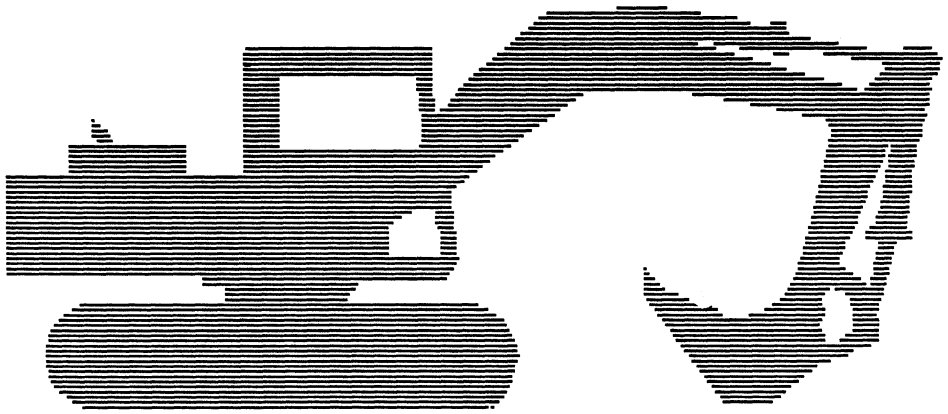
FH120



SERVICE MANUAL

73158518

Reprinted

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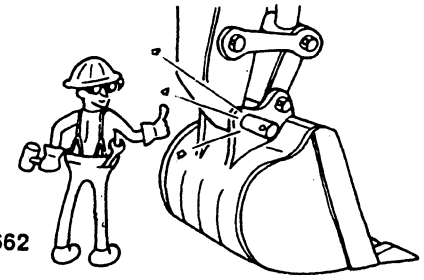
SAFETY RULES

PROTECT YOUR EYES

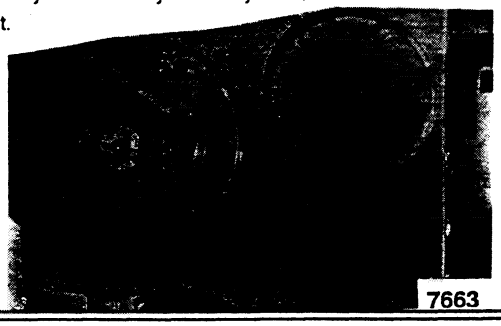
When you drive connecting pins in or out, guard against injury from flying pieces of metal.
Wear approved goggles or safety glasses.



7662

SERVICE HYDRAULIC SYSTEM SAFELY

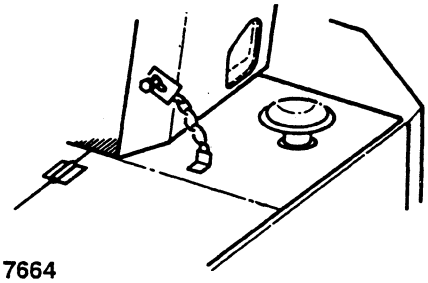
The oil tank is always pressurized.
Before you work on the hydraulic system:
Take off the breather cap, and drain the air in the tank.
Before you use the hydraulic system, be sure all connections are tight.



7663

LOCK THE ENGINE HOOD

Lock the engine hood after opening.
Don't leave the hood open on slopes or in strong winds.



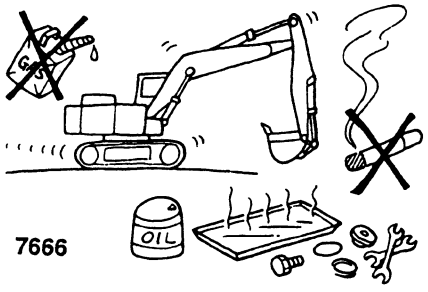
7664

Be careful not to touch hot surfaces or high temperature fluids.

7665

HANDLE FUEL SAFELY

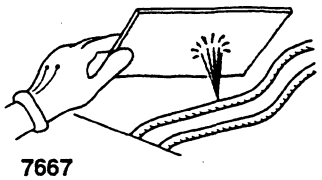
Be careful when you work with any kind of fuel.
Do not fill the fuel tank when the engine is hot or running.
Do not smoke while you fill the fuel tank or service the fuel system.



7666

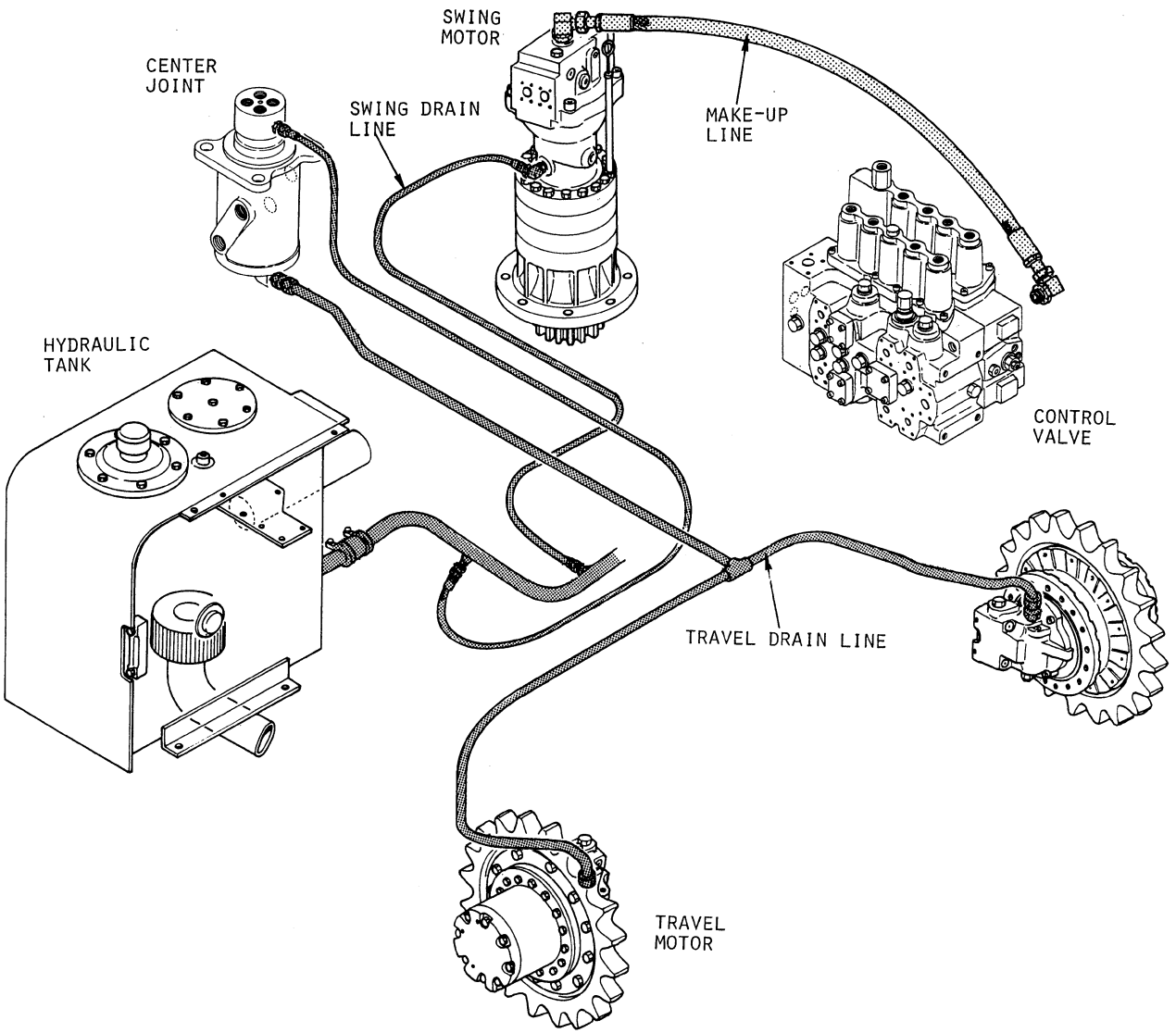
AVOID HIGH PRESSURE FLUIDS

Escaping fluid under pressure can have sufficient force to penetrate the skin, causing serious injury. Before disconnecting lines, be sure to relieve pressure. Before applying pressure, be sure connections are tight and lines, pipes and hoses are not damaged. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.
If injured by escaping fluid, see a doctor at once.

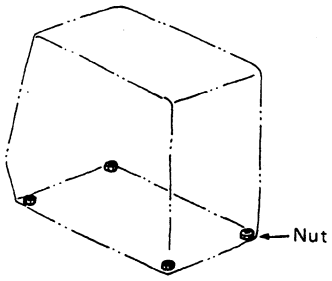


7667

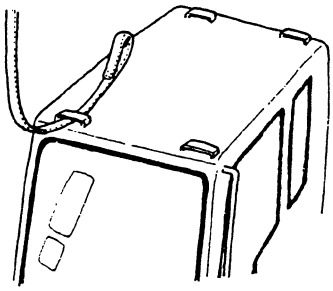
FH 120 HYDRAULIC SYSTEM



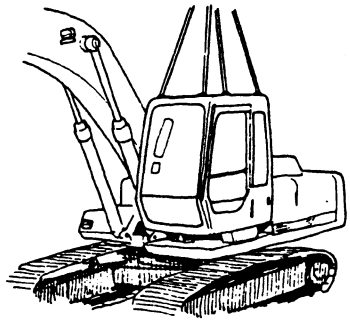
5 Remove 4 U-nuts.



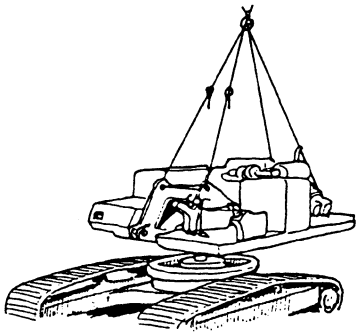
6 Fasten cab head with slings as shown.



7 Lift cab.



1.3.2 Installation of superstructure



1 Fasten slings and lever-blocks to front side and rear side of main frame.

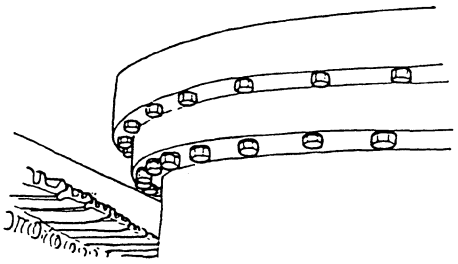
Level main frame by adjusting with lever-blocks.

Lift super structure.

2 Set super structure on under carriage.

Connect super structure with undercarriage by inserting the bolts of swing bearing.

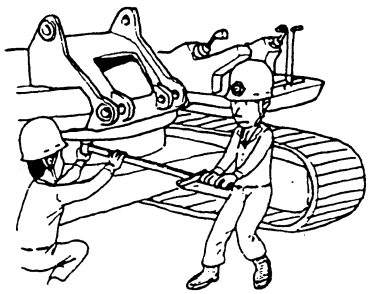
Tighten them temporarily.



3 Lower superstructure.

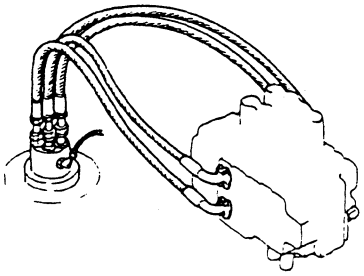
Install the bolts of swing bearing.

THREAD: 18x2,5
TORQUE: 34 daNm



4 Connect elbow and lubricating hose.

Connect 4 pipings at the top of center joint.



5 Install front attachment ass'y.

(Refer to 1.2.2 of this section installation of front attachment ass'y.)

Fill the hydraulic oil.

FH120 SUPERSTRUCTURE

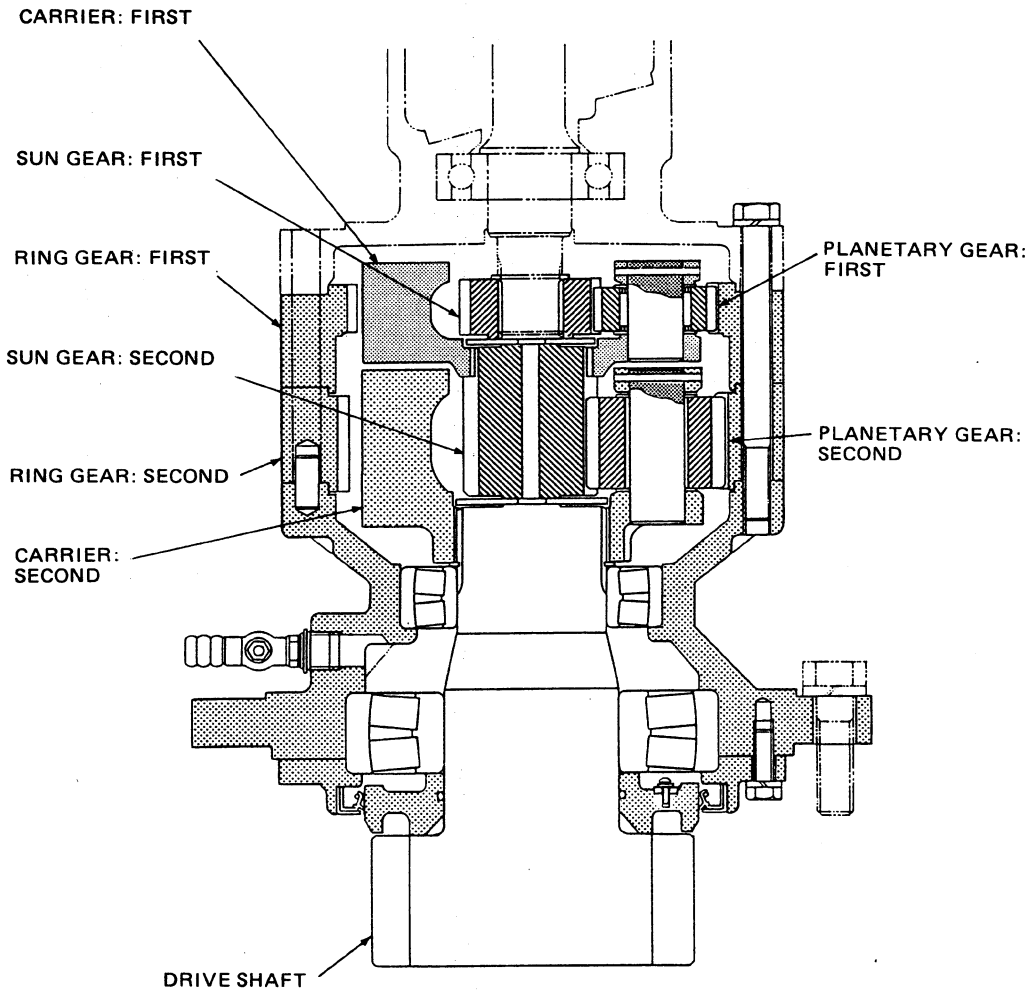
2.3 SPECIFICATIONS

2.3.1 ENGINE

Engine model	8045.25.385
Model	Water cooled, four cycle, vartical in-line, overhead valve direct injection with turbo-charger.
Cylinder, nos.-bore x stroke	4 - 104 mm x 115 mm
Total piston displacement	3,908 cm^3
Compression ratio (to 1)	16,5 : 1
Fuel injection order	1-3-4-2
Rotainer direction	Clockwise viewed from fan side
1. Cooling system	Pressurized forced circulation
.Cooling fan	draw-in type
.Water pump	Belt driven impuller type
.Thermostat	Wax pellet type
2. Starting mortor	Pinion shift system (build-in safety relay)
.Voltage	24 V
.Output	4 kW
4. Generator	AC Generator belt drive (build-in regulator)
.Voltage	24 V
.Output	30 A
5. Super charging system	Turbocharger, forced lubrication
6. Fuel system	
.Injection pump	CAV type OPS
.Governor	Mechanical
7. Stop mechanism	Fuel cut system

FH120 SUPERSTRUCTURE

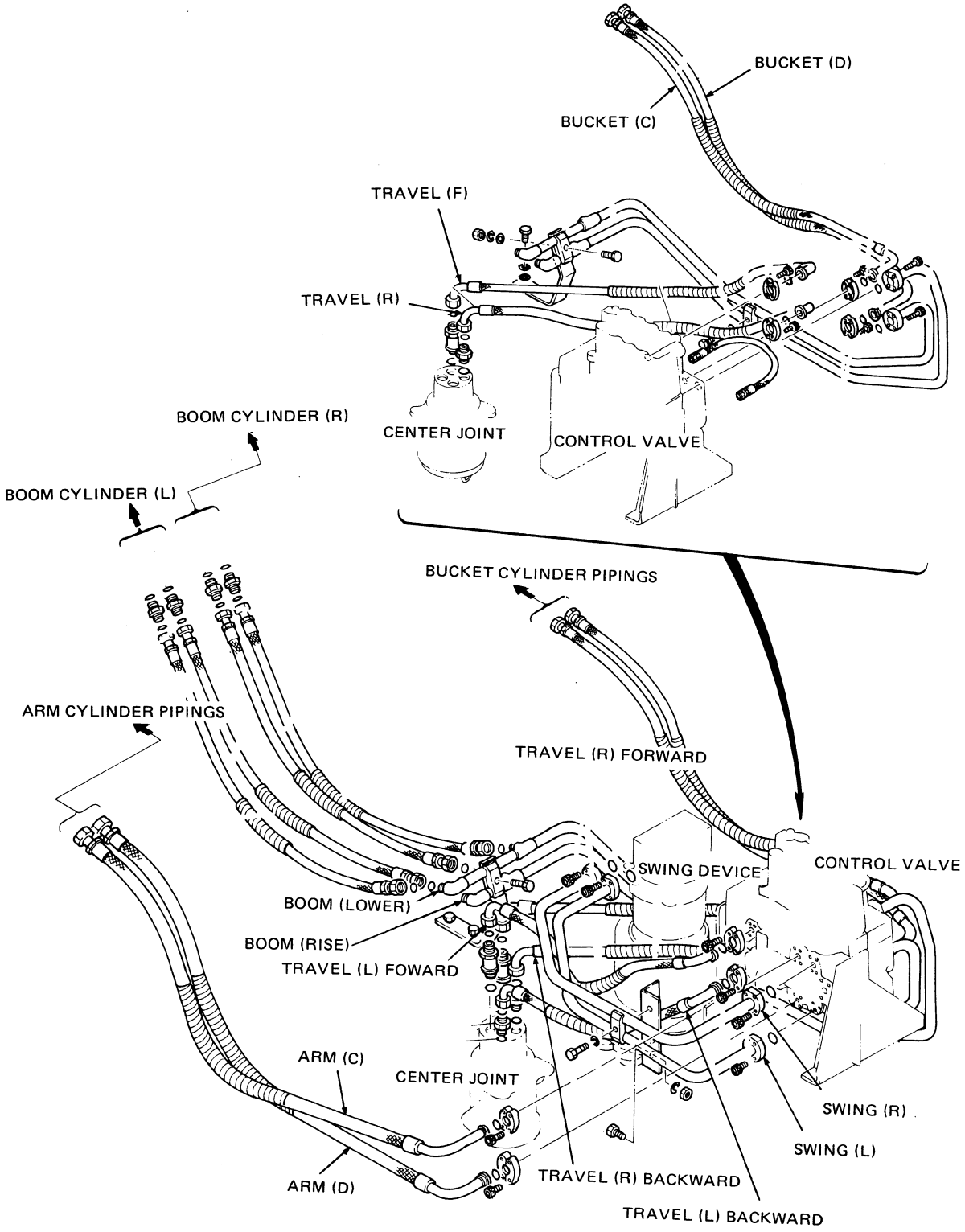
5.1.1 SWING REDUCTION DEVICE



9. MAIN PIPING

9.1 CONSTRUCTION

Main piping consists of boom, arm, bucket, swing and center joint pipings and foses from the control valve.



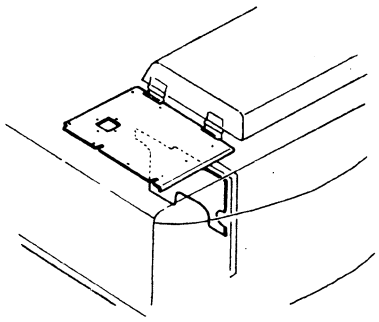
12.2 MAINTENANCE STANDARD

12.2.1 REMOVAL & INSTALLATION

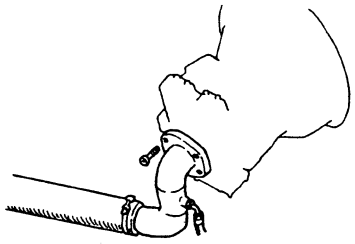
(1) REMOVE MAIN PUMP

1 Place the machine on firm and level ground, lower the bucket to the ground, with the bucket cylinder extended fully and the arm cylinder retracted fully. Stop the engine, then, release the air pressure from the hydraulic tank.

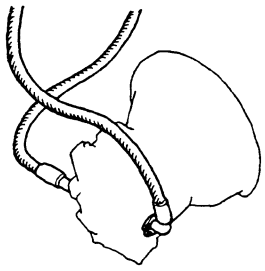
2 Remove the cover.



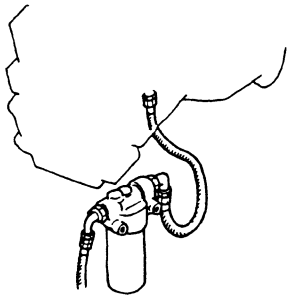
3 Remove suction piping from the pump.



4 Remove the delivery hoses from the main pump.



5 Remove th- delivery hose from the pilot pump.



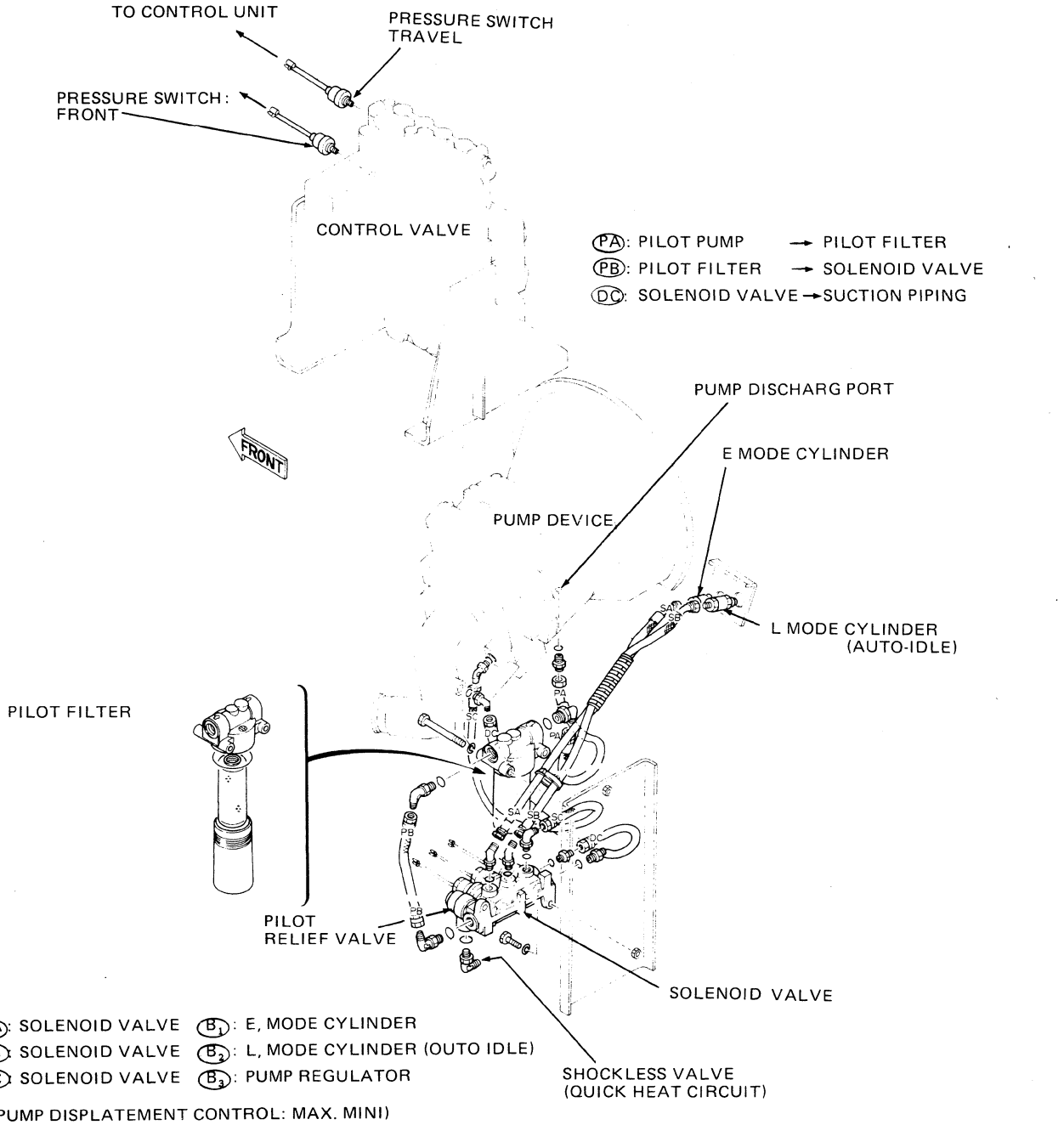
15. PILOT PIPING

15.1 CONSTRUCTION

15.1.1 PILOT PIPING (1)

Pilot piping (1) consists of suction and delivery pipings of the pilot pump, pilot filter, solenoid valve, pressure switch and E. P. mode control pipings. The pressure switches are provided on the control valve and pickup travel and front action's pressure.

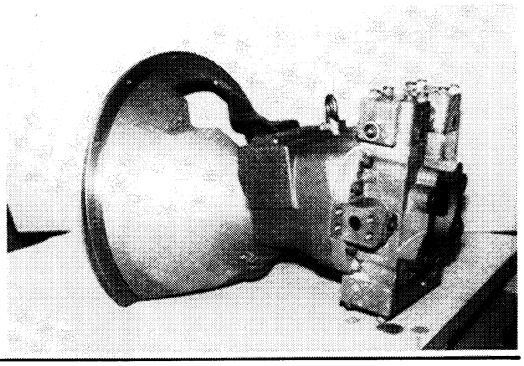
The solenoid valve operates pump regulator, auto-idle cylinder and mode change cylinder.



A8V55 ESBR6.2 PUMP

MAIN PUMP

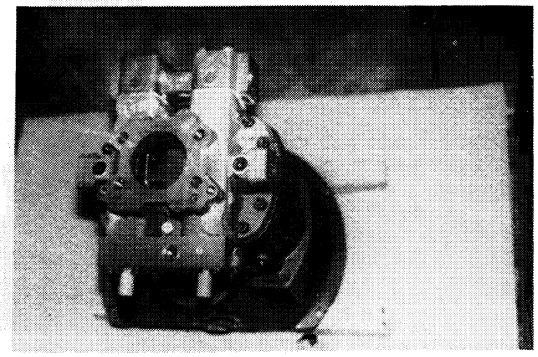
The main pump is a variable displacement type bent-axis piston pump.
It is equipped with a pilot operated regulator.

