



SERVICE MANUAL

CRAWLER EXCAVATOR

CX700
TIER III

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Section 1002

1002

SPECIFICATIONS AND SPECIAL TORQUE SETTINGS

Hydraulic system

Hydraulic pump drive system, directly coupled to the engine (no transmission)

Main pump

Manufacturer	Kawasaki
Pump type	double variable displacement piston pump
Displacement	242 cm ³ (14.76 cu in) X 2 /rev
Rated operating pressure	31.4 MPa (4555 psi)
Maximum operating pressure	34.3 MPa (4975 psi)
Input revolution speed	1850 min ⁻¹
Maximum flow	448 L/min (118.34 gpm) X 2 at 1850 min ⁻¹
Input horsepower	282.2 kW
Shaft input horsepower	285 kW at 1850 min ⁻¹
Shaft input torque.....	1471 N•m (1085 lb-ft) at 1850 min ⁻¹

Pilot pump

Pump type	Gear pump
Displacement	15 cm ³ (0.91 cu in)/rev
Operating pressure	4.4 MPa (638.16 psi) to 4.6 MPa (667.17 psi)
Maximum flow	27.8 L/min (7.34 gpm) (at 1850 min ⁻¹) (1850 rpm ⁻¹)
Input horsepower	2.8 kW

Control characteristics; simultaneous output control of overall, negative control, electric horse power control

Control Valve

Model; 4-spool section: integrated (1) or 5-spool section: integrated (1)

Operation method; hydraulic pilot method: travel, swing and operating machine

Maximum flow	448 L / min (118.34 gpm)
Set pressure of main relief valve	standard; 31.4 MPa (4554 psi), power boost 34.3 MPa (4975 psi)
Set pressure of overload relief valve	when boom down; 27.5 MPa (3988 psi) at 20 L / min
.....	other: 36.3 MPa (5265 psi) at 20 L / min

Functions

- Straight travel circuit
- Boom UP / 2-speed internal confluence for Arm
- Boom/arm load holding circuit
- Boom down regenerative circuit
- Arm IN forced regenerative circuit
- Boom up priority (speed restriction of bucket)
- Boom up priority (Speed restriction of swing)
- Bucket 2-speed internal confluence
- Resevbe 2-speed internal confluence

Hydraulic Cylinders

Boom cylinder (2)

Inner diameter of tube x rod diameter x stroke 190x130x1805 mm (7.48x5.12x72.83 in)

Arm (dipper) cylinder

Inner diameter of tube x rod diameter x stroke 200x140x2025 mm (7.87x5.51x79.72 in)

Bucket cylinder (Standard boom specifications)

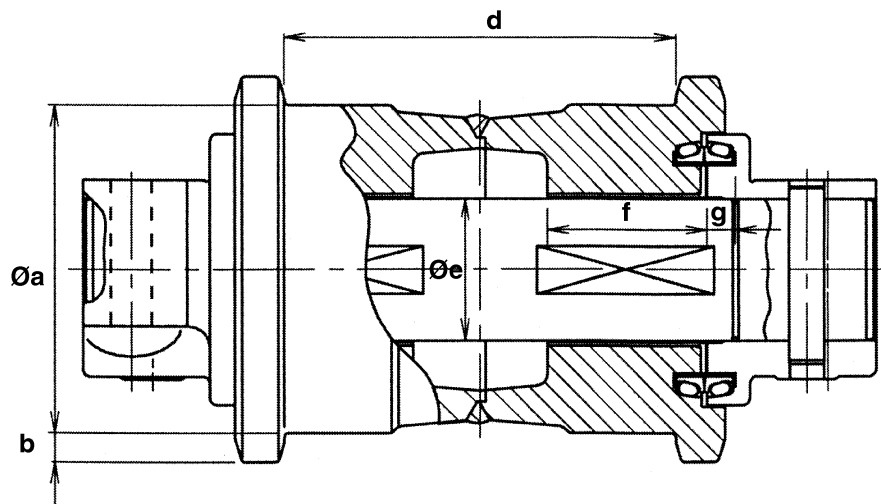
Inner diameter of tube x rod diameter x stroke 180x125x1465 mm (7.09x4.92x57.68 in)

Bucket cylinder (Mass boom specifications)

Inner diameter of tube x rod diameter x stroke 200x145x1450 mm (7.87x5.71x57.09 in)

Lower roller

Dimensions

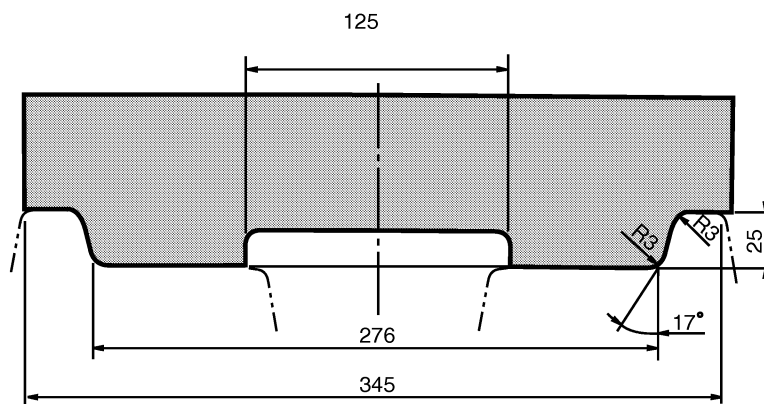


700-6-10-00-10D

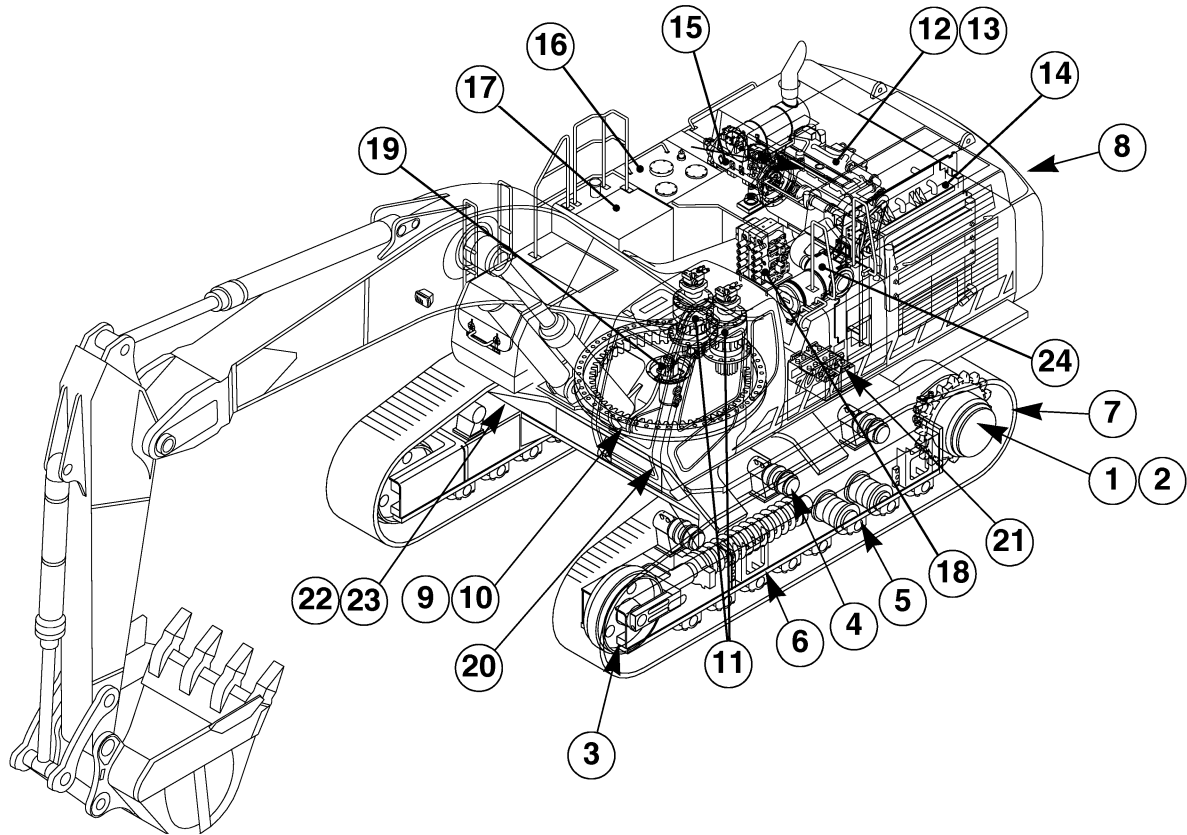
Mark		Dimension		Mark		Dimension	
		mm	in			mm	in
Ø a	Standard	230	9.06	Ø e (bushing)	Standard	100	3.94
	Limit	212	8.35		Limit	101	3.98
b	Standard	25	0.98	f	Standard	113	4.45
	Limit	---	---		Limit	112.5	4.43
d	Standard	276	10.87	g	Standard	20	0.79
	Limit	288	11.34		Limit	19.5	0.77
Ø e (Pin)	Standard	100	3.94				
	Limit	99	3.90				

Gauge

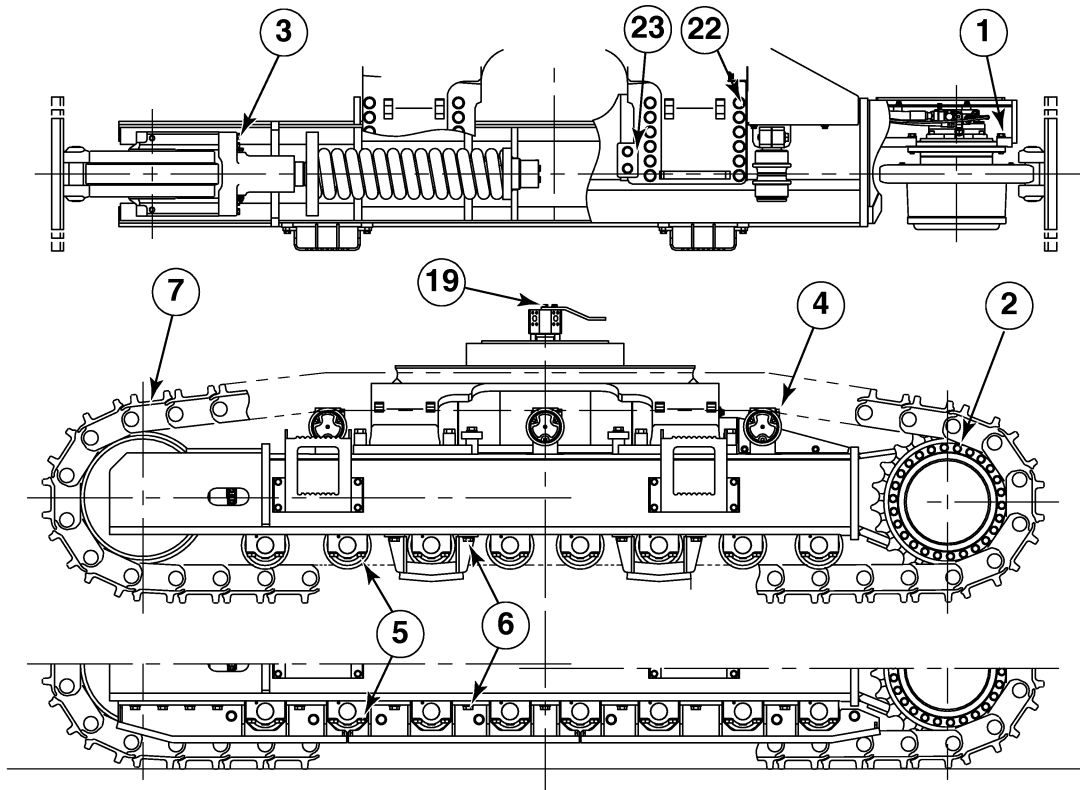
Unit in mm



700-6-10-03-13D



700-2-01-00-15A



700-2-01-01-44AA

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

Section

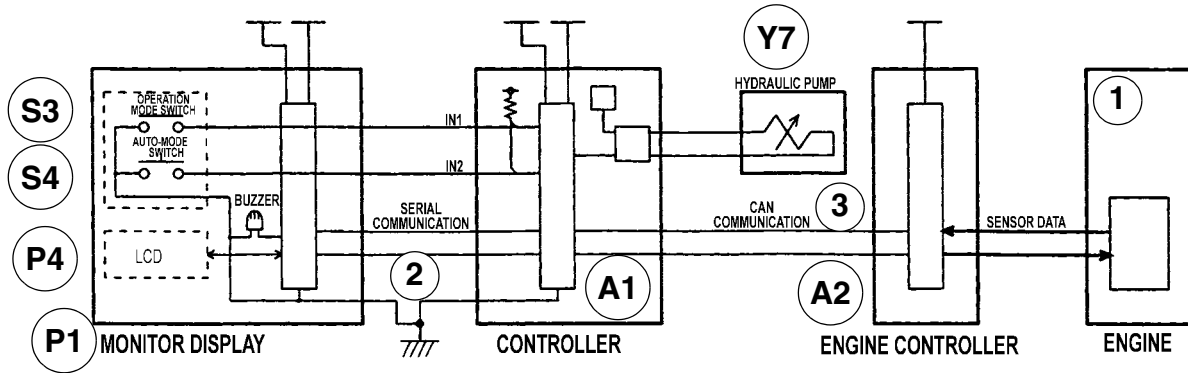
3001

FUEL TANK REMOVAL AND INSTALLATION

	ITEM	FUNCTION	METHOD
9	Correction of atmospheric pressure	It prevents black smoke and engine damage when intake air quantity is decreased such as operating in highland.	Fuel is to be restricted by an atmospheric sensor when altitude is over 3000 meters.
10	Control on engine start	It increases fuel injection according to coolant temperature to improve starting performance. It improves starting performance when sufficient fuel fails to be injected due to wear in the machine as it has been operated for a long time.	It monitors coolant temperature when it is under 0°C. It watches a lapse of time after cranking has been started.
11	Engine stop control	Engine controller (ECM) recognizes engine key OFF by turning key switch OFF	It stops fuel injection from injector. It instructs pressure control valve to be opened fully. It makes EGR valve to be fully open.
12	Emergency engine stop	Emergency stop switch is set up with no engine stop by key switch in mind.	Signal of emergency stop switch is transferred to engine controller (ECM) to perform engine stop control.
13	Engine protection function	When the engine is operated with water temperature, boost temperature, and engine oil pressure exceeded the level respectively specified, it is to protect by limitation of the engine output or by stopping the engine	Water temperature, boost temperature, and engine oil pressure are supervised, and engine is protected
14	Lever lock	It allows the machine not to be operated by control of levers while cab is being moved Up/Down or when the machine will not be needed for operation.	When the lever is raised by control of the gate lever on the left console, the lever lock solenoid turns OFF which in turn pilot pressure is cut off.
15	Auto boost control	Boost control It increases main relief pressure by approx. 10%.	Whether boost of pressure is needed or not is judged by the input data on load factor of the engine and on pump discharge pressure. (Boosting for 8 seconds.)
		Boost -cut control It does not allow boosting according to a certain condition to protect machine and equipment.	Boosting will not function when travelling and reserve pressure switches are turned OFF.
16	Swing lock	It disables swing even when the swing lever is mistakenly controlled.	Turning ON the swing lock switch allows the swing brake solenoid to be energized to actuate mechanical brake.
17	Swing brake control	When swing lock is OFF, in order to protect swing device, it controls swing mechanical brake ON/OFF automatically according to operating conditions.	It controls swing brake solenoid valve by the data obtained from switches of swing, attachments, and travel pressure, and also from pump discharge pressure.
18	Travel speed switching-over	It allows travel speed to switch to either one of 2 levels.	It controls solenoid valve by the travel mode switch to switch over tilt angle of swash plate in the traction motor.
19	Travel alarm	Alarm buzzer functions when travelling.	Travel pressure switch controls the buzzer.
20	Power shut-off delay	This ensures power supply for engine stop function.	It allows a time-lag until main relay shuts off after key switch has been turned OFF.

WORK MODE SELECTION

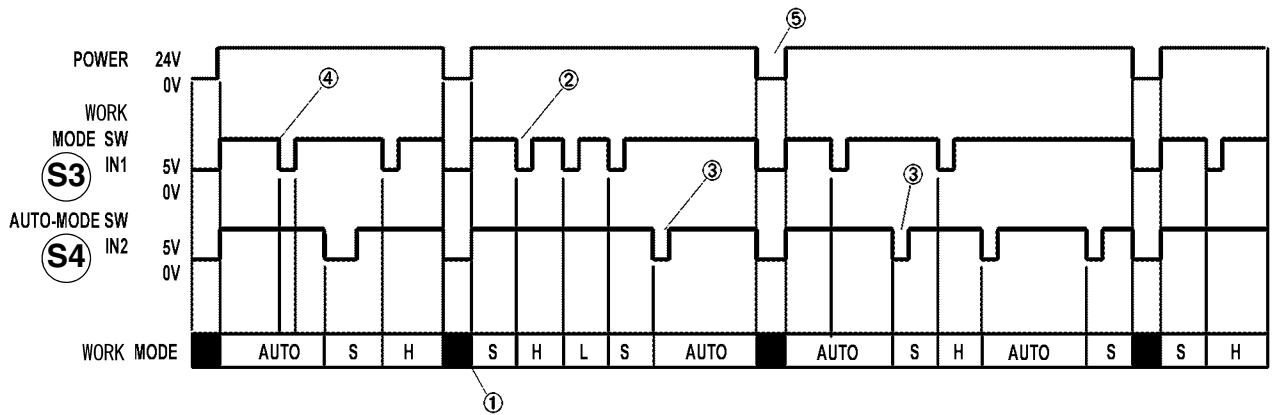
1) Circuit configuration



- 1 Engine
- 2 SERIAL communication
- 3 CAN communication
- A1 Computer
- A2 Engine controller
- P1 Instrument panel
- P4 Monitor display
- S3 Work mode switch
- S4 Auto mode switch
- Y7 Main pump proportional solenoid

700-1-04-01-23AP

2) Timing diagram

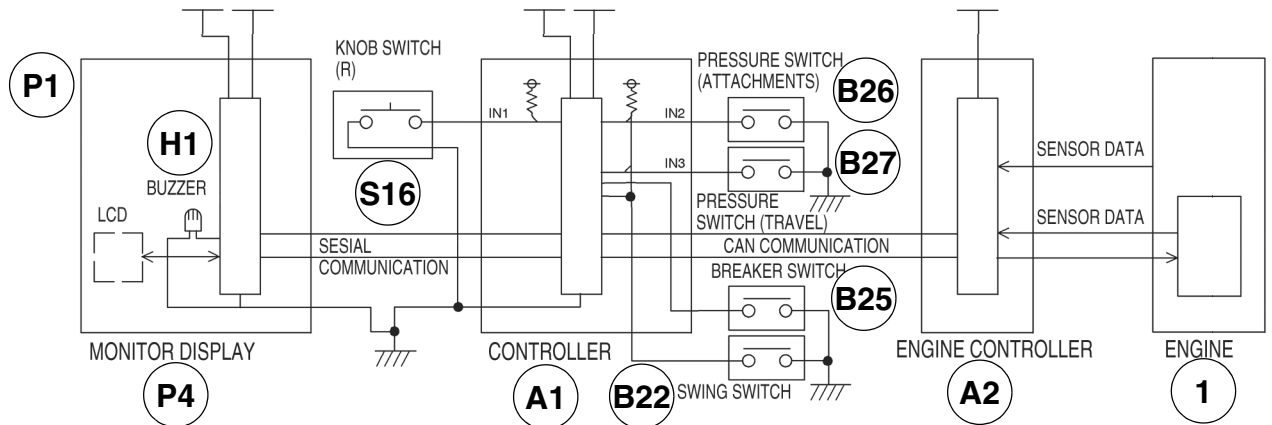


- S3 Work mode switch
- S4 Auto mode switch

700-1-04-01-23 AQ

IDLING CONTROL (AUTO/ONE-TOUCH)

1) Circuit configuration



700.1.04.01.1.23AX

- 1 Engine
- A1 Computer/Controller
- A2 Engine controller
- B22 Swing pilot pressure switch
- B25 Breaker pilot pressure switch
- B26 Upper pilot pressure switch (yellow band)

- B27 Travel pilot pressure switch
- H1 Audible warning device
- P1 Instrument panel
- P4 Monitor display
- S16 One touch idle

2) Switching between auto idle and one-touch idle

1. Pushing the knob switch (IN1) down and holding it for 3 seconds will trigger the modes to toggle between auto and one-touch. When the mode switches, the ON/OFF display on the auto idle section of the LCD also switches, and the buzzer buzzes for 3 seconds.
2. At the time of auto idle/one-touch idle selection, the previous setting will still prevail even after the key switch was turned ON. (Previous data is retained.)
3. The LCD will display ON/OFF status of auto idle. ON on the display indicates the auto idle, OFF indicates one-touch idle.
4. If there occurs no handling through the lever for 5 seconds with auto idle turned ON (both attachment pressure switch and travel pressure switches are OFF), the engine speed automatically goes back to the idling state. (For 5 seconds, the initial setting prevails. Programming is possible through adjusting settings on the back panel for the duration between 1 and 30 seconds.)
5. During auto idle, if operated via lever while engine is idling (either attachment pressure switch or travel pressure switch is on), the engine speed automatically goes back to the previous rate.
6. Even during auto idle, idling/recovery operation is attained by pressing the knob switch (one-touch switch).
7. When auto idle is OFF (i.e. during one-touch idle), idling/recovery is attained by simply operating the knob switch (one-touch idle switch), whether or not

the machine was manoeuvred through the lever.

8. LCD displays "IDLING" on the monitor during idling control.

3) Switching between auto idle and one-touch idle

1. When setting idling revolutions based on conditions described in 2). *Switching between auto idle and one-touch idle*, the controller transmits an idling signal to the engine controller via CAN communication. Also, a signal is sent to the monitor display via serial communication to display "IDLING" on the screen.
2. The engine controller, upon receiving the signal, selects idling mode and adjusts engine speed to that of the idling state.
3. The monitor displays "IDLING" on the LCD according to the signal sent.
4. When recovering from idle control based on the conditions described in 2). *Circuit configuration*, the controller transmits a signal to the engine controller via CAN communication conveying the previous engine mode selection. Also, the serial transmission that has been sent to the monitor for displaying "IDLING" on the screen will be terminated.
5. The engine controller, depending on the mode signal received, switches the idling mode back to the previous mode and adjusts the engine speed.
6. The monitor recognizes the termination of the idling signal transmission and stops the "IDLING" display on LCD.

