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Temperature

Fahrenheit-Centigrade Conversion; a simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vice is to enter the accompanying table in the center or boldface column of figures. These figures refer to the temperature in either Fahrenheit or Centigrade degrees.

If it desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.

If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

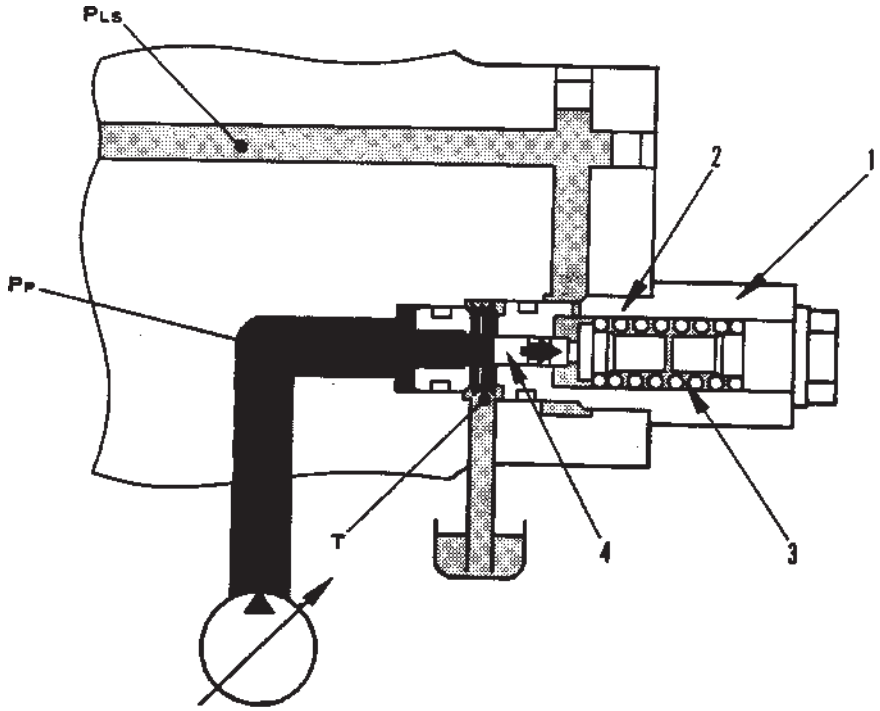
1°C = 33.8°F

°C		°F	°C		°F	°C		°F	°C		°F
-40.4	-40	-40.0	-11.7	11	51.8	7.8	46	114.8	27.2	81	117.8
-37.2	-35	-31.0	-11.1	12	53.6	8.3	47	116.6	27.8	82	179.6
-34.4	-30	-22.0	-10.6	13	55.4	8.9	48	118.4	28.3	83	181.4
-31.7	-25	-13.0	-10.0	14	57.2	9.4	49	120.2	28.9	84	183.2
-28.9	-20	-4.0	-9.4	15	59.0	10.0	50	122.0	29.4	85	185.0
-28.3	-19	-2.2	-8.9	16	60.8	10.6	51	123.8	30.0	86	186.8
-27.8	-18	-0.4	-8.3	17	62.6	11.1	52	125.6	30.6	87	188.6
-27.2	-17	1.4	-7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
-26.7	-16	3.2	-7.2	19	66.2	12.2	54	129.2	31.7	89	192.2
-26.1	-15	5.0	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-25.6	-14	6.8	-6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
-25.0	-13	8.6	-5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
-24.4	-12	10.4	-5.0	23	73.4	14.4	58	136.4	33.9	03	199.4
-23.9	-11	12.2	-4.4	24	73.4	15.0	59	138.2	34.4	94	201.2
-23.3	-10	14.0	-3.9	25	75.2	15.6	60	140.0	35.0	95	203.0
-22.8	-9	15.8	-3.3	26	77.0	16.1	61	141.8	35.6	96	204.8
-22.2	-8	17.6	-2.8	27	78.8	16.7	62	143.6	36.1	97	206.6
-21.7	-7	19.4	-2.2	28	80.6	17.2	63	145.4	36.7	98	208.4
-21.1	-6	21.2	-1.7	29	82.4	17.8	64	147.2	37.2	99	210.2
-20.6	-5	23.0	-1.1	30	86.0	18.3	65	149.0	37.8	100	212.0
-20.0	-4	24.8	-0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
-19.4	-3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
-18.9	-2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
-18.3	-1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
-17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
-17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
-16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
-16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
-15.6	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
-15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
-14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
-13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
-13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
-12.8	9	48.2	6.7	44	111.2	26.1	79	174.2	76.7	170	338.0
-12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	175	347.0

1) Unload valve

Function

1. When the control valve is at neutral, pump discharge amount **Q** discharged by the minimum swash plate angle is eleased to the tank circuit. When this happens, pump discharge pressure **Pp** is set at 3.92 MPa (40 kg/cm^2) by spring (3) inside the valve. (LS pressure **PLS**: 0 MPa (0 kg/cm^2).



