Service Manual

JS110
JS130
JS150LC

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General Information 1
Care & Safety 2
Routine Maintenance 3
Optional Equipment A
Body & Framework B
Electrics C
Hydraulics E
Transmission F
Brakes G
Track & Running Gear J
Engine K

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Contents **Page No.**

Machine Identification 1 - 1

Torque Settings 2 - 1

Service Tools
- Section - C Electrics 4 - 1
- Section - E Hydraulics 5 - 1
- Section - F Transmission 6 - 1

Sealing and Retaining Compounds 7 - 1

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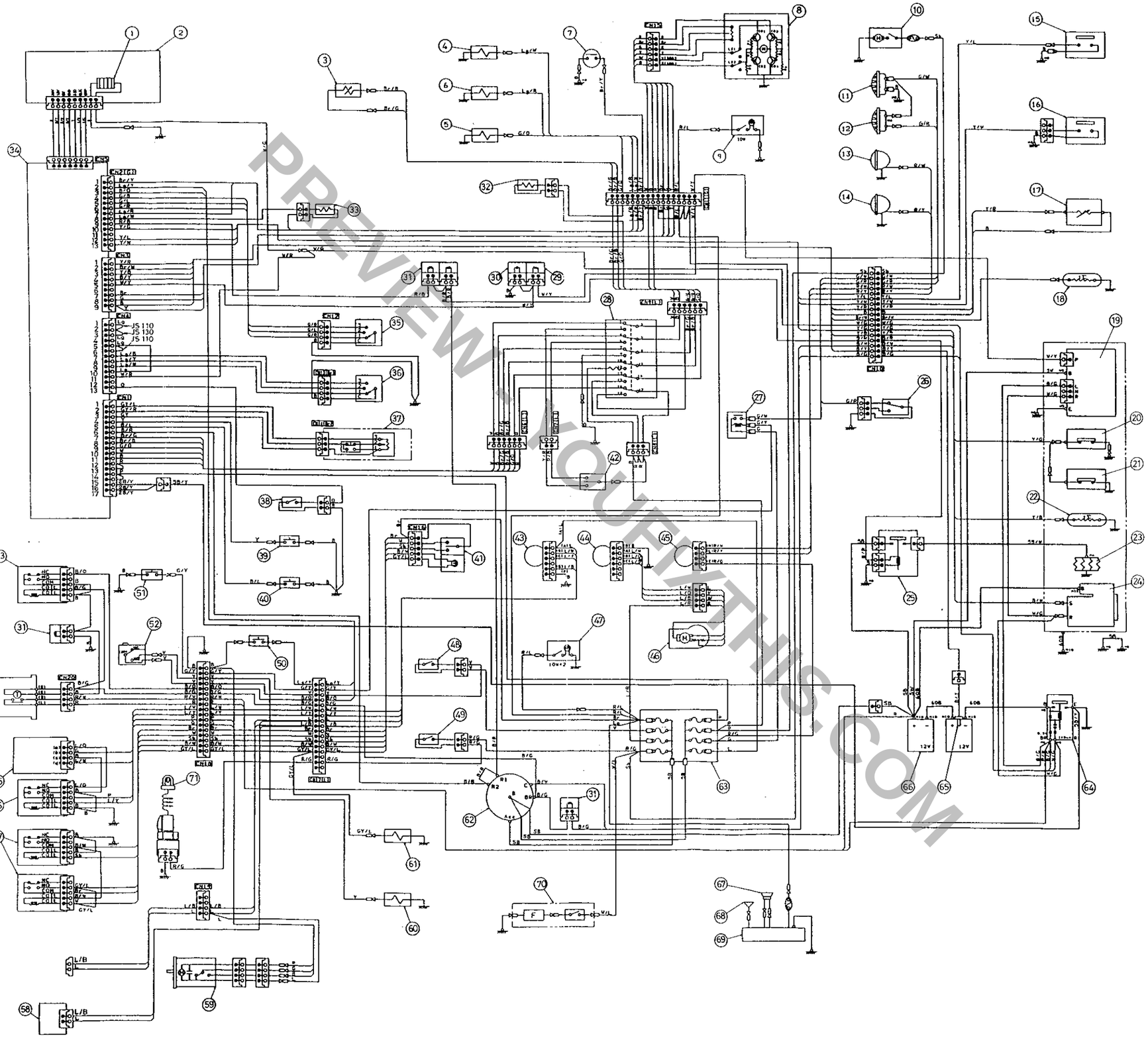
Torque Settings

Note 1: The figures quoted are for non-plated fasteners and are to be used only when there is no torque setting specified in the relevant procedure in this service manual.

Note 2: The 4T grade settings DO NOT APPLY to fasteners used on the engine. If any 4T specification fasteners are found on the engine these must be tightened to the figure quoted in the relevant engine manual.

