SPECIFICATIONS

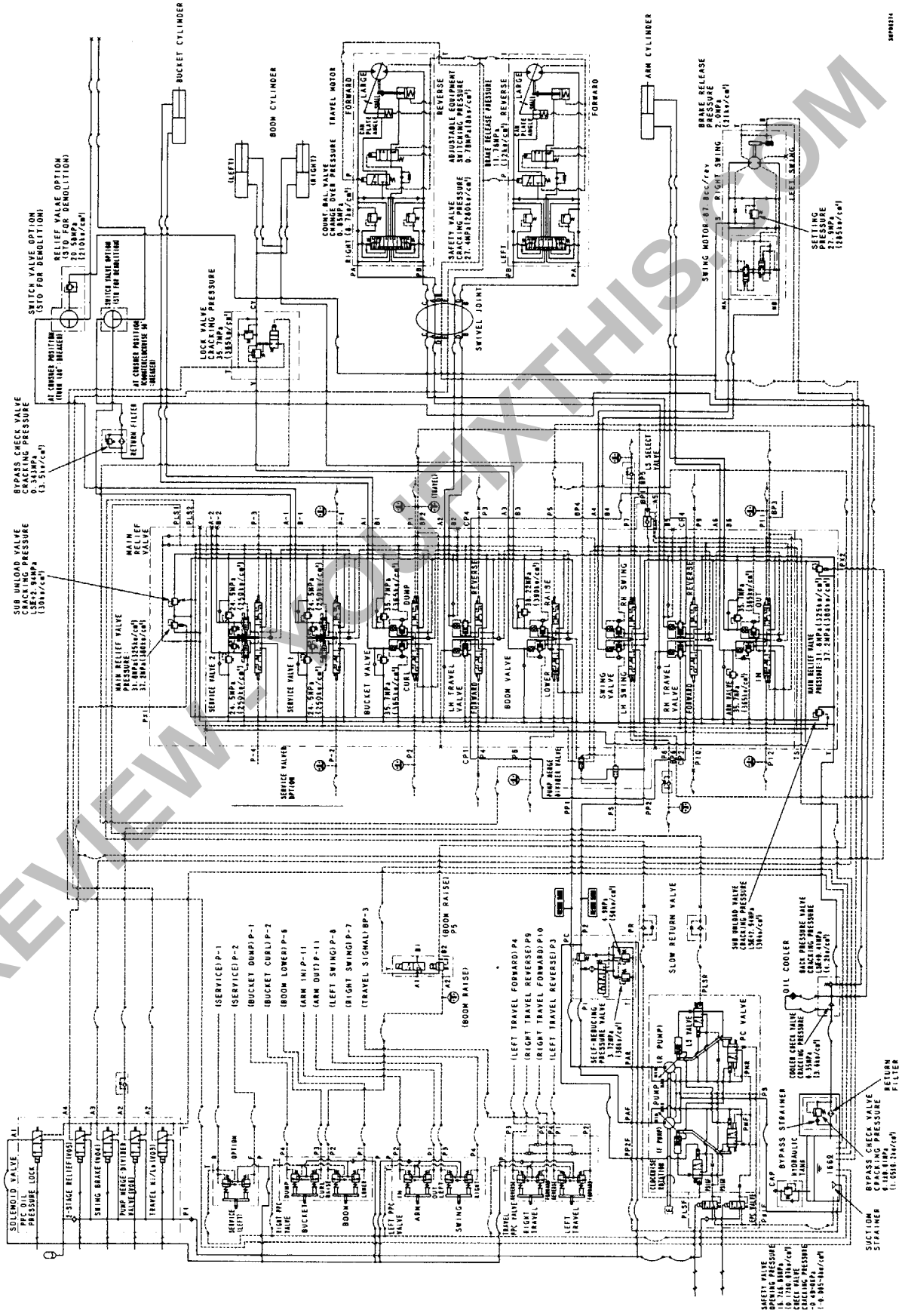
Machine model				PC228USLC-1
Serial Number				11001 and up
Bucket capacity			m^3	0.8
Operating weight			kg	22,900
Performance	Working ranges	Max. digging depth	mm	6,810
		Max. vertical wall depth	mm	5,910
		Max. digging reach	mm	9,850
		Max. reach at ground level	mm	9,670
		Max. digging height	mm	10,700
		Max. dumping height	mm	7,765
	Max. digging force (using power max. function)		kN {kg}	125 {12,800} (137 {14,000})
	Swing speed		rpm	11.0
	Swing max. slope angle		deg.	16
	Travel speed		km/h	Lo: 3.4 Mi: 4.1 Hi: 5.1
	Gradeability		deg.	35
	Ground pressure (triple grouser shoe width: 700 mm)		kPa {kg/cm^2}	41 {0.42}
Dimensions	Overall length (for transport)		mm	8,890
	Overall width		mm	2,980
	Overall width of track		mm	3,080
	Overall height (for transport)		mm	2,990
	Overall height to chassis		mm	2,990
	Ground clearance to bottom of upper structure		mm	1,050
	Min. ground clearance		mm	440
	Tail swing radius		mm	1,625
	Min. swing radius of work equipment		mm	2,310
	Height of work equipment at min. swing radius		mm	8,290
	Length of track on ground		mm	3,640
	Track gauge		mm	2,380
	Height of machine cab		mm	2,280

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HYDRAULIC CIRCUIT DIAGRAM

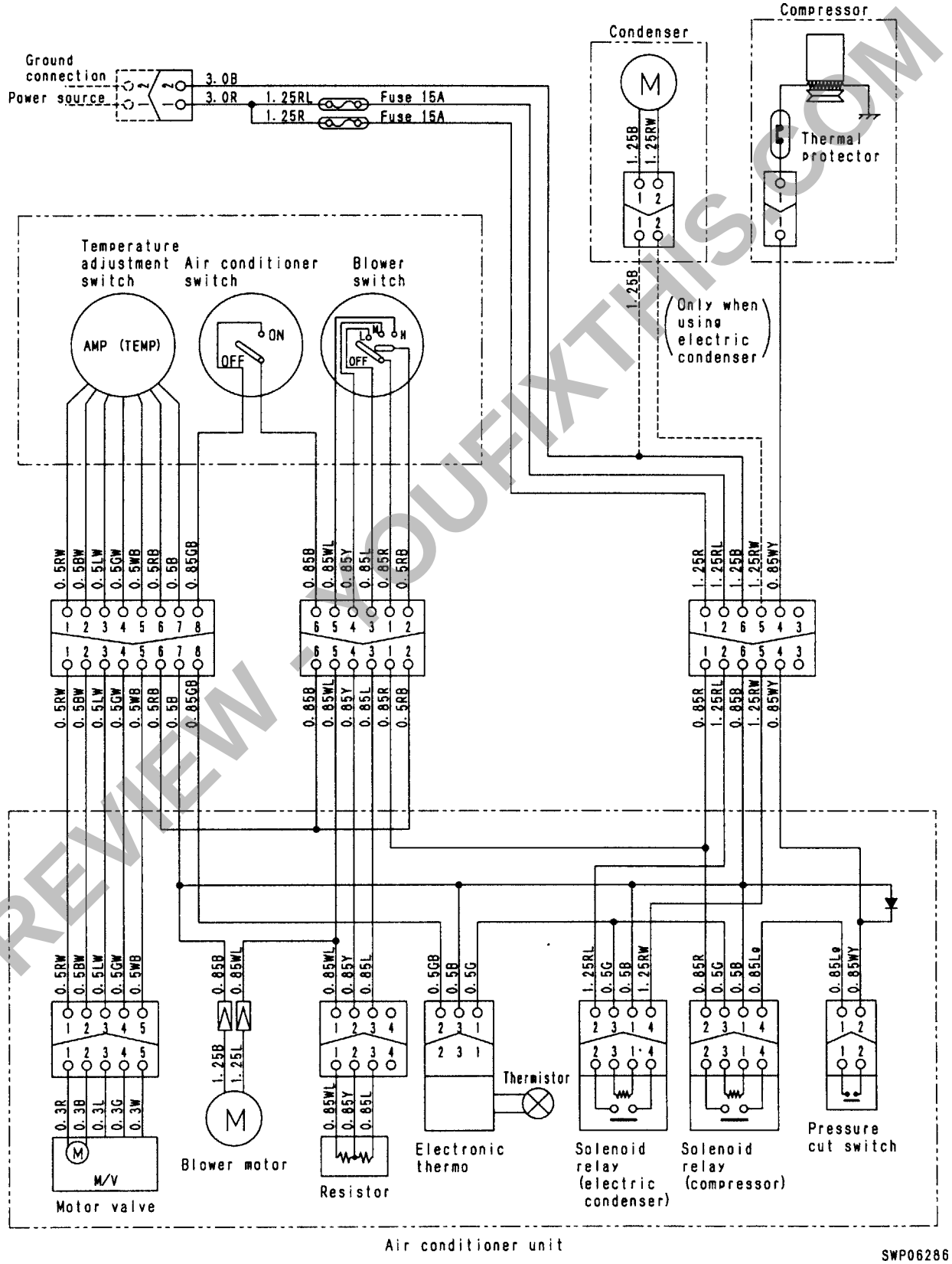
★ For details of this page, see section 90.



