

**CASE**

PROFESSIONAL PARTNER

**SERVICE MANUAL  
CRAWLER EXCAVATOR**

**CX330 TIER III**

87565293 NA

Issued 05-2006

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**WARNING:** Use insulated gloves or mittens when working with hot parts.



**WARNING:** Lower all attachments to the ground or use stands to safely support the attachments before you do any maintenance or service.



**WARNING:** Pin sized and smaller streams of hydraulic oil under pressure can penetrate the skin and result in serious infection. If hydraulic oil under pressure does penetrate the skin, seek medical treatment immediately. Maintain all hoses and tubes in good condition. Make sure all connections are tight. Make a replacement of any tube or hose that is damaged or thought to be damaged. **DO NOT** use your hand to check for leaks, use a piece of cardboard or wood.



**WARNING:** When removing hardened pins such as a pivot pin, or a hardened shaft, use a soft head (brass or bronze) hammer or use a driver made from brass or bronze and a steel head hammer.



**WARNING:** When using a hammer to remove and install pivot pins or separate parts using compressed air or using a grinder, wear eye protection that completely encloses the eyes (approved goggles or other approved eye protectors).



**WARNING:** Use suitable floor (service) jacks or chain hoist to raise wheels or tracks off the floor. Always block machine in place with suitable safety stands.



**WARNING:** When servicing or repairing the machine, keep the shop floor and operator's compartment and steps free of oil, water, grease, tools, etc. Use an oil absorbing material and/or shop cloths as required. Use safe practices at all times.



**WARNING:** Some components of this machine are very heavy. Use suitable lifting equipment or additional help as instructed in this Service Manual.



**WARNING:** Engine exhaust fumes can cause death. If it is necessary to start the engine in a closed place, remove the exhaust fumes from the area with an exhaust pipe extension. Open the doors and get outside air into the area.



**WARNING:** When the battery electrolyte is frozen, the battery can explode if (1), you try to charge the battery, or (2), you try to jump start and run the engine. To prevent the battery electrolyte from freezing, try to keep the battery at full charge. If you do not follow these instructions, you or others in the area can be injured.

## Cooling system

Fan type.....	diameter 850 mm (33.5 in), suction type-6blades resin & steel
Pulley ratio.....	.80 (reduction)
Direction of rotation.....	Right (viewed from fan side); compliant with
Radiator capacity.....	96.0 kW
Fin type.....	wavy
Fin space.....	2.0 mm (0.08 in)
Oil cooler capacity.....	66.6 kW
Fin type.....	Wavy
Fin space.....	1.75 mm (0.07 in)
Inter-cooler capacity.....	29.9 kW
Fin type.....	triangular straight
Fin space.....	2.0 mm (0.08 in)
Fuel cooler capacity.....	1.7 kW
Fin type.....	wavy
Fin space.....	2.0 mm (0.08 in)

## Capacity of coolant and lubricants

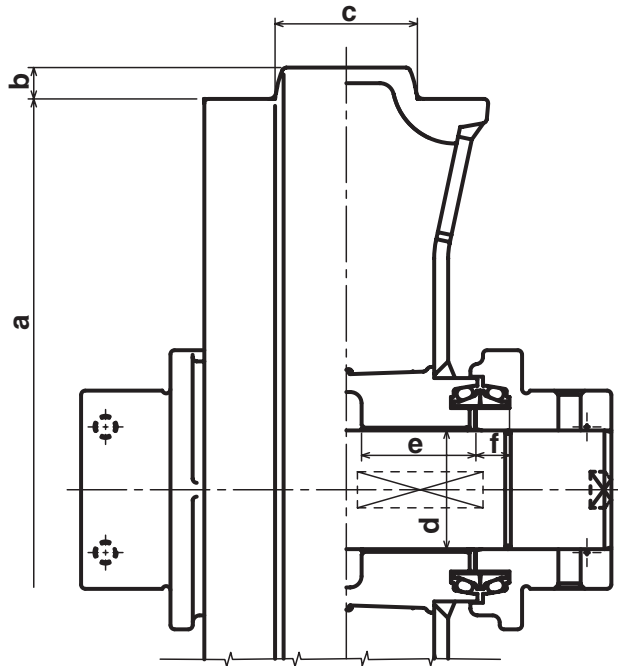
Coolant.....	30 L (7.92 gal)
Fuel.....	580 L (153 gal)
Lubricant for engine.....	38 L (10 gal)
Lubricant for travel reduction gear (per side).....	9.5 L (2.5 gal)
Lubricant for swing reduction gear (per side).....	6 L (1.59 gal)
Hydraulic oil.....	350 L (92.5 gal)
Capacity of hydraulic oil tank.....	175 L (46.2 gal)

## Hydraulic oil filter

Suction filter (inside tank).....	150 mesh
Return filter (inside tank).....	10 $\mu$ m
Nephron filter (inside housing).....	1 $\mu$ m
Pilot line filter (inside housing).....	10 $\mu$ m

# Idler wheel

## Dimensions

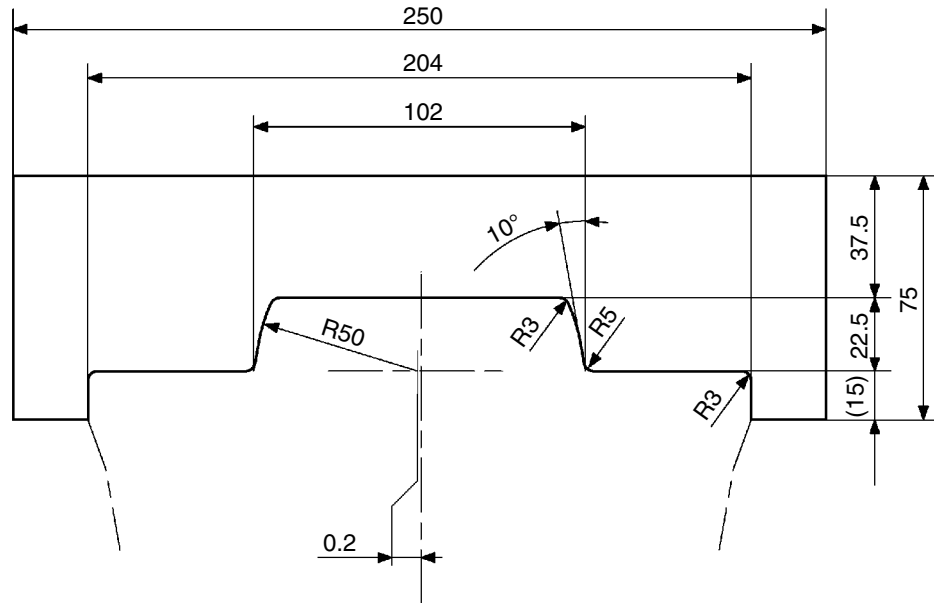


000-6-10-00-08B

Mark		Dimension	
		mm	in
Ø a	Standard	560	22.04
	Limit	550	21.6
b	Standard	22.5	0.88
	Limit	---	---
c	Standard	102	4.01
	Limit	92	3.62
Ø d (shaft)	Standard	85	3.34
	Limit	84	3.30
Ø d (bushing)	Standard	85	3.34
	Limit	86	3.38
e (bushing)	Standard	82	3.22
	Limit	81	3.18
f	Standard	19	0.74
	Limit	18.6	0.73

## Gauge

Unit in mm



CI01N502



**Feet to meters**

ft.	0	1	2	3	4	5	6	7	8	9	ft.
	m	m	m	m	m	m	m	m	m	m	
----		0.305	0.610	0.914	1.219	1.524	1.829	2.134	2.438	2.743	----
10	3.048	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.486	5.791	10
20	6.096	6.401	6.706	7.010	7.315	7.620	7.925	8.230	8.534	8.839	20
30	9.144	9.449	9.754	10.058	10.363	10.668	10.973	11.278	11.582	11.887	30
40	12.192	12.497	12.802	13.106	13.411	13.716	14.021	14.326	14.630	14.935	40
50	15.240	15.545	15.850	16.154	16.459	16.764	17.069	17.374	17.678	17.983	50
60	18.288	18.593	18.898	19.202	19.507	19.812	20.117	20.422	20.726	21.031	60
70	21.336	21.641	21.946	22.250	22.555	22.860	23.165	23.470	23.774	24.079	70
80	24.384	24.689	24.994	25.298	25.603	25.908	26.213	26.518	26.822	27.127	80
90	27.432	27.737	28.042	28.346	28.651	28.956	29.261	29.566	29.870	30.175	90
100	30.480	30.785	31.090	31.394	31.699	32.004	32.309	32.614	32.918	33.223	100

**Meters to feet**

m	0	1	2	3	4	5	6	7	8	9	m
	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	
----		3.2808	6.5617	9.8425	13.1233	16.4042	19.6850	22.9658	26.2466	29.5275	----
10	32.8083	36.0891	39.3700	42.6508	45.9316	49.2125	52.4933	55.7741	59.0549	62.3358	10
20	65.6166	68.8974	72.1783	75.4591	78.7399	82.0208	85.3016	88.5824	91.8632	95.1441	20
30	98.4249	101.7057	104.9866	108.2674	111.5482	114.8291	118.1099	121.3907	124.6715	127.9524	30
40	131.2332	134.5140	137.7949	141.0757	144.3565	147.6374	150.9182	154.1990	157.4798	160.7607	40
50	164.0415	167.3223	170.6032	173.8840	177.1648	180.4457	183.7265	187.0073	190.2881	193.5690	50
60	196.8498	200.1306	203.4115	206.6923	209.9731	213.2540	216.5348	219.8156	223.0964	226.3773	60
70	229.6581	232.9389	236.2198	239.5006	242.7814	246.0623	249.3431	252.6239	255.9047	259.1856	70
80	262.4664	265.7472	269.0281	272.3089	275.5897	278.8706	282.1514	285.4322	288.7130	291.9939	80
90	295.2747	298.5555	301.8364	305.1172	308.3980	311.6789	314.9597	318.2405	321.5213	324.8022	90
100	328.0830	331.3638	334.6447	337.9255	341.2063	344.4872	347.7680	351.0488	354.3296	357.6105	100

**Miles to kilometers**

miles	0	1	2	3	4	5	6	7	8	9	miles
	km	km	km	km	km	km	km	km	km	km	
----		1.609	3.219	4.828	6.437	8.047	9.656	11.265	12.875	14.484	----
10	16.093	17.703	19.312	20.921	22.531	24.140	25.750	27.359	28.968	30.578	10
20	32.187	33.796	35.406	37.015	38.624	40.234	41.843	43.452	45.062	46.671	20
30	48.280	49.890	51.499	53.108	54.718	56.327	57.936	59.546	61.155	62.764	30
40	64.374	65.983	67.592	69.202	70.811	72.420	74.030	75.639	77.249	78.858	40
50	80.467	82.077	83.686	85.295	86.905	88.514	90.123	91.733	93.342	94.951	50
60	96.561	98.170	99.779	101.389	102.998	104.607	106.217	107.826	109.435	111.045	60
70	112.654	114.263	115.873	117.482	119.091	120.701	122.310	123.919	125.529	127.138	70
80	128.748	130.357	131.966	133.576	135.185	136.794	138.404	140.013	141.622	143.232	80
90	144.841	146.450	148.060	149.669	151.278	152.888	154.497	156.106	157.716	159.325	90
100	160.934	162.544	164.153	165.762	167.372	168.981	170.590	172.200	173.809	175.418	100

# Section

# 2001

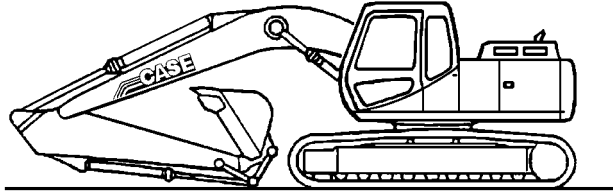
**RADIATOR, OIL-COOLER, INTER COOLER, FUEL  
COOLER AND ENGINE**

**REMOVAL AND INSTALLATION**

## FUEL TANK

### Removal

#### STEP 1



Park the machine on hard, flat ground. Lower the attachment to the ground. JS00163A

#### STEP 2

Reduce the engine speed to idle for 30 seconds, then shut down the engine.

#### STEP 3

Turn the ignition key to "ON" without starting the engine.

#### STEP 4

Attach a "DO NOT OPERATE" tag to the ignition key in the cab.

#### STEP 5

**NOTE:** *The numbers within brackets refer to the figures on pages 5 and 6.*

Remove the access panel under the fuel reservoir (1).

#### STEP 6

Open the filling plug (2) of the tank (1). Bleed the remaining fuel using the valve (3) then remove the latter. Remove the filter (19) and the fuel gauge (20).

#### STEP 7

Lift the hood of the front boot. Remove the retaining screw (4) of the access ramp (5). Remove the access ramp (5).

#### STEP 8

Remove the screws (6) on top and then inside the front boot, then remove the protective housing (7).

#### STEP 9

Remove the screws (8) and the protective plate (9) from on top of the fuel reservoir (1).

#### STEP 10

Loosen the two screws (10) located under the machine. Open the side portion of the machine and remove the two screws (11) located on the RH side of the fuel reservoir (1). Remove the protective plate of the reservoir (12).

#### STEP 11

Attach labels on the two hoses and remove them.

#### STEP 12

Shift the plastic protection (13) from the fuel sensor (14). Remove the retaining screws (15) then the fuel sensor (14) as well as the seal (16).

#### STEP 13

Remove the screws (17) from the fuel tank (1), and the shims (18).

#### STEP 14

Remove the fuel tank (1) using a hoist.

#### STEP 15

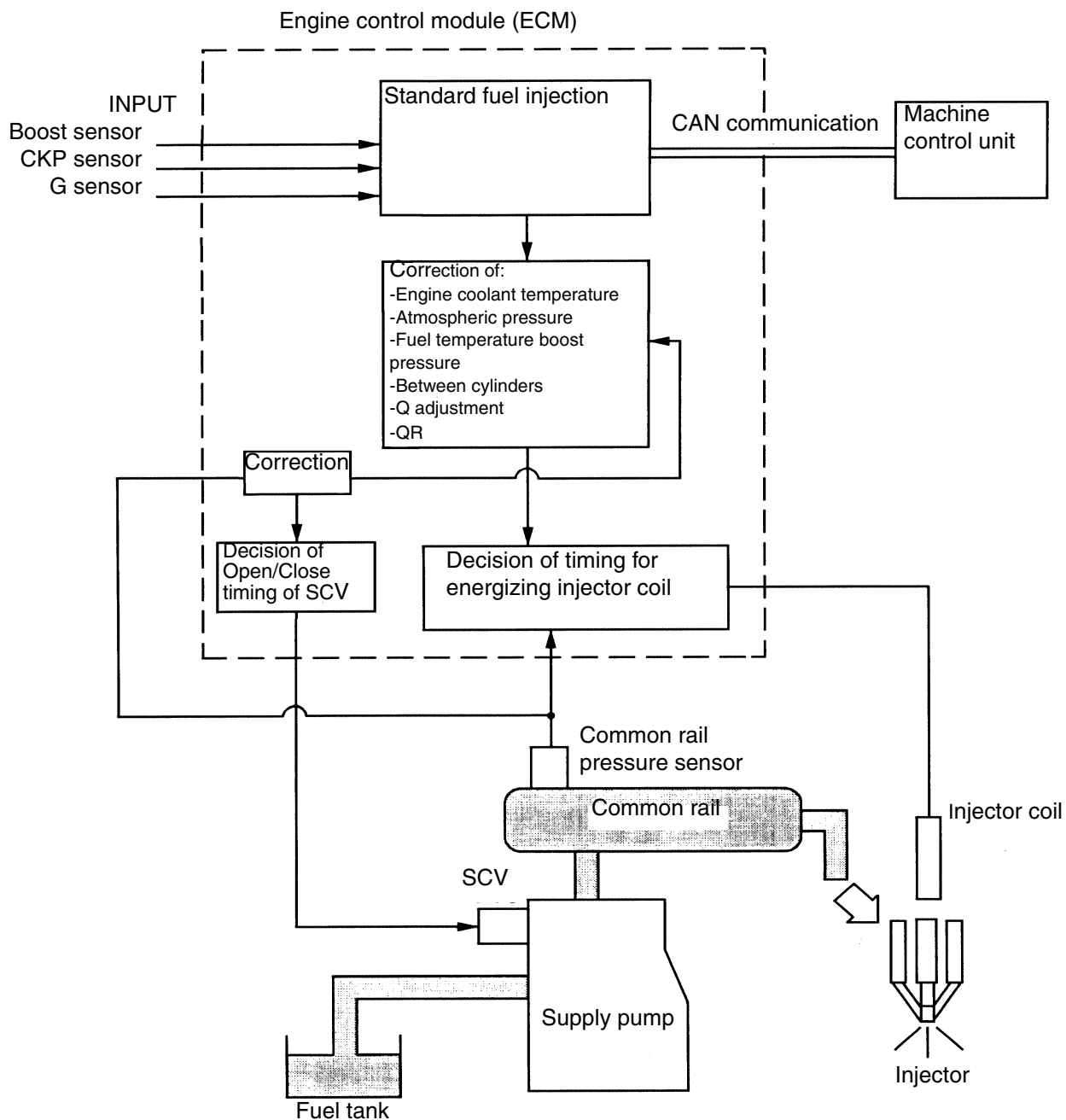
See the operator's manual for removing the fuel filter.

# ENGINE CONTROL

## Fuel Injection Control (Common rail type)

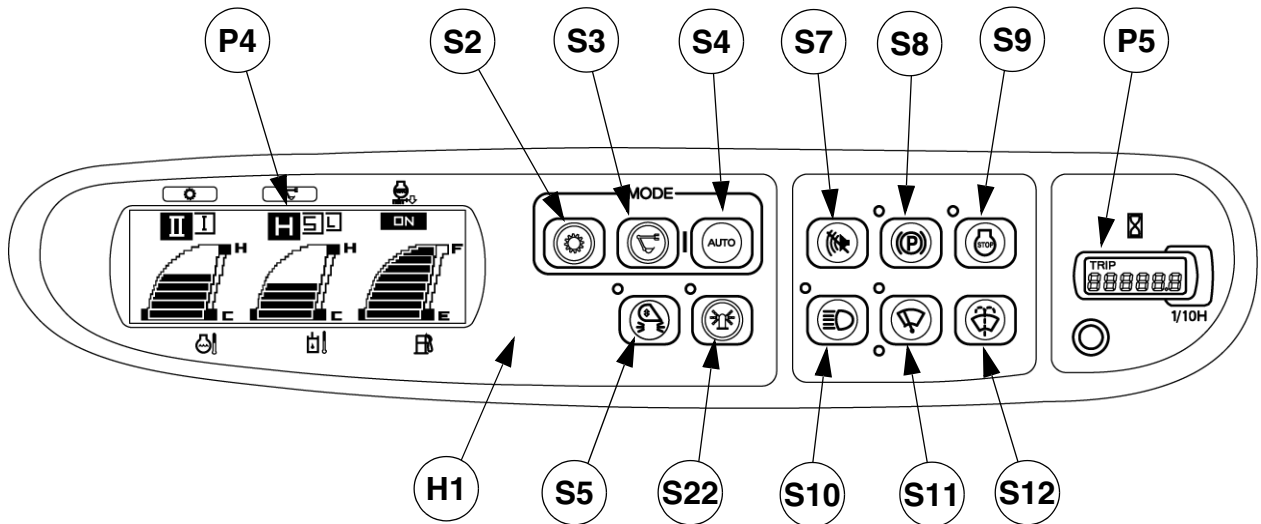
### 1. Process to determine quantity of fuel injection

#### 1) System diagram



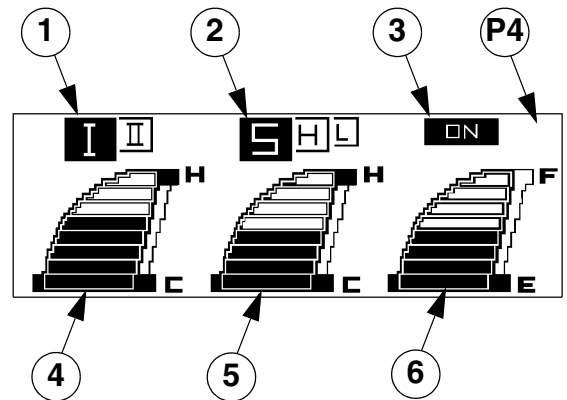
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5) Switches and LCD



CD00E007A

- H1 Audible warning device
- P4 Monitor display
- P5 Hourmeter
- S2 Travel mode switch
- S3 Work mode switch
- S4 Auto mode switch
- S5 Cushion control switch
- S7 Audible alarm cut out switch
- S8 Swing brake switch
- S9 Emergency engine stop switch
- S10 Working light switch
- S11 Wiper switch
- S12 Washer switch
- S22 Rotary light switch (Europe only)
- S22 Free swing switch (North America only)



CS00F521

- 1 Travel speed indicator
- 2 Work mode indicator
- 3 Idle mode indicator
- 4 Coolant temperature indicator
- 5 Hydraulic oil temperature indicator
- 6 Fuel level indicator

## BREAKER MODE

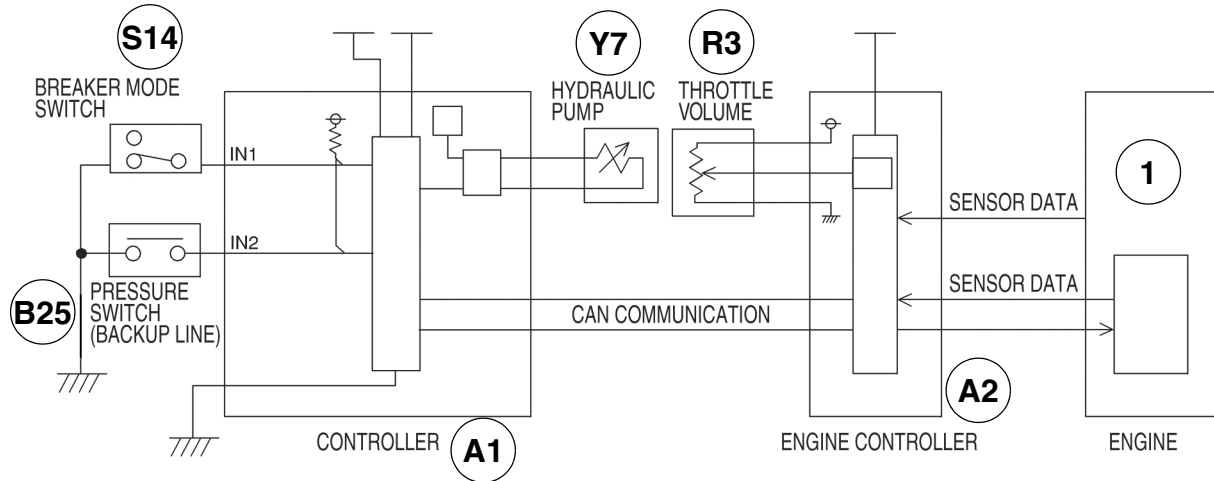
### 1. Alteration

Optimization of pump current in mode S and in mode L at the engine speed with the breaker being used. Pump current at engine speed of between 1200 and 1500 $\text{min}^{-1}$  is applied from that in mode L to that in mode S.

