SEN06792-06

Shop Manual

WHEEL LOADER **WA320-8E0**

SERIAL NUMBERS 86025 and up

KOMATSU

Precautions for Slinging Work and When You Make Signals

- Only one appointed worker must make signals and co-workers must communicate with each other frequently. The appointed signaler must make specified signals clearly at a place where he is well seen from the operator's seat and where he can see the working condition easily. The signaler must always stand in front of the load and guide the operator safely.

  ⚠ Do not do the work while the lifted load is in the range where it possibly falls. It is not allowed to go in the range where the lifted load possibly falls.

  ⚠ Do not move a load over a person.

  ⚠ Never step on the load.

  ⚠ Do not prevent the load from swinging or falling down by holding it simply with the hands.

  ⚠ The sling workers and assistant workers other than the guide must move to a place where they are not caught between the load and materials or equipment on the ground or hit by the load even if the crane starts abruptly.

- When you lift or fix the machine, see “Operation and Maintenance Manual” or “Field Assembly Instruction”.

  ⚠ Do not lift or fix the machine by the positions where the name plate is not attached.

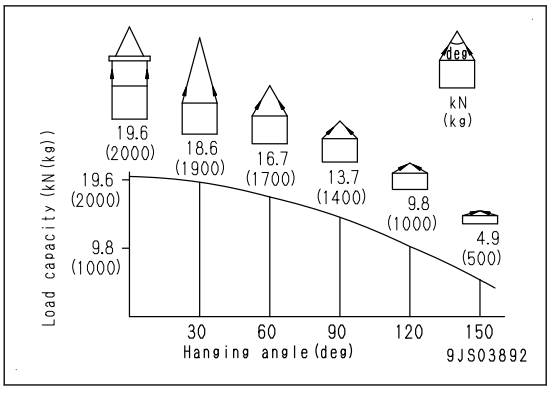
- When you lift the machine for the disassembly and assembly, follow the instructions on the Disassembly and Assembly.
- Check the slings before starting sling work.
- Keep putting on gloves during sling work. (Put on leather gloves, if available.)
- Measure the weight of the load by the eye and check its center of gravity.
- Use proper sling corresponding to the weight of the load and method of slinging. If too thick wire ropes are used to sling a light load, the load may slip and fall.
- Do not sling a load with 1 wire rope alone. If it is slung so, it may rotate and may slip out of the rope. Install 2 or more wire ropes symmetrically.

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

- Hanging angle must be 60 ° or smaller as a rule.
- When slinging a heavy load (20kg or heavier), the hanging angle of the rope must be narrower than that of the hook.

  REMARK

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



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

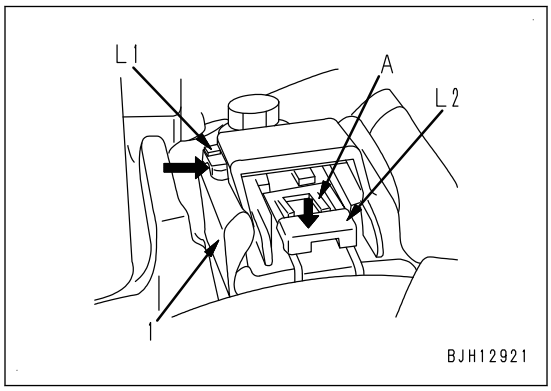
How to Disconnect and Connect Slide Lock Type Connector

How to Disconnect Slide Lock Type Connector (FRAMATOME-3, FRAMATOME-2)

1. Slide lock (L1) to the right.
2. While pressing lock (L2), pull out connector (1) toward you.

REMARK

If portion A does not float when lock (L2) is pressed, and if connector (1) does not come out when it is pulled toward you, push up portion A with a small flat-head screwdriver while pressing lock (L2), and then pull out connector (1) toward you.

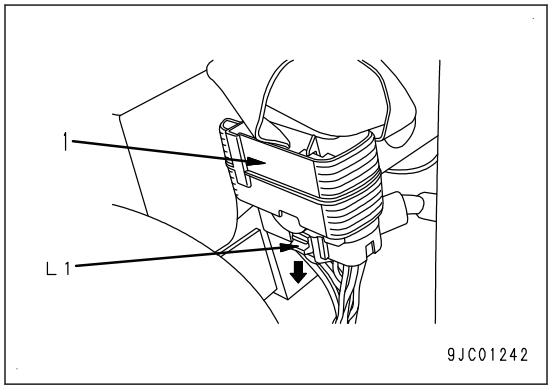


How to Connect Slide Lock Type Connector (FRAMATOME-3, FRAMATOME-2)

Insert it straight until it clicks.

How to Disconnect Slide Lock Type Connector (FRAMATOME-24)

1. Slide down lock (red) (L1).



	Item		Unit	WA320-8E0
D	Overall width		mm	2590
E	Minimum ground clearance		mm	425
F	Bucket width North America specification EU and Turkey Specification		mm	 2740 2750
G	Dumping clearance (*3)	Bucket tip/ BOC tip North America specification EU and Turkey Specification	mm	 2970/2880 2905/2835
H	Dumping reach (*3)	Bucket tip/ BOC tip North America specification EU and Turkey Specification	mm	 960/1000 985/1020
I	Forward tilt angle of the bucket (maximum height)		degree	47
	Minimum turning radius	Bucket tip/ BOC tip North America specification EU and Turkey Specification	mm	 6275/6310 6300/6330
		Center of outside tire	mm	5380
	Allowable towing load		kN {kg}	112 {11415}
	Travel speed	1st (Forward/Reverse)	km/h	1.0 to 13.0/1.0 to 13.0
		2nd (Forward/Reverse)		13.0/13.0
		3rd (Forward/Reverse)		18.7/18.7
		4th (Forward/Reverse)		38.0/38.0

*1: Indicates the value of the bare engine (without cooling fan).

*2: Indicates the value at the minimum cooling fan speed.

REMARK

- The engine rated horsepower is indicated in the net value and gross value. Gross denotes the rated horsepower measured on the basic engine unit. Net denotes the value of an engine which is measured under the condition almost the same as that of the time when it would be installed on a machine.
  - The rated horsepower (net) at the maximum cooling fan speed is the following value.
    112 kW/151 HP{2100 min^{-1}/2100 rpm}

*3: Indicates the value when the forward tilt angle of the bucket is 45 °.

BOC

Abbreviation for Bolt On Cutting edge

Inducement Strategy for Abnormality Recurrence

- The Urea SCR system continuously monitors its operation conditions and stores information on inappropriate operations including malfunctions.
- The stored information is utilized to monitor recurrences of abnormalities, “Abnormality Counter”. “Abnormality Counter” is required by the authorities. The abnormality counting spans 40 hours and it monitors the abnormalities that trigger Inducement other than the amount of DEF in the tank.
- If another abnormality/abnormalities is detected within 40 hours after the previous abnormalities were corrected, regardless of the level of the previous Inducement and whether the new abnormality/abnormalities is the same as the previous ones or not, it is judged as a recurrence.
- If a recurrence occurs, the Inducement strategy will be activated.
- Inducement in the recurrence resumes counting time at the time when the previous abnormalities were corrected if the previous Inducement is in “Warning”, “Continuous Warning” or “Low-Level Inducement”. The alerts resume the previous Inducement.
- If the time the previous abnormalities were corrected is in “Severe Inducement”, Inducement in the recurrence starts from “Low-Level Inducement” but the remaining time to “Severe Inducement” is 1 hour or 2 hours depending on abnormalities. If the 1 hour or 2 hours are used up without correcting the new abnormalities, Inducement will advance to “Severe Inducement” and engine power will be derated heavily.

EGR Valve

EGR

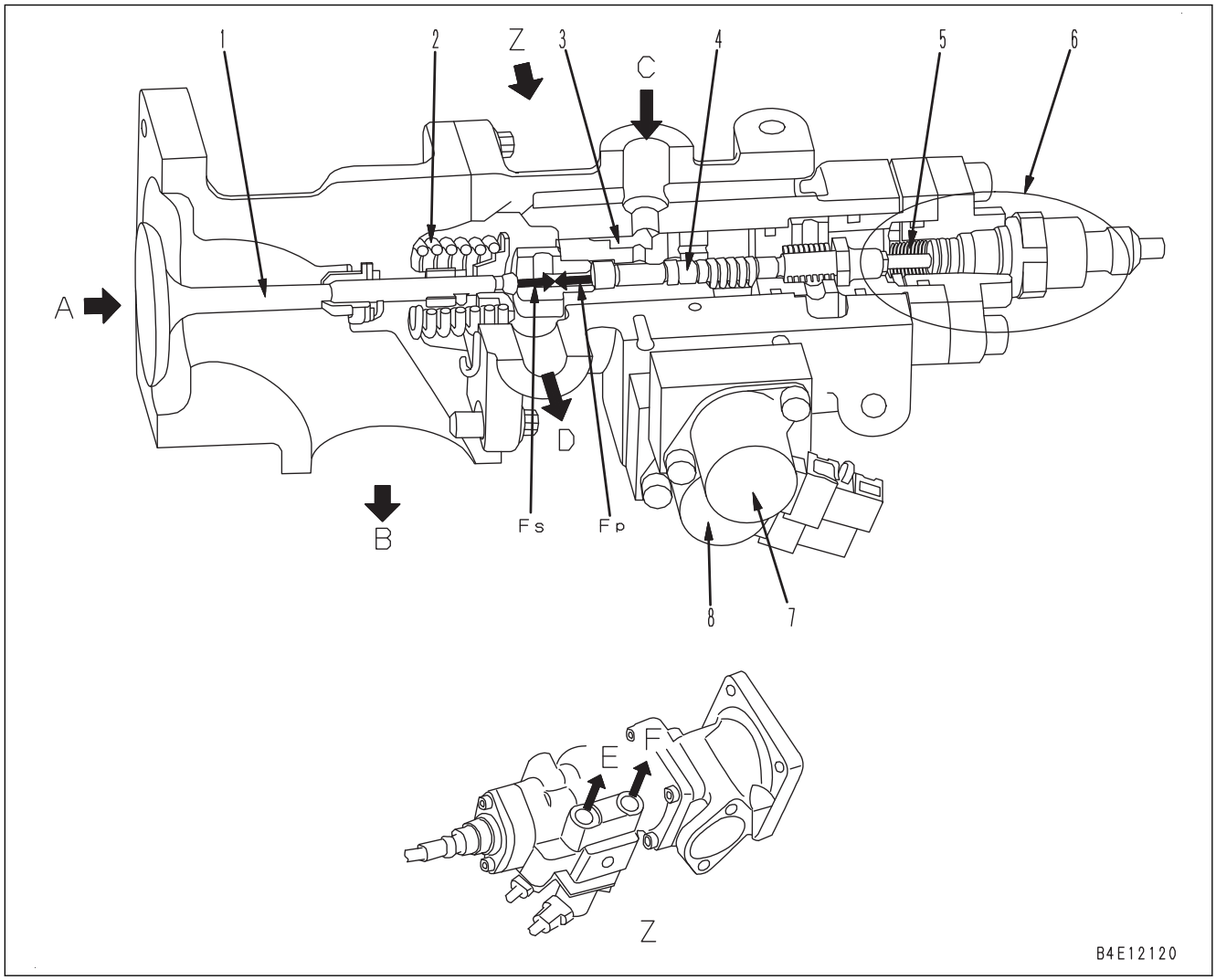
Abbreviation for Exhaust Gas Recirculation

Structure of EGR Valve

REMARK

The shape is subject to machine models.

Sectional View



A: EGR gas inlet (from EGR cooler)
B: EGR gas outlet (to intake manifold)
C: Servo drive oil inlet
1: Valve
2: Spring
3: Power piston
4: Spool
D: Servo drive oil outlet
E: VGT control hydraulic outlet
F: VGT drive pressure outlet
5: Spring
6: EGR valve lift sensor
7: EPC valve (for EGR)
8: EPC valve (for VGT)

Structure

- EGR valve consists of the EGR gas flow control mechanism and EPC valve.
- There are 2 EPC valves, one for the EGR valve and the other for VGT.

Machine Monitor

Displays the machine condition to the operator.

Monitor Controller

Obtains the condition data of various sections of the machine monitored with sensors and switches and processes them. Communicates the network information with each controller.

Switch Panel

Accepts operations of the operator.

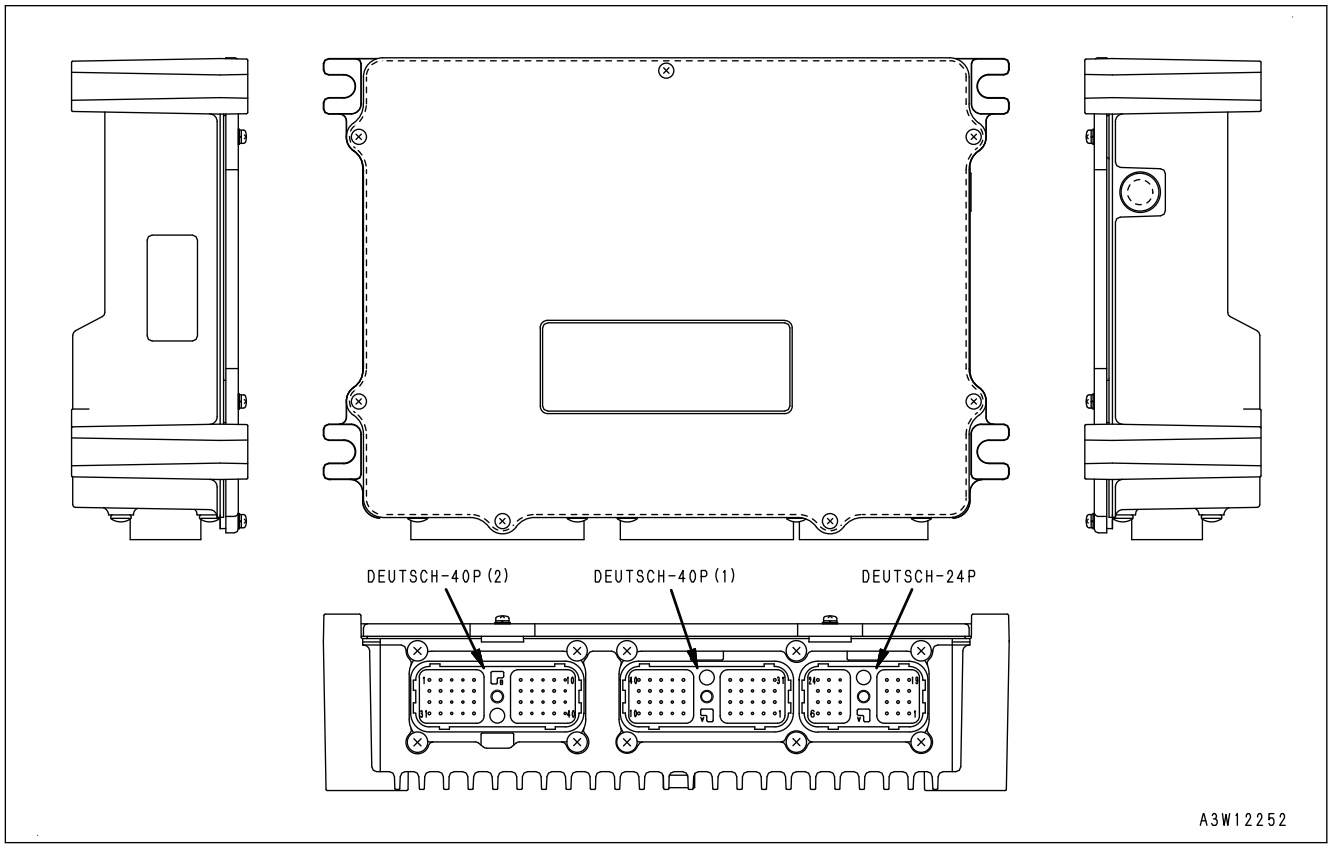
HST Controller

HST

Abbreviation for Hydro Static Transmission

Structure of HST Controller

General View



Function of HST Controller

Real Time Monitoring Function

The conditions of the input and output signals of the controller can be checked with monitoring function of the machine monitor.

REMARK

For the monitoring procedure, see Testing and Adjusting, “Set and Operate Machine Monitor”.

Self-Diagnosis Function

- HST controller constantly monitors the input and output conditions and performs self-diagnosis of the system.
- If any abnormality is detected by self-diagnosis, the information is transmitted through the network to the machine monitor.
- The occurrence of an abnormality can be checked on the machine monitor and KOMTRAX.

Operation When Load is Balanced with Pump Pressure (PA)

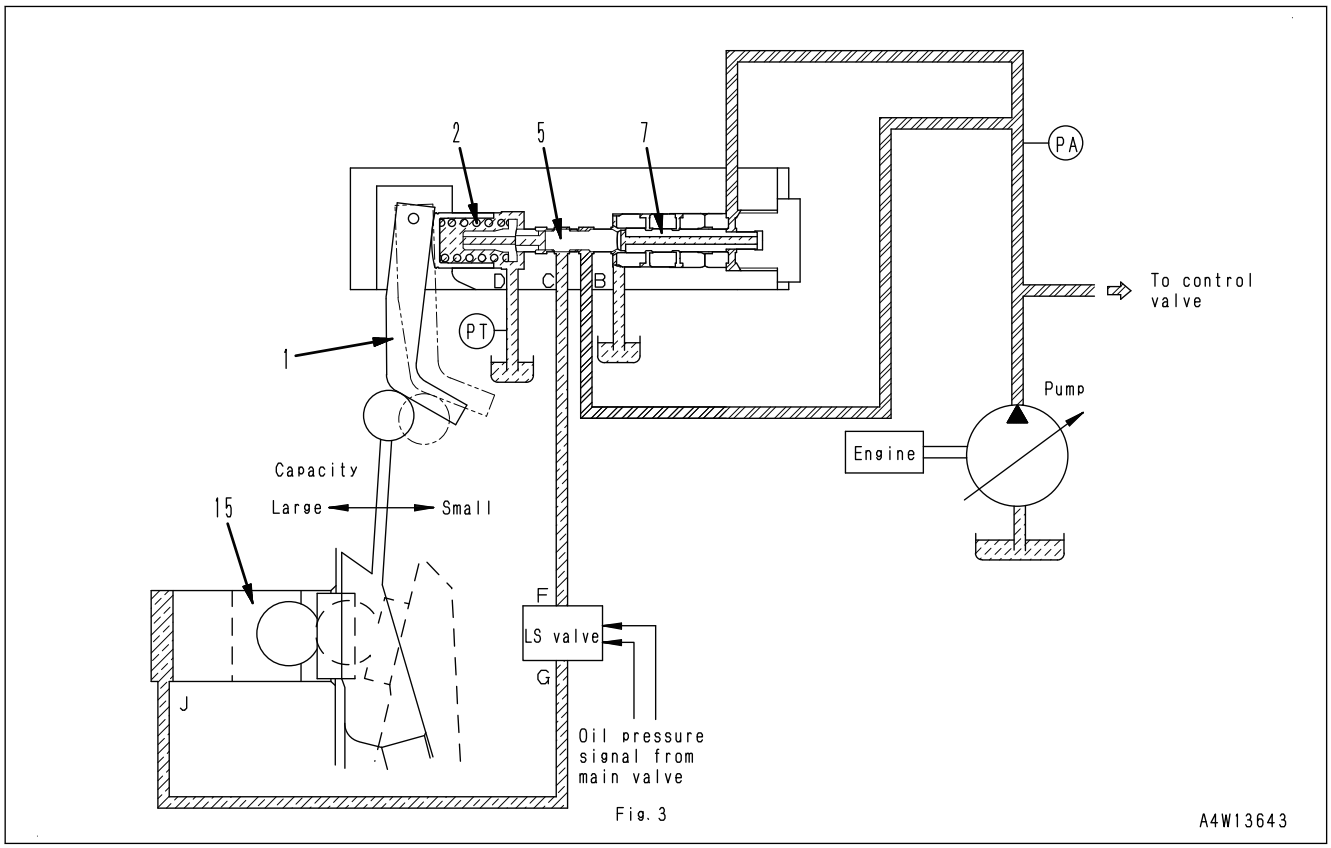


Fig. 3

1. As the servo piston (15) moves, the lever (1) moves to the right and the spring (2) is compressed and its reaction force is increased. Consequently, the spool (5) moves to the right and the port (C) is disconnected from the port (B), and the drain pressure port (D) and the drain pressure port (C) are connected.
2. As a result, the pressure in the port (C) lowers, the piston pressure is decreased, and the servo piston (15) stops moving to the right.
3. Accordingly, the stop position (= pump discharged volume) of the servo piston (15) is determined by the position where the thrust which is caused by the pressure (PA) applied to the piston (7) is balanced with the force of the spring (2) acting through the spool (5). (Fig. 3)

Directional Selector Switch Control Function

The switch to select travel direction is provided on the side of the work equipment control lever. It is independent from the standard directional lever, so that the operator can select the travel direction with his/her right hand.

Change to Directional Selector Switch

- When only the directional lever is used, the directional lever input signal is equal to recognition of travel direction. Since the another switch for directional selection is added, selector switch is provided to shift the actuation.

  REMARK

  The directional selector switch actuation switch actuates the directional selector switch. However, the directional lever (standard directional lever) is given the priority for the operation.

- The directional selector switch is actuated when the standard directional lever is in N (Neutral), the directional selector switch actuation switch is in N (Neutral). Then, the directional selector switch is enabled for selecting travel direction.

  REMARK

  - When the travel direction can be changed with the directional selector switch, the directional selection pilot lamp on the machine monitor lights up in green.
  - If the directional selector switch actuation switch is turned ON or OFF when either is other than N (Neutral), the directional selection pilot lamp on the machine monitor lights up in yellow and the caution lamp lights up.

- The standard directional lever is given the priority for the operation if the standard directional lever is set in a position other than N (F or R) even when the directional selector switch is enabled. The travel direction is set corresponding to the operation of standard directional lever, the directional operation is not selected normally. The directional selection pilot lamp on the machine monitor lights up in yellow and the caution lamp lights up.

  REMARK

  If directional selection pilot lamp lights up in yellow, set both of the standard directional lever and the directional selector switch in N (Neutral), otherwise caution does not stop and the directional selector switch does not work.

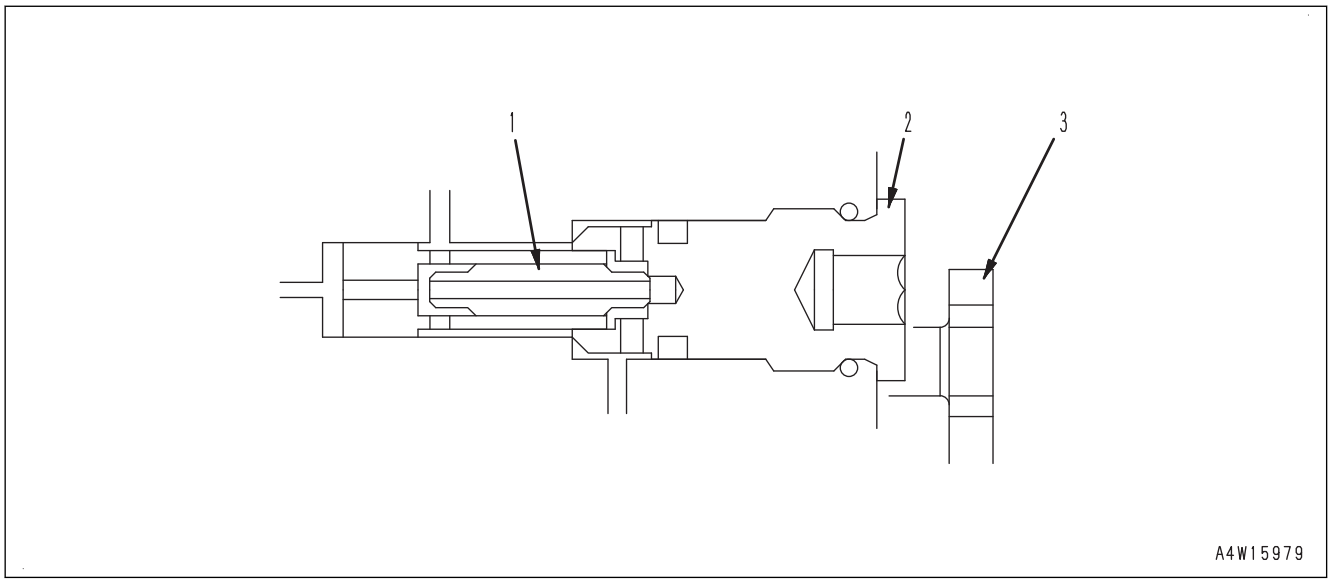
- The above description is shown in the table below.

Mode	Condition	FNR recognition	Directional selector switch enabled/disabled state output	Directional selector switch wrong operation state output	Monitoring operation (Reference)
Directional lever (normal)	Directional lever switch: (F or N or R) Directional selector switch: (N) Directional selector switch actuation switch: (OFF)	Subject to directional lever	OFF (Disabled)	OFF (Absence)	The pilot lamp is not lit. Buzzer stops sounding
Directional selector switch actuation switch: (normal (directional selector switch)	Directional lever switch: (N) Directional selector switch: (F or N or R) Directional selector switch actuation switch: (ON)	Subject to the directional selector switch	ON (Enabled)	OFF (Absence)	The pilot lamp is lit in green. Buzzer stops sounding

Bypass Shuttle Valve of HST Pump

Structure of Bypass Shuttle Valve of HST Pump

Sectional View



1: Piston
2: Plug
3: Stopper

Function of Bypass Shuttle Valve of HST Pump

Function as Bypass Valve

When the plug (2) is loosened, the bypass shuttle valve connects the forward travel high-pressure circuit and reverse travel high-pressure circuit of HST pump. By this operation, the machine can be moved by towing even if the pump swash plate is locked in neutral because of a failure, etc.

Function as Shuttle Valve

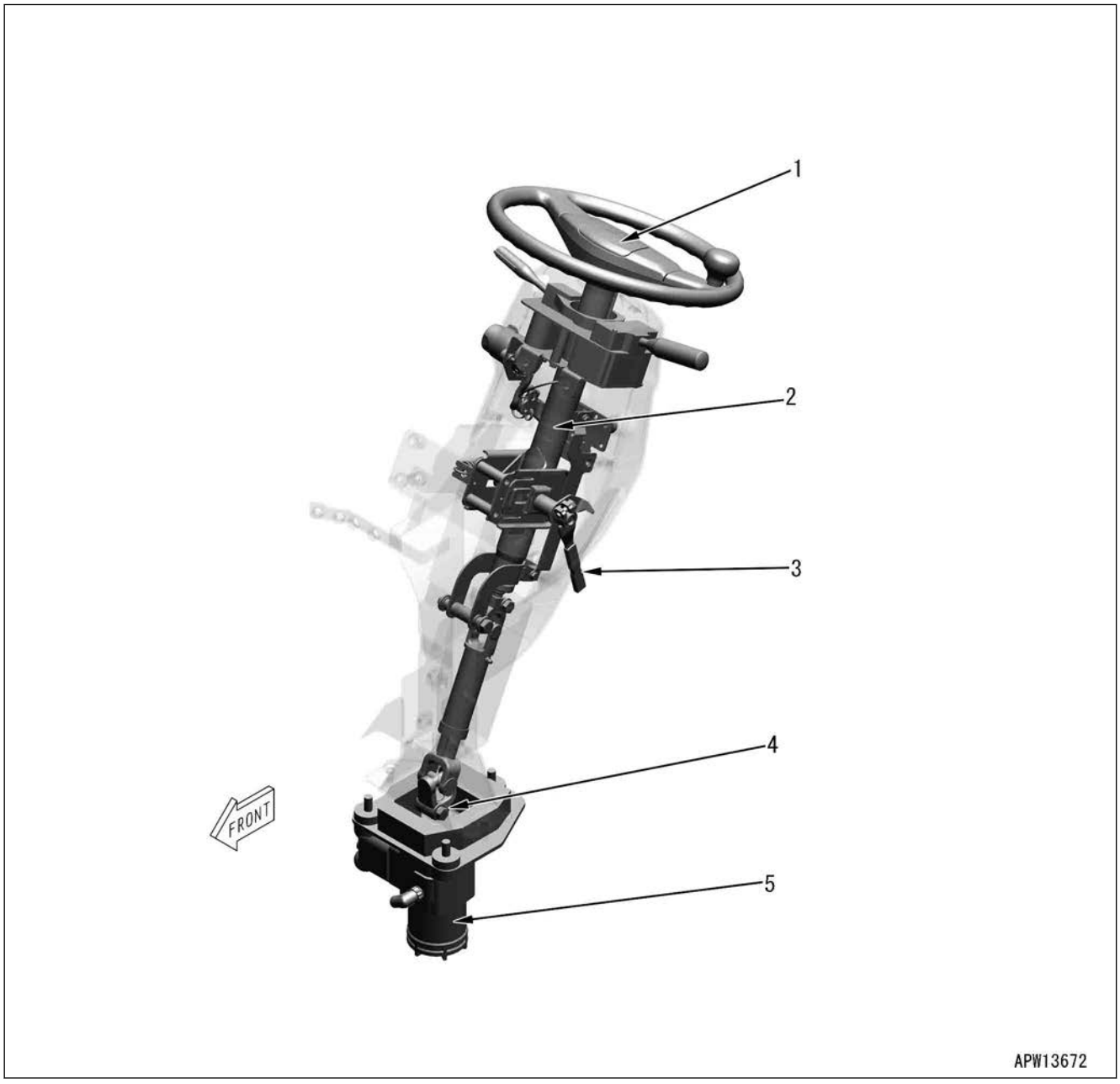
The bypass shuttle valve sends oil to the cut-off valve from whichever is the higher oil pressure of the forward travel high-pressure circuit or reverse travel high-pressure circuit.

10. The control switch (5) has the Hall element (18). The Hall elements are arranged on the circuit board to be matched to each position of speed range selection.
11. If the combination switch senses that the magnet (17) comes just above the Hall element (18) at each position, it outputs “1st”, “2nd”, “3rd”, or “4th” signal according to the operation of the speed range selector switch (13).

