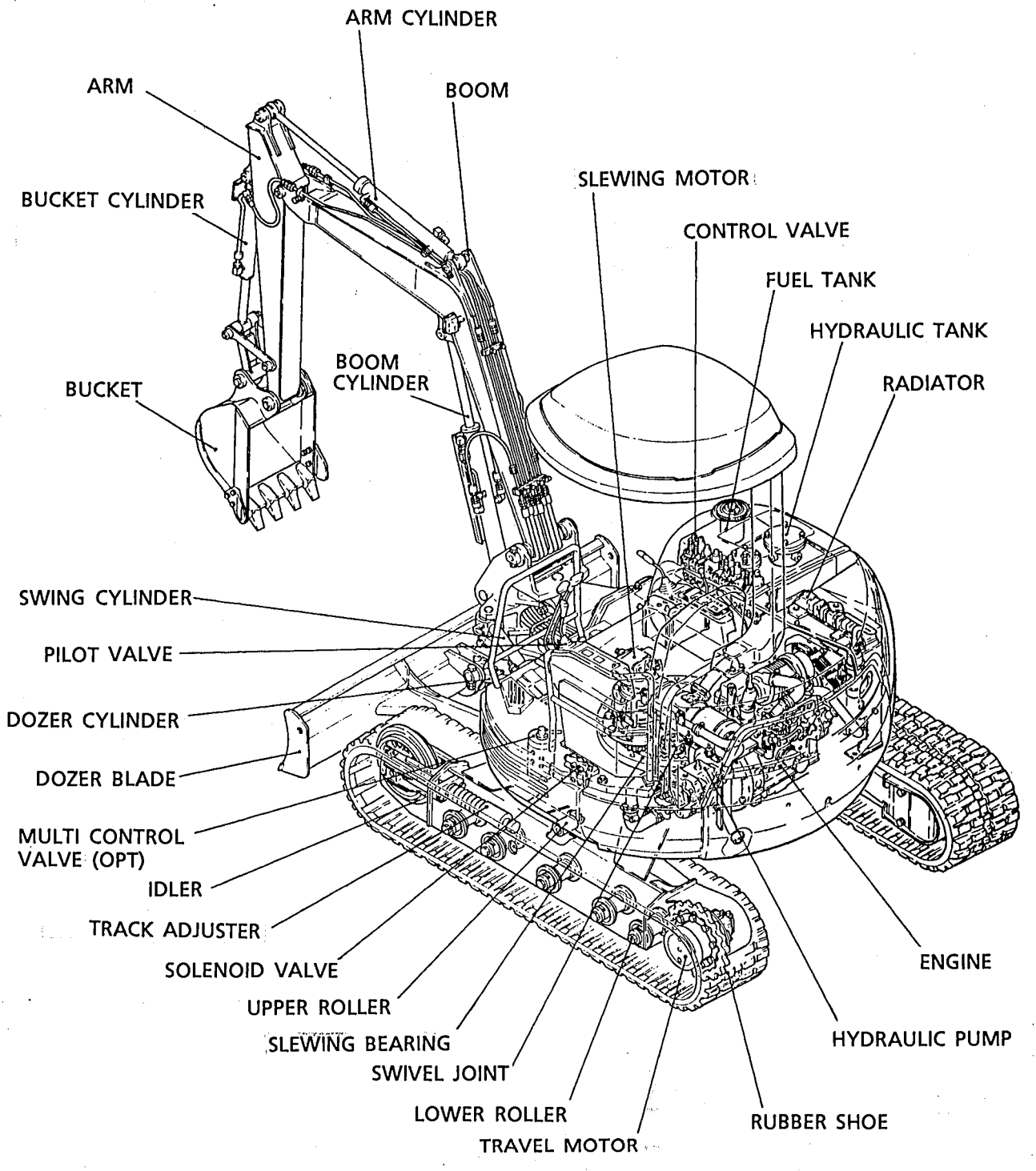
1. NAME OF COMPONENTS

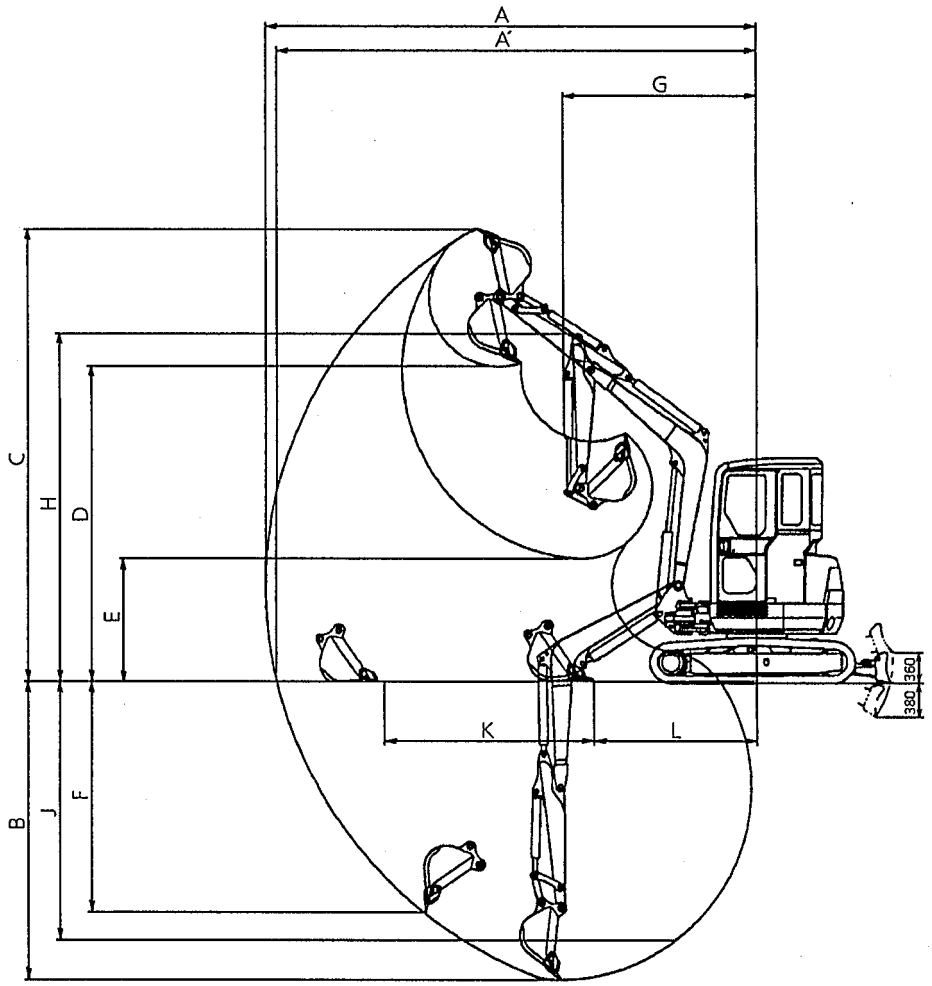


PH-883

※ This machine is canopy spec. for SK40SR.

