

# Service Manual

**JS330**

from machine no. 712501

**JS450**

from machine no. 714501

**JS460/500**

from machine no. 714550

**JS460/500**

machine no. 2410051 - 2410300

PUBLISHED BY THE  
TECHNICAL PUBLICATIONS DEPARTMENT  
OF JCB SERVICE: ©  
WORLD PARTS CENTREkj.b.kjb  
UTTOXETER, STAFFORDSHIRE, ST14 7BS,  
ENGLAND

Tel. ROCESTER (01889) 590312

PRINTED IN ENGLAND

Publication No. 9803/6420

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## Introduction

This publication is designed for the benefit of JCB Distributor Service Engineers who are receiving, or have received, training by JCB Technical Training Department.

These personnel should have a sound knowledge of workshop practice, safety procedures, and general techniques associated with the maintenance and repair of hydraulic earthmoving equipment.

Renewal of oil seals, gaskets, etc., and any component showing obvious signs of wear or damage is expected as a matter of course. It is expected that components will be cleaned and lubricated where appropriate, and that any opened hose or pipe connections will be blanked to prevent excessive loss of hydraulic fluid and ingress of dirt. Finally, please remember above all else **SAFETY MUST COME FIRST!**

The manual is compiled in sections, the first three are numbered and contain information as follows:

- 1 = General Information** - includes torque settings and service tools.
- 2 = Care & Safety** - includes warnings and cautions pertinent to aspects of workshop procedures etc.
- 3 = Routine Maintenance** - includes service schedules and recommended lubricants for the whole machine.

The remaining sections are alphabetically coded and deal with Dismantling, Overhaul etc. of specific components, for example:

- A = Attachments**
- B = Body & Framework ...etc**

The page numbering in each alphabetically coded section is not continuous. This allows for the insertion of new items in later issues of the manual.

Section contents, technical data, circuit descriptions, operation descriptions etc. are inserted at the beginning of each alphabetically coded section.

All sections are listed on the front cover; tabbed divider cards align directly with individual sections on the front cover for rapid reference.

Where a torque setting is given as a single figure it may be varied by plus or minus 3%. Torque figures indicated are for dry threads, hence for lubricated threads may be reduced by one third.

'Left Hand' and 'Right Hand' are as viewed from the rear of the machine facing forwards.

**Note:** In this manual the term 'swing' may sometimes be used in place of 'slew' and the term 'arm' may sometimes be used in place of 'dipper'.

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\*

### JS330/JS450/460 and Variants

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 renew 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 mm	Tightening Torque		
				Nm	kgf m	lbf ft
				JS330/JS450-460	JS330/JS450-460	JS330/JS450-460
1†	Travel Motor	M24	36	900~1051	92~107	663~775
2†	Drive Sprocket	M20/M24	30/36	521~608/900~1051	53~62/92~107	384~448/663~775
3†	Take-up Roller	M16	24	267~312	27~32	197~230
4†	Upper (Carrier) Roller (Standard)	M16	24	267~312	27~32	197~230
	(Heavy Duty)	M18	27	371~432	38~44	273~318
5†	Lower (Track) Roller	M20/24	30/36	521~608/900~1051	53~62/92~107	384~448/603~775
6†	Track Guard	M20/24	30/36	521~608/900~1051	53~62/92~107	384~448/603~775
7	Shoe Bolt (Standard)	M20	30	755~931	77~95	557~687
	(Heavy Duty)	M22	32	980~1180	100~120	723~871
8	Counter weight	M27/M42	41/65	1335~1540/1470	136~158/150	985~1136/1084
9†	Turntable Bearing (Lower Frame)	M24	36	900~1050	92~107	664~775
10†	Turntable Bearing (Slew Frame)	M24	36	900~1050	92~107	664~775
11†	Slew Equipment	M24	36	900~1050	92~107	664~775
12†	Engine (Engine Mount)	M20	30	289~337	30~34	213~248
13†	Engine Bracket	M12&M14	19&22	108~127/176~196	11~13/18~20	79~93/130~144
14	Radiator	M16	24	127~147	13~15	93~108
15†	Hydraulic Pump	M12	19	63~73	6.4~7.4	46~54
16†	Oil Tank	M16	24	196	20	144
17†	Fuel Tank	M16	24	245	25	180
18†	Control Valve	M16/M20	24/30	196/343	20/35	144/253
19†	Rotating Joint	M12&M16	19&24	65~95/245~290	7~10/25~30	48~70/180~214
20	Cab	M16	24	128~142	13~15	94~105
21	Battery	M10	17	20~29	2~3	14.7~21.4

**Note:** Use JCB Threadlocker and Sealer (High Strength) on those marked † and tighten to the torque listed in the above table.