Steering Column

Structure of Steering Column

General View

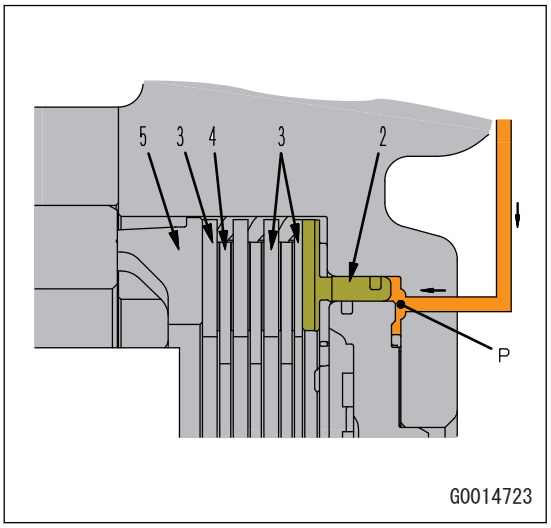


1: Steering wheel
2: Steering column
3: Steering tilt lock lever
4: Short column
5: Orbitrol valve

Operation of Brake

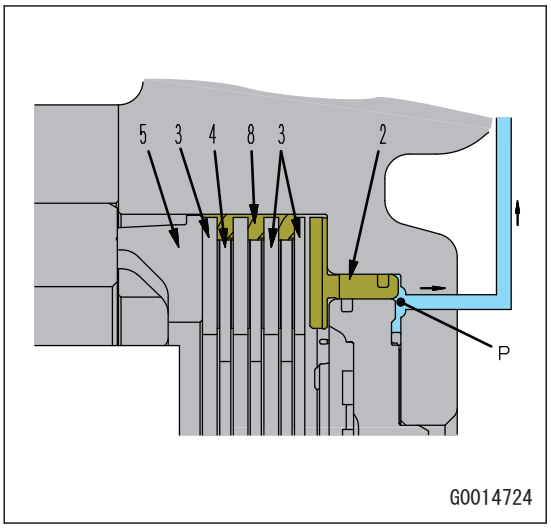
When Brake is Applied

1. When brake pedal is depressed, pressurized oil (P) supplied from the hydraulic tank through the pump and brake charge valve flows through the oil passage in the brake cylinder to push piston (2) to the left.
2. Rotation of discs (4) between piston (2), plates (3), and end plate (5) are stopped, and the brake is applied to the machine.



When Brake is Released

1. When oil pressure is released, piston (2) is returned by the reaction force of spring (8). As a result, clearance is made between plates (3) and end plate (5), and brake is released.
2. Linings installed to discs (4) are grooved in a check pattern, and oil flows in the grooves to cool the linings while discs (4) are turning.



Transfer

Machine model			WA320-8E0	
Engine			SAA6D107E-3	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Clutch control pressure	• HST oil temperature45 to 55 °C • Speed range selector switch: 3rd or 4th • Directional lever: FORWARD position • During the travel at 10 km/h or faster)	MPa {kgf/cm^2}	3.33±0.20 {34±2.0 }	3.33 (+0.20/-0.59) {34 (+2/-6) }

Travel Speed

Machine model			WA320-8E0	
Engine			SAA6D107E-3	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Gear speed: F1	• Road surface state: Flat, level, straight, dry, and paved • Bucket: No load • Traction control switch: OFF (MAX)	km/h	1 (+0.4/-0.5)	Max. 1.5
Gear speed: F2			13±0.7	13±0.9
Gear speed: F3			18.7±0.9	18.7±1.3
Gear speed: F4			38±1.9	38 (+1.9/-2.7)
Gear speed: R1			1 (+0.4/-0.5)	Max. 1.5
Gear speed: R2			13±0.7	13±0.9
Gear speed: R3			18.7±0.9	18.7±1.3
Gear speed: R4			38±1.9	38 (+1.9/-2.7)

Accumulator

Machine model				WA320-8E0	
Engine				SAA6D107E-3	
Item	Measurement condition		Unit	Standard value for new machine	Repair limit
Charge cut-in pressure	• HST oil temperature45 to 55 °C • Accelerator pedal: Not depressed (Low idle)	When brake oil pressure caution lamp is off.	MPa {kgf/cm^2}	5.9 (+0.5/0) {60 (+5/0) }	5.9 (+0.98/-0.5) {60 (+10/-5) }
Charge cut-out pressure		When the oil pressure turned from increase to decrease.	MPa {kgf/cm^2}	9.8 (+0.98/0) {100 (+10/0) }	9.8 (+1.5/-0.5) {100 (+15/-5) }

2. Select “Pre-defined Monitoring” (01/25) or the following monitoring items, and display it by referring to “Set and Operate Machine Monitor”.

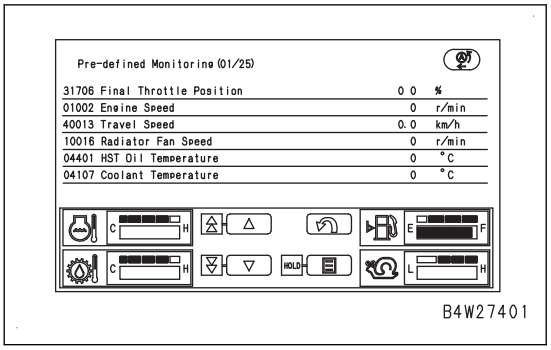
   Monitoring code: 01002 “Engine Speed”

   Monitoring code: 04107 “Coolant Temperature”

   Monitoring code: 04401 “HST Oil Temperature”

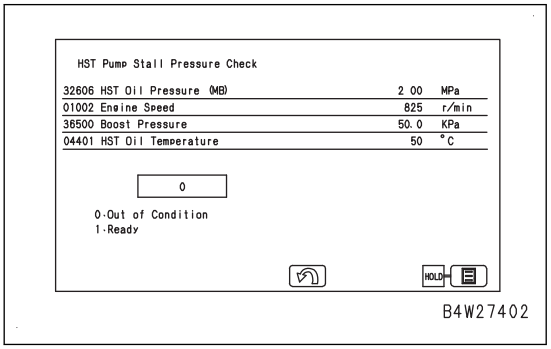
3. Raise the coolant temperature and the HST oil temperature to the specified range.
4. Depress the accelerator pedal gradually. Test the engine speed when the accelerator pedal is depressed to the full stroke (high idle) and the bucket is tilted back at the same time.

   For standard values, see “20 Standard Value Table”.



How to Examine Engine Speed at Full Stall (HST Stall + Hydraulic Stall)

1. Start the engine.
2. Raise the coolant temperature and the HST oil temperature to the specified range.
3. Display the “HST Pump Stall Pressure Check screen ” screen by referring to “Set and Operate Machine Monitor”, “ADJUSTMENT MENU (HST Pump Stall Pressure Check)”.



4. Set the traction control function to OFF (MAX).

   REMARK

   When the traction control function is set to OFF (MAX), the pilot lamp shown in the drawing lights up on the monitor.

5. Set the speed range to 2nd by using the speed range selector switch.
6. While depressing the brake, set the directional lever to FORWARD.
7. Depress the accelerator pedal gradually. Test the engine speed when the accelerator pedal is depressed to the full stroke (high idle) and the bucket is tilted back at the same time.

   ⚠ Keep depressing the brake pedal fully.

   NOTICE

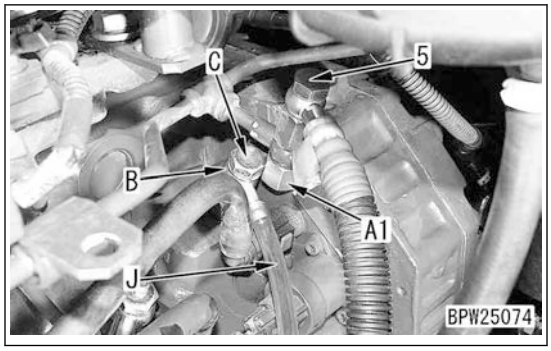
   Do not keep stalling the HST for more than 20 seconds. Take care that HST oil temperature does not exceed 120 °C.

   REMARK

   Measure the engine speed with HST stalled 2 or 3 times.

   For standard values, see “20 Standard Value Table”.

3. Install cap nut A1 of tester kit A to fuel return hose side with joint bolt (5) to prevent the fuel from flowing out.



REMARK

Seal washer D must be installed when installing cap nut A1.

4. Install joint B to the supply pump side with joint bolt C.

REMARK

When installing joint B and joint bolt (C, be sure to install seal washer D.

Joint bolt C:
19.6 to 29.4 Nm {2.0 to 3.0 kgfm}

5. Install hose J to joint B.

REMARK

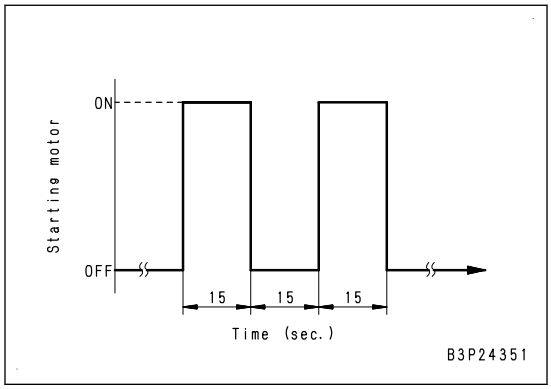
Adjust the route of hose J so that it does not slack, and put its end in measuring cylinder H.

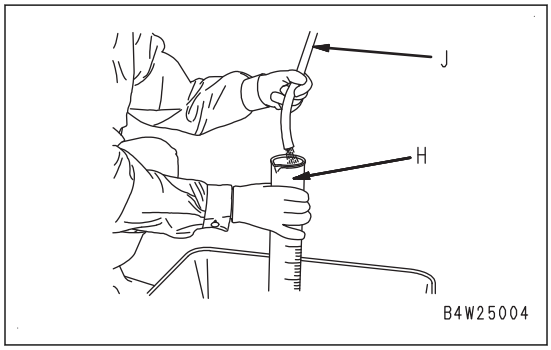
6. Start and run the engine with the accelerator pedal released (low idle), and measure the return rate from the supply pump with measuring cylinder H for 30 seconds.

For standard values, see Standard Value Table, “Standard Value Table for Engine”.

NOTICE

If the engine cannot be started, you may perform the measurement while rotating the engine by using the starting motor, but do not crank the engine for more than 20 seconds continuously to protect the starting motor. “Crank the engine for 15 seconds, stop for 15 seconds and then crank it again for 15 seconds.” Perform the measurement according to this procedure.





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

Bracket mounting bolt (4):
24±4 Nm {2.45±0.41 kgfm}

Joint bolt (5):
19.6 to 29.4 Nm {2.0 to 3.0 kgfm}

8. Check that “0” in the “Test State” column is flashing.

REMARK

Flashing of “0” indicates “Wait for the start (default)”, and the test can be performed. When the display is not “0”, perform the required action according to “Parameter list of test state”.

9. Press UP switch (10) to start “DEF Line Heater Relay 1 Test”.

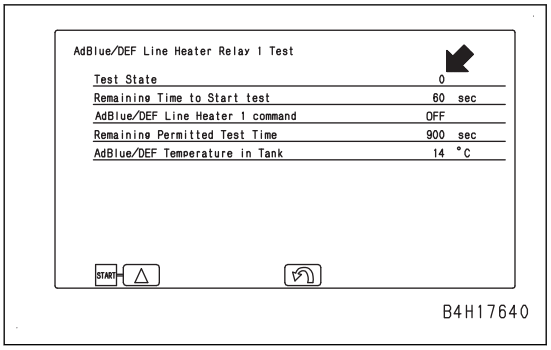
UP switch (10): Starts “DEF Line Heater Relay 1 Test”

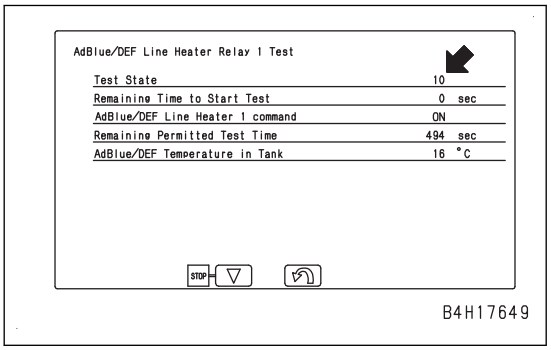
DOWN switch (11): Stops “DEF Line Heater Relay 1 Test” (When “STOP” is displayed.)

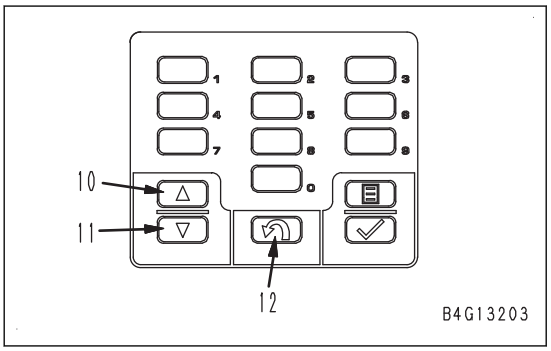
RETURN switch (12): Returns the screen to the “SCR Service Test” screen

NOTICE

- **If the display of “Test State” does not change to “10” and the test does not start even by pressing UP switch (10), turn starting switch to OFF position, and repeat the testing procedure from step 6.**
- **If you turn the starting switch to OFF position by mistake during test, do not turn starting switch to ON position immediately. Check that system operating lamp is off, and then turn the starting switch to ON position again after engine controller shuts down.**
- **The engine controller cannot detect a KOMNET communication error which does not remain for one second, and the test may continue even when the machine monitor does not continue the test (standard screen). In such a case, turn the starting switch to OFF position to shut down the engine controller, and the system operating lamp goes out, and then the test is reset.**







REMARK

- Display of “Test State” changes to flashing of “10”, and display of “Remaining Time to Start Test” is counted down from “60 sec” to “0 sec”, and when it reaches to “0 sec”, the power is supplied automatically.
- When the display of “Test State” is “11” to “41”, perform the required action according to the “Parameter list of test state”.
- When the display of “Remaining Time to Start Test” becomes “0 sec”, “DEF Line Heater 1 Command” is “ON” and the voltage is outputted to the heater relay.
- The heater relay operates 900 seconds at maximum, and its remaining operable time is displayed as “Remaining Permitted Test Time”.
- When the sum of “Remaining Time to Start Test” (1 min) + Heater relay operating time exceeds 16 minutes after UP switch (10) is pressed, the test stops automatically.

10. Measure the voltage between pin 1 and pin 2.

Steering System

Examine Steering Wheel

Tools to Examine Steering Wheel

Symbol	Part No.	Part name	Q'ty	Remarks
A	79A-264-0021	Push-pull scale	1	

⚠ Place the machine on a level ground, lower the work equipment to the ground, set the parking brake switch in PARKING (P) position and work equipment lock switch in LOCK position, and stop the engine.

For testing of the steering wheel to perform troubleshooting or others, refer to this section.

How to Examine Steering Wheel

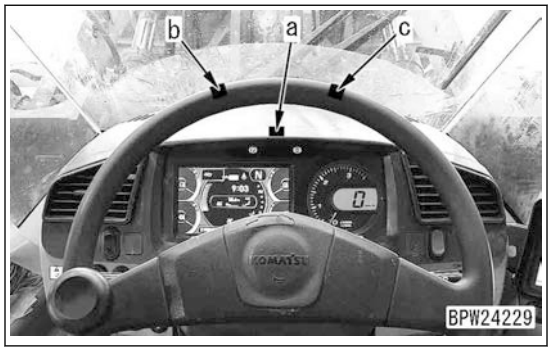
Examine Play of Steering Wheel

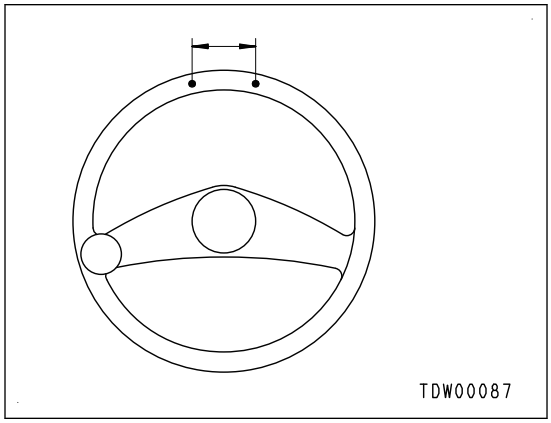
Check this item under the following conditions.

- Engine: Stopped
- Machine posture: Straight travel

1. Move the steering wheel in both directions 2 or 3 times, check the neutrality of the steering mechanism, and put a mark (a) to the outer frame of the machine monitor.
2. Rotate the steering wheel to the right, and put a mark (b) to the point of the steering wheel vertically above the mark (a) when you feel heavier in operating the steering wheel.
3. Rotate the steering wheel to the left (opposite to step 2), and put a mark (c) to the point of the steering wheel vertically above the mark (a) when you feel heavier in operating the steering wheel. Measure the moving distance between the marks (b) and (c) as the linear distance.

   For standard values, see “20 Standard Value Table”.





How to Examine the Steering Wheel Operating Force

Check this item under the following conditions.

- Road surface: Flat, level, paved and dried
- Engine coolant temperature: 60 to 100 °C
- HST oil temperature: 45 to 55 °C
- Tire inflation pressure: Specified pressure
- Bucket: No load

5. Test the oil pressure when the accelerator pedal is depressed (high idle) and the work equipment control lever is operated.

   For standard values, see “20 Standard Value Table”.

How to Examine Outlet Pressure of PPC Valve by Testing Tool

1. Release the remaining pressure in the circuit by referring to “Release Remained Pressure from Work Equipment Circuit”.
2. Remove the cover on the front side of the machine.

   ⚠ **To raise the boom and remove the inspection cover, place the blocking tool under the boom to securely support the boom.**
3. Remove the oil pressure pickup plug (3) of the PPC valve outlet circuit to be tested.

   A: Attachment

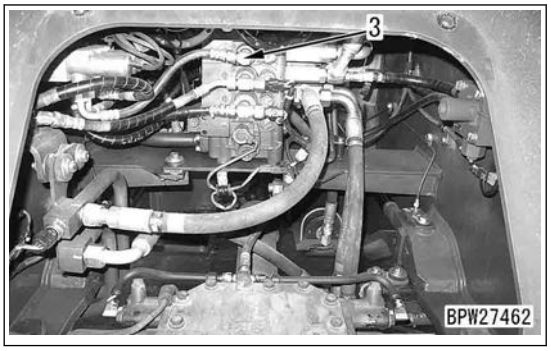
   B: Attachment

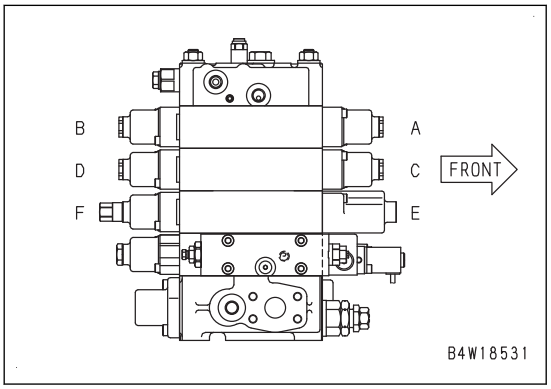
   C: Bucket TILT

   D: Bucket DUMP

   E: Boom RAISE

   D: Boom LOWER, boom FLOAT

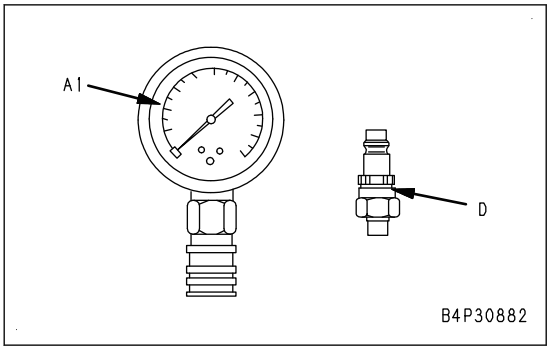




4. Install the nipple D, and connect the gauge A1 in the hydraulic tester A.

   REMARK

   Gauge in the digital hydraulic tester B can also be used instead of the gauge A1.
5. Start the engine.
6. Select and display “Pre-defined Monitoring” (01/25). For details, see “Set and Operate Machine Monitor”.
7. Adjust the HST oil temperature within the specified range.



8. Test the oil pressure when the accelerator pedal is depressed (high idle) and the work equipment control lever is operated.

   For standard values, see “20 Standard Value Table”.

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

How to Adjust Work Equipment PPC Oil Pressure

PPC relief valve cannot be adjusted.

1. Release the remaining pressure in the circuit by referring to “Release Remained Pressure from Work Equipment Circuit”.

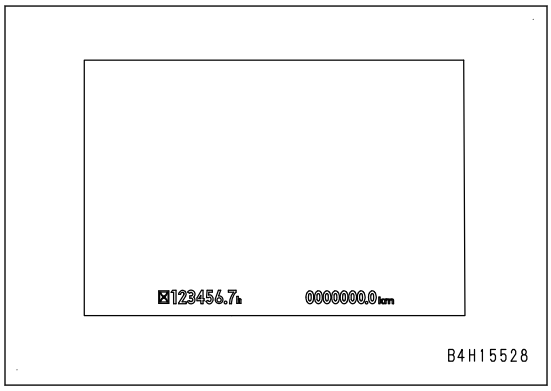
Examine Function of Service Meter and Odometer

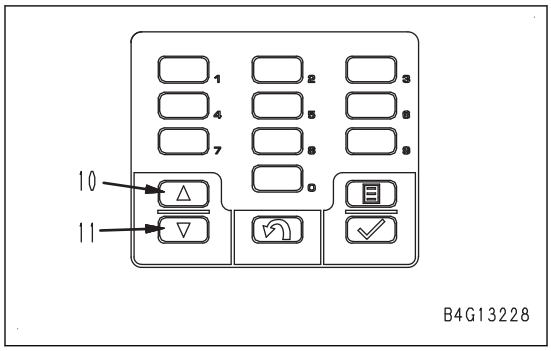
When checking the service meter and odometer with the starting switch in OFF position, operate switches on the switch panel as follows to display the service meter section and odometer section.

Switch operation: Press UP switch (10) (concurrently) while pressing DOWN switch (11).

REMARK

- There are some time lags when starting the LCD, so hold down the switches until the service meter is displayed.
- If you release one of the switches, the multi-information display goes off.





How to Set Usage Limitation and Change Maintenance Password

Password setting can be done on the machine monitor for a user limitation setting. After setting the password, a password enter screen is displayed when resetting the maintenance items.

Perform the usage limitation setting and password setting according to the following procedure.

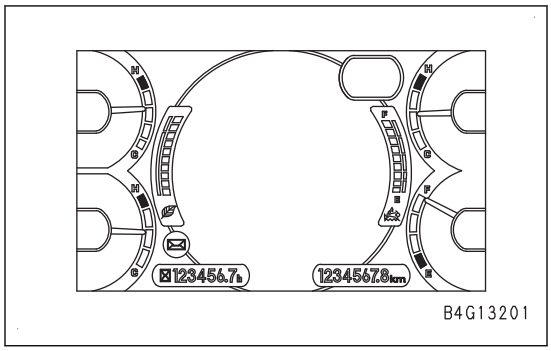
Setting Usage Limitation (Password)

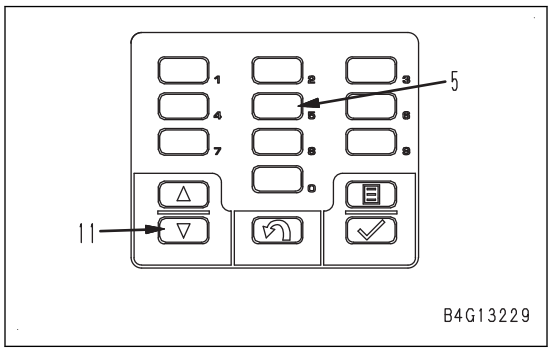
1. After the standard screen is displayed, use a switch on the monitor panel to perform the following operation:

   Switch operation: Press the numeral input switch (5) 3 times while pressing DOWN switch (11) (press both switches simultaneously).

   REMARK

   This switch operation is available after a lapse of 10 minutes after the starting switch is turned to ON position.





4. Select “Maintenance Mode On or Off”. Select an item to be changed with the switches.

   “ON”: Functions of all maintenance items become enabled in operator mode

   “OFF”: Functions of all maintenance items are disabled in operator mode

   UP switch (10): Moves the selected item up by one item

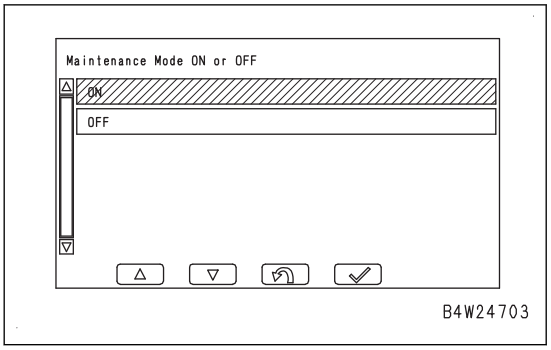
   DOWN switch (11): Moves the selected item down by one item

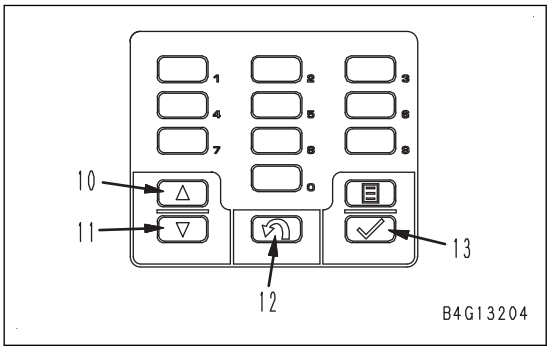
   RETURN switch (12): Cancels the selection and returns the display to the “Maintenance Mode Change” screen

   ENTER switch (13): Enters the selected item and returns the display to “Maintenance Mode Change” screen

   REMARK

   This setting overrides the ON/OFF setting of each item after this change of setting is entered once.





5. Select “Maintenance Notice Time Setting”. Select an item to be changed with the switches.

   “Default”: Maintenance notice time being set on the machine monitor (Recommended by the manufacturer and not changeable).

   “Set”: Maintenance notice time that can be freely set in the range from 10 to 200 hours. Maintenance reminder function works according to this set time in operator mode (the time can be increased or decreased in multiples of 10 hours).

   UP switch (10): Increases the set value

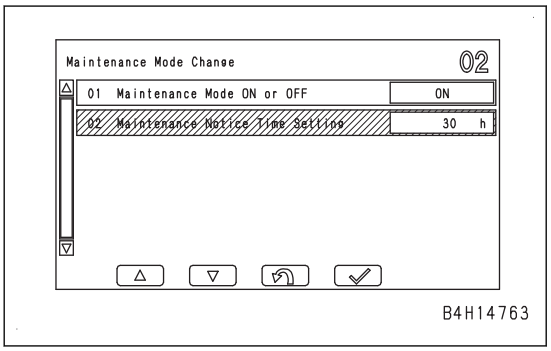
   DOWN switch (11): Decreases the set value

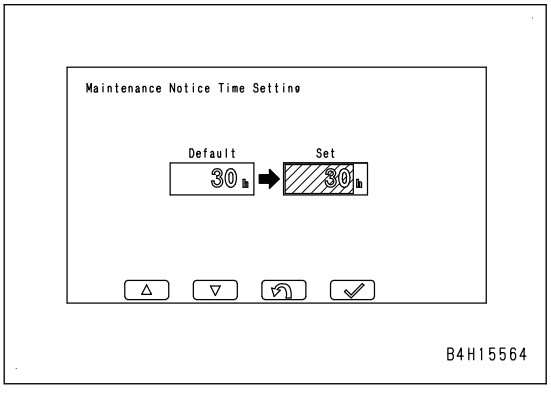
   RETURN switch (12): Cancels the setting and returns the display to the “Maintenance Mode Change” screen

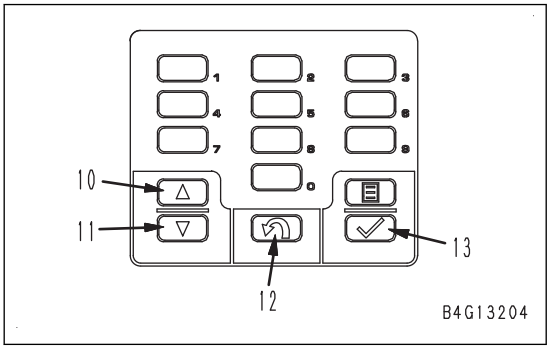
   ENTER switch (13): Enters the setting and returns the display to the “Maintenance Mode Change” screen

   REMARK

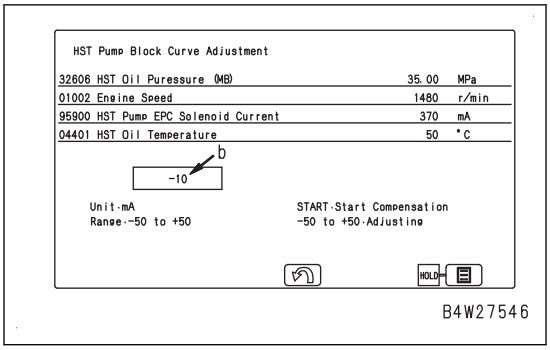
   - Enter the selected item with ENTER switch (13). The setting is validated after the display returns to “Maintenance Mode Setting” screen with the RETURN switch (12).
   - If the value of an item which is set to “ON” is changed after one operating hour or more from the setup, the change is recognized as a reset operation.







When the adjustment value is displayed in the box (b), the adjustment is completed.



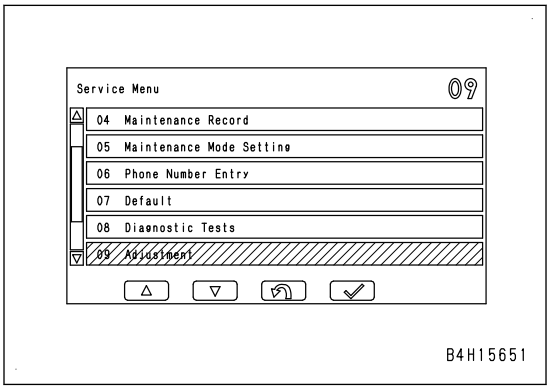
Adjustment Menu (Fan Maximum Speed EPC Solenoid Current)

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

1. Check that the fan does not rotate reversely.
2. From “Service Menu” screen, select “Adjustment”.

   REMARK

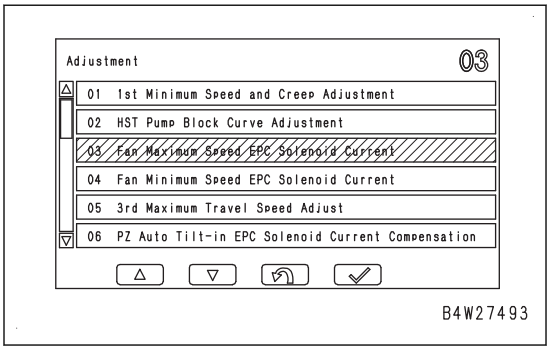
   For selecting method, see “How to Operate Service Mode” in “SERVICE MODE”.



3. When “Adjustment” screen is displayed, use a switch on the switch panel to select “Fan Maximum Speed EPC Solenoid Current”.