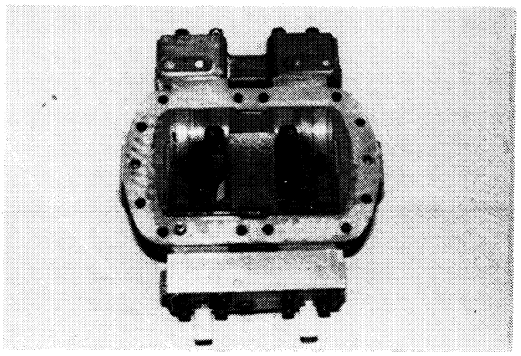


REGULATOR

The pump regulator is attached to each main pump. By changing cylinder block inclination angle the pump's displacement is regulated. Adjustment of the pump's displacement can be performed in two ways:

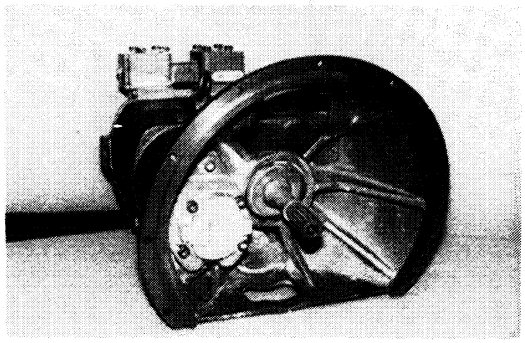
- In accordance with the external pilot pressure from the pilot pressure source line.
  The pump's displacement is determined in an inverse proportion ratio to the pilot pressure.
- In accordance with the main hydraulic system pressure.
  When pressure increases, the regulator automatically decreases pump displacement, and vice versa.





GEAR PUMP

The gear pump consists of two gears fitted into a housing supplied with inlet and outlet ports opposite each other.



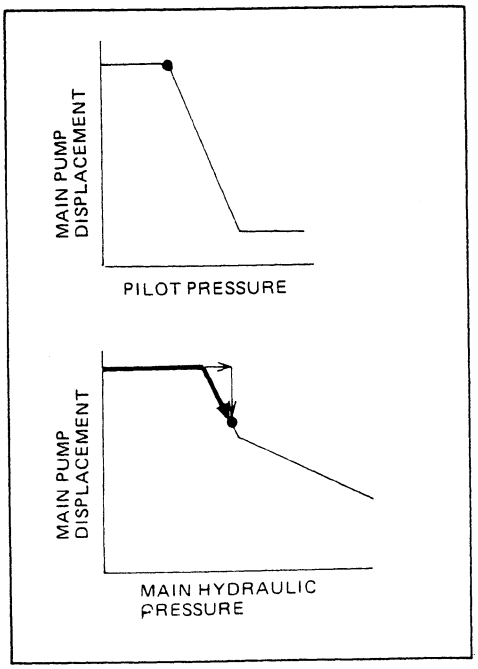
3.5 OVERLOAD PREVENTION

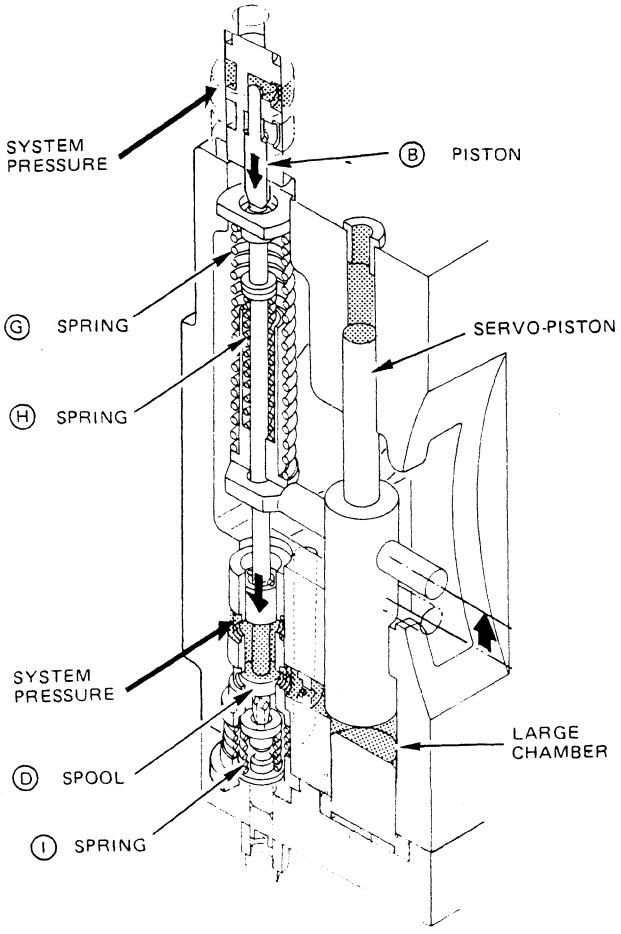
Here the control lever is still at full stroke. Now consider a load being applied to an actuator. This increases the main hydraulic system pressure, hence, the discharged oil pressure from the main pump.

The system pressure always acts on piston Ⓑ. At a pre-set value, this pressure overcomes the force of springs Ⓖ, Ⓘ and pushes piston Ⓑ and spool Ⓓ downward, opening the passage between the servo-piston large chamber and the system pressure line. This permits the flow of oil from the system pressure line to the large chamber. This is turn causes the servo-piston to move upward, decreasing the pump displacement. This is an example of the compensation mechanism working in the overload prevention mode.

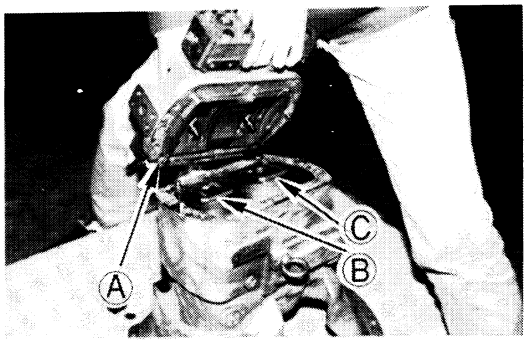
As servo-piston is moved upward, the force of springs Ⓖ , increases. This causes piston Ⓑ and spool Ⓓ to move upward until the main system pressure equals the spring's force.

As in the previous examples, after each movement of the servo-piston, the feedback mechanism operates to complete the adjustment. In this case spool Ⓓ closes the servo-pressure passage to stop the movement of the servo-piston. The operation of this compensation mechanism maintains the pressure displacement curve of the pump below the engine output curve to prevent the pump from overloading the engine.

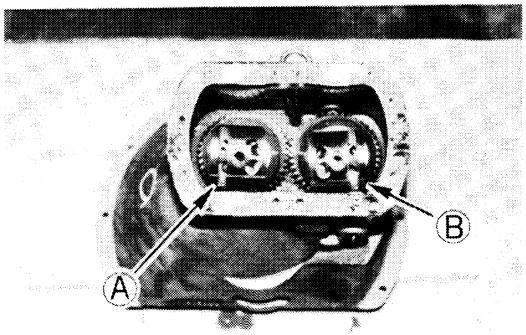




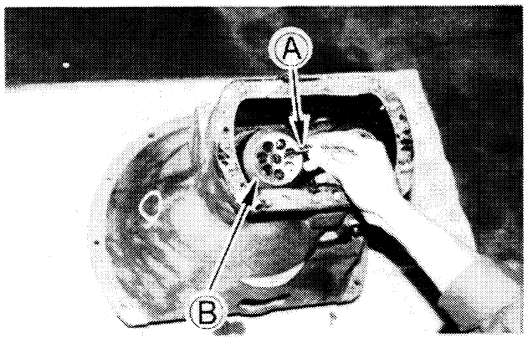
Note: While raising regulator Ⓐ, valve plate Ⓑ and/or Ⓒ fitting to the regulator side may drop off. Be careful not to drop.



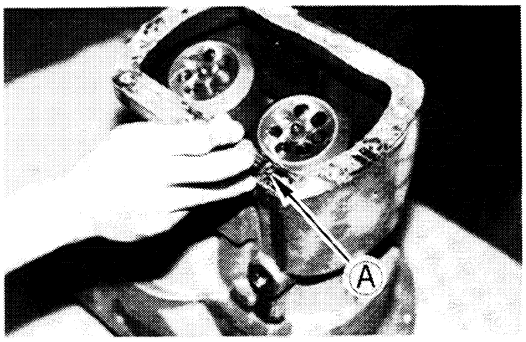
4 Remove valve plate Ⓐ and Ⓑ.



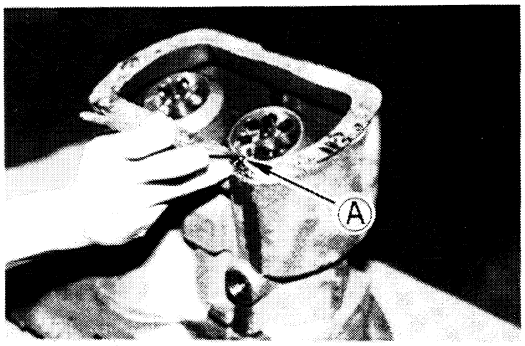
5 Set 2 socket bolts Ⓐ (M5 x 30) with rubber disc not to drop cylinder block Ⓑ.



6 Remove guide Ⓐ using a wire or the like.



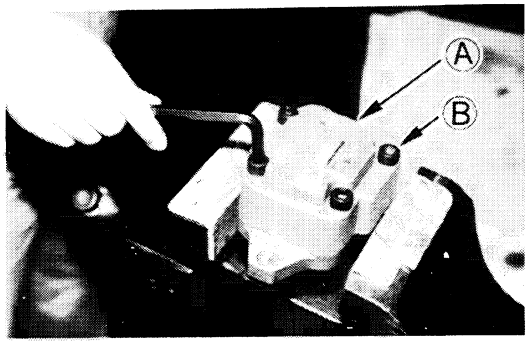
7 Remove steel ball Ⓐ using a magnet bar or the like.



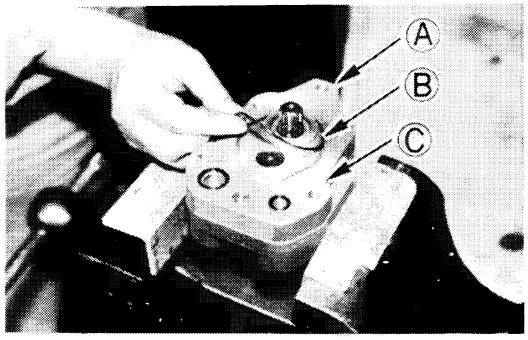
A8V55 ESR6.2 PUMP

52 Hold gear pump Ⓐ by the vise.

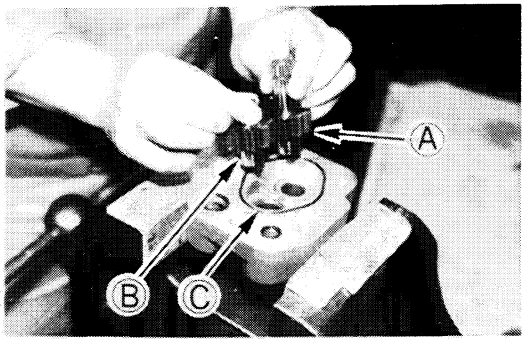
Loosen 4 socket bolts Ⓑ.



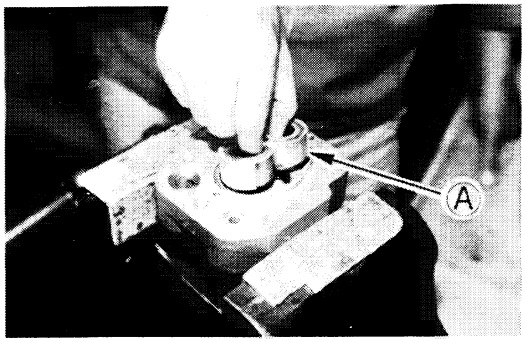
53 Turn gear pump Ⓐ upside down.
Remove O-ring Ⓑ and frame Ⓒ.



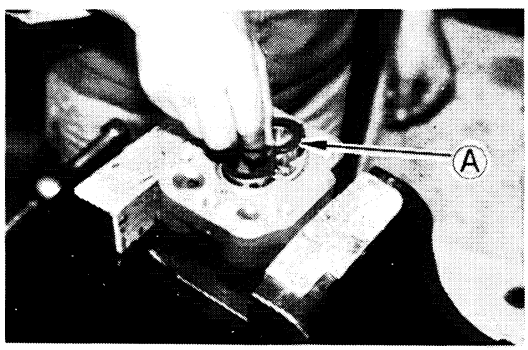
54 Remove drive gear Ⓐ and driven gear Ⓑ.
Remove O-ring Ⓒ.



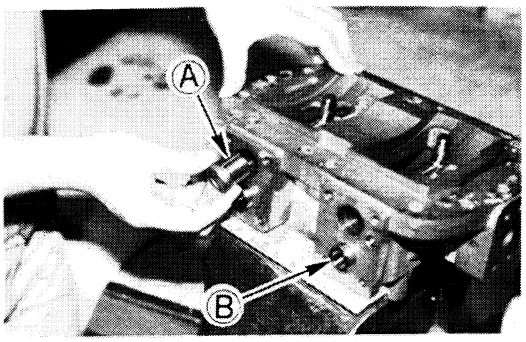
55 Remove side plate Ⓐ.



56 Remove plate Ⓐ.

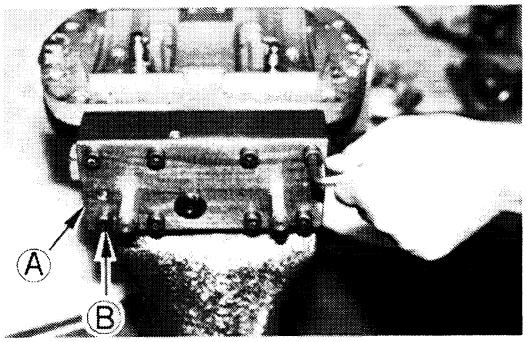


42 Insert 2 pistones Ⓐ and 2 spacer Ⓑ into the casing.

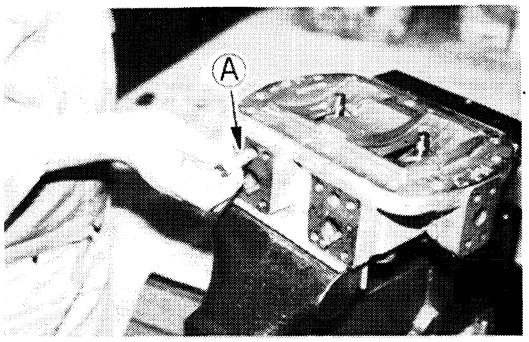


43 Install lower cover Ⓐ on the casing, and install 8 socket bolts Ⓑ , tighten evenly.

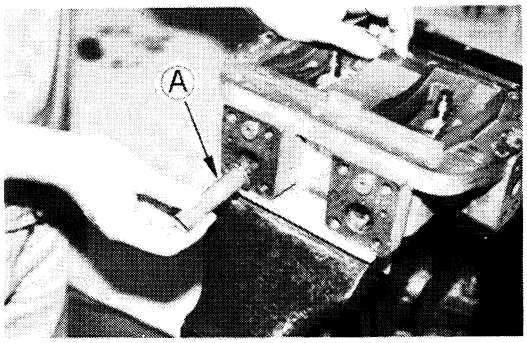
3.6 kgf.m (26 ft.lbs)



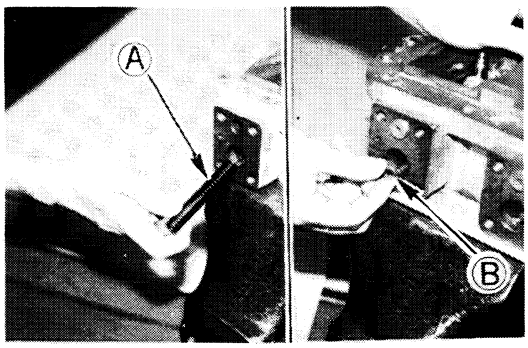
44 Install retainer Ⓐ into the casing.



45 Install retainer Ⓐ into the casing.



46 Install inner spring Ⓐ and shim Ⓑ on the rod.



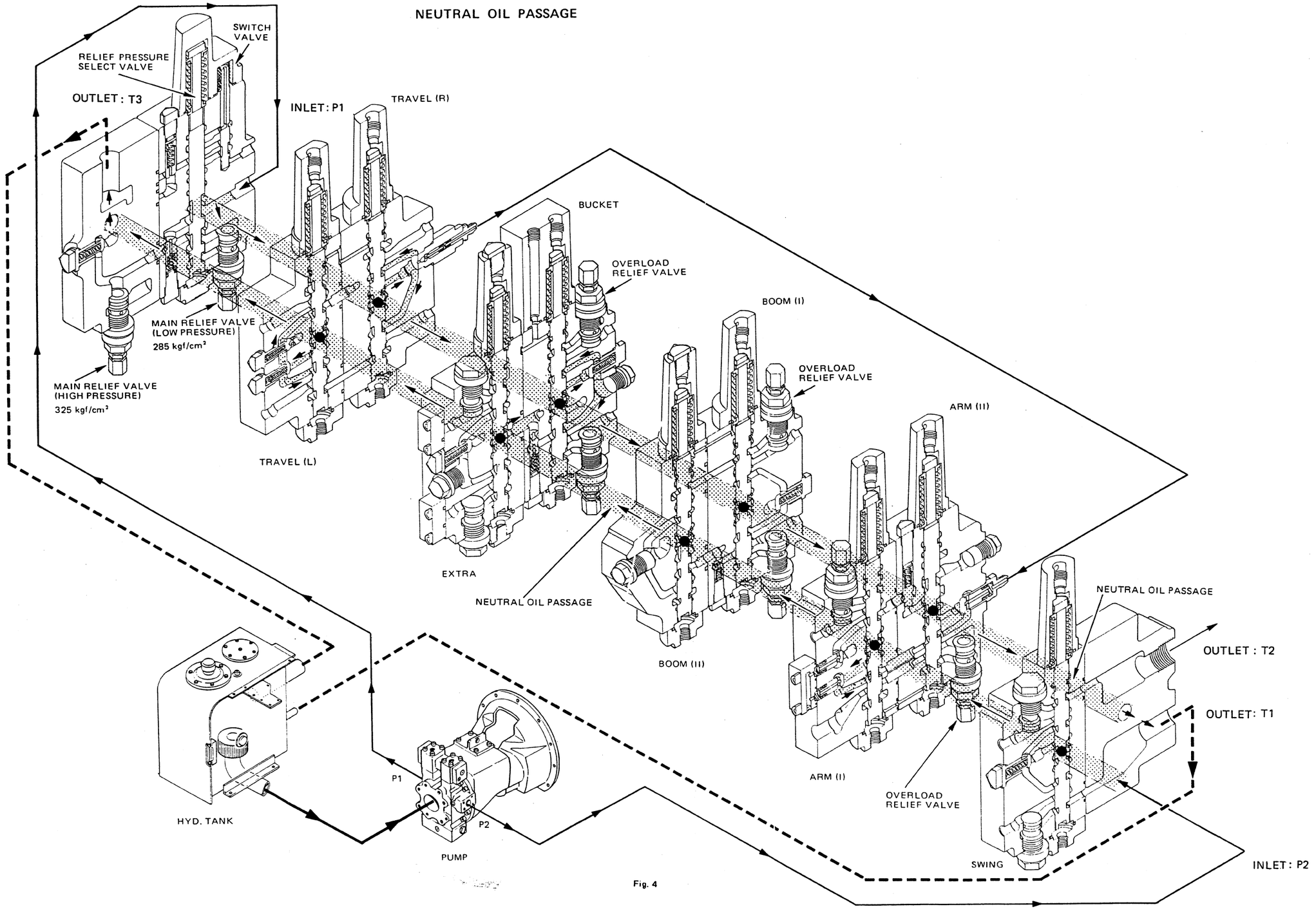

NEUTRAL OIL PASSAGE
SWITCH VALVE
RELIEF PRESSURE SELECT VALVE
OUTLET : T3
INLET : P1
TRAVEL (R)
BUCKET
OVERLOAD RELIEF VALVE
BOOM (I)
MAIN RELIEF VALVE (LOW PRESSURE)
285 kgf/cm²
MAIN RELIEF VALVE (HIGH PRESSURE)
325 kgf/cm²
OVERLOAD RELIEF VALVE
ARM (II)
TRAVEL (L)
EXTRA
NEUTRAL OIL PASSAGE
BOOM (II)
NEUTRAL OIL PASSAGE
OUTLET : T2
OUTLET: T1
ARM (I)
OVERLOAD RELIEF VALVE
HYD. TANK
P1
P2
PUMP
SWING
INLET : P2

Fig. 4

(3) ARM CONTROL SECTION

■ **ARM ROLL-IN OPERATION**

The oil from the INLET "P1" through the neutral oil passage, arm (II) section and the confluence oil passage (B), then enters the arm (I) section, and joins the oil from the INLET "P2". Thus the confluenced oil is fed to the arm cylinder to increase the ARM ROLL-IN speed.

The return oil flows from the rod end of the cylinder through the arm (I) section only returned to the tank.

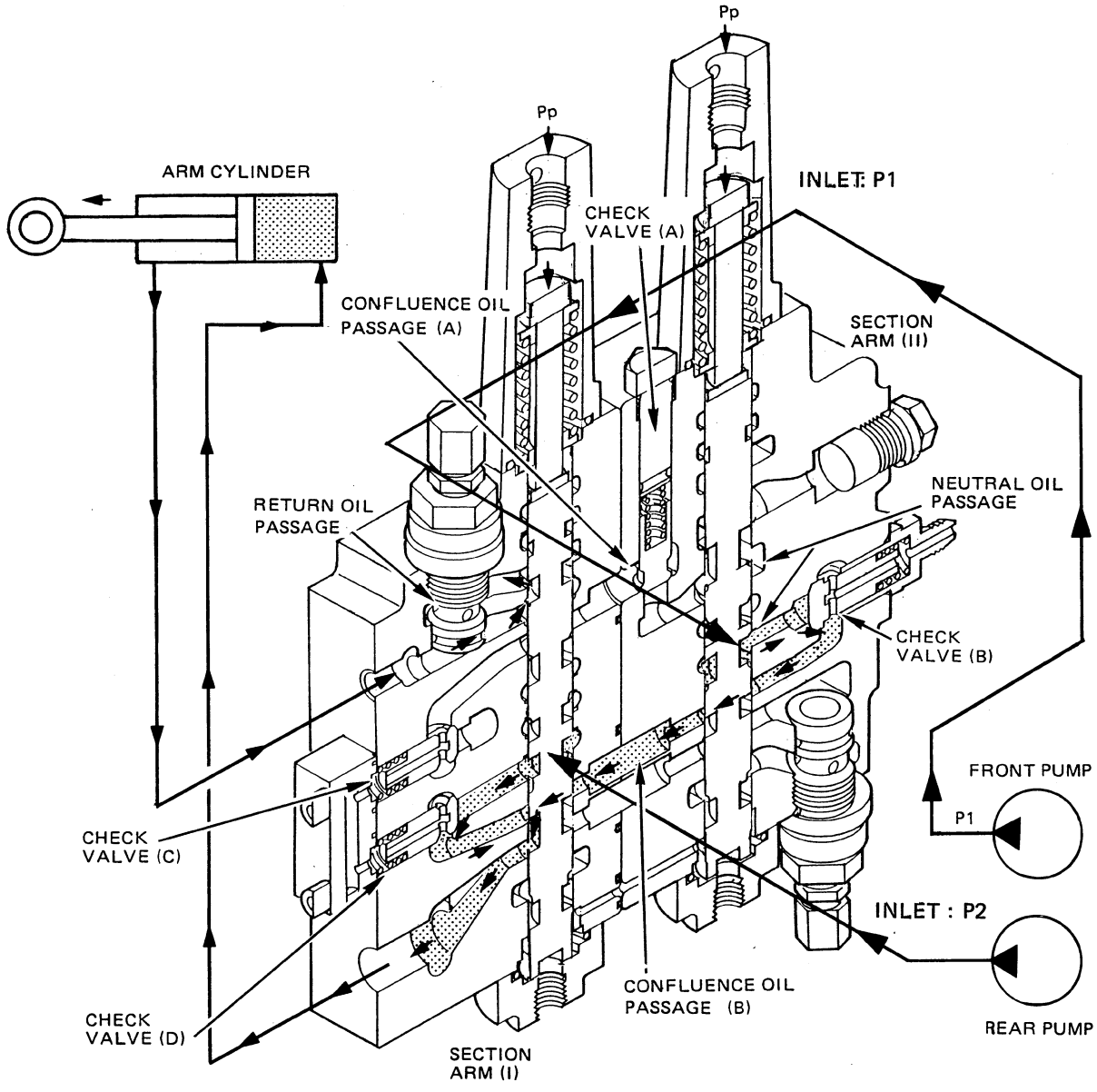
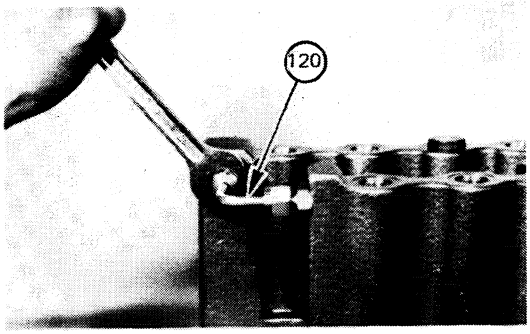
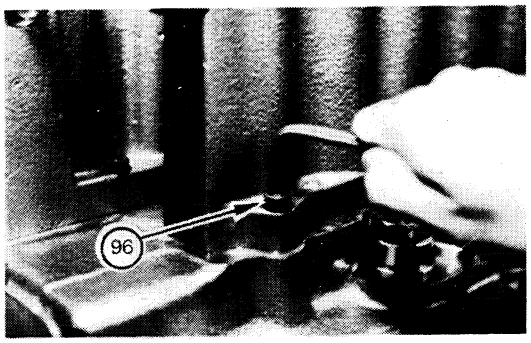


Fig. 14

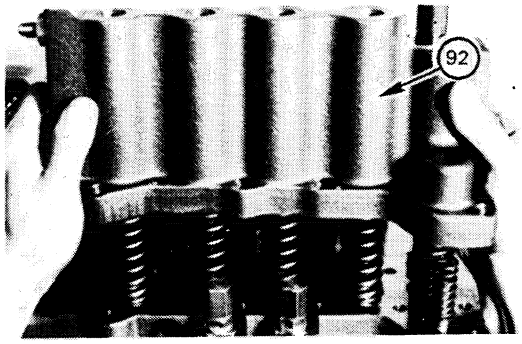
11 SPOOL
Remove pipe assembly (120).