CONTROL WHEN STOPPING ENGINE

1. Operation

- 1) Turn OFF the key switch.
- 2) When the engine controller recognizes that the key is turned OFF, steps 3) through 5) below are carried out simultaneously.
- 3) Fuel injection quantity stops to be calculated.
- 4) Pressure control valve (PCV) is instructed so that it is fully closed.
- 5) EGR valve is instructed so that it is fully closed and its initial point is corrected.
- 6) After steps 3) through 5) have been completed, information such as history failure is written in EPROM in the ECM.
- 7) Turn OFF the main relay and turn OFF the power supplied to ECM.

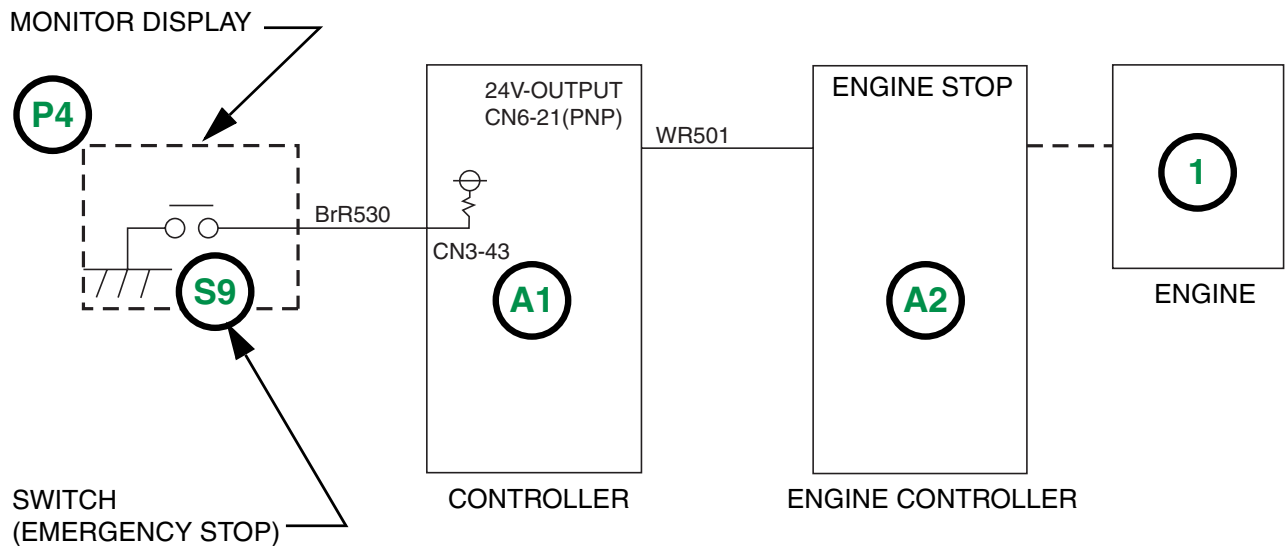
EMERGENCY STOP OF THE ENGINE

1. Alteration

In current type 3 (engine meeting emission control regulation of 2nd-stage), depression of the emergency stop switch allows the engine stop motor to rotate to the stop position by way of the relay and allows the engine governor to control for stopping engine by the engine stop signal from the engine controller (ECU).

In the next type (engine meeting emission control regulation of 3rd-stage), depression of the emergency stop switch allows the controller to transfer engine stop signal to ECM controlling the engine to be stopped.

2. Circuit configuration



- 1** Engine
- A1** Computer/Controller
- A2** Engine controller

- P4** Monitor display
- S9** Engine emergency stop switch

700.1.04.01.23B0

3. Operation

- 1) Depression of emergency stop switch on the monitor display allows the output signal from transistor in the controller to be turned ON and at the same time, the engine stop signal is transferred from the controller to the engine controller (ECM)
- 2) ECM performs stopping control for the engine.

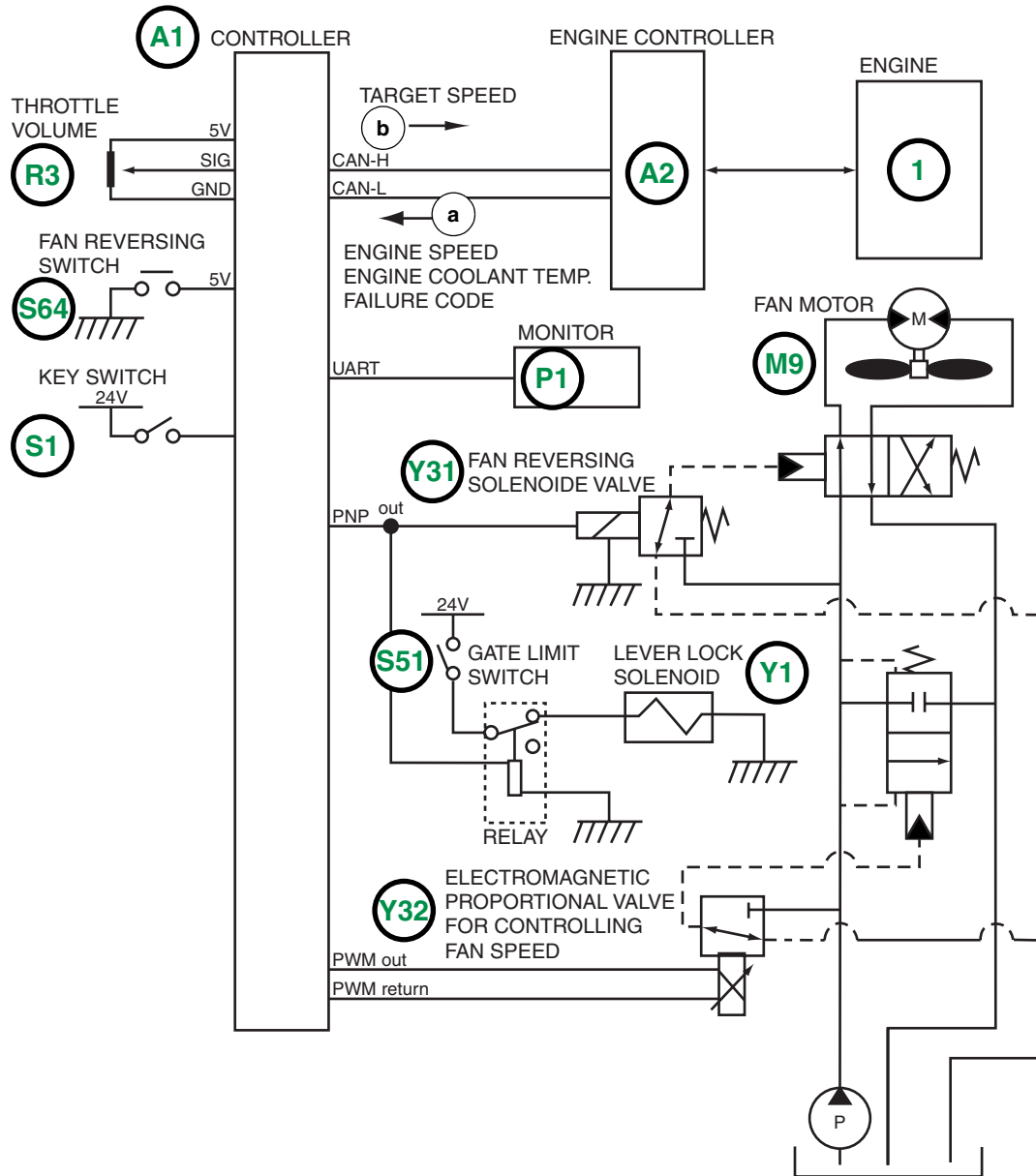
CONTROL OF HYDRAULIC DRIVEN FAN

1) Outline of control

Main control of hydraulic driven fan is illustrated below.
Detailed description for each section is shown after next section.

- 1) Fan speed control according to water temperature
- 2) Spool stick prevention control
- 3) Engine start/stop control
- 4) Reversing fan control (cleaning mode)
- 5) Actual fan speed checking mode

2) Basic circuit configuration



- a) Target speed information,
- b) Engine speed, engine coolant temperature and failure mode information
- 1 Engine
- A1 Computer/ controller

- A2 Engine controller
- R3 Throttle volume
- S1 Key switch

700.1.04.01.23CA

3) Operation

1) Automatic stop

1. Assemble it with the switch built-in the fuel supply pump turned ON. (No control is required for customers.)
2. Put the 3-position rocker switch to Automatic side after the key switch has been turned ON. (Center: OFF, Automatic Alternate: ON, Manual: Momentary ON.)
3. This operation allows electric power to be supplied to the fuel supply pump by way of both relays of «auto» and «main» so that fuel is pumped up into the fuel tank out of an fuel drum.
4. The controller is always monitoring quantity of fuel remained in the tank by using fuel sensor.
5. When the fuel sensor comes to the full level (Rf) position or above, the controller gives output signal to the relay (auto). (NPN output.)
6. The relay (auto) is switched over by the output signal allowing the power supplied to the fuel pump to be shut off.
7. At the same time, the buzzer sounds to inform that refueling has been made an automatic stop.
8. When the 3-position rocker switch is turned OFF, the buzzer stops sounding and automatic refueling mode is released.
9. Even if the automatic refueling mode has been released, the controller keeps on sending output signal to the relay (auto) if the position of fuel sensor is at the full level (Rf) or above.
10. The controller stops giving the output signal to the relay (auto) when the fuel sensor comes down below the full level (Rf) position.

2) Manual refueling

1. In case where automatic refueling fails functioning due to troubles such as in the fuel sensor, the controller, and the relay (auto).
2. In case where a machine cannot fill up the fuel to its full by automatic refueling.
3. Supply fuel while monitoring fuel gauge with the 3-position rocker switch turned to manual side (momentary).
4. Power is supplied to the fuel supply pump via the relay (main) from the manual switch so that fuel can be supplied to the tank.

Diagnostic code

2. Detection of engine failures DIAG1 to 6

1) Trouble diagnosis (DIAG1), Engine system current trouble status (trouble code)

DIAG	MODE II H	E	0000
1			
E	0118	E	0000
E	0000	E	0000
E	0000	E	0000

E: Engine system trouble code
For the engine error code list, refer to Page 68

Example Water temperature sensor abnormality

2) Trouble diagnosis (DIAG2), Engine system past trouble status (trouble code)

DIAG	MODE II H	E	0000
2			
E	2106	E	0000
E	0000	E	0000
E	0000	E	0000

E: Engine system trouble code

Example CAN time-out abnormality

3) Trouble diagnosis (DIAG2), Engine system past trouble status (time of trouble: controller hour meter value)

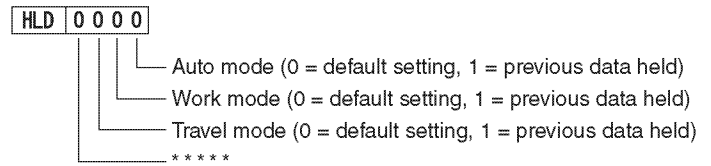
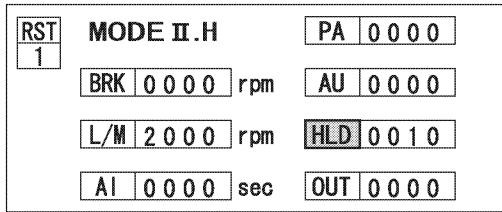
DIAG	MODE II H	E	0000
3			
E	0200	E	0000
E	0000	E	0000
E	0000	E	0000

E: Engine system trouble code trouble code.

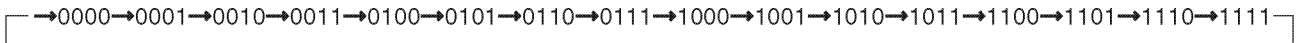
Example CAN time-out abnormality: Abnormality occurred at 200 hours

1. Switching the work mode switch ON for longer than 10 seconds clears the data on past trouble codes and their times of occurrence.
2. The time displayed with «DIAG3» is the time at which the first trouble code occurred after the data was cleared. (The times for the second and subsequent trouble codes are not recorded.)
3. When the data is cleared, the «DIAG2» and «DIAG3» data is stored into EEPROM.

6) Previous data hold condition change



- 1 Select the previous data hold (HLD) with the buzzer stop switch. (The selected item switches from light-on-dark display to dark-on-light display.)
- 2 Now, set the work mode to previous data hold.
Switch the travel mode switch ON so that the number reaches 1.
Each time the switch is switched ON, the number displayed moves to the next step in the sequence:

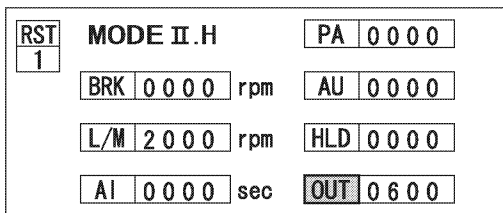


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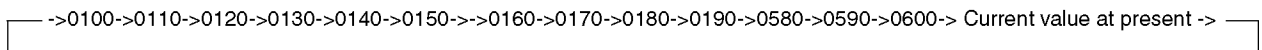
When the setting is complete, switch the work mode switch ON for 10 seconds. The buzzer buzzes to announce that the storing the setting into memory is complete.

- 3 Switch OFF the key switch.

7) Hydraulic drive fan inspection mode (only for specifications with hydraulic drive fan)



- 1 Select the previous data hold (OUT) with the buzzer stop switch. (The selected item switches from light-on-dark display to dark-on-light display.)
- 2 The number displayed shows the command current value. The display immediately after the selection is the command current value. When the travel mode switch is turned ON once, the display becomes «0100» and each time the switch is turned ON, the value displayed moves to the next step in the sequence:



- 3 For the hydraulic drive fan inspection mode, the previous time's data is reset. In other words, even if the key switch is switched OFF with some current value set, the next time the Key switch is switched ON, the mode is normal mode.

Procedures

1. This is how one has to proceed to detect defects when the message is still displayed after all necessary measures have been taken to correct the error.

Message displayed	Description of the problem	Problem No.
Fuel	The message is still displayed even after refilling the fuel tank.	1
Low coolant	The message is still displayed even after refilling with coolant solution.	2
Low oil press.	The message is still displayed even after adjusting the engine oil pressure	3
Overheating	The message is still displayed even when the hydraulic oil temperature is 84°C (183° F) or less and the engine coolant temperature is 92°C (197° F) or less.	4
Alternator	The message is still displayed.	5
Elect. problem	The message is still displayed.	6

2. This is how one has to proceed if the problem is not indicated by a message but machine operation is not correct.

A. Engine

Description of the problem	Problem No.
<pre> graph LR A[The engine does not start.] --> B[«ELEC. PROBLEM» is shown on the monitor.] B -- YES --> C[6] B -- NO --> D[7] </pre>	6 7

3. Problem without message.

Description of the problem	Problem No.
<pre> graph LR A[Impossible to change travel speed] --> B[8] </pre>	8

Troubleshooting	Cause	Action
<p>Troubleshooting using the diagnostic system</p> <p>Key switch ON</p> <pre> graph TD A[Failure code displayed in DIAG 1] -- YES --> B[Refer to the engine troubleshooting manual] A -- NO --> C[Find troubled location by DIAG4] C -- YES --> D[To CHK2] D --> E[With automatic detection for short-circuit] E -- YES --> F[The failure code disappears after disconnecting the solenoid valve connector] F -- YES --> G[Defective (Yn) solenoid valve] F -- NO --> H[The failure code disappears when either one of connectors CN21, CN22, CN23 in short-circuit line is disconnected] H -- YES --> I[Short-circuit on wire] H -- NO --> J[The failure code disappears after disconnecting connector CN6] J -- YES --> I J -- NO --> K[Defective controller] </pre> <p>M0020 appears</p>	<p>Defective (Yn) solenoid valve</p> <p>Short-circuit on wire</p> <p>Defective controller</p>	<p>Replace the solenoid valve (Yn)</p> <p>Repair the wiring</p> <p>Replace controller</p>

INSPECTING THE BATTERY

NOTE: For a proper inspection of the battery, carry out each part of the inspection until the actual state of the battery is known.

Visual inspection

- Check that the cable connections are clean and tightened properly. Remove all foreign bodies from the top of the battery.
- Check the box, the terminals and the battery cables for damage.
- Check the electrolyte level, see page 4.
- If you have added water to the battery, charge the battery for 15 minutes at 15 to 25 amperes to allow the water to mix correctly with the electrolyte.

Check the specific gravity

Use a battery hydrometer to check the specific gravity of the electrolyte. The specific gravity indicates the charge level in each cell.

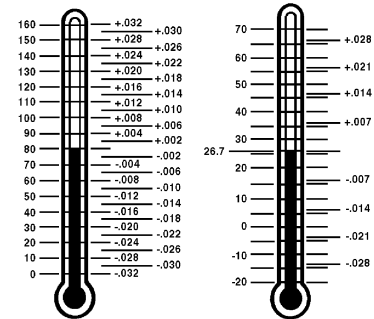
Battery hydrometers are designed to indicate the correct specific gravity when the electrolyte is at a temperature of 26.7°C.

Before checking the specific gravity, check the electrolyte temperature. If the hydrometer is not equipped with a thermometer, use a thermometer to measure the electrolyte temperature. The thermometer has to be calibrated at least up to 52°C.

1. Remove sufficient electrolyte from a cell so that the float moves freely in the tube.

NOTE: If it is not possible to check the specific gravity without first adding water to the cell, charge the battery for 15 minutes at 15 to 25 amperes to allow the water to mix correctly with the electrolyte. Then, check the specific gravity.

2. Read the float.
3. Read the thermometer, if the reading is greater than 26.7°C, add specific gravity points to the reading to get the specific gravity. If the reading is less than 26.7°C, deduct specific gravity points from the reading to get the specific gravity. See the illustration below and add or deduct specific gravity points depending on the situation.



1. Temperature in °F.

2. Temperature in °C.

JS00532A

4. Record the corrected specific gravity for each cell.
5. If the difference between the high and low readings is 0.050 minimum, charge the battery and check the specific gravity again. If after charging the difference is still 0.050 minimum, install a new battery.

NOTE: When the battery is replaced, do not use a used battery with a new one. The life of the new battery will be reduced.

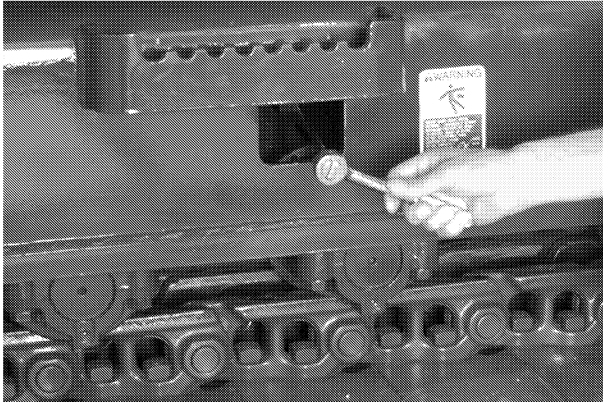
Section

5001

REMOVAL AND INSTALLATION OF THE TRACKS SET

STEP 5

Do the following procedure to decrease the track tension:



JD00273A

1. Do not remove the non-return check valve. Grease in the track tension cylinder is under high pressure. Release the track by gradually loosening the non-return check valve by about two turns, the grease escapes from a port in the check valve thread.

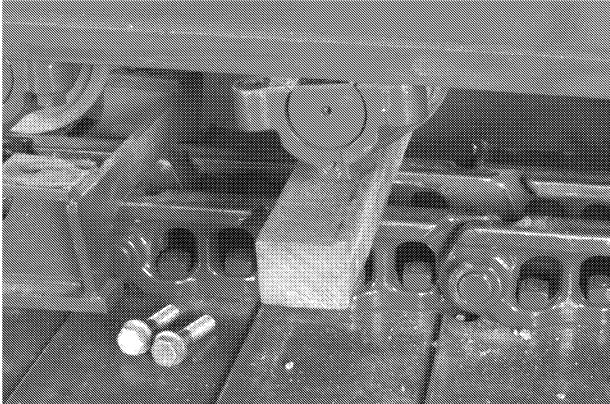


WARNING: Grease is under heavy spring pressure. Disassembly without releasing pressure may result in serious injury or death. Do not disassemble the track compensating system before completely releasing the grease pressure. Release grease pressure by loosening check valve. Do not remove the non-return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

2. When the track tension is correct, tighten the check valve.
3. Clean the grease from the check valve.

Installation

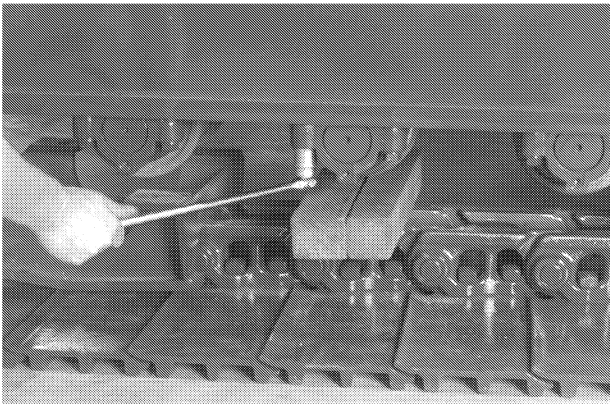
STEP 1



JD00316A

Align the lower roller in position under the lower undercarriage.

STEP 2



JD00299A

Apply Loctite 262 to the threads of the four screws. Assemble the four hardened washers and the screws.

STEP 3

Tighten the four retaining screws of the lower roller end bearings to the torque (see section 1002). Remove the wood blocks.

STEP 4

At each end of the track, remove the wood blocks from beneath the track.

STEP 5

Install the chain guide and tighten to the specified torque. Remove the two supports from beneath the machine.