SK40SR

● BACKHOE ATTACHMENT (CAB SPEC.)



PH-883

Unit : mm

Item	Attachment Type		1.35m arm 0.13m³ bucket	1.65m arm 0.13m³ bucket
A	Maximum digging reach		5,550	5,840
A'	Maximum digging reach at ground level		5,420	5,720
※ B	Maximum digging depth		3,330	3,630
※ C	Maximum digging height		5,130	5,360
※ D	Maximum dumping height		3,570	3,800
※ E	Minimum dumping height		1,370	1,080
※ F	Vertical digging depth		2,570	2,910
G	Minimum slewing radius		2,190	2,250
※ H	Height at minimum slewing		3,950	3,950
※ J	8-feet level digging depth		2,880	3,240
K	Horizontal digging stroke at ground level	Stroke	2,360	2,800
L		Minimum	1,840	1,700

NOTE : Dimensions marked ※ do not include the height of the shoe lug.

5. MEASURING SLEWING PERFORMANCE

5.1 SLEWING SPEED

(1) Purpose

Measure the slewing time and confirm the flow rate between the hydraulic pump and the swing motor.

(2) Preparation

1) Conditions; Hydraulic oil temperature 50±5°C

2) Machine posture

Retract the arm cylinder to the minimum stroke while extending the bucket cylinder to full stroke so the boom foot pin is at the same level as the bucket pin. Then bring the dozer blade down to the ground.

(3) Measurement

Swing the machine by bringing the swing lever to its full stroke. Measure the time required to make two turns after one turn of preliminary run.

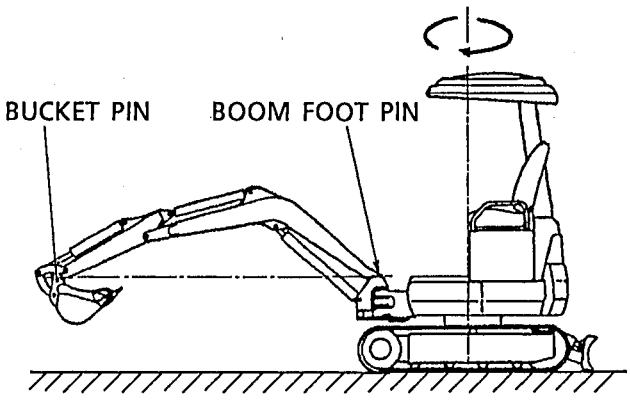


Fig. 19 Slewing speed measuring posture

Slewing speed

SK40SR Table 9−1 Unit: sec/rev

Measuring condition	Reference value	Reference value for remedy	Service limit
One turn	7.3~8.3	9.3~10.6	11~

SK45SR Table 9−2 Unit: sec/rev

Measuring condition	Reference value	Reference value for remedy	Service limit
One turn	7.2~7.8	9.2~10.0	10.8~

5.2 SLEWING INERTIA BRAKING PERFORMANCE

(1) Preparation

1) The posture is the same as that when the slewing speed is measured as mentioned above.

2) Put a matching mark on the outer circumference of the slewing bearing of the upper frame side and of the track frame side.

3) Erect two poles at the front and back of the extended line of the matching mark.

(2) Measurement

1) Slew the machine 180 degrees at full speed and operate the lever to its neutral position in the position of the poles.

2) After the upper structure stops, measure the amount of shift of the matching mark on the slewing race by the length of the outer circumference (arc) of the slewing bearing.

$$\text{Formula}; \frac{\text{Measured length}}{\text{Circumferential length}} \times 360°$$

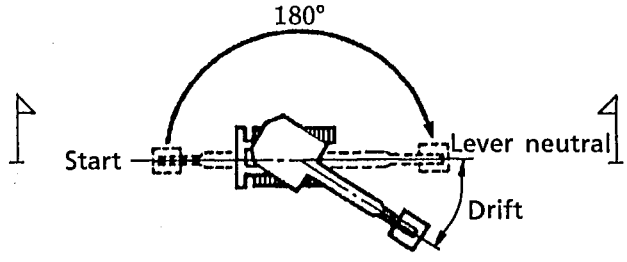


Fig. 20 Slewing inertia braking performance

Slewing drift

SK40SR, SK45SR Table 10 Unit: degree

Model	Reference value	Reference value for remedy	Service limit
SK40SR	10~20	25~35	35~
SK45SR	10~20	25~35	35~

(2) Installing

1) Installing of the crawler is the reverse order of removing : Engage the crawler with the sprocket and mount them on the upper roller. Put an iron pipe in the rubber crawler, turn the sprocket slowly and then the rubber crawler has floated off the idler, engage it with the idler, using an iron pry or the like.

2) Check that rubber crawler retaining projection is matched with front idler, sprocket, lower roller respectively and completely, and then tighten grease nipple for crawler adjuster, and adjust the tension while applying grease.

: 19mm,

Tightening torque of grease nipple : 6 kgf·m

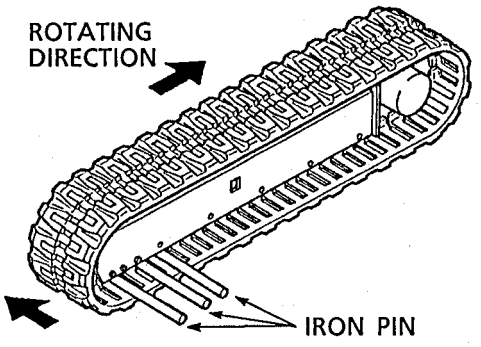


Fig. 4 Installing rubber crawler PH-B83

1.2 PROCEDURE FOR REMOVING AND INSTALLING STEEL CRAWLER (OPTION)

(1) Removing

1) Since crawler track link is provide with one set of master pin (5), position the track link so that master pin (5) comes to just in front of front idler.

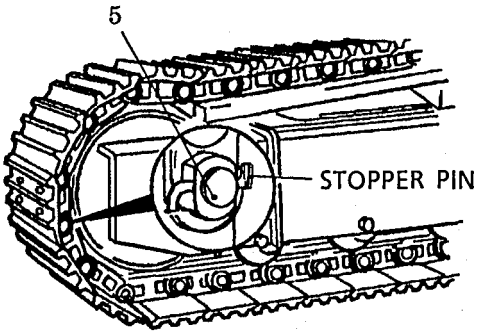


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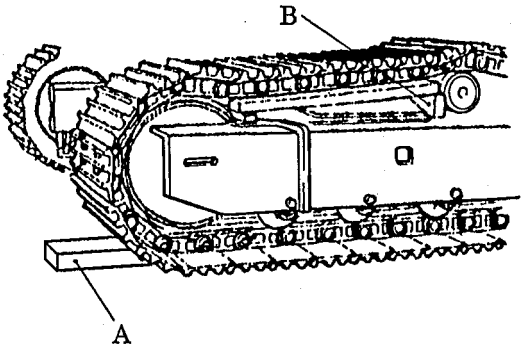
Fig. 5 Master pin position

2) Place square timbers A and B at the crawler head under shoe and space between track frame and link on the upper portion to reduce the load master pin.



