

GROUP 4 MAIN CONTROL VALVE

1. REMOVAL AND INSTALL

1) REMOVAL

- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

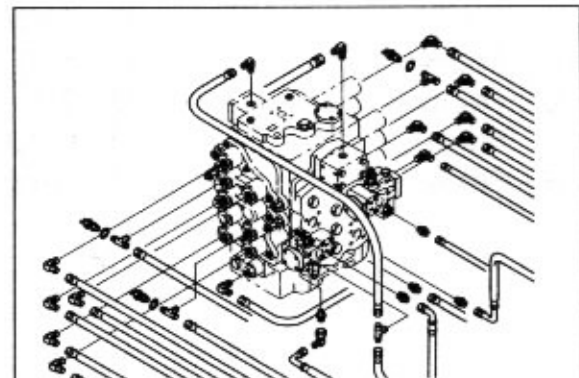
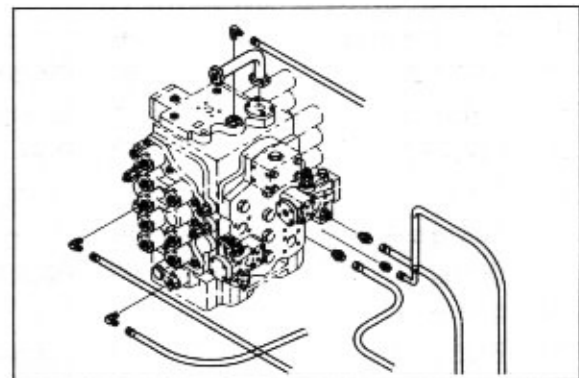
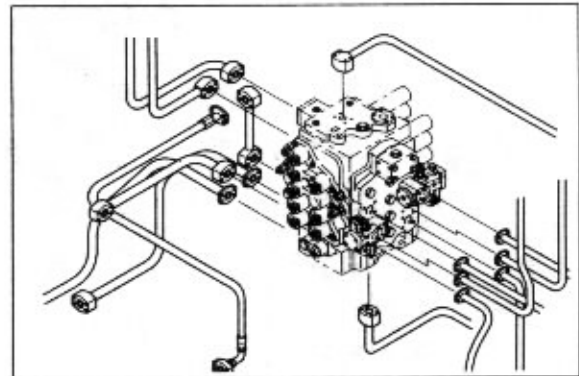
* When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

- (4) Remove bolts and disconnect pipe.
- (5) Disconnect pilot line hoses.
- (6) Disconnect pilot piping.
- (7) Sling the control valve assembly and remove the control valve mounting bolt.
· Weight : 420 kg(930lb)

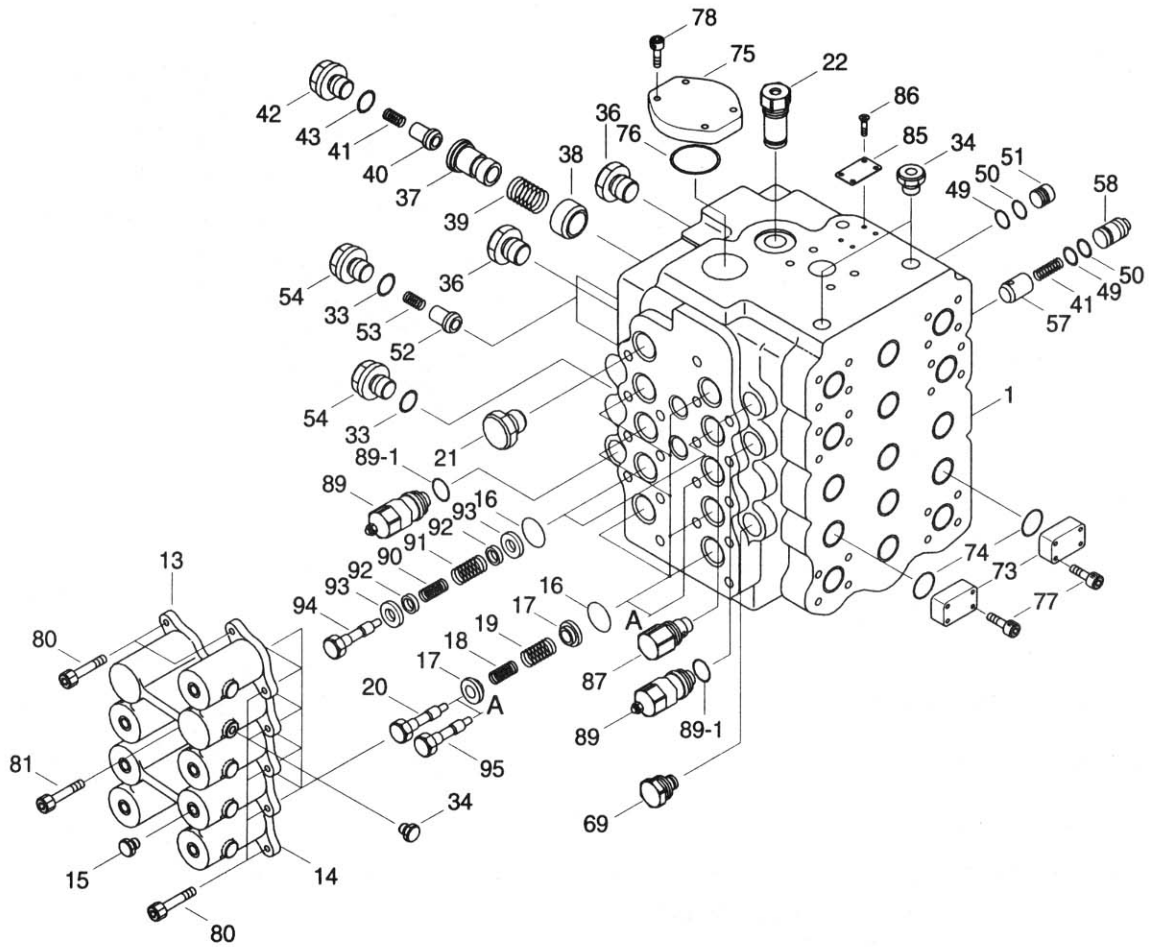
- (8) Remove the control valve assembly.
* When removing the control valve assembly, check that all the piping have been disconnected.

2) INSTALL

- (1) Carry out installation to the reverse order of removal
- (2) Bleed the air from below items.
 - ① Cylinder (boom, arm, bucket)
 - ② Swing motor
 - ③ Travel motor* See each item removal and install
- (3) Confirm the hydraulic oil level and recheck the hydraulic oil leak or not.

