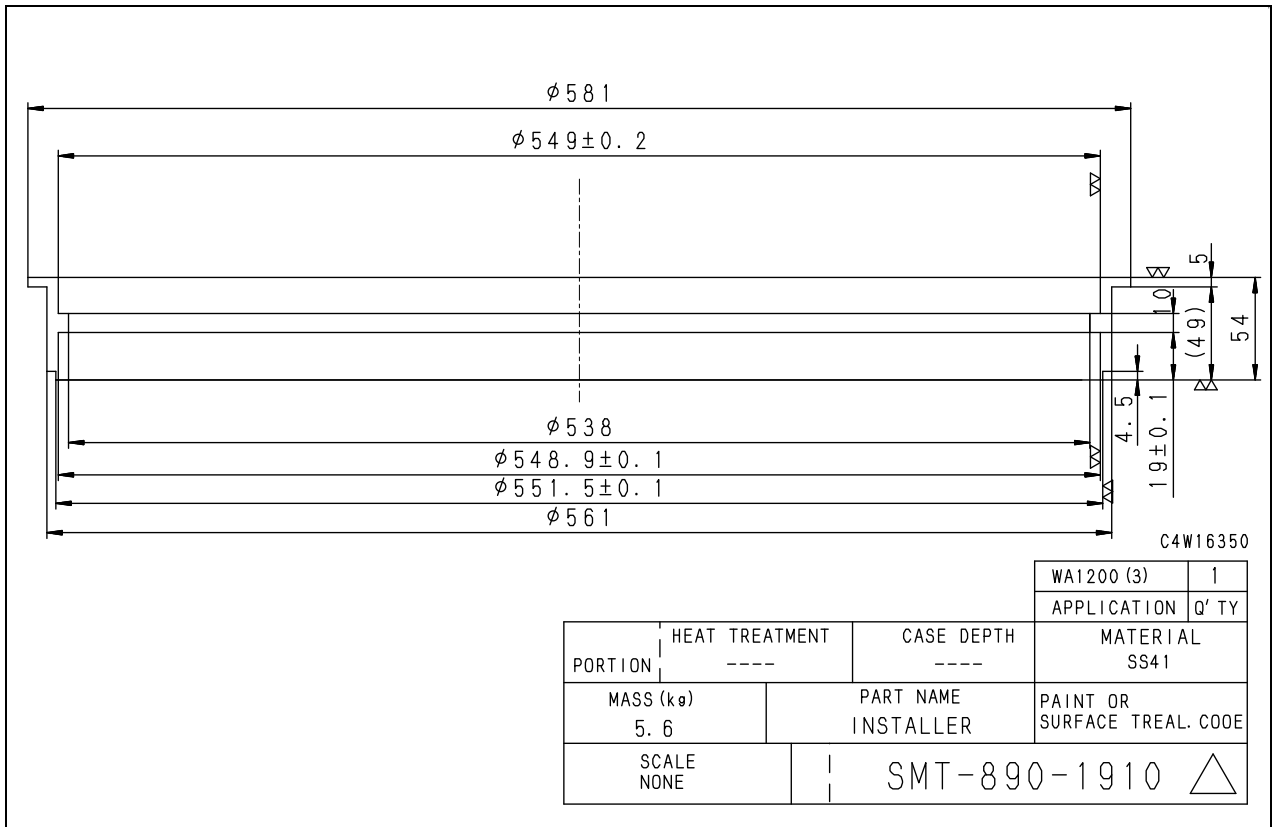


**C5 (4/5) Cap**





Note: Komatsu cannot accept any responsibility for special tools manufactured according to these sketches.

**J5 Installer**



**Flushing pattern B**

1. Drain the oil from the hydraulic tank.
2. Remove the strainer of the hydraulic tank.
3. Preparation for flushing
  - 1) Replace filter element (2) in the hydraulic tank with a flushing element.
  - 2) Replace bypass valve (3) with a bypass circuit closing plate.
  - 3) Connect the inlet and outlet hoses of the hydraulic cylinders by using tools F2 and F3 (short-circuit flanges) to short-circuit the hydraulic circuit.
  - 4) Add hydraulic oil to the specified level in the hydraulic tank.  
 Hydraulic tank:  
1200 l
4. Perform flushing according to the following procedure.
  - 1) Start and run the engine at low idle until the hydraulic oil temperature reaches 40 to 50 °C. Do not operate the work equipment and steering during this step.
  - 2) Run the engine at a medium speed for 20 minutes.  
★ Do not operate the work equipment and steering during this step.
  - 3) Run the engine at the full speed and operate the levers according to the following procedure.
    - 1] Move the steering lever to the right and hold it there for 2 minutes.
    - 2] Move the steering lever to the left and hold it there for 2 minutes.
    - 3] Move up the lift arm lever to RAISE and hold it for 2 minutes.
    - 4] Move the lift arm lever to LOWER and hold it there for 2 minutes.
    - 5] Move the bucket lever to TILT and hold it there for 2 minutes.
    - 6] Move the bucket lever to DUMP and hold it there for 2 minutes.
  - 4) Repeat steps 1) to 6) 5 times or more.
5. Reinstallation
  - 1) Remove the short-circuit flanges from all cylinder circuits and install the hoses to each cylinder.
    - Lift arm cylinder (two cylinders)
    - Bucket cylinder (two cylinders)
    - Steering cylinder (two cylinders)
  - 2) Replace the flushing element in the hydraulic tank with a new standard element.
  - 3) Remove filter bypass circuit closing plates and install the bypass valve.

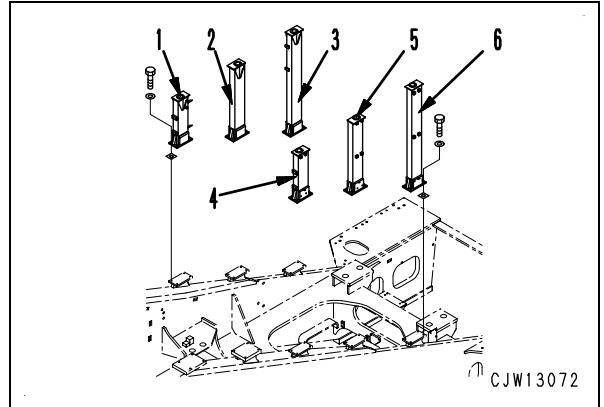
 Engine oil:  
approx. 260ℓ

3. Remove the hood assembly, referring to "Removal and installation of hood assembly".
4. Remove the radiator guard, referring to "Removal and installation of radiator and hydraulic oil cooler assembly".
5. Remove the bulkhead assembly, referring to "Removal and installation of bulkhead assembly".

6. Remove brackets (1), (2), (3), (4), (5), and (6). [\*1]

Tool: Impact wrench, socket wrench

Mounting bolt for bracket (1), (2), (3), (4), (5), (6): Width across flats 24mm, M16



7. Disconnect hoses (7) and (8).

Tool: Open-end wrench, special tool Z2

Hose (7), (8): Width across flats 22mm, Nominal 03

8. Remove brackets (9) and (10).

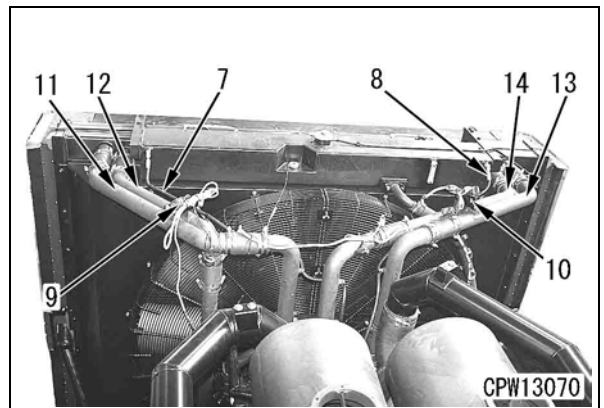
Tool: Impact wrench, socket wrench

Mounting bolt for bracket (9), (10): Width across flats 19mm, M12

9. Loosen the hose clamps and remove HTC radiator inlet tube (11), LTC radiator outlet tube (12), HTC radiator inlet tube (13), and LTC radiator inlet tube (8). [\*2]

Tool: Socket wrench

Hose clamp: Width across flats 9.5mm



10. Loosen hose clamps and remove tubes (14) and (15). [\*3]

Tool: Socket wrench

Hose clamp: Width across flats 9.5mm

11. Remove fan pulley cover (16).

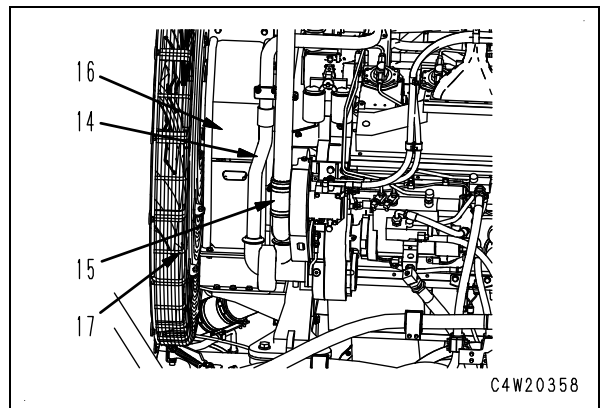
Tool: Impact wrench, socket wrench

Mounting bolt for fan pulley cover (16): Width across flats 19mm, M12

12. Remove fan guard (17).

Tool: Impact wrench, socket wrench

Mounting bolt for fan guard (17): Width across flats 19mm, M12



13. Disconnect wiring harness connector E10 (19).

14. Remove cover (20).

Tool: Impact wrench, socket wrench

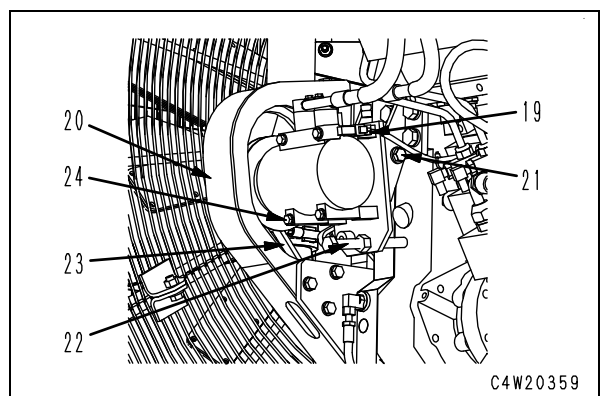
Mounting bolt for cover (20): Width across flats 17mm, M10

15. Loosen bolt (21), loosen belt tension adjustment bolt (22), and then remove belt (23). [\*4]

Tool: Impact wrench, socket wrench

Mounting bolt (21): Width across flats 19mm, M12


Belt tension adjustment bolt (22): Width across flats 24mm, M16



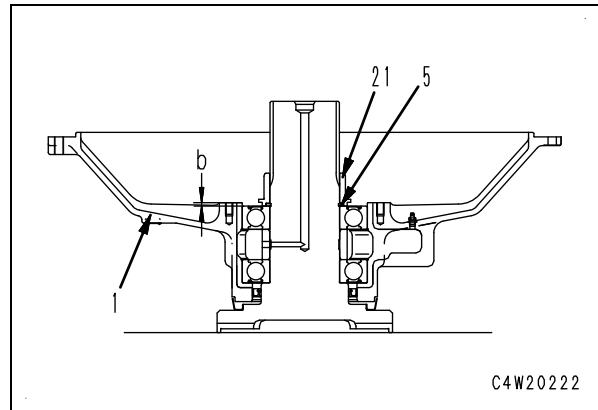
- 8) Reverse cover and shaft assembly (1), and install snap ring (5).

★ Securely install the snap ring in the groove.


- 9) Press fit spacer (21).

 Inside surface of spacer:  
Adhesive (LOCTITE 601)

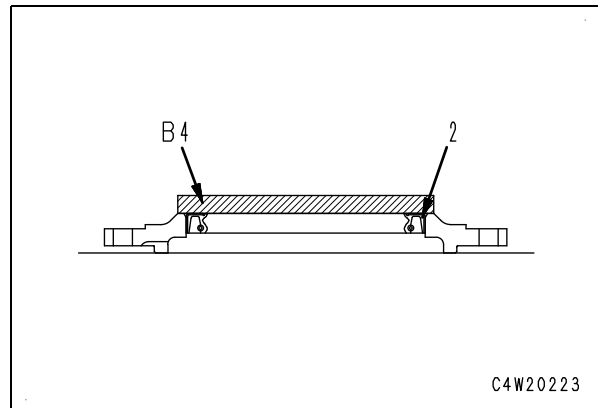
- ★ Check that level difference "b" between the cover and bearing is within the standard value by using the gauge.
- Standard value of level difference "b": 5.05 to 6.65



- 10) Press fit oil seal (2) to cage (4) using installation tool B4.