Bolt Size	Strength Grade of Bolt or Stud								
	4T			**8.8**			**10.9**		
	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft
M3	0.39	0.04	0.28	-	-	-	-	-	-
M4	0.78	0.08	0.57	-			-	-	-
M5	1.67	0.17	1.2	-	-	-	-	-	-
M6	2.84	0.29	2.1	8.04	0.82	5.9	11.3	1.15	8.3
M8	7.06	0.72	5.2	19.6	2.00	14.5	27.7	2.82	20.4
M10	14.0	1.43	10.3	39.1	3.99	28.8	55.0	5.61	40.6
M12	24.6	2.51	18.1	68.5	6.98	50.5	96.2	9.81	71
M16	61.9	6.31	45.7	173	17.6	127.6	242	24.7	178.5
M20	122	12.4	90	337	34.4	249	475	48.4	350
M22	167	17.0	123	464	47.3	342	652	66.5	481
M24	210	21.4	155	584	59.5	431	821	83.7	606
M27	311	31.7	229	864	88.1	637	1220	124	900
M30	420	42.8	310	1170	119	863	1650	168	1217
M33	576	58.7	425	1600	163	1180	2260	230	1667
M36	736	75.1	543	2050	209	1512	2880	294	2124
M39	961	98.0	709	2680	273	1977	3760	383	2773
M42	1190	121	878	3300	336	2434	4640	473	3422
M45	1490	152	1099	4140	422	3054	5820	593	4293
M48	1780	182	1312	4960	506	3659	6970	711	5141

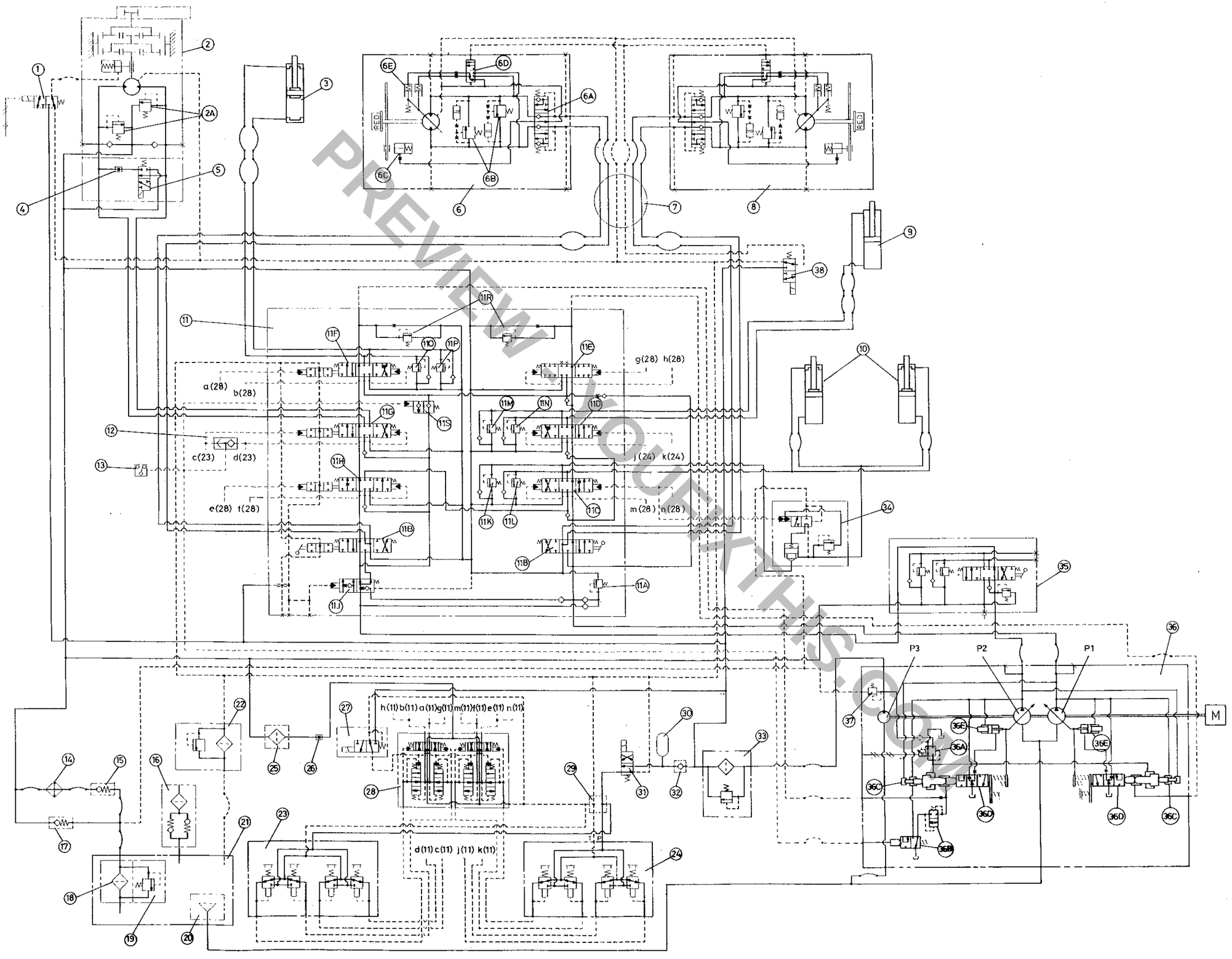
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2 - 1

