

Shop Manual

WHEEL LOADER

WA270-8

SERIAL NUMBERS H75051 and up
83001 and up

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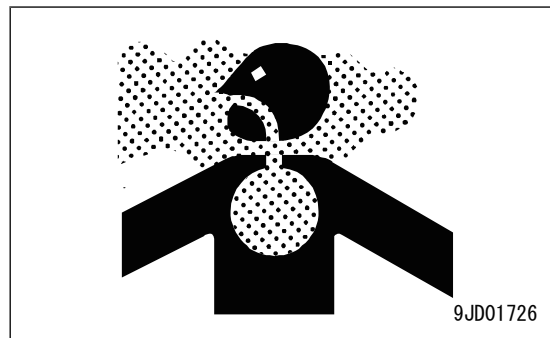
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- Be sure to assemble all parts again in their original places. Replace any damaged parts and parts which must not be reused with new parts. When installing hoses and wiring harnesses, be sure that they will not be damaged by contact with other parts when the machine is operated.
- When installing high pressure hoses and tubes, make sure that they are not twisted. Damaged hoses and tubes are dangerous, so be extremely careful when installing hoses and tubes for high pressure circuits. In addition, check that high pressure hoses and tubes are correctly installed.
- When assembling or installing parts, always tighten them to the specified torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, check again that they are installed correctly.
- Never insert your fingers or hand when aligning 2 holes. Be careful not to get your fingers caught in a hole.
- Check that the measuring tools are correctly installed when measuring hydraulic pressure.
- Take care when removing or installing the tracks of track-type machines. Since the track shoe may separate suddenly when you remove it, never let anyone stand at either end of the track shoe.
- If the engine is operated for a long time in a closed place with poor ventilation, it may cause gas poisoning. Open the windows and doors to ventilate the place well.



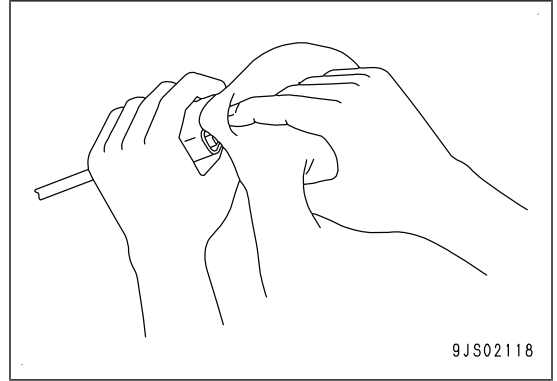
Precautions for slinging work and making signals

- 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.
 - ⚠ **Never stand under the load.**
 - ⚠ **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.**
- 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 (25 kg or heavier), the hanging angle of the rope must be narrower than that of the hook.

1. Disconnect the connector and wipe off the water with a dry cloth.

NOTICE

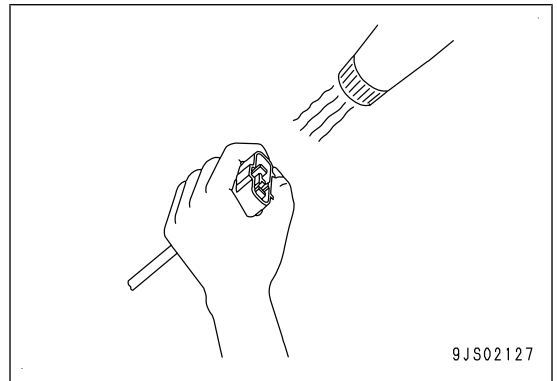
If the connector is to be blown with dry compressed air, there is the risk that oil in the air may cause defective contact, remove oil and water in the air before starting air blow.



2. Dry the inside of the connector with a dryer.
If water enters inside the connector, use a dryer to dry the connector.

NOTICE

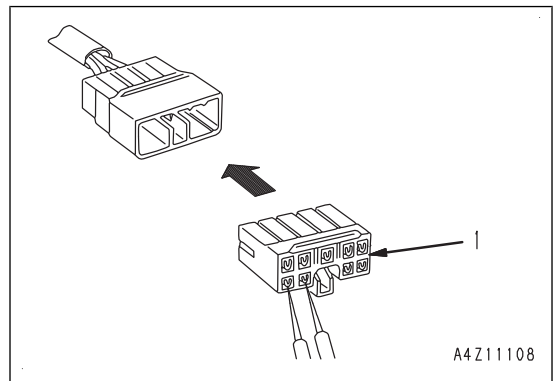
Hot air from a dryer can be used, but limit the time of using a dryer to prevent the connector or related parts from becoming too hot, as this will cause deformation or damage to the connector.



3. Perform a continuity test on the connector.
After drying, leave the wiring harness disconnected, connect T-adaptor(1), and perform a continuity test to check for any short circuits between pins caused by water or etc.

REMARK





After the connector is completely dried, blow the contact restorer, and reassemble them.



Handling controller

- ⚠ When performing arc welding on the machine body, disconnect all of the wiring harness connectors connected to the controller. Fit an arc welding ground close to the welding point.

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
MMS	Multimedia Messaging Service	Communication	This is a service that allows transmission and reception of short messages consisting of characters or voice or images between cell phones.
NC	Normally Closed	Electrical system, hydraulic system	This is a characteristic of electrical or hydraulic circuits. Circuit is normally closed if it is not actuated, and it opens when it is actuated.
NO	Normally Open	Electrical system, hydraulic system	This is a characteristic of electrical or hydraulic circuits. Circuit is normally open if it is not actuated, and it closes when it is actuated.
OLSS	Open-center Load Sensing System	Hydraulic system	This is a hydraulic system that can operate multiple actuators at the same time regardless of the load.
PC	Pressure Compensation	Hydraulic system	This is a function that corrects the oil pressure.
PCCS	Palm command control system	Steering (D Series)	This is a function that electrically controls the engine and transmission in an optimal way with the controller instantly analyzing data from levers, pedals, and dials.
PCV	Pre-stroke Control Valve	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control fuel discharged volume of supply pump.
PPC	Proportional Pressure Control	Hydraulic system	This is a system that operates actuators in proportion to the oil pressure.
PPM	Piston Pump and Motor	Hydraulic system (D, PC, etc)	Piston type hydraulic pump and motor.
PTO	Power Take Off	Power train system	Power take-off mechanism
PTP	Power Tilt and power Pitch dozer	Work equipment (D Series)	This is a function that performs hydraulic control of the tilt and pitch of the dozer blade of the bulldozer.
ROPS	Roll-Over Protective Structure	Cab and canopy	ROPS 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 rolls over. (Roll-over protective structure) This performance is standardized as ISO 3471 or ISO 12117-2.
SCR	Selective Catalytic Reduction	Urea SCR system	This is an exhaust gas purifier using urea water that converts nitrogen oxides (NOx) into harmless nitrogen and water by oxidation-reduction reaction. It may also be mentioned as exhaust gas purification catalyst or part of the name of related devices.
SI	Le Systeme International d' Unites (International unit system)	Unit	Abbreviation for "International System of Units" It is the universal unit system and "a single unit for a single quantity" is the basic principle applied.
SOL	Solenoid	Electrical system	This is an actuator that consists of a solenoid and an iron core that is operated by the magnetic force when the solenoid is energized.

Status		AdBlue/DEF level (*1) (AdBlue/DEF level gauge)	Machine monitor				Engine deration (*3)
			Message of SCR Information	AdBlue/DEF level caution lamp (Action level)	Tone of audible alert	Activated failure code (*2)	
4	Severe Inducement (Inducement 2)	0% (All gradations lights off)	4: Engine power is under heavy deration.	Red  APP14419 Red  APP14413	Continuously	CA1673 CA3547 (AdBlue/DEF level low error 4)	Torque: 50% and RPM: 40%
5	Final Inducement (Inducement 3)	Not remaining in the tank (*6) (All gradations lights off)	5: Engine is running at low idle.	Red  APP14419 Red  APP14413	Continuously	CA1673 CA3547 AS00ZK (AdBlue/DEF level low error 5)	Engine speed is fixed to low idle

*1: It is shown the value of Monitoring ID 19111: "AdBlue/DEF Level Corrected".

*2: These failure codes are displayed on "Current Abnormality" in the operator mode, or "Abnormality Record" in the service mode. For the failure codes, see TROUBLESHOOTING, "TROUBLESHOOTING POINTS FOR UREA SCR SYSTEM".

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

*4: Construction equipment with crawler

*5: Construction equipment with wheel

*6: After progressed "Severe Inducement" the status advances to "Final Inducement" with in 1 hour.

INDUCEMENT STRATEGY WHEN ABNORMALITY IS FOUND IN THE UREA SCR SYSTEM DEVICES (FOR NORTH AMERICA)

- AdBlue/DEF system caution lamp lights up on machine monitor, and an action level is displayed when an abnormality occurs in quality in AdBlue/DEF or in urea SCR system. In addition to the caution by the AdBlue/DEF system caution lamp, alarm sounds as time passes after the abnormality occurred. Then, inducement strategy starts so that the engine output is lowered.
- The Inducement strategy status and the categories of abnormalities can be checked on the "SCR Information" screen of the machine monitor.
- The table shows warning indications and engine power derations by each Inducement strategy status.

ENGINE OUTPUT TORQUE CONTROL FUNCTION

Engine torque control by work phase

- The engine output torque control function is the function that controls the engine output torque so that it is sufficient for each phase of the work by determining the type of work from the engine speed, travel speed, pump discharged pressure, travel direction, work equipment condition, etc.
- This function restrains the engine speed from increasing unnecessarily in order to reduce the fuel consumption.

ENGINE THROTTLE CONTROL FUNCTION

The engine throttle control function is the function that controls the engine throttle by sending the throttle upper limit value and the throttle lower limit value to the engine controller when various controls set those values.

Throttle upper limit value

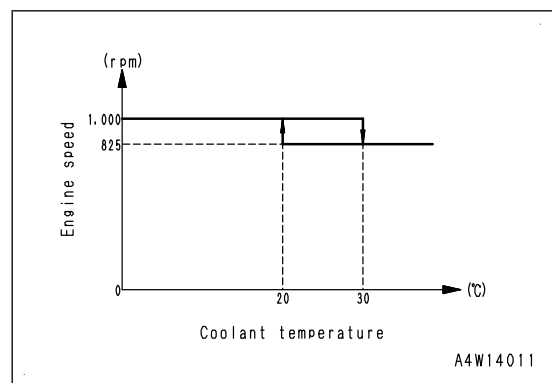
The throttle upper limit value is to be the minimum value among the throttle upper limit values which are restrained when the throttle upper limit value is controlled in cases such as when S mode is set for the traction control function, when traveling with the maximum speed of 4th speed, when performing the directional selection, and when the HC desorb control is enabled. The throttle upper limit value is set to 100 % when these are not applied.

Throttle lower limit value

The throttle lower limit value is to be the maximum value among the throttle lower limit values which are restrained when the throttle lower limit value is controlled in cases such as when two stage low idle switch is "ON", when the automatic regeneration is being performed, when the idling up controlling is enabled, and the HC desorb control is enabled. The throttle lower limit value is set to 0 % when these are not applied.

ENGINE AUTOMATIC WARM-UP FUNCTION

- This function warms up the engine by automatically increasing the low idle speed of the engine when the engine is started in a cold district.
- Engine speed at low idle increases to 1000 rpm when the coolant temperature is 20 °C or below at the starting of engine. The condition required for increasing the low idle speed depends on the coolant temperature as shown in the following figure.
- The automatic warm-up function is canceled and the engine speed returns to 825 rpm when the coolant temperature reaches 30 °C or the accelerator pedal position is kept at 70 % or above for 3 seconds or more during the warm-up operation.



ENGINE AUTOMATIC WARM-UP CANCEL FUNCTION

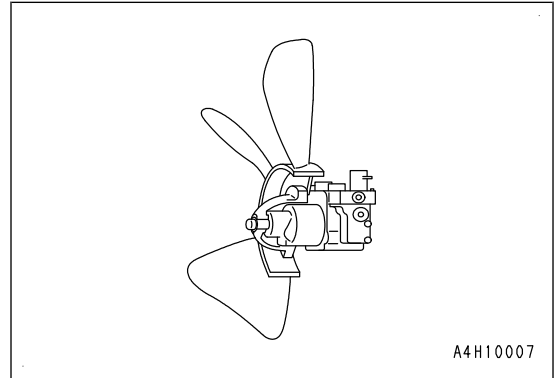
The automatic warm-up cancel function is the function that commands the engine controller to cancel the automatic warm-up in order to prevent the machine from creeping when the speed range is not in NEUTRAL position.

ENGINE OUTPUT DERATING FUNCTION

- This function limits the engine torque or engine speed and protects the engine when the engine controller recognizes a failure.

Structure

The fan motor which is installed within the vane width as shown in the figure below is employed.



SPECIFICATIONS OF COOLING FAN MOTOR

Model: LMF28

Capacity: 23.0 cm³/rev

Rated speed: 1500 rpm

Rated flow rate: 34.5 l/min

Check valve cracking pressure: 0.013 MPa {0.13 kgf/cm²}

Hydraulic oil cooler bypass valve cracking pressure: 0.49 MPa {5.0 kgf/cm²}

FUNCTION OF COOLING FAN MOTOR

It is a swash plate type axial piston motor. It converts the energy of the pressurized oil sent from the cooling fan pump into rotary motion.

Adjustment	1st Minimum Speed / Cleep Adjustment
	HST Pump Block Curve Adjustment
	Fan Maximum Speed EPC Current
	Fan Minimum Speed EPC Current
	3rd Maximum Travel Speed Adjust
	PZ Auto Tilt-in Current Compensation
	ECSS Operating Speed
	HST Pump Stall Pressure Check
	Fan 100% Mode
	Boom Angle Sensor (Raise)
	Boom Angle Sensor (Lower)
	3rd Ext Adjustment
	3rd Ret Adjustment
	4th Ext Adjustment
	4th Ret Adjustment
	PCS Adjustment(Push)
	PCS Adjustment(Pull)
	2-Stage Low Idle Throttle Position
	Fan Reverse Cycle
	Fan Reverse Duration
Speed Limit	
Clutch Engage Time	
No Injection	
KOMTRAX Settings	Terminal Status
	GPS & Communication Status
	Modem Status
Service Message	

REMARK

For operating method of the service mode functions, see TESTING AND ADJUSTING, "SERVICE MODE".

FUNCTION OF HYDRAULIC TANK BREATHER

Prevention of negative pressure in hydraulic tank

Since the tank is pressurized and enclosed, if the oil level in it lowers, negative pressure is generated. At this time, poppet (3) is opened by the differential pressure between the tank pressure and the ambient Pressure to prevent generation of the negative pressure.

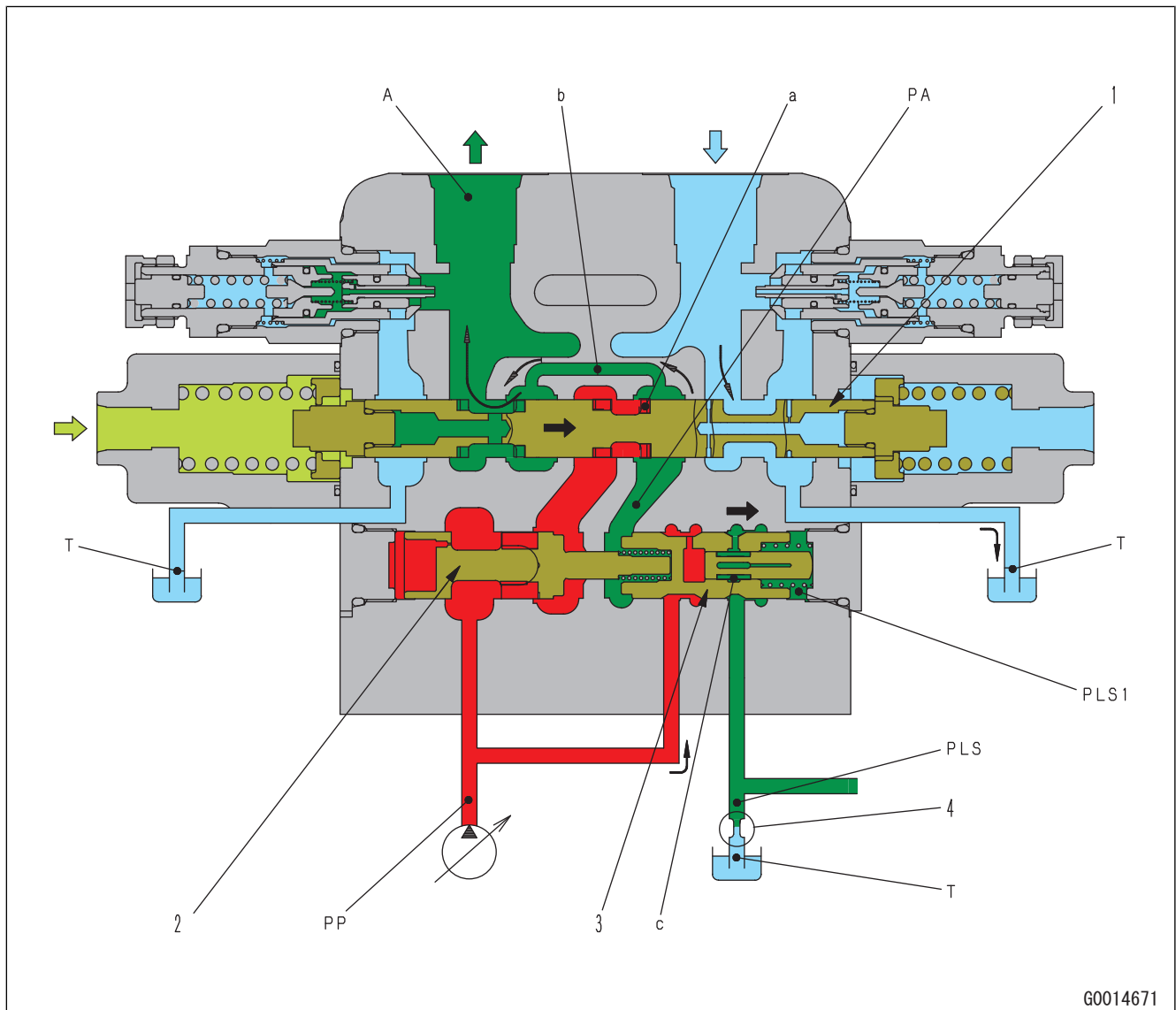
(Set pressure of intake valve: 0 to 2.9 kPa {0 to 0.03 kgf/cm²})

Prevention of pressure rise in hydraulic tank

If the pressure rises to above a specified level while the circuit is in operation by an increase or decrease of oil level and the temperature rise, sleeve (4) is tripped to relieve pressure in the hydraulic tank.

(Set pressure of exhaust valve: 137±20 kPa {1.4±0.2 kgf/cm²})

Work equipment valve (bucket, service)



1. When spool (1) is operated, pump pressure (PP) flows from flow control valve (2) and notch (a) in the spool through bridge passage (b) to actuator circuit (A).
2. Since pressure reducing valve (3) also moves to the right, pump pressure (PP) is transmitted through LS circuit (PLS) as being reduced by the pressure loss at notch (c), and it flows to spring chamber (PLS1).
3. LS circuit (PLS) is connected from LS bypass plug (4) to tank circuit (T) this time. (See "LS bypass plug".)
4. Actuator circuit pressure (A) acts on the left side of pressure reducing valve (3). The reduced pump pressure (PP) acts on the opposite side.
5. Pressure reducing valve (3) is balanced at a position where actuator circuit pressure (A) and the pressure of spring chamber (PLS) are the same. Pump discharged pressure (PP) reduced at notch (c) becomes actuator circuit pressure (PP), and is transmitted into LS circuit (PLS).

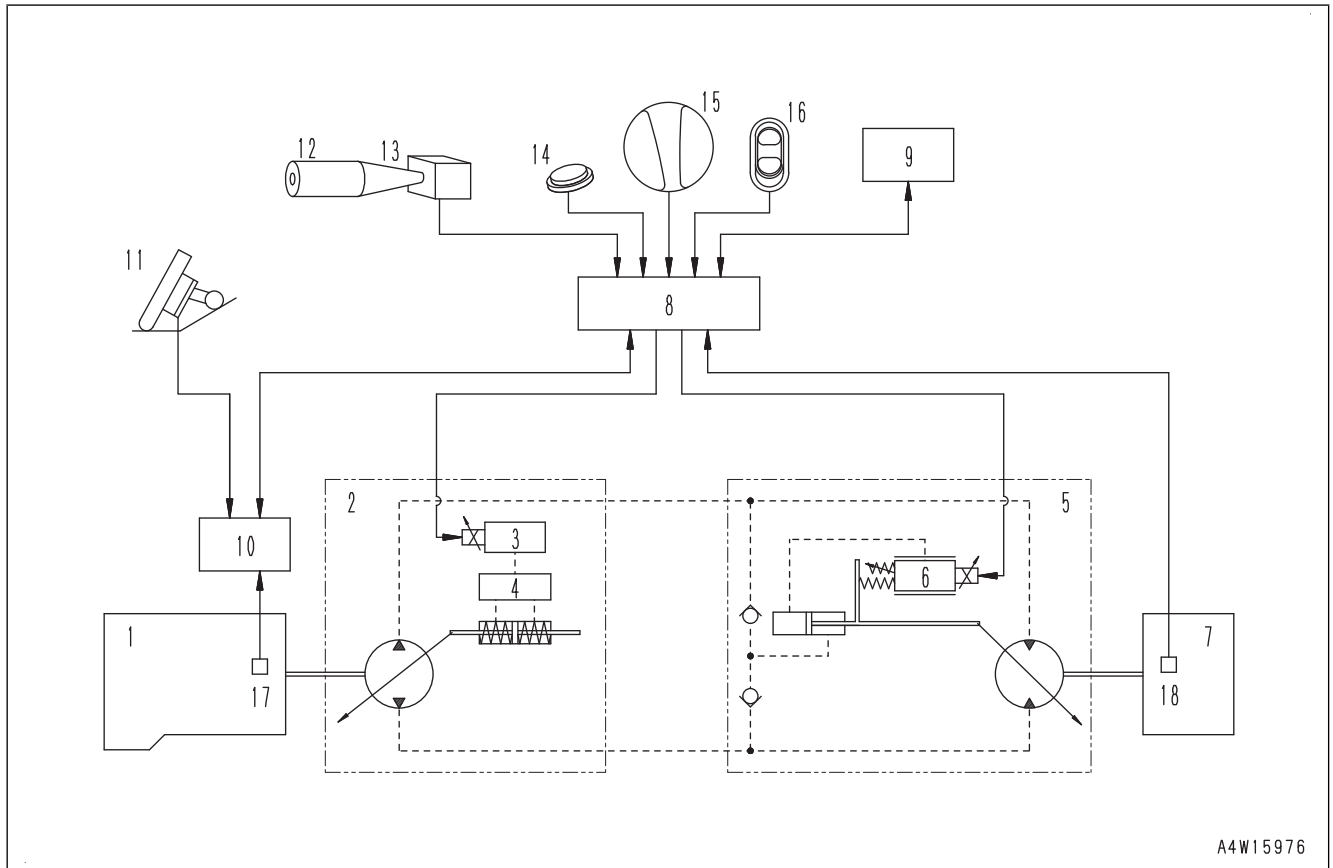
LS BYPASS PLUG OF CONTROL VALVE

LS

Abbreviation for Load Sensing

KOMATSU TRACTION CONTROL SYSTEM (KTCS)

KOMATSU TRACTION CONTROL SYSTEM (KTCS) DIAGRAM

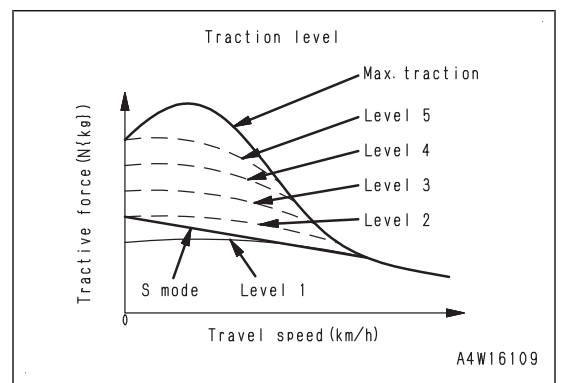


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- | | |
|--|---------------------------------|
| 1: Engine | 10: Engine controller |
| 2: HST pump | 11: Accelerator pedal |
| 3: EPC valve | 12: Speed range selector switch |
| 4: Directional selector solenoid valve | 13: Directional lever |
| 5: HST motor 1 | 14: Max. traction switch |
| 6: EP servo valve | 15: Travel speed control dial |
| 7: Transfer | 16: Traction control switch |
| 8: HST controller | 17: Engine speed sensor |
| 9: Machine monitor | 18: Speed sensor |

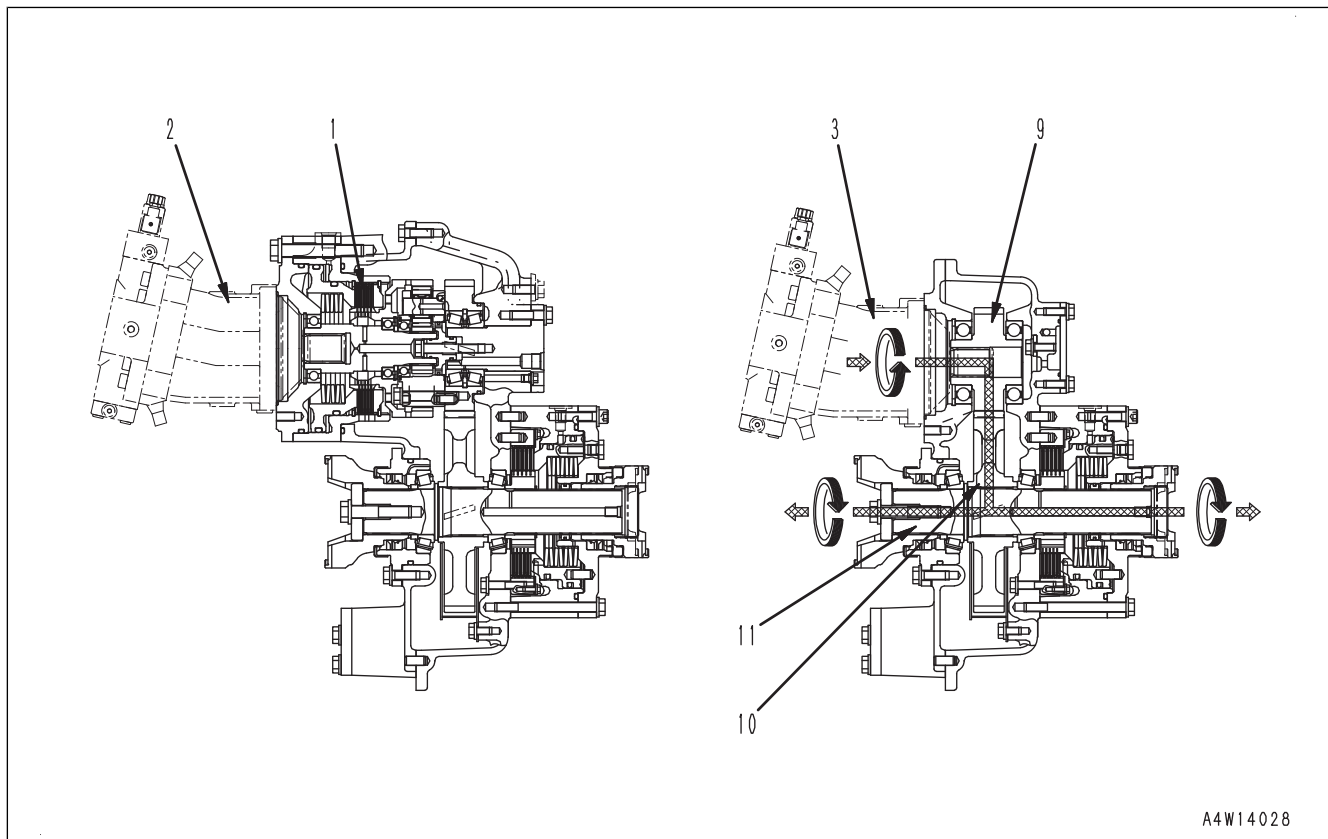
FUNCTION OF KOMATSU TRACTION CONTROL SYSTEM (KTCS)

- Komatsu Traction Control System is the function that limits the maximum capacity of HST motor 1, and controls the drawbar pull when the HST control receives the traction control signal.
- HST controller properly controls the upper limit of throttle position, according to the operating condition.
- The drawbar pull can be changed to "Auto" or "Level 1" to "Level 5" in "Traction Level" on the machine monitor.
- The drawbar pull is adjusted automatically to a proper level according to the operating condition when "Auto" is selected in "Traction Level".