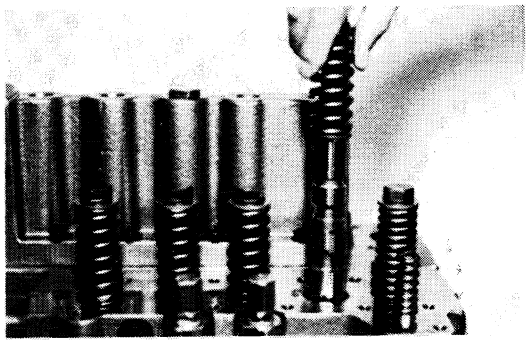
12 Remove socket bolts (96).



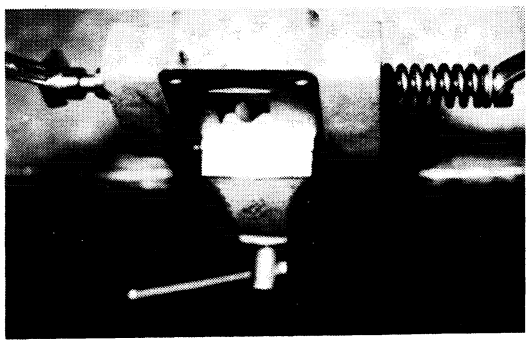
13 Remove housing (92).



14 Remove spool assemblies.



15 Hold the spool assembly as shown.
Loosen bolt (69).

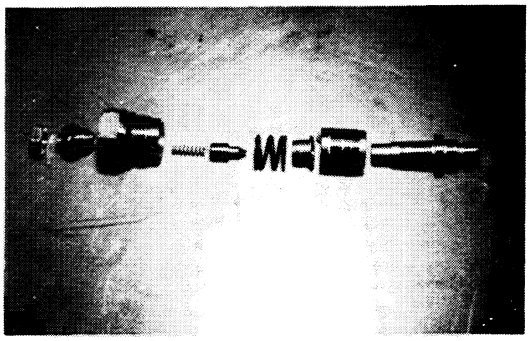


ASSEMBLY

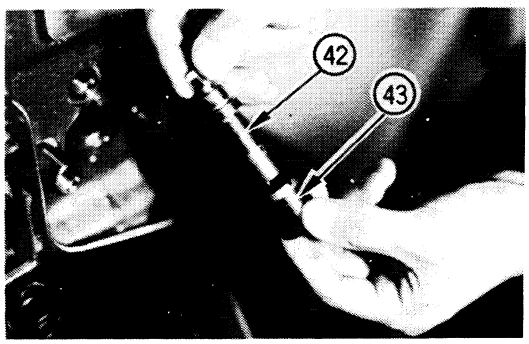
1

Clean all parts with **clean oil** and dry them by compressed air.
Apply the hydraulic oil to the sliding parts.
Then keep the parts clean, and free from dust.

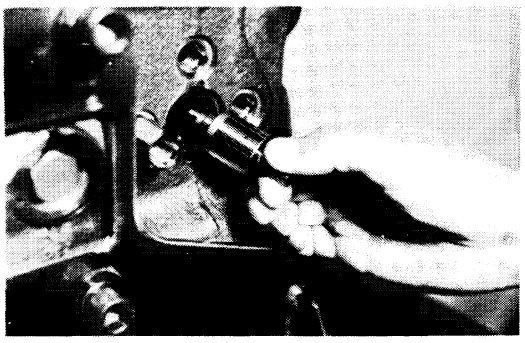
2 PUMP CONTROL RELIEF VALVE
This photo shows all components parts of the valve.



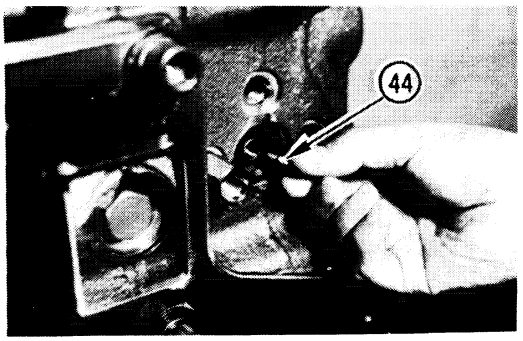
3 Install bushing (43) to valve (42).



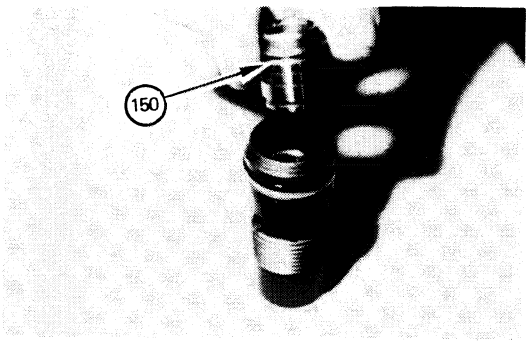
4 Install the body assembly.



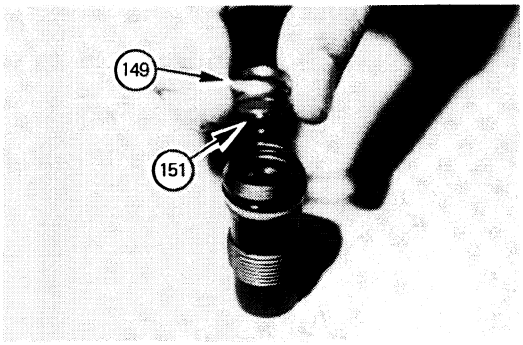
5 Install valve (44).



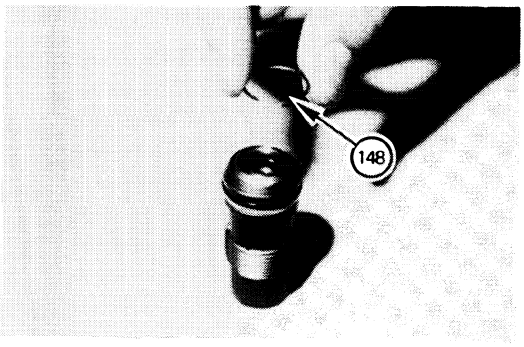
51 Install seat (150) into the valve cartridge.



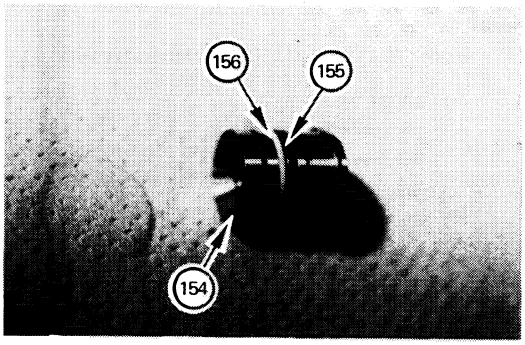
52 Install spring (151) and retainer (149) into the valve cartridge.



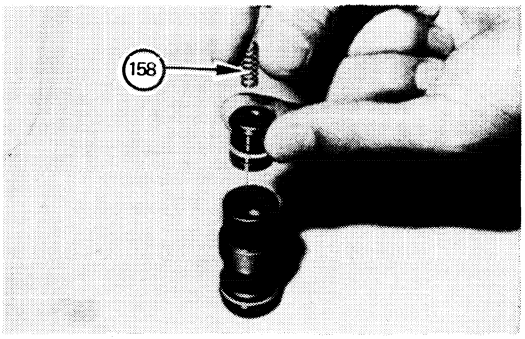
53 Install retaining ring (148) into the valve cartridge.



54 Install O-ring (155) and back-up ring (156) into the groove of poppet (154).



55 Install the poppet and spring (158) into the valve cartridge.



CV22-M CONTROL VALVE

Item	Part name	Q'ty
	VALVE;CONTROL	1
1	.HOUSING	1
2	.HOUSING	1
3	.O-RING	7
4	.RING;BACK-UP	7
5	.O-RING	4
6	.O-RING	4
7	.O-RING	9
8	.RING;BACK-UP	2
9	.O-RING	3
10	.BOLT;SOCKET	3
11	.BOLT;SOCKET	6
13	.SPRING	2
14	.VALVE	1
15	.VALVE	1
16	.VALVE	1
17	.VALVE	1
18	.VALVE	1
19	.VALVE	2
20	.SPRING	6
21	.PLUG	4
22	.PLUG	1
23	.O-RING	5
24	.RING;BACK-UP	5
25	.VALVE	6
26	.VALVE	1
27	.SPRING	7
28	.PLUG	7
29	.PLUG	5
30	.O-RING	14
31	.VALVE	1
32	.ADAPTER	1
33	.VALVE	1
34	.ADAPTER	1
35	.SPRING	1

Item	Part name	Q'ty
36	.PLATE	1
37	.EXPANDER	1
38	.O-RING	4
39	.ADAPTER	1
41	.SCREW	2
42	.VALVE	2
43	.BUSHING	2
44	.VALVE	2
45	.SPRING	2
46	.SEAT	2
47	.SPRING	2
48	.BODY	2
49	.O-RING	2
50	.SCREW	2
51	.NUT	2
52	.O-RING	2
61	.SPOOL	2
62	.SPOOL	1
63	.SPOOL	1
64	.SPOOL	1
65	.SPOOL	1
66	.SPOOL	1
67	.SPOOL	1
68	.SPOOL	1
69	.BOLT	10
70	.SEAT	20
71	.SPRING	9
76	.SPOOL	1
77	.SPRING	1
81	.SPOOL	1
82	.WASHER	1
83	.SPRING	1
84	.O-RING	1
91	.HOUSING	1
92	.HOUSING	1

Item	Part name	Q'ty
93	.HOUSING	1
94	.HOUSING	1
95	.O-RING	20
96	.BOLT;SOCKET	49
97	.PLUG	1
101	.VALVE;RELIEF	1
102	.VALVE;RELIEF	1
103	.VALVE	5
104	.VALVE	1
105	.PLUG	4
105A	..O-RING	1
110	.ADAPTER	3
110A	..O-RING	1
111	.O-RING	3
113	.PLUG	4
114	.PLATE	2
115	.ADAPTER	1
115A	..O-RING	1
116	.PLUG	2
117	.NAME-PLATE	2
118	.NAIL	2
119	.ADAPTER	2
120	.PIPE ASS'Y	1
126	.TUBE	8
127	.SHEET	1
128	.SHEET	1
129	.SHEET	1
130	.SHEET	3
131	.SHEET	11
132	.SHEET	14
133	.SHEET	2
134	.SHEET	7
135	.SHEET	4
136	.SHEET	2

2.3 MAKE-UP VALVE

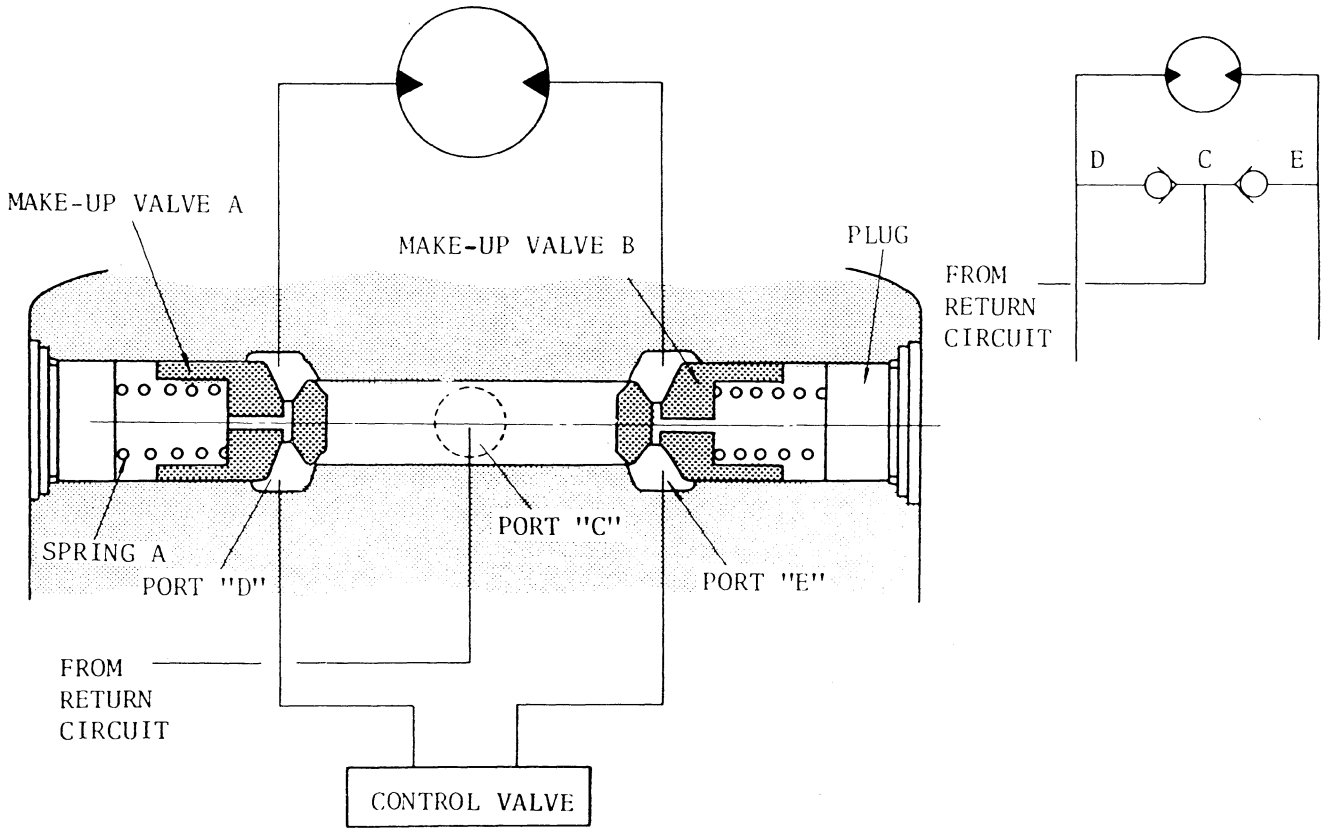
In case of the control valve is set to its neutral position to out off the circuit while the motor is rotating, the motor cannot stop abruptly and is still rotating. In such a case, high pressure works at the side of port "B" of the motor.

Then, the high pressure may be released by means of a relief valve fitted inside the motor or an overload relief valve inside the control valve.

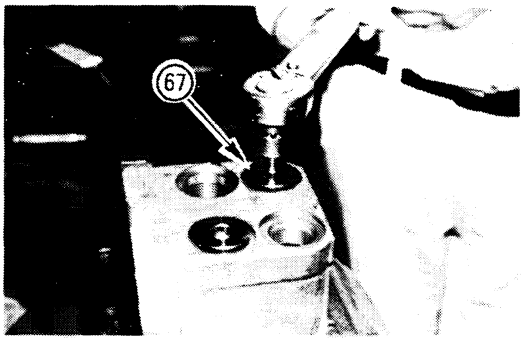
On the contrary the pressure at the side of port "A" drops to be negative pressure condition since the oil becomes short.

As the make-up valve is provided with oil passage hole to connect the port "A" and chamber A, the make-up valve A is moved toward the left against spring A. The oil in the return circuit is drawn into the motor circuit from the part "D" via port "C", preventing a cavitation from occuring in the circuit.

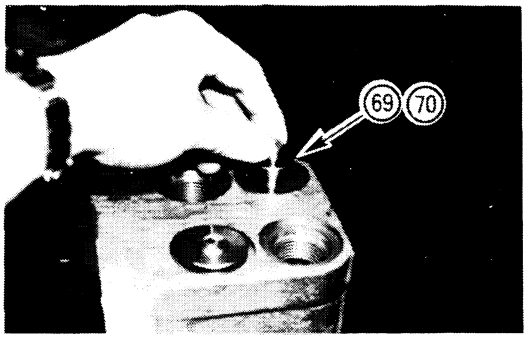
The make-up valve B works in the same function of the above.



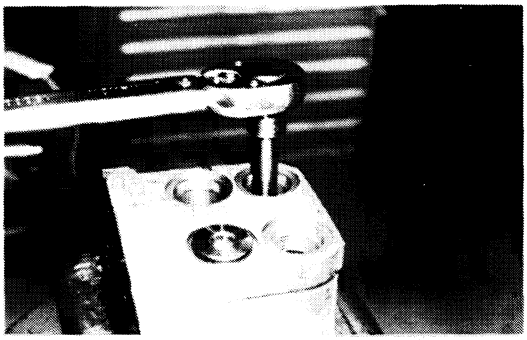
24 Remove plug (67) of shockless piston.



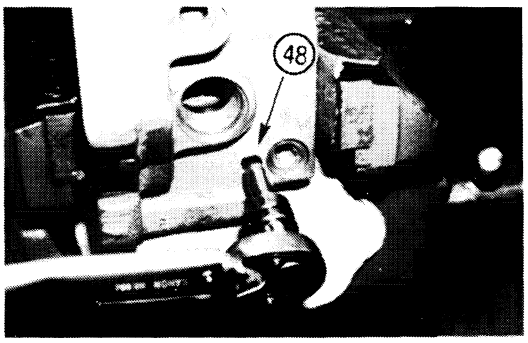
25 Remove piston (69) and spring (70).



26 Remove plug (71).



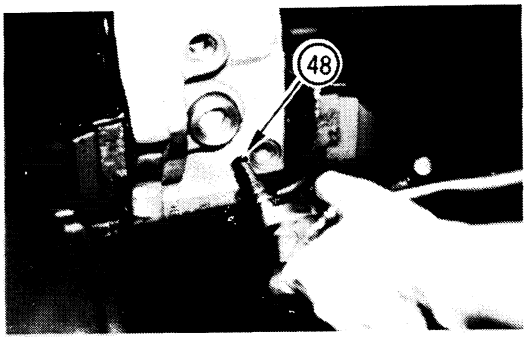
27 Remove plug (48).



28 Remove set screw (55).

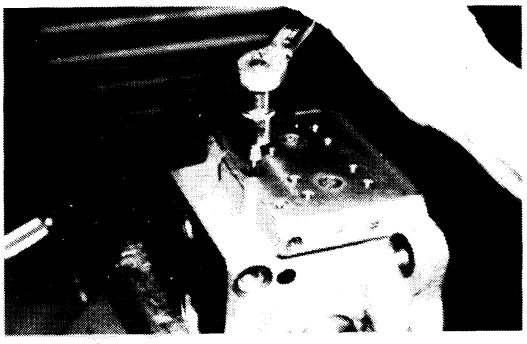
20 Install plug (48) with seal tape to the body.

Tightening torque: 1.25 kg-m, 9 ft.lbs



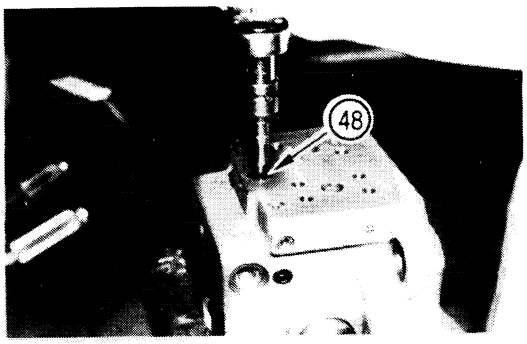
21 Assembly of check valve with the same manner in the step 6 , 7 and 8 .

Punch

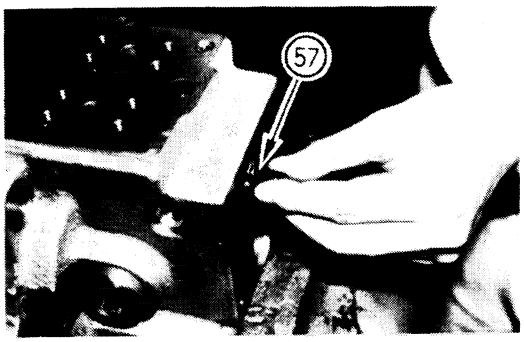


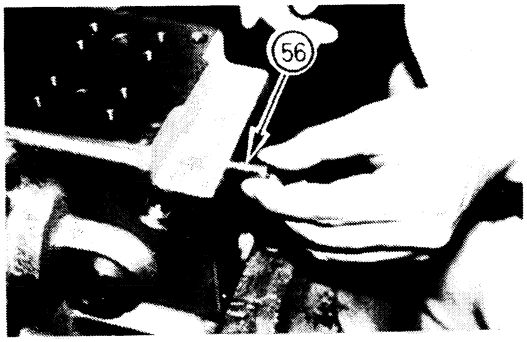
22 Install and tighten plug (48) with seal tape to the body.

Tightening torque: 1.25 kg-m, 9 ft.lbs

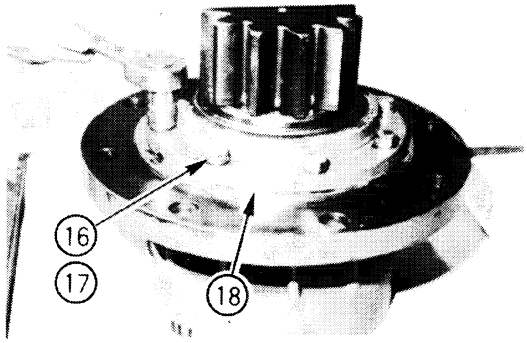


23 Assembly of shuttle valve.
Install spring (57) and valve (56) into the body.

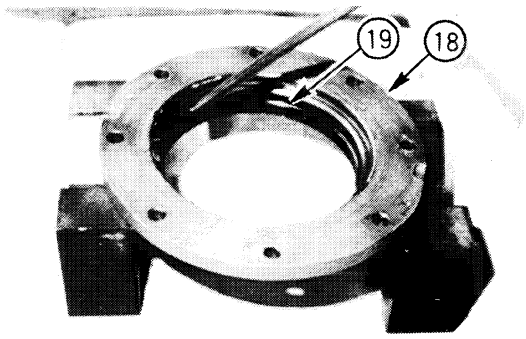




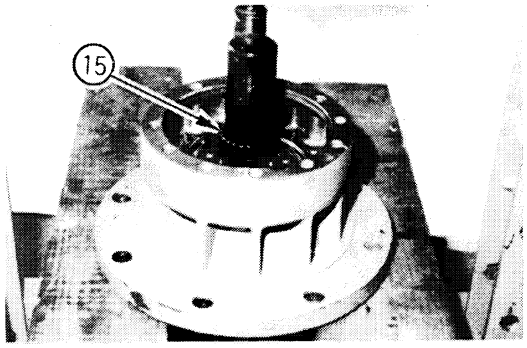
10 Turn the housing up side donw, and remove ten bolts (16).
Install a screw driver into the noches of cover (18) and remove the cover.



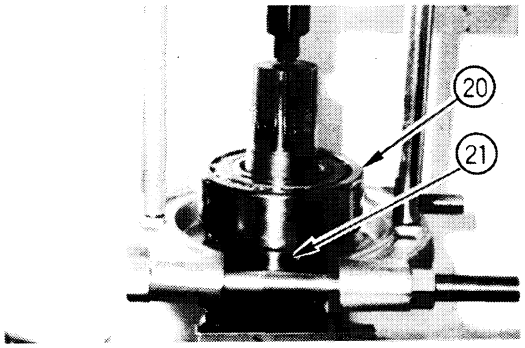
11 Remove oil seal (19) from the cover.



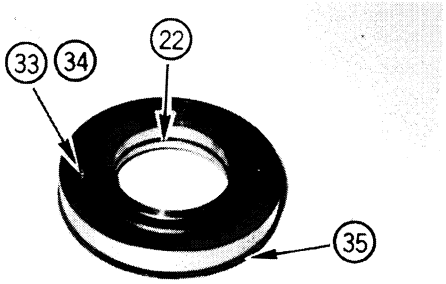
12 Put the housing on a press.
Remove drive shaft (15) with the press.



13 Remove bearing (20) and sleave (21) with a puller.



14 Remove O-ring (22) Magnet (33), screw (34) and retaining ring (35), from the sleave.



2. FUNCTION

2-1. IN NEUTRAL RANGE (A-B)

When the lever is shifted into neutral position, the spool is pushed up by the return spring to block the port "IN" and to connect ports "OUT" to "T". Consequently, the pressure at delivery port "OUT" becomes the same as that at the port "T".
Within the stroke "A" of the pusher the delivery pressure does not rise, keeping the same pressure as that of the tank.
The above neutral range is shown in Fig. 5 by A-B line.

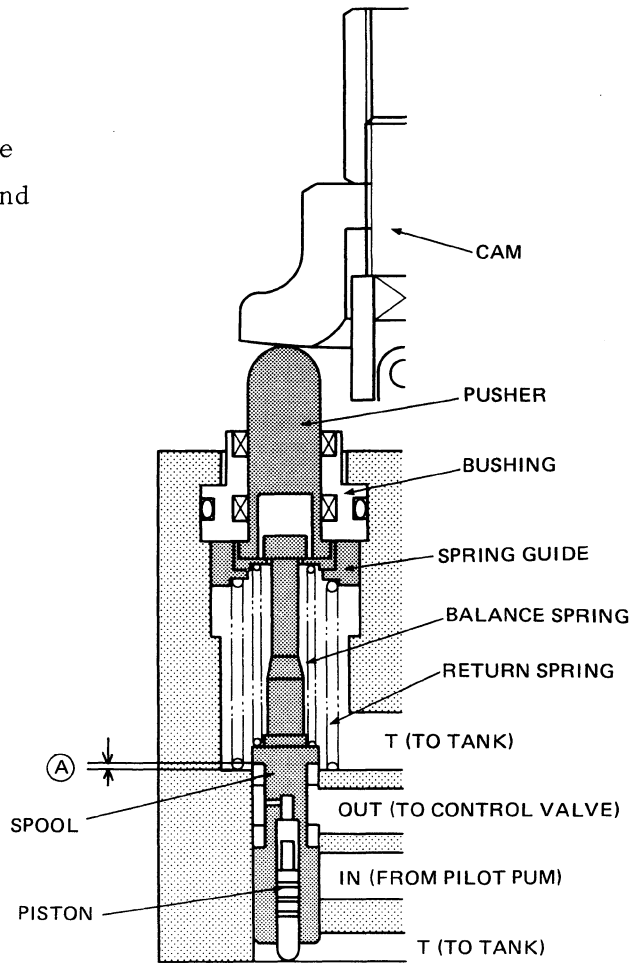


Fig. 4

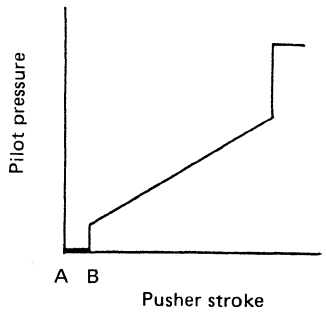
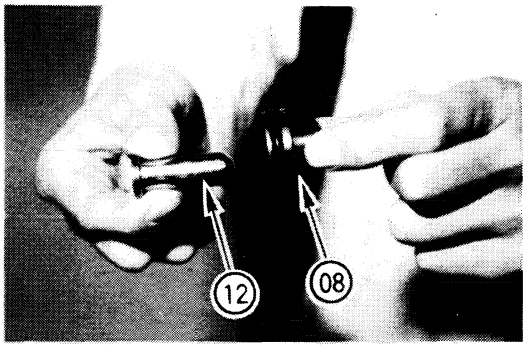


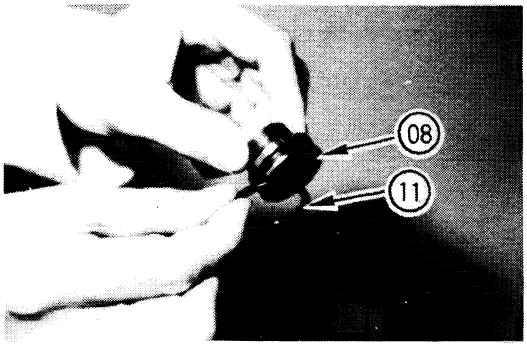
Fig. 5

HV TYPE PILOT VALVE (FOR FRONT)

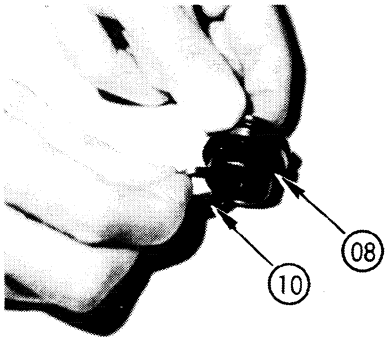
20 Remove pusher (12) from bushing (08).