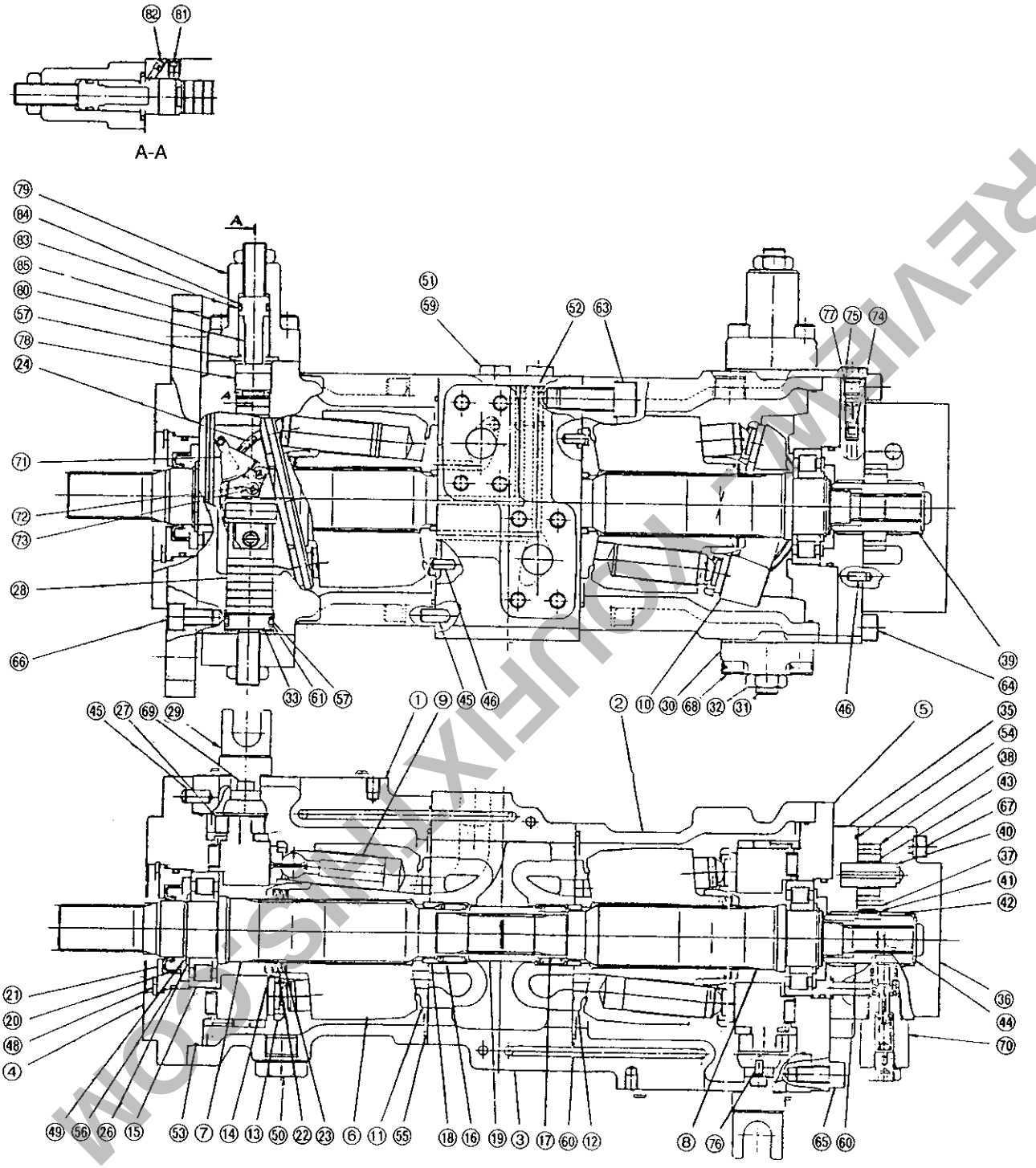


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Hydraulic Pump



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JS 110, 130

Some problems which may occur in the hydraulic system are listed below, either for the system as a whole or for individual components.