STEP 6

Refer to «Adjusting track tension», see section 5001.

Section

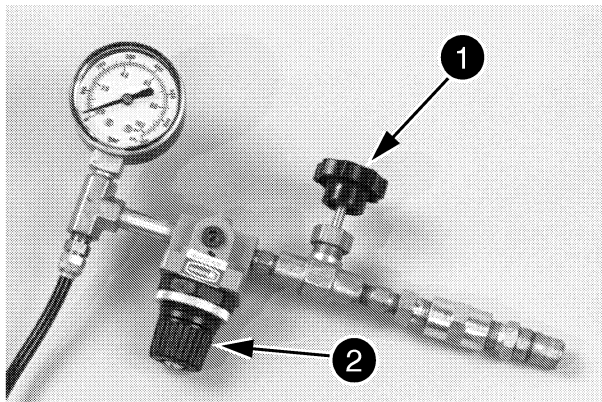
5005

IDLER WHEEL AND TENSION SHOCK ABSORBER

5005

Leakage test

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



B407320M

STEP 1

Connect the shut-off valve (1) to the pressure regulator (2). Connect a union for the air supply hose to the shut-off valve.

STEP 2

Install the adaptor and a quick coupler to the oil filler orifice. Install a seal with the adaptor.

STEP 3

Turn the knob anti-clockwise to close the pressure regulator (2).

STEP 4

Connect the pressure gauge pipe to the quick coupler.

STEP 5

Make sure that the shut-off valve (1) is open.

STEP 6

Open the pressure regulator (2) until the pressure gauge shows 1.9 bar (27.5 psi).

STEP 7

The shaft being checked should now be rotated four times.

STEP 8

Close the regulator until the pressure gauge shows 1 bar (14.5 psi).

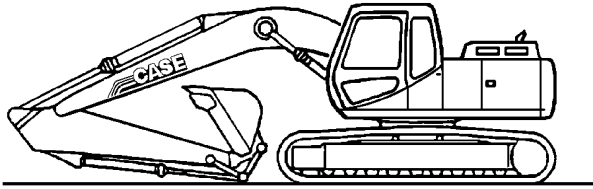
STEP 9

Close the shut-off valve. Maintain the air pressure of step 8 for 10 seconds. A reduction in air pressure during this period shows a defective component or incorrect assembling.

TRAVEL MOTOR/REDUCTION GEAR ASSEMBLY

Removal and installation

STEP 1



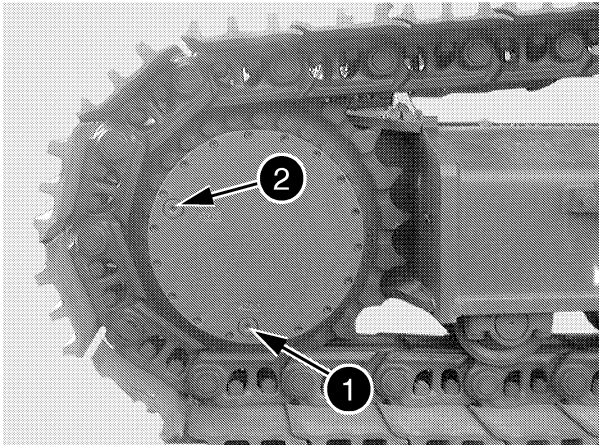
JS00163A

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

STEP 2

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

STEP 3



CD01K026

Remove the oil level plug (2) and the drain plug (1) and drain the oil.

NOTE: When installing, refer to Section 1002 for the recommended quantity and type of oil. Tighten the plugs to a torque of 70.9 Nm (52 lb-ft).

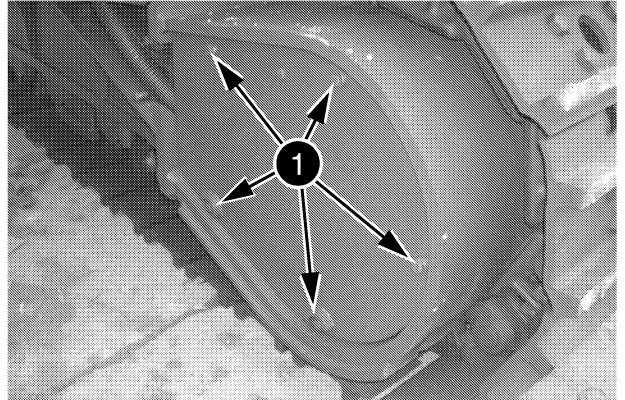
STEP 4

Put Teflon tape around the plug thread and put it back in place. Install the filling plug.

STEP 5

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

STEP 6

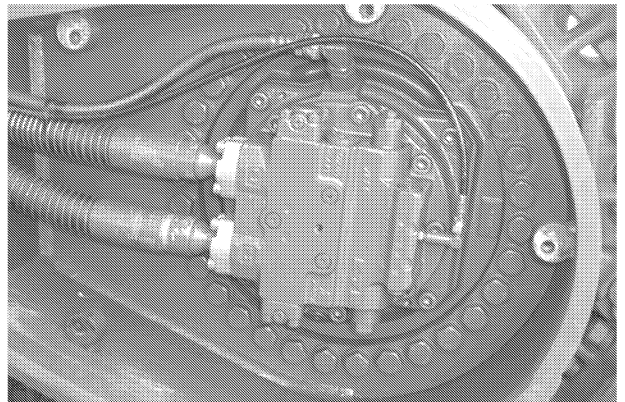


CRPH06A028A

Remove the screws and washers (1) then remove the access panel to the travel motor.

STEP 7

NOTE: The photo below does not correspond to the model of the machine, but the procedure is the same.



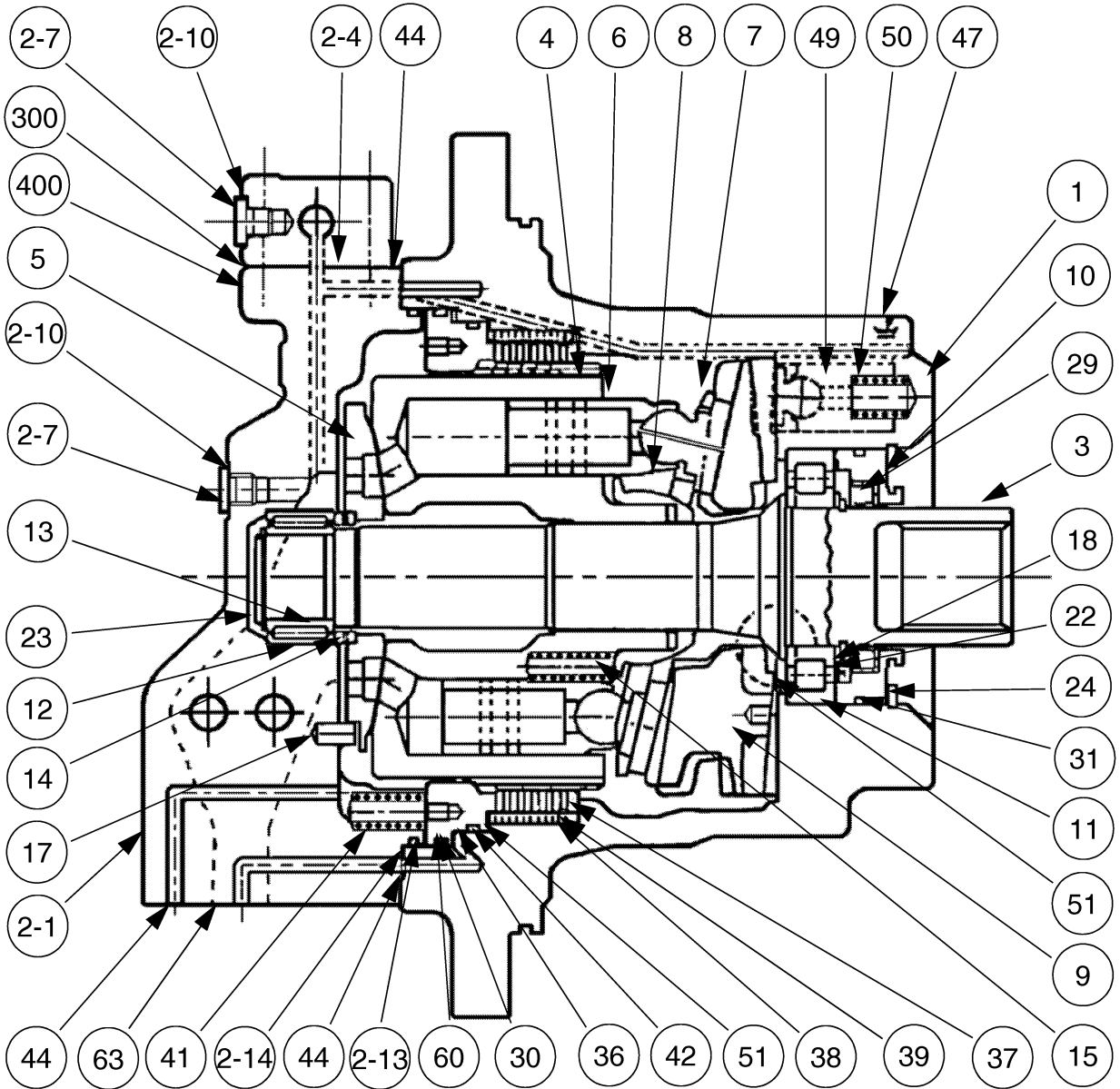
CRPH06A029A

To facilitate reassembly, attach identification tags to the different hoses connected to the travel motor.

STEP 8

Start the vacuum pump.

Sectional view



Abnormality	Possible cause	Countermeasure or remedy
IV.Oil leaks	1.Oil leaks due to damage of the oil seals or O-rings.	Place a broken oil seal or O-ring with a new one. When inserting the oil seal, be careful not to damage the lip. Since the safe working temperature limit of the oil seal and O-ring is up to 90°C, it is necessary to take a countermeasure such as using a cooler in the hydraulic circuit to prevent the hydraulic oil temperature from exceeding 90°C.
	2.Because of [I-2] [III-1], the motor case is pressurized and breaks the oil seal, resulting in oil leakage. -Oil seal Pressure resistance 0.5MPa Ordinary 0.2MPa or less	Refer to [I-1] [III-1] and repair the motor and replace with new oil seal. When inserting new oil seal, be careful not to damage the lip.
	3.Due to clogging, etc. by foreign matter in drain pipe or because of the long, narrow pipes, piping pressure rises causing the oil seal to break which results in oil leakage. -Oil seal Pressure resistance 0.5MPa Ordinary 0.2MPa or less	Clean the clogged drain piping. Recheck the piping system and reduce the passage resistance. By the above remedies, there should not be more than 0.5 MPa on the oil seal and replace it with a new one. When inserting new oil seal, be careful not to damage the lip.
V.Abnormal noise, revolution variation and pressure variation become excessive due to cavitation.	1.The low efficient motor caused over drain volume.	Take necessary countermeasures or remedies according to II-2, III-1.
	2.When the counterbalance valve operates improperly, negative pressure is generated on the suction side of the motor, resulting in cavitation.	By remedying or replacing the counterbalance valve, prevent the generation of negative pressure.

Section

6004

SWING REDUCTION GEAR

6004

Section

6005

**DISASSEMBLY AND ASSEMBLY
OF THE TRAVEL REDUCTION GEAR**

6005

Section

8000

PRESSURE RELEASE AND DECONTAMINATION OF THE HYDRAULIC SYSTEM, USE OF THE VACUUM PUMP AND BLEEDING OF THE COMPONENTS

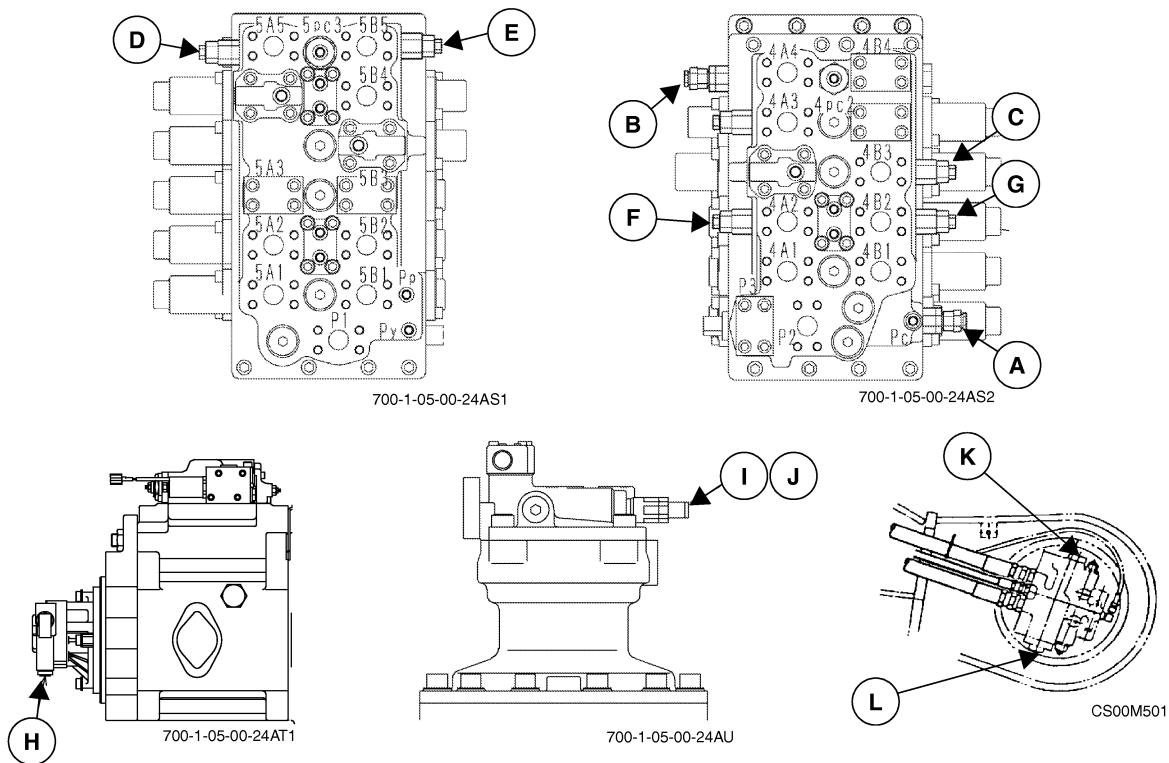
Section

8001

**SPECIFICATIONS, TROUBLESHOOTING,
INSPECTIONS AND HYDRAULIC PRESSURE SETTING**

CHECKING AND SETTING PROCEDURE

Location of secondary relief valves

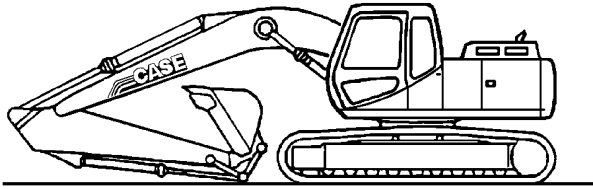


Item	Description	Tool used		Set pressure	Pressure for 1 turn of the screw (or for 1 shim*)
		Look nut	Adjusting screw		
A	Main relief (standard pressure)	30 mm	22 mm	4554 psi	2553 psi
	Main relief (power boost)	41 mm	27 mm	4975 psi	
B	Boom raising port secondary relief	13 mm	Hexagon wrench 4 mm	5265 psi	xxx psi
C	Boom lowering port secondary relief			3988 psi	xxx psi
D	Dipper out port secondary relief			xxx psi	5265 psi
E	Dipper in port secondary relief			xxx psi	
F	Bucket open port secondary relief			xxx psi	
G	Bucket close port secondary relief			xxx psi	
H	Pilot circuit main relief			24 mm	Hexagon wrench 6 mm
I	RH swing port secondary relief	38 mm	30 mm	4047 psi	638. psi
J	LH swing port secondary relief				
K	Reverse travel secondary relief			xx psi	xx psi
L	Forward travel secondary relief				

HYDRAULIC RESERVOIR

Removal

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

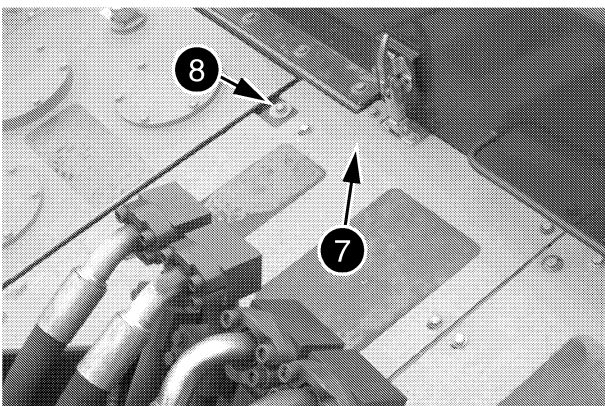
Attach a "DO NOT OPERATE" tag to the starter switch key in the cab.

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

STEP 4

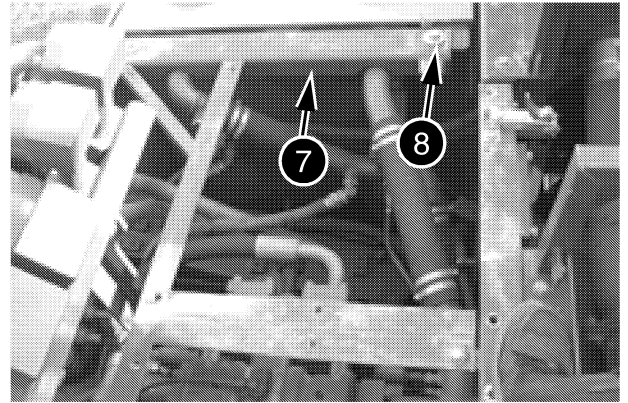
Remove the plates (1) located under the machine, then drain the hydraulic reservoir (3) using the drain valve (2).

STEP 5



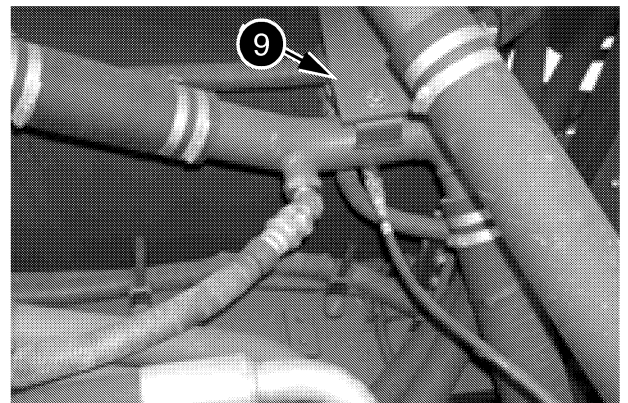
Remove the plate (7) using screws (8). CRPH06A023A

STEP 6



Remove the two screws (8) from the bracket (7). CRPH06A024A

STEP 7



Remove the screws from bracket (9) and remove the bracket. CRPH06A025A

STEP 8

Attach tags to the hoses. Remove all the hoses from the hydraulic reservoir.

STEP 9

Attach slings to the hydraulic reservoir (3), then remove the screws (21) and the washers (22) and spacer (23).

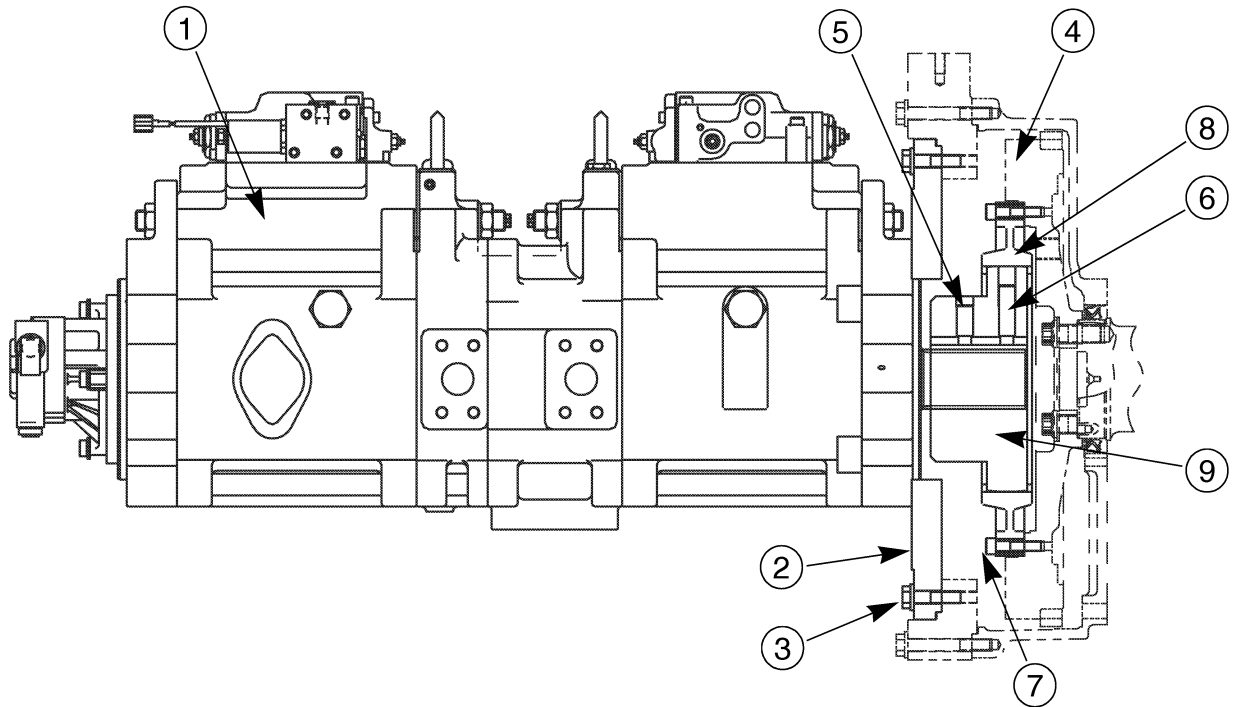
NOTE: When installing, tighten the screws (21) to the torque specified in Section 1002.

STEP 10

Remove the hydraulic reservoir.