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Operation

When control valve is at neutral

- Pnmp discharge pressure **Pp** is acting on the left end of spool (4) and LS pressure **Pls** is acting on the right end.
- When the control valve is at neutral, LS pressure **PLs** is 0, so only pump discharge pressure Pp has any effect, and **Pp** is set only by the load of spring (3).
- As pump discharge pressure **Pp** rises and reaches the load of spring (3) (3.92 MPa (40 kg/cm^2)), spool (4) is moved to the right in the direction of the arrow. Pump discharge pressure **Pp** then passes through the drill hole in sleeve (2) and is connected to the tank circuit **T**.
- In this way, pump discharge pressure **Pp** is set to 3.92 MPa (40 kg/cm^2).

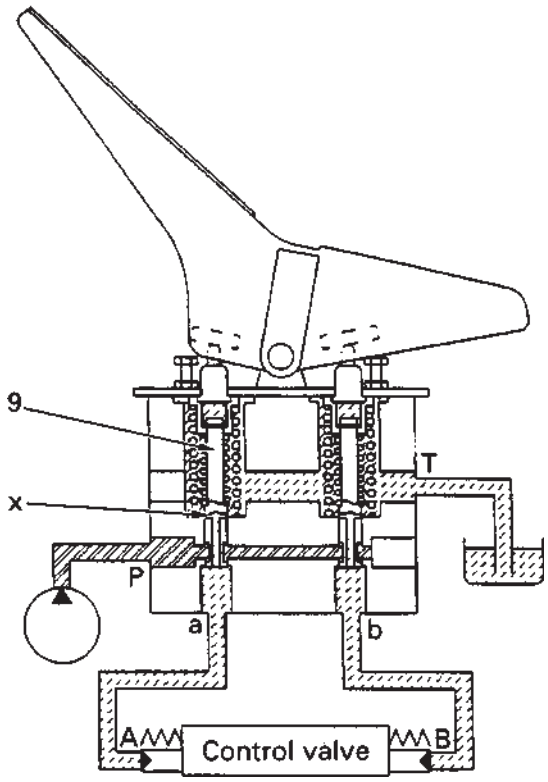
1. Unload valve
2. Sleeve
3. Spring
4. Spool

Pp: Pump circuit (pressure)
PLs: LS circuit (pressure)
T: Tank circuit (pressure)