   REMARK

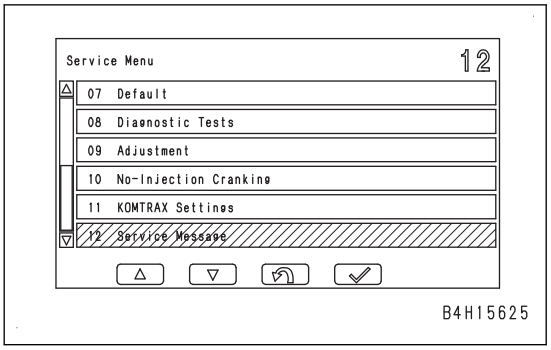
   For selecting method, see “How to Operate Service Mode” in “SERVICE MODE”.



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

   REMARK

   For selecting method, see “How to Operate Service Mode” in “SERVICE MODE”.



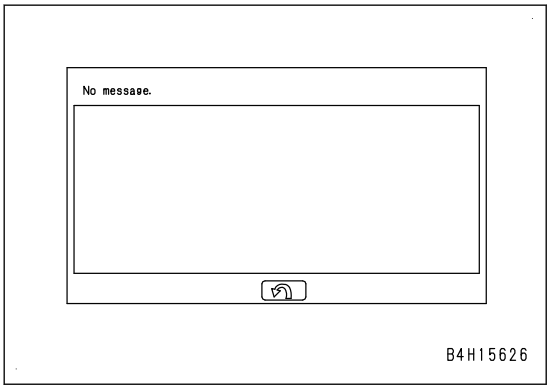
2. Displaying message

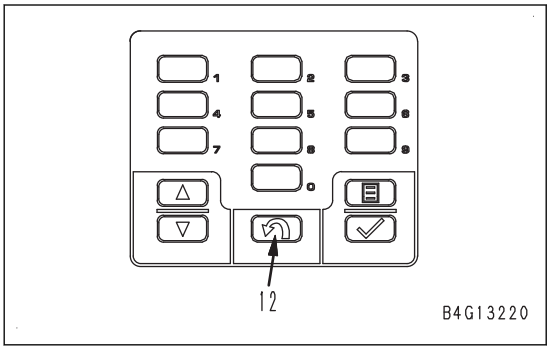
   - Displaying message (read only)

     If there is a message, its contents are displayed. If there is no message, “No message.” is displayed.
     RETURN switch (12): Returns to the “Service Menu” screen

     REMARK

     - The message is different from that sent to the operator in the operator mode.
     - Since this message is only for the technician, the message monitor is not displayed as it is displayed in the operator mode.





   - Display of message (with message return function)

     If a message provides the Numeric Input line under the text, input a proper number with a switch on the switch panel and enter it, and the information is returned to the KOMTRAX base station.

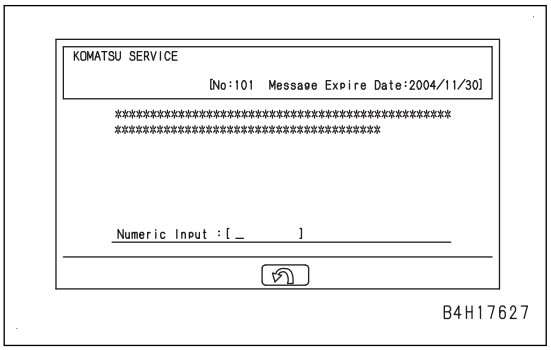
     RETURN switch (12): Returns to the “KOMTRAX Settings” screen.

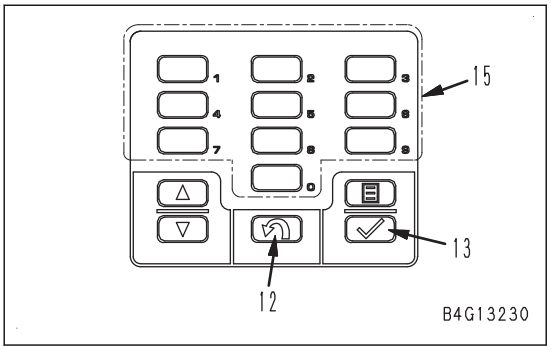
     ENTER switch (13): Validates and returns the inputted value.

     Numerical input switch (15): Enters a numerical value

     REMARK

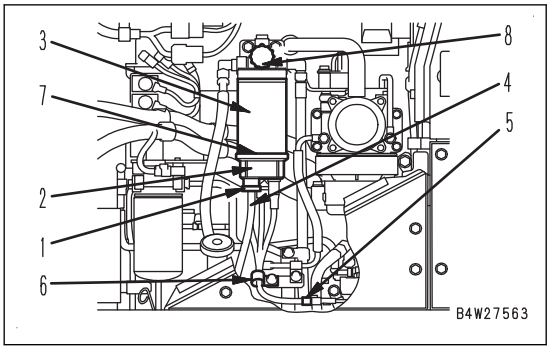
     - The message is different from that sent to the operator in the operator mode.
     - Since this message is only for the technician, the message monitor is not displayed as it is displayed in the operator mode.





Failure Code [CA4164]....40-730
Failure Code [CA4165]....40-732
Failure Code [CA4166]....40-734
Failure Code [CA4168]....40-736
Failure Code [CA4169]....40-739
Failure Code [CA4171]....40-741
Failure Code [CA4249]....40-744
Failure Code [CA4251]....40-746
Failure Code [CA4259]....40-748
Failure Code [CA4261]....40-751
Failure Code [CA4277]....40-754
Failure Code [CA4281]....40-758
Failure Code [CA4459]....40-761
Failure Code [CA4461]....40-763
Failure Code [CA4658]....40-766
Failure Code [CA4731]....40-770
Failure Code [CA4732]....40-771
Failure Code [CA4739]....40-772
Failure Code [CA4768]....40-773
Failure Code [CA4769]....40-775
Failure Code [CA4842]....40-777
Failure Code [CA4952]....40-781
Failure Code [CA5115]....40-783
Failure Code [CA5179]....40-786
Failure Code [CA5181]....40-788
Failure Code [CA5383]....40-790
Failure Code [D103KA]....40-792
Failure Code [D103KB]....40-794
Failure Code [D103KY]....40-796
Failure Code [D103MC]....40-798
Failure Code [D104KA]....40-800
Failure Code [D104KB]....40-802
Failure Code [D104KY]....40-804
Failure Code [D104MC]....40-806
Failure Code [D110L4]....40-808
Failure Code [D160KA]....40-810
Failure Code [D160KY]....40-812
Failure Code [D191KA]....40-813
Failure Code [D191KB]....40-815
Failure Code [D191KY]....40-817
Failure Code [D192KA]....40-818
Failure Code [D192KB]....40-819
Failure Code [D192KY]....40-820
Failure Code [D19JKZ]....40-821
Failure Code [D1B0KA]....40-823
Failure Code [D1B0KB]....40-825
Failure Code [D1B0KY]....40-827
Failure Code [D1B0MC]....40-829
Failure Code [D1E6KA]....40-831
Failure Code [D1E6KB]....40-833
Failure Code [D1E6KY]....40-835
Failure Code [D5ZHKA]....40-837
Failure Code [D5ZHKB]....40-839
Failure Code [D5ZHL6]....40-841
Failure Code [D811MC]....40-842
Failure Code [D862KA]....40-843
Failure Code [D8ALKA]....40-844
Failure Code [D8ALKB]....40-846

1. Open the engine side cover on the right side of the machine.
2. Place a container under the fuel prefilter cartridge to receive the fuel.
3. Loosen the drain valve (1) and drain the water and sediments from the transparent cup (2), and also drain all the fuel from the filter cartridge (3).
4. Remove the drain hose (4).



REMARK

The drain hose and clip are to be reused.

5. Disconnect the connector (5).
6. Wrap the removed connector (5) with a plastic bag to prevent it from being splashed with fuel, oil or water.
7. Remove the clip (6) of the wiring sensor harness.
8. Turn the transparent cup (2) counterclockwise by using the filter wrench, and remove it. (This cap will be used again.)
9. Turn the filter cartridge (3) counterclockwise by using the filter wrench, and remove it.
10. Install the currently removed transparent cup (2) to the bottom of the new fuel prefilter cartridge.

    At this time, always replace the O-ring (7) with a new one.

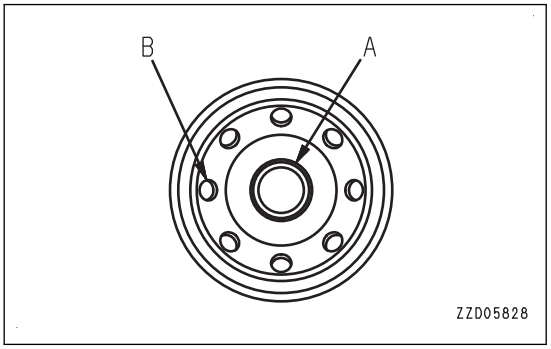
NOTICE

When installing it, thinly apply the oil to the packing surface, contact it to the sealing surface of the filter cartridge (3), and then tighten it 1/4 to 1/2 turn. If the transparent cup is fastened too much, the O-ring will be damaged and this leads to leakage of fuel. If it is too loose, fuel will also leak from gaps of the O-ring. Therefore, be sure to observe the fastening angle.

11. Clean the filter head.
12. Fill the new filter cartridge with clean fuel, apply a thin film of oil to the packing surface, then install it to the filter head.

NOTICE

- **When filling with fuel, do not remove the cap (A) in the center. Always fill with fuel from the small holes (B) (8 places) on the dirty side.**
- **After filling with fuel, remove the cap (A) in the center, and install the fuel filter.**
- **Always fill with clean fuel. Be careful not to let any dirt or dust get into the fuel. In particular, center portion is the clean side, so do not remove the cap (A) when filling with fuel. Be careful not to let dirt or dust get into the center portion on the clean side.**



13. When installing the cartridge, tighten it until the packing surface contacts the sealing surface of the filter head, then tighten it 3/4 of a turn.

NOTICE

If the filter cartridge is fastened too much, the packing will be damaged and this leads to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing. Be sure to observe the tightening angle.
When tightening by using a filter wrench, be extremely careful not to dent or damage the filter.

14. Install the drain hose (14).
15. Check that the drain valve (1) is closed securely.
16. Remove the plastic bag wrapping the connector (5), then connect the connector (5).

No.	Cause	Procedure, measuring location, criteria, and remarks
7	Defective controller	Precautions for troubleshooting (1) Connector number indication method and handling of T-adapter For troubleshooting, insert or connect T-adapters as follows unless otherwise specified. • When (male) or (female) is not indicated with a connector number, disconnect the connector, and insert T-adapters to both sides of male and female. • When (male) or (female) is indicated with a connector number, disconnect the connector, and connect T-adapter to the indicated side of connector. • “Male and female” means male and female of connector pins, not connector housings. • Male and female of connector pins and housing in DT series, etc, are opposite to those described in this manual. Take care. (2) Pin number description sequence and tester lead handling For troubleshooting, connect the positive (+) and negative (-) leads of a multimeter as shown below unless otherwise specified. • Connect the positive (+) lead to pin or wiring harness indicated first. • Connect the negative (-) lead to a pin or wiring harness indicated second.

Circuit Diagram

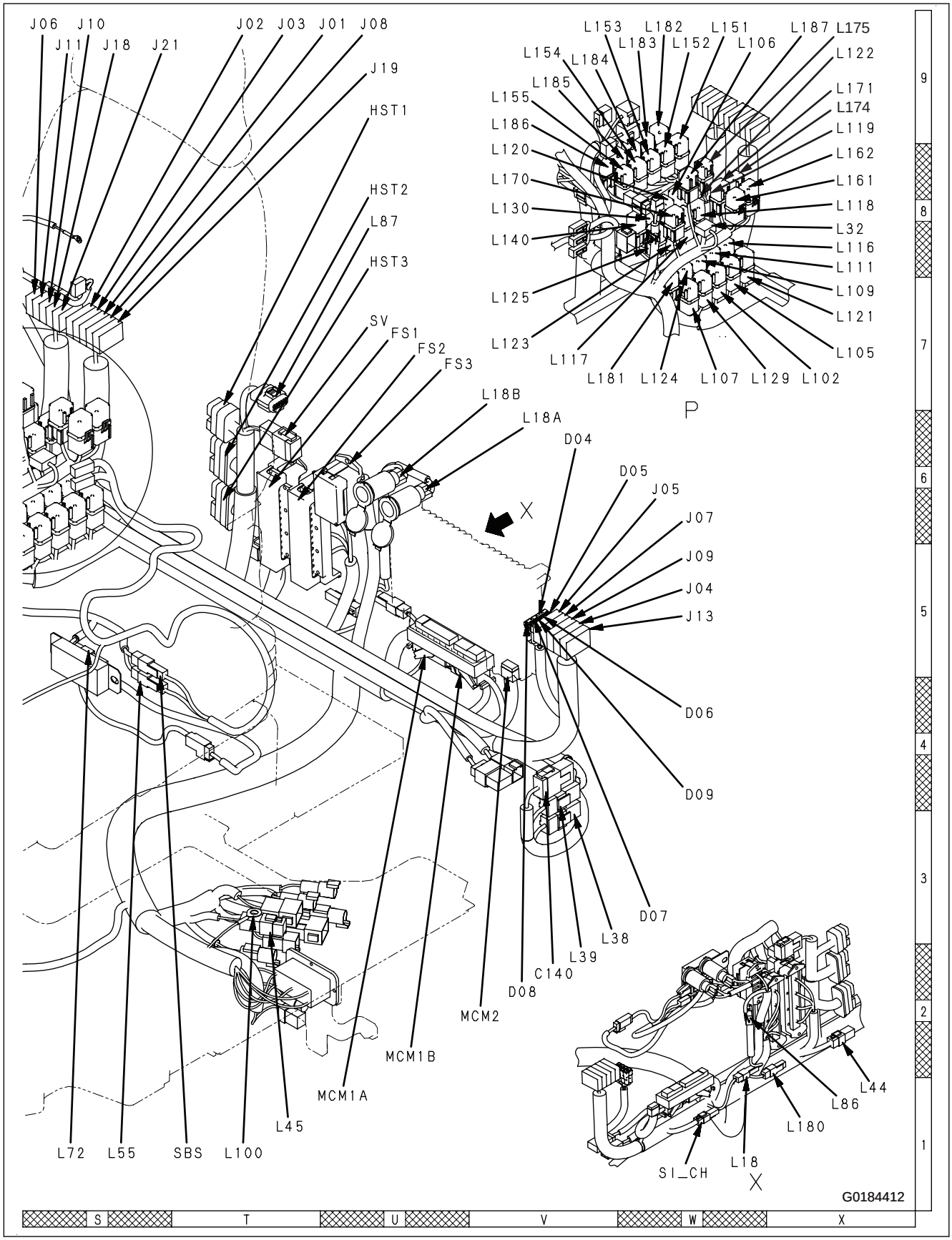
This is the excerpted circuit diagram related to troubleshooting

- The circuit diagram contains the connector No., pin No., and connector color related to the failure.
- “/” is used in the connector No. in the following 2 cases.
  - Abbreviation (3 letters in many cases)
    Example) T/C: Abbreviation for Torque Converter
  - Male side and female side have different connector Nos.
    Example) BREAK OUT / E24
- The circuit diagram contains the destination or source of the branch line in a wiring harness.
- Arrow (↔): Approximate installation position on the machine

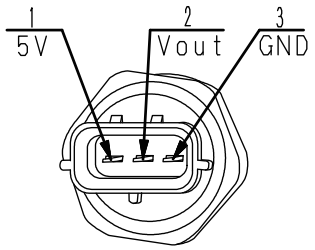
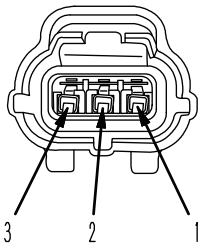
  NO: Normally Open

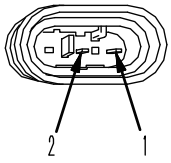
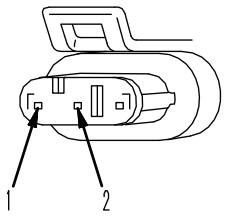
  NC: Normally Closed
- Signal names such as GND and 24V are included in addition to connector numbers at junctions, etc. in circuit diagrams.
- Except for GND and 24V, a signal name indicated at a junction, etc. shows that the wire is connected to another junction or controller at where the same signal name is indicated.

4/7


J06
J10
J11
J18
J21
J02
J03
J01
J08
J19
HST1
HST2
L87
HST3
SV
FS1
FS2
FS3
L18B
L18A
D04
D05
J05
J07
J09
J04
J13
D06
D09
D07
L38
L39
C140
D08
MCM2
MCM1B
MCM1A
L45
L72
L55
SBS
L100
L153
L182
L151
L187
L175
L183
L152
L106
L154
L184
L122
L185
L171
L155
L174
L186
L119
L120
L162
L170
L161
L130
L118
L140
L32
L116
L125
L111
L109
L123
L121
L117
L105
L181
L124
L107
L129
L102
P
X
L44
L86
L180
L18
SI_CH
X
G0184412
9
8
7
6
5
4
3
2
1
S
T
U
V
W
X

AMP connelor for engine

No. of pins	Common rail (fuel) pressure sensor (95, 125, 140 engine)		
	Sensor side (plue)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-9420 (T-adapter) (kit:799-601 -4101) (kit:799-601 -4201)
	—	—	

No. of pins	Turbocharger speed sensor (107, 114 engine)		
	Sensor side (plue)	Harness side (receptacle)	
3			799-601-4660 (Socket) (kit:799-A65 -4600)
	☆ Without pin (3)	☆ Without pin (3)	

B4W21625

Failure code	Failure (Displayed on screen)	Applicable component	Action level	History category	Remarks
CA332	Injector #4 (L#4) Open Circuit Error or Short Circuit Error	ENG	L03	Electrical system	
CA343	Engine Controller Internal Abnormality	ENG	L04	Electrical system	
CA351	Injectors Drive Circuit Error	ENG	L03	Electrical system	
CA352	Sensor 1 Supply Voltage Low Error	ENG	L03	Electrical system	
CA356	MAF Sensor High Error	ENG	L03	Electrical system	
CA357	MAF Sensor Low Error	ENG	L03	Electrical system	
CA386	Sensor 1 Supply Voltage High Error	ENG	L03	Electrical system	
CA428	Water in Fuel Sensor High Error	ENG	L01	Electrical system	
CA429	Water in Fuel Sensor Low Error	ENG	L01	Electrical system	
CA431	Idle Validation Sw Error	ENG	L01	Electrical system	
CA432	Idle Validation Process Error	ENG	L03	Electrical system	
CA435	Engine Oil Pressure SW Error	ENG	L01	Electrical system	
CA441	Power Voltage Low Error	ENG	L04	Electrical system	
CA442	Power Voltage High Error	ENG	L04	Electrical system	
CA449	Common Rail Pressure High Error 2	ENG	L03	Electrical system	
CA451	Common Rail Pressure Sensor High Error	ENG	L03	Electrical system	
CA452	Common Rail Pressure Sensor Low Error	ENG	L03	Electrical system	
CA488	Charge Air Temperature High Torque Derate	ENG	L03	Electrical system	
CA515	Common Rail Pressure Sensor Supply Voltage High Error	ENG	L03	Electrical system	
CA516	Common Rail Pressure Sensor Supply Voltage Low Error	ENG	L03	Electrical system	
CA553	Common Rail Pressure High Error 1	ENG	L01	Electrical system	
CA555	Crankcase Pressure High Error 1	ENG	L01	Electrical system	
CA556	Crankcase Pressure High Error 2	ENG	L03	Electrical system	

Failure Code [879AKA]

Action level	Failure code	Failure	Air Conditioner Inside Air Temperature Sensor Open Circuit (Machine monitor system)
-	879AKA		
Detail of failure	Open circuit in inside air temperature sensor input is detected by air conditioner controller		
Action of controller	• Air mix control: Free angle control by specified temperature • Mode and blower control: Cancel of AUTO control		
Phenomenon on machine	Air conditioner does not function in AUTO mode.		
Related information	• For each connector location, see “Locations of Air Conditioner Parts and Layout of Connectors”. • For arrangement of each connector pin, see “Circuit Diagram and Configuration of Connector Pins of Air Conditioner”. • T-adapter for connector [1]: 799-601-7210, T-adapter for connector [2]: 799-601-7220 • T-adapter is not prepared for other connectors.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective inside air temperature sensor	1. Turn the starting switch to OFF position. 2. Disconnect the connector [4], and connect the T-adapter to male side.			
		Resistance	Between [4] (male) (1) and (2)	Temperature 0 °C	7.2 kΩ
				Temperature 25 °C	2.2 kΩ
2	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors [1], [2], and [4], and connect the T-adapter to female side of [1] and [2].			
		Resistance	Between [1] (female) (30) and [4] (female) (2)		Max. 1 Ω
			Between [2] (female) (6) and [4] (female) (1)		Max. 1 Ω
3	Defective air conditioner controller	Air conditioner controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)			

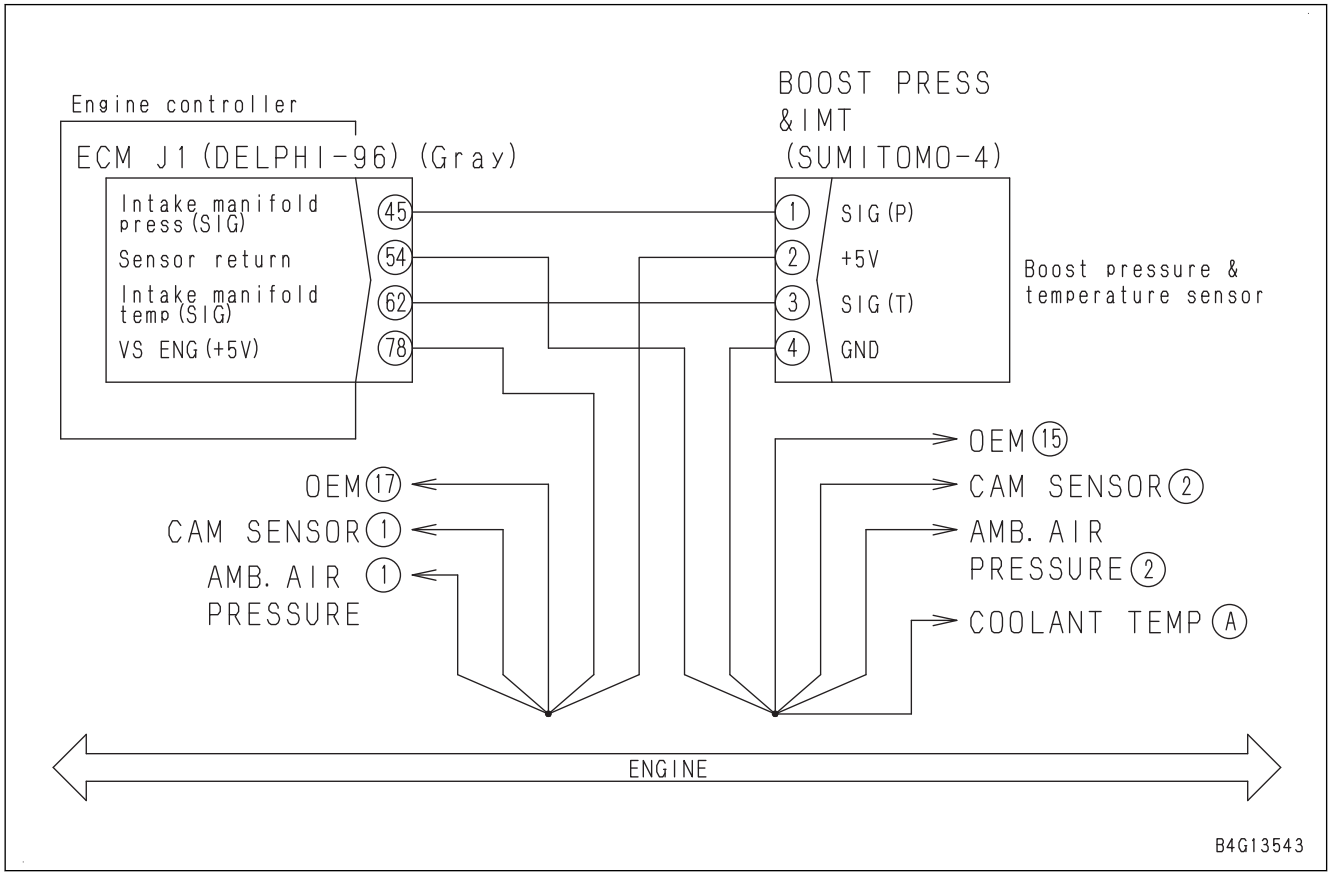
Failure Code [AS00R3]

Action level	Failure code	Failure	Inducement 1 (SCR Device Abnormality)
L03	AS00R3		(Engine controller system)
Detail of failure	• A certain time has passed since AS00R2 occurs. • An abnormality of SCR system has occurred again within a certain time since abnormality repair of SCR system. (EU and Turkey Specification)		
Action of controller	• The information related to this failure code is displayed on the monitor screen. • Engine power deration • [AS00R4] occurs and operates with largely restricted output after a certain time.		
Phenomenon on machine	• Engine power deration • The engine output reduces heavily after a certain time.		
Related information	• This failure code is detected during engine operation. • If this failure code displays after SCR system abnormality is repaired and the engine controller is shut down, run the engine for 1 minute to clear the failure code. • After this failure code is cleared, engine power deration continues until the starting switch is turned to OFF position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	SCR system abnormality	Failure codes of SCR system abnormality are displayed. Perform troubleshooting for them.
2	Engine system abnormality	If any other failure codes than SCR system abnormality are displayed, perform troubleshooting for them.

No.	Cause	Procedure, measuring location, criteria and remarks		
3	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J1, and connect T-adapter to female side.		
		Resistance	Between ECM J1 (female) (62) and ground	Min. 100 kΩ
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J1, and connect T-adapter to female side.		
		Resistance	**REMARK** Use charge temperature sensor resistance characteristics table for check on cause 2 as criteria for resistance between ECM J1 (female) (62) and (54).	80 Ω to 48 kΩ
5	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit Diagram of Charge Air Temperature Sensor



Failure Code [CA352]

Action level	Failure code	Failure	Sensor 1 Supply Voltage Low Error (Engine controller system)
L03	CA352		
Details of failure	Low voltage occurs in sensor power supply 1 (5 V) circuit.		
Action of controller	• Ignores signal from Bkup speed sensor, and operates by NE speed sensor signal. • Ignores signal from ambient pressure sensor, and fixes ambient pressure value to (52.44 kPa {0.53 kgf/cm^2}) for operation. • Ignores signal from charge (boost) pressure sensor, and fixes charge (boost) pressure value to (400 kPa {4.1 kgf/cm^2}) for operation. • Ignores signal from crankcase pressure sensor, and fixes crankcase pressure value to (0 kPa {0 kgf/cm^2}) for operation. • EGR valve closes and fully opens VGT. • Engine power deration • Regeneration control stops.		
Phenomenon on machine	Engine power deration		
Related information	• After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared (note the engine power deration is not canceled right after the failure code is cleared).		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “c: Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position.
		If this failure code is cleared, wiring harness connector is defective.

Failure Code [CA553]

Action level	Failure code	Failure	Common Rail Pressure High Error 1 (Engine controller system)
L01	CA553		
Details of failure	Common rail pressure high error 1 (indicated pressure is higher than that which is assumed)		
Action of controller	None in particular		
Phenomenon on machine	Engine power deration		
Related information	• Signal voltage from common rail pressure sensor can be checked by monitoring function. (Code: 36401 (V)) • Common rail pressure in common rail pressure sensor can be checked by monitoring function. (Code: 36400 (MPa)) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective relevant system	If other failure codes are also displayed, perform troubleshooting for them.
2	Improper fuel is used.	Fuel used may be improper. Check it.
3	Defective connection of ground terminal	Ground terminal may be connected defectively. Check following terminals directly. • Ground terminal of machine ((-) terminal of battery) • Ground terminal of engine • Ground terminal of engine controller • Ground terminal of starting motor
4	Defective electrical system of common rail pressure sensor	Since common rail pressure sensor may have electrical defect, perform troubleshooting for following failure codes. [CA451], [CA452]
5	Defective mechanical system of common rail pressure sensor	Common rail pressure sensor may have mechanical trouble. Check it.
6	Defective overflow valve	Overflow valve spring may be broken, seat may be worn, and ball may be stuck. Check them.
7	Clogged overflow piping	Overflow piping may be clogged. Check it.
8	Defective pressure limiter	Pressure limiter may be defective mechanically. Check it.

2. Turn the starting switch to ON position, and start the engine.
3. Run the engine at low idle speed.
4. Check if monitoring code 19108 “DEF Pump Pressure” rises up 900 ± 100 kPa within 5 minutes.
5. After ensuring the above 4., and after 3 minutes, check if this failure code is cleared after 3 minutes.

REMARK

- If this failure code is cleared, repair is completed.
- In case it is not cleared, return to troubleshooting.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Defective KDPF differential pressure sensor</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector PDPF.
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If this failure code is changed to [CA1881], the KDPF differential pressure sensor is defective.
NOTICE
• If this failure code is displayed, the wiring harness or engine controller is defective.
• Ignore other failure codes displayed.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Open circuit in wiring harness (wire breakage of GND line or defective contact of connector)</td><td colspan="3">If failure code is still displayed after above checks on cause 2, this check is not required.
1. Turn starting switch to OFF position.
2. Disconnect connectors ECM J2 and PDPF, and connect T-adapters to each female side.</td></tr>
<tr><td>Resistance</td><td>Between ECM J2 (female) (32) and PDPF (female) (1)</td><td>Max. 10 Ω</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Short circuit in wiring harness</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors ECM J2 and PDPF, and connect T-adapter to female side of ECM J2.</td></tr>
<tr><td>Continuity</td><td>Between ECM J2 (female) (41) and each pin other than pin (41)</td><td>No continuity (no sound is heard)</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Hot short circuit in wiring harness</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector PDPF.
3. Connect T-adapter to female side of connector PDPF, or insert T-adapter to connector ECM J2.
4. Turn starting switch to ON position (with connector PDPF disconnected).</td></tr>
<tr><td>Voltage</td><td>Between ECM J2 (female) (42) and (32), or between PDPF (female) (2) and (1)</td><td>Max. 1 V</td></tr>
<tr><td>7</td><td>Defective engine controller</td><td colspan="3">If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

Failure Code [CA2288]

Action level	Failure code	Failure	Turbocharger Speed High Error 1 (Engine controller system)
L01	CA2288		
Details of failure	Turbocharger runs at abnormally high speed.		
Action of controller	Runs turbocharger speed at fixed value of 125000 rpm.		
Phenomenon on machine	Engine output decreases.		
Related information	• Speed sensed by turbocharger speed sensor can be checked with monitoring function. (Code: 48100 (rpm)) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Increased turbocharger speed	Turbocharger speed may increase abnormally high. Check it.
2	Defective turbocharger	Turbocharger may be defective. Check it.
3	Defective turbocharger speed sensor	If failure code is still displayed after above checks on cause 1, turbocharger speed sensor system may be defective. Perform troubleshooting for failure code [CA687].