The tightening torques 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	.69	1.7	3.3	5.9	9.9	13.9	20	28
		lbf ft	5	12	24	43	72	101	145	203
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	.89	2.2	4.3	8.0	12	17.9	24.9	34.9
		lbf ft	6.5	16	31	58	87	130	180	253

## 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			12.9		
	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft
<b>M3</b>	0.39	0.04	0.28	-	-	-	-	-	-	-	-	-
<b>M4</b>	0.78	0.08	0.57	-	-	-	-	-	-	-	-	-
<b>M5</b>	1.67	0.17	1.2	-	-	-	-	-	-	-	-	-
<b>M6</b>	2.84	0.29	2.1	8.04	0.82	5.9	11.3	1.15	8.3	-	-	-
<b>M8</b>	7.06	0.72	5.2	19.6	2.00	14.5	27.7	2.82	20.4	48	4.90	35.4
<b>M10</b>	14.0	1.43	10.3	39.1	3.99	28.8	55.0	5.61	40.6	94	9.2	66.4
<b>M12</b>	24.6	2.51	18.1	68.5	6.98	50.5	96.2	9.81	71	166	16.9	122
<b>M16</b>	61.9	6.31	45.7	173	17.6	127.6	242	24.7	178.5	400	40.8	295
<b>M20</b>	122	12.4	90	337	34.4	249	475	48.4	350	-	-	-
<b>M22</b>	167	17.0	123	464	47.3	342	652	66.5	481	-	-	-
<b>M24</b>	210	21.4	155	584	59.5	431	821	83.7	606	-	-	-
<b>M27</b>	311	31.7	229	864	88.1	637	1220	124	900	-	-	-
<b>M30</b>	420	42.8	310	1170	119	863	1650	168	1217	-	-	-
<b>M33</b>	576	58.7	425	1600	163	1180	2260	230	1667	-	-	-
<b>M36</b>	736	75.1	543	2050	209	1512	2880	294	2124	-	-	-
<b>M39</b>	961	98.0	709	2680	273	1977	3760	383	2773	-	-	-
<b>M42</b>	1190	121	878	3300	336	2434	4640	473	3422	-	-	-
<b>M45</b>	1490	152	1099	4140	422	3054	5820	593	4293	-	-	-
<b>M48</b>	1780	182	1312	4960	506	3659	6970	711	5141	-	-	-

## General Notes

For the type of grease to use at each point, see *Lubricants and Capacities*.

Do not mix different types of grease. Keep them separate.

## WARNING

You will be working close into the machine for these jobs. Lower the attachments if possible. Remove the starter key and disconnect the battery. This will prevent the engine being started.

8-3-1-3

## Slew Ring Bearing

- 1 The three grease nipples are grouped together on the front of the machine.

## Slew Ring Teeth and Slew Pinion

Ensure slew ring is kept full of grease. Always grease whenever the machine has been steam-cleaned.

For location of the slew ring gear refer to *component Location Diagrams*.

### 1 Make the Machine Safe

Stop the engine and remove the starter key.

### 2 Grease the Slew Ring

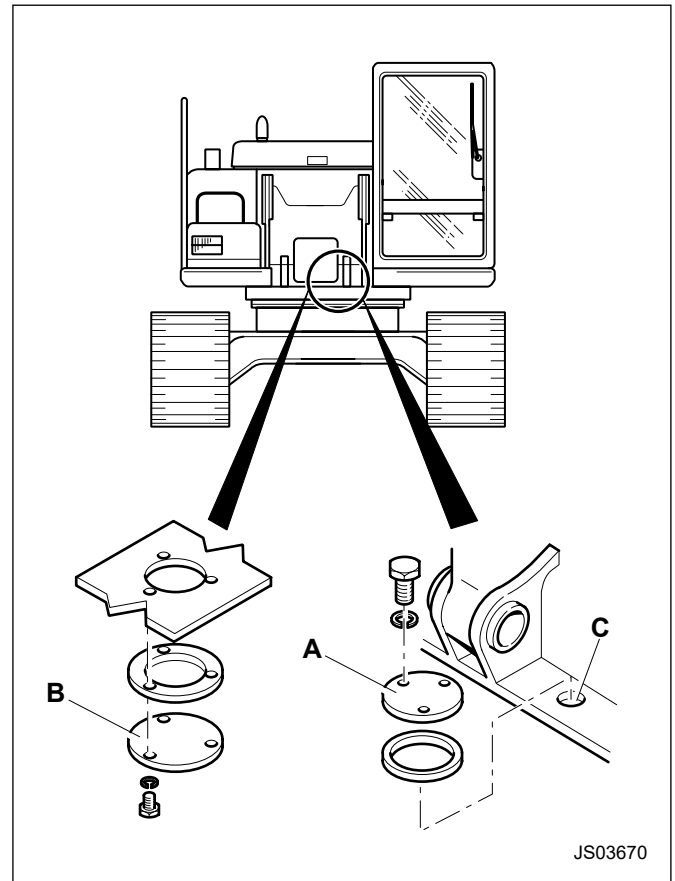
- a Remove the Inspection port cover **A** (on the lower centre section).
- b Remove the grease discharge port cover **B** (on the lower inner side).
- c Remove contaminated grease.
- d Replace the discharge port cover.
- e Apply grease to the slew ring via aperture **C**.

### 3 Slew the Machine

Start the engine and slew the machine a few degrees. Stop the engine, remove the starter key and apply grease again.

Repeat until the whole ring is greased. Check that grease exudes around the entire circumference.