### 2. Purpose

Although in the breaker mode up to now, pump current in mode S is to be applied at engine speed of more than 1500  $\text{min}^{-1}$ , It spreads the speed range in mode S so that the machine can be operated in less than that of the flow-rate.

### 3) Circuit configuration



- 1 Engine
- A1 Computer/Controller
- A2 Engine controller
- B25 Breaker pilot pressure switch

- R3 Throttle volume
- S14 Breaker/crusher switch
- Y7 Main pump proportional solenoid

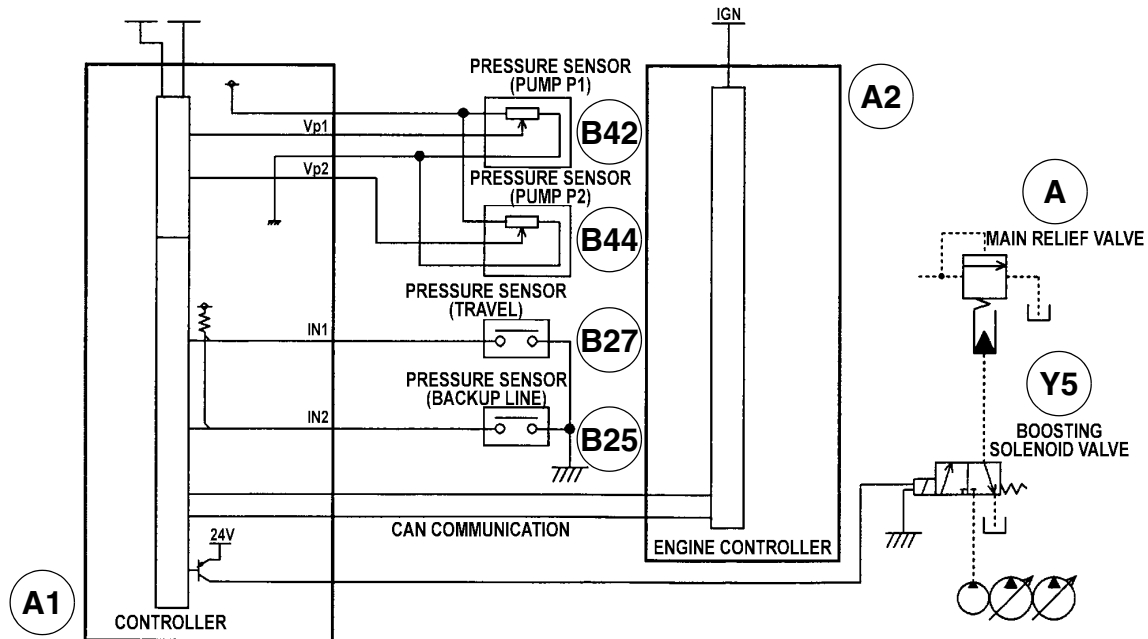
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### 4) Operation

1. When the breaker mode switch is turned ON by locker switch on the console (left side) and the pressure switch in backup line is turned ON, it controls to rotation of the breaker.
2. When the engine is rotated at a speed less than that set for the breaker by controlling the throttle potentiometer, engine speed will not be increased to the speed set for the breaker even if the breaker is operated.
3. If the pressure switch in backup line is turned ON regardless of breaker mode switch input, the pump current is to be at the current value in mode S irrespective of operation of at that time. (However, when the engine speed is less than 1200 $\text{min}^{-1}$ , pump current becomes that in mode L).

# POWER BOOST

## 1) Circuit configuration



- A** Main relief (standard)
- A1** Computer
- A2** Engine controller
- B25** Breaker pilot pressure switch

- B27** Travel pilot pressure switch
- B42** Pump pressure sensor (P1)
- B44** Pump pressure sensor (P2) (yellow band)
- Y5** Power-up solenoid valve (yellow band)

700.1.04.01.23BR

## 2) Increasing the pressure in each work mode

Mode Auto	Automatic power boost (*) (34.3 ↔ 37.3 MPa) (4974 ↔ 5410 psi)
H mode (Pressure)	Automatic power boost (*) (34.3 ↔ 37.3 MPa) (4974 ↔ 5410 psi)
S mode (Pressure)	Automatic power boost (*) (34.3 ↔ 37.3 MPa) (4974 ↔ 5410 psi)
L mode (Pressure)	Constant power boost (*) (34.3 ↔ 37.3 MPa) (4974 ↔ 5410 psi)

\* When the travel pilot pressure switch (B27) or the optional breaker pilot pressure switch (B25) is activated, power boost is deactivated.

## 3) Operation

When operating in H or S mode, the computer (A1) records the ratio between:

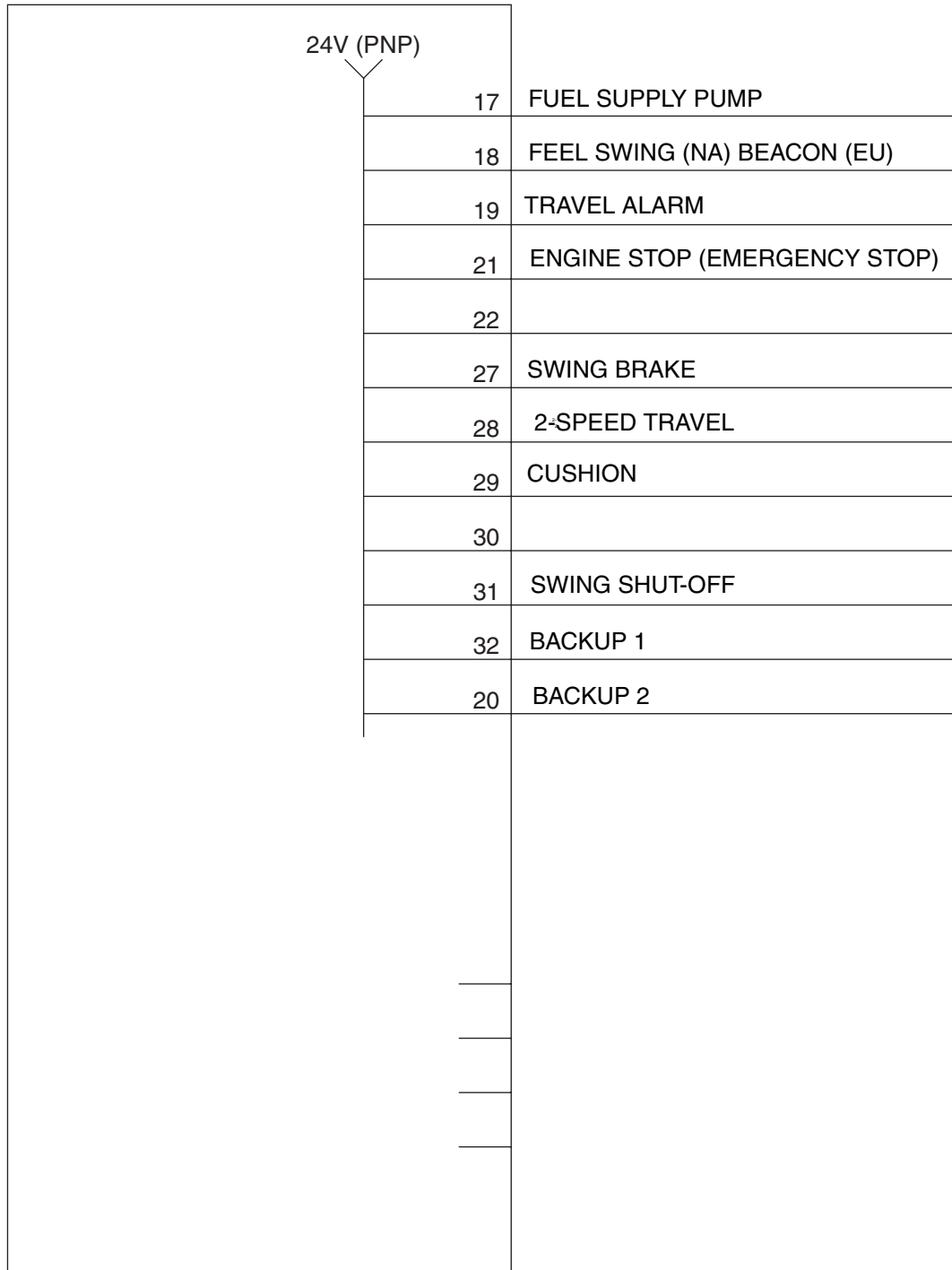
- The engine load transmitted by the engine controller (A2).
- The hydraulic circuit load transmitted by the pump pressure sensors (P1) (B42) and (P2) (B44).

If the pump pressure (P1) or (P2) is greater than 300 bar (4351 psi) and the load ratio is within a range of ± 5% for 2 seconds, the computer (1) activates the power-up solenoid valve (yellow band) (Y5) for 8 seconds, which increases the main pressure.

When the travel pilot pressure switch (B27) or the optional pilot pressure switch (B25) is activated, the computer (A1) deactivates the power-up solenoid valve (yellow band)(Y5).

# POWER TRANSISTOR PROTECTION

## CONTROLLER



In the event that a solenoid valve or a relay develops a short circuit, the power transistor output will be shut off in order to protect the controller. A «ELEC PROBLEM» message will be displayed during the failure. Perform the service support check to have the location of failure pinpointed and displayed.

700-1-04-01-23 CL

Then follow the display result and inspect the wire or the equipment that seems to be experiencing the failure.

#### 4) Trouble diagnosis (DIAG5), Machine main unit system Current trouble status (trouble code)

DIAG	MODE II H	M	0000	
4				
	M	0020	M	0000
	M	0000	M	0000
	M	0000	M	0000

M: Machine main unit system trouble code

Example Oil temperature sensor abnormality

- M0000: No defect
- M0010: Transistor output short
- M0020: Oil temperature sensor
- M0030: Fuel surface sensor
- M0040: Pressure sensor (P1)
- M0050: Pressure sensor (P2)
- M0060: Pressure sensor (N)
- M0070: Key switch
- M0080: Pressure switch (attachments or travel)
- M0090: CAN communications error
- M00A0: Controller reset
- M00B0: Engine controller mismatch
- M00C0: Boom pressure sensor (Europe)

## 8) Maintenance time setting

RST	MODE II.H	4	0	0	0	0
2						
	1	0	0	0	0	0
	2	0	5	0	0	0
	3	0	0	0	0	0
	5	0	0	0	0	0
	6	0	0	0	0	0
	7	0	0	0	0	0

- 1 Move to RST2 with the buzzer stop switch and select (2). (The selected item switches from light-on-dark display to dark-on-light display.)
- 2 The number displayed shows the time for displaying «Maintenance time». The display immediately after the selection is the default maintenance time. Each time the travel mode switch is switched ON, the number displayed moves one step through the cycle «50->250-> 500-> 1000-> 2000-> 5000-> 50-> 250...». When the setting is complete, switch the work mode switch ON for 10 seconds. The buzzer to announce that the storing the setting into memory is complete
- 3 Switch OFF the key switch.

\* If the buzzer stop switch is held ON for 20 seconds, the time until maintenance display (1) is reset.

## 9) Injector test mode

RST	MODE II.H	4	0	0	0	0
2						
	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	1	0
	5	0	0	0	0	0
	6	0	0	0	0	0
	7	0	0	0	0	0

- 1 Move to RST2 with the buzzer stop switch and select (3). (The selected item switches from light-on-dark display to dark-on-light display.)
- 2 Now, set the automatic boost to none. Switch the travel mode switch ON so that the number reaches 1. The number toggles between 0 and 1 each time you switch ON the switch. When the number reaches 1, the engine speed is fixed at 500 min<sup>-1</sup>.
- 3 For the injector test mode, the previous time's data is reset. In other words, even if the key switch is switched OFF with a value set, the next time the Key switch is switched ON, the mode is normal mode.

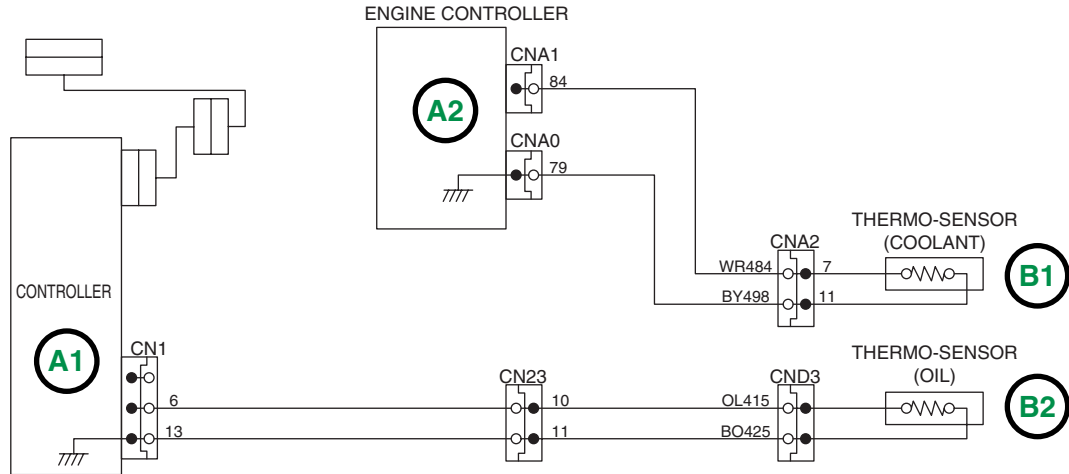
# Overheating

## Description of problem No. 4

- The message is still displayed even when the actual temperature is lower than the following:  
 Hydraulic oil temperature 98°C (208°F), engine coolant temperature 105°C (221°F).

Prior check:

1. Make sure that 8 bars are displayed on the hydraulic oil and engine coolant temperature gauge bar-graphs.

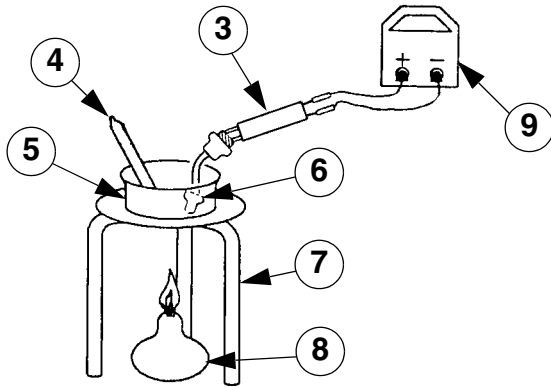


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**A1** Computer/controller  
**A2** Engine controller

**B1** Coolant temperature sensor  
**B2** Hydraulic oil temperature sensor

1. Remove the oil temperature sensor (B2) from the machine.

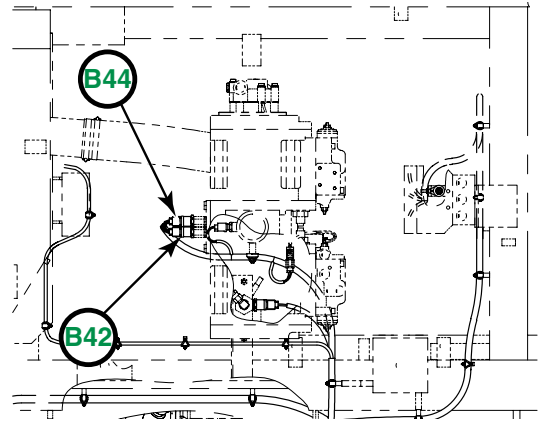


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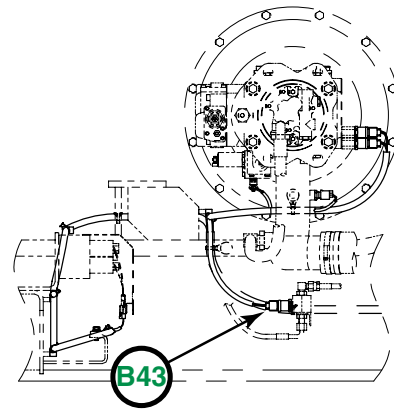
- 3 Service connector (2P)
  - 4 Thermometer
  - 5 Beaker
  - 6 Temperature sensor (B2)
  - 7 Tripod
  - 8 Spirit lamp
  - 9 Voltmeter
2. Connect the appropriate service connector (2P) (3) to the temperature sensor (B2) connector (1) or (2) and install the voltmeter (9).
  3. When the connection has been made, place the temperature sensor (B2) in the beaker (5) containing water. Place the beaker (5) on the tripod (7). Using the spirit lamp (8) gradually increase the water temperature in the beaker (5). Using the voltmeter (9), check the resistance value in function of the temperature read on the thermometer (4) (see table below).

Oil Temperature	Oil temperature sensor
20°C (68°F)	2.45 kΩ
30°C (86°F)	1.66 kΩ
40°C (104°F)	1.15 kΩ
50°C (122°F)	0.81 kΩ
60°C (140°F)	0.58 kΩ
70°C (158°F)	0.43 kΩ
80°C (176°F)	0.32 kΩ

## Pressure sensor



330.1.04.02.15AY2



330.104.02.15AY3

- B42** Pressure sensor P1
- B43** Pressure sensor (nega-cont.) (N)
- B44** Pressure sensor P2

1. Disconnect the connector from the main hydraulic pump pressure sensor.

## CONNECTING A BOOSTER BATTERY



**WARNING:** When a battery is frozen it may explode if (1) you try to charge it or (2) you try to start the engine using jump leads. To prevent the electrolyte from freezing, always keep the battery fully charged. Failure to comply with these instructions can be detrimental to your safety as well as the safety of those around.



**WARNING:** Batteries contain acid and explosive gases. A spark, flame or incorrect cable connection can cause the battery to explode. The correct procedure for connecting jump leads to the machine battery is explained on this page. Non-observance of these instructions may lead to serious or fatal injury.



**WARNING:** Batteries produce explosive gases. Keep all cigarettes, sparks and flames away from the area. If you charge or use a battery in a confined space, make sure that it is well ventilated. Always protect your eyes when working close to batteries.



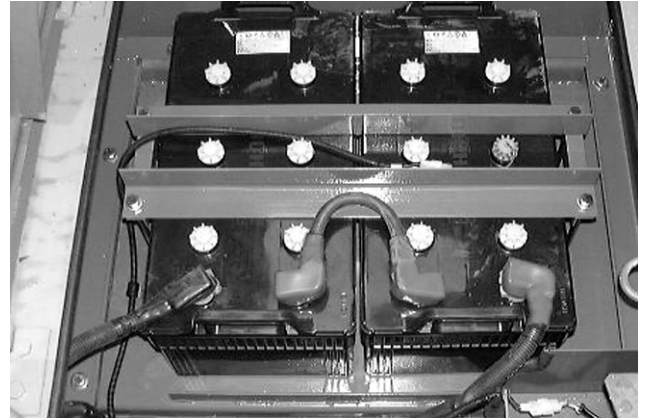
**WARNING:** When connecting booster cables, prevent the positive (+) and negative (-) terminals from touching each other.



**WARNING:** Improper connection of the booster cables may lead to an accident. Always proceed with great care.

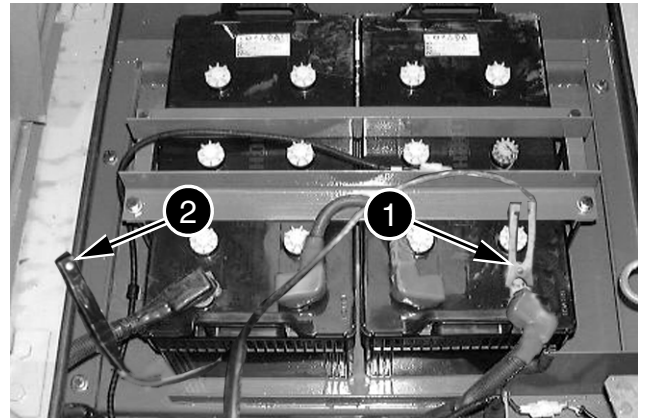
**NOTE:** The photos below do not correspond to the machine model, but the procedure is the same.

1. Open the RH access door.



CD01M005

2. From the operator's seat, ask your assistant to make the connections. Check that the voltage of the booster batteries is indeed 24 volts.
3. If the connections are made from another machine, check that the two machines are not touching each other.
4. Connect the positive (+) (1) booster cable to the positive (+) terminal of the battery.