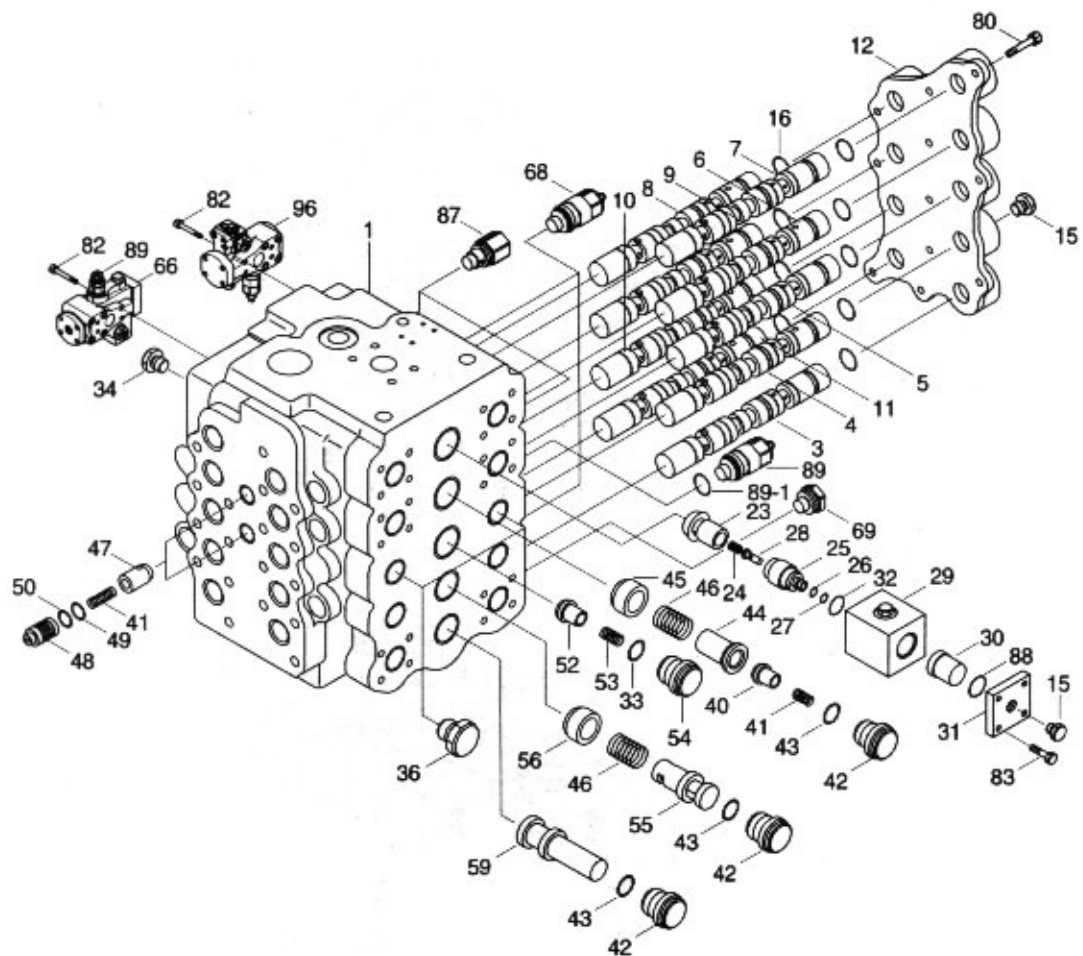


2. STRUCTURE(1/3)



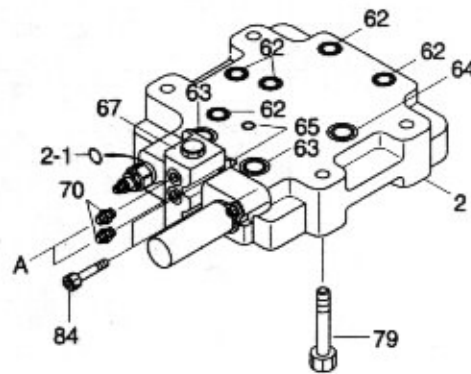
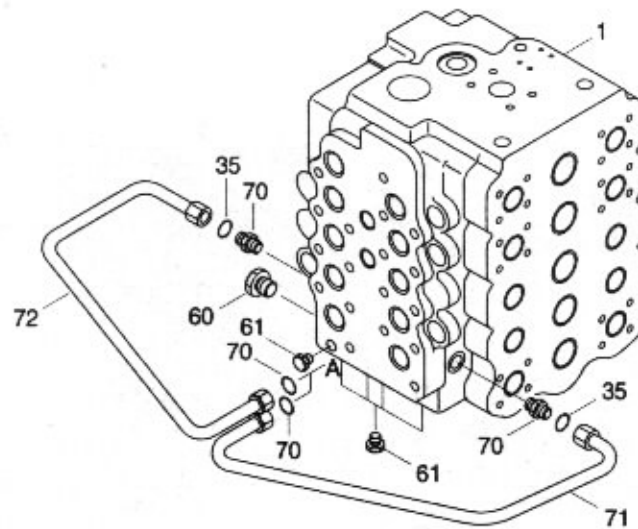
1	Valve housing	39	Spring	75	Flange cap
13	Long cap	40	Poppet	76	O-ring
14	Long cap	41	Spring	77	Socket bolt
15	Plug assy	42	Plug	78	Socket bolt
16	O-ring	43	O-ring	80	Socket bolt
17	Spring seat	49	O-ring	81	Socket bolt
18	Spring	50	Backup ring	85	Name plate
19	Spring	51	Plug	86	Screw drive
20	End spool	52	Poppet	87	Antivoid valve assy
21	Plug assy	53	Spring	89	Relief valve assy
22	Relief valve assy	54	Plug	89-1	O-ring
33	O-ring	57	Poppet	90	Spring
34	Plug assy	58	Plug	91	Spring seat
36	Plug assy	69	Plug	92	Spring seat
37	Sleeve	73	Flange cap	93	Spring seat
38	Poppet	74	O-ring	94	Spool end
				95	Spool end

STRUCTURE(2/3)



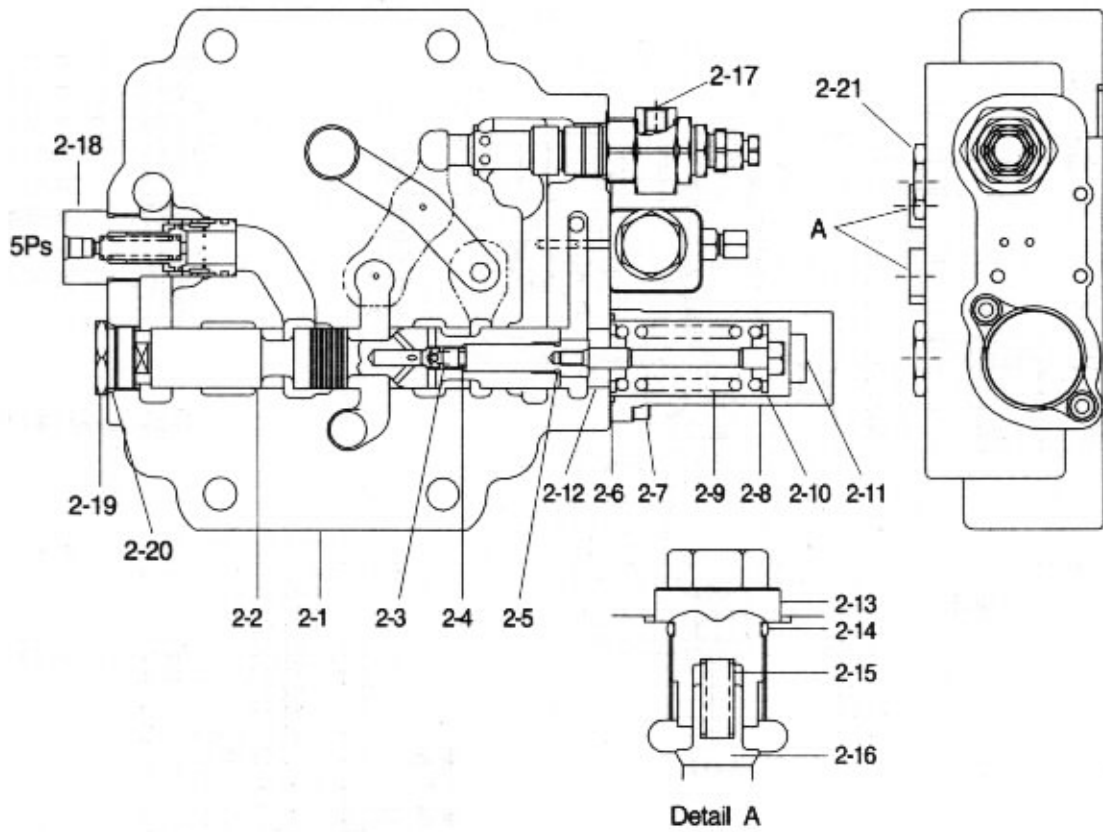
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|----|------------------|----|-----------|------|----------------------|
| 1 | Valve housing | 28 | Piston | 50 | Backup ring |
| 3 | Travel spool(LH) | 29 | Body | 51 | Plug |
| 4 | Option spool | 30 | Piston | 52 | Poppet |
| 5 | Boom 2 spool | 31 | Flange | 53 | Spring |
| 6 | Arm 1 spool | 32 | O-ring | 54 | Plug |
| 7 | Swing spool | 33 | O-ring | 55 | Sleeve |
| 8 | Arm 2 spool | 34 | Plug assy | 56 | Poppet |
| 9 | Boom 1 spool | 36 | Plug assy | 59 | Sleeve |
| 10 | Bucket spool | 40 | Poppet | 66 | Antidrift valve assy |
| 11 | Travel spool(RH) | 41 | Spring | 68 | Relief valve assy |
| 12 | Short cap | 42 | Plug | 69 | Plug assy |
| 15 | Plug assy | 43 | O-ring | 80 | Socket bolt |
| 16 | O-ring | 44 | Sleeve | 82 | Socket bolt |
| 23 | Poppet assy | 45 | Poppet | 83 | Socket bolt |
| 24 | Spring | 46 | Spring | 87 | Antivoid valve assy |
| 25 | Sleeve | 47 | Poppet | 88 | O-ring |
| 26 | O-ring | 48 | Plug | 89 | Relief valve assy |
| 27 | Backup ring | 49 | O-ring | 89-1 | O-ring |
| | | | | 96 | Antidrift valve assy |

STRUCTURE(3/3)