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AIR CONDITIONER ELECTRIC CIRCUIT DIAGRAM



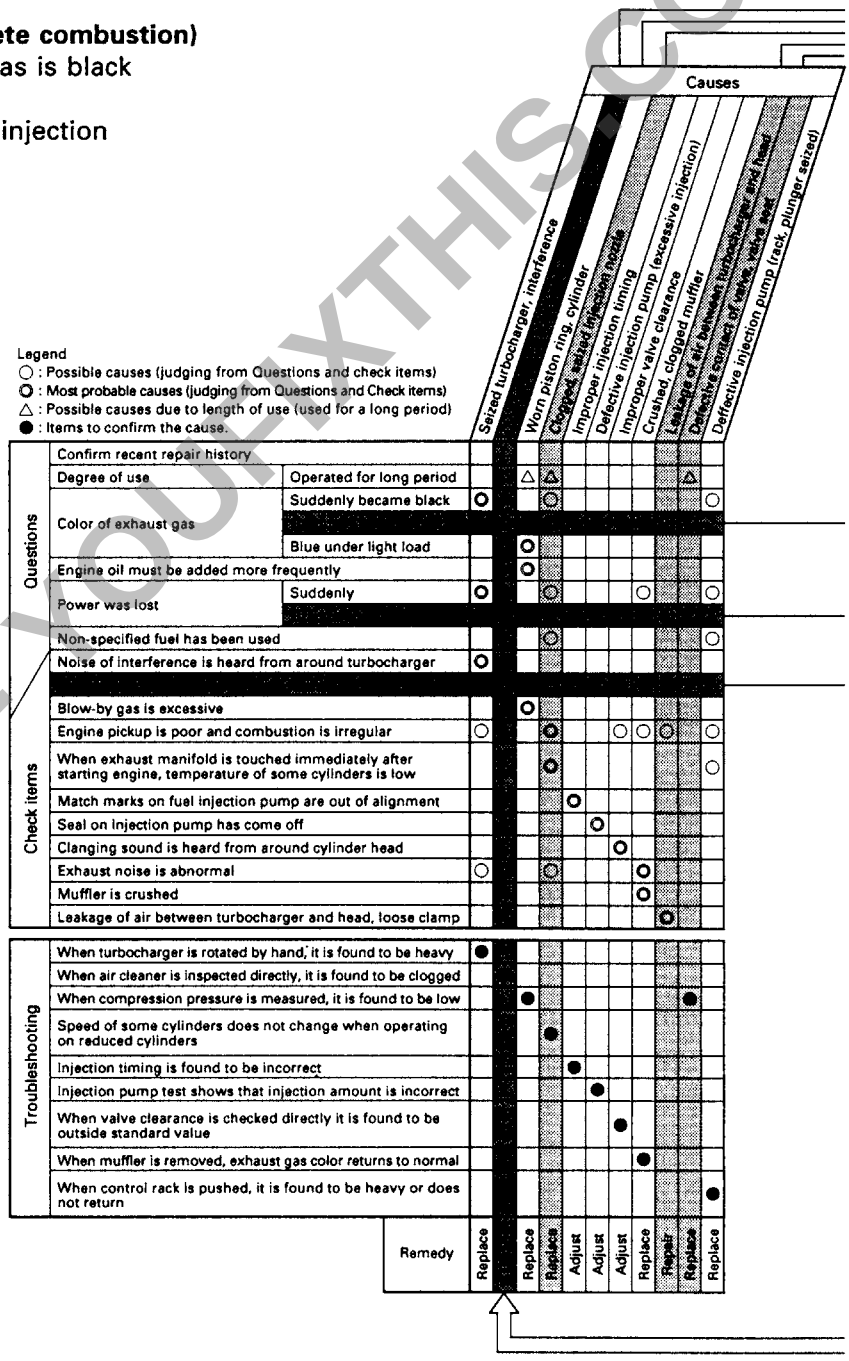
SWP06286

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- **Example of troubleshooting when exhaust gas is black**
  Let us assume that [Clogged air cleaner] is taken to be the cause of black exhaust gas. Three symptoms have causal relationship with this problem: [Exhaust gas slowly became black], [Power slowly became weaker], and [Dust indicator is red].
  If we look from these three symptoms to find the causes, we find that there is a relationship with five causes. Let us explain here the method of using this causal relationship to pinpoint the most probable cause.

S-7 Exhaust gas is black (incomplete combustion)
General causes why exhaust gas is black
- Insufficient intake of air
- Improper condition of fuel injection
- Excessive injection of fuel



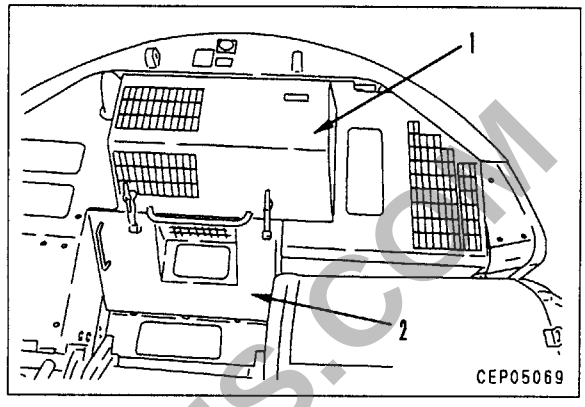
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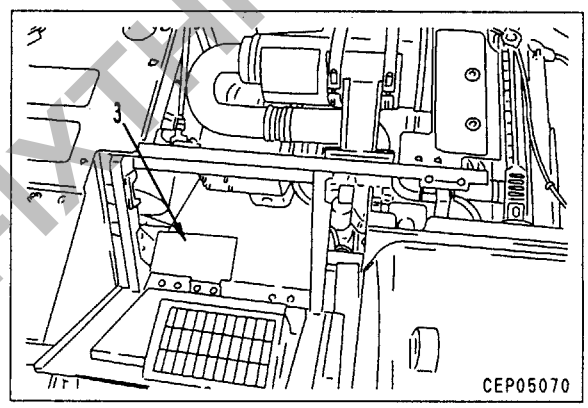
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REMOVAL OF STARTING MOTOR ASSEMBLY

⚠ Disconnect the cable from the negative (–) terminal of the battery.

1. Open covers (1) and (2).
2. Remove step (3).
3. Disconnect wiring (4). (Terminal B of red cable)
4. Disconnect wiring (5). (T17 terminal C)
5. Remove mounting bolt (6), then remove starting motor assembly (7). ※ 1



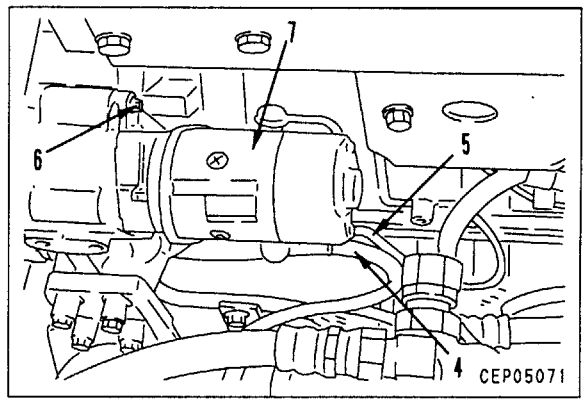


INSTALLATION OF STARTING MOTOR ASSEMBLY

- Carry out installation in the reverse order to removal.