OPERATION

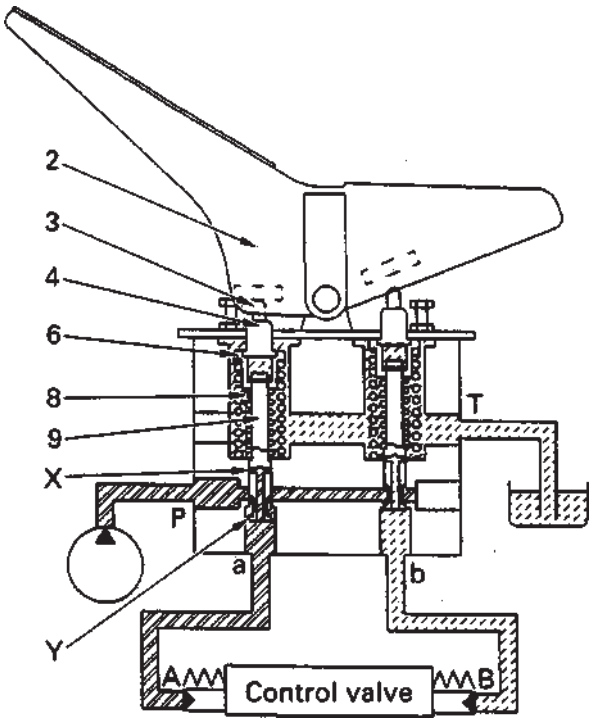
At neutral

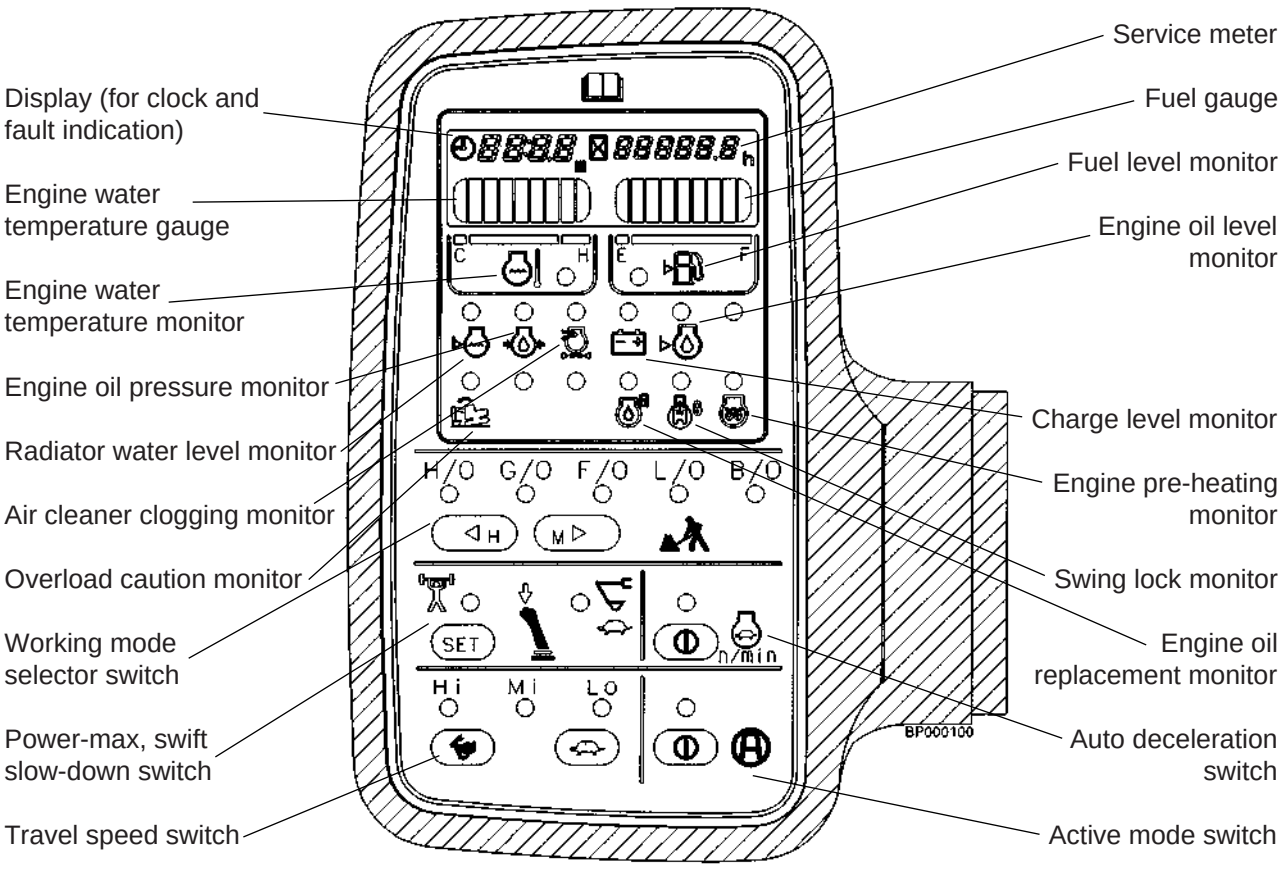
- The pressurized oil from the control pump enters from port **P** and is blocked by spool (9).
- Port **A** and **B** of the control valve and port "**a**" and "**b**" of the PPC valve are connected to drain port **T** through the fine control hole **X** of spool (9).



When operated

- When cam (2) is moved, metering spring (8) is pushed by ball (3), piston (4), and sleeve (6), and spool (9) is also pushed down by this.
- As a result, fine control hole **X** is shut off from the drain circuit. At almost the same time, fine control portion **Y** is connected with port "**a**", and the pressurized oil from port **P** flows from port "**a**" to port **A** of the control valve.





Contents of display

Symbol	Display item	Display range	When engine is stopped	When engine is running
SAP00519	Coolant level	Below low level	Flashes when abnormal	Flashes and buzzer sounds when abnormal
SAP00520	Engine oil pressure	Below 1,500 rpm: below 0.05 MPa (0.5 kg/cm^2) Above 1,500 rpm: below 0.15 MPa (1.5 kg/cm^2)	Lights up when normal (goes out when engine starts)	Flashes and buzzer sounds when abnormal
SAP00521	Air cleaner clogging	When clogged	OFF	Flashes when abnormal
SAP00522	Charge level	When charging is defective	Lights up when normal (goes out when engine starts)	Flashes when abnormal
SAP00523	Engine oil level	Below low level	Flashes when abnormal	OFF
SDP00688	Over load	Above high level	OFF	Flashes when abnormal
SDP00582	Parking	When swing is locked	Lights up when swing lock switch is ON, flashes when swing lock prolix switch is ON	
SAP00526	Preheating	During preheating	Lights up for 30 seconds when starting switch is at HEAT, then flashes for 10 seconds to indicate that preheating is completed	