SYMPTOM	POSSIBLE CAUSE	ACTION
1. Hydraulic System		
a. The hydraulic system is defective or does not operate at all.	1. The pump is defective.	Check pump pressure and replace if defective.
	2. Dirt is clogging the inside of the relief valve.	Dismantle and clean the relief valve.
	3. The relief valve is defective.	* Strip and check the relief valve as detailed on page 26-1.
	4. A ram is worn.	Repair or replace the ram.
	5. Negative pressure is low.	Check circuit pressure.
	6. A valve is cracked.	Replace the valve.
	7. A spool is not operating over its full stroke.	Check the movement of the spool or the operational linkage.
	8. The oil level in the tank is too low.	Replenish the oil.
	9. Circuit filters are clogged.	Clean or replace filters.
	10. The circuit pipes are restricted.	Check the piping.
2. Hydraulic Pump		
a. Oil is not discharged from the pump.	1. The tank strainer or intake pipe is blocked or closed.	Clean the strainer and open the intake pipe.
	2. The end of the inlet pipe is above the tank oil level.	Replenish the oil tank.
	3. One or more of the pump major components is damaged or the input shaft or coupling are defective.	* Dismantle and inspect pump as detailed on pages 20-1 to 20-33. Renew damaged components and reassemble the pump. Renew shaft or coupling.
b. Pump output is low. Hydraulic pressure does not increase.	1. The pressure does not increase because of problems with the hydraulic pump or control valve.	Check hydraulic pump and control valve. Renew as required.
	2. Internal leakage within the hydraulic pump with excessive fluid drain from pump drain port.	* Strip and inspect the hydraulic pump as detailed on pages 20-1 to 20-33, paying particular attention to sliding surfaces. Repair or renew as necessary. Reassemble the pump.
	3. Air is being drawn into the pump from the inlet side.	Check tank oil level and strainer for clogging. Correct as necessary. If OK, check tightness of pump inlet connection.
	4. Inlet resistance causing cavitation.	Check correct oil . Check pump low pressure inlet pipe for collapse. Renew as required.

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Technical Data

Type	Isuzu 4BD1, 4 cylinder turbocharged
Model	
- JS110	4BD1PTA-05
- JS130	4BD1PTA-14
- JS150LC	4BD1PTA-15
Bore	102 mm (4.016 in)
Stroke	118 mm (4.646 in)
Swept Volume	3856 cm^3 (235.3 in^3)
Compression Ratio	17.5 : 1
Compression Pressure at 200 rev/min	30 bar (440 lbf/in^2)
Firing Order	1,3,4,2
Valve Clearance (cold)	
- Inlet	0.4 mm (0,016 in)
- Exhaust	0.4 mm (0.016 in)
Dry Weight (approximately)	350 kg

Fuel System

Max. Speed (No Load)	
- JS110	Less than 2230 rev/min
- JS130	Less than 2425 rev/min
- JS150LC	Less than 2550 rev/min
Injection Timing (static)	18° BTDC
Injector Opening Pressure	180 bar (2630 lbf/in^2)

Induction System

Air Cleaner Type	2 stage, dry element

For further details, see engine service manual, Publication No. 9803/6910

Note: New engines **DO NOT** require a running-in period. The engine/machine should be used in a normal work cycle immediately; glazing of the cylinder bores resulting in excessive oil consumption, could occur if the engine is gently run-in. Under no circumstances should the engine be allowed to idle for extended periods; (e.g. warming up without load).

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Every 10 Operating Hours or Daily
Whichever occurs first

1 Clean

- **a** Machine generally

2 Grease
(if operating in very wet conditions)

- **a** Bucket/dipper pivot points

3 Check (Engine stopped)

- **a** Generally for damage
- **b** For oil and coolant leakage
- **c** Security of bolts and nuts †
- **d** For disconnected or shortened wiring, loose terminals
- **e** Hydraulic fluid level
- **f** Engine oil level
- **g** Engine coolant level
- **h** Windscreen washer fluid level
- **j** Fuel system for leaks
- **k** Fuel level

† Tapping with a hammer will identify any loose nuts and bolts which should then be tightened to the specified torque.

4 Check (Engine running)

- **a** Operation of warning lights and audible alarm
- **b** Operation of other electrical equipment
- **c** Exhaust for excessive smoke
- **d** Track tension
- **e** Excavator operation
- **f** Transmission operation
- **g** Operation of track and swing brakes
- **h** Operation of hourmeter

Every 50 Operating Hours or Weekly
Whichever occurs first

1 Do the Daily jobs plus:

2 Clean

- **a** Drain water and sediment from fuel tank
- **b** Drain fuel water separator

3 Grease

- **a** All pivot pins

Every 100 Operating Hours or 2-Weekly
Whichever occurs first

1 Do a 50 Hour Service plus:

2 Clean

- **a** Battery terminals

3 Grease

- **a** Swing ring bearing

***4 Change**

- **a** Engine oil ††
- **b** Hydraulic servo oil filter element ††
- **c** Hydraulic return filter element ††
- **d** Hydraulic drain filter element ††
- **e** Track and swing gearbox oil ††

***5 Check (Engine stopped)**

- **a** Hose and pipework for chafing or damage
- **b** Condition of ram piston rods
- **c** All grease seals
- **d** Track plate condition
- **e** Track and running gear condition
- **f** Tightness of engine mounting bolts
- **g** Wiring for chafing
- **h** Security of major unit mounting bolts and nuts ††
  If loose, tighten to specified torque.
- **j** Top and bottom track rollers for oil leaks ††
- **k** Track idler wheels for oil leaks ††

6 Check (Engine running)

- **a** Accumulator operation

* †† These procedures are only to be carried out after the **first 100 hours** use of a new machine. Thereafter they are to be carried out as detailed in the following periodic checks.