※ 1

kgm Starting motor mounting bolt:
43.6 ± 6.0 Nm {4.4 ± 0.6 kgm}



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STANDARD TIGHTENING TORQUE

STANDARD TIGHTENING TORQUE TABLE (WHEN USING TORQUE WRENCH)

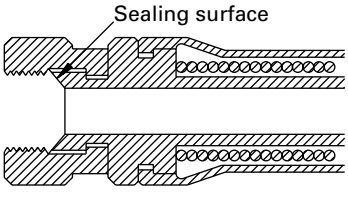
★ In the case of metric nuts and bolts for which there is no special instruction, tighten to the torque given in the table below.

Thread diameter of bolt	Width across flats	 CDL00372	
mm	mm	Nm	kgm
6	10	13.2 ± 1.4	1.35 ± 0.15
8	13	31 ± 3	3.2 ± 0.3
10	17	66 ± 7	6.7 ± 0.7
12	19	113 ± 10	11.5 ± 1
14	22	177 ± 19	18 ± 2
16	24	279 ± 30	28.5 ± 3
18	27	382 ± 39	39 ± 4
20	30	549 ± 59	56 ± 6
22	32	745 ± 83	76 ± 8.5
24	36	927 ± 103	94.5 ± 10.5
27	41	1320 ± 140	135 ± 15
30	46	1720 ± 190	175 ± 20
33	50	2210 ± 240	225 ± 25
36	55	2750 ± 290	280 ± 30
39	60	3290 ± 340	335 ± 35

Thread diameter of bolt	Width across flats	 CDL00373	
mm	mm	Nm	kgm
6	10	7.85 ± 1.95	0.8 ± 0.2
8	13	18.6 ± 4.9	1.9 ± 0.5
10	14	40.2 ± 5.9	4.1 ± 0.6
12	27	82.35 ± 7.85	8.4 ± 0.8

TABLE OF TIGHTENING TORQUES FOR FLARED NUTS

★ In the case of flared nuts for which there is no special instruction, tighten to the torque given in the table below.



SAD00483

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

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ERROR CODE TABLE

★ For details of the error code display, see pp. 20-237 – 238.

Group	Error code	Abnormal system	Single/ multiple	Re-enact
Reset	11	Defective resetting of boom angle	Single	□
Potentio-meter	31	Defective boom potentiometer system	Single	■
Speed sensor	41	Defective engine speed sensor system	Single	■
Solenoid	42	Defective fuel control dial potentiometer system	Single	■
	44	Defective feedback potentiometer system	Single	■
	54	Defective swing holding brake solenoid	Single	■
	58	Defective pump merge/ divider valve solenoid system	Single	■
	62	Defective accelerator motor (+) relay	Single	■
	64	Defective 2-stage relief solenoid	Single	■
	68	Defective accelerator motor (–) relay	Single	■
	71	Defective boom RAISE EPC solenoid	Single	■
	74	Defective PC-EPC (TVC) and solenoid	Single	■
	75	Defective boom RAISE EPC solenoid + swing left brake EPC solenoid	71 + 34	■
	76	Defective boom LOWER EPC solenoid + swing left brake EPC solenoid	72 + 74	■
	77	Defective boom RAISE EPC solenoid + boom LOWER EPC solenoid + swing left brake EPC solenoid	71 + 72 + 74	■
	81	Defective LS-EPC solenoid	Single	■
Switch	C1	Boom pressure switches (RAISE, LOWER) input at same time for more than 3 seconds	Single	■

★ The bold lines indicate occurrence of a single abnormality.

- **Re-enacting display**

  Once the starting switch is turned OFF, the error codes are cleared, so carry out the check with the starting switch ON.

  ★ When checking, turn the cancel switch OFF.

  If the starting switch is turned OFF, it is possible to re- enact the abnormality display as follows.

  - ■: Turn the starting switch ON.
  - □: Start the engine, set the work equipment to the reset posture, then connect the reset terminal.

  ★ During normal operations, if there is a disconnection in any of the ON/OFF solenoid group, the output for that system may stop without any abnormality display being given.

  - For the PPC oil pressure (basic pressure) lock solenoid system, swing holding brake solenoid system, and auto- deceleration relay system, it is not possible to re-enact a disconnection.

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Unit: mm

No.	Check item	Criteria		Remedy
1	Backlash between No. 1 sun gear and No. 1 planetary gear	Standard clearance	Clearance limit	Replace
		0.15 – 0.49	1.00	
2	Backlash between No. 1 planetary gear and ring gear	0.17 – 0.57	1.10	
3	Backlash between No. 1 planetary carrier and motor	0.06 – 0.25	—	
4	Backlash between No. 2 sun gear and No. 2 planetary gear	0.14 – 0.46	1.00	
5	Backlash between No. 2 planetary gear and ring gear	0.17 – 0.57	1.10	
6	Backlash between No. 2 planetary carrier and No. 1 sun gear	0.38 – 0.66	1.00	
7	End play of sprocket shaft	0 – 0.10	—	
8	Amount of wear on sprocket tooth	Repair limit: 6		Rebuild or replace
9	Width of sprocket tooth	Standard size	Repair limit	
		71	68	