### 4 Refit the Cover



JS03670

**Excavator End**

**16 Grease Points**

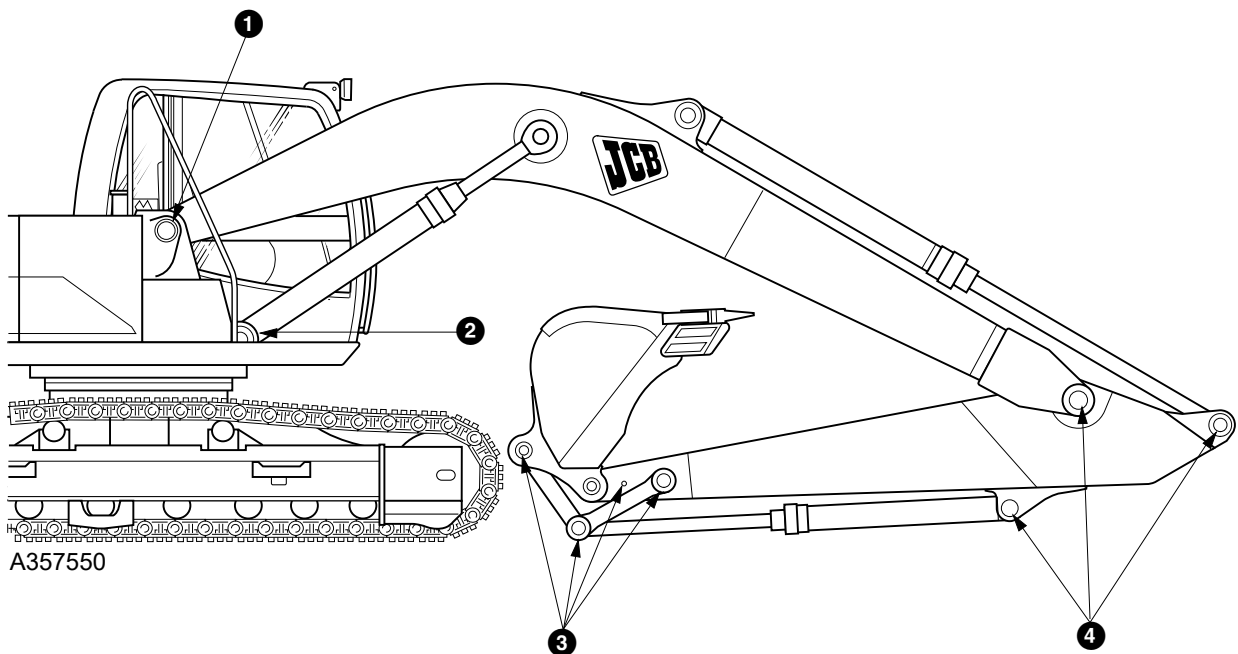
**⚠ WARNING**

You will be working close into the machine for these jobs. Lower the attachments if possible. Remove the starter key and disconnect the battery. This will prevent the engine being started.

