



Service Manual

Hammermaster Rockbreakers

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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 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 numbered sections which contain information as follows:

- 1 = General Information & Safety - includes torque settings and service tools as well as warnings and cautions pertinent to aspects of workshop procedures etc.
- 2 = Routine Maintenance - includes service schedules and recommended lubricants.
- * 3 onwards = Servicing - includes dismantling, overhaul etc. of specific components.

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

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

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Technical Data

Working weight (including blunt tool and hanger bracket)	2950 kg (6394 lb)
Impact energy	6000 Joules
Impact rate	400 - 600 blows/min
Operating pressure	145 bar (2103 lbf/in ²)
Pressure relief - setting limits of carrier ARV	180 - 190 bar (2610 - 2755 lbf/in ²)
Oil supply	210 - 310 l/min (46.2 - 68.2 gal/min)
Return line back pressure	5 bar (73 lbf/in ²)
Input power (max)	75 kW
Output power (max)	60 kW
Port adapters - Hammermaster/connecting hoses	
Pressure line	1 in SAE Flange
Return line	1 1/4 in SAE Flange
Connecting hose inner diameters (minimum)	
Pressure line	25 mm
Return line	32 mm
Oil temperature range	- 20° C to + 80° C (- 4° F to + 176° F)
Carrier weight	35 - 55 tonne (77175 - 121275 lb)
Tool	
Total Length (all types)	1200 mm (47 in)
Weight - blunt	185 kg (407 lb)
- moil point I	78.5 kg (173 lb)
- chisel	78 kg (172 lb)
Shank diameter (new)	160 mm
Shank diameter (minimum allowable)	158 mm
Other tools are available	
Bushings	
Diameter (new)	160 mm
Diameter (maximum allowable)	162 mm
Accumulator charging pressure	40 bar (580 lbf/in ²)

General

The following servicing instructions are intended to be carried out with the Hammermaster removed from the carrier, with the assembly in the upright position and the tool removed.

WARNING

When the Hammermaster is removed from the carrier, special arrangements must be made to ensure that the assembly can not topple over while being worked on in the upright position. Failure to ensure this could result in death or serious injury from crushing.

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Two possible alternative methods of ensuring the safety of servicing personnel are:

- a The provision of a small pit in which to stand the assembly. The pit should be deep enough and a close enough fit to support the assembly, while also providing access for the servicing/dismantling/assembly procedures.
- b A specially constructed stand capable of supporting the weight. Refer to **Technical Data** for the weight of the assembly.

It will also be necessary to provide the service tools listed in Section 1.

When carrying out servicing, absolute cleanliness and careful handling of the precision hydraulic components are essential to avoid damage and ensure long life.

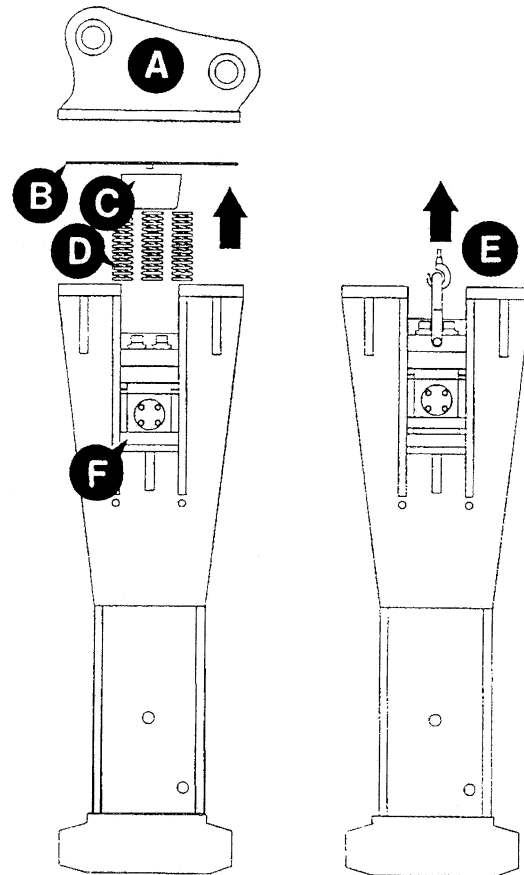
Use only purpose made cleaning fluids for hydraulic parts. **Never** use water, paint thinners or carbon tetrachloride. Keep cleaned and dried parts covered with lint free cloth to prevent re-contamination.

Coat all cleaned hydraulic components, seals and 'O' rings with clean hydraulic oil before assembly.

Wear Plates

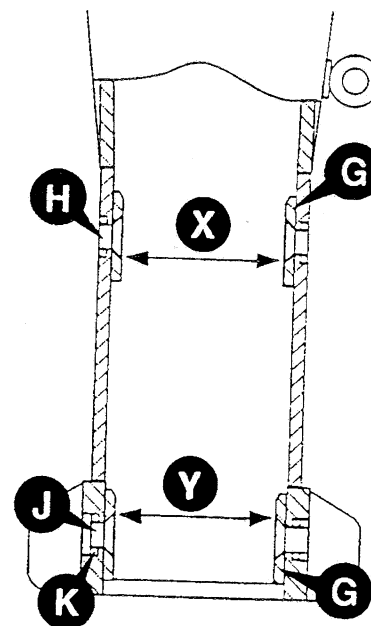
Checking

- 1 Disconnect the short hoses from the adapters located in the mounting brackets on hanger bracket **A**.
 - 2 Remove the hanger bracket by unscrewing the 14 retaining bolts/nuts.
 - 3 Remove plate **B** and then lift out buffer **C** and the eight springs **D**.
 - 4 Fasten a lifting device **E** to the accumulator cover and lift the hammer so that there is a gap of 10 mm (0.4 in) beneath the valve housing shoulders.
 - 5 Sway the hammer from side-to-side. If it moves more than 10 mm (0.4 in) either side of the central position at the level of the shoulders, the wear plates are excessively worn.
 - * 6 If excessive wear is detected, lift the hammer out of the housing and adjust or renew the wear plates to compensate (see below).
 - 7 Check the condition of the two buffers **F** and replace if necessary.
- * **Note:** The top and side buffers must be in good condition.



Replacing/Adjusting

- 1 The gap between the wear plates at points **X** and **Y** should be 332 mm (13.07 in).
 - 2 The gap can be adjusted by fitting new wear plates **G** and/or by installing packing plates between the wear plates and the housing.
 - 3 Cut the weld on the four pins **H** to release the top wear plates **G**.
 - 4 Cut the weld on the four pins **J** to remove rings **K** and release lower wear plates **G**.
 - 5 Adjust the gap as described in step 2 in such a way that the hammer will fit centrally in the housing.
 - 6 Fit new pins **H** and weld to the housing to secure the top wear plates **G**.
 - 7 Fit new pins **J** and rings **K**. Weld them together to secure the lower wear plates **G**.
- * **Note:** If possible use a hydraulic jack to hold new pads in position whilst welding. Do not overtighten jack. Ensure new wear plates are parallel.
- 8 Lower the hammer into the housing, leaving a 10 mm (0.4 in) clearance below the valve housing shoulders. Repeat steps 5 and 6 of **Checking**.
 - 9 If steps 4 and 5 of **Checking** are satisfactory, replace hanger bracket **A**. Tighten the retaining bolts/nuts to a torque of 822 Nm (606 lbf ft).
 - 10 Connect the short hoses to the adapters located in the mounting brackets on the hanger bracket.



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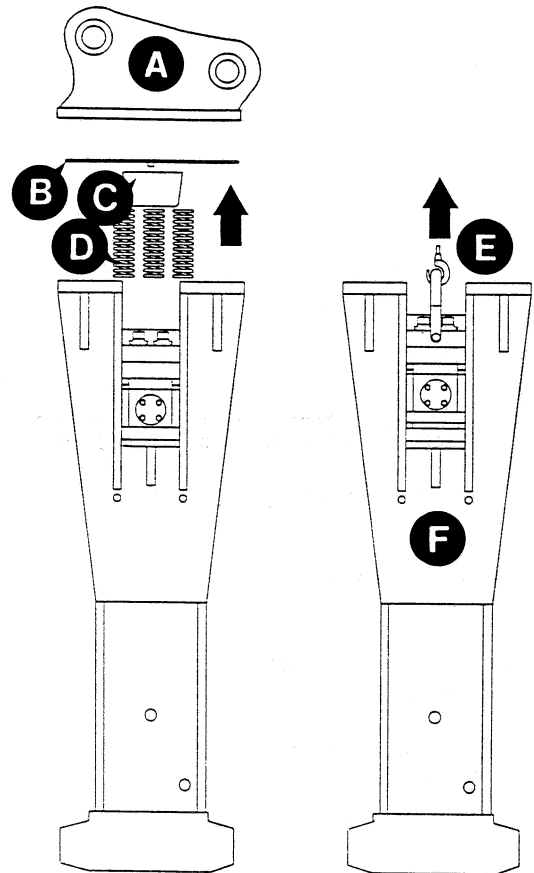
Hammer Assembly

Removing from Housing

- 1 Disconnect the short hoses from the adapters located in the mounting brackets on hanger bracket **A**.
- 2 Remove hanger bracket by unscrewing the 14 retaining bolts/nuts.
- 3 Remove plate **B** and then lift out buffer **C** and the eight springs **D**.
- 4 Fasten a lifting ring **E** to the accumulator cover and lift the hammer assembly out of housing **F**.

Installing in Housing

- 1 Installation is a reversal of removal.
- 2 If installation of the assembly follows replacement or adjustment of the wear plates (see **Wear Plates**), make sure the hammer assembly fits centrally in the housing.
- 3 Tighten the retaining bolts/nuts for hanger bracket **A** to a torque of 822 Nm (606 lbf ft).
- 4 Connect the short hoses to the adapters located in the mounting brackets on the hanger bracket.



Accumulator

Removal

- 1 Remove the hammer assembly from the housing (see **Hammer Assembly**).
- 2 Remove the lifting ring **A** from the accumulator cover. Remove the protective plug from the top of the accumulator.

