KM024-00

UH172

UH172 SPECIFICATIONS

1. ENGINE (Machine Serial No. 869∿)

For more details of Engine Service Data, please refer to ISUZU WORKSHOP MANUAL.

1.1 Main specifications

Model	ISUZU E120 TPZ
Type	4-stroke, water-cooled, in-line overhead valve, open type combustion chamber with turbo-charger
Cyl. nos. - bore & stroke	6 - 135 mm & 140 mm
Total piston displacement	12023 cm^3
Compression ratio	16.5 : 1
Engine performance	
. Test condition	With 760 mm dia. draw-in type fan and 24V - 450W AC generator, without air cleaner and silencer
. Rated flywheel horsepower	$169.05^{+3.7}_{-0}$ KW(230^{+5}_{-0}PS)1950min^{-1}(rpm)
. Max. torque	Not less than 853Nm(87kgfm)/1400min^{-1}(rpm)
. Fuel consumption rate	Less than 238g/kW.hr (175g/PS.hr)
. No load max. rpm	2130±30 min^{-1}(rpm)
. No load min. rpm	650±50 min^{-1} (rpm)
Dry weight	1080 kg including air cleaner
Dimensions	Overall length ; width; height 1507.5 ; 925 ; 1750 mm
Firing order	1-4-2-6-3-5
Rotation direction	Clockwise (viewed from fan)
Super charging system	
. Model	ISHIKAWAJIMA RH09-26
. Type	Turbo-charger, forced lubrication
Fuel system	
. Injection pump	
Model	DIESEL KIKI NP-6P115/721RS1NP94 (ISUZU P/N 1-15600-849-0)
Type	Bosch type, in-line
Plunger	Dia. 11.5 mm, stroke 10 mm
. Injection nozzle	Engine Serial No. ∿ E503952
Model	DIESEL KIKI NP-DLLA150S384NP13 (ISUZU P/N 915311-3660) Engine Serial No. E503953 ∿ DIESEL KIKI NP-DLLA150S384NP73 (ISUZU P/N 115311-0730)
Type	Multiple hole type

UH172 SPECIFICATIONS

8. PREFERENCE VALVE (B) Machine Serial No. ～ 998)

Leading pilot pressure to parking brake

REDUCING VALVE (Machine Serial No. 999～)

Set pressure 11～15 bar (kgf/cm^2)

9. ACCUMULATOR

Oil cylinder capacity 1ℓ

Air cylinder capacity 2.27ℓ

10. PILOT VALVE

Model

. Left pilot valve HV PL B (Arm, Swing)

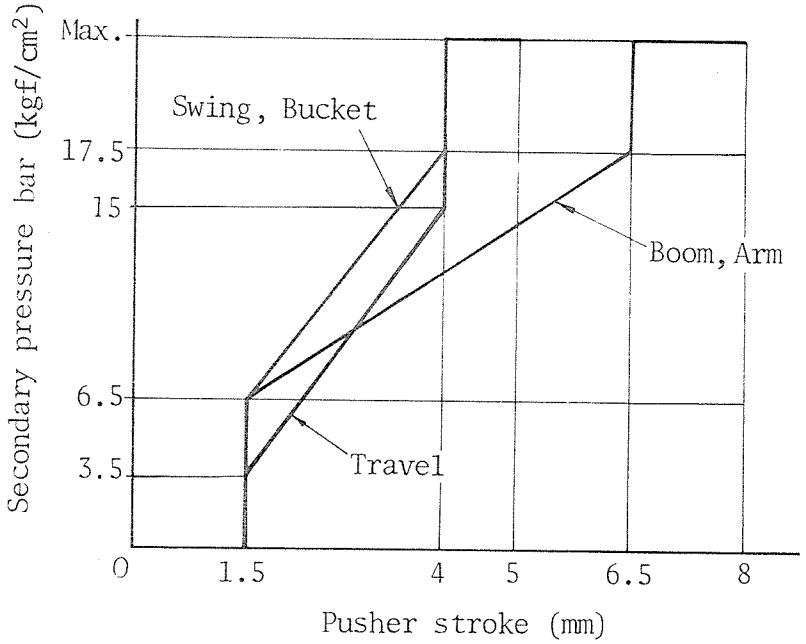
. Center front pilot valve HV PS A (Travel)

. Right pilot valve HV PR B (Boom, Bucket)

. Center rear pilot valve HV PB B (Loader bucket open and close)

Type Mono-block with 4-spool (for loader pilot valve: 2-spool)

Performance



11. SHUTTLE VALVE (A) 2-poppet included, for leading all pilot pressures to main pump regulators as an external pilot prsssure

12. SHUTTLE VALVE (B) 2-poppet included, for leading swing and arm roll-out pilot pressure to switch valve for swing independent operation

13. SHUTTLV VALVE (C) Single poppet for leading pilot pressure oil of boom raising and arm roll-out to switch valve

14. PREFERENCE VALVE (A) 2-spool included, for leading arm pilot pressure to arm (II) control valve

UH172 OPERATIONAL PRINCIPLE

CONTENTS

PILOT VALVE PERFORMANCE

The secondary pilot pressure is varied in proportion to the lever stroke of pilot valve.

As the springs provided in the pilot valves for controlling travel, arm and boom, bucket and swing are different in the co-efficient, and their performances are also different as shown in Fig. 8.

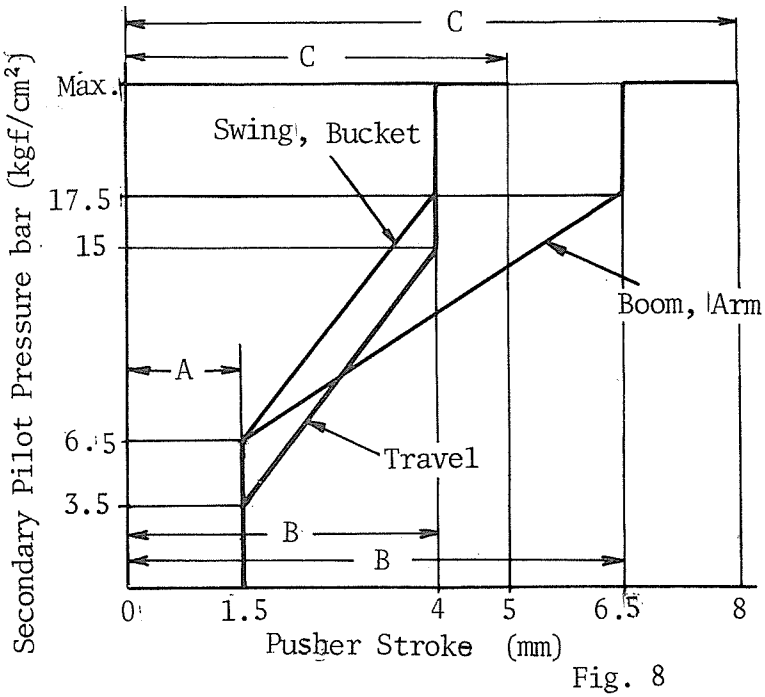
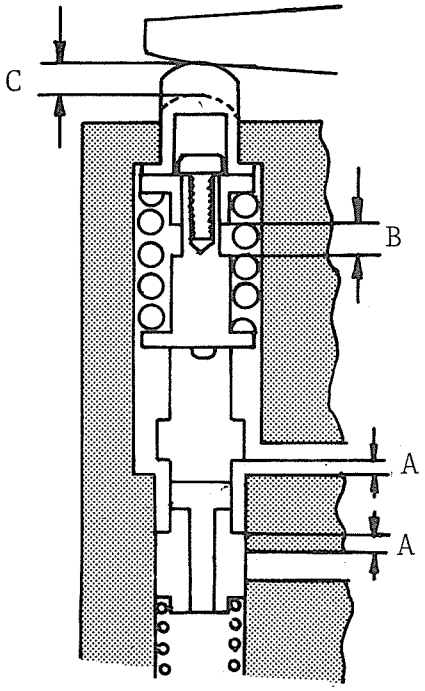


Fig. 8



MAIN PUMP DISPLACEMENT CONTROL

When any pilot valve is operated, the secondary pilot pressure is fed to the control valve spool end chamber to move its spool which is moved in proportion to the secondary pilot pressure magnitude.

Accordingly, the main hydraulic pressure oil from the main pump to the control valve inlet port flows into the actuator to provide the function, producing a functioning speed commensurate with the amount of control lever movement.

This pilot pressure fed to the main control valve spool end chamber is also charged -- via port "5" of each pilot valve and shuttle valve (A) -- to the pilot port "P_i" of upper and lower sides of main pump regulators as shown in Fig. 9.

If this external pilot pressure to the regulator is small, the angle of inclination of the main pump swashplate becomes small, and so does the main pump displacement; if this pressure is great, the swashplate inclination angle becomes large, and so does the displacement.

Since this magnitude of the pilot pressure controls both the control valve opening and the main pump displacement in the above manner, excellent inching performance is obtained.

The performance of the main pump is shown in the chapter of SPECIFICATIONS.

FILTER BYPASS CIRCUIT

If the full-flow filter element is clogged by dust and foreign particles which may be contained in the oil, the pressure difference between the port "IN" and "OUT" is raised. When this pressure difference attains 1.3 bar (kg/cm^2), the filter bypass valve will work to release the pressure, this results in the oil flowing to the port "OUT" directly, not through the filter element as shown in Fig. 20.

This filter is provided with an alarm switch which will be triggered at the time of filter clogging.

When the alarm switch is turned on, the alarm lamp which is installed on the control panel in the cab is lit to let the operator know that the filter is clogging.

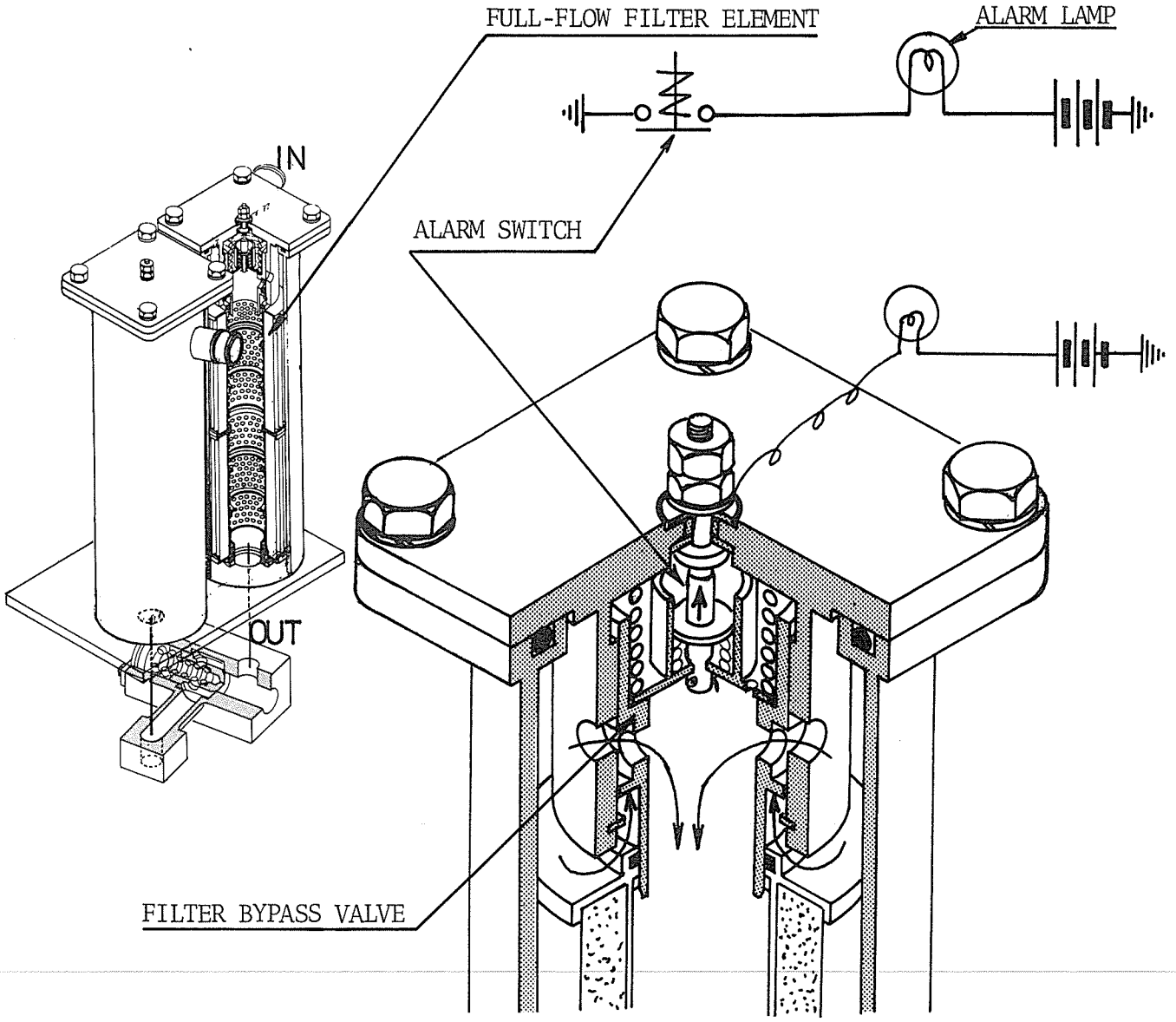


Fig. 20

SWING AND ARM ROLL-OUT OPERATION

Actuating pumps [with arm roll-out pilot pressure below 11 bar (kgf/cm^2)];
(1) Upper and lower auxiliary pumps for swing in exclusive use.
(2) Upper and lower main pumps for arm roll-out in exclusive use.

Actuating pumps [with arm roll-out pilot pressure over 11 bar (kgf/cm^2)];
Upper and lower main pumps and auxiliary pumps for swing and arm roll-out in combined use.

Operating the control lever of the left pilot valve to right (left) swing and arm roll-out simultaneously, the swing pilot pressure oil from port "4" ("2") of the left pilot valve is fed to spool end chamber "R" ("L") of the swing control valve, and the arm roll-out pilot pressure oil from port "1" of the same pilot valve is fed to spool end chamber "0" of the arm (I) control valve and to spool end chamber "0'" of the arm (II) control valve through the preference valve (A) and the slow-return valve (A).

At the same time the swing pilot pressure oil is directed to the switch valve to move its spools as explained in the paragraph of SWING OPERATION ONLY, and the arm roll-out pilot pressure is directed to port "b" of the switch valve through the shuttle valve (C).

When this arm roll-out pilot pressure below 11 bar (kgf/cm^2), No. 2 spool of the switch valve does not move, thus allowing the discharged oil from the upper and lower auxiliary pumps to flow exclusively into the swing motors through the swing control valve.

Accordingly, the arm cylinder is actuated exclusively by the upper and lower main pumps.

When the arm roll-out pilot pressure attains 11 bar (kgf/cm^2), No. 2 spool of switch valve is moved to lead a part of the discharged oil of the auxiliary pumps into the arm cylinder through the arm (I) control valve. That is, the discharged oil of the auxiliary pumps actuates both swing motors and arm cylinder as shown in Fig. 28.

If an unacceptable shock is felt from the arm cylinder motion by returning the swing control lever to the neutral position, adjust and restrict the oil passage holes in the slow-return valve (B) so that the pilot pressure in the ports "a" and "c" of the switch valve drops slowly.

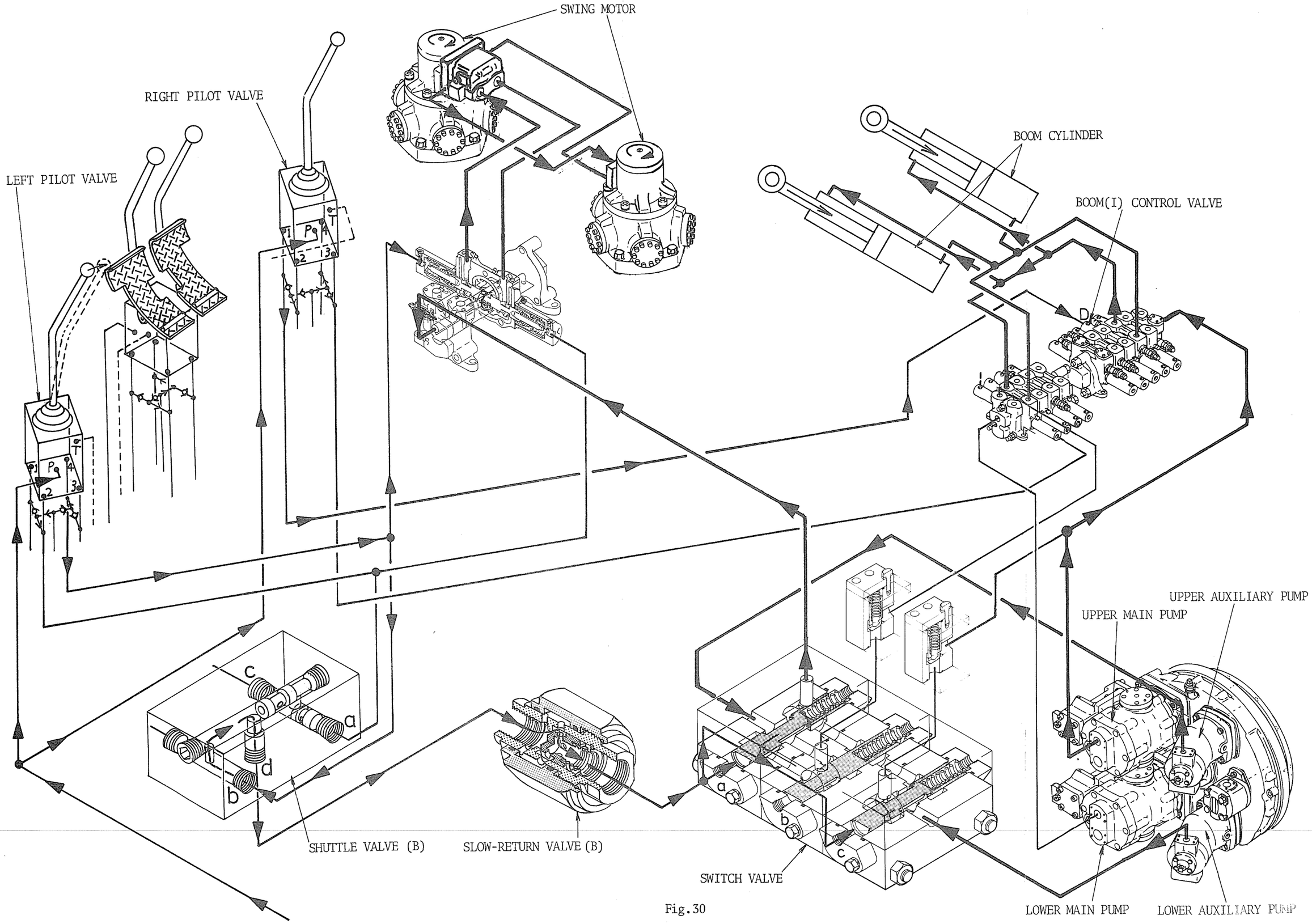

SWING MOTOR
RIGHT PILOT VALVE
LEFT PILOT VALVE
BOOM CYLINDER
BOOM(I) CONTROL VALVE
UPPER AUXILIARY PUMP
UPPER MAIN PUMP
SHUTTLE VALVE (B)
SLOW-RETURN VALVE (B)
SWITCH VALVE
LOWER MAIN PUMP
LOWER AUXILIARY PUMP