CD01M006

5. Connect the negative (-) (2) booster cable to a clean earth away from the battery.

## Removal

### STEP 1

Park the machine on hard, flat ground. Rotate the upperstructure of the machine so that the cab is over the track to be removed.

### STEP 2

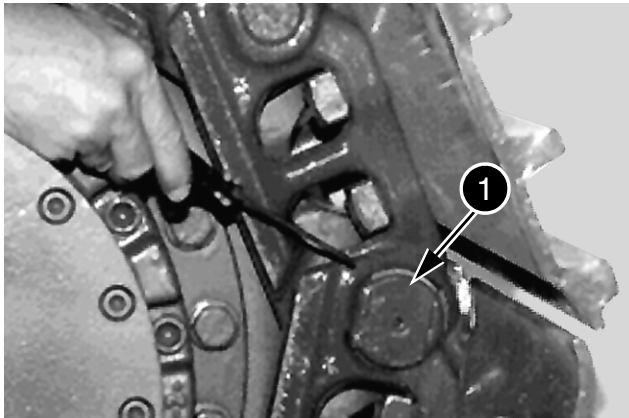


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Lower the bucket or the tool to lift the track a few centimetres off the ground.

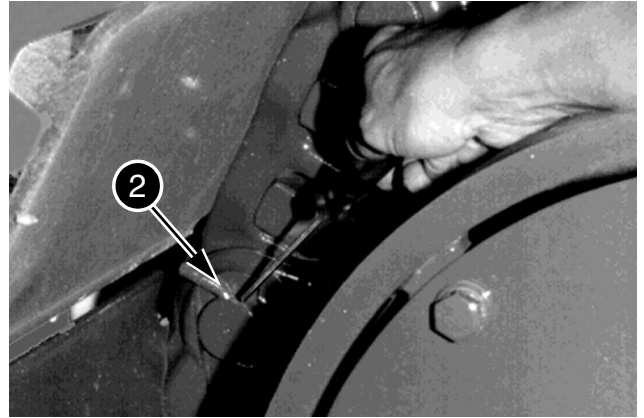
**NOTE:** If the machine does not have a bucket or tool installed, install wood blocks under the dipper and lower the dipper onto the wood blocks. Then, lower the dipper to raise the machine.

### STEP 3



JD00271A

The main axle (1) can be identified by flat surfaces on one end and the pin (2) that fastens it at the other end.



JD00272A

Operate the machine until the main axle is close to the centre of the sprocket. Operate machine to lower track to be removed to ground. Rotate the upper structure of the machine so that the cab is facing the front. Shut down the engine.

### STEP 4



JD00273A

Do not remove the non-return check valve. The grease in the track adjustment cylinder is under high pressure. Slacken the track by gradually loosening the non-return check valve by about two turns. The grease will escape from a port on the check valve thread.



**WARNING:** Grease is under heavy spring pressure. Disassembly without releasing pressure may result in serious injury or death. Do not disassemble the track compensating system before completely releasing the grease pressure. Release grease pressure by loosening check valve. Do not remove the non-return check valve or retaining bracket.

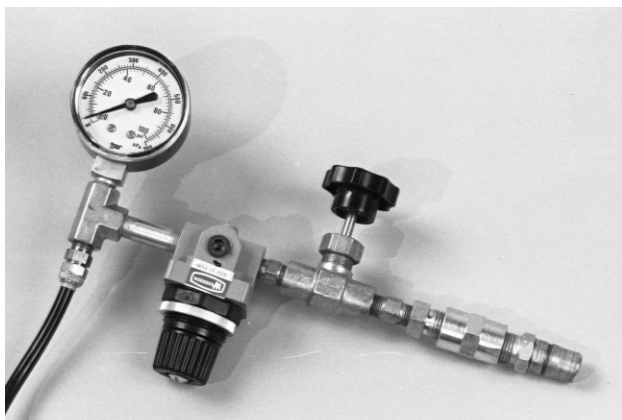
## SPECIFICATIONS

Upper roller oil quantity.....	250 cc (15.25 ci) Gear oil ISO320
Lower roller oil quantity.....	280 cc (17.08 ci) Gear oil ISO320

## SPECIAL TORQUE SETTINGS

See Section 1002.

## SPECIAL TOOLS

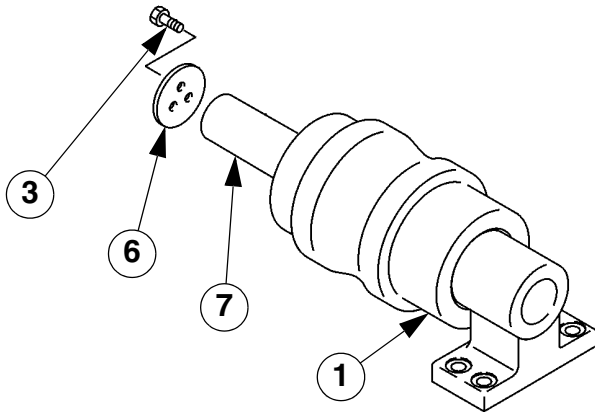


B407320M

Use CAS 1450 and CAS 1682 for the leak checks shown below.

1. 10 T capacity supports
2. Micrometer gauges
3. Torque spanner 700 Nm
4. Jack 5 T
5. Roller pump
6. Loctite 262

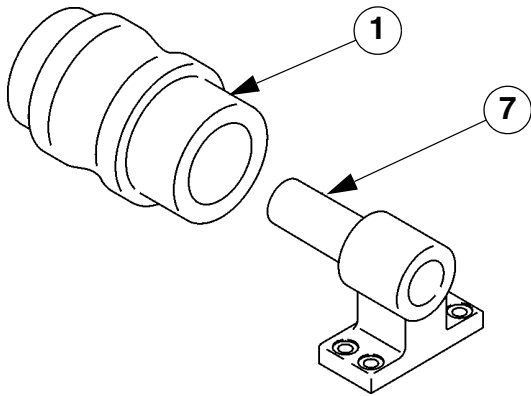
**STEP 3**



CS02B507

Secure the upper roller in a vice. Remove the three screws (3) holding the thrust plate (6). Remove the thrust plate (6).

**STEP 4**



CS02B508

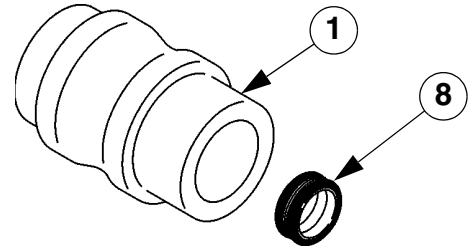
Pull the upper roller (1) from the shaft (7).

**NOTE:** Carry out step 5 only if inspection reveals that the shaft (7) needs to be replaced.

**STEP 5**

Using a press, remove the shaft (7) from the bracket (11). Be careful not to damage the seal bore in the bracket.

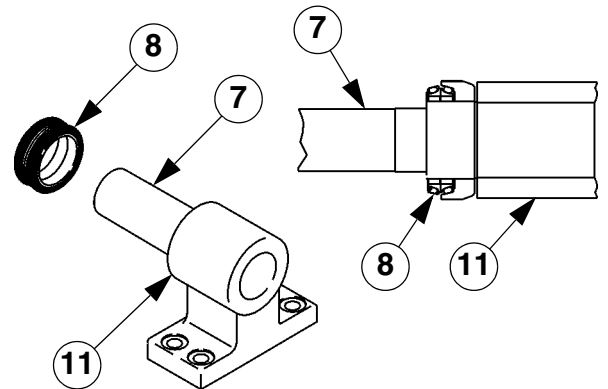
**STEP 6**



CS02B509

Remove and discard the face seal (8) from the upper roller (1) using a screwdriver or other suitable tool. Be careful not to damage the seal bore in the upper roller. Scrap the face seal.

**STEP 7**



CS02B510

Remove and scrap the face seal (8) from the bracket (11) using a screwdriver or other suitable tool. Be careful not to damage the seal bore in the bracket.

# Section

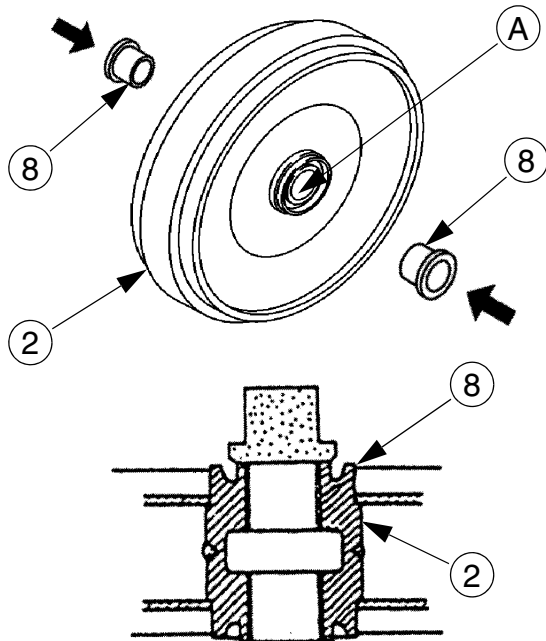
# 5005

## IDLER WHEEL AND TENSION SHOCK ABSORBER

5005

# Assembly

## STEP 1

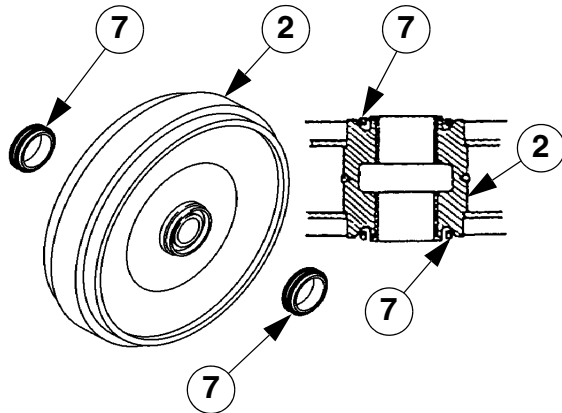


CS02B524

A. Clean the inside

Carefully install the bushings (8) in the idler wheel using a press and a suitable rod.

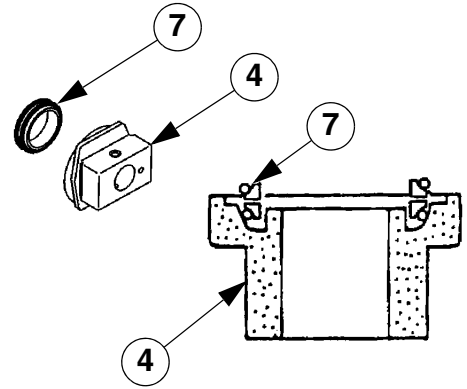
## STEP 2



CS02B522

Install an O-ring and a face seal metal bushing in the idler wheel bore (2). Apply clean oil to the face seal lips. Repeat this step to install the face seal on the other side of the idler wheel.

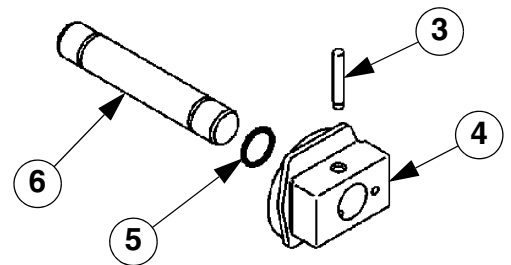
## STEP 3



CS02B521

Install the remaining O-rings and remaining face seal (7) metal bushing in the slide seal bore (4). Apply clean oil copiously to the face seals.

## STEP 4



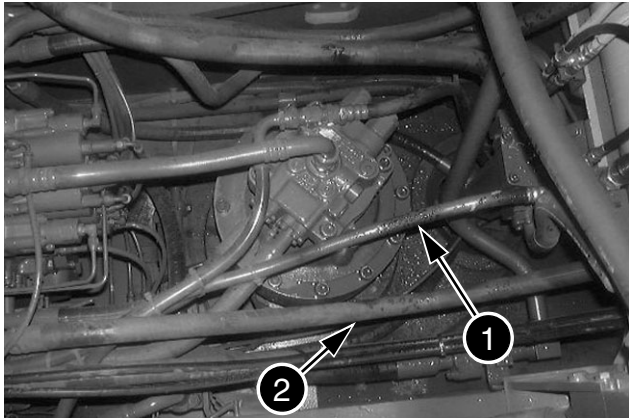
CS02B520

Lubricate the O-rings (5) with clean grease. Install an O-ring on the shaft (6), then install the shaft in the hub (4). Secure the slide and the shaft with a retainer pin (3).

# **Section**

# **6001**

## **REMOVAL AND INSTALLATION OF THE TRAVEL-MOTOR REDUCTION GEAR ASSEMBLY**

**STEP 15**

CD02B034

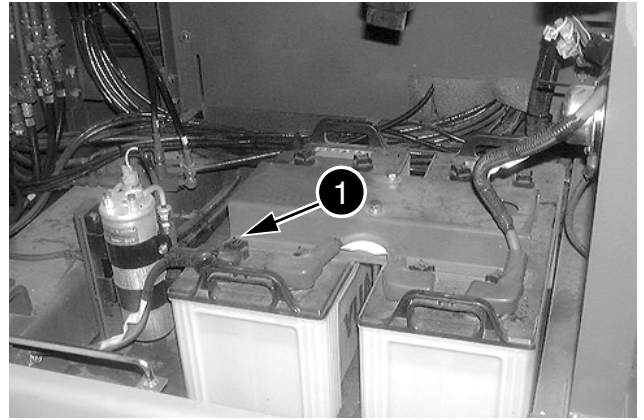
Remove the plugs and connect the hoses (1) and (2).

**STEP 16**

Refer to the removal of the hydraulic swing motor and carry out step 8 in the reverse order.

**STEP 17**

Stop and disconnect the vacuum pump from the hydraulic reservoir (see Section 8000).

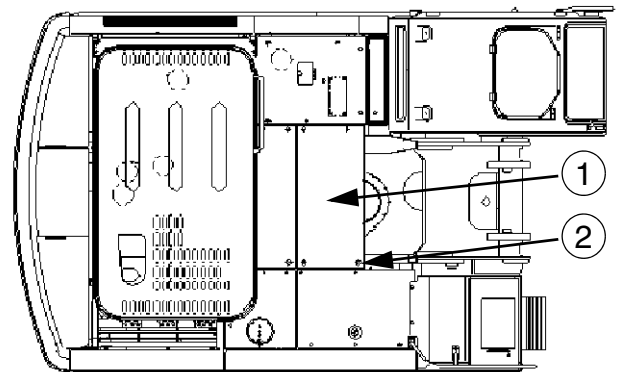
**STEP 18**

CD01K071

Connect the earth cable (1) to the battery.

**STEP 19**

See Section 8001 and adjust the swing motor secondary relief valves.

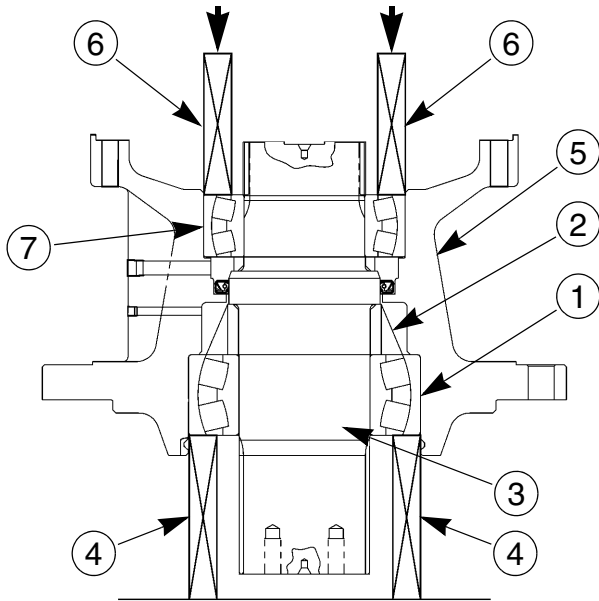
**STEP 20**

CS02B555

Install the upper panel (1) using retaining screws (2).

**NOTE:** Before operating the machine, start the engine, check the system for leaks and check the fluid level in the hydraulic reservoir, top up if necessary.

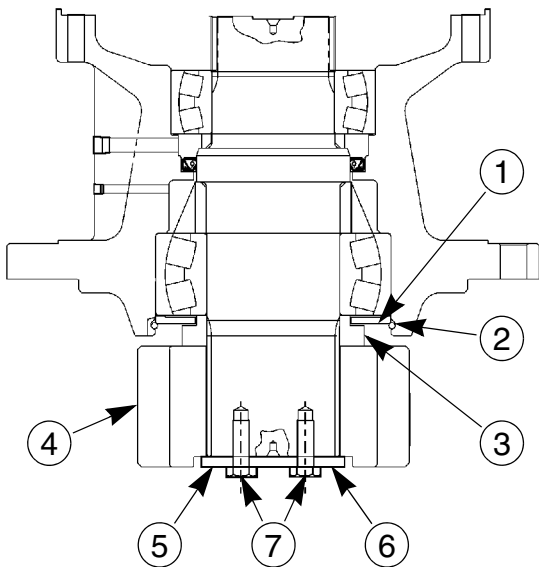
**STEP 8**



C102B505

Coat the roller bearings (1) with 800 grams of No. 2 EP lithium grease (2). Place the shaft assembled (3) on the shims (4) under a press. Position the housing (5) equipped with the bearing and the lip seal on the shaft (3). Position the shims (6) on the bearing (7). Assemble the housing using the press (booms).

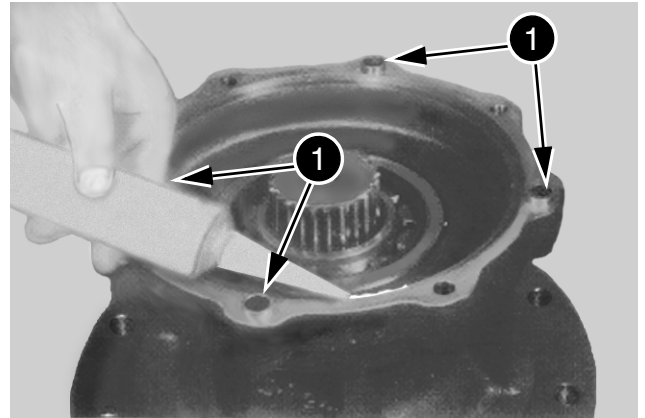
**STEP 9**



C102B506

Assemble the plate (1). Assemble the snap ring (2) with a gap of about 30 mm with respect to the notch on the housing. Install the spacer (3). Lubricate and assemble the pinion (4). Assemble the stop plate (5). Install the brake plate (6), assemble and tighten the screws (7). Bend the corners of the brake plate (6) on the screw heads (7).

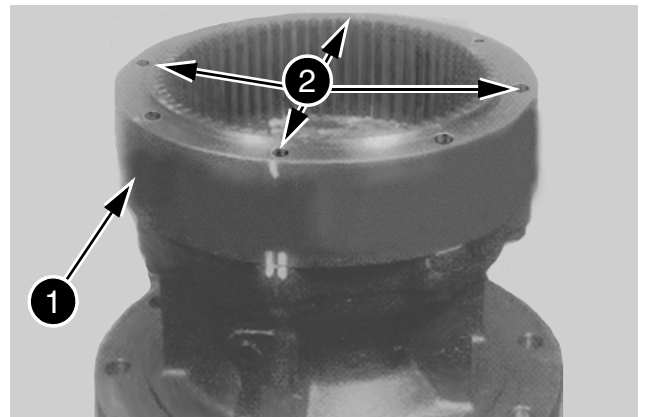
**STEP 10**



JD00469A

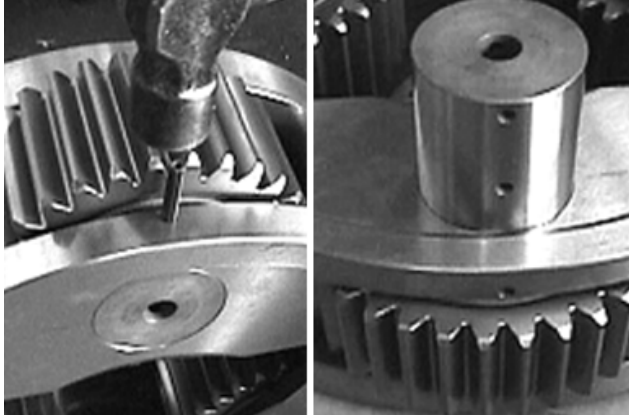
Degrease the mating surfaces of the gear housing, ring gear, and the four dowel pins. Install the four dowel pins (1) into the gear housing. Apply Loctite 504 liquid packing to the mating surfaces.

**STEP 11**



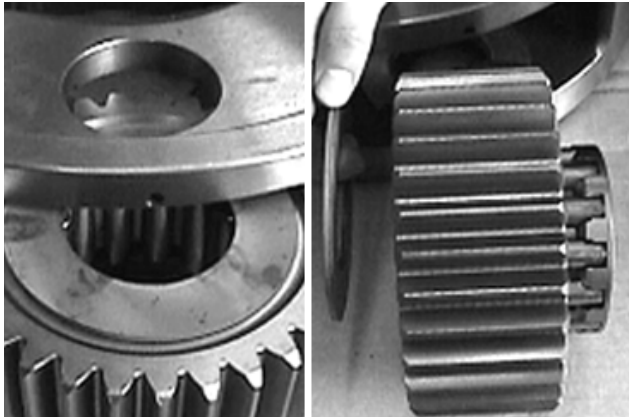
JD00470A

Install the ring gear (1) ensuring the alignment marks are aligned. Assemble four screws (2) in opposition to hold the ring gear (1).

**STEP 17**

CD02B018

Push the spring pin (15) into the carrier pin (12).  
Remove carrier pin (12) from the carrier (11).