⚠ WARNING

Use only nitrogen gas to charge accumulators. The use of any other gas can cause the accumulators to explode. Remember that although nitrogen is not poisonous you can be killed by suffocation if it displaces the air in your workplace. Do not allow excessive quantities of nitrogen to be discharged into the atmosphere.

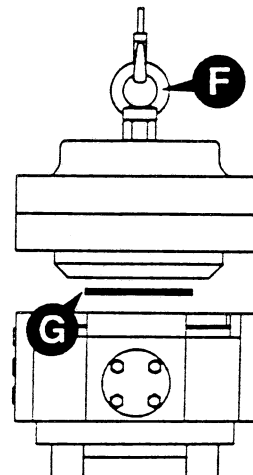
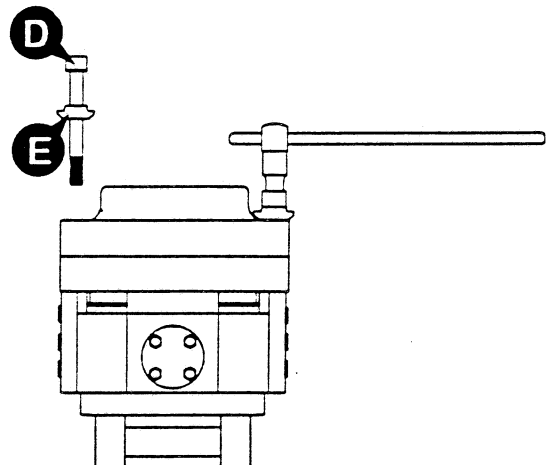
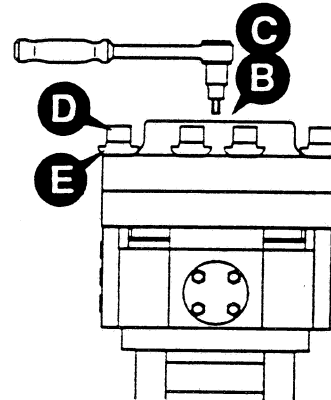
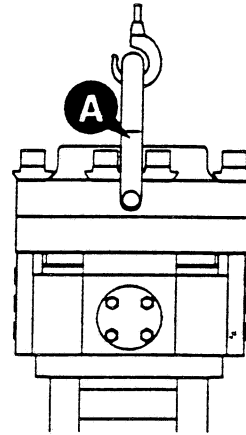
- 3 Carefully open the accumulator filling plug **B** and let the nitrogen gas escape.

When there is no more pressure in the accumulator, remove plug **B** and Usit-ring **C**.

- 4 Remove the eight socket head mounting bolts **D** and washers **E**.
- 5 Install an M28 X 1.5 eyebolt **F** in the top of the accumulator.
- 6 Lift the accumulator clear of the valve body.
- 7 Remove seal **G**.
- 8 If the accumulator requires attention, proceed to **Dismantling**.

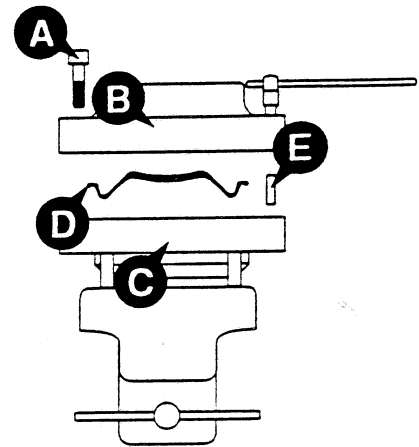
Replacement

- 1 Charge the accumulator (see **Charging**).
- 2 Grease seal **G** and fit to the base of the accumulator.
- 3 Coat the mating surfaces of the valve body and the accumulator with MoS₂ spray.
- 4 Locate the accumulator on the top of the valve body. Remove eyebolt **F**.
- 5 Fit washers **E** to the eight socket head bolts **D**. Grease the bolt threads and install.
- 6 Tighten evenly to a torque of 700 Nm (520 lbf ft) and then further tighten to a torque of 1350 Nm (996 lbf ft).
- 7 Fit a new protective plug to the top of the accumulator.
- 8 Fill the lifting ring holes with silicone compound.
- 9 Replace the hammer assembly in the housing (see **Hammer Assembly**).



Accumulator (continued)**Dismantling**

- 1 Mount the accumulator on the vice - held accumulator assembly jig, (see **Service Tools**, Section 1).
- 2 Remove the sixteen socket head retaining bolts **A**.
- 3 Separate accumulator cover **B** from base **C** and take out diaphragm **D**.
- 4 Remove the two guide pins **E**.
- 5 Thoroughly clean and dry all parts.

**Assembly**

- 1 Install the accumulator base **C** on the assembly jig.
- 2 Fit the two guide pins **E**.
- 3 Install a new diaphragm **D**. Coat the gas side with silicone grease.
- 4 Coat the mating surface of accumulator cover **B** with silicone grease.
- 5 Fit the cover onto the base.
- * 6 Grease the threads of the sixteen retaining bolts **A**. Install the bolts and tighten, first to a torque of 500 Nm (370 lbf ft), and then finally to a torque of 700 Nm (520 lbf ft).
- 7 Charge the accumulator (see **Charging**).

Accumulator (continued)

Charging

⚠ WARNING

Use only nitrogen gas to charge accumulators. The use of any other gas can cause the accumulators to explode. Remember that although nitrogen is not poisonous you can be killed by suffocation if it displaces the air in your workplace. Do not allow excessive quantities of nitrogen to be discharged into the atmosphere.

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- 1 Remove protective plug **A** from the top of the accumulator.

Fit a new Usit-ring **B** and filler plug **C**.

- 2 Connect the nitrogen charging tool kit **D** (see **Service Tools**, Section 1) to the accumulator.

- 3 Via the charging device, open the filler plug **C** by three turns as at **E**.

- 4 Open the discharge valve of the charging device.

Carefully open the nitrogen gas bottle valve and confirm that the nitrogen gas flows freely.

Shut the gas bottle valve and the discharge valve of the charging device.

- 5 Carefully open the gas bottle valve and, watching the gauge, allow nitrogen to flow until the pressure reading reaches 45 bar (656 lb/in²).

Close the gas bottle valve.

- 6 Wait 10 minutes to dissipate the heat generated during charging.

- 7 Adjust the pressure in the accumulator to 40 bar (580 lbf/in²) by carefully opening and closing the discharge valve of the charging device.

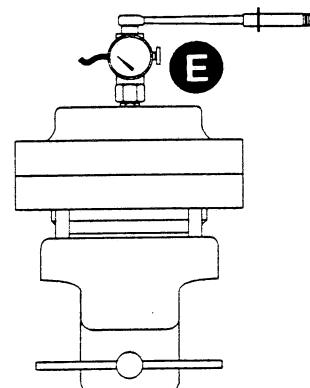
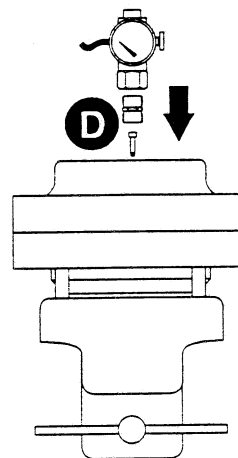
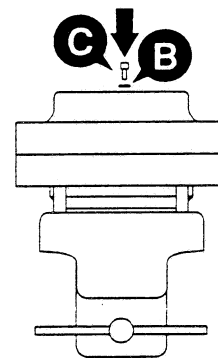
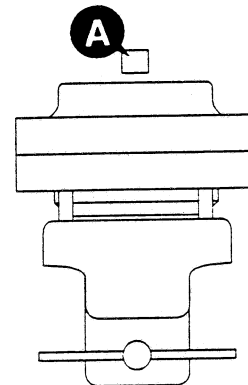
Via the charging device, shut filler plug **C** and tighten to a torque of 20 Nm (15 lbf ft).

- 8 Release the pressure from the gas bottle hose by opening the discharge valve of the charging device.

Disconnect the charging device from the accumulator.

- 9 Check the gas-tightness of filler plug **C** by pouring some oil around it.

- 10 Insert a new protective plug **A** if the accumulator is already installed on the hammer assembly. Otherwise, leave the plug out.



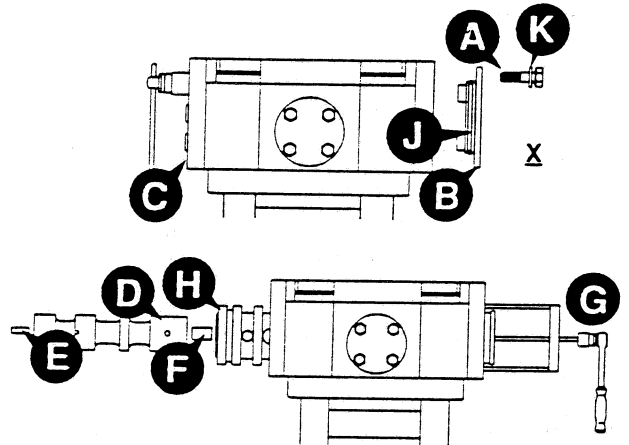
Main Valve

The main valve is located in the valve body, directly beneath the accumulator.

Once the hammer assembly is removed from the housing (see **Hammer Assembly**) it is possible to dismantle/assemble the main valve individually and without first removing the accumulator or any other components.