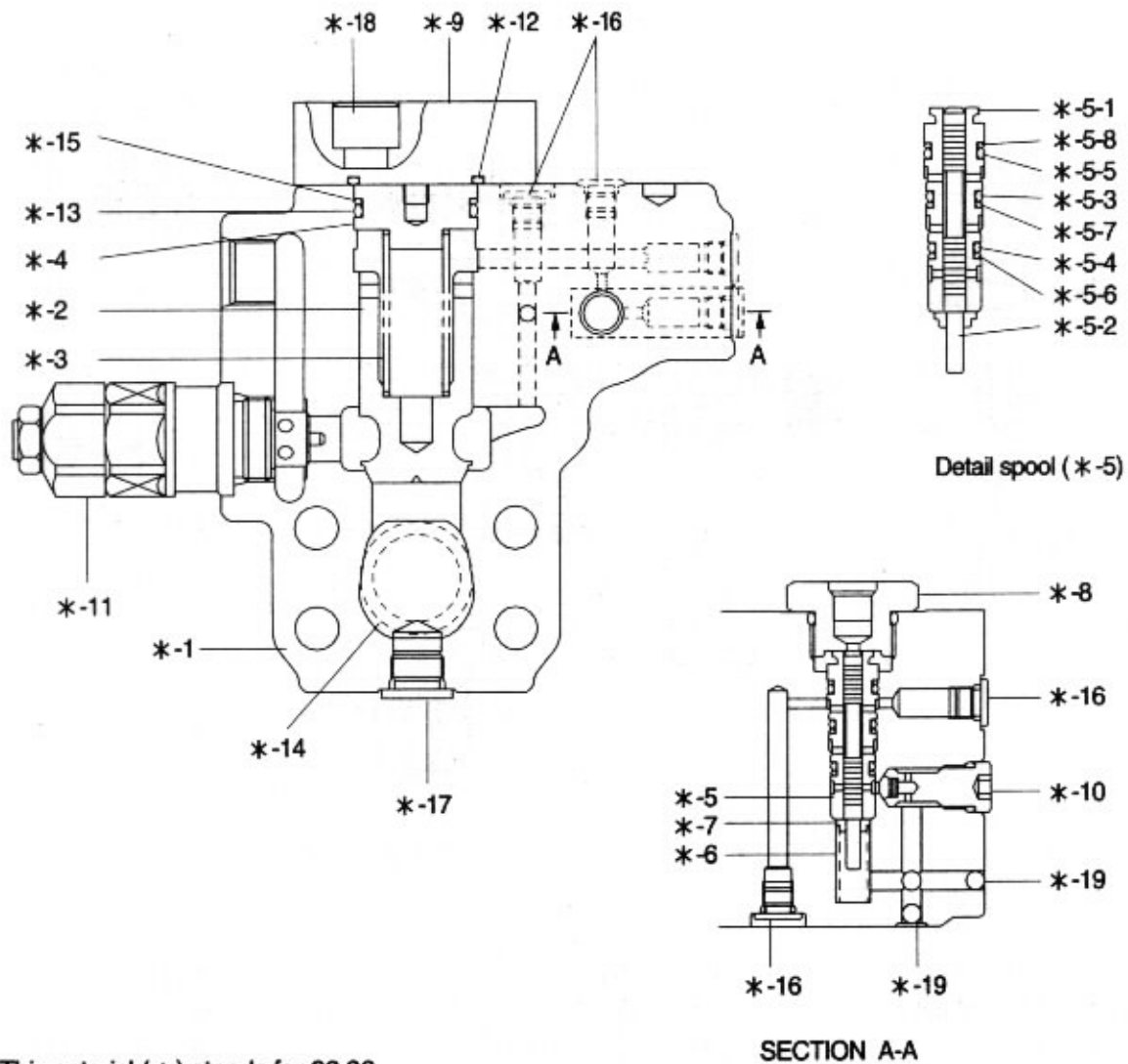
1	Valve housing	62	O-ring	71	Pipe
2	Side body assy	63	O-ring	72	Pipe
2-1	O-ring	64	O-ring	79	Socket bolt
35	O-ring	65	O-ring	84	Socket bolt
60	Plug assy	67	Pilot valve		
61	Plug	70	Joint		

STRUCTURE OF SIDE BODY ASSEMBLY(2)



2-1	Side body	2-8	Cap	2-15	Spring
2-2	Straight travel spool	2-9	Spring	2-16	Poppet
2-3	Valve	2-10	Spring seat	2-17	Relief valve assembly
2-4	Spring	2-11	Spool end	2-18	Relief valve assembly
2-5	O-ring	2-12	Plug	2-19	Plug
2-6	O-ring	2-13	Plug	2-20	O-ring
2-7	Socket head bolt	2-14	O-ring	2-21	Plug assembly

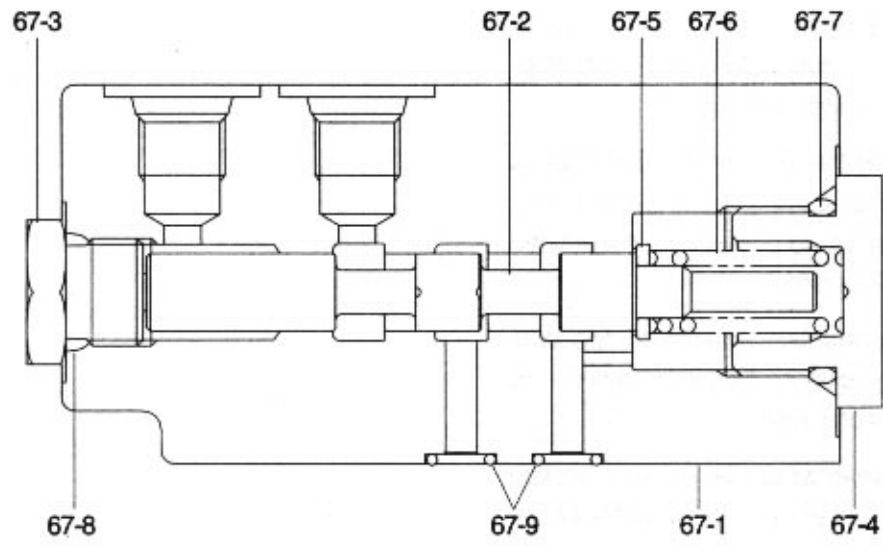
STRUCTURE OF BOOM AND BUCKET ANTI DRIFT VALVE(66, 96)



· This asterisk(*) stands for 66,96.

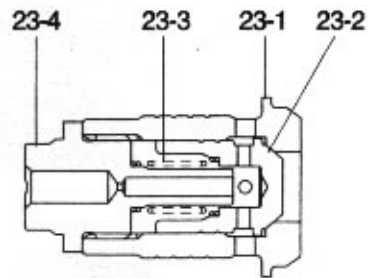
*-1	Valve housing	*-10	Plug assembly	*-19	Steel ball
*-2	Poppet	*-11	Relief valve assembly	*-5-1	Sleeve
*-3	Spring	*-12	O-ring	*-5-2	Spool
*-4	Spacer	*-13	O-ring	*-5-3	O-ring
*-5	Spool assembly	*-14	O-ring	*-5-4	O-ring
*-6	Spring	*-15	Backup ring	*-5-5	O-ring
*-7	Spring seat	*-16	Plug assembly	*-5-6	Backup ring
*-8	Plug assembly	*-17	Plug assembly	*-5-7	Backup ring
*-9	Flange	*-18	Socket head bolt	*-5-8	Backup ring

STRUCTURE OF PILOT VALVE ASSEMBLY(67)



- | | | | | | |
|------|-------|------|-------------|------|--------|
| 67-1 | Body | 67-4 | Plug | 67-7 | O-ring |
| 67-2 | Spool | 67-5 | Spring seat | 67-8 | O-ring |
| 67-3 | Plug | 67-6 | Spring | 67-9 | O-ring |

STRUCTURE OF POPPET ASSEMBLY(23)



- | | | | | | |
|------|--------|------|--------|------|------|
| 23-1 | Poppet | 23-3 | Spring | 23-4 | Plug |
| 23-2 | Poppet | | | | |

3. DISASSEMBLY

1) PRECAUTION

- (1) Handle the components carefully not to drop them or bump them with each other as they are made with precision.
- (2) Do not force the work by hitting or twisting as burred or damaged component may not be assembled or result in oil leakage or low performance.
- (3) When disassembled, tag the components for identification so that they can be re-assembled correctly.
- (4) Once disassembled, O-rings and backup rings are usually not to be used again. (Remove them using a wire with its end made like a shoehorn. Be careful not to damage the slot.)
- (5) If the components are left disassembled or half-disassembled, they may get rust from moisture or dust. If the work has to be interrupted, take measures to prevent rust and dust.

