Bolt and Nut Torque Specifications

Tighten the bolts and nuts according to the table. Before and after daily work, check the bolts and nuts for looseness and for those missing. Tighten if loose and replace if missing.

Tighten the bolts and nuts after the first 50 hours of the running-in stage and every 250 hours thereafter.

Tightening Torque Table

*

No	Tightening Point	Bolt Diameter	Wrench	JS200/210/220/240/260		
				Tighten Torque		
				Nm	kgf m	lbf ft
1†	Travel Motor	M16	24mm	270~310	27.2~31.8	200~230
2†	Drive Sprocket	M16	24mm	270~310	27.2~31.8	200~230
3†	Idler Wheel	M16	24mm	270~310	27.2~31.8	200~230
4†	Upper (Carrier) Roller	M20	30mm	520~608	53.2~62.2	385~450
5†	Lower (Track) Roller	M18	27mm	370~430	37.8~44.1	275~315
6†	Track Guard	M18	27mm	380~440	38.7~45.2	280~325
7	Shoe Bolt	M16	24mm	380~450	38.7~46.0	275~330
8	Counter weight	M27/M30	41/46mm	1058~1235/1335~1545	108~126/136~158	780~910/985~1140
9†	Turntable Bearing (Undercarriage)	M20/M24	30/36mm	475~550/780~910	48.4~55.3/80~93	350~400/575~670
10†	Turntable Bearing (Slew Frame)	M20/M24	30/36mm	475~550/780~910	48.4~55.3/80~93	350~400/575~670
11†	Slew Equipment	M20/M24	30/36mm	525~605/785~910	53.1~62/80~93	390~440/580~670
12†	Engine (Engine Mount)	M16	24mm	265~310	27.0~32	195~230
13†	Engine Bracket	M10	17mm	65~75	6.6~7.6	47~55
14	Radiator	M16	24mm	150~175	15~18	108~130
15†	Hydraulic Pump	M10	17mm	65~75	6.6~7.6	47~55
16†	Hydraulic Oil Tank	M16	24mm	235~285	23.7~29.5	175~210
17†	Fuel Tank	M16	24mm	255~285	25.7~29.5	185~210
18†	Control Valve	M16	24mm	270~310	27.6~31.8	200~230
19†	Rotary Coupling	M12	19mm	110~125	11.1~13	80~94
20	Cab	M16	24mm	127~135	13~14	94~101
21	Battery	M10	17mm	20~30	2.1~2.9	15~21

Note: *Use Loctite 262 (adhesive) on those marked † and tighten to the torque listed in the above table.*

The tightening torque for the bolts and nuts not listed above are as follows:

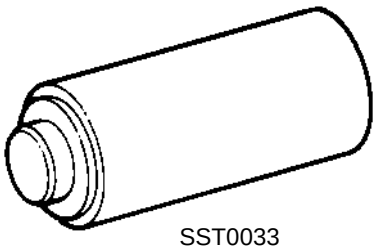
Bolt Diameter (size)			M6	M8	M10	M12	M14	M16	M18	M20
Hex. bolt	Wrench	mm	10	13	17	19	22	24	27	30
	Tightening Torque	Nm	6.9	15.7	32.3	58.8	98.0	137.2	196.0	274.4
		kgf m	0.7	1.6	3.2	5.9	9.8	13.7	19.6	27.4
		lb ft	5	12	24	43	72	101	145	202
Hex. socket head bolt	Wrench	mm	5	6	8	10	12	14	14	17
	Tightening Torque	Nm	8.8	21.6	42.1	78.4	117.6	176.4	245.0	343.0
		kgf m	0.8	2.2	4.2	7.8	11.8	17.6	24.5	34.3
		lb ft	6.5	16	31	58	87	130	181	253

Service Tools *(continued)*

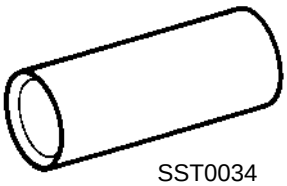
SECTION E - HYDRAULICS

Slew Motor Jig

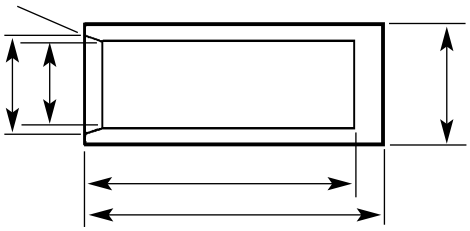
SST0033 Oil Seal Jig
SST0034 Taper Bearing Ring Jig
SST0035 Inner Ring Jig
SST0036 Seal Press Fit Jig
(All dimensions are in mm.)



SST0033



SST0034



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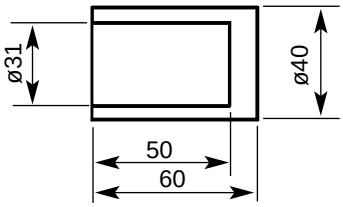
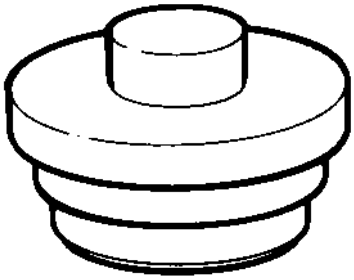
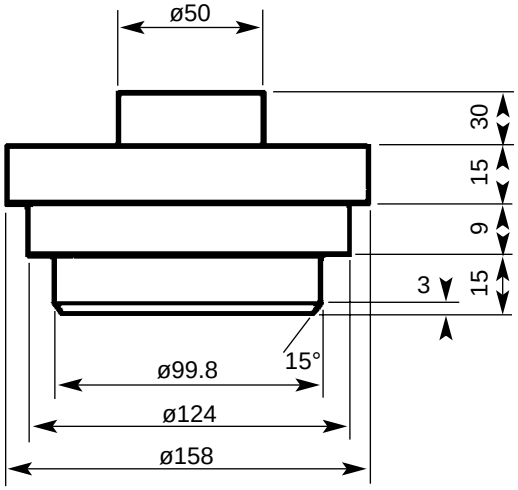




SST0036



All construction and agricultural equipment can be hazardous. When JCB Excavator is correctly operated and properly maintained, it is a safe machine to work with. But when it is carelessly operated or poorly maintained it can become a danger to you (the operator) and others.

Do not work with the machine until you are sure that you can control it.