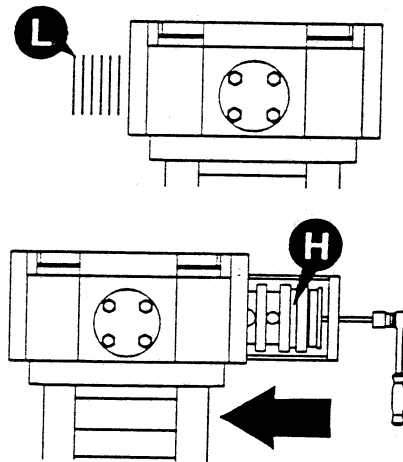
Dismantling

- 1 Remove the bolts **A** with their locking washers **K** from each of covers **B** and **C**. Use M20 bolts to pull out the covers. Mark cover **B** and the corresponding end of the valve housing with **X**.
- 2 Push out spool **D**, taking care not to lose small spools **E** and **F** from the ends. Mark the end of spool **D** corresponding to cover **B** with **X**.
- 3 Fasten main valve extractor **G** (see **Service Tools**, Section 1) to the valve body using the tapped holes intended for bolts **A**.
- 4 Tighten up the tool so that it pushes out valve bushing **H**. Mark the end corresponding to cover **B** with **X**.



Assembly

- 1 Check all parts for damage. Carefully remove minor blemishes. Renew parts which are badly damaged.
Clean and coat all hydraulic parts with clean hydraulic oil before installation.
- 2 Grease and fit new 'O' rings **J** to covers **B** and **C**.
- 3 Lubricate six new seals **L** with clean hydraulic oil and fit them to the valve bushing.
- 4 Locate valve bushing **H** in end **X** of the valve housing. Fasten tool **G** to the same end of the valve housing and use to install the valve bushing. Make sure end **X** of the bushing corresponds with end **X** of the housing.
- 5 Make sure spools **E** and **F** are installed and move freely in spool **D**. Insert spool **D** into the valve housing so that end **X** corresponds with end **X** of the housing.
- 6 Fit end covers **B** and **C**, with **B** at the end **X** of the valve housing.
- 7 Fit locking washers **K** to each of the bolts **A** for each cover. Install the bolts and tighten to a torque of 510 Nm (376 lbf ft).
- 8 Lock the washers **K**.



Pressure Adjusting Valve

The pressure adjusting valve is located in the return side of the valve body, beneath the accumulator. It can be dismantled/assembled individually without removing the accumulator or any other components, and with the hammer assembly still in the housing.

Note: this procedure can also be carried out with the Hammermaster installed on the carrier. Before starting work, switch off the carrier engine and then relieve system pressure by operating the auxiliary control a few times.

Dismantling

- 1 Remove the four socket head bolts **A**.
Use M16 screws to pull out cover **B**.
- 2 Use a screwdriver to carefully prise out the cover **B**/guide **C** assembly. Remove small spool **D**.
- 3 Secure cover **B** in a bench vice. Unscrew and remove the guide **C/E** assembly.
- 4 Remove spool **F**, spring **G**, spring support **H**, spring guide **J** and adjustment plates **K**.
- 5 Remove and discard 'O' rings **L**, **M** and **N**.

Adjustment

Adjustment of the pre-load on spring **G** is the means by which the hammer operating pressure can be varied. This will have been pre-adjusted at the factory and should not need to be altered.

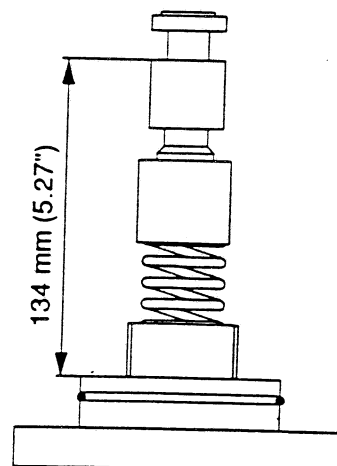
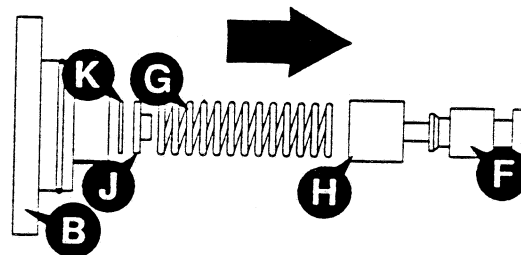
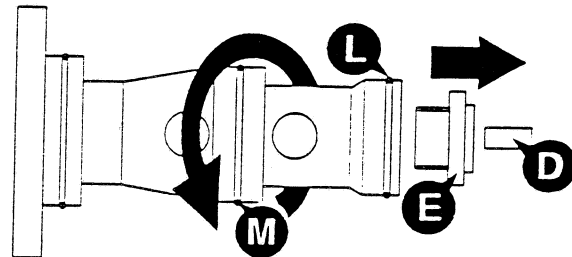
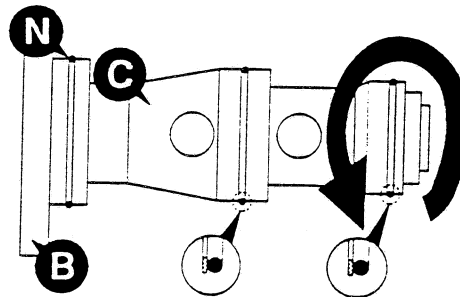
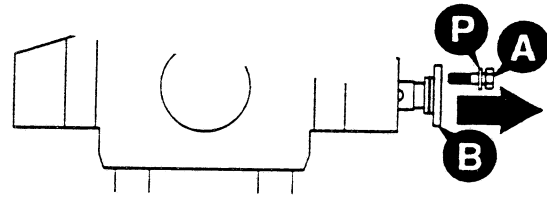
However, if pressure adjustment is found to be necessary, the correct spring pre-load can be restored by adding or removing plates **K**. To achieve the correct pre-load, the assembly comprising components **B**, **F**, **G**, **H**, **J**, **K** should measure 134 mm (5.27 in) as shown.

***Note:** This measurement does not guarantee correct operating pressure. Check the operating pressure after valve installation.

Correct pressure = 145 bar (2103 lbf/in²).

Assembly

- 1 Check all parts for damage. Carefully remove minor blemishes. Renew parts which are badly damaged.
Clean and coat all hydraulic parts with clean hydraulic oil before installation.
- 2 Grease and fit new 'O' rings **L**, **M**, **N** to guide **C**.
- 3 Secure cover **B** in a bench vice and install adjustment plates **K**, followed by spring guide **J**, spring **G** and then spring support **H**. Install spool **F**.
- 4 Finally, install guide **C/E** assembly and screw it to the rest of the assembly.
- 5 Push the cover **B**/guide **C** assembly into the valve body.
- 6 Grease the threads of the four socket head bolts **A** and fit them with locking washers **P**. Install the bolts and tighten to a torque of 200 Nm (147.5 lbf ft).
- 7 Lock the locking washers.



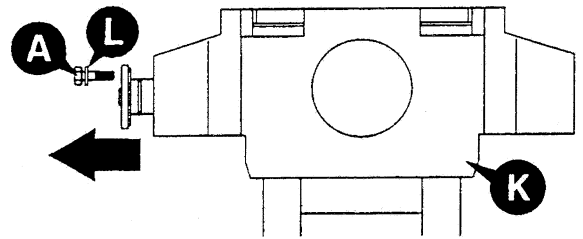
Check Valve

The check valve is located in the feed side of the valve body, beneath the accumulator. It can be dismantled/assembled individually without removing the accumulator or any other components, and with the hammer assembly still in the housing.

Note: this procedure can also be carried out with the Hammermaster installed on the carrier. Before starting work, switch off the carrier engine and then relieve system pressure by operating the auxiliary control a few times.

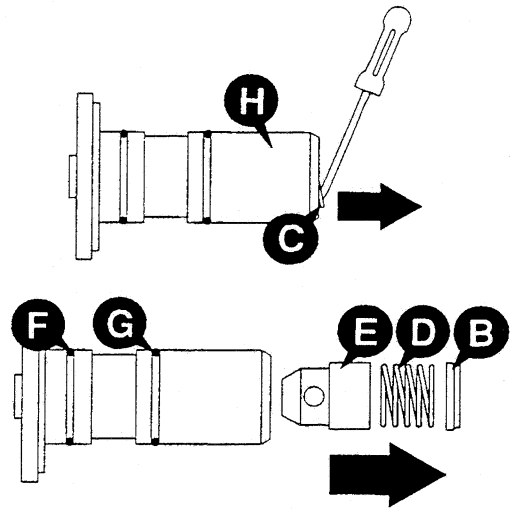
Dismantling

- 1 Remove the four socket head bolts **A** and their locking washers **L**. Use a screwdriver to prise out valve assembly **H** from valve body **K**.
- 2 Push in spring guide **B** and prise out retaining ring **C** from valve assembly **H**.
- 3 Extract guide **B**, spring **D** and then spool **E** from the valve assembly.
- 4 Remove and discard 'O' rings **F** and **G** from the valve assembly.



Assembly

- 1 Check all parts for damage. Carefully remove minor blemishes. Renew parts which are badly damaged.
Clean and lubricate all hydraulic parts with clean hydraulic oil before installation.
- 2 Grease and fit new 'O' rings **F** and **G** to valve assembly **H**.
- 3 In order, install spool **E**, spring **D** and guide **B**.
- 4 Push in spring guide **B** and install retaining ring **C**.
- 5 Check that spool **E** moves freely.
- 6 Install the valve assembly into the valve body **K**.
- 7 Grease the threads of the four socket head bolts **A** and fit them with locking washers **L**. Install the bolts and tighten to a torque of 200 Nm (147.5 lbf ft).
- 8 Lock the washers **L**.



Tie Rods

Removal

- 1 Remove the accumulator (see **Accumulator, Removal**)
- 2 Remove the rubber rings **A** and the locking plates **B**.
- 3 Identify each tie rod **C** with its nut **D** and its location in front head **E**.
- * 4 Use a propane flame to heat the tie rods along length **G** to reduce tensioning.

* **Note:** A gas torch must be used to apply heat.

Use a wrench to loosen each tie rod. Evenly and progressively unscrew the tie rods and remove them.

- 5 Take out the nuts **D**, making note of which way up they are fitted.

Inspection

Clean the tie rods and use crack detecting equipment to inspect them. If cracks are found, or if other damage is evident, replace the affected tie rod and its nut. Inspect locking plates **B**, if any are damaged replace all four.