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Dismantling - JS 110, 130, 150LC

Refer to the sectional drawings of the pump on page 20-1 and the front regulator on page 20-2 and the rear regulator on page 20-3 as a guide to dismantling and assembling.

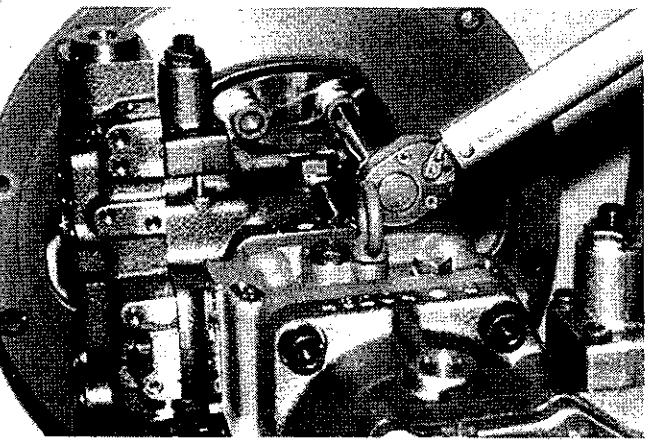
The numbers which identify those parts to be dismantled or assembled are prefixed with a **P** for pump items items and **R** for regulator items.

Before attempting to dismantle the hydraulic pump, blank all inlet and outlet ports and wash the outer surfaces with a suitable solvent to remove all dirt and dust. Dry using compressed air.

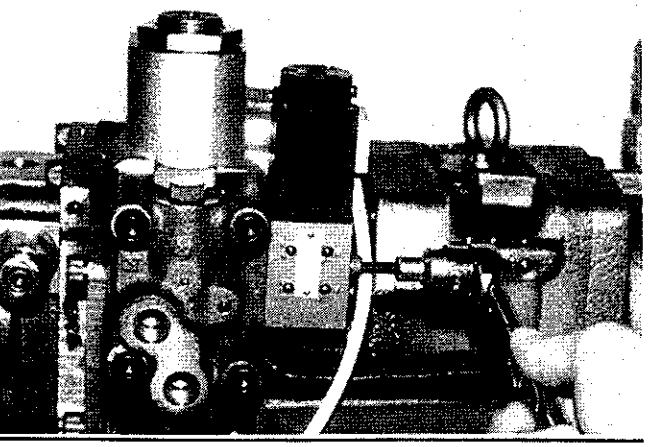
Make different alignment marks across each sub-assembly joint face as an aid to assembly.

1. Remove drain plug **P50** from the oil drain port and drain the hydraulic fluid from the pump. When draining is complete, refit drain plug **P50** and part tighten.

2. Fasten the pump unit in a vice or jig. Remove the mounting flange securing bolts and remove the flange.



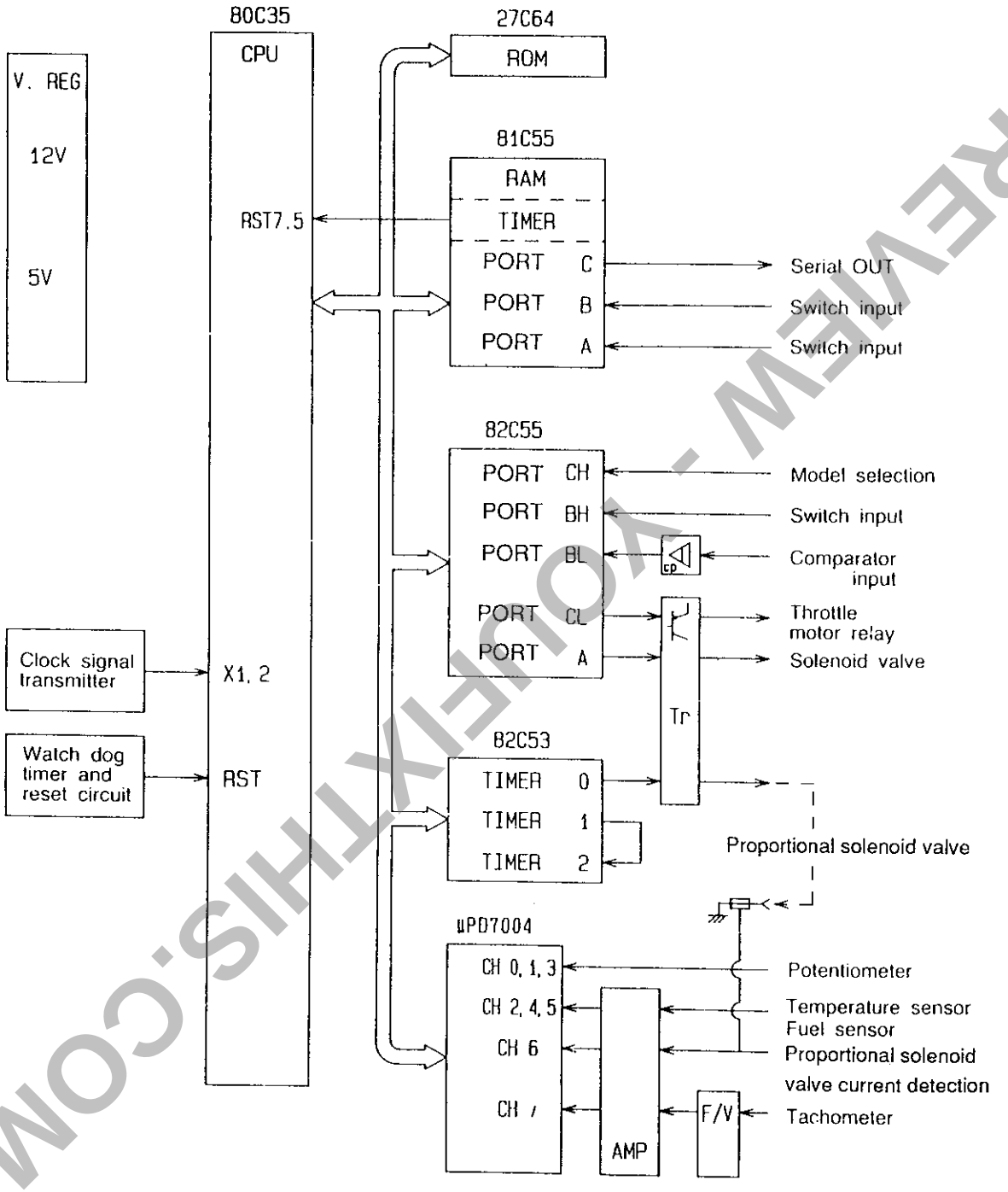
3. Remove the SPPC valve retaining bolts **R47** and remove SPPC valve **R43**.