HYDRAULIC PUMP COUPLING

Section



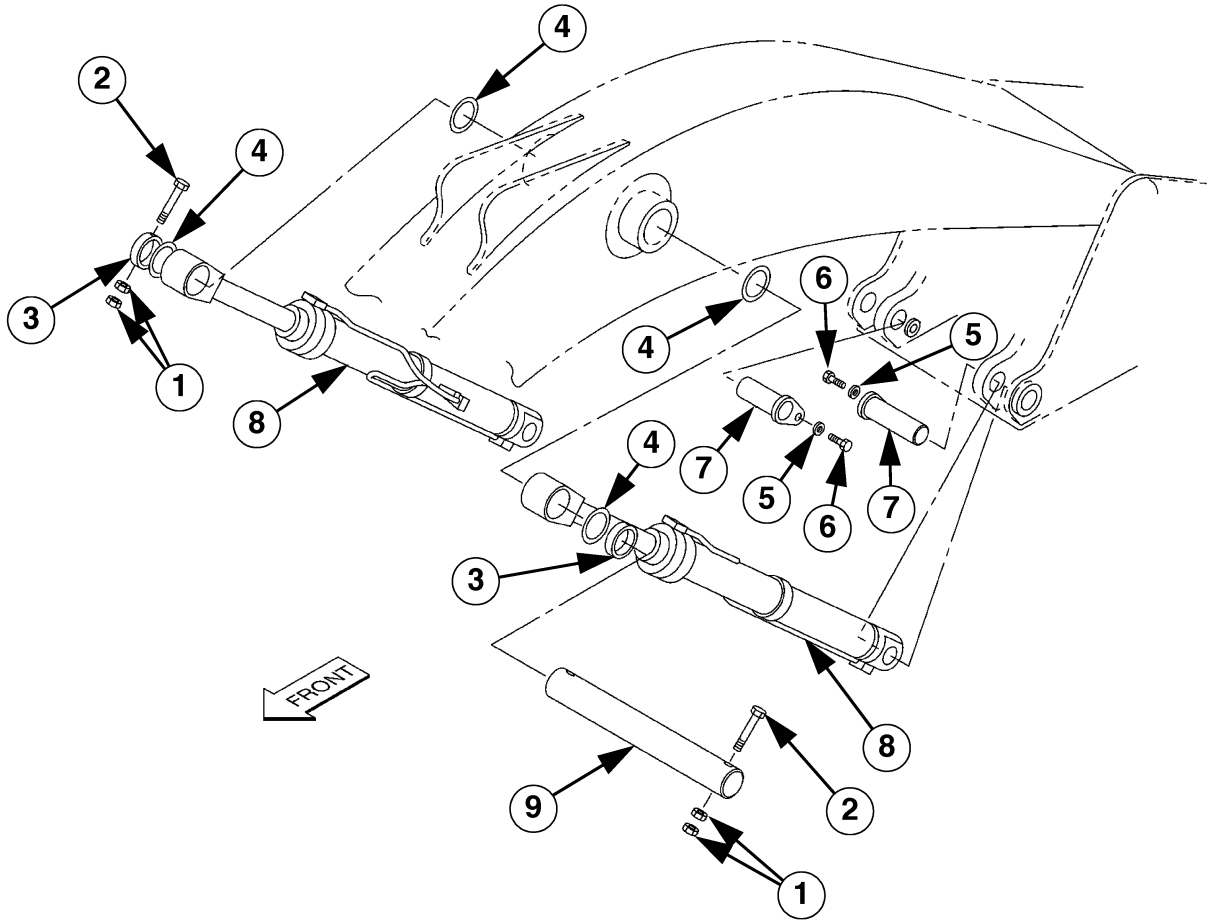
- 1 HYDRAULIC PUMP
- 2 COUPLING FLANGE
- 3 SCREW
- 4 ENGINE FLYWHEEL
- 5 SCREW FOR FIXING THE GROOVED SPACER ON THE SHAFT

- 6 SCREW FOR FIXING THE GROOVED SPACER ON THE SHAFT
- 7 SCREW FOR FIXING THE FLANGE ON THE ENGINE FLY-WHEEL
- 8 FLANGE
- 9 GROOVED SPACER

CRPH06B060F

BOOM CYLINDER

Description



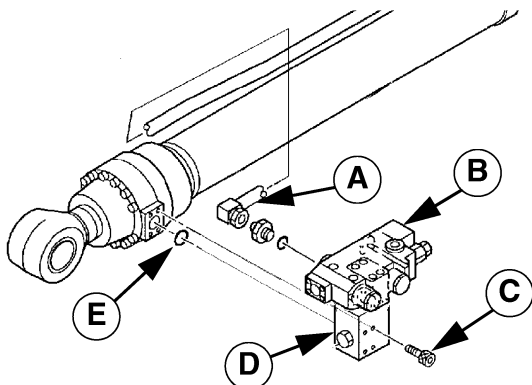
- 1 NUT
- 2 SCREW
- 3 LOCKING BUSHING
- 4 SHIM
- 5 WASHER

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

CS02B563

STEP 2

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

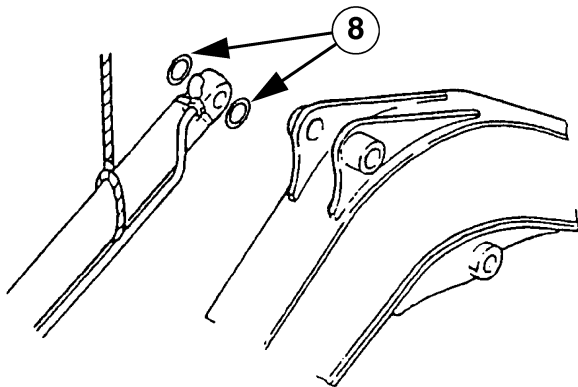


CS00G504

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.

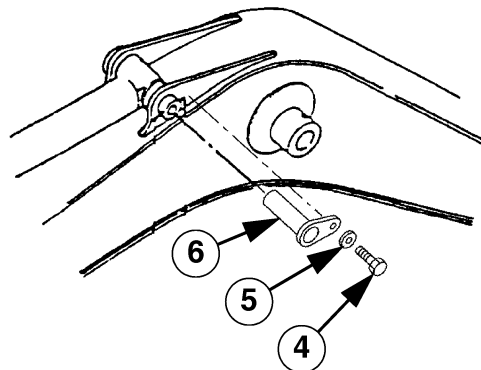
STEP 3



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).

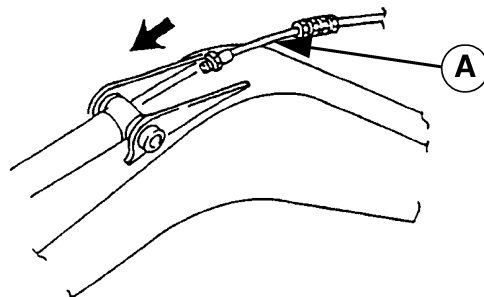
STEP 4



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



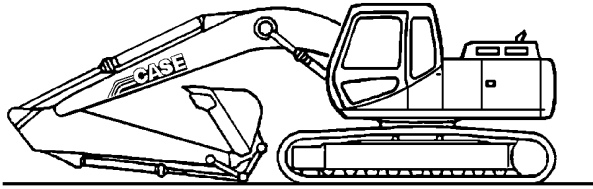
JS00604A

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

HYDRAULIC SWIVEL

Removal and installation

STEP 1

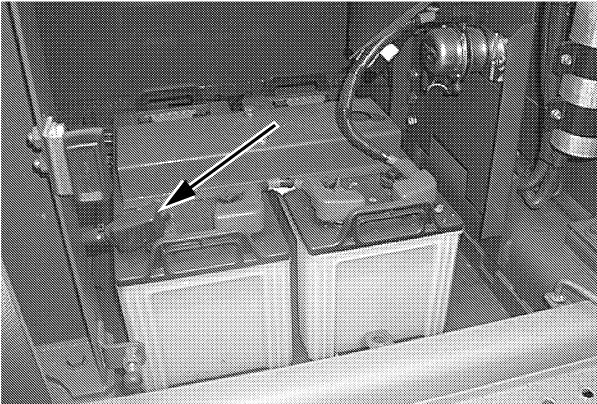


Park the machine on hard, flat ground. Lower the attachment to the ground. JS00163A

STEP 2

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

STEP 3

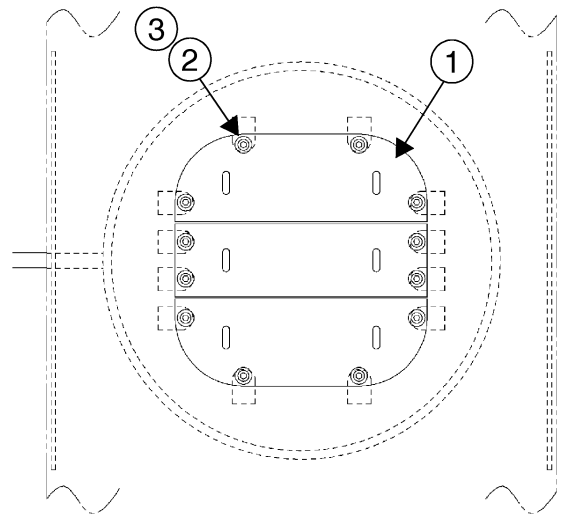


Disconnect the earth cable from the battery. CT05L063

STEP 4

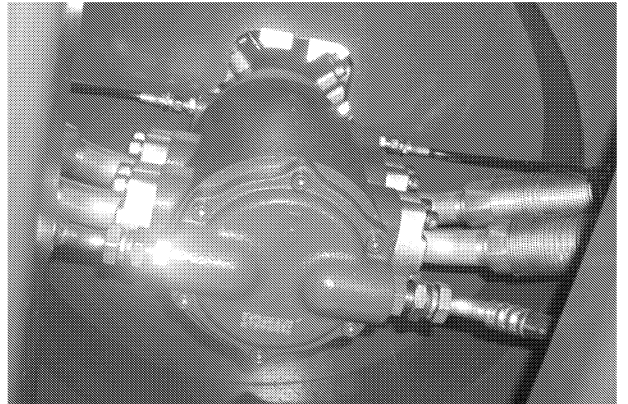
To prevent any fluid leaks when disconnecting hydraulic lines, connect a vacuum pump to the reservoir (see Section 8000).

STEP 5

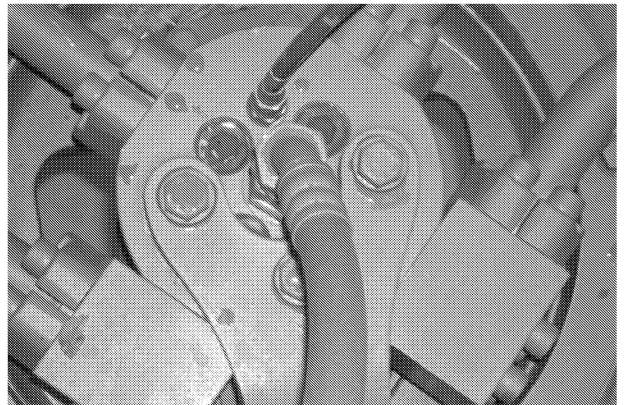


Remove the protective plate of the hydraulic swivel (1) under the machine using screws (2) and washers (3). CS01N580

STEP 6



CRPH06A008A



CRPH06A009A

To facilitate installation, attach identification labels to all the hydraulic swivel hoses (outer and inner).

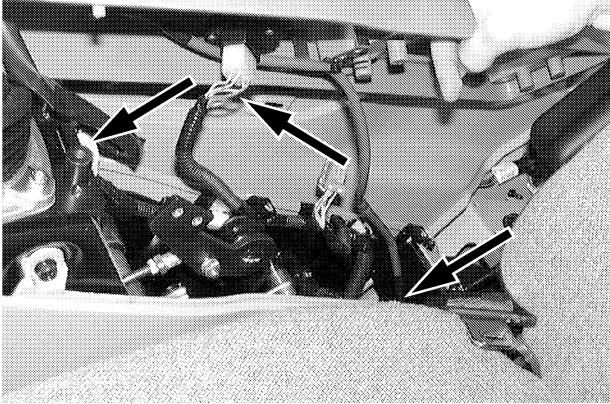
CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
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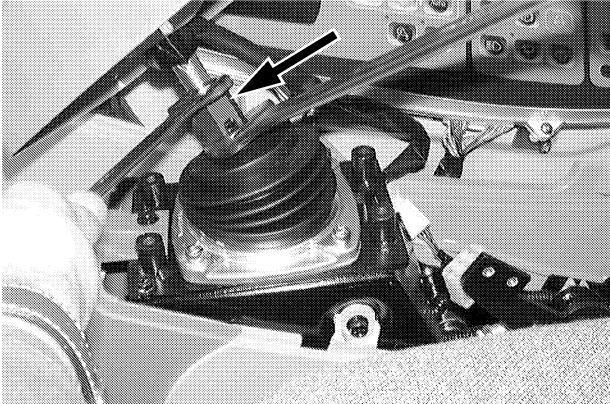
- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

STEP 6

CD00G071

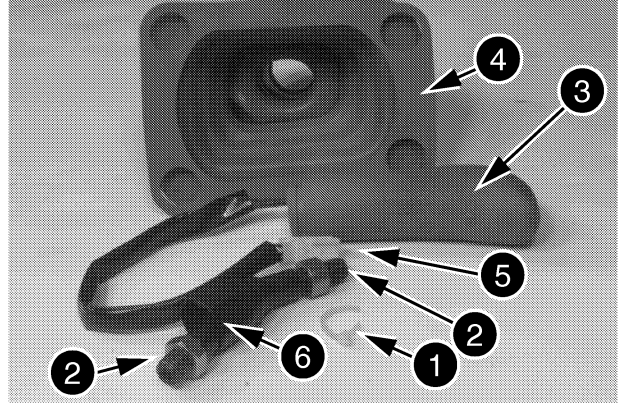
Lift the upper portion of the control arm, label and disconnect the electrical connections.

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 lb-ft).

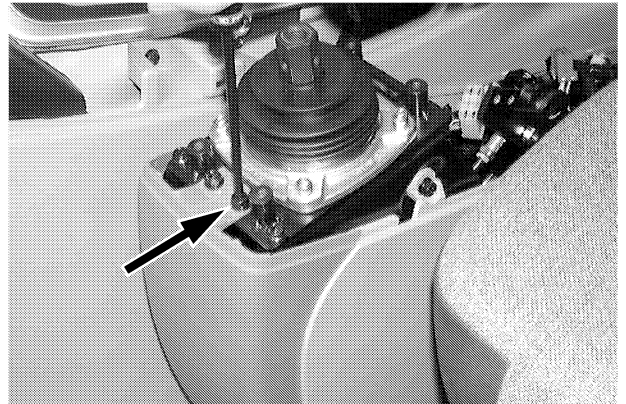
STEP 8

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.

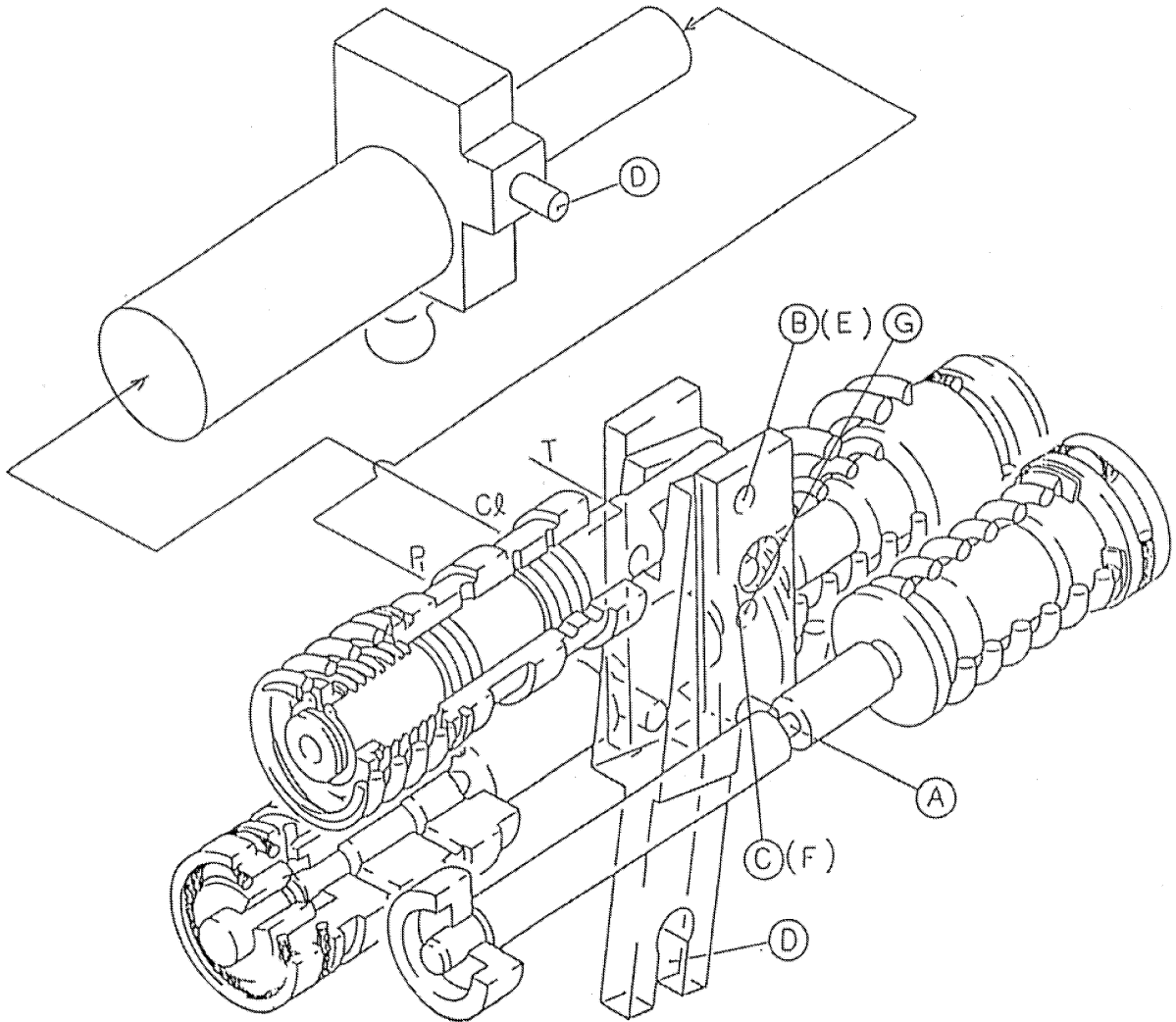
Section

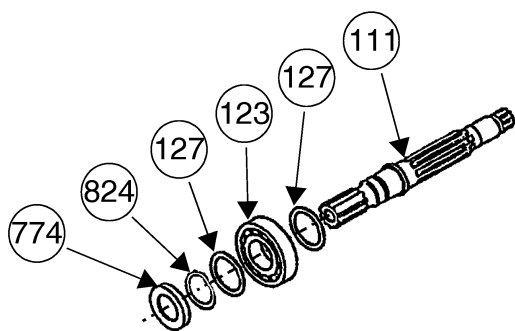
8010

MAIN HYDRAULIC PUMP DISASSEMBLY AND ASSEMBLY

EXPLANATORY DIAGRAM OF REGULATOR OPERATION

Regulator function diagram



STEP 10

CS02A530

Remove the spacer rings (774) from the shaft (111), if this is not already done. Remove the snap ring (824). Remove the shim (127), remove the bearing (123) and the shim (127). Proceed in the same manner when removing the other pump shaft (113).

STEP 11

Check the state of the bearings (124), replace them if necessary.

Section

8011

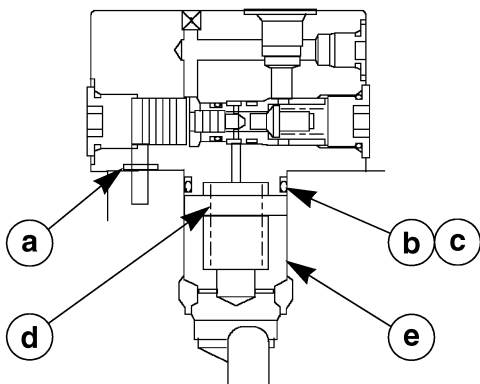
DISASSEMBLY AND REASSEMBLY OF THE CONTROL VALVE

Removing the section for dipper 2, boom 1, bucket, RH travel and straight-line travel

The numbers in brackets refer to the drawing on page 8.

Removing the boom load holding valve (14)

STEP 1



CI02A505

Unscrew the four screws and remove the boom load holding block.

STEP 2

Discard the O-rings (a) and (b) and the back-up ring (c).

STEP 3

Remove the spring (d) and the non-return check valve (e) from the control valve.

Removing from the non-return check valves (8), (9), (11)

STEP 1

Remove the dipper 2 non-return check valve from the control valve.

STEP 2

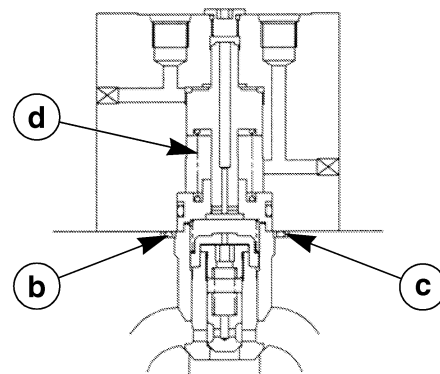
Remove the boom 1 non-return check valve from the control valve.

STEP 3

Remove the straight-line travel non-return check valves from the control valve.

Removing the bucket priority block (15)

STEP 1



700.7.04.01.11AN

Remove the screws from the bucket priority block (15).

NOTE: Be careful of the spring (d) under pressure that can be ejected from the boom priority block.

STEP 2

Remove the O-ring (b) and the back-up ring (c) from the control valve.

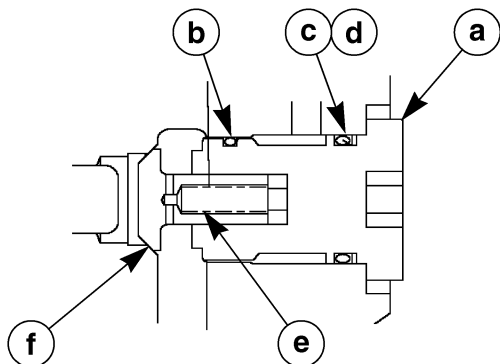
STEP 3

Remove the check valve assembly from the control valve.