BLEEDING AIR

Order for operations and procedure for bleeding air

Air bleeding item / Nature of work	Air bleeding procedure					
	1	2	3	4	5	6
	Bleeding air form pump	Start engine	Bleeding air form cylinder	Bleeding air form swing motor	Bleeding air form travel motor	Start operations
• Replace hydraulic oil • Clean strainer	○ →	○ →	○ →	○ →	○ (note) →	○ (note)
• Replace return filter element		○				○
• Replace, repair pump • Remove suction piping	○ →	○ →	○ →	→	→	○
• Replace, repair control valve		○ →	○ →	→	→	○
• Replace cylinder • Remove cylinder piping		○ →	○ →	→	→	○
• Replace swing motor • Remove swing motor piping		○ →	→	○ →	→	○
• Replace travel motor, swivel • Remove travel motor, swivel		○ →	→	→	○ →	○

Note 1: Bleed the air from the swing and travel motors only when the oil inside the motor case has been drained.

1. Bleeding air from pump

1) Loosen air bleed plug (1), and check that oil oozes out from the plug.
2) When oil oozes out tighten plug (1).

kgm Plug:

17.15±2.45Nm (1.75±0.25kgm)

★ If no oil oozes out from the air bleed plug :

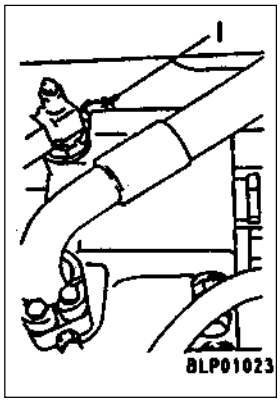
1) Leave plug (1) loosened and remove hose (2) and elbow (3) ;
2) Pour in oil through the elbow mount hole until oil oozes out from plug (1).
3) Fit elbow (3)and install hose (2).
4) Tighten air bleed plug (1).

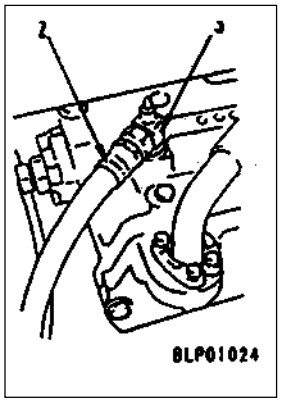
kgm Plug :

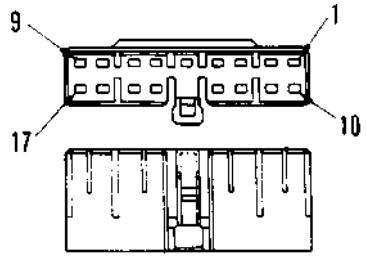
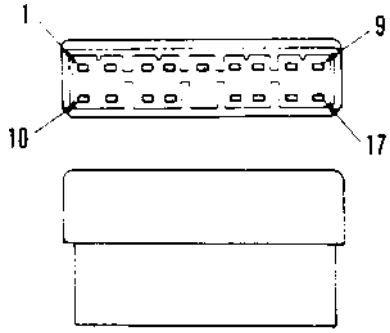
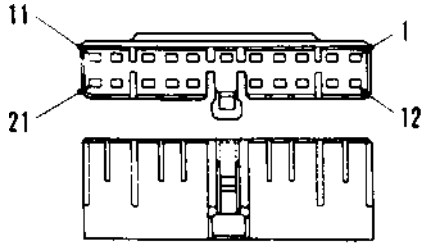
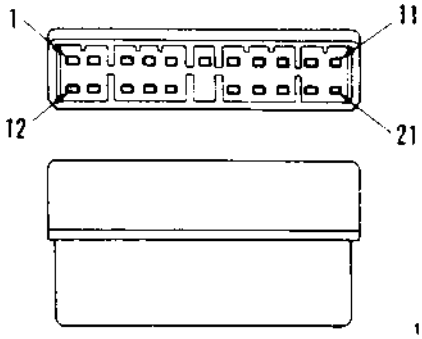
17.25 ± 2.5 Nm {1.75 ± 0.25 kgm}

★ Precautions when starting the engine
After completing the above procedure and starting the engine, run the engine at low idling for 10 minutes.

★ If coolant temperature is low and automatic warming-up is carried out, cancel it by using the fuel control dial after starting the engine.