Replacement

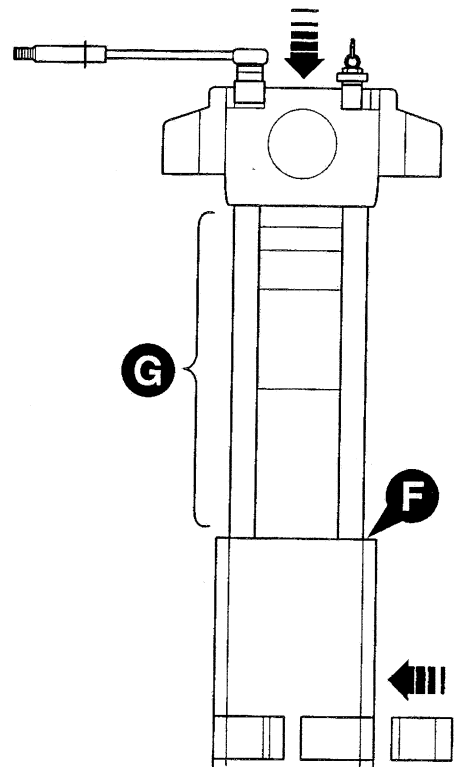
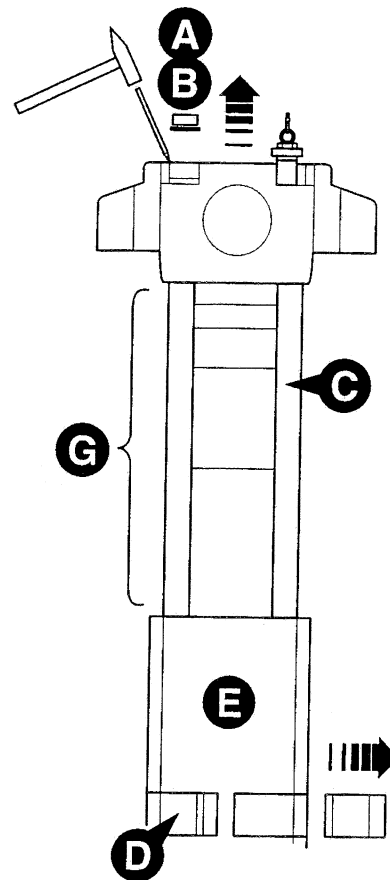
- * 1 Grease the tie rod threads with copper grease and the contact surfaces of the tie rods.
- 2 Spray cold galvanising fluid onto the portion of each tie rod which is located inside the front head **E**.
- 3 Install the four tie rods in the holes from which they originated, making sure each one is paired with its original nut. The nuts should be the same way up as before dismantling.
- 4 Use a torque wrench to tighten the four tie rods progressively and evenly, first to a torque of 100 Nm (74 lbf ft), then to 300 Nm (222 lbf ft) and finally to 700 Nm (520 lbf ft).
- * 5 Heat each tie rod with a propane flame along length **G** sufficiently to enable it to be tightened by a further 120°.

* **Note:** A gas torch must be used to apply heat.

- 6 Install locking plates **B** followed by rubber rings **A**.
- 7 Fill the grooves between the tie rods and the top of the front head (point **F**) with silicone compound. (This also applies to tie rods fitted with O-rings.)

* New Tie Rod Construction

In order to increase the reliability of the Hammermaster 960 the tie rods and nuts have been redesigned and are produced by a new manufacturing method. The new tie rod nuts are asymmetrical which improves the stress distribution in the threads. Therefore it is essential to install the nuts the right way up.



*** New Tie Rod Construction (continued)**

Note: The nuts are stamped with an arrow and the text "UP" (see illustration) to show the correct installation direction.

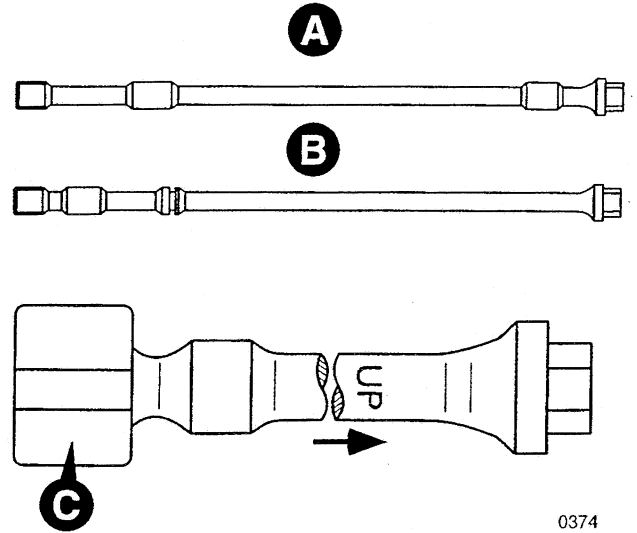
When servicing the hammer, before removing the tie rods from the hammer:

- 1 Mark each tie rod and its nut as a pair.
- 2 Mark the upper end of each nut
- 3 Mark each tie rod's location in the hammer.

If, for any reason, it is necessary to replace a tie rod, its nut must also be replaced.

As always, when a tie rod is replaced, it is recommended that the one diagonally opposite is also replaced. In this case, both should be of the new type.

Note: Use new type nuts only with new type tie rods.



0374

Key

- A Old type tie rod
- B New type tie rod
- C Tie rod nut

Torque Figures for Tie Rods and Nuts

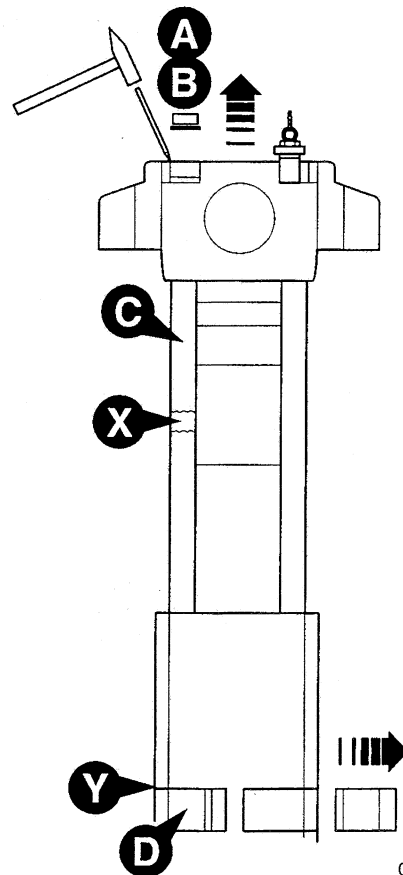
Hammer	Old	New
960	700 Nm + 120°	700 Nm + 120°

Note: Use silicone compound with both old and new type tie rods to fill the groove between the tie rods and front head.

*** Tie Rods**

Removal with Failure or Seizure

- 1 Remove the accumulator (see **Accumulator, Removal**).
- 2 Remove rubber ring **A** and locking plate **B** from each tie rod.
- 3 Insert a protective shield between the tie rod and the cylinder.
- 4 Using a flame cutting torch, cut through tie rod **C** at position **X**.
- 5 Push the tie rod down until nut **D** is at the bottom of the recessed opening.
- 6 Protect the surfaces of the front head and flame cut tie rod **C** at position **Y**. Remove nut **D** and pieces of tie rod and clean the main components.



0753

Replacement

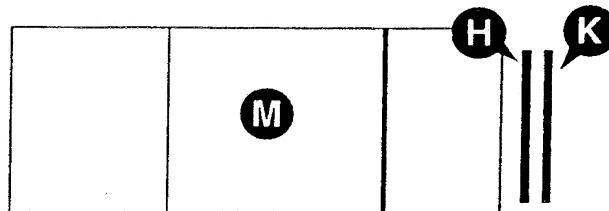
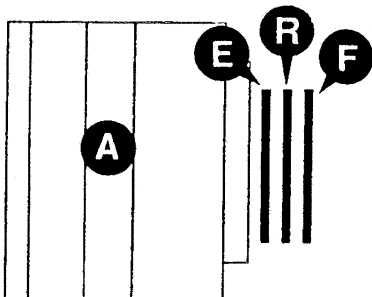
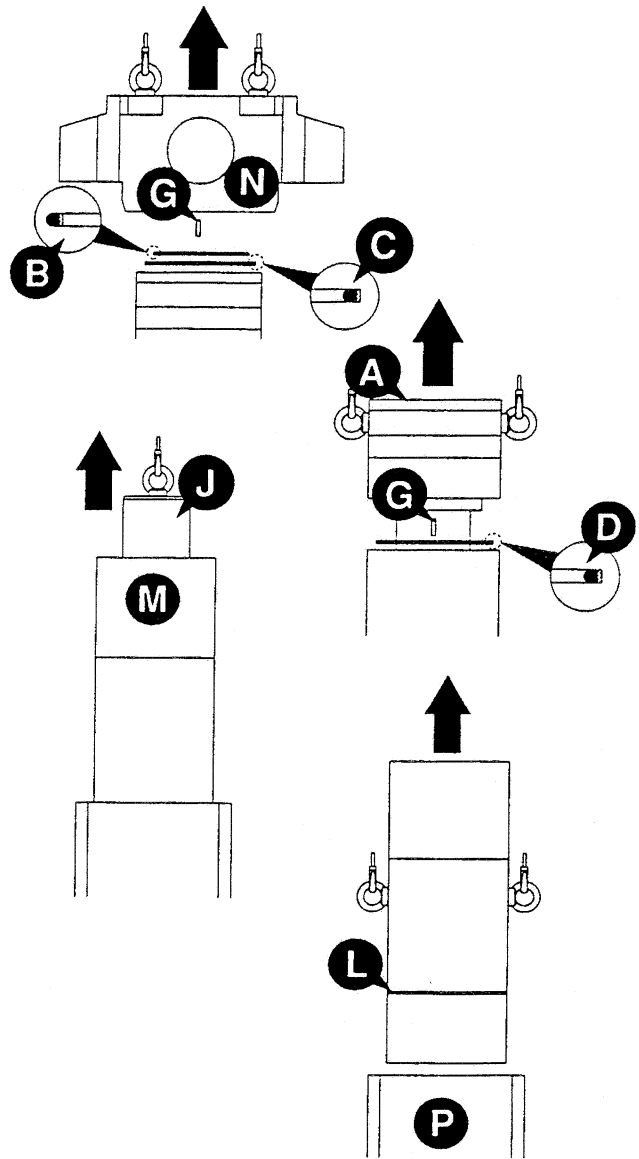
See **Tie Rods - Replacement**.