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective smart sensor power supply relay system</td><td colspan="3">If failure code [CA1776] or [CA1777] is displayed, perform troubleshooting for [CA1776] or [CA1777] first.</td></tr>
<tr><td colspan="3">1. Turn starting switch to OFF position.
2. Check that system operating lamp does not light up, and then turn battery disconnect switch to OFF position.
3. Disconnect relay connector SSR, and connect T-adapter to female side.
4. Turn the battery disconnect switch to ON position.
5. Turn starting switch to ON position.
6. Perform troubleshooting for failure code [CA1776] if a failure is found.</td></tr>
<tr><td>Voltage</td><td>Between SSR (female) (5) and (4)</td><td>Min. 22 V</td></tr>
<tr><td rowspan="8">3</td><td rowspan="8">Defective sensor power supply relay</td><td colspan="3">1. Turn starting switch to OFF position.
2. Check that system operating lamp does not light up, and then turn battery disconnect switch to OFF position.
3. Disconnect connectors TDPF, NOX1, NH3, SCRT, NOX2, and UREA.
4. Insert T-adapter into connector SSR.
5. Turn the battery disconnect switch to ON position.
6. Turn starting switch to ON position.</td></tr>
<tr><td rowspan="6">Voltage</td><td>Between SSR (6) and (4)</td><td>Min. 22 V</td></tr>
<tr><td>Between SSR (7) and (4)</td><td>Min. 22 V</td></tr>
<tr><td>Between SSR (8) and (4)</td><td>Min. 22 V</td></tr>
<tr><td>Between SSR (9) and (4)</td><td>Min. 22 V</td></tr>
<tr><td>Between SSR (11) and (4)</td><td>Min. 22 V</td></tr>
<tr><td>Between SSR (12) and (4)</td><td>Min. 22 V</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Defective turbocharger outlet NOx sensor</td><td colspan="3">If all 6 failure codes of [CA2771], [CA3232], [CA3868], [CA3911], [CA4151], and [CA4152] are displayed
1. Turn starting switch to OFF position.
2. Disconnect turbocharger outlet NOx sensor (NOX1).
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">Displaying less than 6 failure codes indicates the disconnected sensor is defective.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Defective SCR outlet NOx sensor</td><td colspan="3">If all 6 failure codes of [CA2771], [CA3232], [CA3868], [CA3911], [CA4151], and [CA4152] are displayed
1. Turn starting switch to OFF position.
2. Disconnect SCR outlet NOx sensor (NOX2).
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">Displaying less than 6 failure codes indicates the disconnected sensor is defective.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Defective SCR temperature sensor</td><td colspan="3">If all 6 failure codes of [CA2771], [CA3232], [CA3868], [CA3911], [CA4151], and [CA4152] are displayed
1. Turn starting switch to OFF position.
2. Disconnect SCR temperature sensor (SCRT).
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">Displaying less than 6 failure codes indicates the disconnected sensor is defective.</td></tr>
</table>

Failure Code [CA3229]

<table>
<tr><td>Action level</td><td>Failure code</td><td rowspan="2">Failure</td><td rowspan="2">SCR Temperature High Error
(Engine controller system)</td></tr>
<tr><td>L03</td><td>CA3229</td></tr>
<tr><td>Detail of failure</td><td colspan="3">The SCR temperature is been high (800 °C or more).</td></tr>
<tr><td>Action of controller</td><td colspan="3">• Advances to Inducement strategy.
• DEF injection stops.</td></tr>
<tr><td>Phenomenon on machine</td><td colspan="3">• NOx emission increases because DEF injection is disabled.
• Engine power deration according to inducement strategy.</td></tr>
<tr><td>Related information</td><td colspan="3">⚠ Since KDPF, KDOC, and SCR are heated to 500 °C or above, be careful not to get burned.
• The SCR temperature sensor and SCR outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller.
• For the replacement procedure of the SCR temperature sensor, see “50 Disassembly and Assembly”, “Removal and installation of SCR temperature sensor”.
• After turning starting switch to OFF position, engine controller performs DEF purging (for Max. 6 minutes) and then stops. To restart engine, wait until system operating lamp goes off after turning starting switch to OFF position, and then turn starting switch to ON position.
• If regeneration is not implemented, the failure code [CA3231] may be displayed.
• The temperature detected by the SCR temperature sensor can be confirmed from the Predefined Monitoring screen.
• Use engine operation state diagnosis, DEF level, or DEF quality sensor diagnosis on the Pre-defined Monitoring screen. (The following numbers are the monitoring codes)
• Engine operation state diagnosis
01002 Engine speed
19200 Exhaust gas flow rate
47300 KDOC Inlet Temperature
19300 SCR Temperature
19302 SCR Outlet Temperature
• DEF level, DEF quantity sensor diagnosis
19100 DEF Concentration
19110 DEF Level
19111 DEF Level Corrected
19115 DEF Temperature in Tank
19400 Ambient Temperature
19305 DEF Tank Heating State
NOTICE
For this failure code, after investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Confirm Failure Correction” to make sure that the failure code is cleared. (Repair completion cannot be judged without raising the exhaust temperature even if this failure code is cleared by turning ON the starting switch)</td></tr>
</table>

Failure Code [CA3312]

Action level	Failure code	Failure	KDPF Outlet Temperature High Error 2 (Engine controller system)
L03	CA3312		
Details of failure	KDPF outlet temperature remains at very high level.		
Action of controller	• EGR valve closed. • Engine power deration • Regeneration control stops. • Fuel dosing stops..		
Phenomenon on machine	Engine power deration		

Failure Code [CA3558]

Action level	Failure code	Failure	DEF Pump Voltage High Error (Engine controller system)
L01	CA3558		
Detail of failure	High voltage error occurs in the DEF pump drive circuit.		
Action of controller	• DEF pump stops. • DEF purging stops. • Advances to Inducement strategy.		
Phenomenon on machine	• NOx emission increases because DEF injection is disabled. • Engine output is reduced based on inducement strategy.		
Related information	• If the starting switch is turned ON while the DEF pump connector is removed, this failure code is displayed. • The DEF pump operates120 seconds after starting the engine, or it operates, after starting the engine, if not in DEF thawing process, when the KDPF outlet temperature becomes over 150 °C, or when DEF pump pressure raising test is implemented. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position or operate the DEF pump.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of the failure code “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position. 3. See “Service Mode” and “METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)” of SETTING AND OPERATION OF MACHINE MONITOR, and perform an DEF Pump Pressure Up Test.		
		If this failure code is cleared, wiring harness connector is defective.		
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and DSM, and connect T-adapter to either female side.		
		Resistance	Between ECM J2 (female) (54) and DSM (female) (8)	Max. 10 Ω
			Between ECM J2 (female) (79) and DSM (female) (9)	Max. 10 Ω
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and DSM, and connect T-adapter to female side of ECM J2.		
		Continuity	Between ECM J2 (female) (6) and each pin other than (6)	No continuity
			Between ECM J2 (female) (79) and each pin other than (79)	No continuity
4	Defective DEF pump	If failure code is still displayed after above checks, DEF pump may be defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)		
5	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

No.	Cause	Procedure, measuring location, criteria and remarks
14	Improper DEF quality	1. Check the mounting of the DEF quality sensor is secured and the wiring harness connections are not loosen Repair if any abnormality is found. 2. Turn starting switch to ON position. 3. Check if failure code [CA3866] or [CA3867] is displayed. 4. Read 19100 “DEF concentration” on the display and confirm that the concentration is appropriate (29 to 36 %). 5. If failure code [CA3866] or [CA3867] is displayed and the 19100 “DEF concentration” reading is inappropriate, drain the DEF tank, clean the tank, and refill with genuine DEF. 6. Perform “Loaded Diagnostics Operation To Confirm Failure Correction” to check if this failure code is not cleared. 7. If the 19205 “Ammonia concentration (compensation value)” reading is normal (5 to 100 ppm) and the failure code is not redisplayed, the repair is completed. 8. If the ammonia concentration indicates an abnormal value or this failure code recurs, proceed to the next step.
15	Defective urea SCR system (inspection with SCR REMOVAL EFFICIENCY TEST)	1. See “TESTING AND ADJUSTING”, “SERVICE MODE” and “METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)” of “SETTING AND OPERATION OF MACHINE MONITOR”, and perform an “SCR Denitration Efficiency Test”. 2. If the “SCR Denitration Efficiency Test” has not been completed successfully, proceed to cause 10. 3. If failure code [CA1694], [CA3751], or [CA3755] is displayed after the “SCR Denitration Efficiency Test”, perform troubleshooting for relevant failure code first. 4. After the failure code in the above 3 is cleared, perform “Loaded Diagnostics Operation To Clear Failure Code” to check if this failure code is not cleared. 5. If 19205 “Ammonia concentration (compensation value)” indicates a normal value (5 to 100 ppm) and the failure code is cleared, the repair is completed. 6. If the ammonia concentration indicates an abnormal value or this failure code is not cleared, proceed to cause 13. 7. Even if the SCR REMOVAL EFFICIENCY TEST has been completed successfully and any of failure code [CA1694], [CA3751], or [CA3755] is not displayed, proceed to cause 13.

REMARK

- If this failure code is cleared, repair is completed.
- In case it is not cleared, return to troubleshooting.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Ground fault in wiring harness (contact with ground circuit)</td><td colspan="3">If failure code (no open circuit) is still displayed after above checks in cause 2, measure resistance at any one place in Hi line and Lo line.
1. Turn starting switch to OFF position.
2. Check that system operating lamp does not light up, and then turn battery disconnect switch to OFF position.
3. Disconnect all related connectors, and connect T-adapter to the female side of the connector to be measured.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between one of ECM J2 (female) (21), CTN2 (female) (A), CTN (female) (A), NOX1 (female) (3), NH3 (female) (2), TDPF (female) (3), SCRT (female) (3), NOX2 (female) (3), or UREA (female) (2) and ground</td><td>Min. 100 kΩ</td></tr>
<tr><td>Between one of ECM J2 (female) (45), CTN2 (female) (B), CTN (female) (B), NOX1 (female) (2), NH3 (female) (3), TDPF (female) (2), SCRT (female) (2), NOX2 (female) (2), or UREA (female) (3) and ground</td><td>Min. 100 kΩ</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Hot short circuit in wiring harness</td><td colspan="3">If failure code (no open circuit) is still displayed after above checks in cause 2, measure resistance at any one place in Hi line and Lo line.
1. Turn starting switch to OFF position.
2. Check that system operating lamp does not light up, and then turn battery disconnect switch to OFF position.
3. Insert T-adapter into one of the related connectors.
4. Set battery disconnect switch to ON position.
5. Turn starting switch to ON position.</td></tr>
<tr><td rowspan="2">Voltage</td><td>Between one of ECM J2(21), CTN2(A), CTN (A), NOX1(3), NH3(2), TDPF(3), SCRT(3), NOX2(3), or UREA(2) and ground</td><td>1 to 4 V</td></tr>
<tr><td>Between one of ECM J2(45), CTN2(B), CTN (B), NOX1(2), NH3(3), TDPF(2), SCRT(2), NOX2(2), or UREA(3) and ground</td><td>1 to 4 V</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Defective KDPF temperature sensor</td><td colspan="3">1. Turn starting switch to OFF position.
2. Replace KDPF temperature sensor (TDPF).
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If this failure code is cleared, the original sensor is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)</td></tr>
<tr><td>8</td><td>Defective engine controller</td><td colspan="3">If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

No.	Cause	Procedure, measuring location, criteria and remarks
5	Defective DEF pump heater	1. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”. 2. If the DEF pump temperature does not rise by at least 5 °C during the test, replace the DEF pump. 3. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”.
6	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Loaded Diagnostics Operation to Confirm Failure Correction

Check if the repair has been completed with the following procedure:

(Make sure this failure code is not displayed after this procedure.)

1. Turn the starting switch to ON position (Do not start the engine).
2. Check if monitoring code 19136 “DEF Pump Temperature” is 45 °C or below (If not, wait until monitoring code 19136 “DEF Pump Temperature” falls down to below 45 °C).
3. See “TESTING AND ADJUSTING”, “Service mode” and “Inspection menu (SCR Service Test)” in “SETTING AND OPERATION OF MACHINE MONITOR” to perform “DEF Pump Heater Relay Test”.
4. When the increase of monitoring code 19136“DEF Pump Temperature” is 5 °C or more from the start of testing within 30 minutes, repair is completed.
5. After the repair is completed, see “CLASSIFICATION AND PROCEDURES OF TROUBLESHOOTING” to clear the failure code and make sure that the failure code has been cleared from the “Abnormality Record” screen.

REMARK

When the increase of “DEF Pump Temperature is not ”5 °C or more from the start of testing after 30 minutes, return to troubleshooting.

Failure Code [CA4842]

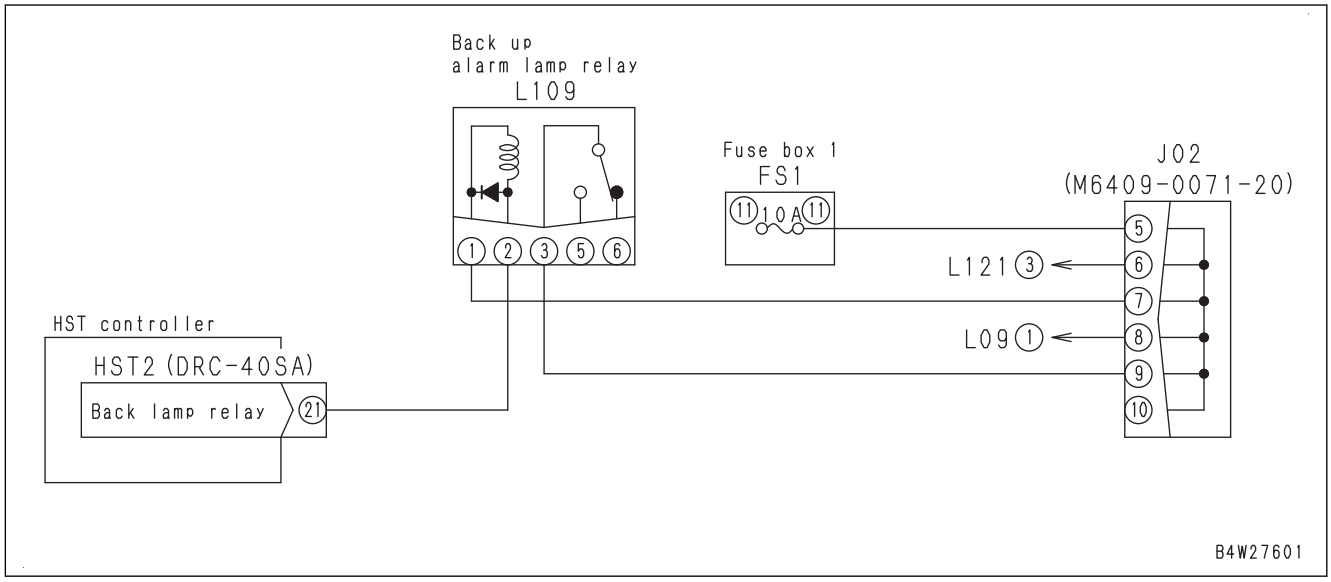
Action level	Failure code	Failure	DEF High Concentration Error
L01	CA4842		(Engine controller system)
Detail of failure	DEF concentration is high (40 % or higher)		
Action of controller	• Advances to Inducement strategy. (*1) • Stops DEF injection. (*1) • Stops DEF pump. (*1) *1: It corresponds to machines of EU, Turkey, Japan, and North America specification which equipped with engines compatible with EPA and California regulations since 2017. **REMARK** EPA and California regulations can be checked on the nameplate of the engine serial number.		
Phenomenon on machine	Engine output is reduced based on inducement strategy. (*1) *1: It corresponds to machines of EU, Turkey, Japan, and North America specification which equipped with engines compatible with EPA and California regulations since 2017. **REMARK** EPA and California regulations can be checked on the nameplate of the engine serial number.		

Failure Code [D160KY]

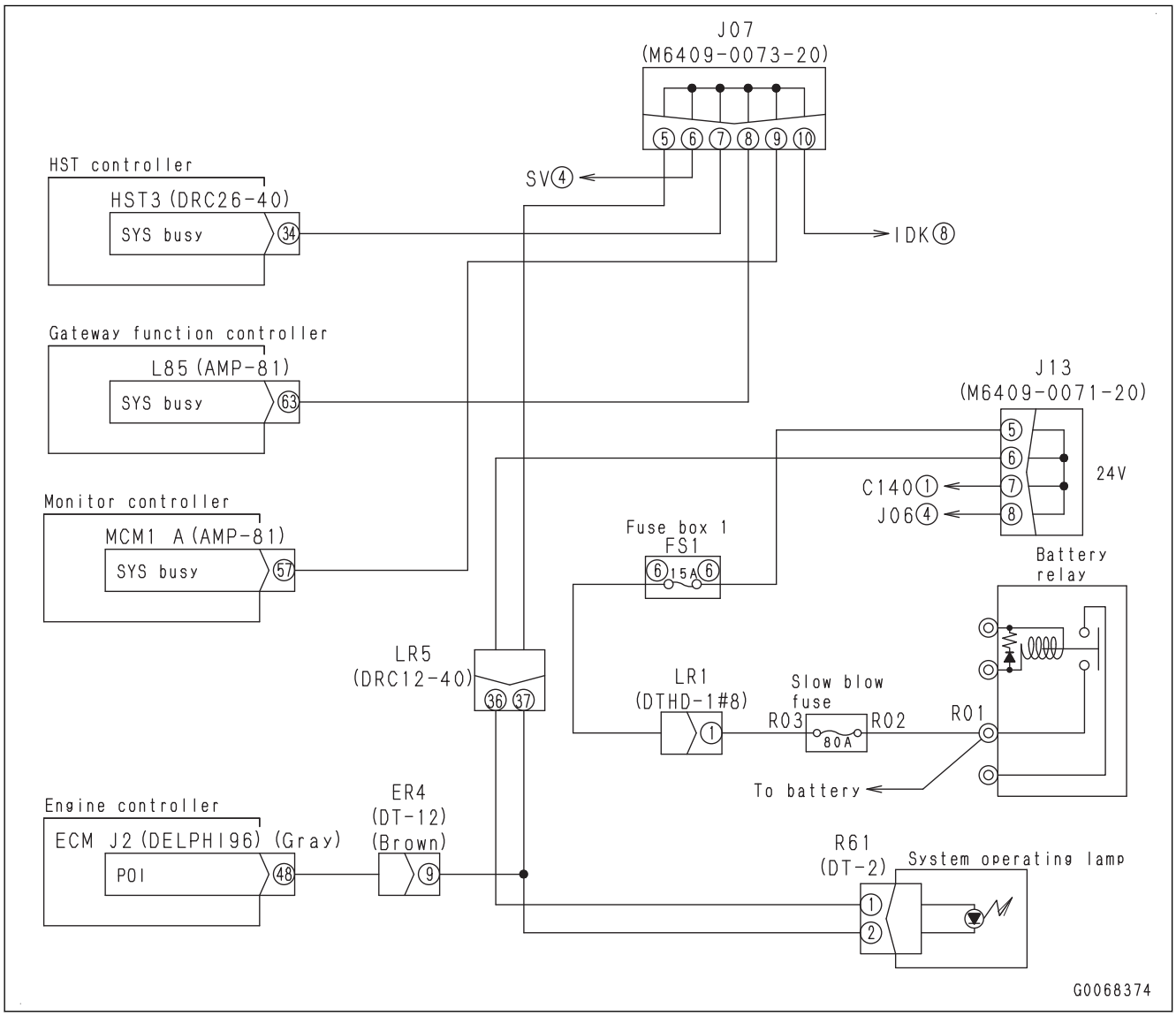
Action level	Failure code	Failure	Backup Lamp Relay Output Hot Short Circuit (HST controller system)
L01	D160KY		
Detail of failure	Due to hot short circuit in backup lamp relay output system, current flows through circuit even if controller stops driving primary circuit (coil) of backup lamp relay.		
Action of controller	• Stops driving primary circuit (coil) of backup lamp relay. • Even if cause of failure is eliminated, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	• Backup lamp stays lit. • Backup buzzer continues to sound.		
Related information	• Output state (ON/OFF) to backup lamp relay can be checked with monitoring function. (Code: 03713) • This failure code detects failure in primary (coil side) circuit of backup lamp relay, but does not detect failure in secondary (contact side) circuit. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position, and operate directional (FNR) lever to R (reverse).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective HST controller	If no failure is found by preceding checks, HST controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		
2	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connector L109, and connect the T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between L109 (female) (1) and (2)	Max. 4.5 V

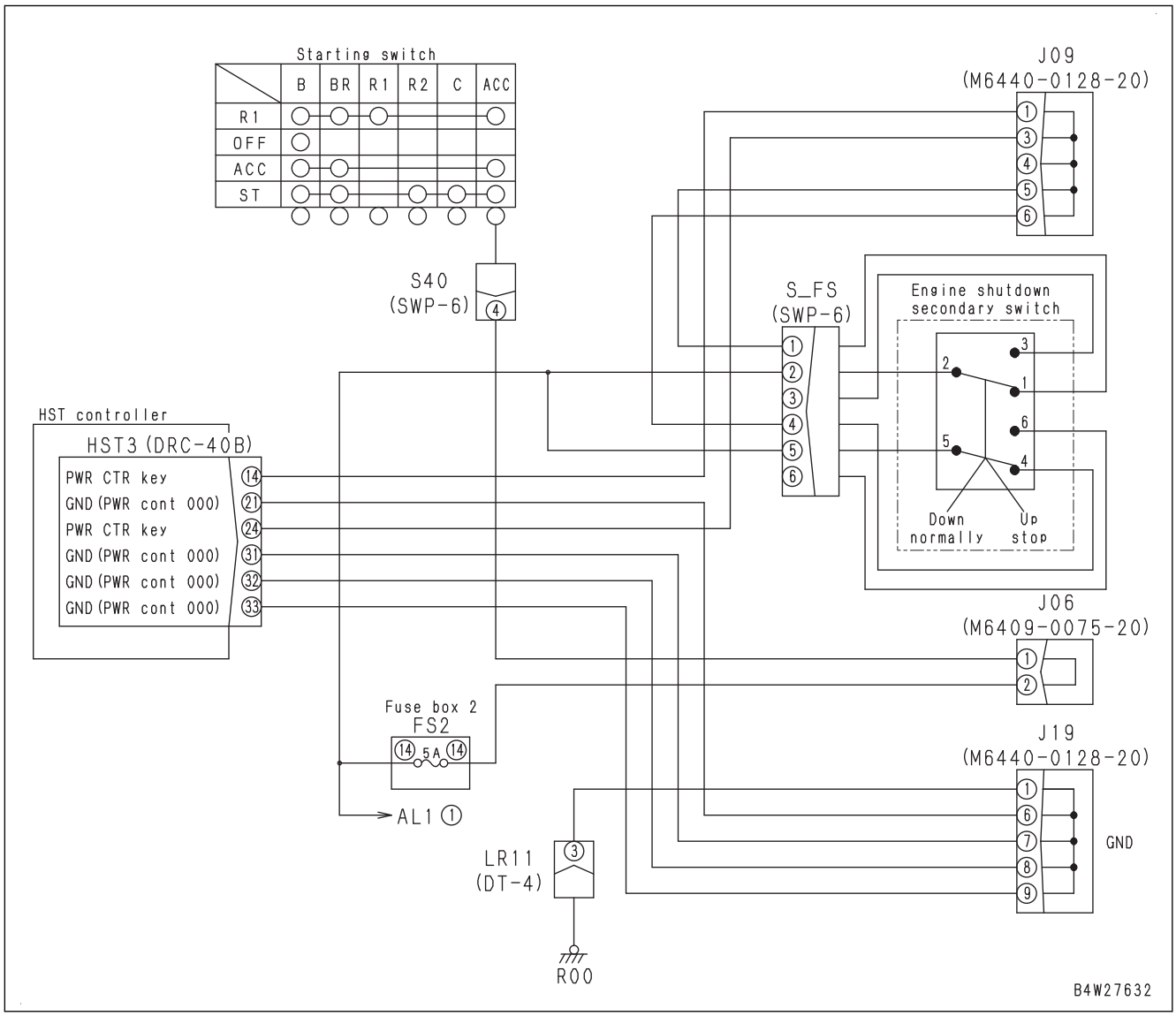
Circuit Diagram Related to Backup Lamp Relay



Circuit Diagram of System Operating Lamp



Circuit Diagram Related to ACC Signal



Failure Code [DAZ9KQ]

Action level	Failure code	Failure	Model Selection Signal Mismatch (Air Conditioner) (Machine monitor system)
-	DAZ9KQ		
Detail of failure	Model in machine monitor program is different from that in air conditioner controller program (replaced monitor controller or air conditioner controller is wrong in part No.)		
Action of controller	None in particular		
Phenomenon on machine	Air conditioner may not operate normally.		
Related information	• Machine model code of machine monitor program can be checked with monitoring function. (Code: 00205) • Air conditioner control data (machine model and series) on machine monitor can be checked with monitoring function. (Code: 55201). • Control data of air conditioner controller (machine model and series) can be checked with monitoring function (Code: 55201). (Control data must be 30 (indicating WA).) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Wrong setting by monitor controller	Check if the model setting of monitor controller is correct. **REMARK** See Testing and Adjusting, “Default Menu”.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="6">3</td><td rowspan="6">Open circuit in wiring harness</td><td colspan="4">1. Turn the starting switch to OFF position.
2. Remove the fuse No.12 in the fuse box FS1.
3. Disconnect the connectors HST3 and L02, and connect the T-adapter to each female side.</td></tr>
<tr><td rowspan="5">Resistance</td><td colspan="2">Between FS1-12 and L02 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between HST3 (female) (10) and L02 (female) (2)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between HST3 (female) (20) and L02 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between HST3 (female) (30) and L02 (female) (4)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between L02 (female) (9) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="5">4</td><td rowspan="5">Ground fault in wiring harness</td><td colspan="4">1. Turn the starting switch to OFF position.
2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position.
3. Disconnect the connectors HST3 and L02, and connect the T-adapter to either female side.
4. Disconnect connectors S_RH4, S_RH7, L62, L102 and HST3, and connect T-adapter to female side of HST3 and L02.</td></tr>
<tr><td rowspan="4">Resistance</td><td colspan="2">Between ground and either FS1-12 or L02 (female) (1)</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Between ground and either HST3 (female) (10) or L02 (female) (2)</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Between ground and either HST3 (female) (20) or L02 (female) (3)</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Between ground and either HST3 (female) (30) or L02 (female) (4)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="7">5</td><td rowspan="7">Defective directional (FNR) lever switch signal line</td><td colspan="4">1. Turn the starting switch to OFF position.
2. Insert T-adapter into connector HST3.
3. Turn the starting switch to ON position.
REMARK
If there is any failure, it may be defective contact. Check it again.</td></tr>
<tr><td rowspan="6">Voltage</td><td rowspan="2">Between HST3 (20) and ground</td><td>Directional (FNR) lever: N (neutral)</td><td>20 to 30 V</td></tr>
<tr><td>Directional (FNR) lever: Other than N</td><td>Max. 1 V</td></tr>
<tr><td rowspan="2">Between HST3 (10) and ground</td><td>Directional (FNR) lever: F (FORWARD)</td><td>20 to 30 V</td></tr>
<tr><td>Directional (FNR) lever: Other than F</td><td>Max. 1 V</td></tr>
<tr><td rowspan="2">Between HST3 (30) and ground</td><td>Directional (FNR) lever: R (reverse)</td><td>20 to 30 V</td></tr>
<tr><td>Directional (FNR) lever: Other than R</td><td>Max. 1 V</td></tr>
<tr><td>6</td><td>Defective HST controller</td><td colspan="4">If no failure is found by preceding checks, HST controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

Failure Code [DHPEKA]

Action level	Failure code	Failure	Steering & Loader Pump Pressure Sensor Signal Open Circuit or Ground Fault (HST controller system)
L01	DHPEKA		
Detail of failure	Due to open circuit or ground fault in pump pressure sensor system, pump oil pressure signal voltage is lower than the normal range. (HST pump pressure sensor signal voltage: 0.3 V and below)		
Action of controller	• Operates pump with its pressure regard as 0 MPa. • If cause of failure is eliminated, machine becomes normal by itself.		
Phenomenon on machine	• Depending on the work condition, engine speed and power may be slightly low. • When traction control is set, rim pull may be higher than normal. • Komatsu SmartLoader Logic malfunctions. • ECO guidance function does not work normally.		
Related information	• Voltage detected by steering and work equipment pump pressure sensor can be checked with monitoring function. (Code: 95305) • Steering and work equipment pump pressure can be checked with monitoring function. (Code: 95304) • If failure code [DAJ6KX] is displayed, perform troubleshooting for it first. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Start the engine.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors HST1, HST2 and RR03, and connect the T-adapter to each female side.		
		Resistance	Between HST2 (female) (1) and RR03 (female) (3)	Max. 1 Ω
			Between HST2 (female) (35) and RR03 (female) (2)	Max. 1 Ω
			Between HST1 (female) (4) and RR03 (female) (1)	Max. 1 Ω
2	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Disconnect the connectors HST1, HST2 and RR03, and connect the T-adapter to any female side.		
		Resistance	Between ground and HST2 (female) (35) or RR03 (female) (2)	Min. 1 MΩ
3	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Disconnect the connectors HST1, HST2 and RR03, and connect the T-adapter to each female side.		
		Resistance	Between HST1 (female) (4) and HST2 (female) (35), or between RR03 (female) (1) and (2)	Min. 1 MΩ

Failure Code [DK5DKY] (Applicable Machine: 85001 to 87648)