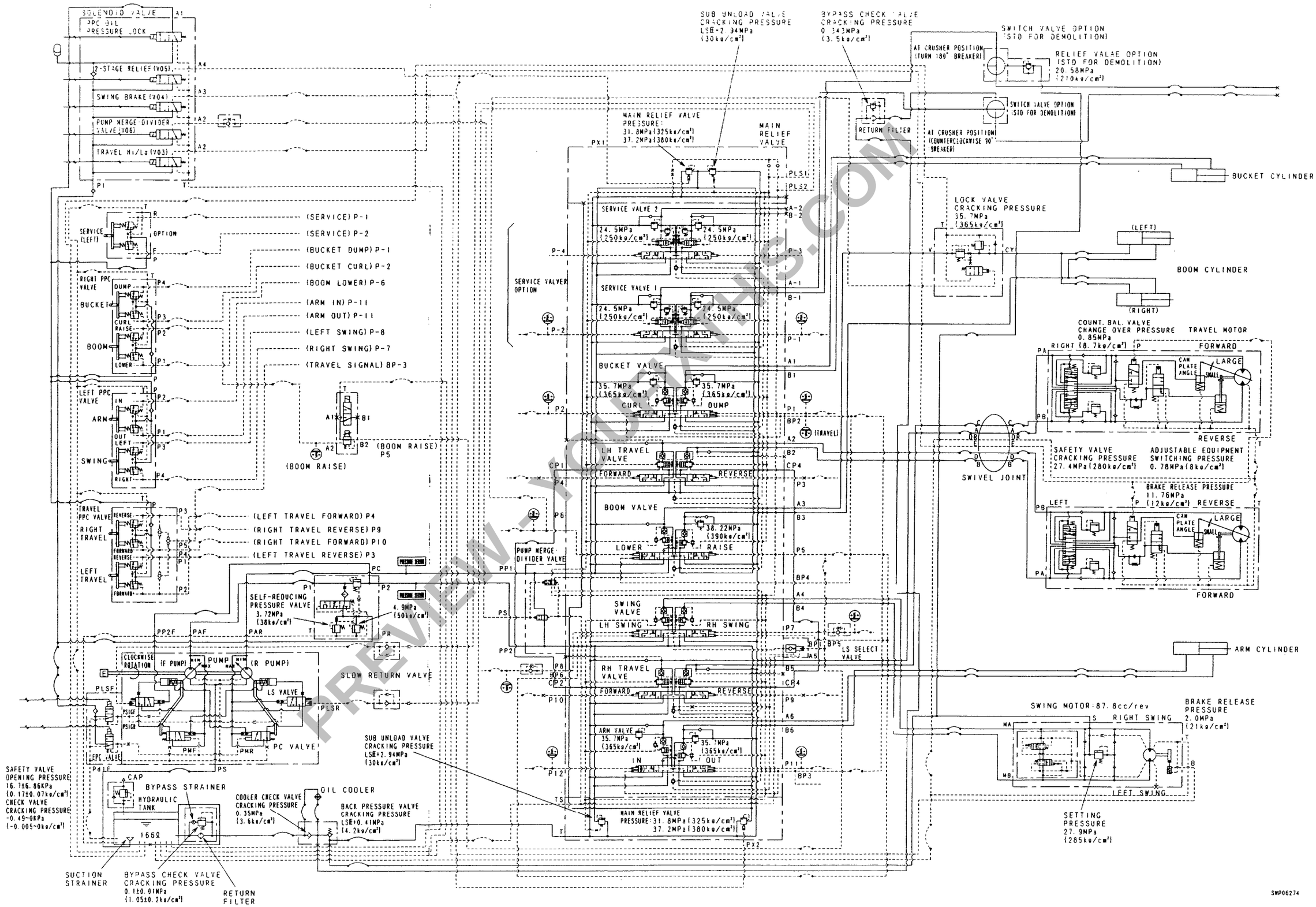
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Machine model				PC228USLC-1		
Serial Number				11001 and up		
Engine	Model			S6D102E-1-A		
	Type			4-cycle, water-cooled, in-line, vertical, direct injection, with turbocharger		
	No. of cylinders – bore × stroke		mm	6 – 102 × 120		
	Piston displacement		ℓ {cc}	5.883 {5,883}		
	Performance	Flywheel horsepower	kW/rpm {HP/rpm}	96/2,000 {128/2,000}		
		Max. torque	Nm/rpm {kgm/rpm}	545.3/1,350 {55.6/1,350}		
		Max. speed at no load	rpm	2,170 $^{+70}_{-40}$		
		Min. speed at no load	rpm	970 ± 60		
		Min. fuel consumption	g/kWh {g/HPh}	218 {160}		
	Starting motor			24V, 4.5 kW		
	Alternator			24V, 50A		
	Battery			12V, 110 Ah × 2		
	Radiator core type			Corrugated CWX-4		
Under-carriage	Carrier roller			2 on each side		
	Track roller			9 on each side		
	Track shoe			Triple grouser, 49 on each side		
Hydraulic system	Hydraulic pump	Type × no.		HPV95+95, variable displacement piston type × 2		
		Delivery	ℓ/min	Piston type: 206 × 2		
		Set pressure	MPa {kg/cm²}	Piston type: 34.8 {355}		
	Control valve	Type × No.		6-spool type × 1		
		Control method		Hydraulic		
	Hydraulic motor	Travel motor		GM38VL, Piston type (with brake valve, parking brake: × 2		
		Swing motor		KMF90AEL-3, Piston type (with safety valve, parking brake): × 1		
	Hydraulic cylinder			Boom	Arm	Bucket
		Type		Double acting piston	Double acting piston	Double acting piston
		Inside diameter of cylinder	mm	120	135	130
		Diameter of piston rod	mm	85	95	90
		Stroke	mm	1,285	1,490	1,020
		Max. distance between pins	mm	3,155	3,565	2,625
		Min. distance between pins	mm	1,870	2,075	1,605
	Hydraulic tank			Box-shaped, sealed		
	Hydraulic filter			Tank return side		
	Hydraulic cooler			CFT-1 (Air cooled)		

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HYDRAULIC CIRCUIT DIAGRAM



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S-1 Starting performance is poor (starting always takes time)

★ Check that the monitor panel does not display any abnormality in the governor control system.
General causes why exhaust smoke comes out but engine takes time to start
- Defective electrical system
- Insufficient supply of fuel
- Insufficient intake of air
- Improper selection of fuel
(At ambient temperature of 10°C or below, use ASTM D975 No. 1)

★ Battery charging rate

Ambient temperature \ Charging rate	100%	90%	80%	75%	70%
20°C	1.28	1.26	1.24	1.23	1.22
0°C	1.29	1.27	1.25	1.24	1.23
–10°C	1.30	1.28	1.26	1.25	1.24

- The specific gravity should exceed the value for the charging rate of 70% in the above table.
- In cold areas the specific gravity must exceed the value for the charging rate of 75% in the above table.

Legend
○ : Possible causes (judging from Questions and check items)
O : Most probable causes (judging from Questions and Check items)
△ : Possible causes due to length of use (used for a long period)
● : Items to confirm the cause

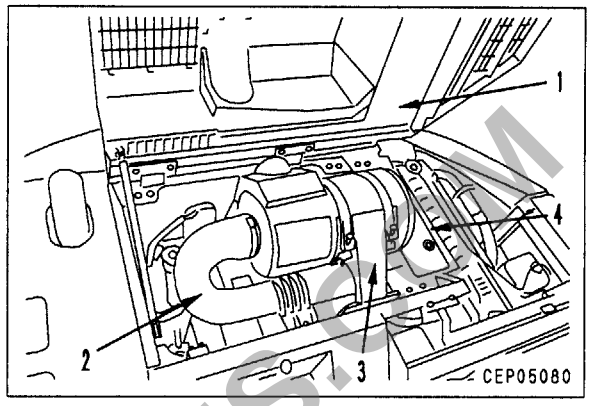
			Causes: Worn piston ring, cylinder	Defective contact of valve, valve seat	Clogged air cleaner element	Clogged fuel filter, strainer	Starting aid	Defective feed pump strainer	Defective alternator	Electrical intake air heater	Defective or deteriorated battery (including regulator)	Defective injection nozzle	Defective injection timing	Leakage, clogging, air in fuel piping (rack, plunger stuck)	Clogged air breather hole in fuel tank cap
Questions	Confirm recent repair history														
	Degree of use of machine	Operated for long period			△	△	△		△						
	Ease of starting	Gradually became worse	O	O	○	○	○								
		Starts when warm					O		O						
	Indicator lamp does not light up						O								
	Engine oil must be added more frequently		O												
	Replacement of filters has not been carried out according to Operation Manual				O	O	O			○		○			
	Air cleaner clogging caution lamp flashes				O										
	Non-specified fuel is being used					○	○			○		○			
Check items	Battery charge lamp is ON							O							
	Starting motor cranks engine slowly								O						
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low									O					
	Engine does not pick up smoothly, and combustion is irregular		○	○						O					
	Blow-by gas is excessive		O												
	Match marks on fuel injection pump are out of alignment										O				
	Mud is stuck to fuel tank cap														○
	When engine is cranked with starting motor, 1) Little fuel comes out even when injection pump sleeve nut is loosened											O			
	2) Little fuel comes out even when fuel filter air bleed plug is loosened				O	O						O			
	Leakage from fuel piping											○	O		
	There is hunting from engine (rotation is irregular)				○	○							O	○	
Troubleshooting	When compression pressure is measured, it is found to be low		●	●											
	When air cleaner element is inspected directly, it is found to be clogged				●										
	When fuel filter, strainer are inspected directly, they are found to be clogged					●								●	
	When feed pump strainer is inspected directly, it is found to be clogged						●								
	Heater mount does not become warm							●							
	Voltage between alternator terminal R and terminal E is not within 26 – 30V								●						
	Either specific gravity of electrolyte or voltage of battery is low									●					
	Speed does not change when operation of certain cylinders is stopped										●				
	When check is made, injection timing is found to be incorrect											●			
	When control rack is pushed, it is found to be heavy or does not return (when blind cover at rear of pump is removed, it can be seen that plunger control sleeve does not move)												●		
	When fuel cap is inspected directly, it is found to be clogged														●
	Remedy		Replace	Correct	Clean	Clean	Replace	Replace	Replace	Replace	Adjust	Replace	Correct	Clean	

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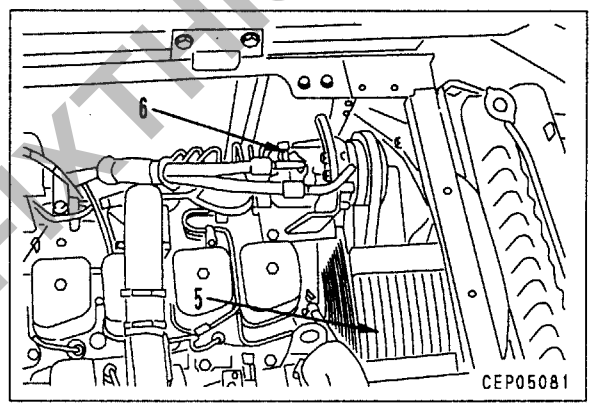
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REMOVAL OF FUEL INJECTION PUMP ASSEMBLY