**STEP 18**

CD02B019

Remove the thrust washer (16), planetary gear (14)  
and needle bearing (13).  
Pull out the spring pin (15) temporarily from the car-  
rier pin (12).  
Always replace three of them together in pairs when  
changing carrier pins (12) or planetary gear (14).

**Inspection**

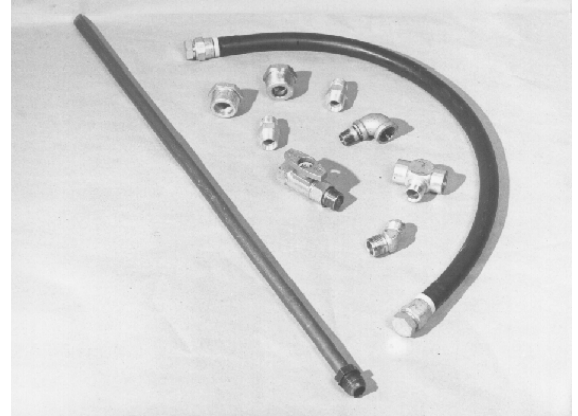
1. Thrust washers  
Inspect if there is any seizure, abnormal wear,  
uneven wear, or other.  
Check that the wear is within allowable values.
2. Gears  
Check for pitching and seizure on the face of  
tooth.  
Check the colour on the root of tooth to find out  
cracks.
3. Bearing  
Make sure that there are no noises or engage-  
ment by manually rotating the bearing.
4. Floating seal  
Check if there is any damage on the sliding faces  
of O-rings.

# SPECIAL TOOLS



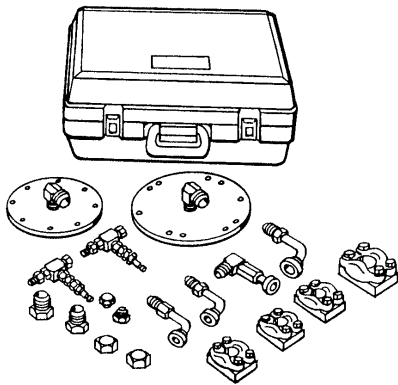
CAS 10162A Portable filter

806127



CAS 10508 Kit for unions

806128



CAS 30038 Set of unions for pressure test and hydraulic flow

CS99B532



CAS 10193 Kit for vacuum pump

M1325

Travel drift ..... 23

Not possible to select 2nd travel speed ..... 24

No swing or slow swing ..... 25

With the excavator on a slope, the swing brake does not hold ..... 25

No movement on any function ..... 26

Lack of power or speed on one of the attachment movements ..... 26

Not possible to select cushion control ..... 27

The boom or the dipper does not lower ..... 27


PROCEDURE FOR CHANGING OPERATION TYPE ..... 28

ISO type ..... 28

Old Sumitomo type ..... 28

Old Mitsubishi type ..... 29

Old Kobelco type ..... 29

 **WARNING:** *This symbol is used in this manual to indicate important safety messages. Whenever you see this symbol, carefully read the message which follows. Your safety depends on it.*

## Main pilot system relief (H)

### Test

1. Connect a 0-1450 psi pressure gauge to pressure test point M3.
2. With the engine at full speed, select mode "S".
3. Move the pilot cancellation lever to its low position.
4. With the attachment, swing and travel controls in neutral, read the value on the pressure gauge:  
**The value should be 551 - 580 psi.**

### Adjustment

1. Loosen the lock nut and turn the valve adjusting screw (H) until 551 - 580 psi is reached.
2. Tighten the lock nut while holding the adjusting screw in position.
3. When the adjusting screw has been tightened, check the pressure again and make sure there are no leaks.

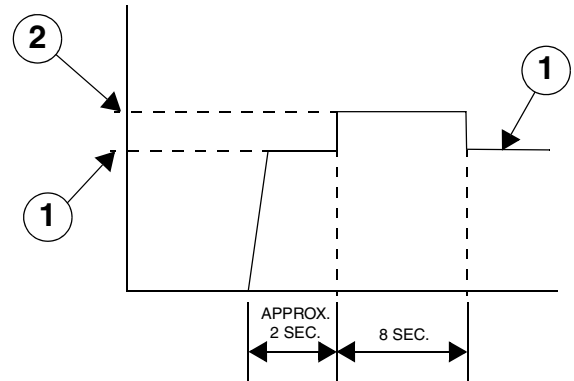
## Checking the pilot accumulator

1. Raise the boom completely and extend the dipper.
2. Shut down the engine, with the starter key switch on "ON".
3. Operate the boom lowering or dipper retracting control several times consecutively.
4. The pressure in the accumulator should enable the boom lowering or dipper retracting function to be performed about six times.

## Main relief (A)

### Test

1. Display the "CHK1" monitor display.
2. With the engine at full speed, select mode "S".
3. Operate and hold in position the dipper retracting control (against cylinder stops).
4. Read the pressure on the monitor display:



1. Standard pressure
2. Power boost

When the dipper cylinder is against the stops, the pressure is the standard value for 2 seconds, then at the higher pressure - 2-stage relief value for 8 seconds before falling back to standard pressure.

Pump	Standard pressure	2-stage relief level
P1-P2	4931 - 5018 psi	5337 - 5482 psi

**NOTE:** To read the higher pressure - 2-stage relief level again, the control lever should be released, then operated against the cylinder stops.

## TROUBLESHOOTING

### Travel drift

(Pressures P1 and P2 correct)

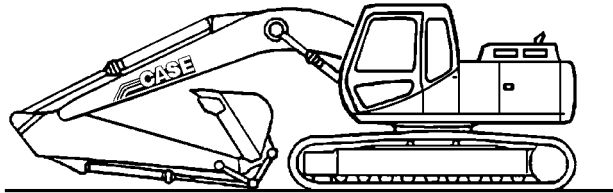
No.	Tests	Results	Repairs
1	With the tracks lifted, check the swing speed at the sprockets	Difference in speed between the two sprockets	Check travel motor leaks (No. 4)
2	Check pressures P1 and P2 during travel	The pressure difference between P1 and P2 is greater than 435 psi	Check the negative pressure (N) of the pump (No. 3)
3	Check the negative pressure (N) of the pump	Pressure above 87 psi	Check the main relief: Adjust or change
			Check the pump regulator or body that is at fault: Adjust or change
		Pressure below 87 psi	Check the travel spool pilot pressure on the side that is at fault
		Pressure below 435 psi Check the operation of the control pedal spool, replace or repair	
		Pressure above 435 psi Check the travel spool (sticking, scratches ...)	
4	Check the travel motors for leaks	Higher than 3.6 gallons	Replace or repair the travel motor
		Lower than 3.6 gallons	Check the travel pressure without load (with track raised)
			Normal pressure: Replace the central seal
		Higher than normal pressure: Drain the reduction gear and check if there is any contamination (metal particles). Replace or repair the travel reduction gear	

## HYDRAULIC RESERVOIR

### Removal

**NOTE:** *The numbers within brackets refer to the figures on pages 5 and 6.*

#### STEP 1



Park the machine on hard, flat ground. Lower the attachment to the ground. JS00163A

#### STEP 2

Release pressure in the hydraulic system and in the hydraulic reservoir (see Section 8000).

#### STEP 3

Attach a "DO NOT OPERATE" tag to the ignition key in the cab.

#### STEP 4

Remove the screws and the access panels under the hydraulic reservoir (1).

#### STEP 5

Using a container of suitable capacity, drain the hydraulic reservoir (1), by removing the plug (2).

#### STEP 6

Remove the screws (4) on top and inside the front boot, then remove the protective housing (3).

#### STEP 7

Remove the screws (5) and the protective plate (6) on top of the hydraulic reservoir (1).

#### STEP 8

Remove the screws (7) and the protective plate (8) on top of the control valve.

#### STEP 9

Loosen the screws (9) located under the machine. Open the side door on the right of the machine and remove the two screws (10). Remove the screw (10) located on the right of the fuel reservoir. Remove the protective plate of the reservoir (11).

#### STEP 10

Loosen the circlips (12) and disconnect the hose (13) under the hydraulic reservoir.

#### STEP 11

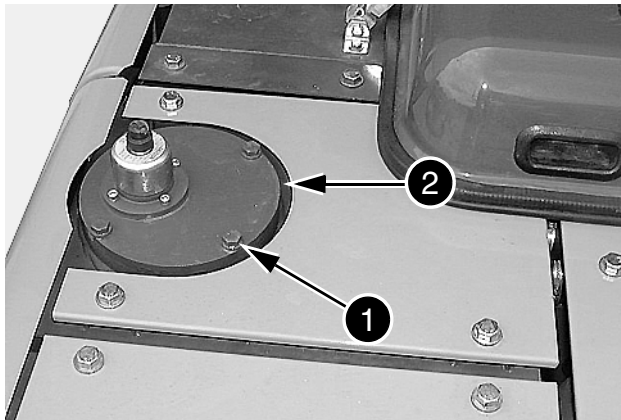
Attach identification tags to the output hoses. Disconnect the hoses.

#### STEP 12

Remove the screws (14) and the retaining shims (15).

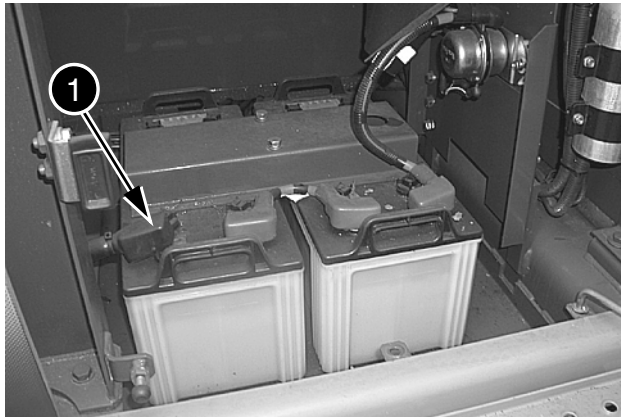
#### STEP 13

Using a hoist, remove the hydraulic reservoir (1) from the machine.

**STEP 18**

CD00E176

Remove the four screws and washers (1). Remove the cover (2) and the O-ring from on top of the hydraulic reservoir. Scrap the O-ring. Fill the hydraulic reservoir with hydraulic fluid (see Section 1002) up to a level in between the "high" and "low" marks on the visual gauge. Install the lid with a new O-ring, fasten it using four screws and washers (1), tighten the screws to a torque of 2.9 to 4.9 Nm (2.1 to 3.6 lb-ft).

**STEP 19**

CT051063

Connect the ground (-) cable (1) of the battery.

**STEP 20**

**NOTE:** Always drain the air out from the hydraulic pump before starting the engine. If the air has not been drained out, the pump can get damaged. For the procedure, see Section 8000.

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- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below

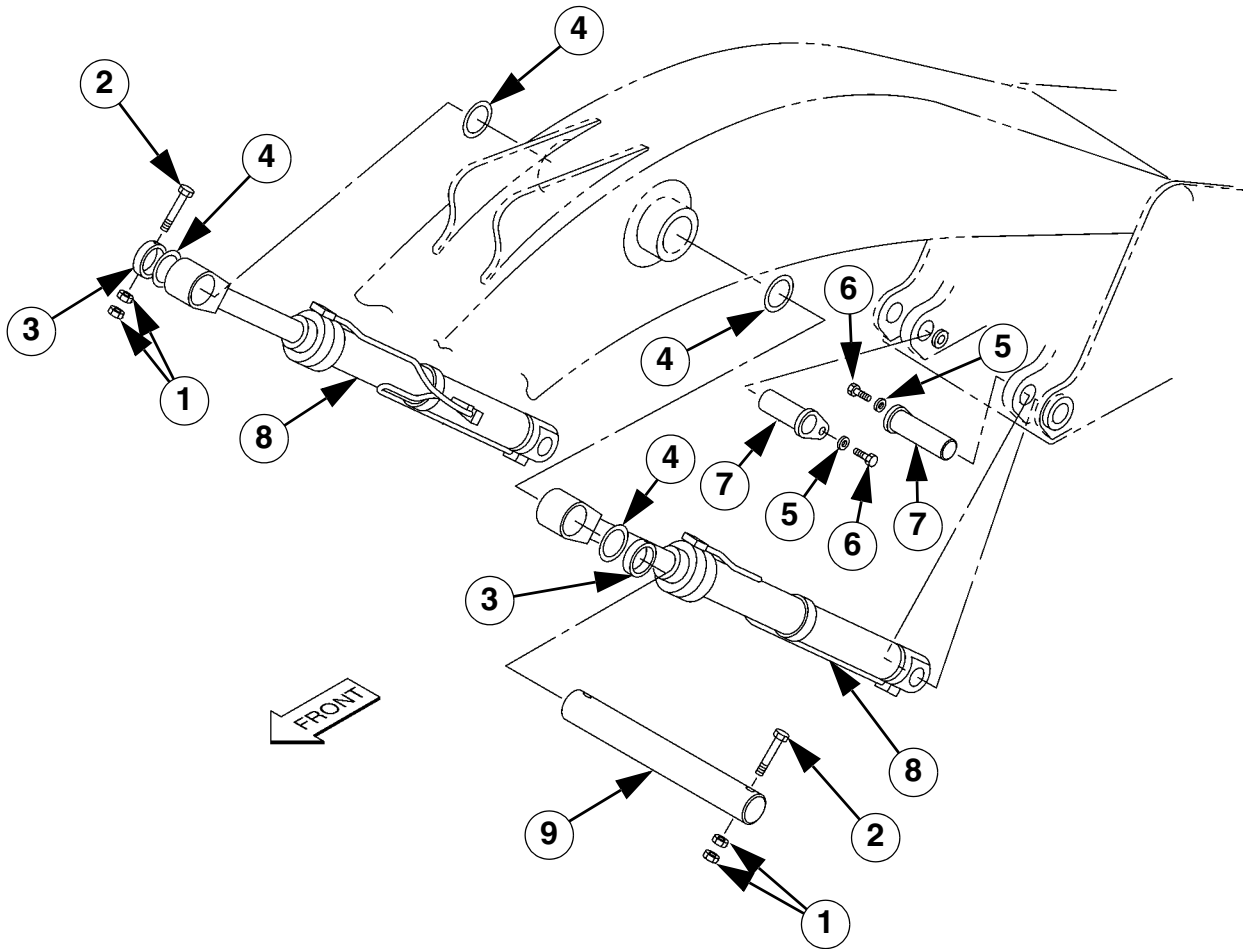


- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

# BOOM CYLINDER

## Description



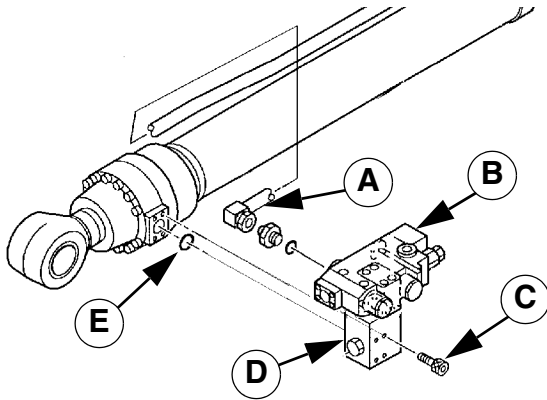
- 1 NUT
- 2 SCREW
- 3 LOCKING BUSHING
- 4 SHIM
- 5 WASHER

- 6 SCREW
- 7 SHAFT
- 8 BOOM CYLINDER
- 9 SHAFT

CS02B563

**STEP 2**

(Only if the machine is equipped with a safety valve)

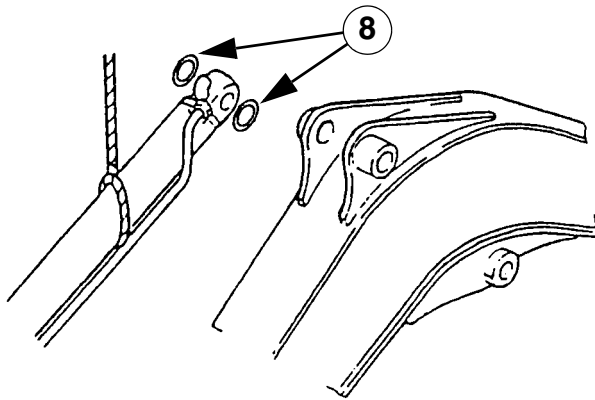


CS00G504

Install a new O-ring (E) on the dipper cylinder and install the safety valve (B) and the base (D) with the screws (C). Connect the pipe (A).

**NOTE:** Lift the cylinder carefully, the cylinder is heavy, its weight has to be balanced with slings during lifting.

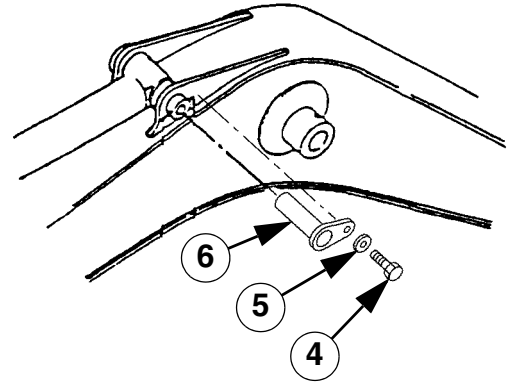
**STEP 3**



JS00602A

Attach a suitable lifting device to the dipper cylinder, lift the dipper cylinder and bring it in position. Align the dipper cylinder mounting ports with the boom brackets and install the shims (8).

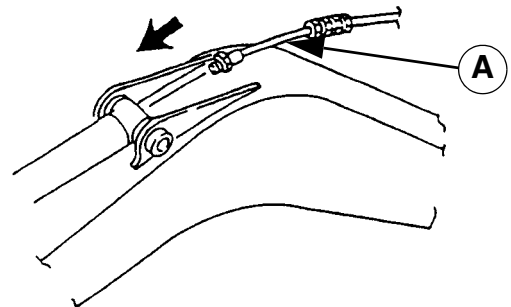
**STEP 4**



CS02B567

Install the shaft (6) using washers (5) and screws (4). Using a set of spacer rings, check that there is a clearance of 0.5 to 3 mm between the mounting bracket and the mounting ring of the cylinder barrel. If necessary, remove the screw, the shaft and add or remove one or more shim(s) (8) as required in order to get the correct clearance. Install the pin and the screw.

**STEP 5**



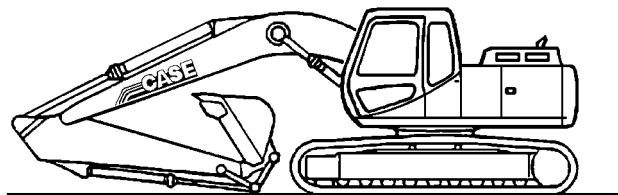
JS00604A

Connect the lubrication hose (A) to the dipper cylinder.

## HYDRAULIC SWIVEL

### Removal and installation

#### STEP 1

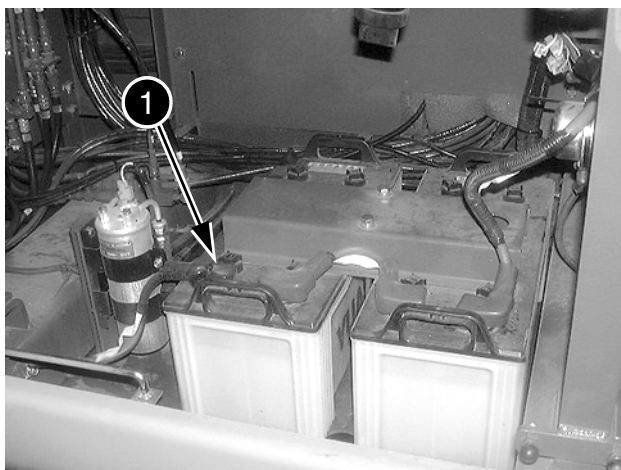


JS00163A  
Park the machine on flat, hard ground. Lower the attachment to the floor.

#### STEP 2

Release pressure in the hydraulic system and release pressure in the hydraulic reservoir (see Section 8000).

#### STEP 3

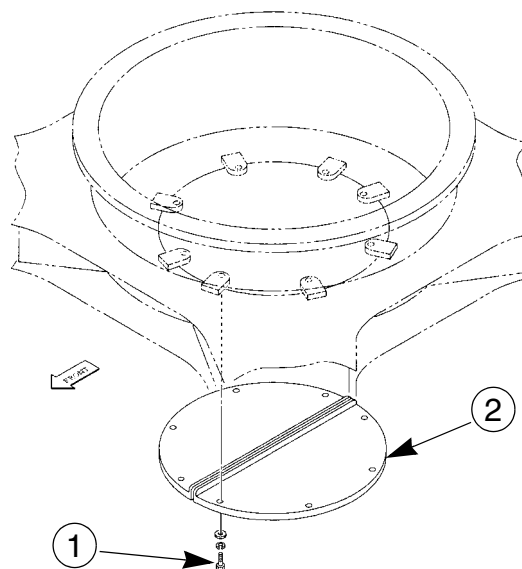


CD01K071  
Disconnect the earth cable (1) from the battery.

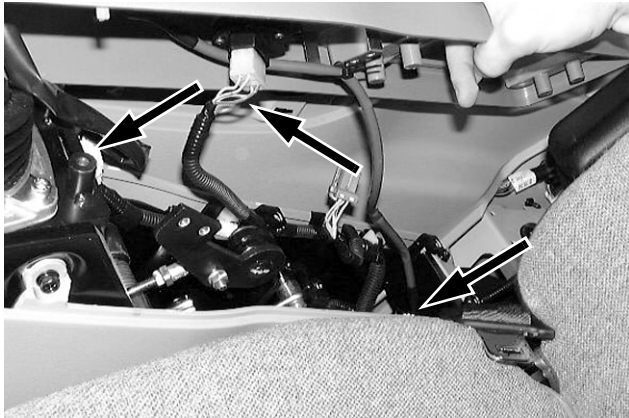
#### STEP 4

To prevent any fluid loss when disconnecting hydraulic lines, connect a vacuum pump to the reservoir (see Section 8000).

