2. Preparations for work

1) Before adding oil or making any repairs, park the machine on a hard and level ground, and apply the parking brake and block the wheels or tracks to prevent the machine from moving.
2) Before starting work, lower the work equipment (blade, ripper, bucket, etc.) to the ground. If this is not possible, insert the lock pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.
3) When disassembling or assembling, support the machine with blocks, jacks, or stands before starting work.
4) Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

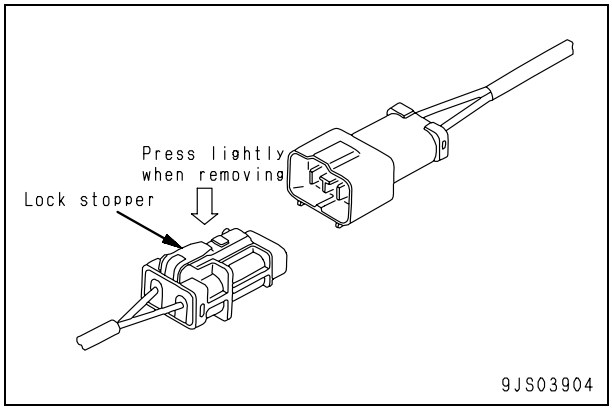
3. Precautions during work

1) Before disconnecting or removing components of the oil, water, or air circuits, first release the pressure completely from the circuit. When removing the oil filler cap, a drain plug, or an oil pressure pickup plug, loosen it slowly to prevent the oil from spurting out.
2) The coolant and oil in the circuits are hot when the engine is stopped, so be careful not to get scalded. Wait for the oil and coolant to cool before carrying out any work on the oil or water circuits.
3) Before starting work, stop the engine. When working on or around a rotating part, in particular, stop the engine. When checking the machine without stopping the engine (measuring oil pressure, revolving speed, temperature, etc.), take extreme care not to get rolled or caught in rotating parts or moving parts.
4) Before starting work, remove the leads from the battery. Always remove the lead from the negative (–) terminal first.
5) When raising a heavy component (heavier than 25 kg), use a hoist or crane. Before starting work, check that the slings (wire ropes, chains, and hooks) are free from damage. Always use slings which have ample capacity and install them to proper places. Operate the hoist or crane slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
6) When removing a cover which is under internal pressure or under pressure from a spring, always leave 2 bolts in diagonal positions. Loosen those bolts gradually and alternately to release the pressure, and then remove the cover.
7) When removing components, be careful not to break or damage the electrical wiring. Damaged wiring may cause electrical fires.
8) When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips onto the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip and can even start fires.
9) As a general rule, do not use gasoline to wash parts. Do not use it to clean electrical parts, in particular.
10) Be sure to assemble all parts again in their original places. Replace any damaged parts and parts which must not be reused with new parts. When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is operated.
11) When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. In addition, check that connecting parts are correctly installed.
12) When assembling or installing parts, always tighten them to the specified torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.
13) When aligning 2 holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
14) When measuring hydraulic pressure, check that the measuring tools are correctly assembled.
15) Take care when removing or installing the tracks of track-type machines. When removing the track, the track separates suddenly, so never let anyone stand at either end of the track.
16) If the engine is operated for a long time in a place which is not ventilated well, you may suffer from gas poisoning. Accordingly, open the windows and doors to ventilate well.

3. Removing, installing, and drying connectors and wiring harnesses

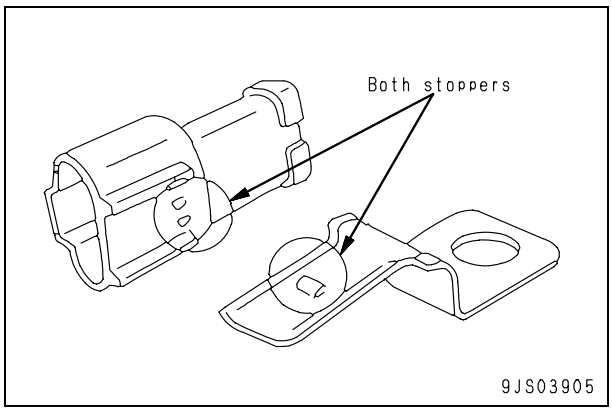
1) Disconnecting connectors

1] Hold the connectors when disconnecting.
When disconnecting the connectors, hold the connectors. For connectors held by a screw, loosen the screw fully, then hold the male and female connectors in each hand and pull apart. For connectors which have a lock stopper, press down the stopper with your thumb and pull the connectors apart.
★ Never pull with one hand.

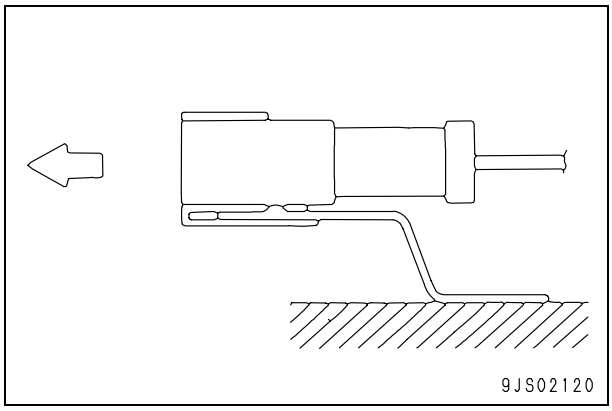


2] When removing from clips

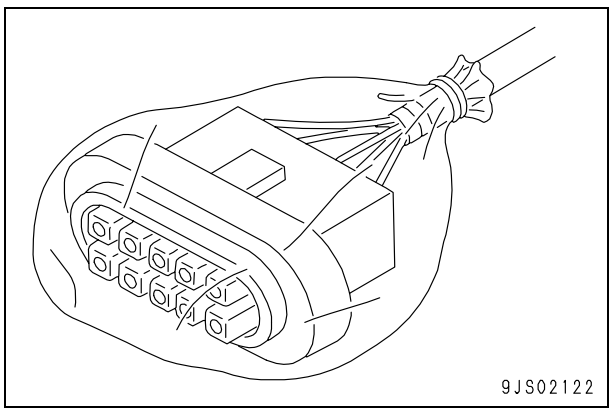
- Both of the connector and clip have stoppers, which are engaged with each other when the connector is installed.