Fig.30

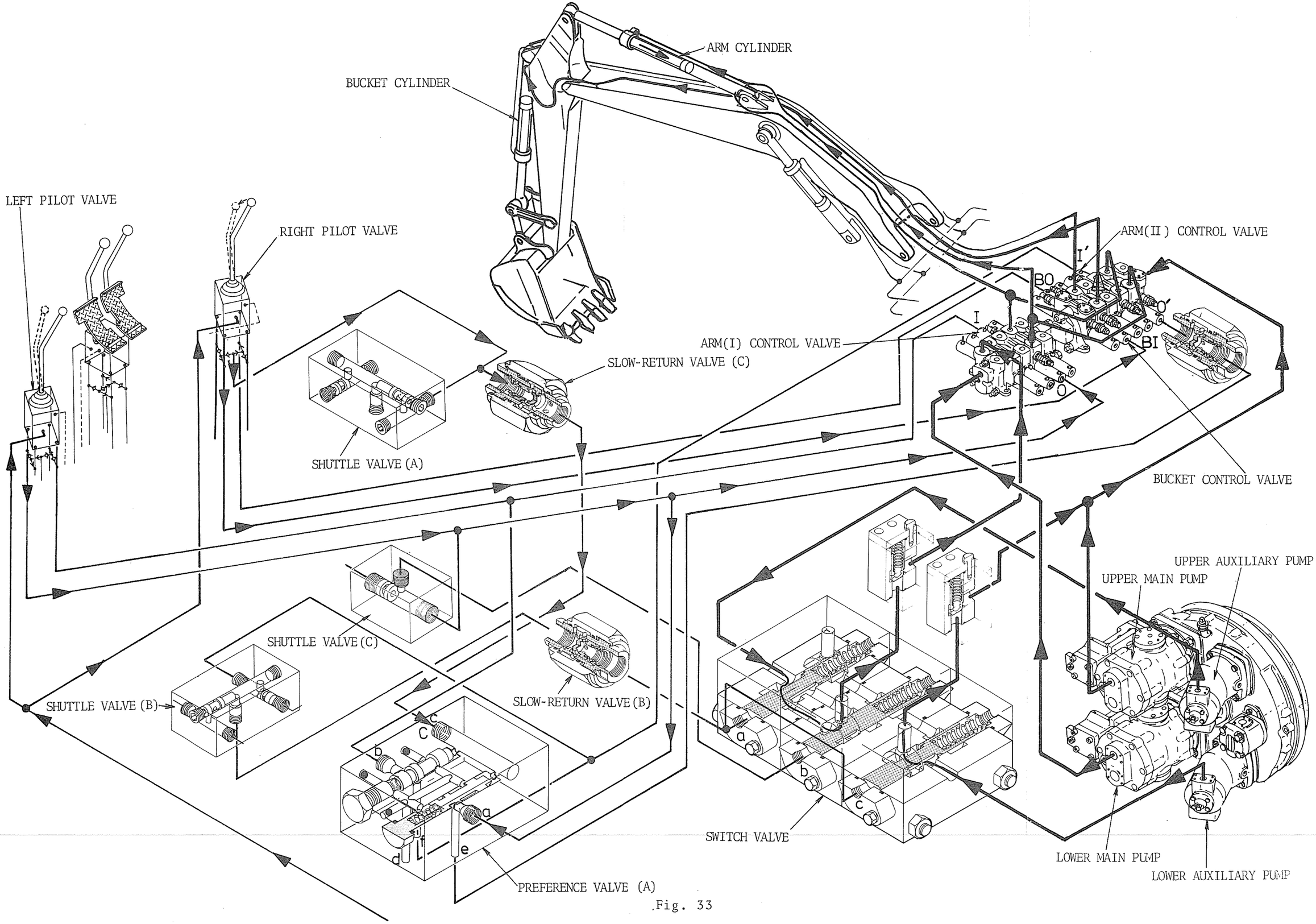

ARM CYLINDER
BUCKET CYLINDER
LEFT PILOT VALVE
RIGHT PILOT VALVE
ARM(II) CONTROL VALVE
ARM(I) CONTROL VALVE
SLOW-RETURN VALVE (C)
SHUTTLE VALVE (A)
BUCKET CONTROL VALVE
UPPER AUXILIARY PUMP
UPPER MAIN PUMP
SHUTTLE VALVE (C)
SHUTTLE VALVE (B)
SLOW-RETURN VALVE (B)
SWITCH VALVE
LOWER MAIN PUMP
LOWER AUXILIARY PUMP
PREFERENCE VALVE (A)

Fig. 33

BOOM RAISING (HIGH SPEED) OPERATION ONLY

Actuating pump; All hydraulic pumps (upper and lower main pumps and auxiliary pumps)

When the boom raising pilot pressure attains 9.8 bar (kgf/cm^2), the boom(II)control valve spool in the left control valve port "BU' " begins connection with port "P", allowing the discharged oil of the lower main pump and upper auxiliary pump to be combined with those of the upper main pump and the lower auxiliary pump to provide a high speed boom raising operation.

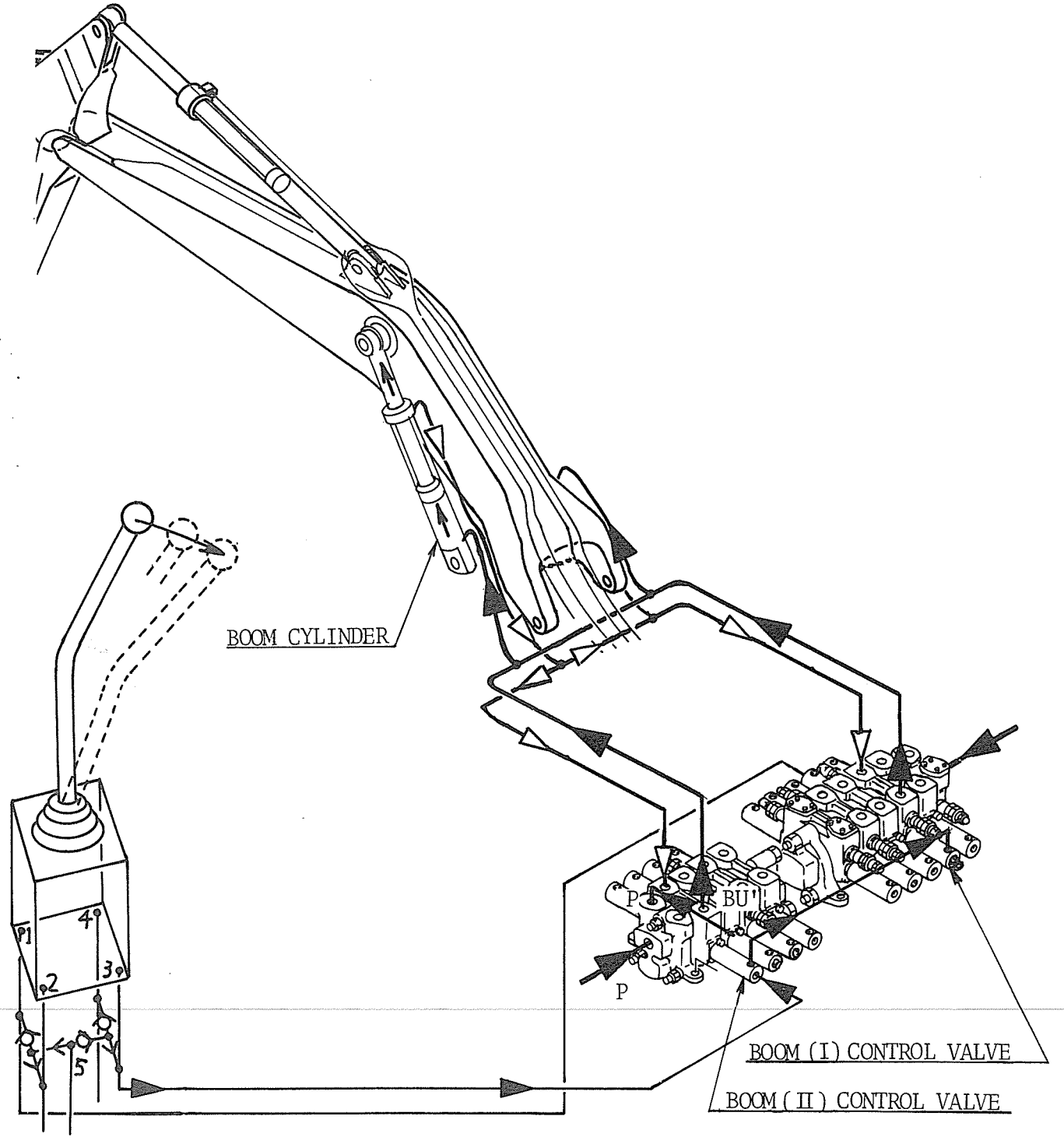


Fig. 42

UH172 GENERAL

The compressed air accumulated in the air tank is reduced to 1.2 bar (kgf/cm^2) and is supplied to an air chamber of the hydraulic tank through the check valve. Since the oil level in the hydraulic tank is varied due to the actuator movement, the air pressure in the air chamber of the hydraulic tnak is also varied in proportion to the oil level. Consequently the hydraulic tank provides low-pressure safety valve to maintain the pressure in the tank below 1.8 bar (kgf/cm^2) by releasing excessive air to the atomosphere.

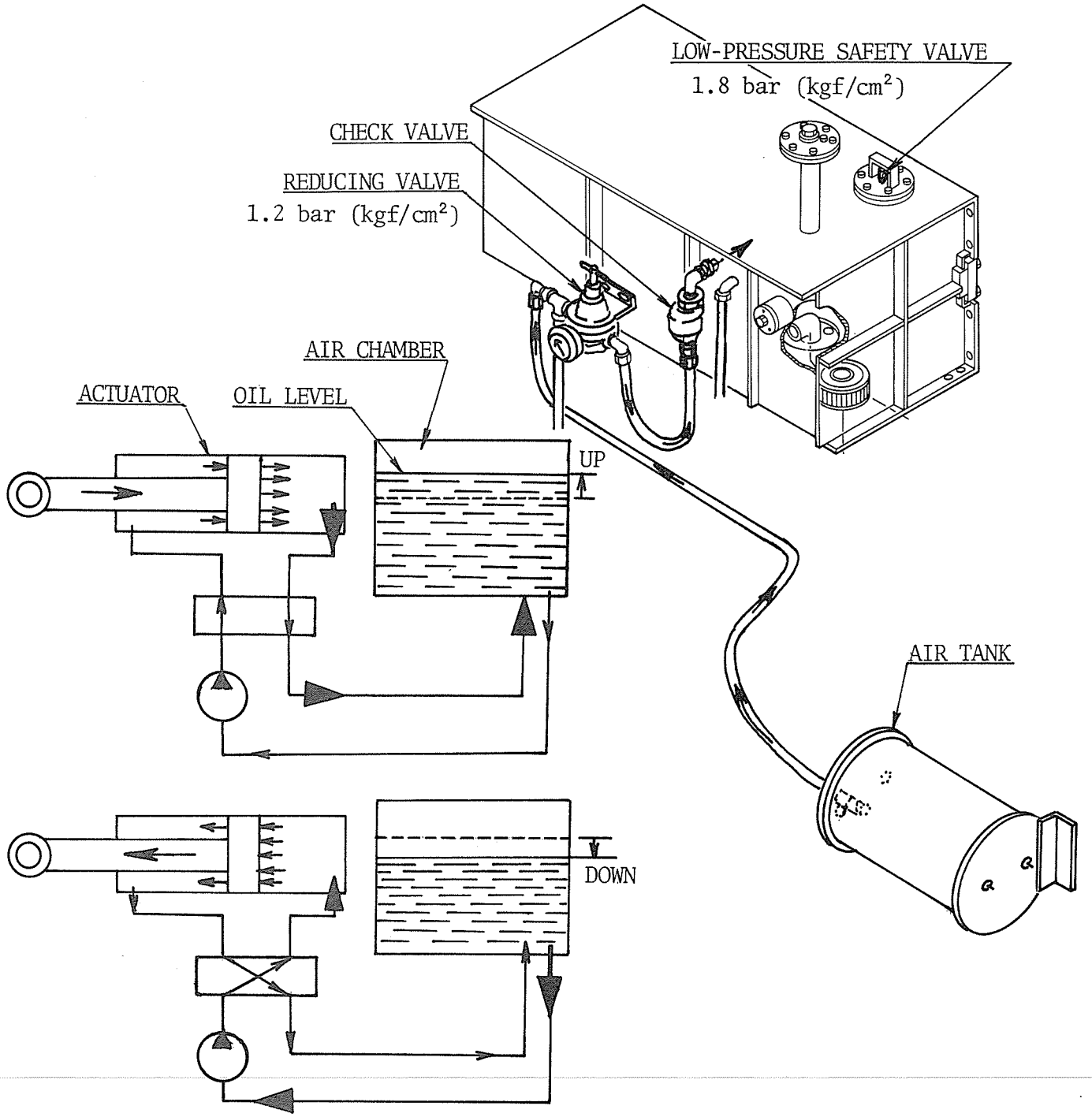


Fig. 49

UH172 AIR CIRCUIT

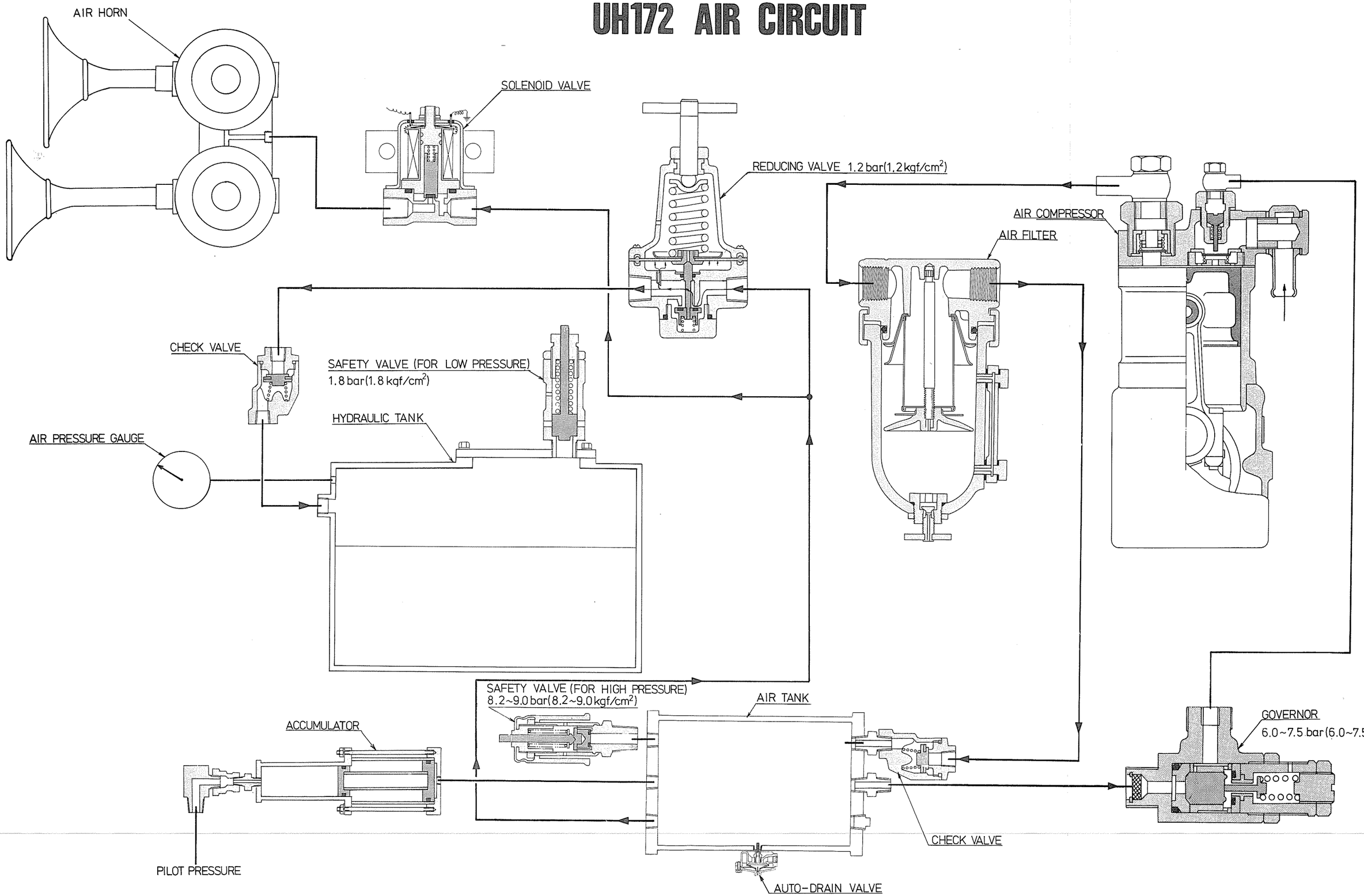


Fig. 60

SWING REDUCTION MECHANISM

The rotation of the hydraulic motor is transmitted to the sun gear (06). As the sun gear meshes with the three planetary gears (05) which mesh with the stational ring gear (04), the motor rotation is transmitted to the planetary gears to rotate output shaft (31).

Since the pinion installed on the output shaft meshes with the internal gear of swing bearing which is bolted on the track frame, the pinion runs along the swing bearing, thus obtaining swing motion.