 Outer periphery of oil seal:  
Adhesive (LOCTITE 601)

- ★ Degrease the inner periphery of cage (4) and the outer periphery of oil seal (2).
- ★ Take care that the oil seal does not slant.

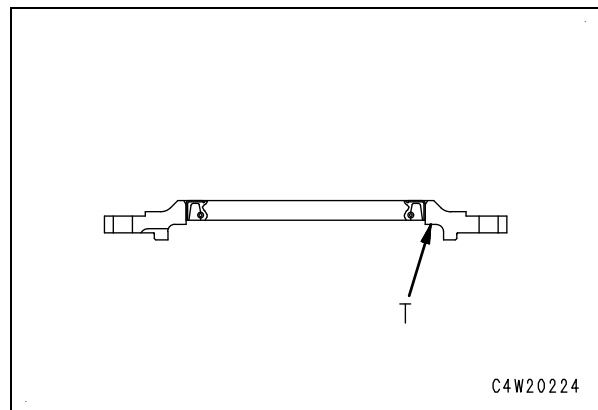


- 11) Press fit oil seal (2), and apply grease to clearance "T".


★ Also apply grease to the oil seal lip.


 Clearance "T" between oil seal and bearing:  
ENS grease (100 g)

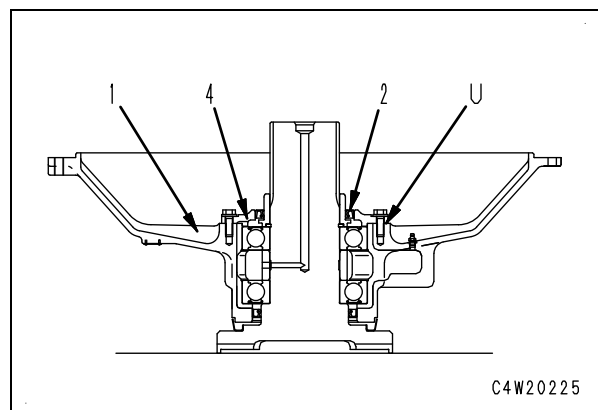
- ENS grease part No.: 427-12-11871 (2 kg can)



- 12) Install cage (4) and oil seal (2) to cover (1).

 Mating faces U on cage (4) and cover (1):  
Liquid gasket (LG-8)

 Bolt:  
98 to 123 Nm {10 to 12.5 kgm}



## Power train

### Removal and installation of torque converter and transmission assembly

#### Standard tools to be used when you remove and installation of torque converter and transmission assembly

The listed parts are for reference only. You can use the part that is not listed if it is applicable.

No.	Part name	Specifications	Q'ty	Remarks
1	Socket wrench	10mm	1	
2	Socket wrench	13mm	1	
3	Socket wrench	14mm	1	
4	Socket wrench	15mm	1	
5	Socket wrench	17mm	1	
6	Socket wrench	19mm	1	
7	Socket wrench	22mm	1	
8	Socket wrench	24mm	1	
9	Socket wrench	27mm	1	
10	Socket wrench	30mm	1	
11	Socket wrench	32mm	1	
12	Socket wrench	36mm	1	
13	Open-end wrench	19mm	1	
14	Open-end wrench	22mm	1	
15	Open-end wrench	27mm	1	
16	Open-end wrench	32mm	1	
17	Open-end wrench	36mm	1	
18	Open-end wrench	41mm	1	
19	Impact wrench		1	
20	Torque wrench (socket)	30 to 300Nm	1	
21	Torque wrench (socket)	100 to 1000Nm	1	
22	Torque wrench (open-end)	10 to 50Nm	1	
23	Torque wrench (open-end)	20 to 200Nm	1	
24	Torque wrench (open-end)	60 to 420Nm	1	
25	Webbing sling		As required	
26	Oil container	350ℓ, 1125ℓ	As required	

**Standard tools to be used when you disconnection and connection of torque converter assembly, PTO and transfer assembly**

The listed parts are for reference only. You can use the part that is not listed if it is applicable.

No.	Part name	Specifications	Q'ty	Remarks
1	Socket wrench	13mm	1	
2	Socket wrench	17mm	1	
3	Socket wrench	19mm	1	
4	Socket wrench	24mm	1	
5	Socket wrench	27mm	1	
6	Open-end wrench	27mm	1	
7	Open-end wrench	32mm	1	
8	Open-end wrench	36mm	1	
9	Open-end wrench	10mm	1	
10	Impact wrench		1	
11	Torque wrench (socket)	20 to 200Nm	1	
12	Torque wrench (socket)	30 to 300Nm	1	
13	Torque wrench (open-end)	20 to 200Nm	1	
14	Torque wrench (hexagonal)	20 to 200Nm	1	
15	Forcing screw	12mm	1	
16	Webbing sling		1	

**Special tools to be used when you disconnection and connection of torque converter assembly, PTO and transfer assembly**

Symbol	Part No.	Part name	Q'ty	Sketch	Remarks
Z	3	07376-70422	Plug	1	Nominal 04
		02789-00422	Cap	1	Nominal 04
		02896-11012	O-ring	1	
	4	07376-70522	Plug	2	Nominal 05
		02789-00522	Cap	2	Nominal 05
		02896-11015	O-ring	2	
	5	07376-70628	Plug	1	Nominal 06
		02789-00628	Cap	1	Nominal 06
		02896-11018	O-ring	1	

**Disconnection**

1. Breather and breather hose

- 1) Remove breather hose (1).

Tool: Open-end wrench, special tool Z5

Breather hose (1): Width across flats 36mm, Nominal 06

- 2) Remove two mounting bolts, and remove breather (2) and the block as a unit.

Tool: Impact wrench, socket wrench

Mounting bolt for breather (2): Width across flats 19mm, M12

- 3) Remove union, remove elbow (3).

Tool: Open-end wrench

Union: Width across flats 32mm

2. Lubrication tube and block

- 1) Remove lubrication tubes (4) and (5).

★ Remove the tube clamps also.

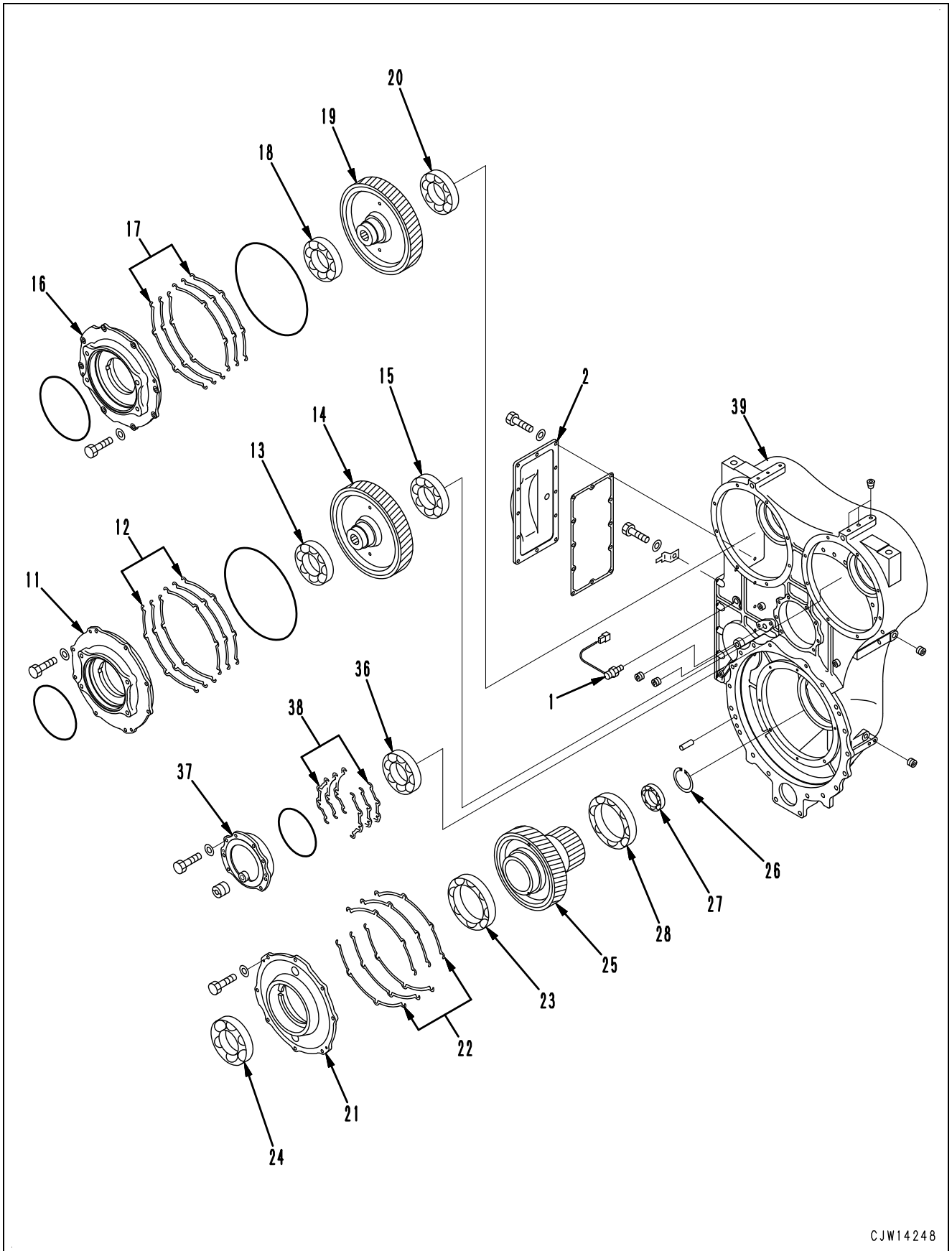
Tool: Open-end wrench, special tool Z4

Lubrication tube (4), (5): Width across flats 32mm, Nominal 05

- 2) Remove four mounting bolts and flange, and remove lubrication tube (6).

★ Remove the tube clamp also.

# Disassembly and assembly of PTO and transfer



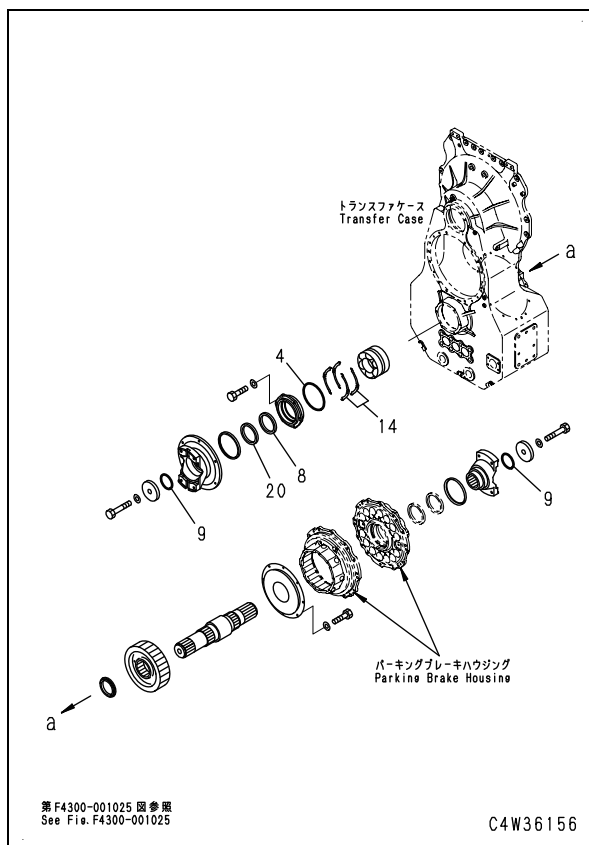
CJW14248

**Service kit parts list**

KIT No.: 42C-15-05280 (Connection service kit for transmission and transfer assemblies)

Fig. No.: Y0 Y99-0000006 (K06) (Transfer output shaft)

Index	Part No.	Part name	Q'ty
4	07000-75210	O-RING	1
8	07012-50140	SEAL	1
9	562-15-39970	O-RING	2
14	42C-15-05010	SHIM KIT	1
20	42C-15-13332	SEAL	1