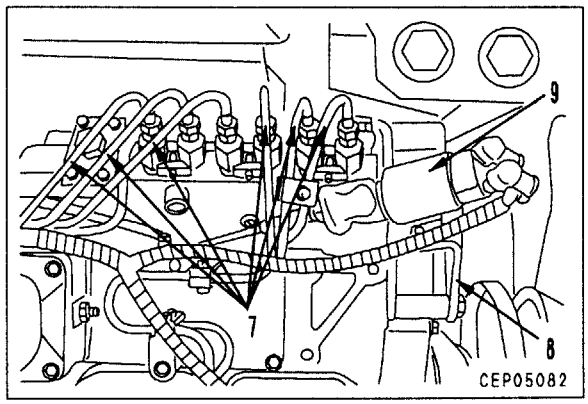
1. Open engine hood (1) and remove suction hose (2).
2. Remove air cleaner assembly (3) and step (4).



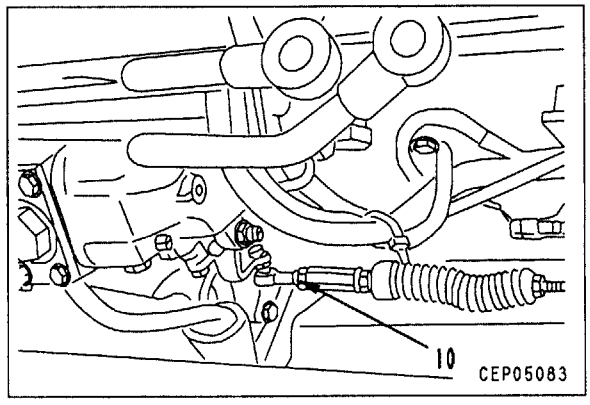
3. Remove fan guard (5).
4. Remove air conditioner compressor (6) together with bracket, and leave at engine flywheel end.
   ★ Do not disconnect the hose.



5. Remove 6 fuel injection tubes (7). ※ 1
6. Remove engine stop solenoid (9) together with bracket (8).
   ★ Leave on top of the engine.



7. Disconnect throttle cable (10).



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TABLE OF TIGHTENING TORQUES FOR SPLIT FLANGE BOLTS

★ In the case of split flange bolts for which there is no special instruction, tighten to the torque given in the table below.

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

TABLE OF TIGHTENING TORQUES FOR O-RING BOSS PIPING JOINTS

★ Unless there are special instructions, tighten the O-ring boss piping joints to the torque below.

Norminal No.	Thread diameter	Width across flat	Tightening torque	
	mm	mm	Nm	kgm
02	14	Varies depending on type of connector.	34.3 ± 4.9	3.5 ± 0.5
03, 04	20		93.1 ± 9.8	9.5 ± 1
05, 06	24		142.1 ± 19.6	14.5 ± 2
10, 12	33		421.4 ± 58.8	43 ± 6
14	42		877.1 ± 132.3	89.5 ± 13.5

TABLE OF TIGHTENING TORQUES FOR O-RING BOSS PLUGS

★ Unless there are special instructions, tighten the O-ring boss plugs to the torque below.

Norminal No.	Thread diameter	Width across flat	Tightening torque	
	mm	mm	Nm	kgm
08	08	14	7.35 ± 1.47	0.75 ± 0.15
10	10	17	11.27 ± 1.47	1.15 ± 0.15
12	12	19	17.64 ± 1.96	1.8 ± 0.2
14	14	22	22.54 ± 1.96	2.3 ± 0.2
16	16	24	29.4 ± 4.9	3 ± 0.5
18	18	27	39.2 ± 4.9	4 ± 0.5
20	20	30	49 ± 4.9	5 ± 0.5
24	24	32	68.6 ± 9.8	7 ± 1
30	30	32	107.8 ± 14.7	11 ± 1.5
33	33	n	127.4 ± 19.6	13 ± 2
36	36	36	151.9 ± 24.5	15.5 ± 2.5
42	42	n	210.7 ± 29.4	21.5 ± 3
52	52	n	323.4 ± 44.1	33 ± 4.5

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ACTION TAKEN BY SELF-DIAGNOSTIC FUNCTION AND PROBLEMS ON MACHINE

Display code	Abnormal system	Nature of abnormality
11	Defective resettingh of boom angle	Defective boom angle potentiometer input voltage when resetting boom angle (outside range)
EE	Communications system or controller power source system	1) Defective contact or disconnection in wiring harness between K1(1) – P1(8) 2) Defective contact or disconnection in wiring harness between K1(2) – P1(12) 3) Defective contact or disconnection in wiring harness between K3(6) – P1(2) 4) When power source is not being input into controller 5) When voltage is more than 38V or less than 9.5V
31	Boom potentiometer system	1) Defective potentiometer 2) Disconnection in wiring harness (in one of three wiring harnesses) 3) Short circuit between wires in wiring harness (two of three) 4) Wiring harness short circuiting with ground (except GND wiring harness) 5) Defective controller
41	Engine speed sensor system	1) Disconnection in wiring harness 2) Defective adjustment or defective speed sensor
42	Fuel control dial potentiometer system	1) Disconnection in wiring harness (in one of three wiring harnesses) 2) Short circuit between wires in wiring harness (two of three) 3) Wiring harness short circuiting with ground 4) Defective potentiometer
44	Feedback potentiometer system	
54	Swing holding brake solenoid system	1) Short circuit inside solenoid (if internal resistance of solenoid is extremely low) 2) Disconnection inside solenoid 3) Short circuit with ground at (+) end of solenoid (K29 (1) – K3 (8) end) 4) Disconnection at (+) end of solenoid (K29 (1) – K3 (8) end) 5) Contact between wiring harness at ground end and (+) end of solenoid 6) Defective controller

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Unit: mm

No.	Check item	Criteria					Remedy
1	Outside diameter of protruding	Standard size			Repair limit		Rebuild or replace
		560			—		
2	Outside diameter of tread	520			508		
3	Width of protrusion	85			—		
4	Total width	164			—		
5	Width of tread	39.5			45.5		
6	Clearance between shaft and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace bushing
			Shaft	Hole			
		65	−0.250 −0.350	+0.074 −0.036	0.214 – 0.424	1.5	
7	Clearance between shaft and support	65	−0.250 −0.290	−0.110 −0.220	0.03 – 0.180	—	Replace
8	Interference between idler and bushing	Standard size	Tolerance		Standard interference	Interference limit	Replace bushing
			Shaft	Hole			
		72	+0.089 +0.059	−0.006 −0.072	0.065 – 0.161	—	
9	Side clearance of idler (each)	Standard clearance			Clearance limit		
		0.39 – 1.00			1.5		

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The affected pages are indicated by the use of the following marks. It is requested that necessary actions be taken to these pages according to the table below.

Mark	Indication	Action required
○	Page to be newly added	Add
●	Page to be replaced	Replace
( )	Page to be deleted	Discard

Pages having no marks are those previously revised or made additions.

LIST OF REVISED PAGE

Mark	Page	Time of revision	Mark	Page	Time of revision	Mark	Page	Time of revision	Mark	Page	Time of revision	Mark	Page	Time of revision
●	00- 1	(3)		01- 1			10-10			10-39			10-66	
	00- 2	(1)		01- 2	(1)		10-11			10-40			10-68	
●	00- 2-1	(3)		01- 2-1	(1)		10-12			10-41			10-69	
●	00- 2-2	(3)		01- 3			10-13			10-42			10-70	
●	00- 2-3	(3)		01- 4	(2)		10-14			10-43			10-71	
●	00- 2-4	(3)		01- 4-1	(1)		10-15			10-44			10-72	
	00- 3			01- 4-2	(2)		10-16			10-46			10-73	
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SAFETY
SAFETY NOTICE

IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for safe machine operation. The service and repair techniques recommended by Komatsu and described in this manual are both effective and safe. Some of these techniques require the use of tools specially designed by Komatsu for the specific purpose.