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High speed mode



The transfer clutch (1) is disengaged, and the HST motor 1 (2) is stopped. Only the power of HST motor 2 (3) is transmitted.

Power of HST motor 2 (3)

↓

Motor 2 gear (9)

↓

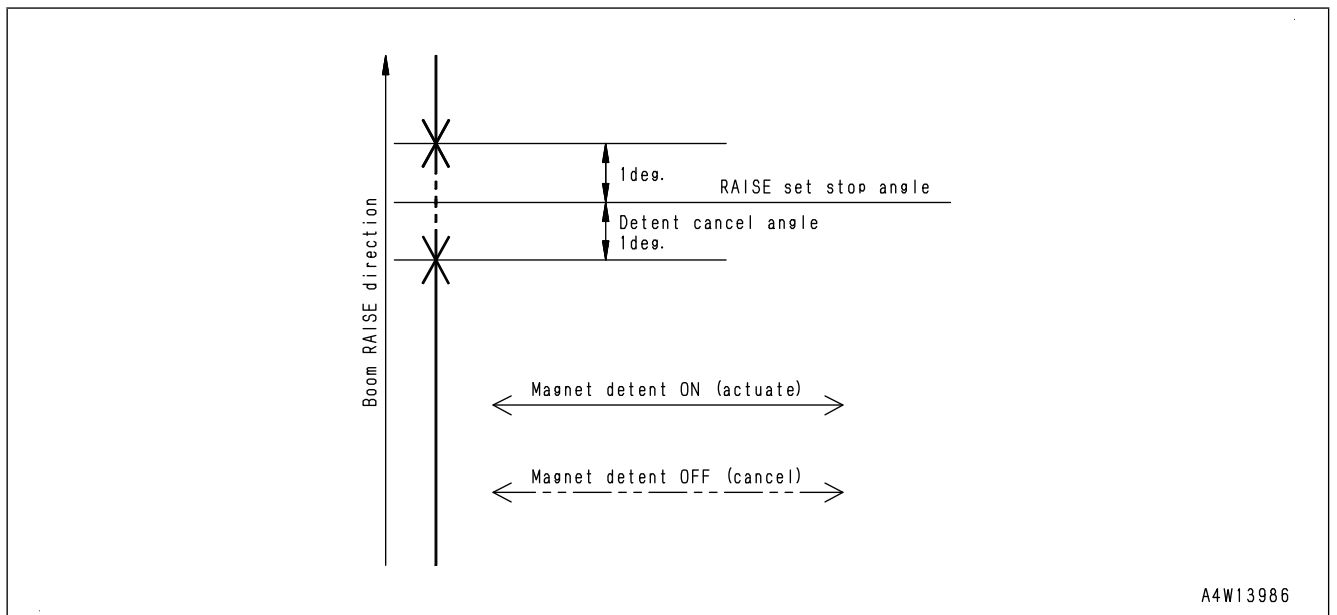
Output gear (10)

↓

Output shaft (11)

<p>Method to set the RAISE stop</p>	<ol style="list-style-type: none"> 1. Raise the boom to the desired position to be set 2. Press the remote positioner switch (less than a second). 3. The boom angle is saved when the position in which the switch is pressed is within the set range. (Setting completed buzzer sounds (short beep), and the pilot lamp lights up on the machine monitor.) 4. The setting is not performed when it is out of the set range (boom angle is below 0 °) or the sensor has an error. (The buzzer does not sound, and the set position is not saved.) 5. Pressing the switch less than a second always changes the set position. (The set position is saved even after the key is turned to OFF position.)
<p>Method to cancel the setting the RAISE stop</p>	<ol style="list-style-type: none"> 1. Keep pressing the remote positioner switch for one second or longer. 2. The stop position is set when the position in which the switch is pressed is within the set range. ((3) above) 3. The RAISE selection is canceled when one second has passed after it is pressed for one second or longer. (The setting cancel buzzer (beep) sounds, and the pilot lamp on the machine monitor goes off.) 4. Disables the RAISE stop control of remote positioner, and allows the boom kick-out control only.

Cancellation of the boom RAISE detent



- The RAISE detent solenoid is "energized" when the boom RAISE PPC pressure increases to 1.0 MPa or higher, and the boom is held when the work equipment (boom) control lever exceeds the notch.
- The detent is turned off in the range of setting stop angle from -1 ° to +1 ° when the remote positioner is operated.

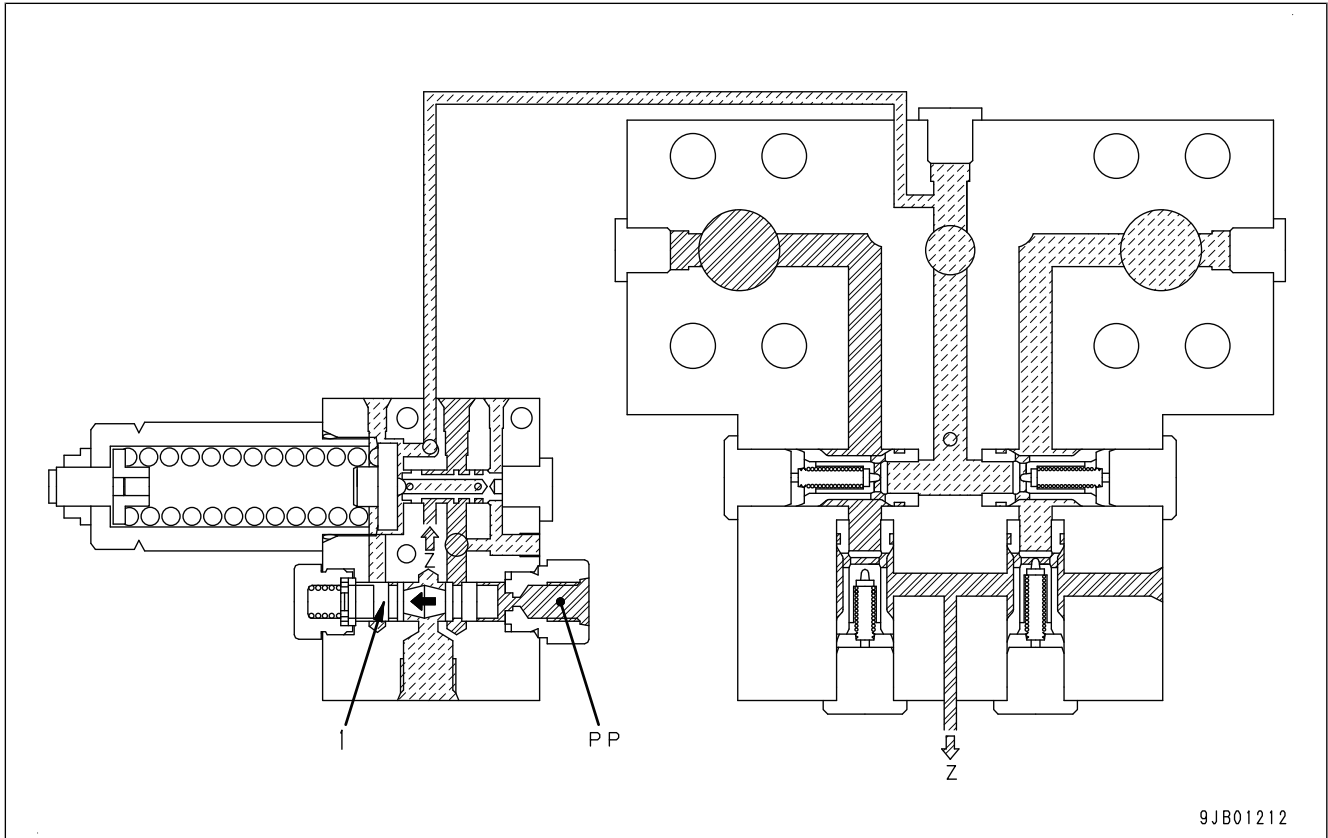
3: Valve body

5: Selector valve

4: Pressure reducing valve

OPERATION OF SECONDARY STEERING VALVE

When the engine, and the steering and work equipment pump are normal



1. The oil sent from the steering and work equipment pump flows into the Orbitrol valve, and is supplied for steering.
2. The oil pressure which is sent from the steering and work equipment pump flows into the Orbitrol valve, and is used for steering.

TIRE

FEATURES OF RADIAL TIRE WHEN COMPARED WITH BIAS TIRE

The radial tires of this machine have the following features.

- High grip
- Better operator comfort
- Low flat tire rate
- Less uneven wear
- Improved fuel economy
- Long life
- Less damage on machine
- Less generation of heat

STRUCTURE OF RADIAL TIRE

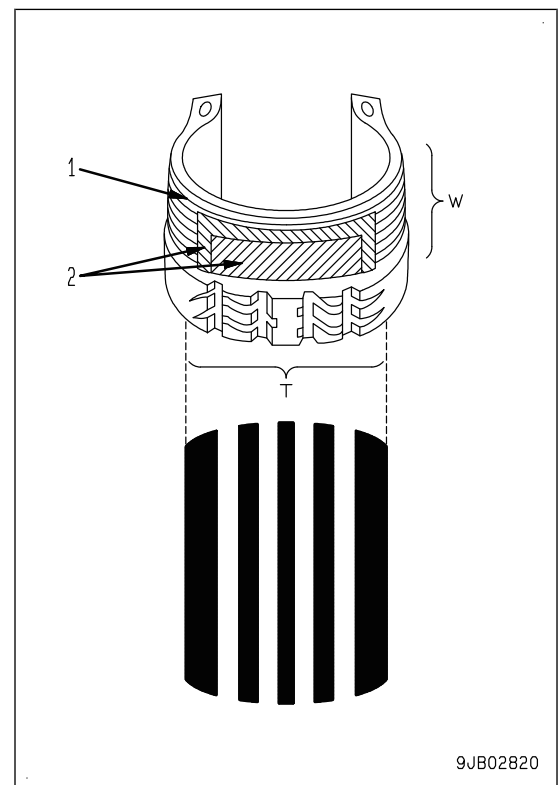
General view

T: Tread

W: Side wall

1: Carcass

2: Belt



Structure

- Cords of carcass (1) are arranged at right angles to the center line of tread (T) (radially).
- Tread (T) is stabilized and protected by several strong belts (2).
- Side wall (W) and tread (T) have independent structure.

MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE

Fig. 1

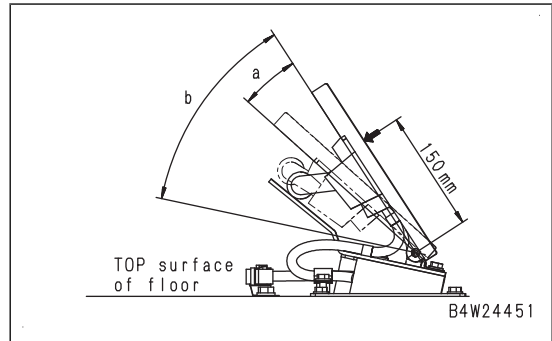


Fig. 2

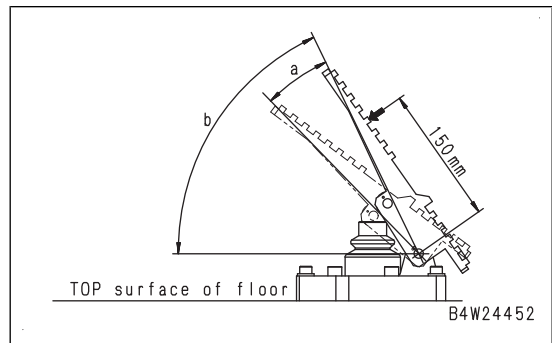


Fig. 3

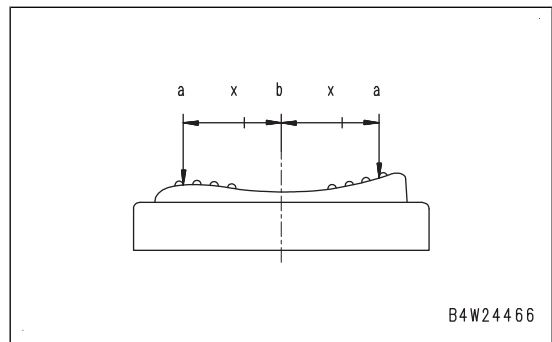


Fig. 4

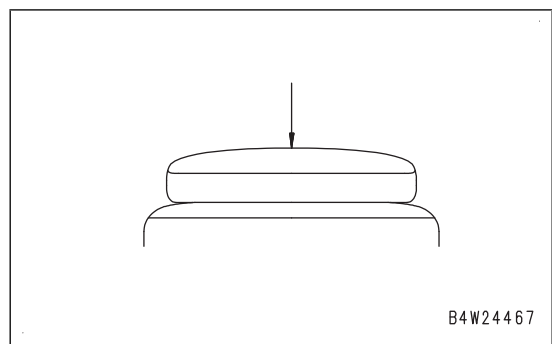
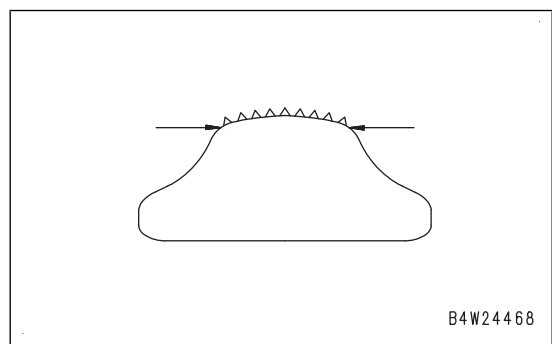
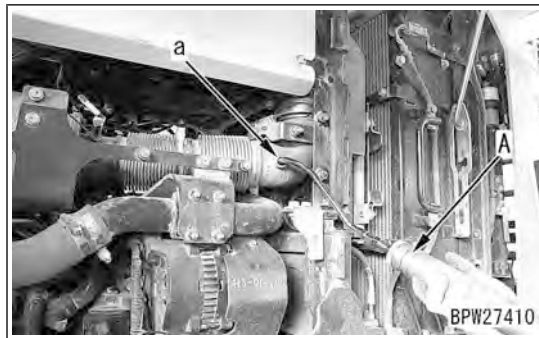


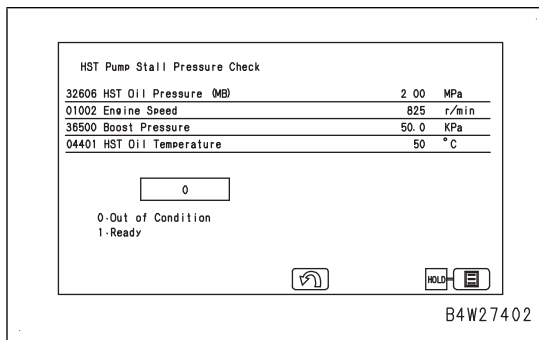
Fig. 5



3. Fit a sheet of filter paper to handy smoke checker A.
4. Insert the exhaust gas intake pipe of handy smoke checker A into port (a) or tail pipe (b) for removed plug (2).
5. Start the engine.
6. Select and display "Pre-defined Monitoring" (01/25). For details, see "SET AND OPERATE MACHINE MONITOR".
7. Raise the coolant temperature and the HST oil temperature to the specified range.



8. Display the "HST Pump Stall Pressure Check" screen by referring to "SET AND OPERATE MACHINE MONITOR", "ADJUSTMENT MENU (HST Pump Stall Pressure Check)".



9. 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.

10. Set the speed range to 2nd by using the speed range selector switch.
11. While depressing the brake, set the directional lever to FORWARD.
12. Depress the accelerator pedal gradually. Test the exhaust gas color when the accelerator pedal is depressed to the full stroke 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.

Collecting time: 1.4±0.2 seconds

For standard values, see STANDARD VALUE TABLE, "STANDARD VALUE TABLE FOR ENGINE".

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

 Plug (2):

Seizure prevention compound (LC-G)



4. Start the engine.

REMARK

Do not depress the accelerator pedal.

5. Stop the engine and check the fuel piping and component for fuel leakage.
 - Check the high-pressure circuit for fuel leakage focusing on the area where the color checker A is sprayed.
 - If there is a fuel leakage, repair it, and perform the testing from step 1 again.

Testing method of fuel circuit for leakage at engine high idle

1. Start the engine.
2. Stop the engine after the engine automatic warm-up function is automatically canceled and the engine speed is stabilized while the accelerator pedal is not depressed (low idle).

REMARK

- The engine automatic warm-up function is canceled by depressing the accelerator pedal to the full stroke (high idle).
 - For the condition of canceling the engine automatic warm-up function, see STRUCTURE AND FUNCTION, "ENGINE AUTOMATIC WARM-UP SYSTEM".
3. Spray the color checker A to the supply pump, common rail, injectors, and joints of the high-pressure piping.
 4. Start the engine, and depress the accelerator pedal to the full stroke (high idle).
 5. Stop the engine and check the fuel piping and component for fuel leakage.
 - Check the high-pressure circuit for fuel leakage focusing on the area where the color checker A is sprayed.
 - If there is a fuel leakage, repair it, and perform the testing from step 1 again.

Method for testing fuel circuit for leakage at HST stall

1. Start the engine.
2. Stop the engine after the engine automatic warm-up function is automatically canceled and the engine speed is stabilized while the accelerator pedal is not depressed (low idle).

REMARK

- The engine automatic warm-up function is canceled by depressing the accelerator pedal to the full stroke (high idle).
 - For the condition of canceling the engine automatic warm-up function, see STRUCTURE AND FUNCTION, "ENGINE AUTOMATIC WARM-UP SYSTEM".
3. Spray the color checker A to the supply pump, common rail, injectors, and joints of the high-pressure piping.
 4. Start the engine.
 5. Stall HST and apply a load to the engine. For details, see "METHOD FOR TESTING ENGINE SPEED".
 6. Stop the engine and check the fuel piping and component for fuel leakage.
 - Check the high-pressure circuit for fuel leakage focusing on the area where the color checker A is sprayed.
 - If there is a fuel leakage, repair it, and perform the testing from step 1 again.

- 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".

- Press UP switch (10) to start "AdBlue/DEF Line Heater Relay 2 Test".

UP switch (10): Starts "AdBlue/DEF Line Heater Relay 2 Test"

DOWN switch (11): Stops "AdBlue/DEF Line Heater Relay 2 Test" (When "STOP" is displayed.)

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

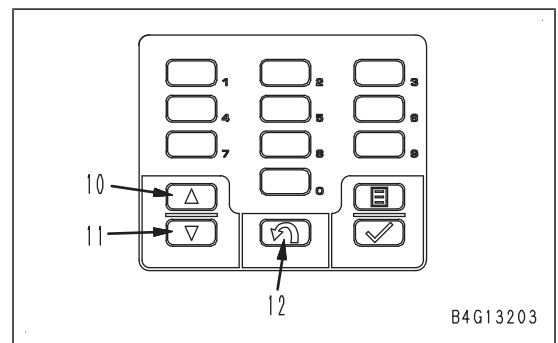
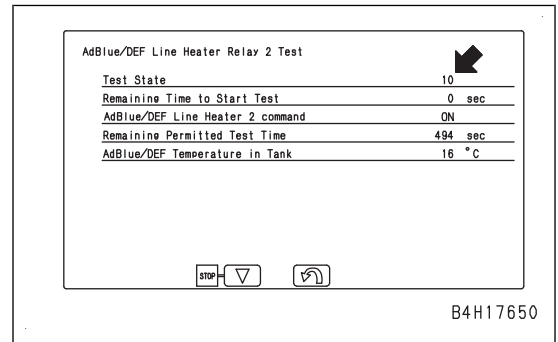
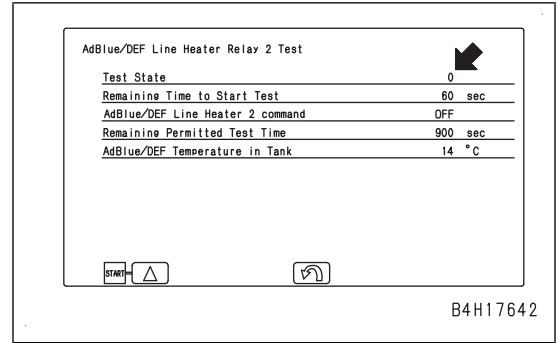
NOTICE

- If "Test State" does not change to "10" and test does not start even by pressing UP switch (10), turn starting switch to OFF position once, 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

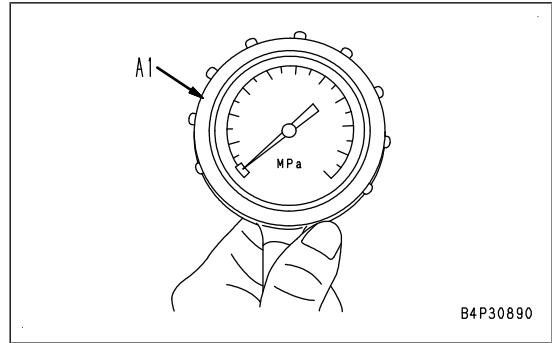
- Display of "Test State" changes to flashing of "10", and display of "Remaining Time to Start Test" is counted down from "60" to "0 sec", and when it reaches to "0 sec", the power is supplied automatically.
- When the display of "Test State" is "11" to "41", perform the required action according to the "Parameter list of test state".
- When the display of "Remaining Time to Start Test" becomes "0 sec", "AdBlue/DEF Line Heater 2 Command" is "ON" and the voltage is output.
- 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.

- Measure the voltage between pin 1 and pin 2.



8. Depress L.H. brake pedal, and test the wheel brake oil pressure.

For standard values, see "STANDARD VALUE TABLE, STANDARD VALUE TABLE FOR MACHINE".



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

- Remove the oil pressure pickup plug (3), install the nipple D, and connect the gauge A2 inside the hydraulic tester A.

REMARK

Gauge in the digital hydraulic tester B can also be used instead of the gauge A2.


- Start the engine.
- Select and display "SET AND OPERATE MACHINE MONITOR" (01/25). See "SET AND OPERATE MACHINE MONITOR".
- Adjust the HST oil temperature within the specified range.
- Set to the Manual Fan Reverse Mode by referring to Operation and Maintenance Manual.
- Test the oil pressure when the accelerator pedal is depressed to the full stroke (high idle).

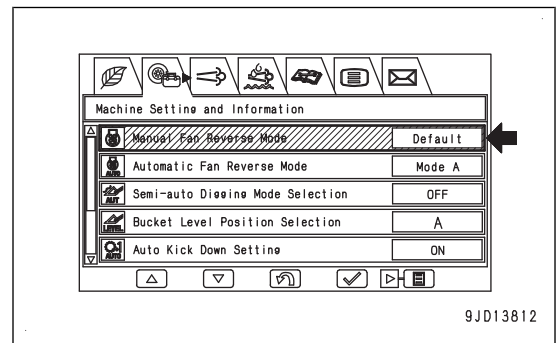
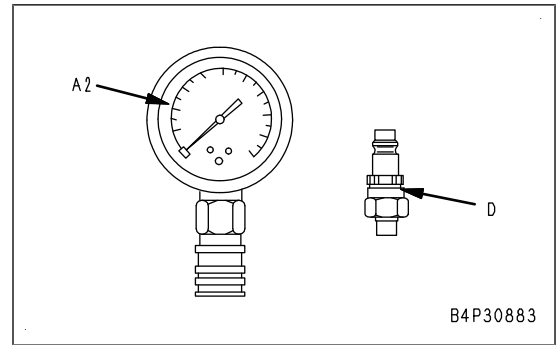
REMARK

Test the fan in both clockwise and counterclockwise direction. Check that the solenoid drives and the oil pressure is at the specified pressure during the fan reverse mode.

For standard values, see "STANDARD VALUE TABLE, STANDARD VALUE TABLE FOR MACHINE".

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

-  Oil pressure pickup plug (3):
9.8 to 12.7 Nm {1.0 to 1.3 kgfm}



Code	Item		Reference
02	Self-define Monitoring		METHOD FOR CHECKING SELF-DEFINE MONITORING INFORMATION
03	Abnormality Record	Mechanical Sys Abnormality Record	METHOD FOR CONFIRMING ABNORMALITY RECORD (MECHANICAL SYSTEMS)
		Electrical Sys Abnormality Record	METHOD FOR CONFIRMING ABNORMALITY RECORD (ELECTRICAL SYSTEMS)
04	Maintenance Record		METHOD FOR CONFIRMING MAINTENANCE RECORD
05	Maintenance Mode Setting		METHOD FOR OPERATING MAINTENANCE MODE SETTING
06	Phone Number Entry		METHOD FOR OPERATING PHONE NUMBER ENTRY SETTING
07	Default	Machine Model Selection	METHOD FOR SETTING WITH DEFAULT SETTING MENU (MACHINE MODEL SELECT)
		Option Selection	METHOD FOR SETTING WITH DEFAULT SETTING MENU (OPTION SELECTION)
		Unit Selection	METHOD FOR SETTING WITH DEFAULT SETTING MENU (UNIT)
		Rearview Monitor Setting	METHOD FOR SETTING WITH DEFAULT SETTING MENU (REARVIEW MONITOR SETTING)
		Minimum of Auto Idle Stop Time	METHOD FOR SETTING WITH DEFAULT SETTING MENU (MINIMUM OF AUTO IDLE STOP TIME)
		Auto Idle Stop Time Fixing	METHOD FOR SETTING WITH DEFAULT SETTING MENU (AUTO IDLE STOP TIMER FIXING)
08	Diagnostic Tests	Cylinder Cutout Mode Operation	METHOD FOR OPERATING TESTING MENU (CYLINDER CUT-OUT OPERATION)
		Active Regeneration for Service	METHOD FOR OPERATING TESTING MENU (REGENERATION FOR SERVICE)
		KDPF Memory Reset	METHOD FOR OPERATING TESTING MENU (KDPF MEMORY RESET)
		SCR Service Test	METHOD FOR OPERATING TESTING MENU (SCR SERVICE TEST)
		Engine Controller Active Fault Clear	METHOD FOR OPERATING TESTING MENU (ENGINE CONTROLLER ACTIVE FAULT CLEAR)
		Ash in Soot Accumulation Correction	METHOD FOR OPERATING TESTING MENU (ASH IN SOOT ACCUMULATION CORRECTION)
		Engine Stop at AdBlue/DEF Inj Overheat Count Reset	METHOD FOR OPERATING TESTING MENU (ENGINE STOP AdBlue/DEF INJ OVERHEAT COUNT RESET)

9. When "Set" screen is displayed, change a set value with the switches on the switch panel.

"Default": Maintenance set time set on the machine monitor (Recommended by the manufacturer and not changeable).

"Set": Maintenance notice time that can be freely set. Maintenance reminder function works according to this set time in operator mode (the time can be increased or decreased in multiples of 25 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 individual setting screen

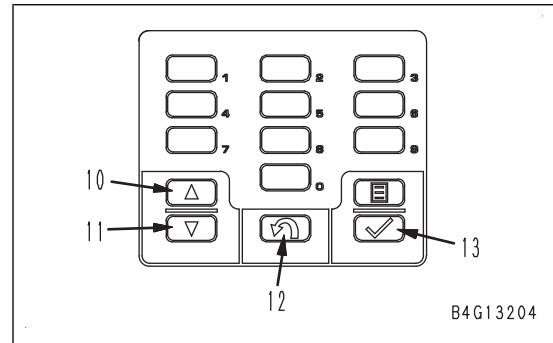
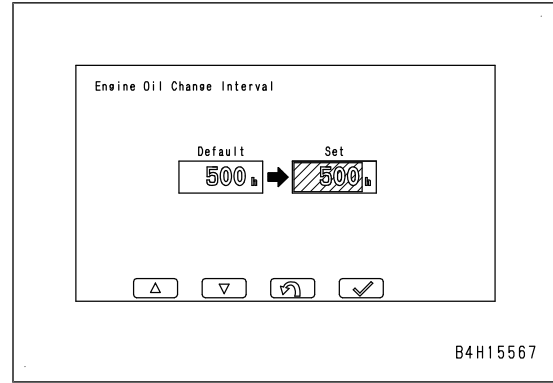
ENTER switch (13): Enters the setting and switches the display to the individual setting screen

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.
- The image will be displayed when "Engine oil Change Interval" is selected.