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SMCU-1 Controller Block Diagram



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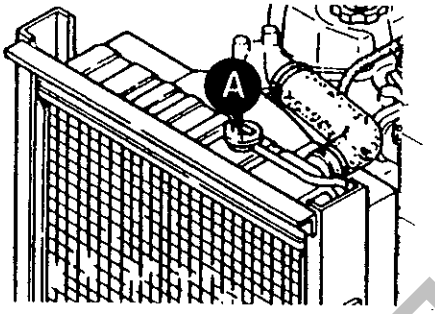
Checking the Coolant Level

1 Park the Machine on Level Ground

Stop the engine and let it cool down. Open the engine compartment.

⚠ WARNING

The cooling system is pressurised when the coolant is hot. Hot coolant will burn you. Make sure that the engine is cool before checking the coolant level or draining the system.
2-3-3-3



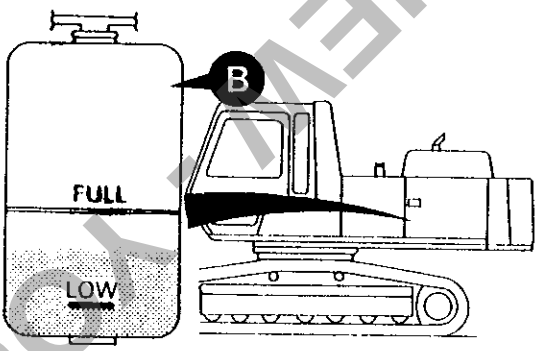
2 Release System Pressure

For location of engine cooling radiator, refer to ***Component Location Diagrams*** at the end of this section.

Carefully slacken cap **A**. Let any pressure escape. Remove the cap.

3 Check the Level

The level should be between the FULL and LOW marks on the expansion bottle **B**. Top up the bottle with pre-mixed water/antifreeze if necessary. See ***Coolant Mixtures.***



4 Refit the Pressure Cap A

Make sure it is tight.

Note: *Check the quality of the antifreeze mixture every year - before the cold weather starts. Change it every two years.*

Coolant Mixtures

To prevent the coolant freezing in cold conditions, antifreeze must be added. JCB Universal Antifreeze will give protection down to the temperatures shown in the table.

Antifreeze Solution	Starts to freeze at
55%	-36°C (-33°F)

Never use less than a 50% solution otherwise there will not be enough corrosion protection.

Never use more than 60% solution otherwise the cooling system may be damaged.

Leave the antifreeze in all the year round as it gives protection against corrosion.

Check the strength of antifreeze solution at least once a year, preferably at the start of the cold period. Always renew the antifreeze every two years.

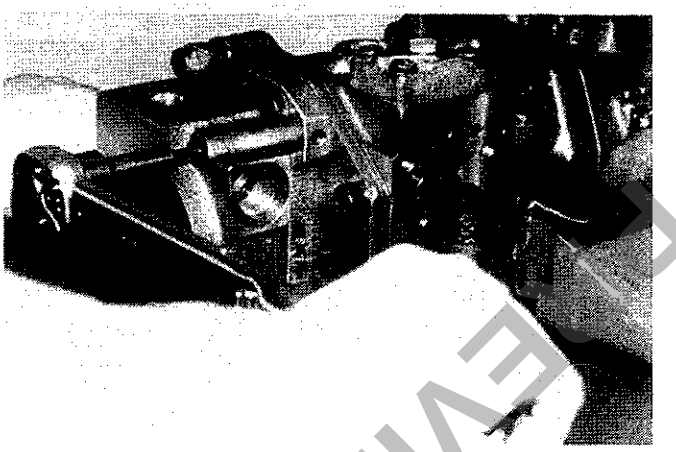
A 50% antifreeze mixture should be used even if frost protection is not needed. This gives protection against corrosion and raises the coolant's boiling point.