To prevent injury to workers, the symbol ⚠ is used to mark safety precautions in this manual. The cautions accompanying these symbols should always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

GENERAL PRECAUTIONS

Mistakes in operation are extremely dangerous. Read the Operation and Maintenance Manual carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
   - Always wear safety glasses when hitting parts with a hammer.
   - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, hand shield, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.
6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.

PREPARATIONS FOR WORK

7. Before adding oil or making any repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.
8. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground. If this is not possible, insert the safety 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.
9. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
10. 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.

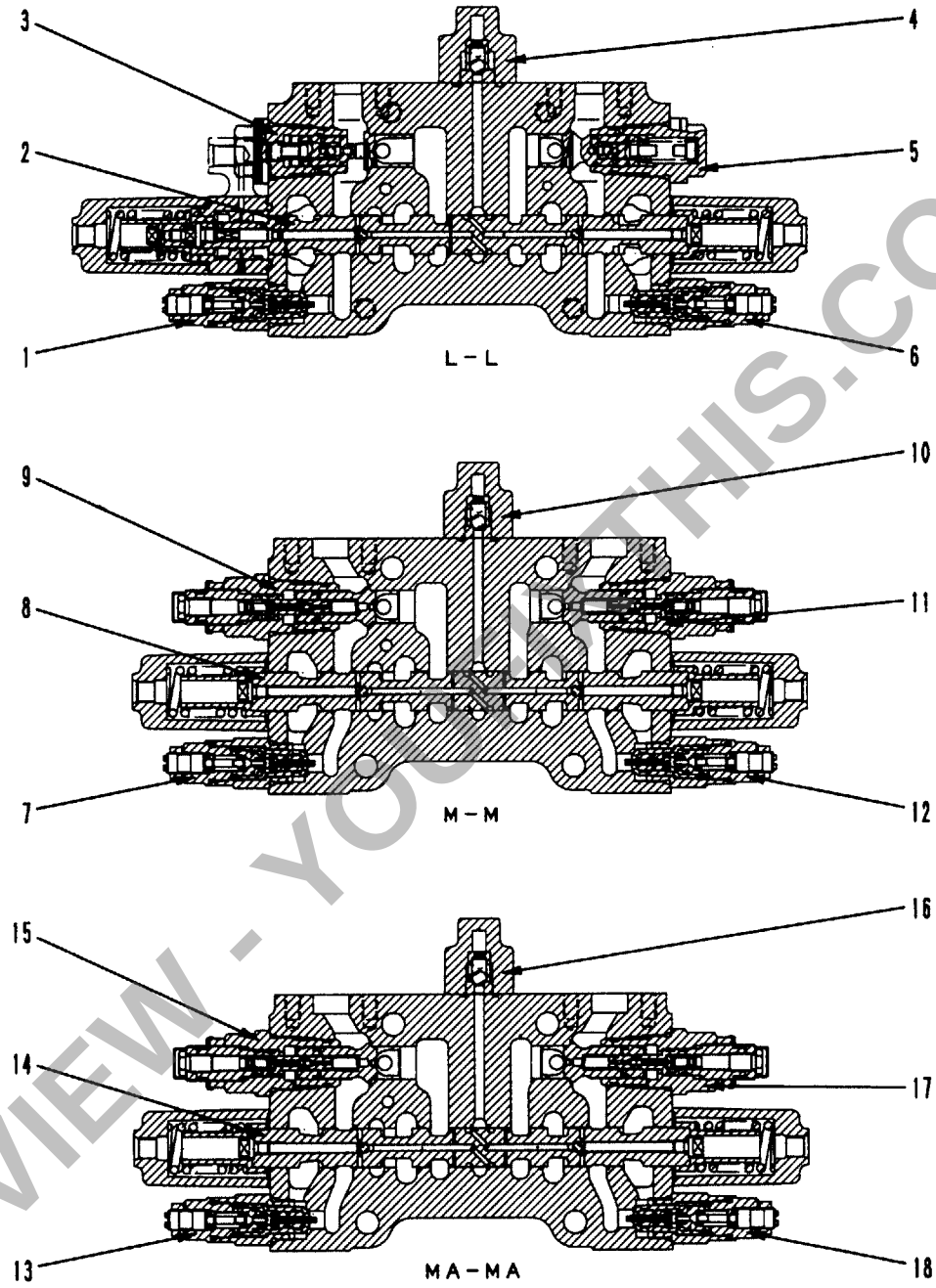
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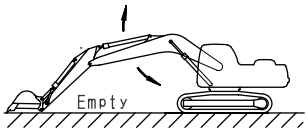
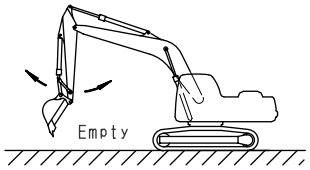
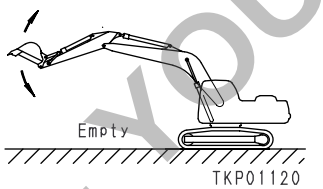
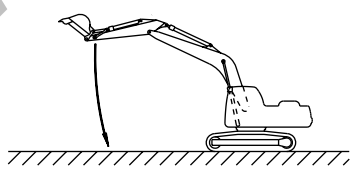
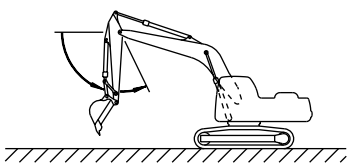
Bucket valve
1. Safety-suction valve
2. Spool
3. Pressure compensation valve (CURL)
4. LS shuttle valve
5. Pressure compensation valve (DUMP)
6. Safety-suction valve

Service valve
7. Safety-suction valve
8. Spool
9. Pressure compensation valve
10. LS shuttle valve
11. Pressure compensation valve
12. Safety-suction valve

Service valve
13. Safety-suction valve
14. Spool
15. Pressure compensation valve
16. LS shuttle valve
17. Pressure compensation valve
18. Safety-suction valve