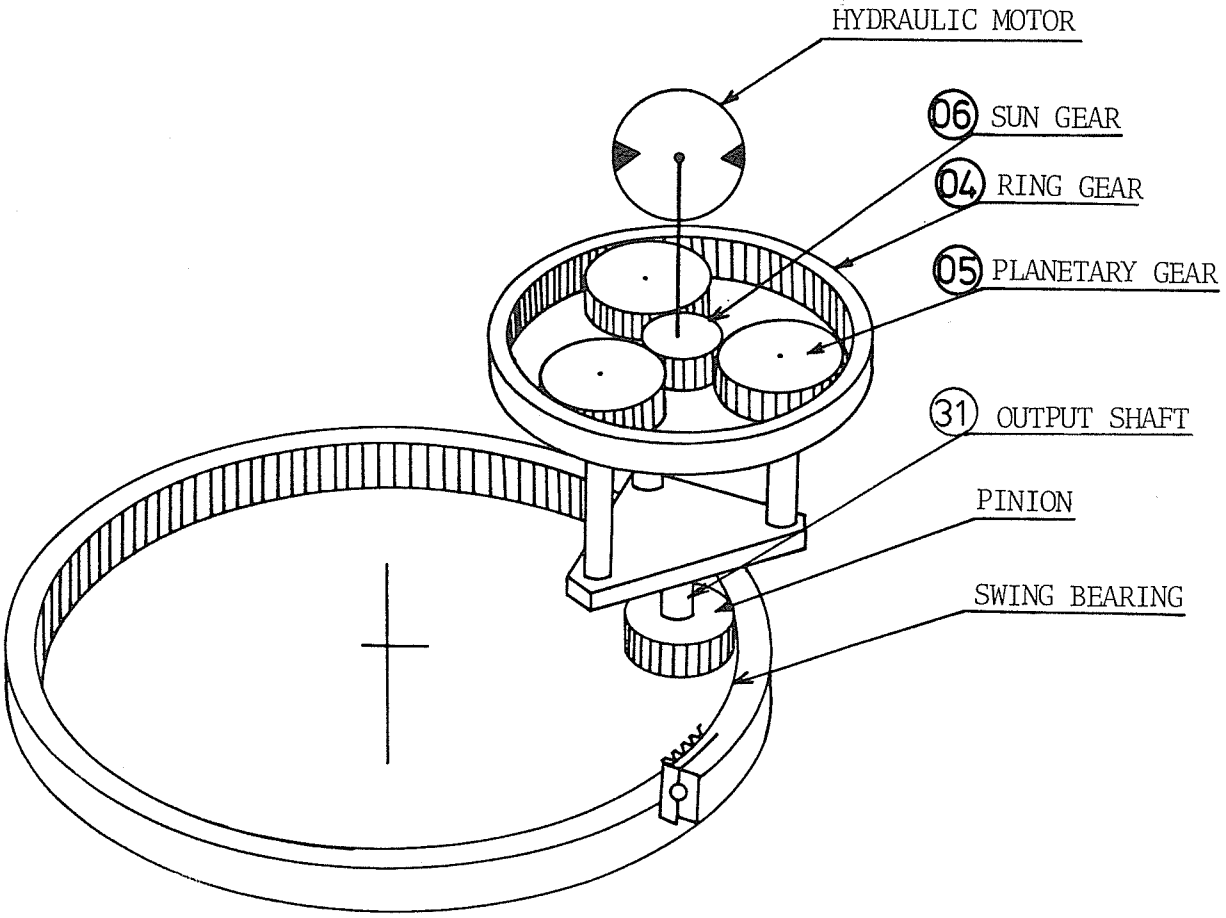


Fig. 70

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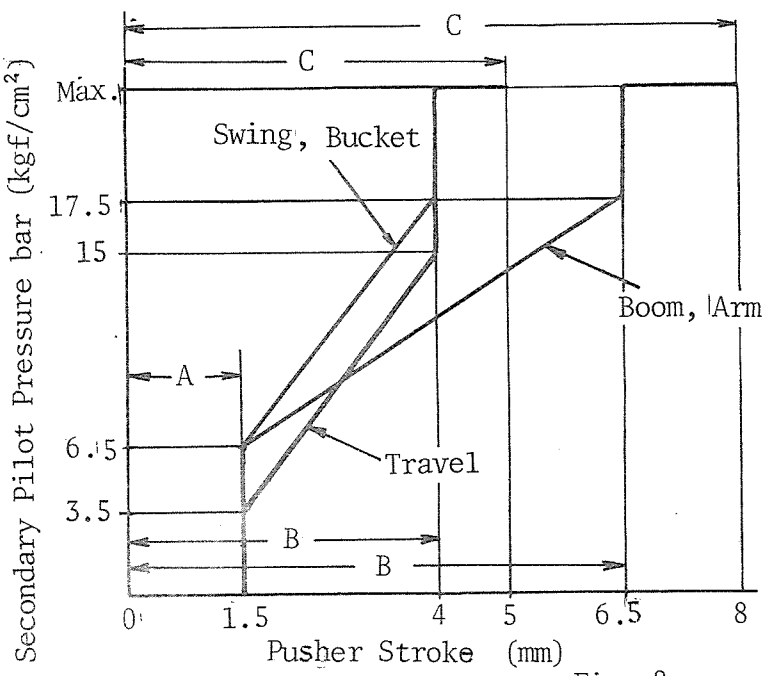

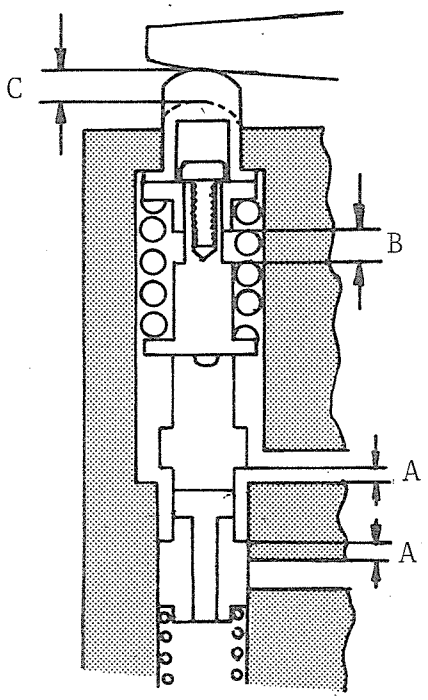

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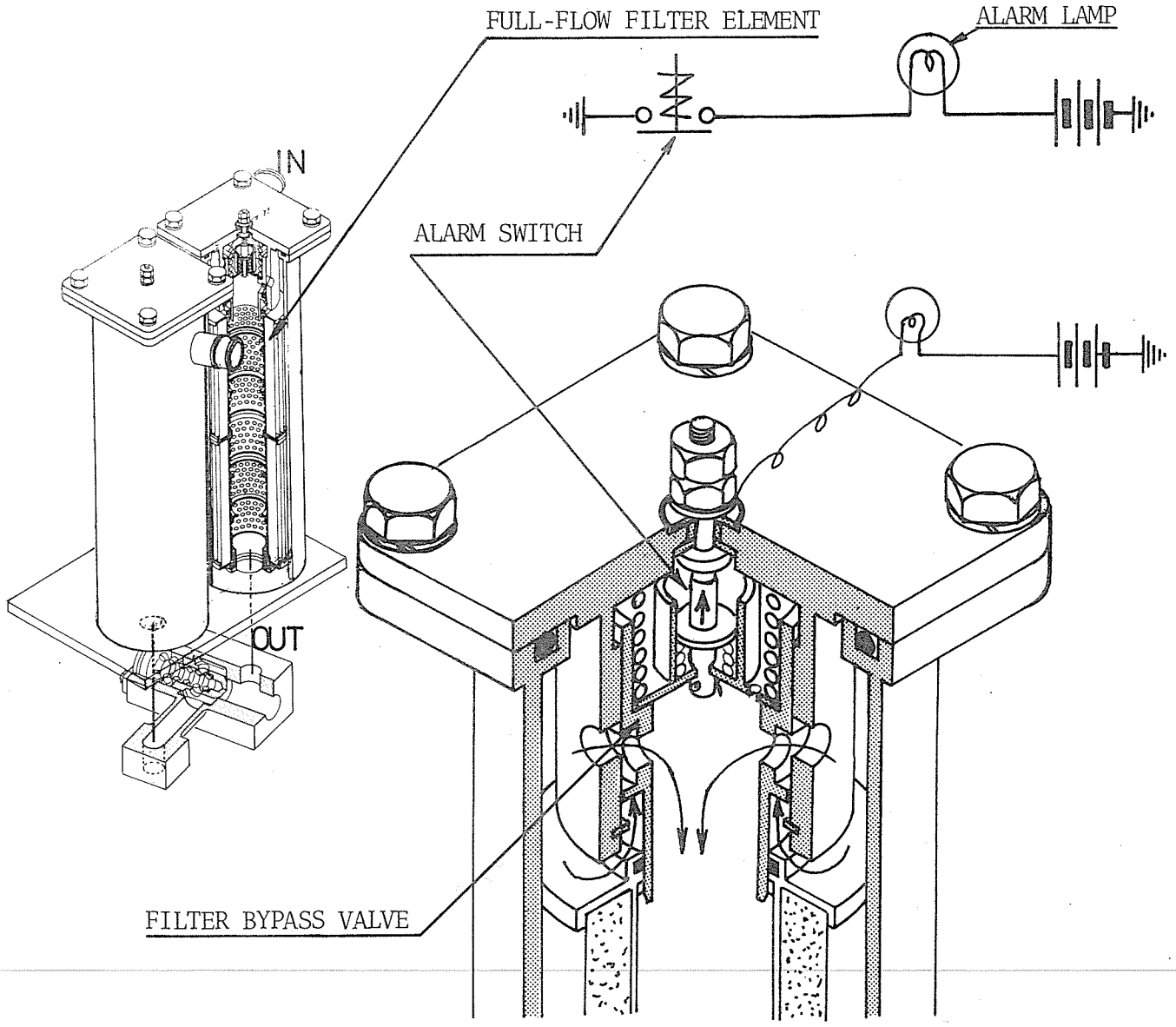

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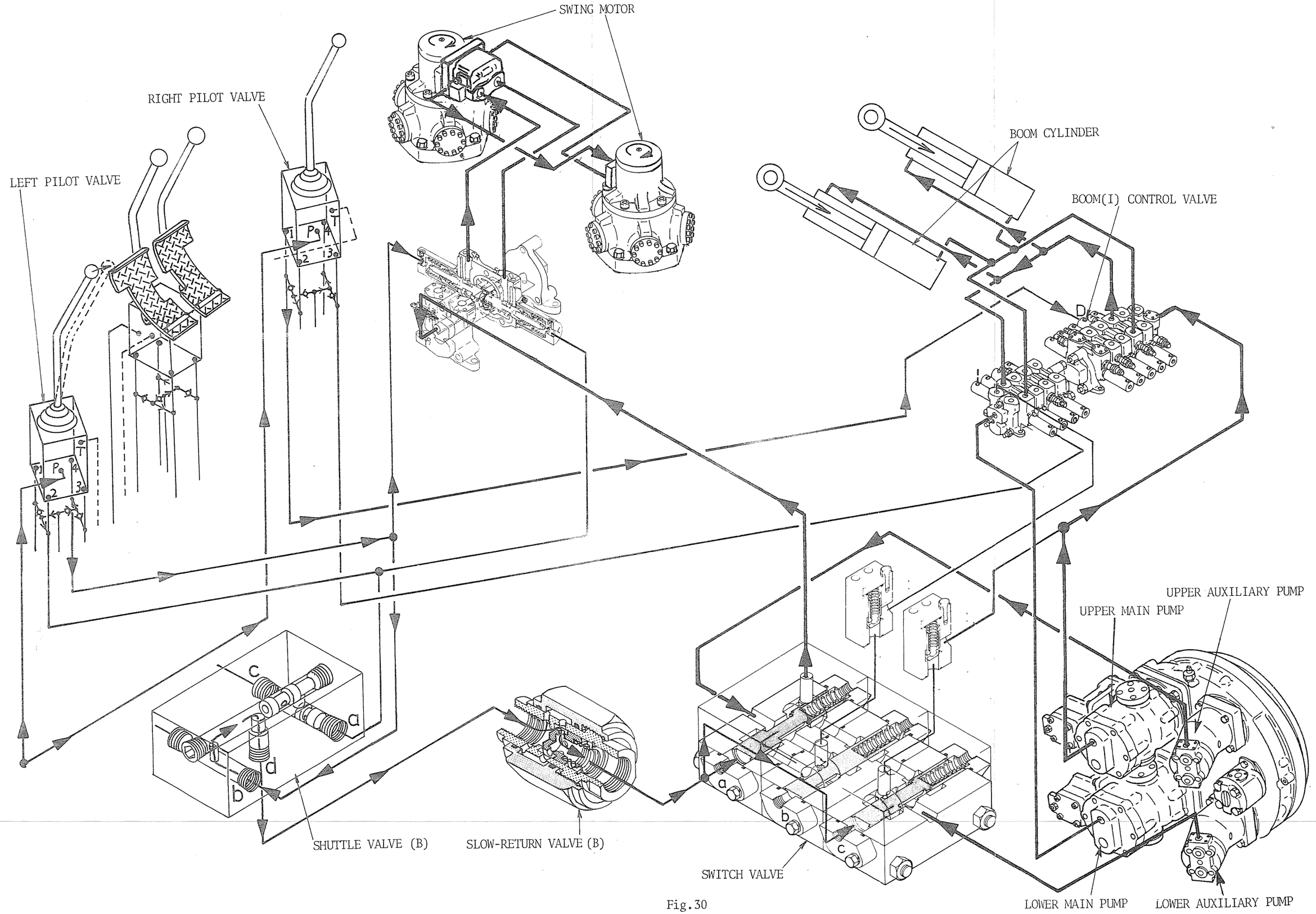
SWING MOTOR
RIGHT PILOT VALVE
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BOOM(I) CONTROL VALVE
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SHUTTLE VALVE (B)
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LOWER AUXILIARY PUMP

Fig.30

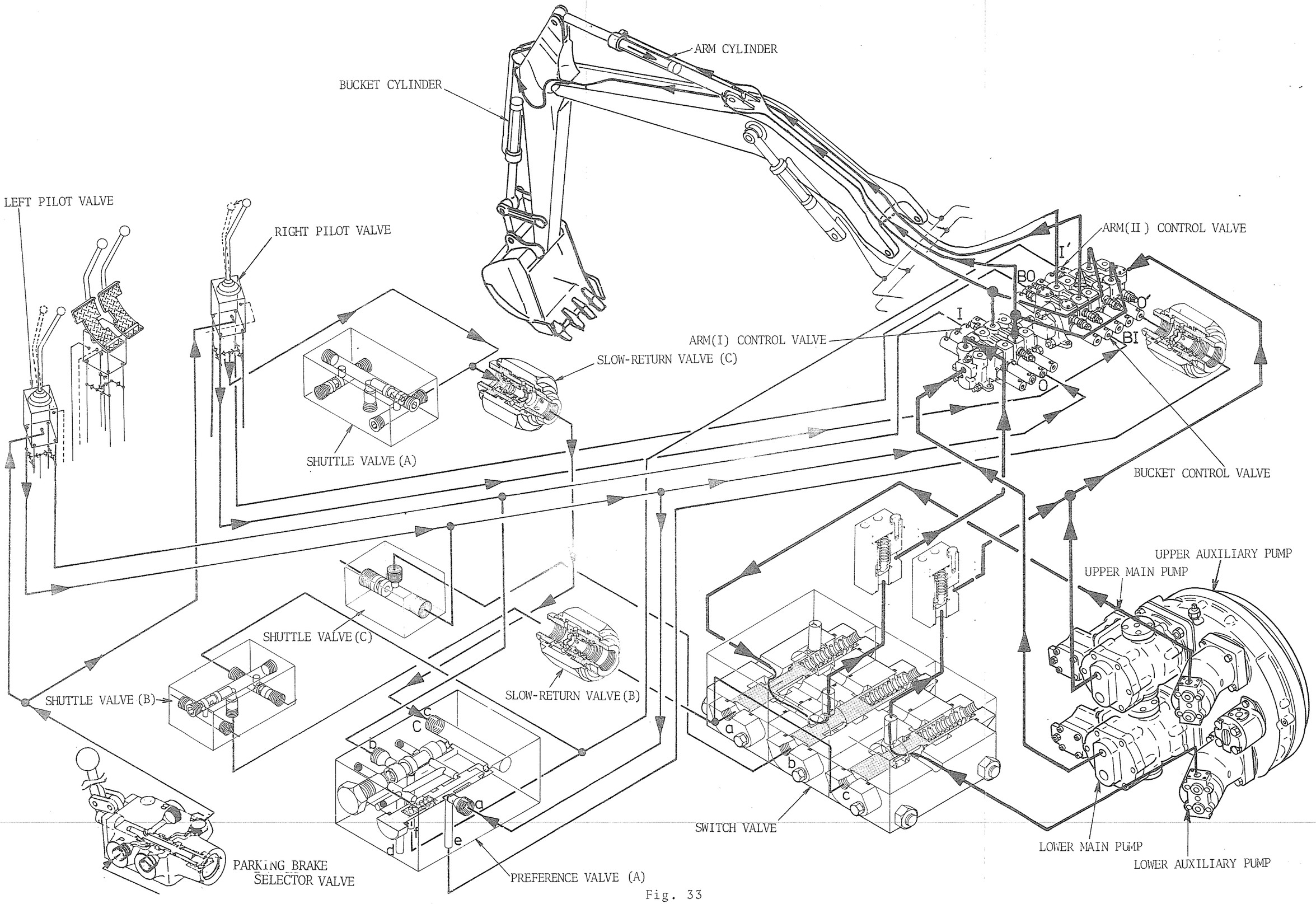
ARM CYLINDER
BUCKET CYLINDER
LEFT PILOT VALVE
RIGHT PILOT VALVE
ARM(II) CONTROL VALVE
ARM(I) CONTROL VALVE
SLOW-RETURN VALVE (C)
SHUTTLE VALVE (A)
BUCKET CONTROL VALVE
UPPER AUXILIARY PUMP
UPPER MAIN PUMP
SHUTTLE VALVE (C)
SHUTTLE VALVE (B)
SLOW-RETURN VALVE (B)
SWITCH VALVE
LOWER MAIN PUMP
LOWER AUXILIARY PUMP
PARKING BRAKE SELECTOR VALVE
PREFERENCE VALVE (A)

Fig. 33

BOOM RAISING (HIGH SPEED) OPERATION ONLY

Actuating pump; All hydraulic pumps (upper and lower main pumps and auxiliary pumps)

When the boom raising pilot pressure attains 9.8 bar (kgf/cm^2), the boom(II)control valve spool in the left control valve port "BU' " begins connection with port "P", allowing the discharged oil of the lower main pump and upper auxiliary pump to be combined with those of the upper main pump and the lower auxiliary pump to provide a high speed boom raising operation.

