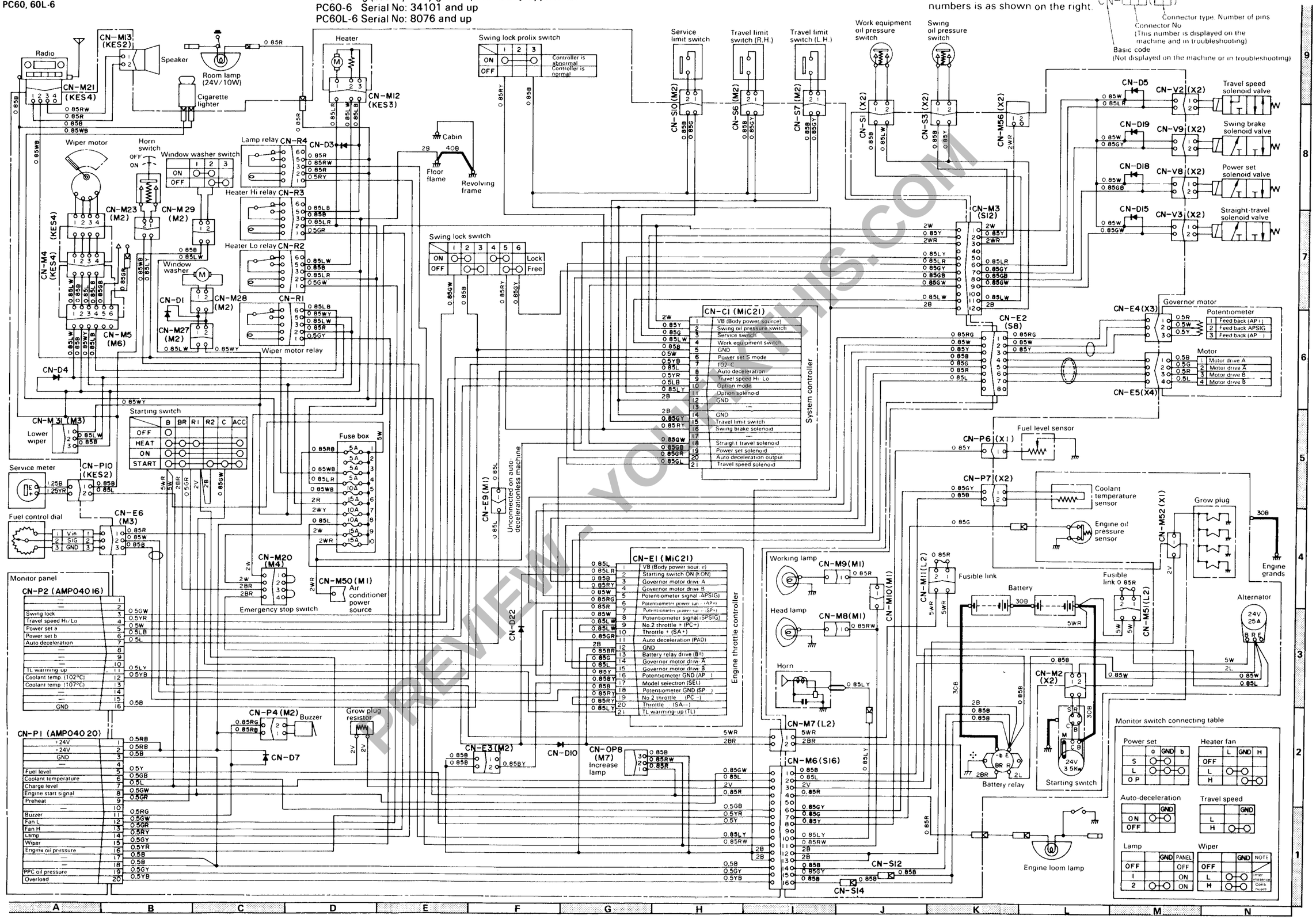
ELECTRICAL CIRCUIT DIAGRAM

PC60, 60L-6

The wiring (battery relay ground) marked ⁘ applies to:
PC60-6 Serial No: 34101 and up
PC60L-6 Serial No: 8076 and up

★ The display for connector numbers is as shown on the right

CN-□□(□□)
- Connector type. Number of pins
- Connector No. (This number is displayed on the machine and in troubleshooting)
- Basic code (Not displayed on the machine or in troubleshooting)