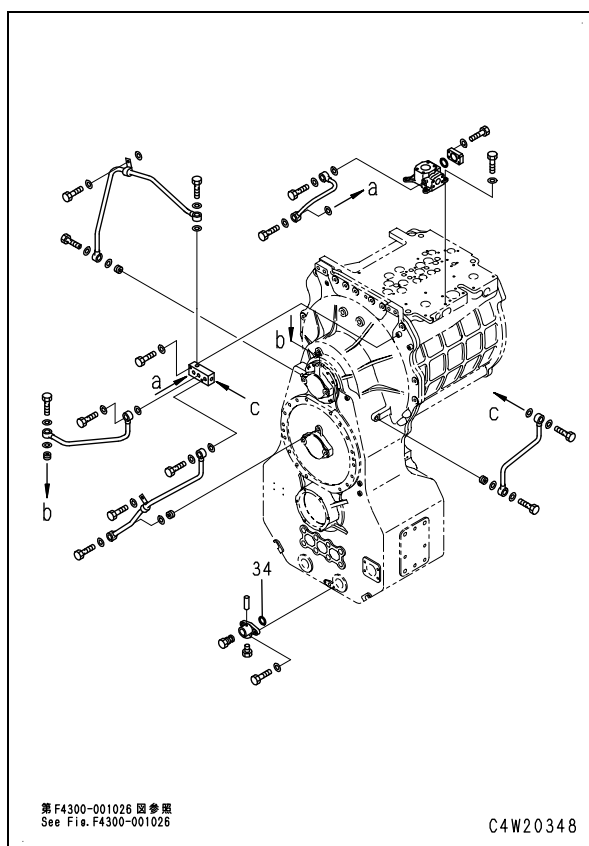


**Service kit parts list**

KIT No.: 42C-15-05280 (Connection service kit for transmission and transfer assemblies)

Fig. No.: Y0 Y99-0000006 (K06) (Transmission piping)

Index	Part No.	Part name	Q'ty
34	07000-73028	O-RING	1

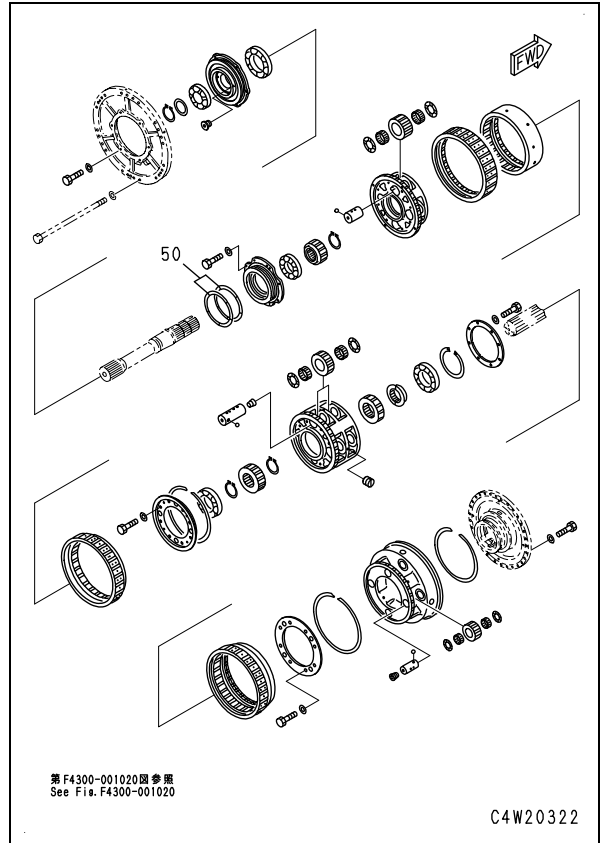


**Service kit parts list**

KIT No.: 42C-15-05051 (Service kit for assembling transmission)

Fig.No.: Y0 Y99-0000002 (K03) (Carrier)

Index	Part No.	Part name	Q'ty
50	19M-15-19280	RING	2

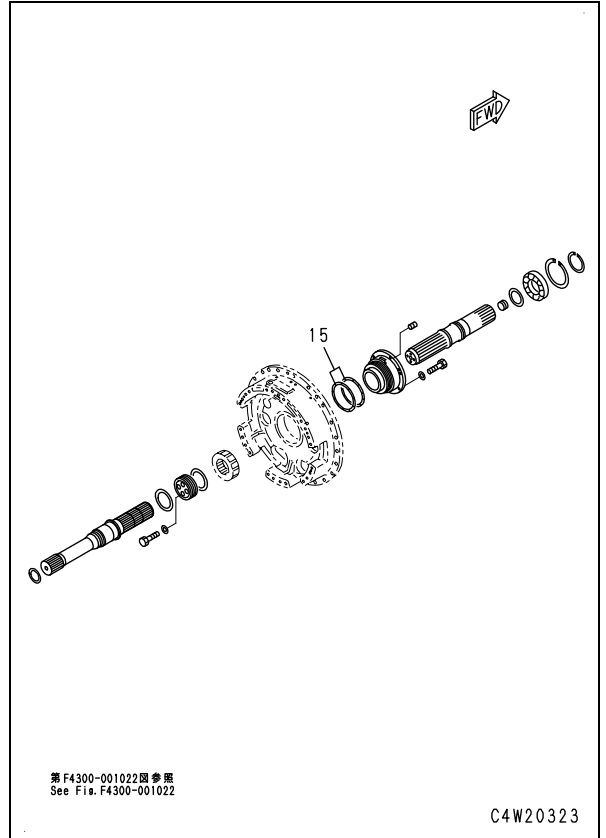


**Service kit parts list**

KIT No.: 42C-15-05051 (Service kit for assembling transmission)

Fig.No.: Y0 Y99-0000002 (K03) (Input and output shafts)

Index	Part No.	Part name	Q'ty
15	195-15-39260	RING	2



## Removal and installation of steering pump, control pump and PPC pump assembly

### Standard tools to be used when you remove and installation of steering pump, control pump, and PPC pump assembly

The listed parts are for reference only. You can use the part that is not listed if it is applicable.

No.	Part name	Specifications	Q'ty	Remarks
1	Socket wrench	13mm	1	
2	Socket wrench	14mm	1	
3	Socket wrench	17mm	1	
4	Socket wrench	19mm	1	
5	Socket wrench	30mm	1	
6	Socket wrench	36mm	1	
7	Open-end wrench	22mm	1	
8	Open-end wrench	36mm	1	
9	Impact wrench		1	
10	Torque wrench (socket)	100 to 1000Nm	1	
11	Webbing sling		As required	
12	Oil container	1125ℓ	As required	

### Special tools to be used when you remove and installation of steering pump, control pump, and PPC pump assembly

Symbol	Part No.	Part name	Q'ty	Sketch	Remarks
Z	2	07376-70315	Plug	1	Nominal 03
		02789-00315	Cap	1	Nominal 03
		02896-11009	O-ring	1	
	5	07376-70628	Plug	1	Nominal 06
		02789-00628	Cap	1	Nominal 06
		02896-11018	O-ring	1	
	17	07379-01044	Flange	2	Nominal 10
		07378-11000	Head	2	Nominal 10
		07000-13032	O-ring	2	
		07371-31049	Split flange	4	
		07375-21035	Bolt	8	

### Removal

**⚠ Before performing removal, be sure to implement "2. Preparatory work" and "3. Precautions during work" in "00 Safety notice".**

1. Drain the hydraulic oil.

Tool: Socket wrench, oil container

Hydraulic oil drain plug: Width across flats 36mm, M27



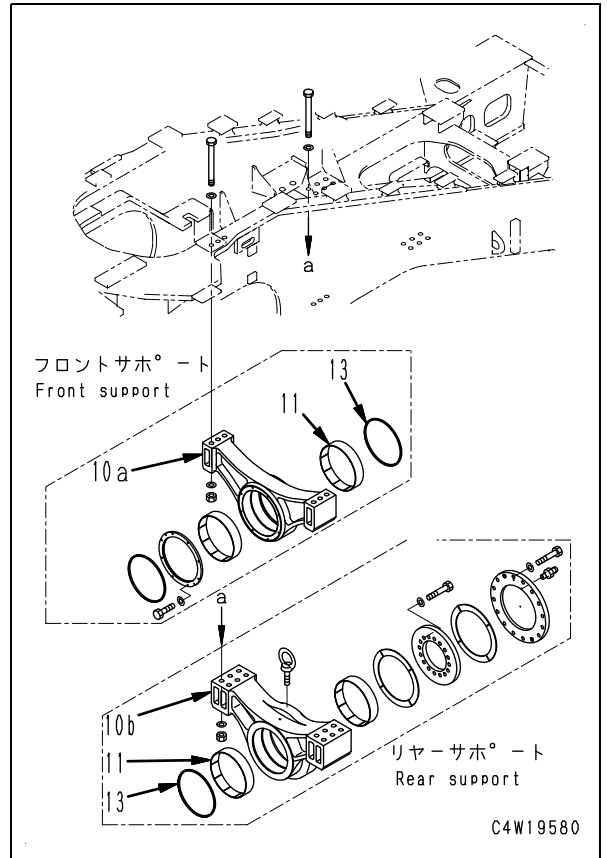
Hydraulic oil:

approx. 1,125ℓ

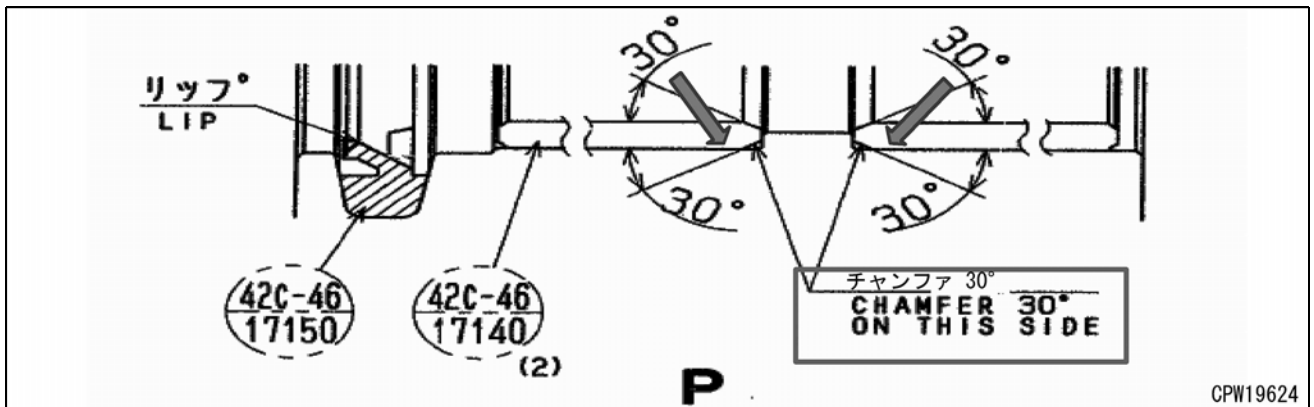
2. Open the upper step cover.

3. Rear support


- 1) Install bushings (11) and dust seals (13) to rear support (10b) according to the same procedure as to front support (10a).

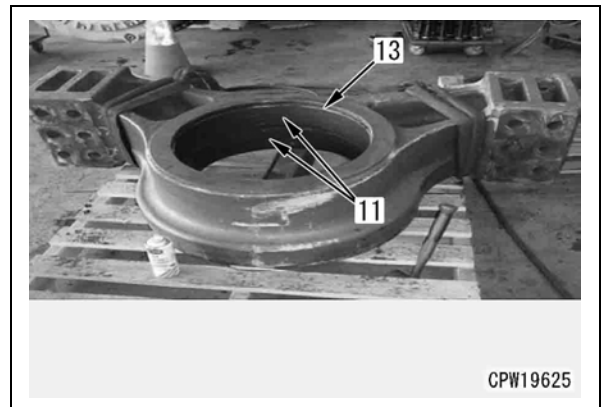


★ Install the dust seal with the lip facing outside.

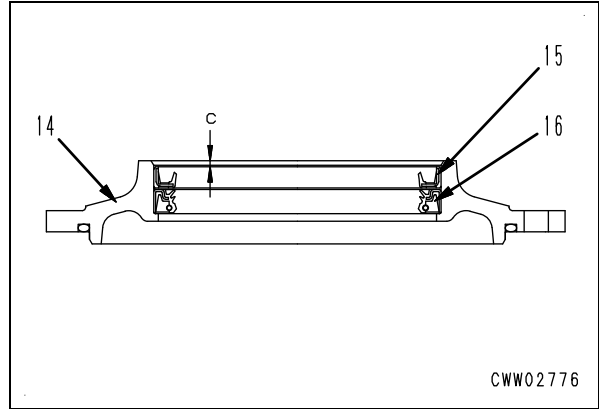


- 2) Apply grease to the entire inner periphery of bushings (11) and dust seal (13).

 Bushing (11) and dust seal (13):  
Molybdenum disulphied grease (LM-G)



- 7] Rotate cage (15) to fit in the bearing, and check that the starting torque is within the range of 15.7 to 52.0 Nm {1.6 to 5.3 kgm}.
  - ★ If it is outside the range, adjust the shims again.