Removing the connection section from the control valve (23)

Removing the non-return check valve option (24)

STEP 1



CI02A513

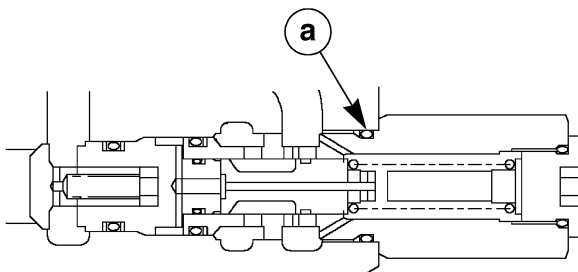
Remove the plug (a) from the section (23).

Remove the insert (b), the O-ring (c) and the back-up ring (d).

STEP 2

Remove the spring (e), then the non-return check valve (f).

Removing the free return valve (25)

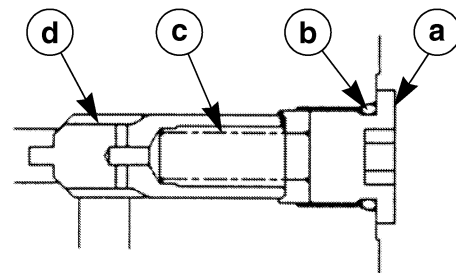


CI02A514

Remove the free return valve and discard the O-ring (a).

Removing the straight-line travel non-return check valve restrictor (26)

STEP 1



700.7.04.01.11BU

Remove the plug (a) and discard the O-ring (b).

STEP 2

Remove the spring (c) and remove the check valve (d).

Removing the plug (27)

Unscrew, then remove the screws, remove the cover and discard the O-ring.

Removing the plug (28)

Remove the plug (28) and discard the O-ring.

Installing the connection section from the control valve (23)

Installing the plug (28)

Install a new O-ring on the plug and install the assembly on the connection section.

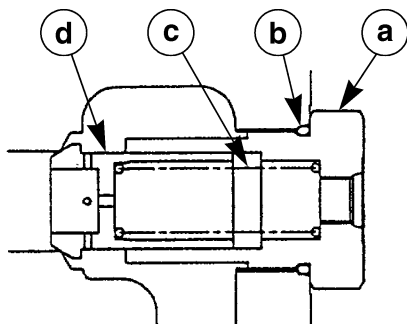
Installing the plug (27)

Install a new O-ring on the cover and install the cover on the section, tighten the screws.

NEGATIVE CONTROL RELIEFS (N1), (N2)

Disassembly

STEP 1



CS02A568

Remove the nut (a) and discard the O-ring (b).

STEP 2

Remove the spring (c) then the check valve (d).

Inspection

See "Inspection" chapter page 35.

Assembly

STEP 1

Install a new O-ring (b) on the nut (a).

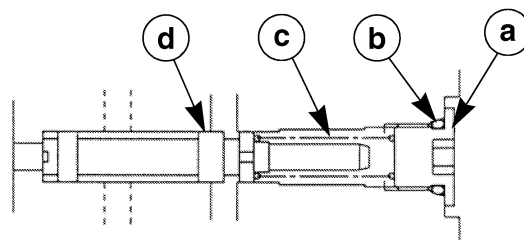
STEP 2

Install a spring (c) then a check valve (d) in the nut. Install the assembly on the control valve, tighten to a torque of 245 Nm (180.7 lb-ft).

STRAIGHT-LINE TRAVEL PILOT (18)

Disassembly

STEP 1



700.7.04.01.11BQ

Remove the plug (a), discard the O-ring (b).

STEP 2

Remove the spring (c) then the spool (d).

Inspection

See "Inspection" chapter page 35.

Assembly

STEP 1

Install the spool (d) then the spring (c) in the control valve.

STEP 2

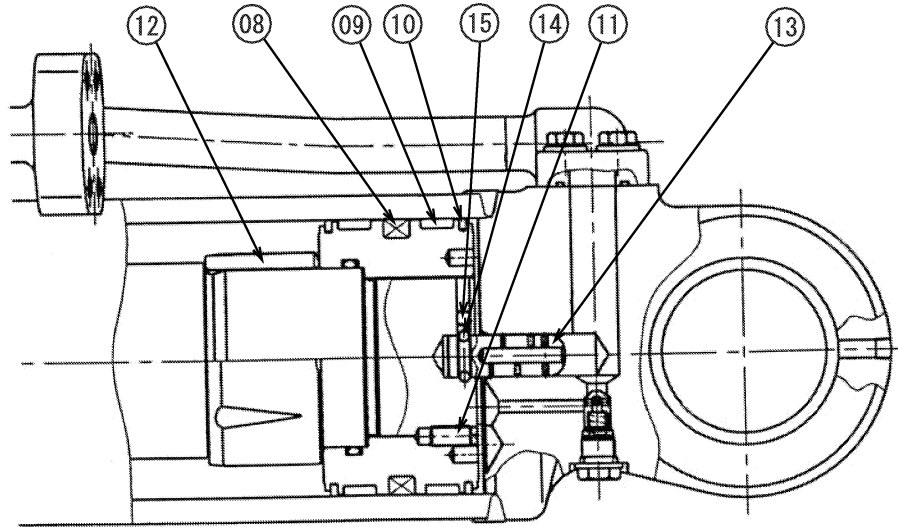
Install a new O-ring (b) on the plug (a). Install the assembly on the control valve, tighten to a torque of 29.4 Nm (21.6 lb-ft).

Piston ring (08)

The sealing, which is located at the center of the piston, seals the annular space formed between the piston and cylinder tube. It divides into high pressure and low pressure chambers by using the piston as a boundary.

Ring (09) and (10)

The wear rings are located at both ends of the piston ring and are in contact with the inner surface of the cylinder tube. They reduce eccentricity, which adversely affects the seal performances, by sharing lateral load applied on the cylinder together with the bushing located on the inner surface of the cylinder head. They also perform high-bearing linear motion against the cylinder tube inner surface, as well as supporting one end of the piston rod. The ring (10) submerges and captures contaminants engaged between the cylinder tube and the wear ring.



000-7-05-02-20AB

Screw (11)

Screw prevents the piston from turning.

Plunger (13)

It generates high pressure in the cushion chamber and this softens the cylinder's impact at the most shorten position.

Ball (14)

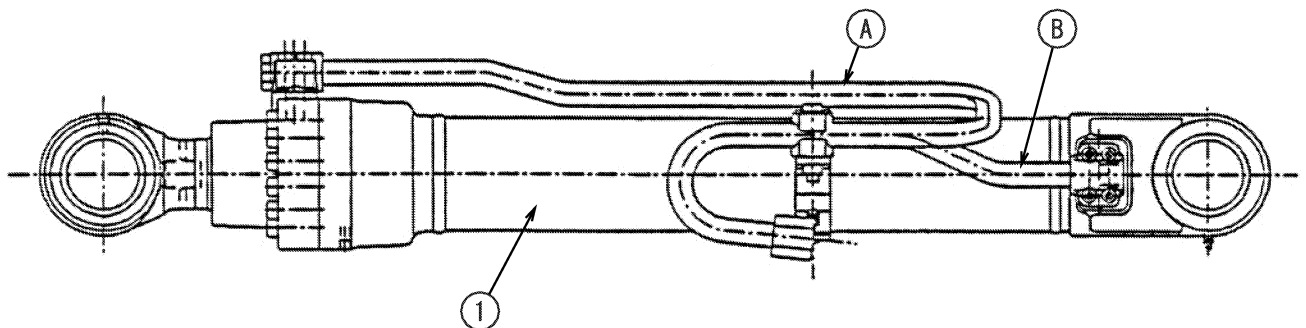
Ball is an omission stop of plunger. Moreover, eccentric of plunger is prevented.

Cap (15)

Cap prevents the ball from coming off.

3) Pipes (A) and (B)

A pair of pipes are located on each port on the extension and retraction side on the cylinder tubes (1). The pipes supply and drain high-pressure oil from the flexible hose connection end to the cylinder tube port.

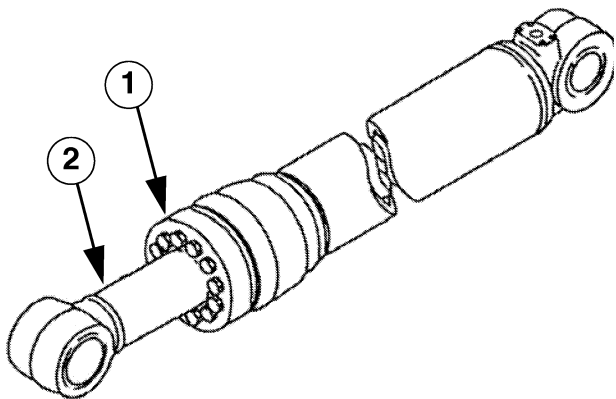


000-7-05-02-20AB

BOOM CYLINDER

Disassembly

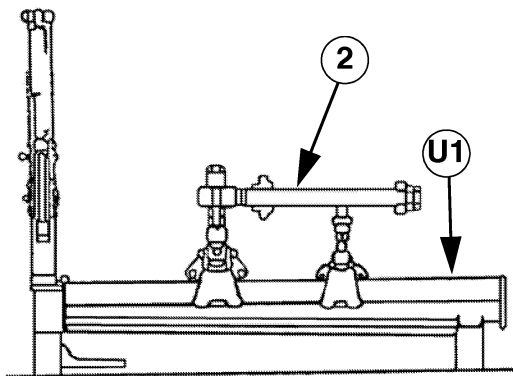
STEP 1



CRPH06B008A01

Remove the piping from the cylinder assembly.
 Remove the mounting bolts and disconnect head assembly (1).
 Pull out piston rod assembly (2).
 Place an oil receiving pan under the cylinder to receive the oil.

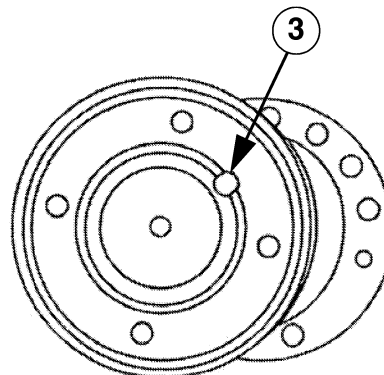
STEP 2



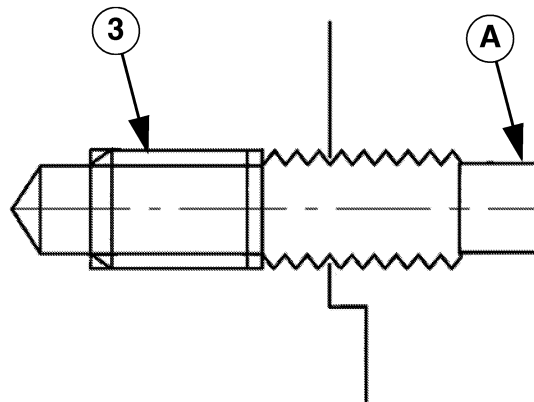
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Disassemble the piston rod assembly according to the following procedure.
 Set piston rod assembly (2) to tool U1.

STEP 3



CRPH06B010A01

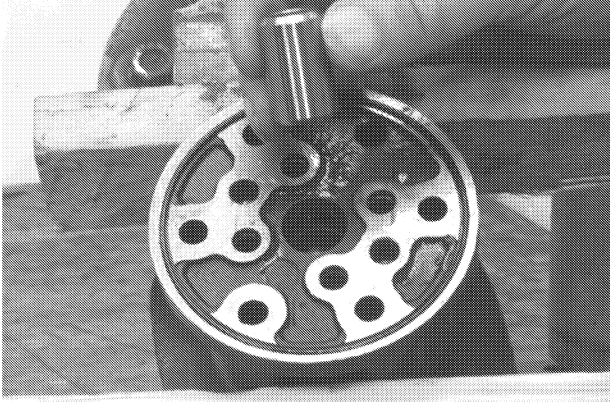


CRPH06B011A01

Remove piston assembly set screw (3).
 If screw (3) is caulked too strongly and you cannot remove it, tighten it temporarily and cut the female threads with a tap (A), and then remove it.

Item	Symptom	Related parts	Error Item	Preventive/remedy measures
4	4-1 Does not move smoothly	Piston rod, cylinder tubes	Curved too much; exceeds specified curve distortion level.	Replace with a new one. Check seals and sliding materials also because they may be damaged. If abnormality is found, replace.
		Cylinder tubes	Dents	Replace with new ones. Same as above described, check seals and sliding materials.
Piston rod, cylinder tubes, sliding materials		Abnormal wear and damage on the sliding parts Foreign substances engaged in the piston and cylinder head sliding parts	Replace with new ones. Same as above described, check seals and sliding materials. Remove foreign substances. Same as above described, check seals and sliding materials.	
4-2 Internal oil leakage makes the piston rod extend or retract or fall abnormally while operating or can not give specified speed output.	Piston seal	Damage such as scratches and wear is found.	Replace with a new one. Also check the cylinder's inner face.	
	Cylinder tubes	Scratches and rust on the inside surface.	Remove scratches and rust by honing or with oil-stone to smooth the surfaces. If scratches are too big to repair, replace cylinder tubes with new ones. Replace piston seals with new ones.	
	Piston tightening	Loose tightening	Fasten with specified tightening torque. Refer to Tightening torque.	
	Valves	Leakage from valves	Check the valve leakage volume and repair if necessary.	
	CAUTION: Hydraulic oil tends to expand and shrink according to changes in temperature and pressure. This also causes cylinders to extend and retract; therefore, we sometimes see this as internal oil leakage. Check internal oil leakage under a given pressure condition.			

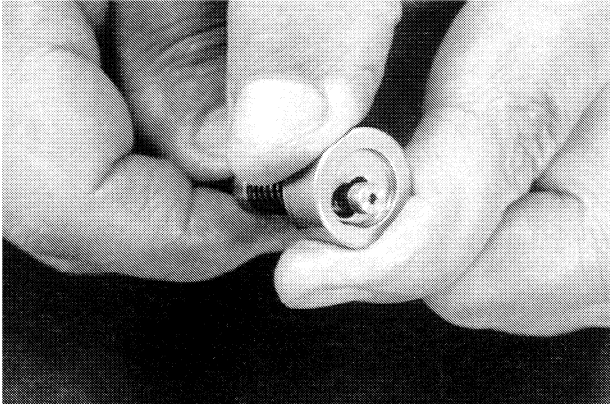
STEP 10



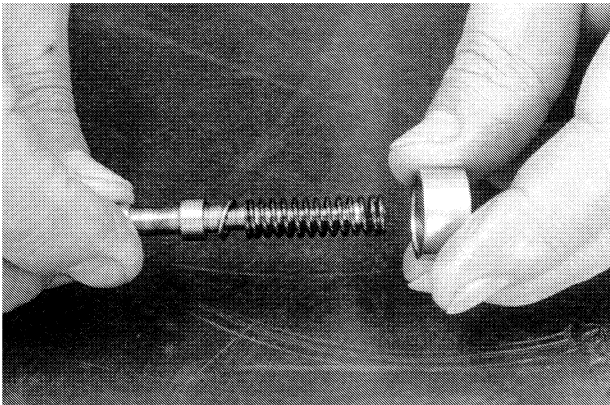
JD00774A

Remove the bushing from the body of the control lever.

STEP 11



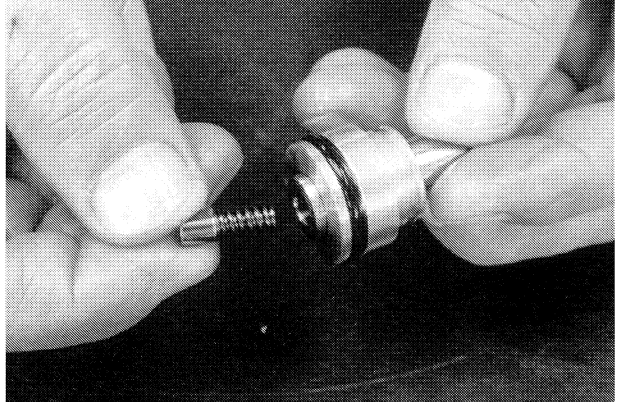
CD00G096



CD00G097

Press the spring down a few millimetres so as to free the spool (11) from the spring seat (8). Separate the spool (11) from the spring (10) and the washer (22). Keep these components together for the reassembly procedure.

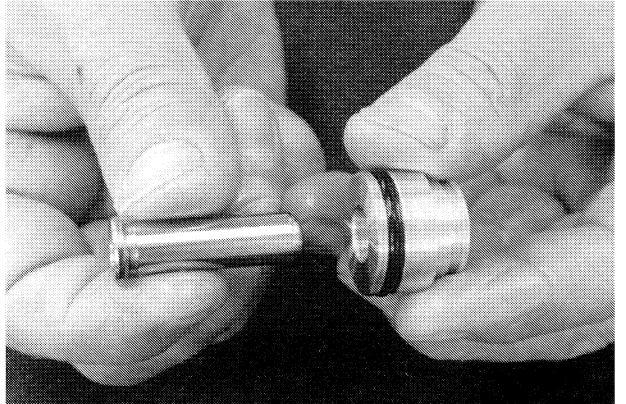
STEP 12



CD00G098

Remove the spool (17) and the spring (18) from the plunger assembly (6).

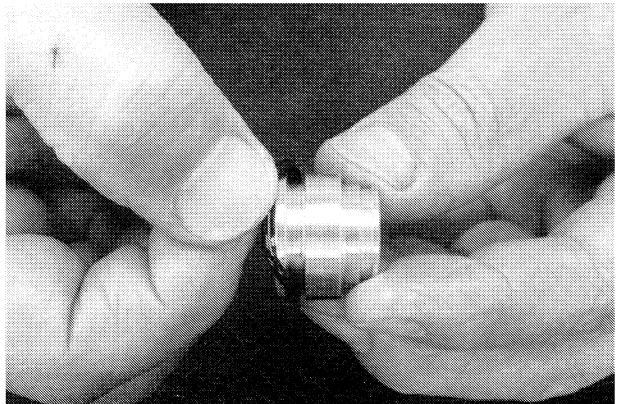
STEP 13



CD00G099

Remove the push-rod (4) from the plunger assembly (6).

STEP 14

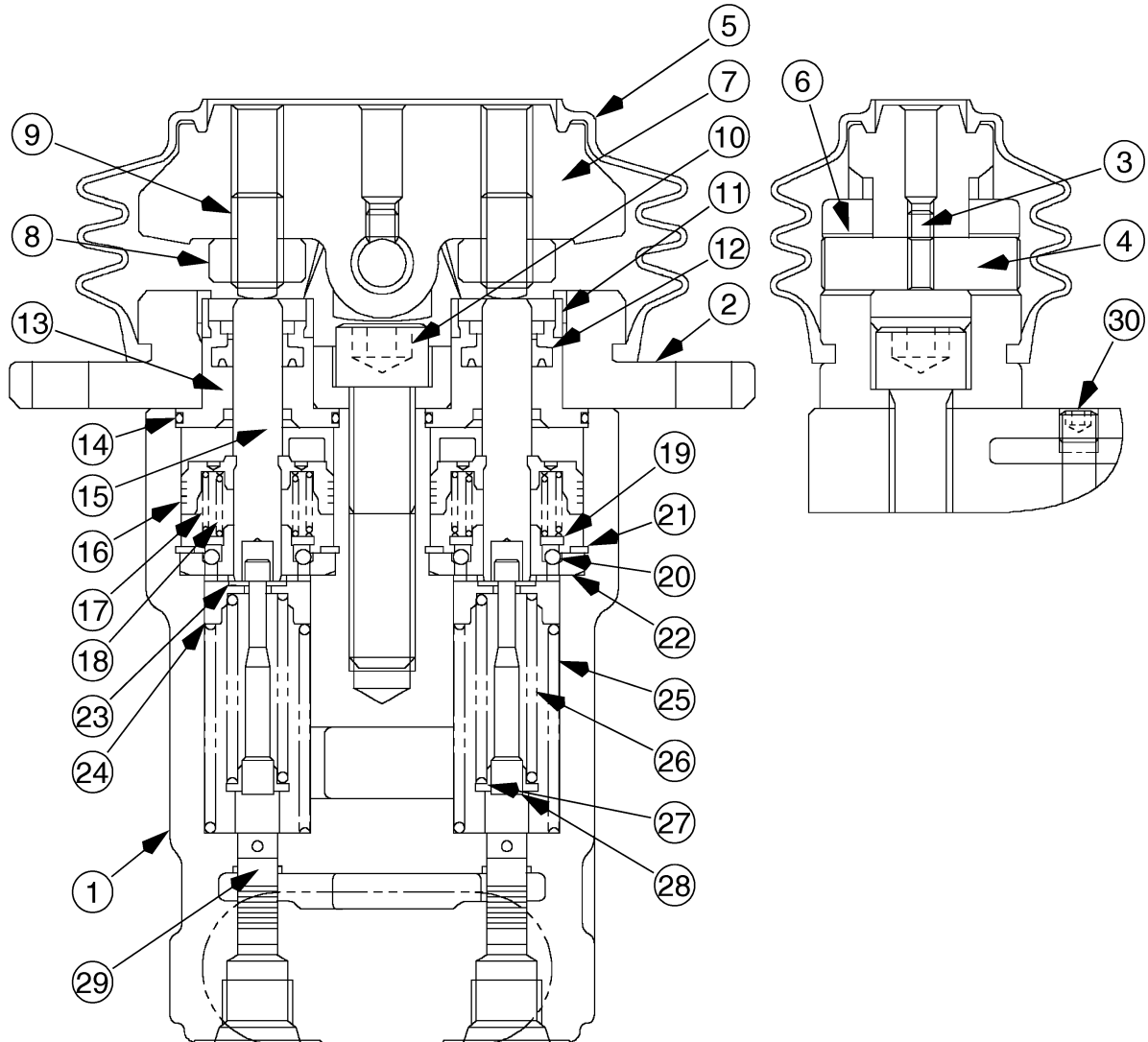


CD00G100

Remove and scrap the plunger assembly O-ring.