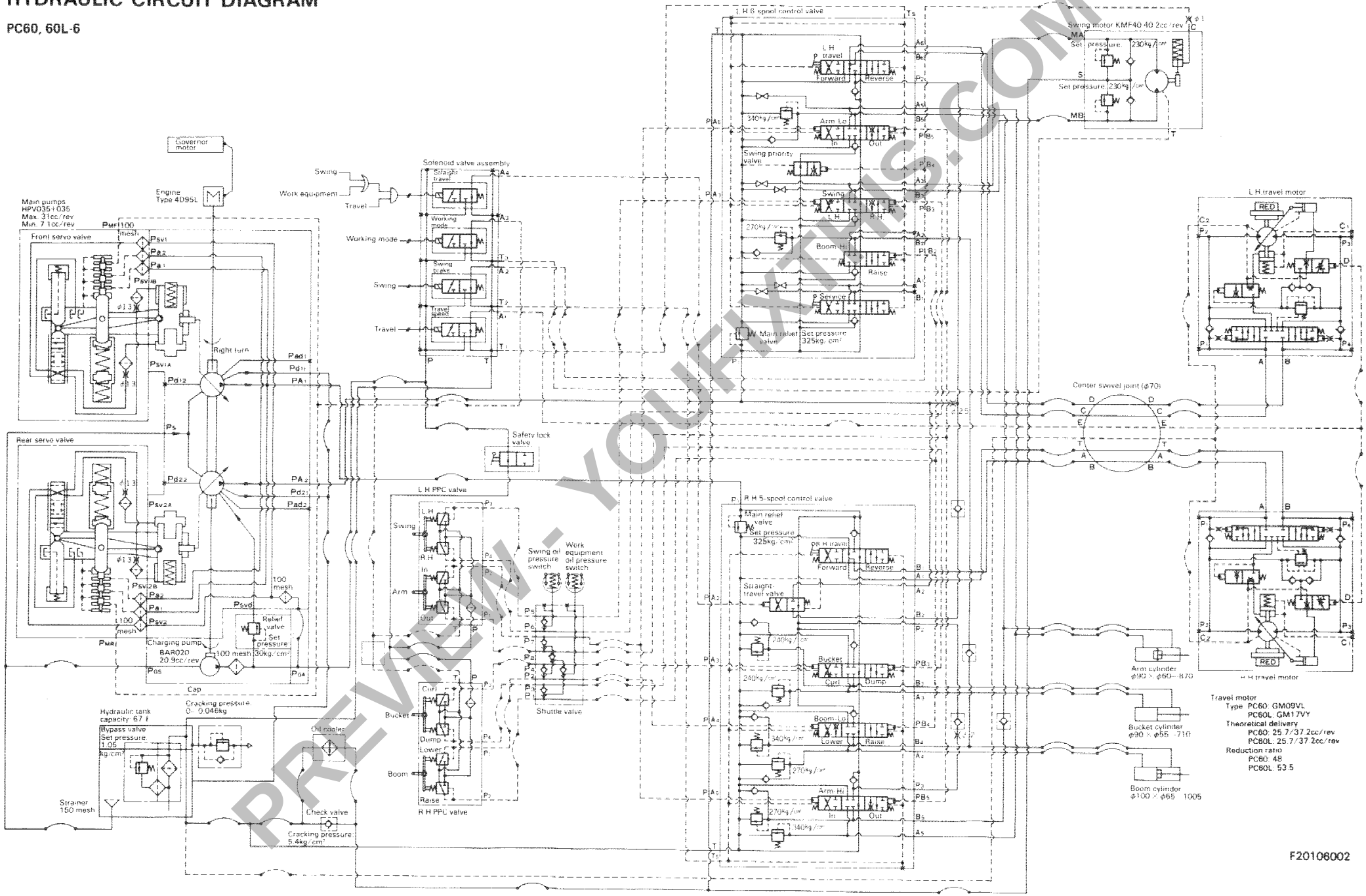
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HYDRAULIC CIRCUIT DIAGRAM

PC60, 60L-6



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kgm

STANDARD TIGHTENING TORQUE

1. STANDARD TIGHTENING TORQUE OF BOLTS AND NUTS

The following charts give the standard tightening torques of bolts and nuts. Exceptions are given in sections of "**Disassembly and Assembly**".

Thread diameter of bolt (mm)	Width across flat (mm)	(T)	(H)
		kgm	Nm
6	10	1.35±0.15	13.2±1.4
8	13	3.2±0.3	31.4±2.9
10	17	6.7±0.7	65.7±6.8
12	19	11.5±1.0	112±9.8
14	22	18.0±2.0	177±19
16	24	28.5±3	279±29
18	27	39±4	383±39
20	30	56±6	549±58
22	32	76±8	745±78
24	36	94.5±10	927±98
27	41	135±15	1320±140
30	46	175±20	1720±190
33	50	225±25	2210±240
36	55	280±30	2750±290
39	60	335±35	3280±340

This torque table does not apply to the bolts with which nylon packings or other non-ferrous metal washers are to be used, or which require tightening to otherwise specified torque.

★ **Nm (newton meter): 1Nm ≒ 0.1 kgm**

2. TIGHTENING TORQUE OF SPLIT FLANGE BOLTS

Use these torques for split flange bolts.

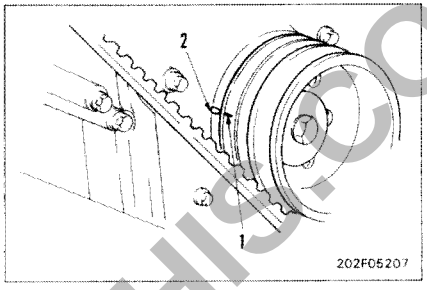
Thread diameter of bolt (mm)	Width across flats (mm)	Tightening torque	
		kgm	Nm
10	14	6.7±0.7	65.7±6.8
12	17	11.5±1	112±9.8
16	22	28.5±3	279±29

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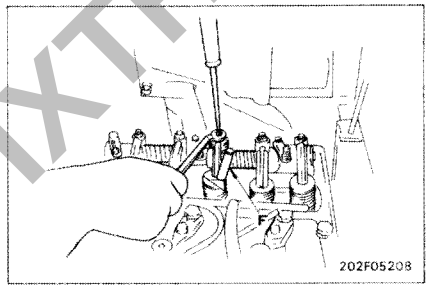
ADJUSTING VALVE CLEARANCE

1. Remove the cylinder head cover.
2. Rotate the crankshaft in the normal direction to align pointer (2) with 1.4 TOP line (1) on the crankshaft pulley. When rotating, check the movement of the intake valve of No. 6 cylinder.
3. When No. 1 cylinder is at top dead center, adjust the valves marked ●. Next, rotate the crankshaft one turn (360°) in the normal direction and adjust the valve clearance of the remaining valves marked ○.



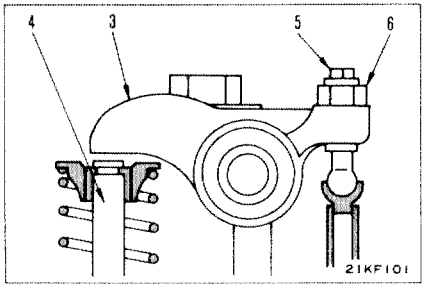
★ Valve arrangement

Cylinder No.	1		2		3		4	
Intake valve	●		○		●		○	
Exhaust valve		●		●		○		○



4. To adjust the valve clearance, loosen locknut (6), then insert tool **F** between rocker arm (3) and valve stem (4), and turn adjustment screw (5) until the clearance is a sliding fit. Then tighten locknut (6) to hold the adjustment screw in position.

   Locknut: 4.5 ± 0.5 kgm



★ After adjusting No. 1 cylinder at top dead center, it is also possible to turn the crankshaft 180° each time and adjust the valve clearance of each cylinder according to the firing order.
- Firing order: 1 — 2 — 4 — 3

- After tightening the locknut, check the clearance again.