No. of pins	MIC connector	
	Male (female housing)	Female (male housing)
17	 142F414	 142F415
21	 142F416	 142F417

Checking monitoring, check items							Machine monitor check item			Troubleshooting code if no service code display is given
Battery relay drive signal	No. 2 throttle command value	Fuel control dial command value	Governor motor potentiometer	Governor motor A phase current	Governor motor B phase current	Coolant temperature voltage	Is the range displayed? 102°C or above	Is the range displayed? 105°C or above	Does starting motor turn?	
Monitoring code										
35	16	30	31	33	34	41		108		
										S-1
									○	S-2
		※	※	※	※			○		S-3
										S-4
										E-9A), S-5
			※							E-9A), S-5
	※	※				○				E-10, S-6
										E-3. E-4
○				※	※					E-11
						○		○		E-3 . E-4
										S-7
										S-8
										S-9
										S-10
										S-11
										S-12
										S-13
						○	○			S-14
										S-15
										S-16
	※									E-3 . E-4
-	-	-	-	-	-	-	-	-	-	
E-12	-	-	-	-	-	M-14	M-13	M-13	E-8	

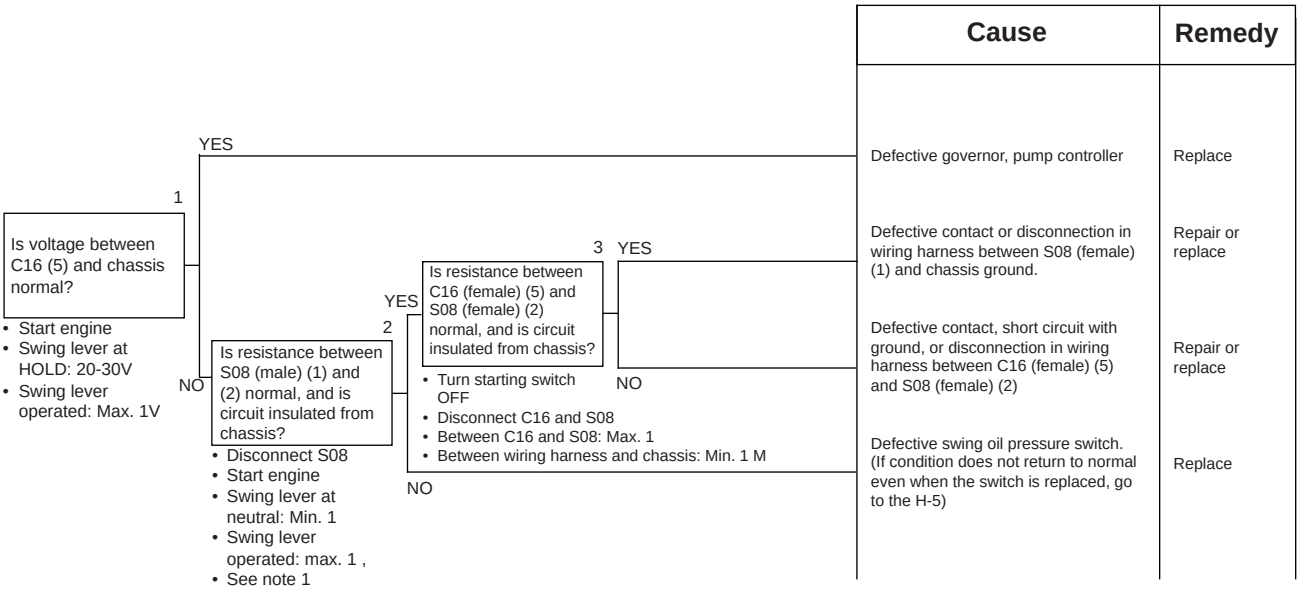
○: This shows item to check with monitoring or machine monitor

F-1 BIT PATTERN 20- (1) Swing oil pressure switch does not light up

★ **This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adapter, or when removing the T-adapter and returning the connector to its original position, if the monitoring mode display returns to normal, the problem has been removed.**

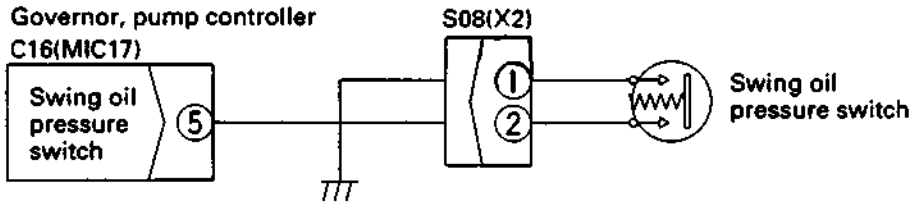
⚠ Turn the swing lock switch ON before operating the swing lever.

★ If there is no display when the lever is operated in one direction, the PPC shuttle valve is defective. (see H- 5)
(When measuring with the engine stopped, charge the accumulator before starting.)
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on the next step.