Do not start any job until you are sure that you and those around you will be safe.

If you are unsure of anything, about the machine or the job, ask someone who knows. Do not assume anything.

Remember

BE CAREFUL
BE ALERT
BE SAFE

GEN-1-6

As well as the warnings in the following pages, specific warnings are given throughout the book. This section is designed to give a safety code for use of the machine generally and for operation and maintenance practices.

Note: *This section includes a certain amount of operating safety information. But remember that whenever you drive the machine or operate its controls, you are in effect a machine operator. Therefore you should read and understand the information given in the Operator Handbook before driving the machine or operating its controls.*

General Safety

WARNING

Lifting Equipment

You can be injured if you use faulty lifting equipment. Make sure that lifting equipment is in good condition. Make sure that lifting tackle complies with all local regulations and is suitable for the job. Make sure that lifting equipment is strong enough for the job.

INT-1-3-7

WARNING

Clothing

You can be injured if you do not wear the proper clothing. Loose clothing can get caught in the machinery. Wear protective clothing to suit the job. Examples of protective clothing are: a hard hat, safety shoes, safety glasses, a well fitting overall, ear-protectors and industrial gloves. Keep cuffs fastened. Do not wear a necktie or scarf. Keep long hair restrained.

INT-1-3-6

WARNING

Care and Alertness

All the time you are working with or on the machine, take care and stay alert. Always be careful. Always be alert for hazards.

INT-1-3-5

WARNING

Raised Equipment

Raised equipment can fall and injure you. Do not walk or work under raised equipment unless safely supported.

13-1-1-6

DANGER

Before removing the boom from the machine, ensure that the counterweight is adequately supported as in certain ground conditions the machine could tip backwards. Never travel or transport the machine with the boom removed.

BF6-3

* Changing the Air Filter Elements

1. Prepare the Machine
Put the machine on level ground. Lower the bucket to the ground.

2. Stop the Engine
Remove the starter key.

Note: *Renew the inner element every second time you renew the outer element. As a reminder, mark the inner element with a felt tip pen when you renew only the outer element.*

Outer element must be changed sooner if the filter warning light on the instrument panel lights up.

DO NOT run engine with end cover or dust valve removed.

DO NOT attempt to wash or clean elements they must be renewed.

3. Locate the Air Filter
*(See **Identification of Machine Components**).*

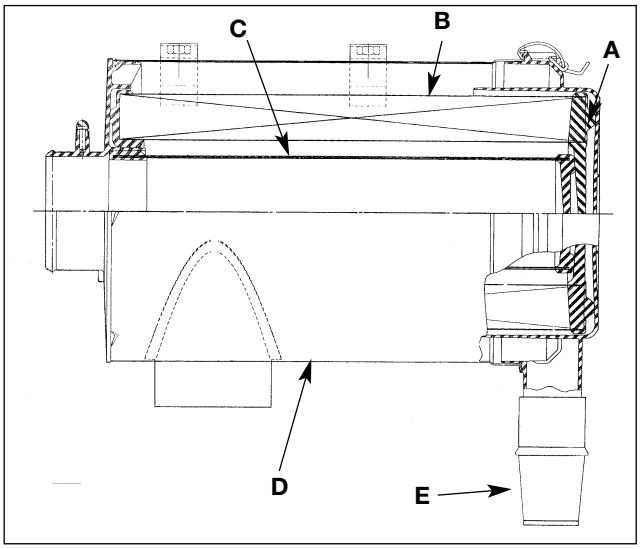
* **4. Open the Hydraulic Compartment**

* **5. Remove the Elements**
Remove end cover **A**. Remove the outer element **B**. Remove the inner element **C**.

* **6. Clean the Filter**
Clean the pre-cleaner, the inside of the canister **D**, the end cover **A**, and dust valve **E**.

* **7. Fit the New Elements**
Carefully insert the new inner element into the canister. Make sure it seats correctly. Carefully insert the new outer element **B**. Make sure it seats correctly.

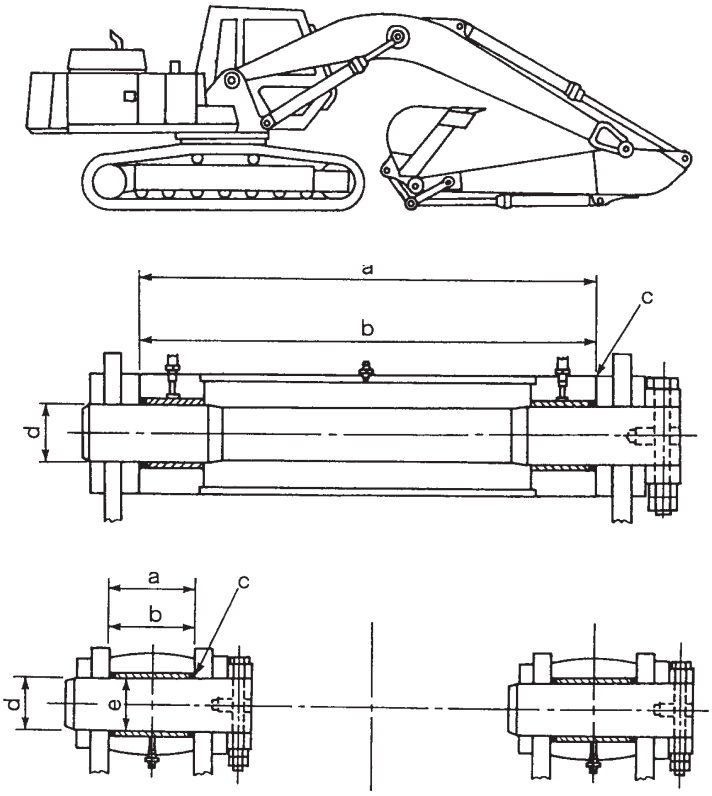
* **8. Assemble the Filter**
Fit the end cover **A** onto the canister. Make sure the dust valve **E** is fitted, then fasten the retaining clips. Fit the pre-cleaner. Make sure the air filter blocked switch connector is fitted.