- 6) Install the O-ring to cage (19).
- 7) Install oil seal (21) to cage (19).
- 8) Install dust seal (20) to cage (19).
  - ★ Dust seal press fit dimension "c": 4 mm from cage end face

- Oil seal press fit portion:  
Liquid gasket (LG-1 or LG-5)
- Seal lip:  
Grease (G2-LI)

- 9) Install cage (19) to cage (15) with four bolts.

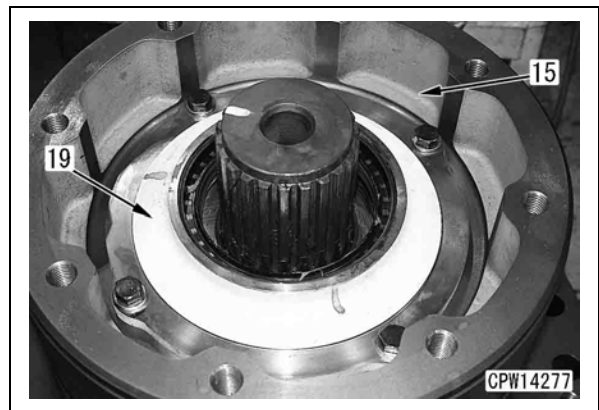
- Mounting bolt:  
157 to 196 Nm {16 to 20 kgm}

- 10) Install support (15A).

- Mounting bolt:  
824 to 1,030 Nm {84 to 105 kgm}

- 11) Install coupling (18) to pinion (22), and install the O-ring.

- Yoke end face and shaft spline:  
Lubricant (LM-G)



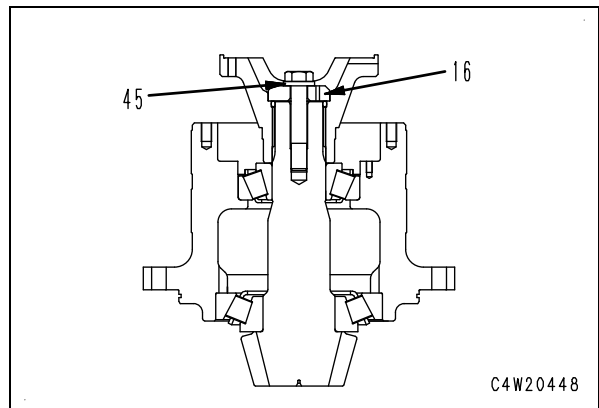
- 12) Fit the selected shims, and install holder (16) and washer (45) with the bolt.

- Mounting bolt:  
Adhesive (LT-2)
- Mounting bolt:  
2,450 to 3,040 Nm {250 to 310 kgm}

- 13) Install the O-ring to cage (15).

- 14) Adjust the shim pack thickness of the differential carrier according to the following procedure.

- ★ If the bearing, pinion gear, bevel gear, etc. is replaced, perform the shim adjustment procedure.

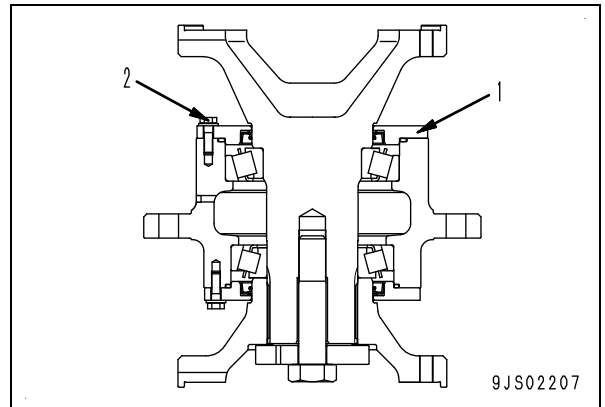


## Disassembly and assembly of center support

### Disassembly

#### 1. Retainer

Remove three mounting bolts (2) of retainer (1).

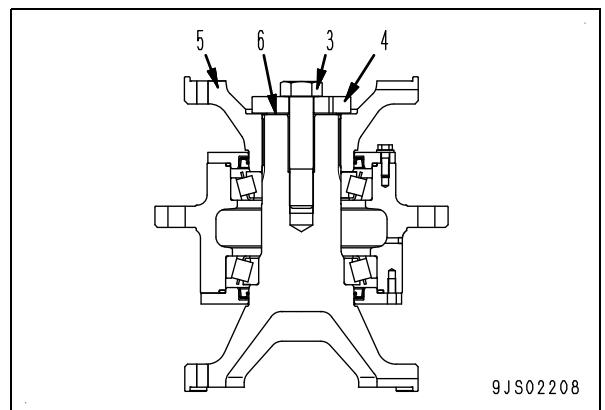


#### 2. Coupling

1) Turn over the center support assembly.

2) Remove bolt (3) and remove holder (4), coupling (5) and shim (6).

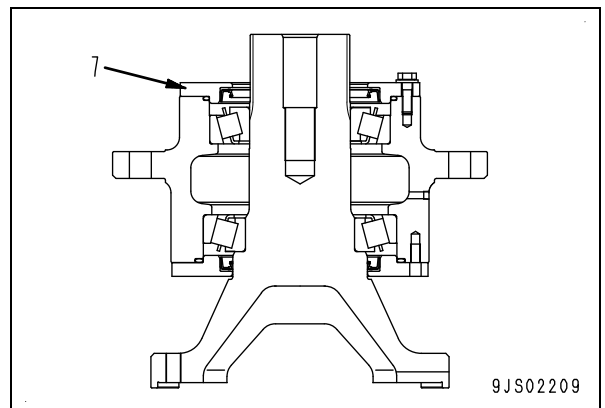
★ Note the thickness and quantity of the shims.



#### 3. Retainer

1) Remove the mounting bolts to remove retainer (7).

2) Remove the O-ring in the joint portion.

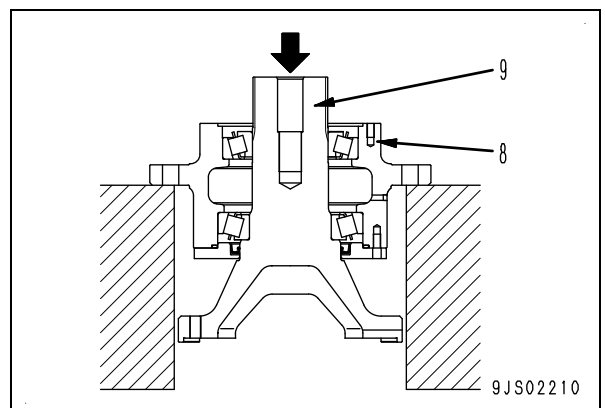


#### 4. Shaft

1) Set the shaft and housing assembly (8) on the press stand.

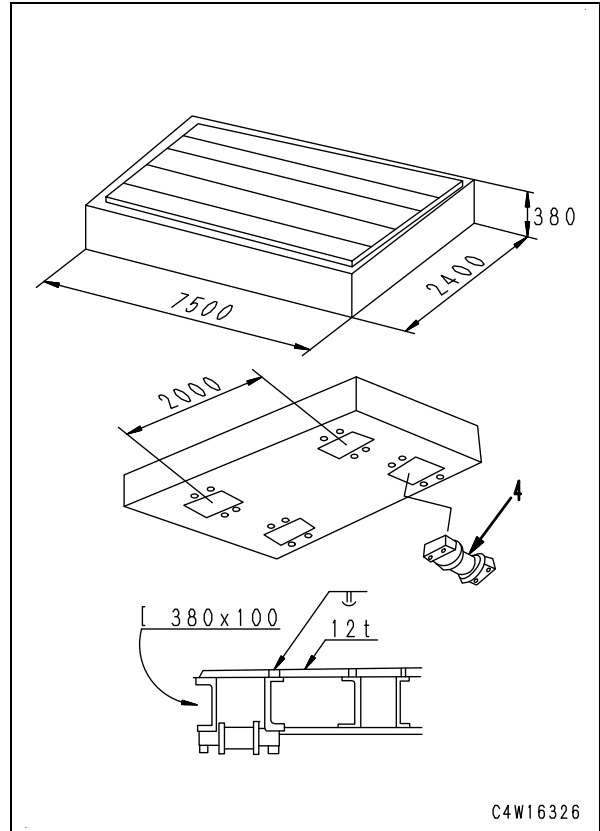
2) Push out shaft (9) using the press.


★ Take care not drop the shaft to the floor directly.



Shape of truck [Example]

- (4): Four track rollers of PC800

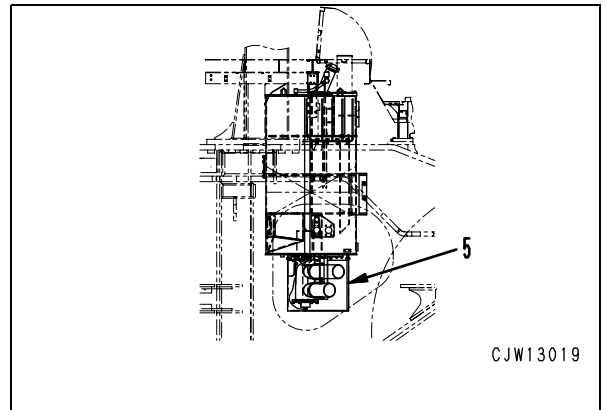


 Ladder:  
75 kg

5. Remove cover (5).

Tool: Impact wrench, socket wrench, webbing sling

Mounting bolt for cover (5): Width across flats 19mm, M12



6. Disconnect hydraulic oil temperature sensor connector HS1 (6).

7. Remove couplings (7) and (8).

Tool: Impact wrench, socket wrench

Coupling (7), (8): Width across flats 22.3mm

8. Sling suction tube (9), disconnect bracket (10) and remove suction tube (9).

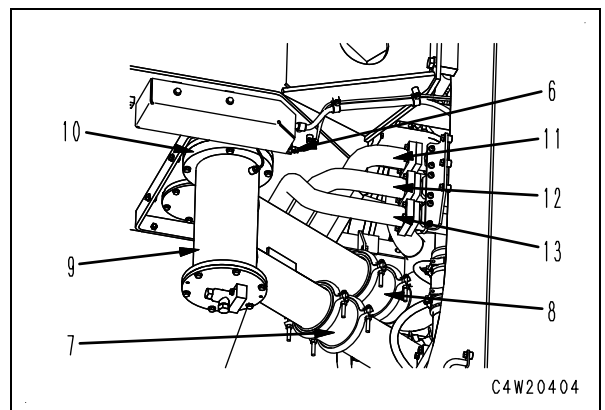
Tool: Impact wrench, socket wrench, webbing sling

Mounting bolt for bracket (10): Width across flats 19mm, M12

9. Disconnect tubes (11), (12), and (13).

Tool: Impact wrench, socket wrench

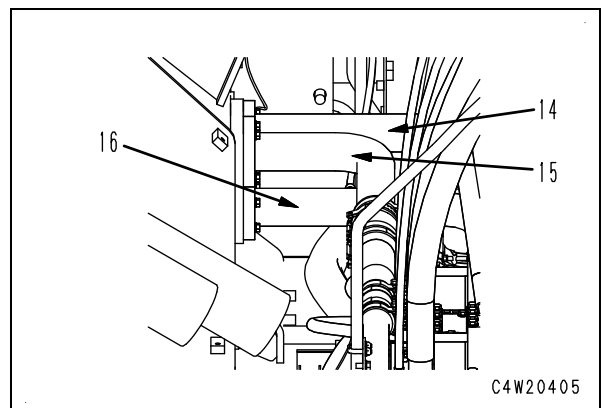
Mounting bolt for tube (11), (12), (13): Width across flats 17mm, M12



10. Disconnect tubes (14), (15), and (16).

Tool: Impact wrench, socket wrench

Mounting bolt for tube (14), (15), (16): Width across flats 17mm, M12



11. Disconnect hoses (17), (18), and (19).

Tool: Open-end wrench, special tool Z2, Z4, Z5

Hose (17): Width across flats 36mm, Nominal 06

Hose (18): Width across flats 32mm, Nominal 05

Hose (19): Width across flats 22mm, Nominal 03

12. Disconnect tube (20) at the intermediate connection.

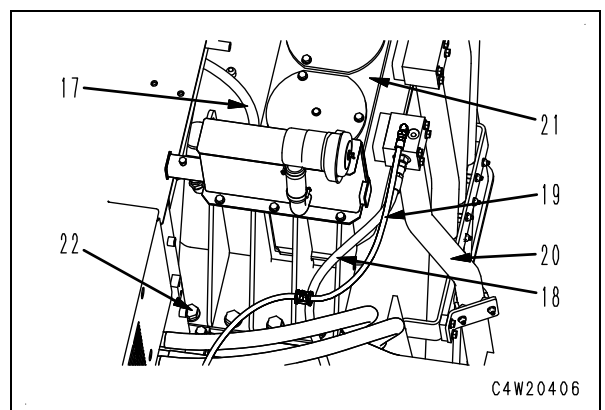
Tool: Impact wrench, socket wrench

Mounting bolt for tube (20): Width across flats 17mm, M12

13. Sling the hydraulic tank and filter case assembly (21), remove mounting bolts (22), and then remove the hydraulic tank and filter case assembly. [\*1]