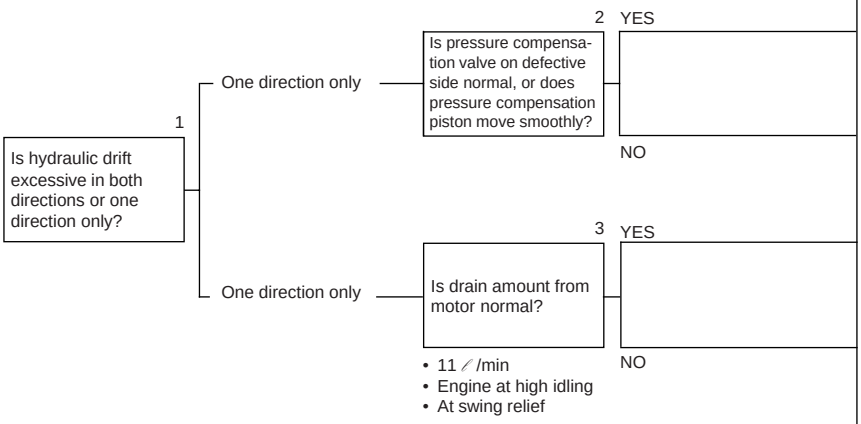
Note: it is also possible to fit a short connector and judge the condition. In this case, check the voltage between C16 (5) and the chassis.
- If it is 20-30V: Go to Yes
- If it is less than 1V: Go to NO

F-1 Related electrical circuit diagram



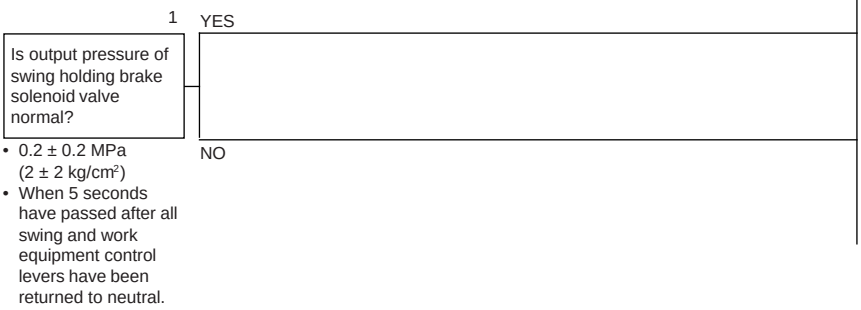
H-30 Excessive hydraulic drift of swing

a) When swing holding brake is released



Cause	Remedy
Defective swing motor safety-suction valve	Correct or replace
Defective pressure compensation valve for swing, or defective operation of pressure compensation piston	Correct or replace
Defective control valve spool for swing	Replace
Defective swing motor	Repair or replace

b) When swing holding brake is applied

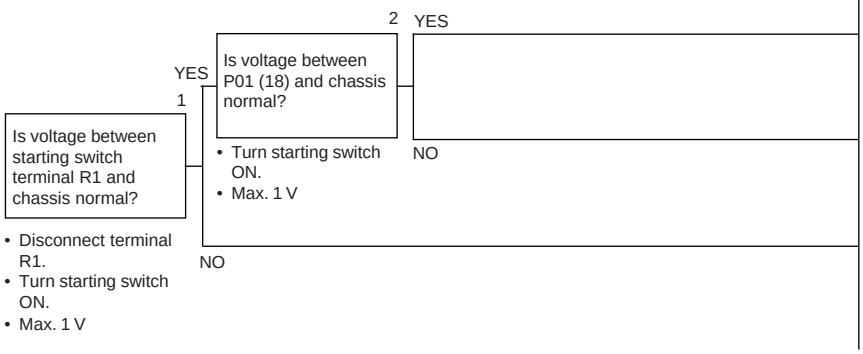


Cause	Remedy
Defective operation of swing holding brake	Repair or replace
Defective operation of swing holding brake solenoid valve	Correct or replace