NOTICE

Maintenance notice time can be set at "Set" in "Air Cleaner Cleaning or Change Interval". Perform the cleaning or replacement of the air cleaner element when "Air cleaner clogging caution lamp" lights up.

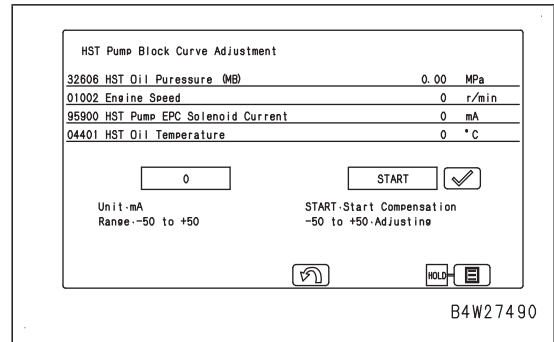


- When "HST Pump Block Curve Adjustment" screen is displayed, set the traction control function to OFF (MAX).

REMARK

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

- Set the speed range selector switch to the 2nd speed.
- Depress the brake pedal.
- Set the directional lever to F position.



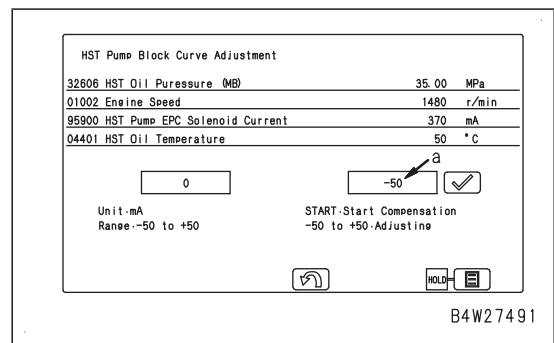
- Depress the accelerator pedal and check that the engine speed is 1460 ± 20 km/h, and then press ENTER switch (13).

RETURN switch (12): Returns to "Adjustment" screen

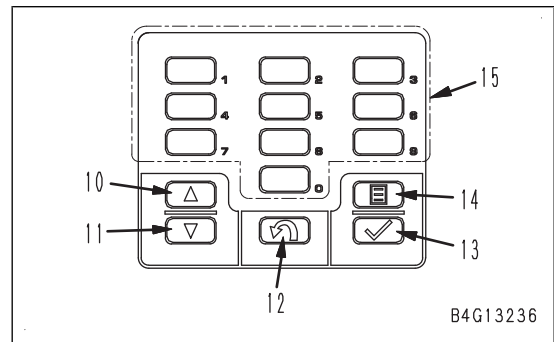
ENTER switch 13: Starts adjustment

Menu switch (14): Switches between the Hold and the Releasing hold (If the Hold is selected, "HOLD" part is hatched.)

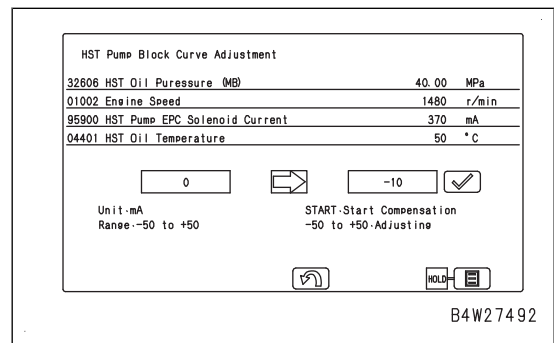
The adjustment value in the box (a) increases from -50 mA.



- When "HST Oil Pressure (MPa)" is 35.7 ± 0.5 MPa, press ENTER switch (13) to move to the adjustment confirmation screen.



- When the adjustment confirmation screen is displayed, press ENTER switch (13) again to confirm the adjustment value.



KOMTRAX SETTINGS MENU

CHECK KOMTRAX Settings (Terminal State) (MACHINE WITH KOMTRAX TERMINAL)

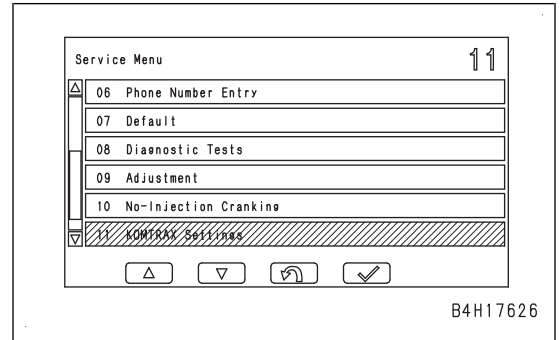
The setting and operating state of KOMTRAX can be checked by using the menu of KOMTRAX Settings.

"Terminal Status" is used to check the setting condition of the KOMTRAX terminal.

1. Select "KOMTRAX Settings" on "Service Menu" screen.

REMARK

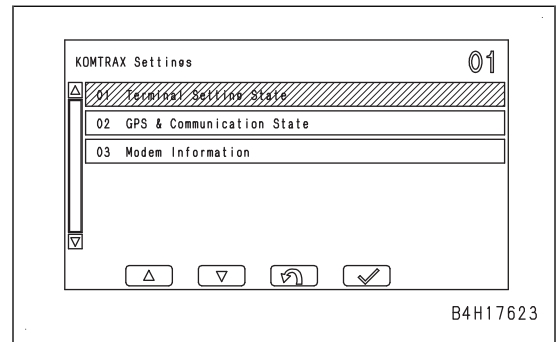
For selecting method, see "METHOD FOR OPERATING SERVICE MODE" in "SERVICE MODE".



2. After the "KOMTRAX Settings" screen is displayed, use a switch on the switch panel to select "Terminal Setting State".

REMARK

For selecting method, see "METHOD FOR OPERATING SERVICE MODE" in "SERVICE MODE".



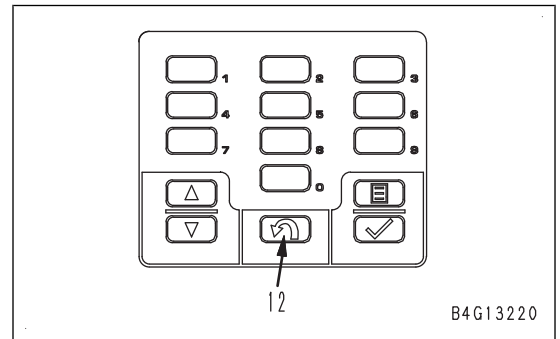
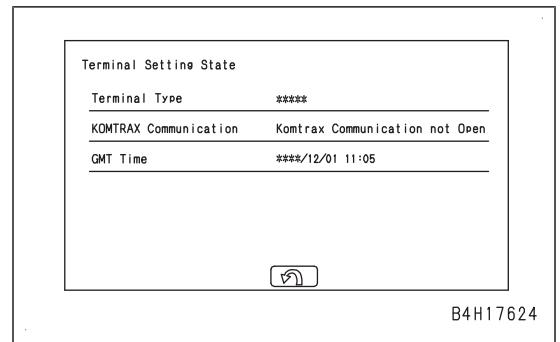
3. After the "Terminal Status" screen is displayed, the following items of information are displayed.

Terminal Type: Model name of the KOMTRAX communication modem

KOMTRAX Communication Inspection: State of radio station establishment

GMT time: Greenwich Mean Time (add 9 hours to it for Japan time)

RETURN switch (12): Returns to the "KOMTRAX Settings" screen



CHECK KOMTRAX Settings (GPS & Communication State) (MACHINE WITH KOMTRAX TERMINAL)

The setting and operating state of KOMTRAX can be checked on KOMTRAX settings screen.

FAILURE CODE [CA352]	40-299
FAILURE CODE [CA356]	40-302
FAILURE CODE [CA357]	40-304
FAILURE CODE [CA386]	40-307
FAILURE CODE [CA428]	40-308
FAILURE CODE [CA429]	40-310
FAILURE CODE [CA431]	40-312
FAILURE CODE [CA432]	40-315
FAILURE CODE [CA435]	40-319
FAILURE CODE [CA441]	40-321
FAILURE CODE [CA442]	40-323
FAILURE CODE [CA449]	40-324
FAILURE CODE [CA451]	40-325
FAILURE CODE [CA452]	40-327
FAILURE CODE [CA488]	40-329
FAILURE CODE [CA515]	40-330
FAILURE CODE [CA516]	40-332
FAILURE CODE [CA553]	40-334
FAILURE CODE [CA555]	40-335
FAILURE CODE [CA556]	40-336
FAILURE CODE [CA559]	40-337
FAILURE CODE [CA595]	40-340
FAILURE CODE [CA687]	40-341
FAILURE CODE [CA689]	40-343
FAILURE CODE [CA691]	40-346
FAILURE CODE [CA692]	40-348
FAILURE CODE [CA697]	40-350
FAILURE CODE [CA698]	40-351
FAILURE CODE [CA731]	40-352
FAILURE CODE [CA778]	40-354
FAILURE CODE [CA1117]	40-359
FAILURE CODE [CA1664]	40-360
FAILURE CODE [CA1669]	40-362
FAILURE CODE [CA1673]	40-363
FAILURE CODE [CA1677]	40-364
FAILURE CODE [CA1678]	40-365
FAILURE CODE [CA1682]	40-366
FAILURE CODE [CA1683]	40-370
FAILURE CODE [CA1684]	40-372
FAILURE CODE [CA1686]	40-374
FAILURE CODE [CA1691]	40-375
FAILURE CODE [CA1694]	40-378
FAILURE CODE [CA1695]	40-381
FAILURE CODE [CA1696]	40-382
FAILURE CODE [CA1712]	40-384
FAILURE CODE [CA1713]	40-387
FAILURE CODE [CA1714]	40-389
FAILURE CODE [CA1715]	40-390
FAILURE CODE [CA1776]	40-391
FAILURE CODE [CA1777]	40-394
FAILURE CODE [CA1843]	40-397
FAILURE CODE [CA1844]	40-399
FAILURE CODE [CA1879]	40-402
FAILURE CODE [CA1881]	40-405
FAILURE CODE [CA1883]	40-407
FAILURE CODE [CA1885]	40-411
FAILURE CODE [CA1887]	40-413
FAILURE CODE [CA1921]	40-415

- Check and clean of rearview camera
Check the rearview monitor for abnormality. If any abnormality is found, repair it
- Check of wheels (tires, rims) for abnormality, wear, loose bolts, and oil leakage
If any abnormality is found, repair it and tighten any loose bolts.
- Check of handrails and steps for abnormality and looseness of bolts
If any abnormality is found, repair it and tighten any loose bolts.
- Check and clean rearview mirrors
Check rearview mirror for abnormality. If any, repair it.
Clean the mirror surface and adjust the mirror angle so that the rear of the machine can be seen from the operator's seat.
- Check of gauges and monitors for abnormality
Check gauges and monitors in the operator's cab for abnormality. If any abnormality is found, replace it with a new one.
Clean up the surfaces.
- Check of seat belt and mounting hardware
Check the hook, the lock, and hook mounting part for damage. If any abnormality is found, repair it.

SYMPTOM AND TROUBLESHOOTING NUMBERS

No.	Symptom of failure	Troubleshooting
		Index
User code, failure code		
1	Action level is displayed on the machine monitor. Press ENTER switch (check mark), "Current Abnormality" is displayed.	Perform troubleshooting for failure code
2	Failure code is displayed on mechanical system abnormality record	
3	Failure code is displayed on electrical system abnormality record	
Symptom related to engine		
4	Engine does not start (engine does not rotate).	E-1, S-1
5	Engine does not crank when starting switch is turned to "START" position.	E-1, S-1
6	Engine cranks but no exhaust gas comes out	S-2
7	Fuel is being injected but engine does not start (misfiring: engine cranks but does not start)	S-3
8	Engine startability is poor	S-4
9	Engine does not pick-up smoothly	S-5
10	Engine stops during operation	S-6, H-2
11	Engine runs rough or is unstable	S-7
12	Engine lacks power	S-8
13	Exhaust gas color is black (KDPF becomes clogged soon)	S-9
14	Engine oil consumption is excessive	S-10
15	Oil becomes contaminated early	S-11
16	Fuel consumption is excessive	S-12
17	Oil is in coolant (or coolant spurts back or coolant level goes down)	S-13
18	Engine oil pressure drops	S-14
19	Fuel mixes into engine oil	S-15
20	Water mixes into engine oil (milky)	S-16
21	Coolant temperature rises too high (overheating)	S-17
22	Unusual noise is heard	S-18
23	Vibration is excessive	S-19
24	Air cannot be bled from fuel circuit	S-20
25	Active regeneration is executed frequently	S-21
26	Active regeneration takes time	S-22
27	White smoke is exhausted during active regeneration	S-23
28	Consumption of AdBlue/DEF is excessive.	S-24
29	There is unusual smell (irritating odor).	S-25
30	Foreign materials enter AdBlue/DEF (AdBlue/DEF increases).	S-26
31	Manual preheating system does not work	E-2
32	Automatic preheating system does not work	E-3
33	While preheating is working, preheating monitor does not light up.	E-4

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

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

No. of pins	DELPHI connector for engine controller		Testing connection use special tool Part No.
	Engine side (plug)	Harness side (receptacle)	
96 (Brown) (Gray)			-
	-	-	

B4D24293

Failure code	Failure (Displayed on screen)	Applicable component	Action level	History category	Remarks
CA3148	SCR Outlet Temperature Sensor In Range Error	ENG	L01	Electrical system	
CA3151	SCR Catalyst Efficiency Low Error 2	ENG	L01	Electrical system	
CA3165	SCR Outlet Temperature High Error	ENG	L03	Electrical system	
CA3229	SCR Temperature High Error	ENG	L03	Electrical system	
CA3231	SCR Temperature High Error - Non Regeneration	ENG	L03	Electrical system	
CA3232	Turbo Outlet NOx Sensor Datalink Timeout Error	ENG	L01	Electrical system	
CA3235	SCR Outlet Temperature High Error - Non Regeneration	ENG	L03	Electrical system	
CA3239	AdBlue/DEF Line Heater 2 Voltage High Error	ENG	L01	Electrical system	
CA3241	AdBlue/DEF Line Heater 2 Voltage Low Error	ENG	L01	Electrical system	
CA3242	AdBlue/DEF Tank Heating Error	ENG	L01	Electrical system	
CA3251	KDOC Inlet Temperature High Error	ENG	L03	Electrical system	
CA3253	KDOC Temperature Error - Non Regeneration	ENG	L03	Electrical system	
CA3254	KDOC Outlet Temperature High Error 1	ENG	L01	Electrical system	
CA3255	KDPF Temperature Error - Non Regeneration	ENG	L03	Electrical system	
CA3256	KDPF Outlet Temperature High Error 1	ENG	L01	Electrical system	
CA3311	KDOC Outlet Temperature High Error 2	ENG	L03	Electrical system	
CA3312	KDPF Outlet Temperature High Error 2	ENG	L03	Electrical system	
CA3313	KDOC Inlet Temperature Sensor Low Error	ENG	L03	Electrical system	
CA3314	KDOC Inlet Temperature Sensor High Error	ENG	L03	Electrical system	
CA3315	KDOC Inlet Temperature Sensor In Range Error	ENG	L03	Electrical system	
CA3316	KDOC Outlet Temperature Sensor Low Error	ENG	L03	Electrical system	
CA3317	KDOC Outlet Temperature Sensor High Error	ENG	L03	Electrical system	
CA3318	KDOC Outlet Temperature Sensor In Range Error	ENG	L03	Electrical system	

FAILURE CODE [879BKA]

Action level	Failure code	Failure	Air Conditioner Outside Air Temperature Sensor Open Circuit (Machine monitor system)
-	879BKA		
Detail of failure	Open circuit in outside air temperature sensor input is detected by air conditioner controller		
Action of controller	Controls with outside air temperature fixed at 25 °C.		
Phenomenon on machine	AUTO mode air conditioner is controlled without using outside air temperature sensor.		
Related information	<ul style="list-style-type: none"> For each connector location, see "INSTALLATION LOCATIONS OF AIR CONDITIONER PARTS AND ARRANGEMENT OF CONNECTORS". For arrangement of each connector pin, see "CIRCUIT DIAGRAM AND ARRANGEMENT OF CONNECTOR PINS FOR 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 outside air temperature sensor	1. Turn the starting switch to OFF position.		
		2. Disconnect the connector [6], and connect the T-adapter to male side.		
		Resistance	Between [6] (male) (1) and (2)	Temperature 0 °C
			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 [6], and connect the T-adapter to female side of [1] and [2].		
		Resistance	Between [1] (female) (30) and [6] (female) (2)	Max. 1 Ω
		Between [2] (female) (8) and [6] (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.)		

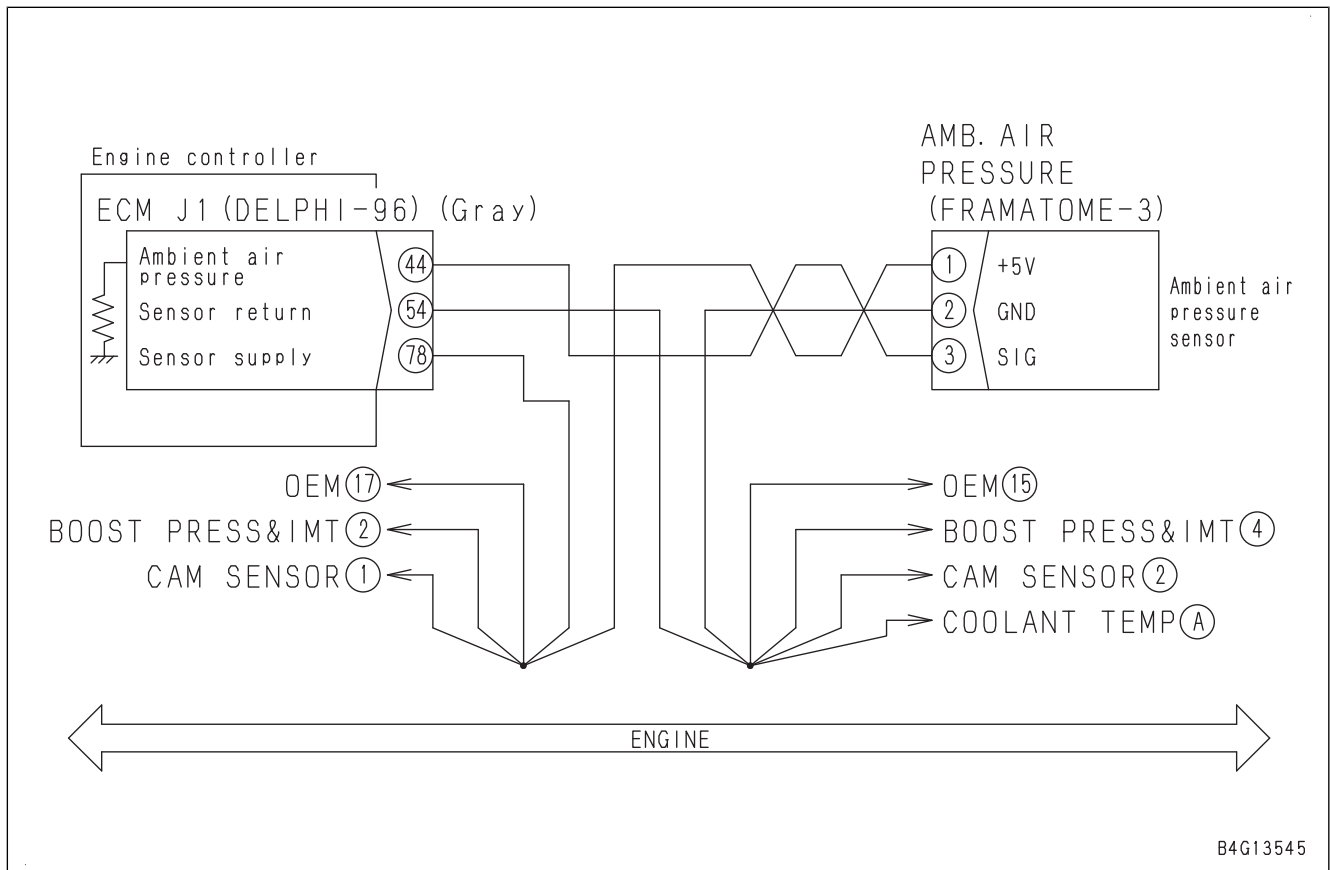
FAILURE CODE [AS00ZK]

Action level	Failure code	Failure	AdBlue/DEF Level Low Error 5 (Engine controller system)
L04	AS00ZK		
Detail of failure	AdBlue/DEF tank level lowers and a certain time has passed since failure code [CA3574] occurs.		
Action of controller	<ul style="list-style-type: none"> The information related to this failure code is displayed on the monitor screen. Engine power deration for operation. Neither Manual Stationary Regeneration nor Active Regeneration for Service can be performed. 		
Phenomenon on machine	Engine speed is fixed at low idle.		
Related information	<ul style="list-style-type: none"> The AdBlue/DEF level has been equivalent to or lower than 0.0 % for an hour. After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. After this failure code is cleared, engine power deration continues until the starting switch is turned to OFF position. 		

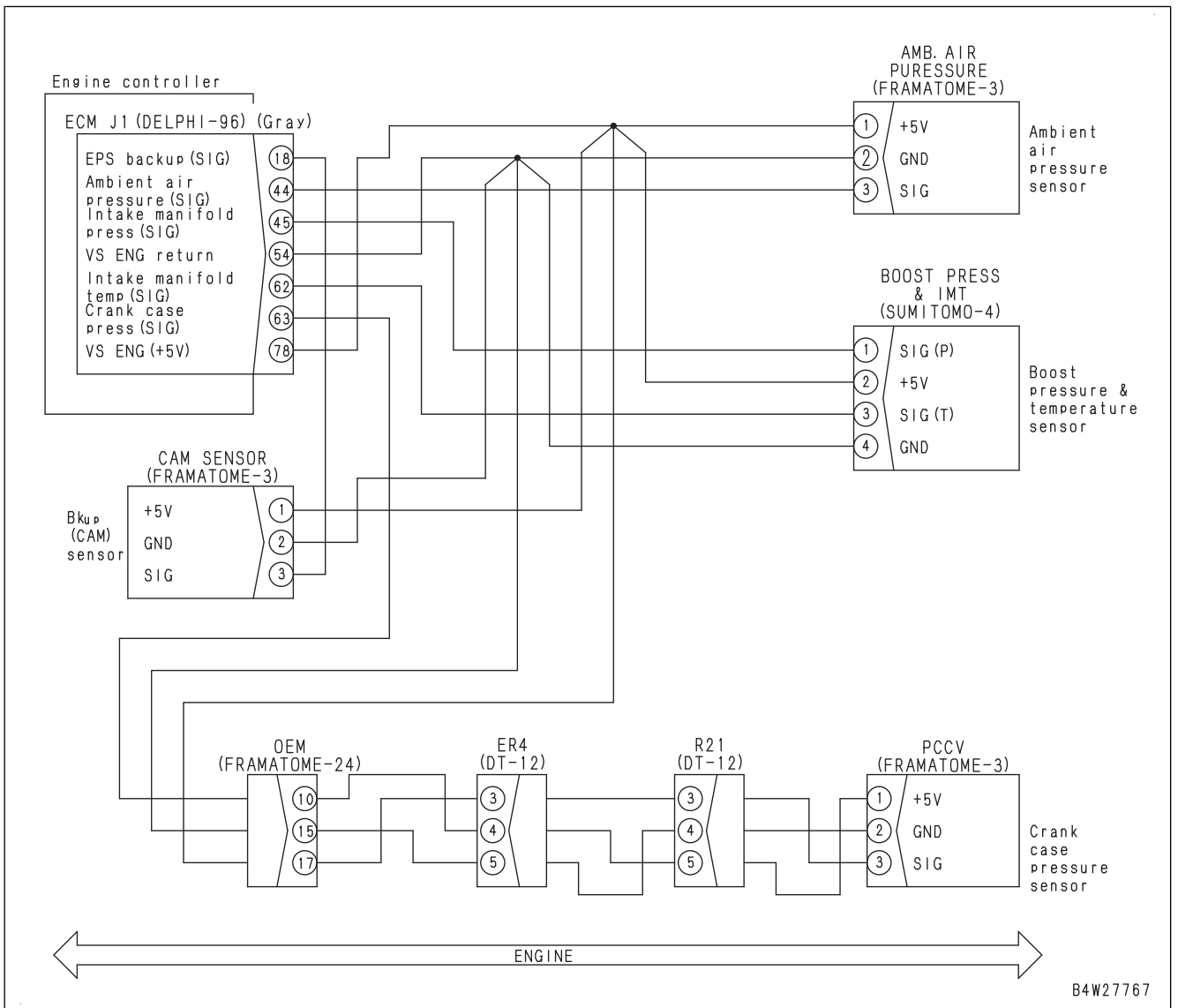
No.	Cause	Procedure, measuring location, criteria and remarks
1	Low AdBlue/DEF level	<ol style="list-style-type: none"> Turn starting switch to OFF position. Check the sight gauge to confirm that there is sufficient amount of AdBlue/DEF in the AdBlue/DEF tank. Refill AdBlue/DEF if the level is low. Turn starting switch to ON position.
		If this failure code is cleared, AdBlue/DEF has been insufficient.
2	Defective AdBlue/DEF tank sensor	<ol style="list-style-type: none"> Check the sensor connector for contamination and damage. Turn starting switch to OFF position. Replace the AdBlue/DEF tank sensor. Turn starting switch to ON position.
		If this failure code is cleared, any internal parts in the original AdBlue/DEF tank sensor is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)
3	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		
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and AMB.AIR PRESSURE, and connect T-adapter to either female side.		
		Resistance	Between ECM J1 (female) (78) and (44), or between AMB.AIR PRESSURE (female) (1) and (3)	Min. 100 kΩ
6	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector AMB.AIR PRESSURE, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between (2) and AMB.AIR PRESSURE (female) (3)	Max. 1 V
7	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 (AMBIENT PRESSURE SENSOR)



Circuit diagram related to sensor 1 supply circuit



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	<ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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.