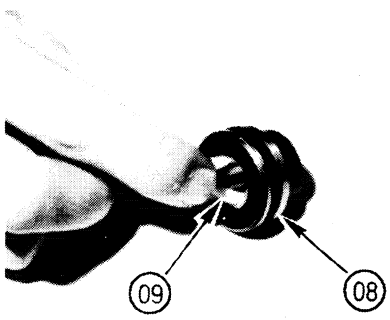
21 Remove O-ring (11) from bushing (08).



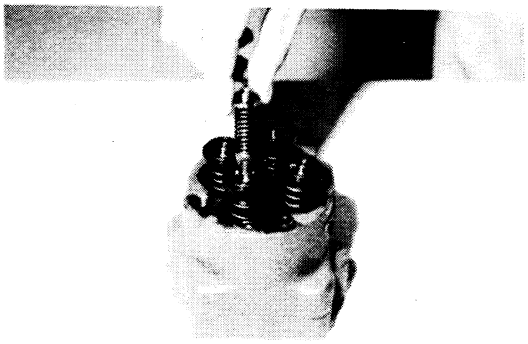
22 Remove dust seal (10) from bushing (08).



23 Remove oil seal (09) from bushing (08).



24 Remove four spool assemblies.



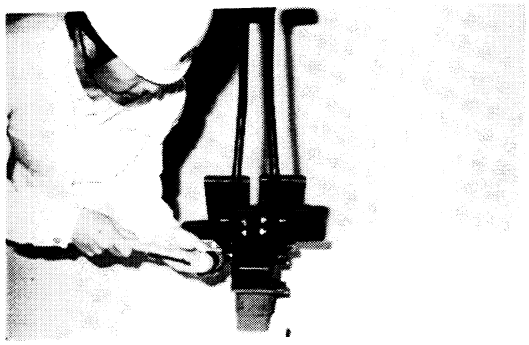
Note: Arrenge the parts disassembled to each port with caution to do not confuse.

HV TYPE PILOT VALVE (FOR TRAVEL)

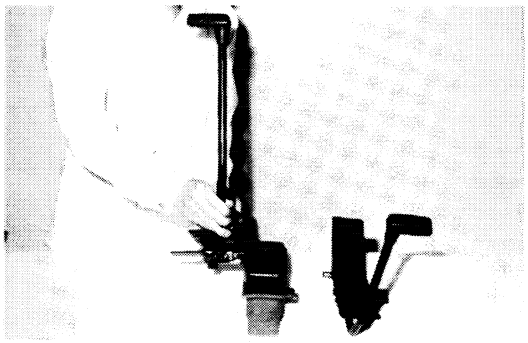
1. DISASSEMBLY

Note: Before disassembling clean the all parts.

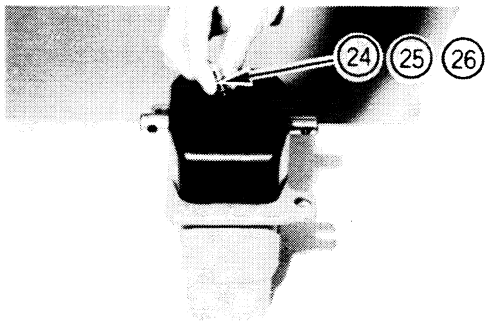
1 Put a pilot valve assembly on a work-bench.
Remove two spring pins.



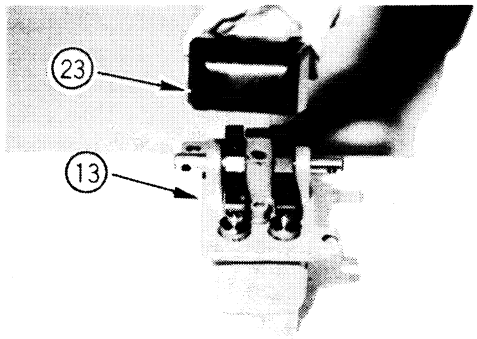
2 Remove both right and left lever.



3 Remove bolt (24), plain washer (25) and spring washer (26).

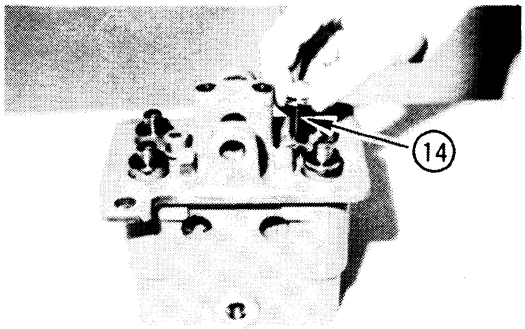


4 Remove cover (23).

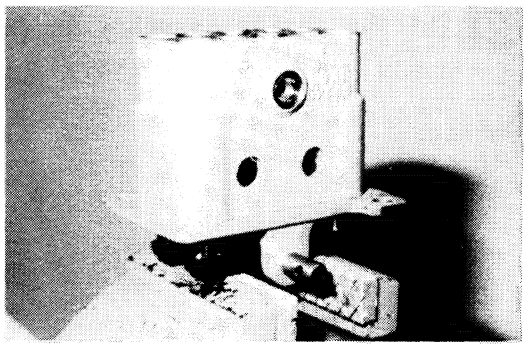


21 Install socket bolt (14).

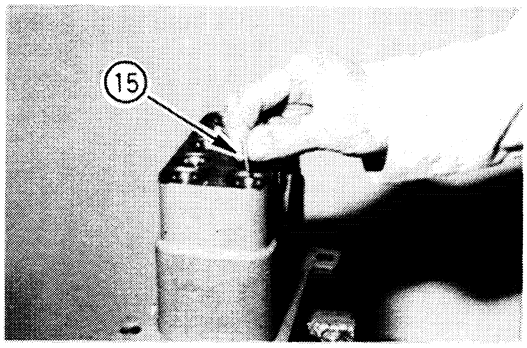
Tighten torque: 5 kg.m (36.17 ft.lbs)



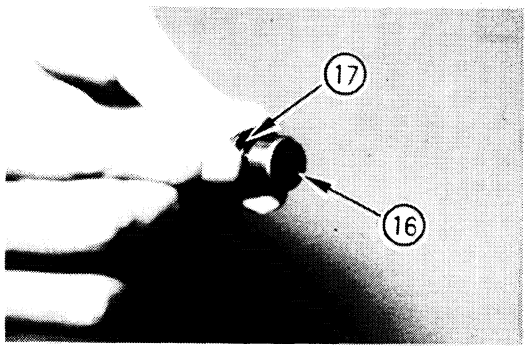
22 Hold the casing assembly by the vice.



23 Install piston (15) into spool (02).

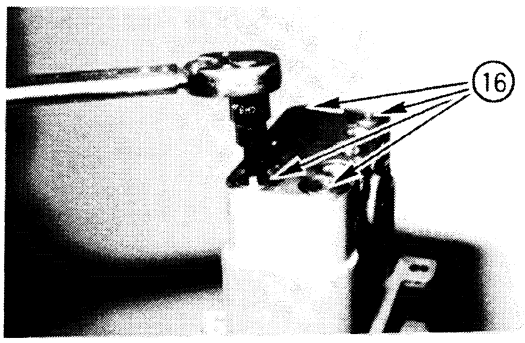


24 Install O-ring (17) into plug (16).

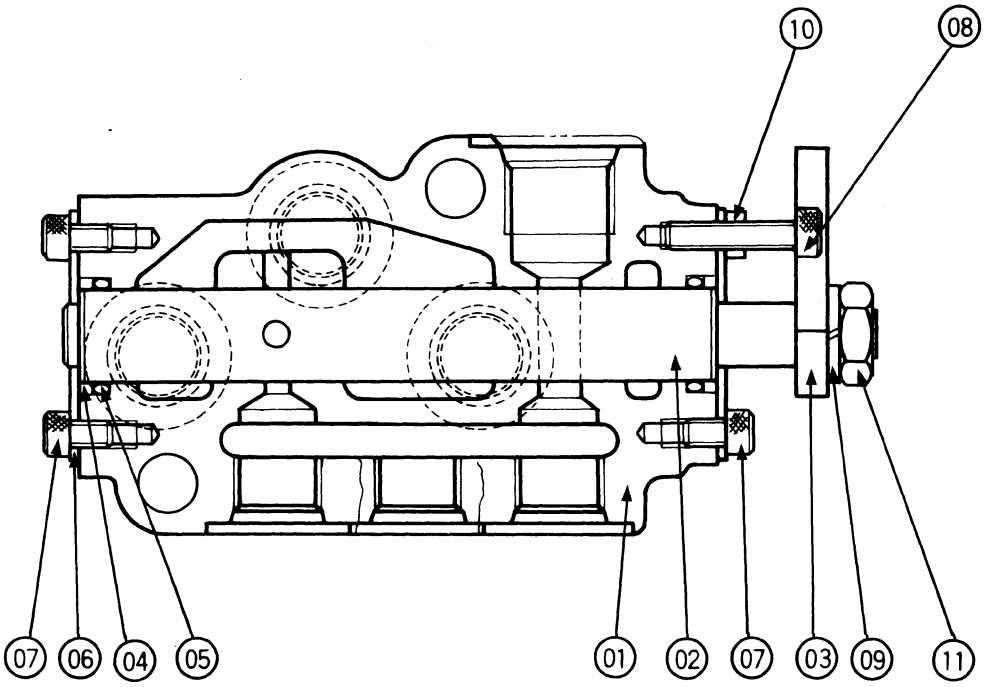


25 Install four plugs (16).

Tighten torque: 5 kg.m (36.17 ft.lbs)



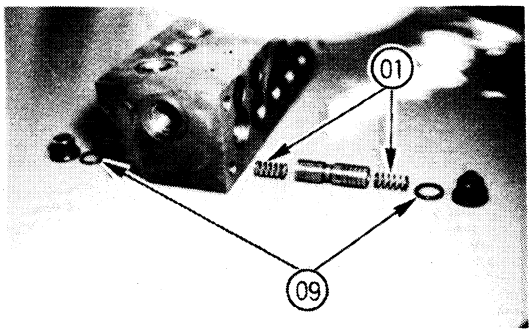
CONTROL NEUTRALIZER VALVE



Item	Part name	Q'ty
01	Body	1
02	Spool	1
03	Lever	1
04	Back-up ring	2
05	O-ring	2
06	Seal plate	2
07	Bolt	3
08	Bolt	1
09	Spring washer	1
10	Nut	1
11	Nut	1

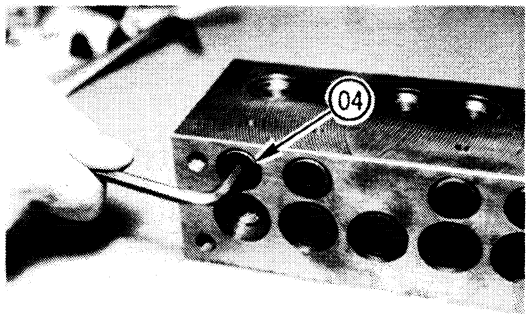
SHOCKLESS VALVE

5 Remove spring (01) and O-ring (09) from the plug.

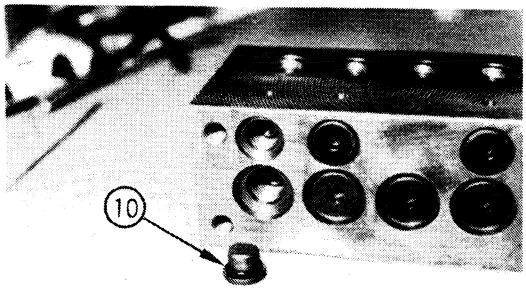


DISASSEMBLY OF FILTER AND CHECK ASS'Y

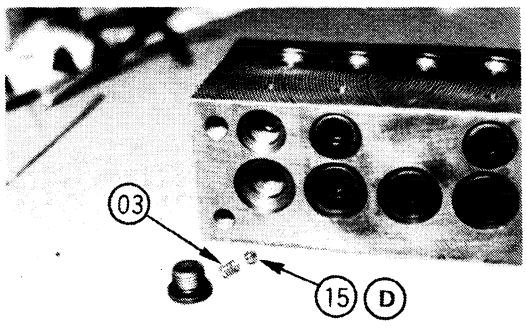
1 Remove plug (04).



2 Remove O-ring (10).



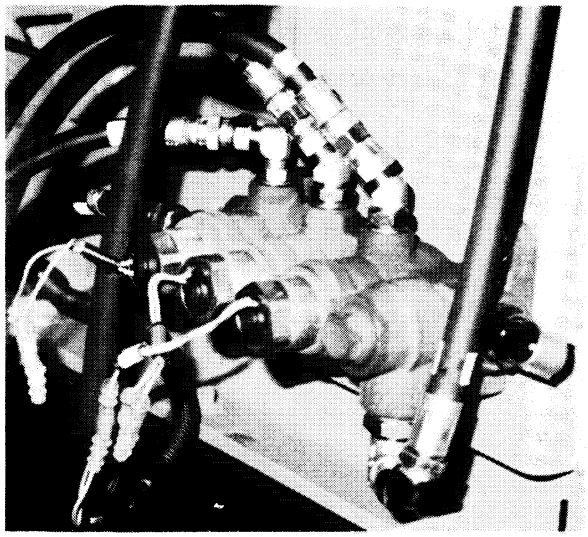
3 Remove spring (03) and steel ball (15D).



SOLENOID VALVE

1. OUTLINE

Solenoid valves are provided in the pilot circuit to operate pump regulator, auto-idle cylinder and mode-change cylinder.



This valve is mainly composed of spool, magnetic coil, plunger and body.

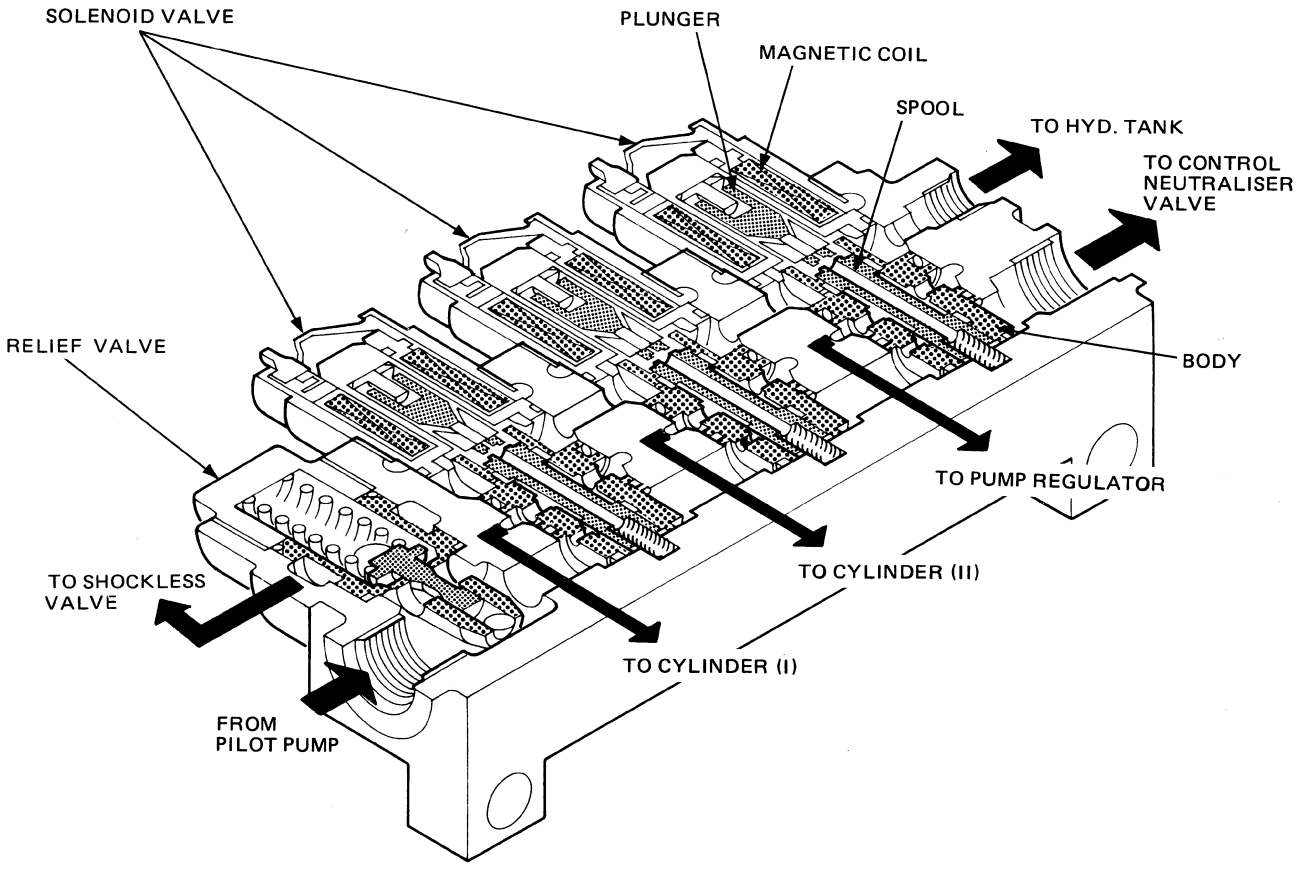
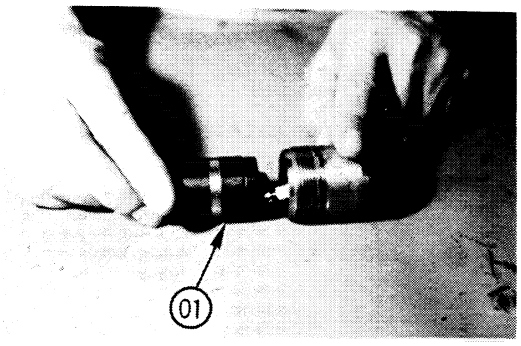


Fig. 1

2. INSPECTION

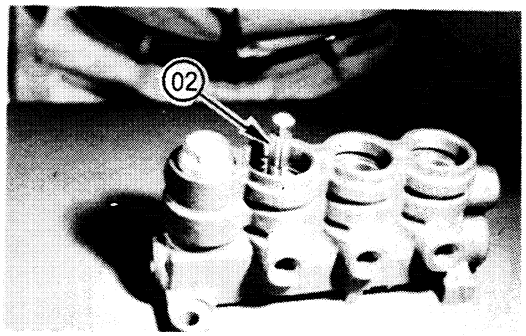
1 Coil assembly

When coil assembly (01) short-circuited or disconnected, change coil assembly.



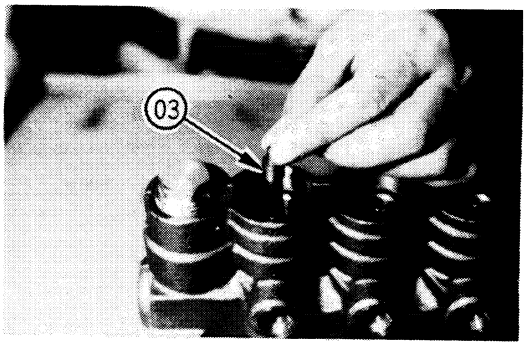
2 Plunger

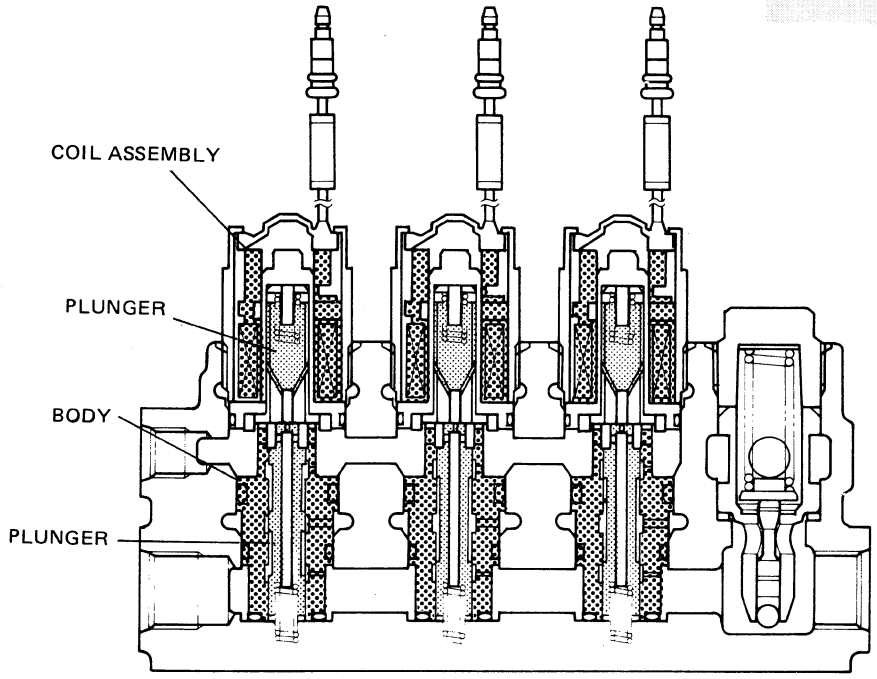
When punger (02) stuck because of rust or dust, check surface of plunger.
So if it has rust or flaw, change the plunger.

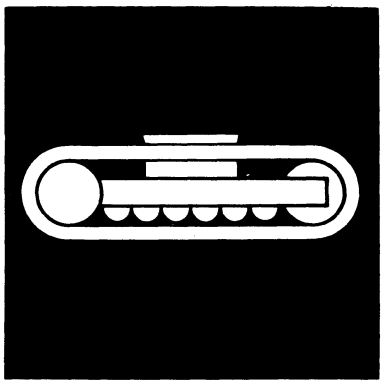


3 Spool

When spool (03) stuck because of rust or dust, check surface of spool.
So if it has rust or flaw, change the spool and body.







Section 5 UNDERCARRIGE

CONTENTS

O/P: OPERATIONAL PRINCIPLE
D/A: DISASSEMBLY & ASSEMBLY

UNDERCARRIAGE

UNDERCARRIAGE

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

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- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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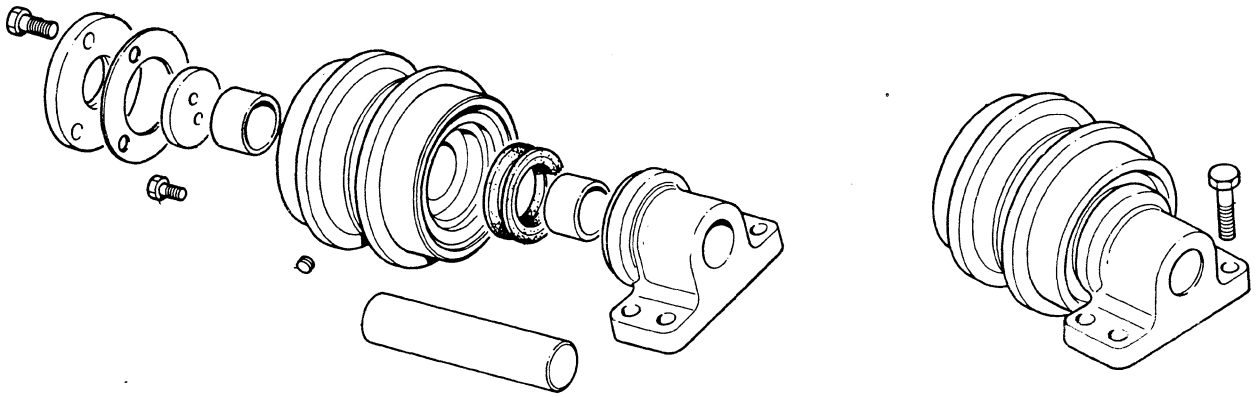
6. UPPER ROLLER & LOWER ROLLER

6.1 CONSTRUCTION

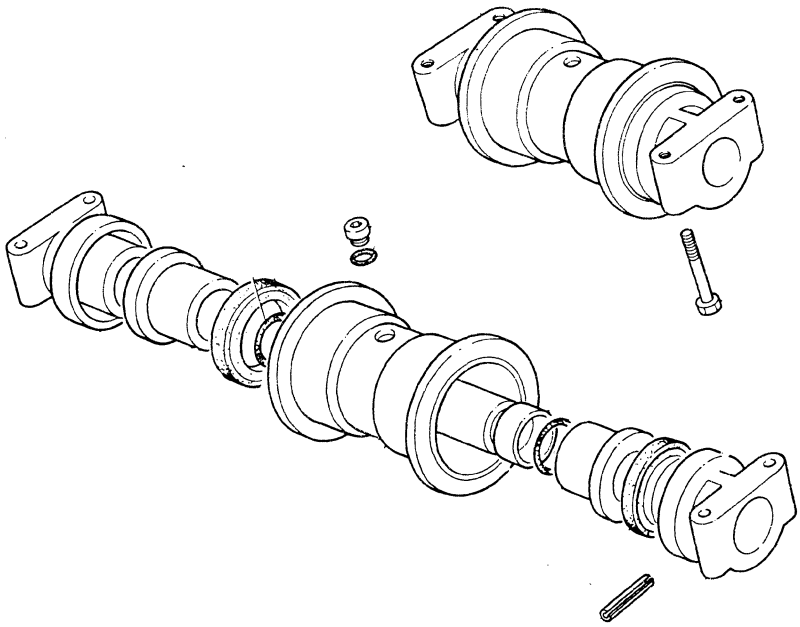
6.1.1 UPPER ROLLER

One upper rollers are equipped on each side track frame to support track link. This roller is an overhang support type.