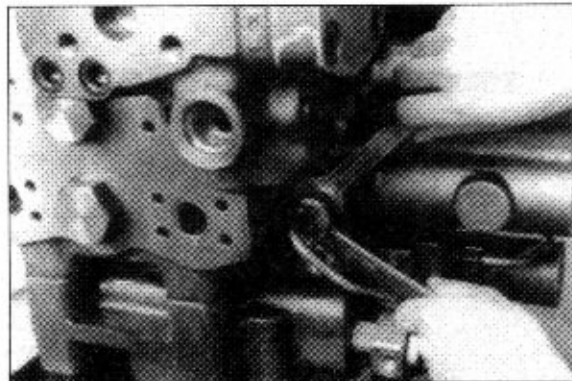
2) PROCEDURE

(1) Disassembly of travel straight pilot parts

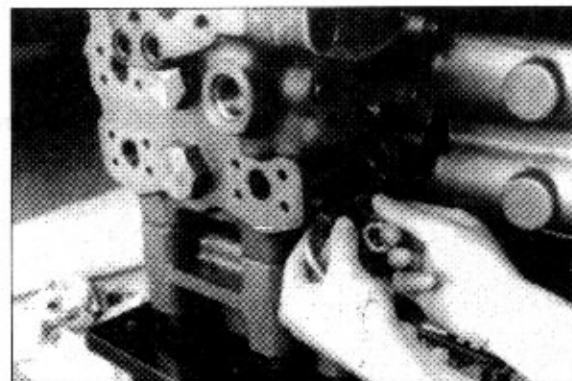
※ A number of sub part is expressed by type of parent number - child number.

Example : 2-1, 2-2

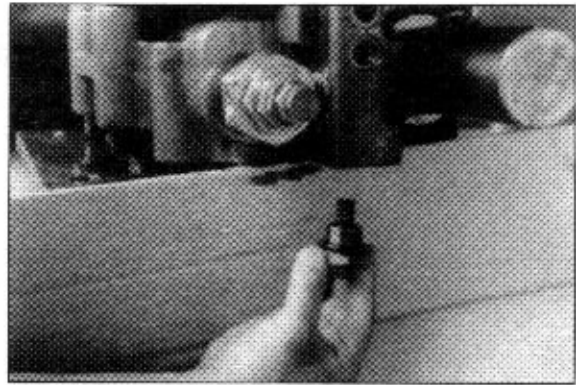
- ① Loosen joint (70) and remove the pipe(71, 72)



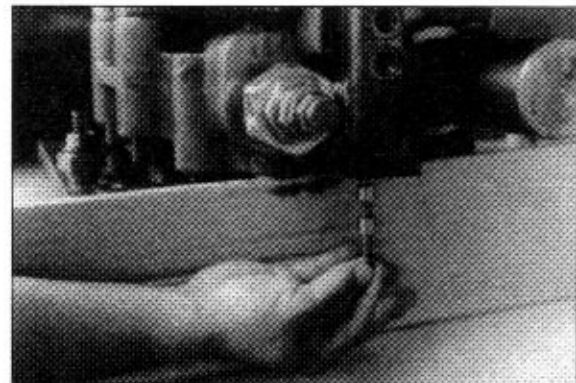
- ② Disassemble joint (19) from valve housing.



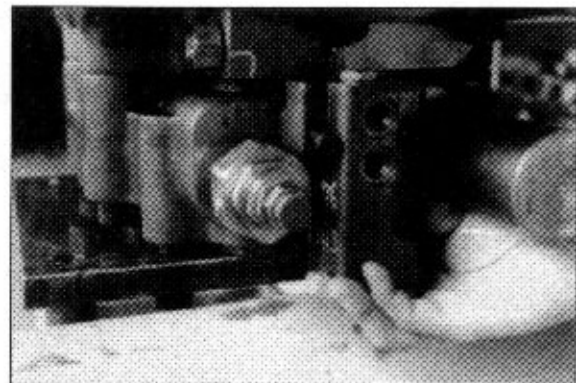
- ③ Loosen the plug(67-4) and disassemble O-ring (67-7).
Pull out spring (67-6).



- ④ Pull out spring seat (67-5) and spool (6-2) simultaneously.



- ⑤ Loosen socket head bolts (84 : 3 places)
and remove body (67-1).

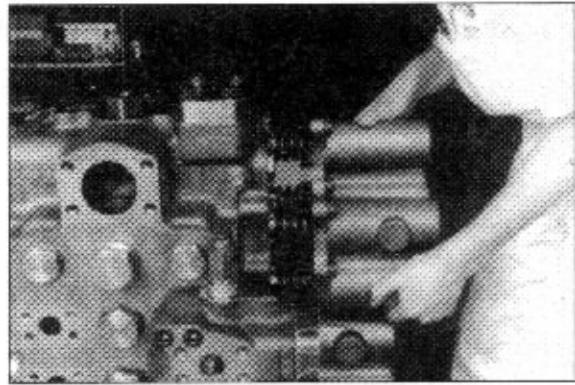


- ⑥ Remove plug (67-3) from body and
disassemble O-ring (67-8).
Disassemble O-rings (67-9 : 2 places)
from body.

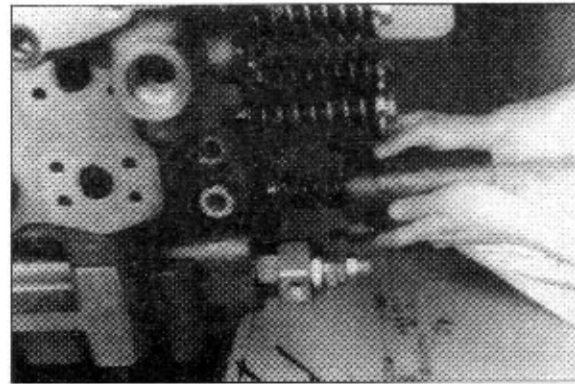


(2) Disassembly of spool part

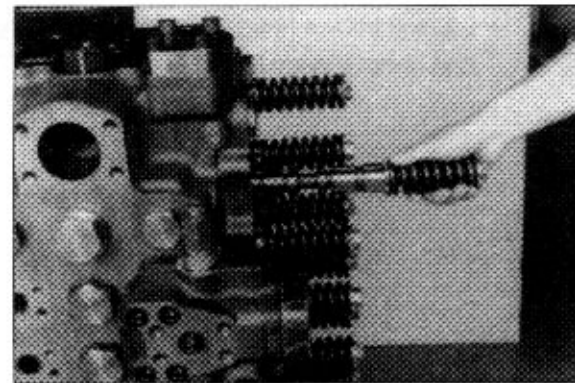
- ① Loosen socket head bolts (80,81) and disassemble lock caps (13,14).
Pull out O-ring(16) from hole of cap.



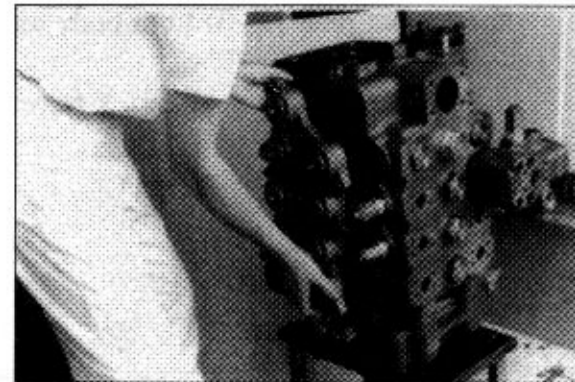
- ② Loosen socket head bolt (2-7) of side body (2) and disassemble cap (2-8).
Pull out O-ring (2-6) from hole of cap.



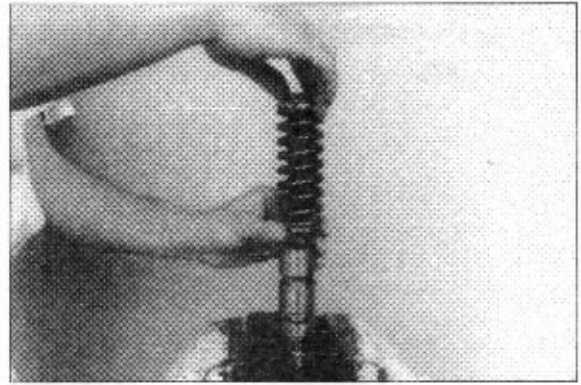
- ③ Disassemble all spool of subassembly itself from valve housing.
* Be careful not to damage while pulling out spool.
Identify them with a tag to prevent from being mistaken at disassembly.



- ④ Loosen socket head bolt (80) and disassemble short cap(12).
Pull out O-ring (16) from hole of cap.



- ⑤ Loosen spool end (20) from spool (3-11), and then disassemble spring seat (17) and spring (18, 19).



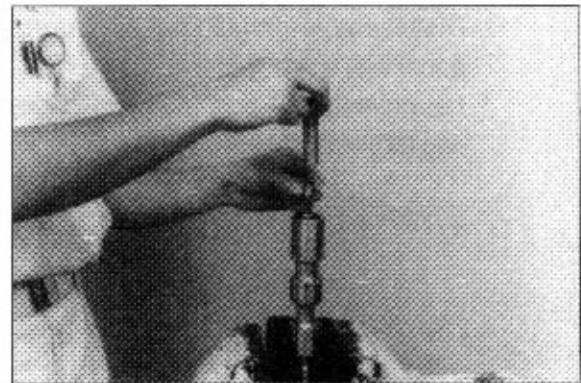
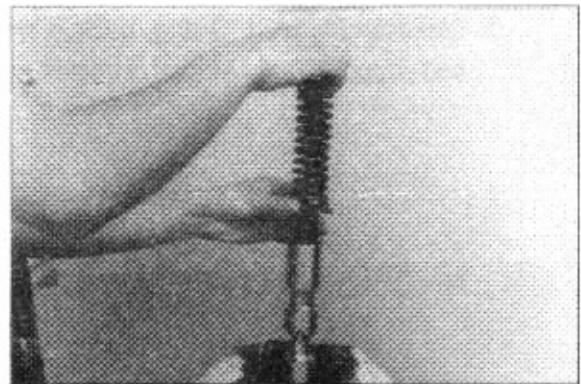
- ⑥ Loosen spool end (2-11) of spool (2-2) and disassemble spring seat (2-10) and spring (2-9).