PH-B83

Fig. 6 Preparation for removing master pin

3) Loosen grease nipple for track spring adjuster, and discharge the grease remaining in cylinder to release the tension.

: 19mm

⚠ • Do not loosen grease nipple by more than one turn while loosening grease nipple for adjuster.
• Move machine back and forth when grease is not completely discharged.

⚠ • Use care that grease is not spouted out.

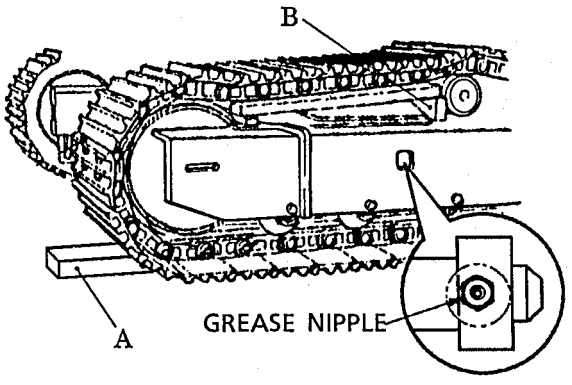


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Fig. 7 Loosening grease nipple for adjuster

4.4 MAINTENANCE STANDARD

(1) Clearance between Boom swing Pin and Bushing

SK40SR
SK45SR

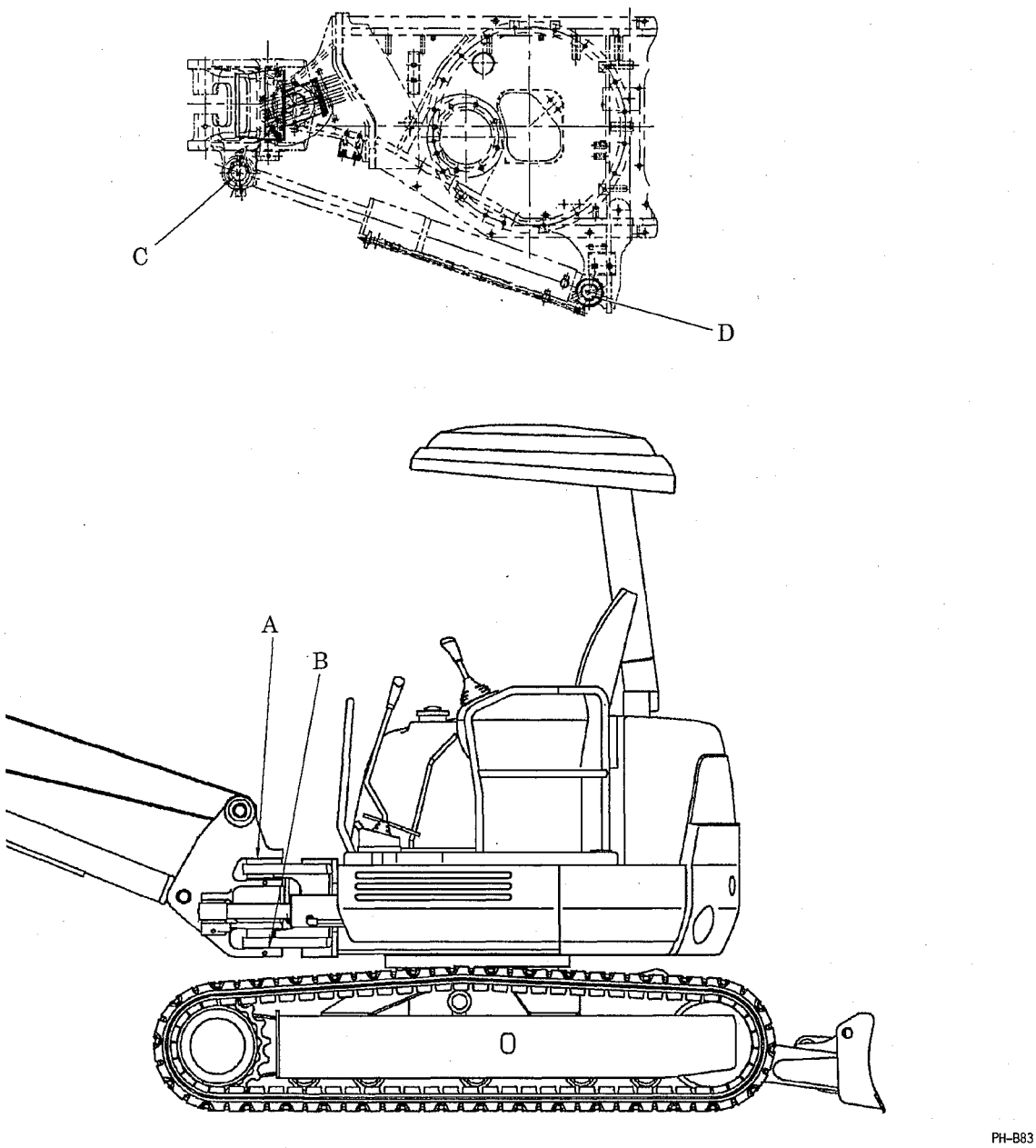


Fig. 21 Clearance between boom swing pin and bushing

Table 10 Unit : mm

No.	Item		Pin parts No.	Standard dimension			Clearance			Remedy
				Pin dia.	Tolerance on pin dia.	Tolerance on bushing bore dia	Standard value	Reference value for remedy	Service-ability limit	
A	Swing bracket (Upper frame side)		PH02B01006P1	∅70	−0.050 −0.080	+0.10 +0.03	+0.18 +0.08	0.7	1.0	Replace bushing or pin
B	Swing bracket (Lower frame side)									
C	Swing cylinder (Rod side)		PH02B01001D4	∅50	−0.050 −0.110	+0.25 +0.05	+0.36 +0.10			
D	Swing cylinder (Head side)	SK40SR	PH02B01019P1							
		SK45SR	PY02B01077P1							