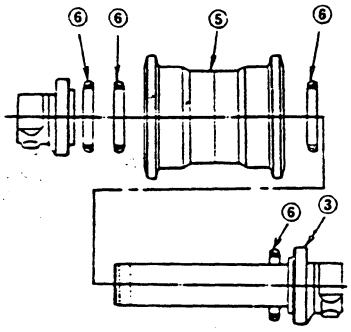


6.1.2 LOWER ROLLER

Seven lower rollers are equipped under each side of track frame to stable rotating of track link.

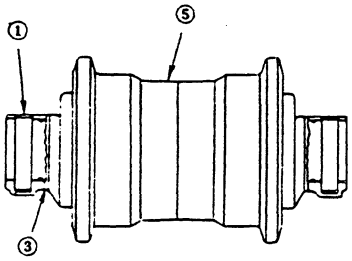


3 Install seal groups (06) into roller (05) and collar (03).



Note: Apply grease to O-ring part of seal groups.
Apply engine oil to matching surface of seal groups.

4 Install axle (04) into roller (05).
Fix another collar (03) to the axle by pin (01).

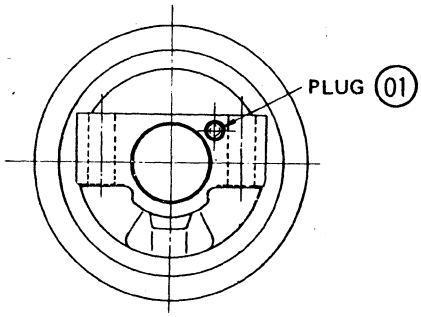


5 Supply engine oil to the roller through the plug hole.
Install plug (01) to collor (03).

Note: Recommended oil

Class: SEA30

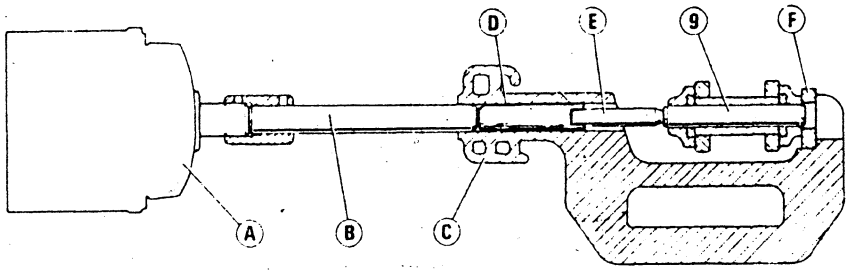
Volume: Kg. 0,32



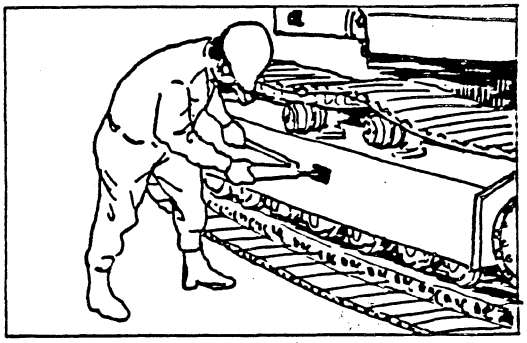
5 Install master pin using a special tool:

C : 75294946
B : 75295628
E : 75295627
D : 75295630
F : 75295756
A : 75297580
9 : MASTER PIN

6

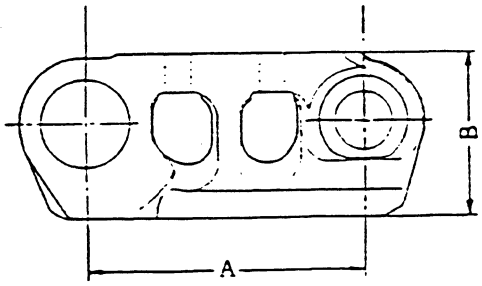


7 Supply grease to the cylinder through the fitting to adjust track link tension.



7.2.5 SPECIFICATIONS

(1) TRACK LINK



Mark	ND	RL	LU	Remedy
A	170	173	174	
B	97	93	91	Rebuild & Finish

* The pitch should be determined by taking the average of 5 links.

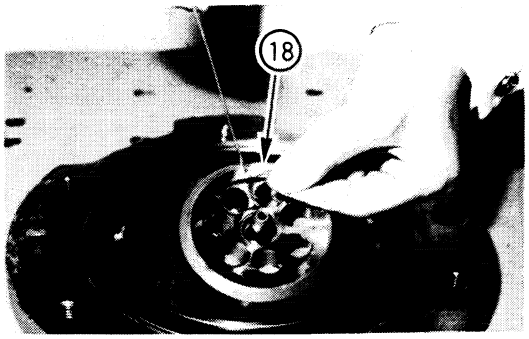
ND: Nominal Dimension

RL: Recommended Service Limit

LU: Limit of Use

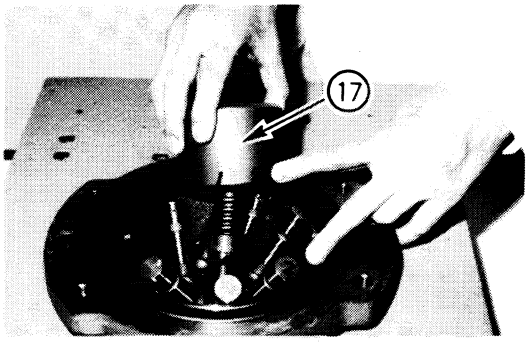
UNDERCARRIAGE

9 Remove retaining ring (18) from the center shaft.

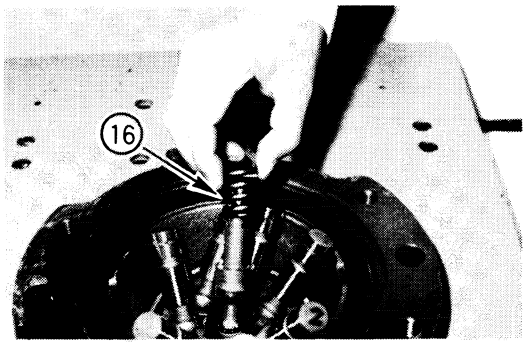


10 Remove rotor (17).

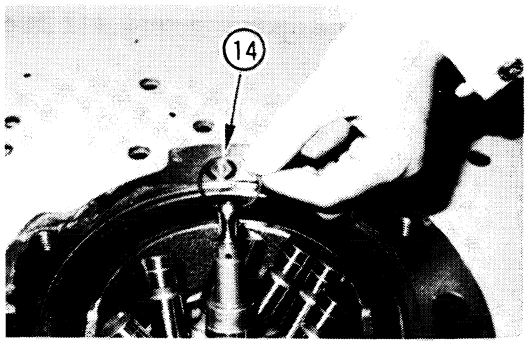
Note : Put matching number on the piston heads and rotor holes.



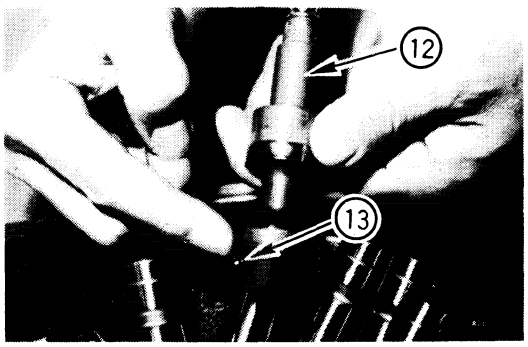
11 Remove center spring (16).



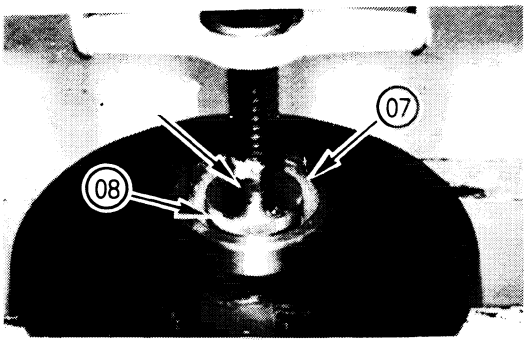
12 Remove retaining ring (14) from the drive disk (01).



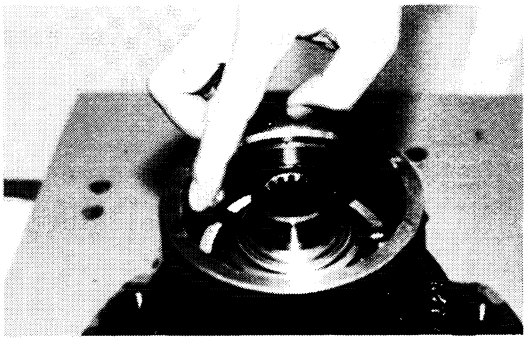
13 Pull out the center shaft (12) from the drive disk.



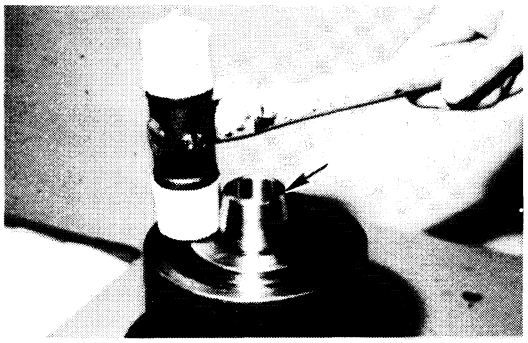
12 Apply a liquid packing to the outside surface of seal and install it by using a special tool and press.



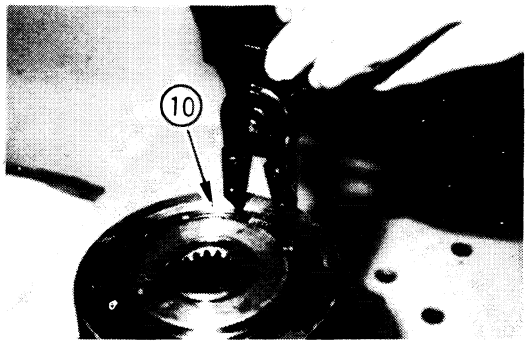
13 Apply a grease to the seal cover (07), oil seal lip (08) and O-ring (09).



14 Install special tool to drive disk.
Install seal cover (07) with oil seal (08).

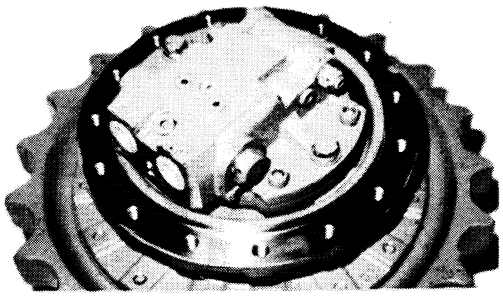


15 Install retaining ring (10) to the groove of casing.



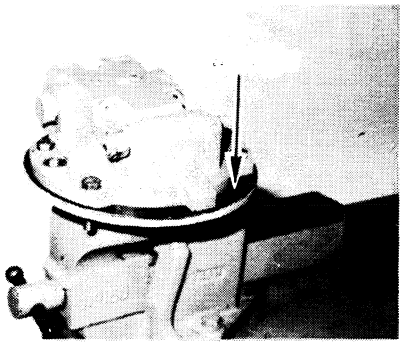
1. DISASSEMBLY BRAKE VALVE

Note : Before disassembling, thoroughly clean the outside of the brake valve.

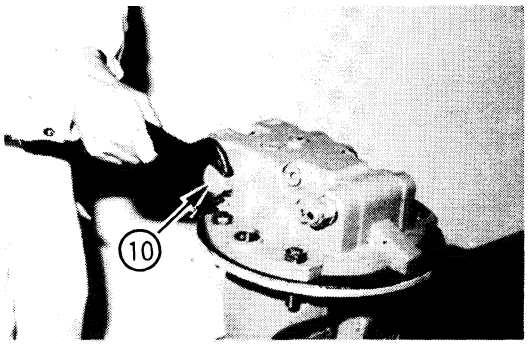


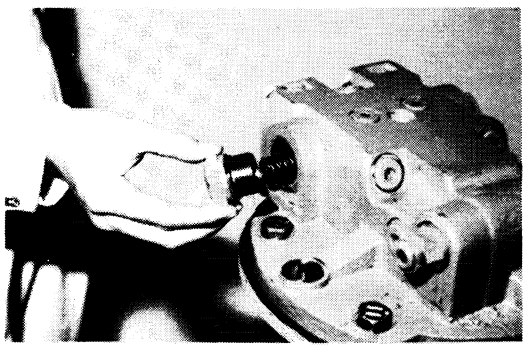
1 Remove bolts and socket bolts from travel motor.

2 Attach brake valve assembly to worke-bench with bolts.

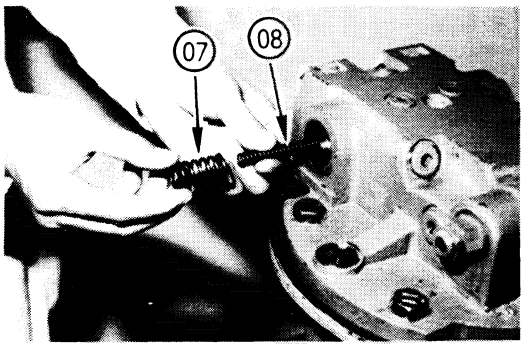


3 Remove plug (10) of the counterbalance valve from valve assy.



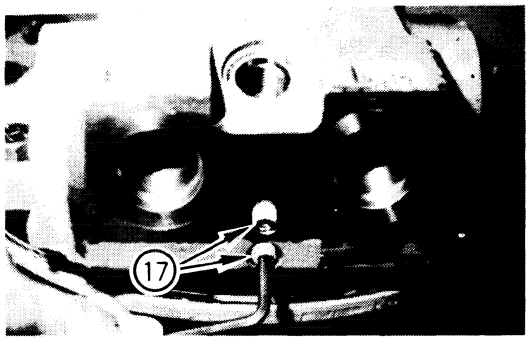


4 Remove springs (07 and 08).



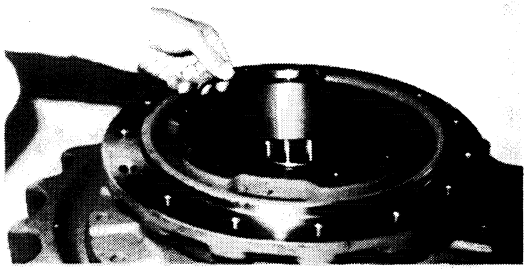
25 Install plug (17) with seal tape to body.

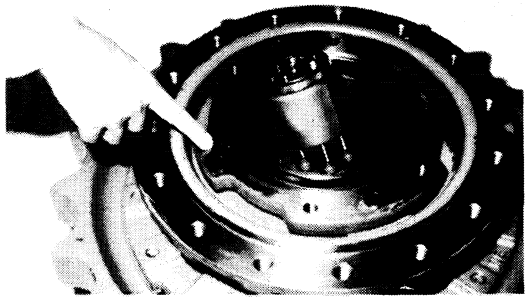
Tightening torque: 1 kg-m, 7 ft.lbs



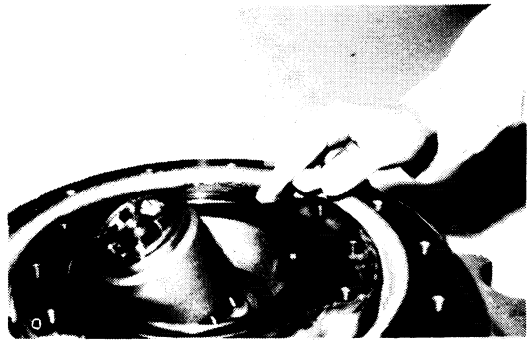
26 Remove plug from the body.

27 Install O-rings to travel motor casing.



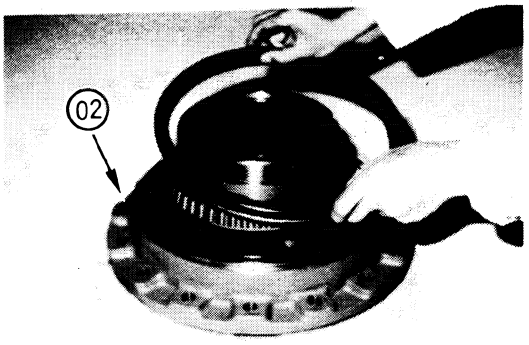


28 Apply grease to motor casing and O-rings.

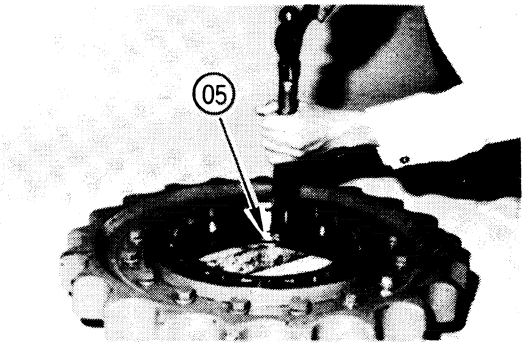


20 Remove the half side of floating seal (03) from the housing (02).

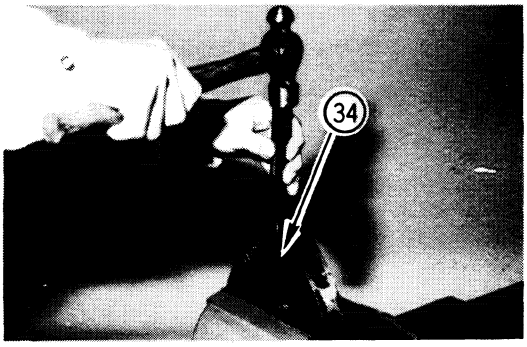
Note: No necessary remove bearing inner race unless damaged.



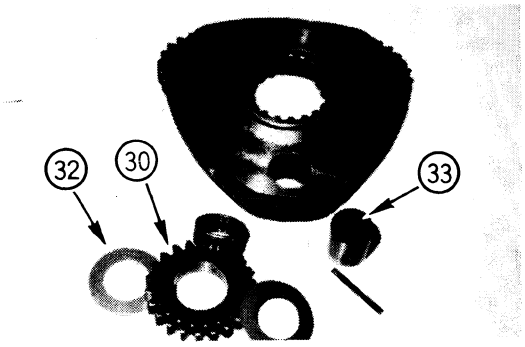
21 Remove bearing outer race (05) from the drum (04) by using a bar and hammer.



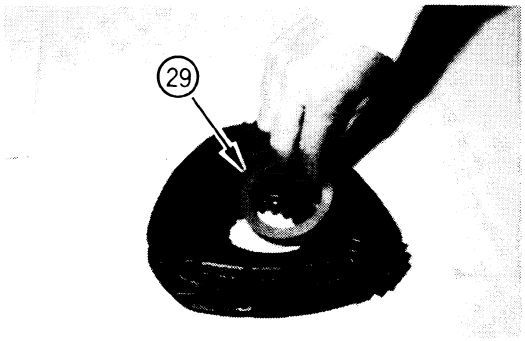
22 Push out spring pin (34) from carrier (28) by using a punch.



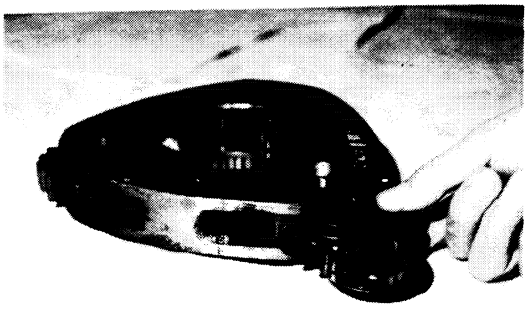
23 Remove pin (33), planetary gear (30) and thrust plates (32).



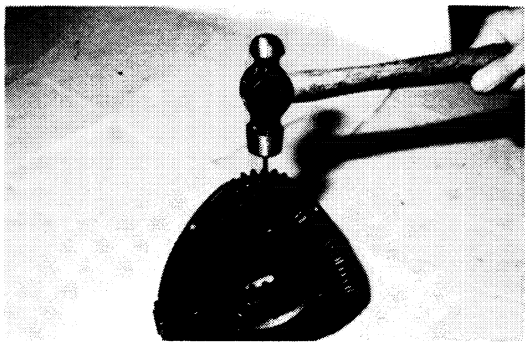
24 Remove spacer (29) from the carrier.



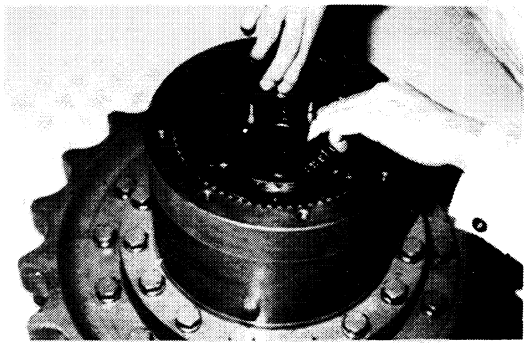
34 Install one thrust plate (32) on each side of planetary gear (30).
Install planetary gear assembly into the carrier (28).



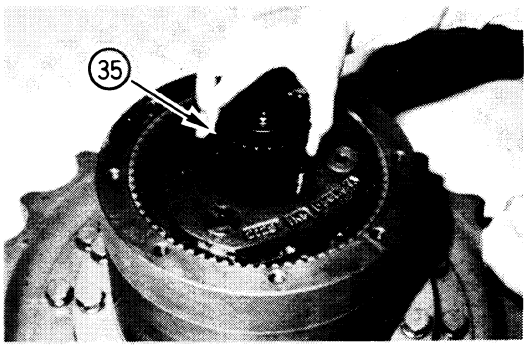
35 Install pin (33) aligning the hole of pin with the hole of carrier.
Install spring pin (34) aligning the notch of spring pin with end face of pin.



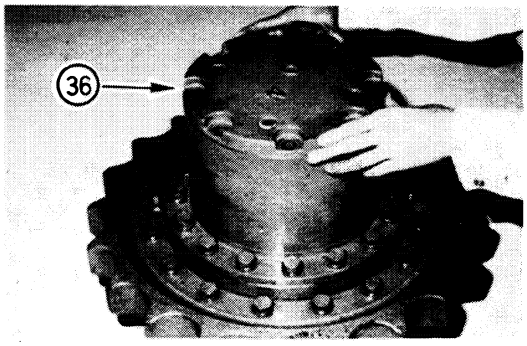
36 Install carrier assembly into the ring gear.



37 Install propel shaft (35) into the carrier.



38 Apply a liquid packing to the mating surfaces of the ring gear and the cover.
Install cover (36) onto the ring gear.

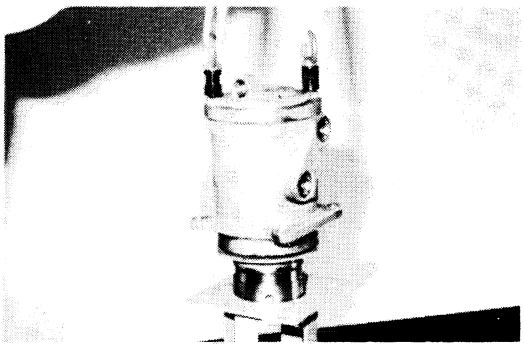


CENTER JOINT

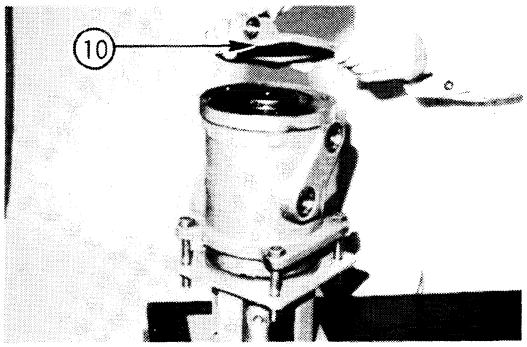
1. DISASSEMBLY

Note: Before disassembling, clean the all parts.
Put a fitting mark on body and spindle.

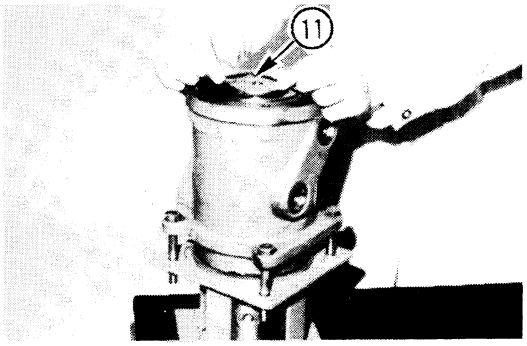
1 Install center joint on workbench using two eye bolts as shown.



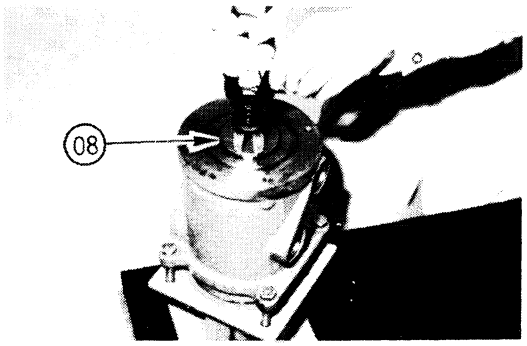
2 Remove the another two tighten bolts to remove cover (10).