Action level	Failure code	Failure	3rd Lever Potentiometer Sensor Signal Hot Short Circuit (Main) (HST controller system)
L03	DK5DKY		
Detail of failure	Due to hot short circuit in 3rd valve (PCS) lever potentiometer (main: A line) system, 3rd valve (PCS) lever potentiometer (main: A line) signal voltage is higher than the normal range. (3rd valve (PCS) lever potentiometer (main: A line) signal voltage: 4.7 V and above)		
Action of controller	• Controls by using 3rd valve (PCS) lever potentiometer (sub: B line) if 3rd valve (PCS) lever potentiometer (sub: B line) is normal. However, in this case, controller decreases the work equipment speed to 30 % of normal speed. • Makes centralized warning lamp light up and alarm buzzer sound. • Even if cause of failure is eliminated, machine does not become normal until 3rd valve (PCS) lever is set to NEUTRAL position. • Even if cause of failure is eliminated, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	• Attachment expands momentarily, then it can be controlled by using signals from sub potentiometer. • However, work equipment speed decreases to 30 % of normal speed.		
Related information	• This failure code is not displayed on a machine that is not equipped with 3rd valve (PCS). (If this failure code is displayed on the machine that is not equipped with 3rd valve, select “None” for 3rd valve (PCS) setting on option setting screen of machine monitor.) • Input voltage from 3rd valve (PCS) potentiometer (main: A line) can be checked with monitoring function. (Code: 42018) • Input voltage from 3rd valve (PCS) potentiometer (sub: B line) can be checked with monitoring function. (Code: 42019) • If failure code [DAJ6KX] is displayed at the same time, perform troubleshooting for it first. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connector L70, and connect the T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between L70 (female) (2) and (4)	Max. 1 V
2	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors HST1 and L70, and connect the T-adapter to female side of HST1.		
		Continuity	Between HST1 (female) (19) and each pin other than HST1 (female) (19)	No continuity

Failure Code [DKA0L0]

Action level	Failure code	Failure	Boom angle sensor signal mismatch (ICT controller system)
L01	DKA0L0		
Detail of failure	Due to boom angle sensor dislocation, boom angle is not detected correctly. (Boom angle exceeds its upper limit +5 ° or boom angle does not reach its lower limit -5 °.)		
Action of controller	• Cannot control the engine speed and power precisely depending on the work condition. • Does not correct the PZ auto tilt-in, load meter measurement, and boom kick-out initial position dislocation (calculates with incorrect data). • Disables boom FLOAT detent function when remote positioner LOWER stop function is ON, and allows boom FLOAT detent function to work normally when remote positioner LOWER stop function is OFF. • Disables boom RAISE detent function • If cause of failure is eliminated, machine becomes normal by itself. (When the cause is improper adjustment of angle sensor.)		
Phenomenon on machine	• Machine cannot control the engine speed and power precisely depending on the work condition. • Performance error of PZ auto tilt-in is generated. • Boom kick-out initial position is dislocated. • Defective function of Komatsu SmartLoader Logic. (Fuel consumption increases since engine control is not optimized.)		
Related information	• If failure code [DAJ6KX] is displayed at the same time, perform troubleshooting for it first. • If installing position of boom angle sensor is dislocated, this failure code may be displayed. In this case, adjust it. For details, see TESTING AND ADJUSTING. • If installing position of boom angle sensor is dislocated, this failure code may be displayed. In this case, adjust it. For details, see TESTING AND ADJUSTING. • Input voltage detected by boom angle sensor can be checked with monitoring function. (Code: 06007) • Angle of boom angle sensor can be checked with monitoring function. (Code: 06006) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Start the engine, and perform boom RAISE or LOWER to stroke end		

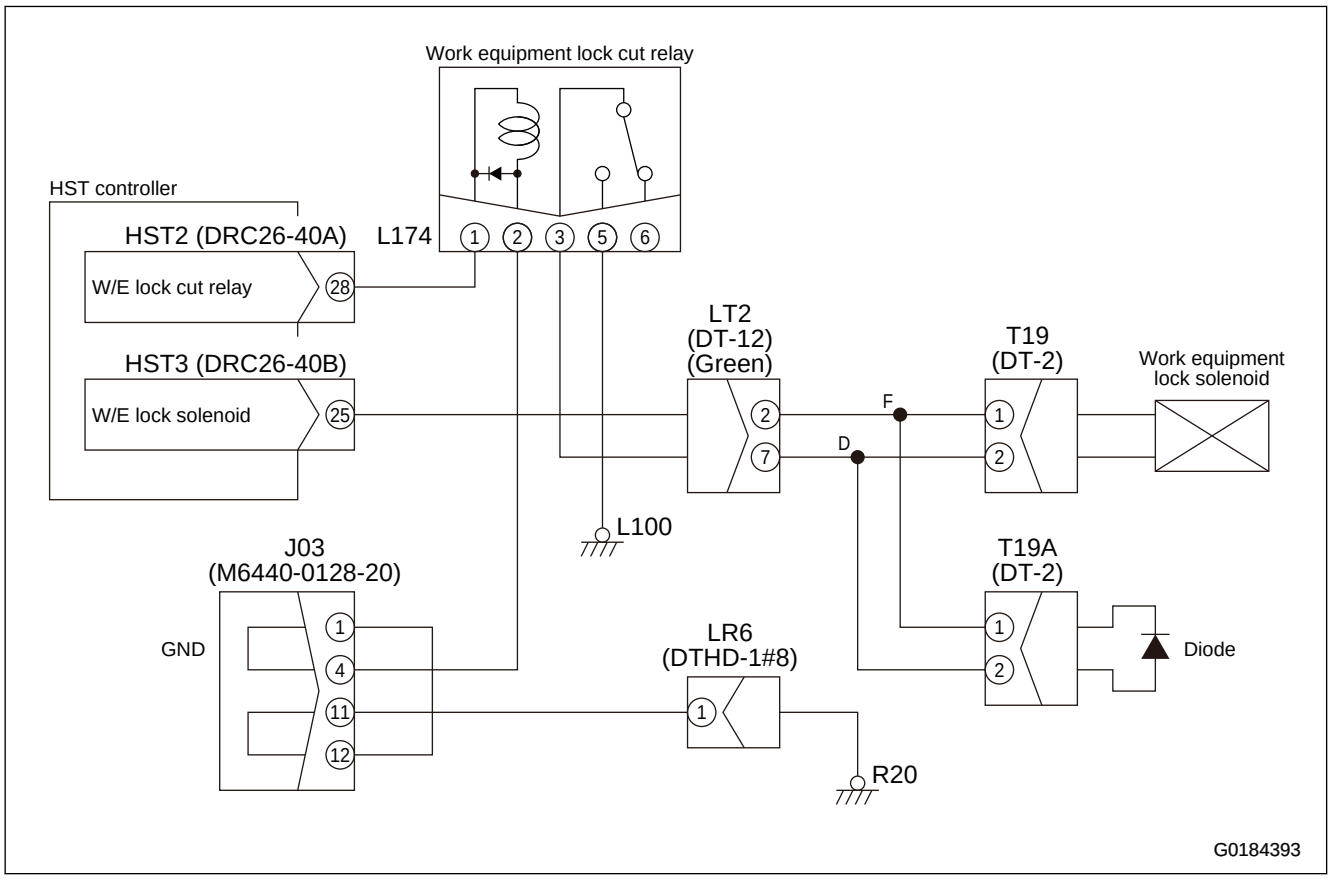
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective boom angle sensor	1. Turn the starting switch to OFF position. 2. Insert T-adapter into the connector F15. 3. Start the engine. 4. Operate boom lever to perform troubleshooting.			
		Voltage	Between F15 (B) and (A)	Always	1.13 to 4.02 V
				RAISE stroke end	3.52 to 4.02 V
				LOWER stroke end	1.13 to 1.63 V

Failure Code [DT22KB] (Applicable Machine: 87649 and Up)

Action level	Failure code	Failure	Work Equipment Lock Switch Indicator Ground Fault (Machine monitor system)
L01	DT22KB		
Detail of failure	Since output circuit of lamp built in work equipment lock switch has ground fault, the lamp built in work equipment lock switch is not driven.		
Action of controller	• None in particular • Even if cause of failure is eliminated, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	Lamp built in work equipment lock switch does not light up.		
Related information	• Output state (ON/OFF) to lamp built in work equipment lock switch can be checked with monitoring function. (Code: 04700) • As T-adapter for monitor controller connector is “socket-type box”, operating voltage cannot be measured at monitor controller connector. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Disconnect the connectors S_RHC and MCM1 A, and connect the T-adapter to either female side.			
		Resistance	Between ground and either MCM1 A (female) (58) or S_RHC (female) (1)		Min. 1 MΩ
2	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors MCM1 A and S_RHC, and connect the T-adapter to female side of S_RHC.			
		Resistance	Between S_RHC (female) (1) and (2)		Min. 1 MΩ
3	Defective work equipment lock switch indicator	1. Turn the starting switch to OFF position. 2. Insert the T-adapter into connector MCM1 A. 3. Turn the starting switch to ON position. 4. Turn the work equipment lock switch ON/OFF to perform troubleshooting.			
		Voltage	Between MCM1 A (58) and ground	When the switch is turned on	20 to 30 V
				When the switch is turned off	Max. 1 V
4	Defective monitor controller	If no failure is found by above checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).			

Circuit Diagram Related to Work Equipment Neutral Lock Solenoid



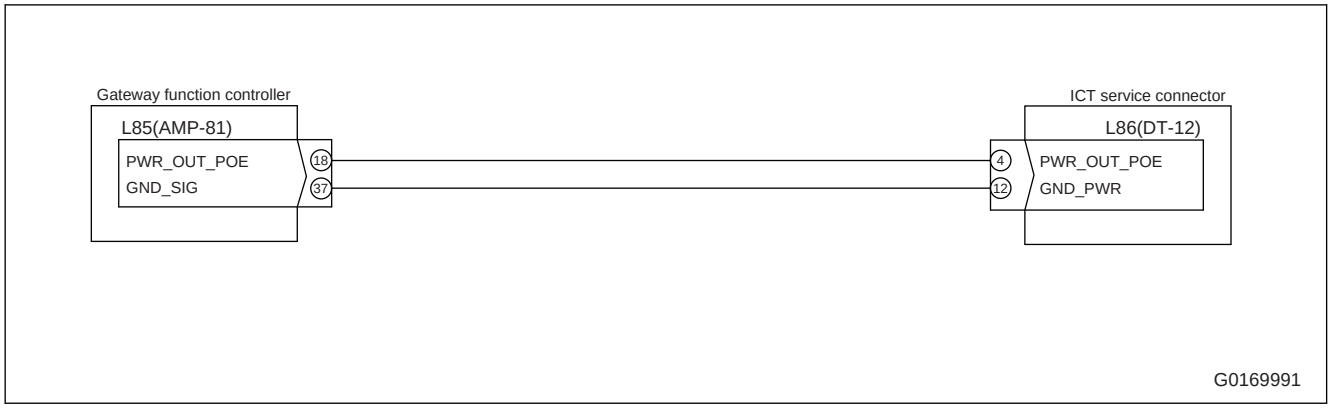
Failure Code [DXH8KA]

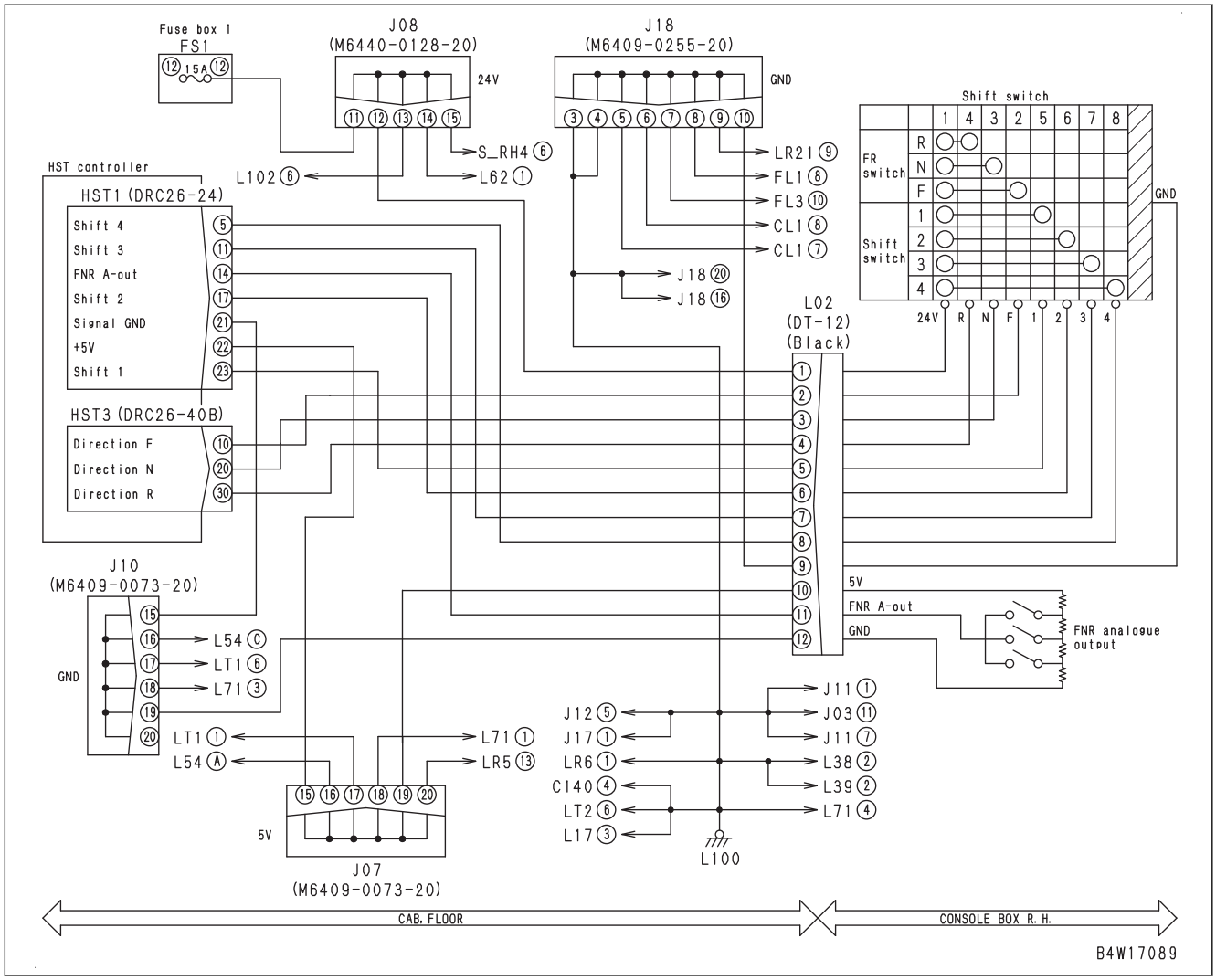
Action level	Failure code	Failure	Forward Solenoid Open Circuit (HST controller system)
L03	DXH8KA		
Detail of failure	Due to open circuit in HST pump solenoid (forward) output signal system, no current flows when controller drives HST pump solenoid (forward).		
Action of controller	• Makes centralized warning lamp light up and alarm buzzer sound. • Even if cause of failure is eliminated, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	Machine does not move forward.		
Related information	• Output current value to HST pump solenoid (forward) can be checked with monitoring function. (Code: 03714) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Start the engine and move forward.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective HST pump solenoid	1. Turn the starting switch to OFF position. 2. Disconnect the connector T01-1F, and connect the T-adapter to male side.		
		Resistance	Between T01-F (male) (1) and (2)	15 to 35 Ω
			Between T01-F (male) (1) and ground	Min. 1 MΩ
2	Defective circuit related to HST pump solenoid	1. Turn the starting switch to OFF position. 2. Disconnect the connector T01-F, and connect the T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between T01-F (female) (1) and (2)	Max. 4.5 V
3	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors HST2 and T01-F, and connect the T-adapter to each female side.		
		Resistance	Between HST2 (female) (19) and T01-F (female) (1)	Max. 1 Ω
			Between T01-F (female) (2) and ground	Max. 1 Ω
4	Defective HST controller	HST controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

<table>
<tr><th>No.</th><th>Check item</th><th colspan="4">Procedure of troubleshooting</th><th colspan="2">Judgment and remedy</th></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Short circuit in wiring harness</td><td colspan="4">1. Turn the starting switch to the OFF position.
2. Disconnect the connectors L85 and L86. Connect a T-adapter to the female side of L85.
3. Measure the resistance.
4. Does the troubleshooting result agree with the standard value?</td><td>YES</td><td>• The wiring harness does not have a short circuit.
• Go to the next check item.</td></tr>
<tr><td>Item</td><td colspan="2">Measurement position, condition</td><td>Standard value</td><td rowspan="2">NO</td><td rowspan="2">• The wiring harness has a short circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td>Resistance</td><td colspan="2">Between L85 (female) (18) and each pin other than pin (18)</td><td>Min. 1MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Confirmation of check results</td><td colspan="4" rowspan="2">1. Do the troubleshooting above again.
2. Can you find the cause by the check?</td><td>YES</td><td>The repair is done.</td></tr>
<tr><td>NO</td><td>• The gateway function controller can be defective.
• Replace the gateway function controller.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Confirmation of repair</td><td colspan="4" rowspan="2">1. Turn the starting switch to the OFF position.
2. Connect all the component parts.
3. Turn the starting switch to the ON position. Then, do the troubleshooting.
4. Is this failure code shown?</td><td>YES</td><td>Go back to the first check item.</td></tr>
<tr><td>NO</td><td>The repair is done.</td></tr>
</table>

Circuit Diagram of Gateway Function Controller




Fuse box 1
FS1
15A
J08
(M6440-0128-20)
24V
J18
(M6409-0255-20)
GND
Shift switch
FR switch
Shift switch
GND
HST controller
HST1 (DRC26-24)
Shift 4
Shift 3
FNR A-out
Shift 2
Signal GND
+5V
Shift 1
HST3 (DRC26-40B)
Direction F
Direction N
Direction R
L102
S_RH4
L62
LR21
FL1
FL3
CL1
CL1
J18
J18
L02
(DT-12)
(Black)
5V
FNR A-out
GND
FNR analogue output
J10
(M6409-0073-20)
GND
L54
LT1
L71
LT1
L54
L71
LR5
J12
J17
LR6
C140
LT2
L17
J11
J03
J11
L38
L39
L71
L100
5V
J07
(M6409-0073-20)
CAB. FLOOR
CONSOLE BOX R. H.
B4W17089

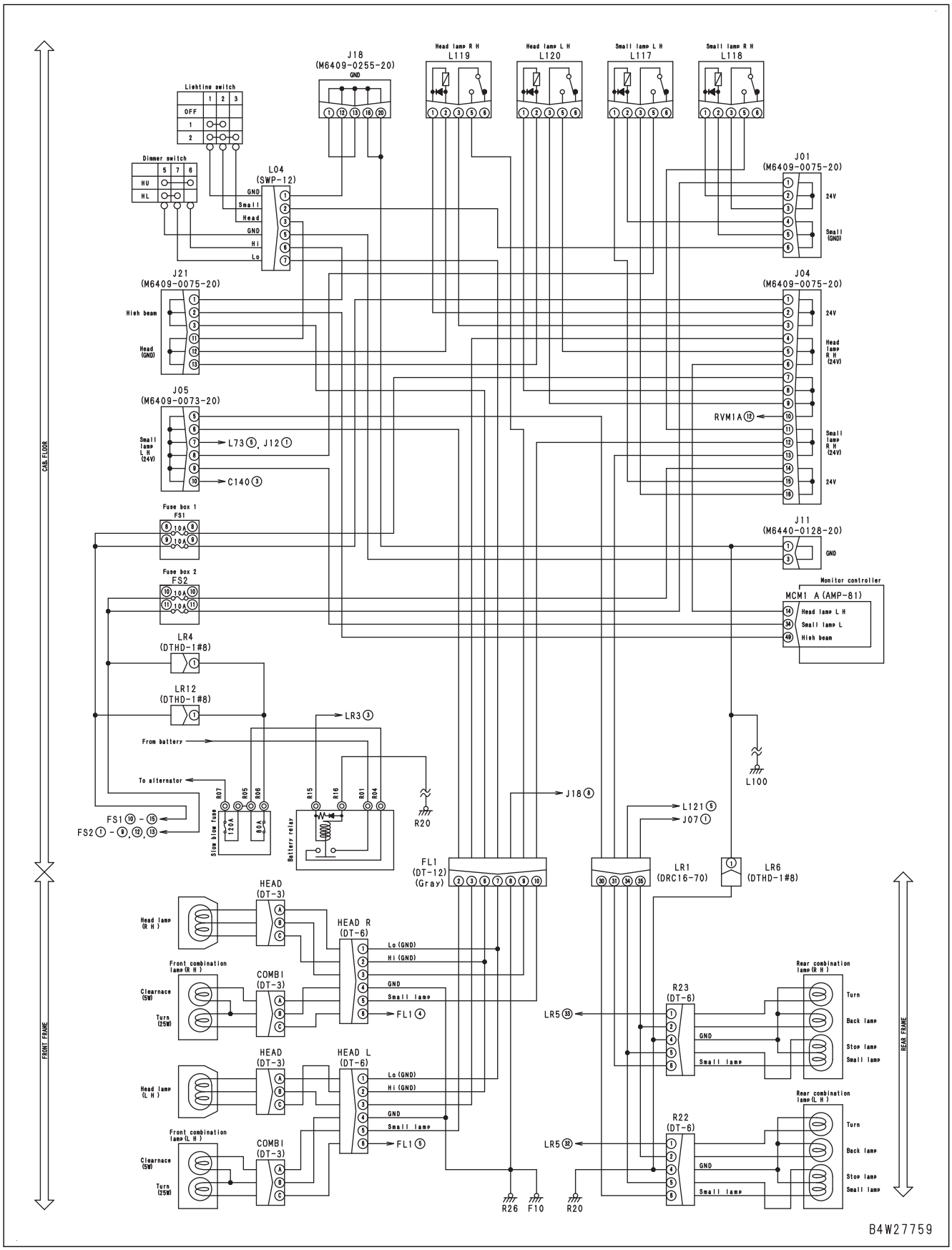
E-15 Some Items of Gauges and Caution Lamps on Machine Monitor are Not Shown Normally

Failure	Some items of gauges and caution lamps are not displayed properly.
Related information	If mechanical system failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective sensor or switch	Perform troubleshooting for failure code related to defective sensor or switch.
2	Defective CAN communication system	Perform troubleshooting for failure code related to defective CAN communication.
3	Defective machine monitor	If no failure is found by checks on causes 1 and 2, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="8">4</td><td rowspan="8">Open circuit in wiring harness (Wire breakage or defective contact of connector)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector ER4, and connect T-adapter to female side.
3. Turn starting switch to ON position.
4. Turn emergency HST pump drive switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between ER4 (female) (1) and (2)</td><td>20 to 30 V</td></tr>
<tr><td colspan="3">If no failure is found by above checks, this check is not required.
1. Turn starting switch to OFF position.
2. Disconnect connector ER4, and connect T-adapter to female side.
3. Remove fuse-15 in fuse box 1 (FS1).
4. Turn emergency HST pump drive switch to ON position.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between ER4 (female) (1) and FS1-5</td><td>Max.1 Ω</td></tr>
<tr><td>Between ER4 (female) (2) and ground</td><td>Max.1 Ω</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Open circuit or ground fault in wiring harness</td><td colspan="3">If no failure is found by above checks, this check is not required.
1. Turn starting switch to OFF position.
2. Disconnect connector C26, and connect T-adapter to female side.
3. Remove fuse-15 in fuse box 1 (FS1).</td></tr>
<tr><td>Resistance</td><td>Between C26 (female) (8) and ground</td><td>Min.1 MΩ</td></tr>
</table>

Circuit Diagram Related to Headlamp, Clearance Lamp, and Tail Lamp



No.	Cause	Procedure, measuring location, criteria and remarks		
6	Defective flasher unit	1. Starting switch: OFF 2. Insert T-adapter into connector L132. 3. Turn the starting switch to ON position 4. Troubleshoot hazard lamp switch for both of ON and OFF.		
		Voltage	Between L132 (female) (4) and (1)	Pulse of 20 to 30 V and 0 V
7	Open circuit 2 in wiring harness (wire breakage or defective contact of connector)	1. Turn the starting switch to OFF position. 2. Disconnect connectors L124, L125, and L132, and connect T-adapters to each female side.		
		Resistance	Between L125 (female) (3) and L132 (female) (3)	Max. 1 Ω
			Between L132 (female) (4) and L04 (female) (9)	Max. 1 Ω
			Between L132 (female) (4) and L124 (female) (1)	Max. 1 Ω
			Between L132 (female) (4) and L124 (female) (3)	Max. 1 Ω
			Between L132 (female) (1) and ground	Max. 1 Ω
8	Ground fault in wiring harness (contact with ground circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connectors L125 and L132, and connect T-adapter to either female side.		
		Resistance	Between ground and L125 (female) (3) or L132 (female) (3)	Min. 1 MΩ
			Between ground and L132 (female) (4) or L04 (female) (9)	Min. 1 MΩ
9	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors L04 and L132, and connect T-adapter to either female side. 3. Turn the starting switch to ON position.		
		Voltage	Between ground and L132 (female) (4) or L04 (female) (9)	Max. 1 V

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="10">4</td><td rowspan="10">Defective front wiper switch (internal defect)</td><td colspan="4">1. Starting switch: OFF
2. Disconnect connector L21, and connect T-adapter to male side.</td></tr>
<tr><td rowspan="10">Resistance</td><td rowspan="2">Between L21 (male) (7) and (5)</td><td>Front wiper switch: Lo</td><td>Max. 1 Ω</td></tr>
<tr><td>Front wiper switch: INT, Hi</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">Between L21 (male) (7) and (4)</td><td>Front wiper switch: Hi</td><td>Max. 1 Ω</td></tr>
<tr><td>Front wiper switch: INT, Lo</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">Between L21 (male) (7) and (2)</td><td>Front wiper switch: INT</td><td>Max. 1 Ω</td></tr>
<tr><td>Front wiper switch: Lo, Hi</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">Between L21 (male) (3) and (5)</td><td>Front wiper switch: INT</td><td>Max. 1 Ω</td></tr>
<tr><td>Front wiper switch: Lo, Hi</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Between ground and each of L21 (male) (2), (3), (4), (5) and (7)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="11">5</td><td rowspan="11">Open circuit 2 in wiring harness (wire breakage or defective contact of connector)</td><td colspan="4">INT operation related
If INT operation is not abnormal, this check is not required.
1. Turn the starting switch to OFF position.
2. Disconnect connectors L21 and L31, and connect T-adapters to female side of L21.
3. Remove fuse No.14 in fuse box FS1.</td></tr>
<tr><td rowspan="5">Resistance</td><td colspan="2">Between L31 (female) (1) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between FS1-14 and L31 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between L21 (female) (2) and L31 (female) (4)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between L21 (female) (3) and L31 (female) (5)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Between L31 (female) (6) and L57 (female) (5)</td></tr>
<tr><td colspan="4">Front wiper motor related
If no failure is found by check of each input voltage on cause 3, this check is not required.
1. Turn the starting switch to OFF position.
2. Disconnect connectors L57 and L21, and connect T-adapters to each female side.
3. Remove fuse No.14 in fuse box FS1.</td></tr>
<tr><td rowspan="4">Resistance</td><td colspan="2">Between FS1-14 and L57 (female) (6)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between L21 (female) (4) and L57 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between L21 (female) (5) and L57 (female) (2)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between L21 (female) (7) and FS1-14</td><td>Max. 1 Ω</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="4">8</td><td rowspan="4">Defective oil pressure 2 of HST line</td><td colspan="4">Be ready with engine stopped, select “Measure HST stall pressure” by adjustment menu in service mode, set speed range selector switch to 2nd, traction control switch to MAX, directional lever to F, and with brake pedal depressed, raise the engine speed gradually from low idle.</td></tr>
<tr><td rowspan="3">HST oil pressure (MB)</td><td rowspan="3">Engine speed</td><td>Low idle</td><td>2.0 ± 0.2 MPa {20 ± 2.0 kgf/cm^2}</td></tr>
<tr><td>1460 ± 20 rpm</td><td>40 (+0.5/-2.5) MPa {408 (+5/-27) kgf/cm^2}</td></tr>
<tr><td>Min. 2000 rpm</td><td>45 (+1.0/-3.3) MPa {459 (+10/-33) kgf/cm^2}</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Defective oil pressure 3 of HST line</td><td colspan="4">If HST oil pressure (MB) is low even if engine speed is raised, clutch solenoid valve, clutch and HST pump (body, high-pressure cut-off valve, EV valve,directional solenoid valve, bypass and shuttle valve) may be defective.</td></tr>
<tr><td colspan="4">• If HST oil pressure (MB) is low even if engine speed is raised, and clutch solenoid valve and clutch are not defective, HST pump may be defective.
• Even if the engine speed is raised gradually from low idle with directional lever at F position, if HST pump servo cylinder pressure (port X2) does not pick up, high-pressure cut-off valve of HST pump, EV valve, directional solenoid valve, bypass and shuttle valve may be defective.
check that bypass and shuttle valve is not loose, and if no failure is found, replace the parts or HST pump assembly.
• Servo cylinder pressure picks up but HST oil pressure (MB) is low even if engine speed is raised, piston pump body may be defective. HST pump assembly should be replaced.
In normal state, servo cylinder pressure (port X2) with directional lever at F and engine at high idle is approximately 2 MPa and above.</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Defective HST motor 1</td><td colspan="4">When the oil pressure of HST circuit is normal, check the maximum speed of 2nd, and check that HST motor 1 is not defective.
Set the speed range to 2nd, drive on the level ground, and check the travel speed (maximum speed) with speedometer.</td></tr>
<tr><td>Travel speed</td><td>Speed range selector switch</td><td>2nd</td><td>Approx. 13 to 16 km/h
(Speedometer indication)</td></tr>
<tr><td colspan="4">When travel speed does not pick up normally even if speed range is set to 2nd, the solenoid valve controlling the plate angle of HST motor 1 or HST motor 1 itself may be defective, thus motor 1 capacity may not decrease.</td></tr>
<tr><td>11</td><td>Defective HST motor 2</td><td colspan="4">When travel speed does not pick up to approximately 38 km/h even if speed range is set to 4th, the solenoid valve controlling the plate angle of HST motor 2 or HST motor 2 itself may be defective, thus motor 2 capacity may not decrease.</td></tr>
</table>

H-24 Bucket Slows Down During Tilt Back Operation

Failure	Bucket decelerates during tilt-back operation.
Related information	Check bucket and bucket cylinder for visible deformation.

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective bucket cylinder	Swelling of bucket cylinder tube or damage of cylinder inside is suspected. Disassemble the bucket cylinder and check it. **REMARK** For the other abnormal phenomena during bucket operation, see “Bucket Moves Slow or Lacks Tilt-Back Force” in H mode.

S-14 Engine Oil Pressure Drops

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

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

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
TOPS	Tip-Over Protective Structure	Cab and canopy	This is a protective structure that intended to protect the operator wearing seat belt from suffering injury which may be caused if the cab is crushed when the machine tips over. (Roll-over protective structure of hydraulic excavator) This performance is standardized as ISO 12117.
TWV	2-Way Valve	Hydraulic system	This is a solenoid valve that switches over direction of flow.
VGT	Variable Geometry Turbocharger	Engine	This is a turbocharger on which the cross-section area of the exhaust passage is variable.
VHPC	Variable Horse Power Control	Engine control	This is a function that finely controls the maximum output of the machine so that high work efficiency and low fuel consumption rate are both achieved.