1. SPECIFICATION

1.1 GENERAL VIEW

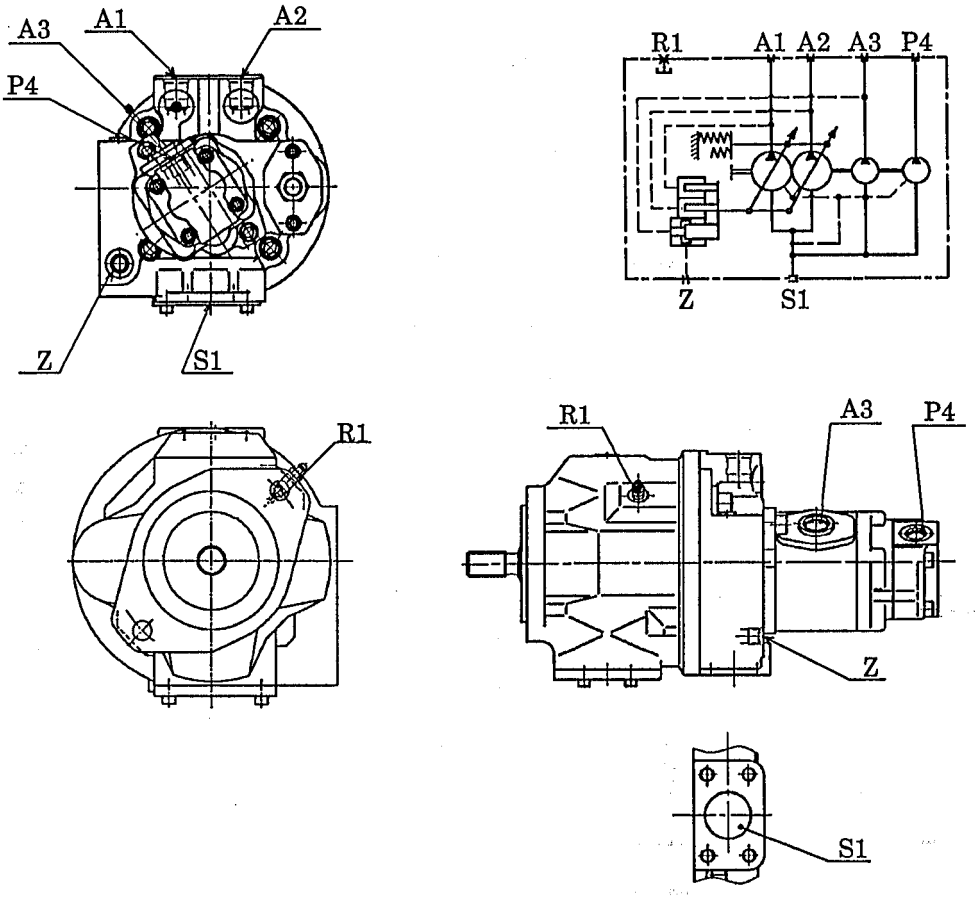


Fig. 1 General view of pump

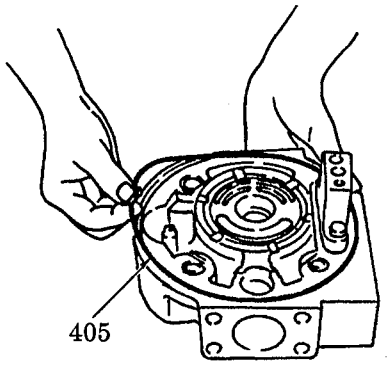
Symbol	Port Name	Size	Symbol	Port Name	Size
S1	SUCTION PORT	SAE 1 1/2	R1	AIR BLEEDER PORT	M10×1.0
A1,A2	DELIVERY PORT	PF 1/2		(WITH BREATHER VALVE)	
A3	DELIVERY PORT	PF 1/2	Z	STANDARD	DRAIN
P4	PILOT DELIVERY PORT	PF 3/8		COOLER MODE (OPT)	PF 1/4

1.2 SPECIFICATION

Table 1

Item \ Type	AP2D25LV1RS7-953-0		
	Piston pump section	Gear pump section	
Type of each single pump	AP2D25	GSP2-16	G1-04
Parts No.	PY10V00007F1	PY10N00008F1	
Working pressure kgf/cm²	210	200	40
Displacement cc/rev	25.0×2	16.2	4.5
Flow rate ℓ/min	55.0×2	35.6	9.9
Rated revolution rpm	2,200		
Weight kg	33.5		

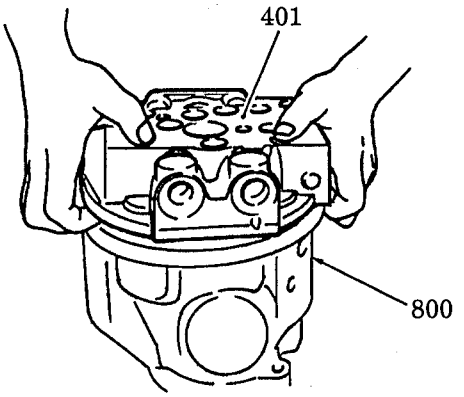
(27) Fit O rings, one (405) and four (406), on mating face of cover (401).



PY-B84

Fig. 73 Fitting O ring (405), (406)

(28) Install cover (401) parallel to the mounting surface of housing (800).



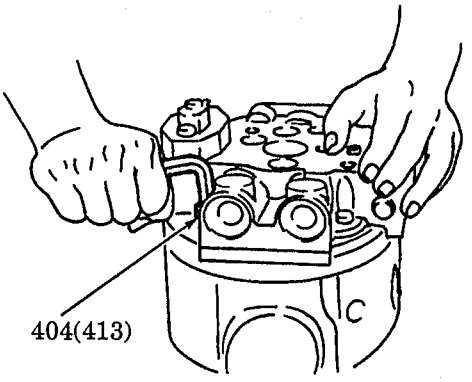
PY-B84

Fig. 74 Installing cover (401)

(29) Install cover (401) with three socket bolts (404) M12×30 and one socket bolt (413) M12×55.

: 10mm,

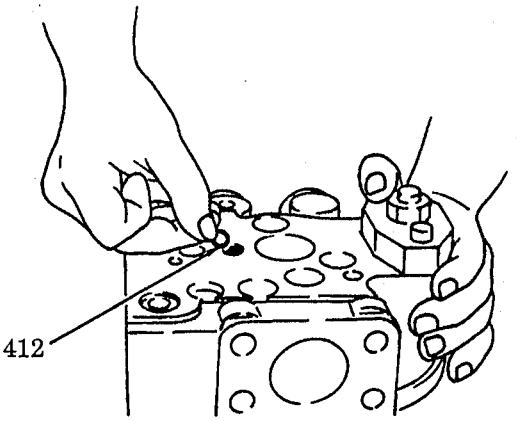
Tightening torque : 11±1.0kgf·m



PY-B84

Fig. 75 Installing cover (401)

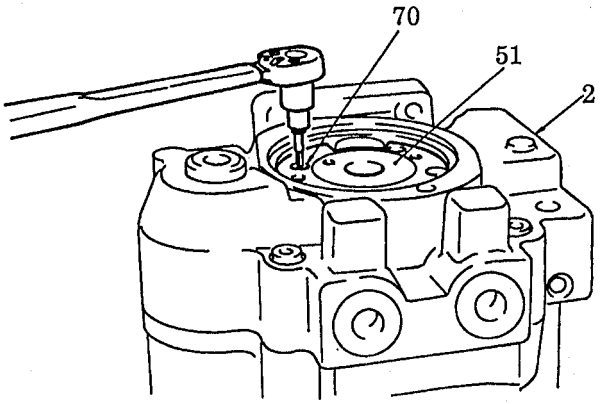
(30) Apply grease to O ring (412) and fit it to the cover (401).