M-10 Preheating is not being used but (preheating monitor) lights up

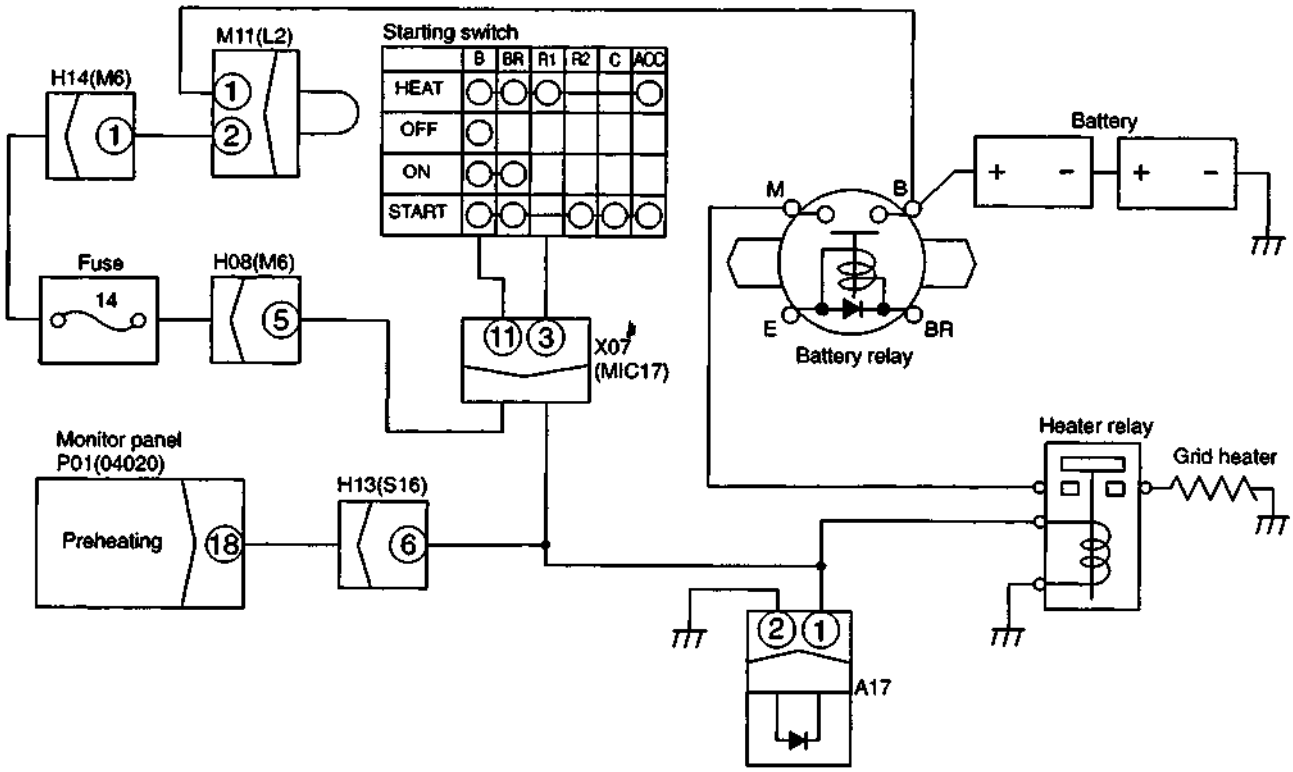
SAP00520

★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on the next step.



Cause	Remedy
Defective monitor panel	Replace
Short circuit with power source in wiring harness between starting switch R1 - X07 (3) - H13 (6) - P01 (female) (18) or heater relay- H13 (female) (6)	Repair or replace
Defective starting switch	Replace

M-10 Related electric circuit diagram



REMOVAL OF TRACK SHOE ASSEMBLY

1. Stop machine at a point where master pin is midway between idler and carrier roller, and where there is space to lay out track assembly on ground.

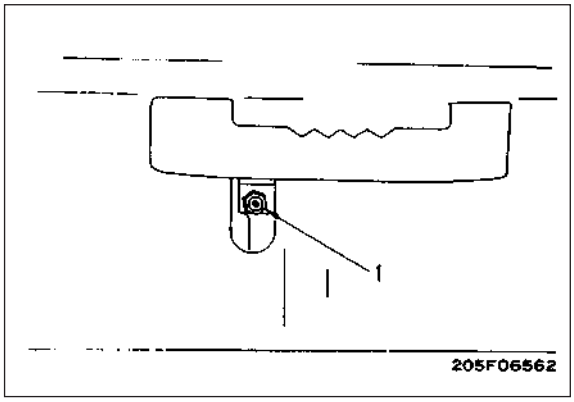
2. Lower work equipment, then loosen lubricator (1), and relieve track tension. ※ 1

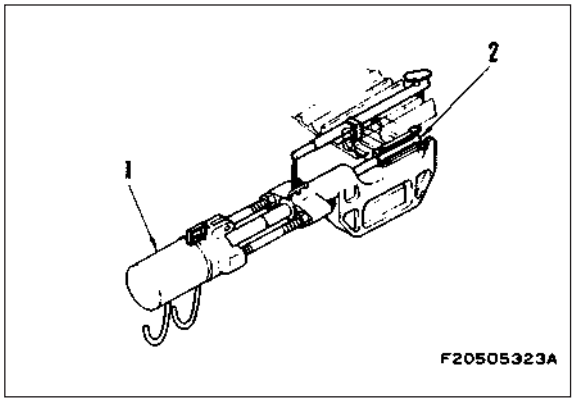
⚠ The adjustment cylinder is under extremely high pressure. Never loosen the lubricator more than one turn. If the grease does not come out, move the machine backwards and forwards.