*1: Code for applicable machine model

D: Bulldozer

HD: Dump truck

HM: Articulate dump truck

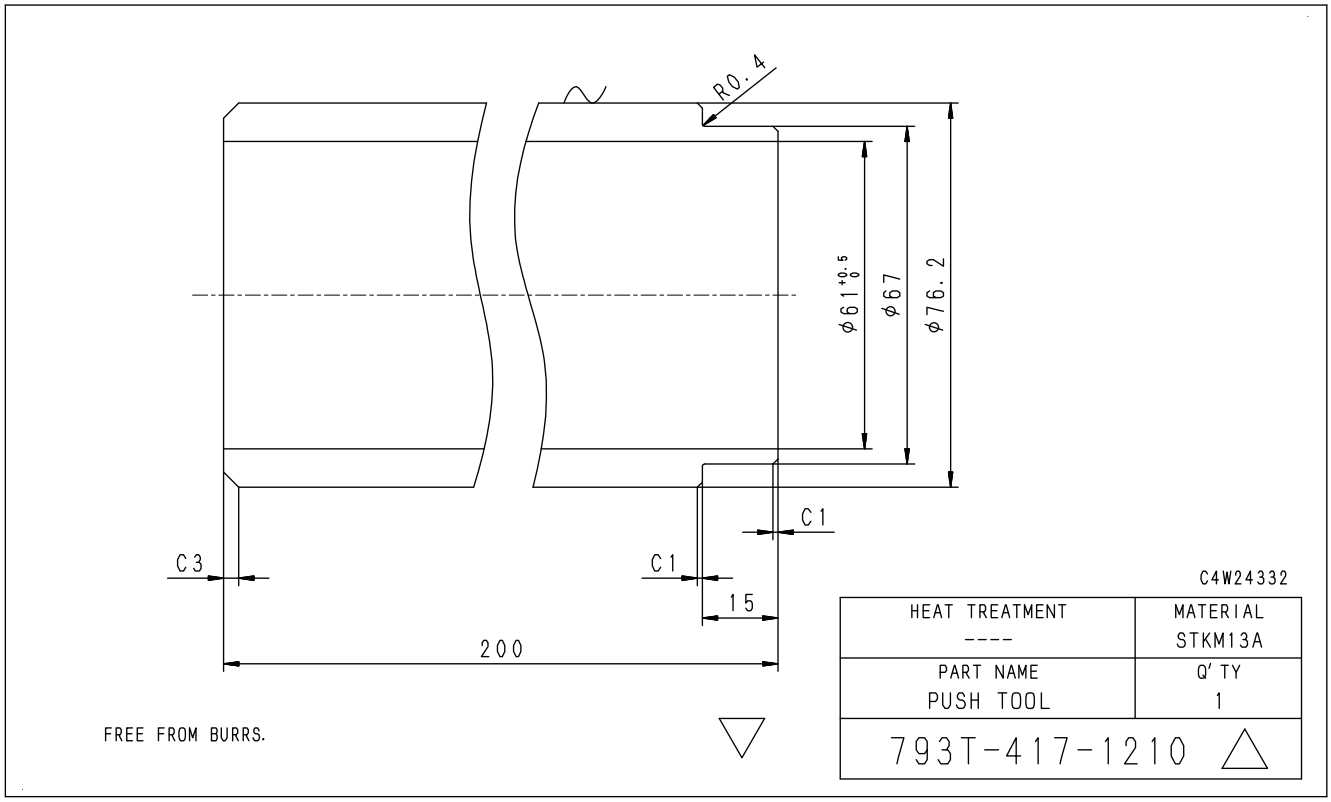
PC: Hydraulic excavator

WA: Wheel loader

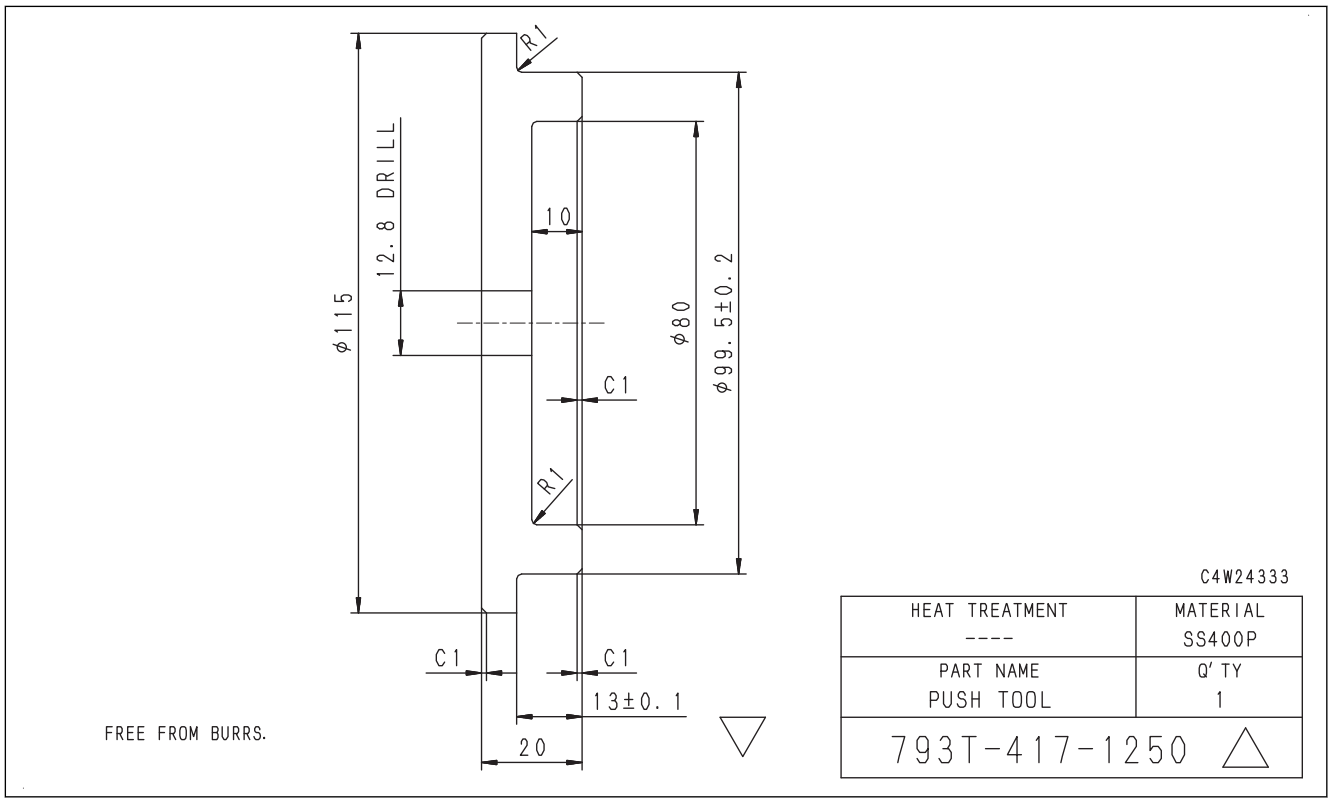
List of Abbreviations Used in the Circuit Diagrams

Abbreviation	Actual word spelled out
A/C	Air Conditioner
A/D	Analogue-to-Digital
A/M	Air Mix Damper
ACC	Accessory
ADD	Additional
AUX	Auxiliary
BR	Battery Relay
CW	Clockwise
CCW	Counter Clockwise
ECU	Electronic Control Unit
ECM	Electronic Control Module
ENG	Engine
EXGND	External Ground
F.G.	Frame Ground
GND	Ground
IMA	Inlet Metering Actuator
NC	No Connection

793T-417-1210: Push Tool



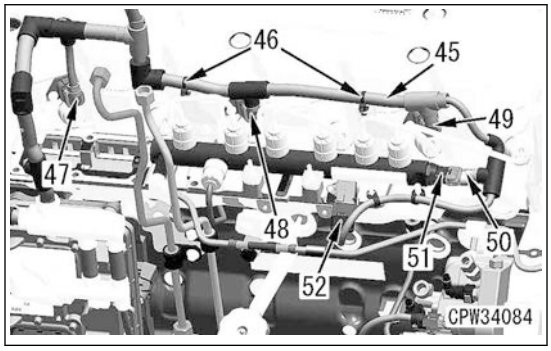
793T-417-1250: Push Tool



NOTICE

The fuel spray prevention caps are installed so that fuel will not spout over the hot part of the engine and catch fire when it leaks by any chance.

22. Connect the connectors INJECTOR CYL. 1 & 2 (47), INJECTOR CYL. 3 & 4 (48), INJECTOR CYL. 5 & 6 (49) to the cylinder head with the clips (46) (2 pieces) of the wiring harness (45).

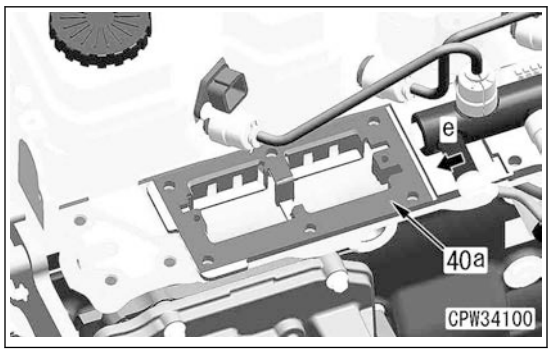


Air intake assembly

23. Install the gasket (40a).

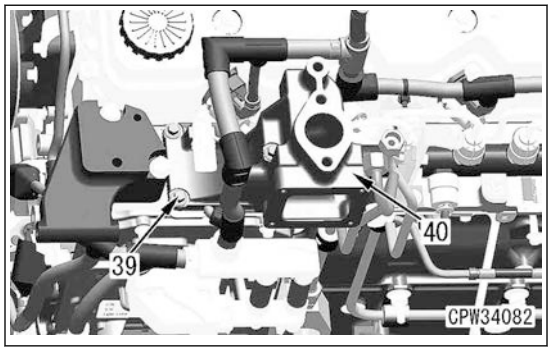
REMARK

Install the gasket so that the part number tag (e) faces the rear side.



24. Install the intake assembly (40) with the bolts (39) (6 pieces).

Bolt (39) :
24±4 Nm {2.45±0.41 kgfm}



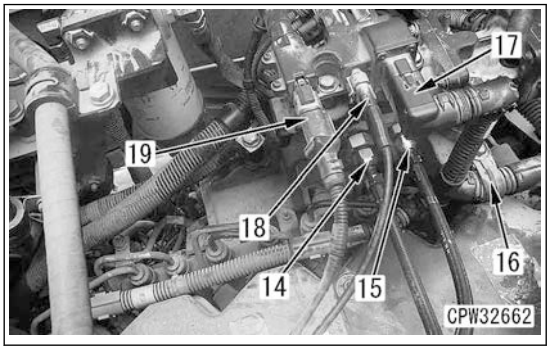
EGR valve assembly

12. Disconnect the hoses (14) and (15).

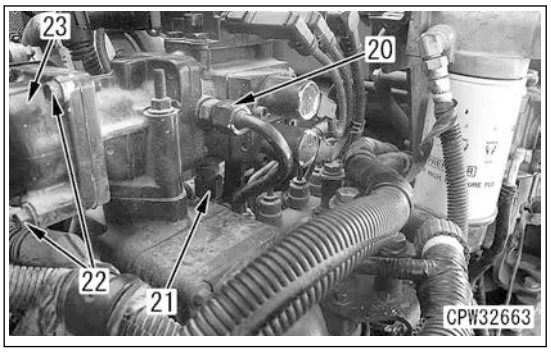
    ⚠ **Be sure to disconnect the hoses (14) and (15) at the air intake manifold side to prevent the oil from splashing to the high temperature area which causes fire.**

    - Hose (14): VGT control hydraulic circuit
    - Hose (15): VGT drive hydraulic circuit

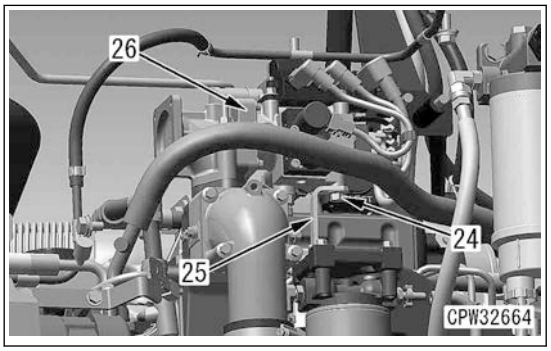
13. Remove the clamp (16), and disconnect the connectors (17), (18), and (19).



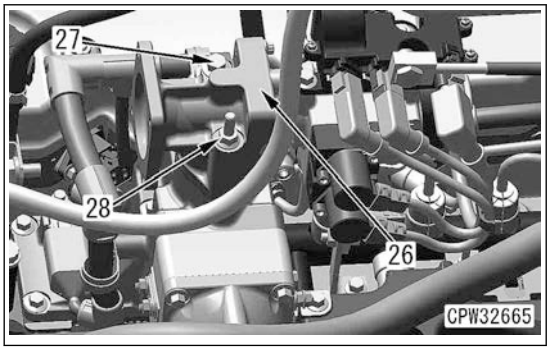
14. Disconnect the tubes (20) and (21).
15. Remove the bolts (22) (4 pieces), and remove the flange (23).



16. Remove the bolt (24), and disconnect the bracket (25) from EGR valve assembly (26).



17. Remove the bolt (27) and nut (28), and remove EGR valve assembly (26).



Remove and Install Automatic Tensioner

⚠ Place the machine on a level ground, and set the parking brake switch to ON position.

⚠ Set the frame lock bar to LOCK position, and chock the tires.

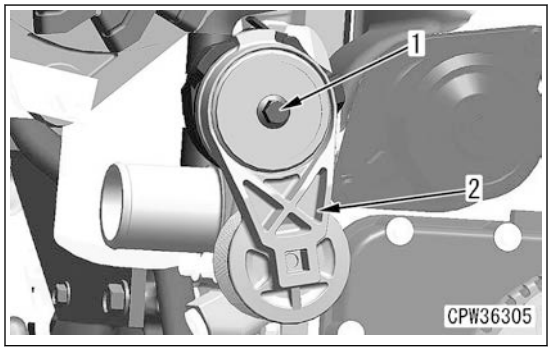
⚠ Lower the work equipment to the ground, and set the work equipment lock switch to LOCK position.

⚠ Turn the starting switch to OFF position to stop the engine.

⚠ Set the battery disconnect switch to OFF position, and remove the key. (For details, see Testing and Adjusting, "Handle Battery Disconnect Switch".)

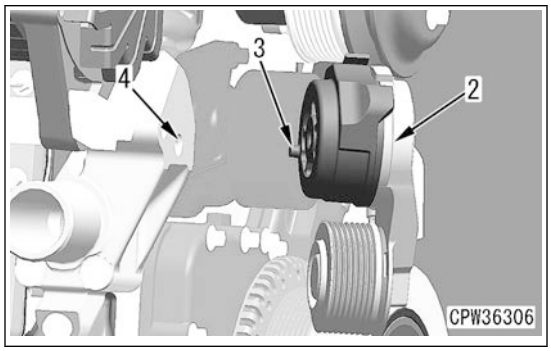
How to Remove Automatic Tensioner

1. Remove air conditioner compressor belt. For details, see "Remove and Install Alternator Belt".
2. Remove the bolt (1), and remove the auto-tensioner (2).
   Bolt (1): Width across flats 13 mm

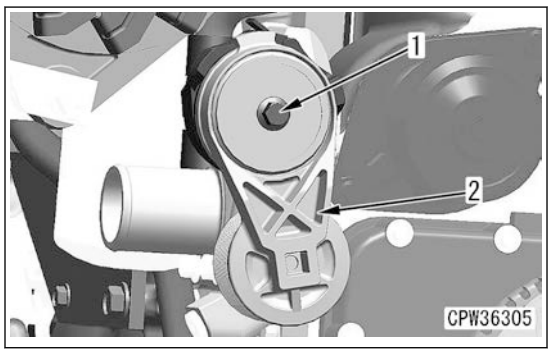


How to Install Automatic Tensioner

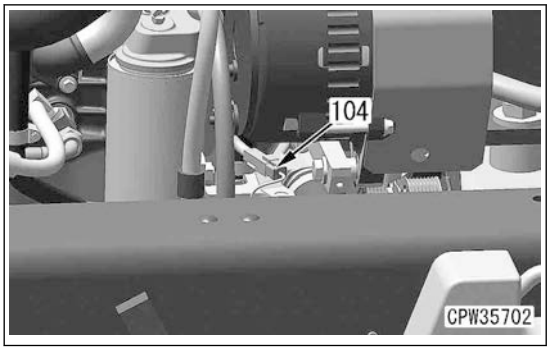
1. Set the dowel pin (3) of the new auto-tensioner (2) to be aligned with the groove (4) of the cylinder block.



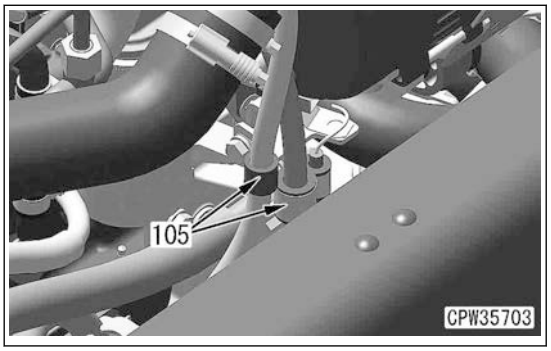
2. Install automatic tensionerr (2) with bolt (1).
   Bolt (1): Width across flats 13 mm
   bolt (1): 43±6 Nm {4.4±0.6 kgfm}
3. Install the air conditioner compressor belt. For details, see "Remove and Install Alternator Belt".



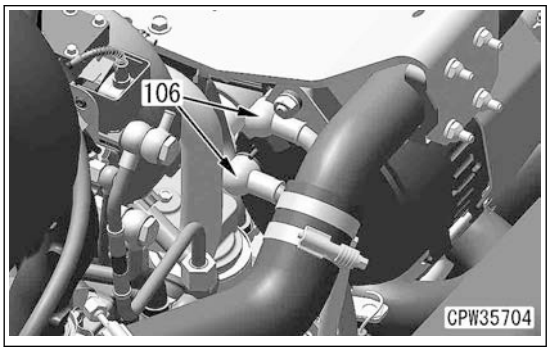
74. Disconnect the connector E02 (104).

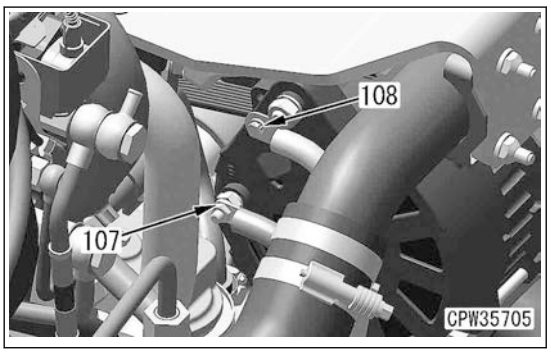


75. Remove the clamps (105) (2 places).

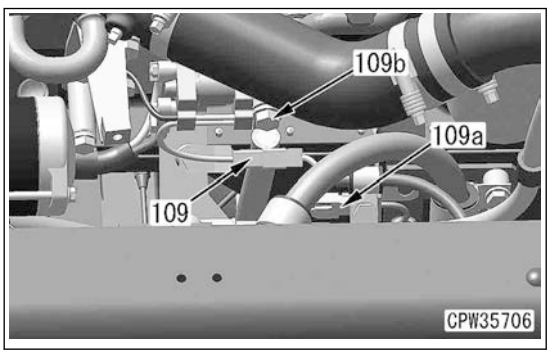


76. Roll up the rubber caps (106) (2 places).
77. Disconnect the ground terminals E03 (107) and E04 (108).

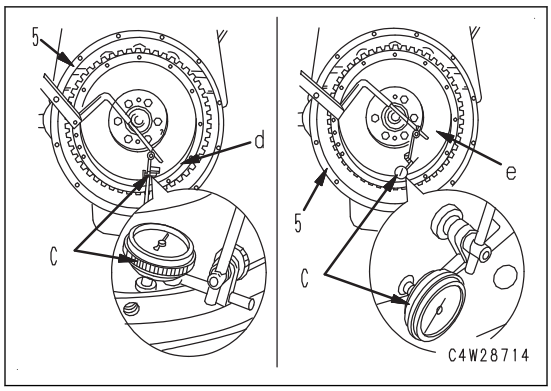




78. Disconnect the connector R24 (109).
79. Disconnect the connector R27 (109a).
80. Disconnect the ground terminal (109b).



- Measurement of radial runout



NOTICE

Radial runout: 0.13 mm or less

1) Install the stand to the dial gauge (C), and install it to the flywheel housing (5).
2) Set the probe of the dial gauge (C) perpendicularly to the spigot joint part (d) or outside perimeter of the flywheel.
3) Rotate the flywheel by 1 turn, and measure the difference between the lowest and the highest values that the pointer of the dial gauge (C).

REMARK

Rotate the flywheel 1 turn, and check that the pointer of the dial gauge (C) indicates the same position as that before starting rotation.

NOTICE

When measuring, move the crankshaft to either end of front or rear to eliminate error caused by the backlash.

- Measurement of facial runout

NOTICE

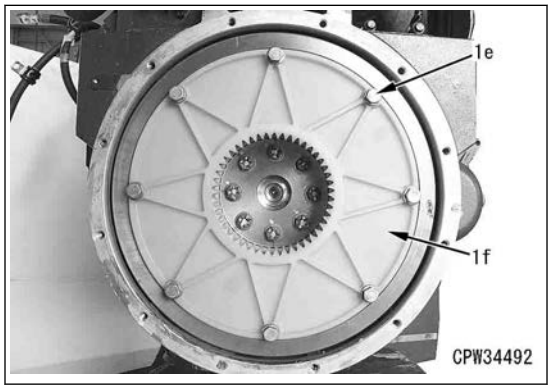
Facial runout: 0.20 mm or less

1) Install the stand to the dial gauge (C), and install it to the flywheel housing (5).
2) Set the probe of the dial gauge (C) perpendicularly to the end surface (e) near the outside perimeter of the flywheel.
3) Rotate the flywheel by 1 turn, and measure the difference between the lowest and the highest values that the pointer of the dial gauge (C).

REMARK

Rotate the flywheel 1 turn, and check that the pointer of the dial gauge (C) indicates the same position as that before starting rotation.

8. Install the damper (1f) with the bolts (1e) (8 pieces).



Contacting face of the damper case:
Liquid coating agent (LT-2)

Bolt (1e):
44.1 to 53.9 Nm {4.5 to 5.5 kgfm}

Engine assembly

9. Install the engine assembly. For details, see “Remove and Install Engine Assembly”.

Engine hood assembly

10. Install the engine hood assembly. For details, see “Remove and Install Engine Hood Assembly”.

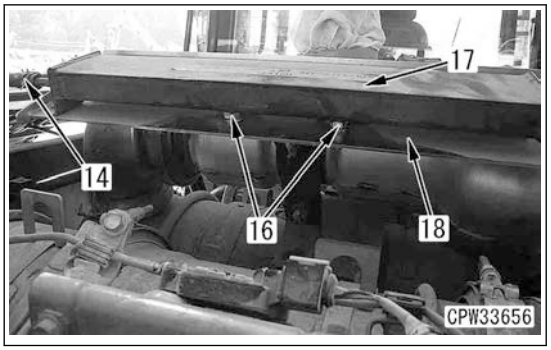
Air bleeding

11. Bleed air from the fuel circuit. For details, see Testing and Adjusting, “Bleed Air from Fuel Circuit”.

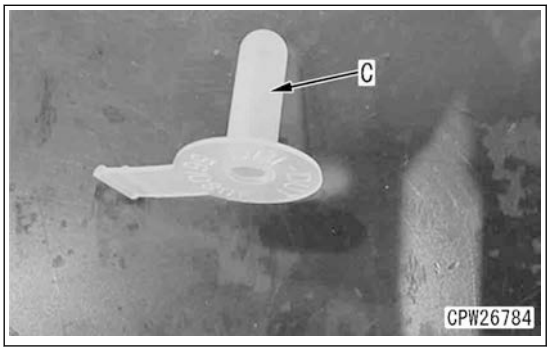
Refilling the radiator with coolant

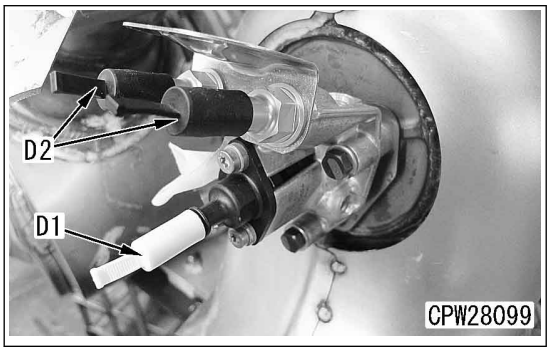
12. Refill the radiator with coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant, and then check the coolant level again.

27. Install the bracket (18) with the bolts (16) (2 pieces).

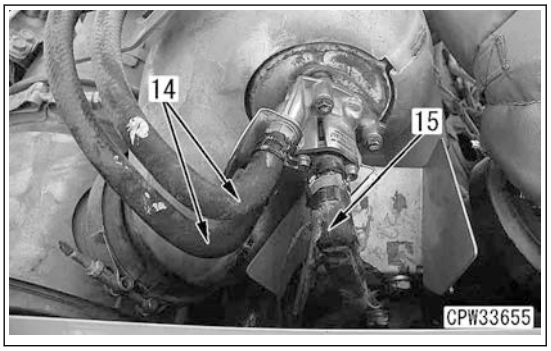


28. Remove the plug (for 5/16 inch hose diameter) (C), cap (yellow) (D1) on DEF side, and cap (brown) (D2) on the coolant side.



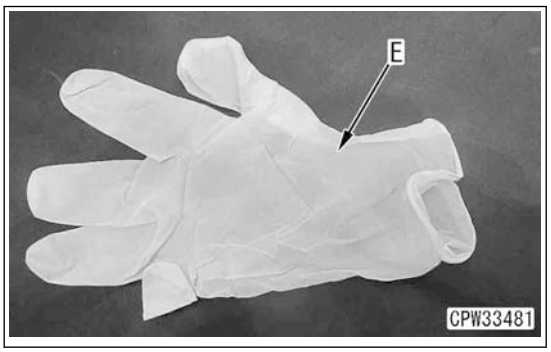


29. Connect DEF hose (15), and connect the coolant hoses (14) (2 pieces).

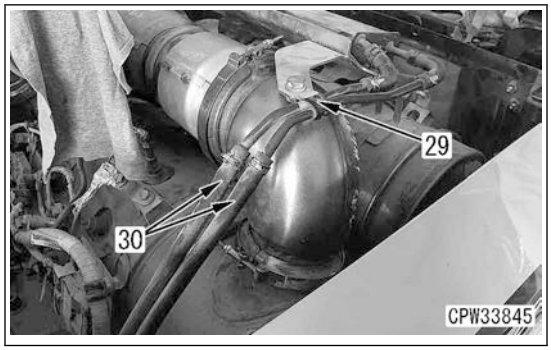


NOTICE

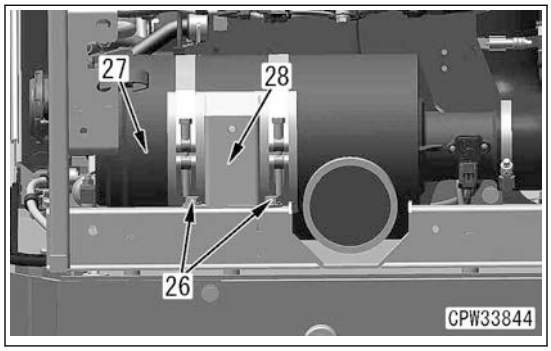
- **Install the wiring connector UDM (19), and then connect DEF hose (15). (In order to prevent DEF from sticking to the wiring connector)**
- **When handling DEF, be sure to wear the vinyl gloves (E).**
- **Wash the connecting portions of DEF hose (15) with distilled water to remove the sticking materials before connecting the hose.**



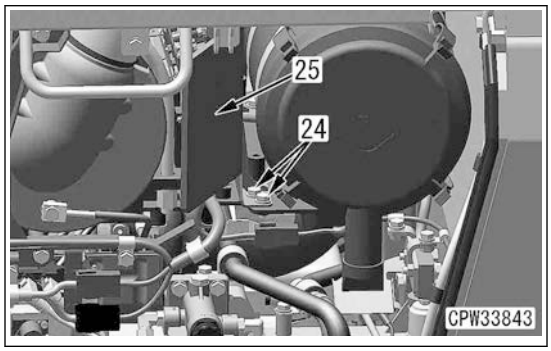
28. Connect the coolant hoses (30) (2 pieces).
29. Install the clamp (29).



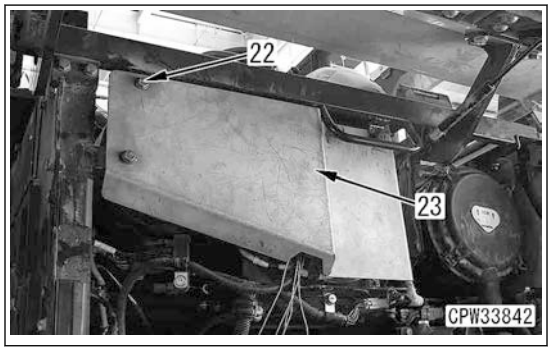
30. Install the air cleaner (27) together with the bracket (28) with the bolts (26) (2 pieces).



31. Install the heat insulation cover (25) with the bolts (24) (4 pieces).



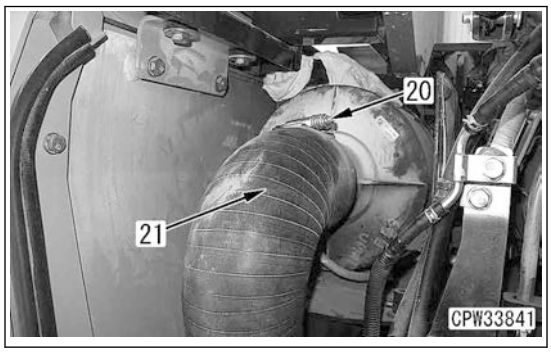
32. Install the right and left thermal guards (23) with the bolts (22) (3 pieces each on the right and left sides).