#### STEP 5



C100F500  
Remove the retaining hardware (1) from the lower plates (2) then remove the plates.

**STEP 6**

CD00G071

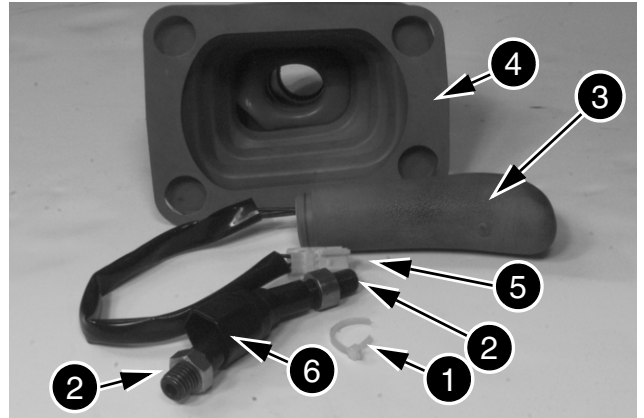
Lift the upper portion of the control arm, label and disconnect the electrical connections.

**STEP 7**

CD00G072

Loosen the locknut, unscrew the control lever and remove the upper portion of the control arm.

**NOTE:** When installing, tighten the locknut to a torque of 41 Nm (30.2 lb-ft).

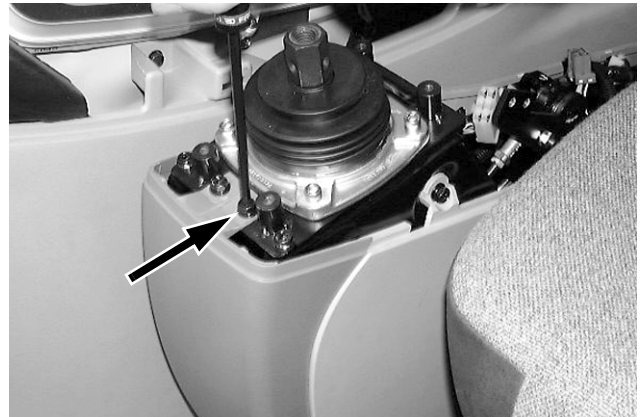
**STEP 8**

JD00764A

- 1 CLIP
- 2 NUT
- 3 HANDLE
- 4 GROMMET
- 5 CONNECTOR
- 6 LEVER

Cut the clip (1) and discard it. Loosen the nut (2). Unscrew and remove the handle (3) and the connector (5) from the lever (6). Remove the nut (2) to remove the grommet (4).

**NOTE:** Replace the grommet if it is damaged. The grommet protects the unions from all types of contamination.

**STEP 9**

CD00G073

Loosen and remove the two upper retaining screws as well as the two lower retaining screws from the front portion of the control arm.

# Section

# 8010

## MAIN HYDRAULIC PUMP DISASSEMBLY AND ASSEMBLY

## Description

412 - HEX SCREW C.H.C	651 - SLEEVE
413 - HEX SCREW C.H.C	652 - SPOOL
436 - HEX SCREW C.H.C	653 - SPRING SEAT
438 - HEX SCREW C.H.C	654 - RETURN SPRING
496 - PLUG	655 - SET SPRING
601 - CASING	656 - BLOCK COVER
611 - FEEDBACK LEVER	708 - O-RING
612 - LEVER (1)	722 - O-RING
613 - LEVER (2)	724 - O-RING
614 - CENTER PLUG	725 - O-RING
615 - ADJUSTING PLUG	728 - O-RING
621 - COMPENSATOR PISTON	730 - O-RING
622 - PISTON CASE	732 - O-RING
623 - COMPENSATOR ROD	733 - O-RING
624 - SPRING SEAT (C)	734 - O-RING
625 - OUTER SPRING	735 - O-RING
626 - INNER SPRING	755 - O-RING
627 - ADJUSTING STEM (C)	756 - O-RING
628 - ADJUSTING SCREW (C)	763 - O-RING
629 - COVER (C)	801 - NUT
630 - LOCK NUT	814 - SNAP RING
631 - PF SLEEVE	836 - SNAP RING
641 - PILOT COVER	858 - SNAP RING
643 - PILOT PISTON	874 - PIN
644 - SPRING SEAT (Q)	875 - PIN
645 - ADJUSTING STEM (Q)	876 - PIN
646 - PILOT SPRING	887 - PIN
	897 - PIN
	898 - PIN
	924 - SET SCREW
	925 - ADJUSTING SCREW (Q)

## Regulator assembly instructions

Assembly is done in the reverse order of disassembly, taking into account the following instructions:

- Clean the components with detergent and dry them with compressed air.
- Tighten the screws and plugs to the recommended torque.
- Coat the moving parts with clean oil before assembling them.
- Install new seals and O-rings.

### Assembly

Press the pin (876) into the casing (601).

Press the pin (875) into the lever (1) (612).

Install the compensating rod (623) in the casing (601).

Install the lever (1) (612) on the pin (875) by engaging the pin (875) in the groove of the compensating rod (623).

Install the snap ring (836) on the sleeve (651), grease and install the spool (652) in the sleeve (651), install the assembly in the casing (601) at port (A) by adjusting the spool (652). Check that the sleeve and the spool are sliding freely.

Install the control feedback lever (611) complete with its pin (897), maintaining the orientation (reference mark made during disassembly), align the bores of the feedback lever (611) and the spool (652) and install the pin (874).

Install the pilot piston (643) at (C) in the casing (601).

Install the lever (2) (613), engaging the pin (875) in the groove on the pilot piston (643).

Install the center plug (614) complete with the pin (875) in the casing (601). Position the lever (2) (613) correctly so that the pin (875) is engaged in the orifice on the lever (2) (613), then install the snap ring (858).

Install the adjusting plug (615) and the snap ring (858).

Install the return spring (654), the spring seat (653) on the spool (652) and install the snap ring (814).

Install the set spring (655).

Install the compensating piston (621), the piston case (622), the pilot sleeve (631) and the pin (898) at orifice (B).

Install the pilot cover (641) and tighten the hex screws (436).

Install the spring seat (Q) (644), the pilot spring (646) and the adjusting stem (Q) (645) in the housing at (E) (see disassembly).

Install the spring seat (C) (624), the inner spring (626), the outer spring (625) in the housing at (D) (see disassembly).

Install the cover (C) (629) complete with adjusting screws (C) (628), (Q) (925) and set screw (924), the adjusting stem (C) (627), the lock nuts (630) and nut (801).

Install and tighten the retaining hex screws (438).

## SPECIAL TORQUE SETTINGS

### Spool assembly

Screws (D) for spools (2) to (6) and (14) to (17) .....	20 to 22 Nm (14.7 to 16.2 lb-ft)
Screws (22) for the spool (19) .....	19 to 22 Nm (14 to 16.2 lb-ft)

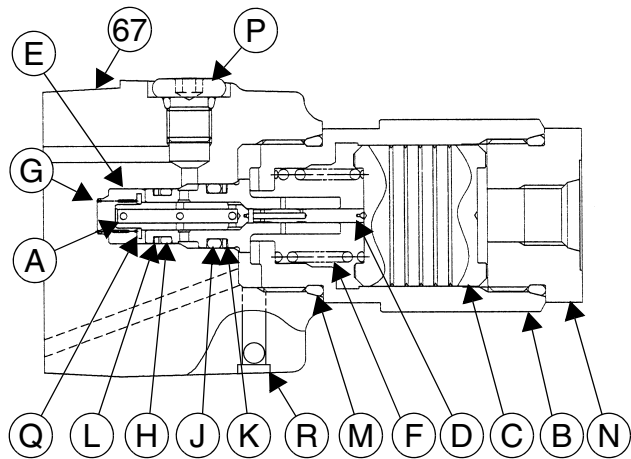
### Load holding valve (67)

Plug (N) and (B) .....	147 to 157 Nm (108.4 to 115.7 lb-ft)
Plug (P) .....	14 to 18 Nm (10.3 to 13.2 lb-ft)
Retaining screw (76) .....	39 to 44 Nm (28.7 to 32.4 lb-ft)

### Control valve assembly

Relief valve (68) .....	78 to 88 Nm (57.5 to 65 lb-ft)
Safety valves (69) .....	78 to 88 Nm (57.5 to 65 lb-ft)
Safety valves (70) .....	103 to 113 Nm (76 to 83.3 lb-ft)
Retaining screws (77) of the control valve sections .....	167 to 177 Nm (123 to 130.5 lb-ft)
Plugs (92) .....	205 to 227 Nm (151 to 167.4 lb-ft)
Plug (46) .....	107 to 117 Nm (79 to 86.2 lb-ft)
Plugs (72) .....	73 to 79 Nm (53.8 to 58.2 lb-ft)
Plugs (87) .....	78 to 88 Nm (57.5 to 65 lb-ft)
Plugs (24) and (60) .....	103 to 113 Nm (76 to 83.3 lb-ft)
Plug (61) .....	39 to 44 Nm (28.7 to 32.4 lb-ft)
Plug (63) .....	14 to 18 Nm (10.3 to 13.2 lb-ft)
Plugs (72) .....	73 to 79 Nm (53.8 to 58.2 lb-ft)
Cap retaining screws (37), (43) and (88) .....	58 to 64 Nm (42.7 to 47.2 lb-ft)
Cap retaining screws (10), (12), (8) and (9) .....	39 to 44 Nm (28.7 to 32.4 lb-ft)
Cap retaining screw (18) .....	8.8 to 10.8 Nm (6.4 to 8 lb-ft)
Plugs (73), (97) and (91) .....	19 to 22 Nm (14 to 16.2 lb-ft)

## Load holding valve (67)



CS01K599

**NOTE:** Be careful when removing components, some parts are subject to spring pressure.

### STEP 1

Loosen and remove the plug (N) and remove the O-ring.

### STEP 2

Remove the piston (C), the spool (D) and the spring (F).

### STEP 3

Loosen and remove the plug (B) and remove the O-ring (M).

### STEP 4

Remove the sleeve (E), the check valve (A) from the load holding valve body (67). Remove the O-rings (H) and (J), the back-up rings (K) and (L) from the periphery of the sleeve (E).

### STEP 5

Remove the spring seat (Q) and the spring (G).

### STEP 6

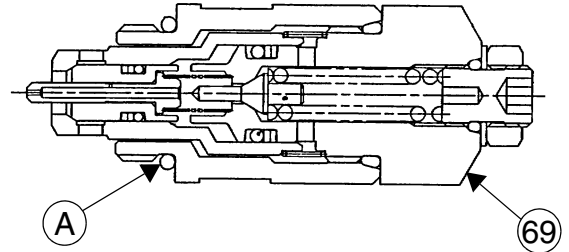
Loosen and remove the plug (P), if this is required.

**NOTE:** The steel ball (R) is a press fit, do not remove it.

## Valves

**NOTE:** Do not operate the valve components, as this will affect the pressure, otherwise see Section 8001 for the valve settings.

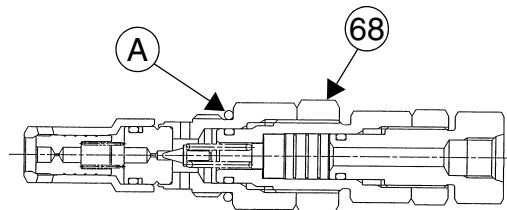
### STEP 1



CS02C563

Loosen and remove the six safety valves (69) from the control valve body. Remove the O-ring (A) from the safety valve body.

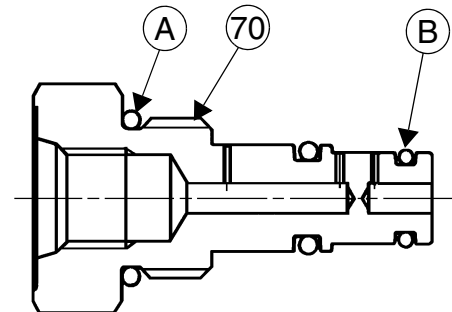
### STEP 2



CS02C560

Loosen and remove the relief valve (68) from the control valve body. Remove and discard the O-ring (A).

### STEP 3



CS01K600

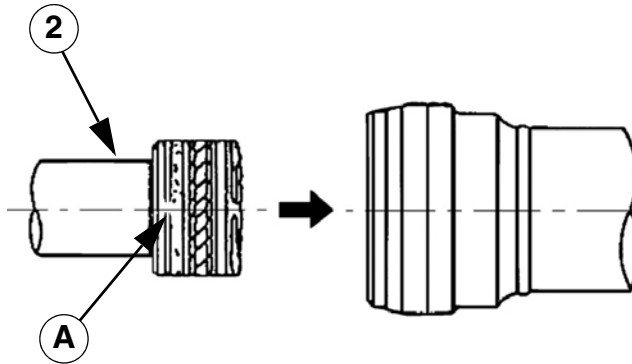
Loosen and remove the two safety valves (70) and remove the O-rings (A) and (B).

# Section 8012

8012

## DISASSEMBLY AND ASSEMBLY OF THE ATTACHMENT CYLINDERS



**STEP 9**

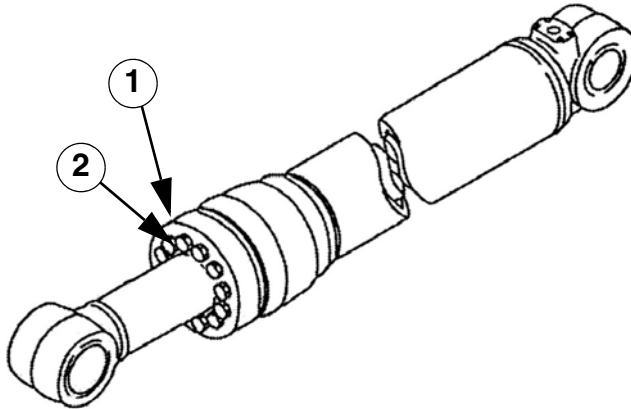
CRPH06B046A01

Install piston rod assembly (2):

Ring groove (grease (G2-L1)).

Set the closed gap of the ring horizontally (on the side) and insert the piston rod assembly, aligning it with the cylinder tube.

**NOTE:** After inserting the piston rod assembly half-way, check that the ring is not damaged or removed, and then insert to the end.

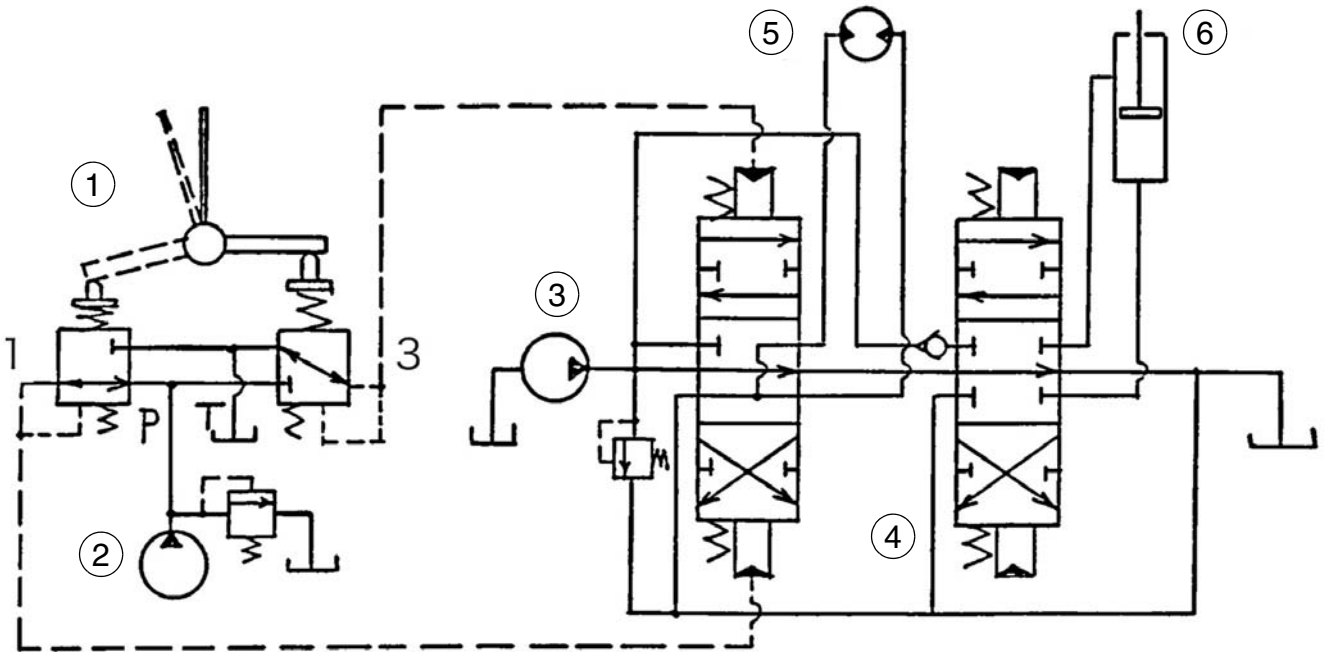
**STEP 10**

CRPH06B008A01

Tighten the mounting bolts (2) of head assembly (1) to the torque specified on page 3.

**Operation**

This section describes the operation of pilot valves based on the Hydraulic Oil Circuit Drawing (Figure 1) and Operation Description Diagrams (Figures 2 through 4). Figure 1 shows a typical usage of the pilot valve.



- 1 PILOT VALVE
- 2 PILOT PUMP
- 3 MAIN PUMP

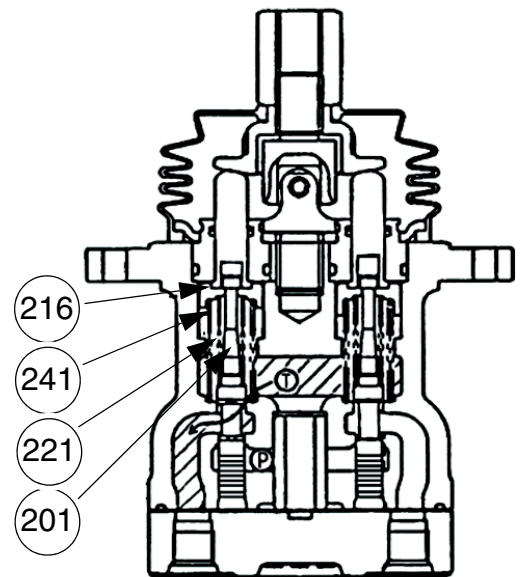
- 4 CONTROL VALVE
- 5 HYDRAULIC MOTOR
- 6 HYDRAULIC CYLINDER

CRPH06B106E

Figure 1. An example of pilot valve use

**When the handle is in neutral**

The force of the spring for setting secondary pressures (241), which determines the output pressure on the pilot valve, is not applied on the spool (201). Therefore, the spool (201) is pushed upward by the return spring (221) (by the spring seat 1 (216)), the output ports (2, 4) are connected with the port T. At this moment, the output pressure is equal to the tank pressure.



000-7-06-01-15B

## TROUBLESHOOTING

It is not easy to find the faulty part. The following table lists some possible problems. As repairs are not easy, refer to the possible causes and countermeasures in the table.

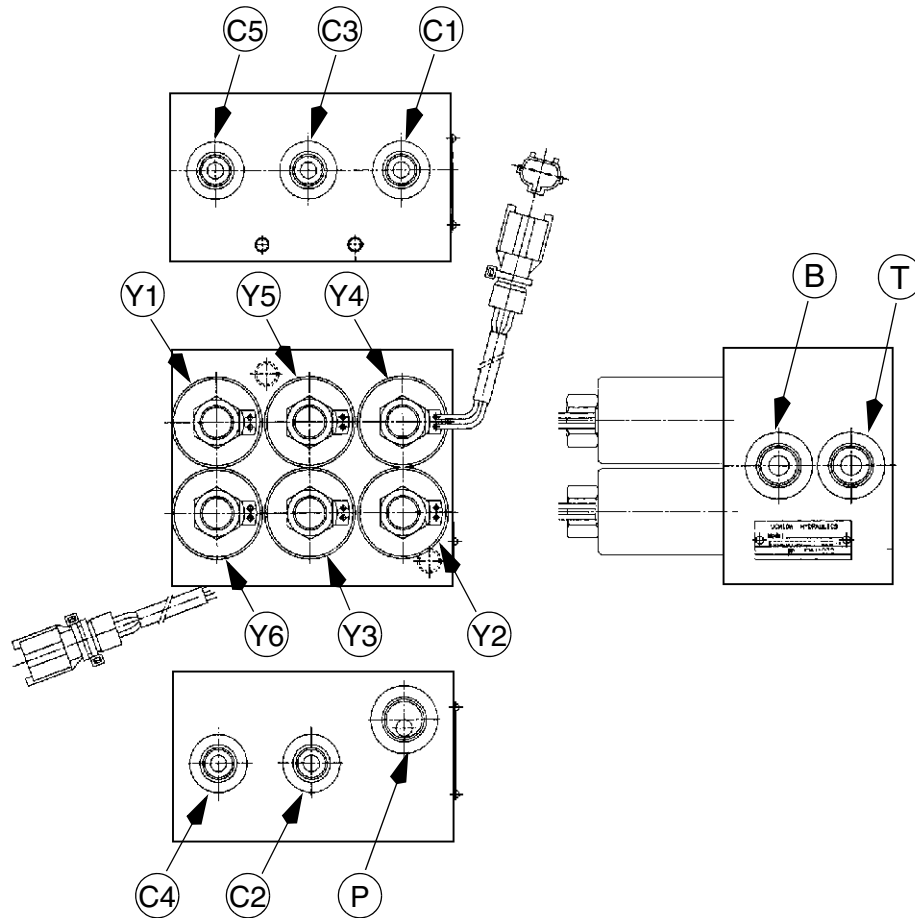
The table below shows general symptoms/possible causes and countermeasures. However, as a machine's trouble is generally caused not by a single faulty component but by other related components as well, it may be necessary to apply measures other than those listed in the Table.