- When removing a connector from a clip, pull the connector in a parallel direction to the clip for removing stoppers.
★ If the connector is twisted up and down or to the left or right, the housing may break.



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



Conversion table

Method of using the conversion table

The conversion table in this section is provided to enable simple conversion of figures. For details of the method of using the conversion table, see the example given below.

Example: Method of using the conversion table to convert from millimeters to inches

1. Convert 55 mm into inches.

1) Locate the number 50 in the vertical column at the left side, take this as (A), and then draw a horizontal line from (A).
2) Locate the number 5 in the row across the top, take this as (B), then draw a perpendicular line down from (B).
3) Take the point where the 2 lines cross as (C). This point (C) gives the value when converting from millimeters to inches. Therefore, 55 mm = 2.165 inches.

2. Convert 550 mm into inches.

1) The number 550 does not appear in the table, so divide it by 10 (move the decimal point one place to the left) to convert it to 55 mm.
2) Carry out the same procedure as above to convert 55 mm to 2.165 inches.
3) The original value (550 mm) was divided by 10, so multiply 2.165 inches by 10 (move the decimal point one place to the right) to return to the original value. This gives 550 mm = 21.65 inches.

Millimeters to inches

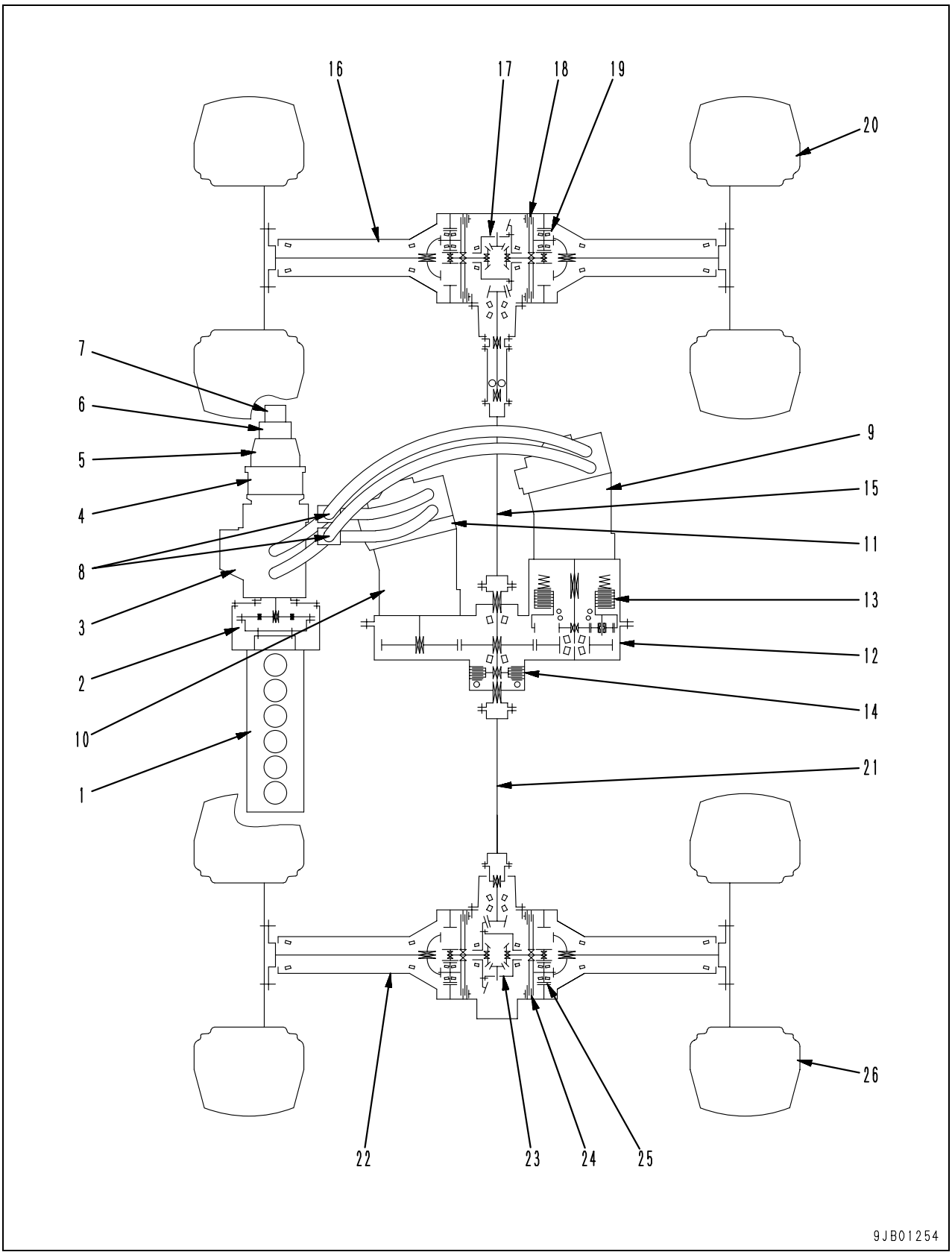
(B)

1 mm = 0.03937 in

	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
						(C)				
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