CONTROL PEDAL

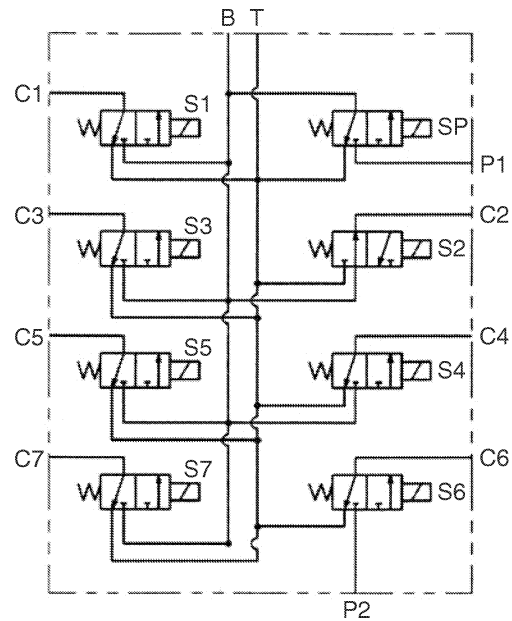
Description



- | | | | |
|----|-----------------|----|--------------------|
| 1 | BODY | 16 | PISTON |
| 2 | COVER | 17 | SPRING |
| 3 | LOCKING SCREW | 18 | SPRING |
| 4 | CAM SHAFT | 19 | SPRING SEAT |
| 5 | BOOT | 20 | BALL |
| 6 | BUSHING | 21 | RETAINER |
| 7 | CAM | 22 | BUSHING |
| 8 | BRAKE NUT | 23 | WASHER |
| 9 | SCREW | 24 | SPRING SEAT |
| 10 | RETAINING SCREW | 25 | SPRING |
| 11 | CAP | 26 | COMPRESSION SPRING |
| 12 | RETAINER | 27 | WASHER |
| 13 | PLUG | 28 | WASHER |
| 14 | O-RING | 29 | SPOOL |
| 15 | CONTROL ROD | 30 | PLUG |

CS02A503

Theory of operation

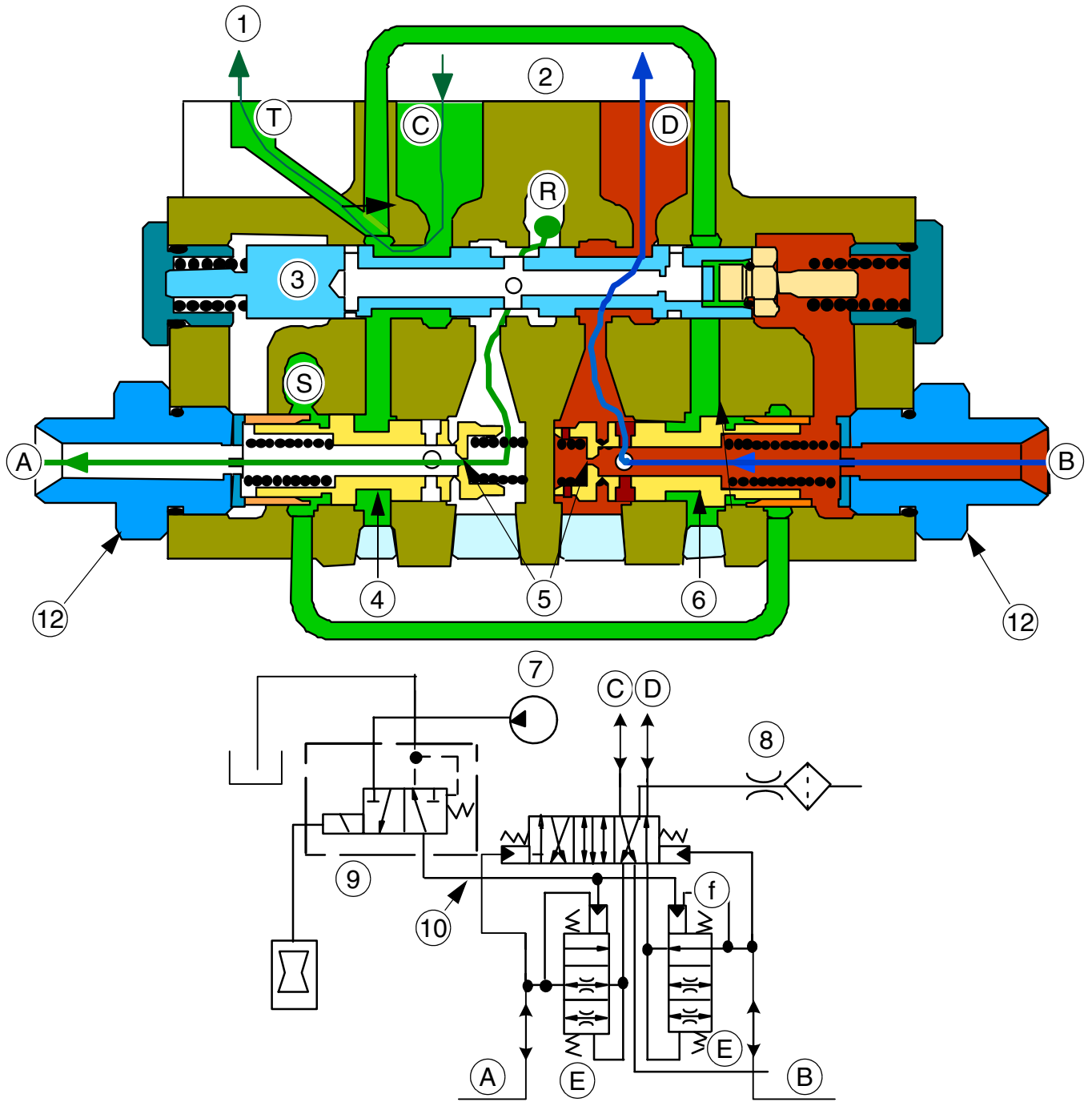


The hydraulic pressured oil delivered from port P1, P2 is supplied to the electromagnetic valves, S1 to S7 when the electromagnetic selector valve SP is energized, and the hydraulic pressured oil is supplied to the ports, C1 to C7, according to the energization on the electromagnetic selector valves S1 to S7.

Electromagnetic selector valves S1, 3, 4, 5, 6 and 7: Oil passes through when energized

Electromagnetic selector valve S2: Oil passes through when not energized.

000-7-07-01-12B



- 1 TO RETURN FILTER
- 2 TO BOOM OR ARM SPOOL
- 3 SPOOL F
- 4 SPOOLS E
- 5 ORIFICES
- 6 SPOOLS E

- 7 PILOT PRESSURE
- 8 FROM CONTROL VALVE RETURN
- 9 CUSHION SHUT-OFF SOLENOID VALVE
- 10 S PORT
- 11 TO RETURN FILTER
- 12 FROM HAND CONTROL

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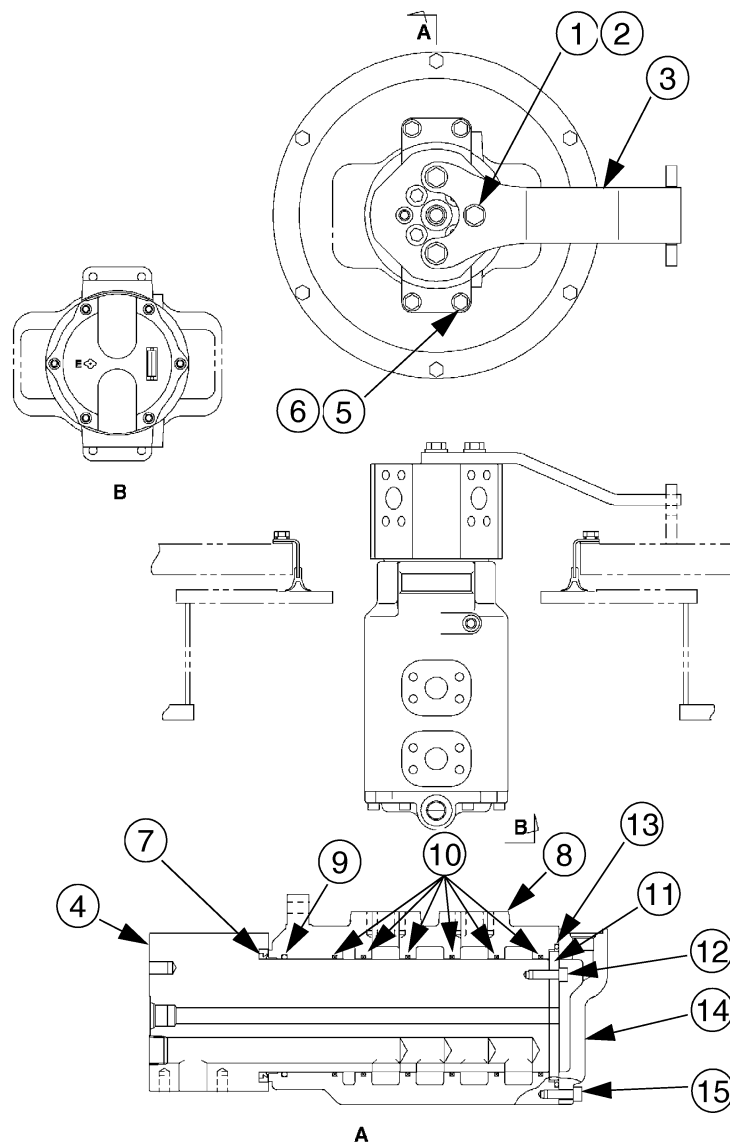
Section 8017

SAFETY VALVES

8017

HYDRAULIC SWIVEL

Description

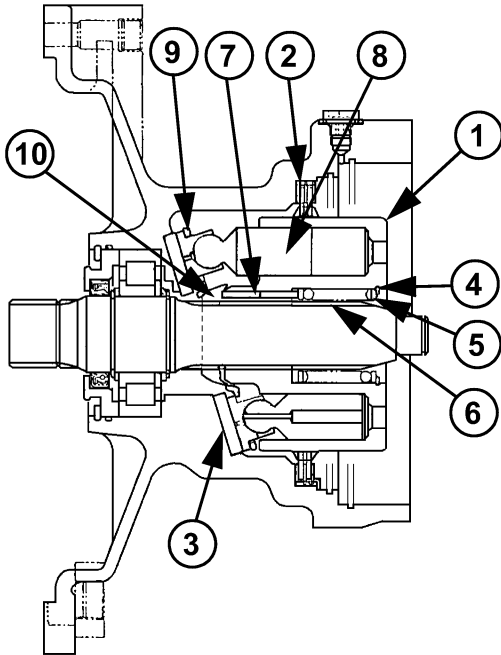


- 1 SCREW
- 2 WASHER
- 3 LOCKING BAR
- 4 PIVOT (INNER COMPONENT)
- 5 CAP SCREW
- 6 WASHER
- 7 "V" SEAL
- 8 BUSHING (OUTER COMPONENT)

- 9 O-RING
- 10 SEALING RING
- 11 THRUST PLATE
- 12 HEXAGONAL ALLEN TYPE CAP SCREW
- 13 O-RING
- 14 COVER
- 15 HEXAGONAL ALLEN TYPE CAP SCREW

CS02A502

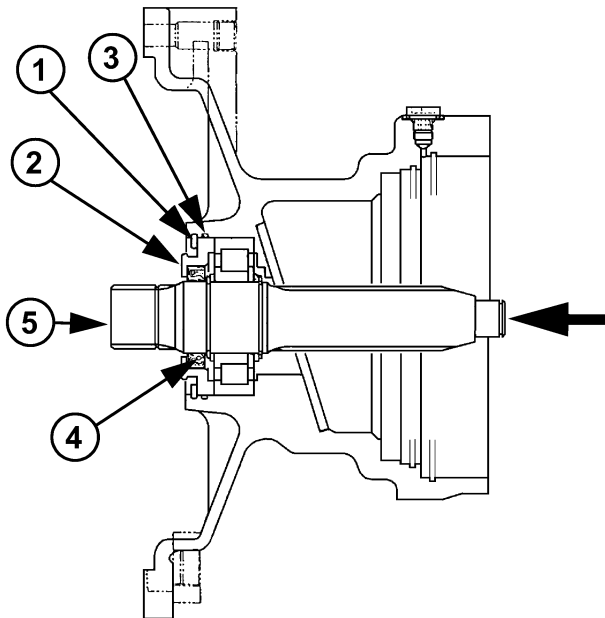
STEP 4



CS99J552

Place the engine horizontally. Remove the cylinder block (1), the brake disks (2), the plate (3). Remove the snap ring (4), the spacer (5) and the spring (6) and the push rods (7). Remove the pistons (8), the guide plate (9) and the spherical bushing (10).

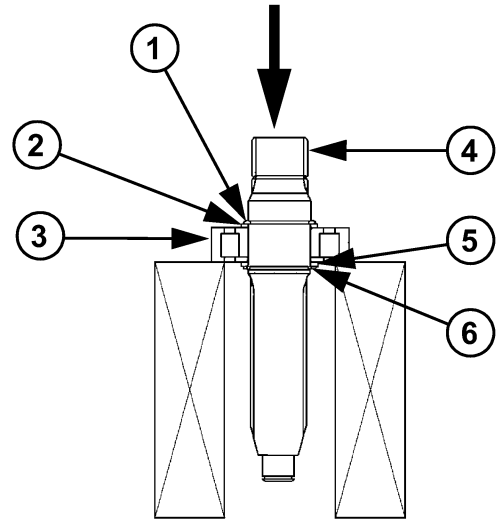
STEP 5



CS99J553

Remove the snap ring (1) using the clamp. Extract the seal carrier cover (2). Discard the seals (3) and (4). Using a plastic mallet, force the engine shaft out (boom).

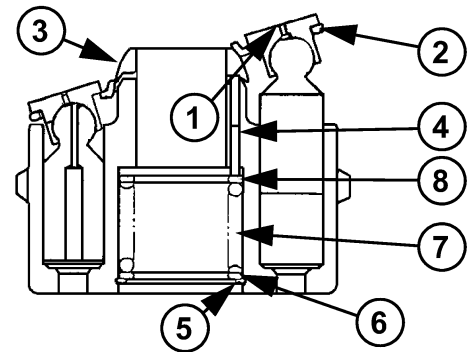
STEP 6



CS99J554

Remove the retaining ring (1) and the spacer (2). Install the shaft (4) equipped with the bearing (3) in a press. Force the shaft (4) out and remove the bearing (3). Remove the snap ring (5) and the spacer (6).

STEP 7



CS99J555

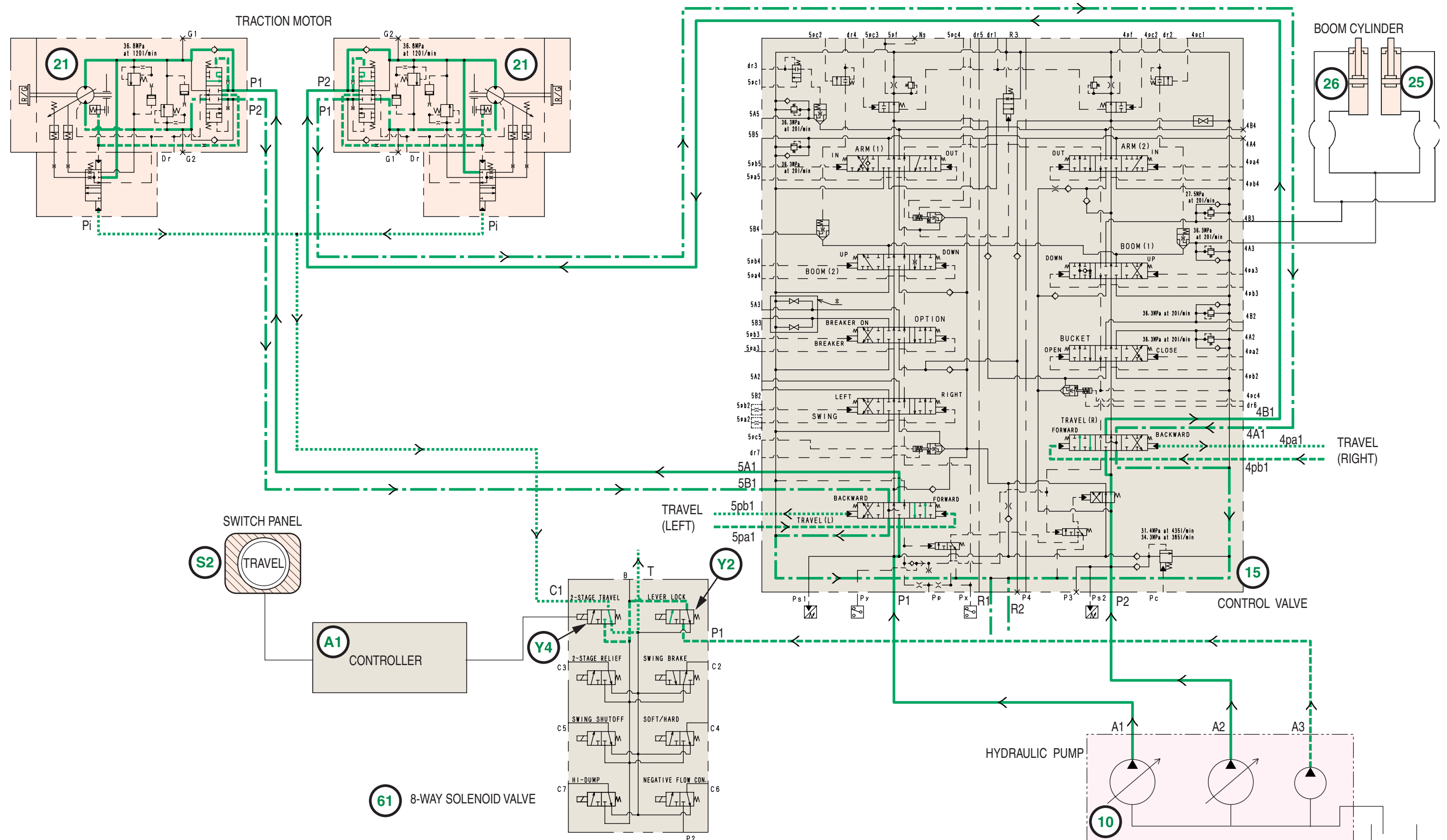
Mark the position of the pistons on the cylinder block. Remove the shoe piston assembly (1) equipped with the guide plate (2). Remove the spherical bushing (3), the push rods (4). Remove the snap ring (5). Remove the spacer (6), the spring (7) and the spacer (8).

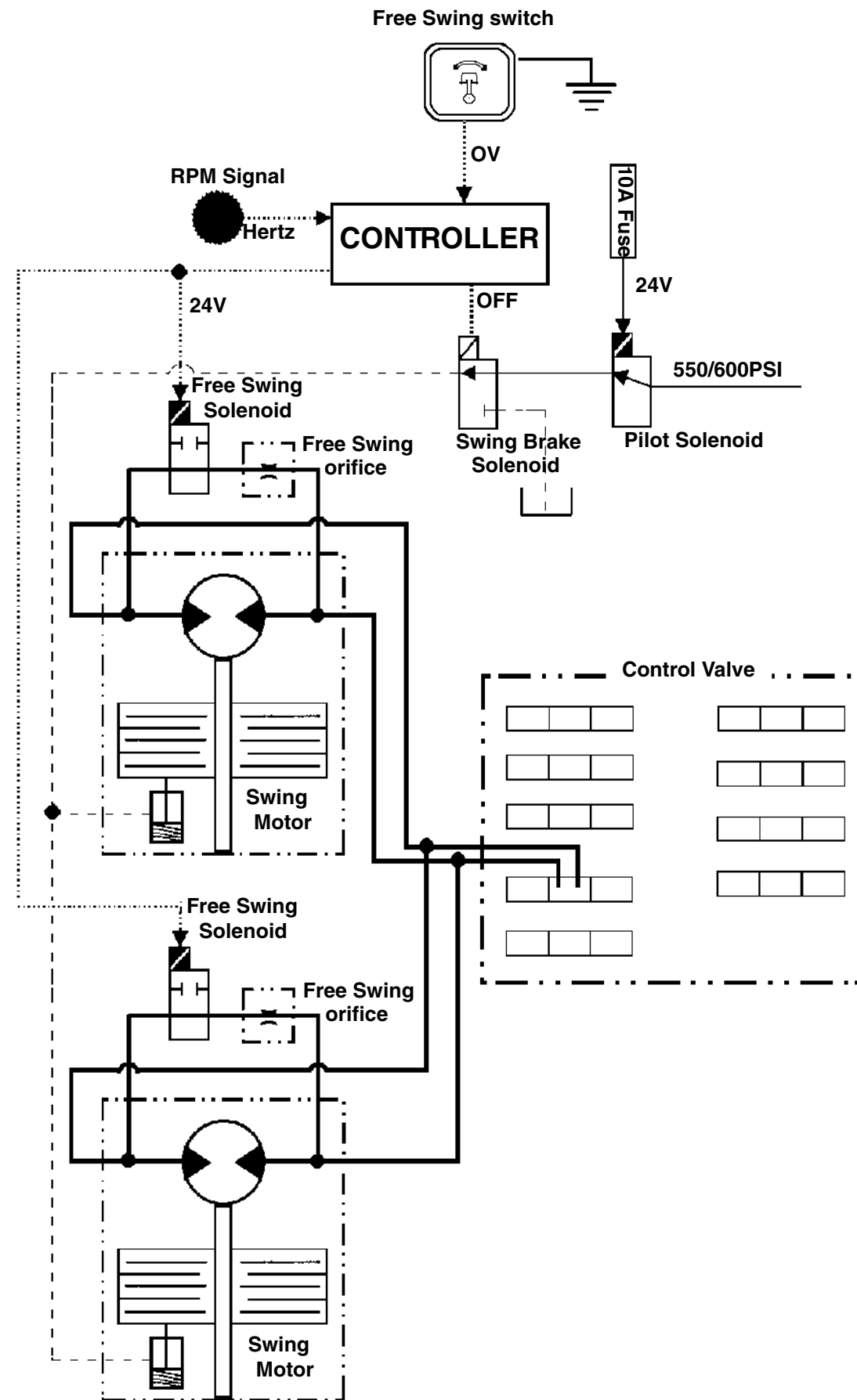
Symptom	Cause	External inspection	Solution	Repair
Overheating	Seizing of sliding parts or the rotating parts of the motor.	Check for any accumulation of filings in the engine drainage oil or in the drain filter. Apply a servo control pressure of 580 psi at the brake release port and try to rotate the shaft with a torque of about 14.7 to 22 lb-ft.	In case the presence of filings is detected, or if a drive shaft is not rotating freely under the effect of this torque, there is a strong possibility that the internal components of the motor are damaged. Remove the assembly and carry out an inspection.	Repair or replace the damaged parts. Replace the motor assembly
Oil leaks from contact surfaces	Damaged O-ring.			Replace the O-rings.
	Contact surfaces damaged.			Repair or replace the contact surface.
	Loose screws.	Check the tightening of the screws.	Tighten the screws to the specified torque.	
Leak in the housing	Lack of power		If the leak volume in the housing when measured by applying the rated pressure and by locking the motor exceeds 8.1 gpm (see the method in Section 8001).	Change the damaged components or change the motor assembly.