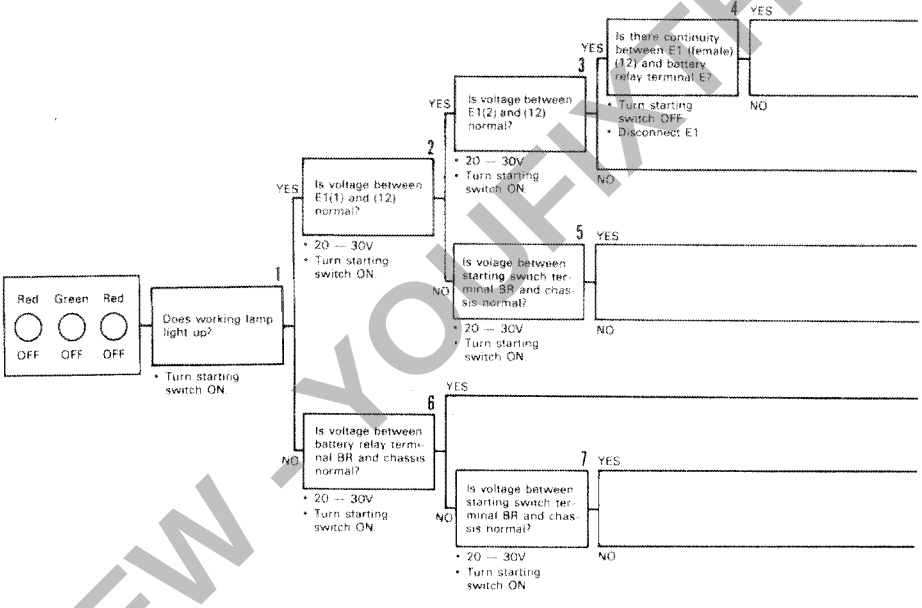
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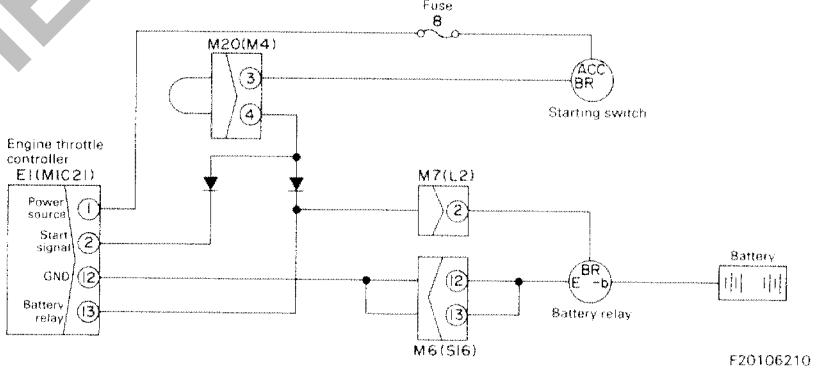
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E-1 Red Green Red [Abnormality in power source system or controller] is displayed (All lamps OFF)

- ★ If fuse 8 is not blown.
  If they are blown, check for a short circuit in the wiring harness between fuse — controller or starting switch.
- ★ If battery is normal.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on to the next step.





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WEIGHT TABLE

⚠ This weight table is a guide for use when transporting or handling components.

Unit: kg

Machine Model	PC60-6	PC60L-6	PC90-1
Serial Numbers	28001 and up	8001 and up	1001 and up
Engine assembly (excluding water and oil)	310	310	310
P. T. O.	20	20	20
Radiator and oil cooler assembly	27	27	27
Revolving frame	645	645	645
Operator's cab	240	240	240
Operator's seat	32	32	32
Hydraulic tank and fuel tank assembly (excluding oil and fuel)	125	125	130
Counterweight	700	700	1,400
Hydraulic pump assembly	85	85	85
L.H. 6-spool control valve	26	26	26
R.H. 5-spool control valve	24	24	24
Swing circle assembly	111	111	112
Swing machinery assembly	86	86	86
Swing motor	26	26	26
Center swivel joint	19	19	19
Track frame assembly	1,295	1,381	1,819
• Track frame	718	815	932
• Idler	53.5 x 2	53.5 x 2	68.5 x 2
• Idler cushion	36.5 x 2	36.5 x 2	52 x 2
• Carrier roller	11 x 2	11 x 2	11 x 2
• Track roller	14.2 x 10	14.2 x 12	19.3 x 12
• Travel motor	91.5 x 2	152 x 2	167 x 2
• Sprocket	25 x 2	21 x 2	29 x 2

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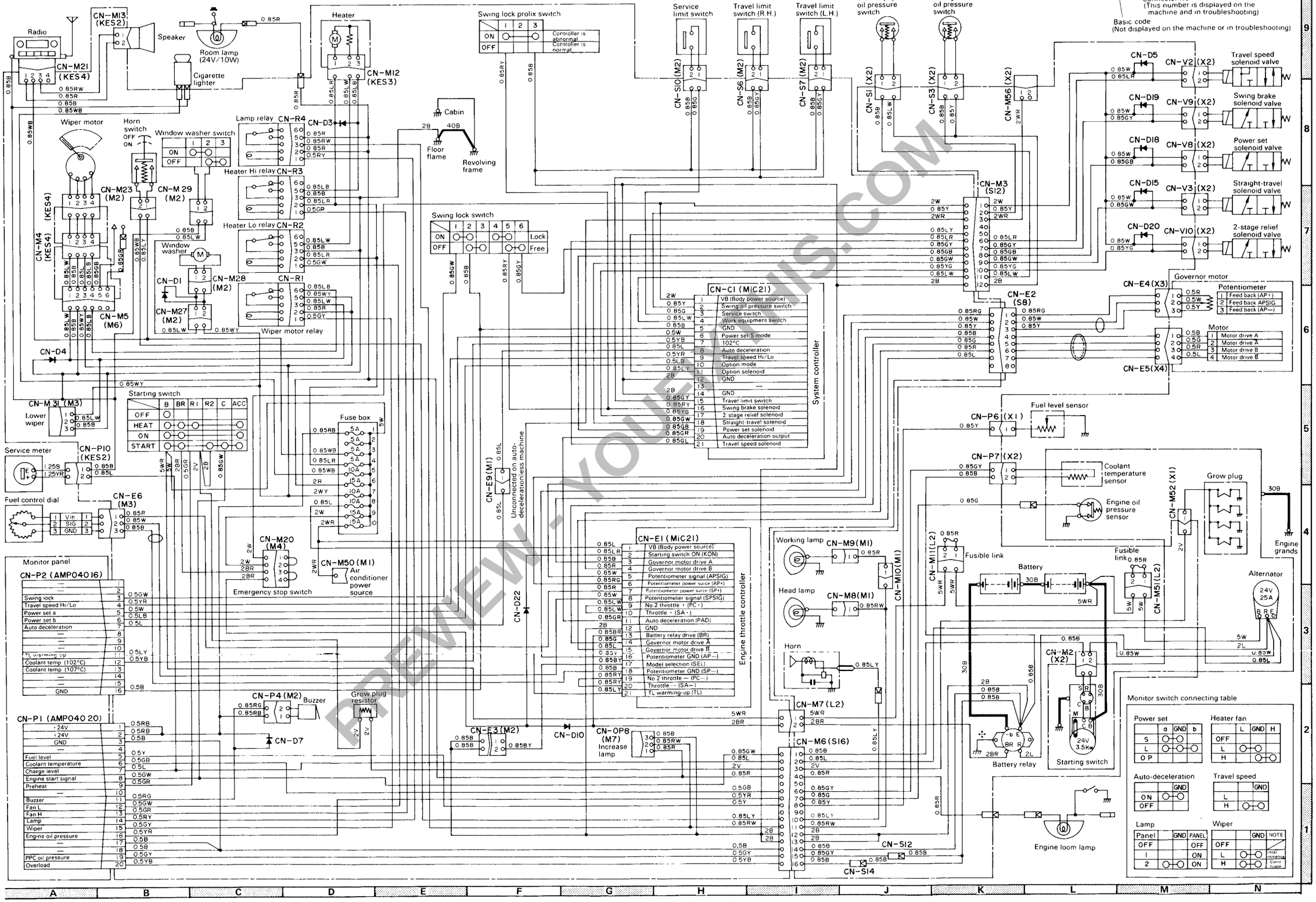
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The wiring (battery relay ground) marked ⁘ applies to:
PC90-1 Serial No: 1404 and up