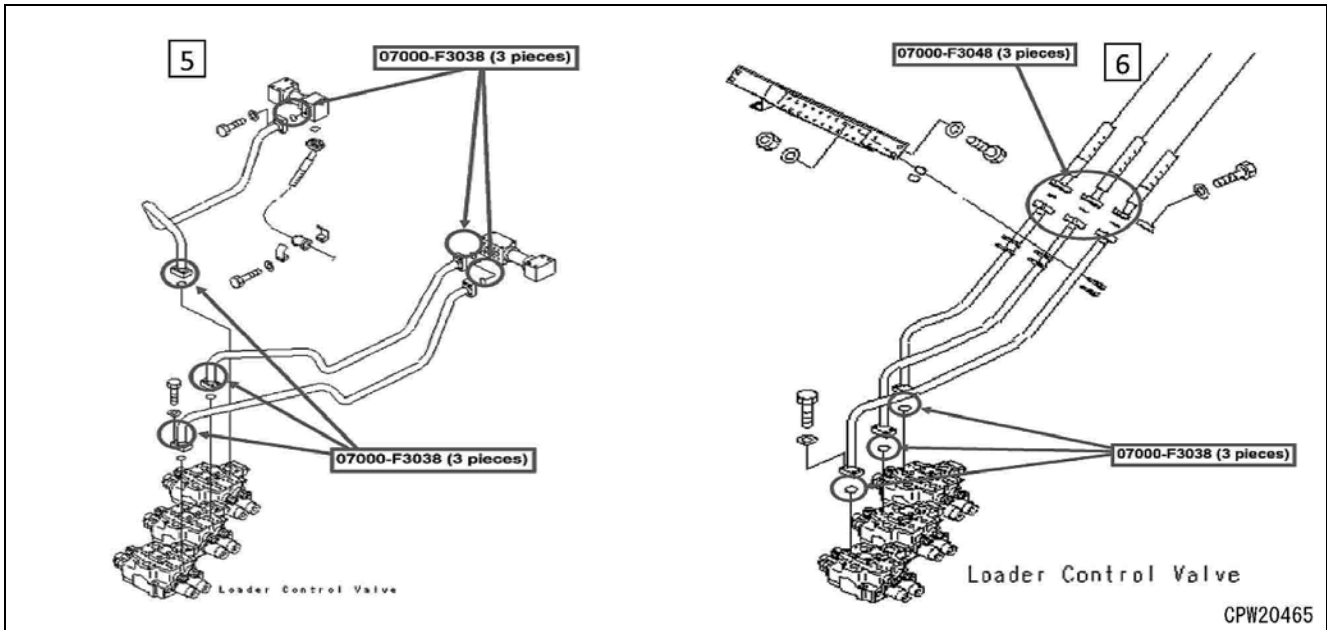
Tool: Impact wrench, socket wrench, webbing sling

Mounting bolt for hydraulic tank and filter case assembly (21): Width across flats 36mm, M24



- ☞ Mounting bolt for tube (4):  
153 to 190 Nm {15.5 to 19.5 kgm}

3) Installation of hoses and tubes (3)

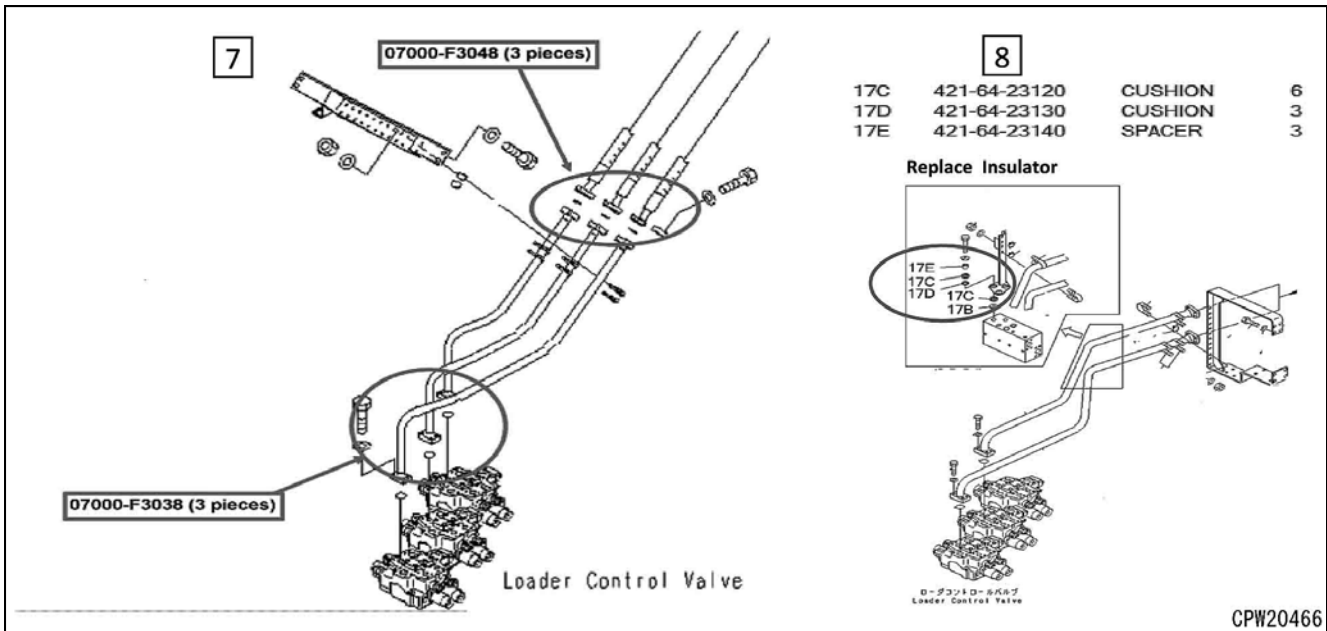


Tool: Torque wrench (socket)

Mounting bolt for tube (5), (6): Width across flats 19mm, M12

- ☞ Mounting bolt for tube (5), (6):  
98 to 123 Nm {10 to 12.5 kgm}

4) Installation of hoses and tubes (4)



Tool: Torque wrench (socket)

Mounting bolt for tube (7): Width across flats 19mm, M12

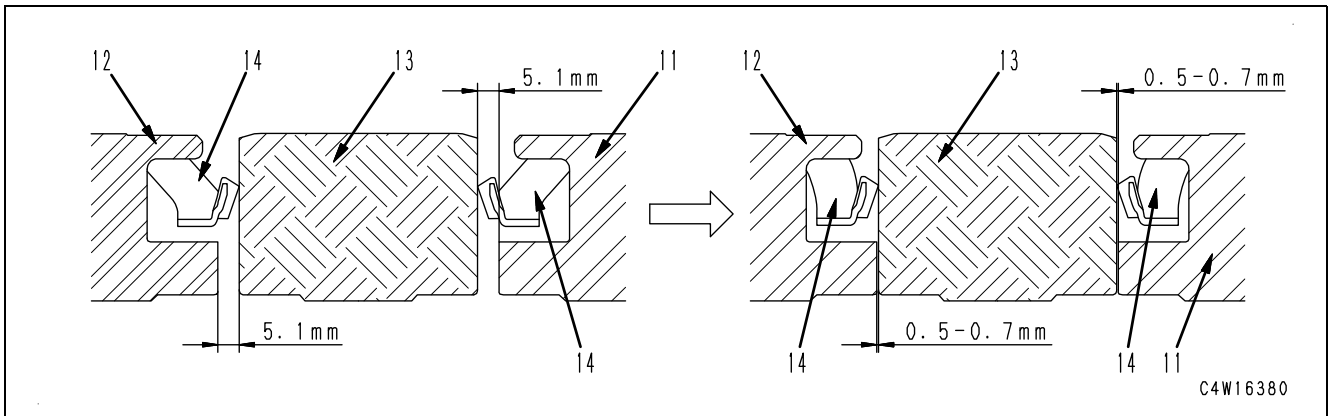
- ☞ Mounting bolt for tube (7):  
98 to 123 Nm {10 to 12.5 kgm}

5) Installation of pilot hose

- 1) Connect the hose.

Tool: Open-end wrench, torque wrench (open-end), special tool Z2


2. In order to prevent leakage of oil, the bushing seal assembly and O-ring are installed to the contact portions between the parts to provide the sealing function.
3. Bushing seal assembly (14) is provided with tension enough to secure the sealing performance.
4. To give bushing seal assembly (14) required tension, shims are installed to each part of work equipment pin, collar A (11) and collar B (12).
5. Work equipment joint parts must be installed so that an appropriate clearance is secured between bushing (13) and collar A (11), and between bushing (13) and collar B (12) to provide bushing seal assembly (14) with enough tension.
  - Clearance without tension: 5.1 mm
  - Appropriate clearance after shim adjustment: 0.5 to 0.7 mm

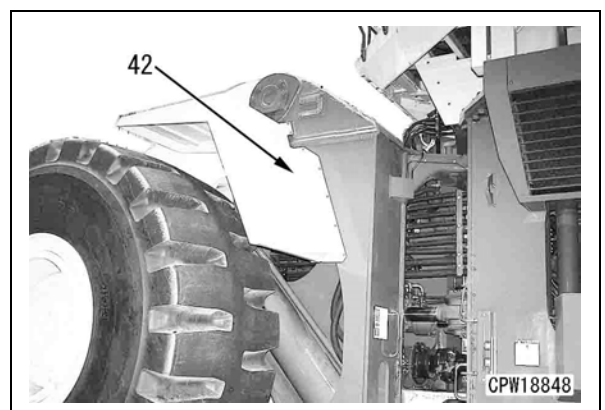


## Removal

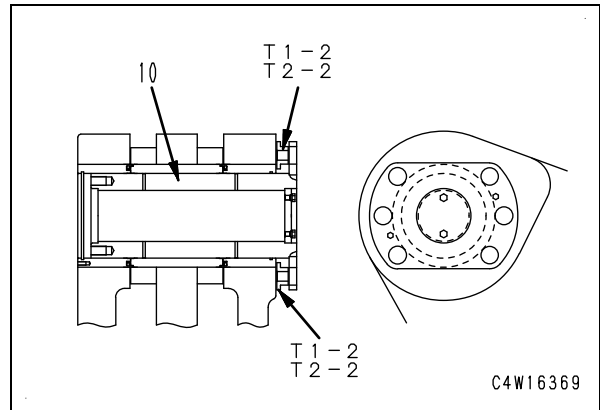
- ⚠ Before performing removal, be sure to implement "2. Preparatory work" and "3. Precautions during work" in "00 Safety notice".
- ⚠ Stop the machine on a level ground, lower the bucket to the ground, apply the parking brake, and then lock the tires with chocks.
- ⚠ Since oil is contained in the mounting pin, prepare a container to receive the oil and drain the oil from the oil drain plug on the flange side of the mounting pin.

### [If tires are not removed]

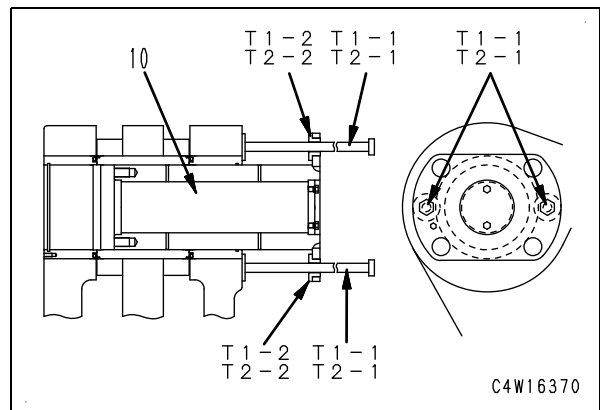
1. Sling front fender (42) and remove it.  
 Tool: Impact wrench, socket wrench  
 Mounting bolt for front fender (42): Width across flats 19mm, M12  
 Mounting bolt for front fender (42): Width across flats 24mm, M16  
 Front fender:  
 140 kg



- 2) Through clearance (a) made in Step 1), install the flanged nut of tool T1 or T2 (T1-2 or T2-2 ) to the flange hole of pin (10).