No.	Cause	Procedure, measuring location, criteria and remarks		
3	Open circuit or short circuit in AdBlue/DEF line heater 1	If failure code [CA3713] or [CA5115] is displayed on the abnormality record screen, perform troubleshooting these first.		
4	Defective AdBlue/DEF pump temperature sensor system	If failure code [CA2976] is also displayed, perform checks on causes 2 and after in troubleshooting for this failure code.		
5	Defective AdBlue/DEF level sensor system	If failure code [CA1669] or [CA3868] or [CA4732] or [CA4739] or [CA4769] is displayed, perform troubleshooting these first.		
6	Low AdBlue/DEF level	If failure code [CA1673] or [CA3497] or [CA3498] or [CA3547] is displayed, troubleshoot for those codes first. If the level is low, replenish AdBlue/DEF until it can be seen in the sight gauge, and then "Loaded Diagnostics Operation To Clear Failure Code".		
7	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors ECM J2,UHR1,UHA and UHB, and connect the T-adapter to each female side.		
		Resistance	Between ECM J2 (female) (39) and UHR1 (female) (8)	Max. 10 Ω
			Between UHR1 (female) (12) and ground	Max. 10 Ω
			Between UHB (female) (1) and UHR1 (female) (5)	Max. 10 Ω
			Between UHB (female) (2) and ground	Max. 10 Ω
			Between UHA (female) (1) and UHR1 (female) (6)	Max. 10 Ω
Between UHA (female) (2) and ground	Max. 10 Ω			
8	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors ECM J2,UHR1,UHA and UHB, and connect the T-adapter to each female side. 3. Turn the starting switch to ON position.		
		Voltage	Between ground and ECM J2 (female) (39) or UHR1 (female) (8)	Max. 3 V
			Between ground and UHR1 (female) (5) or UHB (female) (1)	Max. 3 V
			Between ground and UHR1 (female) (6) or UHA (female) (1)	Max. 3 V
9	Defective AdBlue/DEF line heater	1. Turn starting switch to OFF position. 2. Disconnect the connectors UHB and UHA, and connect the T-adapter to each male side.		
		Resistance	Between UHB (male) (1) and (2)	5 to 40 Ω
			Between UHA (male) (1) and (2)	5 to 40 Ω
10	Hot short circuit in AdBlue/DEF line heater	1. Turn the starting switch to OFF position. 2. Disconnect the connectors UHB and UHA, and connect the T-adapter to each male side. 3. Turn the starting switch to ON position.		
		Voltage	Between UHB (male) (1) and ground	Max. 3 V
			Between UHA (male) (1) and ground	Max. 3 V

No.	Cause	Procedure, measuring location, criteria and remarks			
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and PCCV, and connect T-adapters to each female side. NOTICE If there is any abnormality in wiring harness, disconnect connector OEM and check similarly to see if abnormality is in engine harness or in chassis harness.			
		Resistance	Between ground and ECM J1 (female) (63) or PCCV (female) (3)	Min. 100 kΩ	
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and PCCV, and connect T-adapter to either female side.			
		Resistance	Between ECM J1 (female) (63) and (54), or between PCCV (female) (3) and (2)	Min. 100 kΩ	
6	Defective crankcase pressure sensor (internal defect)	1. Turn starting switch to OFF position. 2. Insert T-adapters into connector PCCV. 3. Turn starting switch to ON position.			
		Voltage	Between PCCV(3) and (2)	Sensor output	0.3 to 4.7 V
7	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.)			
		Reference 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector ECM J1. 3. Turn starting switch to ON position.			
		Voltage	Between ECM J1 (63) and (54)	Sensor output	0.3 to 4.7 V

No.	Cause	Procedure, measuring location, criteria and remarks		
6	Short circuit of connector box (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors INTER-CONNECT and SEGR, and connect T-adaptor to male side of INTER-CONNECT or female side of SEGR.		
		Resistance	Between INTER-CONNECT (male) (3) and (5), or between SEGR (female) (A) and (C)	Min. 100 k Ω
7	Open circuit in wiring harness (wire breakage of GND line or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and INTER-CONNECT, and connect T-adapters to each female side.		
		Resistance	Between ECM J1 (female) (57) and INTER-CONNECT (female) (4)	Max. 10 Ω
8	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and INTER-CONNECT, and connect T-adaptor to either female side.		
		Resistance	Between ECM J1 (female) (81) and (88), or between INTER-CONNECT (female) (3) and (5)	Min. 100 k Ω
9	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector INTER-CONNECT, and connect T-adaptor to female side. 3. Turn starting switch to ON position.		
		Voltage	Between INTER-CONNECT (female) (5) and ground	Max. 1 V
10	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.)		
		Reference		
		1. Turn starting switch to OFF position. 2. Insert T-adaptor into connector ECM J1. 3. Turn starting switch to ON position.		
		Voltage	Between ECM J1 (88) and (57)	1.0 to 4.0 V

<p>Related information</p>	<ul style="list-style-type: none"> • How to perform manual stationary regeneration <ol style="list-style-type: none"> 1. Start engine. 2. Make sure that machine is in a safe condition. 3. From service menu of machine monitor, display Diagnostic Tests screen, open Active Regeneration for Service, and then perform Manual Stationary Regeneration. <ul style="list-style-type: none"> • Switch operation during manual stationary regeneration: By pressing "1", "2", "3" in order while numeral input switch [4] is pressed, the screen changes to Monitoring. <p>Time required for the manual stationary regeneration depends on the accumulated soot in KCSF, however, it is estimated as follows.</p> <ul style="list-style-type: none"> • If soot accumulation is level 4: Approximately 40 minutes to 1 hour • If soot accumulation is level 5: Approximately 1 to 2 hours • If soot accumulation is level 6 or 7: Approximately 2 to 3 hours • If soot accumulation is level 8: Manual stationary regeneration cannot be performed. • If another failure code is displayed (including when manual stationary regeneration is in progress), perform troubleshooting for these first. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.
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No.	Cause	Procedure, measuring location, criteria and remarks
1	Increased accumulation of soot due to regeneration disable	<ol style="list-style-type: none"> 1. Check that "Regeneration Disable" is chosen on the screen of the machine monitor. (See operation manual) Cancel the "Regeneration Disable" if it is chosen. 2. Cancel regeneration disable and perform cause 2 and subsequent causes.
2	Defective KDOC inlet temperature sensor	After temperature is cooled down sufficiently, run engine at low idle speed and check if temperature differences between the KDOC inlet temperature and the KDOC outlet temperature, or KDPF outlet temperature is not large. If it is large difference, try to change KDOC inlet temperature sensor.
3	Defective VGT (Mechanical failure)	<p>VGT may have a mechanical failure. Check it.</p> <p>Also check that there is no foreign material in oil inlet of VGT servo.</p> <p>If KDOC inlet temperature: approximately 250 °C or below and VGT solenoid current: approximately 1000 mA are kept after active regeneration for service, VGT is defective (See failure code CA2639 because approximate manual stationary regeneration time depends on the soot level estimation).</p>
4	Defective KDPF (KDOC, or KCSF)	Perform troubleshooting for "S-22 ACTIVE REGENERATION TAKES TIME" of S mode.
5	Defective exhaust gas color	<ul style="list-style-type: none"> • If failure code [CA1921], or [CA2639] is displayed after manual stationary regeneration is complete, perform the following: • See "TEST EXHAUST GAS COLOR" section in "Chapter 30 TESTING AND ADJUSTING" for checking the exhaust gas color. • Perform regeneration disable on the machine monitor to check the exhaust gas color. <ol style="list-style-type: none"> 1. Suddenly accelerate the engine from low idle to high idle two times, and then keep the engine running at high idle speed for 5 seconds. If an excess black smoke is seen at high idle speed during acceleration, perform "KDPF GETS CLOGGED IN A SHORT TIME" of S mode. Even excessive black smoke is exhausted during engine acceleration, if it is not at engine high idle, it is not defective. 2. To finish the exhaust gas color check, cancel the regeneration disable. 3. Make sure that the failure code is cleared.

No.	Cause	Procedure, measuring location, criteria and remarks
2	Defective SCR outlet NOx sensor system (Open circuit, internal defect, defective sensor heater)	If failure code [CA1887], [CA2771], [CA3545], [CA3583], [CA3681], or [CA3717] is displayed, perform troubleshooting for these failure codes first.
3	Defective SCR temperature sensor system (Open circuit, Internal defect)	If failure code [CA3142] or [CA3143] or [CA3144] or [CA3146] or [CA3147] or [CA3148] or [CA3165] or [CA3229] or [CA3231] or [CA3235] or [CA4152] or [CA4159] or [CA4164] or [CA4165] or [CA4166] is displayed, perform troubleshooting for these failure codes first.
4	Defective ammonia sensor system (Open circuit, internal defect, defective sensor heater)	If failure code [CA3899], [CA3911], [CA3912], [CA3932], [CA3933], [CA3934], [CA3935], [CA3936] or [CA4281] is displayed, perform troubleshooting for these failure codes first.
5	Clogged AdBlue/DEF injector	<ol style="list-style-type: none"> 1. If failure code [CA4658] or [CA3568] is displayed, or failure code [CA4658] or [CA3568] is displayed on the service meter display of the abnormality record within 2 hours, perform "Loaded Diagnostics Operation To Confirm Failure Correction", check if failure code [CA3151], [CA3543], or [CA3582] is displayed. 2. If 19205 "Ammonia concentration (compensation value)" indicates a normal value (5 to 100 ppm) and the failure code is cleared, the repair is completed ("Loaded Diagnostics Operation To Confirm Failure Correction" has resolved the clogging problem and the machine has restored normal operation). 3. If the ammonia concentration indicates an abnormal value or either failure code [CA3151], [CA3543], or [CA3582] is displayed, proceed to the next step.
6	Defective mixing tube (exhaust gas leakage)	<ol style="list-style-type: none"> 1. Visually check the piping from the KDPF outlet to the SCR outlet for damage or defective connection. 2. Visually check for white crystallized AdBlue/DEF deposits on the surrounding area. 3. If defective connections or damages are found, fix or replace parts.
7	Damaged AdBlue/DEF hose, AdBlue/DEF leakage at connection	<p>If crystallized AdBlue/DEF is adhered to the surrounding of hose, tank, pump, or engine compartment, it shows AdBlue/DEF may be leaking. Refer to "TESTING AND ADJUSTING", "SETTING AND OPERATION OF MACHINE MONITOR", "METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)" to perform AdBlue/DEF Pump Pressure Up Test and find the location of the AdBlue/DEF leak.</p> <p>Replace parts as necessary.</p>

FAILURE CODE [CA3255]

Action level	Failure code	Failure	KDPF Temperature Error - Non Regeneration (Engine controller system)
L03	CA3255		
Details of failure	KDPF outlet temperature remains at high level when active regeneration is not performed.		
Action of controller	<ul style="list-style-type: none"> • EGR valve closed. • Engine power deration • Regeneration control stops. • Fuel dosing stops. 		
Phenomenon on machine	Engine power deration		

FAILURE CODE [CA3543]

Action level	Failure code	Failure	AdBlue/DEF Quality Error (SCR Catalyst Efficiency Low) (Engine controller system)
L01	CA3543		
Detail of failure	<ul style="list-style-type: none"> The SCR catalyst efficiency is poor (65 % or less) after AdBlue/DEF refilling with coolant. It is likely that the AdBlue/DEF quality is abnormal. 		
Action of controller	<ul style="list-style-type: none"> Advances to Inducement strategy. 		
Phenomenon on machine	<ul style="list-style-type: none"> The NOx emission likely to have increased. Engine power deration according to inducement strategy. 		

No.	Cause	Procedure, measuring location, criteria and remarks
4	Defective AdBlue/DEF level sensor system	If failure code [CA1669] or [CA3868] or [CA4732] or [CA4739] or [CA4769] is displayed, perform troubleshooting these first.
5	Low AdBlue/DEF level	If failure code [CA1673] or [CA3497] or [CA3498] or [CA3547] is displayed, troubleshoot for those codes first. If the level is low, replenish AdBlue/DEF until it can be seen in the sight gauge, and then "Loaded Diagnostics Operation To Clear Failure Code".
6	Damaged AdBlue/DEF hose, AdBlue/DEF leakage at connection	If crystallized AdBlue/DEF is adhered to the surrounding of hose, tank, pump, or engine compartment, it shows AdBlue/DEF may be leaking. Refer to "TESTING AND ADJUSTING", "SETTING AND OPERATION OF MACHINE MONITOR", "METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)" to perform AdBlue/DEF Pump Pressure Up Test and find the location of the AdBlue/DEF leak. Replace parts as necessary.
7	Clogged AdBlue/DEF suction hose	Check the AdBlue/DEF suction hose for entry of foreign material or clogging due to frozen AdBlue/DEF. Blow air or send AdBlue/DEF through each AdBlue/DEF hose, and repair or replace the hose if clogged.
8	Clogged AdBlue/DEF tank strainer	Check the AdBlue/DEF tank for entry of foreign material. Check the AdBlue/DEF tank strainer for clogging. Repair or replace the part if any abnormality is found. Use AdBlue/DEF for cleaning.
9	Suction tube clogged or torn apart in the AdBlue/DEF tank	<ol style="list-style-type: none"> 1. Remove the flange from the AdBlue/DEF tank. 2. Check if a suction tube in the AdBlue/DEF tank is torn apart. 3. see "TESTING AND ADJUSTING", "SETTING AND OPERATION OF MACHINE MONITOR", "SERVICE MODE", "METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)" to perform "AdBlue/DEF Pump Pressure Up Test" to check if AdBlue/DEF is not leaking from the suction tube in the AdBlue/DEF tank visually.
10	Clogged AdBlue/DEF pump filter	If the interval specified in the Operation and Maintenance Manual has elapsed since the last time the AdBlue/DEF pump filter was replaced, or foreign material was found in the check for AdBlue/DEF tank strainer, replace the AdBlue/DEF pump filter. (Refer to "METHOD FOR REPLACING AdBlue/DEF FILTER" in the Operation and Maintenance Manual)
11	Defective AdBlue/DEF pump	If the cause is not determined by above checks, replace the AdBlue/DEF pump.
12	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 Clear Failure Code

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

(Make sure this failure code is cleared after this procedure.)

1. Turn the starting switch to OFF position, and shut down the engine controller.
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 "AdBlue/DEF Pump Pressure" rises up 900 ± 100 kPa within 5 minutes.

REMARK

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

FAILURE CODE [CA3713]

Action level	Failure code	Failure	AdBlue/DEF Line Heater 1 Voltage High Error (Engine controller system)
L01	CA3713		
Detail of failure	High voltage error is detected in signal circuit of AdBlue/DEF line heater 1 (on low-temperature pressure, intake, and purge).		
Action of controller	None in particular		
Phenomenon on machine	AdBlue/DEF line stops thawing. NOx emission increases because AdBlue/DEF injection is disabled at low temperature.		
Related information	<ul style="list-style-type: none"> The AdBlue/DEF line heater 1 operates in AdBlue/DEF supply system thawing, warning, or implementation of AdBlue/DEF line heater relay 1 test. The AdBlue/DEF line heater 1 is operated by the AdBlue/DEF line heater relay 1 in the AdBlue/DEF heater relay. This failure code is detected only when the AdBlue/DEF line heater 1 is OFF. If the connectors of all heaters connected to the AdBlue/DEF line heater 1 are disconnected, this failure code is displayed. After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	<ol style="list-style-type: none"> See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check them. Turn the starting switch to ON position. 		
		If this failure code is not displayed, the wiring harness connector is defective.		
2	Open circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect the connectors ECM J2,UHR1,UHA and UHB, and connect the T-adaptor to each female side. 		
		Resistance	Between ECM J2 (female) (39) and UHR1 (female) (8)	Max. 10 Ω
			Between UHR1 (female) (12) and ground	Max. 10 Ω
			Between UHB (female) (1) and UHR1 (female) (5)	Max. 10 Ω
			Between UHB (female) (2) and ground	Max. 10 Ω
			Between UHA (female) (1) and UHR1 (female) (6)	Max. 10 Ω
Between UHA (female) (2) and ground	Max. 10 Ω			
3	Hot short circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect the connectors ECM J2,UHR1,UHA and UHB, and connect the T-adaptor to each female side. Turn the starting switch to ON position. 		
		Voltage	Between ground and ECM J2 (female) (39) or UHR1 (female) (8)	Max. 3 V
			Between ground and UHR1 (female) (5) or UHB (female) (1)	Max. 3 V
			Between ground and UHR1 (female) (6) or UHA (female) (1)	Max. 3 V

FAILURE CODE [CA3912]

Action level	Failure code	Failure	SCR NH3 Sensor Heater Warming up Error (Engine controller system)
L01	CA3912		
Detail of failure	Temperature control of the ammonia sensor is not working correctly.		
Action of controller	<ul style="list-style-type: none"> • Uses AdBlue/DEF injection control without using the ammonia sensor. • Advances to Inducement strategy (EU Specification). 		
Phenomenon on machine	<ul style="list-style-type: none"> • NOx emission may increase or ammonia may be exhausted because AdBlue/DEF injection works inappropriately. • Engine output is reduced based on inducement strategy (EU Specification). 		
Related information	<p>⚠ SCR assembly, the sensor installation piping, and the sensor probe become hot (min. 400 °C). Be careful not to get burned.</p> <p>⚠ Be careful not to get burned by the sensor probe as it is heated by itself even if the ambient temperature is not high.</p> <ul style="list-style-type: none"> • If the ammonia sensor controller detects a circuit error of the ammonia sensor, the error is sent to the engine controller via CAN communication, and this failure code is displayed. • On the Pre-defined Monitoring screen troubleshooting for the engine operation state is used (the figures below denote monitoring codes). <p>Engine operation state troubleshooting 01002 Engine Speed 19200 Exhaust Gas Flow Rate 47300 KDOC Inlet Temperature 19300 SCR Temperature 19302 SCR Outlet Temperature</p> <p>NOTICE 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.</p>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective ammonia sensor system (Open circuit, internal defect, defective sensor heater)	If failure code [CA3899], [CA3911], [CA3932], [CA3933], [CA3934], [CA3935] or [CA3936] is displayed, perform troubleshooting for these failure codes first.
2	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check it. 2. Perform "Loaded Diagnostics Operation To Confirm Failure Correction". If this failure code is cleared, wiring harness connector is defective.
3	Defective ammonia sensor	If the failure code persists after the above checks, the sensor may be defective. 1. Turn starting switch to OFF position. 2. Replace the ammonia sensor. 3. Perform "Loaded Diagnostics Operation To Confirm Failure Correction". If the failure code is cleared, the original ammonia sensor may be defective.

FAILURE CODE [CA4162]

Action level	Failure code	Failure	KDOC and KDPF Temperature Sensor ECU Voltage Low Error (Engine controller system)
L03	CA4162		
Detail of failure	A battery low voltage error is detected in the KDPF temperature sensor controller.		
Action of controller	<ul style="list-style-type: none"> • Run the engine by using the fixed value of the KDOC inlet temperature, KDOC outlet temperature, and the KDPF outlet temperature (250 °C). • Engine power deration • AdBlue/DEF injection stops • EGR valve closed. • Regeneration control stops. • Fuel dosing stops. • Advances to Inducement strategy. 		
Phenomenon on machine	<ul style="list-style-type: none"> • NOx emission increases because AdBlue/DEF injection is disabled. • Defective forcible regeneration control. • KDPF Soot Accumulation High. • All of the KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature cannot be detected. • Engine output is reduced based on inducement strategy. 		
Related information	<p>⚠ Be careful not to get burned as the temperature of KDPF and KDOC rises up over 500 °C.</p> <ul style="list-style-type: none"> • The KDOC inlet temperature sensor, the KDOC outlet temperature sensor, and the KDPF outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. • For replacement of the KDPF temperature sensor, see DISASSEMBLY AND ASSEMBLY, "DISASSEMBLE AND ASSEMBLE KDPF ASSEMBLY". • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared (note that the engine power deration is not canceled only by the failure code is cleared). 		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective wiring harness connector	<ol style="list-style-type: none"> 1. See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check it. 2. Turn starting switch to ON position. <p>If this failure code is cleared, wiring harness connector is defective.</p>
2	Defective KDPF temperature sensor	<ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Replace KDPF temperature sensor (TDPF). 3. Turn starting switch to ON position. <p>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.)</p>

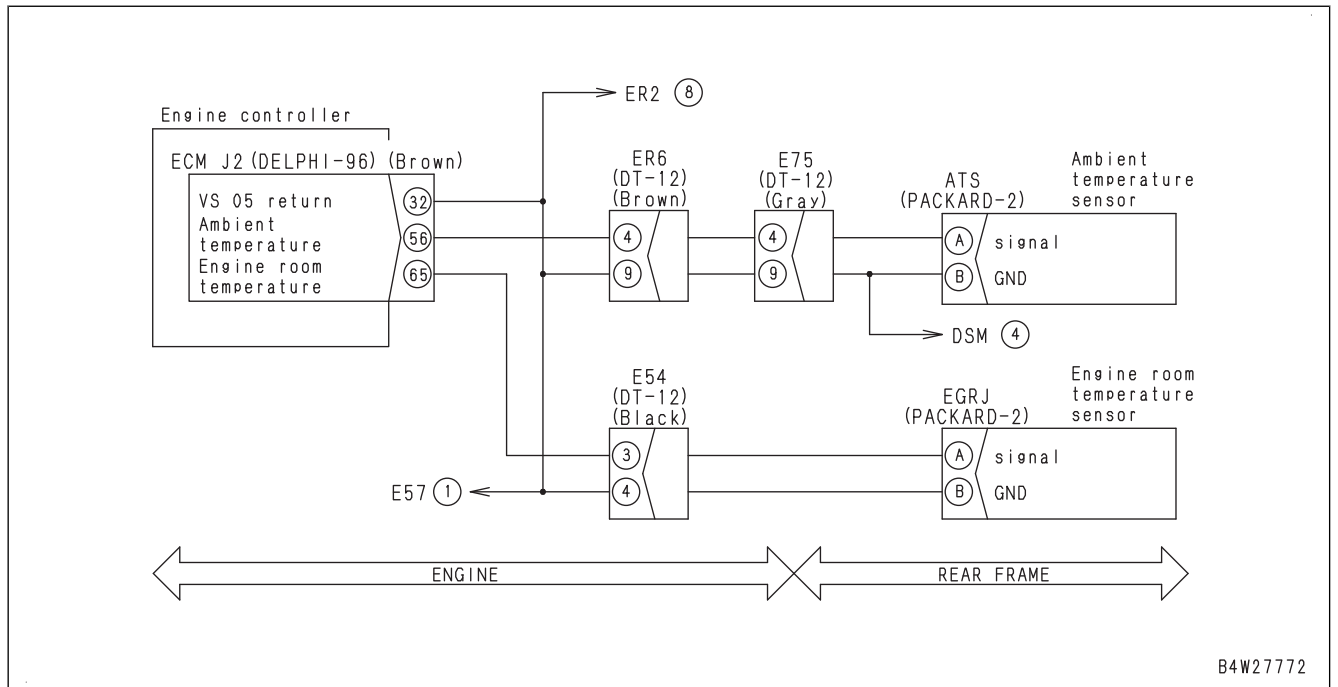
FAILURE CODE [CA4281]

Action level	Failure code	Failure	SCR NH3 Sensor Stuck Response Error (Engine controller system)
L01	CA4281		
Detail of failure	Ammonia concentration in ammonia sensor changes slow.		
Action of controller	Uses AdBlue/DEF injection control without using the ammonia sensor.		
Phenomenon on machine	NOx emission may increase or ammonia may be exhausted because AdBlue/DEF injection works inappropriately.		
Related information	<p>⚠ SCR assembly, the sensor installation piping, and the sensor probe become hot (min. 400 °C). Be careful not to get burned.</p> <p>⚠ Be careful not to get burned by the sensor probe as it is heated by itself even if the ambient temperature is not high.</p> <ul style="list-style-type: none"> This failure code is displayed when ammonia sensor value cannot be detected; a sensor probe is not attached to the exhaust pipe. This failure occurs also when AdBlue/DEF injector is clogged, and when [CA3568] or [CA3582] or [CA4658] is displayed, repair these codes first. If AdBlue/DEF injector is clogged when outside air temperature is -5 °C or below, this error may appear solely. On the Pre-defined Monitoring screen AdBlue/DEF injector and the operation basics are used (the figures below denote monitoring codes). AdBlue/DEF injector <ul style="list-style-type: none"> 47200 KDPF 1 Outlet Temperature 19304 AdBlue/DEF Pump State 19120 AdBlue/DEF Injection Quantity 19205 SCR NH3 Concentration Corrected 19202 Turbo Outlet NOx Corrected 19209 SCR Outlet NOx Corrected Operation basics <ul style="list-style-type: none"> 01002 Engine Speed 18600 Inject Fueling Command 19200 Exhaust Gas Flow Rate 47300 KDOC 1 Inlet Temperature 19300 SCR Temperature 19302 SCR Outlet Temperature <p>NOTICE This failure code requires "Loaded Diagnostics Operation To Clear Failure Code". After investigating the cause of the problem and completing the repair, perform "Loaded Diagnostics Operation To Clear Failure Code" to make sure the failure code is cleared. (This failure code is not cleared by only turning starting switch to ON position.)</p>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective AdBlue/DEF injector system	If failure code [CA3568] or [CA4658] is displayed, perform troubleshooting for the code first.
2	Defective SCR catalyst	If failure code [CA3582] is displayed, perform troubleshooting for the code first.

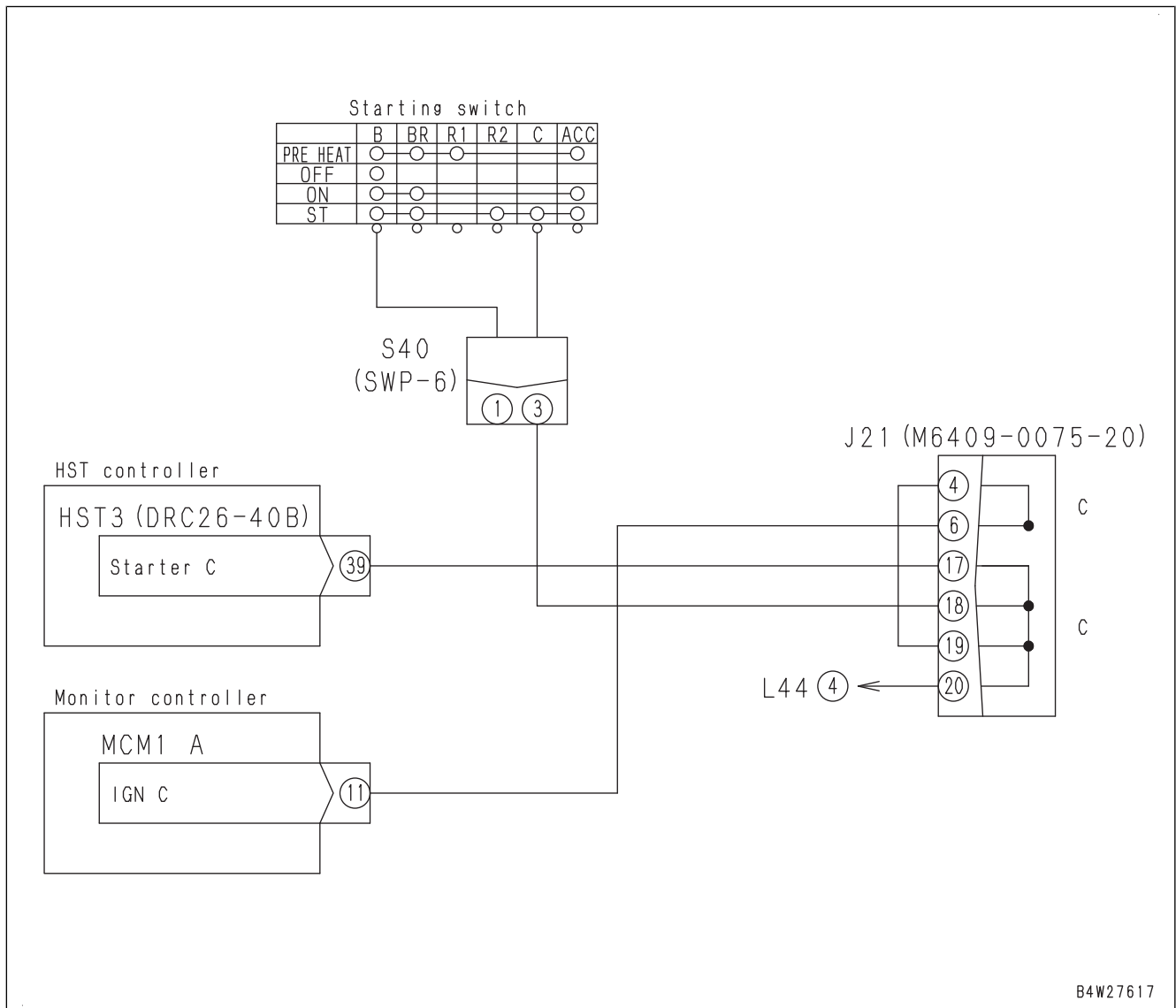
No.	Cause	Procedure, measuring location, criteria and remarks		
4	Ground fault in wiring harness	1. Turn starting switch to OFF position.		
		2. Disconnect connectors ECM J2 and EGRJ, and connect T-adaptor to female side of ECM J2.		
	Resistance	Between ECM J2 (female) (56) and ground	Min. 100 kΩ	
5	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 (ENGINE ROOM TEMPERATURE SENSOR)



B4W27772

Circuit diagram related to key switch C terminal signal



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No.	Cause	Procedure, measuring location, criteria and remarks		
7	Ground fault in wiring harness (CAN2 communication line)	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 L80A, MCM1 B, MDM3, IDK, AL1, SV, HST2, CAN1, and ECM J2, and connect the T-adapter to female side of MCM1 B.		
		Resistance	Between MCM1 B (female) (97) and ground	Min. 1 MΩ
			Between MCM1 B (female) (89) and ground	Min. 1 MΩ
8	Hot short circuit in wiring harness (CAN2 communication line)	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. Insert the T-adapter into connector CAN1. 4. Turn the battery disconnect switch to ON position. 5. Turn the starting switch to ON position. REMARK Voltage of CANH and CANL is 2.5±1 V including during communication, so regard wiring harness as normal if measured voltage is 1 to 4 V.		
		Voltage	Between CAN1 (A) and ground	1 to 4 V
			Between CAN1 (B) and ground	1 to 4 V
9	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).		