Cylinder

Dismantling

- 1 Remove the accumulator and tie rods (see **Accumulator, Removal** and **Tie Rods, Removal**).
- 2 Into valve body **N**, utilising threaded holes intended for the accumulator mounting bolts, install two eyebolts diametrically opposite each other. Lift the valve body away from cylinder **M**.
- 3 Install two M24 eyebolts into seal carrier **A** and carefully lift it clear.
- 4 From seal carrier **A**, remove seals **B**, **C**, **D**, **E**, **R**, wiper **F** and guide pin **G**.
- 5 Install an M20 eyebolt in the top of piston **J** and lift it out of cylinder **M**.
- 6 Install two M20 eyebolts in the sides of the cylinder and carefully lift it away from front head **P**.
- 7 From cylinder **M**, remove guide pin **G**, seal **H**, wiper **K** and 'O' ring **L**.
- 8 Check seal carrier **A**, cylinder **M**, piston **J** and front head **P** for wear. Carefully remove minor blemishes.

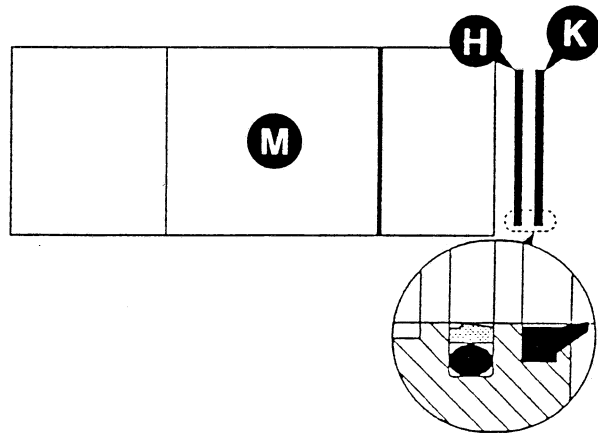
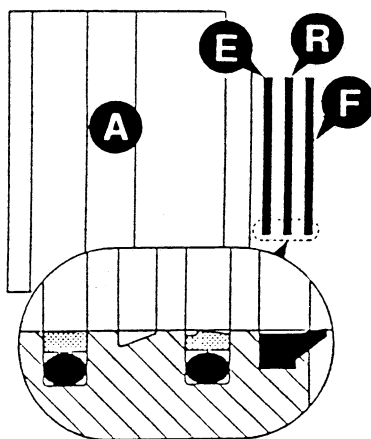
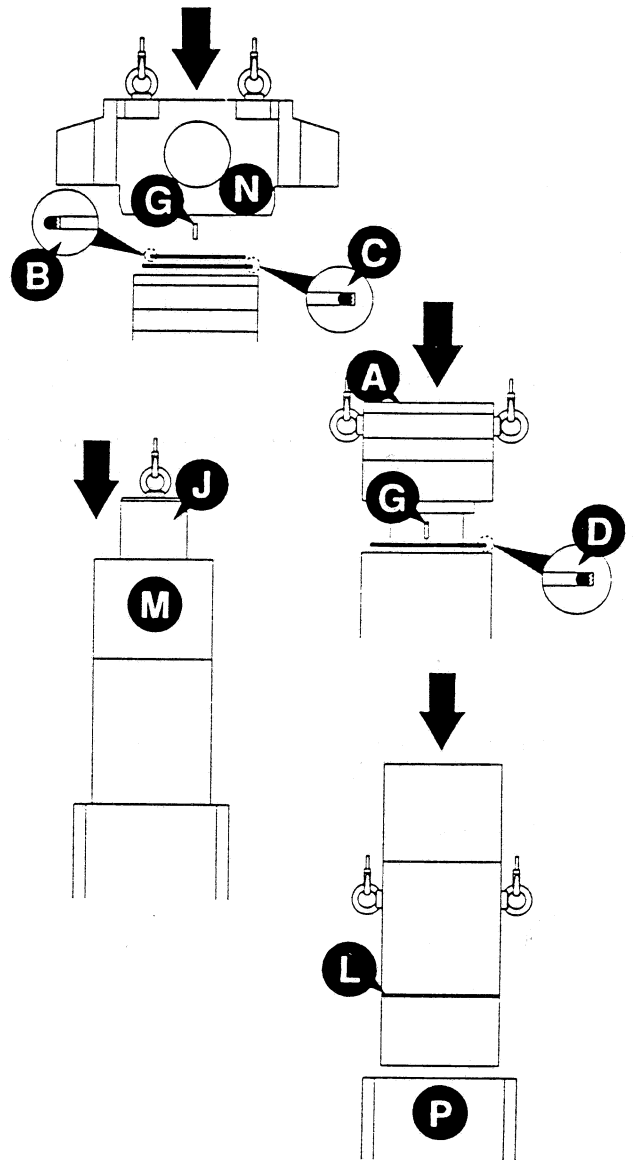
Thoroughly clean all parts and lubricate with clean hydraulic oil.



Cylinder (continued)

Assembly

- 1 Fit new 'O' ring **L**, seal **H** and wiper **K** to cylinder **M**.
- 2 Use a hoist to lift cylinder **M**. Lower the cylinder onto front head **P**. Remove the lifting eyebolts.
- 3 Coat the outer surface of piston **J** with clean hydraulic oil and, using a lifting eyebolt, lower carefully into cylinder **M**. Remove the lifting eyebolt.
- 4 Install guide pin **G**, new seals **B**, **C**, **D**, **E**, **R** and wiper **F** (see diagram for correct fitting) to seal carrier **A**. Lift the seal carrier onto the top of cylinder **M**, taking care to align the guide pin. Gently tap the seal carrier into position using a soft faced implement. Remove the lifting eyebolts.
- 5 Check the mating surfaces of seal carrier **A** and valve body **N** for cleanliness and then spray them with molybdenum disulphide (MoS_2) grease. Install guide pin **G** on the seal carrier. Install the valve body on the seal carrier, taking care to align with the guide pin. Remove the lifting eyebolts.
- 6 Install the tie rods (see **Tie Rods, Replacement**) and the accumulator (see **Accumulator, Replacement**).



Front Head

Dismantling

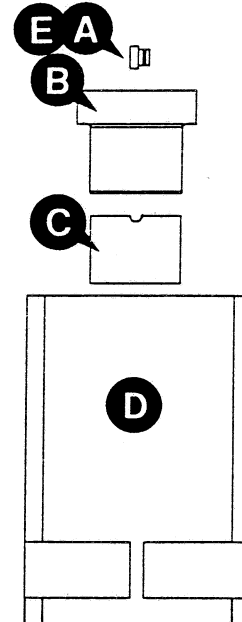
- 1 Remove the accumulator, tie rods, valve body, seal carrier, cylinder and piston.
- 2 Remove wedge **A** and thrust ring **B**.
- 3 Remove upper tool bushing **C**, using a suitable puller. If the bushing is tight apply heat to the lower end of front head **D**.
- 4 Check all parts for damage. Carefully remove minor blemishes.

Clean and oil or grease all parts ready for assembling.

- 5 Check the upper tool bushing for excessive wear. If the internal diameter at any point exceeds 117 mm, renew the bushing.

Assembly

- * 1 Grease outer surface of tool bushing **C**. Insert bush **C** into front head **D** with the grooves uppermost.
- * 2 Grease the outer surface of thrust ring **B** and install. Check wear limits (see Section 2, Page 3 - 12).
- 3 Grease and fit a new 'O' ring **E** to wedge **A**. Install the wedge.
- 4 Install the piston, cylinder, seal carrier, valve body, tie rods and accumulator.



Fault Finding

Symptom	Possible Fault	Remedy
1 The Hammermaster does not start.	a The piston is in its lower hydraulic brake.	Keep the hammer control valve open and push the tool against an object. The tool head lifts the piston out of the brake.
	b The hammer control valve is not opening.	Check that the hammer feed line pulsates when the control valve is operated. If it does not, the valve is not opening correctly. Check the mechanical connections, servo pressure and electrical control.
	c The relief valve in the Hammermaster line opens at too low a pressure. The Hammermaster operating pressure is not reached.	* Check the carrier relief valve operation and adjust if necessary. Check that the Hammermaster feed line pressure relief valve setting is correct.
	d Leakage from pressure side to return in the carrier hydraulic circuit.	Check pump and other hydraulic components.
	e Excessive back pressure.	Check the installation.
	f Piston failure.	Dismantle the Hammermaster and investigate.
	g Hammermaster valve failure.	Dismantle the Hammermaster and check the main valve and pressure control valve.
2 The Hammermaster strikes with reduced power.	a Incorrect working method.	Ensure that the Hammermaster is being operated correctly, without bending stress on the tool. Check for sufficient and correct greasing.
	b No pressure in the accumulator.	Dismantle the accumulator and check the seals and the diaphragm. Charge the accumulator.
	c As 1g.	
	d As 1c.	