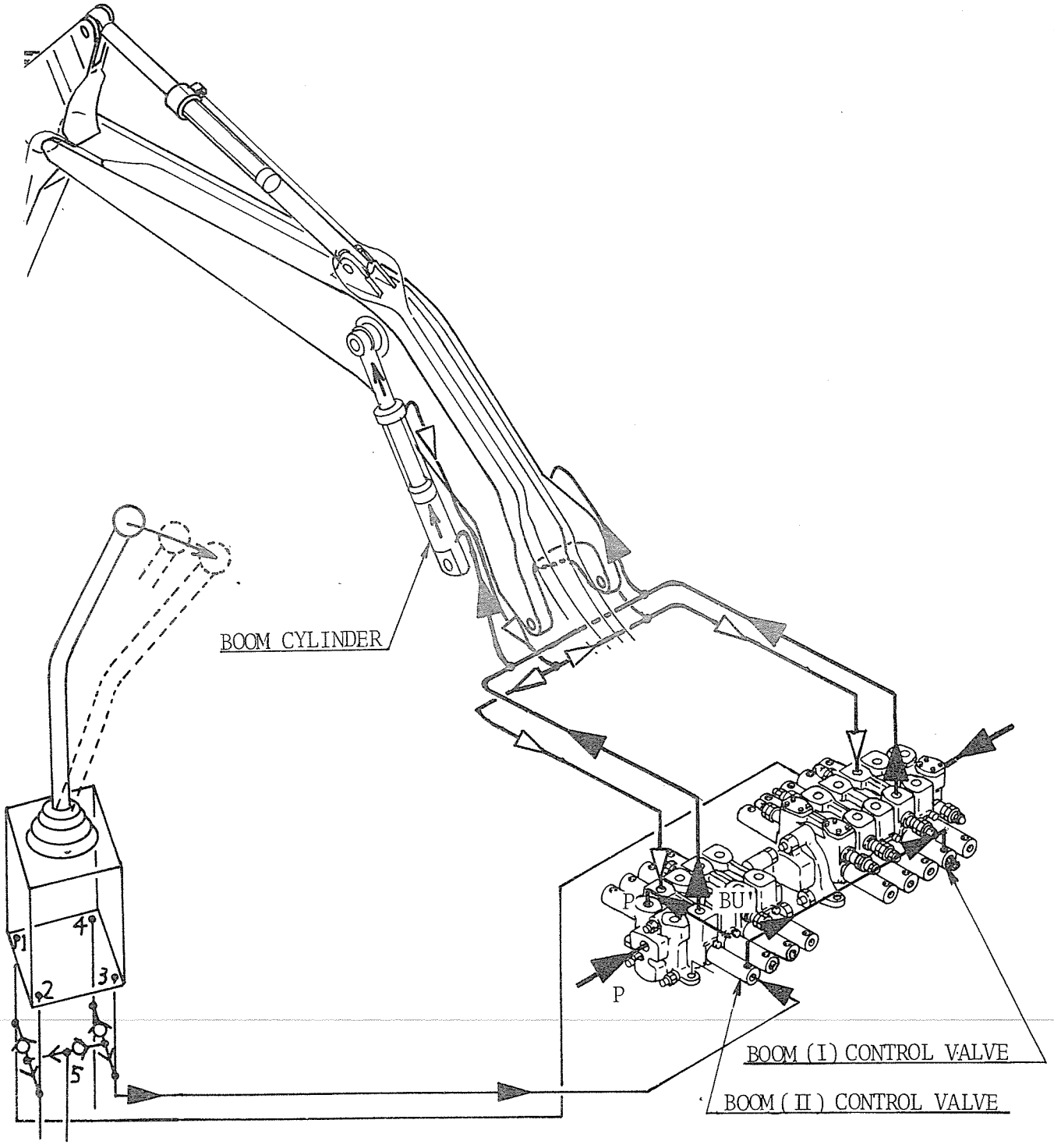

Fig. 42

UH172 GENERAL

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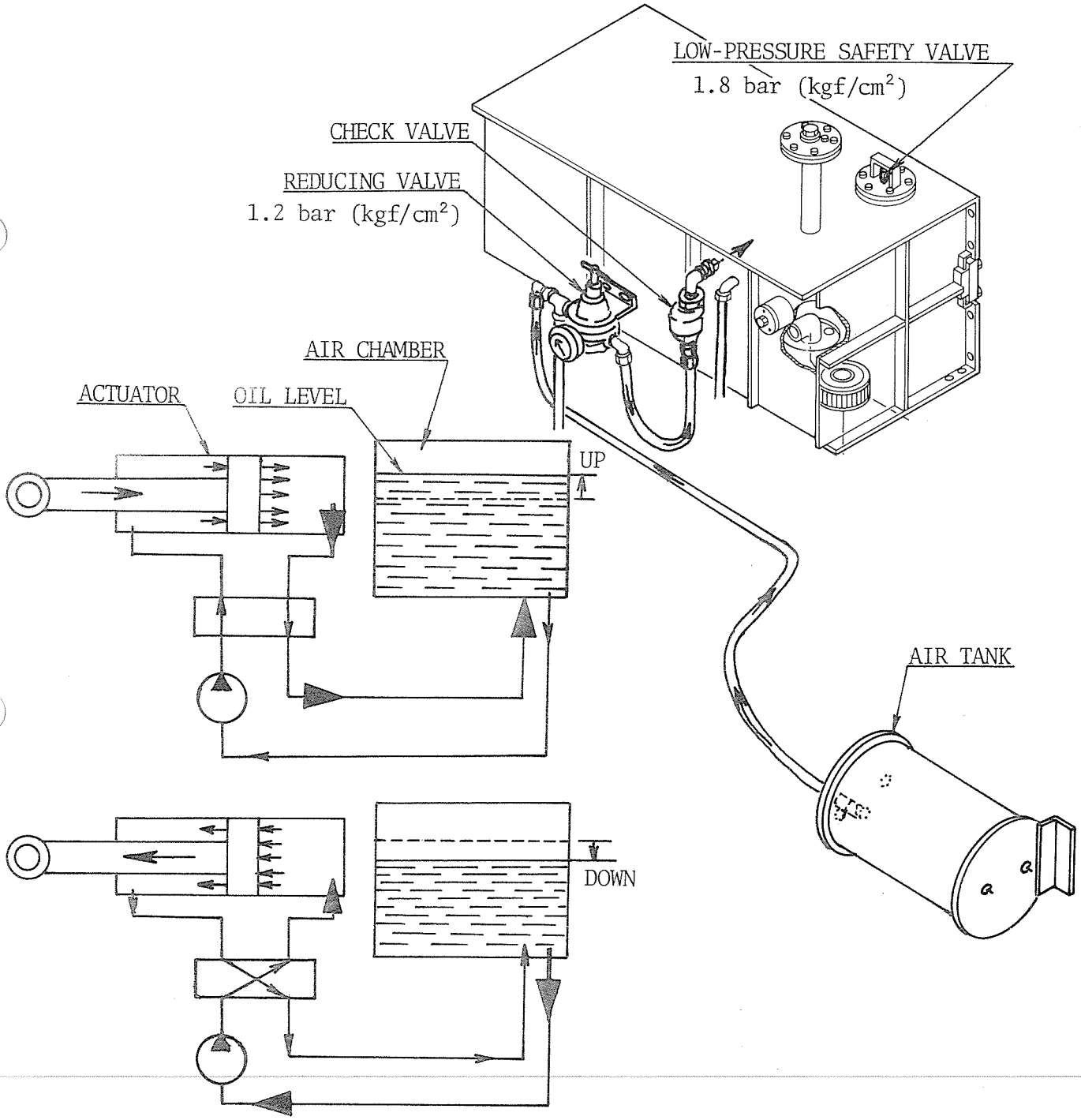


Fig. 49

UH172 AIR CIRCUIT

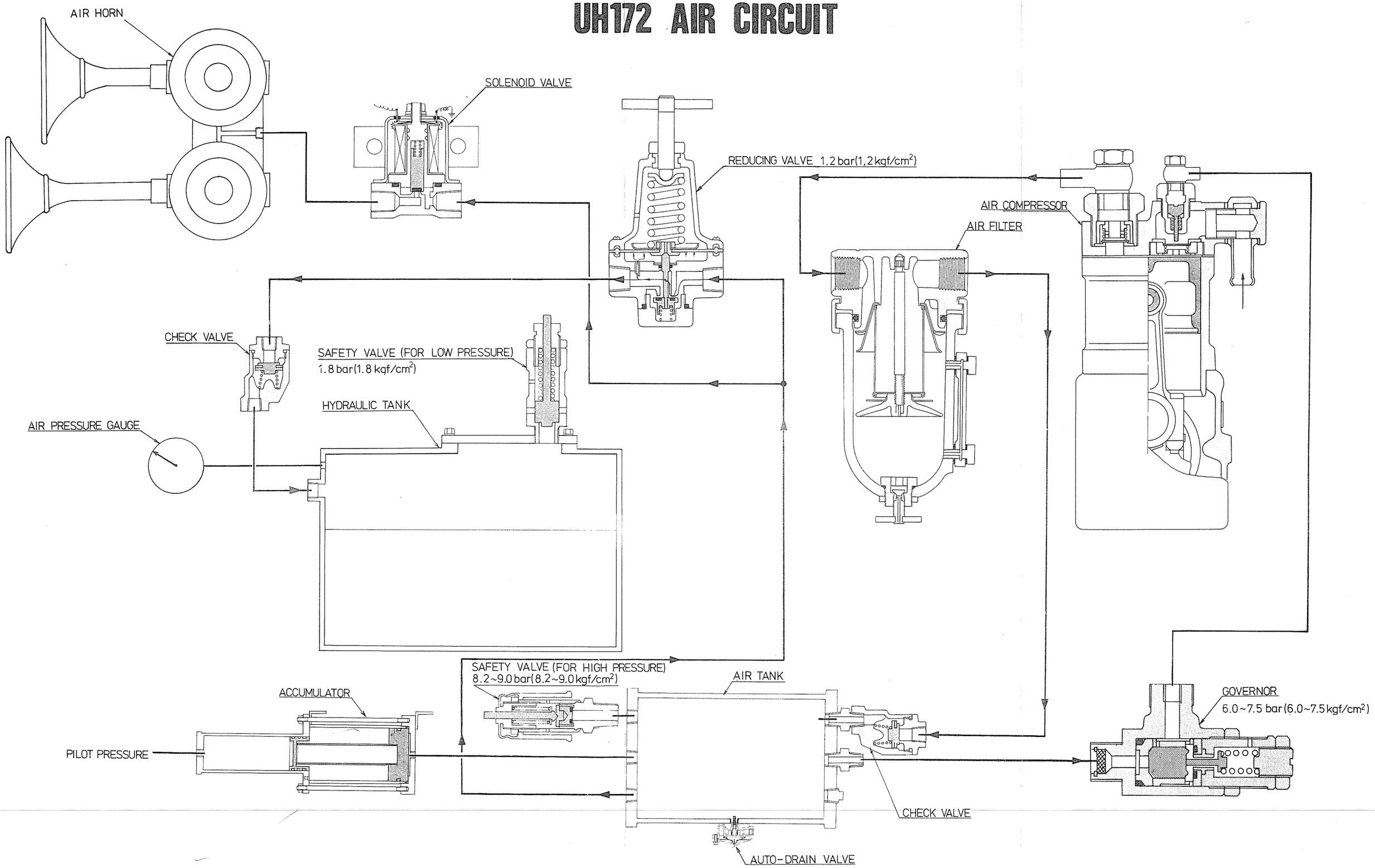


Fig. 60

SWING REDUCTION MECHANISM

The rotation of the hydraulic motor is transmitted to the sun gear (06). As the sun gear meshes with the three planetary gears (05) which mesh with the stational ring gear (04), the motor rotation is transmitted to the planetary gears to rotate output shaft (31).

Since the pinion installed on the output shaft meshes with the internal gear of swing bearing which is bolted on the track frame, the pinion runs along the swing bearing, thus obtaining swing motion.

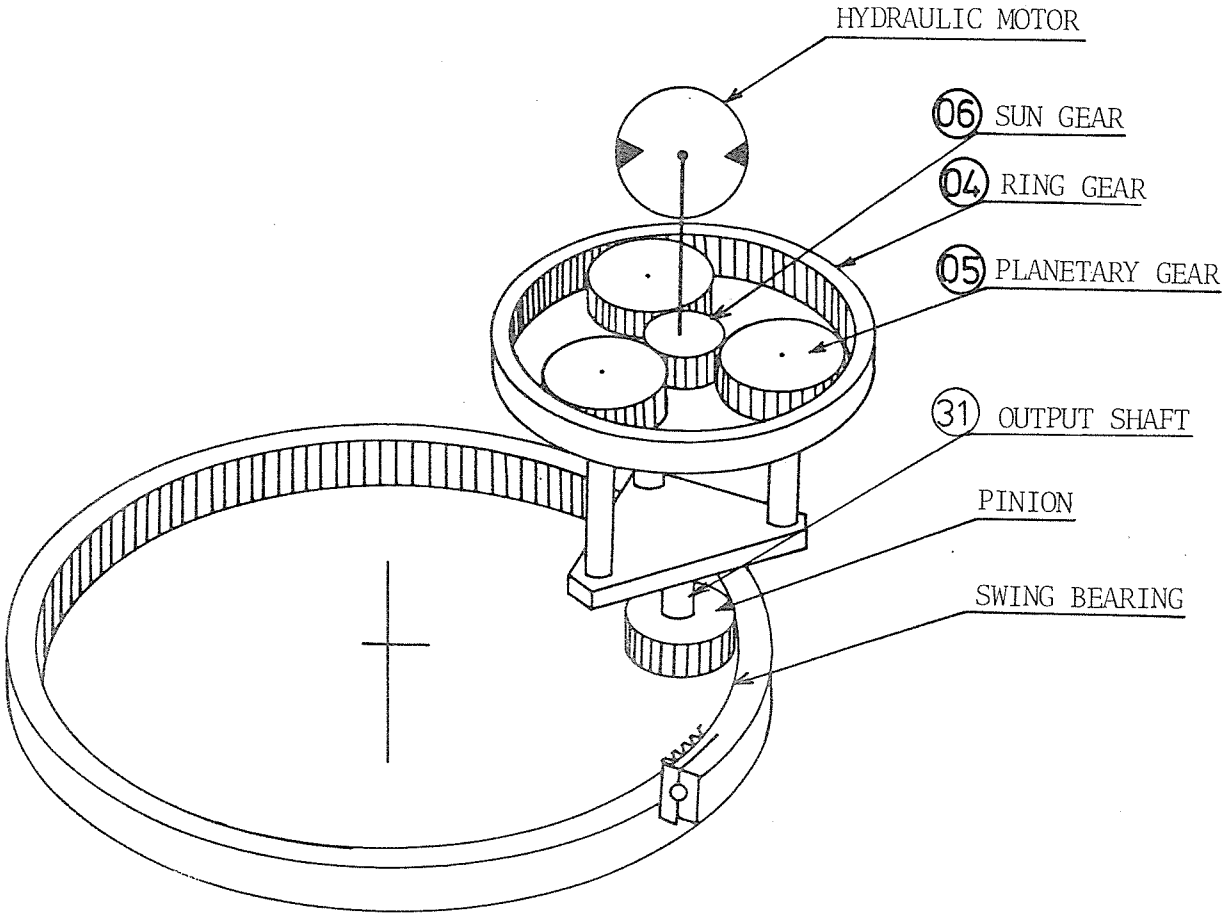
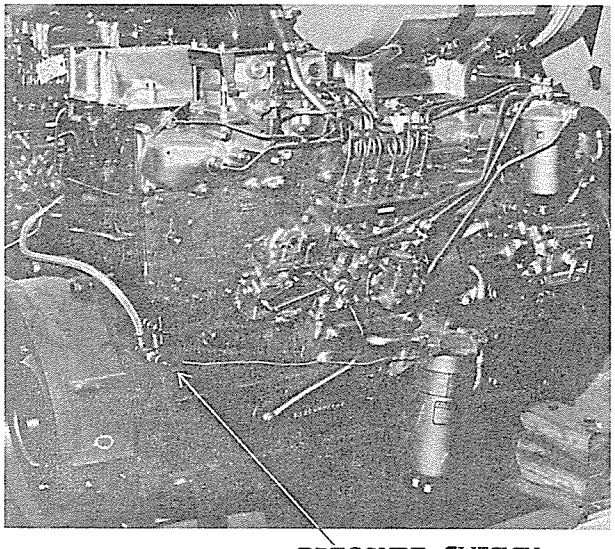
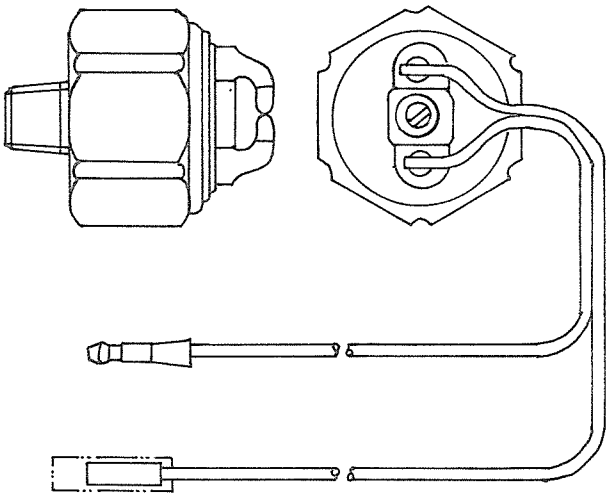


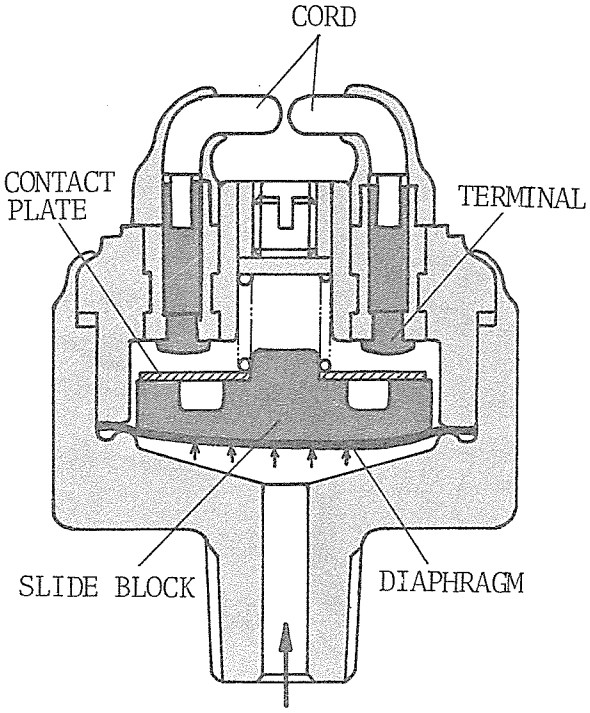
Fig. 70

ENGINE

PRESSURE SWITCH







When the hydraulic pressure acts on the diaphragm in the arrow direction as shown, the slide block and contact plate are brought into contact with the terminals, allowing the current to flow.

A-C GENERATOR

CONSTRUCTION

1. The bearing and slip ring on the rear side are so constructed to prevent entry of dirt and dust, improving the dustproof efficiency.
2. The brush is an assembly and the front shaft is straight, making it easier to disassemble and check.
3. The capacity of bearing and the strength of drive shaft are increased, improving the durability.

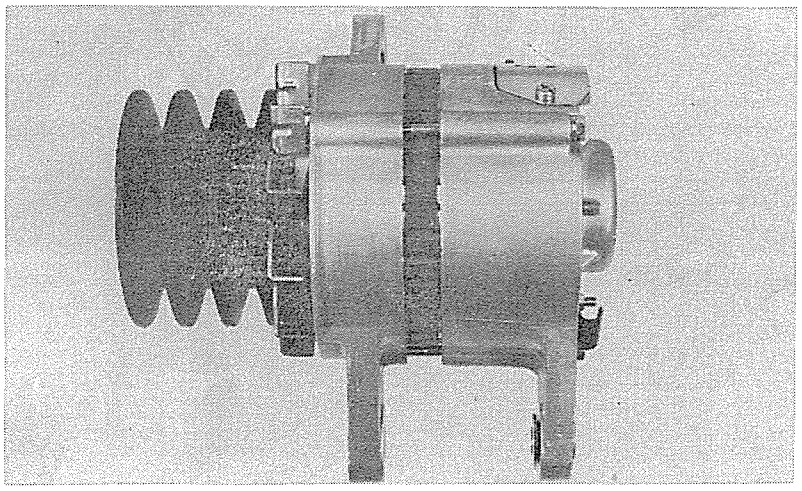


Fig. 1 External view

This generator is a revolving-field, threephase AC generator are commonly used. It consists of a pulley, a fan, a front cover, a rotor, a stator, and a rear cover. The brush holder assemblies can be removed and installed from the rear, upper part of the rear cover. Further this generator is so designed to prevent entry of dirt and dust (by forming a labyrinth seal).

Labyrinth seal

As shown in Fig. 2, the area of the rotor on the side of slip ring is made convex in one piece and the entrance in the bearing cage area of the rear cover is made concave. In other words, the combination of the rotor and rear cover forms a labyrinth seal.