Loosen plug(2-12), and then pull out spring (2-4) and poppet (2-3) from inside of spool.

Remove O-ring (2-5) from plug.

- * When disassemble spool assembly, fix the spool with vise. On this occasion, attach wood between vise blades to prevent spool from damaging.

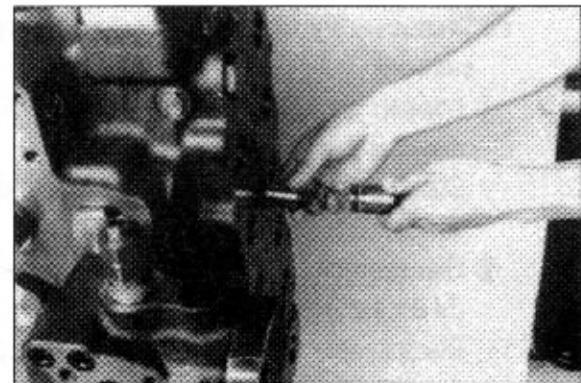
Heat outer face of spool end to loosen screw easily with industrial drier. (temperature : 200~250 °C).



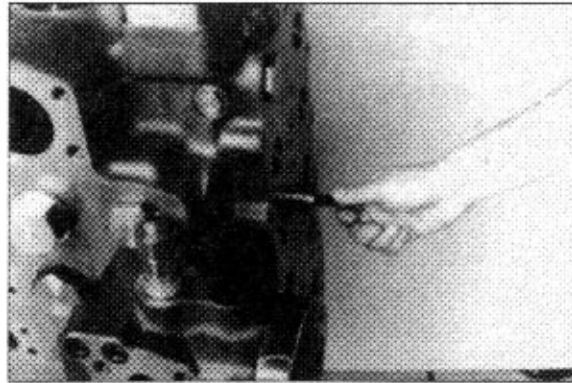
(3) Disassembly of parts between cap and valve housing

- ① Disassemble plug(48) of 4B3 port of boom and 5B2 port of arm with screw (M12 x 1.5)

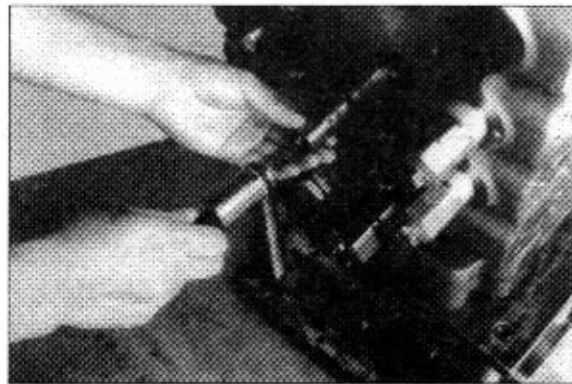
Disassemble O-ring (49) and backup ring (50) from plug.



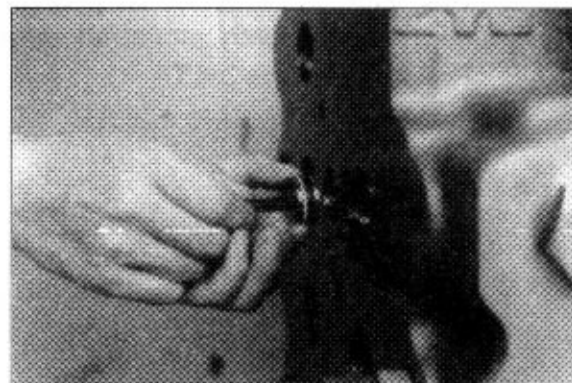
- ② Disassemble spring (41) and poppet (47).



- ③ Disassemble plug, O-ring, backup ring and poppet(57) of 4A2 port of bucket.

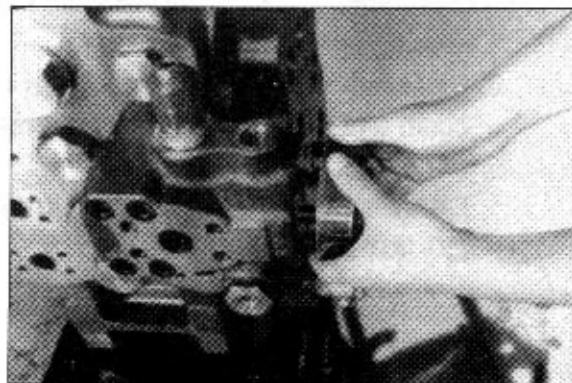


- ④ Disassemble plug(51) of 5A2 port of boom with screw (M6 x 1).
Disassemble O-ring (49) and backup ring (50) from plug.

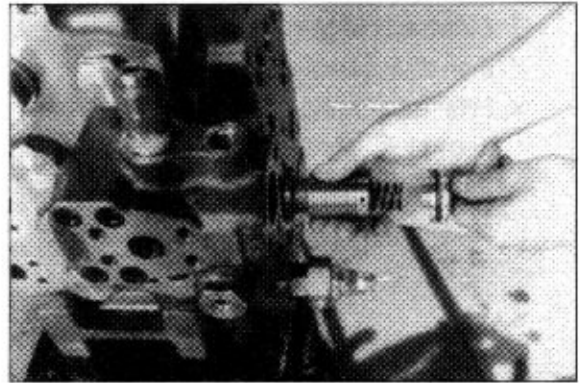


(4) Disassembly of antidrift valve (boom section)

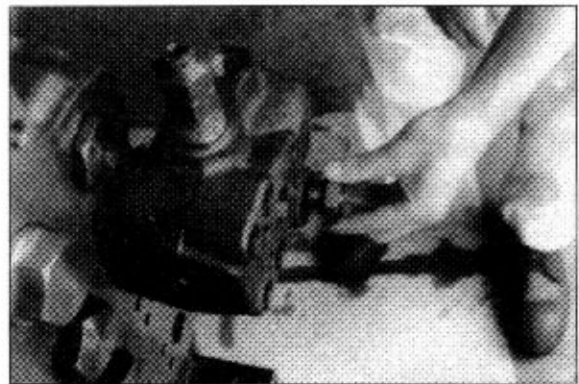
- ① Loosen socket head bolt (66-18) and disassemble flange (66-9).
Disassemble O-ring (66-12) from hole of flange.
- ② Disassemble spacer (66-4) with screw (M 8 x 1.25).
Disassemble O-ring (66-13) and backup ring (66-15) from spacer.



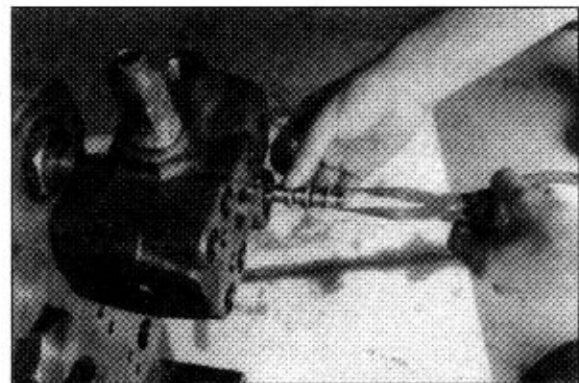
- ③ Disassemble spring (66-3) and poppet (66-2) from valve housing.



- ④ Loosen plug (66-8) and then disassemble O-ring from plug.



- ⑤ Disassemble spool (66-5-2) and sleeve (66-5-1).
Disassemble O-rings (66-5-3, 4, 5) and backup rings (66-5-6, 7, 8) from sleeve.

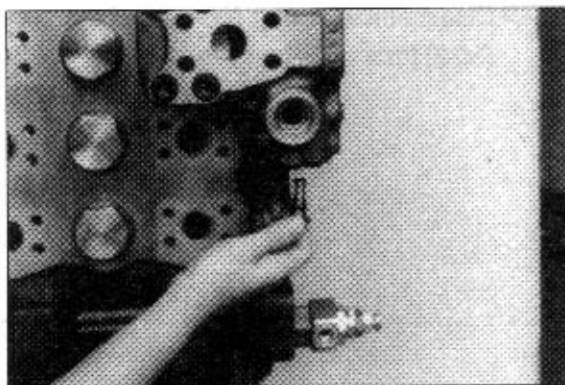


- ⑥ Disassemble spring seat (66-7) and spring (66-6) from hole inside.