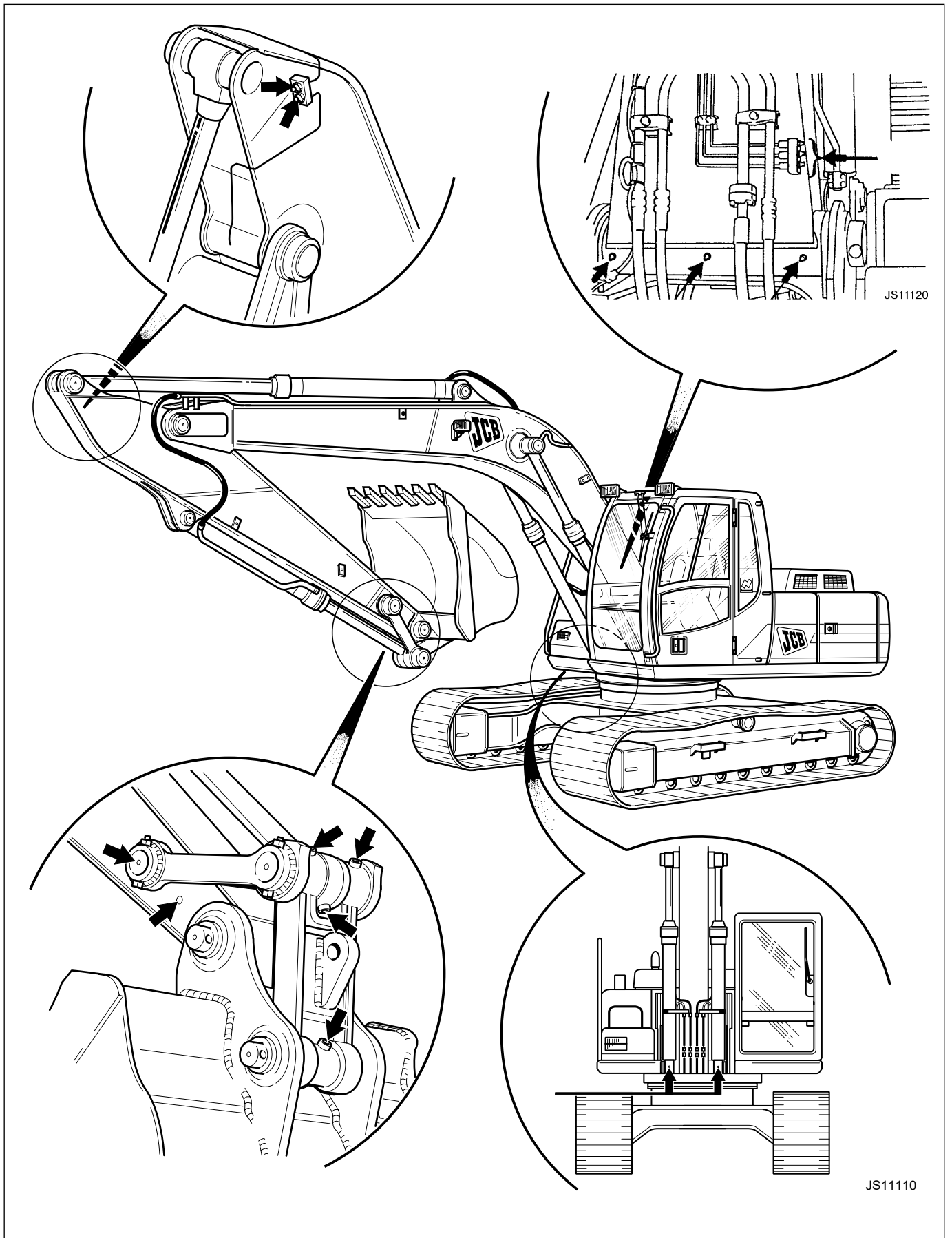
8-3-1-3

Greasing Points	(No.) Reference drawing	Number of greasing points
Boom Boom ram, eye end pin Dipper ram, dump end pin	1	3. } 2. } Centralised greasing (total of 6 points) 1.
Boom ram, dump end pin	2	2.
Bucket ram to Bucket linkage pin Bucket linkage to Bucket pin Dipper to Bucket Linkage pin Dipper to Bucket pin	3	2. 1. (total of 5 points) 1. 1.
Bucket ram, dump end pin Dipper ram, eye end pin Boom to Dipper, connecting pin	4	1. 1. (total of 3 points) 1.

**Note:** The JS450/460 has the EMS (Easy Maintenance System) bearings, using a bush and plated pin system it is possible to extend the excavator lubrication intervals to 1000 hours (this does not include bucket pins which should be greased at 50 hour intervals).



Excavator End





### First Aid - Electrolyte

#### EYES

FLUSH WITH WATER FOR 15 MINUTES. GET MEDICAL HELP FAST.

#### IF SWALLOWED

DO NOT INDUCE VOMITING. DRINK LARGE QUANTITIES OF WATER OR MILK. Then drink milk of magnesia, beaten egg or vegetable oil.

#### SKIN

FLUSH WITH WATER. REMOVE AFFECTED CLOTHING.

#### **⚠ WARNING**

Batteries give off an explosive gas. Do not smoke when handling or working on the battery. Keep the battery away from sparks and naked flames.

Battery electrolyte contains sulphuric acid. It can burn you if it touches your skin or eyes. Wear goggles. Handle the battery carefully to prevent spillage.

Keep metallic items (watches, rings, zippers etc) away from the battery terminals. Such items could short the terminals and burn you.

Set all switches in the cab to OFF before disconnecting the battery. When disconnecting the battery, take off the earth (-) lead first.

When reconnecting, fit the positive (+) lead first.

Re-charge the battery away from the machine, in a well-ventilated area. Switch the charging circuit off before connecting or disconnecting the battery. When you have installed the battery in the machine, wait five minutes before connecting it up.

5-3-4-3

#### **⚠ CAUTION**

Do not disconnect the alternator, the battery, or any part of the charging circuit with the engine running.

8-3-4-1

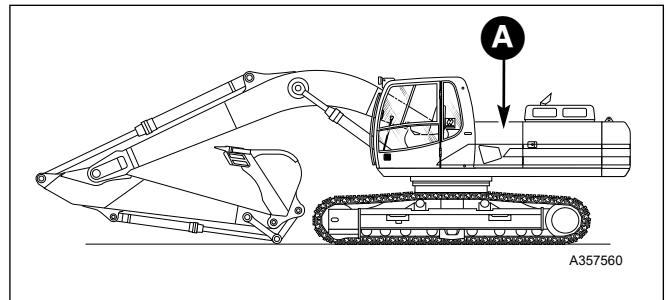
Charge Rate Depending on the Battery specific Gravity

Temperature	20°C	0°C	-10°C
Charge Rate			
100% (satisfactory)	1.26	1.27	1.28
90% (satisfactory)	1.24	1.25	1.26
80% (charge)	1.22	1.23	1.24
75% (charge)	1.21	1.22	1.23

If the battery is charged and the charge rate is less than 75%, replace the battery.

### Check the Electrolyte Level

#### 1 Open the Battery Compartment A



Remove the two bolts **B** securing the metal plate above the battery. Remove the plate **C**.

#### 2 Check the Level

Remove covers and look at the level in each cell. The electrolyte should be 6 mm. (0.25 inch) above the plates. Top up if necessary with distilled water or de-ionized water.