★ The display for connector numbers is as shown on the right.

CN-□□□(□□)
- Connector type, Number of pins
- Connector No. (This number is displayed on the machine and in troubleshooting)
- Basic code (Not displayed on the machine or in troubleshooting)

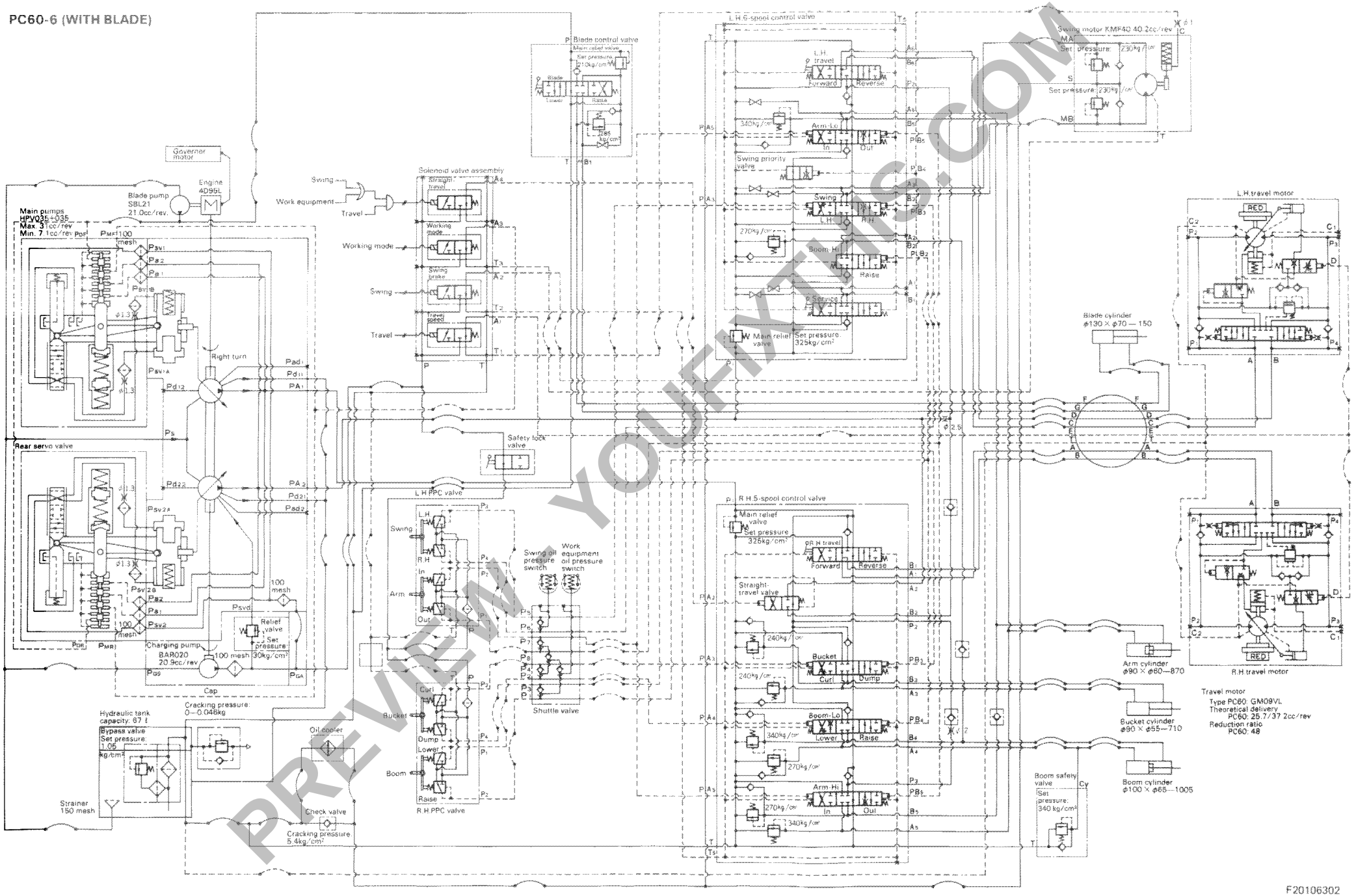


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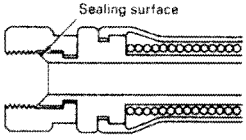
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kgm

3. TIGHTENING TORQUE FOR NUTS OF FLARED



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Use these torques for nut part of flared.