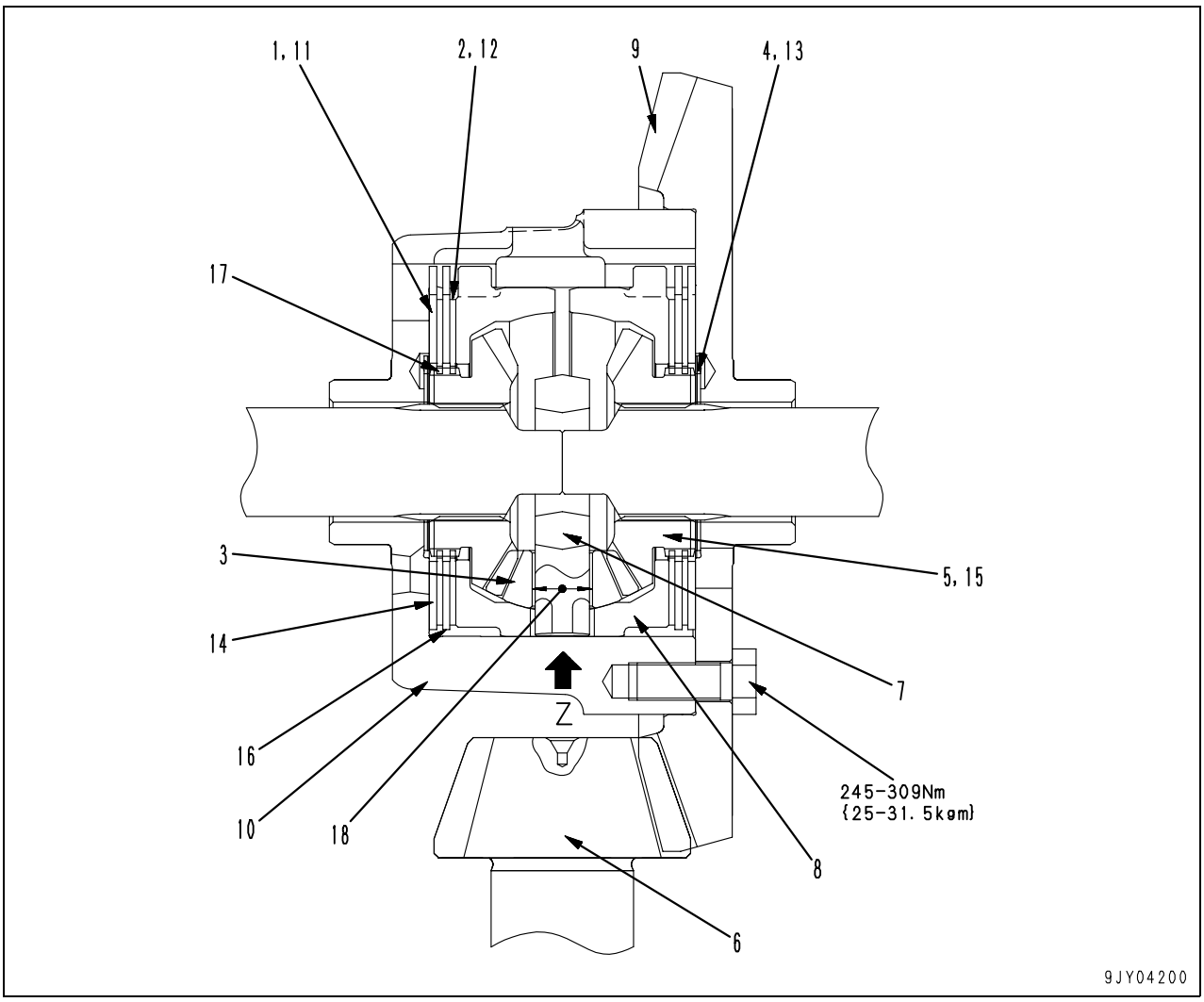
(A)

Power train system diagram



Limited slip differential

(if equipped)



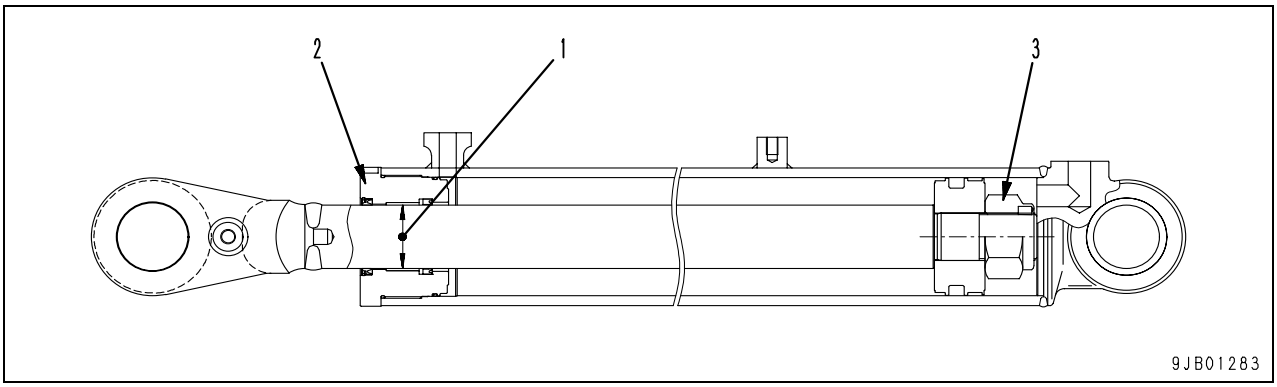
1. Plate
2. Disc
3. Pinion (number of teeth: 12)
4. Washer
5. Side gear (number of teeth: 24)
6. Bevel pinion
7. Shaft
8. Pressure ring
9. Bevel gear (number of teeth: 43)
10. Case