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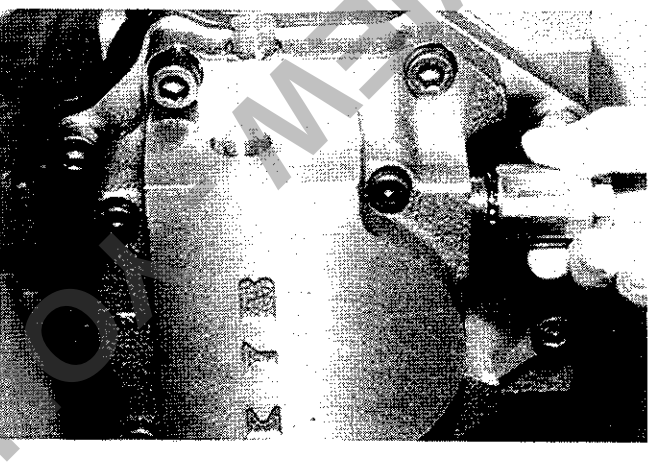
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Assembly - JS 110, 130, 150LC (cont'd)

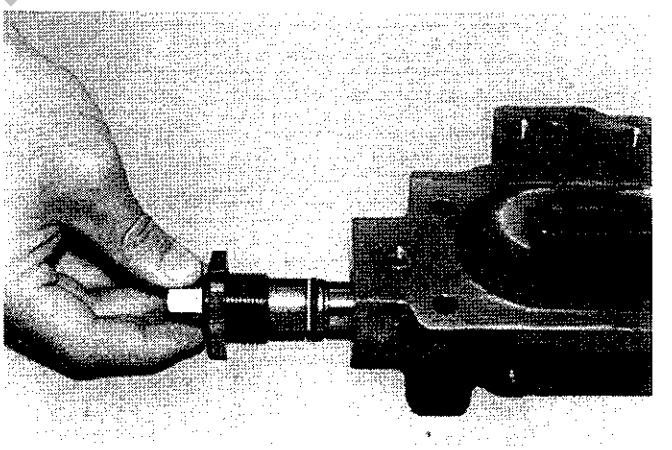
* **35.** Fit remaining bolts and plugs and torque tighten to the prescribed tightening torque (see Torque Tightening Table on page 20-33).



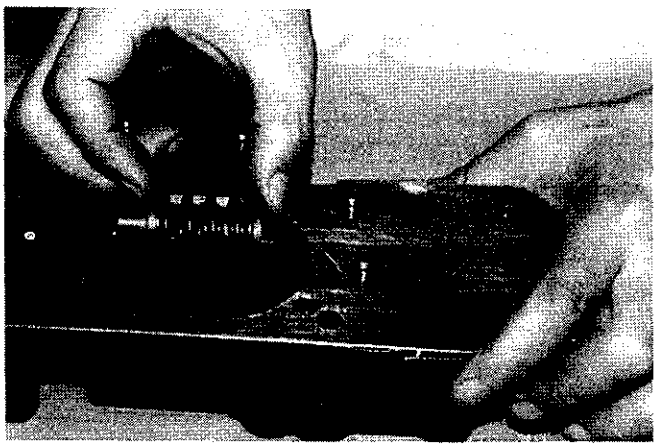
36. Fit relief valve assembly **P70** in servo pump casing **P36**.



37. Fit 'O' rings **R26**, back-up rings **R52** and nut **R39** on sleeves **R2**. Screw sleeves into bodies **R1**.



38. Assemble spring seats **R9** and **R10** and springs **R16** and **R17** together. Fit the assembly into bodies **R1**, ensuring that they are fitted in the correct orientation.



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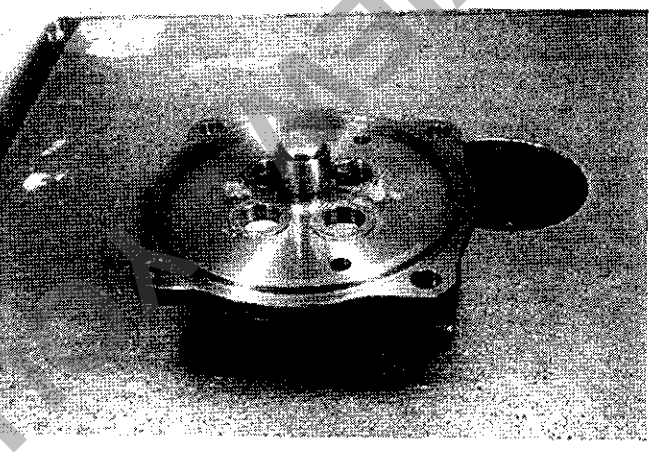
Assembly - JS 110, 130 (cont'd)

17. Generously apply grease to bushes **19** and Teflon rings **18**. Fit Teflon rings **18** and springs **17** to bushes **19** and position in cover **16**.