No.	Cause	Procedure, measuring location, criteria and remarks		
6	Open circuit in wiring harness (CAN1 communication line)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. Disconnect the connectors HST2 and MCM1 B, and connect the T-adaptor to each female side. 		
		Resistance	Between HST2 (female) (33) and MCM1 B (female) (112)	Max. 1 Ω
			Between HST2 (female) (33) and MCM1 B (female) (113)	Max. 1 Ω
			Between HST2 (female) (23) and MCM1 B (female) (105)	Max. 1 Ω
7	Ground fault in wiring harness (CAN1 communication line)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. Disconnect the connectors HST2, MCM1 B, SV, ECM J1, and TERMINATOR PORT, and connect the T-adaptor to female side of HST2, and MCM1 B. 		
		Resistance	Between ground and any of HST2 (female) (33), MCM1 B (female) (112) and (113)	Min. 1 MΩ
			Between ground and either HST2 (female) (23) or MCM1 B (female) (105)	Min. 1 MΩ
8	Hot short circuit in wiring harness (CAN1 communication line)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. Insert the T-adaptor into connector TERMINATOR PORT. Turn the battery disconnect switch to ON position. Turn the starting switch to ON position. <p>REMARK Voltage of CANH and CANL is 2.5±1 V including during communication, so regard wiring harness as normal if measured voltage is 1 to 4 V.</p>		
		Voltage	Between TERMINATOR PORT (A) and ground	1 to 4 V
			Between TERMINATOR PORT (B) and ground	1 to 4 V
9	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.)		
10	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.)		

No.	Cause	Procedure, measuring location, criteria and remarks			
3	Open circuit in wiring harness	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 MF1, and connect the T-adapter to each female side.			
		Resistance	Between FS1-12 and MF1 (female) (4)	Max. 1 Ω	
			Between HST3 (female) (9) and MF1 (female) (2)	Max. 1 Ω	
			Between HST3 (female) (19) and MF1 (female) (3)	Max. 1 Ω	
			Between HST3 (female) (40) and MF1 (female) (1)	Max. 1 Ω	
4	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 HST3 and MF1, and connect the T-adapter to either female side. 4. Disconnect the connectors S_RH4, S_RH7, L02, and L102.			
		Resistance	Between ground and either FS1-12 or MF1 (female) (4)	Min. 1 MΩ	
			Between ground and either HST3 (female) (40) or MF1 (female) (1)	Min. 1 MΩ	
			Between ground and either HST3 (female) (19) or MF1 (female) (3)	Min. 1 MΩ	
			Between ground and either HST3 (female) (9) or MF1 (female) (2)	Min. 1 MΩ	
5	Defective directional (FNR) selector switch signal line	1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector HST3. 3. Turn the starting switch to ON position. 4. Move directional (FNR) selector switch. REMARK If there is any failure, it may be defective contact. Check it again.			
		Voltage	Between HST3 (40) and ground	Directional (FNR) selector switch: F (forward)	20 to 30 V
				Directional (FNR) selector switch: Other than F	Max. 1 V
			Between HST3 (9) and ground	Directional (FNR) selector switch: N (neutral)	20 to 30 V
				Directional (FNR) selector switch: Other than N	Max. 1 V
			Between HST3 (19) and ground	Directional (FNR) lever: R (REVERSE)	20 to 30 V
				Directional (FNR) selector switch: Other than R	Max. 1 V
6	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.)			

FAILURE CODE [DHPCKA]

Action level	Failure code	Failure	Boom Cylinder Pressure Sensor Open Circuit or Ground Fault (Bottom) (HST controller system)
L01	DHPCKA		
Detail of failure	Due to open circuit or ground fault in boom cylinder bottom pressure sensor circuit, signal voltage of boom cylinder pressure is lower than normal range. (Signal voltage from boom cylinder bottom pressure sensor: Below 0.3 V)		
Action of controller	If cause of failure is eliminated, machine becomes normal by itself.		
Phenomenon on machine	<ul style="list-style-type: none"> • Komatsu SmartLoader Logic does not operate and fuel consumption increases. • ECO guidance function does not work normally. • When traction control is set, rim pull at digging may be different from normal. 		
Related information	<ul style="list-style-type: none"> • Input voltage detected by boom cylinder bottom pressure sensor can be checked with monitoring function. (Code: 40404) • Oil pressure detected by boom cylinder bottom pressure sensor can be checked with monitoring function. (Code: 40403) • 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 F16, and connect the T-adaptor to each female side.		
		Resistance	Between HST2 (female) (1) and F16 (female) (3)	Max. 1 Ω
			Between HST2 (female) (6) and F16 (female) (2)	Max. 1 Ω
	Between HST1 (female) (4) and F16 (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 HST2 and F16, and connect the T-adaptor to either female side.		
		Resistance	Between ground and HST2 (female) (6) or F16 (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 F16, and connect the T-adaptor to each female side.		
		Resistance	Between HST2 (female) (6) and HST1 (4), or between F16 (female) (1) and (2)	Min. 1 MΩ

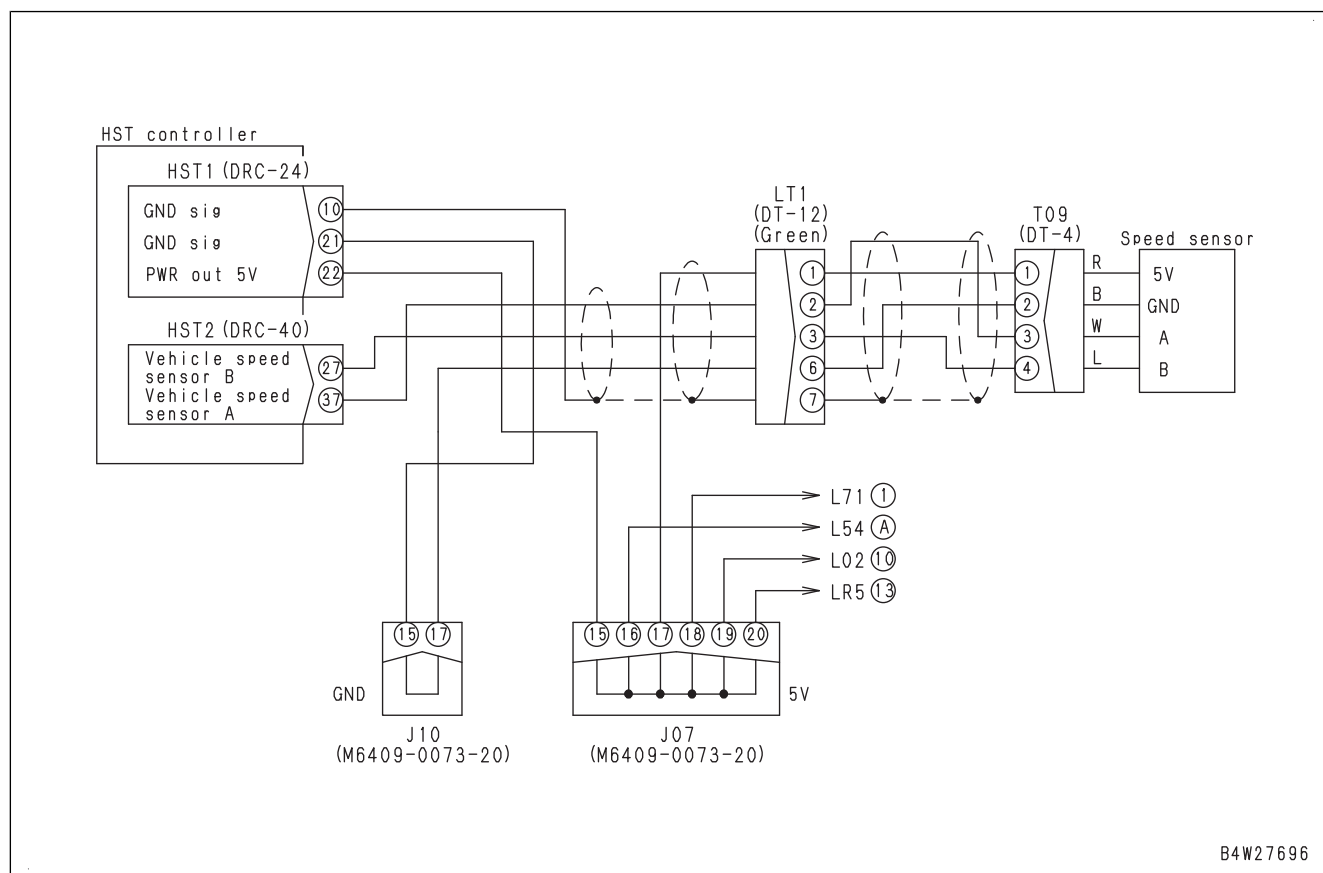
FAILURE CODE [DK5DKA]

Action level	Failure code	Failure	3rd Lever Potentiometer Sensor Signal Open Circuit or Ground Fault (Main) (HST controller system)
L03	DK5DKA		
Detail of failure	Due to open circuit or ground fault in 3rd valve (PCS) lever potentiometer (main: A line) system, 3rd valve (PCS) lever potentiometer (main: A line) signal voltage is lower than the normal range. (3rd valve (PCS) lever potentiometer (main: A line) signal voltage: 0.3 V and below)		
Action of controller	<ul style="list-style-type: none"> 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. 		
Phenomenon on machine	<ul style="list-style-type: none"> Attachment retracts momentarily, then it can be controlled by using signals from sub potentiometer. However, work equipment speed decreases to 30 % of normal speed. 		
Related information	<ul style="list-style-type: none"> 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	Open circuit in wiring harness	1. Turn the starting switch to OFF position.		
		2. Disconnect the connectors HST1, HST2 and L70, and connect the T-adapter to each female side.		
		Resistance	Between HST1 (female) (19) and L70 (female) (3)	Max. 1 Ω
			Between HST2 (female) (1) and L70 (female) (1)	Max. 1 Ω
Between HST1 (female) (4) and L70 (female) (4)	Max. 1 Ω			
2	Ground fault in wiring harness	1. Turn the starting switch to OFF position.		
		2. Disconnect the connectors HST1 and L70, and connect the T-adapter to either female side.		
		Resistance	Between ground and either HST1 (female) (19) or L70 (female) (3)	Min. 1 MΩ

No.	Cause	Procedure, measuring location, criteria and remarks
5	Defective travel speed sensor	<ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Disconnect the connector T09, and replace the sensor with an another one of same type. 3. Turn the starting switch to ON position. 4. Start the engine and drive the machine at 5 km/h and above. <p>If this failure code is cleared, original sensor is defective.</p>
6	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.)

Circuit diagram related to travel speed control dial potentiometer



B4W27696

FAILURE CODE [DW4RKA]

Action level	Failure code	Failure	Bucket TILT EPC Solenoid Open Circuit (HST controller system)
L01	DW4RKA		
Detail of failure	Due to open circuit in output signal circuit to bucket TILT EPC solenoid, no current flows when controller drives bucket TILT EPC solenoid.		
Action of controller	<ul style="list-style-type: none"> 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	PZ auto tilt-in does not function.		
Related information	<ul style="list-style-type: none"> Output current value to bucket TILT EPC solenoid can be checked with monitoring function. (Code: 41922) After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Start the engine, and perform bucket TILT operation. 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective bucket TILT EPC solenoid	1. Turn the starting switch to OFF position.	
		2. Disconnect the connector F32, and connect the T-adapter to male side	
		Resistance	Between F32 (male) (1) and (2) 5 to 15 Ω Between F32 (male) (1) and ground Min. 1 MΩ
2	Defective circuit related to bucket TILT EPC solenoid	1. Turn the starting switch to OFF position.	
		2. Disconnect the connector F32, and connect the T-adapter to female side.	
3	Open circuit in wiring harness	3. Turn the starting switch to ON position.	
		Voltage	Between F32 (female) (1) and (2) 1 to 4.5 V
		Resistance	Between HST3 (female) (27) and F32 (female) (1) Max. 1 Ω Between HST3 (female) (23) and F32 (female) (2) Max. 1 Ω
4	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.)	

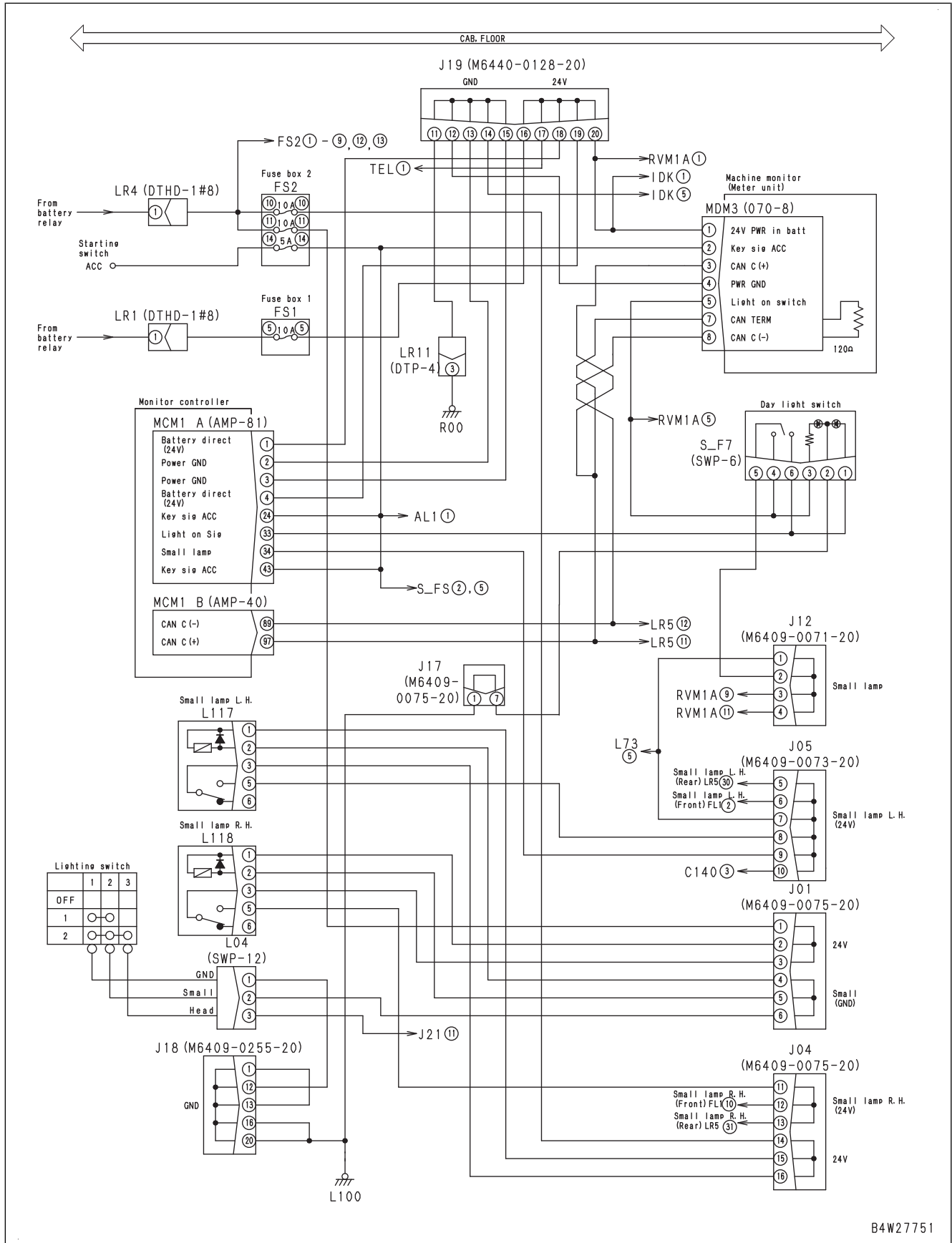
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective emergency HST pump switch	1. Turn the starting switch to OFF position. 2. Disconnect the connector C26, and connect the T-adapter to male side.			
		Resistance	Between C26 (male) (1) and C26 (male) (3)	Emergency HST pump switch: OFF	Max. 1 Ω
			Between C26 (male) (1) and each pin other than C26 (male) (3)	Emergency HST pump switch: OFF	Min. 1 MΩ
			Between C26 (male) (2) and C26 (male) (4)	Emergency HST pump switch: OFF	Max. 1 Ω
			Between C26 (male) (2) and each pin other than C26 (male) (4)	Emergency HST pump switch: OFF	Min. 1 MΩ
			Between C26 (male) (8) and each pin other than C26 (male) (8)	Emergency HST pump switch: OFF	Min. 1 MΩ
			Between C26 (male) (9) and C26 (male) (7)	Emergency HST pump switch: OFF	Max. 1 Ω
			Between C26 (male) (9) and each pin other than C26 (male) (7)	Emergency HST pump switch: OFF	Min. 1 MΩ
			Between C26 (male) (1) and each pin other than C26 (male) (1)	Emergency HST pump switch: ON	Min. 1 MΩ
			Between C26 (male) (2) and each pin other than C26 (male) (2)	Emergency HST pump switch: ON	Min. 1 MΩ
			Between C26 (male) (8) and C26 (male) (5)	Emergency HST pump switch: ON	Max. 1 Ω
			Between C26 (male) (8) and each pin other than C26 (male) (5)	Emergency HST pump switch: ON	Min. 1 MΩ
			Between C26 (male) (9) and C26 (male) (6)	Emergency HST pump switch: ON	Max. 1 Ω
			Between C26 (male) (9) and each pin other than C26 (male) (6)	Emergency HST pump switch: ON	Min. 1 MΩ
2	Defective HST pump EPC solenoid		1. Turn the starting switch to OFF position. 2. Disconnect the connector E50, and connect the T-adapter to male side.		
		Resistance	Between E50 (male) (1) and (2)	15 to 35 Ω	
			Between E50 (male) (1) and ground	Min. 1 MΩ	
3	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors HST3 and E50, and connect the T-adapter to either female side.			
		Resistance	Between ground and either HST3 (female) (17) or E50 (female) (1)	Min. 1 MΩ	

FAILURE CODE [M100N1]

Action level	Failure code	Failure	HST Pump Overrun (HST controller system)
L02	M100N1		
Detail of failure	Engine speed exceeds upper control limit with HST pump pressure at high level.		
Action of controller	Makes centralized warning lamp light up and alarm buzzer sound.		
Phenomenon on machine	HST pump may be damaged.		
Related information	<ul style="list-style-type: none"> • Engine speed can be checked with monitoring function. (Code: 01002) • HST pump pressure can be checked with monitoring function. (Code: 32608) 		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective relevant system	Check if any other failure codes are also displayed, and perform troubleshooting for them, if any.
2	Incorrect machine usage	The machine may be used incorrectly, so instruct the correct usage.
3	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.)

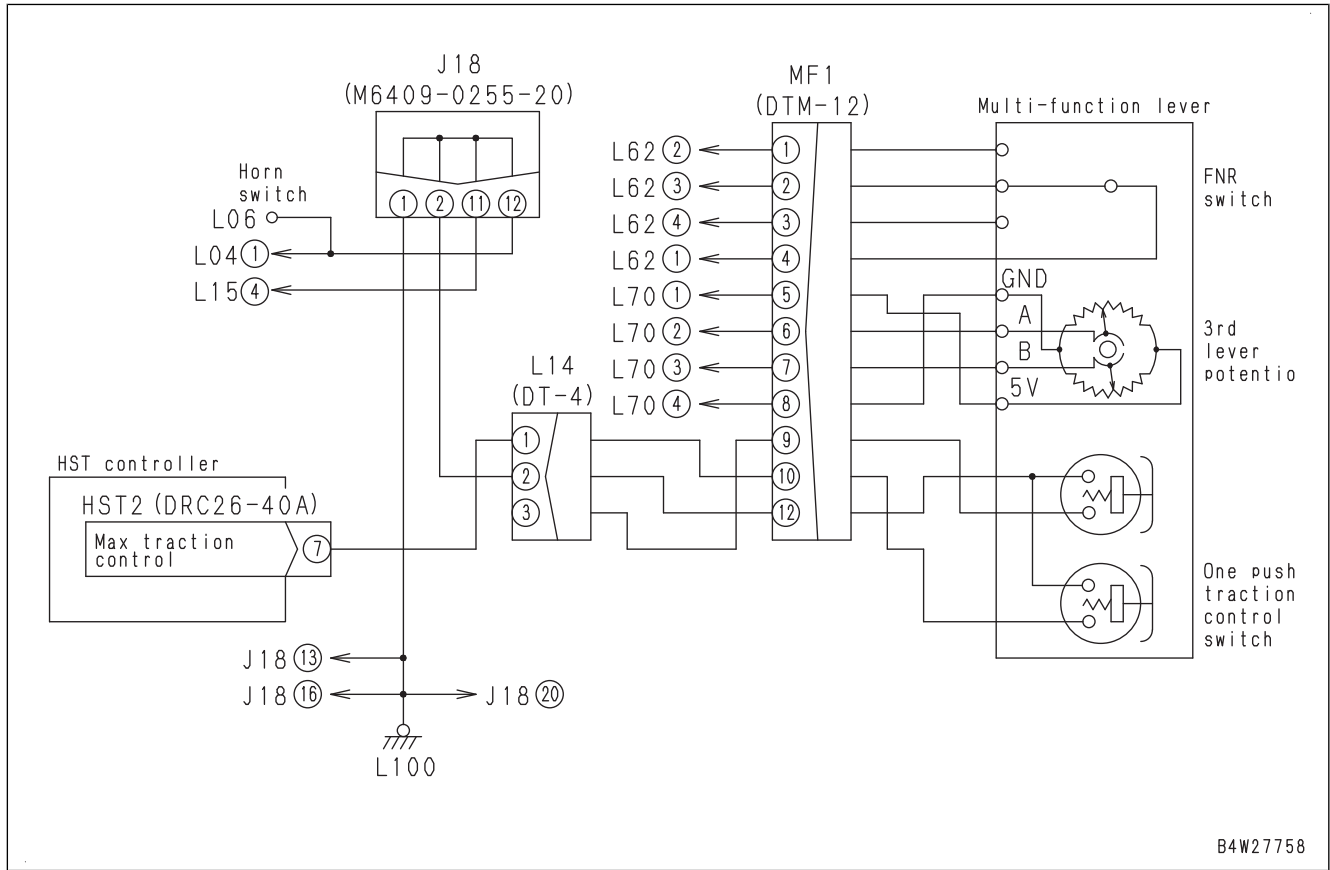
Circuit diagram between monitor controller and meter unit of machine monitor



B4W27751

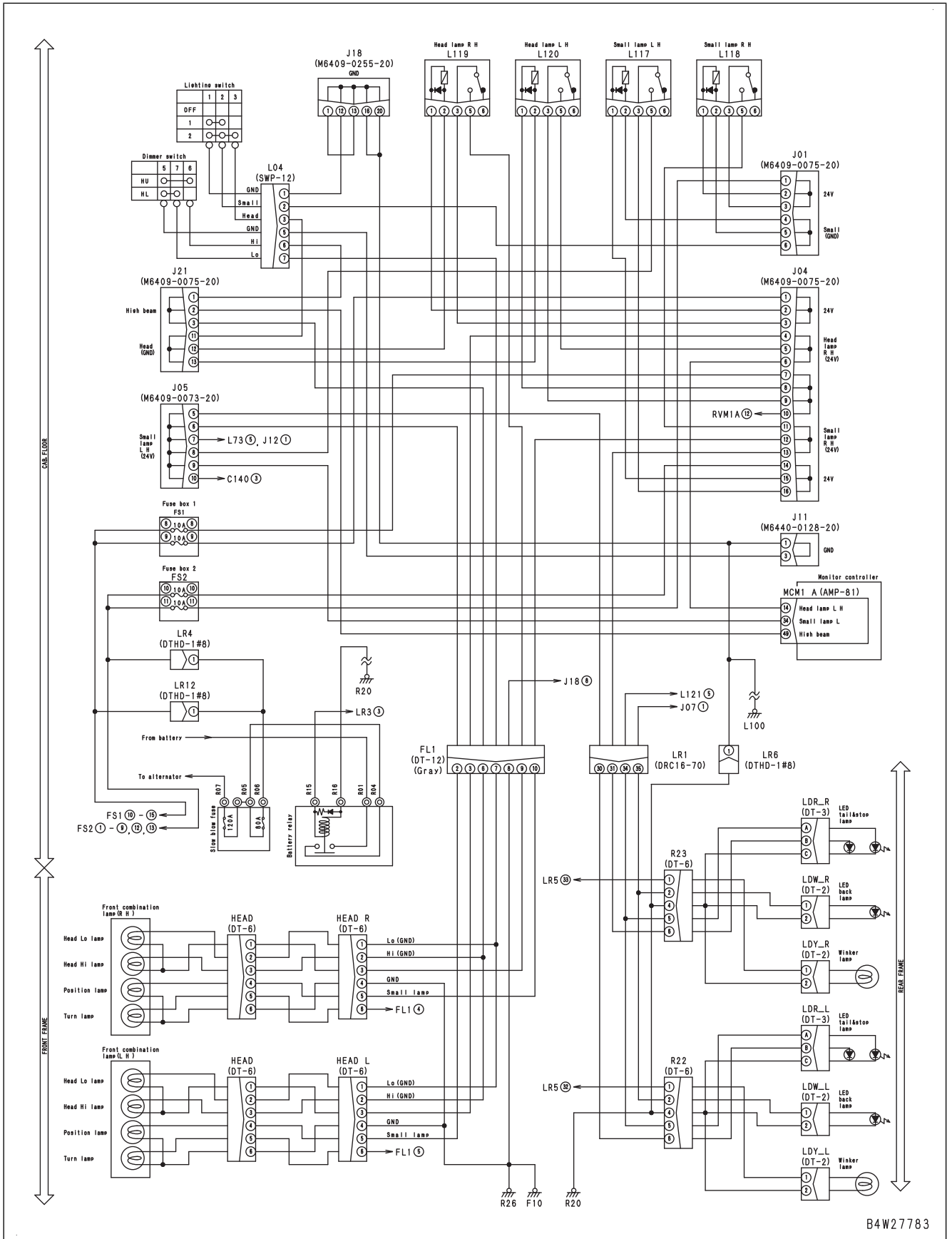
No.	Cause	Procedure, measuring location, criteria and remarks		
10	Defective diode (internal open circuit or short circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connector T15A, and connect T-adapter to diode. REMARK Measure it with diode range of multimeter.		
		Continuity	Between T15A (male) (1) (+) and (2) (-)	No continuity
			Between T15A (male) (2) (+) and (1) (-)	Continuity
11	Defective HST controller	1. Turn the starting switch to OFF position. 2. Insert T-adapter into the connector HST3. 3. Turn the starting switch to ON position. REMARK Automatic idling state is excluded.		
		Voltage	Between HST3 (18) and (31)	Parking brake switch: Parking Max. 4.5 V
12	Defective parking brake oil pressure circuit	Check parking brake oil pressure. (See TESTING AND ADJUSTING.) REMARK Start the engine to perform troubleshooting.		
		Parking brake oil pressure	Parking brake switch: ON (Parking)	Max.0.34 MPa {Max.3.5 kgf/cm ² }
13	Defective monitor controller	If no failure is found by preceding checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed). Reference 1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector LT2. 3. Turn the starting switch to ON position.		
		Voltage	Between LT2 (5) and (6)	Parking brake switch: RE-LEASE 20 to 30 V
				Parking brake switch: PARKING Max. 4.5 V

Circuit diagram related to max. traction switch



B4W27758

Circuit diagram related to headlamp, clearance lamp, and tail lamp



B4W27783

No.	Cause	Procedure, measuring location, criteria and remarks		
7	Hot short circuit in wiring harness	<ol style="list-style-type: none"> 1. Turn the starting switch to OFF position 2. Disconnect connectors L09, L121, LDR_R and LDR_L, and connect T-adaptor to either female side. 3. Turn the starting switch to ON position 		
		Voltage	Between ground and L09 (female) (2) or L121 (female) (1)	Max. 1 V
			Between ground and L121 (female) (5), LDR_R (female) (A) or LDR_L (female) (A)	Max. 1 V

Component causing failure		Steering component							Work equipment and hydraulic component								
		Priority valve (unload valve)	Priority valve (LS shuttle valve)	Priority valve (LS bypass line)	Steering cylinder	Cushion valve	Steering LS lin (between priority valve and Orbitrol)r	Pump coupling	Steering and work equipment pump	Steering and work equipment pump strainer	Steering and work equipment pump suction piping	Back pressure valve (return circuit to hydraulic tank)	Boom control valve (spool)	Bucket control valve (spool)	Main relief valve	Boom pressure compensation valve	Bucket pressure compensation valve
Failure																	
HSTsystem	Machine can travel neither forward nor reverse.							○	○	○	○						
	Machine can not travel forward (machine travels reverse normally).																
	Machine can not travel reverse (machine travels forward normally).																
	Travel speed of forward travel and reverse travel is slow, or power is low.	○								○	○						
	Forward travel speed is slow or power is low (machine travels reverse normally).																
	Reverse travel speed is slow or power is low (machine travels forward normally).																
	Engine speed drops largely or engine stops.																
Steering system	Machine does not turn.	○	○		○			○	○	○	○						
	Steering wheel is heavy to operate.	○	○					○	○	○	○						
	Machine sways or large shocks are made while machine turns.			○	○	○											
	Machine unintentionally turns to one side when machine travels.				○	○											
Brake system	Wheel brakes do not work or they are weak.																
	Wheel brakes are not released or they drag.																
	Parking brake does not work or it is weak.																
	Parking brake is not released or it drags.																