Unit: mm

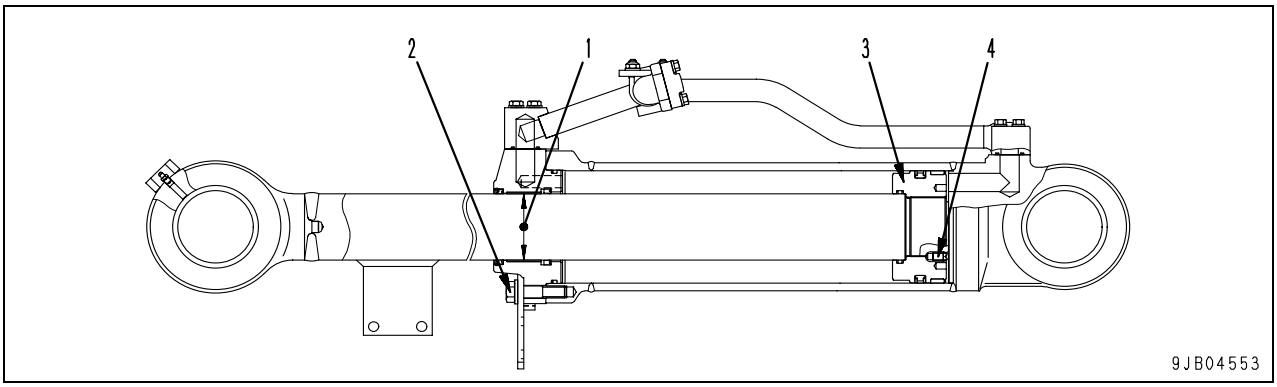
<table>
<tr><th>No.</th><th>Check item</th><th colspan="5">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="9">5
6
7</td><td rowspan="9">Side clearance
Clearance between inside diameter of plain bearing and outside diameter of gear shaft
Pin driven depth</td><td>Type</td><td colspan="2">Standard clearance</td><td colspan="2">Clearance limit</td><td rowspan="9">Replace</td></tr>
<tr><td>SAR(3)56</td><td colspan="2" rowspan="4">0.10 – 0.15</td><td colspan="2" rowspan="4">0.19</td></tr>
<tr><td>SAR(2)40</td></tr>
<tr><td>SBR(1)12</td></tr>
<tr><td>SBR(1)12</td></tr>
<tr><td>SAR(3)56</td><td colspan="2">0.083 – 0.144</td><td colspan="2" rowspan="4">0.20</td></tr>
<tr><td>SAR(2)40</td><td colspan="2">0.071 – 0.121</td></tr>
<tr><td>SBR(1)12</td><td colspan="2" rowspan="2">0.068 – 0.115</td></tr>
<tr><td>SBR(1)12</td></tr>
<tr><td>Type</td><td>Standard size</td><td colspan="2">Allowance</td><td>Repair limit</td></tr>
<tr><td>SAR(3)56</td><td>13</td><td colspan="2" rowspan="3">0
–0.5</td><td rowspan="4">—</td></tr>
<tr><td>SAR(2)40</td><td>12</td></tr>
<tr><td>SBR(1)12</td><td>10</td></tr>
<tr><td>SBR(1)12</td><td>7</td><td colspan="2">+0.5
0</td></tr>
<tr><td>8</td><td>Torque of spline rotating shaft</td><td colspan="5">13.8 – 28.5 Nm {1.4 – 2.9 kgm}</td><td rowspan="6">—</td></tr>
<tr><td rowspan="5">—</td><td rowspan="5">Delivery
Oil: SAE10WCD
Oil temperature: 45 – 55°C</td><td>Type</td><td>Speed (rpm)</td><td>Discharge pressure (MPa {kg/cm^2})</td><td>Standard delivery (ℓ/min)</td><td>Allowable delivery (ℓ/min)</td></tr>
<tr><td>SAR(3)56</td><td rowspan="4">2,500</td><td rowspan="3">20.6 {210}</td><td>129</td><td>119</td></tr>
<tr><td>SAR(2)40</td><td>91</td><td>82</td></tr>
<tr><td>SBR(1)12</td><td>27</td><td>24</td></tr>
<tr><td>SBR(1)12</td><td>2.9 {30}</td><td>27</td><td>24</td></tr>
</table>