⑦ Disassemble plug assembly (66-10), and then disassemble O-ring.

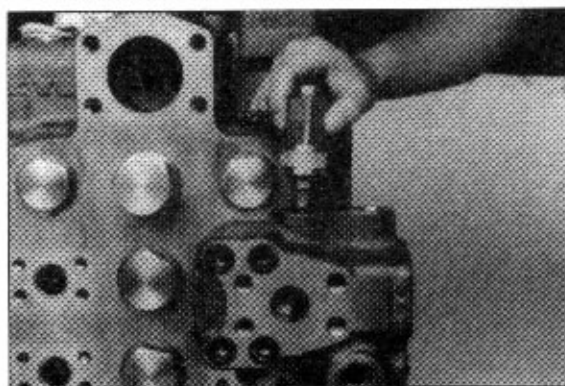
* Filter and O-ring cannot be disassembled from plug, because they were locked at the plug. If any defect is found, change assembly.



⑧ Disassemble overload relief valve (66-11).

⑨ Disassemble plug assemblies (66-16 : 5 places, 66-17 : 1 place), if necessary.

Do not disassemble steel ball because it is tight fitted.



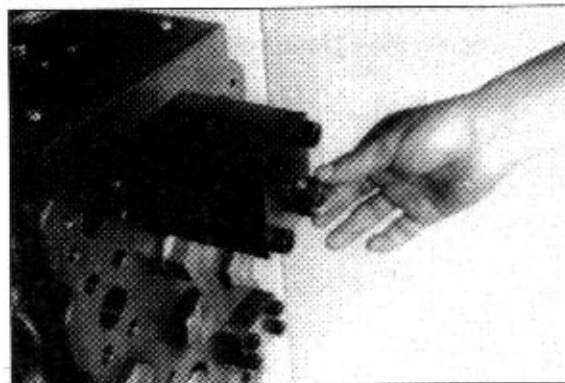
⑩ Loosen socket head bolts (82 : 4 places), and then disassemble valve housing (66-1) from body.

Disassemble O-ring (66-14) of mating face.

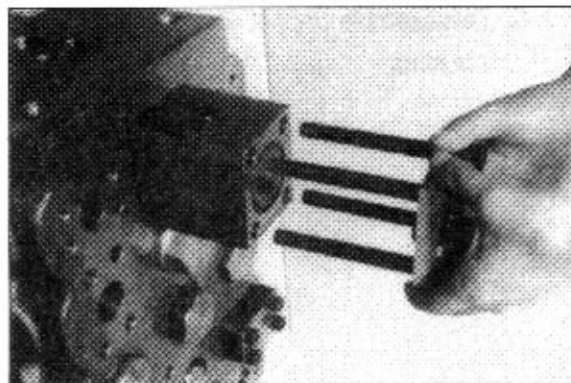


(5) Disassemble of boom priority valve

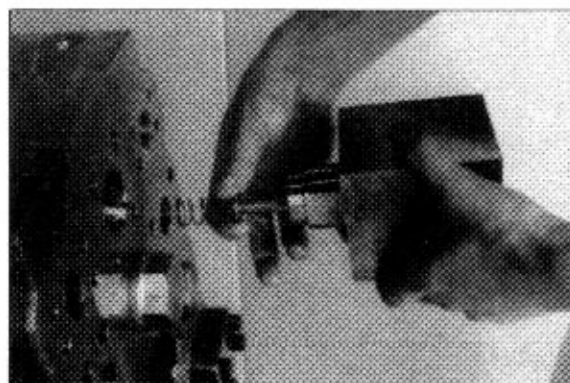
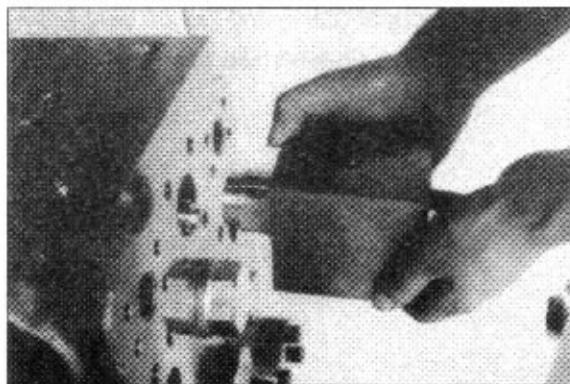
① Loosen plug assembly (15) and disassemble O-ring



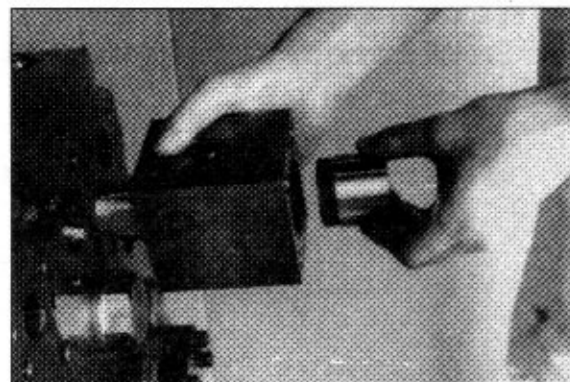
- ② Loosen socket head bolt (83) and disassemble flange (31) and O-ring (88).



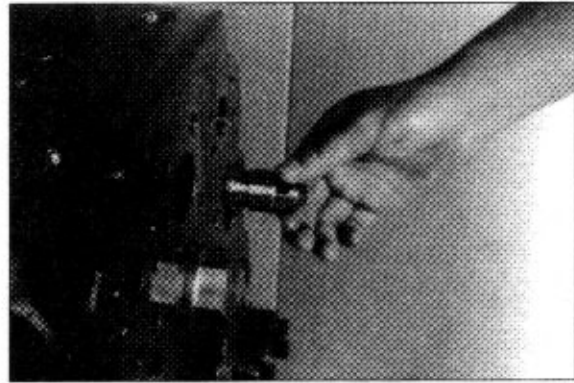
- ③ Disassemble body (29) straight, disassemble spool (25), piston (28) and spring (24) from body. Disassemble O-ring (26) and backup ring (27) from sleeve.



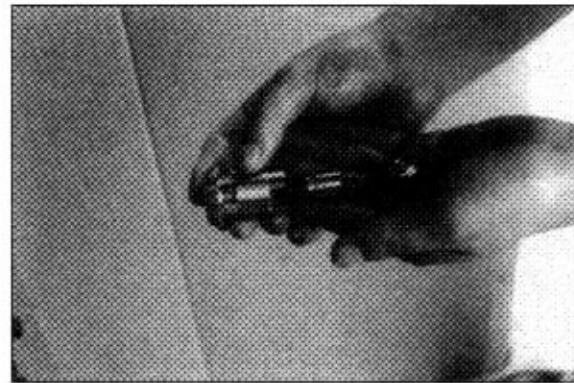
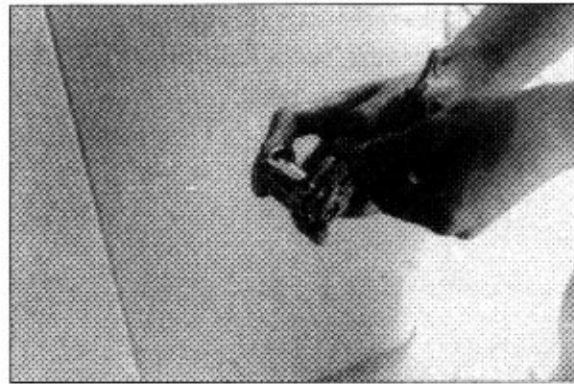
- ④ Disassemble piston (30) and O-ring (32) from body.



- ⑤ Disassemble poppet assembly (23) from housing.

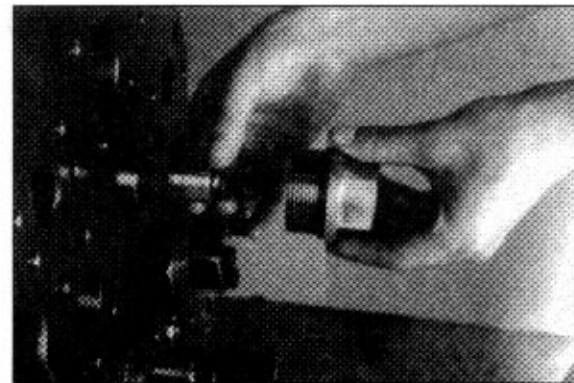


- ⑥ Fix poppet (23-1) and loosen plug (23-4) and then disassemble spring (23-3) and poppet (23-2).