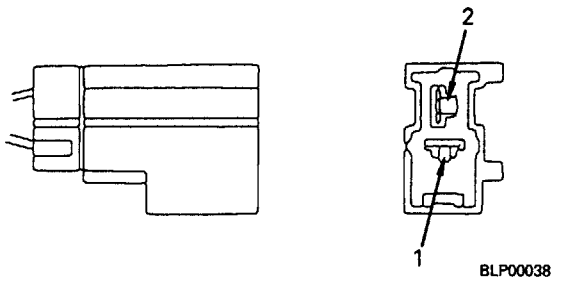
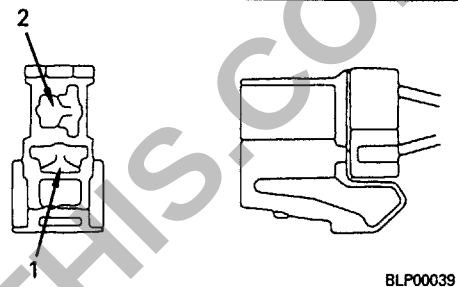
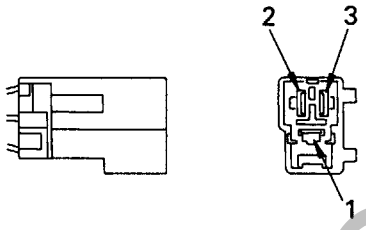
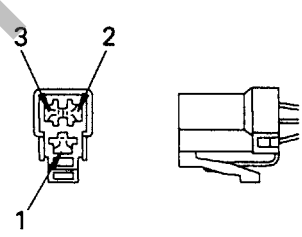
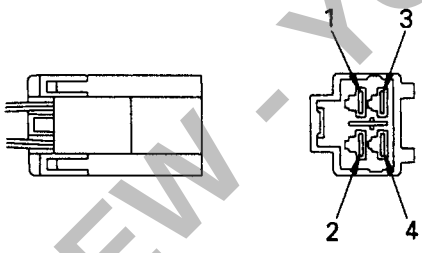
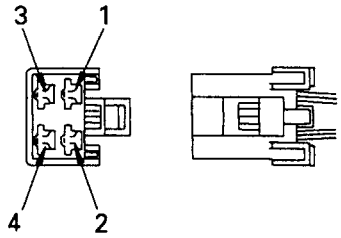
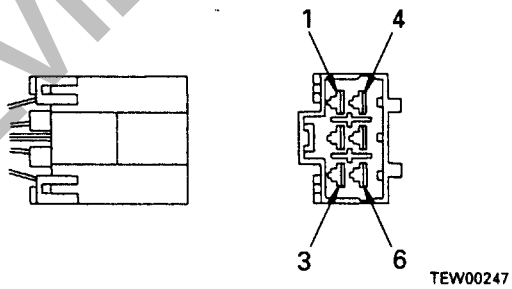
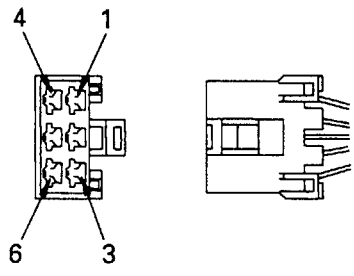
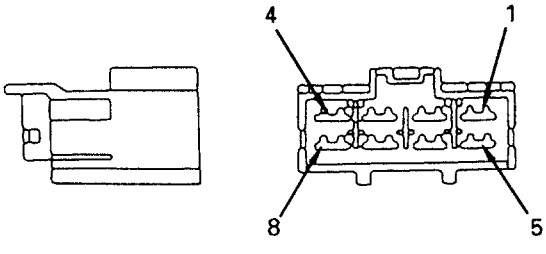
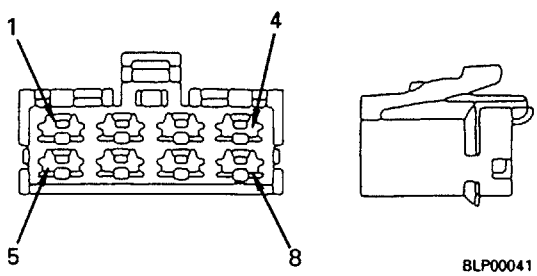
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Applicable model					PC228USLC-1	
Category	Item	Measurement conditions		Unit	Standard value	Permissible value
Work equipment	Work equipment speed	Boom Bucket teeth in contact with ground ↕ Cylinder fully extended	 · Engine at high idling · Hydraulic oil temperature: 45 – 55°C	RAISE	4.4 ± 0.5	Max. 5.2
				LOWER	4.0 ± 0.4	Max. 4.4
		Arm Cylinder fully retracted ↕ Fully extended	 · Engine at high idling · Hydraulic oil temperature: 45 – 55°C	IN	3.6 ± 0.4 (To Just before cushion)	Max. 4.5 (To Just before cushion)
				OUT	2.9 ± 0.3 (To Just before cushion)	Max. 3.5 (To Just before cushion)
		Bucket Cylinder fully retracted ↕ Fully extended	 · Engine at high idling · Hydraulic oil temperature: 45 – 55°C	CURL	2.6 ± 0.4	Max. 3.3
				DUMP	2.1 ± 0.3	Max. 2.7
	Time lag	Boom	 · Lower boom and measure time taken from point where bucket contacts ground to point where chassis rises from ground · Engine at low idling · Hydraulic oil temperature: 45 – 55°C	sec	Max. 1.0	Max. 1.2
		Arm	 · Stop arm suddenly and measure time taken for arm to stop · Engine at low idling · Hydraulic oil temperature: 45 – 55°C		Max. 1.0	Max. 2.8

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No. of pins	M type connector	
	Male (female housing)	Female (male housing)
2	 BLP00038	 BLP00039
3	 TEW00243	 TEW00244
4	 TEW00245	 TEW00246
6	 TEW00247	 TEW00248
8	 BLP00040	 BLP00041

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TROUBLESHOOTING OF CONTROLLER INPUT SIGNAL SYSTEM (F MODE)

★ When the monitoring mode is checked, if following input signals are not displayed or do not light up, carry out troubleshooting for that item.

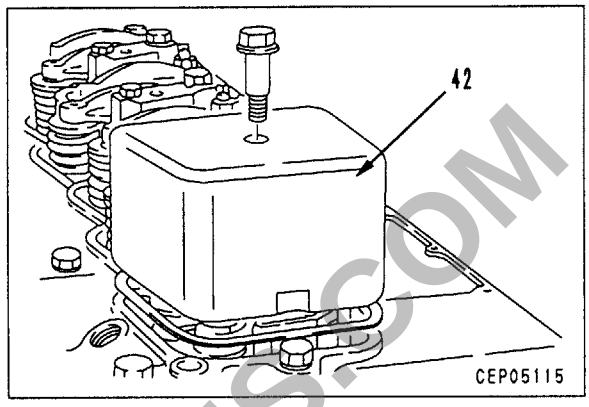
※ Note that no display is given on the monitor for problems F-7 and F-8; the display appears only on the controller.

F-1 Monitor display does not show [P1] (Boom RAISE pressure switch) 20-402
F-2 Monitor display does not show [P2] (Boom LOWER pressure switch) 20-403
F-3 Monitor display does not show [P3] (Swing pressure switch) 20-404
F-4 Monitor display does not show [P5] (Arm IN pressure switch) 20-405
F-5 Monitor display does not show [P7] (Travel pressure switch) 20-406
F-6 Monitor display does not show [P9] (Arm OUT, bucket, offset pressure switch) 20-407
F-7 Controller display does not show [UP] power max. signal (knob switch signal) 20-408
F-8 Controller display does not show [Hi] (Travel speed boost switch) 20-409

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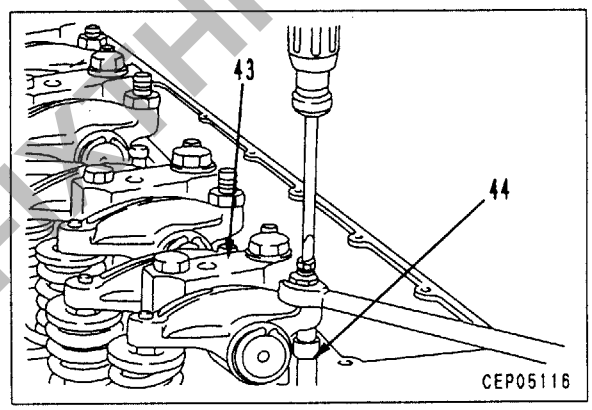
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39. Remove head cover (42). ※11

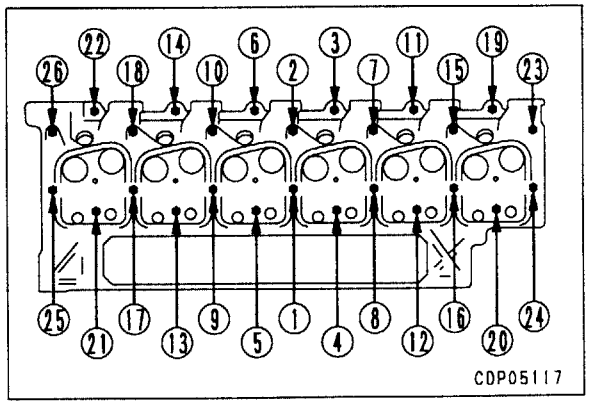


40. Remove rocker arm (43). ※12
★ Loosen the rocker arm, then loosen the adjustment screw 2 – 3 turns.

41. Remove push rod (44).



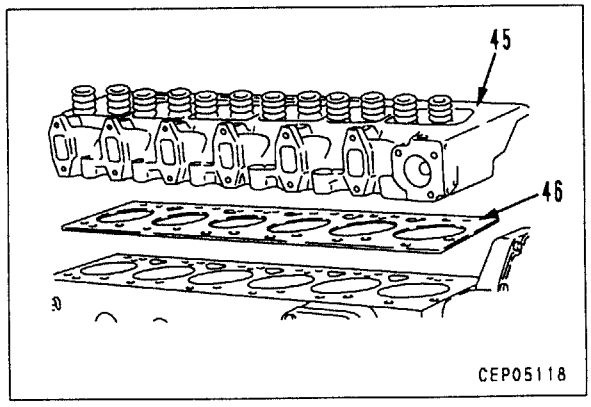
42. Remove mounting bolts of cylinder head in order shown in diagram on right. ※13