WA250PZ-6

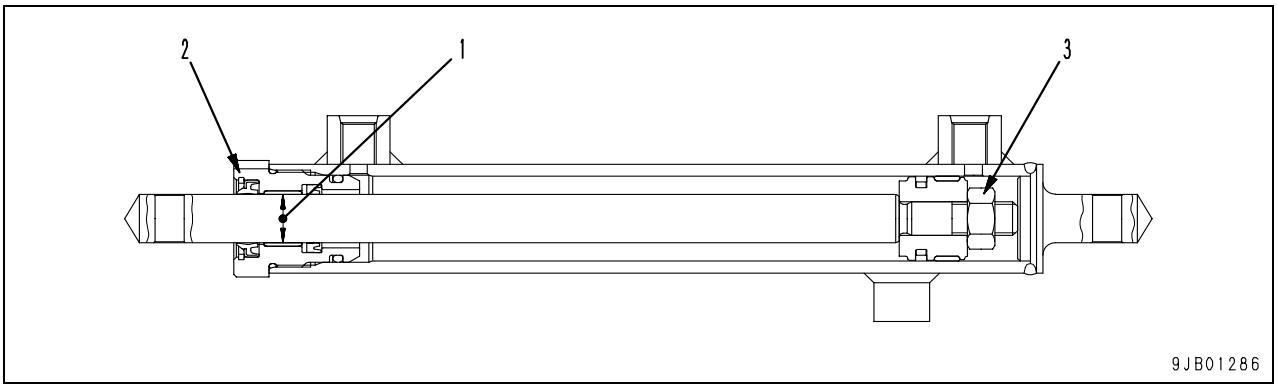
Lift cylinder



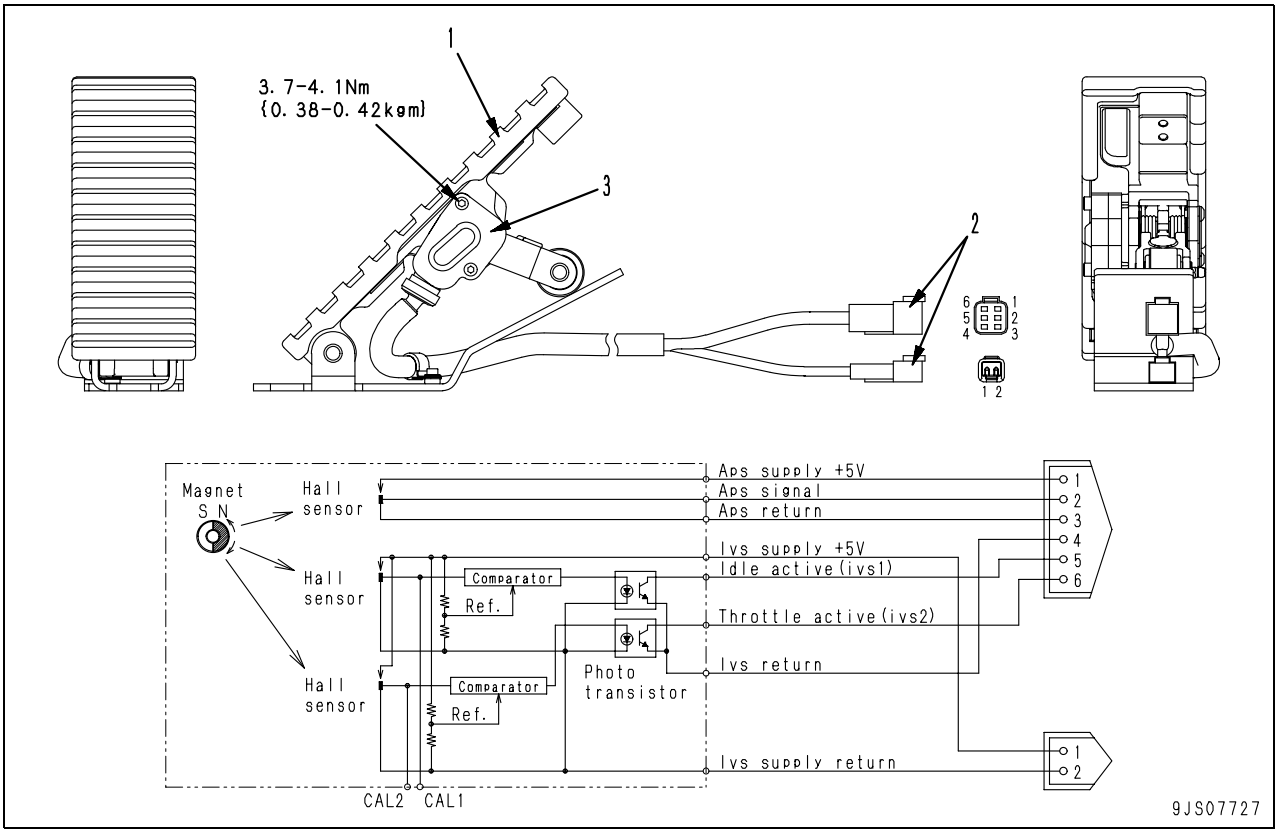
Bucket cylinder



Coupler plunger



Accelerator pedal sensor



1. Pedal
2. Connector
3. Sensor

Function

- This sensor is installed on the surface of the floor. It outputs the accelerator signal or idle validation signal depending on the accelerator pedal pressing angle.

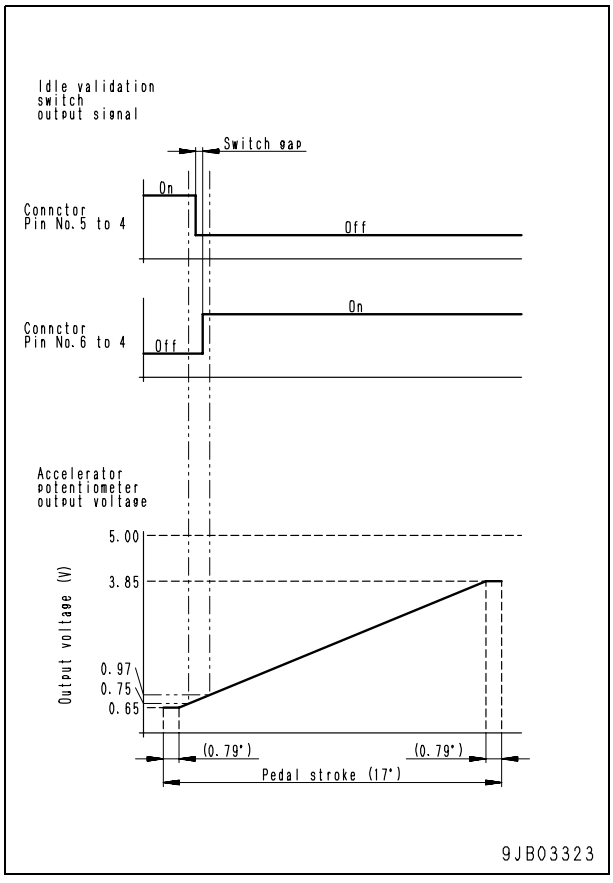
Accelerator signal

- Magnitude of the accelerator pedal displacement being detected by the sensor is output in variable voltage from No. 2 pin.

Idle validation signal

- The sensor detects the accelerator pedal operation. As the accelerator pedal is released, it outputs the signal being entered to No. 5 pin from No. 4 pin. And as the accelerator pedal is pressed, it outputs the signal being entered to No. 6 pin from No. 4 pin.

Output characteristics



2. Contents of 7-segment and dot displays for CPU

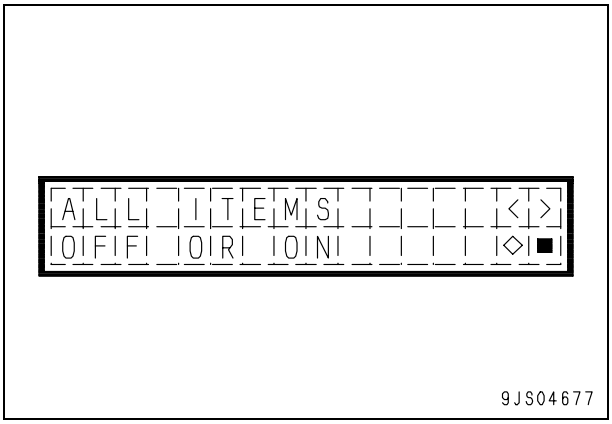
★ The LED display should be checked with the starting switch turned ON.

No.	LED	Name/function	Display (*2)	Description
7	7 segments	Number of unsent mails, satellite capture state	0 to 9 displayed	The number indicates the number of unsent mails. (10 or more unsent mails are indicated by “9”.) Light-on indicates that the machine is in process of capturing the satellite.
			0 to 9 fast blink	The number indicates the number of unsent mails. (10 or more unsent mails are indicated by “9”.) Fast blink indicates that the satellite is not captured.
8	Dot	GPS positioning status	ON	GPS positioning was completed. (The position can be confirmed. *3)
			OFF	GPS positioning was not completed. (The position cannot be confirmed. *3)

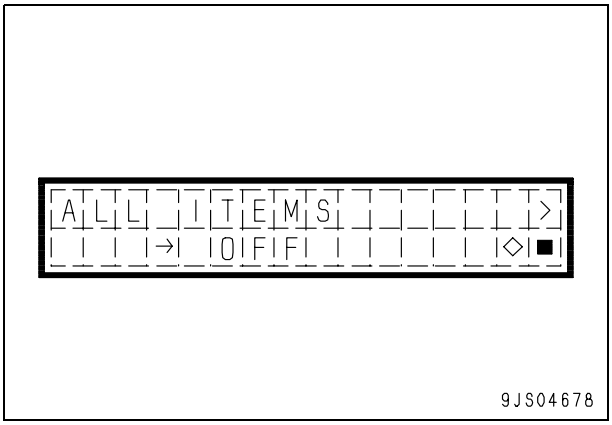
*2: Blink types and blink times
Fast blink: Blinks in about 0.5-second cycle
Slow blink: Blinks in about 2.0-second cycle

*3: Supplementary explanation of GPS positioning status
One or more minute may be taken until GPS positioning is completed after the starting switch was turned ON even in an outdoor service area.
GPS positioning will fail in a weak signal or non-service area.