Therefore, as the slip ring and ball bearing are located within a compartment, entry of dirt and dust are completely prevented.

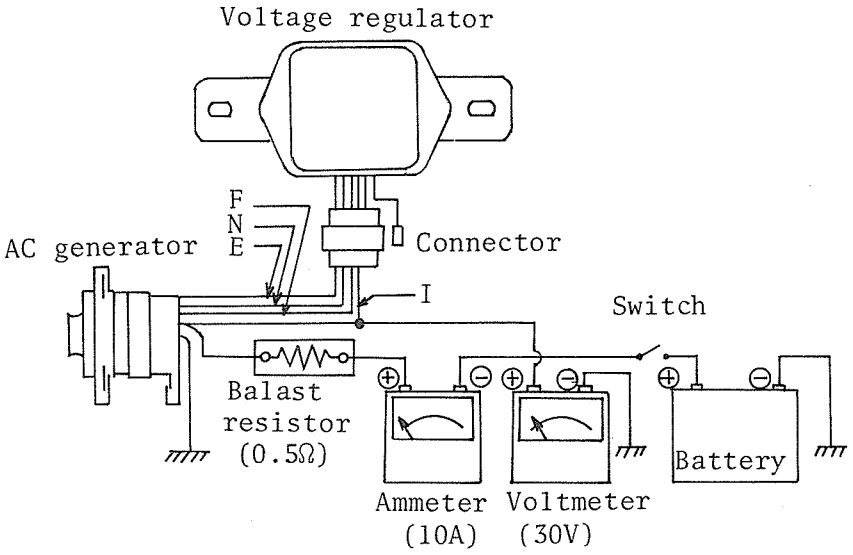
The labyrinth seal formation has been first used in this standardized AC generator. Thereby troubles due to entry of dirt and dust are eliminated, lengthening the service life of the slip ring, brushes and ball bearing.

A-C REGULATOR

CHECKING REGULATOR VOLTAGE SETTING

Bench Test

To determine whether the voltage regulator is adjusted properly, connect an ammeter, voltmeter, tachometer, fully charged battery and resistor (0.5Ω, 25W) as shown.



(1) Run the generator at the rated speed.

(2) Read the voltage indicated on the dial just beneath the needle of the voltmeter and compare it against the specifications.

(3) Make sure that the current is below 5A on the ammeter.

Notes: a. Use a voltmeter of 0.5% accuracy.

b. Take the exact volt and ampere indicated on the meters by gradually increasing the speed of the generator.

c. Take measurements as near to the regulator "I" terminal as possible.

4.2 On-vehicle Test

Use the same instruments as in Para. 4.1 above, and hook them up as shown.

(1) Before performing this test, be sure to turn off all lights and accessaries (cooler, radio, etc.).

(2) Start the engine.

(3) Raise the speed gradully to the rated engine rpm. Measure the voltage indicated on the voltmeter dial.

Notes: a. The needle of the ammeter will be swung reversely due to the reverse current from the battery to the generator at starting. To overcome this, it is necessary to connect the fuse side terminal of the resistor and negative (-) terminal of the ammeter before testing.

ELECTRIC ACCESSORIES

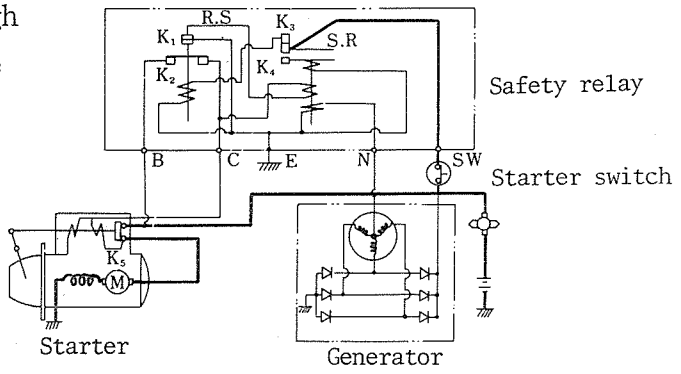
ELECRRIC ACCESSARIES

(3) Starting (B)

As the contact K_2 is closed, current will flow through the lines as shown by the solid lines, causing the engage switch (ES) contact K_5 to close. The pinion goes into mesh with the flywheel ring gear.

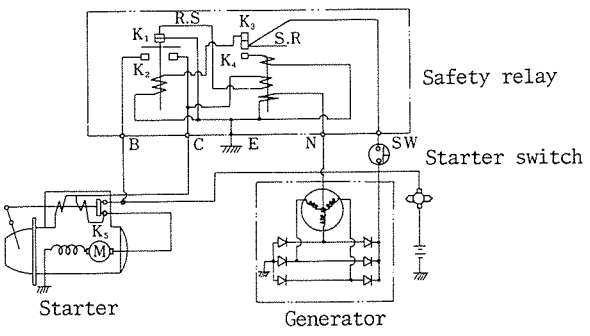
(4) Cranking

Starting current will now flow through the starter, causing the engine to be cranked by the starter.



(5) Operation of Safety Relay

As the engine starts, the generator produces output. The current flowing through the relay winding creates a magnetic field that pulls down the relay contact K_4. With the starting switch kept depressed, the current will flow through the SW, relay contact K_4 to the ground E. That is, the contact K_4 is connected. If the starter switch is still kept depressed, the current will then flow through the circuits by ways of SW-K_4-E. This means that the relay prevents the starter from being cranked while the engine is in rotation even if the starter switch is turned on.



KVC925 PUMP (SINGLE)

GENERAL

KVC925 single type hydraulic pump is of a swashplate type variable displacement axial piston pump and consists of a pump and a pilot operated regulator.

The pump displacement can be controlled by the following factors.

(1) The displacement is varied in proportion to the degree of external pilot pressure being applied to the port "Pe" of the regulator.

(2) The displacement is reduced by its discharged pressure increasing being applied to cavity "C3".
If its discharged pressure is decreased, the displacement is increased automatically as recovery operation.

(3) The displacement is reduced by applying the discharged pressure of non-partner pump to port "Pt" as 3rd pump compensating operation.

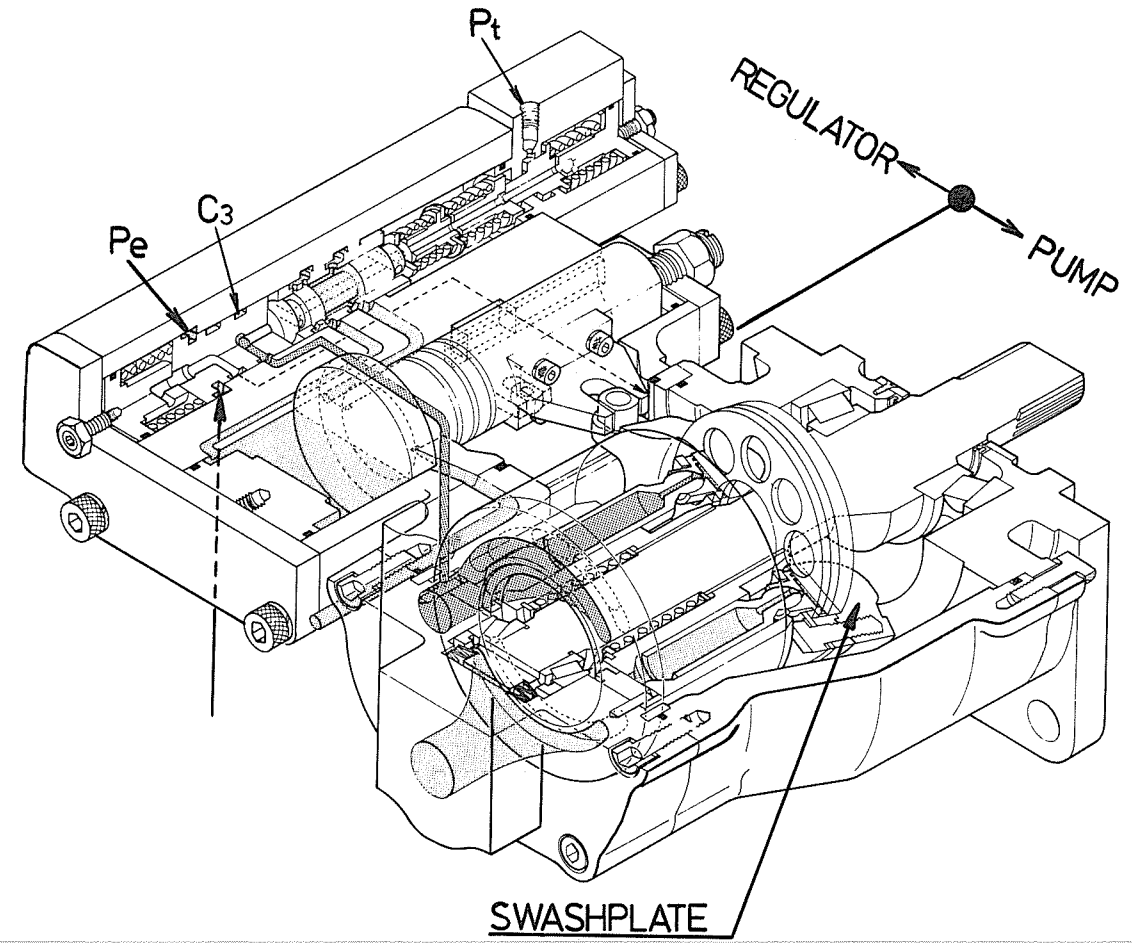


Fig. 1

KVC925 PUMP (SINGLE)

6. In the control lever full stroke operation, the housing (23) is fully moved to the left until its left end touches spring seat (28).
   Under this condition, the servo-pressure oil is fed to the large servo-piston chamber through the cavities "C_1" and "C_2" of the sleeve (21) to increase the pump displacement.
   This displacement increasing operation is limited by the ring (09), thus obtaining the maximum displacement.

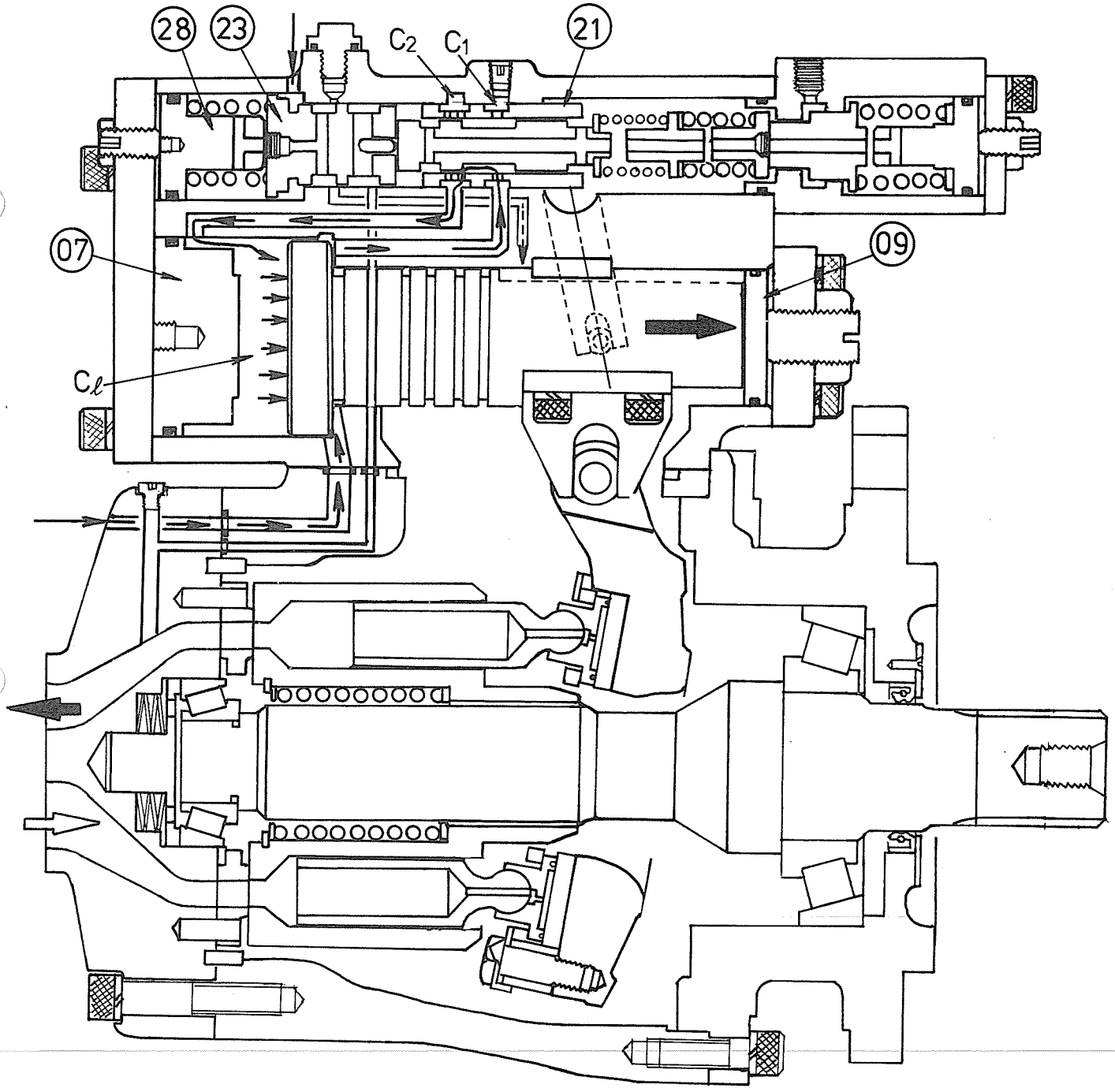


Fig. 13

KVC925 PUMP (SINGLE)

16. This displacement decreasing operation due to decreasing pilot pressure is continued until the sleeve (21) moves to cut the connection between the large servo-piston chamber "Cℓ" and the pump casing at the cavity "C_2".

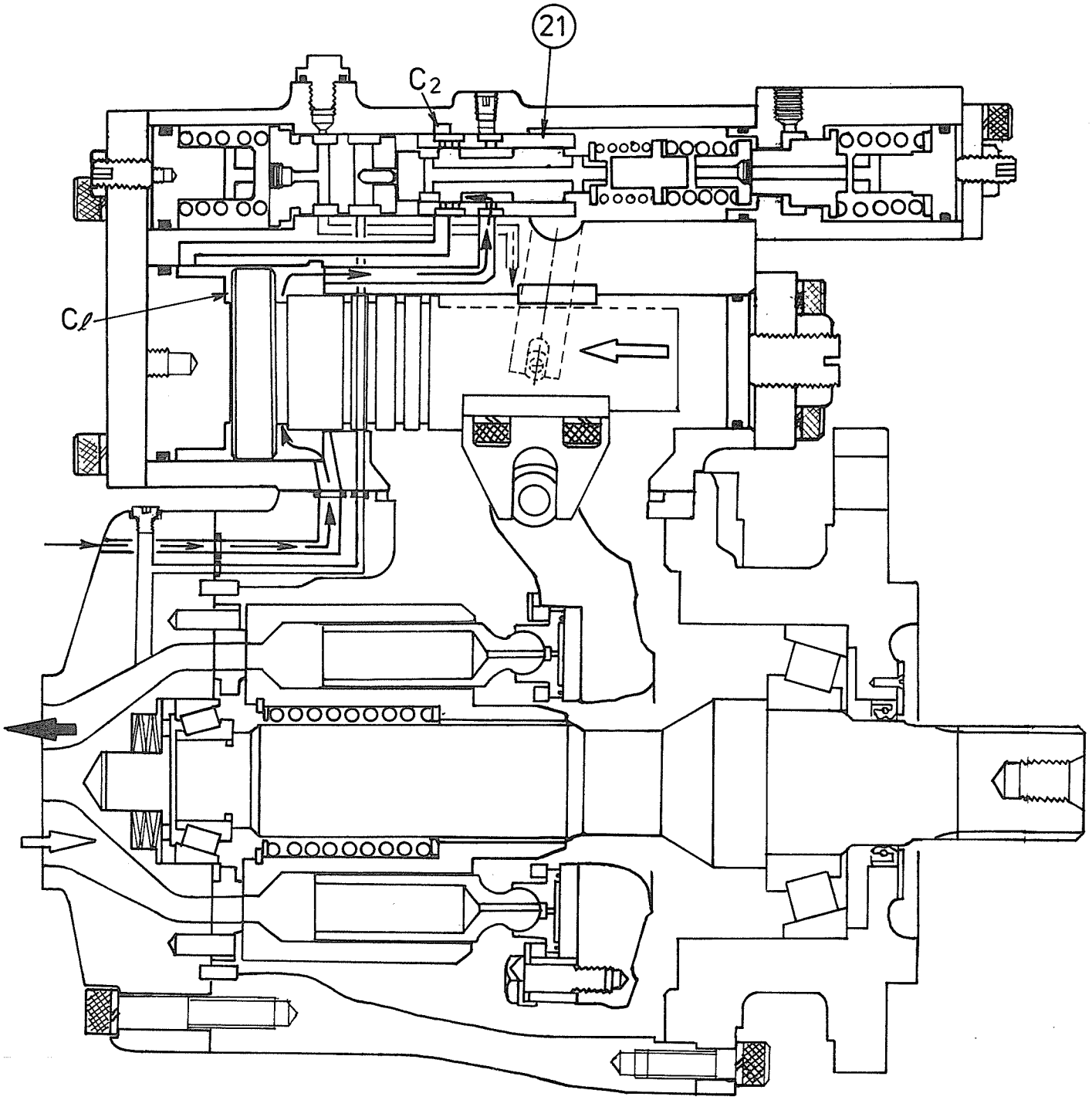


Fig. 23

PF50 PLUNGER PUMP

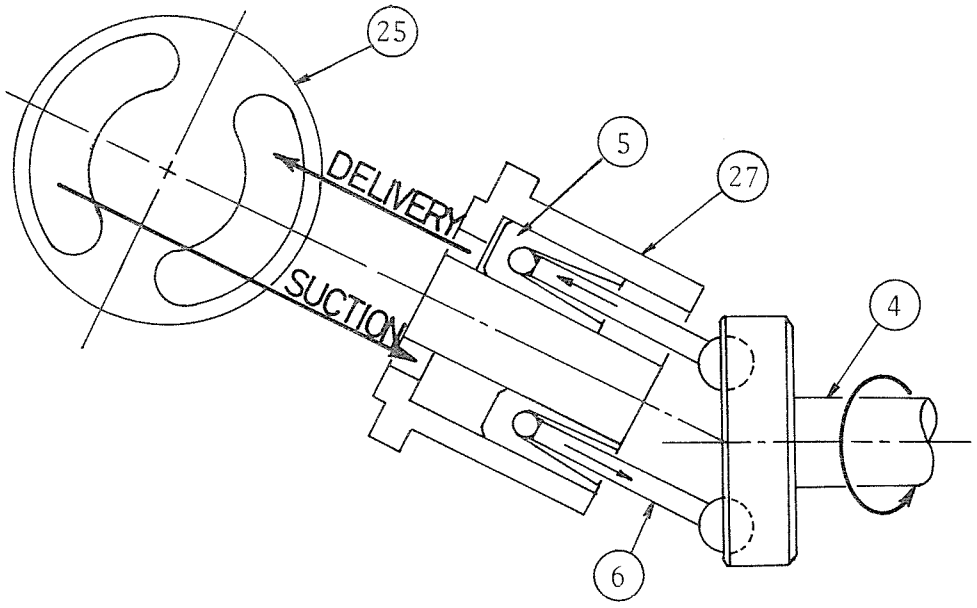
The angle between the driving shaft (4) and cylinder block (27) is about 28° relative to each other. Thus, rotation of the drive shaft (4) is transmitted through the connecting rods (6) to the cylinder block.