Table 2

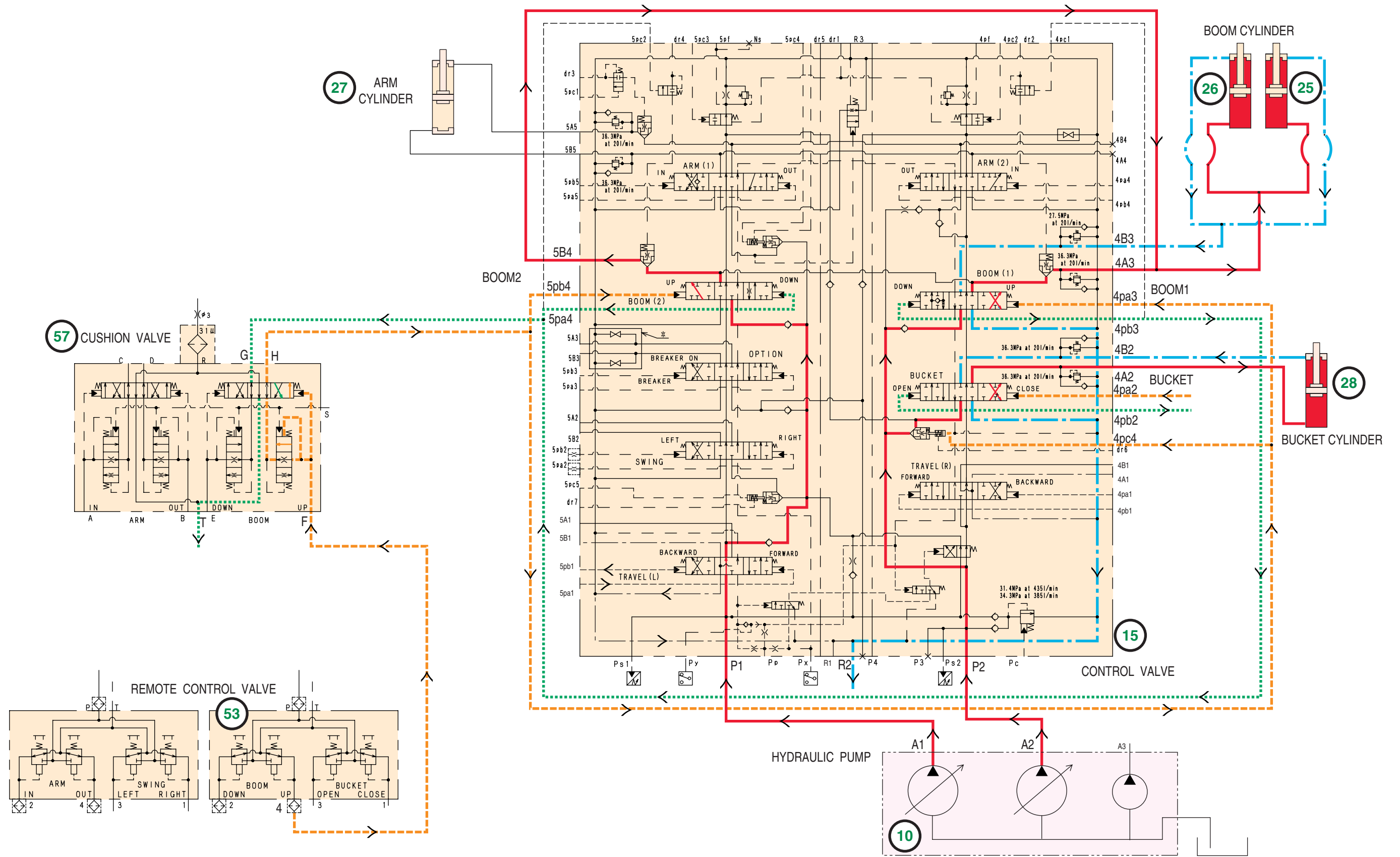
No.	Inspected part	Repair
a	Wear on the sliding surface of the distribution plate (19).	Change the part.
b	Damage on the sliding surface of the plate (11).	Change the part or change the motor
c	Damage on the sliding surface of the piston assemblies (12).	Change the part or change the motor
d	External wear of the piston assemblies (14).	Change the part or change the motor
e	Wear of the piston bores of the cylinder (28).	Change the motor

Low Speed Travel Circuit

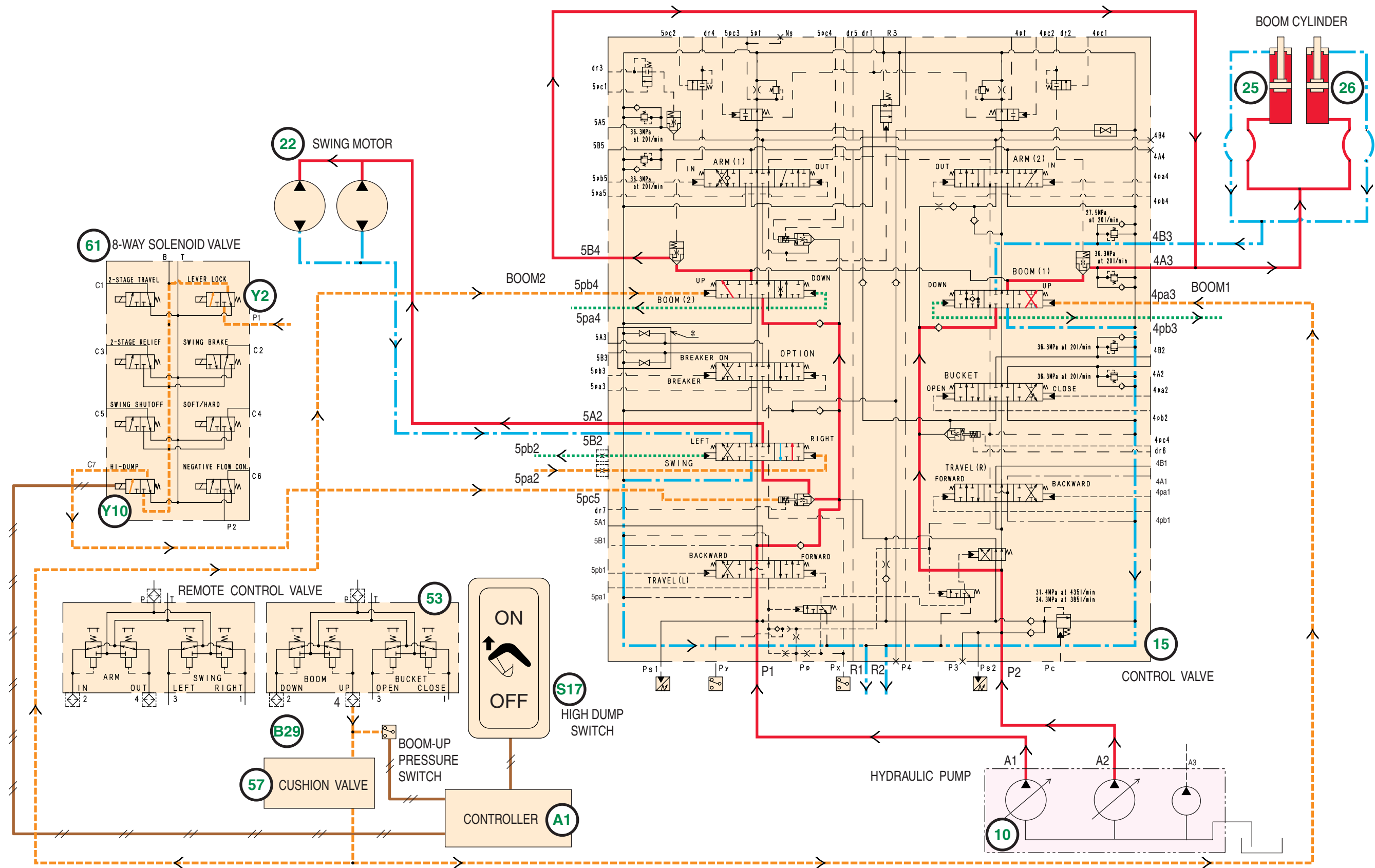




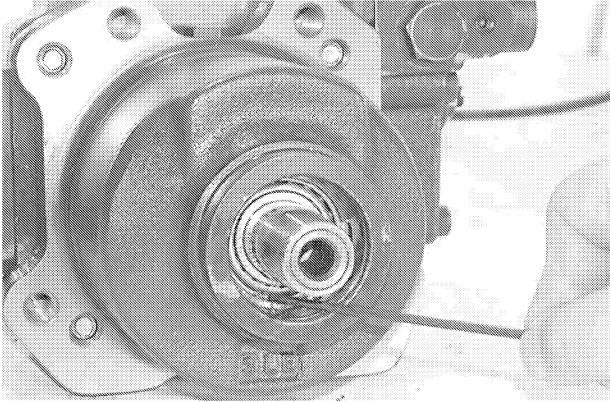
Boom-Up Circuit (Combined)



High Dump



STEP 5



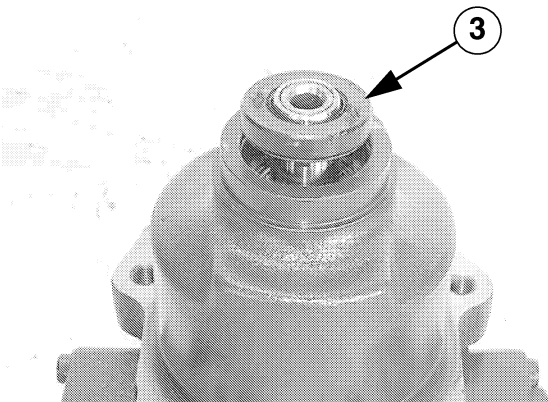
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Remove the foreign substance remaining in the seal groove to clean the groove completely.

NOTE: When cleaning, take care that foreign matter will not enter the bearing.

Assembly

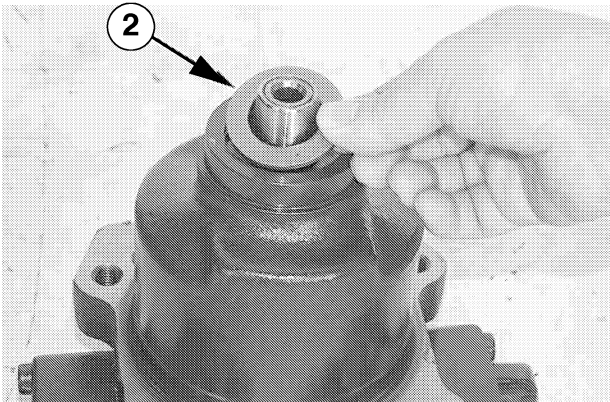
STEP 1



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After applying grease on the inside surfaces of the lip of the oil seal (3), install the oil seal into the shaft.

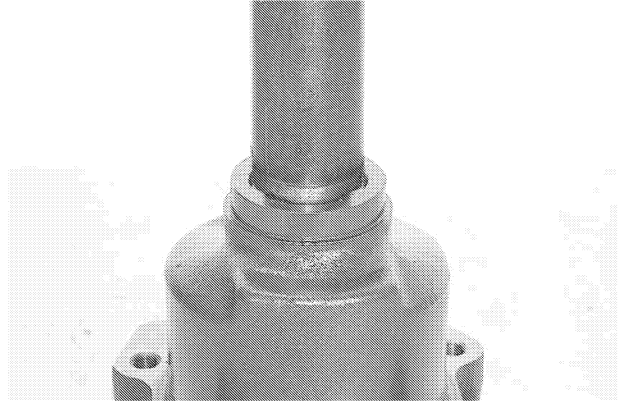
STEP 2



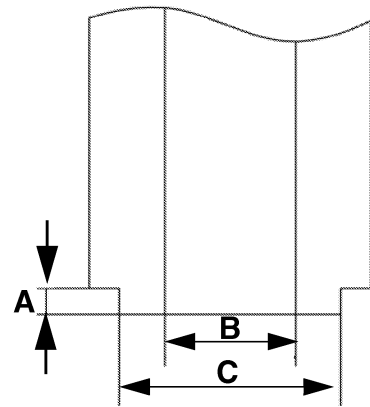
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Install the spacer (2).

STEP 3



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CRPH06B025A01

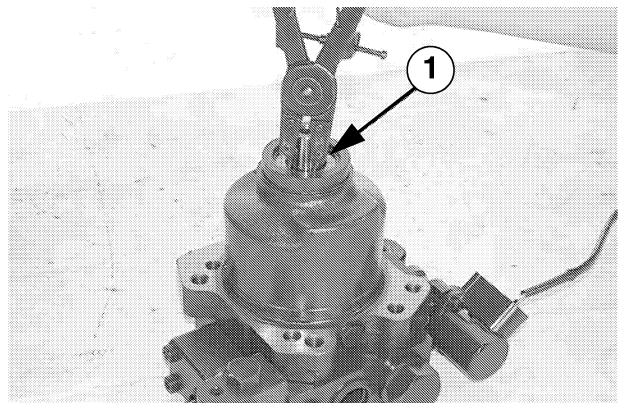
Install the oil seal into the seal groove using a press-fitting tool.

(A) 5.2 ± 0.1 (mm)

(B) $\varnothing 26$ (mm)

(C) $\varnothing 44$ (mm)

STEP 4



CRPH06B019A01

Using snap ring pliers, install the snap ring (1) into the ring groove.

NOTE: Check and make sure that the snap ring is being inserted securely into the ring groove.

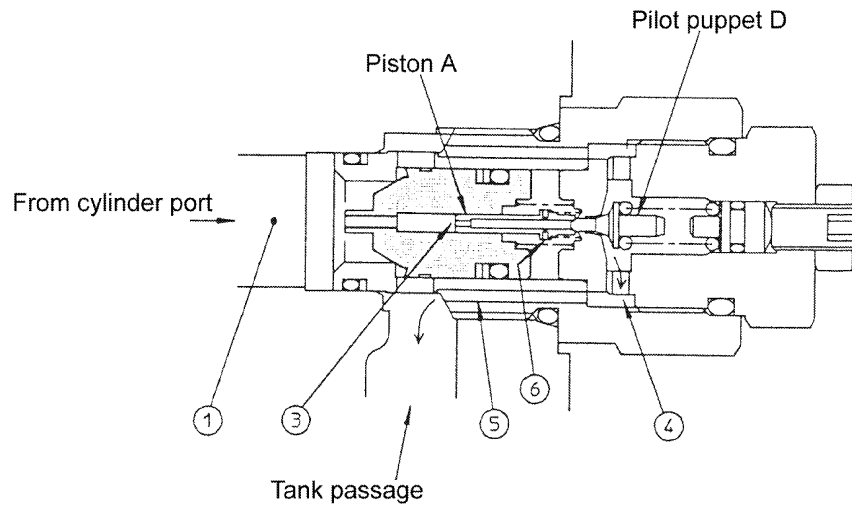
Installation

NOTE: *When installing the fan pump on the machine, proceed in the reverse order from that of removal.*

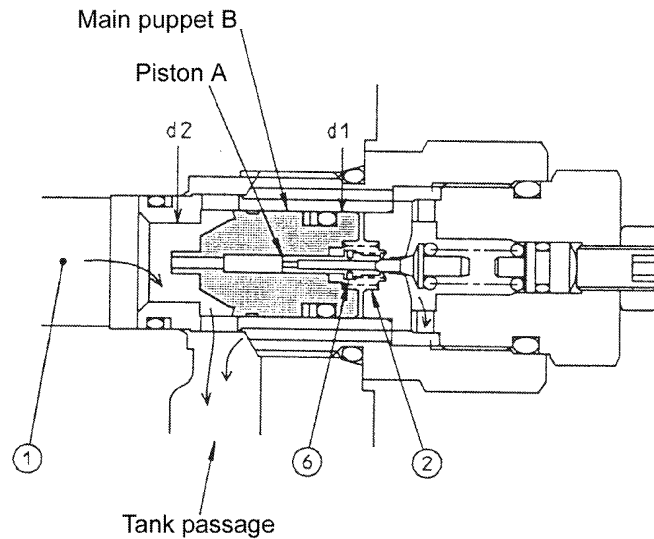
Before operating the machine, carry out the following operations:

- Bleed and prime the fuel system (see Operator's Manual).
- Fill and bleed the engine cooling system (see Operator's Manual).
- Check the hydraulic, fuel and cooling systems for leaks.
- Check the oil level in the hydraulic reservoir. Top up if necessary.

- 3) Oil flow is composed and the pressure reduction occurs at the front and the rear of the orifice [3] of the piston A, and the piston A moves to the right and is seated at the top of the pilot puppet D. The oil in the room [1] runs through the orifice [6] of the piston A, the horizontal hole [4] and the passage [5], and runs to the tank passage.



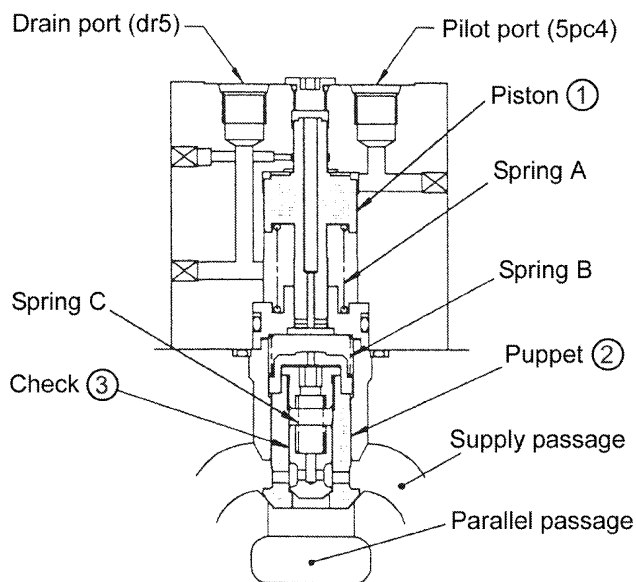
- 4) The pressure reduction occurs at the front and the rear of the orifice [6] of the piston A and, when becoming to the Pressure in the room [1] x Area of d2 portion > Pressure in the room [2] x Area of d1 portion, the main puppet B opens and the circuit let the pressured oil in the cylinder port run to the tank passage, which protects the actuators.



[2] When the swing spool is operated.

- 1) When Parallel passage pressure \leq Supply passage pressure

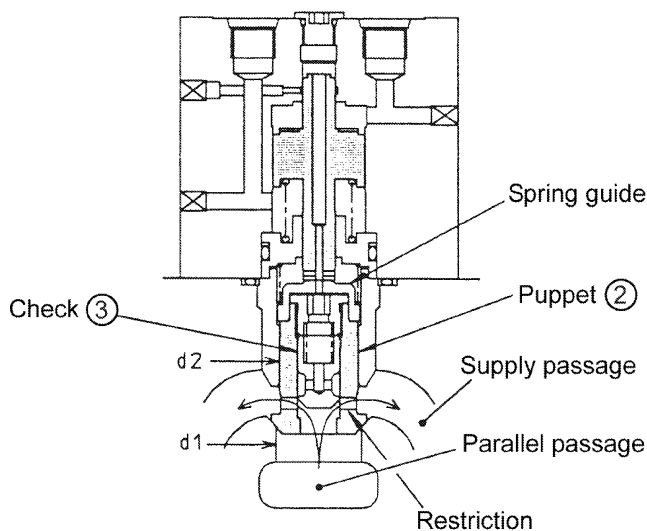
When the swing spool control pilot pressure becomes higher than 0.1 to 0.15 MPa, the piston moves to the position shown above by the pressure working on the X surface, but, as same in the above item 1, the puppet (2) is positioned by the spring B and the check (3) positioned by the spring C as shown in the above sketch, which are firmly seated. Accordingly, no reversing flow from the supply passage to the parallel passage can be occurred.



- 2) When Parallel passage pressure $>$ Supply passage pressure.

Being Seat diameter ($d1$) $>$ Puppet diameter ($d2$), but $d1 \approx d2$.

Accordingly, the pilot pressure works on the piston, which pushes the puppet (2) through the spring guide. Then the puppet (2) cannot lift with the pilot pressure even though it is the comparatively low. At this time, the check (3) lifts and the oil runs as the arrow sign in the above sketch indicates, and is supplied to the arm cylinder, but, due to the effect by the throttle furnished in the puppet (2), the flow volume becomes small and accordingly, most of the flow oil delivered from the pump is supplied to the swing motor by priority.