Thread diameter of nut part (mm)	Width across flats of nut part (mm)	Tightening torque	
		kgm	Nm
14	19	2.5±0.5	24.5±4.9
18	24	5±2	49±19.6
22	27	8±2	78.5±19.6
24	32	14±3	137.3±29.4
30	36	18±3	176.5±29.4
33	41	20±5	196.1±49
36	46	25±5	245.2±49
42	55	30±5	294.2±49

COATING MATERIALS

The recommended coating materials prescribed in Komatsu Shop Manuals are listed below.

Nomenclature	Komatsu code	Applications
Adhesives	LT-1A	Used to apply rubber pads, rubber gaskets, and cork plugs.
	LT-1B	Used to apply resin, rubber, metallic and non-metallic parts when a fast, strong seal is needed.
	LT-2*	Preventing bolts, nuts and plugs from loosening and leaking oil.
	LT-3	Provides an airtight, electrically insulating seal. Used for aluminum surfaces.
	LT-4	Used to coat plugs (plate shaped, bowl shaped) and holes, and mating portion of shaft.
Sealant gasket	LG-1	Used with gaskets and packings to increase sealing effect.
	LG-3	Heat-resistant gasket for precombustion chambers and exhaust piping.
	LG-4	Used by itself on mounting surfaces on the final drive and transmission cases. (Thickness after tightening: 0.07 – 0.08 mm)
	LG-5	Used by itself to seal grease fittings, tapered screw fittings and tapered screw fittings in hydraulic circuits of less than 50 mm in diameter.
	LG-6	Silicon base type used in combination with LG-1 and LG-4.
	LG-7	Has a shorter curing time than LG-6, and is easier to peel off.
Antifriction compound (Lubricant including molybdenum disulfide)	LM-P	Applied to bearings and taper shafts to facilitate press-fitting and to prevent sticking, burning or rusting.
Grease (Lithium grease)	G2-LI	Applied to bearings, sliding parts and oil seals for lubrication, rust prevention and facilitation of assembling work.
Vaseline	—	Used for protecting battery electrode terminals from corrosion.

*LT-2 is also called LOCTITE in the shop manuals.

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MEASURING COMPRESSION PRESSURE

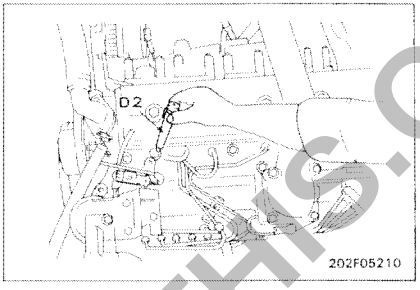
⚠ When measuring the compression pressure, be careful not to touch the exhaust mainfold or muffler, or to get your clothes caught in the fan, fan belt or other rotataing parts.

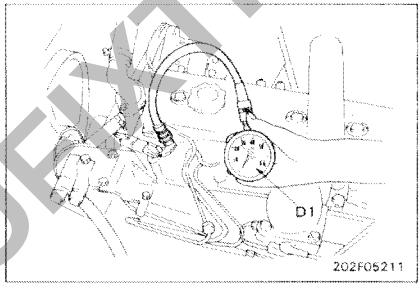
1. Adjust the valve clearance.
   For details, see ADJUSTING VALVE CLEARANCE.
2. Warm up the engine to make the oil temperature 40 - 60°C.
3. Remove the nozzle holder assembly from the cylinder to be measured.
4. Install adapter **D2** in the mount of the nozzle holder, then connect pressure gauge **D1**.
5. Set tachometer **A** in position.
6. Disconnect the fuel control rod, place the control lever of the injection pump in the NO INJECTION position, then crank the engine with the starting motor and measure the compression pressure.

★ Measure the compression pressure at the point where the pressure gauge indicator remains steady.

★ When measuring the compression pressure, measure the engine speed to confirm that it is within the specified range.

★ After measuring the compression pressure, install the nozzle holder assembly.





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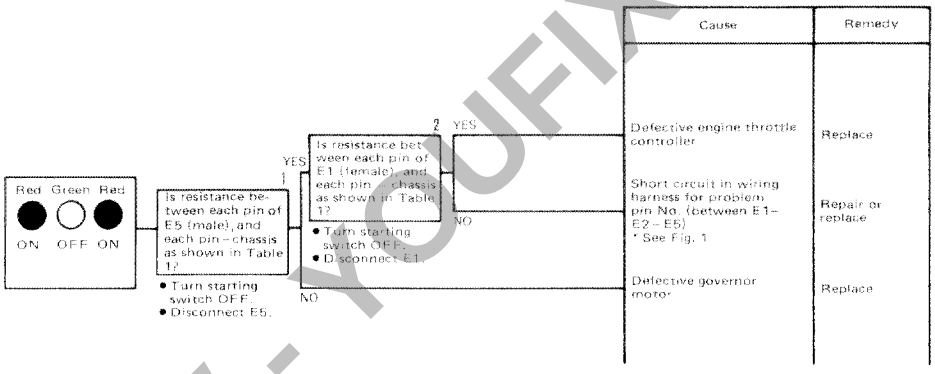
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E-2 Red Green Red [Short circuit in governor motor] is displayed

★ If this happens during operation, because of the force of the spring:
1) Engine speed changes to low idling.
2) Engine does not stop
★ If the problem occured when the engine was stopped:
1) Engine starts but remains at low idling
2) Engine starts, but does not stop

⚠ Stop the engine (place the governor lever of the injection pump in the NO INJECTION position) before carrying out any checks.