3 Remove O-ring (11).



4 Remove retaining ring (08).

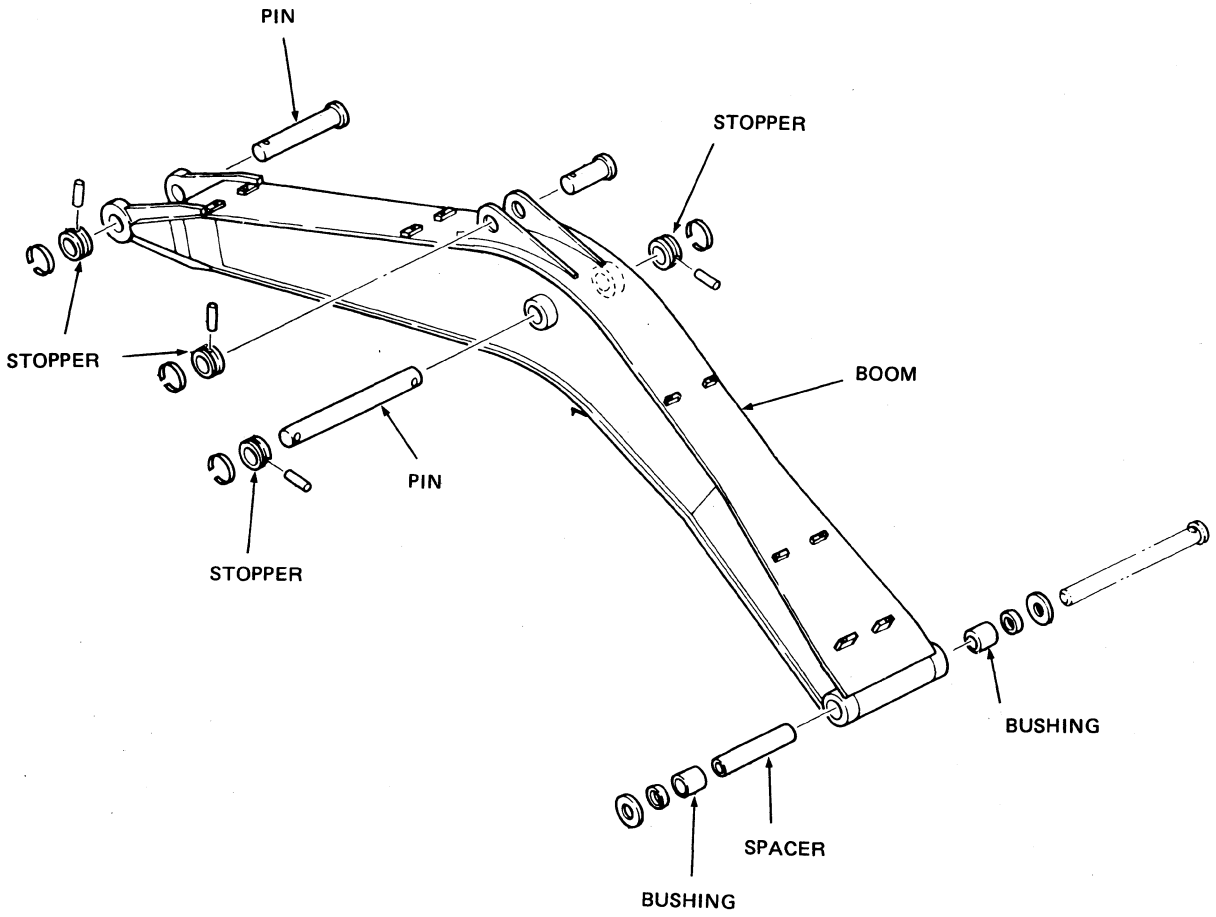


FH120 FRONT-END ATTACHMENTS

1. BOOM ASSEMBLY

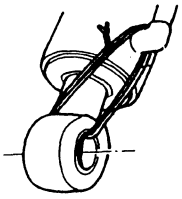
1.1 CONSTRUCTION

Boom assembly consists of Boom with bushings and pins for Boom cylinders and arm cylinder. The stoppers are wedded on the boom except the boom cylinder rod side.

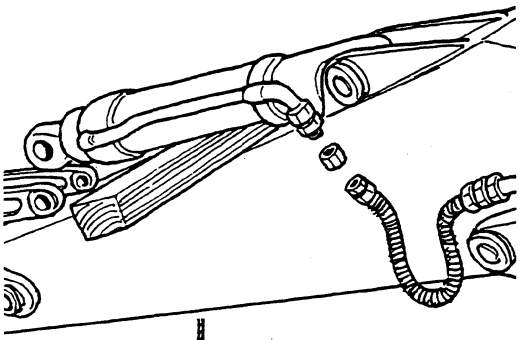


FH120 FRONT-END ATTACHMENTS

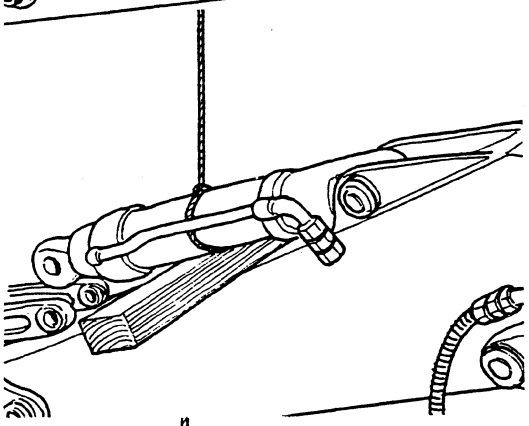
6 Fasten wire to bucket cylinder to hold cylinder rod.



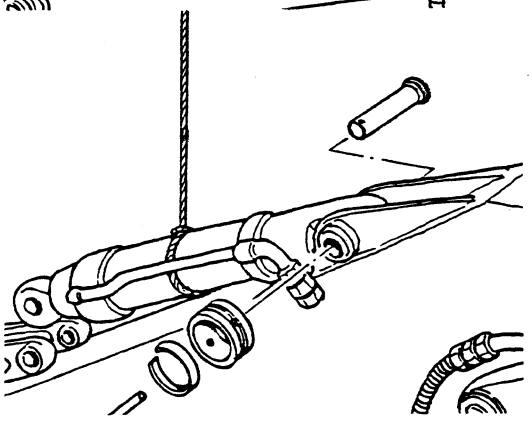
7 Remove bucket cylinder hoses. Install plugs to the bucket cylinder.



8 Hoist bucket cylinder.



9 Remove ring, stopper pin and pin, then, remove bucket cylinder.

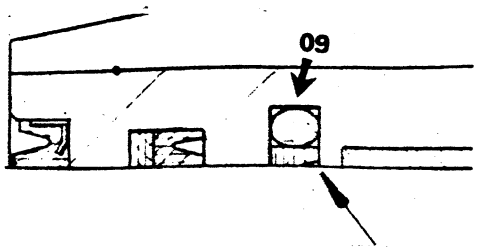


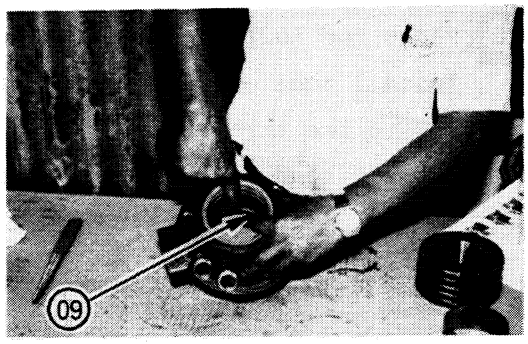
FH120 FRONT-END ATTACHMENTS

4.3 SPECIFICATIONS

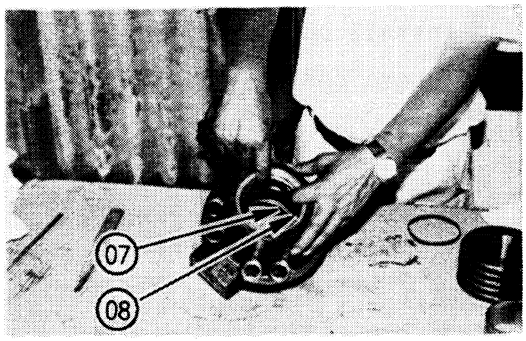
Boom cylinder	
Bore × Rod dia. × stroke	105 mm × 75 mm × 1100 mm
Minimum retracted length	1,580 mm
Arm cylinder	
Bore × Rod dia. × stroke	115 mm × 80 mm × 1170 mm
Minimum retracted length	1,705 mm
Bucket cylinder	
Bore × Rod dia. × stroke	95 mm × 65 mm × 995 mm
Minimum retracted length	1,470 mm

5 Install buffering (09) with seal lip toward the inside of cylinder.



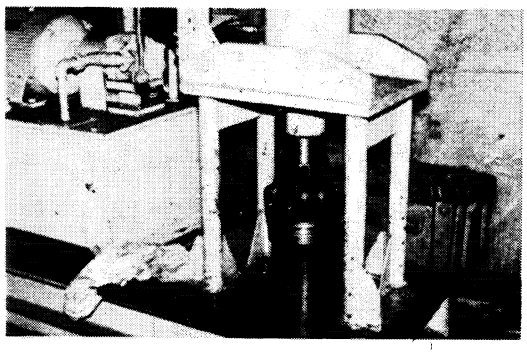


6 Install U-ring (08), backup ring (07) with seal lip toward the inside of cylinder.

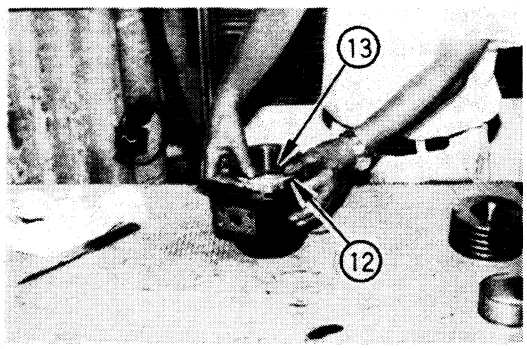


7

8 Install wiper ring (05) with seal lip toward the outside of cylinder.
Use press and tool.



9 Install backup ring (12) and O-ring (13). Put hydraulic oil on the O-ring and the seals in head.



HYDRAULIC SYSTEM

1. OUTLINE

Hydraulic circuit mainly consists of MAIN HYDRAULIC CIRCUIT AND PILOT HYDRAULIC CIRCUIT.

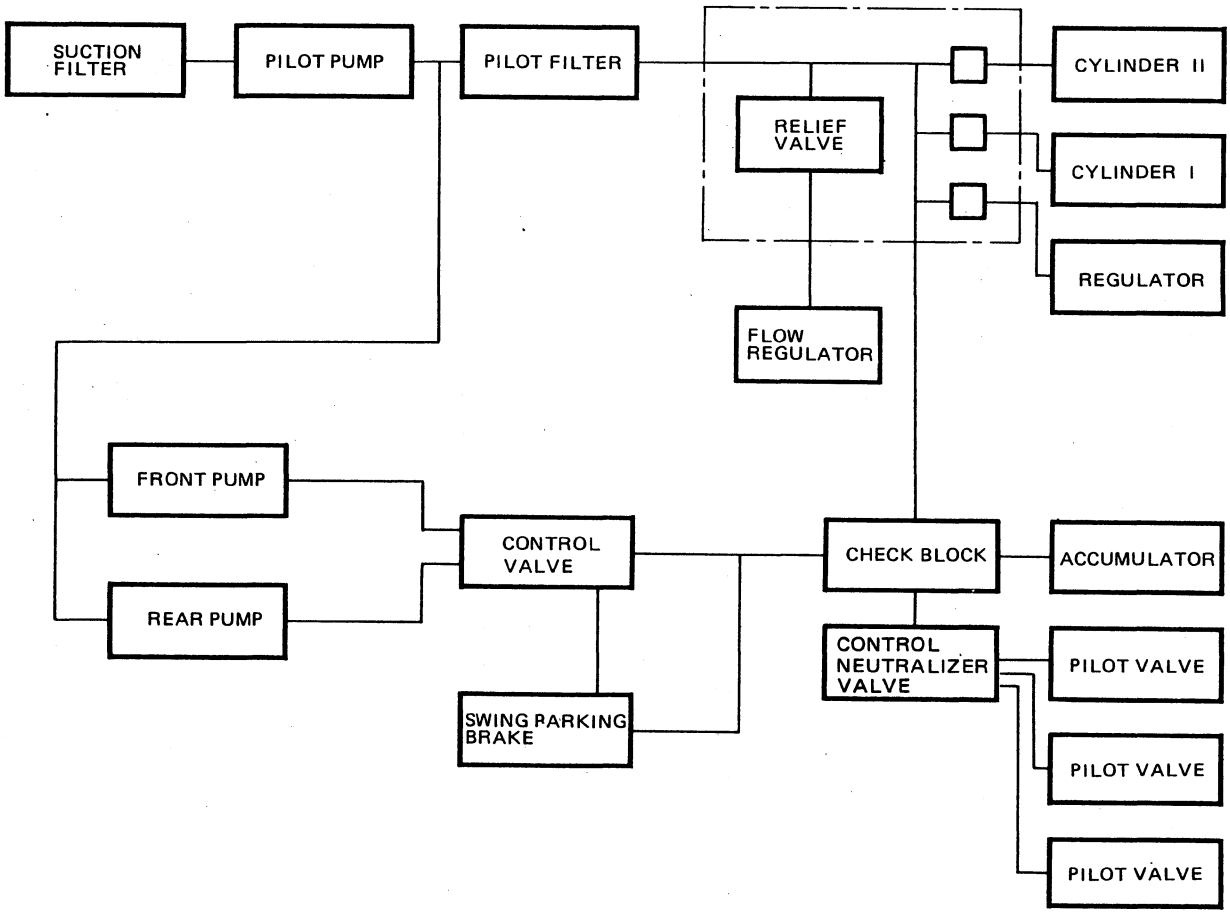
The pilot hydraulic circuit is mainly used for operating the control valve. The hydraulic system consists of one engine, two main pumps, one pilot pump, one control valve, four hydraulic cylinders, one swing motor and two travel motors. The pumps are connected to the engine through a pump transmission. The oil discharged from the main pumps flows to each function through the control valve. The oil discharged from the pilot pump flows to three pilot valves.

3. PILOT CIRCUIT

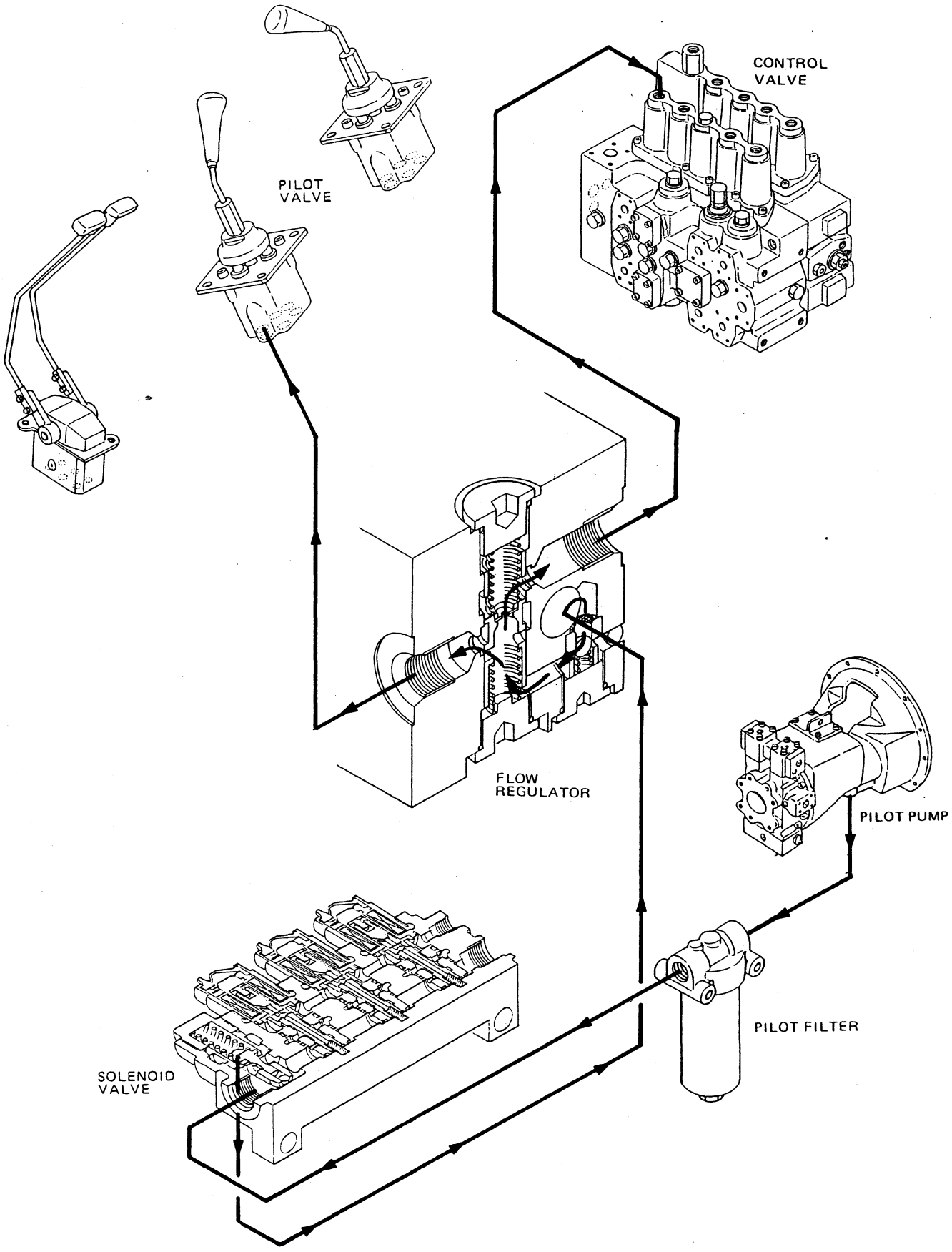
The pilot circuit consists of the pilot pump, flow regulator, control neutraliser valve, solenoid valve and three pilot valves. The pilot pump receives the oil from the hydraulic tank through the suction filter. The discharged oil from the pilot pump flows to the pilot valves through the solenoid valve and the control neutralizer valve.

Pilot oil is utilized as follows.

1. Applied to pilot valves to operate the control valve.
2. Applied to pump regulator for controlling the pump displacement.
3. Applied to relief pressure select valve to change the relief pressure in main circuit.
4. Applied to switch valve to combine the main pump outputs.
5. Applied to parking brake valve to allow swing motor operation.
6. Applied to pump regulator to change the travel speed.
7. Applied to two cylinders to limit the maximum engine speed.



HYDRAULIC SYSTEM



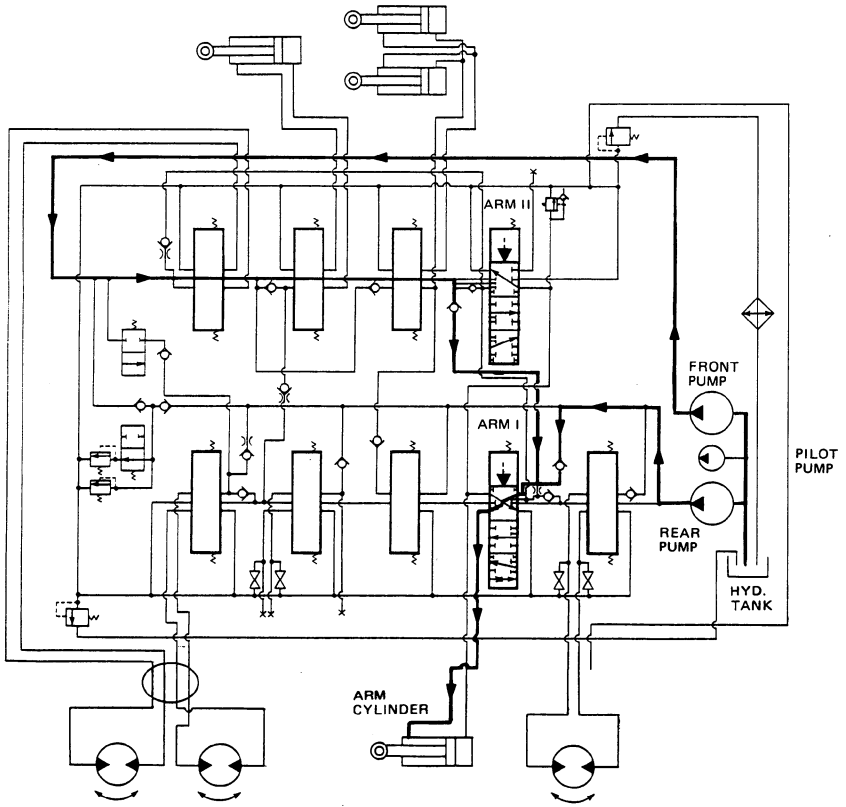
4.4 ARM ROLL-OUT CIRCUIT OPERATION

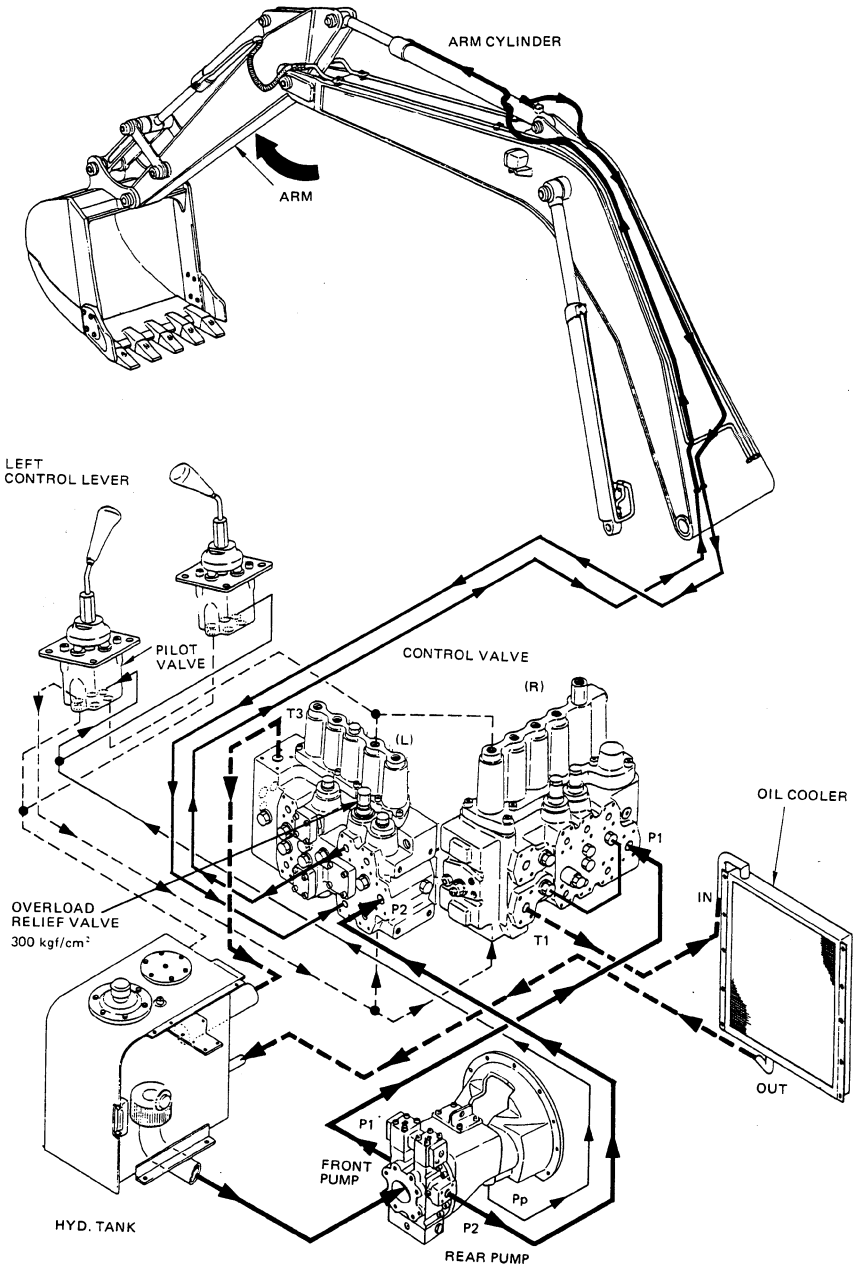
When the left control lever manually is placed in the arm roll-out position. Then the oil flows from pilot pump through the pilot valve to arm sections of the control valve. Here, the spool positions are moved to arm roll-out position.

The oil flows from the front pump to the arm (I) section through the confluence passage, because the arm section (II) is blocked. The oil flows from the rear pump to the arm (I) section, then confluence with the oil from the front pump. This oil from the arm (I) section to the rod end of the arm cylinder to roll-out arm.

The return oil flows from the bottom end of the cylinder through the arm (I) and arm (II) sections returned to the tank.

The cavitation which will happen to the rod of the arm cylinder is prevented by a make-up valve, on other hand. The excess pressure is also prevented by on overload relief valve in the control valve.

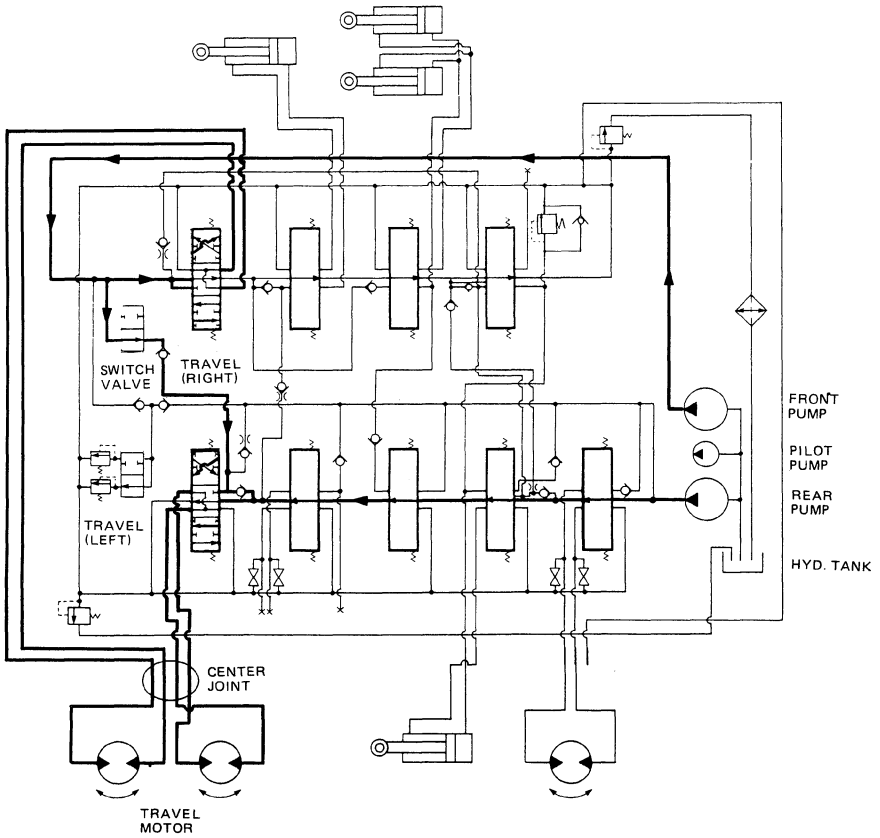


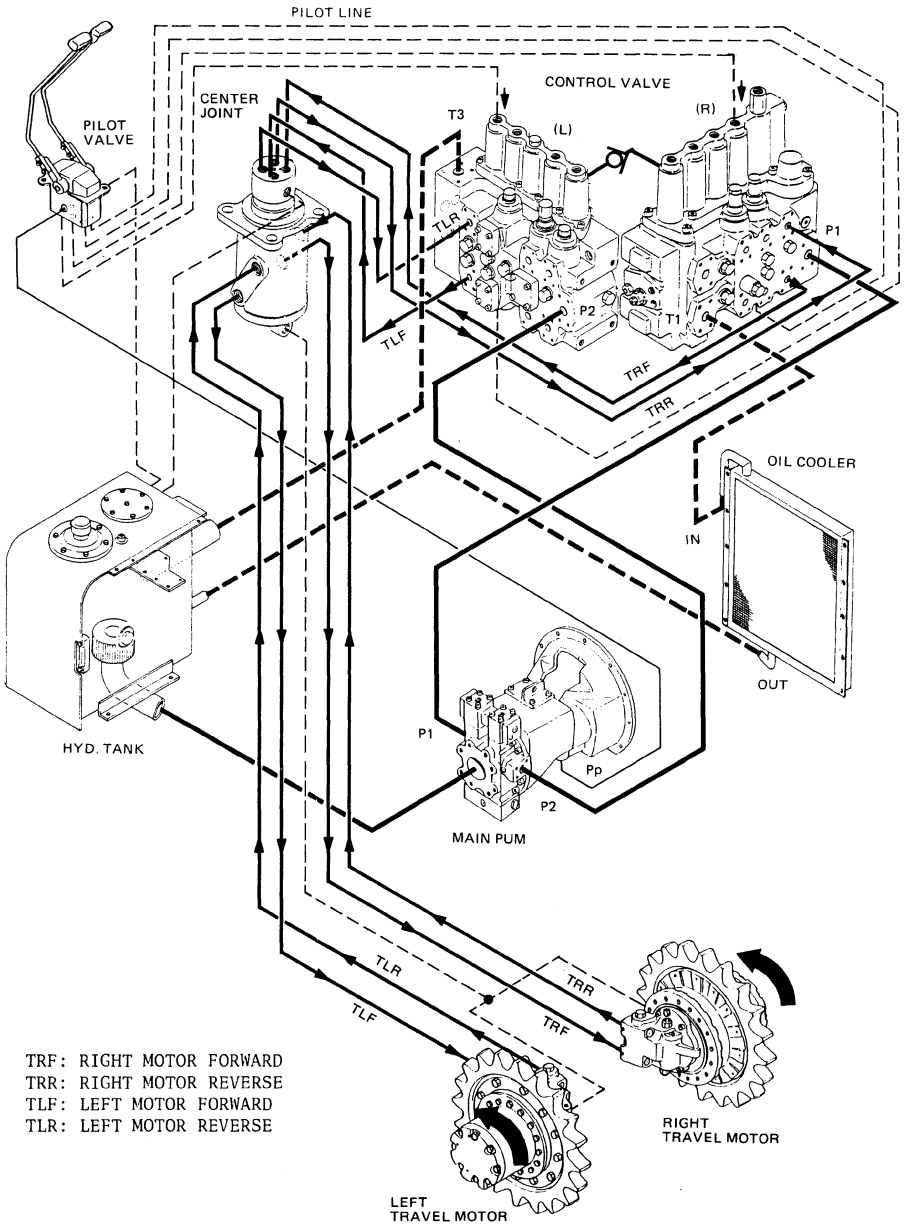


4.9 TRAVEL FORWARD and REVERSE OPERATION

When the right and left travel levers are manually placed to the forward or reverse position. Then the oil flows from front pump through the travel (R) section of the control valve and center joint to the right travel motor and oil flows from rear pump though the travel (L) section of the control valve and center joint to the left travel motor and move the machine forward and reverse.