3. 2-Speed Switch Mechanism Operation Principle

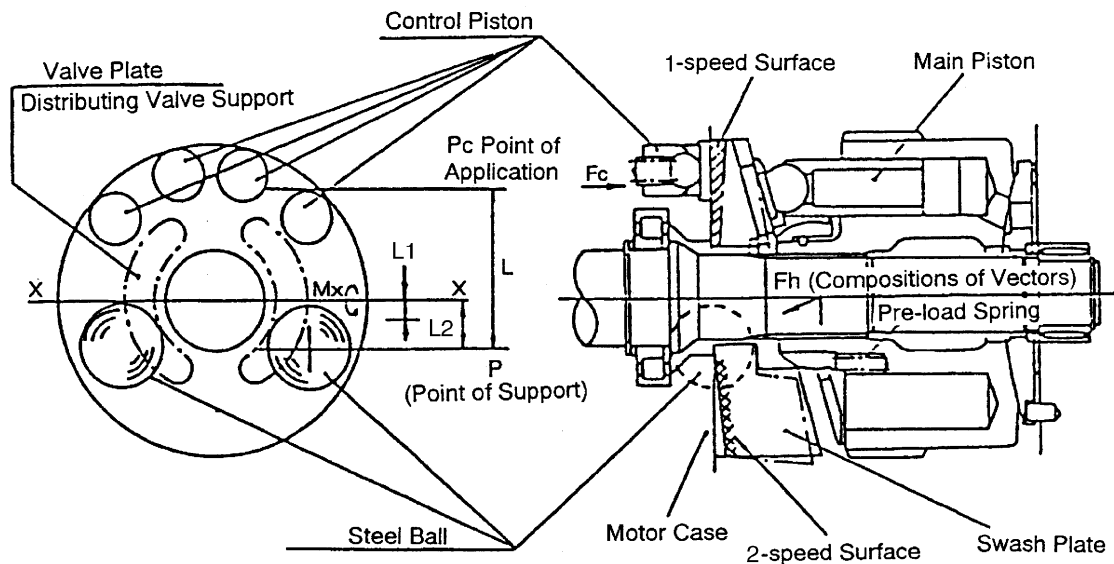


Fig. 2

There are two kinds of surfaces on the automatic 2-speed switch which are none sliding surface of the cam plate and the fixed surface (facing to the motor case). The big volume (1-speed) and the small volume (2-speed) are separated with the fixation on the various surfaces, to operate the cam plate tilt, with acting of the selecting valve of the 1, 2-speed switch, push the control piston by the self pressure of the running motor and tilt the cam plate. There are 2 of each kinds of the control pistons varying with the ports of the high-low pressure regulating valve, to transmit the thrust force to the cam plate.

The following drawing explains the fixing principle of the cam plate under different volumes

As Fig. 2, the support points of the cam plate tilt are made of the steel balls located at the position where L_2 to X axial is offset, the support points are located on the ball central line parallel to the X axial.

During 1-speed, there is no pressurized oil guided into the control piston, the thrust force of the piston $F_c \approx 0N$. Then the moment M_x acting on the cam plate and rotating around the X axial acts to the main piston by the summary of the oil pressure and presetting spring force F_h , in order to locate the support point L_1 of F_h according to the offset point P , the cam plate is fixed on the 1-speed surface.

During 2-speed, the oil is supplied to the control piston by self pressure and the moment $M_S = F_c \times L$ acts on the cam plate where P is the support point, this moment overcomes the moment M_x by the pressurized oil force F_h , tilt the cam plate and keep the moment balance on the 2-speed surface and fix it.

The indication of the cam plate (torque reversal, radial reversal) is shown by 2 steel balls.

Operation Principle

1. Hydraulic Motor

Function

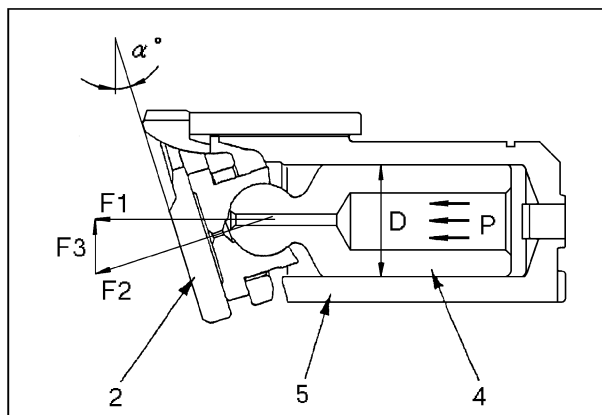
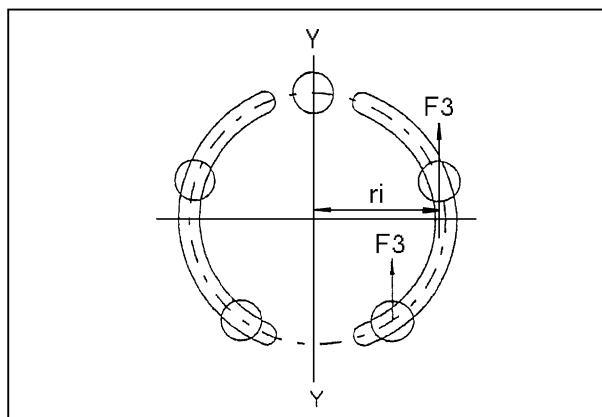
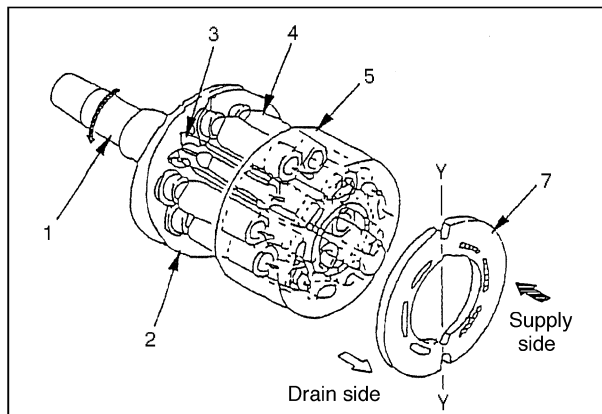
- The hydraulic motor is called as swash plate axial piston motor and it converts force of pressure oil transferred from the hydraulic pump into rotation.

Operation Principle

- Oil flown out of the hydraulic pump is introduced into the cylinder block [5] through the valve plate [7].

It has been so designed that the oil is to be introduced in the one side area of the line Y-Y connecting the top dead center to the bottom dead center in the piston [4] stroke.

- Pressure oil entered in the one side part in the cylinder block [5] pushes each piston [4] (2 pistons or 3 pistons) to generate force F_1 . ($F_1 = P \times \frac{\pi}{4} D^2$ cm²)
- Although the force works to the thrust plate [2], the force is divided to F_2 and F_3 as the thrust plate [2] is fixed with a certain angle of α° against the output shaft [1].
- Of the component of a force, the radial force F_3 generates each torque of ($T = F_3 \times r_i$) against the line Y-Y connecting the top dead center to the bottom dead center.
- The resultant force of the torque [$T = \Sigma(F_3 \times r_i)$] allows the cylinder block [5] to be rotated via piston as a turning force.
- Since the cylinder block [5] makes a spline connection with the output shaft, the output shaft rotates to transfer the torque.



STEP 6

Refer to Section 8006 and remove the hydraulic swivel.

STEP 7

Refer to Section 9003 and remove the bucket, the dipper and the boom.

STEP 8

Refer to page 10 in this section and remove the counterweight.

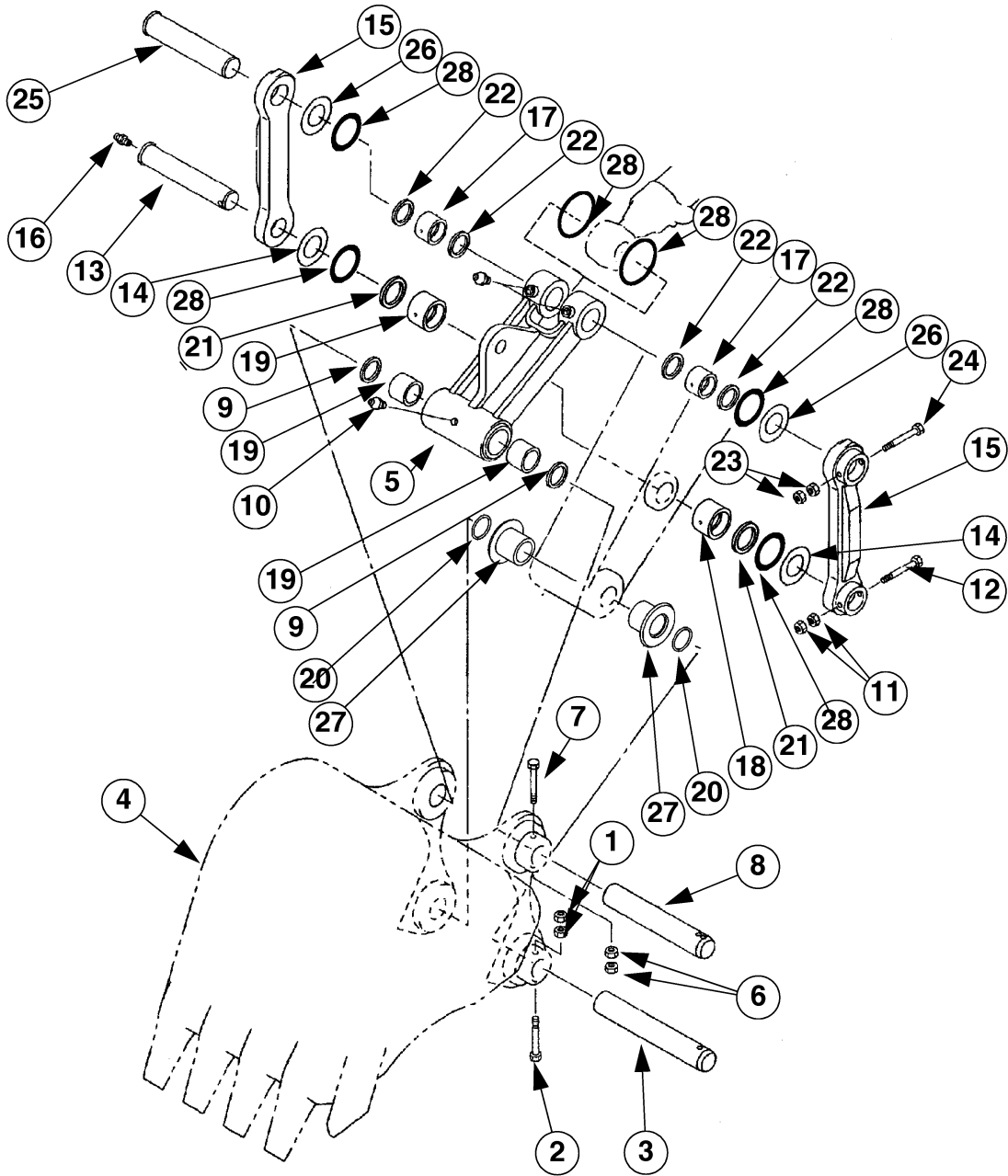
STEP 9

Install lifting rings at the rear of the upperstructure. Connect a suitable lifting device to these lifting rings and to the lifting rings located at the front of the upperstructure, above the boom brackets. Use the total movement of the lifting device.

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.*

BUCKET

Description



- | | |
|-------------------|-------------------|
| 1 NUT | 15 YOKE |
| 2 SCREW | 16 GREASE FITTING |
| 3 PIN | 17 BUSHING |
| 4 BUCKET | 18 BUSHING |
| 5 CONNECTING ROD | 19 BUSHING |
| 6 NUT | 20 DUST SEAL |
| 7 SCREW | 21 DUST SEAL |
| 8 SHAFT | 22 DUST SEAL |
| 9 DUST SEAL | 23 NUT |
| 10 GREASE FITTING | 24 SCREW |
| 11 NUT | 25 SHAFT |
| 12 SCREW | 26 SHIM |
| 13 SHAFT | 27 BUSHING |
| 14 SHIM | 28 O-RING |

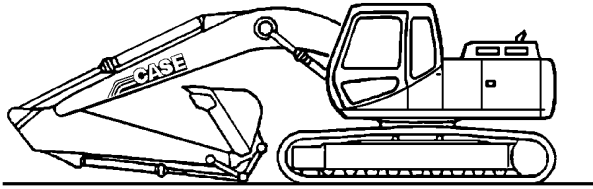
CRPH06A003G

Section

9004

SEAT AND SAFETY BELT

9004

CAB**Removal****STEP 1**

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

STEP 2

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

STEP 3

Disconnect the earth cable from the battery.

STEP 4

Fold the operator's seat-back down and move the seat as far as possible.

STEP 5

Remove the floor mat from the cab.

STEP 6

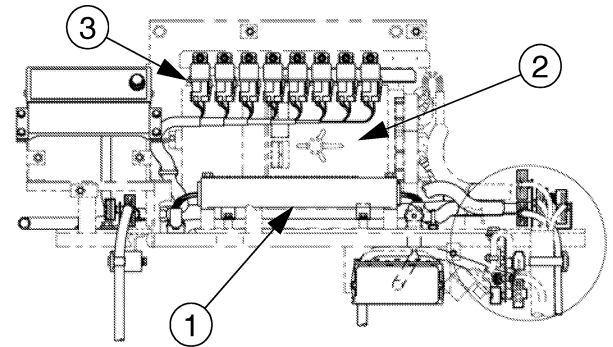
Remove the guardrail on the LH side of the cab.

STEP 7

Remove the radio, if fitted.

STEP 8

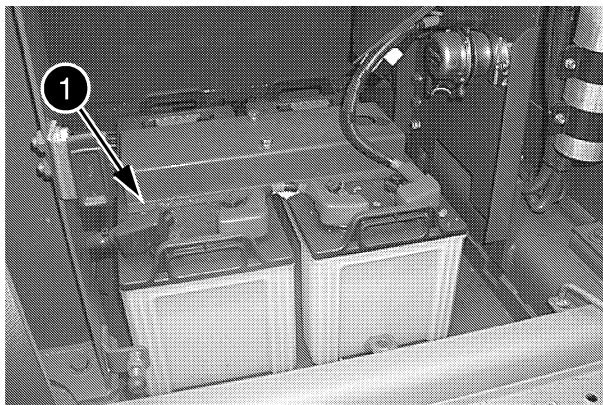
Remove the trim panel at the rear of the cab, taking care to disconnect the connector for the cigarette lighter and the solar radiation detector (only on air-conditioned models). CD00G003

STEP 9

Remove the two controllers (1) and (2), as well as the relays (3) (see Section 4003). CRPH06B076A

STEP 10

Pour suitable cooling fluid in the radiator (see the Operator's manual).

STEP 11

CT05L063

Connect the earth cable (1) to the battery.

STEP 12

Start the engine and run it at idle speed for one minute. Shut down the engine.

STEP 13

Add cooling fluid according to requirement in the expansion reservoir.



WARNING: *Boiling cooling fluid can spurt out when the radiator cap is removed. To remove the cap, proceed as follows: Wait until the system has cooled down and then turn the cap slightly and wait for all the pressure to be released. You can be seriously scalded if the radiator cap or expansion reservoir cap is removed too quickly. For checking and maintenance of the cooling system, refer to the maintenance instructions.*

STEP 14

Start the engine and run it at maximum speed until it reaches normal working temperature.

STEP 15

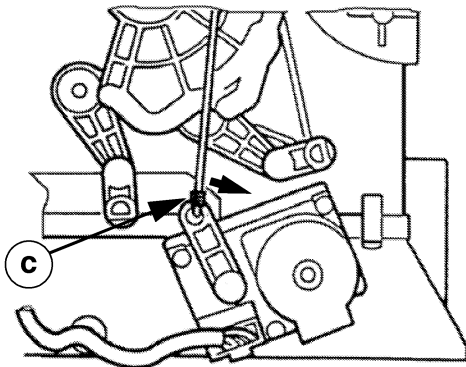
Reduce the engine speed to idle for 30 seconds, then shut down the engine.

STEP 16

When the radiator feels cold, remove the caps from the radiator and the expansion reservoir. Top up if necessary.

STEP 10

**Replacement of the motor actuator:
Replacement of mode motor actuator:**



CRPH06B072A01

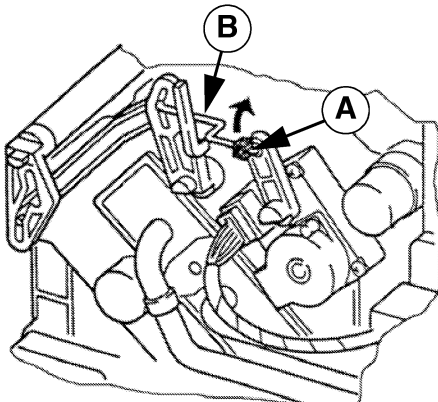
Remove the rod clamp (C) interlocking the mode motor actuator and mode cam by pushing to the direction of ARROW.

Remove 3 mounting screws from the motor actuator and remove the motor actuator with its rod clamp and lever attached from the unit.

Remove the rod clamp and lever. Then, install them on a new motor actuator in the reverse order of the disassembly.

STEP 11

Replacement of the air mix motor actuator:



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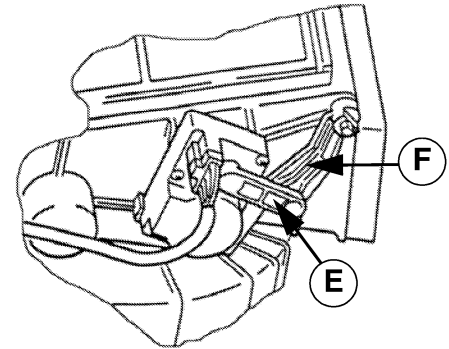
Remove the rod (B) from the lever by pushing the rod clamp (A), which is attached on the lever of the motor actuator, to the direction of ARROW.

Remove the 3 mounting screws from the motor actuator, and remove the motor actuator with its rod clamp and lever attached from the unit.

Remove the rod clamp and lever from the motor actuator. Install a new motor actuator in the reverse order of the disassembly.

STEP 12

Replacement of the inside/outside air switch-over motor actuator:

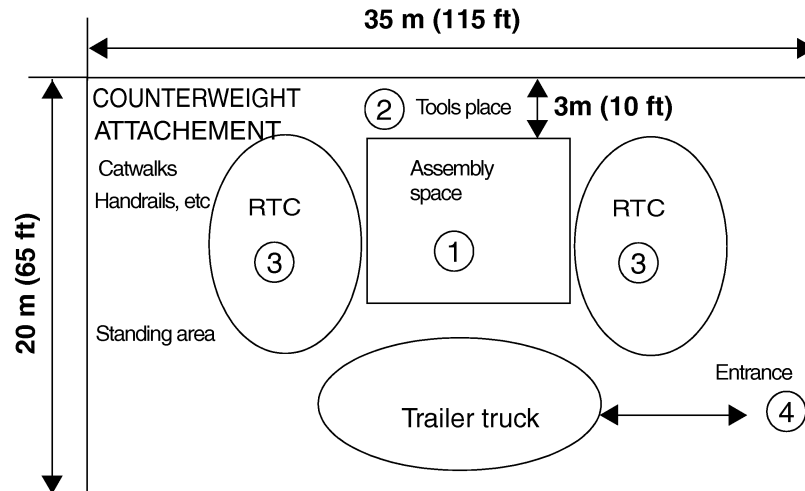


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Remove the screw fixing the motor actuator with its lever (E) attached, and remove the motor actuator.

Remove the lever from the motor actuator. Install a new motor actuator in the reverse order of the disassembly.

Overall layout

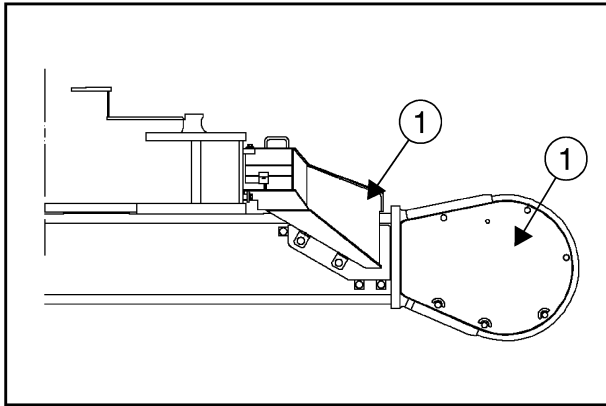


NOTE:

1. Space for assembling needs 6.5 x 8 m (22x27 ft).
2. Compound plywood is placed in the area for tools and jigs for preventing dirt and dust.
3. Rough terrain crane (RTC) must extend outriggers. RTC 45 T 2 sets (One set is for unloading the steel plates and setting the stools, another set is for setting the components).
4. Entrance/Exit is always clears from any obstacle to truck passage.

IMPORTANT : *The working area must have a warning sign reading «No person other than the concerned is authorized to enter this area».*

Fitting the lower piping covers



700-1-06-02-05E1

1. Fit the piping covers (1).
2. Apply Loctite to the screws. Tighten them to a torque of 137 Nm (101 lb-ft, 14 kgf.m).

Other fittings

- 1: Fit the catwalks
- 2: Fit the handrails.

MOUNTING THE COUNTERWEIGHT

Purpose

To mount the counterweight.

CAUTION : *No person must be present under the lifted counterweight.*

NOTE: *Tightening torque for the counterweight is 2256 to 2550 Nm (1664 to 1880 lb-ft, 230 to 260 kgf.m).*

CHECKING WORK

To check there is no abnormality on the machine after it is assembled

1. Check the oil quantity at the transportation stage, and add oil if necessary.
 - 200 litres drum
 - Hand pump (T29)
2. Grease
 - Grease pump (T30)
 - Grease gun (with 10 cartridge)
3. Touch up the paint work
 - Wipe out dirt
 - Paint with a brush (T31)
 - Spay with a gun
 - Compressor (T3)
 - Set of painting tool
4. Front side of the right platform
 - Fitting handrails
5. Machine body check
 - Engine oil
 - Water
 - Reduction oil
 - Any other abnormal point
6. Operational check.

OPERATIONAL TESTING AFTER ASSEMBLY WORK

1. Items to be attended to after assembly.
 - Actuate each actuator and the machine, with the engine at minimum speed.
 - When each actuator starts, check the correct movement direction by using the inching control with the control lever.

CAUTION : *When control for each movement starts, make sure no person is located around the machine.*
2. Procedure for operational testing and the items to be attended to after the assembling work is completed.

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