#### **⚠ WARNING**

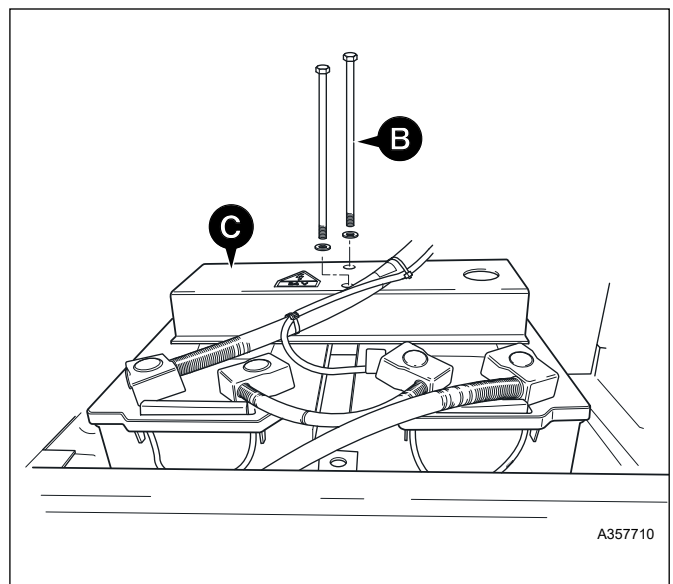
Do not top the battery up with acid. The electrolyte could boil out and burn you.

2-3-4-6

#### 3 Check the Connections

Make sure that the terminals are tight and clean. Coat them with petroleum jelly to prevent corrosion.

Refit the metal plate **C** above the battery. Refit the two securing bolts **B**.



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**Releasing Tank Pressure**

**⚠ WARNING**

**DO NOT** remove the hydraulic tank filler cap or cover plate when the engine is running. The hydraulic system is under pressure. You or others could be injured. First stop the engine and then release the pressure.

8-3-4-4/1

**⚠ WARNING**

The temperature of the hydraulic oil will be high soon after stopping the engine. Wait until it cools down (less than 40°C) before beginning maintenance.

8-3-4-10

**1 Prepare the Machine**

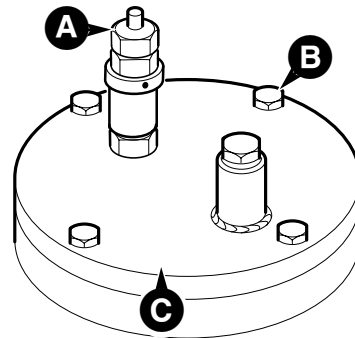
Position the machine on level ground. Stop the engine. Remove the starter key.

**2 Locate the Hydraulic Oil Tank Filler Cap or Filler Plate**

Refer to **Component Location Diagrams** at the end of this section.

**3 Release Tank Pressure**

Loosen air release plug **A** and allow tank pressure to disperse. When no more air escapes loosen the plug a bit further to confirm the tank is no longer pressurised. Retighten the air release plug. Remove retaining screws **B** and lift off filler plate **C**.



JS09771

**Air Bleeding Procedures**

**⚠ WARNING**

**Hydraulic Pressure**

**Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses, stop the engine and operate the controls to release pressure trapped in the hoses. Make sure the engine cannot be started while the hoses are open.**

INT-3-1-11/1

	Air Bleeding Sequence			
	Air Bleeding from pump	Air Bleeding from ram	Air Bleeding from slew motor	Check
Hydraulic oil or pump replacement	○ →	○ →	○ →	○
Ram replacement		○ →		○
Slew motor replacement			○ →	○

## Air Bleeding Procedures (continued)

### Air Bleeding from Hydraulic Pump

#### After Dismantling and Assembly

- 1 Open bleed port **D** and drain port **R** and bleed air.
- 2 When hydraulic oil flows from drain port **R**, close and tighten plug.
- 3 Fill the pump with clean hydraulic fluid through bleed port **D** until oil overflows. Close and tighten plug.
- 4 Start the engine and run at idling speed until the complete system warms up.
- 5 Carefully loosen bleed plug **D** and release any trapped air.

- 6 Repeat step 3 if necessary.

**Note:** See illustration for reversed port references on the JS450 machine.

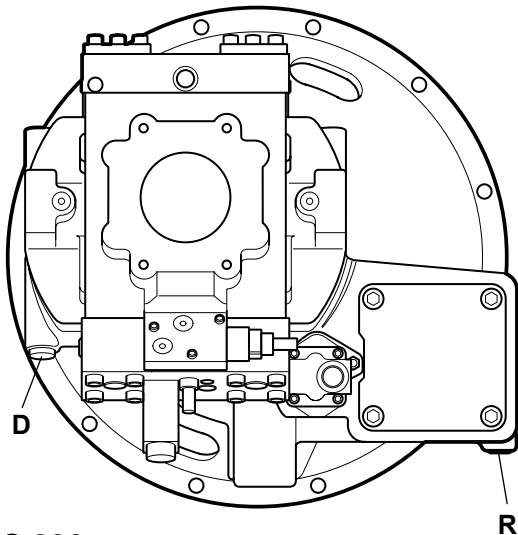
### **⚠** WARNING

The temperature of the hydraulic oil will be high soon after stopping the engine. Wait until it cools down (less than 40°C) before beginning maintenance.