Fault Finding (continued)

Symptom	Possible Fault	Remedy	
3 Impact rate slows down.	a The hydraulic oil has overheated. (Over +80 °C, +176 °F).	Check for cooling system fault or internal leak in Hammermaster.	
	b As 1e.		
	c As 1c.		
	d As 1d.		
	e As 1g.		
	f As 2b.		
	g Hydraulic oil viscosity is too low.		Check that correct oil is being used.
	h Incorrect working practice.		Refer to Correct Working Methods in Operators Handbook.
	j Carrier switches, taps, etc. not set correctly.		Refer to carrier Operators Handbook concerning use of attachments.
	4 Hammermaster strikes with irregular rhythm.		a As 1c.
b As 1g.			
c As 3h.			
5 Oil overheats.	a As 1c.	Dismantle the Hammermaster to locate the oil leak. Renew all 'O' rings and seals.	
	b As 1d.		
	c Internal oil leak in Hammermaster.		
	d As 3g.		
	e Insufficient cooling (non-JCB carriers).		Install extra oil cooling equipment.
6 External oil leaks.	a Faulty coupling adapter.	Fit new adapter.	
	b Faulty piston seals	Dismantle the Hammermaster and renew all 'O' rings and seals.	
	c Leaking between body parts of Hammermaster.	Dismantle the Hammermaster and renew all 'O' rings and seals.	

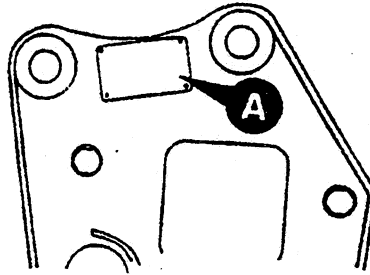
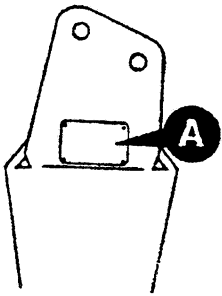
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Note: Hammermaster 70 - All Service Information relating to this hammer is contained in Section 13. Safety requirements are retained in this section.

* **Note:** Hammermaster 100 and Hammermaster 115 - All Service Information relating to these hammers is contained in Section 20. Safety requirements are retained in this section.

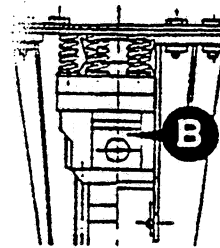
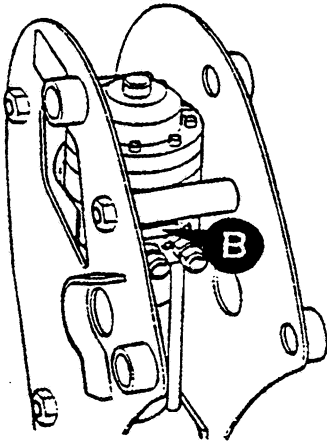
Hammermaster Identification

* This manual deals with the Hammermaster 160, 160Q, 160R, 260, 260L, 260LQ, 360, 360Q, 360-70, 460-110, 560, 660, 760, 860, 960, 570, 670 and 770 rockbreakers. The equipment serial number is stamped on plate **A** located on the left hand sideplate of Hammermaster 160, 160Q, 160R, 260/260L (later models), 360 and 360Q, and between the two pivot bosses of the right hand side plate on models 360-70 and 460-110. For Hammermaster 260/260L (early models), 560, 660, 760, 860, 960, 570, 670 and 770 the serial number is stamped on the valve housing, as at **B**.



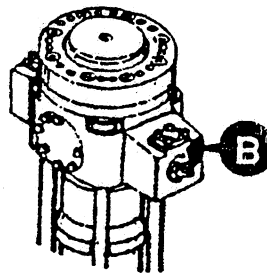
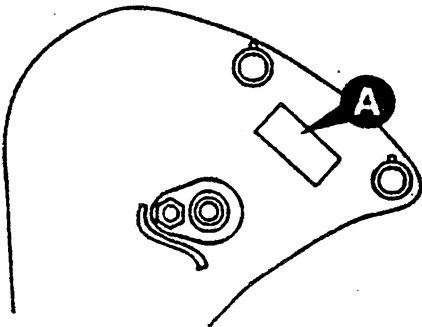
* Hammermaster 160, 160Q, 160R

Hammermasters 360-70 and 460-110



Hammermasters 260/260L (early models)

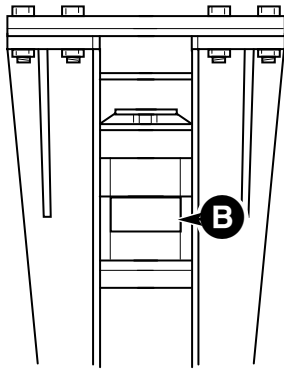
Hammermaster 560



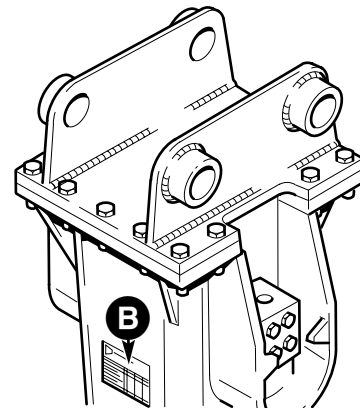
* Hammermaster 260/260L, 260LQ, 360, 360Q

Hammermaster 660

Hammermaster Identification (continued)



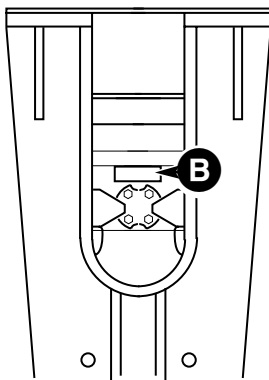
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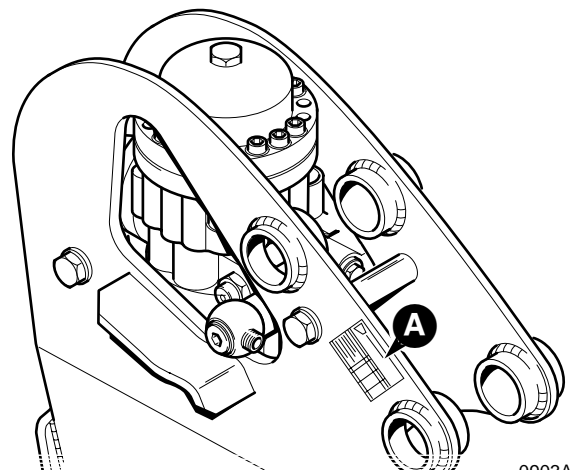
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Hammermaster 760

* Hammermaster 570, 670, 770, 1050, 1150, 1350, 1450, 1750 and 2350/2950/3850/3950



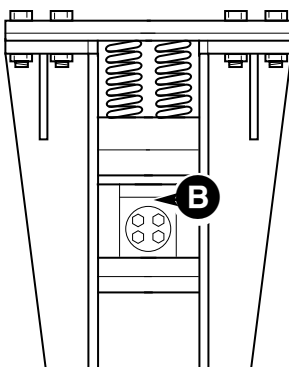
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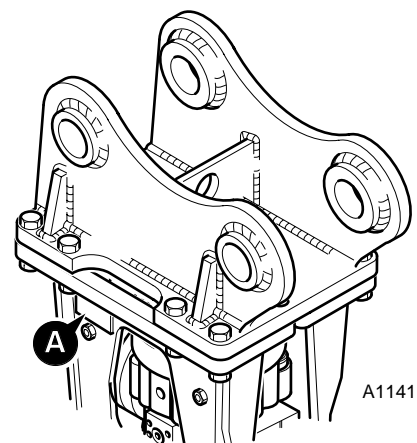
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Hammermaster 860

Hammermaster 550



0387A

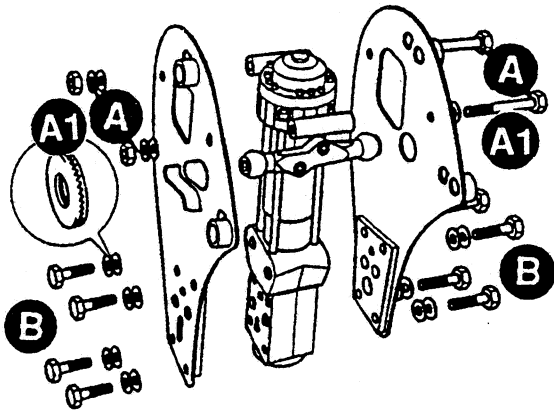


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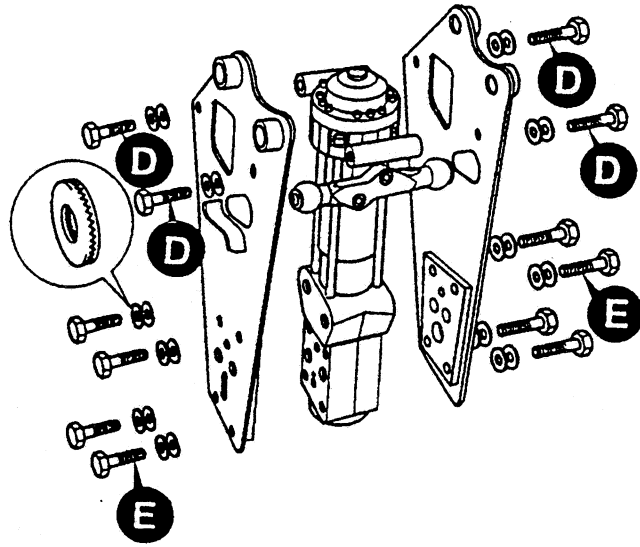
Hammermaster 960

Hammermaster 850

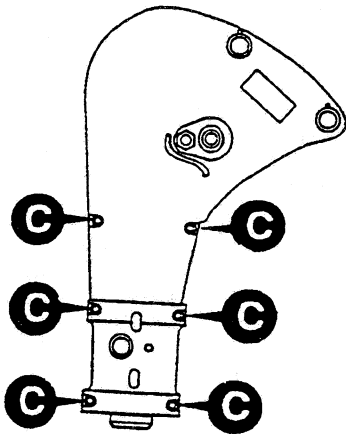
* Torque Settings - Hammermaster 360 Range



