



# 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**

<b>Working weight (including blunt tool and hanger bracket)</b>	2950 kg (6394 lb)
<b>Impact energy</b>	6000 Joules
<b>Impact rate</b>	400 - 600 blows/min
<b>Operating pressure</b>	145 bar (2103 lbf/in <sup>2</sup> )
<b>Pressure relief - setting limits of carrier ARV</b>	180 - 190 bar (2610 - 2755 lbf/in <sup>2</sup> )
<b>Oil supply</b>	210 - 310 l/min (46.2 - 68.2 gal/min)
<b>Return line back pressure</b>	5 bar (73 lbf/in <sup>2</sup> )
<b>Input power (max)</b>	75 kW
<b>Output power (max)</b>	60 kW
<b>Port adapters - Hammermaster/connecting hoses</b>	
Pressure line	1 in SAE Flange
Return line	1 1/4 in SAE Flange
<b>Connecting hose inner diameters (minimum)</b>	
Pressure line	25 mm
Return line	32 mm
<b>Oil temperature range</b>	- 20° C to + 80° C (- 4° F to + 176° F)
<b>Carrier weight</b>	35 - 55 tonne (77175 - 121275 lb)
<b>Tool</b>	
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	
<b>Bushings</b>	
Diameter (new)	160 mm
Diameter (maximum allowable)	162 mm
<b>Accumulator charging pressure</b>	40 bar (580 lbf/in <sup>2</sup> )

## 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.

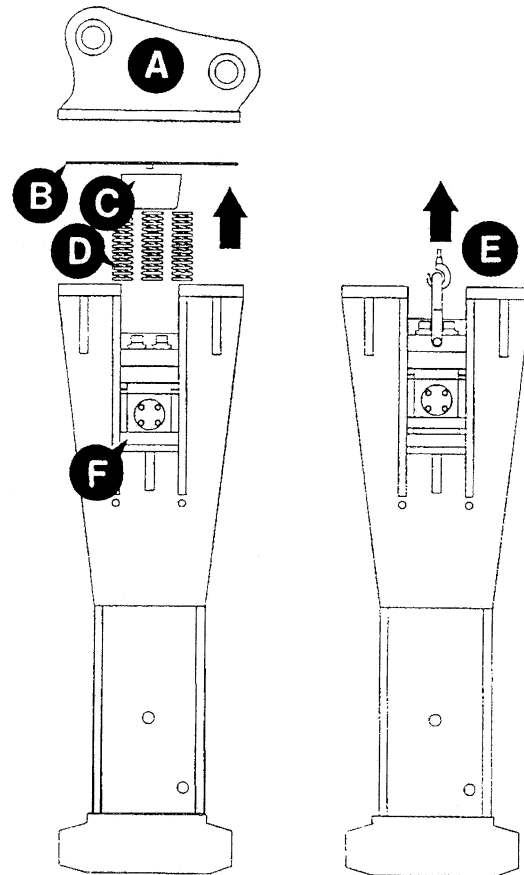
Use only purpose made cleaning fluids for hydraulic parts. **Never** use water, paint thinners or carbon tetrachloride. Keep cleaned and dried parts covered with lint free cloth to prevent re-contamination.

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

## Wear Plates

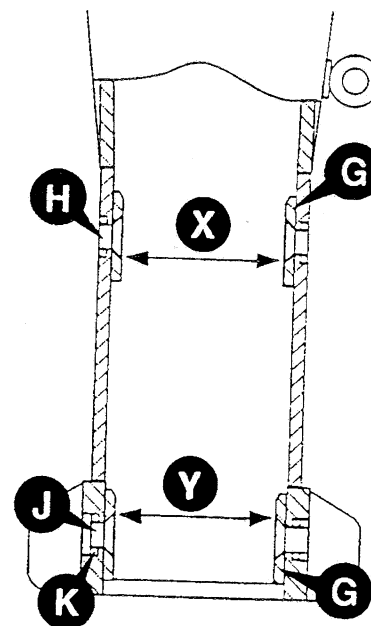
### Checking

- 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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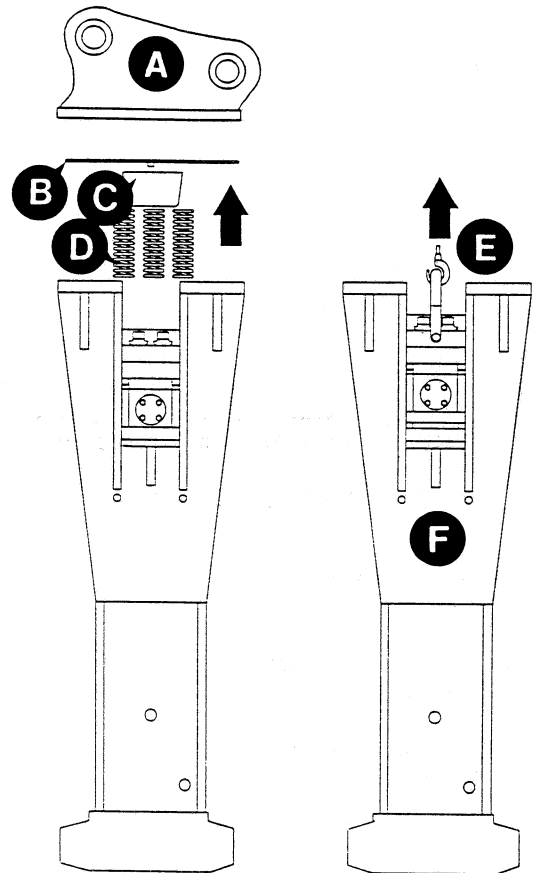
## Hammer Assembly