PY-B84

Fig. 76 Fitting O ring (412)

28) Put the cover (51) into the port block (2) and tighten them with three socket bolts (70).
: 4mm,
Tightening torque 0.75kgf·m

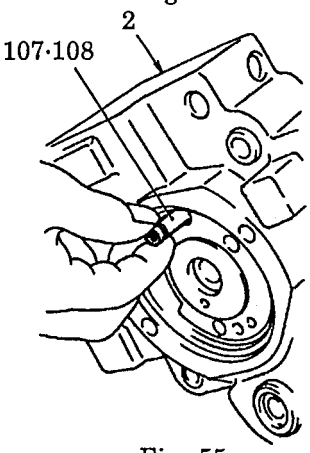


PH-B83

Fig. 54

29) Installing the gear pump
Place O ring (108) to pipe (107). Insert the pipe into the port block (2) and install it to the gear pump (11).

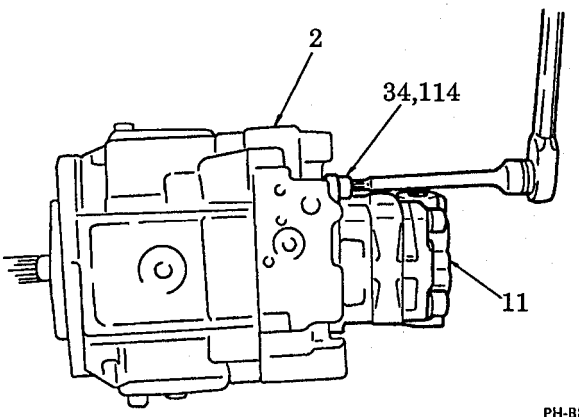
- Align so the hole in the gear pump (11), the hole in the pipe (107), the spline of the gear pump (11) and the spline of the trochoid rotor (23) with each other.



PH-B83

Fig. 55

30) Tighten the gear pump (11) against the port block (2) with socket bolts (34) [2 pcs with washer (114)].
: 8mm,
Tightening torque 4.5kgf·m

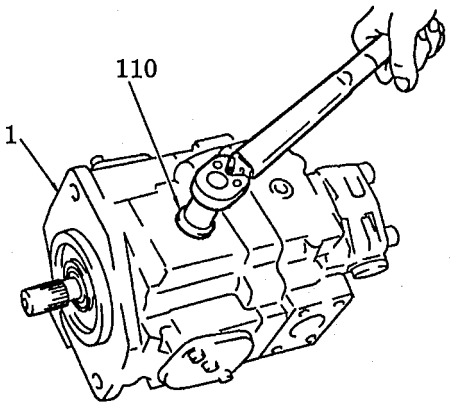


PH-B83

Fig. 56

31) Fasten the plug of the air bleeder (110) to the casing (1).
Tightening torque 3.0kgf·m

32) Fasten the bleeder of the air vent.
: 10mm,
Tightening torque 1.5kgf·m



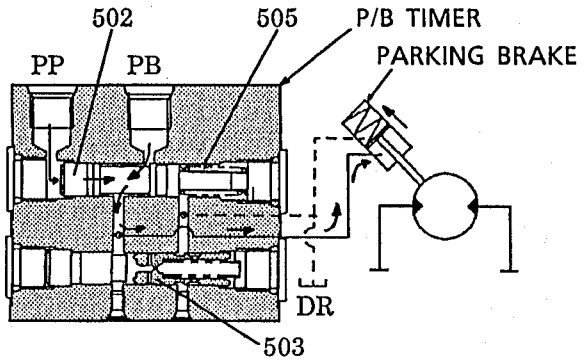
PH-B83

Fig. 57

2) Action of hydraulic parking brake (P/B) timer
When the parking brake operates as the upper structure produces inertia, the hydraulic parking brake timer operates to delay the operation of the parking brake for a certain time length.

1. When the parking brake is released;
If the pressure flows into the brake release command secondary pilot pressure port (PP), it overcomes the force of spring (505) and pushes spool (502) to the positions in Fig. 7 and in the figure above. On that occasion, the brake release pressure at the brake releasing primary pressure port (PB) passes through the arrow in Fig. 7 above, is flowed into the chamber of the parking brake piston, and releases the parking brake.

2. When the parking brake acts;
If the pilot pressure at the brake releasing command secondary pilot pressure port (PP) is blocked, spool (502) is pushed back to the position in the figure below by the force of spring (505). The brake release pressure at the brake releasing pressure port (PB) is blocked by spool (502) and block the pressure supply to the chamber of the parking brake piston. The pressure of the parking brake piston chamber is pushed out by the force of the spring in the parking brake and flows out to the DR port through the passage indicated by an arrow in the figure below : On that occasion, the oil that is flowing out is regulated by the choke of piston (503), flows out to the DR port slowly, and delays the action of the parking brake for a certain time length.



When the brake releasing command secondary pilot pressure flows into port PP;

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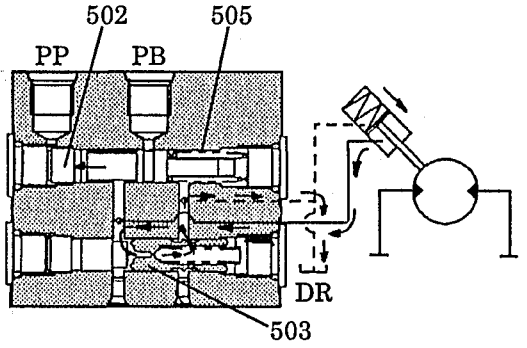


When the brake releasing command secondary pilot pressure is blocked at port PP;

PH-B84

Fig. 7 Operation of hydraulic parking brake timer

3.4 CAUTIONS TO BE EXERCISED ON OPERATION

(1) Installing method

1) Mating part of sprocket A
   Mating part of body B
2) When installing the motor to the machine body and when mounting it to the sprocket, do not strike it with a hammer or push it in gently, utilizing the mounting bolts.
3) Use designated types for the motor mounting bolts and the sprocket mounting bolts and tighten them to specified torques.

(2) Piping

1) The motor pipings are indicated in the hydraulic system and the main piping system. Pipe it taking care of the rotating direction.
2) At delivery, the pipe ports are equipped with covers. When piping it, use care so as not to allow sand and dirt to enter them.
3) Two pipe ports (PF1/4) are provided. A drain pipe is connected to only one of them, another being plugged. When piping it, use the port at which the casing is filled up with hydraulic oil. Fill in 200cc of hydraulic oil and pipe it.
4) The back pressure of drain (allowable pressure in the hydraulic motor casing) is restricted by the oil seal. Therefore, devise it so the allowable pressure of the drain pipe casing is 3kgf/cm^2 for working and 10kgf/cm^2 or less for surge.