Hammermaster 360



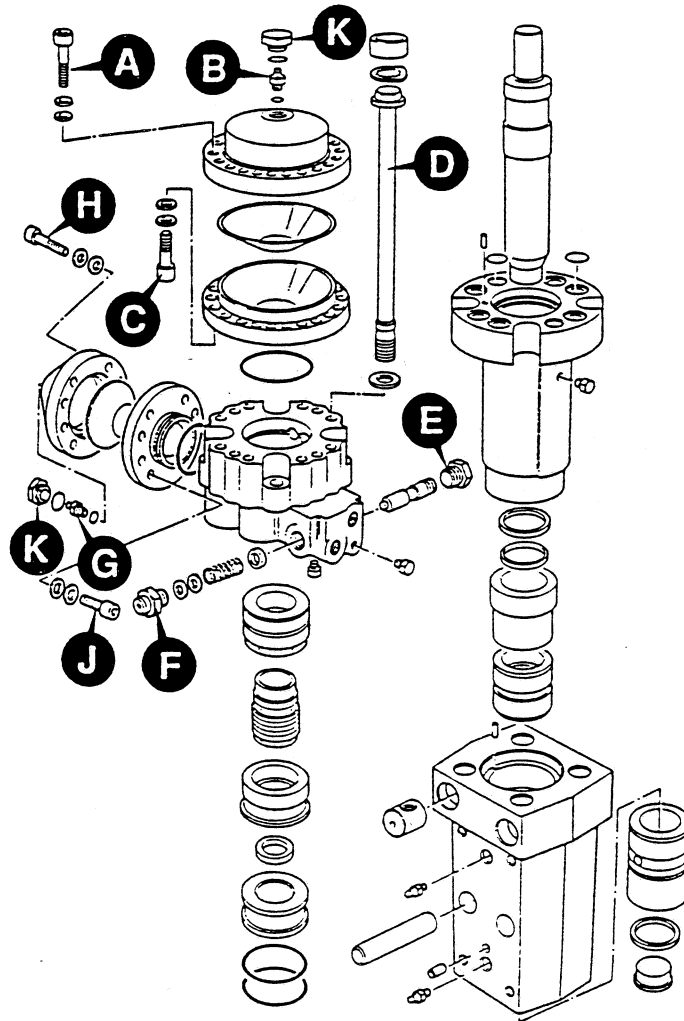
Hammermaster 360-70



Hammermaster 360Q

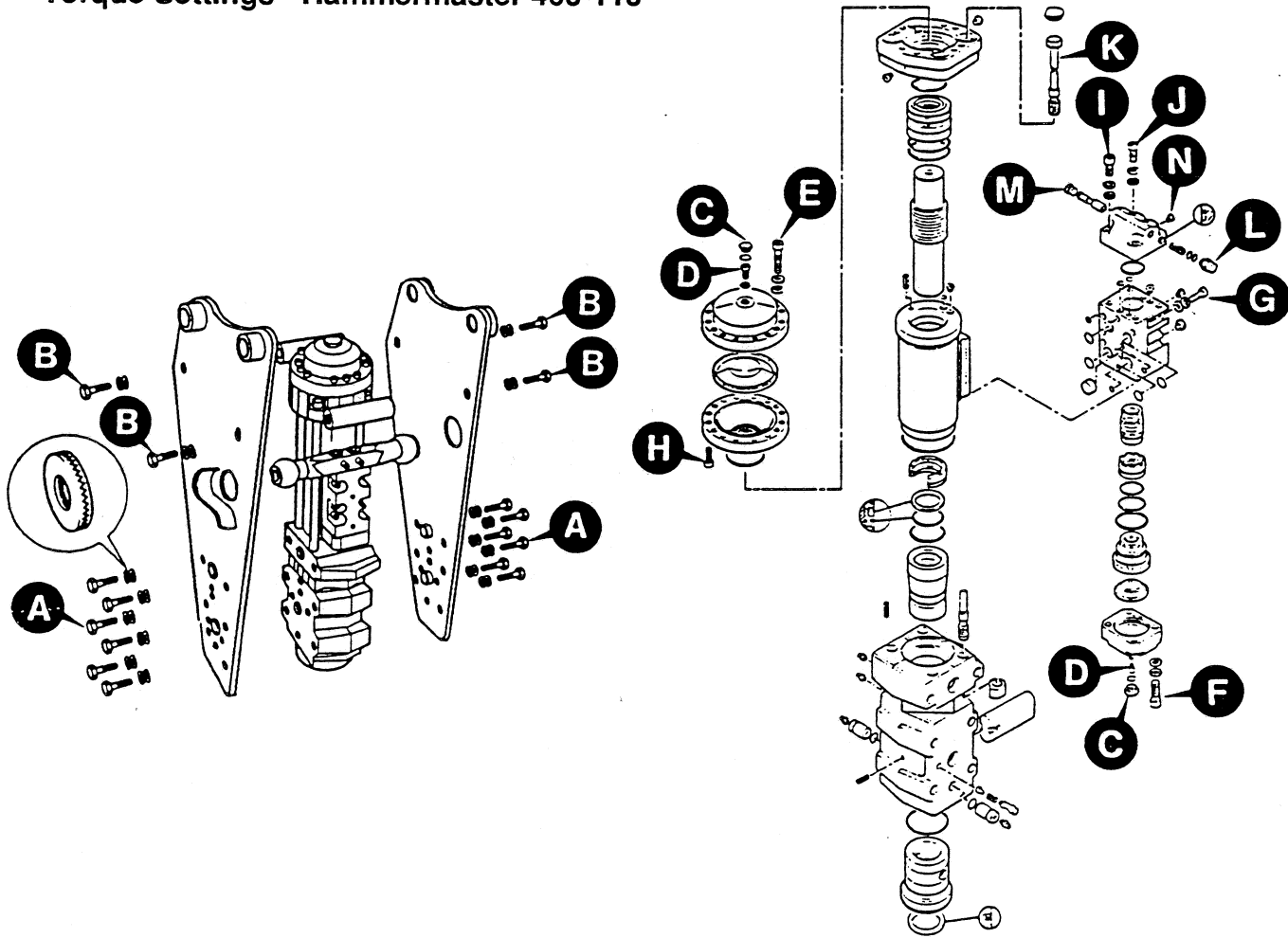
Item	Description	Quantity	Torque Setting	
			Nm	lbf ft
A	Sideplate mounting bolts/nuts (early models)	2	580	428
A1	Sideplate mounting screws (later models)	2	580	428
B	Sideplate mounting screws	8	580	428
C	Sideplate mounting screws	6	340	250
D	Sideplate mounting screws (upper) M24 x 50	4	580	430
E	Sideplate mounting screws (lower) M24 x 90	8	580	430

* Torque Settings - Hammermaster 360 Range (cont'd)



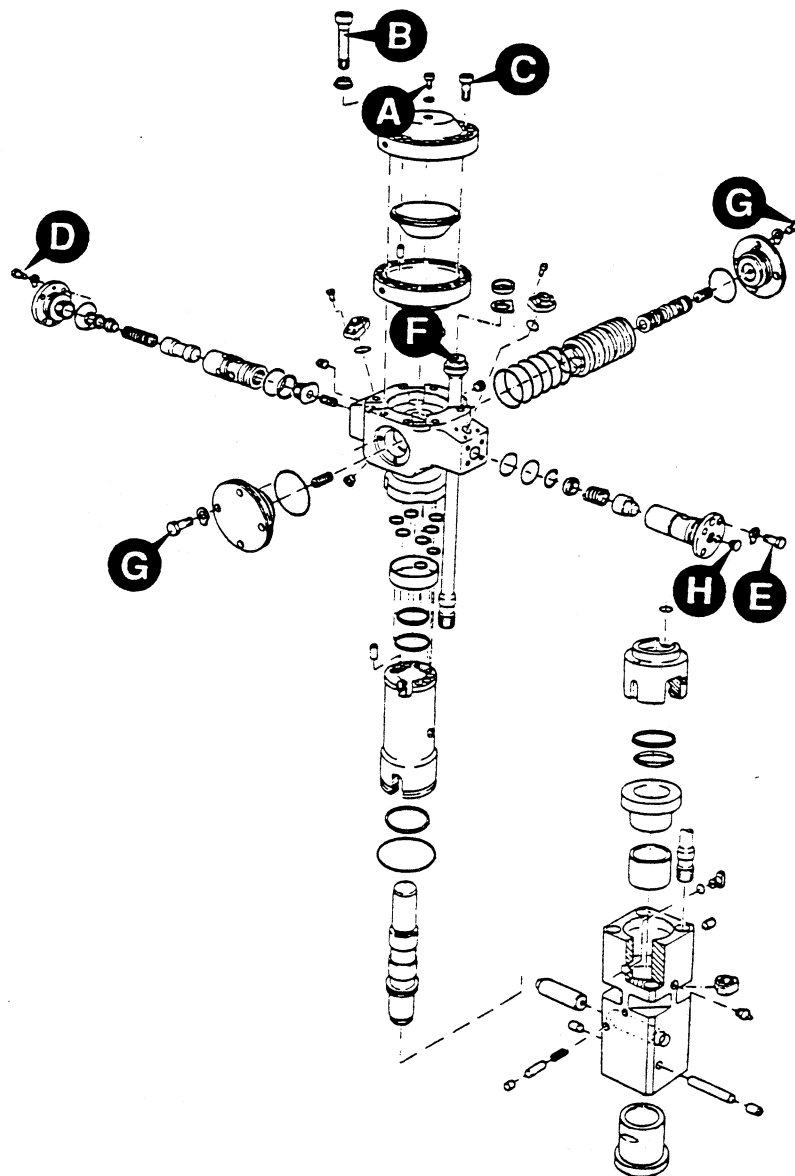
Item	Description	Quantity	Torque Setting	
			Nm	lbf ft
A	Mounting screws - LP accumulator	12	175	129
B	Filler plug - LP accumulator	1	20	15
C	Cover mounting screws - LP accumulator	8	175	129
D	Tie rods (plus 60°)	4	500	369
E	Plug - pressure adjusting valve	1	150	110
F	Spring housing - pressure adjusting valve	1	340	251
G	Filler plug - HP accumulator	1	20	15
H	Mounting screws - HP accumulator	4	175	129
J	Cover mounting screws - HP accumulator	4	175	129
K	Accumulator blanking plugs	2	150	110