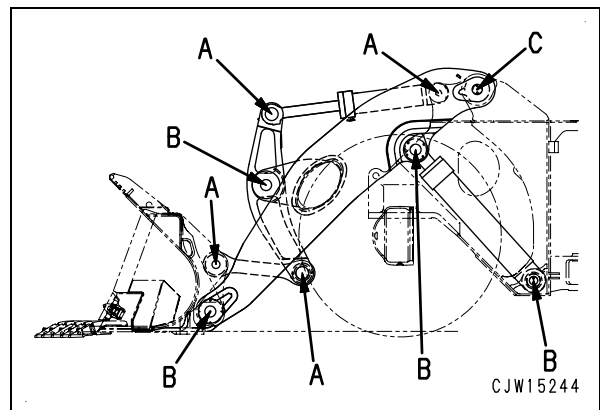


- 3) Screw in the forcing bolt of tool T1 or T2 (T1-1 or T2-1) into the flanged nut (T1-2 or T2-2) installed in Step 2) to remove pin (10).



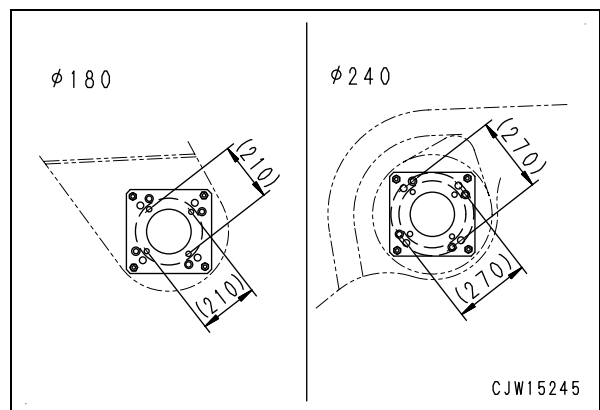
2. How to use collar removal tool (T4 or T5)

- ★ If the collar is hard to remove, use collar removal tool T4 or T5 to remove it.
- ★ Select plate T4 or T5 depending on the pin diameter.
  - Tool T4: For pin of  $\phi 180$  mm (A)
  - : For pin of  $\phi 240$  mm (B)
  - Tool T5: For pin of  $\phi 280$  mm (C)




1) Tool T4: For pins of  $\phi 180$  and  $240$  mm

- Install the plate of T4. Since the plate can be used for both pins of  $\phi 180$  and  $240$  mm, use the bolt hole appropriate for the pin.

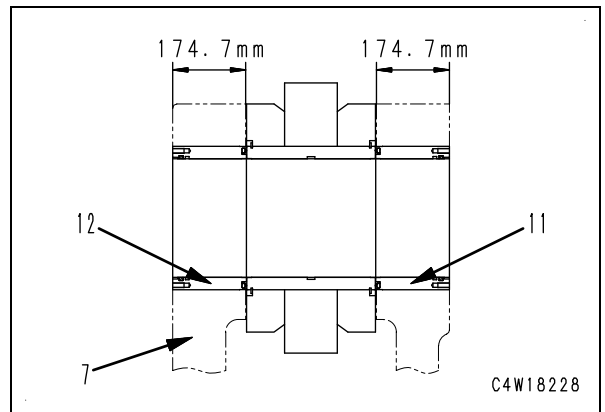


- 5) Remove collar A (11) and collar B (12) from front frame (7).

Tool: Webbing sling, special tool T5

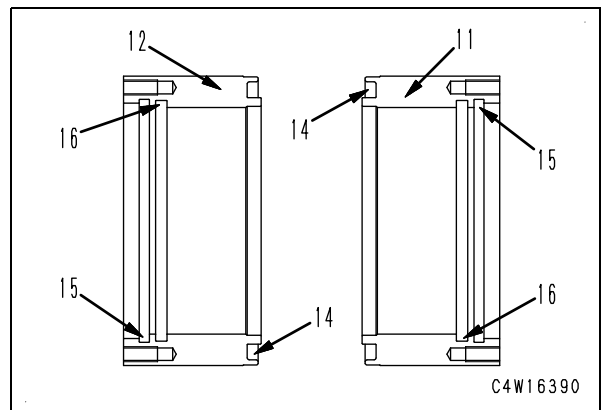
 Collars A and B (single unit):  
40 kg

- Length of collar A (11) and collar B (12): 174.7 mm
- ★ If collars A and B are hard to remove, use special tool T5 to remove them.
- ★ For the collars A and B removal procedure using special tool T5, see "2. How to use collar removal tool" in the "How to use special tools".




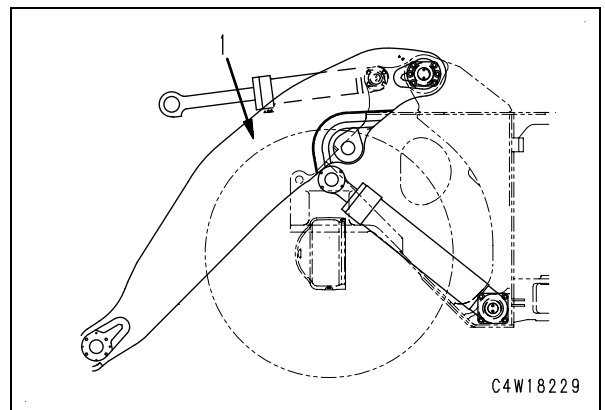
- 6) Remove bushing seal assembly (14), dust seal (15) and collar O-ring (16) from collar A (11) and collar B (12).

- 7) Taking the same procedure in Steps 3) to 6), remove the other pin connecting the lift arm and front frame.



- 8) Remove lift arm (1)

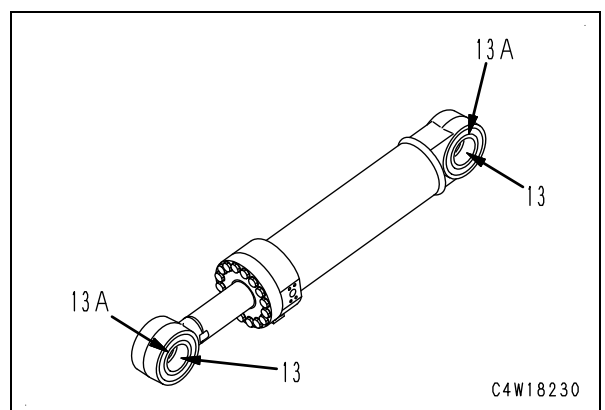
 Lift arm:  
17,850 kg



9. Removal of the bushing press fitted to the work equipment and cylinders

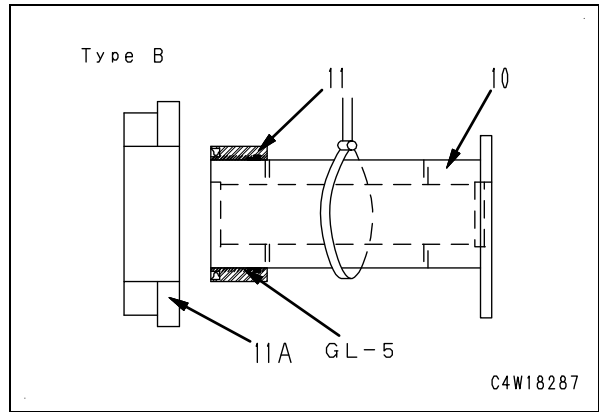
- 1) When replacing bushing (13) press fitted to the work equipment and cylinder, gas cut bushing (13) at four places to remove it.

- ★ Take care not to melt bushing boss (13A) in gas cutting.



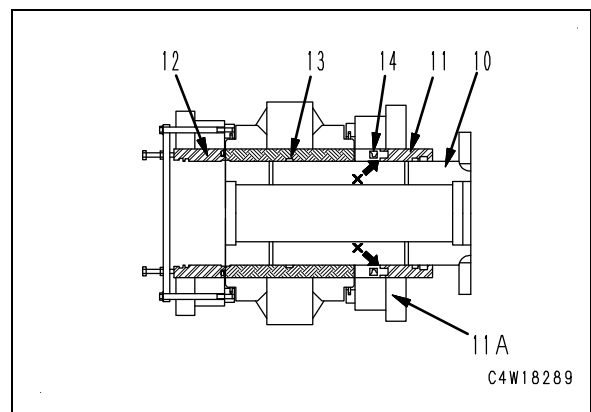
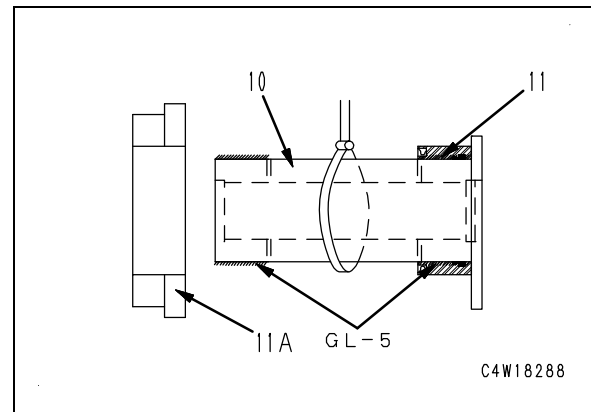
Type B: Installing mounting pin (10) equipped with collar A (11) at its tip to collar boss A (11A) after removing collar A (11) once from collar boss A (11A).

- ★ These are the two installation methods. Select a suitable one depending on the situation.



[Prohibited action: Ban on unascertainable work]

- Other than types A and B above, there is another mounting pin (10) insertion approach. In which, collar A (11) is inserted up to the flange side of mounting pin (10) for the center alignment with collar B (12) and bushing (13). Then after mounting pin (10) is inserted to bushing (13), collar A (11) is inserted to collar boss A (11A). In this case, however, confirmation of detachment of bushing seal assembly (14) becomes unavailable when inserting collar A (11) to collar boss A (11A). Therefore, this approach must not be employed.



- ★ The following describes Type A mounting pin installation method.

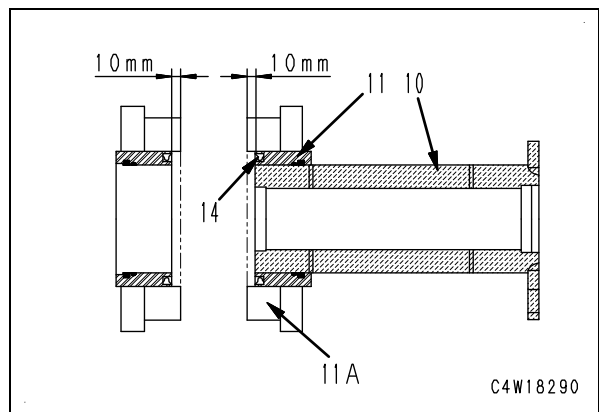
1] Install mounting pin (10) to collar A (11), which has been installed to collar boss A (11A).

- ★ When the collar end face shim is selected in step 7-11), install it to the mounting pin beforehand.

2] When the tip of mounting pin (10) came near to the inner end face of collar A (11), stop the installation once.

- ★ At this point, collar A (11) may be pushed to move by mounting pin (10) and, as a result, bushing seal (14) installed to collar A (11) can jump out of the inner end face of collar boss A (11A) on collar A (11) side. To prevent such jumping, collar A (11) must be positioned 10 mm out of the inner end face of collar boss A (11A).

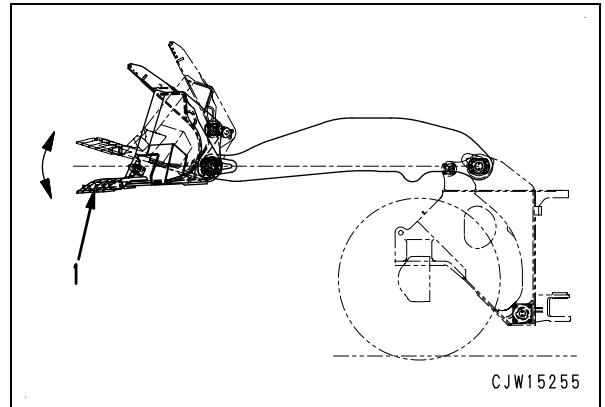
- ★ When only a single crane is used, stop slinging of the mounting pin with the crane and remove the belt beforehand.



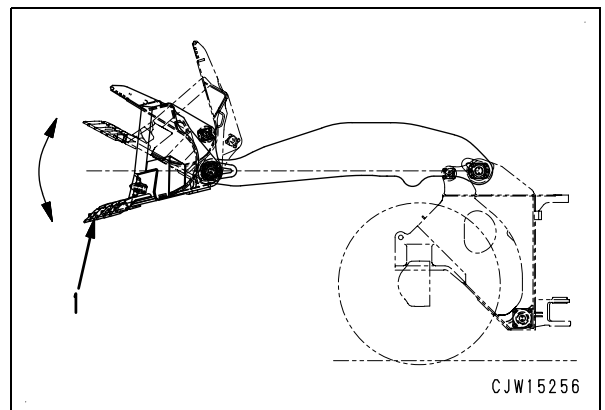
## Procedure for running in bucket pin

- When disassemble or assemble the work equipment, or removing or installing it, perform running-in operation of the bucket pin and lift arm pin.
  - ★ For running-in operation of lift arm pin, see "Procedure for running in lift arm pin".
  - ★ Air must be bled from each cylinder before installing the work equipment assembly.