H-16 BOOM DOES NOT RISE

Failure	Boom does not rise.
Related information	<p>⚠ Be sure to release the remaining pressure in the work equipment circuit. For details, see TESTING AND ADJUSTING, "RELEASE REMAINING PRESSURE IN WORK EQUIPMENT CIRCUIT".</p> <p>⚠ Pressure may not be released even if releasing pressure from the work equipment circuit is performed. Take care.</p> <ul style="list-style-type: none"> • Check that the oil level in hydraulic tank is correct. • If any failure code is displayed, perform troubleshooting for that failure code first. • Engine speed can be checked with monitoring. (Code: 01002) (For measuring method, see TESTING AND ADJUSTING, "TEST ENGINE SPEED".) • Steering and work equipment pump pressure can be checked with monitoring. (Code: 95304) • PPC valve outlet pressure can be checked with following monitoring. • Boom lever RAISE PPC pressure can be checked with monitoring. (Code: 07402) • Boom lever LOWER PPC pressure can be checked with monitoring. (Code: 07502) • Bucket lever TILT PPC pressure can be checked with monitoring. (Code: 07800) • Bucket lever DUMP PPC pressure can be checked with monitoring. (Code: 07802)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective damper and coupling	If all of steering, work equipment and cooling fan malfunction, damper or coupling may be defective. Check them.			
2	Defective strainer of steering and work equipment pump	If steering or work equipment also malfunctions, steering and work equipment pump strainer may be clogged. Check it.			
3	Suction of air at suction port of steering and work equipment pump	If steering or work equipment also malfunctions, check the suction side piping for crack, etc.			
4	Defective self-pressure reducing valve	Be ready with engine stopped, then perform troubleshooting with engine at high idle and in non travel state.			
		Self-pressure reducing valve output pressure	All control levers (including steering wheel)	NEUTRAL	3.33 (+0.20/-0.59) MPa {34 (+2/-6) kgf/cm ² }
		<ul style="list-style-type: none"> • Self-pressure reducing valve output pressure is source pressure of pilot pressure for boom control valve (raise and lower). • If pump pressure is normal but the self-pressure reducing valve output pressure is abnormal, adjust the pressure. 			
5	Malfunction of PPC valve for boom RAISE	Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		PPC valve outlet pressure	Boom control lever	RAISE operation	3.33 (+0.20/-0.59) MPa {34 (+2/-6) kgf/cm ² }

S-1 ENGINE DOES NOT CRANK WHEN STARTING SWITCH IS TURNED TO START POSITION

Failure	Engine does not crank when starting switch is turned to "START" position
Related information	<ul style="list-style-type: none"> • See E-mode in "ENGINE DOES NOT START (ENGINE DOES NOT CRANK)" for electrical system troubleshooting • If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Defective starting circuit wiring system	When starting switch is turned to START, starting motor pinion does not pop out.	Perform troubleshooting of "ENGINE DOES NOT START (ENGINE DOES NOT CRANK)" in E mode, and take corrective action.
2	Defective starting motor (safety relay portion)	<ul style="list-style-type: none"> • Starting motor pinion makes grating noise (When starting switch is turned to START position, starting motor pinion pops out). • Starting motor pinion comes off halfway (When starting switch is turned to START position, starting motor pinion pops out). • Starting motor makes flapping sound and does not turn (When starting switch is turned to START position, starting motor pinion protrudes) (Reference: "Flapping sound" means sound made when starting motor pinion pops in and out) 	Perform troubleshooting of "ENGINE DOES NOT START (ENGINE DOES NOT CRANK)" in E mode, and take corrective action.
3	Breakage of flywheel ring gear	If starting motor pinion makes grating noise and the starting motor does not turn, visually check the flywheel ring gear.	Replace if the item is broken
4	A crack on the EGR cooler (Reference: coolant contained in exhaust)	Disconnect the inlet and outlet gas piping of EGR cooler to check if water containing coolant is draining. REMARK Moisture in exhaust gas may be condensed, but this is not a failure. Check if it is coolant or not.	After EGR cooler replacement, drain the water in the engine cylinder.

S-25 FOREIGN MATERIALS ENTER AdBlue/DEF (AdBlue/DEF INCREASES)

Failure	Foreign matters enter AdBlue/DEF (AdBlue/DEF increases).
Related information	If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	AdBlue/DEF tank is damaged	Check that AdBlue/DEF concentration in the AdBlue/DEF tank is not lower than the standard concentration. Standard concentration for AdBlue/DEF: 32.5 % (Has it not been increased with rain water?)	<ul style="list-style-type: none"> • Replacement of AdBlue/DEF tank • Cleaning in the tank or replacement of AdBlue/DEF
2	Damage of internal parts (heating pipe for thawing) in the AdBlue/DEF tank	Confirm whether AdBlue/DEF in the tank is colored in blue (Confirm whether coolant is mixed).	<ul style="list-style-type: none"> • Replacement of heating pipe • Cleaning of AdBlue/DEF hose • Replacement of AdBlue/DEF pump • Replacement of AdBlue/DEF injector • Cleaning inside AdBlue/DEF mixing tube • SCR replacement
3	AdBlue/DEF is contaminated by mistake.	Check that AdBlue/DEF tank does not smell of fuel.	<ul style="list-style-type: none"> • Replacement of AdBlue/DEF tank • Cleaning of AdBlue/DEF hose • Replacement of AdBlue/DEF pump • Replacement of AdBlue/DEF injector • Cleaning inside AdBlue/DEF mixing tube • SCR replacement

Tools to be used when disassembling and assembling KDPF assembly

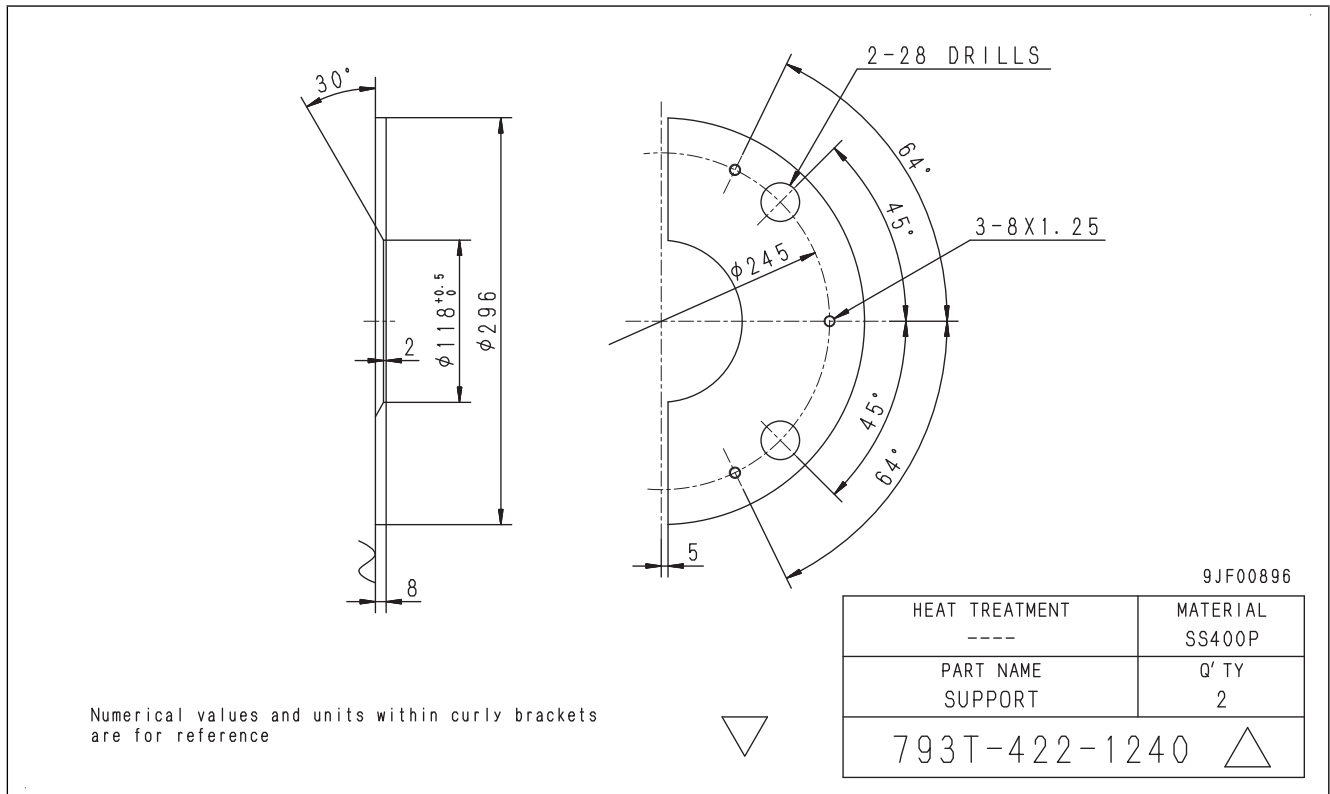
Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Block	•	4			Disassembly and assembly of KDPF assembly
B	Commercially available	Long socket (7/16 inch)	•	1			
C	Commercially available	Long socket (1/2 inch)	•	1			

Tools to be used when removing and installing SCR assembly

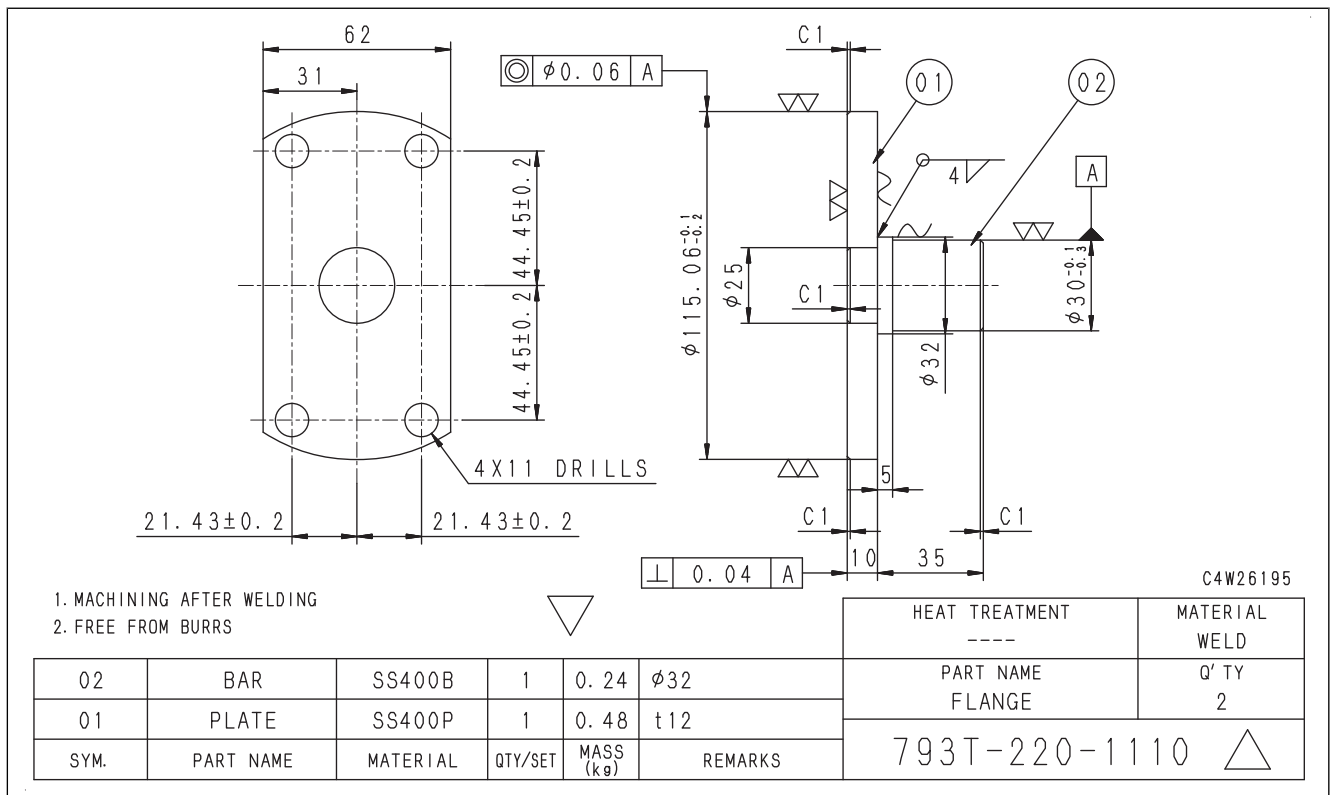
Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Lifting tool	•	3			For slinging top hood
B	6540-71-1310	Cover for AdBlue/DEF injector electric connector	■	1			Disconnection and connection of AdBlue/DEF injector electric connector
C	600-919-5050	Plug (for 5/16 inch hose diameter)	■	1			Disconnection and connection of AdBlue/DEF hose
D	-	6540-71-1720	AdBlue/DEF injector cap kit	■	1		Removal and installation of AdBlue/DEF injector
	1	-	• AdBlue/DEF side cap (yellow)	■	1		Disconnection and connection of AdBlue/DEF hose
	2	-	• Coolant side cap (brown)	■	2		Disconnection and connection of coolant hose
	3	-	• Injector side cap	■	1		Removal and installation of AdBlue/DEF injector
E	Commercially available	Vinyl gloves	•	1			Disconnection and connection of AdBlue/DEF hose
F	Commercially available	Plastic hammer	•	1			Tightening of clamp
G	Commercially available	Webbing sling	•	1			For slinging AdBlue/DEF mixing tube
H	Commercially available	Lifting tool	•	1			For slinging SCR Ass'y

SKETCHES OF SPECIAL TOOLS

793T-422-1240:Support



793T-220-1110:Flange



46. Install the hose (4) with the clamps (3) (3 places).



47. Install the hose (2) with the clamps (1) (2 places).



KCCV assembly

48. Install KCCV assembly. See "REMOVE AND INSTALL KCCV ASSEMBLY".

KDPF, SCR assembly

49. Install KDPF and SCR assembly. See "REMOVE AND INSTALL KDPF, SCR ASSEMBLY".

Engine hood assembly

50. Install the engine hood assembly. See "REMOVE AND INSTALL ENGINE HOOD ASSEMBLY".


Air bleeding

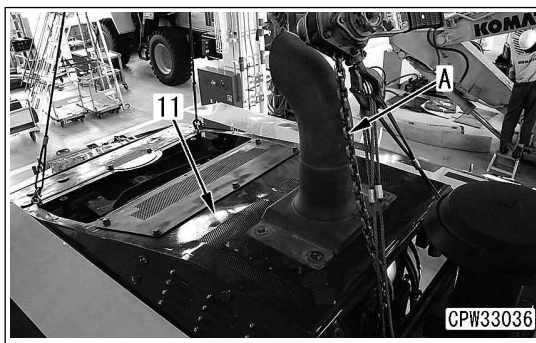
51. Bleed air from the fuel circuit. See TESTING AND ADJUSTING, "BLEED AIR FROM FUEL CIRCUIT".

REMOVE AND INSTALL EGR VALVE ASSEMBLY

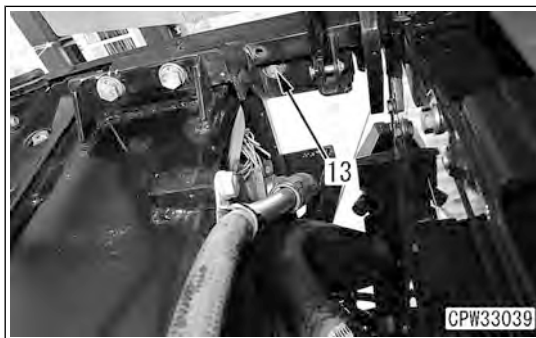
Top hood

- By using the lifting tools (A), sling the top hood (11), and set it to the installing position.

 Top hood (11):
57 kg



- Install the bolts (13) (4 pieces each on the right and left sides).



- Close the grille (12).



REMOVE AND INSTALL RADIATOR ASSEMBLY

Tools to be used when removing and installing the radiator assembly

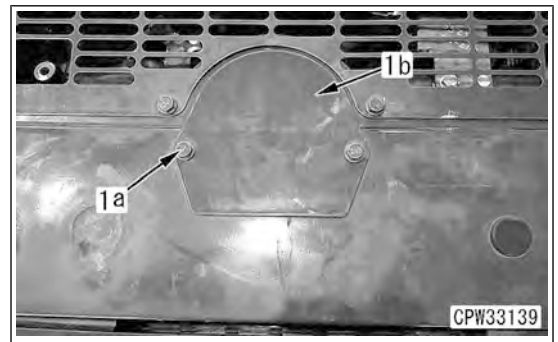
Symbol	Part No.	Part name	Necessity	Qty	New/Redesign	Sketch	Remarks
A	Commercially available	Lifting tool	•	1			Removal and installation of radiator assembly

- ⚠ 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.
- ⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)
- ⚠ If you drain the radiator coolant when it is still hot, you may be scalded. Accordingly, wait for the coolant temperature to drop before draining.
- ⚠ Loosen the radiator cap slowly, and release the pressure inside the radiator.

METHOD FOR REMOVING RADIATOR ASSEMBLY

Draining coolant

1. Remove the bolts (1a) (2 pieces), and remove the cover (1b).



2. Loosen the radiator cap (1c), and release the remaining pressure.

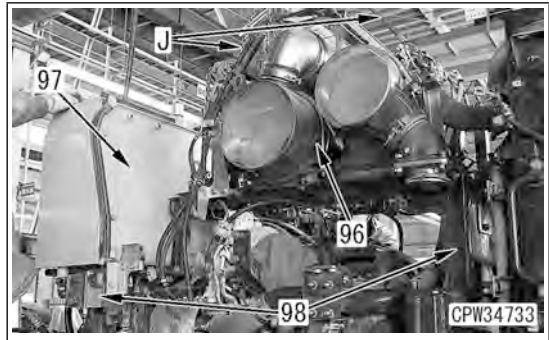
REMARK

Slowly loosen the radiator cap (1c) since there is remaining pressure.



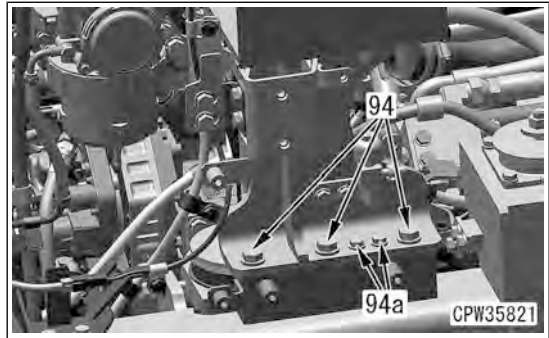
REMOVE AND INSTALL ENGINE ASSEMBLY

66. By using the lifting tool (J), sling KDPF and SCR assembly (96), hydraulic tank assembly (97), and brackets (98), and hold them.

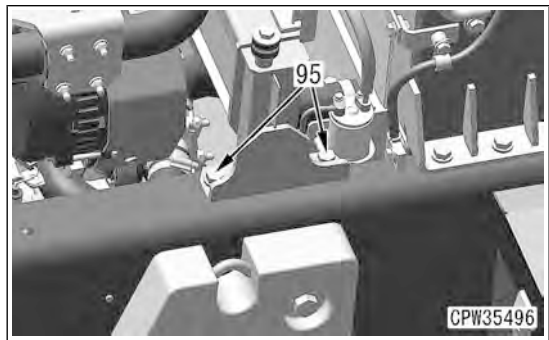


67. Remove the bolts (94) (3 pieces). (Right and left)


68. Remove the bolts (94a) (2 pieces). (Right and left)

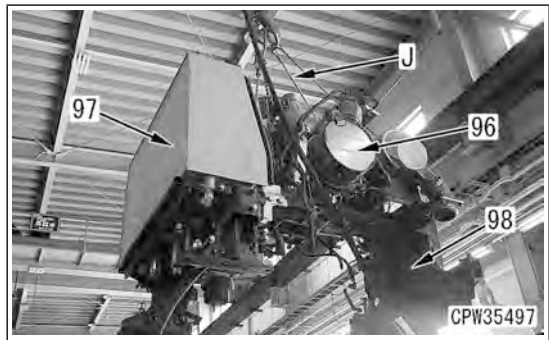


69. Remove the bolts (95) (2 pieces). (Right and left)



70. Sling KDPF and SCR assembly (96) and hydraulic tank assembly (97) together with the brackets (98), and remove them.

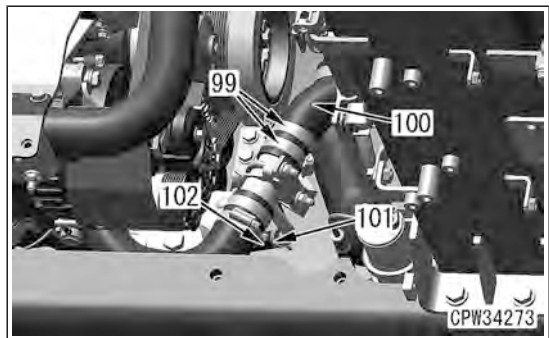
 KDPF and SCR assembly (96), hydraulic tank assembly (97), bracket (98):
380 kg



Engine assembly

71. Remove the clamps (99) (2 places), and disconnect the hose (100).

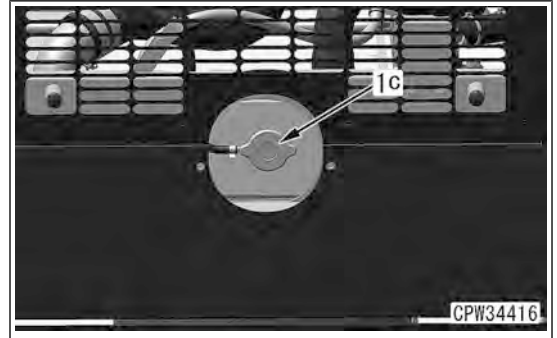
72. Remove the clip (101), and disconnect the hose (102).



- Loosen the radiator cap (1c), and release the remaining pressure.

REMARK

Slowly loosen the radiator cap (1c) since the pressure remains.



- Loosen the drain plug (1d), and drain the coolant.

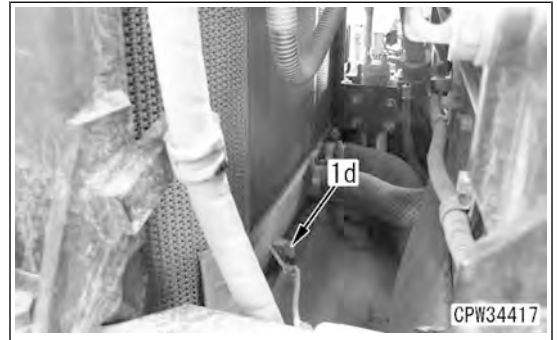


Radiator:

31.8 ℓ

REMARK

After draining is completed, tighten the drain plug (1e).



Engine hood assembly

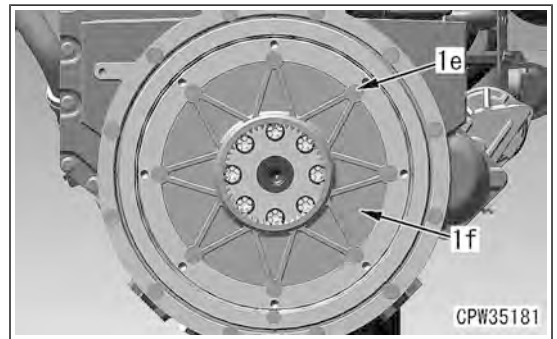
- Remove the engine hood assembly. See "REMOVE AND INSTALL ENGINE HOOD ASSEMBLY".

Engine assembly

- Remove the engine assembly. See "REMOVE AND INSTALL ENGINE ASSEMBLY".

Flywheel

- Remove the bolts (1e) (8 pieces), and remove the damper (1f).

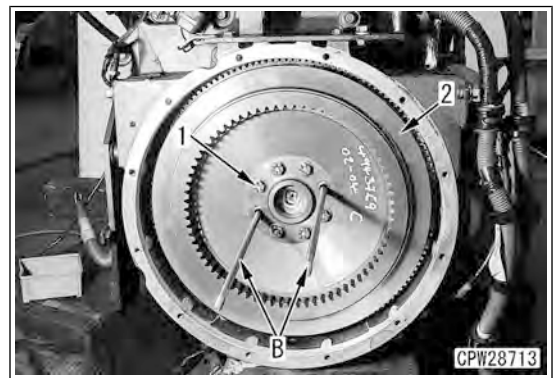


- Remove the bolts (1) (2 pieces), and install the guide bolts (B).
- Remove the remaining bolts (1) (6 pieces), remove the flywheel assembly (2).



Flywheel assembly (2):

35 kg



AdBlue/DEF tank assembly

12. Remove the clamps (20) (3 places).



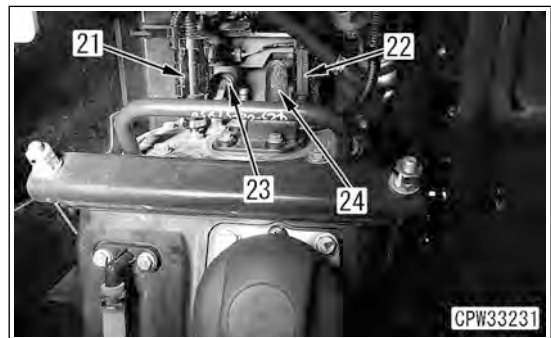
13. Disconnect the following hoses.