* Torque Settings - Hammermaster 460-110



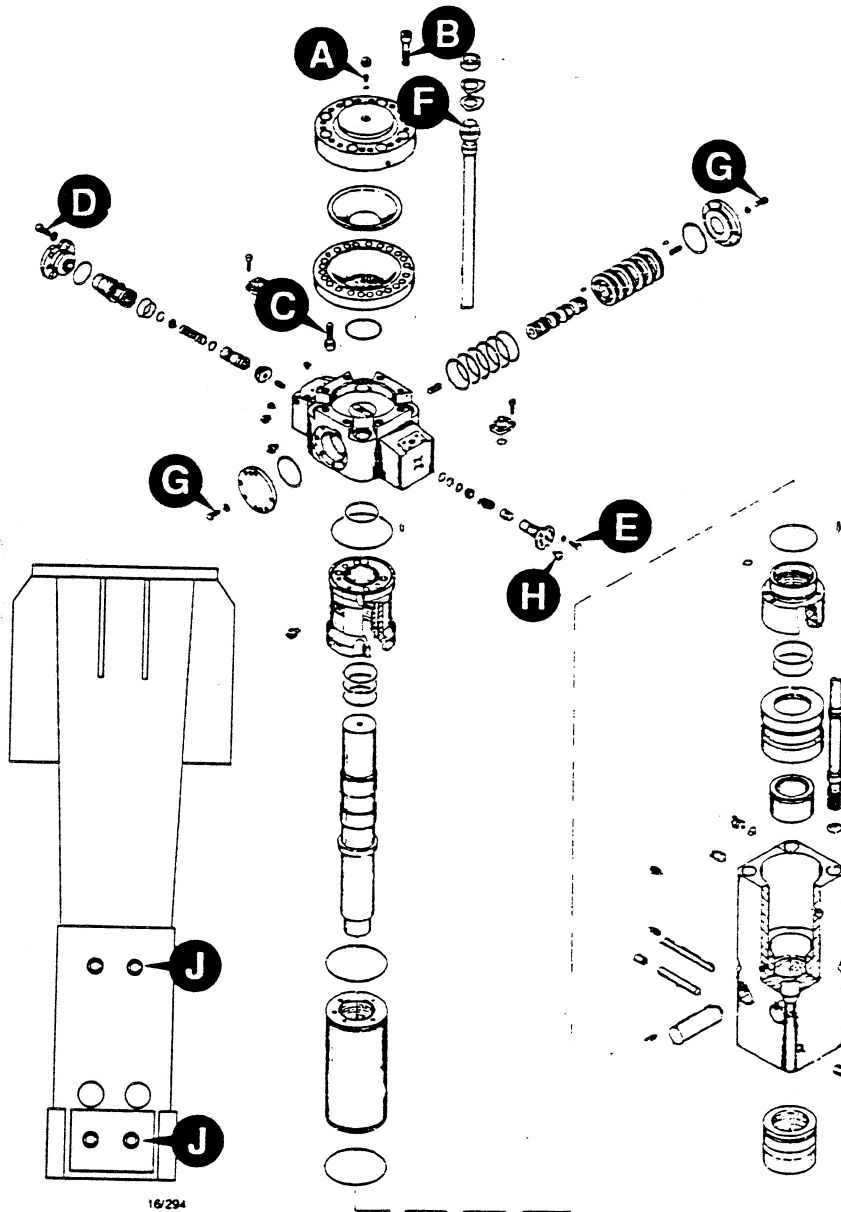
Item	Description	Quantity	Torque Setting	
			Nm	lbf ft
A	Sideplate mounting screws (lower) M30	12	1150	848
* B	Sideplate mounting screws (upper) M24	4	580	430
C	Accumulator plugs	2	150	110
D	Accumulator filling plugs	2	20	15
E	Mounting screws - LP accumulator	8	175	129
F	Mounting screws - HP accumulator	4	340	250
G	Mounting screws - valve body	6	340	250
H	Cover mounting screws - LP accumulator	8	175	129
I	Mounting screws - pressure adjusting cover	2	340	250
J	Mounting screws - pressure adjusting cover	3	175	129
K	Tie rods (plus 60°)	4	500	370
L	Spring housing	1	150	110
M	Plug - pressure adjusting valve	1	150	110
N	Plug - pressure adjusting cover	1	90	66
-	All other plugs	6	33	24

Torque Settings - Hammermaster 560



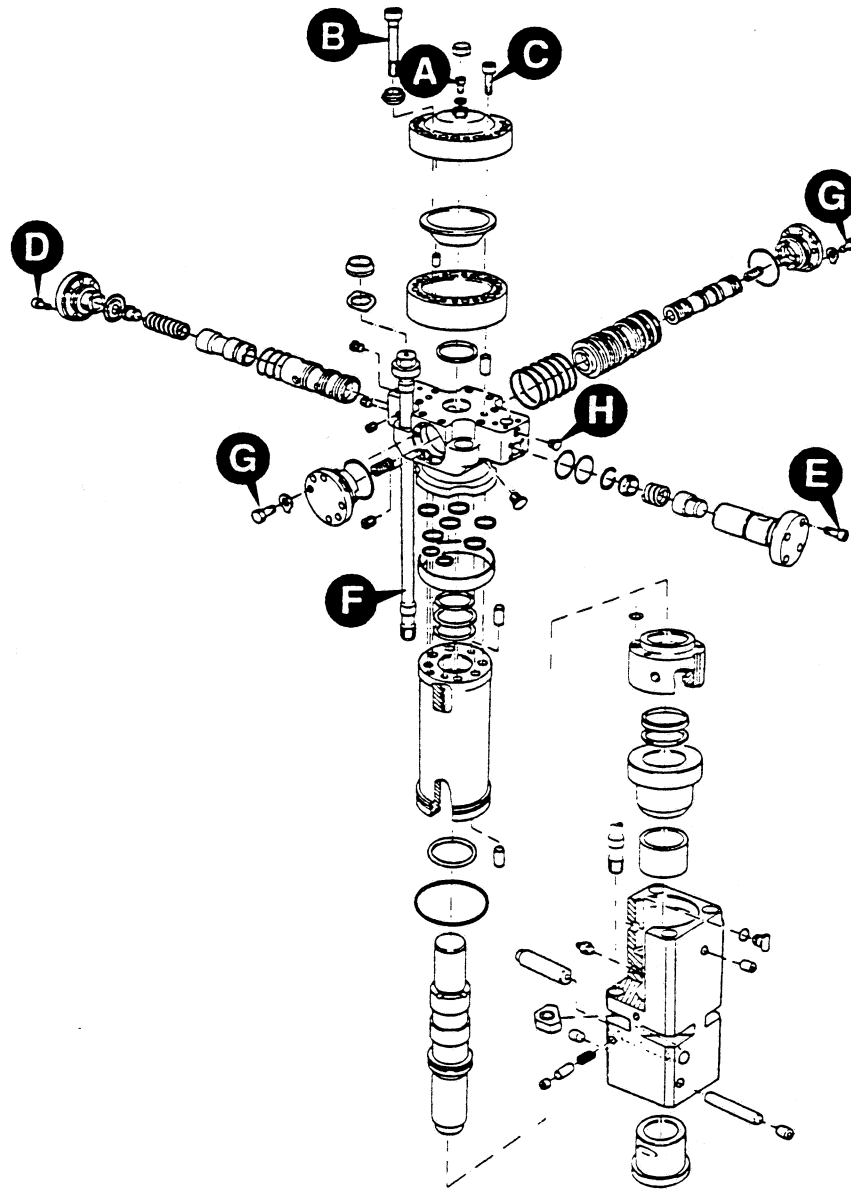
Item	Description	Quantity	Torque Setting	
			Nm	lbf ft
A	Accumulator filling plug	1	20	15
*B	Accumulator mounting bolts	8	500	368
C	Accumulator cover mounting bolts	16	300	220
D	Pressure control valve cover mounting bolts	4	83	62
E	Check valve cover mounting bolts	4	83	62
*F	Tie rods (plus 100°)	4	500	368
G	Main valve cover mounting bolts	8	200	148
H	Plug - pressure measuring point	1	33	24
J	Hanger bracket mounting bolts/nuts (not shown)	14	822	606

Torque Settings - Hammermaster 660



Item	Description	Quantity	Torque Setting	
			Nm	lbf ft
A	Accumulator filling plug	1	20	15
* B	Accumulator mounting bolts	8	500	368
* C	Accumulator cover mounting bolts	16	450	332
D	Pressure control valve cover mounting bolts	4	200	147.5
E	Check valve cover mounting bolts	4	200	147.5
F	Tie rods (plus 120°)	4	500	368
G	Main valve cover mounting bolts	14	120	88
H	Plug - pressure measuring point	1	33	24
J	Wear plate bolts/nuts	8	1500	1105
K	Hanger bracket mounting bolts/nuts (not shown)	14	822	606

Torque Settings - Hammermaster 760



Item	Description	Quantity	Torque Setting	
			Nm	lbf ft
A	Accumulator filling plug	1	20	15
* B	Accumulator mounting bolts	8	500	368
* C	Accumulator cover mounting bolts	16	450	332
D	Pressure control valve cover mounting bolts	4	48	36
E	Check valve cover mounting bolts	4	48	36
F	Tie rods (plus 120°)	4	500	368
G	Main valve cover mounting bolts	12	120	88
H	Plug - pressure measuring point	1	33	24
J	Hanger bracket mounting bolts/nuts (not shown)	14	822	606

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