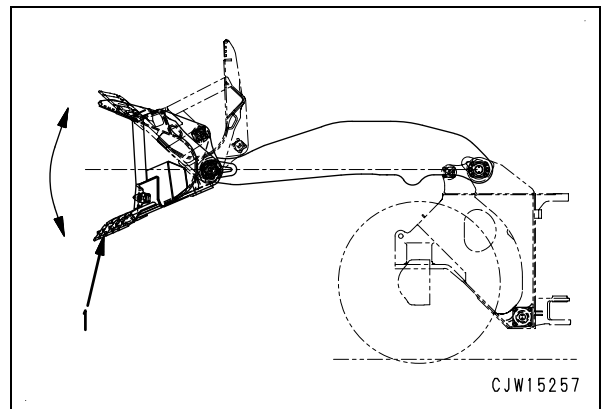
- Run the engine at low idle, and set cutting edge (1) of the bucket horizontal. Tilt the bucket approx. 10 degrees up, return it to horizontal, tilt it approx. 10 degrees down, and return it to horizontal. Repeat this cycle five times.



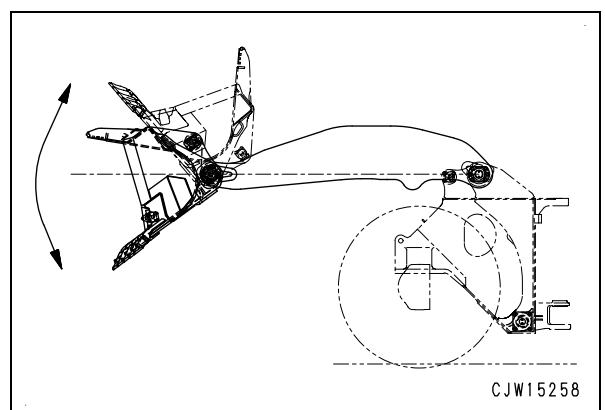
- Run the engine at low idle, and set cutting edge (1) of the bucket horizontal. Tilt the bucket approx. 10 degrees up, return it to horizontal, tilt it approx. 10 degrees down, and return it to horizontal. Repeat this cycle five times.



- Run the engine at low idle, and set cutting edge (1) of the bucket horizontal. Tilt the bucket approx. 35 degrees up (approx 10 degrees before the tilt back stroke end), return it to horizontal, tilt it approx. 35 degrees down (approx 10 degrees before the dump stroke end), and return it to horizontal. Repeat this cycle five times.



- Run the engine at low idle, and tilt the bucket from the tilt back stroke end to dump stroke end. Repeat this cycle five times.



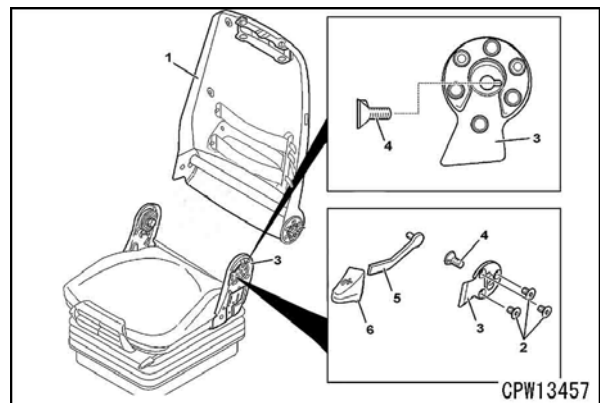
- ★ Put bearing (B/8) into back support (B/4).
  - 2) While gently pushing backrest (1) to the left, install it upward.
    - ★ Move the recliner until cylindrical protruding portion (C/2) fits into the positioning hole in backrest support (C/3) on the left side.
    - ★ Engage spring (A/9) on the stopper welded to the backrest (A/1).
  - 3) Install washer (10) and bolt (11).
  - 4) Install washers (6) and (7) and secure them with nuts (5).
    - 🔩 Mounting nut:  
25 Nm {2.6 kgm}
  - 5) Assemble the recliner. For details, see "6. Disassembly and assembly of recliner".
  - 6) Install the armrests. For details, see "4. Removal and installation of armrests". (For a machine equipped with armrests)
  - 7) Install the backrest cushion. For details, see "2. Removal and installation of seat cushion and backrest cushion".
  - 8) Install the document box. For details, see "1. Removal and installation of document box".
6. Disassembly and assembly of recliner

### Disassembly

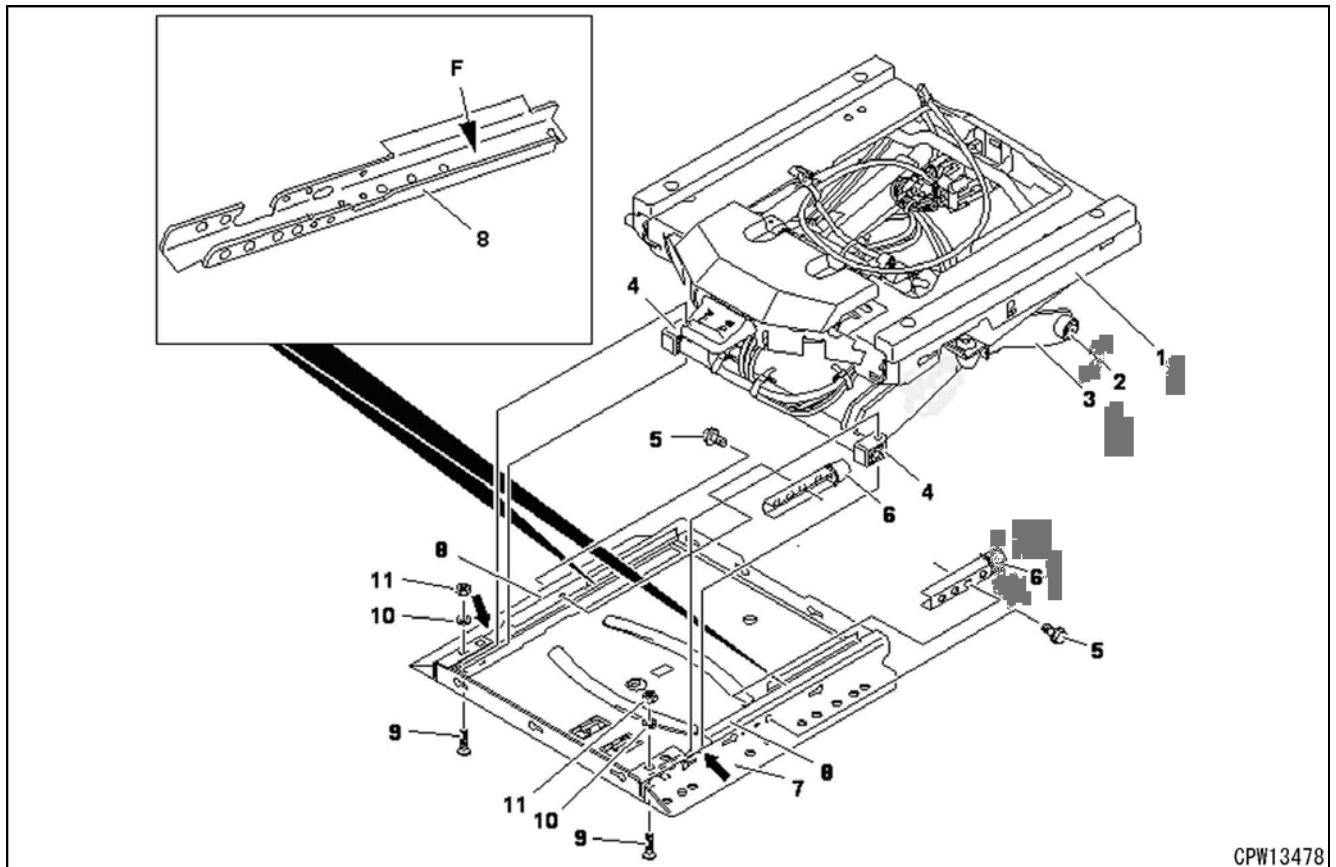
- 1) Remove the document box. For details, see "1. Removal and installation of document box".
- 2) Remove the backrest cushion. For details, see "2. Removal and installation of seat cushion and backrest cushion".
- 3) Remove the armrests. For details, see "4. Removal and installation of armrests". (For a machine equipped with armrests)
- 4) Tilt backrest (1) forward.
- 5) Remove screw (2), adapter plate (3), and screw (4) in that order.
- 6) Remove lever (5) and handle (6).

### Assembly

- 1) Tilt backrest (1) forward.
- 2) Install handle (6) and lever (5).
- 3) Install screw (4), adapter plate (3), and screw (2) in that order.
  - ★ Install screw (4) so that it fits to the notch in adapter plate (3).
  - 🔩 Mounting bolt:  
12 Nm {1.2 kgm}
- 4) Install the armrests. For details, see "4. Removal and installation of armrests". (For a machine equipped with armrests)
- 5) Install the backrest cushion. For details, see "2. Removal and installation of seat cushion and backrest cushion".
- 6) Install the document box. For details, see "1. Removal and installation of document box".



## 14. Disassembly and assembly of suspension lower part



CPW13478

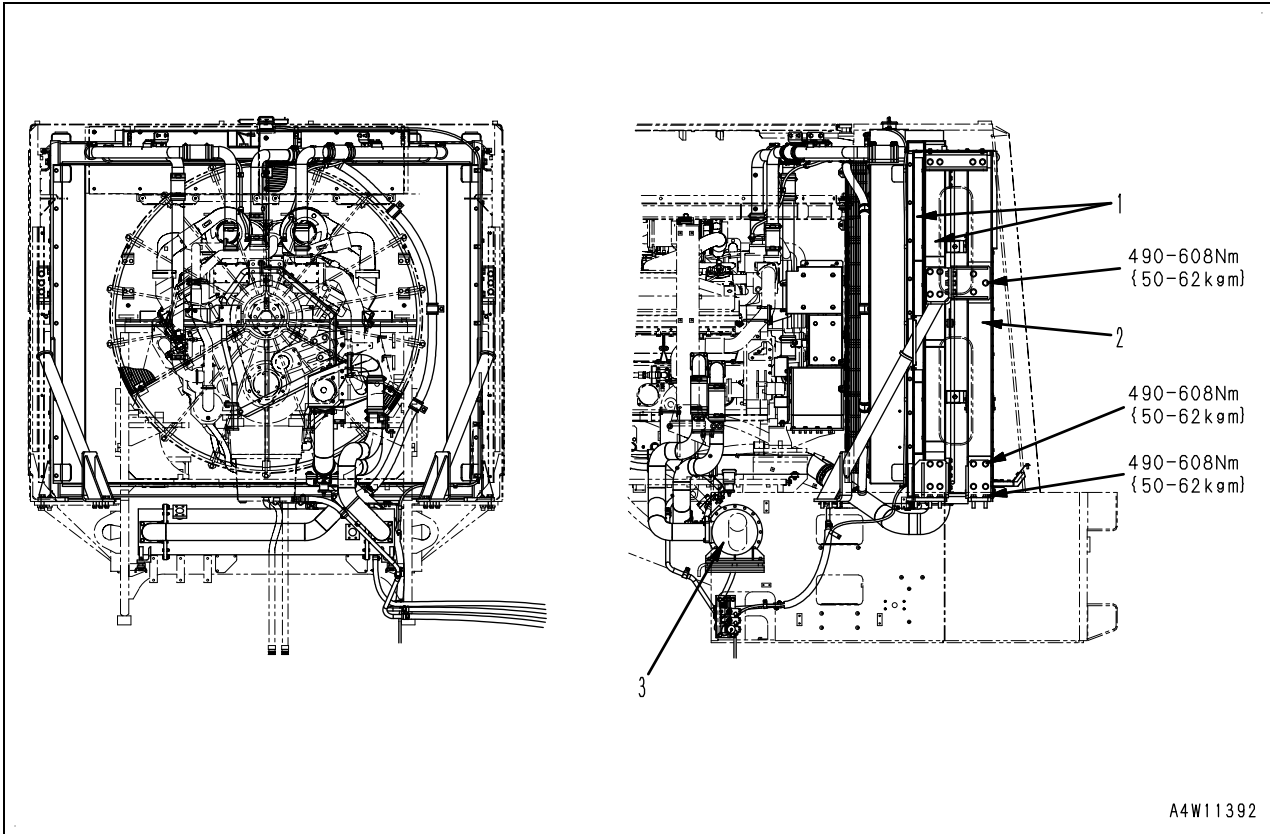
**Disassembly**

- 1) Remove the upper seat. For details, see "I Upper seat".
- 2) Remove the upper cover. For details, see "1. Removal and installation of upper cover".
- 3) Remove the boot. For details, see "3. Removal and installation of boot".
- 4) Remove the compressor. For details, see "6. Removal and installation of compressor".
  - ★ It is not necessary to remove the cables and hoses.
  - ★ Secure the swing arm with adhesive tape to protect the compressor from impact.
- 5) Remove the belt from lower part (7). (See "7. Removal and installation of level controller".)
- 6) Remove the countersunk screw from the air spring. (See "10. Removal and installation of air spring".)
- 7) Remove the cable ties from the vehicle power cable in lower part (7). (See "12. Removal and installation of harness".)
- 8) Remove two each nuts (11), washers (10), and countersunk screws (9).
- 9) Remove two bolts (5) and two U-profiles (6) from guide rail (8).
- 10) Push suspension upper part (1) backward together with swing arm (3) until bearing (4) is removed from the opening (indicated by an arrow) in guide rail (8).
- 11) Raise upper part (1) and swing arm (3) to remove roller (2) from guide rail (8).