The table shown below does not necessarily include all possible causes and remedies. Therefore, the technician in charge of repairs must further investigate problems and their causes as necessary.

Problem	Causes	Countermeasures
Secondary pressure doesnot rise.	1.Lower primary pressure 2.Breakage and fatigue of secondary pressure spring (241) 3.Abnormally large gap between spool (201) and casing (101) 4.Loose handle section	Ensure given primary pressure Replace with new one Replace as a remote valve complete assembly Disassemble/assemble and replace handle section
Unstable secondary pressure	1.Engaged sliding part 2.Fluctuations in tank line pressure 3.Entrapped air in piping	Repair engaged part Direct return to oil tank Bleed air by several operations
High secondary pressure	1.High tank line pressure 2.Engaged sliding part	Direct return to oil tank Repair engaged part

## SIX SOLENOID VALVES BLOCK

### Identifying the ports and the solenoid valves



- C1 HIGH SPEED CONTROL
- C2 SWING BRAKE CONTROL
- C3 POWER BOOST CONTROL
- C4 CUSHION CANCELLATION CONTROL
- C5 SWING CANCELLATION CONTROL
- P SIX SOLENOID VALVES BLOCK POWER SUPPLY
- B MACHINE CONTROL POWER SUPPLY
- T RETURN TO THE RESERVOIR

- CS01C519
- Y1 SWING CANCELLATION SOLENOID VALVE (GREEN RING)
  - Y2 PILOT PRESSURE SOLENOID VALVE
  - Y3 SWING BRAKE SOLENOID VALVE (PINK RING)
  - Y4 HIGH SPEED TRAVEL SOLENOID VALVE (RED RING)
  - Y5 POWER BOOST SOLENOID VALVE (YELLOW RING)
  - Y6 CUSHION CANCELLATION SOLENOID VALVE (LIGHT GREEN RING)

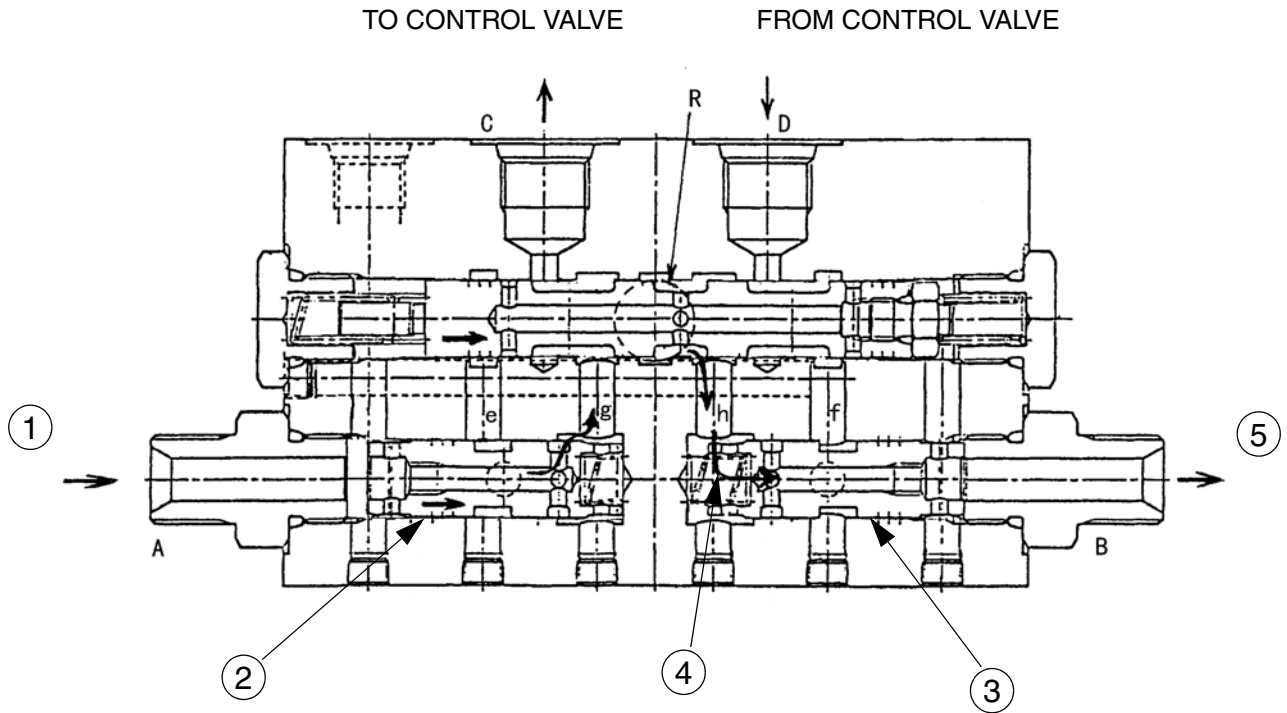
## OPERATIONAL DESCRIPTION

### Changed over to "SOFT"

#### Lever in Neutral

(1) The heat oil separated from the oil cooler line enters the cushion valve Port R.

(2) Then, the oil passes the reverse notch spool and goes through passages e and f. After passing the outer circumference of each cushion spool, the oil returns to the hydraulic oil tank via Port T.



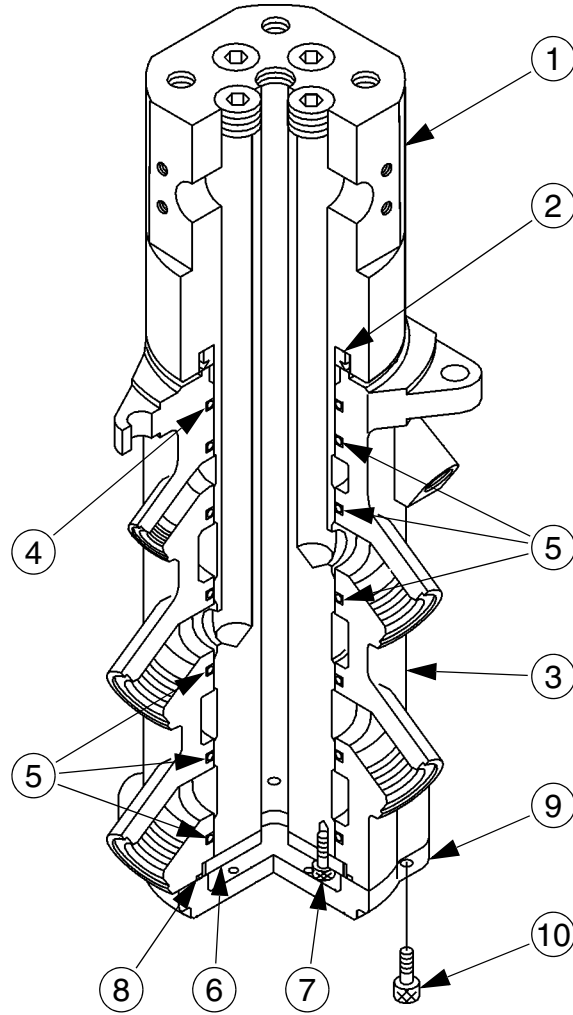
CRPH06C008F

- 1 FROM REMOTE CONTROL VALVE
- 2 CUSHION SPOOL
- 3 CUSHION SPOOL

- 4 THROTTLE
- 5 TO REMOTE CONTROL VALVE

# HYDRAULIC SWIVEL

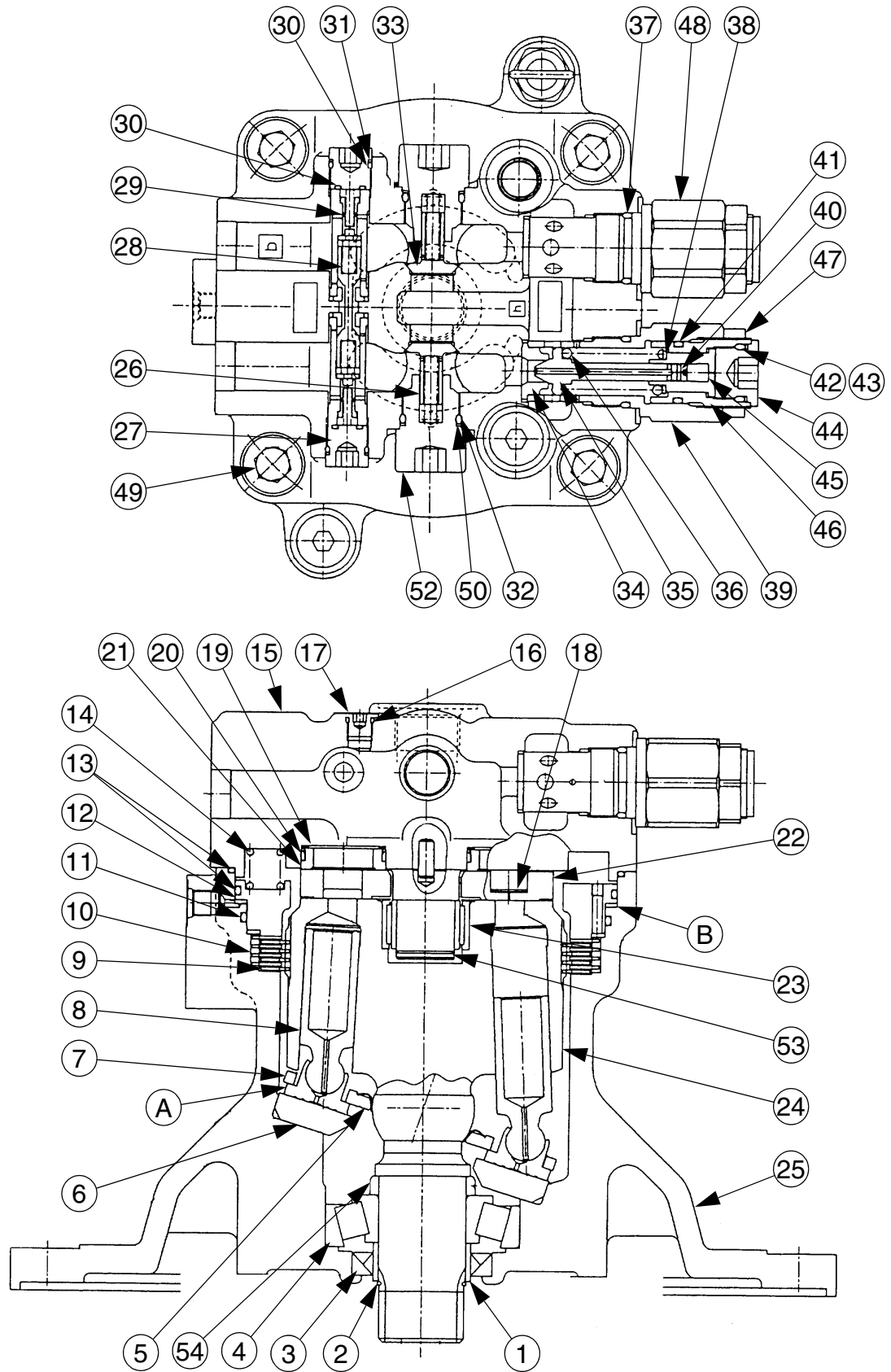
## Description

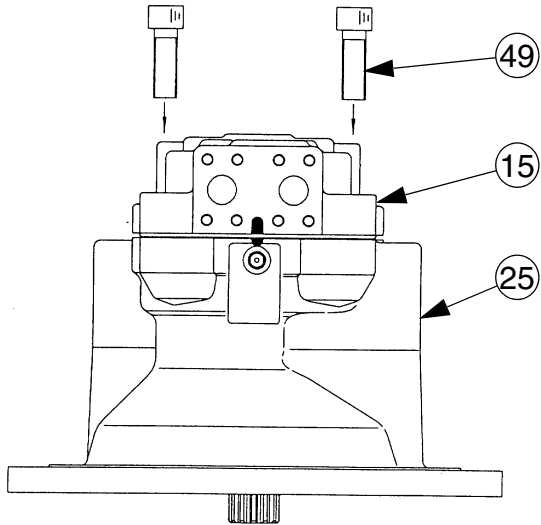


- 1 PIVOT
- 2 "V" SEAL
- 3 BUSHING
- 4 O-RING
- 5 SEALING RING

- 6 THRUST PLATE
- 7 SCREW
- 8 O-RING
- 9 COVER
- 10 SCREW

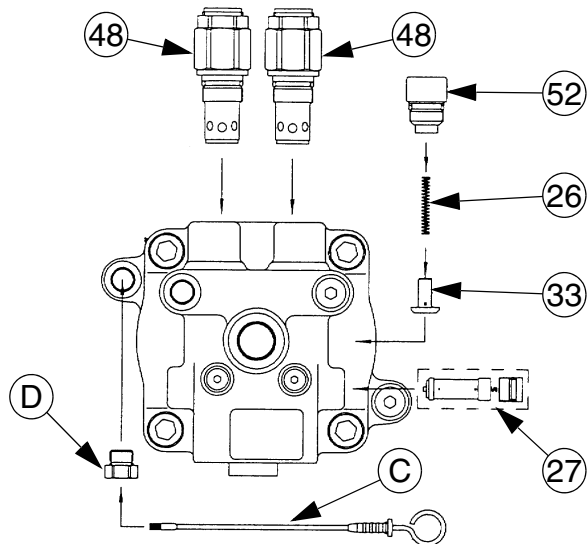
CS02B552



**STEP 19**

CS02C550

Install the four cover retaining screws (49) and tighten to a torque of 392 Nm (289 lb-ft).

**STEP 20**

CS02C551

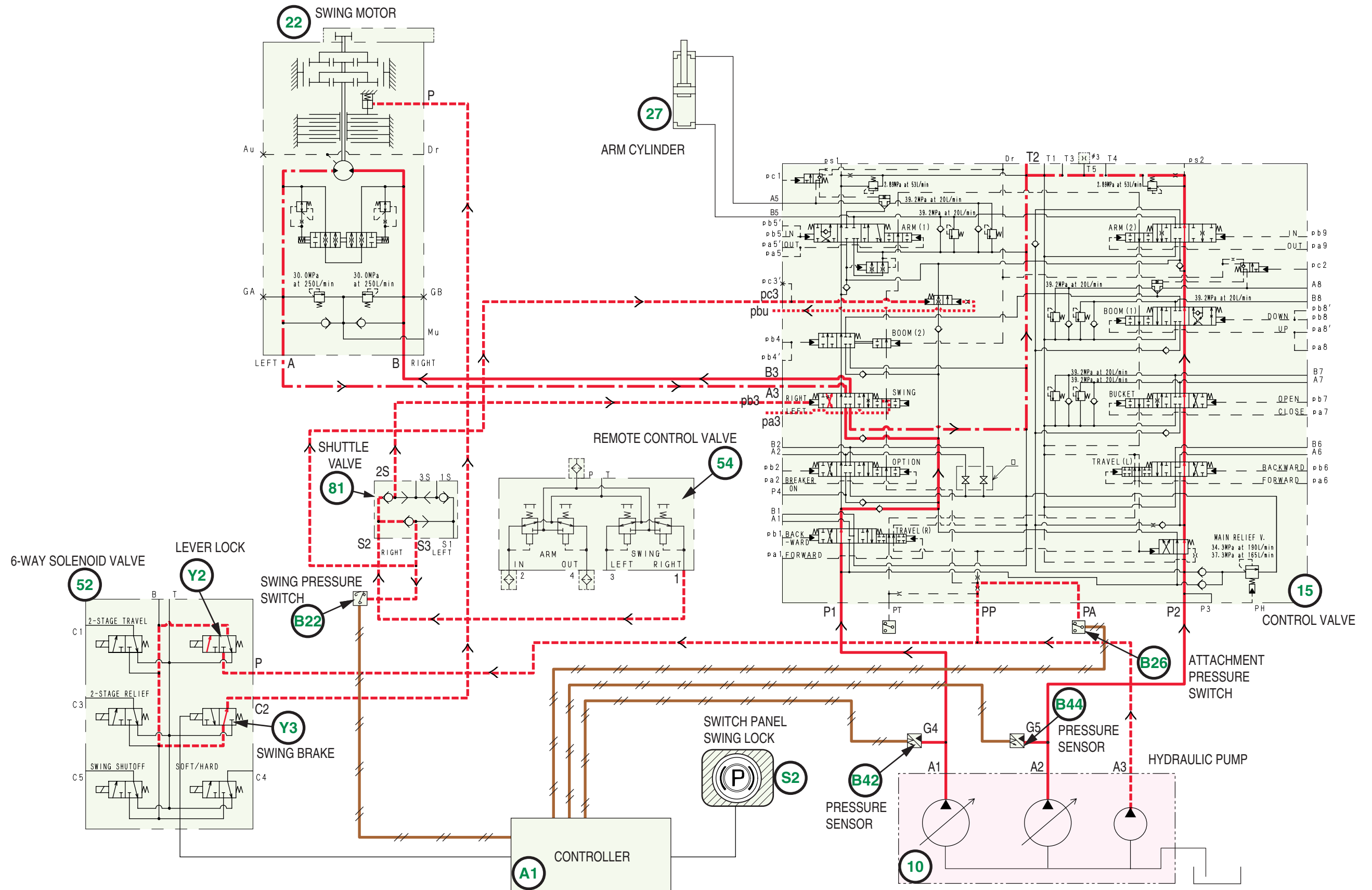
Remove the oil level dipstick (C) and dipstick tube (D). Install the relief valve assemblies (48) of the swing motor.

Install the by-pass valve assemblies (27), as well as the plugs (52), the springs (26) and the non-return check valve (33).

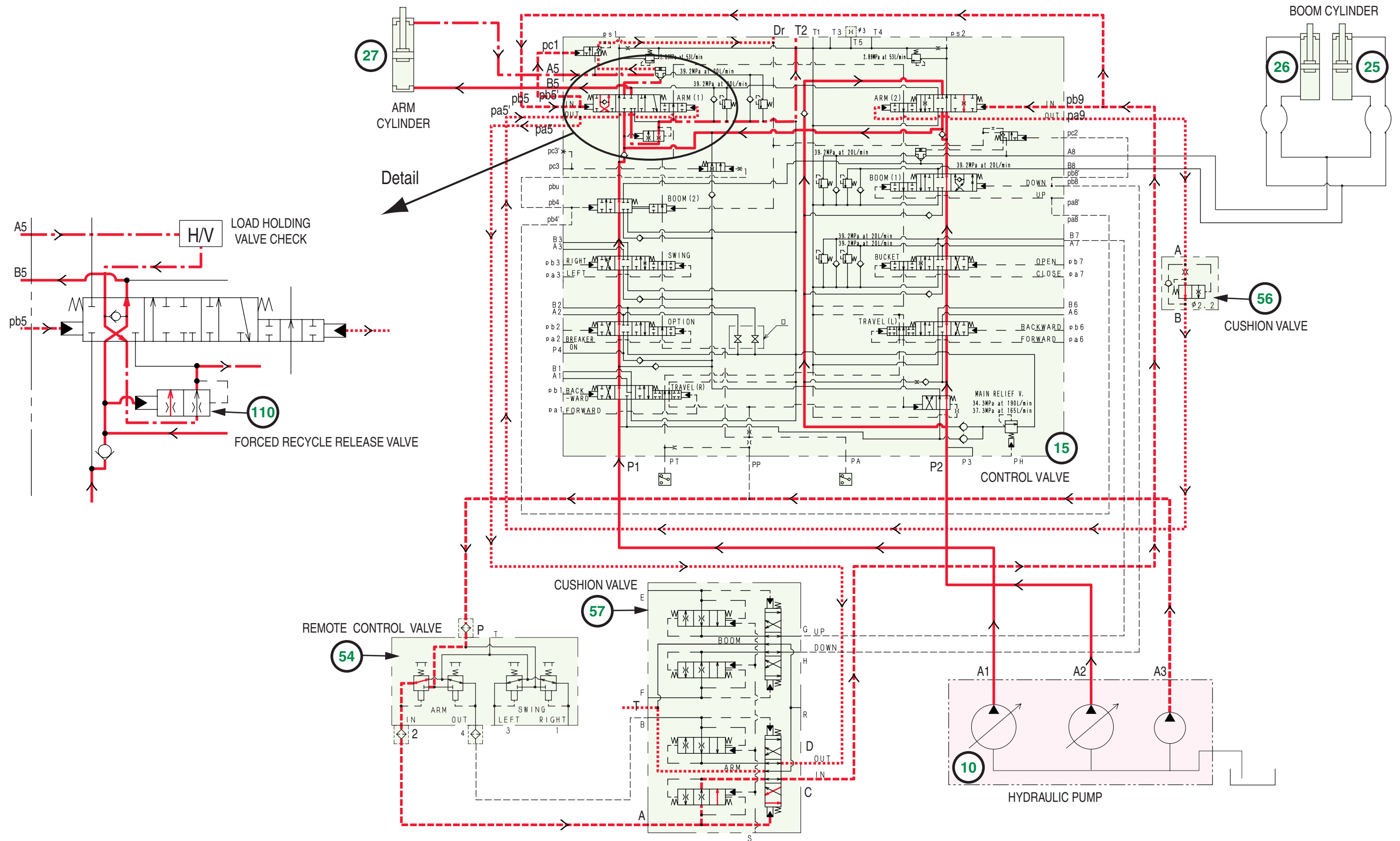
Install new O-rings on each component.