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

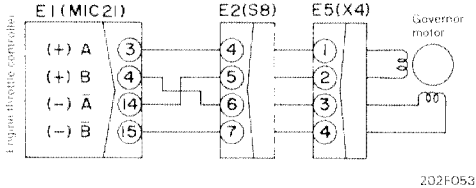


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Table 1

E5 (male)	E1 (female)	Resistance value
(1) – (2)	(3) – (14)	4 – 9Ω
(3) – (4)	(4) – (15)	4 – 9Ω
(1) – (3)	(3) – (4)	Min. 1 MΩ
(1) – (4)	(3) – (15)	Min. 1 MΩ
Between pins (1), (2), (3), (4) – chassis	Between pins (3), (4), (14), (15) – chassis	Min. 1 MΩ

Fig. 1



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LIST OF LUBRICANT AND WATER

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE 14 32 50 68 86°F / −10 0 10 20 30°C	CAPACITY (ℓ) Specified	CAPACITY (ℓ) Refill
Engine oil pan	Engine oil	SAE 30 / SAE 10W / SAE 10W-30	8.0	7.0
PTO case Swing machinery case Final drive case (each)	Engine oil	SAE 30	0.9 2.4 PC60: 1.7 PC60L,90: 3	0.9 2.4 PC60: 1.7 PC60L,90: 3
Hydraulic system	Engine oil	SAE 10W / SAE 10W-30 / SAE 15W-40	PC60,60L: 100 PC90: 105	PC60,60L: 67 PC90: 67
Idler (each) Track roller (1 piece) Carrier roller (1 piece)	Engine oil	SAE 30	PC60,60L: 0.06 PC90: 0.120–0.135 PC60,60L: 0.08 PC90: 0.100–0.115 0.072	PC60,60L: 0.06 PC90: 0.120–0.135 PC60,60L: 0.08 PC90: 0.100–0.115 0.072
Fuel tank	Diesel fuel	* / ASTM D975 No. 2	PC60,60L: 160 PC90: 200	—
Cooling system	Water	Add antifreeze	10	—

* ASTM D975 No. 1

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NOTE:

ASTM: American Society of Testing and Material
SAE: Society of Automotive Engineers
API: American Petroleum Institute
Specified capacity: Total amount of oil including oil for components and oil in piping.
Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

(1) When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual. Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

(2) When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40 even though an atmospheric temperature goes up to 10°C more or less in the day time.

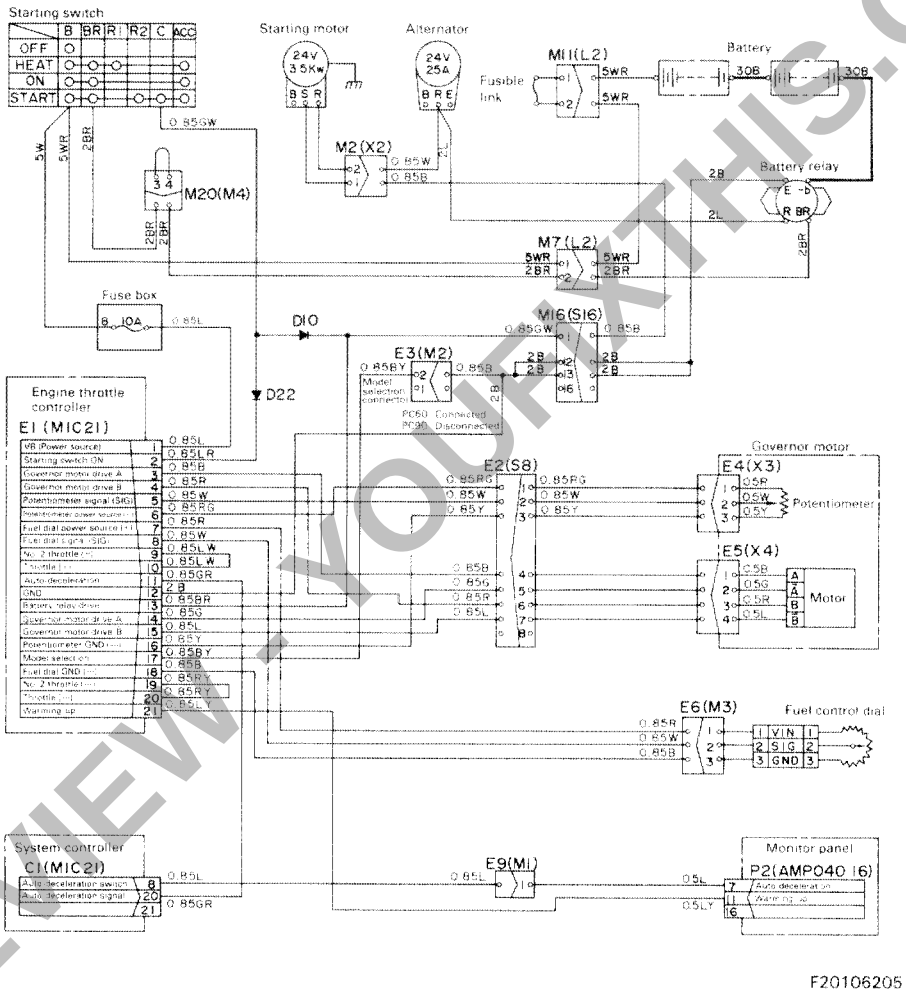
(3) Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.