(3) Lube oil for gears

1) Use API Class, CD Grade, SAE30 for lube oil. (At shipping, it is filled with Idemitsu Apolloil Diesel Motive S-330)
2) The gear oil may be any of the recommended brands. Avoid mixing different brands ; use the same brand as much as possible.
3) Oil is filled up at shipping. Replenish oil according to the following steps :
   (All plugs are sealed with O rings.)
   1. Remove the plug at the oil inlet.
   2. Remove the plug at the oil level check port.
   3. Fill in lube oil to LEVEL.
   4. Fasten the plugs at the oil level check ports and the oil inlet.
4) Volume of lube oil 700cc
5) Timing of replacing lube oil

Initial	200hr. or two months of operation
2nd and thereafter	1000hr. or one year of operation

(4) General precautions
We recommend that the user prepare a sheet for checking lube oil.

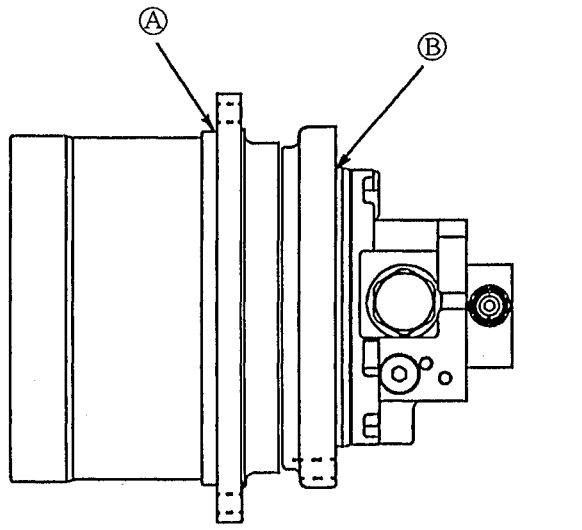


Fig. 46

Thread size	Tightening torque
M12	9~11.5kgf·m

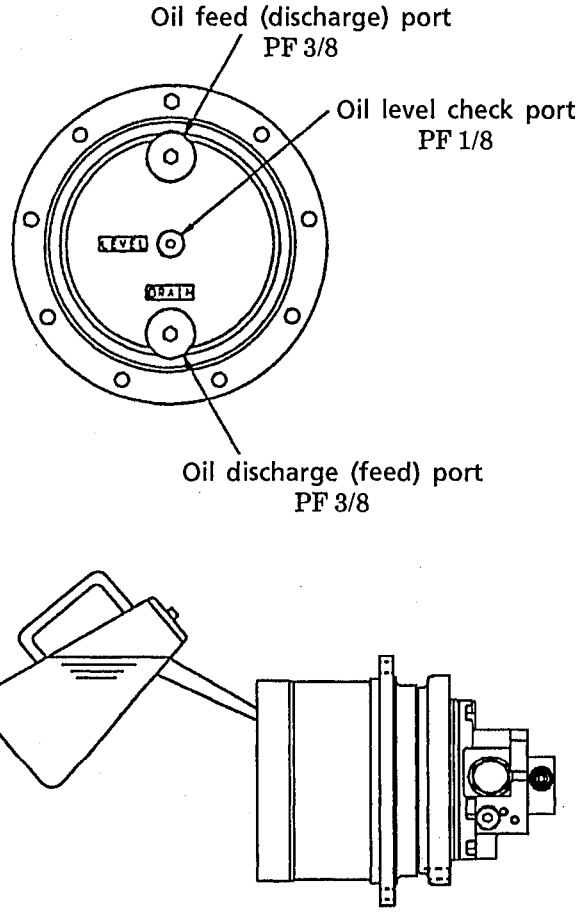


Fig. 47

(24) Removing the fitting of hold flange (3).

1) Remove the outer race of taper roller bearing (22) from hold flange (3), using a steel rod and a hammer.

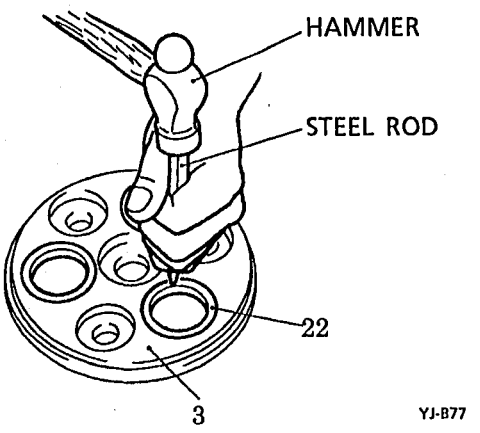


Fig. 90 Removing the outer race of taper roller bearing (22)

2) Remove the inner race of ball bearing (21) from hold flange (3), using a steel rod and hammer.

⚠ Removing the inner race of ball bearing (21) only when the parts are replaced.

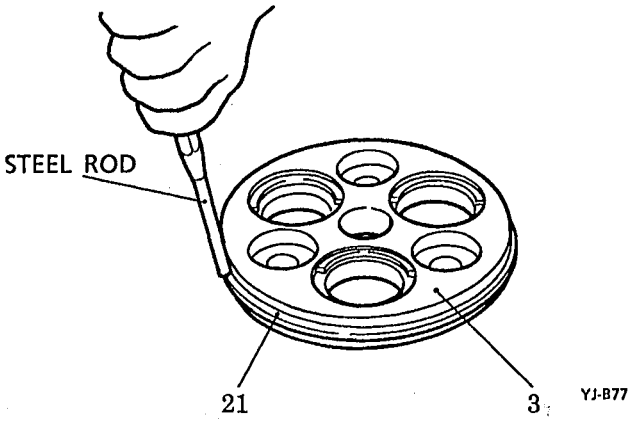


Fig. 91 Removing the inner race of taper roller bearing (21)

(25) Rough washing of parts.

1) Distinguish the four parts ; hub (1), spindle (2), cover (8), and rear flange (101) from other parts (hereunder called built-in parts).

2) Put the hub, spindle, cover and rear flange in a cleaning bath and clean them.

- Earth and sand are adhered to the outer surface of parts in some cases ; clean them and remove earth and sand form the parts.

3) Put the built-in parts in a rough cleaning container containing and clean the parts.

- If dirty parts are washed immediately in oil, they tend to be scored. Leave them immersed in light oil till dirt and oily matter get loosen and come to the surface.