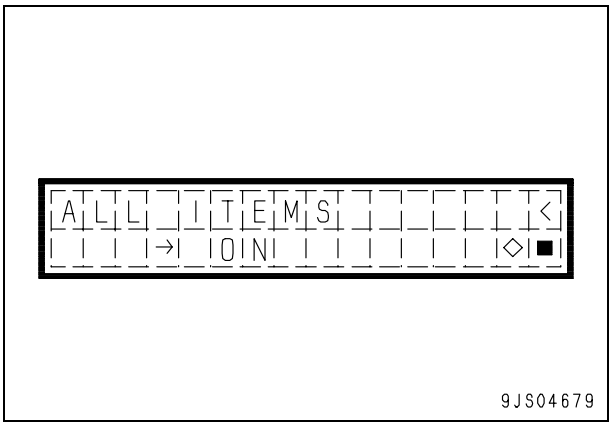
2) Using [<] or [>] switch, select the ALL ITEMS OFF OR ON screen from the following table.



3) Press [◇] switch to display the ALL ITEMS → OFF screen.

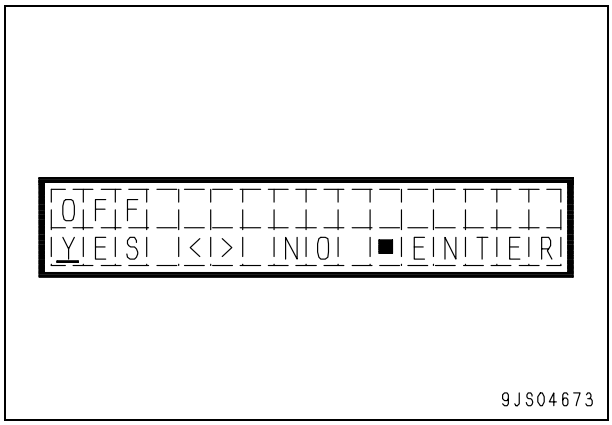


4) Press [<] or [>] switch when selecting the ALL ITEMS → ON.



5) Press [◇] switch from the ALL ITEMS → OFF screen or the ALL ITEMS → ON screen.

★ When [◇] switch is pressed from the ALL ITEMS → OFF screen, OFF will be is displayed in the upper space.

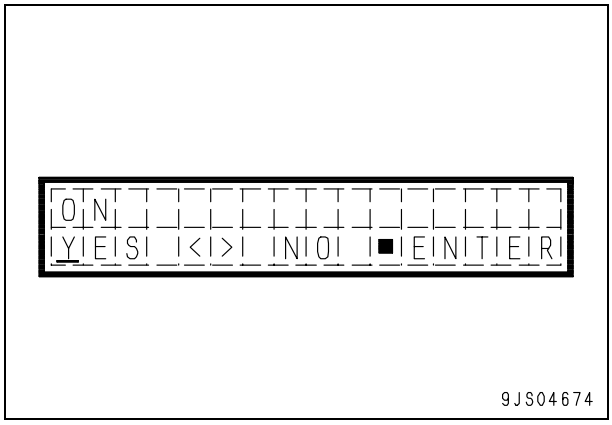


★ When [◇] switch is pressed from the ALL ITEMS → ON screen, ON will be is displayed in the upper space.

6) Select “YES” or “NO” using [<] or [>] switch.

★ The selected cursor will start flashing. If “YES” is selected and [■] switch is pressed, the information will be deleted. If “NO” is selected and [■] switch is pressed, deletion is cancelled and the maintenance interval change item screen is restored.

★ By default, the cursor is set to NO (cancel) to prevent resetting error.