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ELECTRICAL CIRCUIT DIAGRAM

ENGINE THROTTLE CONTROLLER SYSTEM

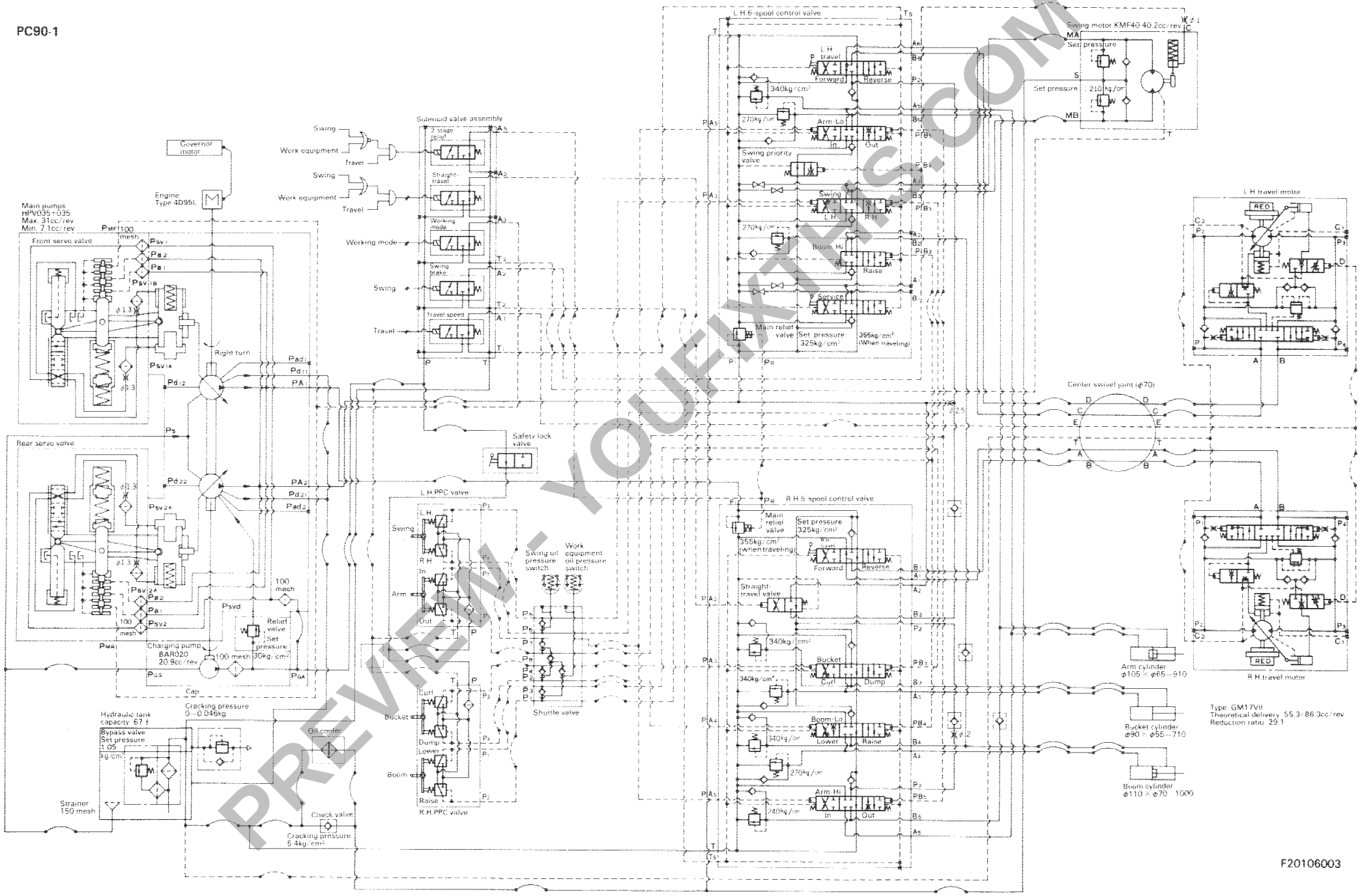


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TIGHTENING TORQUES AND STANDARD VALUES TABLE

Component		Item	Unit	Model		
				PC60-6	PC60L-6	PC90-1
Engine	1	Fuel injection pipe sleeve nut	kgm	2.25 ± 0.25	2.25 ± 0.25	2.25 ± 0.25
	2	Nozzle holder mounting bolt		4.5 ± 0.5	4.5 ± 0.5	4.5 ± 0.5
	3	Crankshaft pulley mounting bolt		9.5 ± 0.5	9.5 ± 0.5	9.5 ± 0.5
	4	Flywheel mounting bolt				
		1st Step		9 ± 3	9 ± 3	9 ± 3
		2nd Step		18 ± 2	18 ± 2	18 ± 2
	5	Head cover mounting bolt		0.9 ± 0.1	0.9 ± 0.1	0.9 ± 0.1
	6	Rocker arm mounting bolt and nut		2.5 ± 0.5	2.5 ± 0.5	2.5 ± 0.5
	7	Rocker arm locknut		4.5 ± 0.5	4.5 ± 0.5	4.5 ± 0.5
	8	Cylinder head mounting bolt				
		1st Step		7 ± 1	7 ± 1	7 ± 1
		2nd Step		11 ± 0.5	11 ± 0.5	11 ± 0.5
		3rd Step	deg	Tighten to 90^{+30}_{-0}	Tighten to 90^{+30}_{-0}	Tighten to 90^{+30}_{-0}
	9	Engine mounting bolt	kgm	28.5 ± 3	28.5 ± 3	28.5 ± 3
Power train	1	Travel motor assembly 1) Reamer bolt	kgm	37.6 ± 6	55 ± 7	55 ± 7
		2) End cap mounting bolt		5.9 ± 1	5.9 ± 1	16.6 ± 2.5
		3) Valve body mounting bolt		3 ± 0.5	3 ± 0.5	3 ± 0.5
		4) Plug of safety valve		17 ± 2.5	17 ± 2.5	34 ± 5
		5) Plug of counterbarance valve		17 ± 2.5	17 ± 2.5	34 ± 5
		6) Plug of check valve		9 ± 1.5	9.5 ± 1.5	13.5 ± 2
		7) Plug of cover		4 ± 1.5	6 ± 2	6 ± 2
		8) Cover mounting bolt		—	10.4 ± 1.6	10.4 ± 1.6

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TESTING AND ADJUSTING FUEL INJECTION TIMING

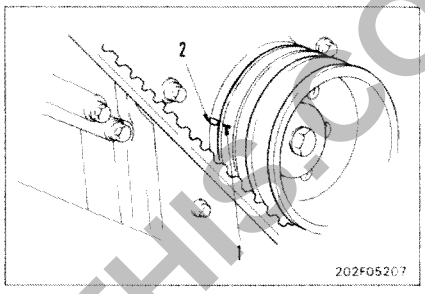
1. Rotate the crankshaft in the normal direction to align pointer (2) with 1.4° line (1) on the crankshaft pulley.
2. Disconnect fuel injection pipe (3) of No. 1 cylinder.
3. Remove delivery valve holder (4), take out delivery valve (5) and spring (6), then install delivery valve holder (4) again.
4. Place the governor lever at the FULL position.
5. Loosen the nut in the oblong hole of the mounting flange of the fuel injection pump, then loosen injection pump mounting bolts (7).
6. Move the fuel injection pump towards the outside, then move the injection pump towards the cylinder block a little at a time while operating the priming pump, and stop at the point where the fuel stops flowing from the delivery valve holder.
   ★ If the fuel does not stop whichever way the injection pump is moved, rotate the crankshaft one more turn.
   ★ Adjust the fuel injection timing by moving the fuel injection pump as follows.
   To RETARD timing, move towards OUTSIDE.
   To ADVANCE timing, move towards CYLINDER BLOCK.
7. Tighten injection pump mounting bolts (7) in turn.
8. Tighten the nut in the oblong hole of the mounting flange of the fuel injection pump.
9. Remove delivery valve holder (4), assemble delivery valve (5) and spring (6), then install delivery valve holder (4) again.