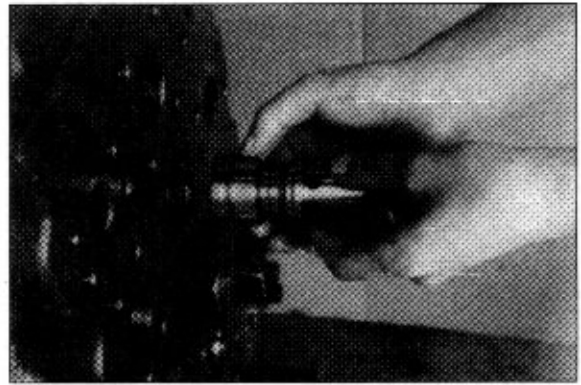
(6) Disassembly of load check valve part

- ① Disassemble plug (42) of arm load check valve.
Disassemble O-ring from plug.
- ② Disassemble spring (41) and poppet (40).

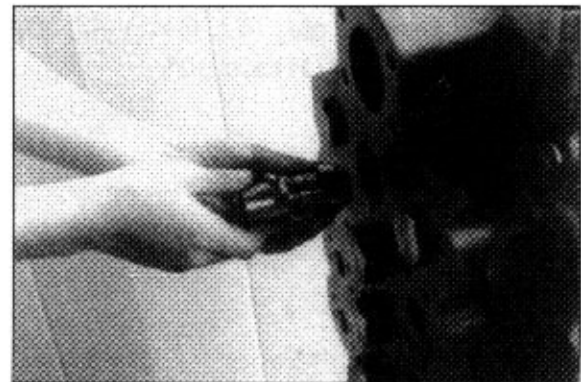
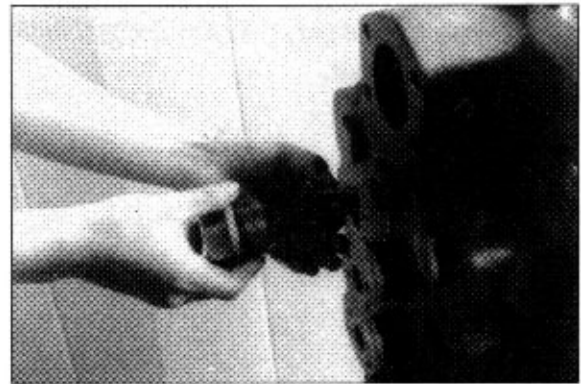


③ Disassemble sleeve (44), spring (46) and poppet (45).

* Be careful not to drop spring into the passage. It can bring about nonstop or overspeed of actuator because spool is stucked.



④ Disassemble plug (42), O-ring (43), spring (41), poppet (40), sleeve (37), spring (39) and poppet (38) of arm 2 part.



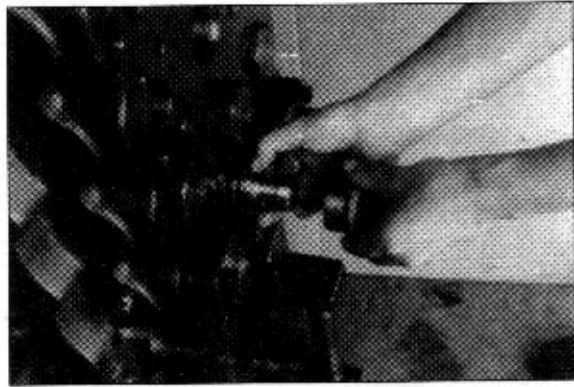
⑤ Disassemble plug(54) of boom 1, boom 2 and bucket part.

Disassemble O-ring (33) from plug.

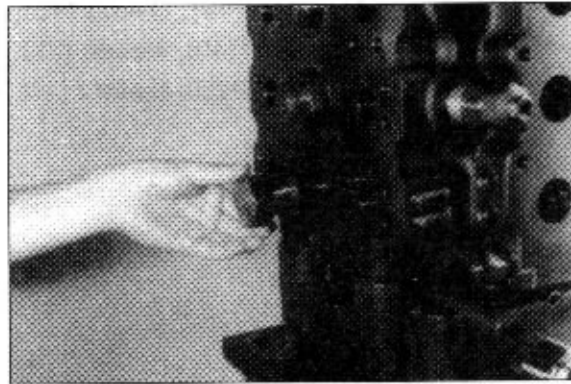
⑥ Disassemble spring (53) and poppet (52).



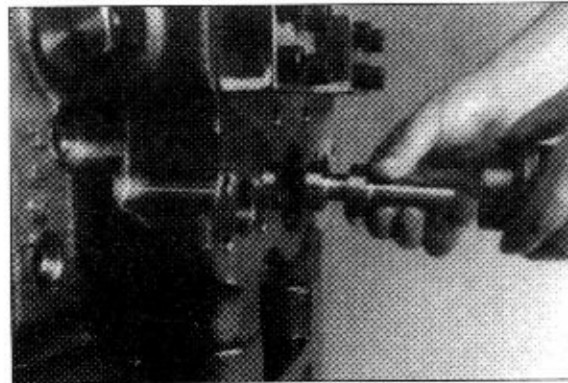
- ⑦ Disassemble plug (42) of service part.
Disassemble O-ring (43) from plug.
- ⑧ Disassemble sleeve (55), spring (46) and poppet (56).



- ⑨ Disassemble plug (54) and O-ring (33) of RH travel part.

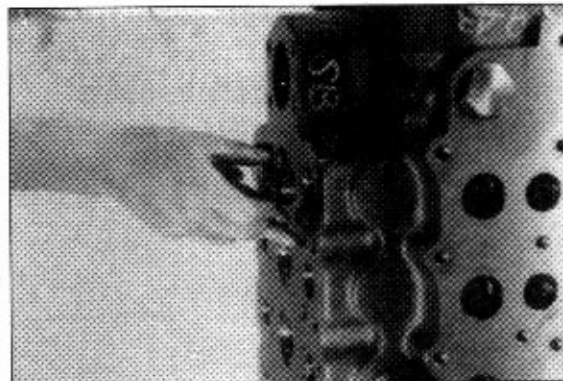


- ⑩ Disassemble plug (42), O-ring (43) and sleeve (59) of LH travel part.

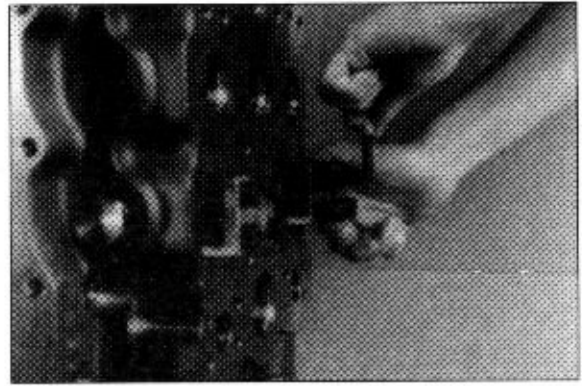


(7) Disassembly of port plug and flange cap

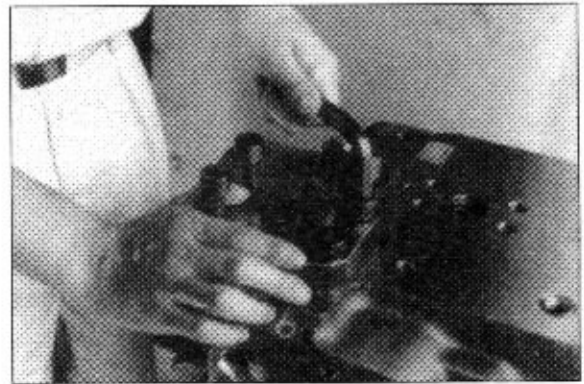
- ① Disassemble plug assembly (36) of arm 2 and boom 2.
Disassemble O-ring from plug.



- ② Loosen socket head bolt (77) of spare port, and then disassemble flange cap (73) and O-ring (74).

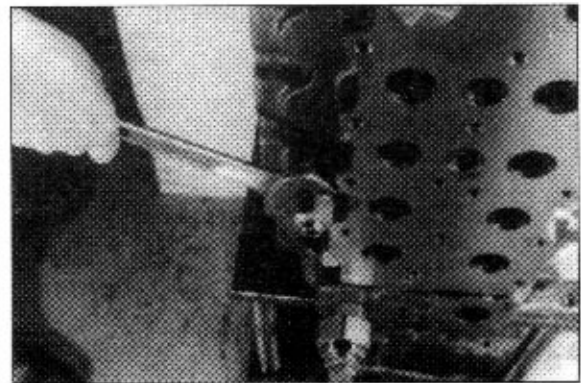


- ③ Loosen socket head bolt (78), and then disassemble flange cap (75) and O-ring (76).