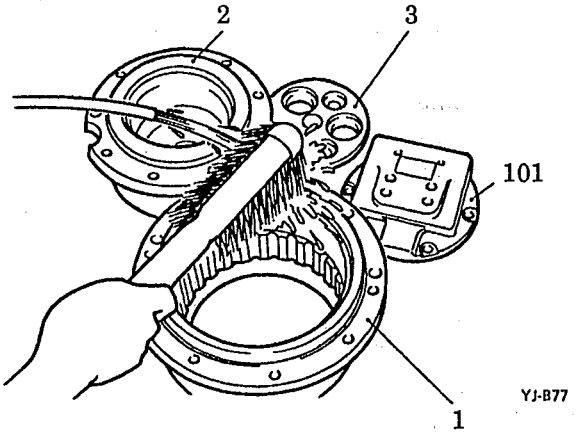
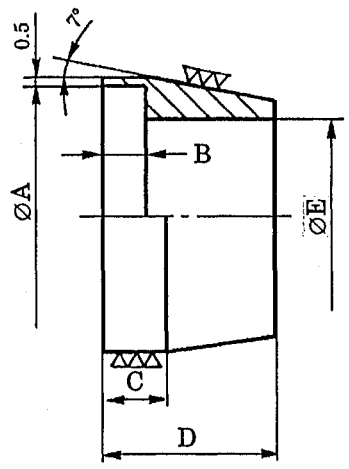


Fig. 92 Rough washing

6.3 SEAL RING (12) SLIDING JIG (III)

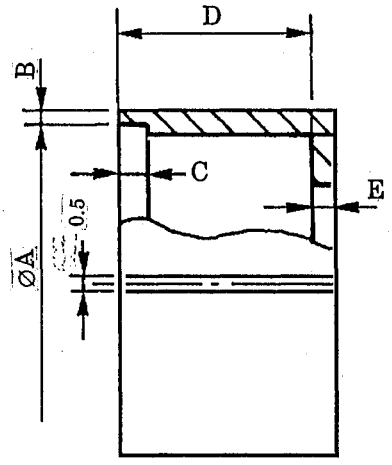


Material : STKM13A or equivalent

Unit : mm

NAME		SK40SR	SK45SR
Boom cylinder	A	89.7	99.7
	B	16.0	←
	C	21.0	
	D	77.0	
	E	75.0	84.0
Arm cylinder	A	79.7	89.7
	B	16.0	←
	C	21.0	
	D	77.0	
	E	65.0	75.0
Bucket cylinder	A	74.7	79.7
	B	16.0	←
	C	21.0	
	D	72.0	60.0
	E	60.0	65.0
Swing cylinder	A	99.7	104.7
	B	16.0	←
	C	21.0	
	D	77.0	85.0
	E	84.0	90.0
Dozer cylinder	A	89.7	94.5
	B	16.0	23.0
	C	21.0	28.0
	D	77.0	68.0
	E	75.0	64.0

6.4 SEAL RING (12) PUSHING JIG (IV)



Material : STKM13A or equivalent

Unit : mm

NAME		SK40SR	SK45SR
Boom cylinder	A	90.0	100.0
	B	1.0	←
	C	7.0	
	D	80.0	
	E	3.5	
Arm cylinder	A	80.0	90.0
	B	1.0	←
	C	7.0	
	D	80.0	
	E	3.5	
Bucket cylinder	A	75.0	80.0
	B	1.0	←
	C	7.0	
	D	80.0	
	E	3.5	
Swing cylinder	A	100.0	105.0
	B	1.0	←
	C	7.0	
	D	80.0	
	E	3.5	
Dozer cylinder	A	90.0	105.0
	B	1.0	←
	C	7.0	
	D	80.0	
	E	3.5	

3. Cooling Water, Lubricating Oil and Fuel Oil

3-1. Cooling water

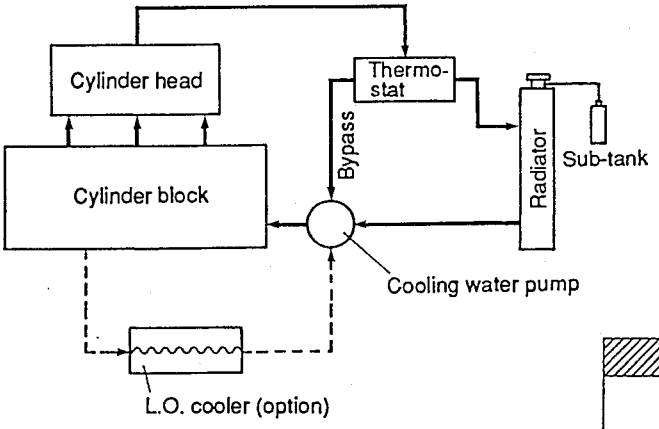
1. Proper use of cooling water

Impurities in cooling water are deposited in the engine and radiator in the form of scale and cause rusting. For this reason, heat conduction of the cooling system and cooling water flow are impaired, and cause cooling functions to reduce and the engine to overheat. Therefore, drain the cooling water at intervals of 400 hours or one year. Never use hard water as the cooling water.

In order to prevent the cooling water from freezing in cold weather, be sure to use an antifreeze agent. For further information on and proper usage and type of rust-preventive agents, antifreezes, and cleaning agents, contact your nearest dealer.

2. Cooling water system diagram

Indirect injection system and direct injection system



3-2. Lubricating oil

1. Proper use of lubricating oil

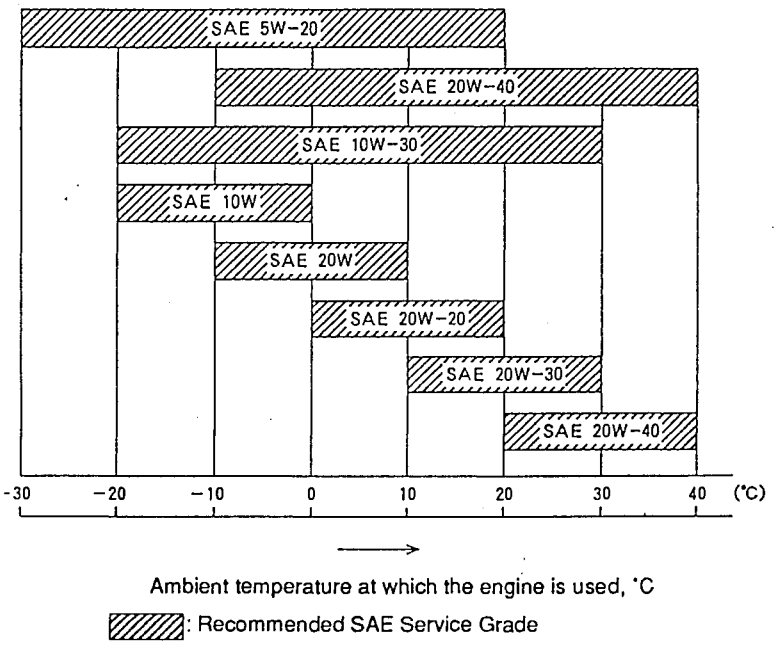
Use of proper lubricating oil brings about the following effects.

(1) The friction part of the engine is protected from friction and wear.
(2) The engine parts is protected from rusting and corrosion.
(3) The high temperature part of the engine is effectively cooled.
(4) The engine is protected from leakage of combustion gas.
(5) The engine parts are protected from sludge deposits.

For the above reasons, use lubricating oil API Service Classification Class CC or better.

[Reference : Lubricating oil to be used at ambient temperature]

Select the viscosity of lubricating oil depending on ambient temperature at which the engine is used, according to SAE Service Grade shown below.