The return oil flows from both travel motor through the center joint and travel (R) (L) sections returned to the tank.



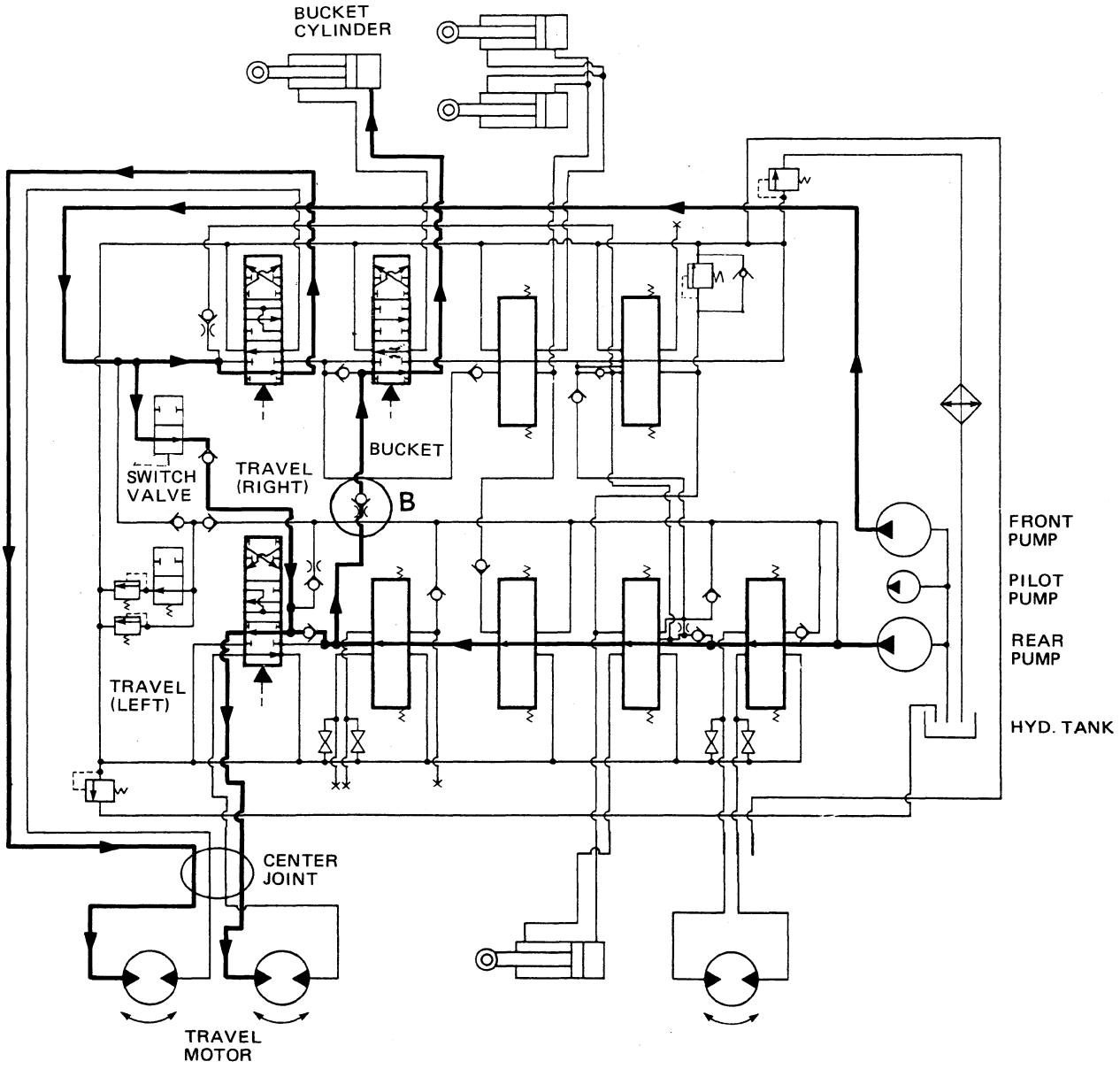


TRF: RIGHT MOTOR FORWARD
TRR: RIGHT MOTOR REVERSE
TLF: LEFT MOTOR FORWARD
TLR: LEFT MOTOR REVERSE

5.9 COMBINED BUCKET AND TRAVEL OPERATION

When the bucket and travel (R) (L) functions are operated, the bucket and travel (R) (L) spools and the switch valve changed. The oil flows from front pump through the travel (R) (L) section of the control valve to right and left travel motor and the machine traveling.

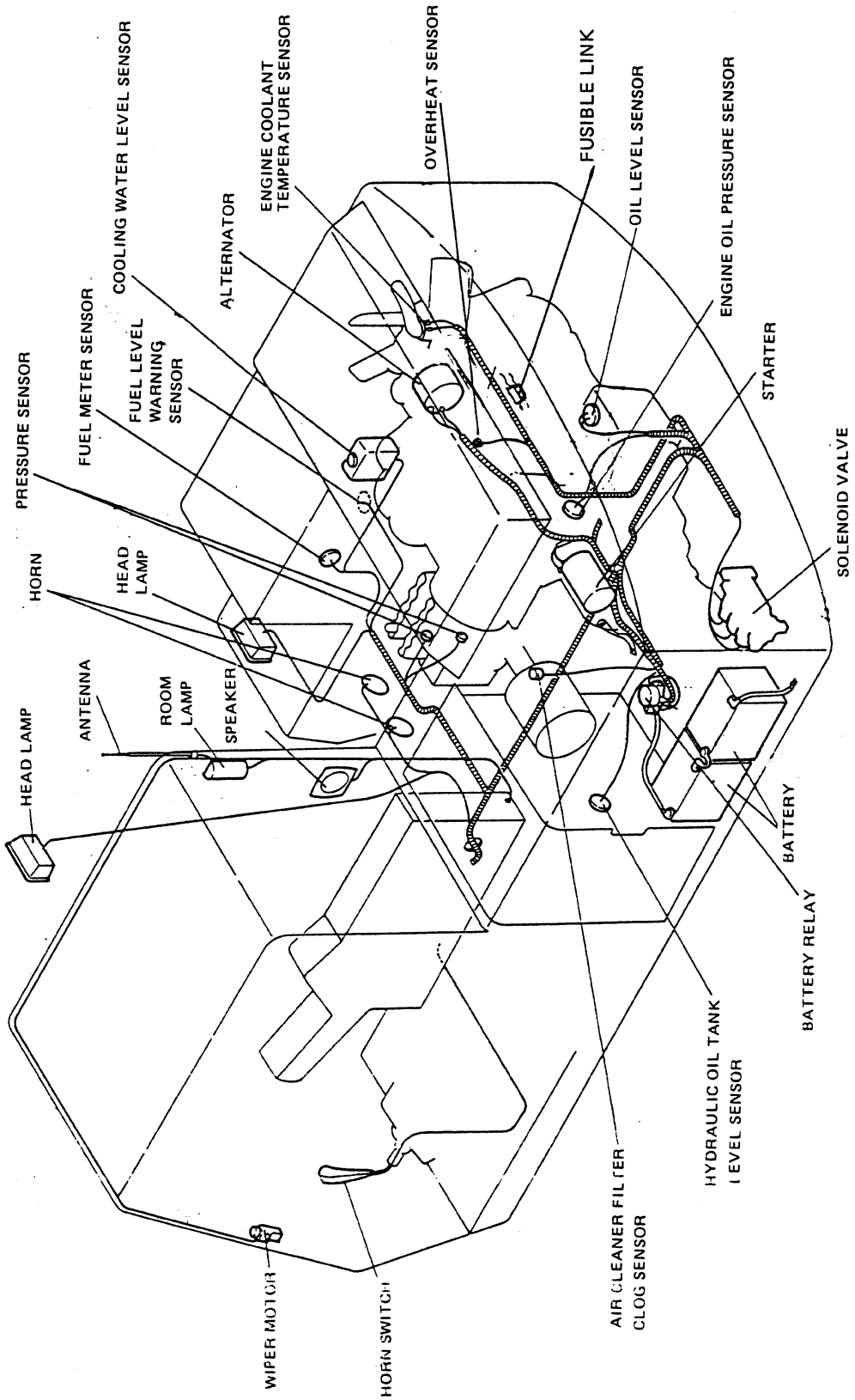
The oil flows from rear pump through neutral oil passage, check valve with orifice "B" and bucket section of the control valve to the bucket cylinder and the bucket functions.



CONSTRUCTION AND FUNCTION

1. CONSTRUCTION OF ELECTRICAL SYSTEM

(1) Arrangement of Equipment



CONSTRUCTION AND FUNCTION

° When the engine is stopped, it is normal that all warning lamps go out except the engine oil pressure warning lamp and battery charge warning lamp.

° While the engine is running, it is normal that all red lamps go out.

° When starting the engine, it is normal that all lamps light.

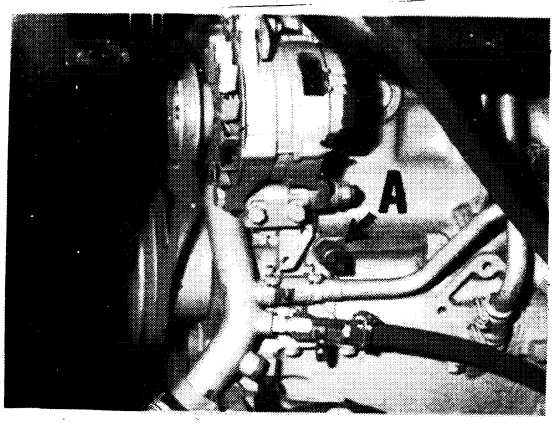
o When the buzzer stop switch is pushed about one second, the buzzer does not sound even though the switch is released.
Since the buzzer function is automatically resetted the switch is released the buzzer sounds, if a abnormality occurs again.

4. FUNCTION OF SENSORS AND RELAYS

(1) Engine oil pressure sensor (pressure switch)

As soon as engine oil pressure goes up, the oil pressure sensor turns OFF, shutting off the engine oil warning lamp.

As soon as engine oil pressure goes down, the sensor turns ON, lighting the warning lamp.

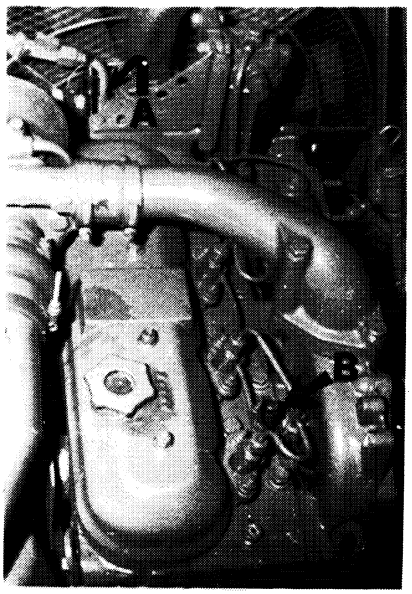


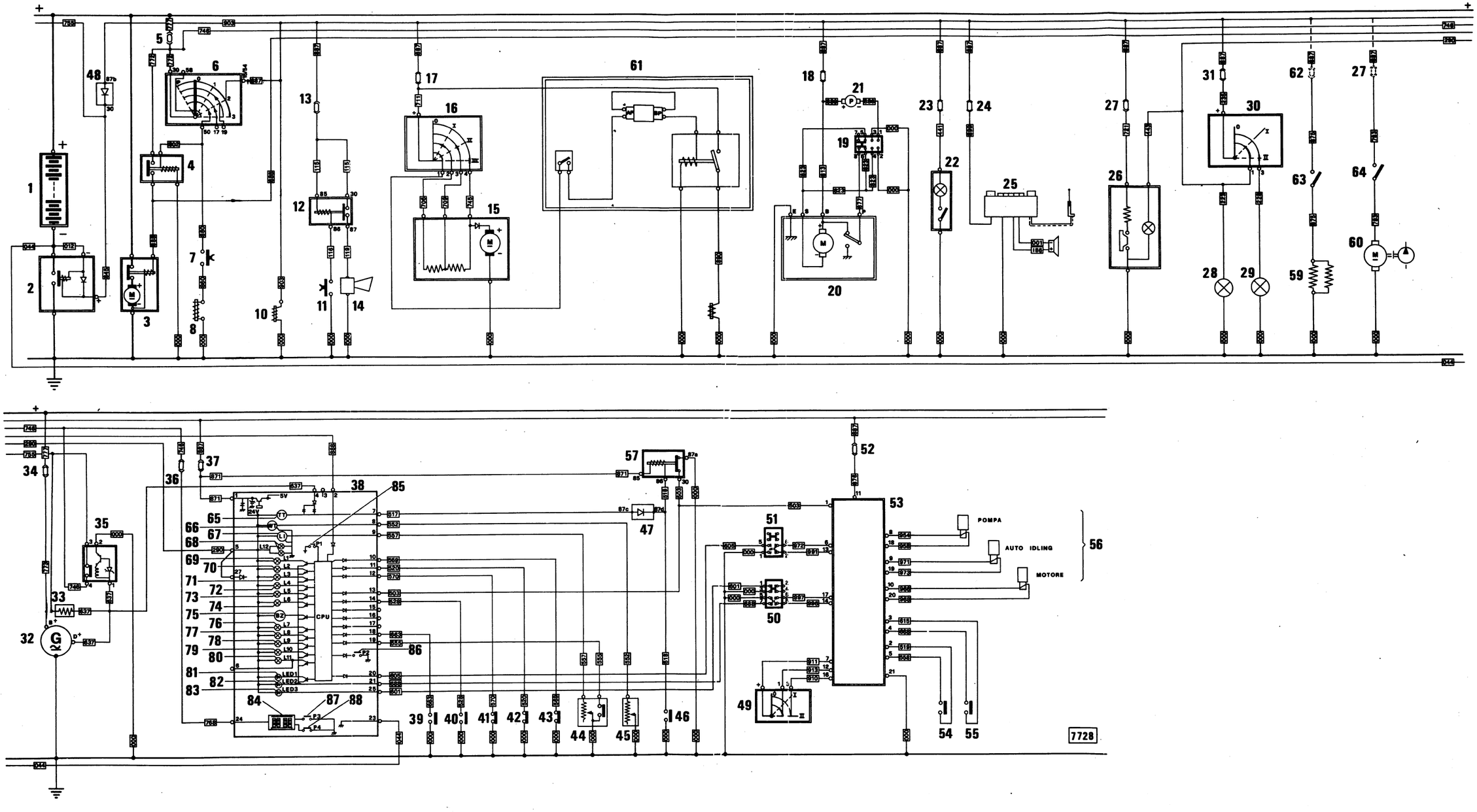
A. Engine oil pressure sensor o motore

(3) Overheat sensor

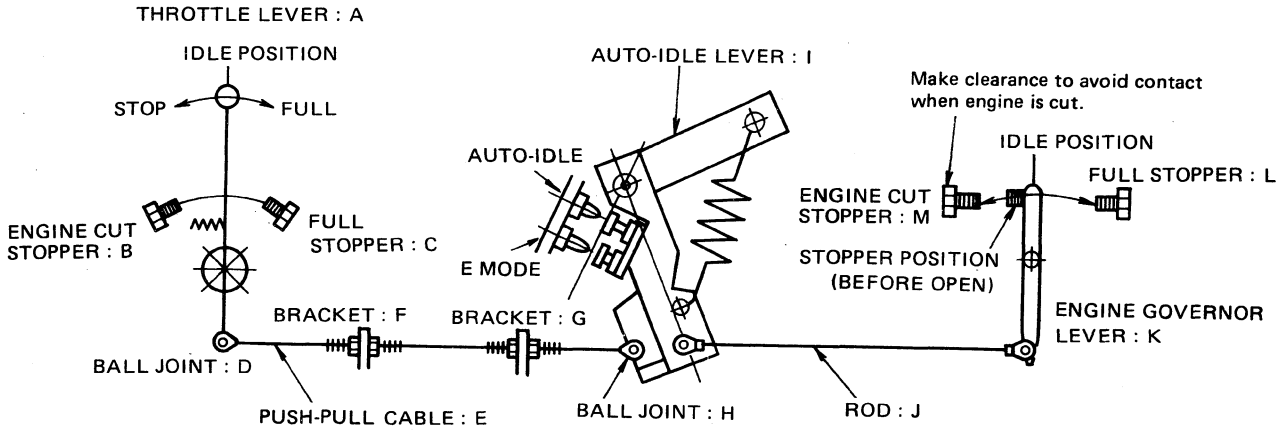
When engine cooling water is overheated, the overheat sensor turns ON to light the engine overheat warning lamp.

A. Engine coolant temperature sensor
B. Engine coolant excessive temperature sensor

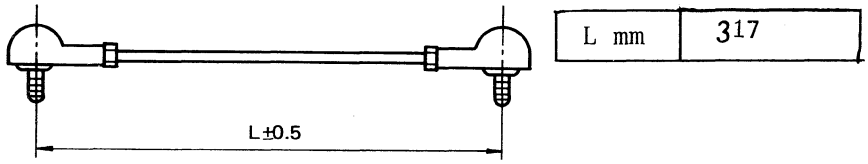



POMPA
AUTO IDLING
MOTORE
CPU
LED1
LED2
LED3
5V
7728

2. ASSEMBLY AND ADJUSTMENT OF AUTO-IDLE DEVICE



(1) Adjust the length of the rod J at L ± 0.5 mm



(2) Install the rod J between the governor lever and the auto-idle lever.

(3) Install the cable E between the slottle lever A and the auto-idle lever I. Install the cable in the following procedures:

1 Turn the governor lever to the idle position.

2 Install the cable in the order of: Ball joint D → Bracket F → Bracket G → Ball joint H.

Cautions

o The ball joint H should be fixed with the auto-idle lever so that the cable is pulled slightly (to keep the idle speed from lowering).

o To turn the throttle lever to the idle position, at first turn it to cut the engine, and put it back until it stops.

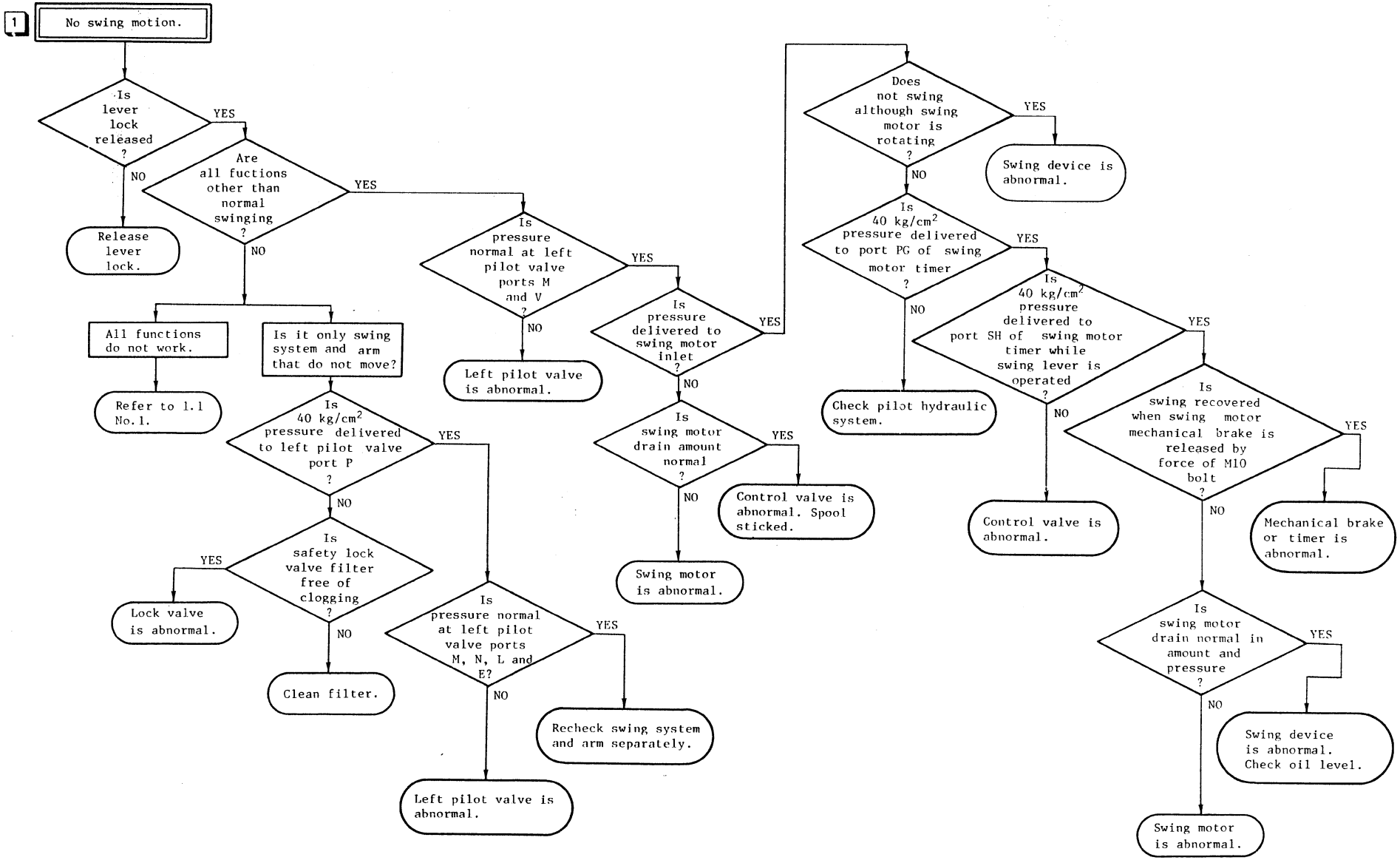
(4) Loosen the stopper bolt C, turn the throttle lever to "FULL" little by little, and turn the governor lever to make it contact with the full stopper.

(5) Adjust the full stopper C while keeping the governor lever K contact with the stopper L. The adjustment should be made so that the clearance between the throttle lever and the stopper bolt becomes 0.5 mm when the throttle lever is in the FULL position.

(6) Turn the throttle lever to the STOP position, and make adjustments so that the engine cut stopper bolt comes in contact with the throttle lever.

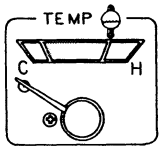
INTORODUCTION

1.3 SWING


1
No swing motion.
Is lever lock released ?
YES
NO
Release lever lock.
Are all fuctions other than normal swinging ?
YES
NO
All functions do not work.
Refer to 1.1 No.1.
Is it only swing system and arm that do not move?
Is 40 kg/cm2 pressure delivered to left pilot valve port P ?
YES
NO
Is safety lock valve filter free of clogging ?
YES
Lock valve is abnormal.
NO
Clean filter.
Is pressure normal at left pilot valve ports M, N, L and E?
YES
Recheck swing system and arm separately.
NO
Left pilot valve is abnormal.
Is pressure normal at left pilot valve ports M and V ?
YES
NO
Left pilot valve is abnormal.
Is pressure delivered to swing motor inlet ?
YES
NO
Is swing motor drain amount normal ?
YES
Control valve is abnormal. Spool sticked.
NO
Swing motor is abnormal.
Does not swing although swing motor is rotating ?
YES
Swing device is abnormal.
NO
Is 40 kg/cm2 pressure delivered to port PG of swing motor timer ?
YES
NO
Check pilot hydraulic system.
Is 40 kg/cm2 pressure delivered to port SH of swing motor timer while swing lever is operated ?
YES
NO
Control valve is abnormal.
Is swing recovered when swing motor mechanical brake is released by force of M10 bolt ?
YES
Mechanical brake or timer is abnormal.
NO
Is swing motor drain normal in amount and pressure ?
YES
Swing device is abnormal. Check oil level.
NO
Swing motor is abnormal.

DIAGNOSE MALFUNCTIONS

2.3 Monitor



Maloperation of water temperature gauge

Pointer does not swing. (It does not rise from zero point)

Check connection of terminal of sensor unit of water temperature gauge.

Is terminal loose ?
- (Loose) Yes → Poor connection of terminal
- No → Extracting terminal of sensor unit, ground round terminal at harness side through resistance of 10 to 20Ω.

Does pointer swing almost to upper limit?
- Yes → Exchange sensor unit
- No → Remove 8P connector at back of gauge panel, check continuity between No.8 terminal at harness side and sensor unit terminal at harness side. (With terminal of sensor unit left extracted)

Is continuity obtained ?
- (R=0) Yes → Exchange water temperature gauge
- (R=∞) No → Harness defective (disconnection)

Pointer swings scalcover

Extracting terminal of sensor unit, turn key switch ON.