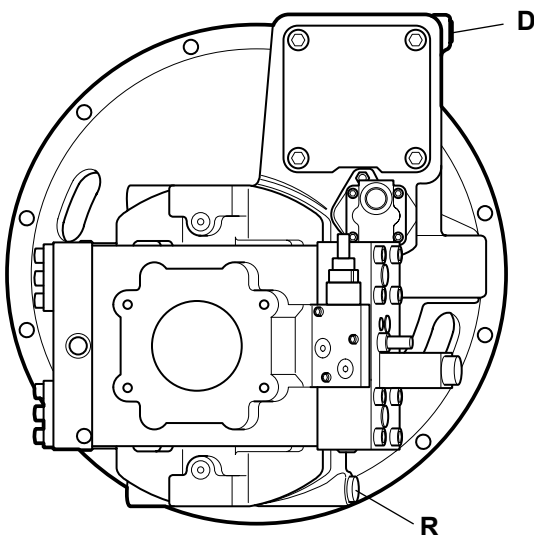
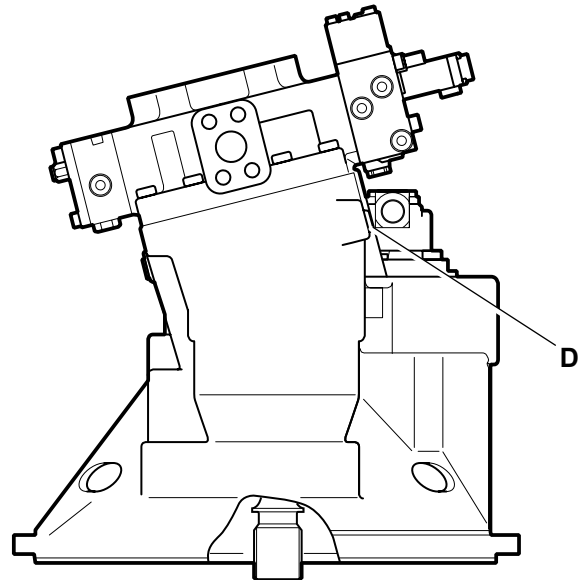
8-3-4-10

#### After Changing the Hydraulic Fluid

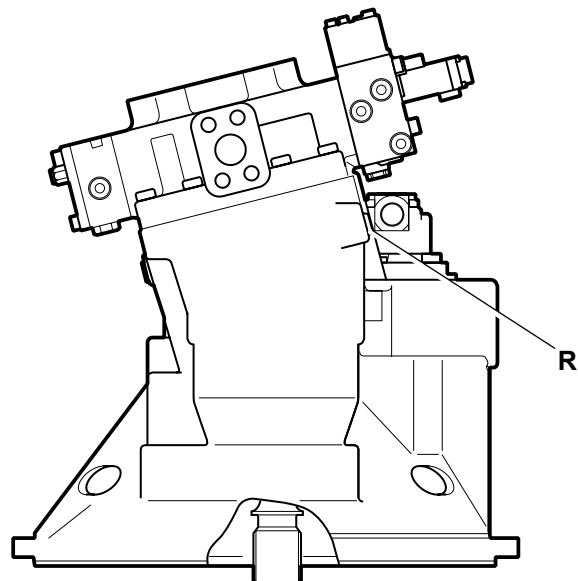
Carry out steps 5 and 6 of **After Dismantling and Assembly**.



JS 330



JS 450



JS09570

## Air Bleeding Procedures (continued)

### Air Bleeding from Ram

#### **WARNING**

##### Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses, stop the engine and operate the controls to release pressure trapped in the hoses. Make sure the engine cannot be started while the hoses are open.

INT-3-1-11/1

#### **WARNING**

The temperature of the hydraulic oil will be high soon after stopping the engine. Wait until it cools down (less than 40°C) before beginning maintenance.

8-3-4-10

### 1 Prepare the Machine

- a Position the Machine on level ground.
- b Idle the engine at low speed and retract each ram 4 or 5 times without reaching the stroke end (about 100mm (4 in.) before the end of the ram).
- c Operate each ram 3 or 4 times to the stroke end to completely bleed the air.
- d Stop the engine and allow the bubbles to make their way through the hydraulic tank.

### Air Bleeding from the Slew Motor

#### **WARNING**

DO NOT remove the hydraulic tank filler cap or cover plate when the engine is running. The hydraulic system is under pressure. You or others could be injured. First stop the engine and then release the pressure.

8-3-4-4/1

#### **WARNING**

The temperature of the hydraulic oil will be high soon after stopping the engine. Wait until it cools down (less than 40°C) before beginning maintenance.