Attachments *(continued)*

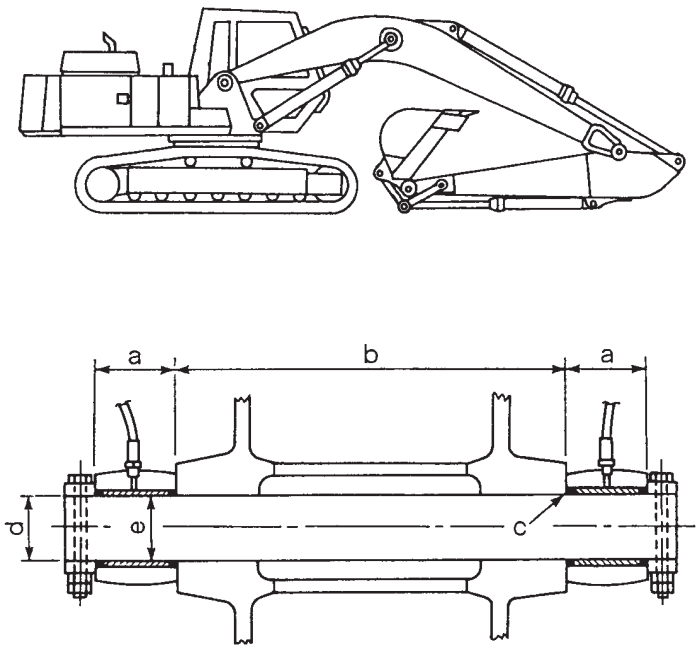
Boom and Slew Frame Installation JS240, JS240LC

Equipment Name	Part Name	Code	Standard Value (mm)	Service Limit (mm)
1. Boom and slew frame installation	Slew frame	a	676	686
	Boom	b	-	-
	Clearance	c	1.0-3.5	Shim for adjustment KBV0474
	Pin	d	ø100	ø99
	Bushing (boom)	e	ø100	ø101.5
2. Boom and slew frame installation	Slew frame	a	109	115
	Boom ram (dump end)	b	108	106
	Clearance	c	1.0-2.5	Shim for adjustment KBV0764
	Pin	d	ø90	ø89
	Bushing (boom ram)	e	ø80	ø91.5



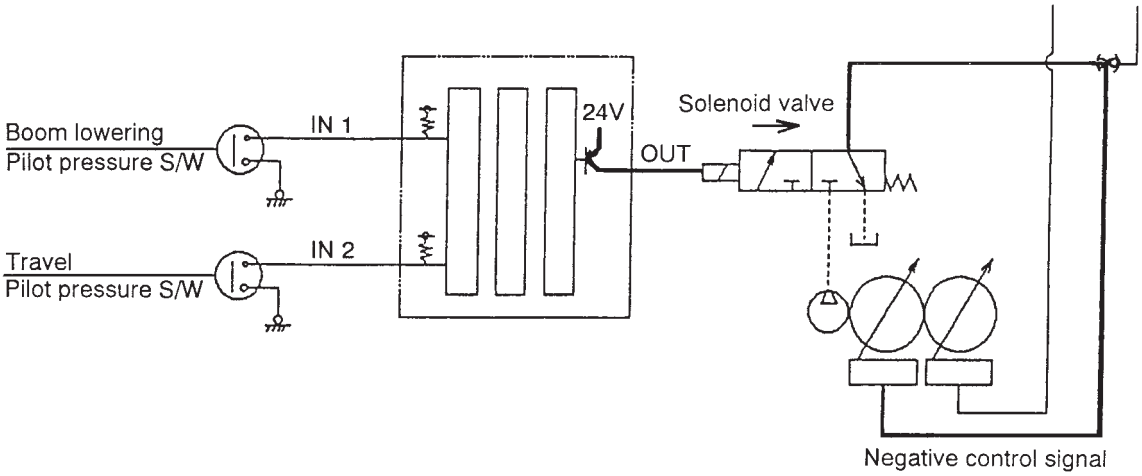
Boom Ram Installation JS240, JS240LC

Equipment Name	Part Name	Code	Standard Value (mm)	Service Limit (mm)
3. Boom and boom ram installation	Boom ram (dump end)	a	108	106
	Boom	b	508	502
	Clearance	c	1.0-2.5	Shim for adjustment KBV0837
	Pin	d	ø90	ø89
	Bushing (boom ram)	e	ø90	ø91.5

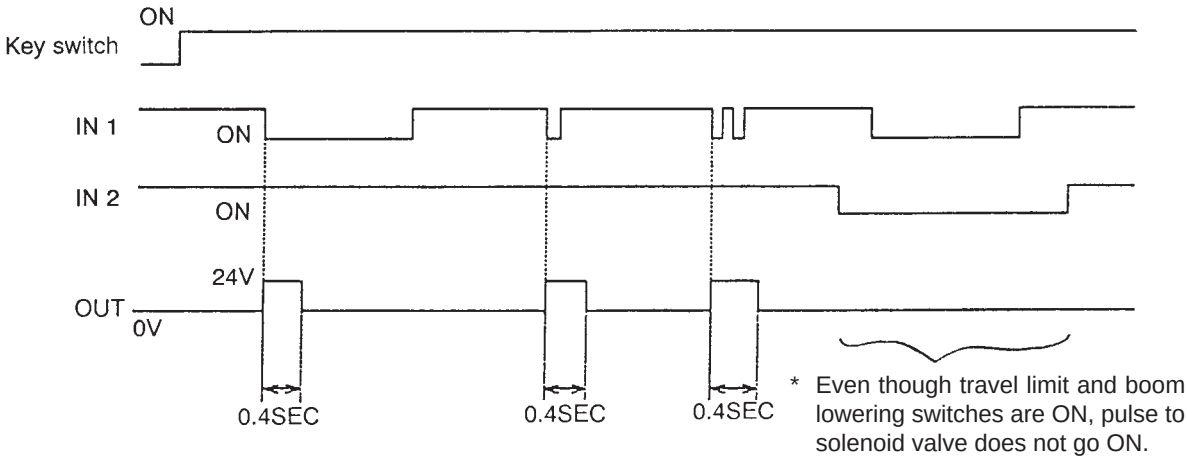


Cushioned Boom Starting

Circuit Diagram



Time Chart



* When the boom lowering pressure switch turns **ON**, the solenoid valve switches on for 0.4 sec, and pilot pressure is sent to the negative control signal port of the pump. This pilot pressure adjusts the pump swashplate angle to temporarily reduce the output flow and thereby initially slow down (cushion start) the boom lowering facility.

* If travel and boom lowering procedure are initiated together, the boom cushioned start facility is not available, because the travel pilot pressure is monitored to ensure smooth travel.