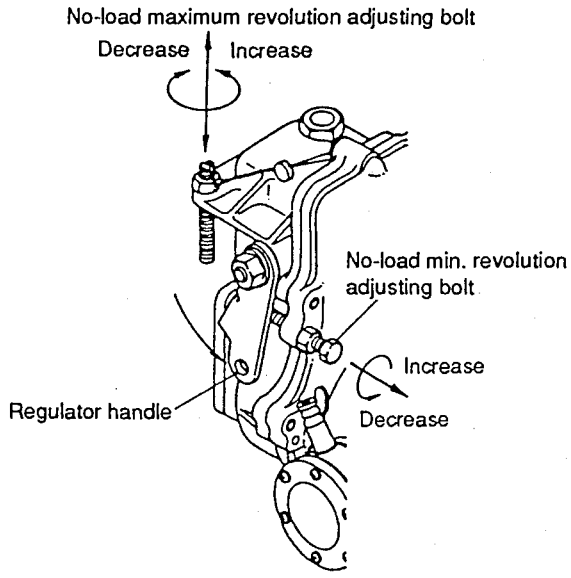


6-6. Adjusting the no-load maximum (or minimum) revolutions

(1) First warm up the engine. Then, gradually increase the engine speed up to the no-load max. revolution (Refer to Chapter 1, Specifications and Performance).

(2) If the present no-load max. revolution differ from the specified one, adjust the no-load max. revolution using the no-load max. revolution adjusting bolt.

(3) Set the engine to the idling revolution, (Refer to Chapter 1, Specifications and Performance) by turing the no-load min. revolution adjusting bolt.



✻ : *The illustration shows the partial perspective view of the governor for the direct injection system.*

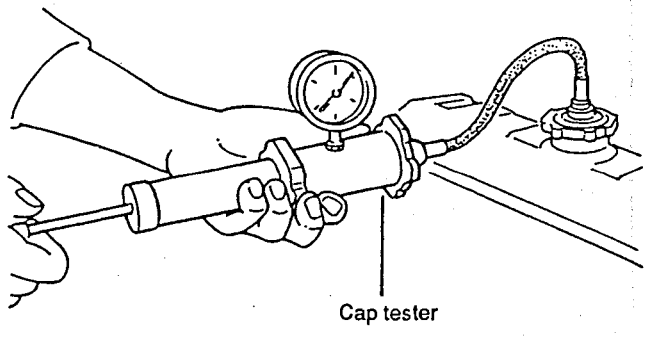
6-7. Checking the cooling water system and radiator for water leakage

1. Checking the cooling water system for water leakage

✻ : *The cooling water system can be checked effectively while the engine is warm.*

(1) Supply cooling water up to the normal water level in the radiator. Attach the cap tester body to the radiator.

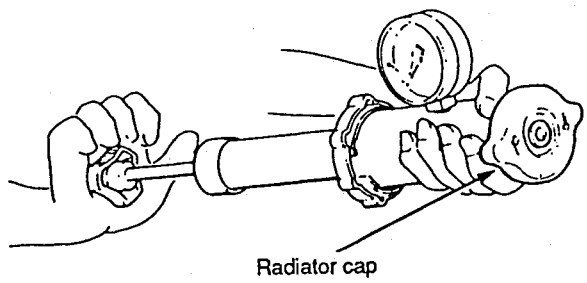
(2) Start the cooling water pump, and set it to a pressure of 0.9±0.15 kgf/cm². Any lower reading of the pressure gauge on the cap tester indicates water leak from the cooling water system. Then, detect the portion where cooling water leaks from the cooling water system.



(Checking the cooling water system for water leakage)

2. Checking the radiator cap

Attach the radiator cap to a cap tester. Set the tester to a pressure of 0.9±0.15 kgf/cm². Check to see if the cap is opened at the set pressure. If not, replace the cap, because it is defective.

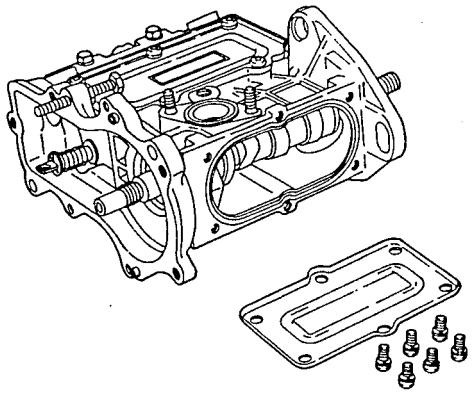


(Checking the radiator cap)

12-3. Disassembly

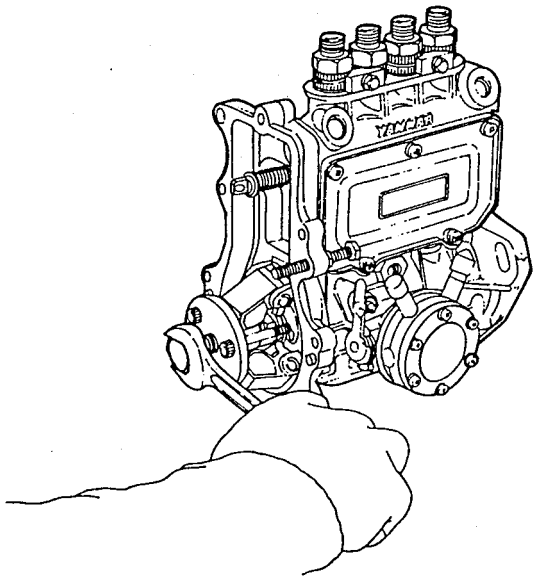
(1) Remove the bottom cover from the fuel injection pump to drain lubricating oil from the fuel injection pump.

(2) Turn the fuel injection pump upside down to drain fuel oil.



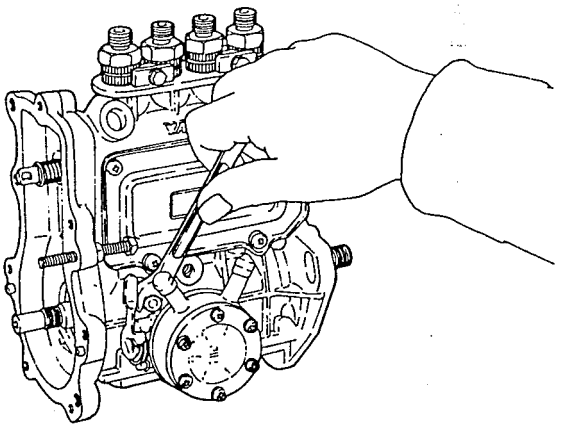
(3) Take out the governor weight assembly using the governor weight extractor tool (special service tool)

* *For separating the governor assembly from the fuel injection pump, refer to Chapter 13, 13-3.*



(4) Remove the fuel feed pump.

* *Do not disassemble the fuel feed pump.*



(5) Remove the fuel injection pump side cover.