Hose (21): AdBlue/DEF hose suction

Hose (22): AdBlue/DEF hose return

Hose (23): Heater hose IN

Hose (24): Heater hose OUT

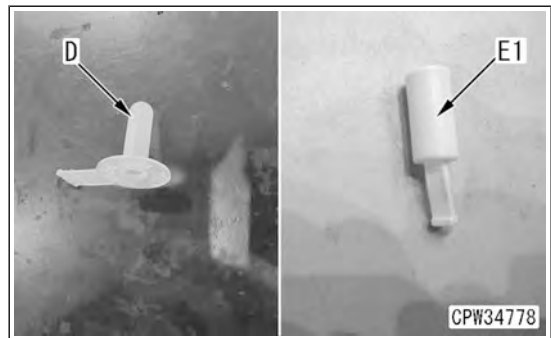
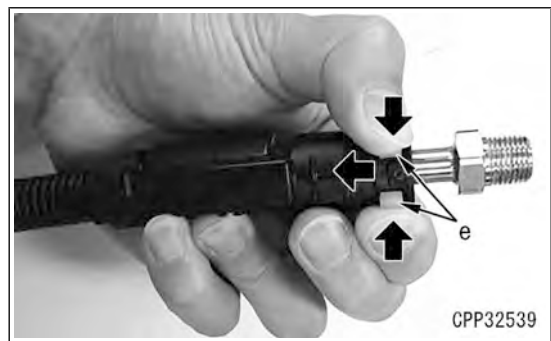


REMARK

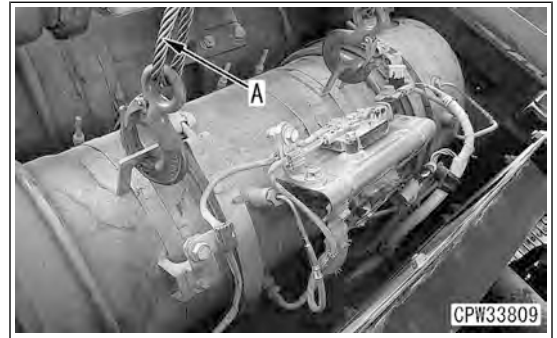
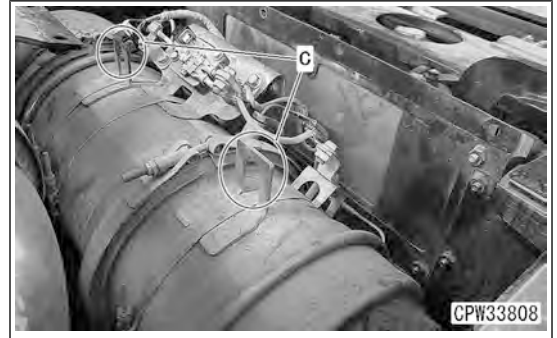
By pinching the protruding portions (e) of the clip with your fingers, the lock is unlocked. While they are kept pinched, disconnect AdBlue/DEF hoses (21) and (22).

NOTICE

- Wash the connecting portions of AdBlue/DEF hoses (21) and (22) with clean tap water to remove the sticking materials.
- After disconnecting AdBlue/DEF hoses (21) and (22), install the plugs (for 3/8 inch hose diameter) (D) on the sides of AdBlue/DEF hoses (21) and (22), and install the cap (green) (E1) on the nipple side to prevent leakage and entering of foreign materials.
- After disconnecting the heater hoses (23) and (24), cover the hose side with a plastic bag and plug the nipple side to prevent leakage and entering of dusts.



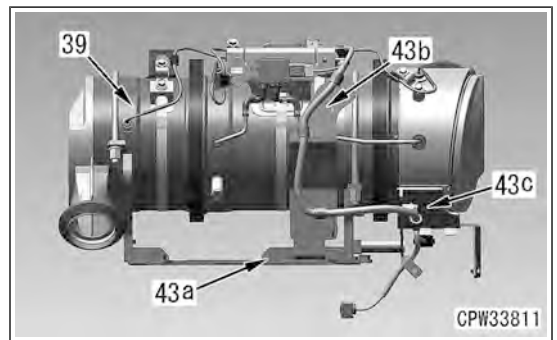
24. Install the lifting tool (H) to the slinging position (c), sling KDPF assembly (39), and hold it.



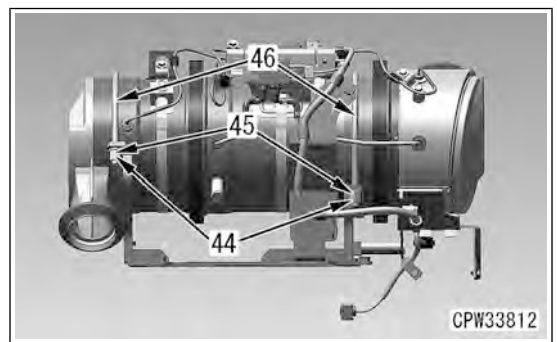
25. Remove the bolts (42) (2 pieces each on the right and left sides), and remove KDPF assembly (39) together with the brackets (43a), (43b), and (43c).



KDPF assembly (39) and brackets (43a), (43b), and (43c):
49 kg

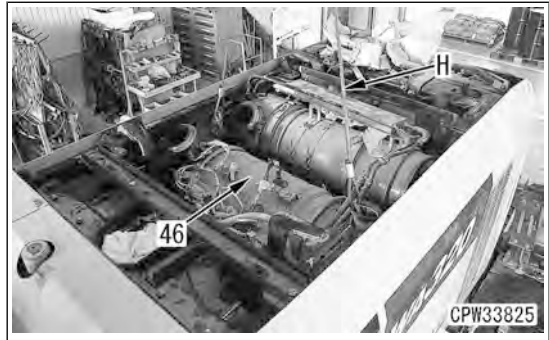
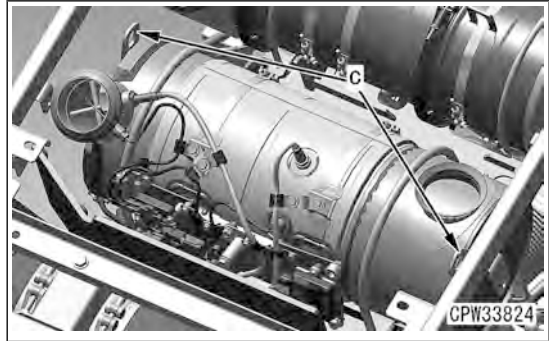


26. Remove the nuts (44) (4 pieces) and (45) (4 pieces), and remove U-bolt (46).

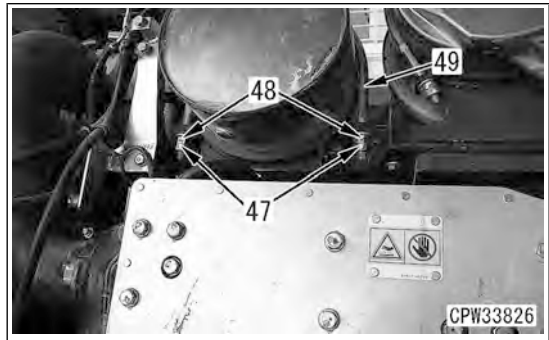


REMOVE AND INSTALL SCR ASSEMBLY

27. Install the lifting tool (H) to the slinging position (c), sling SCR assembly (46), and hold it.



28. Remove the nuts (47) (4 pieces) and (48) (4 pieces), and remove U-bolt (49).

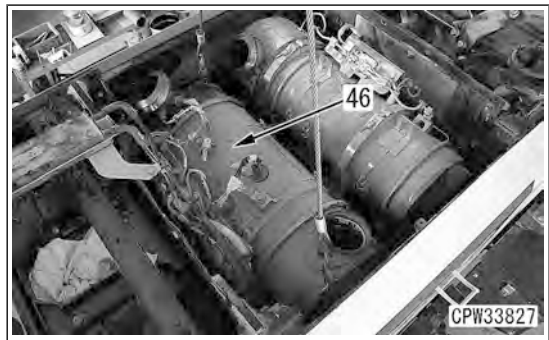


29. Sling SCR assembly (46), and remove it.



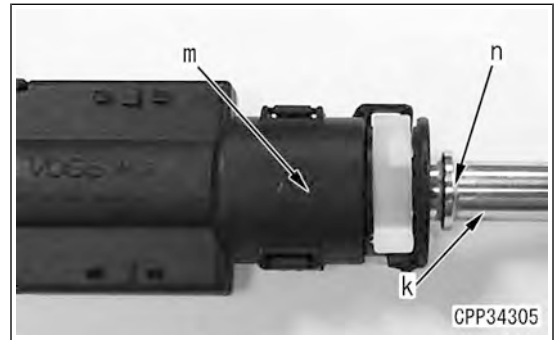
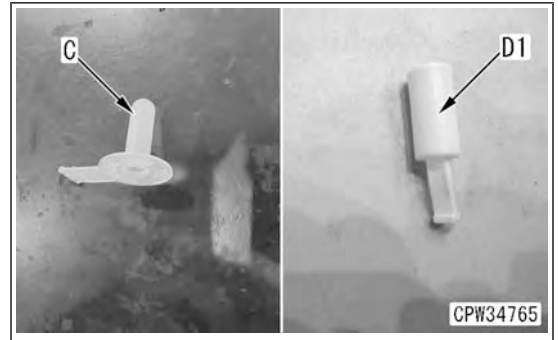
SCR assembly (46):

40 kg




REMARK

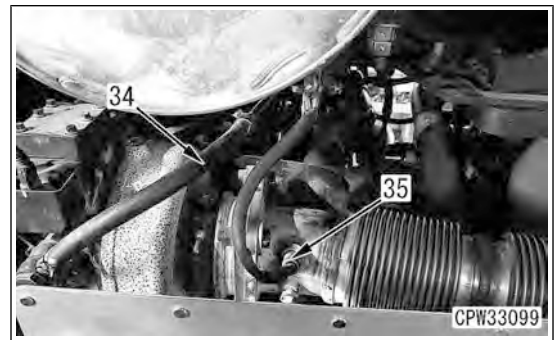
- Remove the plug (for 3/8 inch hose diameter) (C) and cap (yellow) (D1) before connecting AdBlue/DEF hose (38).
- Insert the connector (m) of AdBlue/DEF hose (38) into the pin (k) on the injector and joint side until click sound is heard to install it.
- When the convex part (n) of the pin (k) passes the convex part inside of the clip, lock it by using the clip.



23. Connect NOx sensor (36).

-  NOx sensor (36):
 Seizure prevention compound (LC-G)

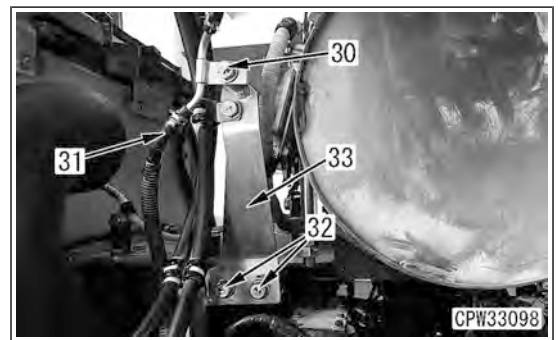
24. Connect the hose (34).



25. Install the bracket (33) with the bolts (32) (2 pieces).

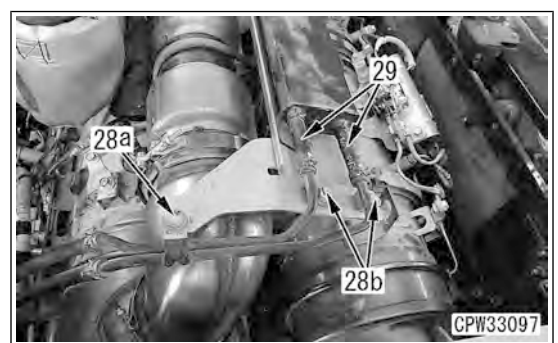
26. Connect the hose (31).

27. Install the clamp (30).



28. Connect the coolant hoses (29) (2 pieces).

29. Install the clamp (28b) and (28a).



REMOVE AND INSTALL VGT ASSEMBLY

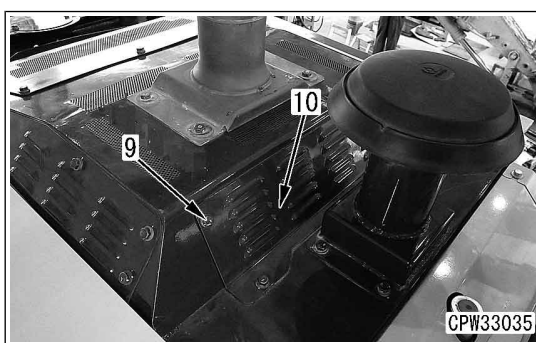
20. Install the bolts (13) (4 pieces each on the right and left sides).



21. Close the grille (12).



22. Install the cover (10) with the bolts (9) (4 pieces).

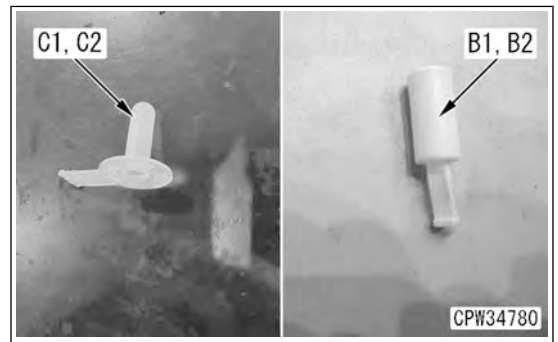


6. Remove AdBlue/DEF hose (13) between AdBlue/DEF pump and joint according to the following procedure.

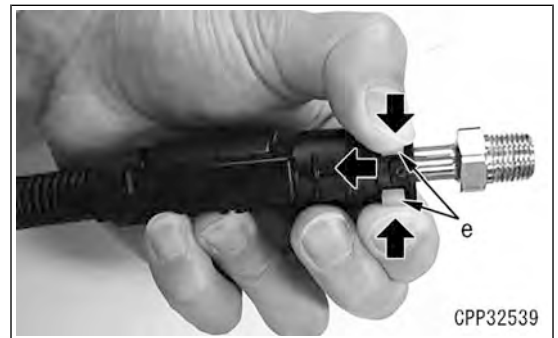


NOTICE

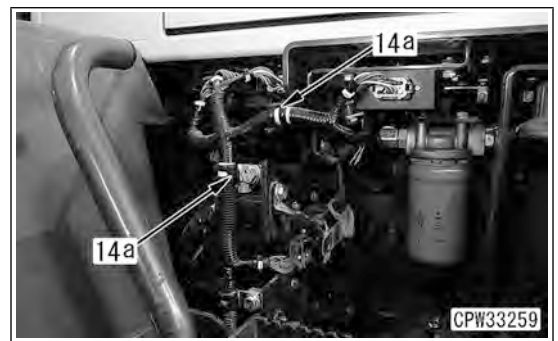
- Before disconnecting AdBlue/DEF hose (13), wash the connecting portions with distilled water to remove the sticking materials.
- After disconnecting AdBlue/DEF hose (13) (pump side), install the plug (for 5/16 inch hose diameter) (C2) to the hose, and install the cap (yellow) (B2) to the nipple to prevent leakage and entering of foreign materials.
- After disconnecting AdBlue/DEF hose (13) (joint side), install the plug (for 3/8 inch hose diameter) (C1) to the hose, and install the cap (green) (B1) to the nipple to prevent leakage and entering of foreign materials.
- Cover the connecting portion with a clean plastic sheet, etc. to prevent entering of dusts or sticking of AdBlue/DEF.



By pinching the protruding portions (e) of the clip with your fingers, the lock is unlocked. While they are kept pinched, disconnect AdBlue/DEF hose (13).

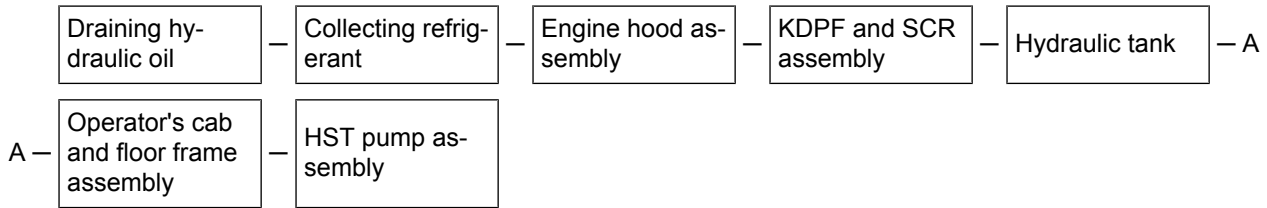


- 1) Remove the clamps (14a) (2 places).



POWER TRAIN

REMOVE AND INSTALL HST PUMP ASSEMBLY



Tools to be used when removing and installing the HST pump assembly

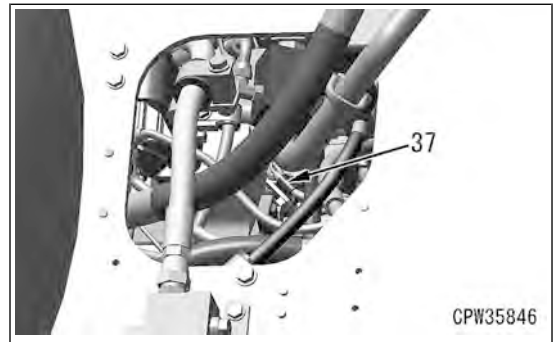
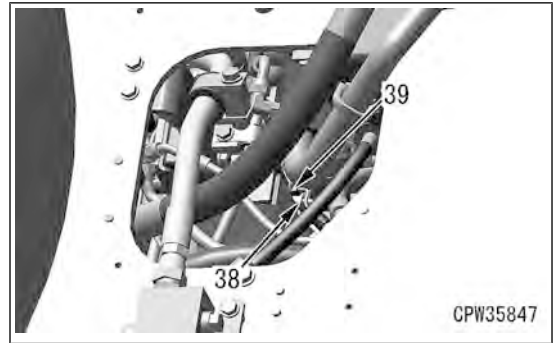
Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Oil container	•	1			Removal and installation of the HST pump assembly
B	Commercially available	Lifting tool	•	2			
C	Commercially available	Webbing sling	•	1			

- ⚠ Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.
- ⚠ Set the work equipment lock lever to LOCK position.
- ⚠ Turn the starting switch to OFF position to stop the engine.
- ⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)
- ⚠ When removing and installing the fuel piping, take care to prevent foreign materials from entering the fuel piping. If dusts, etc. stick to any part, clean that part thoroughly with clean fuel.
- ⚠ Ask a qualified person for collecting, adding, and filling operations of the refrigerant. (Only qualified persons can work.)
- ⚠ Never release the refrigerant to the atmosphere.
- ⚠ If refrigerant gas gets in your eyes, you may lose your sight. And if it touches your skin, you may suffer from frostbite. Accordingly, put on the protective eyeglasses, gloves, and working suits with long sleeves while you are collecting or filling with it.

NOTICE

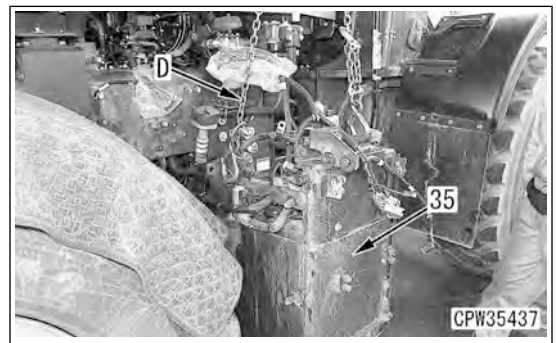
- Check the connector numbers and installed positions before disconnecting wires and hoses, and write them down.
- When disconnecting the wires and hoses, take extreme care not to damage or deform the wires and hoses by the clips and clamps. If the wires or hoses may be damaged or deformed, remove the clips and clamps before starting the work.

9. Connect the connector T06_T07 (39) and TEMO (38).
10. Install the clamp (37).

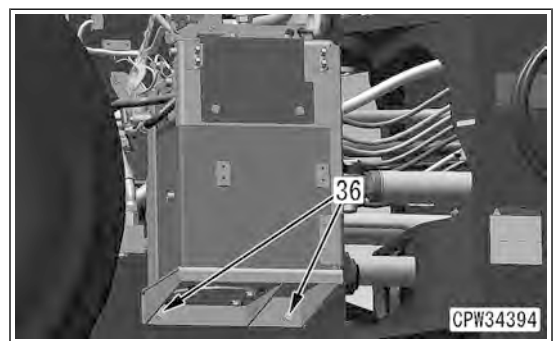
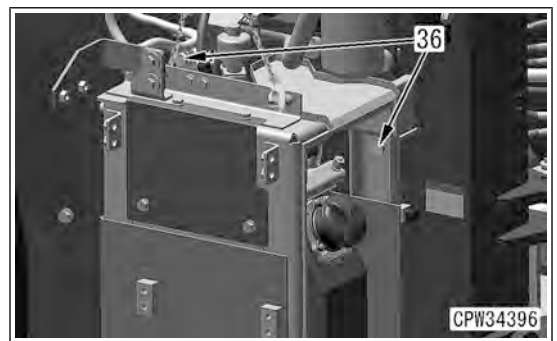


AdBlue/DEF tank assembly

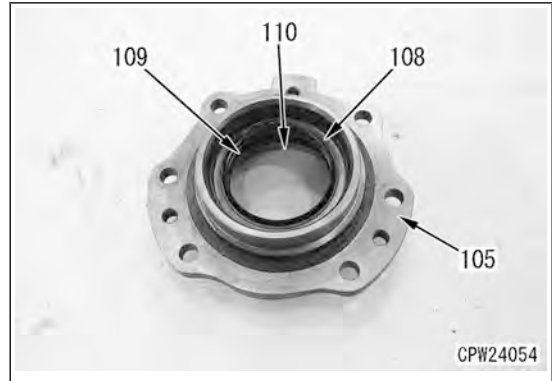
11. By using the lifting tool (D), sling AdBlue/DEF tank assembly (35), and set it on the installing position.



12. Install the bolts (36) (4 pieces).



- 67. Remove O-ring from the output cage assembly (105).
- 68. Remove the dust seal (108), oil seal (109), and outer race (110) from the output cage assembly (105).



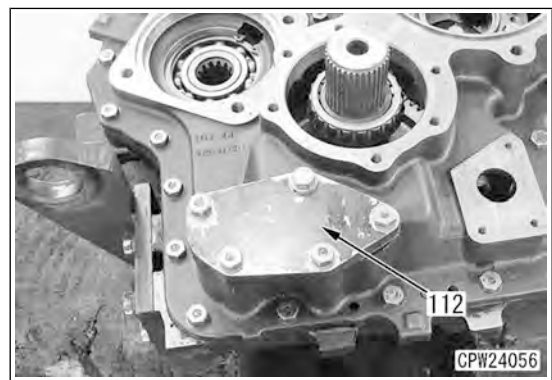
Spacer

- 69. Remove the spacer (111) from the output shaft.



Cover

- 70. Remove the bolt, and remove the cover (112).

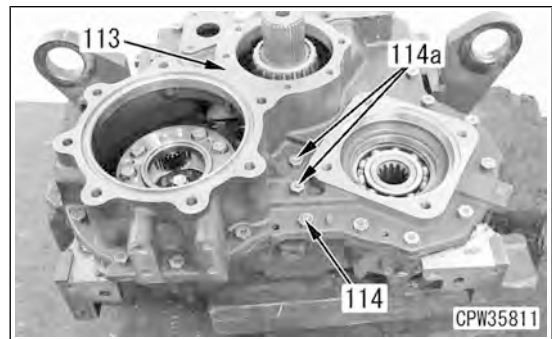


Removing the front case

- 71. Remove the bolts (114) (24 pieces) of the front case (113).

REMARK

Be sure to remove the bolts (114a) (2 pieces) at the center of the front case.



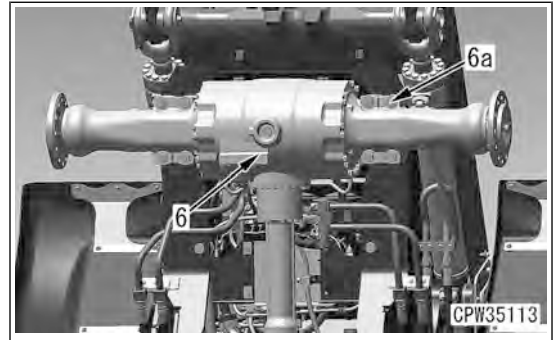
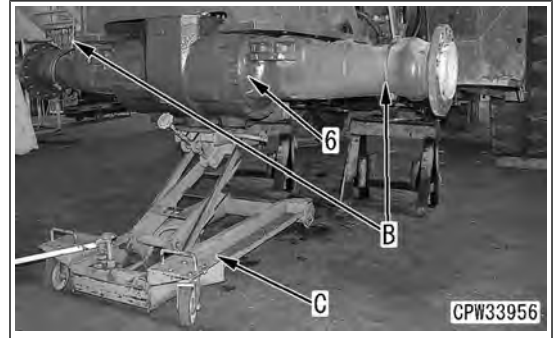
- By using the lifting tool (B), sling the front axle assembly (6), and hold it.



Front axle assembly (6):

590 kg

- Support the bottom of the front axle assembly (6) by using the jack (C), remove the bolts (6a) (4 pieces on the right and left sides), and remove the front axle assembly (6).



METHOD FOR INSTALLING FRONT AXLE ASSEMBLY

- By using the lifting tool (B), sling the front axle assembly (6), and hold it.



Front axle assembly (6):

590 kg

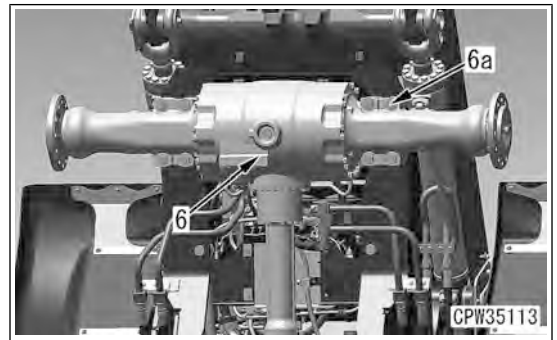
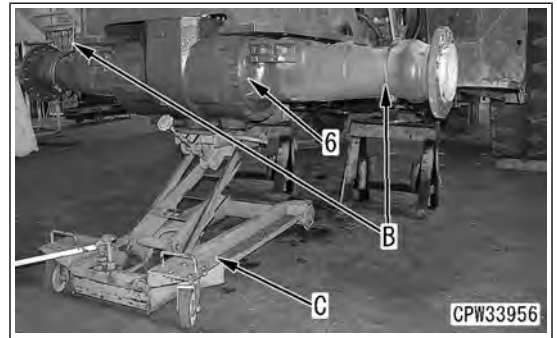
- Support the bottom of the front axle assembly (6) by using the jack (C), and set it to the installing position.



Bolt (6a):

706 to 862 Nm {72 to 88 kgfm}

- Install the front axle assembly (6) with the bolts (6a) (4 pieces each on the right and left sides).



- Connect the front drive shaft (5), and install the bolts (5a) (4 pieces).

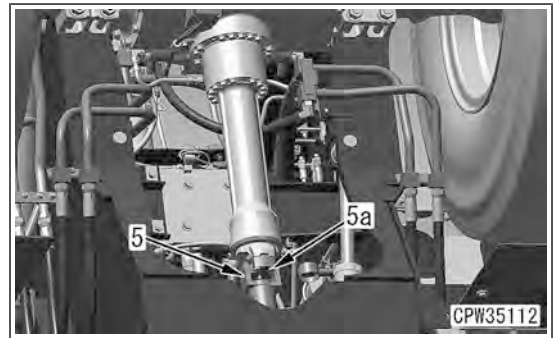
REMARK

When installing the drive shaft, check that the spider cap key securely fits in the key groove of the mating yoke, and then tighten the bolts (5a) (4 pieces).



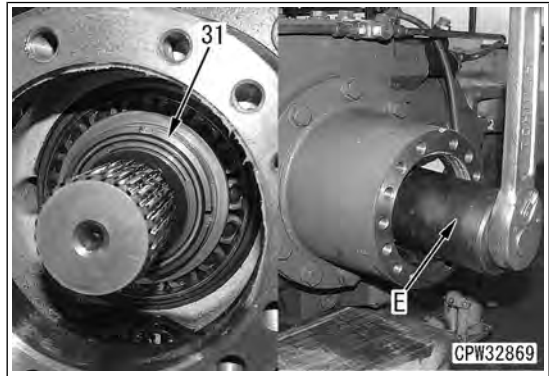
Bolt (5a):

59 to 74 Nm {6.0 to 7.5 kgfm}

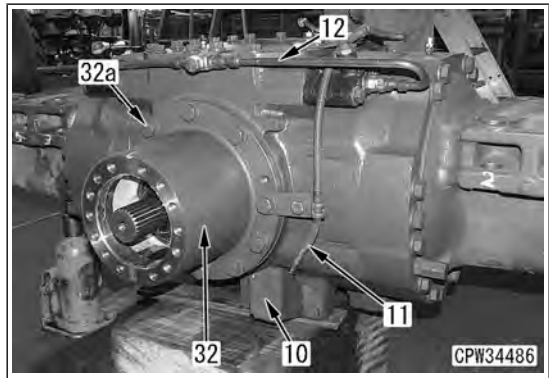


Removing the front cage assembly (for front differential)

10. Loosen the nut (31) by using the wrench (E) in advance before removing the cage assembly.



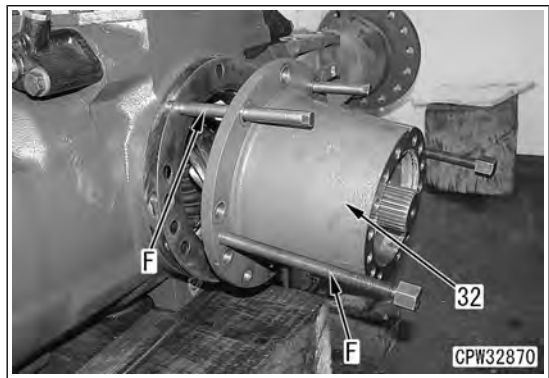
- 11. Remove the cover (10).
- 12. Remove the axle oil temperature sensor (hidden by the cover (10)) together with the wiring harness (11).
- 13. Remove the brake tube assembly (12).
- 14. Remove the bolts (32a) (10 pieces) of the front cage assembly (32).