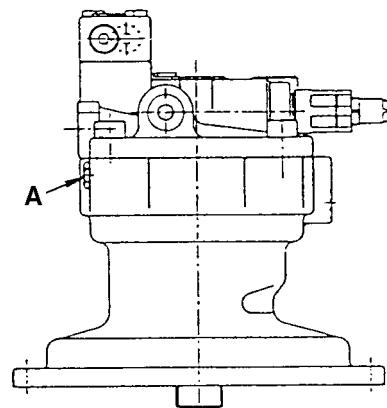
8-3-4-10

### 1 Prepare the Machine

- a Position the machine on level ground.
- b Idle the engine at low speed, loosen the air bleeding plug **A** and check that oil comes out from the air bleeding port.

### DO NOT SLEW THE MACHINE.

- c If no oil comes out, stop the engine, remove the air bleeding plug **A** and fill the motor case with hydraulic oil.
- d Install the air bleeding plug. Tighten and then loosen again.
- e Idle the engine at low speed and continue to run until oil comes out from the air bleeding port.
- f Completely tighten the air bleeding plug.
- g Idle the engine at low speed and slowly slew the machine left to right evenly more than 2 turns.
- h Stop the engine and allow the bubbles to make their way through the hydraulic tank.



JS09620

For location of hydraulic oil tank see **Component Location Diagram**.

### **WARNING**

Fine jets of hydraulic fluid at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic fluid leaks. Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic fluid. If hydraulic fluid penetrates your skin get medical help immediately.

INT-3-1-10/1

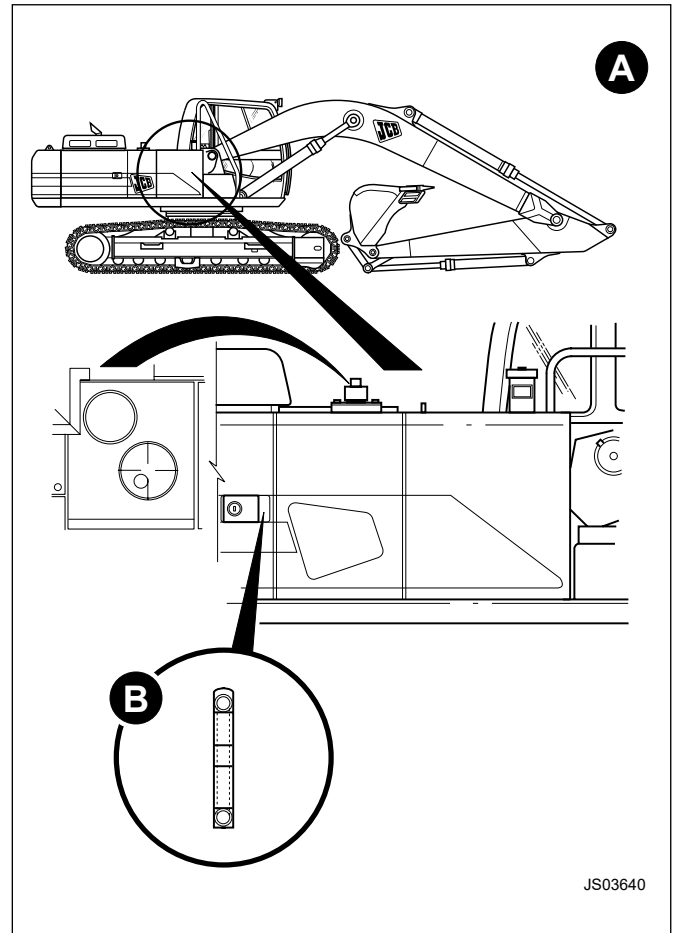
## Checking the Fluid Level

### 1 Prepare the Machine

Position the machine on level ground with the bucket and dipper rams fully extended and the boom lowered to rest the attachment on the ground, as at **A**.

### 2 Check the Level

Look at the fluid level in the sight tube **B**. The level should be between the two marks on the tube. If the fluid is cloudy, water or air has entered the system. Water or air in the system could damage the hydraulic pump.



## Topping up Fluid Level

### **WARNING**

**DO NOT** remove the hydraulic tank filler cap or cover plate when the engine is running. The hydraulic system is under pressure. You or others could be injured. First stop the engine and then release the pressure.

8-3-4-4/1

### 1 Prepare the Machine

Position the Machine on level ground as at **A**. Stop the engine. Remove the starter key.

### 2 Locate the Hydraulic Oil Tank or Filler Plate

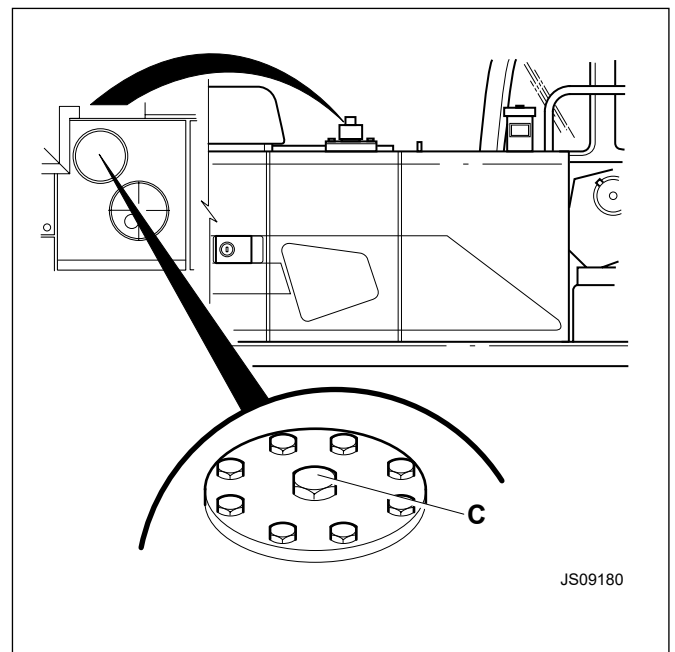
See **Component location Diagrams**.