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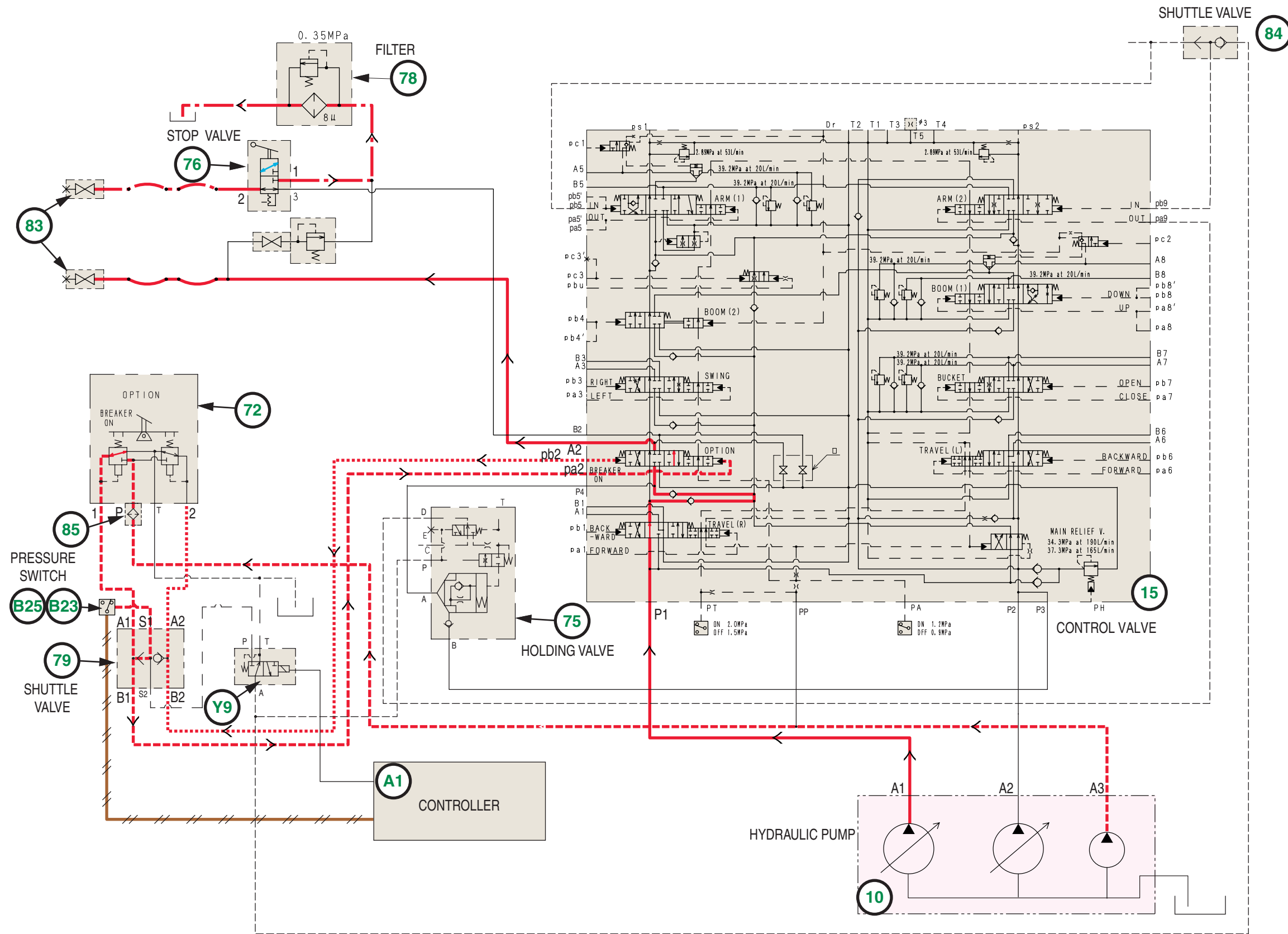
### Swing Parking Circuit (Brake Released)



# Arm-In Circuit



### Combined Circuit (Breaker Circuit)



## Disassembly

### General precautions

1. Hydraulic devices are made of precision components in general and structurally have small tolerances. Disassembling/assembling must be done in a clean area free of dust. Tools and cleaning oil must also be clean and must be handled with care.
2. If devices are removed from the main machine, first clean the surrounding areas of the port, then plug the ports and handle with utmost care to keep dust/water from entering the inside.

3. Review the sectional drawings prior to disassembling and obtain the parts required according to the specific purpose/scope of the job. Do not reuse seals and O-rings that have been disassembled. Also, some parts must be replaced as subassembly because those parts are not supplied separately.
4. Pistons and cylinders, when they are brand new, do not need to be assembled in a particular order. When disassembling, however, they need to be marked if they are to be used again. Before removing the pistons from the cylinders, mark them all so they can be put together in the exact order they were assembled in originally.



**WARNING:** Keep hands and fingers away from small gaps or crevices among parts. Lifted loads also require extra attention since they may fall on your feet.

**NOTE:** the numbers in brackets refer to the drawing on page 3.

### STEP 1

Remove the plug (29) and O-ring (30).

### STEP 2

Remove spring (28), spring holder (27) and spool assembly (26).

Put the mating mark on both spool assembly (26) and rear cover (24) so that spool assembly (26) should not be reversed on re-assembling.

It is impossible to disassemble this spool assembly (26) further because spool assembly (26) is fixed by adhesive.

### STEP 3

Remove plug (42), O-ring (43), check restrictor spring (41) and restrictor (40).

### STEP 4

Remove overload relief valves (57).

When removing overload relief valve (57), valve seat (57-3) easily comes off, so take great care not to fall into the rear cover (24) or lose.

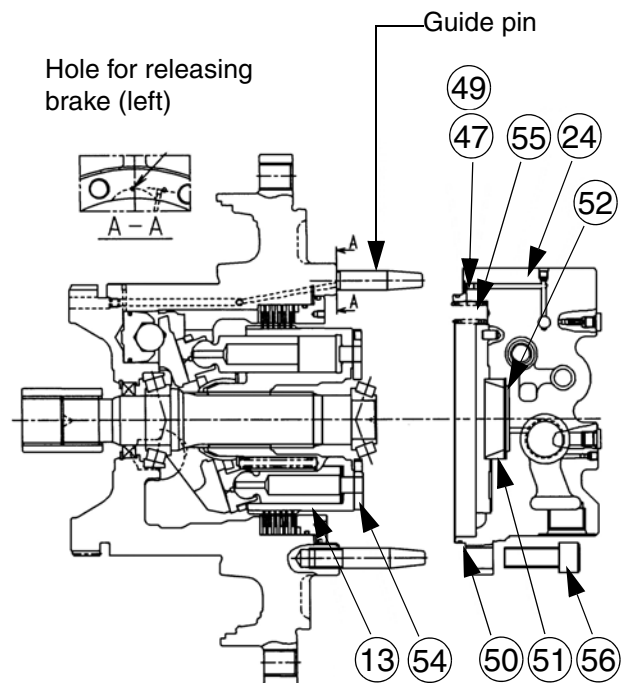
### STEP 5

Remove pilot valve plug (35) and then, remove O-ring (36), pilot valve spring (34), spring holder (33), pilot valve spool (31) and pin (32).

### STEP 6

Remove coupling (58).

### STEP 7



CRPH06D012B

Place the motor with the shaft horizontal, remove Hex. socket head bolts M18 x 50 (56) of rear cover (24) leaving two on diagonally upper and lower position.

## TROUBLESHOOTING

<b>1. Hydraulic motor never starts</b>		
SYMPTOM	CAUSE	REMEDY
Pressure never increases	Malfunction of built-in relief valve.	Repair or replace relief valve
Pressure increases	1. Parking brake is not released Clogging of restrictor  2. Parking brake is not released Spool is installed in wrong direction  3. Stuck friction or separating plate of parking brake portion  4. Stuck brake piston  5. Seizure of sliding piston  6. Malfunction of spool: - Stick between spool and body - Clogging of restrictor	1. After inspection of clogging, repair or replace  2. Re-install the spool in correct direction  3. Replace friction and separating plate  4. Repair outer dia. of brake piston or replace it.  5. Check, repair or replace piston shoe, swash plate, cylinder block valve plate etc.  6. Repair or replace
<b>2. Hydraulic motor rotates weakly</b>		
Set pressure of overload valve is correct, but brake is released belatedly	Malfunction of spool: - Stick between spool and body	Repair or replace
Negative brake is released, but motor is hard to start	High oil viscosity.	Raise oil temperature or change the hydraulic oil
Negative brake is released, but motor starts weakly	1. Negative brake is not completely released. Clogging of choke of pressure release passage  2. Relief valve catches small particles  3. Seizure of sliding portion	1. Check clogging of choke  2. Wash relief valve, check or replace seat of it  3. Check, repair or replace sliding portion
<b>3. Drive shaft never rotate up to the set value</b>		
Rotation of drive shaft never reaches the set value	1. Shortage of oil coming in  2. Large wear or flaw made on shoe, cylinder block or valve plate	1. Check oil flow or hydraulic circuit to motor.  2. Check, repair or replace the parts

### 3. Swing spool switching (Figure 5)

When switching the swing spool by adding pressure through Pilot Port Pb3 (Pa3) in Swing (Section 3), the neutral passage L1 closes. Oil supplied from Port P1 passes the load check valve S3-2, the passage S3-1 and the neck part of the spool through the parallel passage L3 and flows into Port B3 (A3). The return oil passes the neck part of the spool via Port A3 (B3) and returns to the tank passage Ta.

### 4. Bucket spool switching (Figure 5)

When switching the bucket spool by adding pressure through Pilot Port Pb7 (Pa7) in Bucket (Section 7), the neutral passage R1 closes. Oil supplied from Port P2 passes the load check valve S7-2, the passage S7-1 and the neck part of the spool through the parallel passage R3 and flows into Port B7 (A7). The return oil passes the neck part of the spool via Port A7 (B7) and returns to the tank passage Ta.

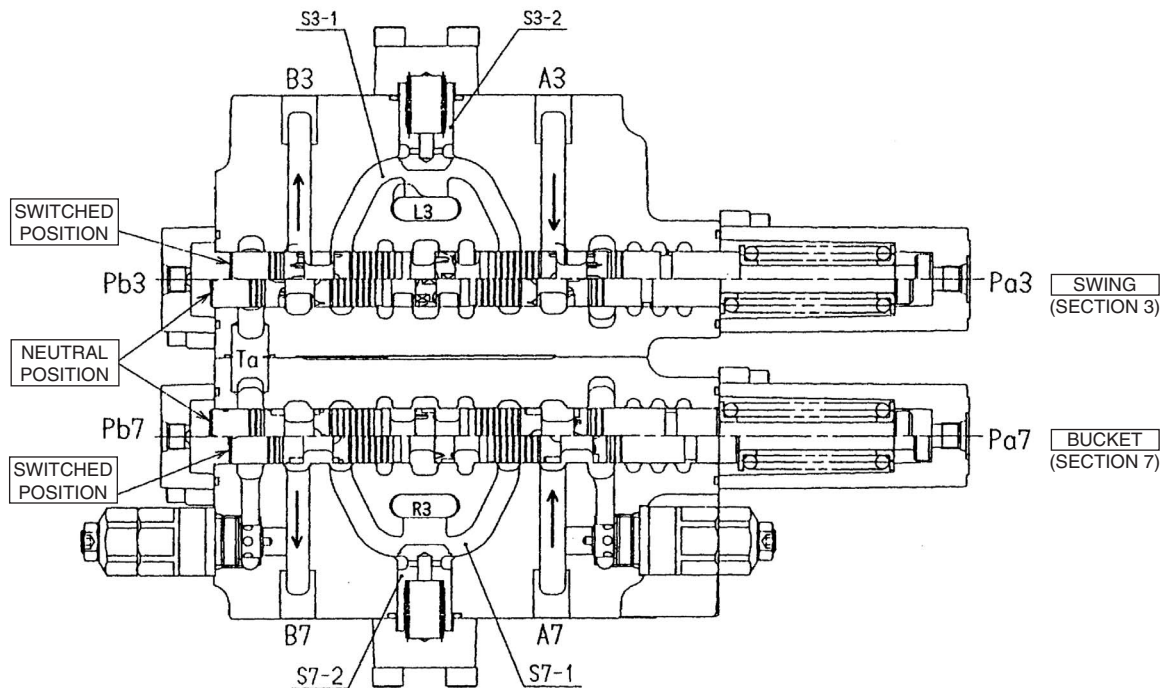


Figure 5

# Combined Operation

## 1. Travel combined operation (Figure 15)

If operation other than travel is carried out at the same time while performing simultaneous travel left/right operation (at the time of forward or backward movement or pivot turn), or if simultaneous travel left/right is carried out while performing operation other than travel, oil supplied from Port PP is shut off from tank passage Ta at the signal land other than the travel section which has switched Lc4, Lc7, Rc3 and Rc5. As a result, the pressure in the signal passage rises to the set relief pressure for the oil pressure source used for signals.

Due to rising signal pressure, the straight travel spool is switched over. The pressures on Port PT and PA also increase.

When the straight travel spool is switched over, oil supplied from Port P1 flows into Travel (Section 1) from the neutral passage L1, and at the same time it passes the passage (2), the neck of straight travel spool, and the neutral passage R1 and flows into Travel (Section 6). Oil supplied from Port 2 passes through the neck of the straight travel spool and passage (1) and flows into the parallel passage L3.

If the load pressure on sections other than travel is higher than the load pressure on Travel (Section 6), part of the oil supplied from Port P2 pushes open puppet S6-2 and passes the restriction at the tip of the puppet to merge at passage S6-1.

Because Travels (Section 1 and 6) operate with oil supplied from Port P1 while operational devices other than Travels operate with oil from Port P2, even when the machine is in combined operations of simultaneous travel left/right and other operations, curved travel is prevented.

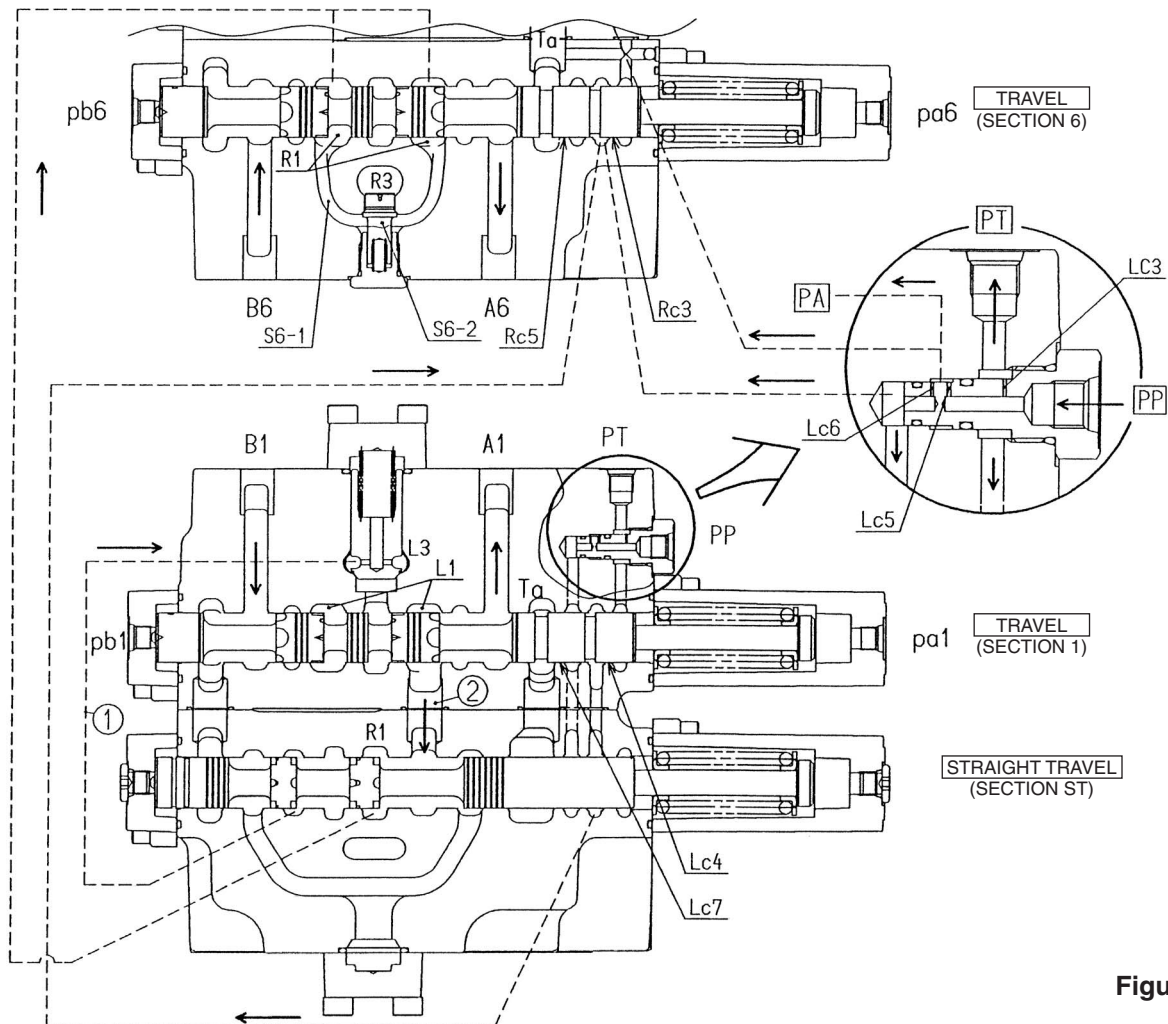
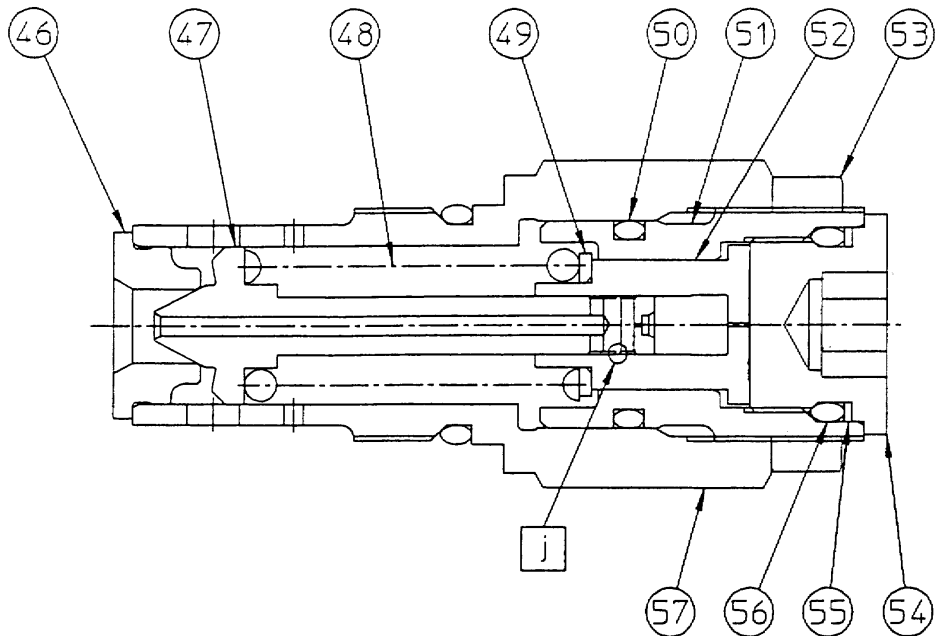
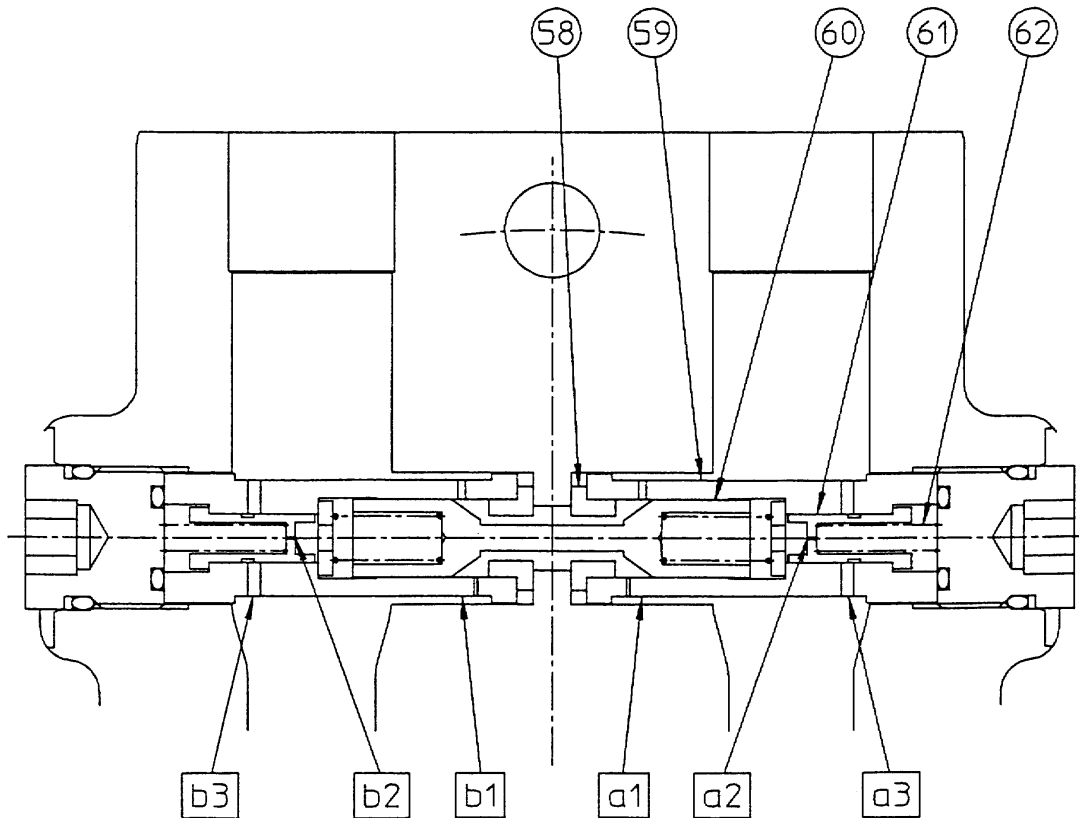


Figure 15

### Internal Structural Drawing of Externally Adjusted Shockless Relief Valve



### Internal Structural Drawing of Bypass Valve



## (2) Accelerating operation (see Figure 10)

When VA and VB ports are connected respectively to pump and tank by operating the control valve, hydraulic oil from pump is forwarded through VA port to push open the check valve provided inside spool (26), and oil flows to motor via MA port to rotate the motor.