Fault Diagnosis *(continued)*

		Item	Judgement Value	Measure
Start-up Inspection items	Lubricants • Coolants	1. Fuel amount check	-	Refuel
		2. Inspection for fuel contaminant	-	Clean, drain
		3. Hydraulic oil amount check	-	Refill oil
		4. Inspection of hydraulic oil strainer	-	Clean, drain
		5. Inspection of oil amount for each reduction gear	-	Refill oil
		6. Inspection of engine oil amount (amount in oil pan)	-	Refill oil
		7. Coolant amount check	-	Refill water
		8. Dust indicator clogging check	-	Clean or replace
	Electric Equipment	9. Inspection for looseness, corrosion of battery terminal and wiring	-	Tighten or replace
		10. Inspection for looseness, corrosion of alternator terminal and wiring	-	Tighten or replace
		11. Inspection for looseness, corrosion of starter terminal and wiring	-	Tighten or replace
Other Inspection Items	Hydraulic • Mechanical Equipment	12. Abnormal sound, smell check	-	Repair
		13. Oil leakage check	-	Repair
		14. Air-bleeding	-	Air bleeding
	Electricity • Electric Equipment	15. Battery voltage (engine stopped) check	* 25-26V	Replacement
		16. Battery fluid sensor not fitted, fault should not be displayed.	-	Replenish or replace
		17. Inspection for discolouration, burning, peeling of wiring	-	Replacement
		18. Inspection for wiring clamp removal, sagging	-	Repair
		19. Inspection for wet wiring (special attention to wet connector and terminal)	-	Disconnect and dry
		20. Inspection for fuse breakage, corrosion	-	Replacement
		21. Alternator voltage check (engine revolution more than 1/2 throttle) (When battery insufficiently charged, may be about 25V right after starting.)	27.5~29.5V	Replacement
		22. Battery relay making noise (when starter switch is **ON** or **OFF**)	-	Replacement

Operation

The rotary group consists of the drive shaft F (111), cylinder rod (141), piston shoe (151, 152), press plate (153), spherical bush (156), spacer (158) and cylinder spring (157). The drive shaft is supported on both sides by the bearings (123, 124). The shoe is caulked on the piston and forms the spherical coupler, and because it slides slightly on the shoe plate (211), it has a pocket to balance the oil pressure. The subgroup, which is made up of the piston and shoe is held down on the shoe plate by the cylinder spring through the press plate and spherical bush. In the same way, the cylinder block is held down on the valve plate (313) by the cylinder spring.

* The swash plate group consists of the swash plate (212), shoe plate (211), swash plate support (251) bush (214) pin (531) and servo piston (532). The swash plate is supported by the swash plate support at the cylindrical part formed by the side opposite to the shoe sliding surface. The oil pressure controlled by the regulator is guided to the hydraulic cavities on both sides of the servo piston which moves the servo piston to the left and right, causing the swash plate, through the spherical portion of the pin, to press on the swash plate support and changes the angle (a).

The valve cover group is comprises the valve block (312), valve plate (313) and valve plate pin (885). The valve plate, which has two oval shaped ports, is on the valve block and delivers oil to and recovers oil from the cylinder block. The oil directed by the valve plate flows through the valve block and is connected to the outer piping.

When the drive shaft is driven by the engine, the cylinder block rotates simultaneously with the spline coupling. When the swash plate is leaning, the piston in the cylinder block rotates simultaneously with the cylinder block and causes reciprocal motion relative to the cylinder.

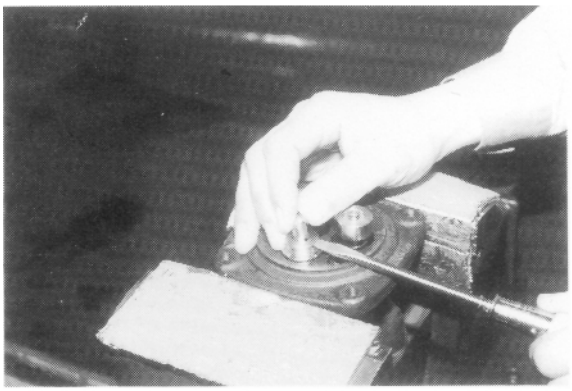
Therefore, during one rotation, the piston moves away from the valve plate for 180° (enough for oil suction) and approaches the valve plate for the remaining 180°. When the swash plate leaning angle is at the minimum 5° the piston does not stroke and does not deliver oil.

Dismantling *(continued)*

8. Remove the Plate (151)

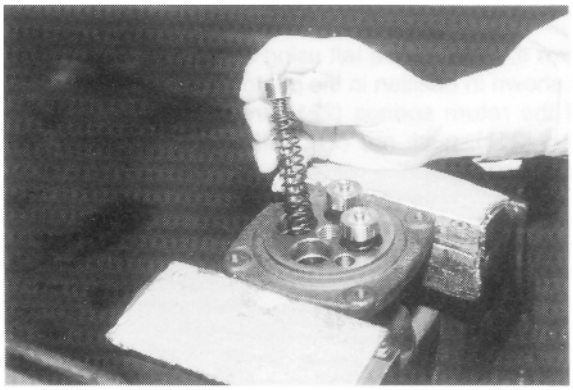
9. If the return springs (221) are weak, the sliding resistance of the 'O'-ring causes the plugs (211) to stick in the casing. In this case, remove the plugs with a straight-headed screwdriver.

Note: *Use the groove in the plug periphery, taking care not to damage the plug. Take care as the plugs may fly out due to the force in the return springs (221).*

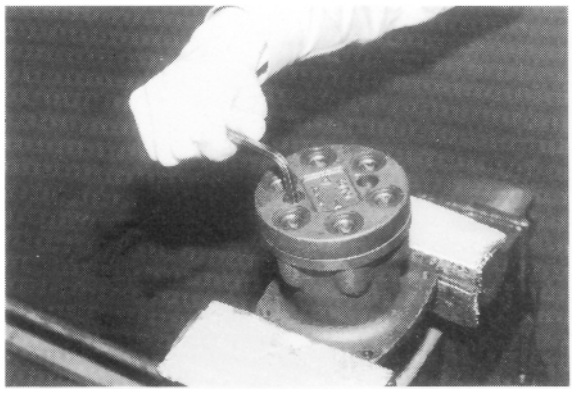


10. Remove the pressure reduction assembly return springs (221) from the casing.

Note: *Make a note of the relationship of positions of the pressure reduction assembly and the hole in the casing to facilitate reassembly. (When reassembling, install in the same position as that before disassembly).*



11. Loosen and remove the hexagonal socket head bolts (125) with an Allen wrench.



Precautions during use JS200/JS240

1. Precautions when installing the ram on the machine

When installing and removing from the machine, suspend the ram safely.