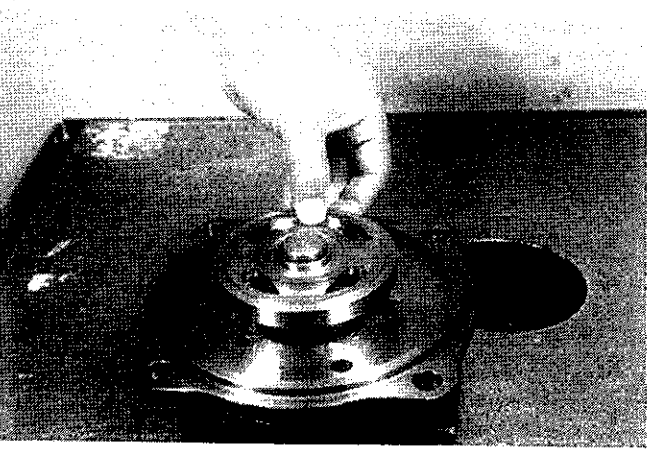
Note: Grease is used to help prevent items from falling out when the cover is mounted onto the housing.



18. Apply grease to pins **15** in cover **16**.



19. Fit balance plate **20** onto cover **16** in the position from which it was removed.



20. Grease 'O' ring **13** and fit onto cover **16**.



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Component Inspection - JS110/130

Part Name	Wear symptom	Standard Value	Allowable Value	New Part to be fitted
Piston Assembly	Mating surfaces deeply scored or rough	--	--	Cylinder block & pistons
	Piston to bore clearance excessive	0.03 mm (0.001 in)	0.06 mm (0.02 in)	Cylinder block & pistons
	Shoe/ball backlash excessive	0.15 mm (0.006 in)	0.4 mm (0.02 in)	Cylinder block & pistons
Cylinder Block	Mating surfaces deeply scored or rough	--	Scratch depth max. 0.2mm (0.008 in) No thermal seizure	Cylinder block & pistons (if scratch cannot be removed by lapping)
	Excessive bore wear	--	--	Cylinder block & pistons
	Broken splines	--	--	Cylinder block & pistons
Valve Plate	Mating surfaces deeply scored or rough	--	Scratch depth max. 0.2mm (0.008 in) No thermal seizure	Cylinder block & pistons (if scratch cannot be removed by lapping)
Swash Plate	Mating surfaces deeply scored or rough	--	Scratch depth max. 0.2mm (0.008 in) No thermal seizure	Cylinder block & pistons (if scratch cannot be removed by lapping)
Shaft	Seal contact area scored	--	--	Shaft
	Broken splines	--	--	Shaft
Brake Piston	Mating surfaces deeply scored or rough		Score depth max. 0.3 mm (0.01 in)	Brake piston and friction plate
Brake Friction Plate	Friction material deeply scored or scaled	Thickness: 3.5 mm (0.14 in)	3.2 mm (0.13 in)	Friction plate
Roller Bearing	Running surface flaked, scaled or indented	--	--	Roller bearing
	Abnormal noises when rotated	--	--	Roller bearing

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Dismantling - JS 150LC (continued)

13 **Note:** It is recommended that if any parts are worn, the shaft and bearings should be renewed as an assembly (see **Component Inspection**). The assembly should not be dismantled unless individual components have to be renewed.

If dismantling is necessary:

1) Drive off bearing **401** using a suitable tube located against the outer ring. Then remove bearing and seal ring **254** by means of a press.

2) Remove snap ring **913.**

3) Use a press to remove bearing **402.**



Component Inspection - JS 150LC

Wash all parts in a suitable solvent and dry them with compressed air. Renew all seals and 'O' rings.

In addition to renewing components subject to obvious wear or damage, the following components should be renewed as detailed.

Gears	Renew if depth of pitting on teeth is 1mm or more, over 5% or more of the surface.
Drive Shaft Bearings	Shaft and bearings must be renewed as a set if any component is unserviceable. Bearings must be free from pitting and flaking. They must be free to be rotated easily and smoothly by hand. They must be free from excessive wear. Wear may be indicated by large particles of metal dust which may be present between rollers and retainer.
No. 2 Planet Carrier	Renew the complete planet carrier assembly if backlash on planet gears is greater than 0.5 mm (0.020 in).
Thrust Plate **284**	Renew if there are marks or scratches on the upper surface.
Needle Bearings **403** and Planet Pins **285**	Renew if there is pitting on the rollers or on the surface of the planet pins.
Dowels **351**	During original manufacture, the dowel holes in casing **102** and ring gear **202** are machined together to ensure accuracy. If dowels are excessively loose in their holes or if the casing or ring gear are being renewed, new holes must be machined by a competent engineering machine shop.

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