**Assembly**

- 1) Raise upper part (1) and swing arm (3) to install roller (2) to guide rail (8).
  - ★ Apply non-acidic multi-purpose grease to the sides (F) of guide rail (8) of roller (2).
- 2) Install bolts (5) and U-profiles (6) to guide rail (8).
- 3) Install countersunk screws (9), washers (10) and nuts (11).
- 4) Secure the vehicle power cable in lower part (7) with cable ties. (See "12. Removal and installation of harness".)
- 5) Install the countersunk screw to the air spring. (See "10. Removal and installation of air spring".)
- 6) Install the belt to lower part (7). (See "7. Removal and installation of level controller".)
- 7) Install the compressor. For details, see "6. Removal and installation of compressor".

## Cooling system



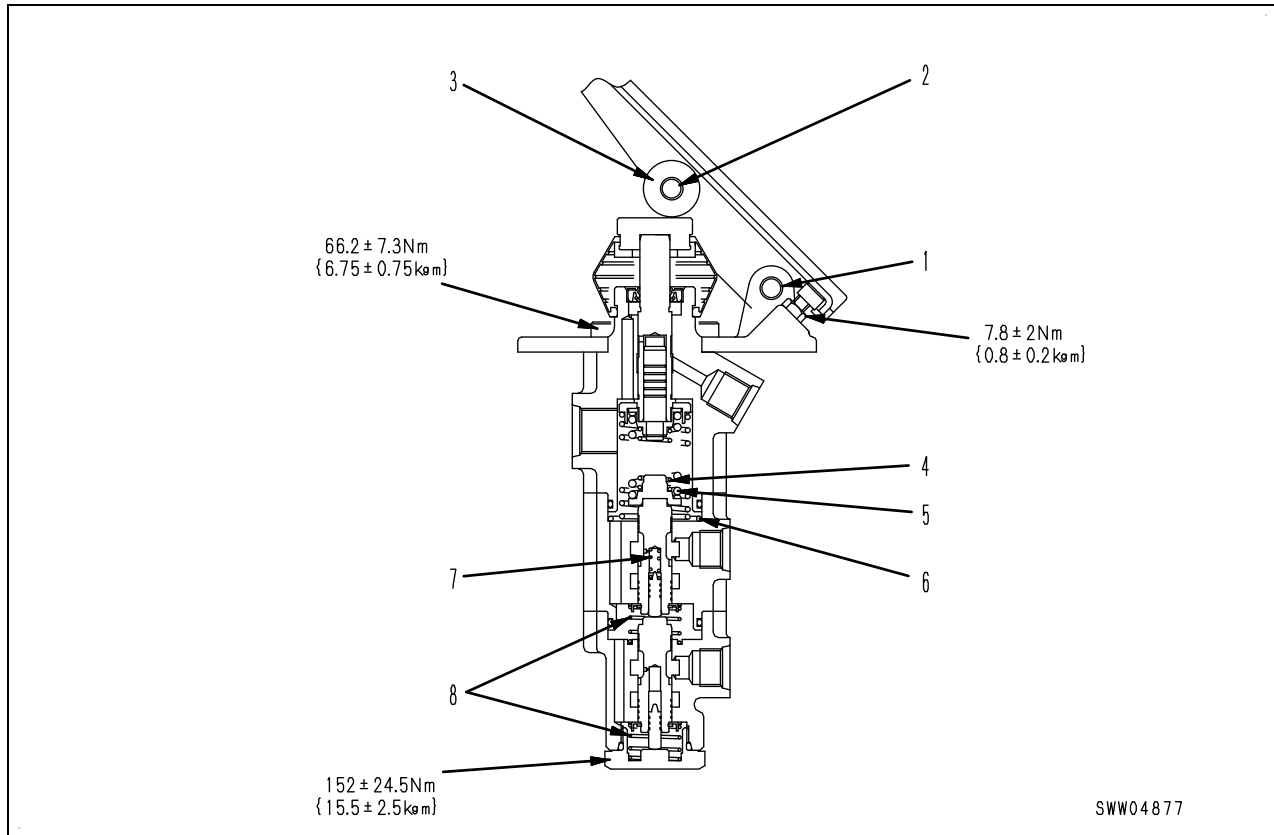
No.	Item	Unit	Criteria	Remarks	
-	Average wind speed	Engine speed: 1,900 rpm	m/s	15 or above	
-	Load factor		%	91	
-	Ambient temperature (conversion)		°C	50	
1	Radiator inlet/outlet water temperature difference		°C	6.3 to 8	See Inspection and Adjustment - "Radiator Performance Check".
2	Hydraulic oil cooler inlet/outlet oil temperature difference		°C	11 to 13	See Inspection and Adjustment - "Hydraulic Oil Cooler Performance Check (Check by Temperature Difference)".
3	Torque converter oil cooler inlet/outlet oil temperature difference		°C	11 to 13	See Inspection and Adjustment - "Torque Converter Oil Cooler Performance Check".
-	Hydraulic tank oil temperature		°C	104.5	

Unit: mm

No.	Item	Criteria				Remedy	
		Standard dimension	Tolerance		Repair limit		
1	Outside diameter of front coupling oil seal contacting surface	φ140	+0.052 +0.027		139.8	Replace	
			+0.052 +0.027				
2	Outside diameter of rear coupling oil seal contacting surface	φ140	+0.052 +0.027		139.8		
3	Backlash between input gear and idler gear	0.25 to 0.65					
4	Backlash between idler gear and output gear	0.25 to 0.65					
5	Interference of input gear and bearing	Standard dimension φ140	Tolerance		Standard interference 0.060 to 0.103		Allowable interference 0.060 to 0.103
			Shaft	Hole			
6	Interference of input gear bearing and transfer case	φ250	0	-0.014	-0.016 to 0.060		-0.016 to 0.060
			+0.060	-0.060			
7	Interference of idler gear and bearing	φ140	+0.078	0	0.060 to 0.103		0.060 to 0.103
			+0.060	-0.025			
8	Interference of idler gear bearing and transfer case	φ250	0	-0.014	-0.016 to 0.060		-0.016 to 0.060
			-0.030	-0.060			
9	Interference of output shaft and bearing	φ120	+0.045	0	0.023 to 0.065	0.023 to 0.065	
			+0.023	-0.020			
10	Interference of front output bearing and transfer case	φ215	0	-0.014	-0.016 to 0.060	-0.016 to 0.060	
			-0.030	-0.060			
11	Interference of spacer and bearing	φ169	0	+0.025	-0.045 to 0	-0.045 to 0	
			-0.02	0			
12	Interference of rear output bearing and parking brake cover	φ250	0	-0.014	-0.016 to 0.060	-0.016 to 0.060	
			-0.030	-0.060			

## Brake system Brake valve

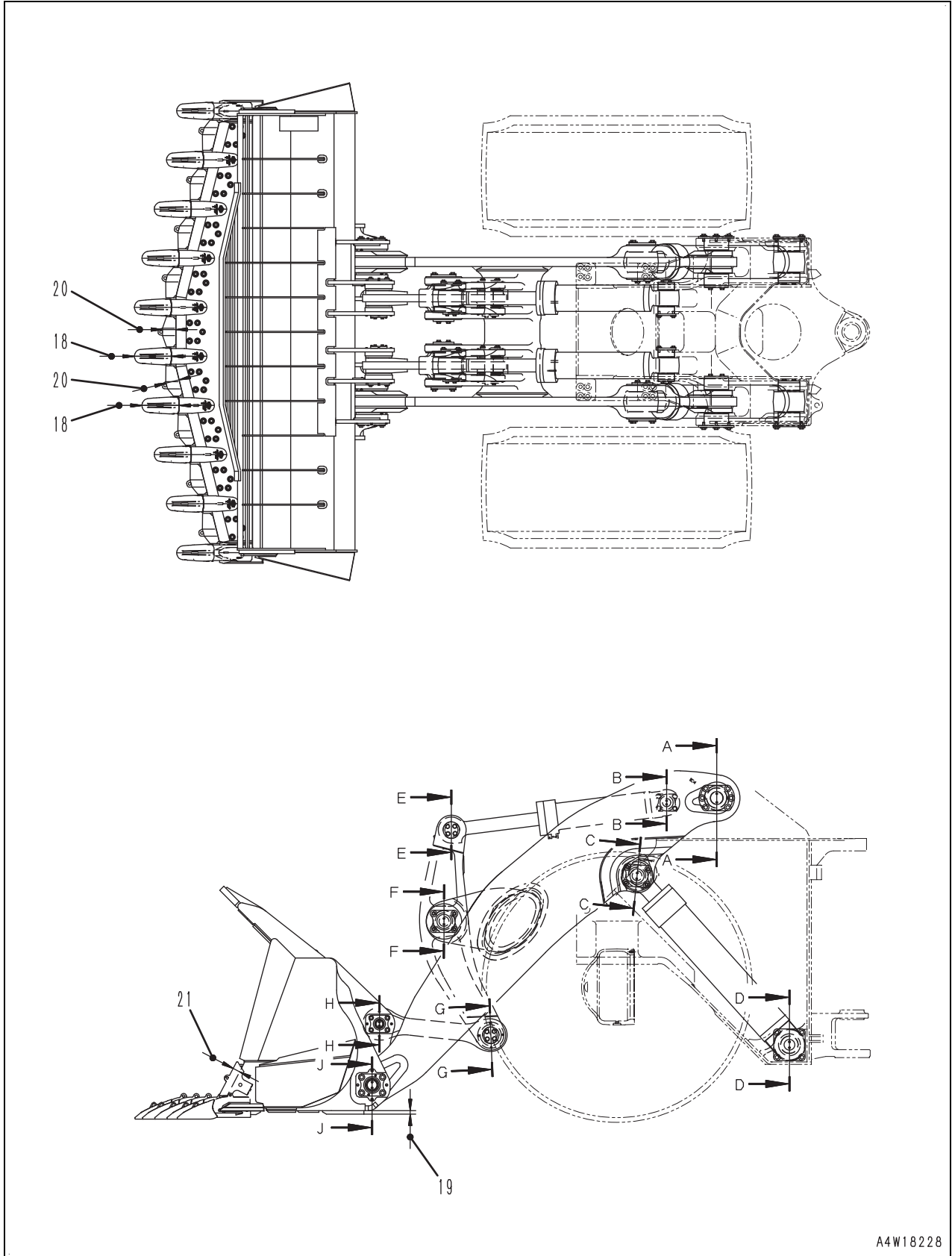
(R.H.)



Unit: mm

No.	Item	Criteria				Remedy
		Standard dimension	Tolerance		Standard clearance	
1	Clearance between pedal mounting hole and bracket hole		10	Shaft		Hole
		-0.025		+0.1		
2	Clearance between roller and pin	10	-0.025	+0.1	0.175 to 0.025	0.25
			-0.075	0		
3	Outside diameter of roller	Standard dimension	Tolerance		Repair limit	
		30	0	-0.5	29.2	
4	Control spring	Standard dimension			Repair limit	
		Free length	Installation length	Installation load	Free length	Installation load
		34	33.5	4.6 N {0.47 kg}	33	
5	Control spring	46.3	46.0	11.8 N {1.2 kg}	45.3	
6	Return spring	86.2	58	60.8 N {6.2 kg}	78	
7	Spring	17	16.5	17.7 N {1.8 kg}	16.2	
8	Return spring	31.5	19.5	16.7 N {1.7 kg}	28	

# Work equipment Work equipment linkage



A4W18228



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