Suspending the ram by the piping is not only dangerous, but can also cause damage to the cylinder.
Secure the rod with a band. It is very dangerous if the rod should fly out unexpectedly. Also, the rod can be damaged and become unusable.

Welding after installing the ram may result in damage.

If electric welding is done even at a point away from the ram, there may be sparking inside the ram and it will become necessary to replace the ram with a new one.

When painting the machine, mask the ram.

If paint adheres to the rod surface or to the wiper ring and the ram is worked, the wiper ring cannot function properly and foreign matter from the outside and paint can easily enter the ram and cause damage to the seals, drastically shortening the life of the ram.

Install the ram only when it is clean.

2. Caution During Use

Use only under designated conditions.

If hydraulic oil other than the designated oil is used, the seals quickly degenerate and become damaged. If the relief valve is set at a value higher than specified, it may cause ram damage and is dangerous.
In high temperature environments (Approx. 90°C and above) or low temperature environments (Below -20°C), seals quickly become damaged. Special seal materials are necessary so check to see if the ram that you are using is suitable or not.
The number one cause of ram oil leakage is due to rod damage. Be careful not to damage the rod.

Warm up sufficiently before beginning work.

In cold conditions the rod seals may be frozen so if the ram is operated at maximum pressure and maximum speed, the seals will be damaged.
There is a large amount of air in a new ram or one which has been left for a long time, so the ram will not operate smoothly. Also, if pressure is applied suddenly without bleeding the air, high temperature will be generated due to adiabatic compression and the seals may burn.
Before beginning work, always move the ram at full stroke with no load and expel air from the cylinder.

When stopping or storing, do it at a safe and fixed position.

The installed ram cannot maintain the same position for a long period of time.
The oil inside the ram may leak and due to the temperature change in the hydraulic oil, the hydraulic oil volume changes. For that reason, the ram expands and contracts, causing unexpected movement to the machine which is dangerous. Stop or store the machine in a safe and fixed position.

3. Maintenance, Inspection Points.

Carry out daily maintenance and inspection.

The key point for correct long-term ram function is daily maintenance and inspection. Carry out maintenance and inspection so that the ram functions fully at all times. Always remove any mud, water, dust or oil film adhering to the rod and keep it in normal condition. However, when cleaning the wiper ring and seals, do not get them wet with water but wipe clean with a rag. If leaving for more than one week, apply anti-rust oil to the rod surface.

Use genuine JCB parts when replacing parts.

If parts other than genuine JCB parts are used, the desired results may not be obtained. Use only genuine JCB parts.

Caution during disassembly and reassemble.

Disassembling the ram while it is still installed on the machine can be dangerous as unexpected movements of the machine can occur. Remove the ram from the machine and then disassemble.
If reassembled with dirty hands, foreign matter can enter the ram causing a shorter life span and also the other hydraulic equipment may be damaged. Reassemble in a clean state.
Follow the instructions in the diagrams regarding torque tightening for screwed parts. If the torque is too high or too low, it can cause damage.

Assembly JS200/JS240 *(continued)*

6. Assemble the piston rod into the cylinder.

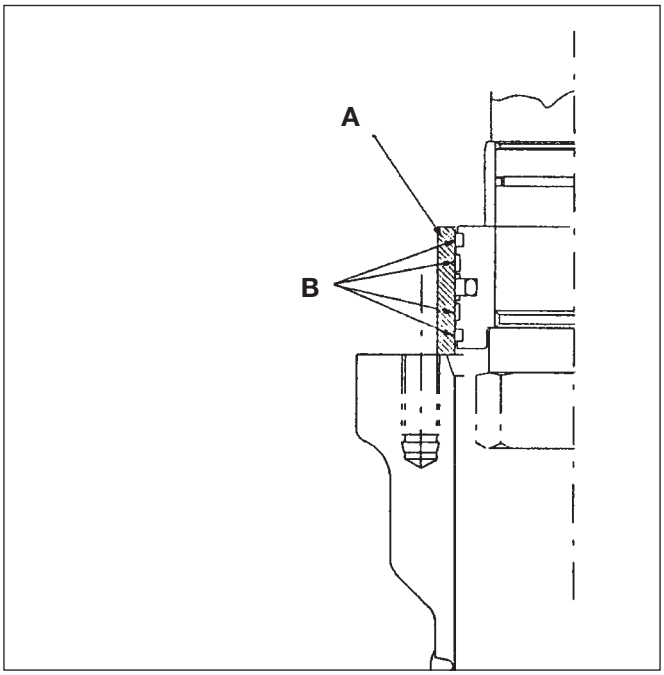
a. Secure the cylinder vertically or horizontally, insert the piston into the cylinder.

b. If the cylinder is vertical the piston rod will enter under its own weight. If horizontal, it must be helped in.

Note: *When inserting the piston into the cylinder take care to prevent the slide rings from falling off.*

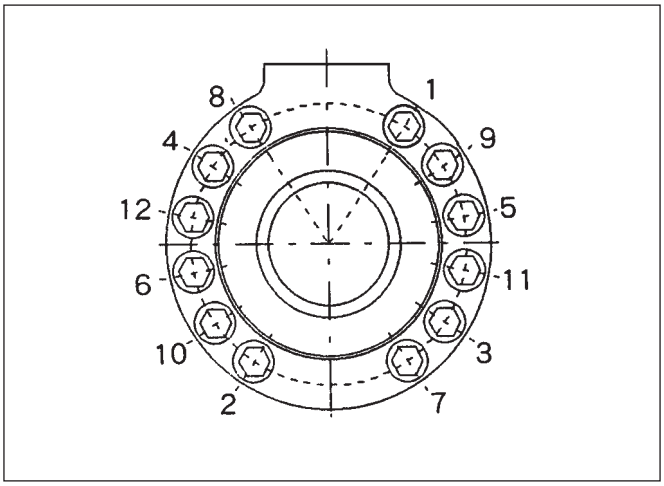
c. Use a jig **A** (split nylon pipe) to compress the slide rings **B** during insertion.

e. Phase the gaps of slide rings **B** at 180°.