Therefore, the pressure increases and negative brake is released by the pressure supplied from pump. At the same time, the pressure of pilot chamber increases to push and move the spool (26) left wards, overcoming the spring (28) force. Thus, the return line from MB to VB opens to rotate the motor.

In case inertia load is too big to start rotation, accelerating pressure reaches the set pressure of relief valve and high pressure oil is being relieved while the motor gains the rotational speed. As the rotational speed goes up, the relieved volume decreases, and finally the motor rotates at a fixed speed.

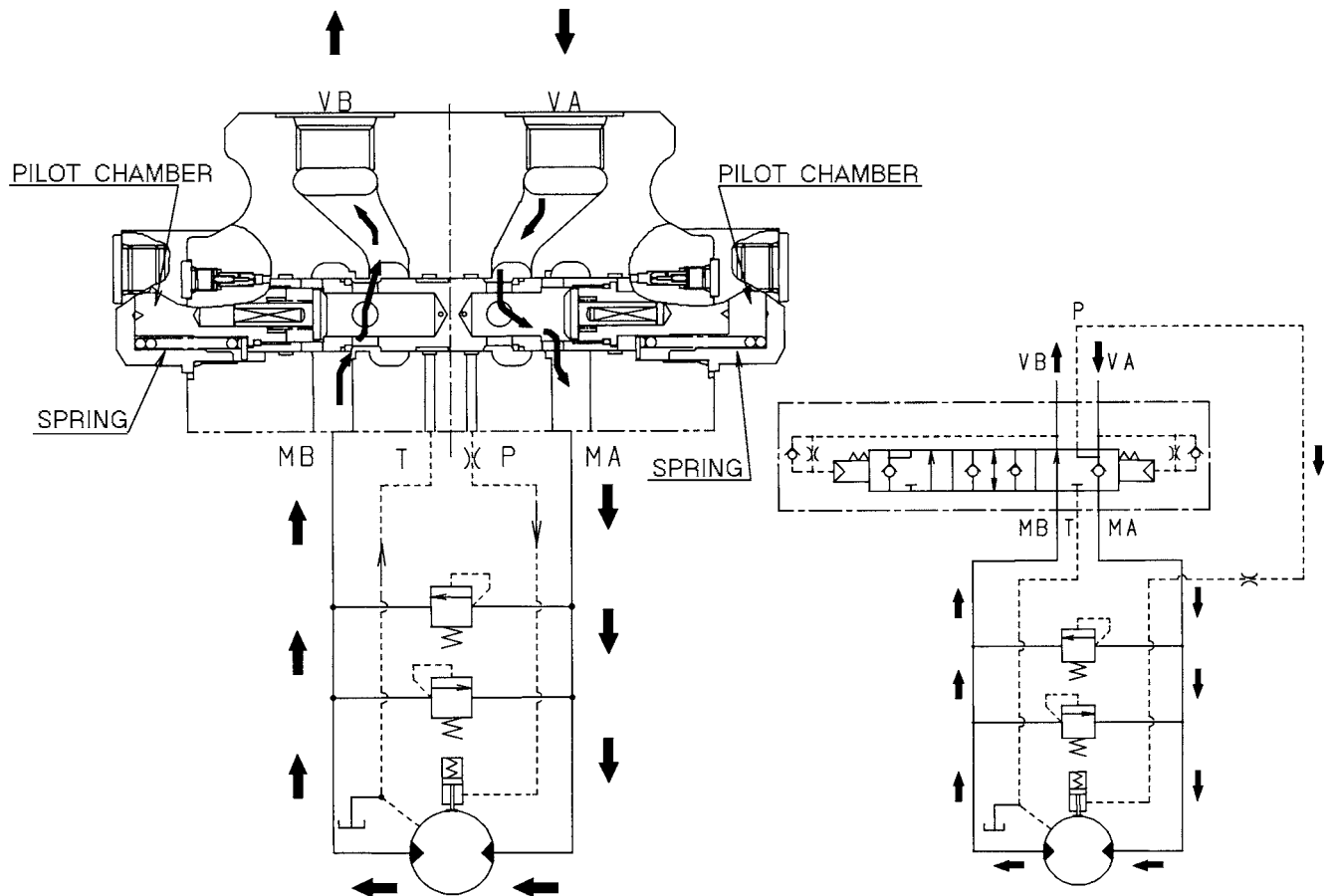
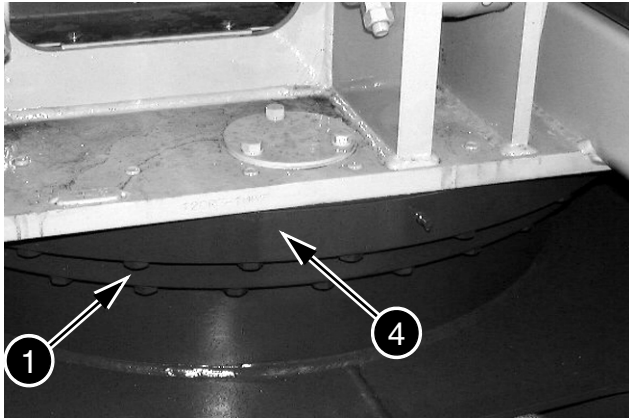


Figure 10. Accelerating operation

**STEP 4**

Coat the screw threads (1) with Loctite 262. Install the screws (1) to attach the turntable (4) to the undercarriage. Tighten the screws (1) to the torques specified on page 2.

**STEP 5**

Connect a suitable lifting device to the lifting rings located in front of the upperstructure, on top of the boom brackets, as well as to the rings installed on the upper frame behind the upperstructure.

**NOTE:** Refer to specifications on page 2 for the weight of the upperstructure. Make sure that the lifting equipment has sufficient lifting and support capacity for the upperstructure.

**NOTE:** When the upperstructure is lowered and touches the turntable and the crown wheel, make sure that the swing reduction gear pinion engages perfectly with the teeth on the upperstructure crown wheel.

**STEP 6**

Carefully install the upperstructure in position on the turntable. Align the marks on the upperstructure and on the turntable. Check that the mounting ports of the upperstructure are aligned with those of the turntable.

**NOTE:** The numbers within brackets in the following steps refer to the schematic on page 6.

**STEP 7**

Coat the screw threads (1) with Loctite 262. Install the screws (1) with flat washers (2) in the turntable and the upperstructure to fasten the upperstructure in position. Tighten the screws (1) to the torques specified on page 2.

**STEP 8**

Remove the lifting device then remove the lifting rings.

**STEP 9**

Refer to Section 8006 and reassemble the hydraulic swivel.

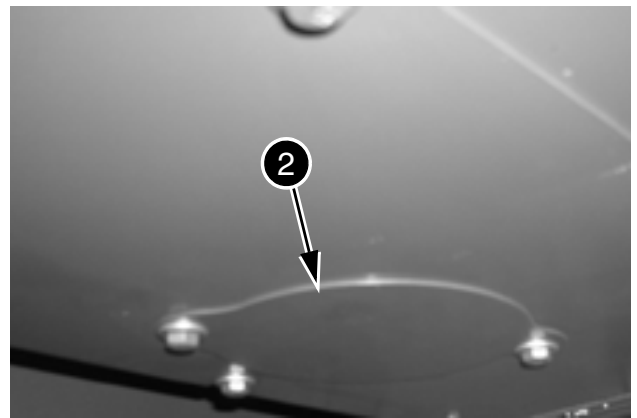
**STEP 10**

Refer to Section 9003 and reassemble the boom, the dipper and the bucket on the machine.

**STEP 11**

Make sure that the drain valve of the hydraulic reservoir is closed. For filling the reservoir refer to the chapter "Filling the reservoir" in the operator's manual.

**NOTE:** See Section 1002 for the capacity of the hydraulic reservoir and the capacity of entire system.

**STEP 12**

CD01K081A

Fill the reservoir (see the operator's manual). Install the lower access plate (2) of the hydraulic reservoir.

**STEP 6**

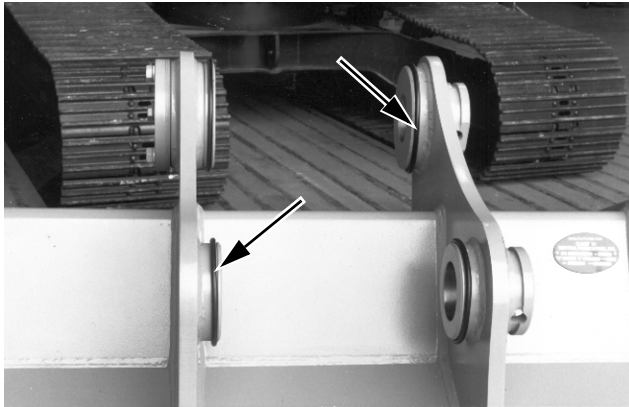
Attach a suitable lifting device to the connecting rod (5) and position the connecting rod on the dipper. Install the bucket cylinder rod on the connecting rod (5) and the yokes (15), see Section 8005. Install the grease fittings (10).

**STEP 7**

Install new dust seals (9) on the connecting rod (5).

**STEP 8**

Install new dust seals (20) on the dipper.

**STEP 9**

Install new coupling shafts on the boss of the bucket. B9240128

**STEP 10**

Start the engine and align the dipper ports with the ports in the bucket.

**STEP 11**

Install the pin (3) through the bucket and the dipper. Install the screw (2).

**STEP 12**

align the ports of the connecting rod with the ports of the bucket and install the pin (8) through the bucket and the compensator. Install the screw (7).

**STEP 13**

Using a set of spacer rings, check that the play between the compensator and the bucket is 1 to 3.5 mm. If required, remove the screw (7) and the pin (8) and add one or more shims according to the requirement in order to get the correct play. Install the pin (8) and the screw (7).

**STEP 14**

Install the first nut (6) on the screw and tighten until the nut touches the boss on the connecting rod. Loosen a quarter of a turn and use two wrenches to tighten the second nut on the first. Do the same for the nuts (1) and the screw (2).

**STEP 15**

Push the coupling shafts back in their positions.

**STEP 16**

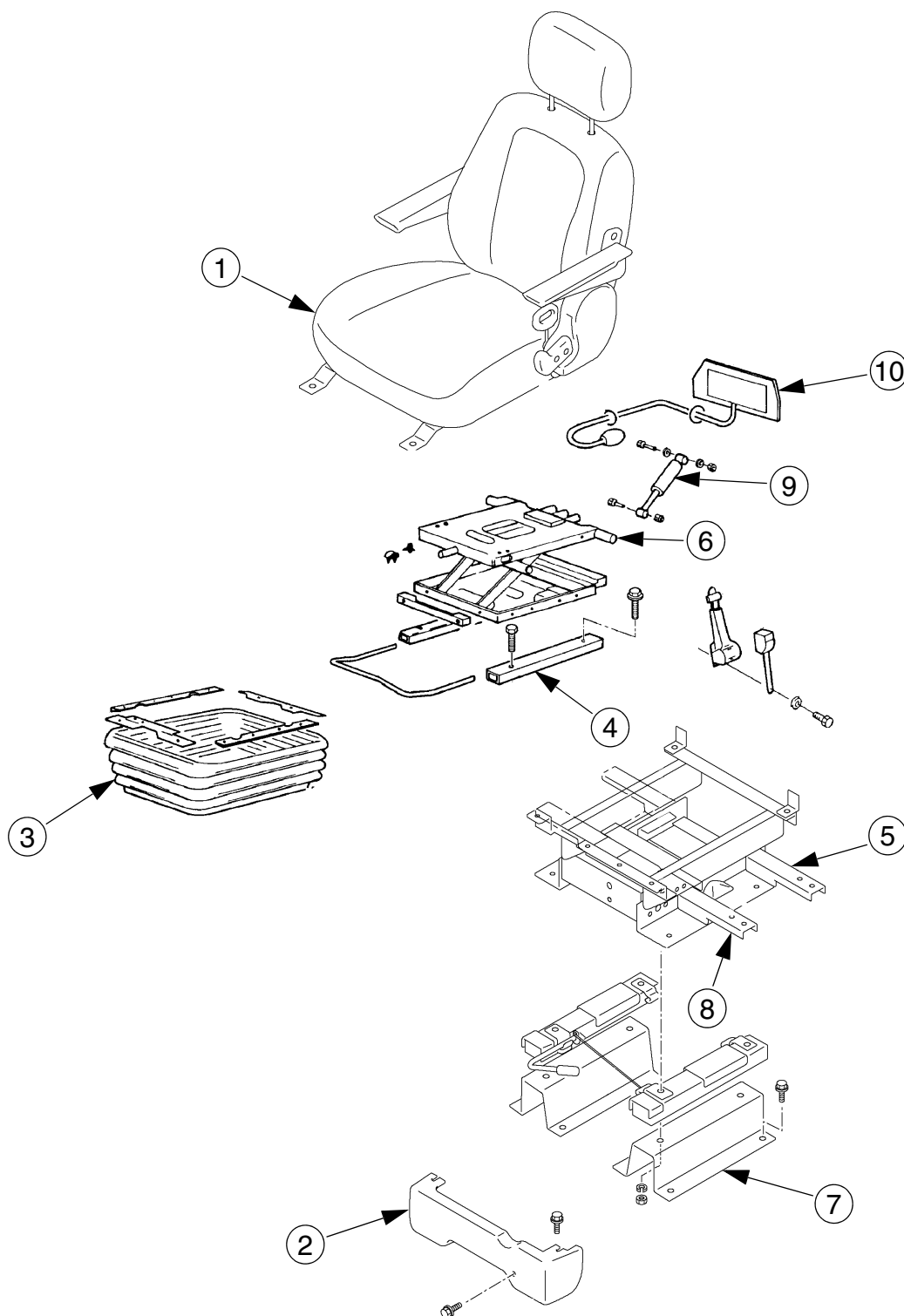
Grease the linkages.

**STEP 17**

Carry out the shimming of the bucket, see page 6.

# OPERATOR'S SEAT

## Description



- 1 OPERATOR'S SEAT
- 2 MASK
- 3 BOOT
- 4 RAIL
- 5 REAR CONTROL ARM BRACKET

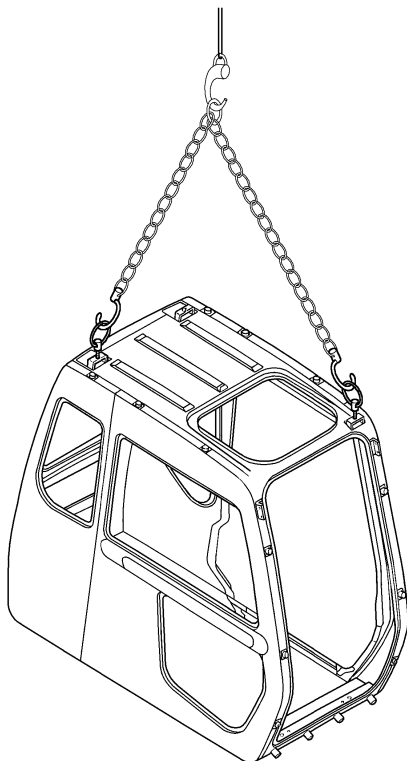
- 6 SHOCK ABSORBER
- 7 BRACKET
- 8 FRONT CONTROL ARM BRACKET
- 9 CYLINDER
- 10 BULB

CS02A504

**STEP 19**

Remove the screws and washers which fasten the cab to the upperstructure frame.

**NOTE:** *Keep away from the cab while it is being lowered. Make sure that the cab is not damaged during lifting or lowering. Room for manoeuvre is very limited at the rear, on the sides and inside the cab.*

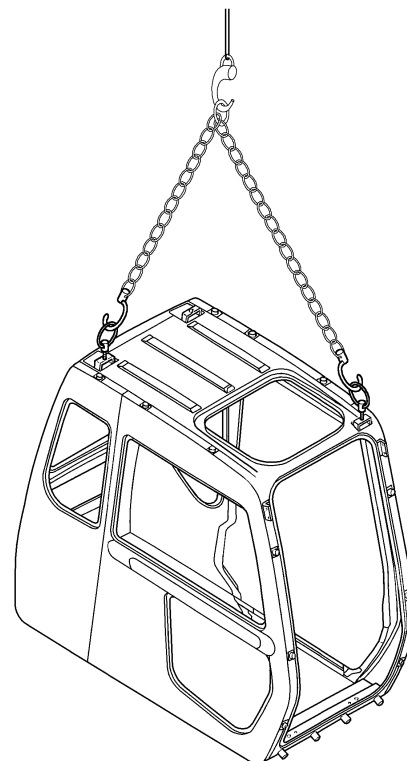
**STEP 20**

Using the lifting equipment, carefully raise the cab until it is completely away from the machine, then lower it to the ground.

**NOTE:** *The cab weighs 255 kg (562 lb).*

**Installation**

**NOTE:** *Keep away from the cab while it is being lowered. Make sure that the cab is not damaged during lifting or lowering. Room for manoeuvre is very limited at the rear, on the sides and inside the cab.*

**STEP 1**

Install suitable lifting rings on the top of the cab. Using suitable lifting equipment, raise the cab. Guide the cab so that it is correctly aligned with the mounting studs and orifices in the upperstructure frame.

**NOTE:** *The cab weighs 255kg (562 lb).*

**STEP 2**

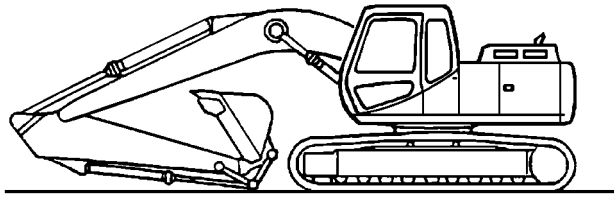
Install the screws and washers which fasten the cab to the upperstructure frame. Tighten them to a torque of 78 to 80 Nm (57.5 to 59 lb-ft).

**STEP 3**

Install the working light on the top of the cab.

## Removal

### STEP 1

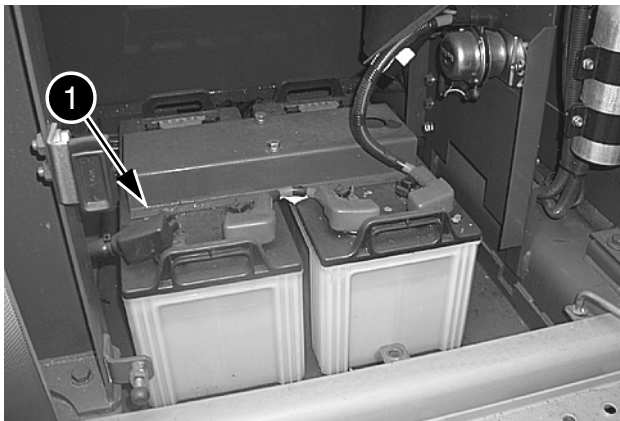


JS00163A  
Park the machine on hard, flat ground. Lower the tool to the ground.

### STEP 2

Reduce the engine speed to idle for 30 seconds, then shut down the engine.

### STEP 3



CT05L063  
Disconnect the earth cable (-) (1) from the battery.

### STEP 4

**NOTE:** The numbers within brackets refer to the schematic on page 14.

From the front of the cab, raise the protective flap (1) located on the lower portion of the windshield wiper arm (2).

### STEP 5

Remove the nut (3).

### STEP 6

Note the position of the windshield wiper arm (2). Remove the windshield wiper arm (2) from the windshield wiper motor (4) by pulling it off the windshield wiper motor shaft.

### STEP 7

Remove the rubber cap (5).

### STEP 8

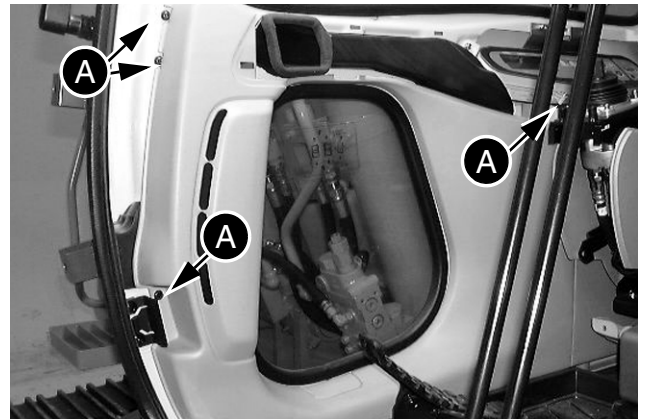
Remove the nuts (6), washer (7) and plastic support (8) from the windshield wiper motor shaft.

### STEP 9



CD00G133  
Remove the upper RH trim panel.

### STEP 10



CD00G134  
Remove the lower front trim panel inside the cab using screws (A).

### STEP 11

Disconnect the electrical harness (10) from the windshield wiper motor (4).

### STEP 12

Remove the screws (9) and (11) from the windshield wiper motor. Remove the windshield wiper motor.

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