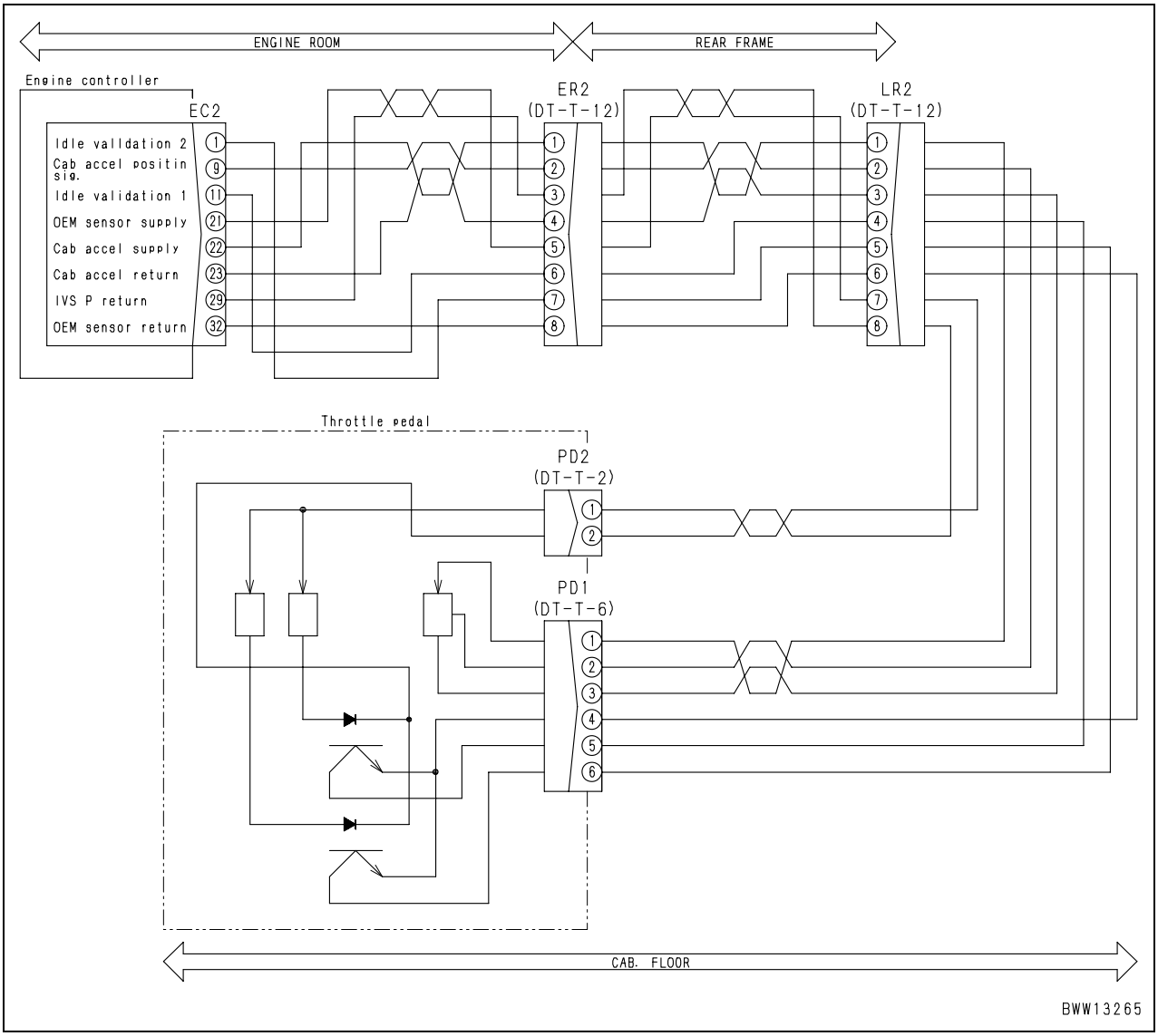


Failure code [B@BCZK] Engine: Low coolant level

Action code	Failure code	Trouble	Engine: Low coolant level (Machine monitor system)
E01	**B@BCZK**		
Contents of trouble	• Radiator coolant level switch signal circuit was opened (disconnected from GND) for 30 seconds.		
Action of machine monitor	• Turns radiator coolant level caution lamp ON.		
Problem that appears on machine	• If machine is used as it is, engine may overheat.		
Related information	• Operation of radiator coolant level switch can be checked with monitoring function. (Monitoring code: MONITOR PANEL – 40903 – D-IN-27)		

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Low radiator sub-tank coolant level	System is normal. ★ Radiator sub-tank coolant level may be low. Check and add coolant, if necessary.			
	2	Defective radiator coolant level switch (Internal defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			M05 (male)	Sub-tank coolant level	Resistance	
			Between (1) – (2)	Above low level (Normal)	Max. 1 Ω	
				Below low level	Min. 1 MΩ	
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between L27 (female) (10) – B05 (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between B05 (female) (2) – ground		Resistance	Max. 1 Ω
	4	Defective machine monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			L27	Sub-tank coolant level	Voltage	
			Between (10) – ground	Above low level (Normal)	Max. 1 V	
				Below low level	20 – 30 V	

Related circuit diagram



Failure code [DD1NL4] Fan automatic reverse switch signal: Abnormality

Action code	Failure code	Trouble	Fan automatic reverse switch signal: Abnormality (HST controller system)
E01	**DD1NL4**		
Contents of trouble	• Because of hot short in fan automatic reverse switch system, fan automatic reverse switch input and fan manual reverse switch input were sensed simultaneously.		
Action of controller	• Turns automatic reverse switch function OFF.		
Problem that appears on machine	• After error is detected, fan does not reverse. • Automatic reverse switch LED lamp keeps lighting.		
Related information	• Input state from fan automatic reverse switch can be checked with monitoring function (Code: HST – 93400 – FAN REVERSE SW) (Code: MONITOR PANEL – 40901 – D-IN-9). • Method of reproducing failure code: Turn starting switch ON.		

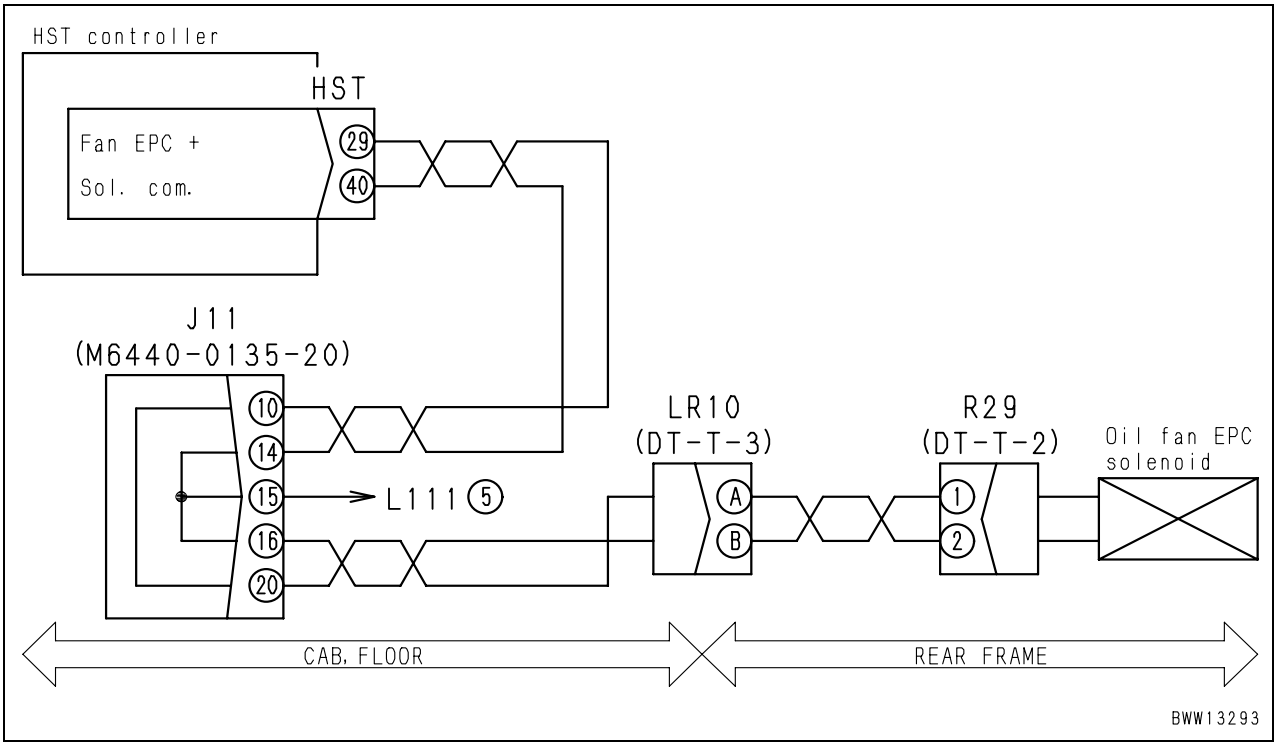
	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective fan automatic reverse switch (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L69 (male)	Fan automatic reverse switch	Resistance	
			Between (3), (4) – (5)	ON	Max. 1 Ω	
				OFF	Min. 1 MΩ	
	2	Hot short in wiring harness (Contact with 24V circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting. (Carry out troubleshooting with automatic reverse switch OFF)			
			Wiring harness between L25 (female) (14) – L69 (female) (3), (4) and ground		Voltage	Max. 1 V
	3	Defective machine monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			L25 (male)	Fan automatic reverse switch	Voltage	
			Between (14) and ground	ON	20 – 30 V	
				OFF	Max. 1 V	