The piston makes one reciprocating motion when the cylinder makes one complete turn.

When the piston rises up from the bottom dead center in the block, the oil is discharged since the oil port in the piston head end is in sliding contact with the delivery port in the valve plate (25).

When the piston (5) goes down from the top dead center, the oil is sucked into the cylinder block. The reason is that in this case the port in the cylinder block on the piston head end is now in sliding contact with the suction port in the valve plate (25).

Thus, with the rotation of the drive shaft, oil is sucked in the cylinder and then discharged in a successive manner.



PILOT VALVE

PILOT VALVE (ONE LEVER TYPE)

One lever type pilot valve mainly consists of four each of pushers (08), spring (06), spring holders (02), spools (09) and return springs (10), and these are installed in the valve body. In addition to the above assembly, the shuttle valve assembly is equipped on the bottom as shown in Fig. 1.

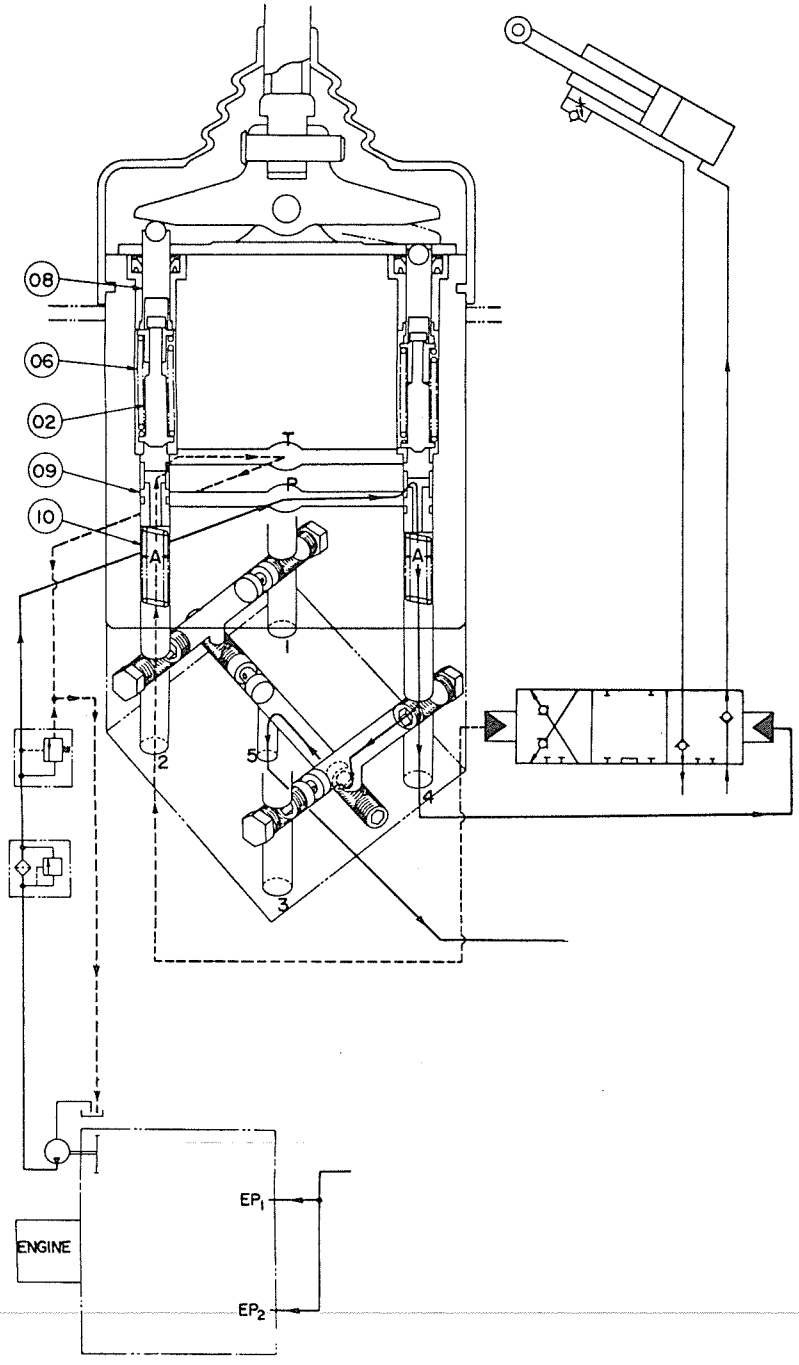


Fig. 1

CONTROL VALVE
(HUSCO MODELS NO.5000, 6000 AND 7000)

CONSTRUCTION

These control valves consist of the inlet-section, outlet-section, and spool-sections.

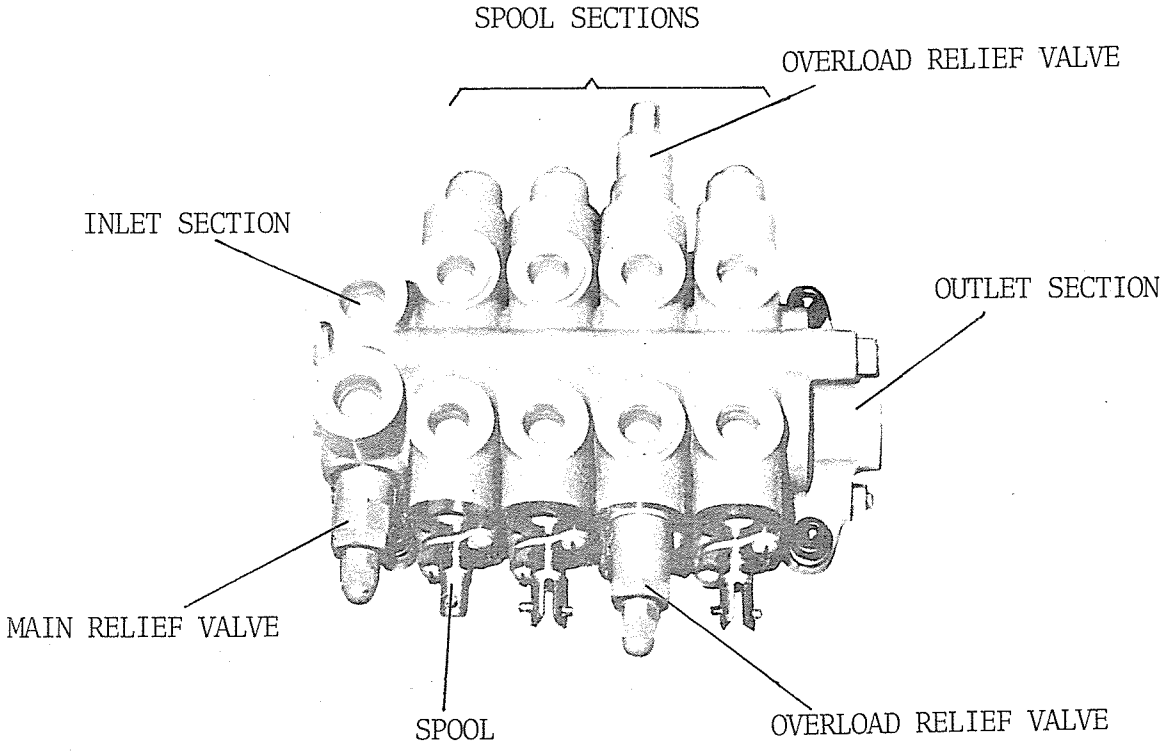
The inlet-section has a main relief valve.

The spool-section.

There are the spool-sections of three types; type B (open-center), C (closed-center), D (semi-open center), and each of them has the load check valve.

The overload relief valves are installed in both sides of the spool-section as occasion demands.

There are spool operations of three types; manual type, pilot pressure type and manual type with detent device.

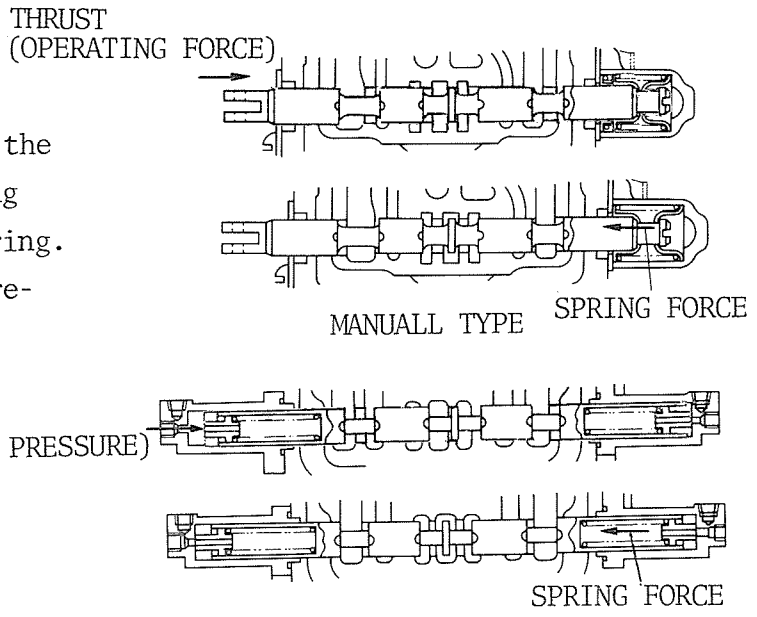


CONTROL VALVE
(HUSCO MODELS NO.5000, 6000 AND 7000)

7. Spool operation

7.1 Manual type and pilot pressure type

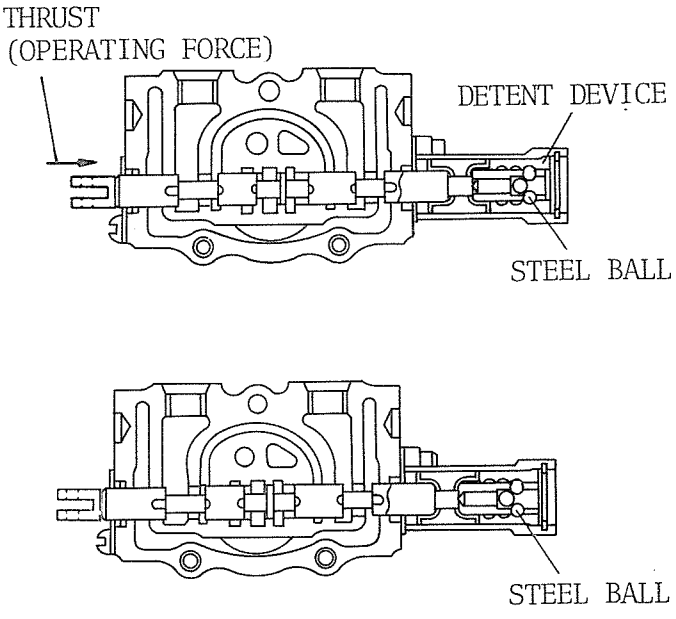
When thrust operates in the end of the spool, the spool is moved overcoming against the force of the return spring. When thrust excepts, the spool is returned by the force of the return spring.



PILOT PRESSURE TYPE

7.2 Manual type with detent device

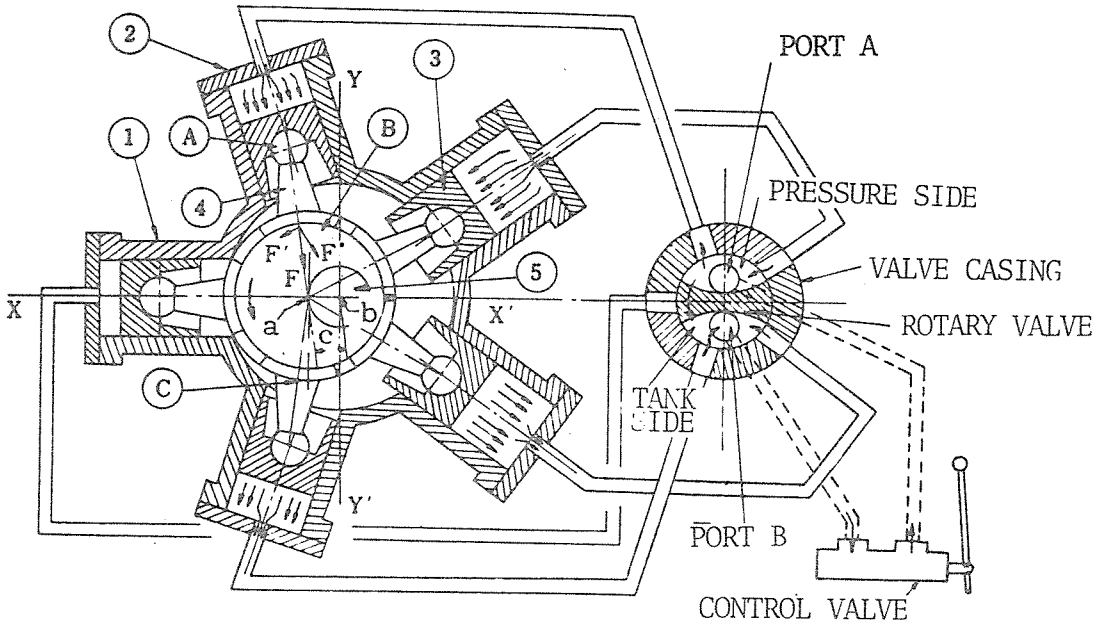
When thrust operates in the fork-end of the spool, the spool is moved to the oposite derection of the fork-end, and held in position by the steel balls in the spool end. Even if the thrust is excepted, the spool is held in position.



Manual type with detent device

SX MOTOR

1. GENERAL



(1) Cylinder
(2) Cylinder cover
(3) Piston
(4) Connecting rod
(5) Crankshaft

(A) Ball and socket joint
(B) Cam
(C) Slide shoe
a Center of cam
b Center of shaft
c Offset

Fig. 1

Fig. 1 shows the cross sections of the SX-series radial piston type hydraulic motor and rotary valve.

The motor proper consists of five elements each comprising cylinder and piston radially arranged in a monoblock housing.

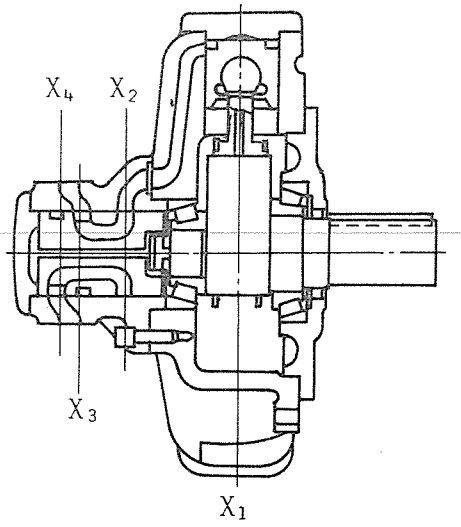
The smaller ends of the connecting rods are jointed to the pistons in a ball-and-socket fashion and the large ends jointed to the cam on the crankshaft.

Oil is fed into a space above a piston that reciprocates between its top dead center and its extheme retract position.

2. CYCLE of OPERATION

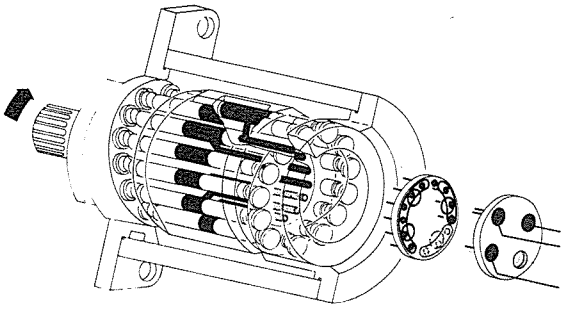
The moments of the rotary valve and motor pistons in each cycle of operation in sections X1, X2, X3 and X4 are as follows:

Assume that the port A in the rotary valve is opened to the pump and the port "B" to the tank, both through the control valve...



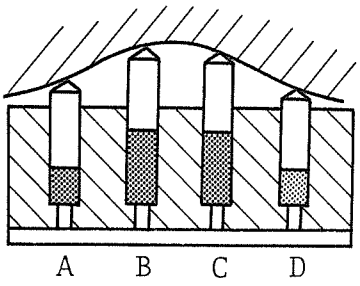
HTM E TYPE MOTOR

Then, since the number of pistons developing power for rotating the motor is halved, the torque is also halved. Further, to rotate the same load of low-speed operation at high-speed, pressure to be applied to the motor has to be doubled. By changing the shape of the cuts in the balance plate, any speed can be obtained. The other method sends the oil to the three ports in the balance piston, instead of the two ports and supplies it to the nine or ten pistons.



Here, to make the description easy, it is assumed that one piston is related with one port in the balance piston.

The oil is sent to the pistons A, B and C, and the piston D is drained. Now the pistons A and B develop power for rotating the motor clockwise and the piston C for rotating the motor counterclockwsie.



Under such a condition, the pistons B and C develop the same power in the opposite direction to each other and they are balanced.

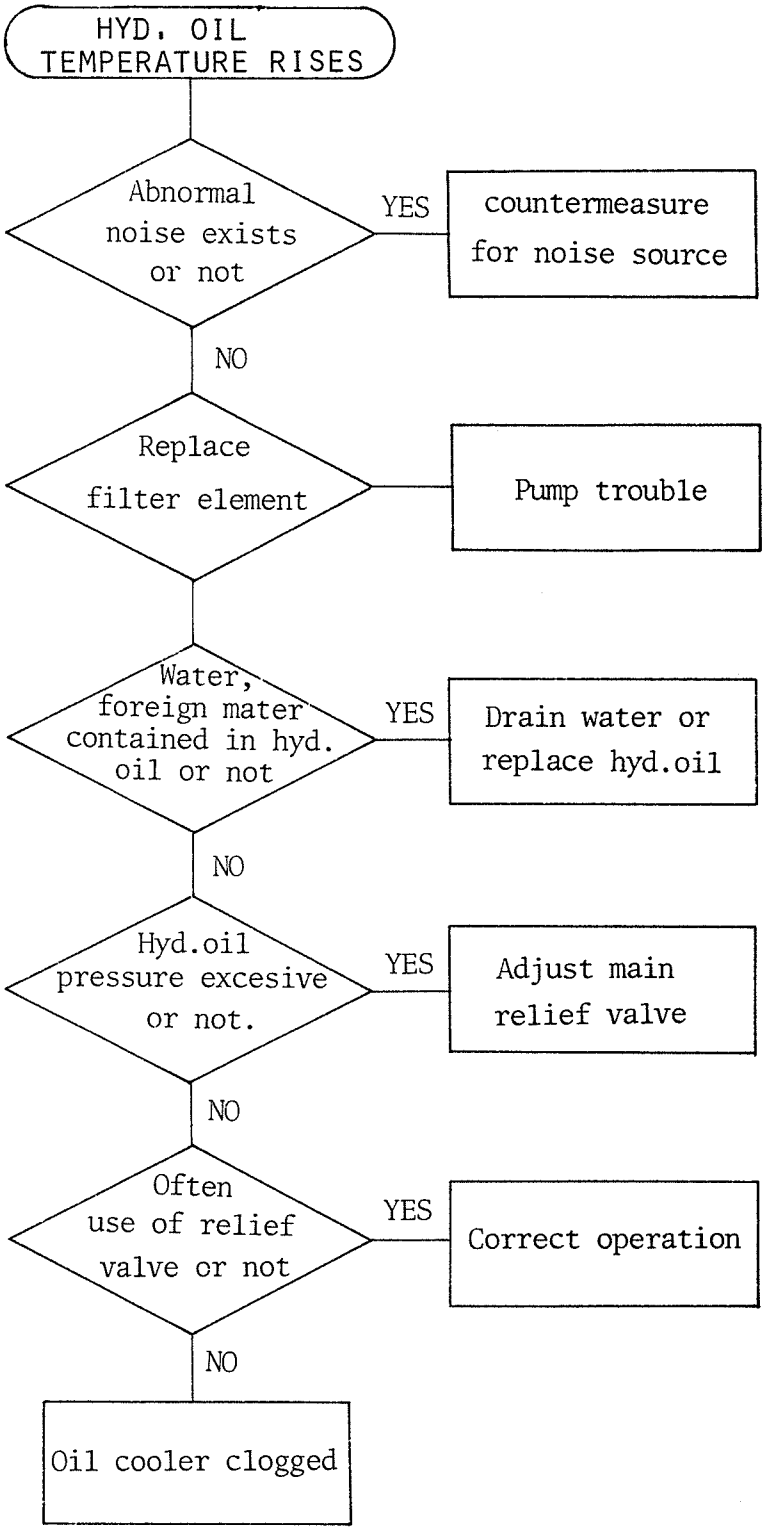
Accordingly only power developed by the piston A is effective and torque is halved in comparison with that on low-speed operation.