15. By using the bolt (F), remove the front cage assembly (32).

REMARK

Shims are installed. Check the thickness and quantity, and write down them.



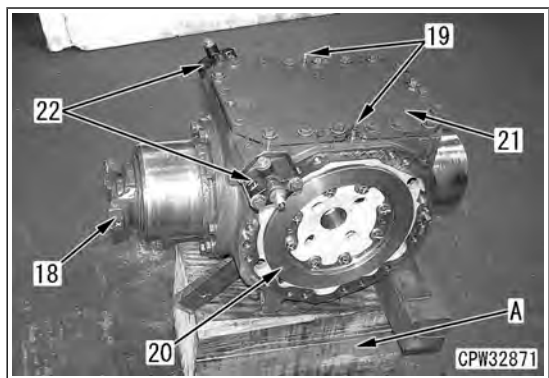
Differential assembly

16. Place the differential assembly on the block (A) to stabilize it.

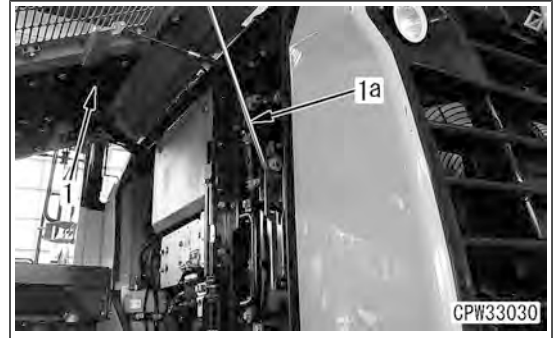
REMARK

- The photo shows the rear differential.
- Remove both right and left parts according to the same procedure.

- 17. Remove the slack adjusters (22) (2 pieces).
- 18. Remove the bleeder screws (19) (2 pieces).
- 19. Remove the piston (20).
- 20. Remove the coupling (18). (Only for rear differential)
- 21. Remove the bolt of the top cover (21).



3. Unlock the lock bar (1h), and close the cover (1g).
4. Turn the starting switch to ON position, and start the engine.



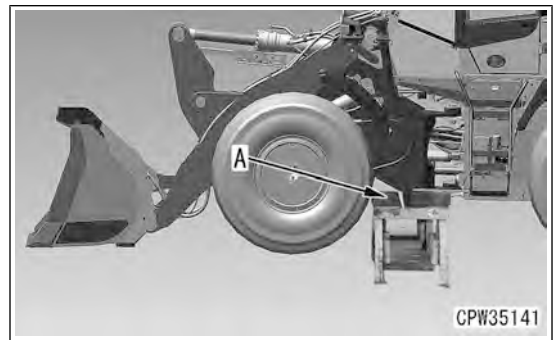
5. Push up the machine front by using the work equipment, and set the right and left support stands (A) under the frames at the rear of the front wheels.

⚠ Set the parking brake switch to ON position, and chock the rear 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.

⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)



6. Push up the counterweight bottom by using the jack (B), and set the support stand (C).



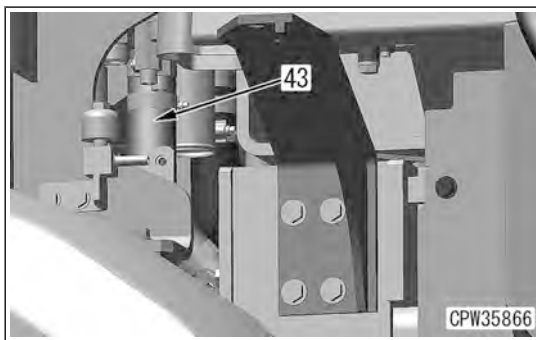
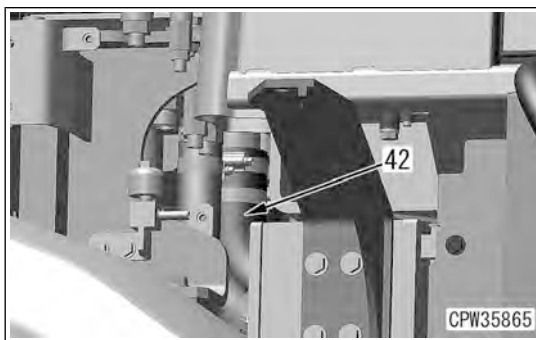
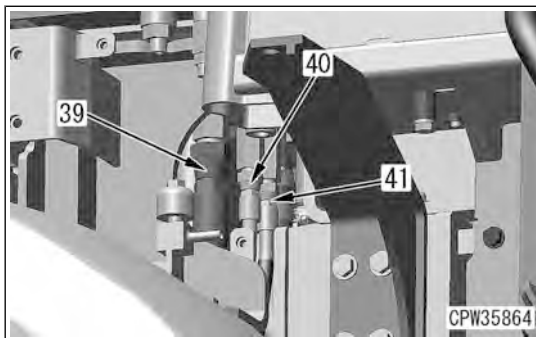
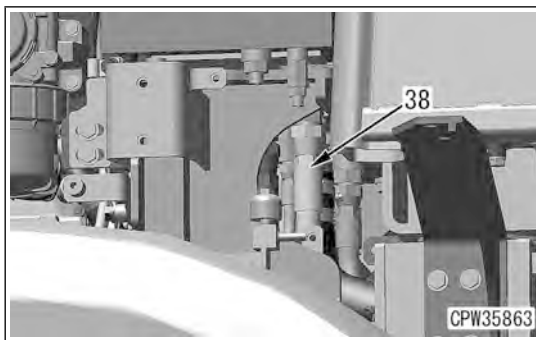
REMOVE AND INSTALL HYDRAULIC TANK ASSEMBLY

25. Disconnect the following hydraulic hoses from the lower right of the hydraulic tank.

- Hose (38)
- Hose (39)
- Hose (40)
- Hose (41)
- Hose (42)
- Hose (43)

REMARK

- Place an oil container under the hose end.
- Plug the disconnected hoses and the installing locations to prevent oil from flowing out and dust from entering.



METHOD FOR REMOVING WORK EQUIPMENT ASSEMBLY

Bucket link assembly

1. By using the lifting tool (A), sling the bucket link assembly (1), and hold it.
2. Remove the lock bolt (2) and pin (3) from the bucket, and disconnect the bucket and bucket link assembly (1).
3. Fix the bucket link assembly (1) to the bell crank by using the chain (B), etc.



(Reference: Bucket link assembly (1):

45 kg)

⚠ Never insert your fingers into the pin holes.

REMARK

Check the thickness and quantity of the shims, and write them down.

4. Remove the lock bolt (4) from the bucket hinge, and remove the pin (5). (Right and left)

⚠ Never insert your fingers into the pin holes.

5. Turn the starting switch to ON position, and start the engine.
6. Move the machine backward, and disconnect the bucket (5a).

REMARK

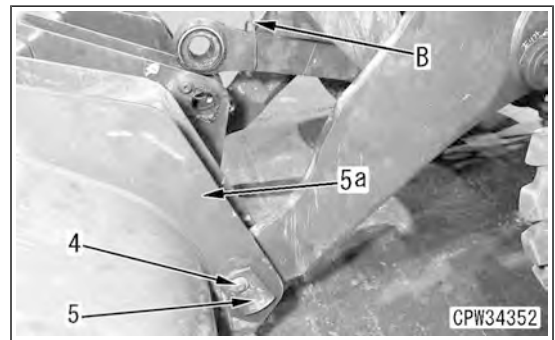
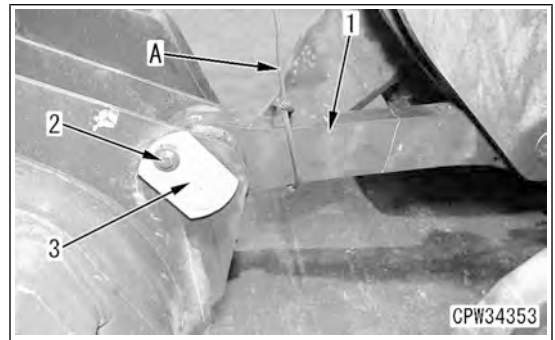
Check the thickness and quantity of the shims, and write them down.

⚠ Set the parking brake switch to ON 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.

⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)



Bucket cylinder assembly

7. By using the webbing sling (C), sling the bucket cylinder assembly (6), and hold it.
8. Remove the lock bolt (7) and pin (8) from the bell crank, and disconnect the cylinder rod and bell crank.



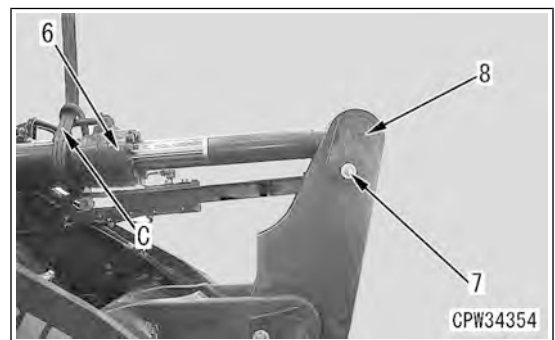
(Reference: Bucket cylinder assembly (6):

165 kg)

⚠ Never insert your fingers into the pin holes.

REMARK

Check the thickness and quantity of the shims, and write them down.



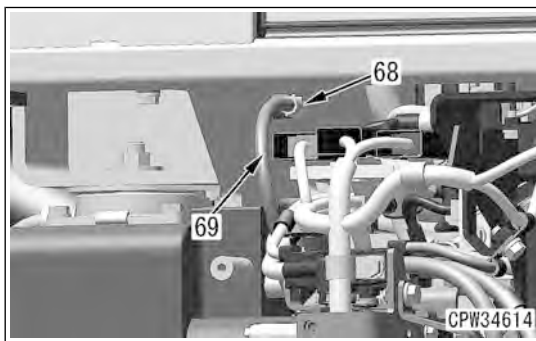
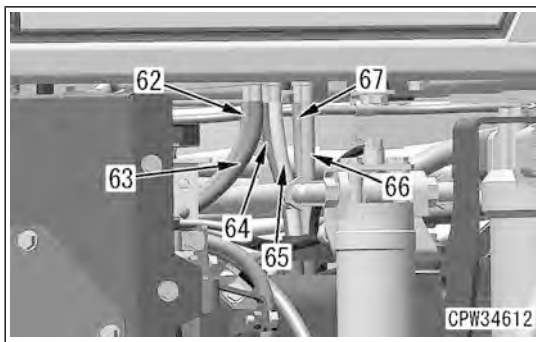
29. Disconnect the following PPC hoses.

- Hose (62)
- Hose (63)
- Hose (64)
- Hose (65)
- Hose (66)
- Hose (67)

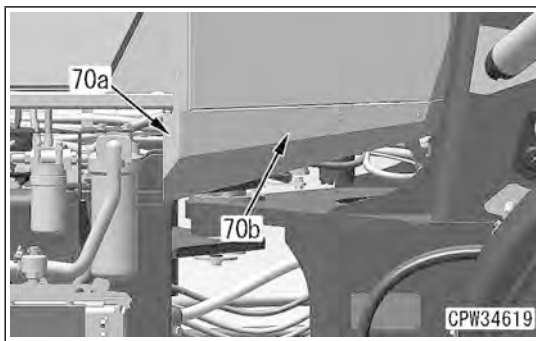
REMARK

Place an oil container under the hose end.

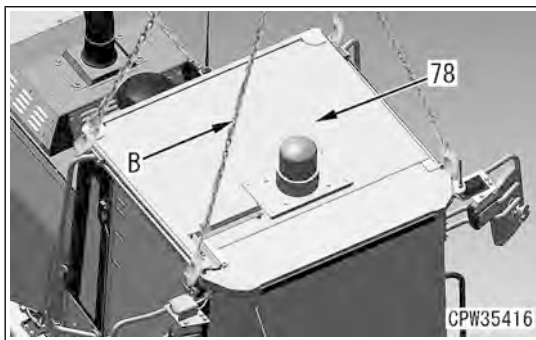
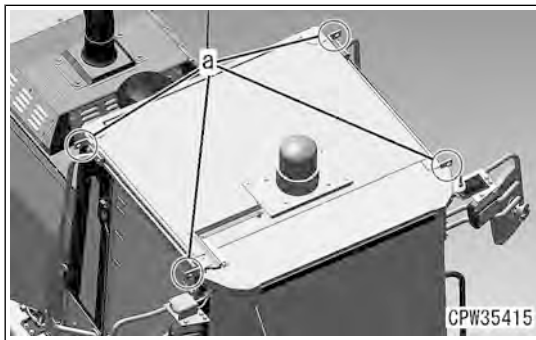
30. Remove the bolt (68), and disconnect the ground terminal (69).



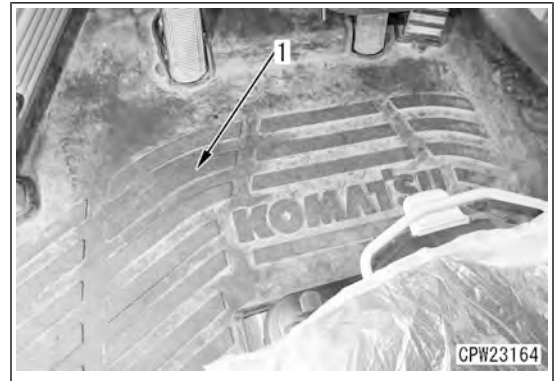
31. Remove the bolts (70a) (3 pieces), and remove the cover (70b). (Right side of the machine)



32. Install the lifting tool (b) to the installing positions of the lifting tool (a) (4 places). Sling the operator's cab and floor frame assembly (78), and hold it.



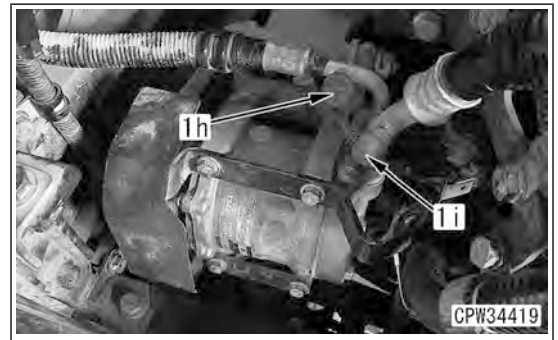
32. Install the floor mat (1).



Refilling with refrigerant

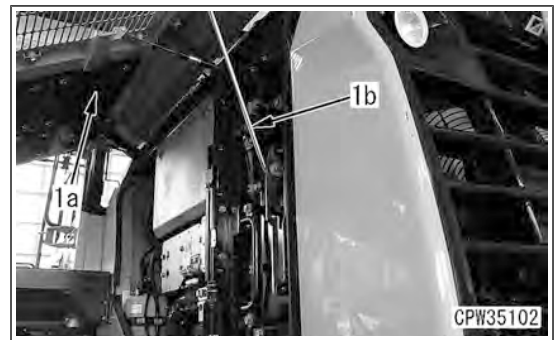
33. Refill with refrigerant (air conditioner gas: R134a) through the ports (1h) and (1i).

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.



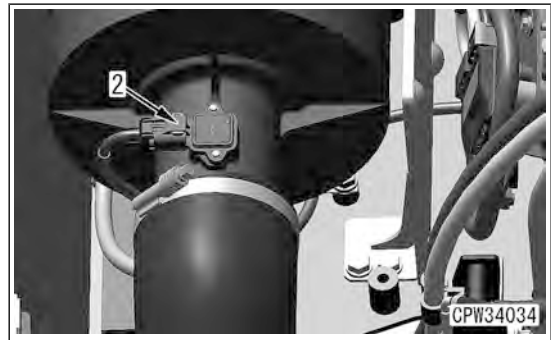
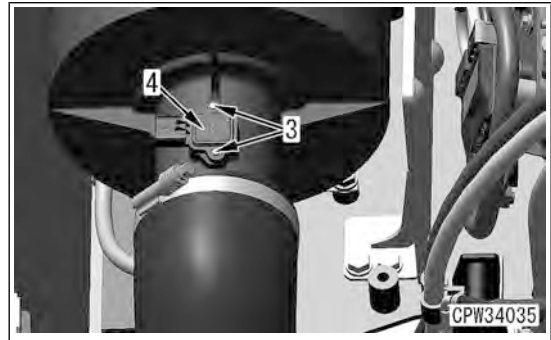
METHOD FOR INSTALLING MASS AIR FLOW AND TEMPERATURE SENSOR

Mass air flow and temperature sensor assembly

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

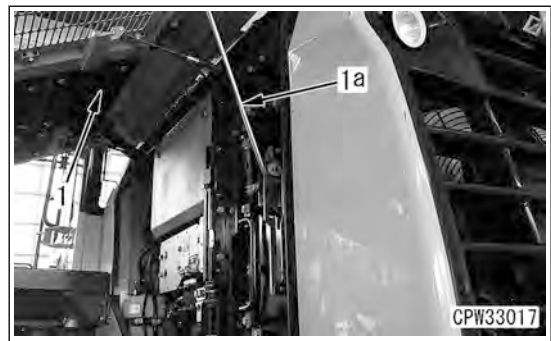
 Bolt (3):
0.98 to 1.27 Nm {0.10 to 0.13 kgfm}

2. Connect the connector MAF (2).



Cover

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



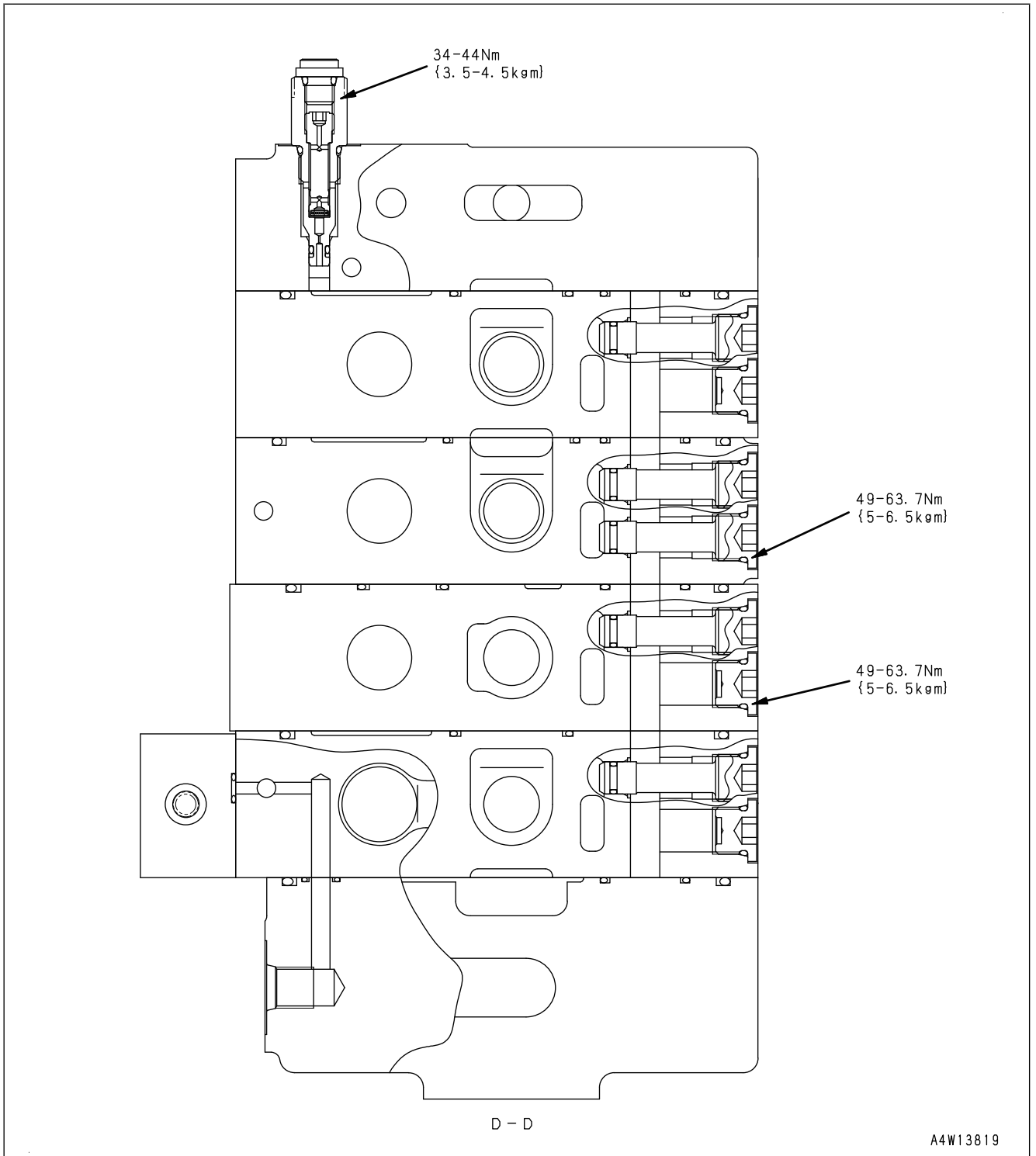
60 MAINTENANCE STANDARD

Unit: mm

No.	Item		Judgment criteria				Remedy	
			Standard dimensions	Tolerance		Standard clearance		Allowable clearance
	Shaft	Hole						
1	Clearance between planetary gear bearing and shaft		33.338	+0.025 +0.013	+0.013 0	-0.025 to 0	-	Replace
2	Clearance between axle housing and ring gear		276	+0.10 0	+0.10 0	-0.10 to 0.10	-	
3	Seal press fitting portion of axle shaft	Housing	140	+0.4 +0.2	+0.063 0	-0.4 to -0.137	-	
		Shaft	105	0 -0.054	-0.2 -0.4	-0.4 to -0.146	-	
4	Clearance at press fitting portion of axle housing bearing	Outer race	130	0 -0.025	-0.028 -0.068	-0.068 to -0.003	-	
		Inner race	85	+0.045 +0.023	0 -0.020	-0.065 to -0.023	-	
5	Clearance at press fitting portion of axle housing bearing	Outer race	125	0 -0.018	-0.028 -0.068	-0.068 to -0.010	-	
		Inner race	80	+0.030 +0.011	0 -0.015	-0.045 to -0.011	-	
6	Clearance in guide pins		12	+0.025 +0.007	+0.207 +0.145	0.120 to 0.200	-	
7	Clearance between oil seal and housing		0.2 or less				Adjust	
8	End play of axle shaft		0					
9	Tightening torque of the bolt		490 to 608 Nm {50 to 62 kgfm}				Re-tighten	

REMARK

For starting torque of axle housing, see DISASSEMBLY AND ASSEMBLY, "DISASSEMBLE AND ASSEMBLE AXLE HOUSING ASSEMBLY"



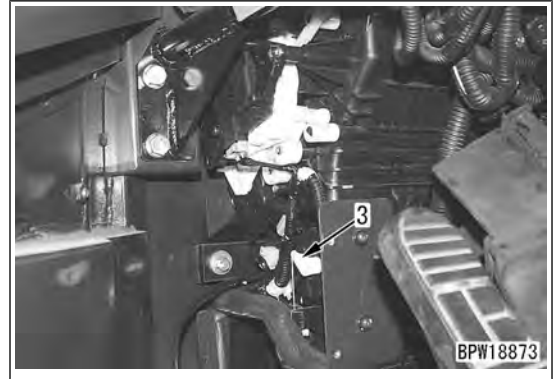
- To evaporate the liquid refrigerant at lower temperature, the pressure in the evaporator must be kept as low as possible. For this purpose, the compressor sucks in the evaporated refrigerant.

Relation between refrigerant and cooling trouble

- While repeating the refrigeration cycle, the refrigerant circulates in the refrigeration circuit and dissipates the heat in the cab to the outside of the cab.
- If there is an insufficient quantity of refrigerant, all of it is evaporated while it is passing through the evaporator. This causes evaporator efficiency to deteriorate, which will result in defective air conditioning.
- If there is excessive refrigerant, not all of it is evaporated and part of it will be sucked into the compressor in liquid form, which causes the compressor to compress the liquid and may damage the components.
- If water is contained in the refrigerant circuit, it freezes in the small hole of the expansion valve and blocks the refrigerant flow to cause a cooling trouble.

6. Operate the FRESH/RECIRC air selector switch to check whether FRESH/RECIRC air changeover damper (4) opens and closes or not.

In case of FRESH air, lever (3) becomes as follows.



After completion of test, turn the starting switch to OFF position.

No.	Cause	Procedure, measuring location, criteria and remarks		
6	Ground fault in wiring harness (contact with ground circuit)	If fuse is blown out, replace it in advance. 1. Turn the starting switch to OFF position. 2. Remove fuse No. 8 in fuse box FS8. 3. Disconnect connectors [1], [2], [12], and [13], and connect T-adapters to female side of [1] and [2].		
		Resistance	Between fuse No. 8 in fuse box FS8 and ground	Min. 1 MΩ
			Between [2] (female) (18) and ground	Min. 1 MΩ
			Between [2] (female) (12) and ground	Min. 1 MΩ
7	Defective air conditioner controller	1. Turn the starting switch to OFF position. 2. Disconnect connectors [1] and [2], and insert T-adapter into it. 3. Turn the starting switch to ON position. 4. Press fan switch on the air conditioner operation screen (for any air flow rate).		
		Voltage	Between [2] (12) and [1] (36)	Approx. 10 V
			Between [1] (26) and (36)	Max. 1 V
8	Defective switch panel (defective switch)	1. Turn the starting switch to OFF position. 2. Display the air conditioner operation screen on the machine monitor. Press the fan switch from MIN to MAX. LCD (Liquid Crystal Display) display of air flow rate changes from MIN to MAX.		

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
ICT	Information and Communication Technology	Communication and electronic control	A general term for the engineering and its socially applied technology of information processing and communication.
IMA	Inlet Metering Actuator	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump fuel discharged volume. (Same as IMV)
IMU	Inertial Measurement Unit	Engine	This is a device to detect the angle (or angular velocity) and acceleration of the 3 axes that control motions.
IMV	Inlet Metering Valve	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump combustion discharged volume. (Same as IMA)
KCCV	Komatsu Closed Crankcase Ventilation	Engine	This is a mechanism that burns the blowby gas again by separating oil from blowby gas and returning it to the intake side. It primarily consists of filters.
KCSF	Komatsu Catalyzed Soot Filter	Engine	This is a filter that captures soot in exhaust gas. It is built in to KDPF.
KDOC	Komatsu Diesel Oxidation Catalyst	Engine	This is a catalyst that is used for purifying exhaust gas. It is built in to KDPF or assembled with the muffler.
KDPF	Komatsu Diesel Particulate Filter	Engine	This is a component that is used to purify the exhaust gas. KDOC (catalyst) and KCSF (filter to capture soot) are built-in it. It is installed instead of the conventional muffler.
KTCS	Komatsu Traction Control System	Travel and brake (HM)	This is a function that performs braking with the optimum force and recovers the driving force of the wheels by actuating the inter-axle differential lock when the wheels runs idle while the machine travels on the soft ground.
LCD	Liquid Crystal Display	Machine monitor	This is an image display equipment such as a monitor in which the liquid crystal elements are assembled.
LED	Light Emitting Diode	Electronic parts	This is a semiconductor element that emits light when the voltage is applied in forward direction.
LIN	Local Interconnect Network	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
LS	Load Sensing	Hydraulic system	This is a function that detects differential pressure of pump, and controls discharged volume corresponding to load.
LVDS	Low Voltage Differential Signaling	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
MAF	Mass Air Flow	Engine	This indicates engine intake air flow. This is not used independently but is used as combined with sensor. Mass air flow sensor can be called as MAF sensor.

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