43. Lift off cylinder head assembly (45).

kg Cylinder head assembly : **52 kg**

44. Remove cylinder head gasket (46). ※14



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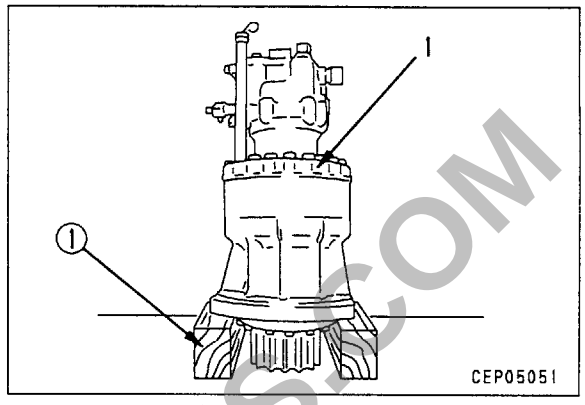
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DISASSEMBLY OF SWING MACHINERY ASSEMBLY

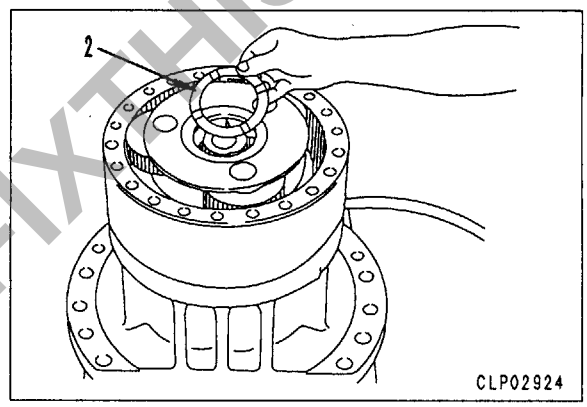
1. **Draining oil**
   Loosen drain plug and drain oil from swing machinery case.

   Swing machinery case : **Approx. 5.5 ℓ**

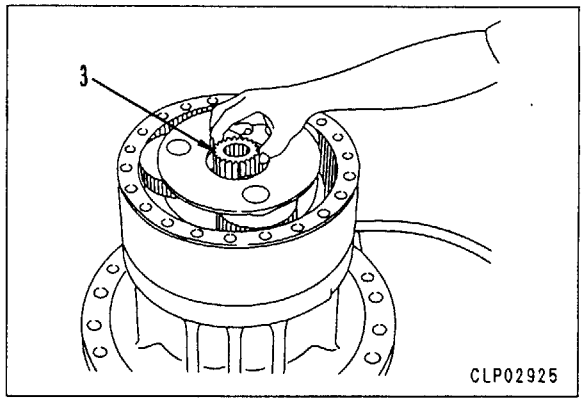
2. **Swing motor assembly**
   1) Set swing motor and swing machinery assembly on block ①.
   2) Remove mounting bolts, then remove swing motor assembly (1).



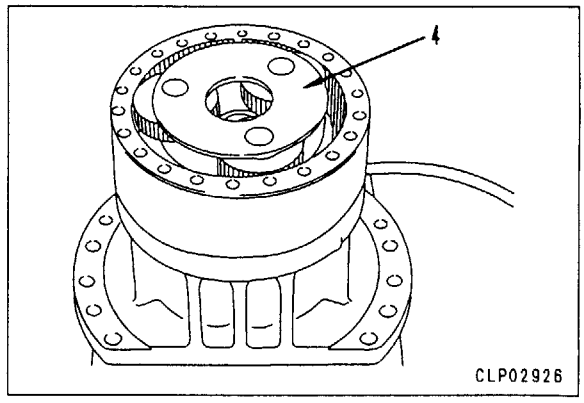
3. **No. 1 thrust washer**
   Remove No. 1 thrust washer (2).



4. **No. 1 sun gear**
   Remove No. 1 sun gear (3).



5. **No. 1 carrier assembly**
   1) Remove No. 1 carrier assembly (4).

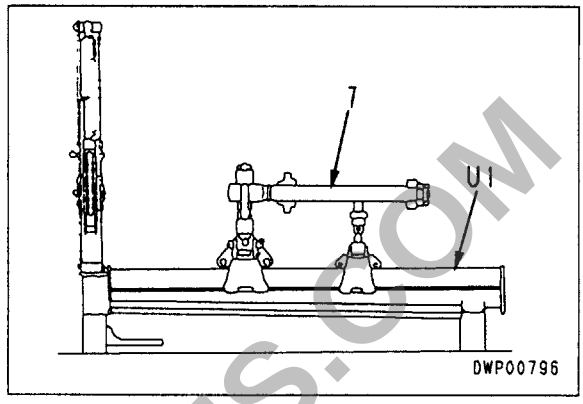


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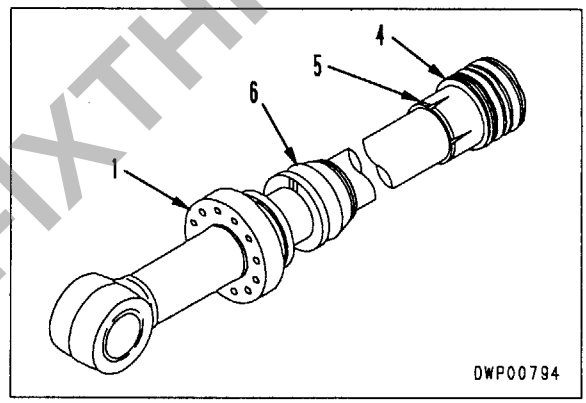
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3. Piston rod assembly

1) Fix rod (7) in tool **U1**.



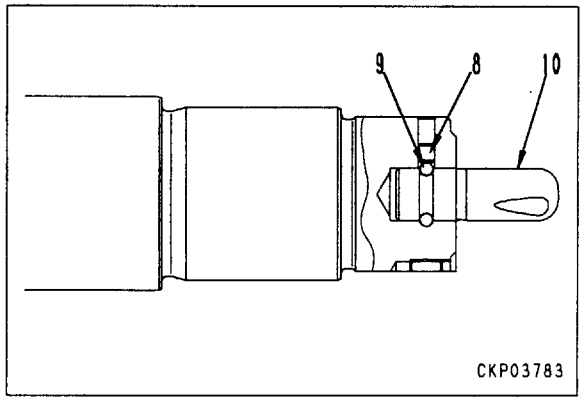
2) Assemble head assembly (1).
3) Install O-ring and backup ring to collar (6) and assemble.
   - Boom, arm cylinder only.
4) Assemble plunger (5).
   - Boom, arm cylinder only.
   - ★ Check that there is a small amount of play at the tip of the plunger.
   - Arm cylinder only

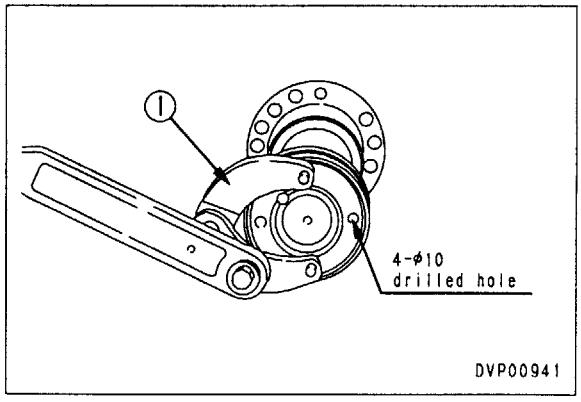


5) Set cushion plunger (10) to piston rod, assemble 12 balls (9), then secure with cap (8).
   - Arm cylinder only

6) Assemble piston assembly (4) as follows.
   - When using piston rod assembly (2) again.
     - ★ Wash thoroughly and remove all metal particles and dirt.
     - i) Screw in piston assembly (4), then use tool ① to tighten piston assembly until positions of screw holes are aligned.
       - ★ Use a file to remove all burrs and flashes from the thread.
     - ii) Tighten screw (3).

kgm Screw (3):
66.2 ± 7.35 Nm {6.75 ± 0.75 kgm}





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