7. Position the cylinder head as shown.

Install the mounting bolts, temporarily tighten them in the order shown and re-tighten the bolts to the specified torque in the sequence shown.



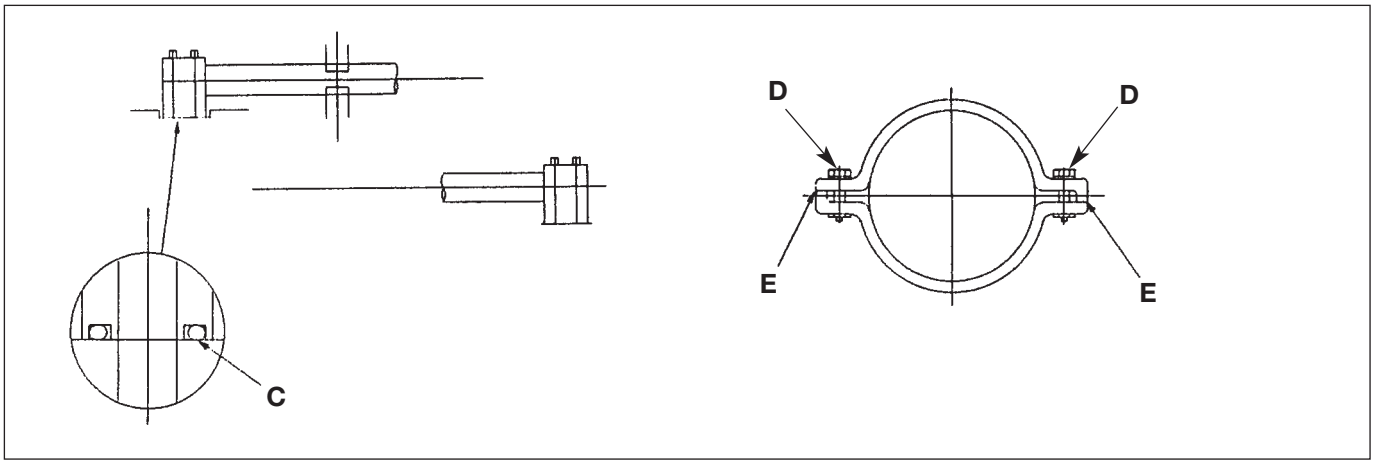
8. Installing the piping.

a. Make sure the 'O'-rings **C** are properly installed in the respective grooves.

b. Fasten the bolts at each port first.

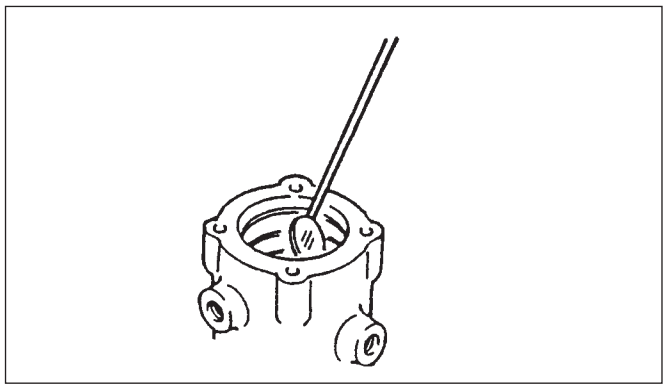
c. Fasten the bolts to the specified torque.

d. Fasten the piping band screws **D** equally on both sides to the specified torque so that the gap clearances **E** are eliminated.

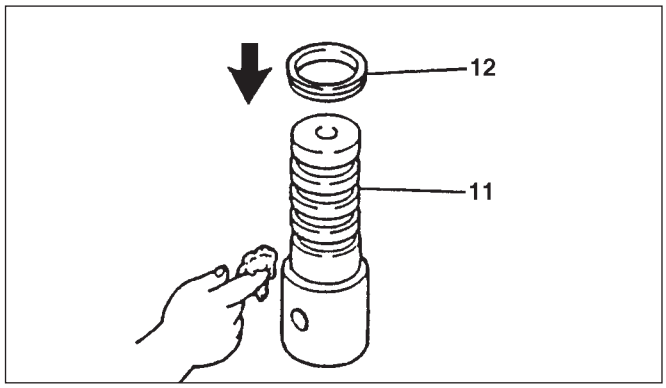


Assembly JS200/JS240 *(continued)*

3. After installing the 'O'-ring, packing ring and packing, check with a mirror to see if they are installed correctly. After checking, coat with grease then check once more for any protrusion, twisting, etc.

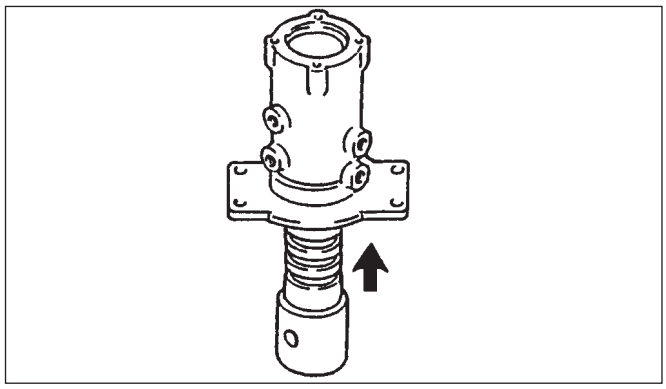


4. Install the V-ring 12 on the axle 11 and grease adequately.
Take care to prevent contamination of the grease by water or dirt.