3. Using tool **I**, pull out master pin (2) ※ 2

4. Remove tool **I**, and move machine forward so that position of temporary pin ② is at front of idler, and set block ① in position.

5. Remove temporary pin ②, and remove dust seal, then drive machine in reverse to lay ou track (3). ※ 3





INSTALLATION OF TRACK SHOE ASSEMBLY

※ 1

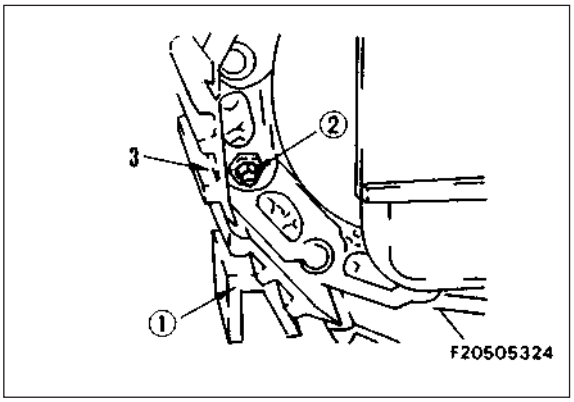
★ Adjust the track tension. For details, see TESTING AND ADJUSTING, Testing and adjusting track tension.

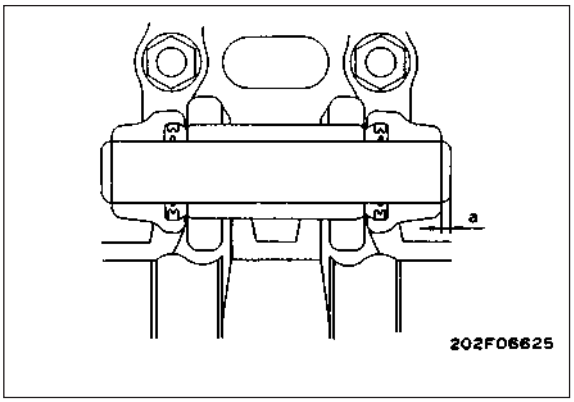
※ 2

★ Use tool **I** and press fit so that the protrusion of the master pin is dimension "**a**".
Protrusion "**a**" of master pin: 4 ± 2 mm

※ 3

★ When assembling the dust seal, coat the bushing contact surface with grease (G2-LI).





DISASSEMBLING

STEP 20
Using the equipment AT709C16, remove the bush (pos. 14) from the flanged hub (pos. 18) or from the 3rd reduction planet carrier.

STEP 21
Using the equipment AT709C16 remove the 4 planet assemblies of the 3rd reduction (pos. 13).

STEP 22
Remove the centering ring (pos. 17) from the flanged hub (pos. 18).

Unit: mm

No. \ Model		2.25 mARM	2.6 m ARM
1		$\phi 80^{+0.1}_{0}$ / $^{-0.030}_{-0.076}$	$\phi 80^{+0.1}_{0}$ / $^{-0.030}_{-0.076}$
2		96 ± 12	96 ± 12
3		$284^{+0.5}_{0}$ / $^{-0.3}_{-0.8}$	$284^{+0.5}_{0}$ / $^{-0.3}_{-0.8}$
4		$\phi 80^{+0.141}_{0.074}$ / $^{-0.030}_{-0.104}$	$\phi 80^{+0.141}_{0.074}$ / $^{-0.030}_{-0.104}$
5		395.8 ± 2	399.5 ± 2
6		203.8 ± 1	173.8 ± 1
7		745.3 ± 1	753 ±1.0
8		2995.3	3357.6 ± 3
9		2377 ± 1.0	2377 ± 1.0
10		330 ± 0.5	330 ± 0.5
11		583 ± 0.5	583 ± 0.5
12		524 ± 0.5	524 ± 0.5
13		400.8	400.8
14		(1348)	(1348)
15		$\phi 70^{+0.2}_{0}$ / $^{-0.030}_{-0.076}$	$\phi 70^{+0.2}_{0}$ / $^{-0.030}_{-0.076}$
16		311.5 ± 1	311.5 ± 1
17		$\phi 70^{+0.2}_{0}$ / $^{-0.030}_{-0.076}$	$\phi 70^{+0.2}_{0}$ / $^{-0.030}_{-0.076}$
18	Arm as individual part	$276^{0}_{-0.5}$	$276^{0}_{-0.5}$
	When press fitting bushing	310	310
19	Min.	1547	1547
	Max.	2560	2560