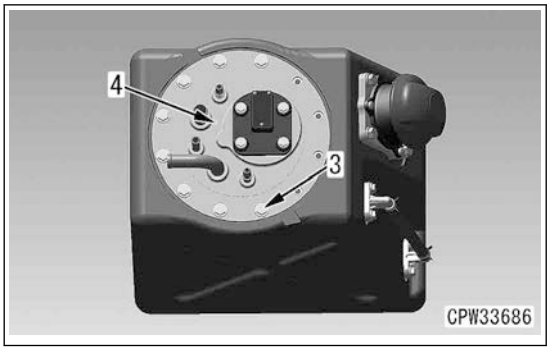
33. Connect the hose (21), and install the clamp (20).

Clamp (20):
10.5±0.5 Nm {1.07±0.05 kgfm}

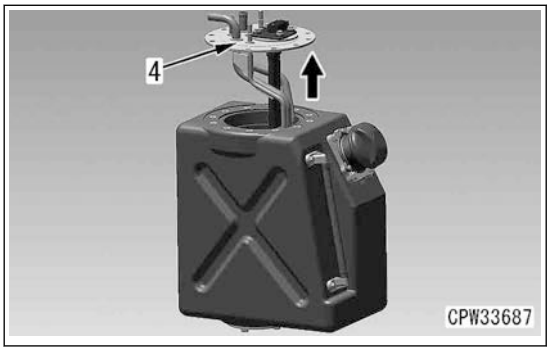
34. Connect the connector MAF (19) according to the following procedure.



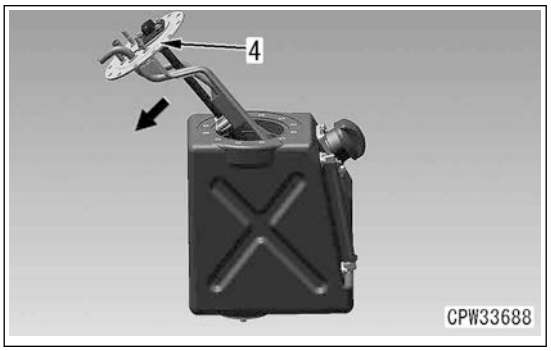
2) Remove the bolts (3) (8 pieces), and remove DEF tank sensor flange assembly (4).



3) Pull out DEF tank sensor flange assembly (4) upward.



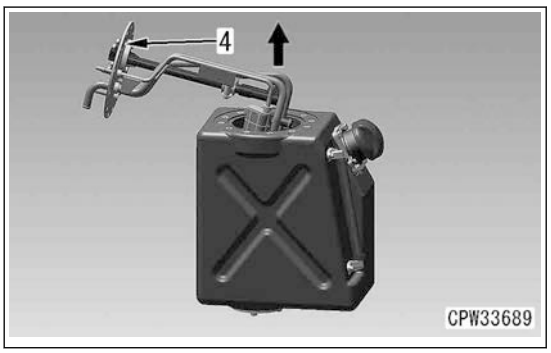
4) Tilt DEF tank sensor flange assembly (4) in the direction of the arrow.

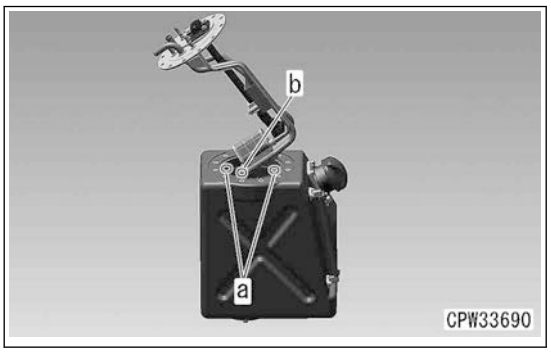


5) Raise the bottom edge of DEF tank sensor flange assembly (4) in the direction of the arrow.

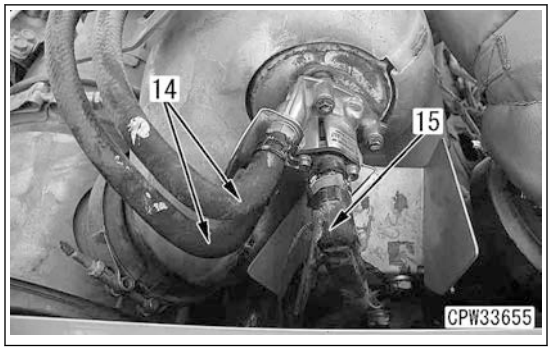
REMARK

Prevent the tip (b) of DEF tank sensor flange assembly (4) from interfering with the part (a) of DEF tank assembly when removing the assembly.



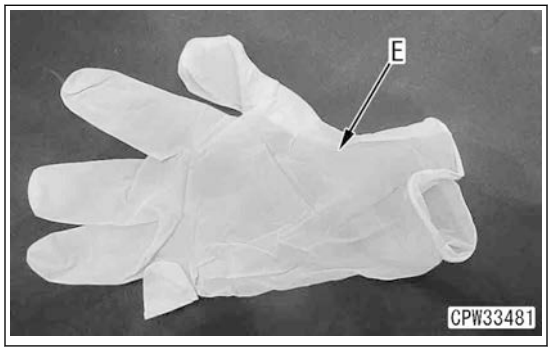


31. Connect DEF hose (15), and connect the coolant hoses (14) (2 pieces).



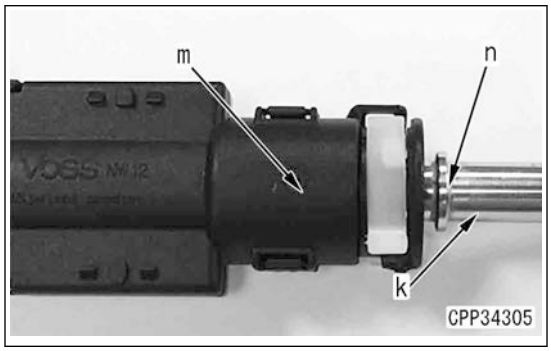
NOTICE

- **Install the wiring connector UDM (19), and then connect DEF hose (15). (In order to prevent DEF from sticking to the wiring connector)**
- **When handling DEF, be sure to wear the vinyl gloves (E).**
- **Wash the connecting portions of DEF hose (15) with distilled water to remove the sticking materials before connecting the hose.**



REMARK

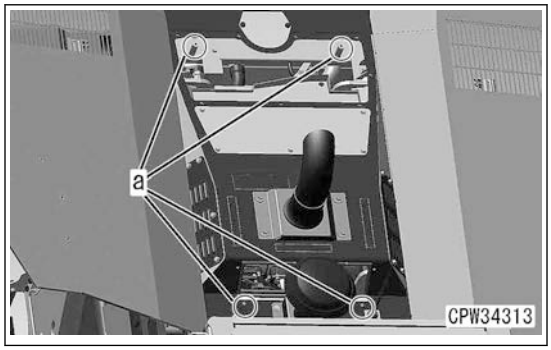
- Insert the connector (m) of DEF hose (15) into the pin (k) on the injector side until the click sound is heard to install it.
- When the convex part (n) of the pin (k) passes the convex part inside of the clip, lock it by using the clip.



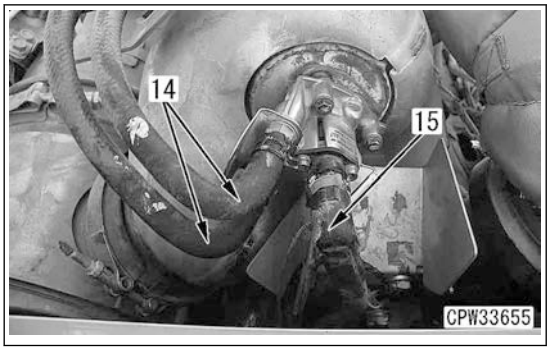
Top hood

32. Install the lifting tool (A) to the slinging positions (a), sling the top hood (12), and set it on the installing position.

Top hood (12):
32.7 kg

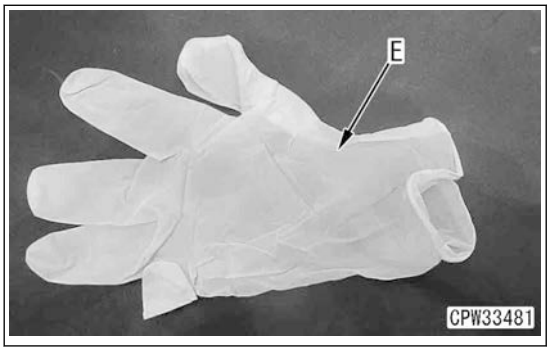


9. Connect DEF hose (15), and connect the coolant hoses (14) (2 pieces).



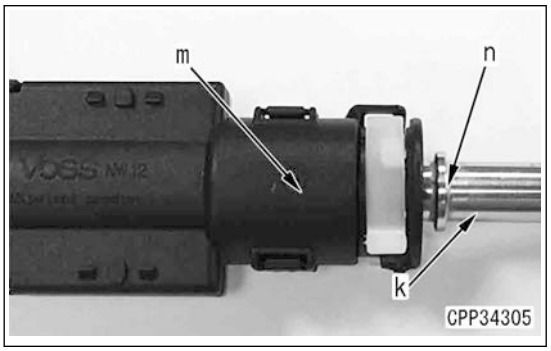
NOTICE

- **Install the wiring connector UDM (19), and then connect DEF hose (15). (In order to prevent DEF from sticking to the wiring connector)**
- **When handling DEF, be sure to wear the vinyl gloves (E).**
- **Wash the connecting portions of DEF hose (15) with distilled water to remove the sticking materials before connecting the hose.**



REMARK

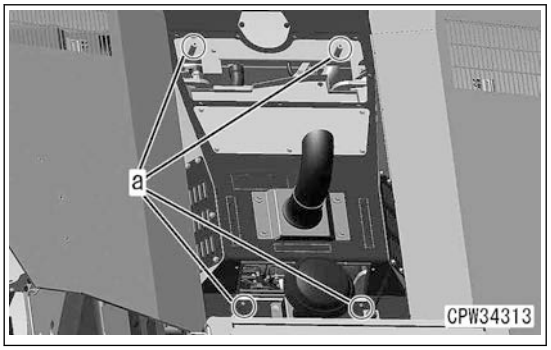
- Insert the connector (m) of DEF hose (15) into the pin (k) on the injector side until click sound is heard to install it.
- When the convex part (n) of the pin (k) passes the convex part inside of the clip, lock it by using the clip.



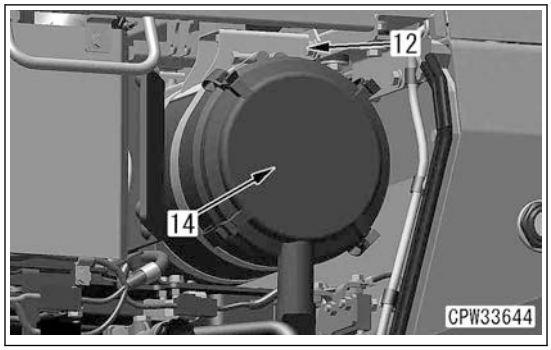
Top hood

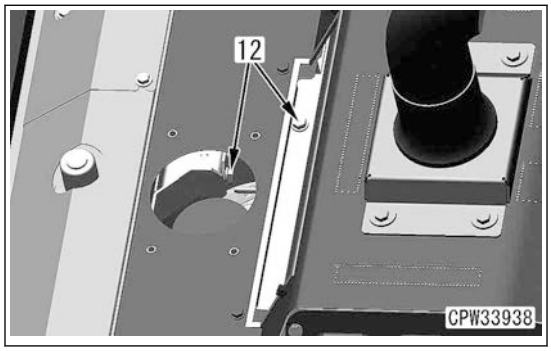
10. Install the lifting tool (A) to the slinging positions (a), sling the top hood (12), and set it on the installing position.

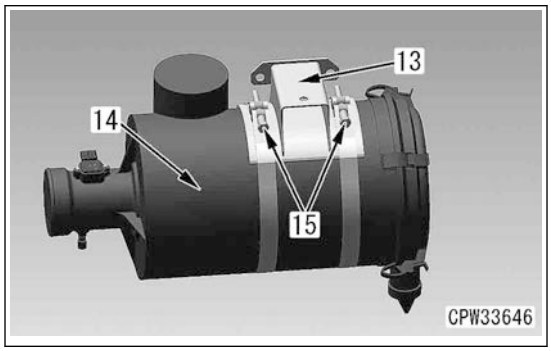
Top hood (12):
32.7 kg



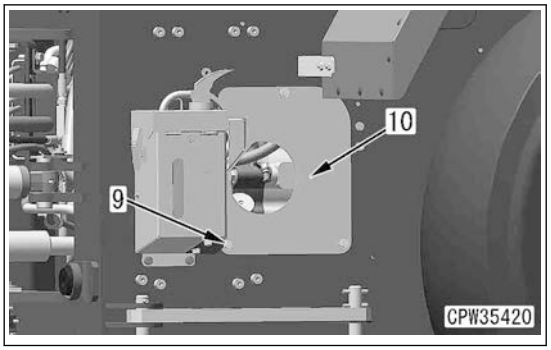
8. Remove the bolts (12) (3 pieces), and remove the air cleaner assembly (14) together with the bracket (13).
9. Remove the bands (15) (2 places), and remove the air cleaner assembly (14) from the bracket (13).







12. Install the cover (10) with the bolts (9) (3 pieces).



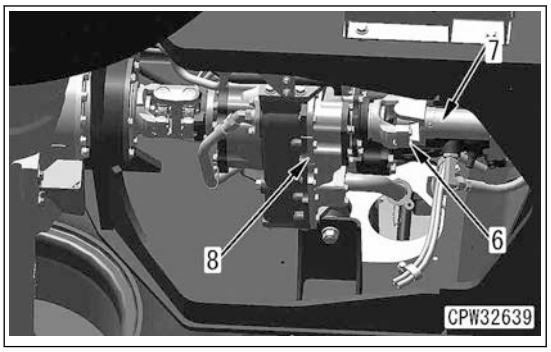
Front drive shaft

13. Connect the front drive shaft (7) to the transfer (8) side with the bolts (6) (4 pieces).

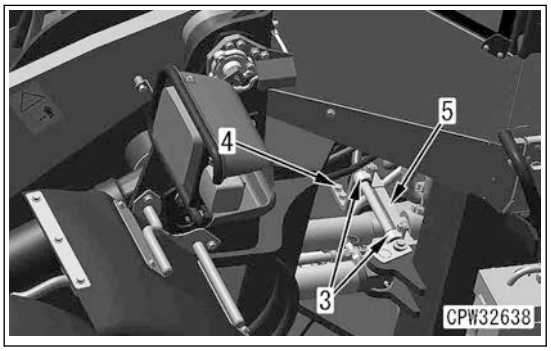
REMARK

When installing the front drive shaft, check that the spider cap key securely fits in the keyway of the mating yoke, and then tighten the bolts (6) (4 pieces).

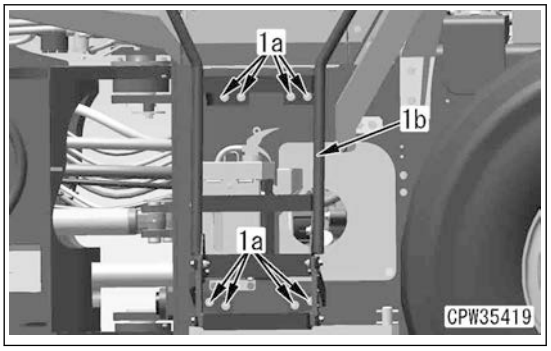
Bolt (6):
59 to 74 Nm {6.0 to 7.5 kgfm}



14. Install the bracket (5) with the bolts (4) (4 pieces).
15. Install the clamps (3) (2 places).



16. Install the step (1b) with the bolts (1a) (8 pieces).



Refilling with hydraulic oil

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

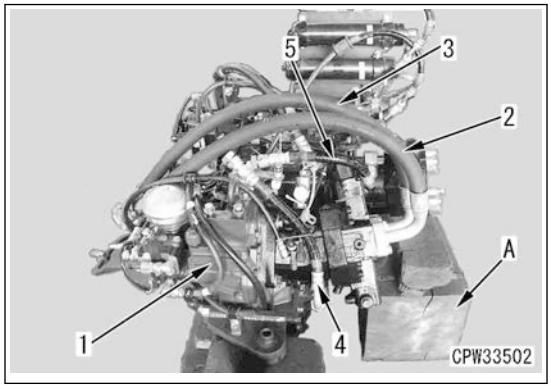
Hydraulic tank:
92 ℓ

REMARK

If the oil level is lower when checking the level again, refill with hydraulic oil.

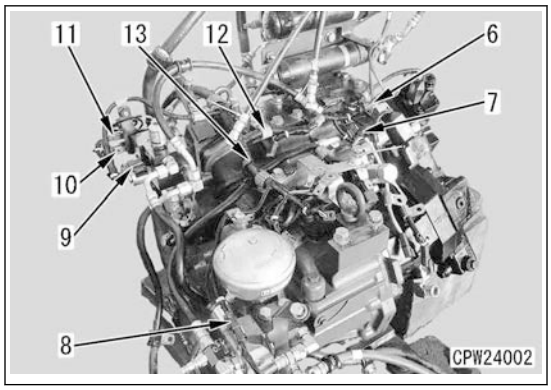
Piping

2. Set the transfer assembly (1) on the block (A).
3. Remove HST motor hoses (2), (3), (4), and (5).



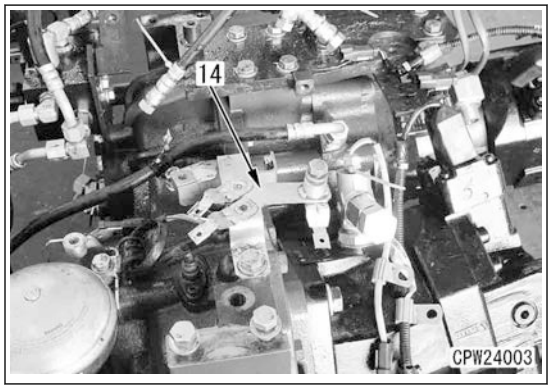
Wiring assembly

4. Disconnect the connectors T13 (6), T12 (7), T19 (8), T15 (9), and T18 (11).
5. Remove the clamps (12) (6 places), and remove the wiring assembly (13).



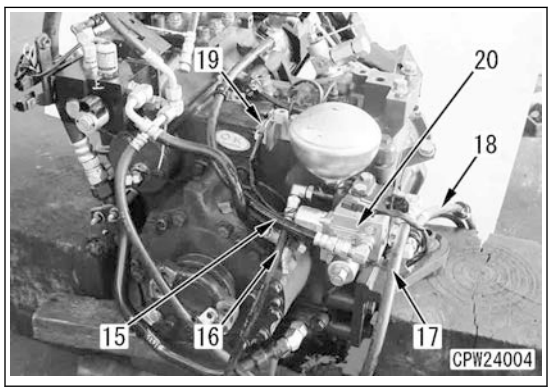
Bracket

6. Remove the wiring bracket (14).



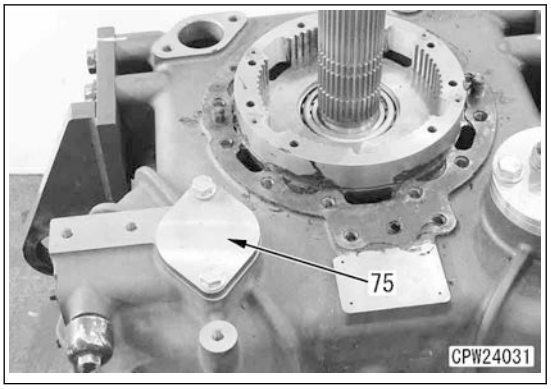
Accumulator and clutch solenoid valve assembly

7. Remove the hoses (15), (16), (17), and (18).
8. Remove the clamp (19).
9. Remove the bolts (2 pieces), and remove the accumulator and clutch solenoid valve assembly (20).



73. Install the plate (75).

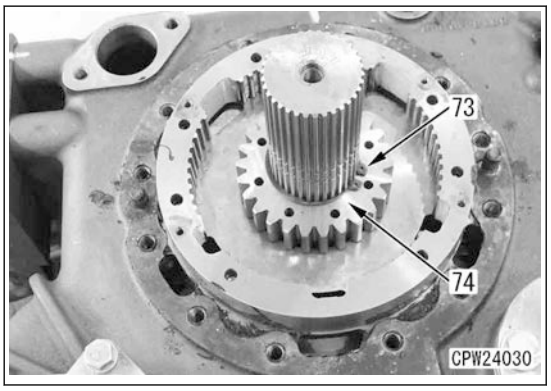
Bolt:
59 to 74 Nm {6 to 7.5 kgfm}



Assembling the parking brake

74. Install the parking brake hub (74) to the output shaft, and install the snap ring (73).

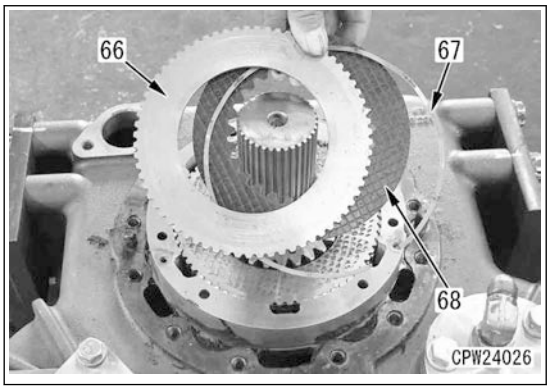
Spline part of the parking brake hub (74):
Molybdenum disulfide lubricant (LM-S)



75. Install the plates (66) (6 pieces), wave springs (67) (5 pieces), and discs (68) (5 pieces) of the parking brake clutch.

REMARK

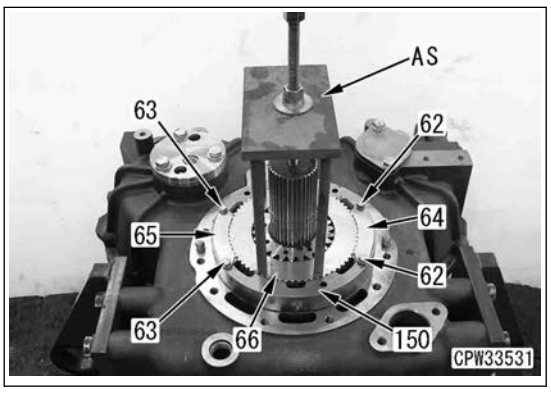
Soak the discs in clean power train oil (TO10) for at least 2 minutes before installing.



76. By using the tool (AS), push in the plate (66) until it is lower than the thickness of the parking brake drum (150), install the plates (64) and (65), and tighten the bolts (62) and (63) (4 pieces).

Threaded portion of the bolts (62) and (63):
Liquid adhesive (LT-2)

Bolts (62) and (63):
11.8 to 14.7 Nm {1.2 to 1.5 kgfm}

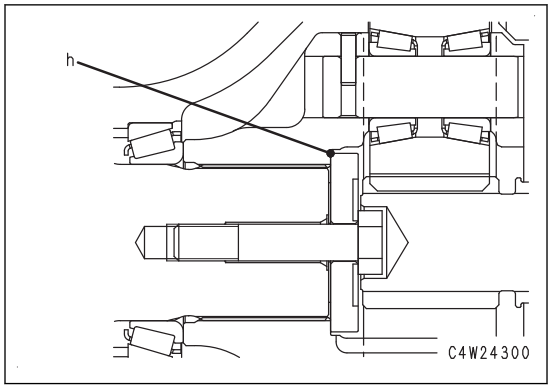


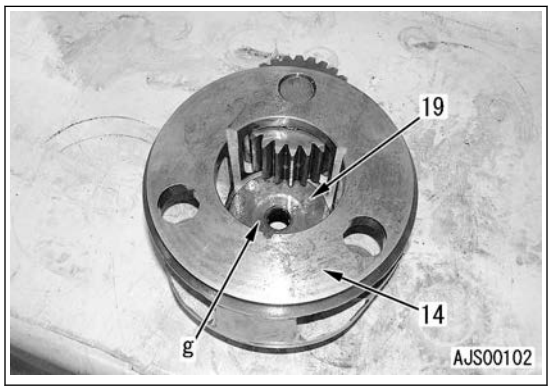
20. Install the spacer (19) into the planetary carrier (14).

REMARK

Insert the spacer from the side (g) of the planetary carrier (14) before installing the 2nd gear (17).

Entire circumference of the part (h):
Lubricant (LM-G or LM-P)

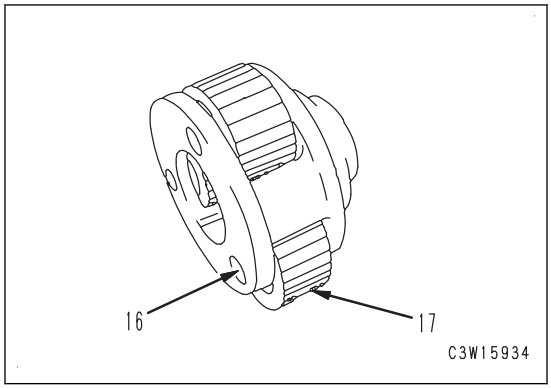




21. Install the 2nd and 3rd gears (17) to the planetary carrier (14) according to the same procedure as step 16.

REMARK

Tap the end surface of the shaft (16) and the differential side of the gear (17) lightly, push back the bearing, and then check that the gear rotates smoothly.

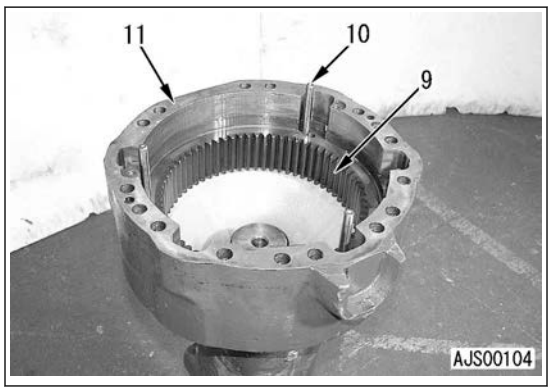


Ring gear

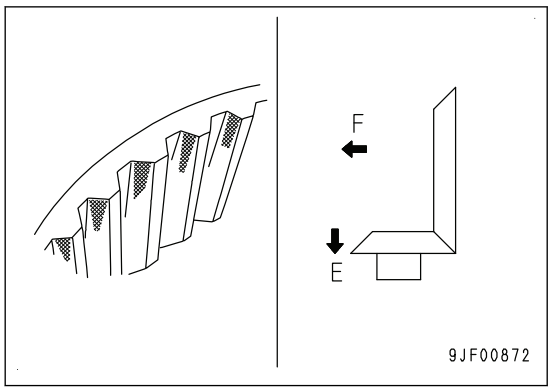
22. Install the ring gear (9) to the axle housing (11), and insert the pins (10) (3 pieces).

REMARK

Align the housing with the pin hole of the ring gear to install it.



67. If the bevel gear is excessively distanced from the bevel pinion, pattern of the tooth contact is shown in the drawing below. Correct the tooth contact according to the following procedure.
    1) Increase the shims of the cage assembly (bevel pinion side), and advance the bevel pinion in the direction (E).
    2) Adjust the right and left shims of the bearing carrier, advance the bevel gear in the direction (F), and move it closer to the bevel pinion.



REMARK

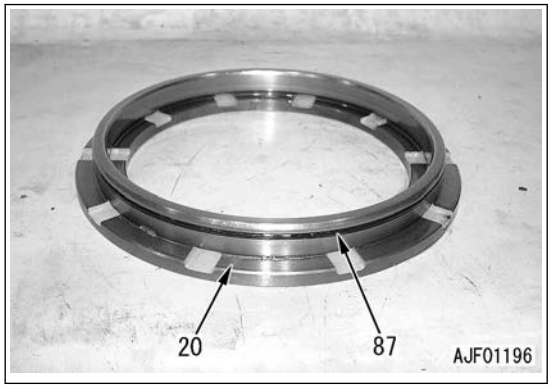
Do not change the sum of thickness of the right and left shims of the bearing carrier.

Brake

68. Install the seal (87) to the piston (20).

REMARK

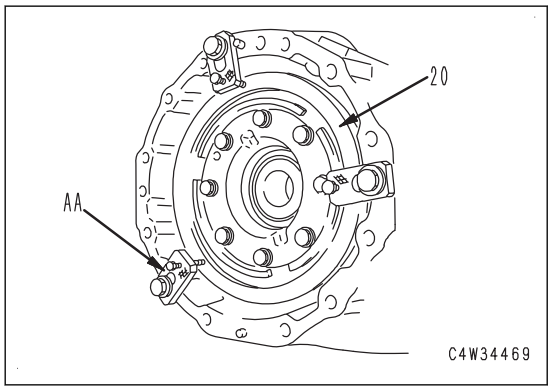
Apply axle oil lightly to the piston and piston mounting part.



69. By using the installer (AA), press fit the piston (20) evenly.

REMARK

- Press fit the piston completely until it touches the housing.
- Do not tap the piston by using a plastic hammer to press fit it. (Otherwise, O-ring and piston are damaged.)

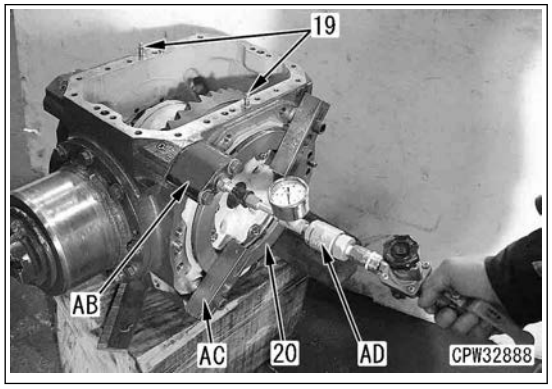


70. Install the bleeder screw (19).
71. Install the plate (AB).

REMARK

- You can install the plate (AB) also when checking for the brake oil leakage.
- Be sure to install O-ring to the plate (AB).

Bolt:
98 to 123 Nm {10.0 to 12.5 kgfm}



72. Set the installer (AC), blow air into the brake oil port by using the oil leak tester (AD), and smooth the piston movement.

NOTICE

If blowing air without setting the installer, it is dangerous because the piston may leap out. Be careful when blowing air.

Hydraulic tank :
92 ℓ

Engine hood assembly

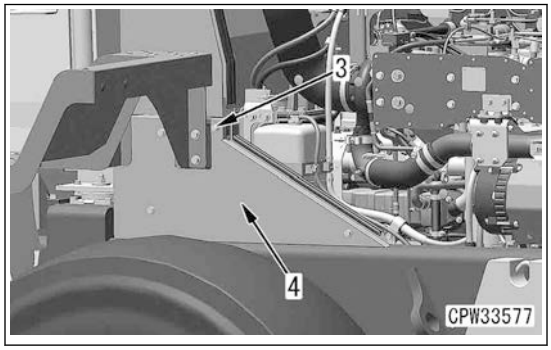
2. Remove the engine hood assembly. For details, see “Remove and Install Engine Hood Assembly”.