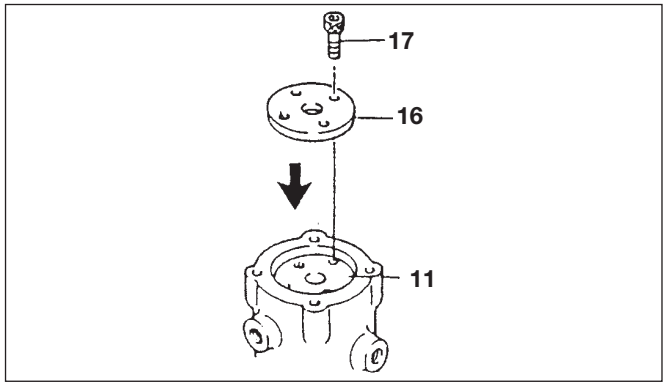


5. Install the axle 11 to the rotor 13.

Note: *Set the V-ring 12 so that it will not be cut or scratched.*

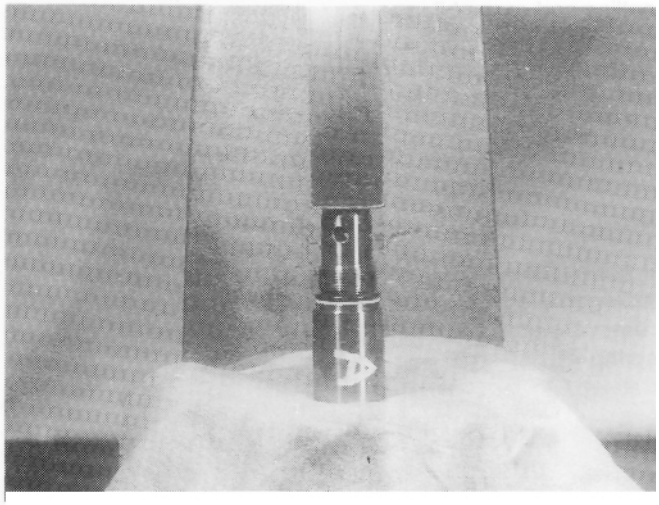


6. Install the thrust plate.

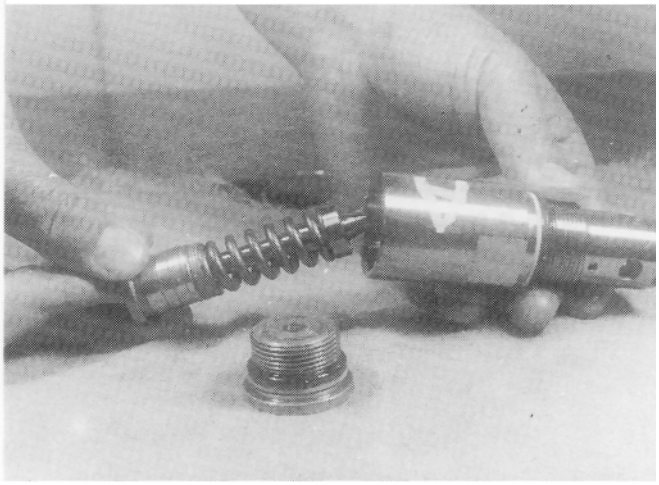


* Relief Valves Assembly

1 Press fit seat **44** into sleeve **39** which has an 'O'-ring **41**.



2 Mount poppet **43**, spring **42**, shim **40**, piston **38**, liner **51** onto sleeve **39**.

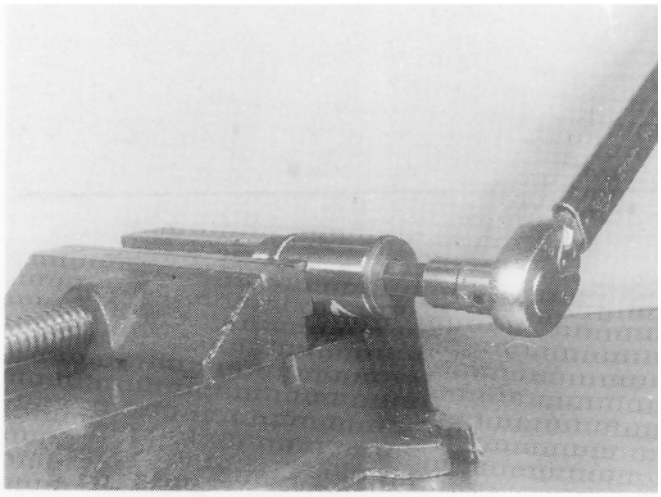


3 Screw cap **37** (with a 14 mm A/F hexagonal socket) with 'O'-ring **36** and back-up **35** mounted, on to sleeve **39** and tighten to a torque of 157 Nm (116 lbf ft).

Check the relief set pressure.

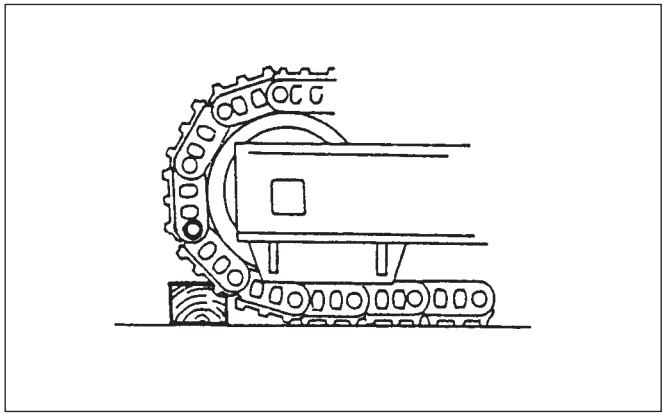
The correlation between the set pressure of the relief valve and the adjusting shims is shown below. However, adjustment must not be attempted if the pressure cannot be checked.

A 0.1 mm (0.003 in) shim equals 5 kgf/cm^2 (71 lbf/in^2) approximately.



Removal

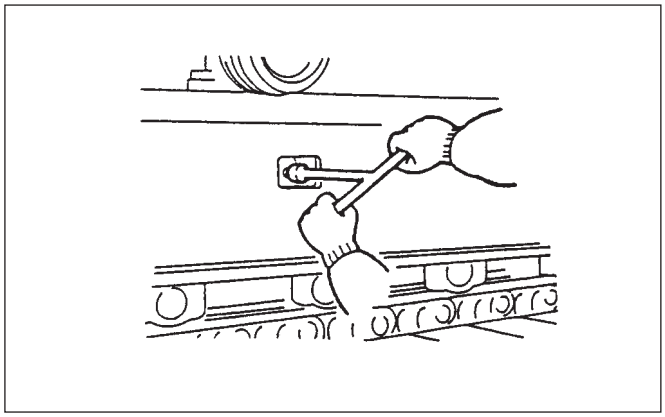
1. Move the track link until the master pin is over the take-up roller in the position shown, place a wooden block under the track shoe as shown.