### 3 Release Tank Pressure

See **Releasing Tank Pressure**.

### 4 Add Fluid.

- a Remove plug **C**.
- b Refill oil through the filler port using a suitable tundish.
- c Check the level through the level gauge on the side of the tank.
- d Refit plug **C**.



## Changing the Hydraulic oil

### **⚠ WARNING**

**DO NOT** remove the hydraulic tank filler cap or cover plate when the engine is running. The hydraulic system is under pressure. You or others could be injured. First stop the engine and then release the pressure.

8-3-4-4/1

### **⚠ WARNING**

#### Hydraulic Pressure

Oil is toxic. If you swallow any oil, do not induce vomiting, seek medical advice. Used engine oil contains harmful contaminants which can cause skin cancer. Do not handle used engine oil more than necessary. Always use barrier cream or wear gloves to prevent skin contact. Wash skin contaminated with oil thoroughly in warm soapy water. Do not use petrol, diesel fuel or paraffin to clean your skin.

INT-3-2-3

#### 1 Prepare the Machine

Position the machine on level ground as at **A**. Stop the engine. Remove the starter key.

2 Locate the Hydraulic oil tank or Filler Plate. See **Component Location Diagrams** at the end of the section.

#### 3 Release Tank Pressure

See **Releasing Tank Pressure**.

#### 4 Drain the Hydraulic Oil Tank

a Remove the filler port cover **B** and 'O'-ring **C**.

b Use a pump and discharge the hydraulic oil into an empty waste container.

c Remove the drain plug **D** on the bottom of the Tank and drain the remaining oil from the tank (have a drain pan ready).

#### 5 Replace the Suction Strainer **E**

See **Changing the Suction Strainer**.

#### 6 Replace the Return Filter **F**

See **Changing the Return Filter**.

#### 7 Seal the System

a Refit Drain plug **D**.

#### b Refill the Tank

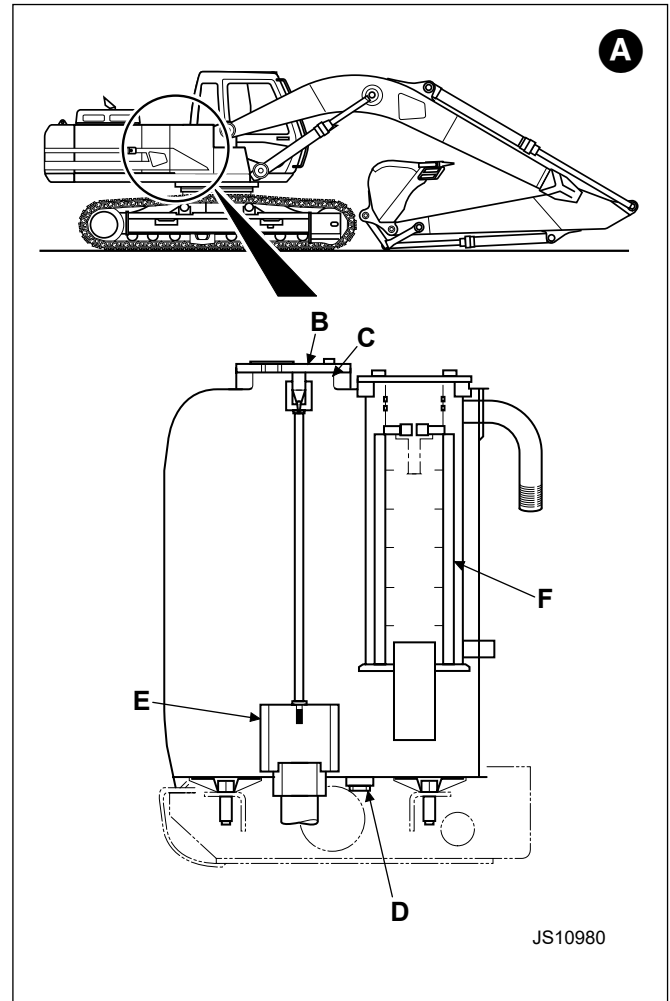
Refill the Tank with Hydraulic oil (See **Lubricants and Capacities** for the type of fluid) to the specified level see **Checking the Fluid Level**.

c Install the 'O'-ring **C** and filler port cover **B**.

**Note:** If the 'O'-Ring **C** is damaged, replace it with a new one.

#### 8 Bleed the Hydraulic Components

See **Air Bleeding Procedures**



#### 9 Check for Leaks

a Start the engine and run it for around 5 minutes without load.

b Slowly operate the travel, slew and cylinders several times.

#### 10 Check the Fluid Level

See **Checking the Fluid Level**.

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