(The pistons A, B and C are connected by one passage.) Since the pistons B and C move reversely to each other, the volume of those pistons where the oil is to be sent is always constant.

As the cylinder block rotates, oil to be pushed out of the piston C is sent to the piston B and those pistons are balanced, requiring no sending the oil to the pistons B and C.

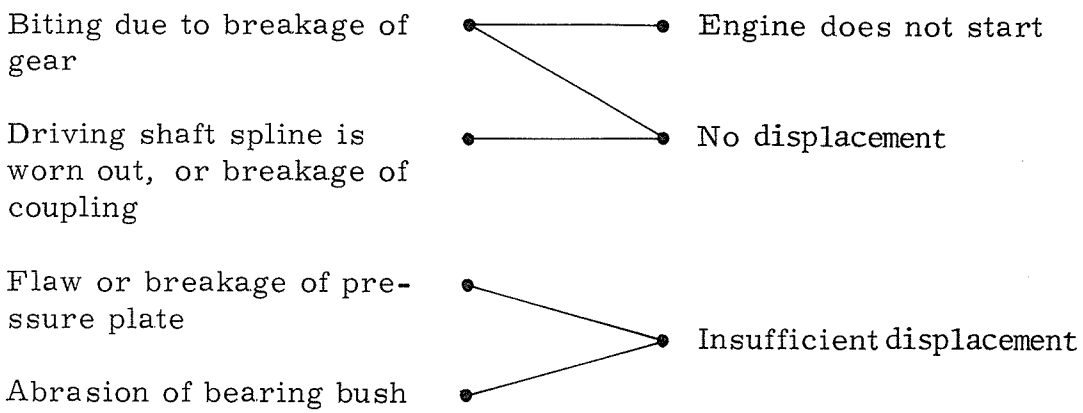
In the result, since it comes to the same thing as the oil is sent to only the piston A, the flow rate of oil which is twice that on low-speed is sent to the piston A and the motor speed is doubled. However, in this method,

TROUBLESHOOTING



TROUBLESHOOTING

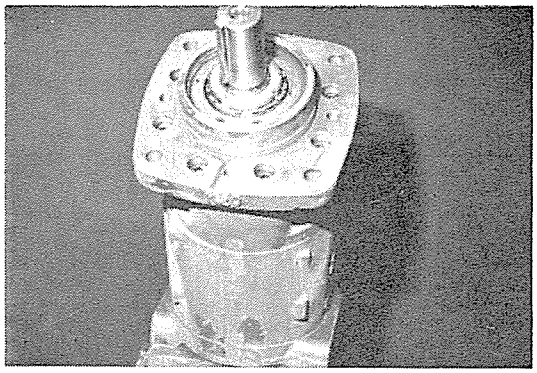
Gear pump



PF PUMP

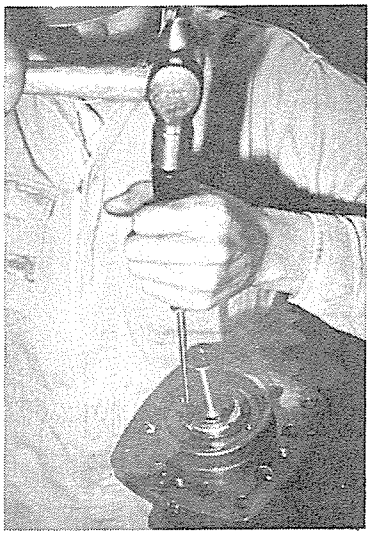
DISASSEMBLY

1. Hold the pump assembly by a vice. Then provided mating mark on the periphery of pump as shown.



2. Remove key (49) from shaft (06).

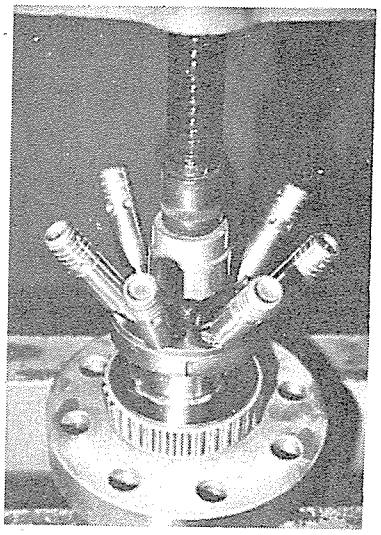
3. Flatten bearing washer (19).



4. Loosen bearing nut (20) as shown.

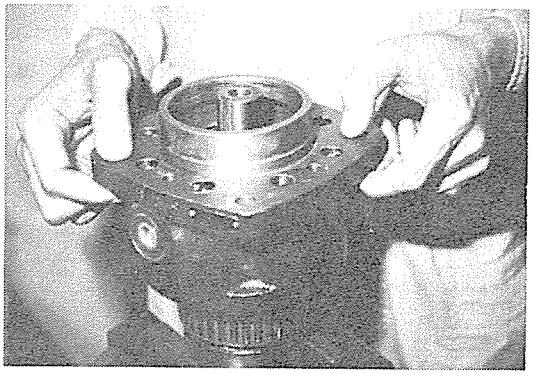
PF PUMP

4. Install radial bearing part of bearing (15) to the shaft assembly by using a press so that the flange of shaft comes to touch with the part of chamfered bore end of bearing.

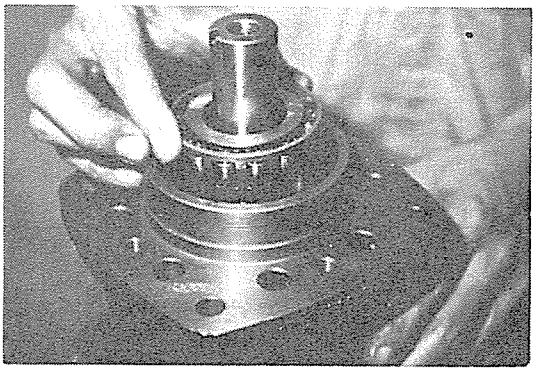


5. Install thrust bearing and thrust plate of bearing (15) to the shaft assembly with care of placing the larger diameter side of thrust plate downward.

6. Install casing (01) to the shaft.



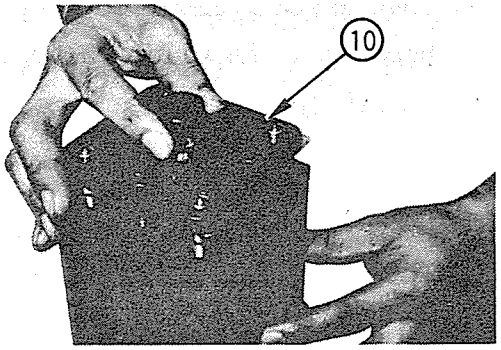
7. Install inner race of bearing (02) to the shaft.



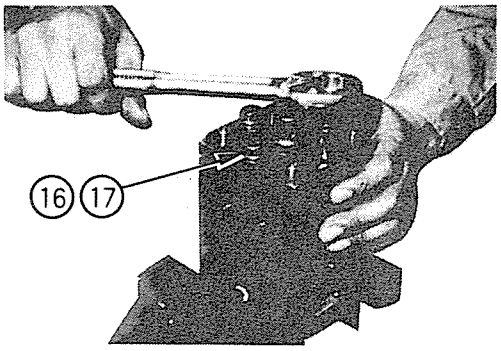
PILOT VALVE

HV TYPE PILOT VALVE

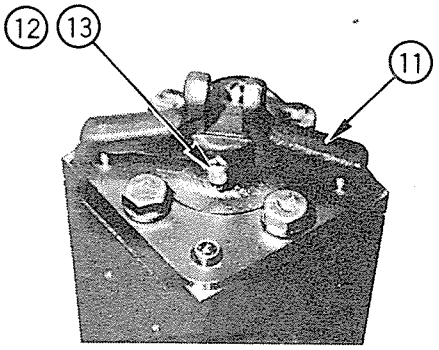
20. Install holder (10) with care of mating mark which was provided at time of removing the holder.



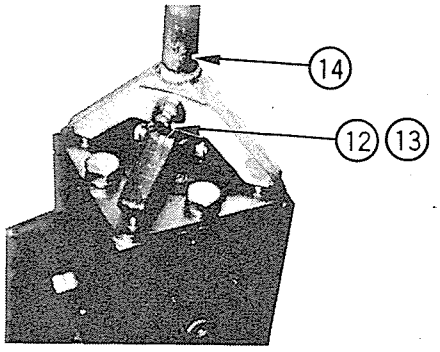
21. Fix the holder out the housing by tightening bolts (16) with spring washers (17).



22. Install cam (11), and fix it by pin (12) and split pin (13). Bend the split pin securely.

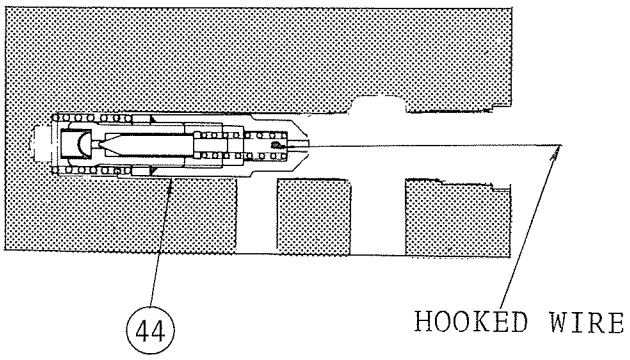


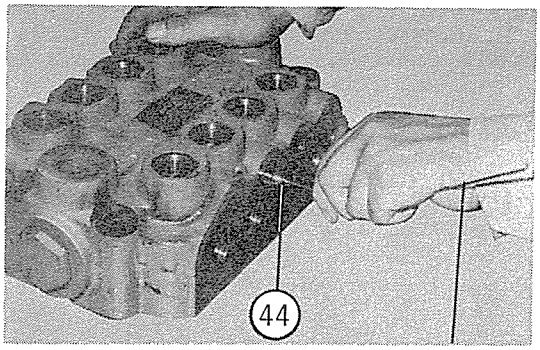
23. Install lever (14), and fix it by installing pin (12) and split pin (13).
Then bent the split pin.

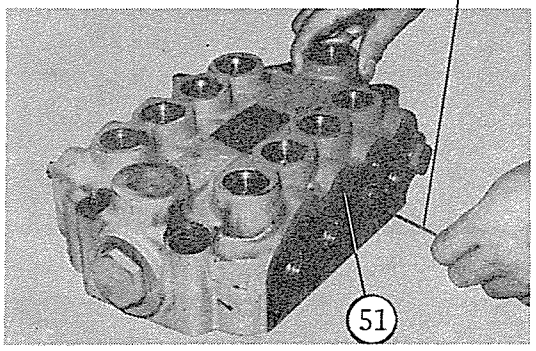


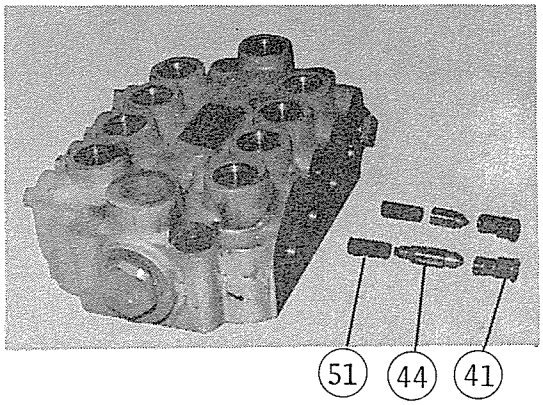
V33 CONTROL VALVE

6. Remove relief poppet cartridges (44) by using a hooked wire through the holes.

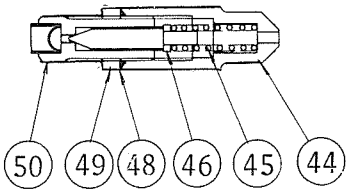








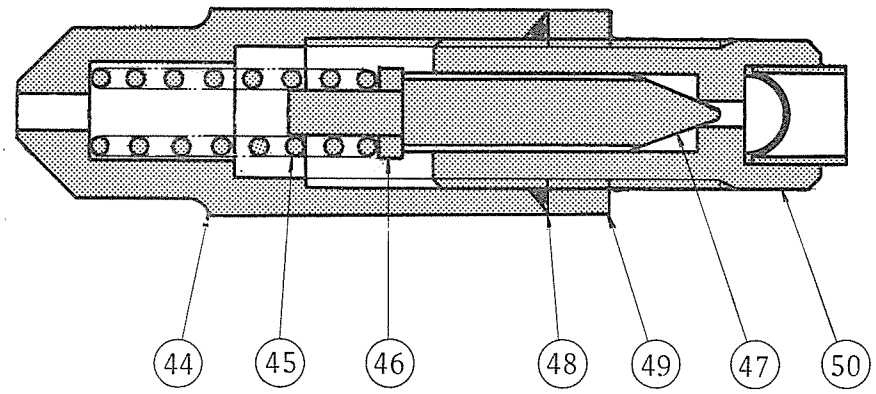
8. Remove locknut (49), adjusting bolt (50), O-ring (48), spring seat (46) and spring (45) from relief poppet cartridge if necessary.



V33 CONTROL VAVLE

20. Adjust the overload setting pressure by following methods, if necessary.
Take out the overload relief valve assembly and hold it in a vice through a soft metal and then loosen lock nut (49).
By using a spanner, turn the adjusting screw (50) clockwise for increasing the setting pressure.

NOTE: BY TURNING THE ADJUSTING SCREW (50) IN ONE FULL TURN, THE SETTING PRESSURE WILL VARY APPROXIMATELY 70 KG/CM^2.

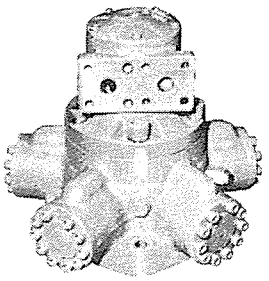


Tighten the lock nut (49) securely and then install the overload relief valve assembly into the housing in place.

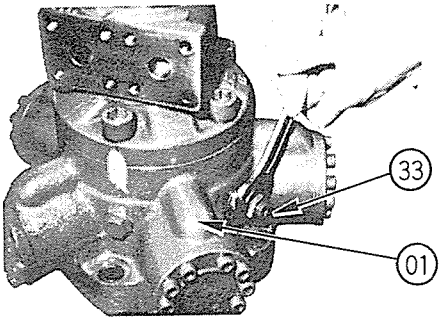
SX MOTOR

DISASSEMBLY

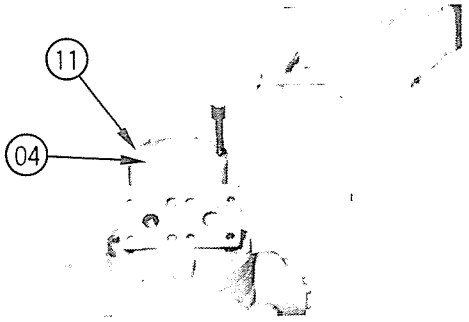
1. Clean periphery of the motor, then keep it free from mud and dust.
   Place the motor on a work bench.
   Put a mating mark on the periphery of the motor for proper reassembling.



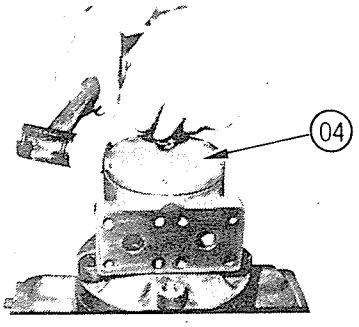
2. Remove socket (33) from casing (01) for draining oil.



3. Remove socket bolts (11) and secure rear cover (04) in position.

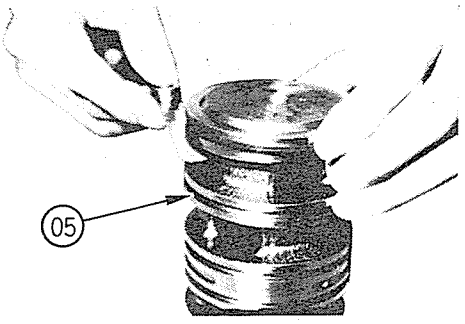


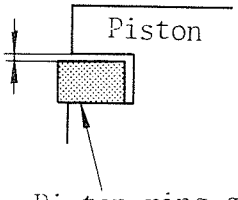
4. While tapping the rear cover with a soft mallet, pull up the rear cover for removing.



SX MOTOR

7. Measure the clearance of rotary valve piston ring (07) and groove of rotary valve (05). If the clearance is found to exceed the service limit, replace the ring with a new one.
   Also, check the ring gap.





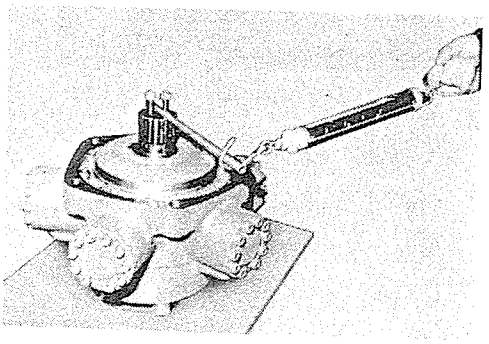
T40256MO

Specifications Unit: mm

		Nominal dimension	Standard clearance	Service limit (recommended)	Service limit
Piston	SX504BM SX505BM	5 4	0.05 ∿ 0.03	0.5	0.7
	SX506BM SX508BM SX508CM SX509BM	3	0.03 ∿ 0.07	0.1	0.2
	SX510BM	4			
Rotary valve	SX504BM	2	0.01 ∿ 0.04		
	SX505BM	3	0.01 ∿ 0.05		
	SX506BM SX508BM SX508CM SX509BM SX510BM	3	0.01 ∿ 0.04		

SX MOTOR

30. Turn the assembly upside down.
Check the shaft's rotating torque by referring to the following specifications.



Model	Shaft rotating torque
SX506BM	27Nm (280kgfcm)
SX508CM	25Nm (250kgfcm)
SX508BM	27Nm (280kgfcm)
SX509BM	29Nm (300kgfcm)
SX510BM	30Nm (310kgfcm)
SX510D	18∿38Nm (180∿390kgfcm)

If the shaft's rotating torque is not in compliance with specifications, adjust it by adding or removing shims.
This adjustment has priority to the step 26.