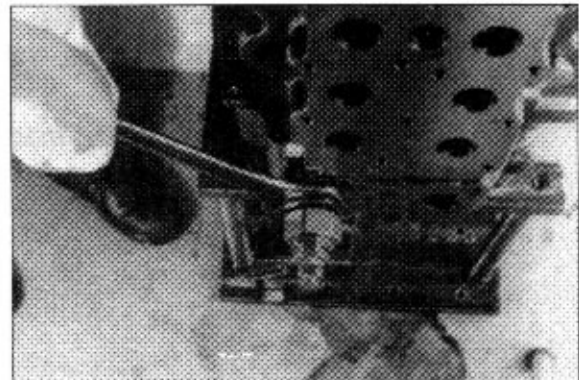


(8) Disassembly of relief valve and plug assembly

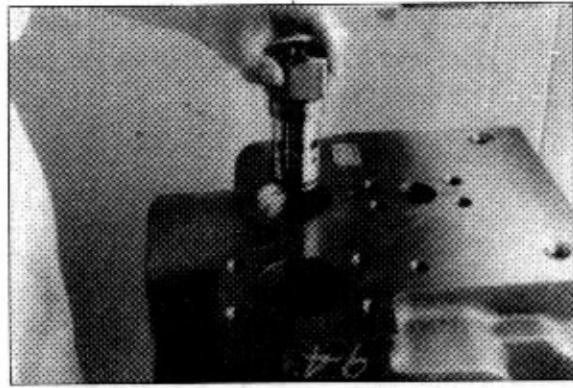
- ① Disassemble overload relief valves (68, 69 : 5 places).



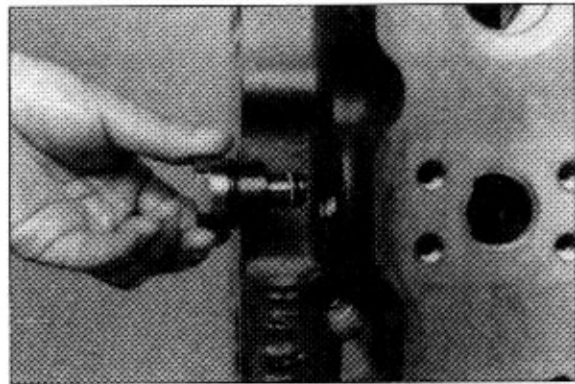
- ② Disassemble main relief valve (2-17).
Be careful not to change setting pressure by loosen the plug except the plug (8) at page 8-69.



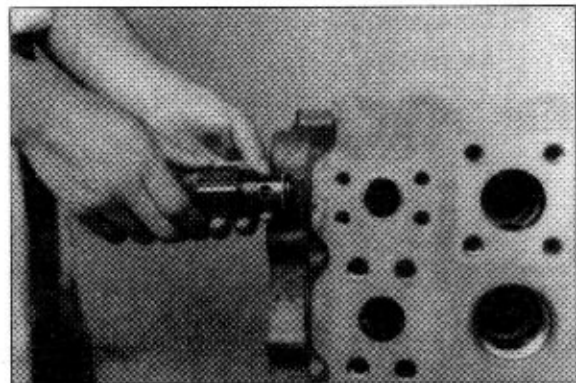
③ Disassemble relief valves (22, 2-18).



④ Disassemble backup rings (69 : 2 places).

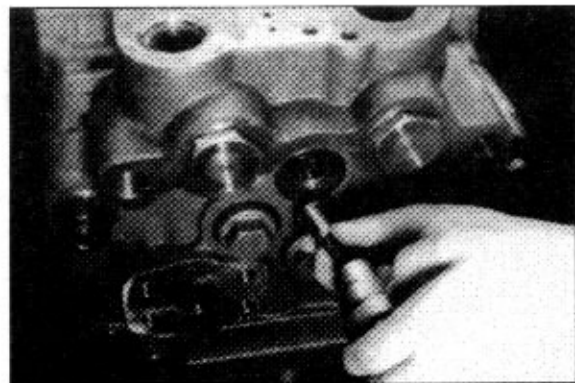


⑤ Disassemble antivoid valves (87:2 places).

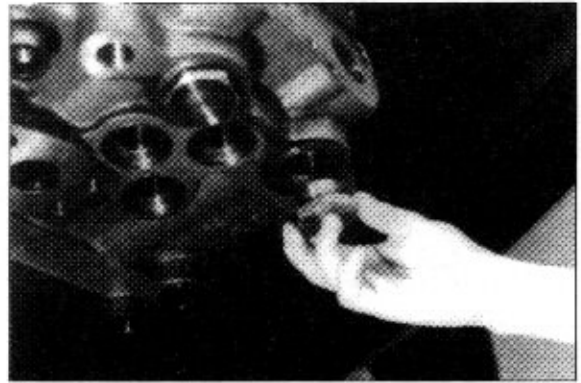


(9) Disassembly of side body assembly

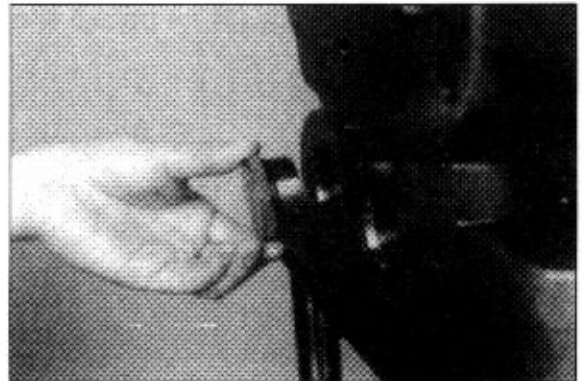
- ① Disassemble plugs (2-13 : 3 places) and O-ring (2-14).
- ② Disassemble spring (2-15) and poppet (2-16).



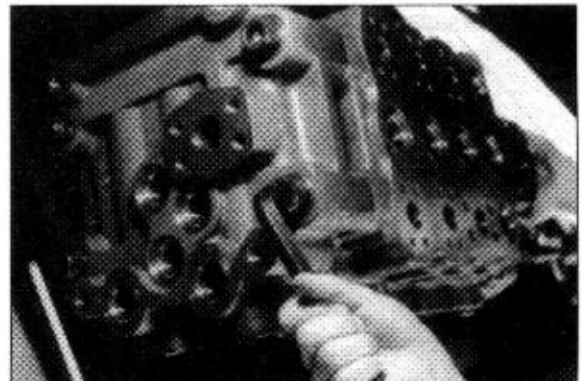
- ③ Disassemble plug (2-21), and O-ring.



- ④ Disassemble plug (2-19) and O-ring (2-20).

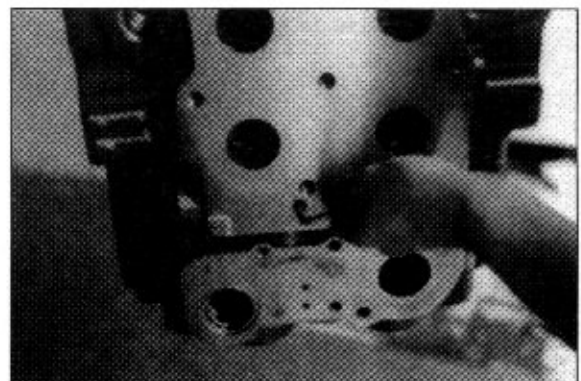


- ⑤ Loosen socket head bolts (79 : 4 places) and disassemble side body (2-1) from valve assembly.
⑥ Disassemble O-rings (62, 63, 64, 65) from mating face.



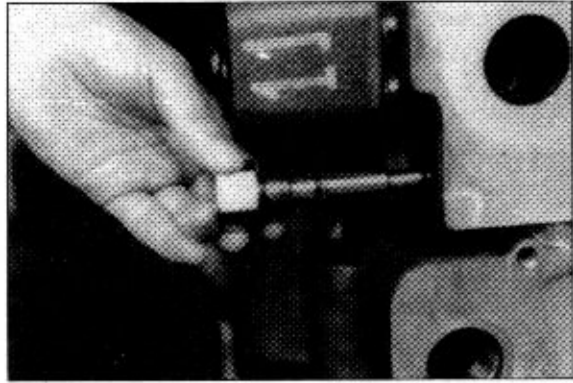
(10) Disassembly of the other plugs

- ① Disassemble plugs (61 : 5 places) and remove seal tape of thread.

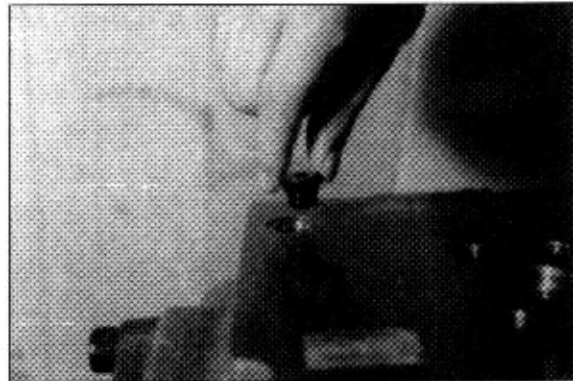


② Disassemble plug (60) and O-rings (3 places).

* Do not disassemble filter compulsorily.
If disassemble and reassemble, filter is separated or fractured.



③ Disassemble plugs (34 : 4 places) and O-rings.



④ Disassemble plug (21) and O-ring.



⑤ Disassemble plugs (15 : 3 places) and O-rings.