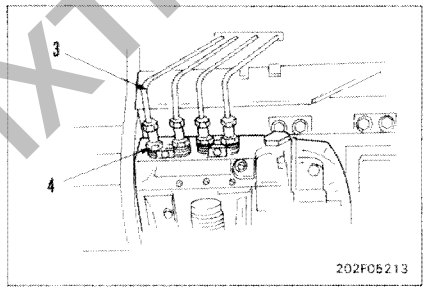
   Delivery valve holder: 3.3 ± 0.2 kgm

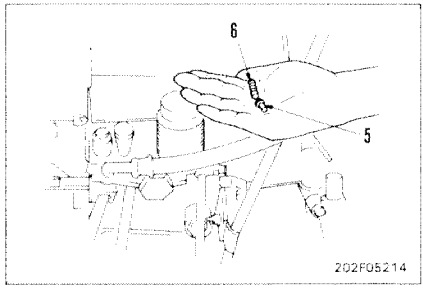
10. Connect fuel injection pipe (3).

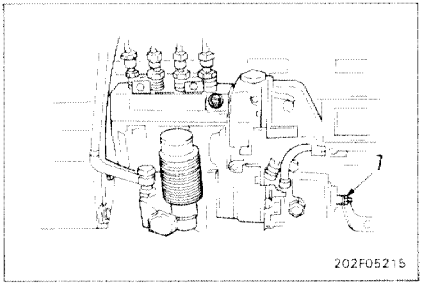
    Sleeve nut: 2.4 ± 0.1 kgm

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E-3 [Red Green Red] [Abnormality in battery relay] is displayed

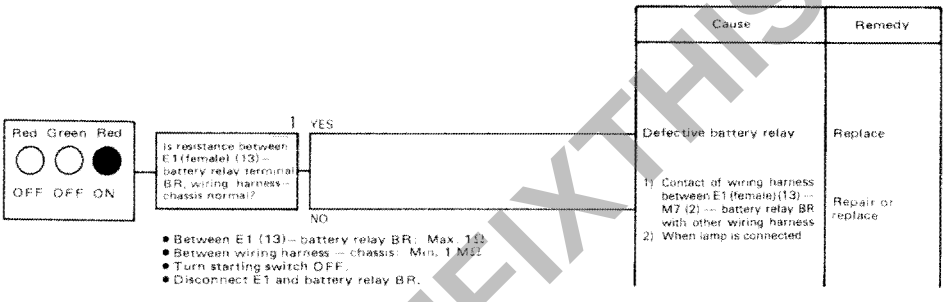
Note: This occurs only when the engine is stopped and the starting switch is turned to the OFF position.

★ The engine does not stop.

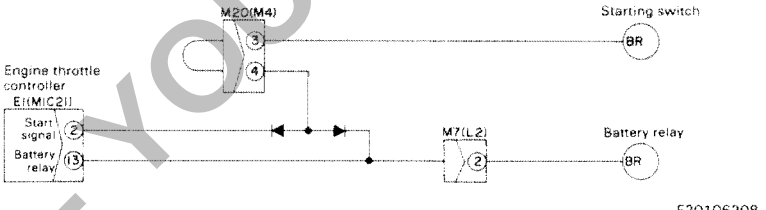
⚠ Stop the engine (place the governor lever of the injection pump in the NO INJECTION position) before carrying out any checks.

★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.

★ Always connect any disconnected connectors before going on to the next step.

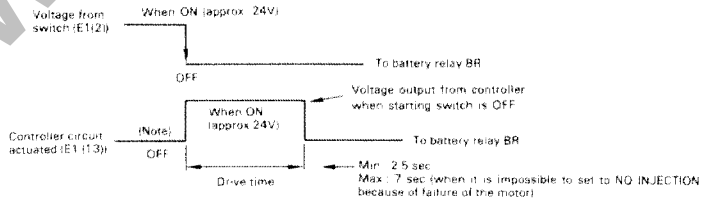


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Table 1



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Note: When the starting switch is ON, the controller is OFF, but a voltage of 20 – 30V is always flowing from the starting switch BR, so if the measurement is made at E1 (13), the voltage is 20 – 30V.

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TABLE OF JUDGEMENT STANDARD VALUE

- FOR ENGINE

Machine model			PC60, 60L-6		PC90-1	
Engine			4D95L-1		4D95L-1	
Item	Measurement conditions	Unit	Standard value	Permissible value	Standard value	Permissible value
Engine speed	High idling	rpm	2,300 +50 −80	—	2,475 +50 −75	—
	Low idling	rpm	950 ± 50	—	950 ± 50	—
	Rated speed	rpm	2,100	—	2,300	—
Exhaust gas color	At sudden acceleration	Bosch index	Max. 4.0	6.0	Max. 4.5	6.0
	At high idling	Bosch index	Max. 2.0	2.0	Max. 2.5	2.0
Valve clearance (normal temperature)	Intake valve	mm	0.35	—	0.35	—
	Exhaust valve	mm	0.50	—	0.50	—
Compression pressure (SAE 30 oil)	Oil temperature: 40 – 60°C (Engine speed)	kg/cm² (rpm)	Min. 30 (320 – 360)	21 (320 – 360)	Min. 30 (320 – 360)	22 (320 – 360)
Blowby pressure (SAE oil)	(Coolant temperature: Operating range) At rated output	mmH₂O	Max. 50	100	Max. 50	100
Oil pressure	(Coolant temperature: Operating range)					
	At high idling (SAE30)	kg/cm²	3.5 – 6.0	2.5	3.5 – 6.0	2.5
	At high idling (SAE10W)	kg/cm²	3.0 – 6.0	2.1	3.0 – 6.0	2.1
	At low idling (SAE30)	kg/cm²	Min. 1.0	0.7	Min 1.0	0.7
	At low idling (SAE10W)	kg/cm²	Min. 0.8	0.7	Min 0.8	0.7
Oil temperature	Whole speed range (inside oil pan)	°C	80 – 110	120	80 – 110	120
Fuel injection timing	B.T.D.C.	°	16 ± 1	16 ± 1	16 ± 1	16 ± 1
Belt tension (alternator)	Deflection when pressed with finger force of approx. 6 kg.	mm	8	7 – 10	8	7 – 10

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