31. As the rotary valve is classified into seven ranges, and the casing into three ranges, they should be selected for assembly to have a proper clearance as shown table below.
The classified marks are provided on the top end surface of rotary valve and casing.

Table A

Casing or valve casing	Rotary Valve								
	1 ring type			2 ring type					
X	X	U	P	X	U		P	V	X
Y	Y	V		Y	V	X		W	Y
Z	Z	W		Z	W	Y			Z
Radial clearance (μ)	17 ∿25	30 ∿38	55 ∿77	17 ∿25	30 ∿38	21 ∿29	55 ∿77	26 ∿34	17 ∿21
Recommended combination RC	S			C1	C	C2		C3	C4

Table B

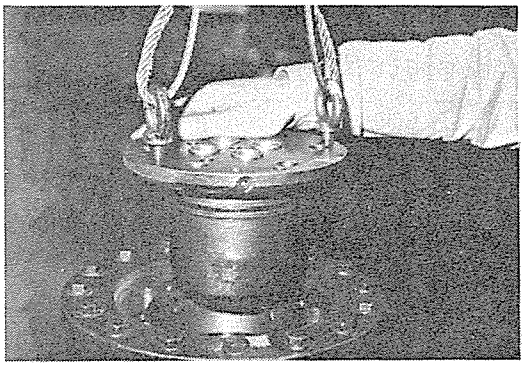
RC	Model
C	UH801
C1	UH051, UH052, UH061, UH062, UH101, UH121
C2	UH07-3, UH081
C3	UH171
C4	UH052M
S	Other Models

HTM E TYPE MOTOR

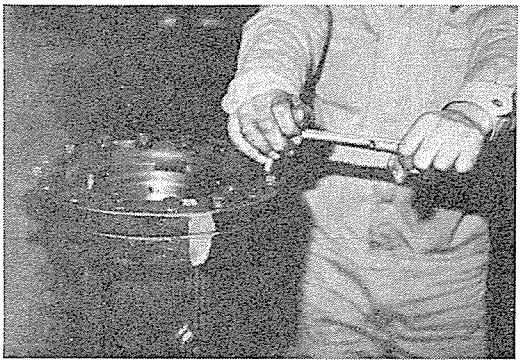
10. Remove socket bolts (16), (17).

11. Lift up the cover ass'y by using lifting tools.

12. Pull out the cover ass'y.

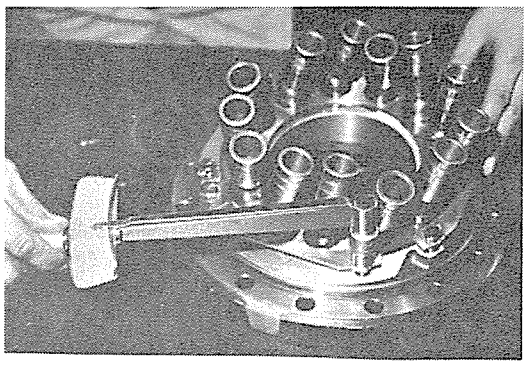


13. Remove bolts (15) and spring washers (04).

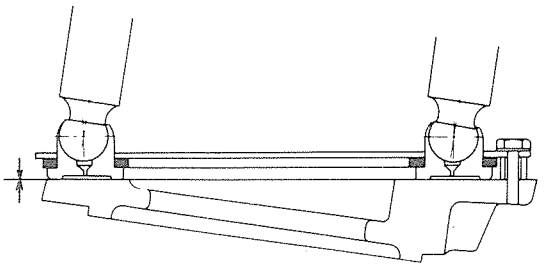


HTM E TYPE MOTOR

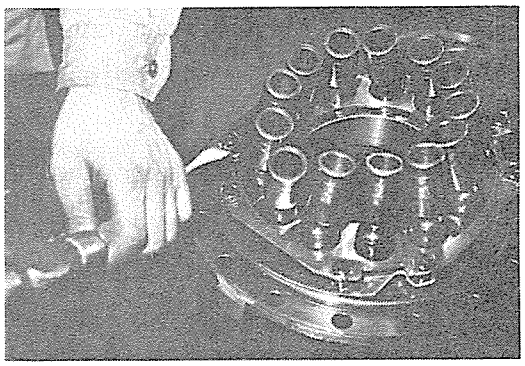
9. Tighten the bolts to a torque of 20 Nm (2.0 kgfm).



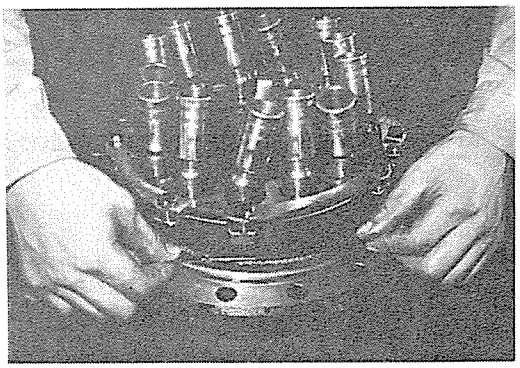
10. Check the clearance between all shoes and the cam with feeler gauge.
If the clearance becomes larger than 0.3 mm, replace the pistons with shoes with new ones.



11. Bend the end of washer against the bolts.



12. Apply grease to O-ring (32). Then install the O-ring into the groove of cam (14).



13. Install roller bearing (40), spacer (39) to the end of shaft (01).

HTM E TYPE MOTOR

Item	Part Name	Q'ty
01	Shaft	1
02	Seal; oil	1
03	Bolt; socket	6
04	Washer; spring	16
05	Retainer	1
06	Shim	1
07	Bearing; taper roller	1
08	Screw	2
09	Spacer	1
10	Housing	1
11	Cylinder	1
12	Piston	26
13	Shim	1
14	Cam	1
15	Bolt	16
16	Bolt; socket	2
17	Bolt; socket	16
18	Ring	2
19	Bushing	2
20	Plug	1
21	Pin	2
22	Ring; retaining	1
23	Pin	2
24	Collar	4
25	Spring	2
26	Bushing	1

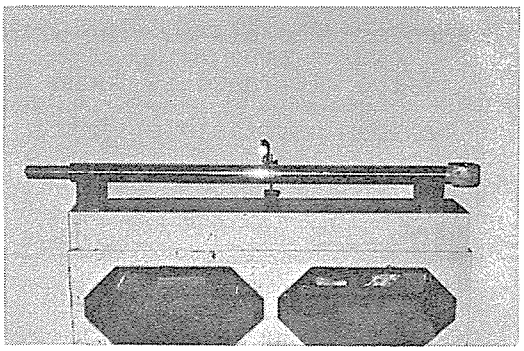
Item	Part Name	Q'ty
27	Ring	1
28	Cover	1
29	O-Ring	1
30	Plate; balance	1
31	Plate; port	1
32	O-Ring	1
33	Bearing; roller	1
34	Plate; return	2
35	Plate; lock	8
36	Bolt	16
37	Washer	16
38	Spacer	16
39	Spacer	1
40	Bearing; roller	1
41	Plug	1
42	Cam	1
43	Packing; metal	4
44	Bolt; socket	2
45	Bolt; socket	2
46	O-Ring	1
47	Name plate	1
48	Pin; name plate	4
49	Spring	1
50	Flange	1
51	O-Ring	1
52	O-Ring	1

Item	Part Name	Q'ty
53	Spring	1
54	Bushing	1
55	Ring	1
56	Shim	1
57	Valve; selector	1
58	. Manifold	1
59	. Name plate	1
60	. Pin; name plate	2
61	. Cap	2
62	. Plug	2
63	. Washer; spring	6
64	. Bolt	6
65	. O-Ring	2
66	. Piston	1
67	. Cap	1
68	. Cap	1
69	. Stopper	1
70	. Spring	1
71	. Spool	1
72	. Bolt; socket	8
73	. O-Ring	4
74	. O-Ring	1
75	. O-Ring	1

CYLINDER

INSPECTION

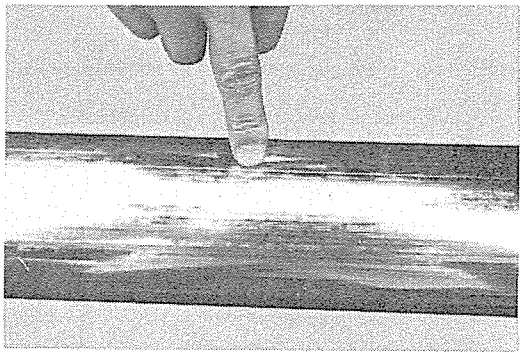
1. Clean all the parts with solvent, and dry them with the compressed air.
   Place the piston rod on the V-blocks and set a gauge on the piston rod surface as shown. Then rotate the cylinder rod to mesure the bend of the cylinder rod.
   If the bend exceeds the service limit, replace the cylinder rod with a new one.



Bend par 1m rod length
Unit: mm

	Service Limit
Fault	0.25

2. Surface defects
   Check the piston rod surface for defects such as scores and pitting. Slight scores may be repaired by grinding with a oil stone and plating.
   Replace the rod with a new one if a score exceeds the service limit.



Unit: mm

	Service Limit
Score depth	0.3

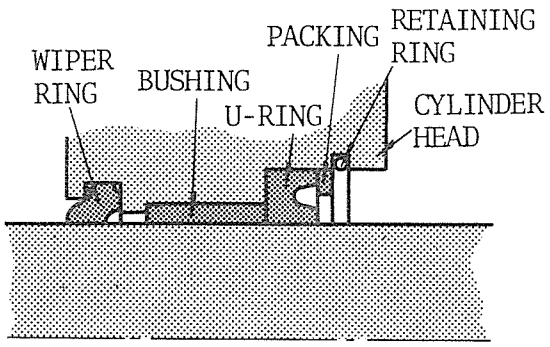
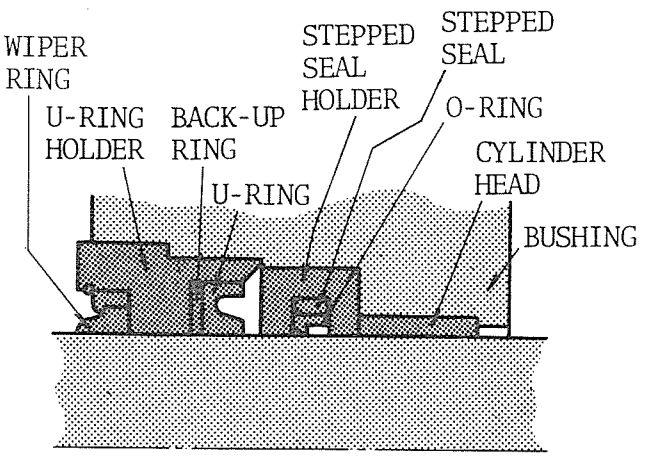
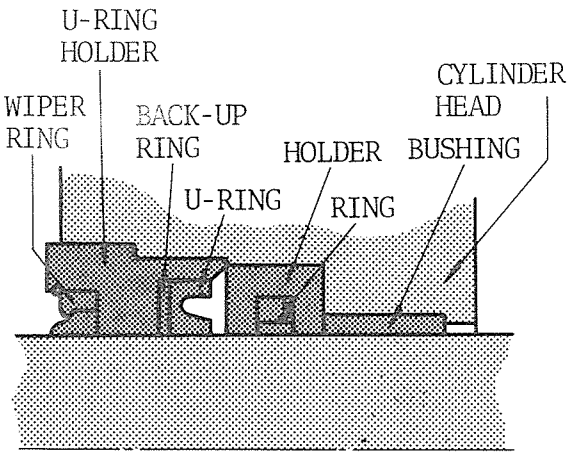
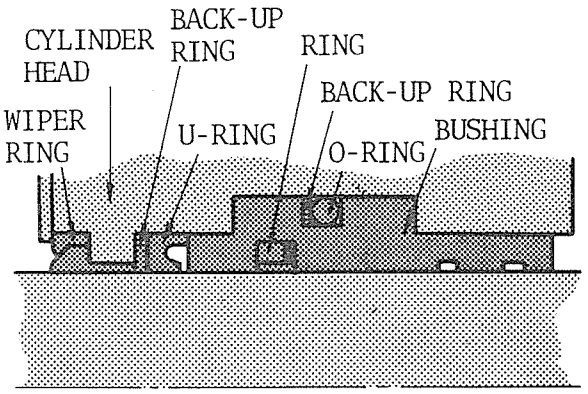
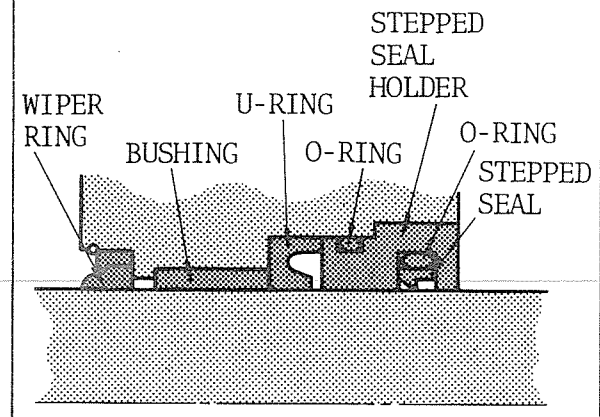
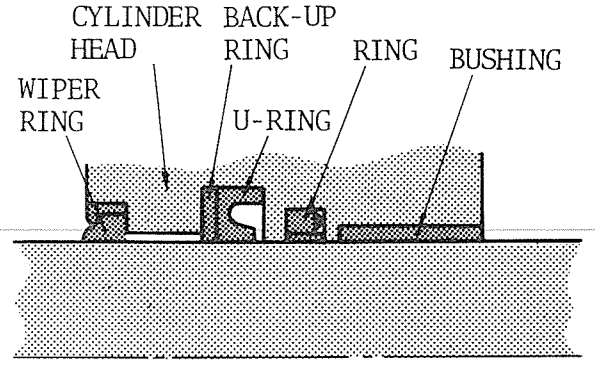
3. PISTON ROD and BUSHING
   Check the clearance between piston rod and bushing. If the clearance is found to exceed the maximum permissible clearance, replace the bushing with a new one.

Unit: mm

Nominal diameter (rod diameter)	Standard clearance	Max. permissible clearance
25∿40	0.060∿0.234	0.4
45∿75	0.072∿0.288	0.5
80∿120	0.152∿0.477	0.6

CYLINDER

TYPES OF CYLINDER HEAD

Type	Illustration	Type	Illustration
1		4	
2		5	
3		6	

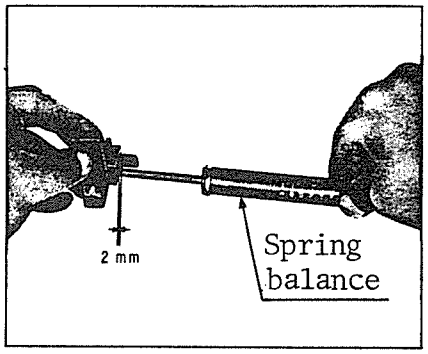
A-C GENERATOR

(b) Measurement of brush spring tension

The load of a new set spring is 255 to 345g. Measure with the brush protruded about 2mm from the brush holder as shown in Fig. bellow.
When the brush is worn, the spring tension decreases about 20g to every 1mm wear. (Overall length of brush: 14.5mm)

(c) Movement of brush

Check to see if the brush smoothly moves within the brush holder. If not, replace the brush and/or holder with new one.

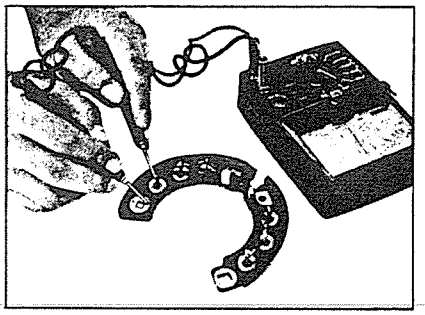


Measurement of brush spring load

(4) Diodes

There are six diodes, three for the positive (+) side and three for the negative (-) side group. Each group has its own heat sink for radiation of heat into surrounding air.
To check for continuity, it is necessary to disconnect each diode from the circuit at its connections. Replace diodes if there is continuity in both directions or there is no continuity in both directions.

CAUTION: Do not use megger to check diodes as this will destroy them.

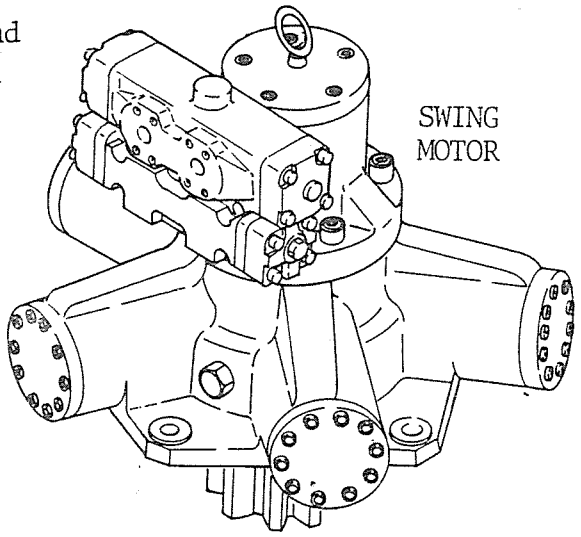


Continuity test of diode

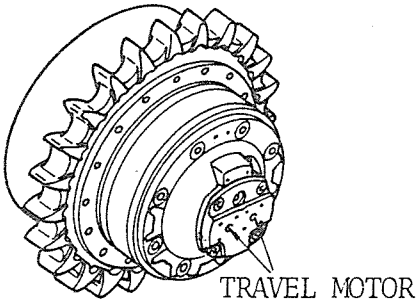
HOW TO DISASSEMBLE/ASSEMBLE HYDRAULIC EQUIPMENT

(4) Hydraulic Motor Installing/Removing Precautions

a. Pay attention to cleanliness around the hydraulic motor when it is removed or installed, because it is exposed to mud, like travel motors. Also, it is important to properly cover the opening of the reduction gear or the internal gear, through which the motor is removed.



b. It is required to correctly observe the construction discrived in the Ports List, because motor-assembling bolts and motor-attaching bolts are used for the some flange in the HM type motor for instance.



(5) Hydraulic Cylinder Installing/Removing Precautions

a. Be careful not to damage the plating of the hydraulic cylinder rod during installing/removing operations. In principle, remove the cylinder with the cylinder rod retracted fully.

b. Pay attention to twist of the hydraulic hoses.
There is the possibility that the hose will be caught and twisted by the front linkage for a loading shovel, for instance.