### 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.

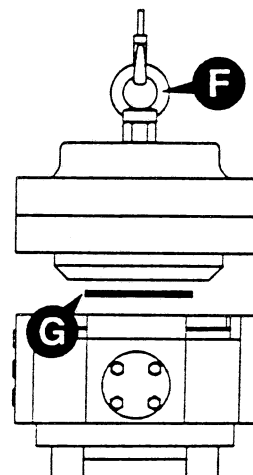
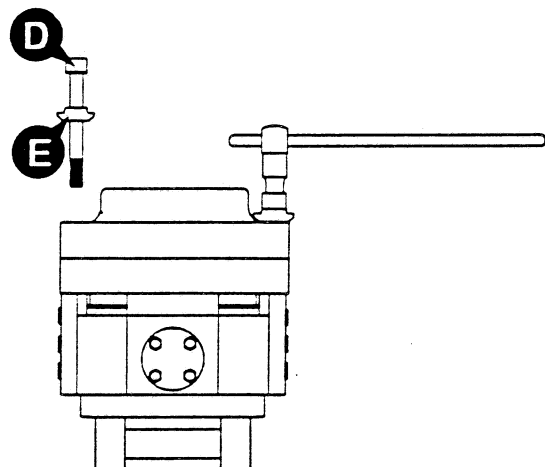
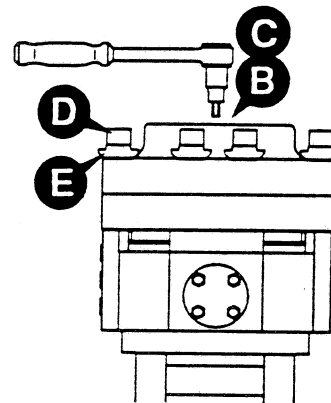
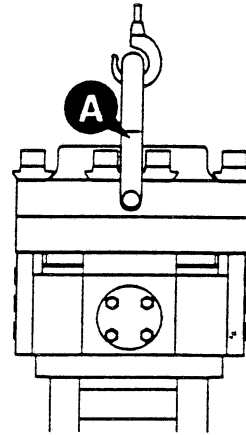
- 6 Lift the accumulator clear of the valve body.

- 7 Remove seal **G**.

- 8 If the accumulator requires attention, proceed to **Dismantling**.

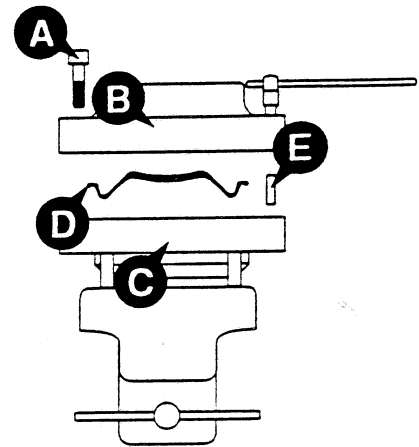
### Replacement

- 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 MoS<sub>2</sub> 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/in<sup>2</sup>).

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/in<sup>2</sup>) by carefully opening and closing the discharge valve of the charging device.

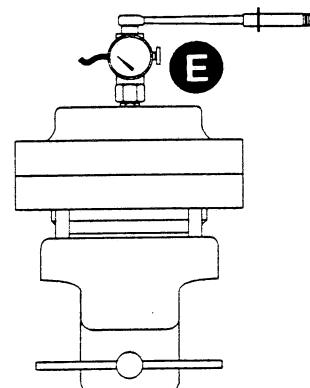
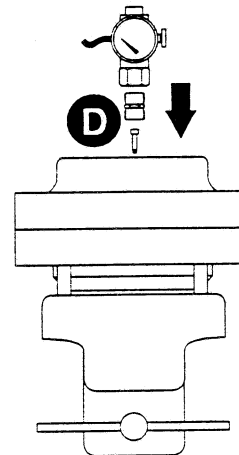
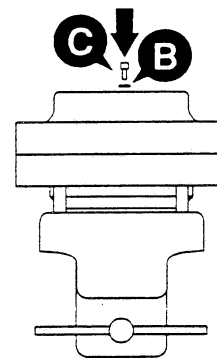
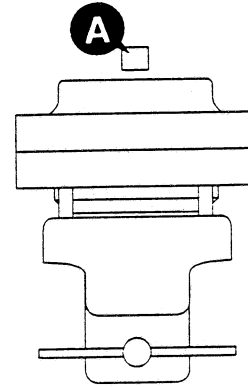
Via the charging device, shut filler plug **C** and tighten to a torque of 20 Nm (15 lbf ft).