KDPF and SCR assembly

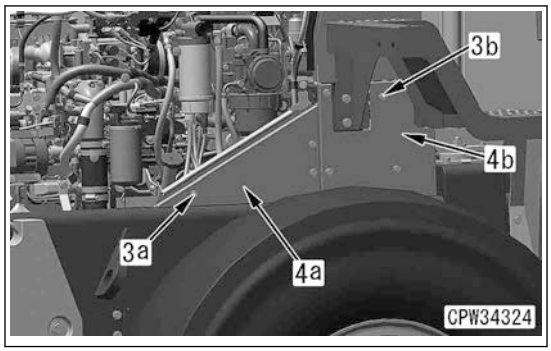
3. Remove KDPF and SCR assembly. For details, see “Remove and Install KDPF and SCR Assembly”.

Fender

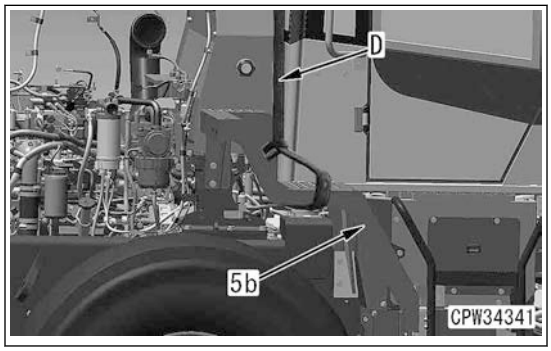
4. Remove the bolts (3) (4 pieces), and remove the cover (4). (Left side of the machine)

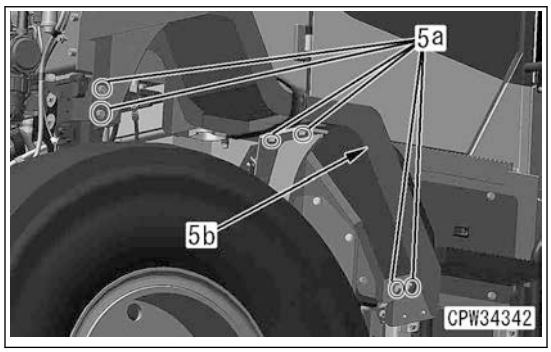


5. Remove the bolts (3a) (3 pieces) and (3b) (4 pieces), and remove the covers (4a) and (4b). (Right side of the machine)

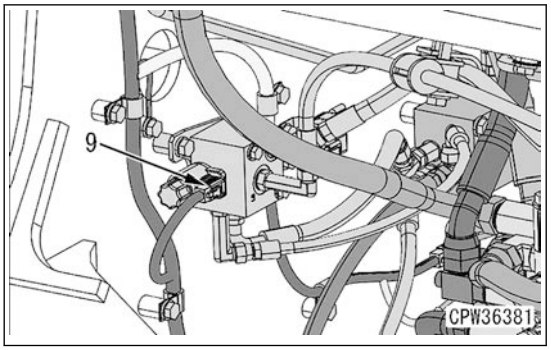


6. By using the webbing sling (D), sling the fender (5b), and hold it.
7. Remove the bolts (5a) (6 pieces), sling the fender (5b), and remove it. (Right and left sides of the machine body)





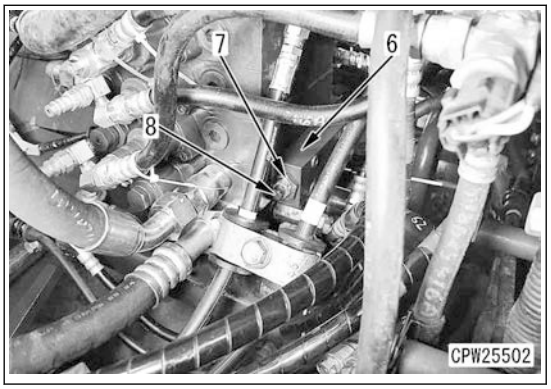
8. Connect the connector F28 (9).



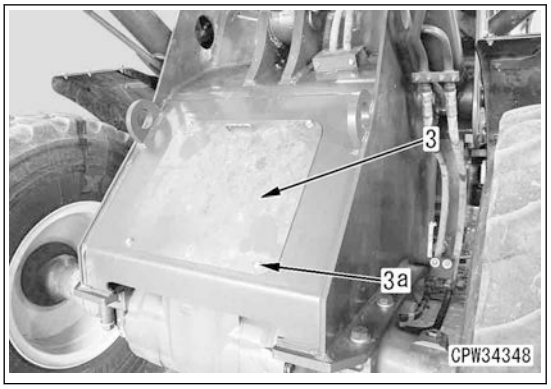
9. Tighten the plug (8) of the travel damper valve (6) according to the following procedure.
   1) Loosen the lock nut (7).
   2) After tightening the plug (8), tighten the lock nut (7).

   Plug (8):
   19.6 to 27.5 Nm {2.0 to 2.8 kgfm}

   Lock nut (7):
   19.6 to 27.5 Nm {2.0 to 2.8 kgfm}



10. Install the cover (3) at the front of the machine body with the bolts (3a) (4 pieces).



Refilling with hydraulic oil

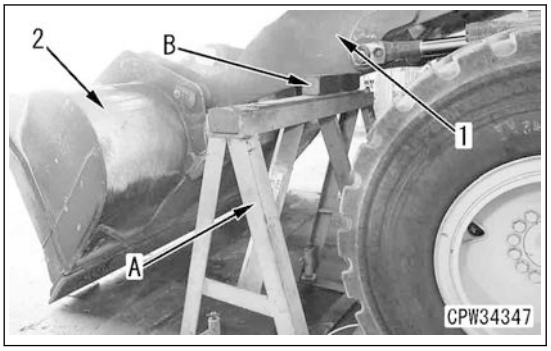
11. Refill the hydraulic tank with Komatsu genuine oil to the specified level through the oil filler port. Start the engine to circulate the oil through the piping, and check the oil level again.

   Hydraulic tank:
   92 ℓ

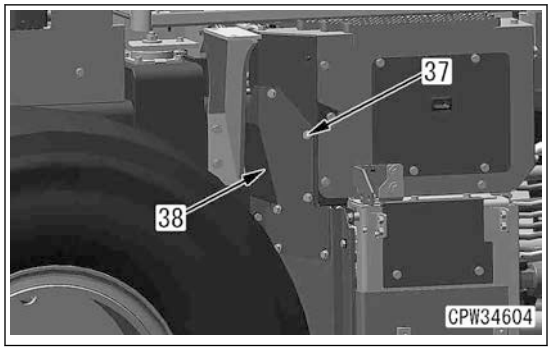
   REMARK

   If the oil level is lower when checking the level again, refill with hydraulic oil.

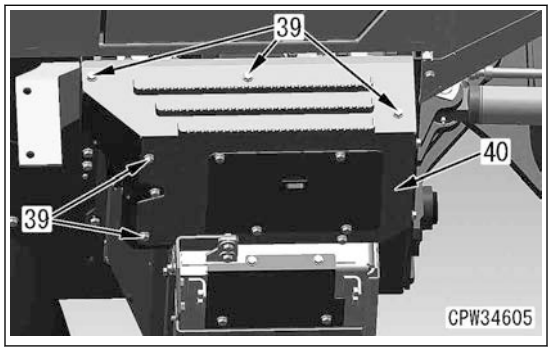
12. Turn the starting switch to ON position, and start the engine.
13. Change the state of the work equipment bucket from the bucket DUMP to the bucket CURL, raise the work equipment, and remove the support stand (A) and block (B).

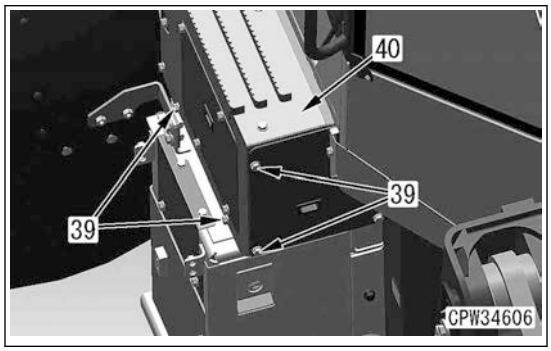


21. Remove the bolts (37) (7 pieces), and remove the cover (38).

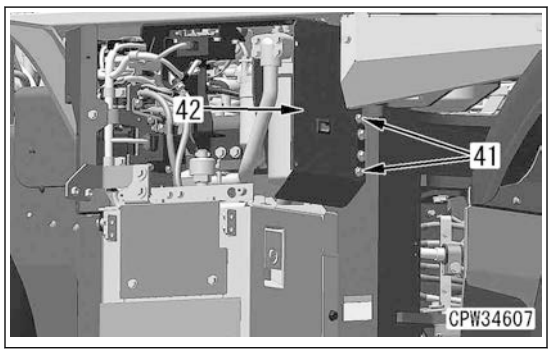


22. Remove the bolts (39) (9 pieces), and remove the cover (40).





23. Remove the bolts (41) (2 pieces), and remove the cover (42).



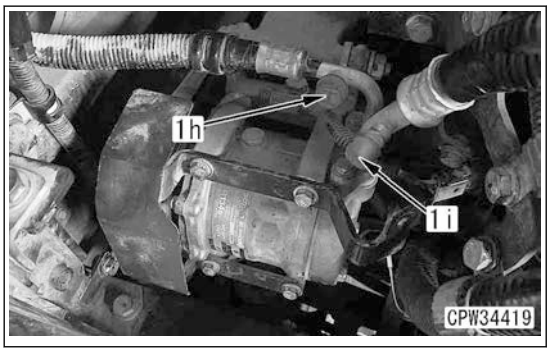
24. Remove the floor mat (1).

32. Install the floor mat (1).

Refilling with refrigerant

33. Refill with refrigerant (air conditioner gas: R134a) through the ports (1h) and (1i).

    Filling quantity : 950±50 g



Refilling with air conditioner compressor oil

34. Refill with air conditioner compressor oil. See “Handle Compressor Oil”.

35. Release the lock lever (1b), and close the cover (1a) on the right side of the machine body.

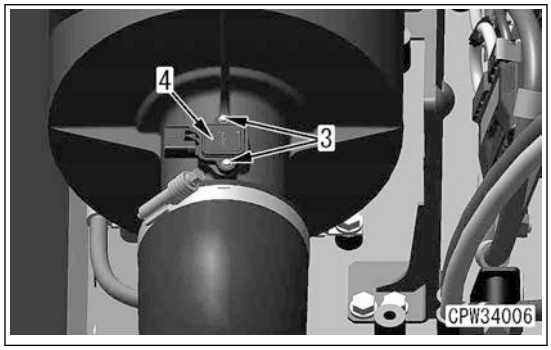
How to Install Mass Air Flow and Temperature Sensor

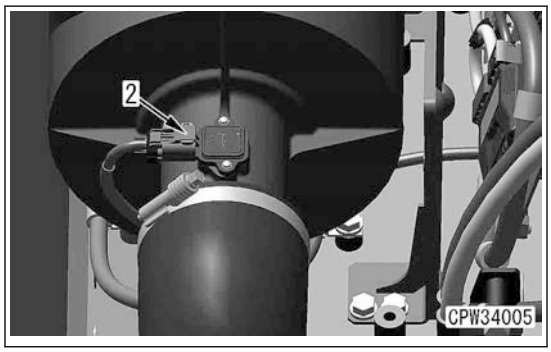
Mass air flow and temperature sensor assembly

1. Install the mass air flow and temperature sensor assembly (4) with the bolts (3) (2 pieces).

   Bolt (3):
   0.98 to 1.27 Nm {0.10 to 0.13 kgfm}

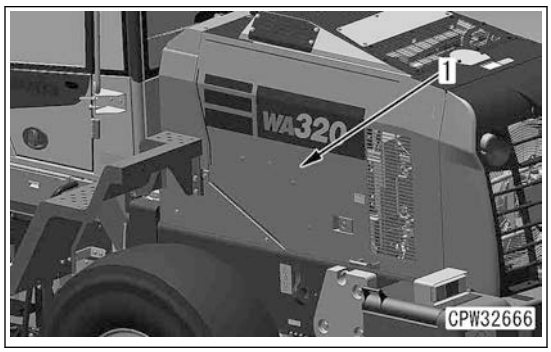
2. Connect the connector MAF (2).



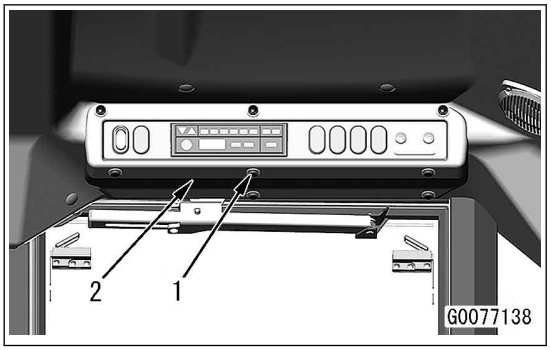


Cover

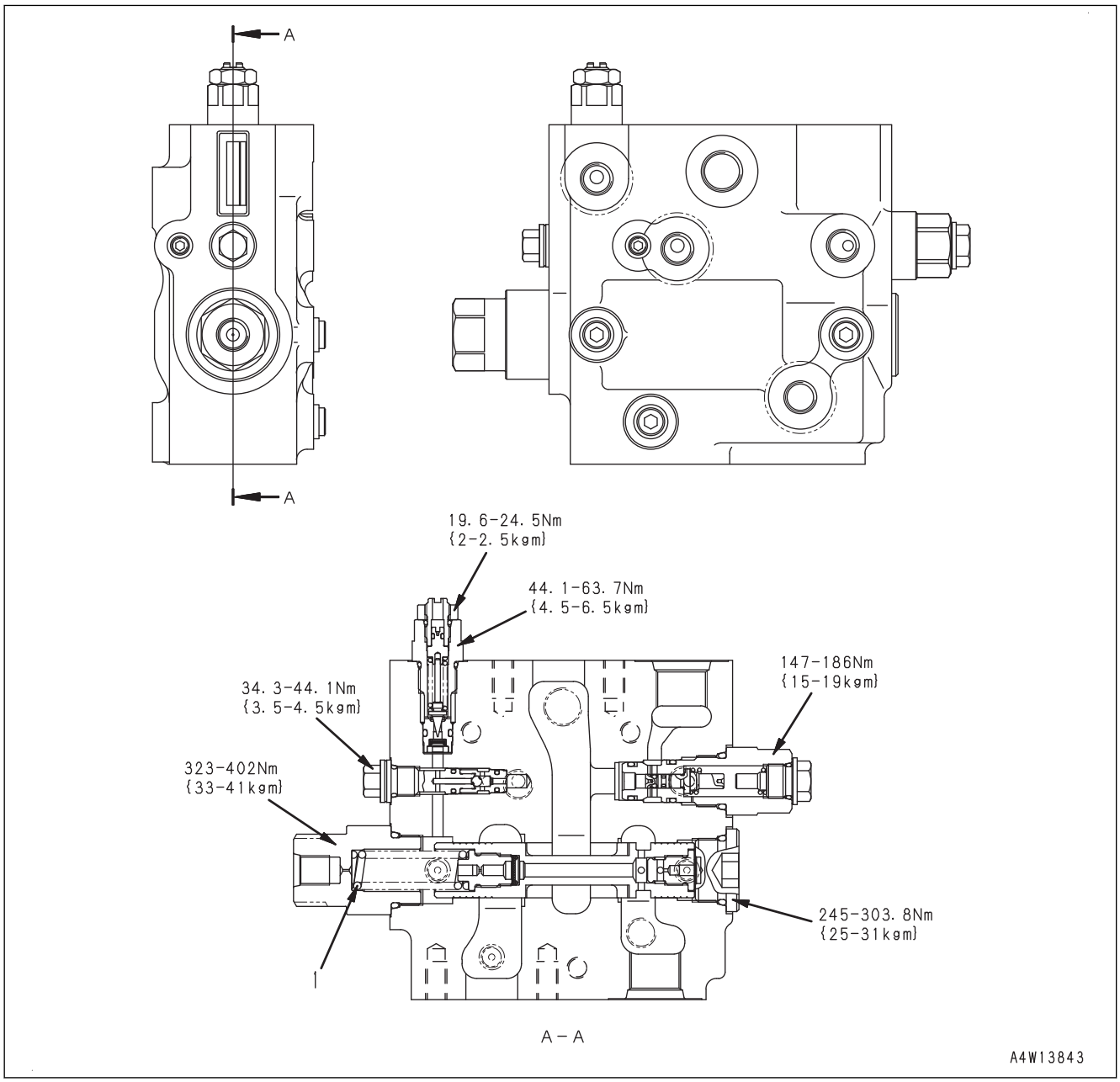
3. Unlock the lock lever (1a), and close the cover (1).



14. Install the cover (2) with the bolts (1) (8 pieces).



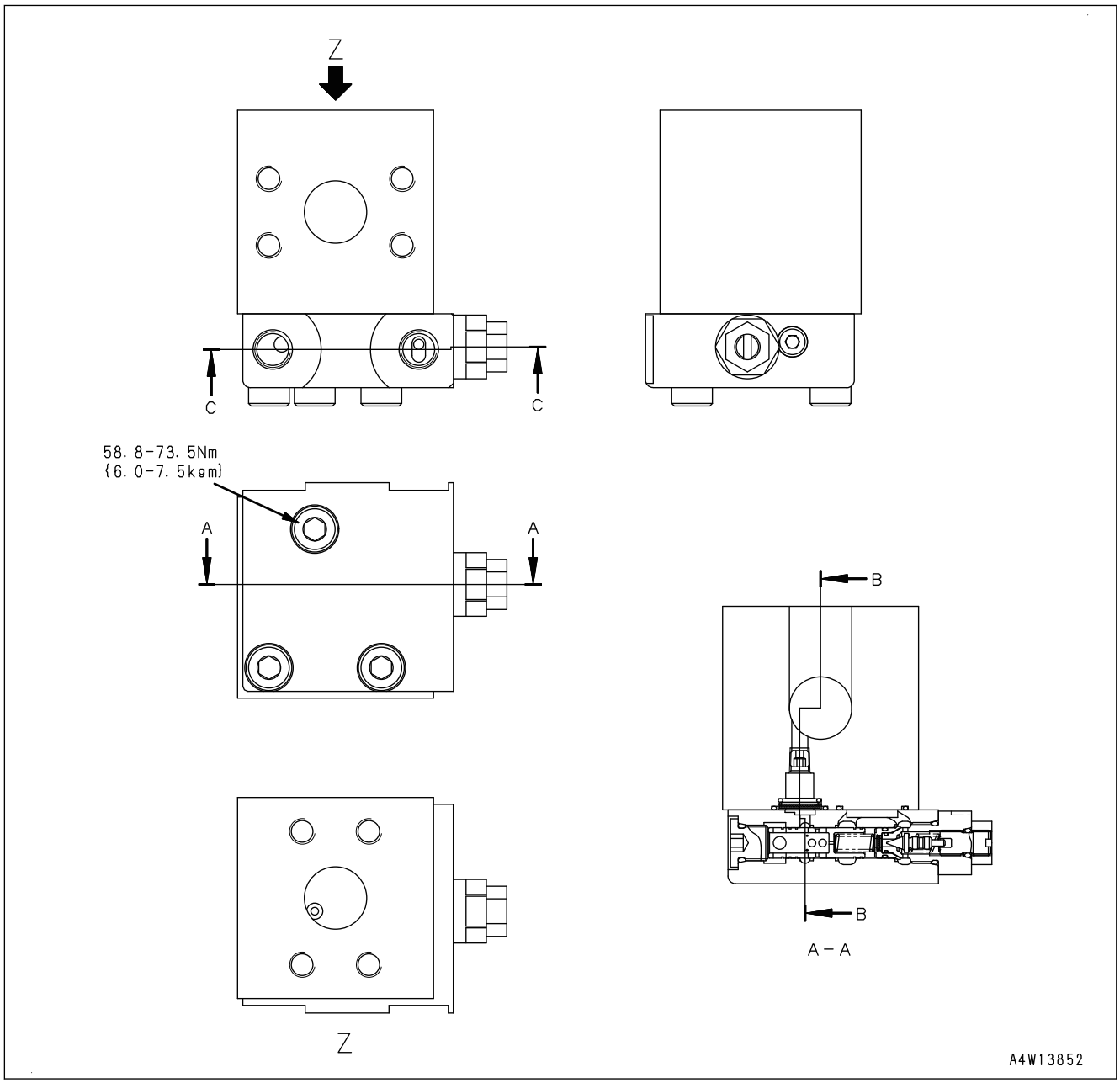
Maintenance Standard for Priority Valve



Unit: mm

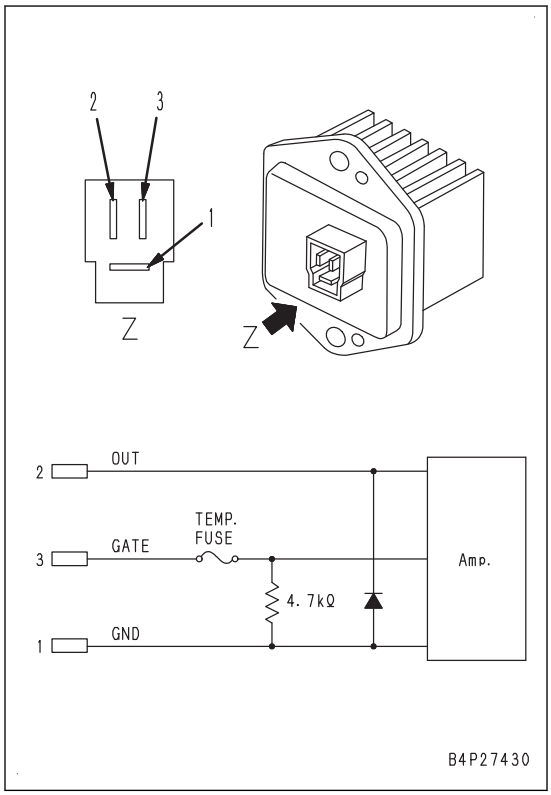
No.	Item	Judgment criteria					Remedy
		Standard dimensions			Repair limit		
1	Control spring	Free height	Installed height	Load at installed height	Free height	Load at installed height	Replace
		56	55	64.7 N {6.6 kg}	-	51.8 N {5.3 kg}	

Maintenance Standard for Self-Pressure Reducing Valve



Function of Blower Amplifier as Air Conditioner Unit Component

Blower amplifier (13) receives signal current from the air conditioner controller, and controls the speed of blower motor (4).



Function of Blower OFF Relay as Air Conditioner Unit Component

The signal current from the air conditioner controller controls the coil of blower OFF relay (17). When the coil of blower OFF relay (17) is energized and blower OFF relay (17) is turned ON, blower motor (4) is powered.

Function of Compressor Clutch Relay as Air Conditioner Unit Component

Signal current, that is sent from the air conditioner controller according to the operation of dual pressure switch (19), controls the coil of compressor clutch relay (16). When the relay coil is energize to engage compressor clutch relay (16), the electromagnetic clutch of compressor engages and the compressor starts to run.

Function of Heater Core as Air Conditioner Unit Component

- Heater core (2) is heated with the hot water (engine coolant) sent from the engine.
- Air sent by blower fan, blower motor (4) is heated when it passes through the fins of heater core (2).

Function of Evaporator Temperature Sensor as Air Conditioner Unit Component

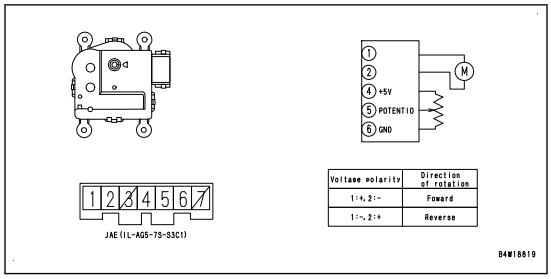
Evaporator temperature sensor (14) is installed to evaporator (1) by using the holder, and its resistance varies with the temperature of evaporator (1). The air conditioner controller grasps the temperature of evaporator (1) from the voltage change in evaporator temperature sensor (14), and preventing the freeze of evaporator (1).

Function of Servo Motor as Air Conditioner Unit Component

Servomotors are used for the temperature control (air mix), vent (mode) changeover, and FRESH/ RECIRC air changeover.

NOTICE

Do not drive the servomotor by supplying power directly between servomotor terminals (1) and (2) during inspection.



Compressor Does Not Turn at All or Does Not Turn Correctly in Cool Mode.

See “TROUBLESHOOTING OF COMPRESSOR SYSTEM (AIR IS NOT COOLED)”.

Failed part	Probable cause	Check method	Remedy
Compressor belt	Loose belt	Belt deflection is large. See Shop Manual, 30, TESTING AND ADJUSTING, “TEST AND ADJUST AIR CONDITIONER COMPRESSOR BELT TENSION”.	Adjustment of tension
Compressor	Internal defect of compressor	Slip of belt	Repair or replace
	Insufficient compressor oil Seized compressor	Heating of compressor	See “Handle Compressor Oil”.
Magnetic clutch	Low battery voltage	Slip during rotation	Charge a battery
	Open circuit or short circuit in coil	Check with multimeter (10 to 20 Ω).	Replace
	Open circuit in wiring or defective connection of ground cable	Check ground cable and connecting part See “Troubleshooting for Compressor and Refrigerant System (Air is Not Cooled)”.	Repair
Relay	Defective compressor clutch relay	See “Examine Relay”.	Replace
Refrigerant pressure	Abnormal pressure (pressure switch is actuated)	See “Troubleshooting by Gauge Pressure”.	See “Troubleshooting by Gauge Pressure”.
Dual pressure switch	Defective pressure switch	See “Troubleshooting for Compressor and Refrigerant System (Air is Not Cooled)”. See “Examine Refrigerant (Dual) Pressure Switch”	Replace

Blower Fan Motor is Normal but Air Flow is Not Sufficient in Heat Mode.

Probable cause	Check method	Remedy
Ventilation resistance is high.	Check filter for clogging and duct for crushing or clogging.	Repair
Air leakage through connecting part of duct	Check the connecting part of duct, and see “Examine Air Leakage (Duct)”	Repair
Clogging of heater core fins	Check for clogging of heater core fins	Clean

Abnormality of Temperature or Quantity of Engine Coolant in Heating Mode

Probable cause	Check method	Remedy
The engine coolant temperature is low.	Check engine coolant temperature after warm-up operation.	Investigate the causes

Precautions for Disconnection and Connection of Air Conditioner Piping

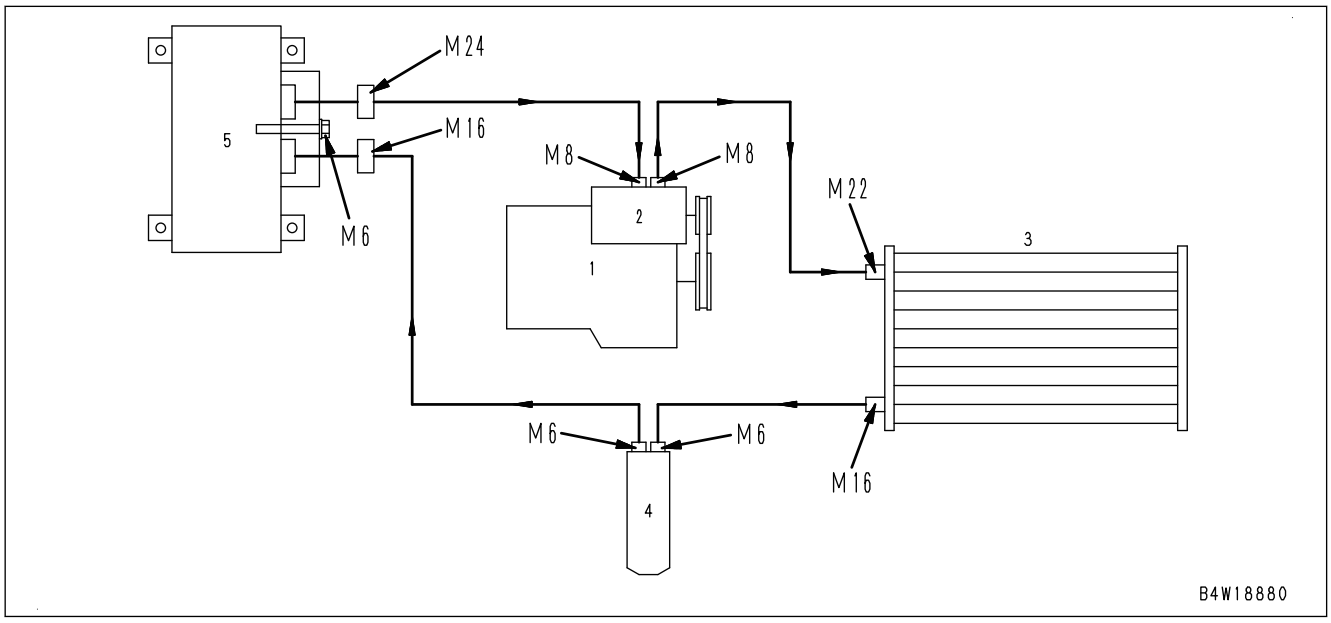
Precautions for Disconnection

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

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

NOTICE

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



1: Engine
2. Compressor
3: Capacitor
4: Receiver drier
5: Air conditioner unit

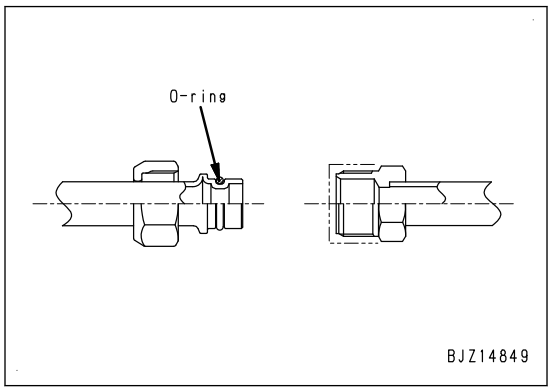
- When loosening the air conditioner hose nut after collecting the refrigerant, be sure to use 2 wrenches. Use one wrench to fix one nut and the other wrench to loosen the other nut.
- When working on the air conditioner piping, take measures to prevent the entry of dirt, dust, water, etc. into the hoses.

Precautions for Connection

- When connecting the pipes, apply compressor oil(SP-10) for R134a to prevent O-ring from damage and twisting.
  Do not apply oil to the threaded portion of a bolt, nut or union, however.

  REMARK

  An O-ring is fitted to every joint of the air conditioner piping.
- Once an O-ring is used, it is deformed and deteriorated. Accordingly, do not reuse it. When removing it, use a soft



Electrical Circuit Diagram of Machine (Machine with Collision Detection System) (Applicable Machine: 87649 and Up) (6/8)

REMARK

This figure covers the equipment and devices that are unavailable as optional items in some areas.