2. Slacken the check valve to bleed out the grease.

⚠ WARNING

Slacken the check valve slowly and stop when grease is released. The grease and valve are under extremely high pressure and could cause injury if suddenly released.
TRANS 6-2



* **3.** Disconnect the track link by removing the locking pin and knocking out the master pin.

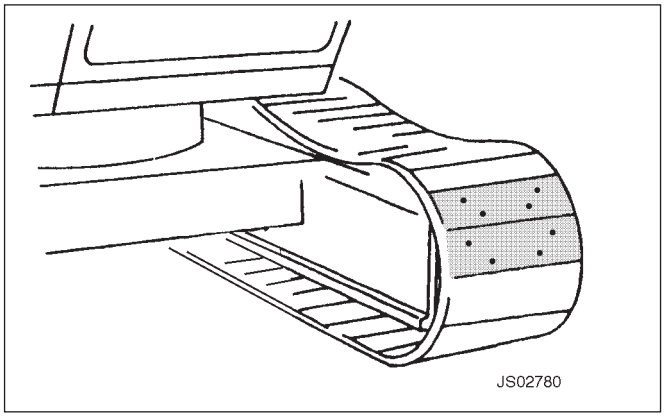
a. Remove bolts and lift off the track shoes adjacent to the master pin.

b. Position a suitable hydraulic press so that its ram aligns with the master pin.

c. Insert the spacer bar between the master pin and the hydraulic ram.

d. Slowly operate the hydraulic ram and press out the master pin.

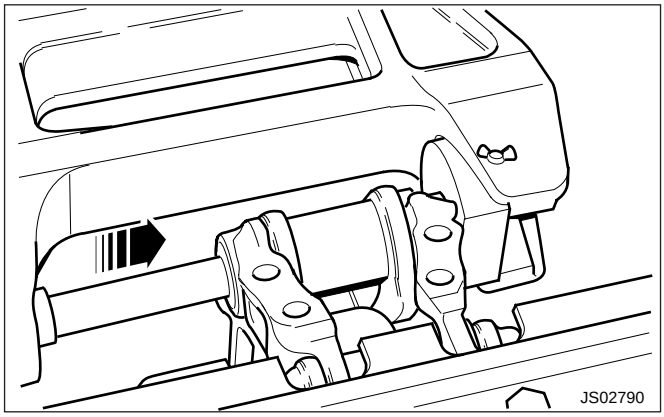
*



⚠ WARNING

Stand clear and to one side of the track while you remove the master pin. When the master pin is removed the track could fall forward and injure you.
TRACK 1-1

e Remove the seal rings from each side of the chain link.



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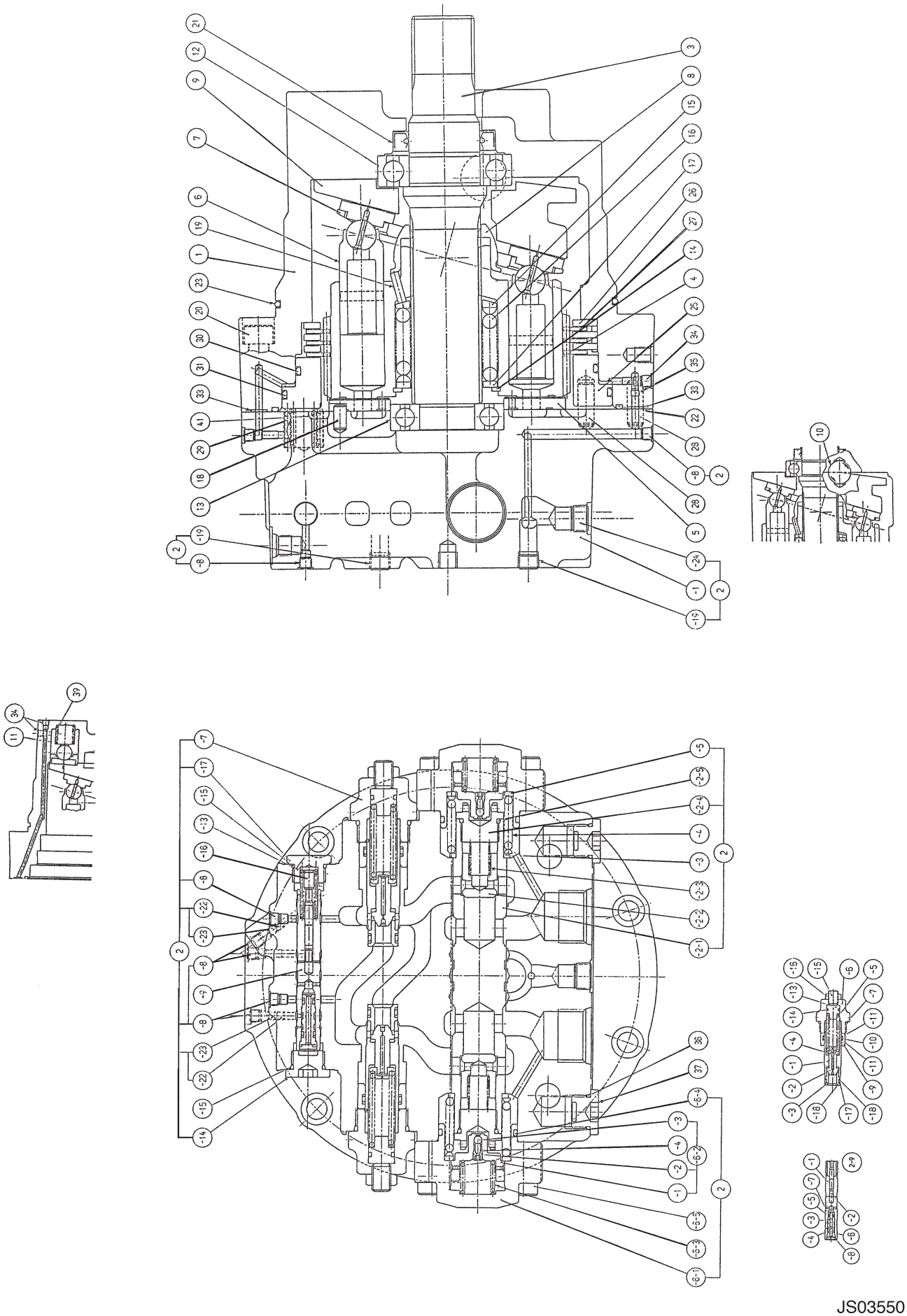

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