Failure code [DX16KY] Fan EPC solenoid: Hot short

Action code	Failure code	Trouble	Fan EPC solenoid: Hot short (HST controller system)
E01	**DX16KY**		
Contents of trouble	• Since the fan EPC solenoid system is shorted with the power source, abnormal voltage is applied when the fan EPC solenoid output is OFF.		
Action of controller	• Turns the output to the fan EPC solenoid OFF. • If problem is removed, system is returned to normal operating state.		
Problem that appears on machine	• The fan speed is minimized.		
Related information	• The output state (current) to the fan EPC solenoid can be checked with the monitoring function (Code: HST – 41400 – FAN EPC DIR). • Method of reproducing failure code: Turn the starting switch ON.		

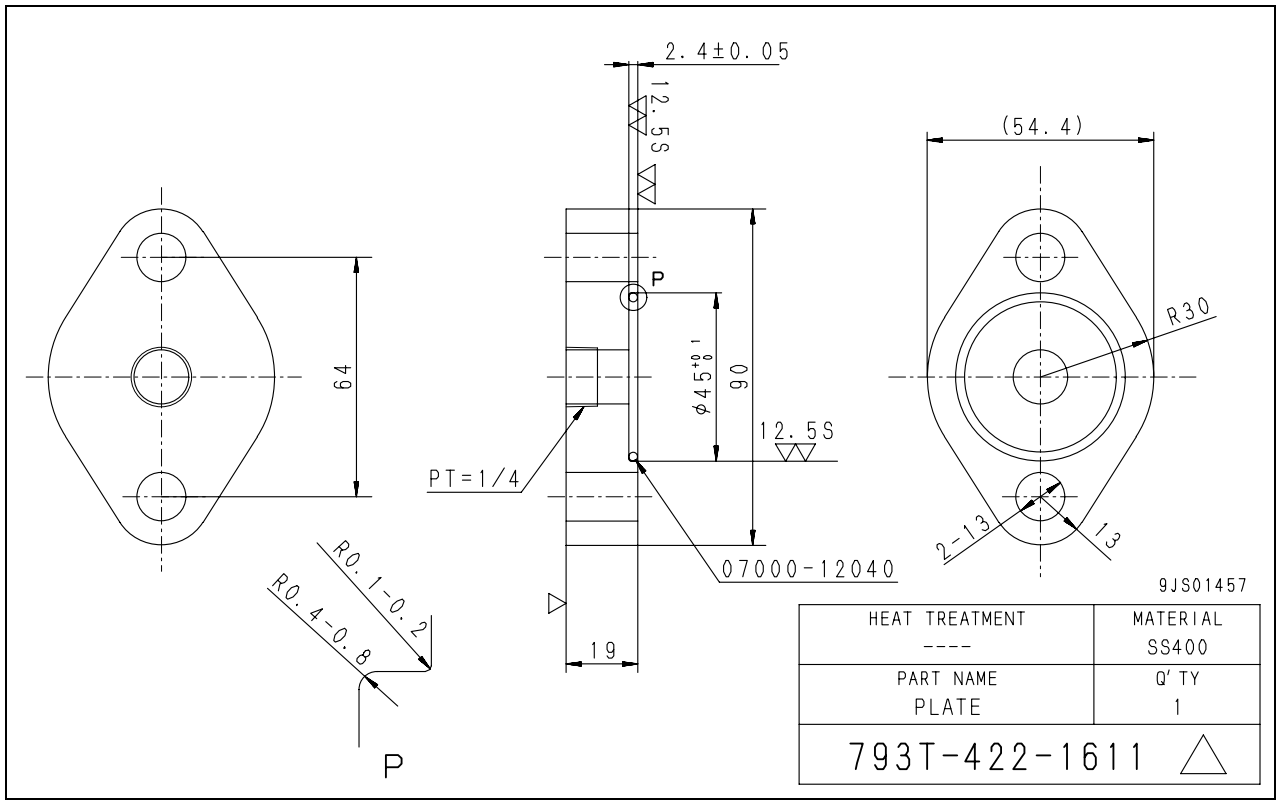
	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective fan EPC solenoid (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			R29 (male)	Resistance	
			Between (1) – (2)	5 – 10 Ω	
			Between (1), (2) and ground	Min. 1 MΩ	
	2	Hot short in wiring harness (Contact with 24V circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between HST (female) (29) – R29 (female) (1) and ground	Voltage	Max. 1 V
	3	Defective HST controller	• If causes 1 – 2 are not detected, HST controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Related circuit diagram



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

H22 Plate



H23 Push tool