- 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.



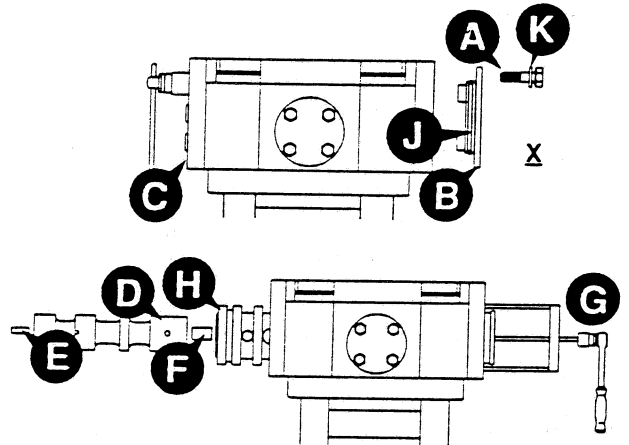
## Main Valve

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.

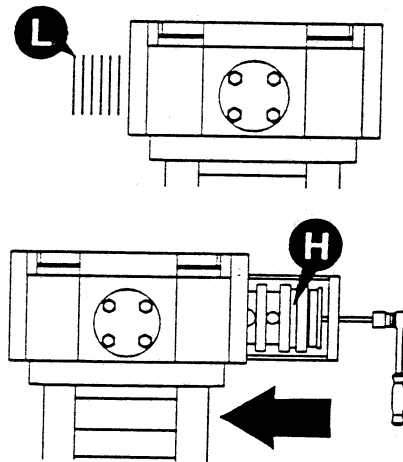
### Dismantling

- 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.

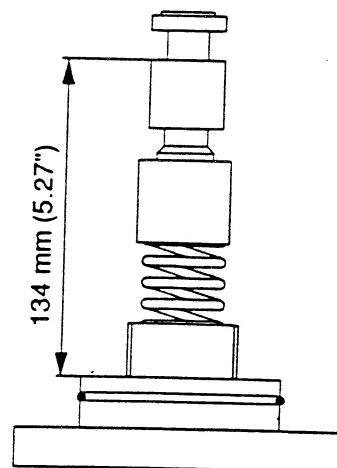
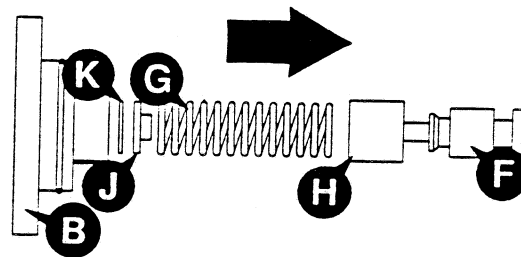
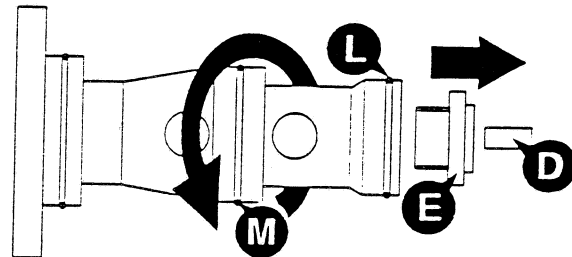
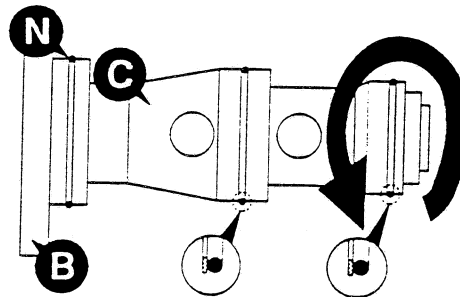
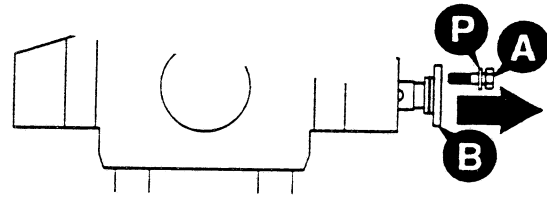
However, if pressure adjustment is found to be necessary, the correct spring pre-load can be restored by adding or removing plates **K**. To achieve the correct pre-load, the assembly comprising components **B**, **F**, **G**, **H**, **J**, **K** should measure 134 mm (5.27 in) as shown.

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

Correct pressure = 145 bar (2103 lbf/in<sup>2</sup>).

### 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.



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