Does pointer swing back to zero point ?
- Yes → Exchange sensor unit
- No → Remove 8P connector at gauge panel, check continuity between No.8 terminal at harness side and body (E) (With terminal of sensor unit left extracted)

Is continuity obtained ?
- Yes → Harness defective (short)
- No → Exchange water temperature gauge

Pointer swings unstably

Check connection of terminal of sensor unit.

Is terminal loose ?
- (Loose) Yes → Poor connection of terminal
- No → Extracting terminal of sensor unit, ground terminal at harness side through resistance of 10 to 20Ω.

Does pointer swing stable ?
- Yes → Exchange sensor unit
- No → Exchange water temperature gauge

Pointer remains indicating a certain value (It doesn't swing back to zero point)

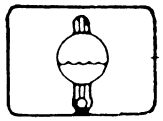
Turn key switch OFF

Does pointer swing back to zero point ?
- Yes → Normal
- No → Exchange water temperature gauge

DIAGNOSE MALFUNCTIONS

2.3 Monitor

13



. Maloperation of engine overheat warning lamp

Lamp is not turned on when engine is overheated.

Is lamp turned on when checking for burn-out of filament ?

- No → Exchange bulb
- Yes → Remove harness from terminal of overheat alarm switch, ground harness terminal. (Key switch → ON)

Is lamp turned on ?

- No → Harness defective (disconnection) (Disconnection between No.14 terminal connector of gauge panel and switch)
- Yes → Was pointer of water temp. gauge in red range when engine was overheated?

Was pointer in red range ?

- No → Normal
- Yes → Overheat alarm switch defective

Lamp is turned ON even if water temp. is low.

Remove harness from overheat alarm switch (Key switch → ON)

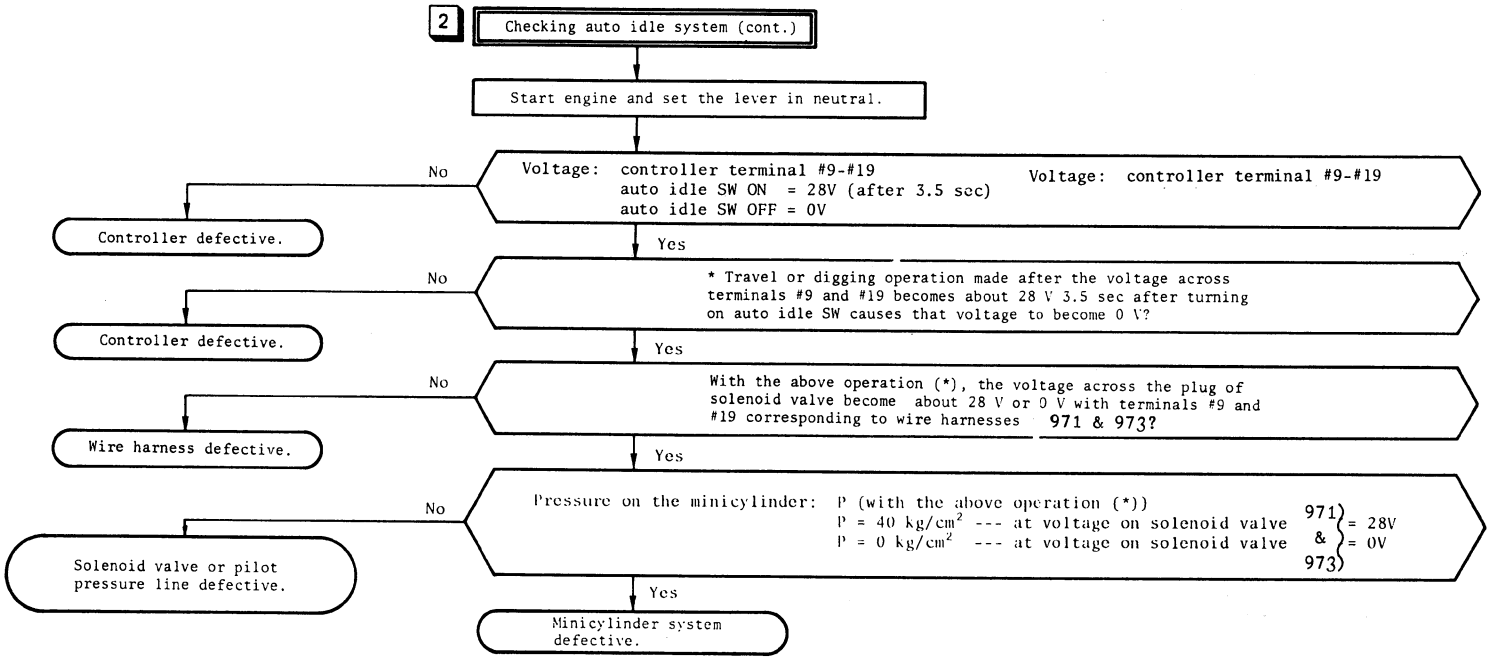
Is lamp turned off ?

- Yes → Replace overheat alarm switch.
- No → Remove connector from gauge panel. (Key switch → ON)

Check continuity between switch terminal and body to make sure of it. (Continuity should be obtained.)

Is lamp turned off ?

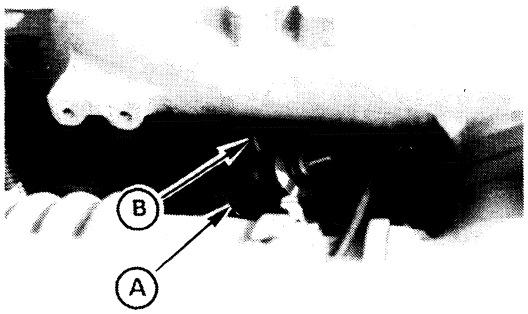
- No → Replace gauge panel
- Yes → Harness defective (short) (Short across No.14 terminal connector of gauge panel and overheat alarm switch)


2
Checking auto idle system (cont.)
Start engine and set the lever in neutral.
Voltage: controller terminal #9-#19
auto idle SW ON = 28V (after 3.5 sec)
auto idle SW OFF = 0V
Voltage: controller terminal #9-#19
No
Controller defective.
Yes
* Travel or digging operation made after the voltage across terminals #9 and #19 becomes about 28 V 3.5 sec after turning on auto idle SW causes that voltage to become 0 V?
No
Controller defective.
Yes
With the above operation (*), the voltage across the plug of solenoid valve become about 28 V or 0 V with terminals #9 and #19 corresponding to wire harnesses 971 & 973?
No
Wire harness defective.
Yes
Pressure on the minicylinder: P (with the above operation (*))
P = 40 kg/cm² --- at voltage on solenoid valve 971 & 973 = 28V
P = 0 kg/cm² --- at voltage on solenoid valve 971 & 973 = 0V
No
Solenoid valve or pilot pressure line defective.
Yes
Minicylinder system defective.

FH120 EXCAVATOR PERFORMANCE TEST

❷ Install a sensor Ⓐ of tachometer onto the injection pump piping Ⓑ.

❸ Start and run the engine at fast idle. Warm up the water temperature to 50°C or above and the hydraulic temperature to 50±5°C.



(2) Measurement

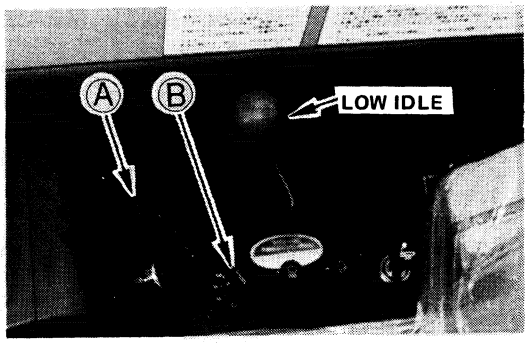
1 Unloaded low idle

❶ Switch selection

Ⓑ: Mode selector switch ..... P

Ⓐ: Auto-idle switch ..... OFF

❷ Start and run the engine at low idle and read the engine speed.



2 Unloaded fast idle (P mode)

❶ Switch selection

Ⓑ Mode selector switch ..... P

Ⓐ Auto-idle switch ..... OFF

❷ Start and run the engine at fast idle and read the engine speed.

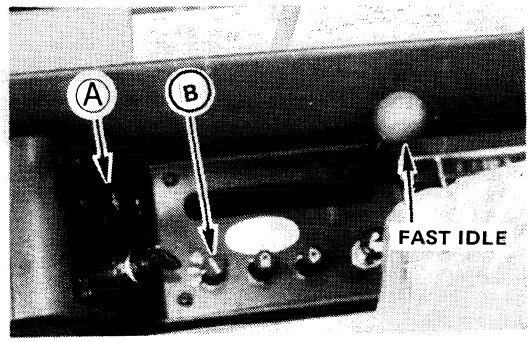
3 Unloaded fast idle (E mode)

❶ Switch selection

Ⓑ Mode selector switch ..... E

Ⓐ Auto-idle switch ..... OFF

❷ Start and run the engine at fast idle and read the engine speed.



4 Auto-idle condition engine speed

❶ Switch selection

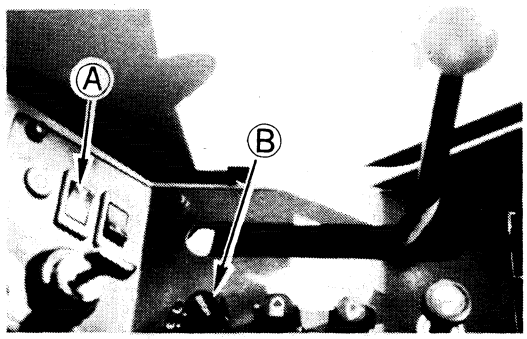
Ⓑ Mode selector switch ..... P

Ⓐ Auto-idle switch ..... ON

❷ Start and run the engine at fast idle.

❸ Hold the bucket lever to the position roll-in and reset it to the neutral position.

After about four seconds, read the engine speed when it is automatically decreased.



❺ Make measurement for each swinging at the right and left sides.

❻ Make measurement three times, obtain the average value, and take it as the measurement.

(3) Judgement Unit: mm

Model name		Recommended to service	Limit of use
FH120		880	920

4.3 ABRASION (PLAY) AMOUNT O. THE SWING BEARING

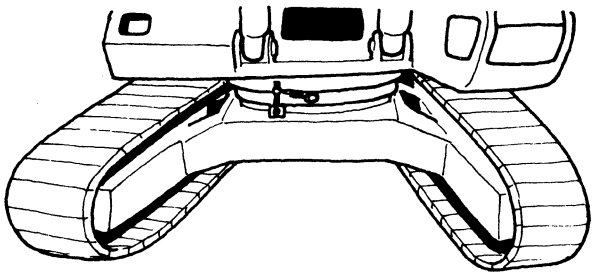
Note:
- Measure the degree of abrasion for the swing bearing race surface and ball by the opening amount of the inner-race and outer-race.
- Make sure that the mounting bolt for the swing bearing has been tightened with a specified torque.
- Check the swing bearing for greasing and abnormal noises during swinging and smoothness of swinting.
- Care must taken to maintain safety during measurement.

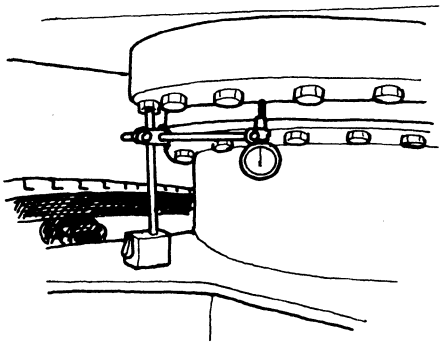
(1) Measurement preparation

❶ Attach a dial gauge to the support such as a magnetic base and fix it to the center of the track frame upper surface at the front idler side.

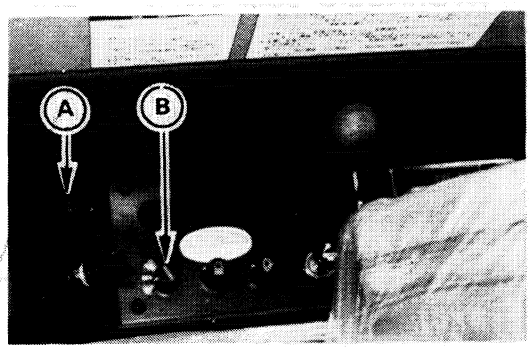
❷ The direction of the superstructure is the same as that of the travelling direction of the track frame.

❸ Make the measuring element of the dial gauge in contact with the lower surface of the swing bearing outer surface.



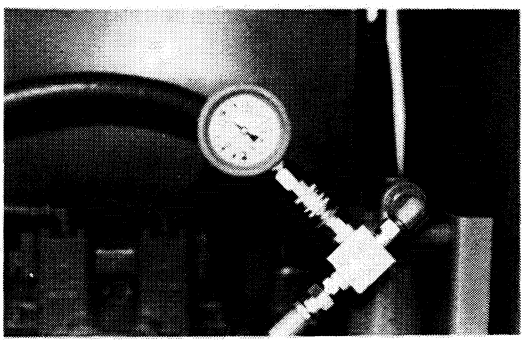


3 Turn mode switch to P mode and auto-idling switch "OFF".
Warm up the hydraulic oil temperature to 50±5°C by operating the machine.
Check oil leakage from the connections.
Ⓐ : Auto-idling switch
Ⓑ : Mode switch



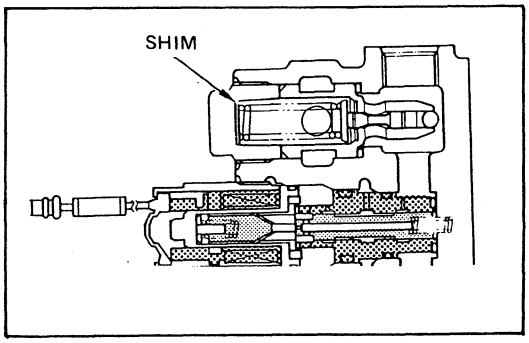
4 Run the engine at slow idle.
Read the pressure gauge. The pressure indication must be 40±5 kgf/cm^2 (3.9±0.5 MPa).

5 Run the engine at fast idle.
Read the pressure gauge. The pressure indication must be 45±5 kgf/cm^2 (4.9±0.5 MPa).



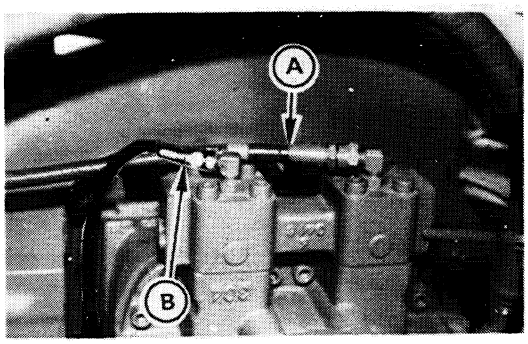
6 If necessary, adjust the pilot relief valve.
Add adjustment shim to increase the pressure setting or remove shim to decrease the pressure setting.

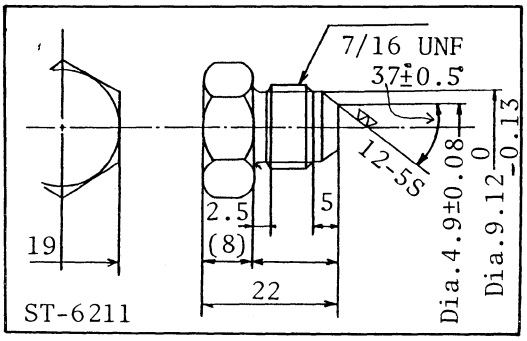
Note: Refer to Section 4-Group 12-SOV9 for shim of pilot relief valve servicing procedure.



4 Disconnect each main pump control pipings Ⓐ at regulator and install the plugs to the pipings.
Install two test pipings Ⓑ to the regulator for receive draing oil in the vessel being tested.

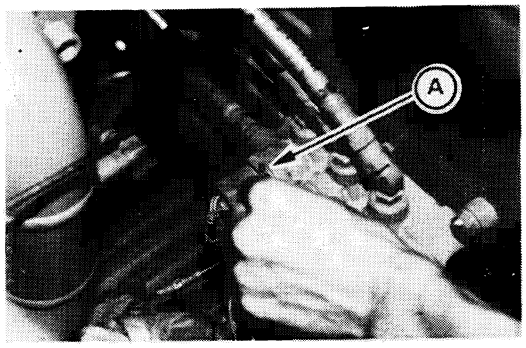
Note: This causes the pump displacement to keep up to the maximum value even if each control lever is not operated.



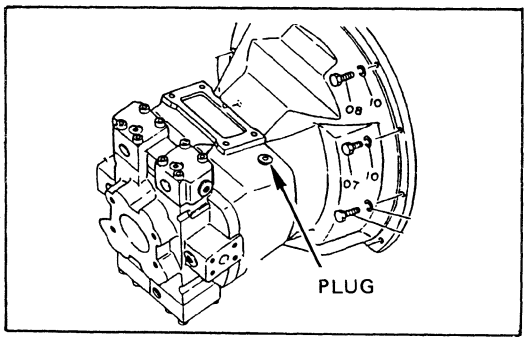


5 Disconnect 958cable of solenoid valve for the pump displacement control.
Place a jumper wire between solenoid valve connector and body.

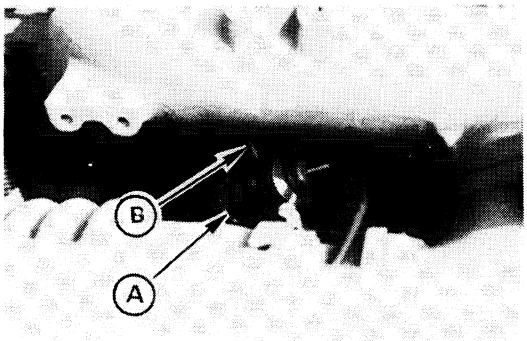
Note: This causes the maximum flowrate to increase up to the 110% performance.
Ⓐ : 958cable



6 ❶ Open the hydraulic tank cap.
❷ Disconnect the vacuum pump.
❸ Loosen plug slightly until oil comes out of the port. This will remove all air from the pump casing. If not, hydraulic pumps can be damaged.
❹ Close the cap.



7 Install a sensor Ⓐ of tachometer onto the injection pump piping Ⓑ.



ELECTRICAL SYSTEM TEST

- Contact with active wire: Battery circuit, charge circuit, preheat circuit; especially, clock circuit and emergency stop circuit (Model FH120) may have an electrically active line even when the starter switch is turned OFF.

(3) Measurement of resistance (Use your tester in the range of resistance measurement)

This machine requires the measurement of resistance to check the normal resistance (or accurary) of the sensors for the engine coolant temperature gauge and the fuel gauge. For the measurement procedures in each case, refer to CHAPTER 10 "TROUBLESHOOTING".

(4) Measurement of current

Electric current is measured to find a faulty part when the batteries consume too much or there is a possibility of short-circuit.

(5) Control System Check

This machine uses an E-P control system that controls the engine and the pump at the same time. The control is effected by a controler having a built-in microcomputer. The controller is located in the control box (right) and fixed with 4 bolts.

The controller can be checked by using an ordinary volt-ohm meter, which however, requires complicated testing procedures.

As to the checking procedures, refer to "TROUBLESHOOTING OF CONTROL SYSTEM" (I: with VOLT-OHM METER).

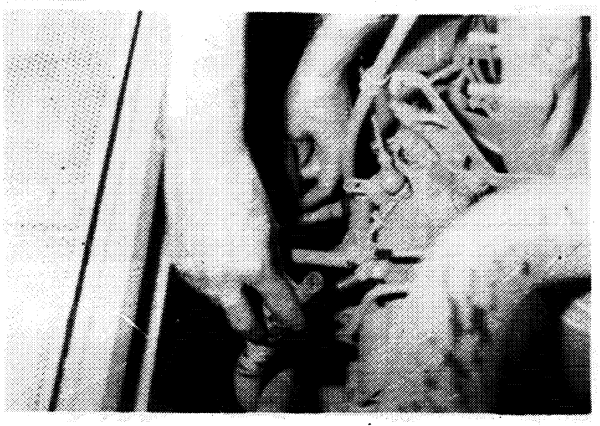
FIAT-HITACHI supplies a *MECHATRO CHECKER. (option) specially designed for the control system check. For the checking procedures and usage of the test kit, refer to "TROUBLESHOOTING OF CONTROL SYSTEM" (II: with MECHATRO CHECKER) and the separate operation manual for the CHECKER.

*NOTE

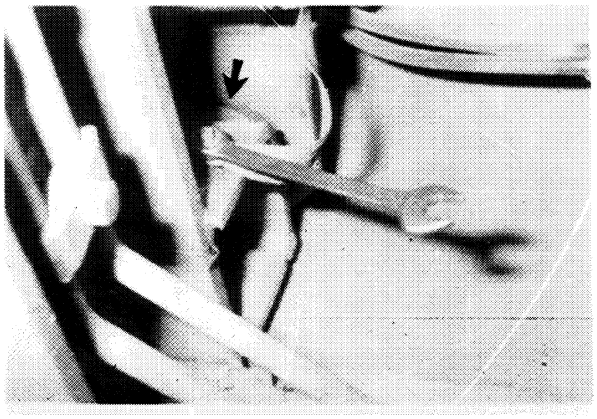
MECHATRO CHECKER:

MECHAnics-elecTROnics CHECKER

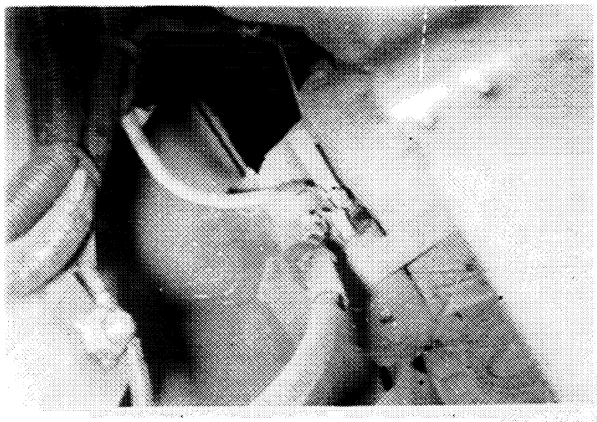
M E C H A T R O C H E C K E R order number: 75292914



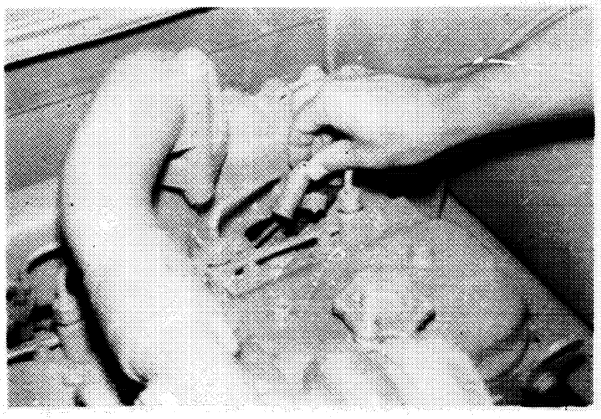
Unfasten clamps retaining the delivery and return lines between fuel tank and injection pump, then disconnect the lines.



Disconnect ground braid.

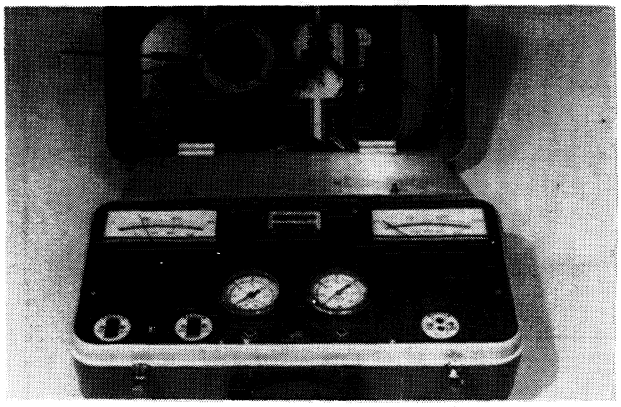


Disconnect electrical wiring at starter motor.



Disconnect the engine coolant temperature gauge sender switch.

5 . TESTS

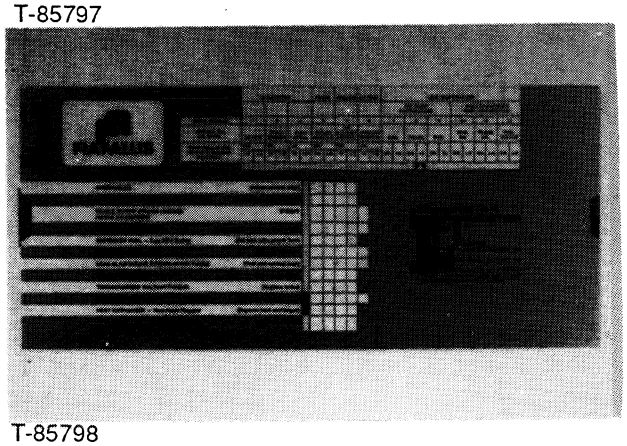


T-85796

When testing an engine, use the Engine Diagnostic Kit, P/N 75300772 and Troubleshooting Guide P/N 75300010. The diagnostic kit allows the engine rpm, engine intake manifold pressure, exhaust manifold pressure and air cleaner restriction to be monitored with relatively easy hook-ups. In addition there are two thermo-couples that can monitor low temperatures that occur in the radiator or heat exchanger.

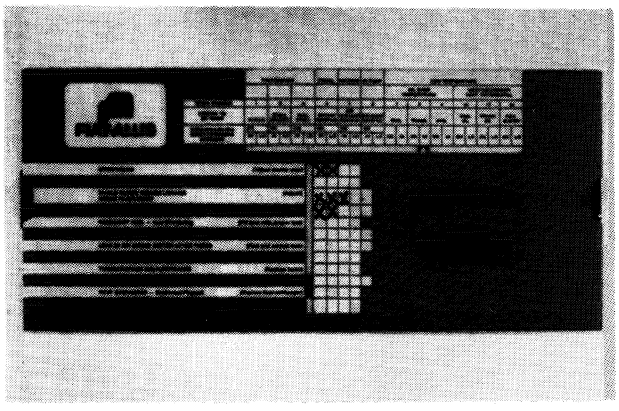
T-85797

Install the engine sensors as described in Service Manual 73111023. Conduct the engine tests after the engine has come up to operating temperature. Record all results of the test.



T-85798

Use the data in the engine specification section of this manual along with the Troubleshooting Guide to pin point possible problems that occur in the engine's different systems.



Align the white triangle under the different results in the solution area of the guide.

Use a pencil *(NO PEN)* and mark wherever a black line appears in the solution area. After recording all data, note that some boxes have more marks than others. Try to repair those items which have the highest number of pencil marks because that is probably the cause of the problem.

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