

**Rammer**  
**S 56**  
**Workshop**  
**Manual**

Note !

This manual contains confidential information and it must not be given to a third party without permission.

Specifications and design presented in this manual are subject to change without notice.

**TAMROCK CORP.**

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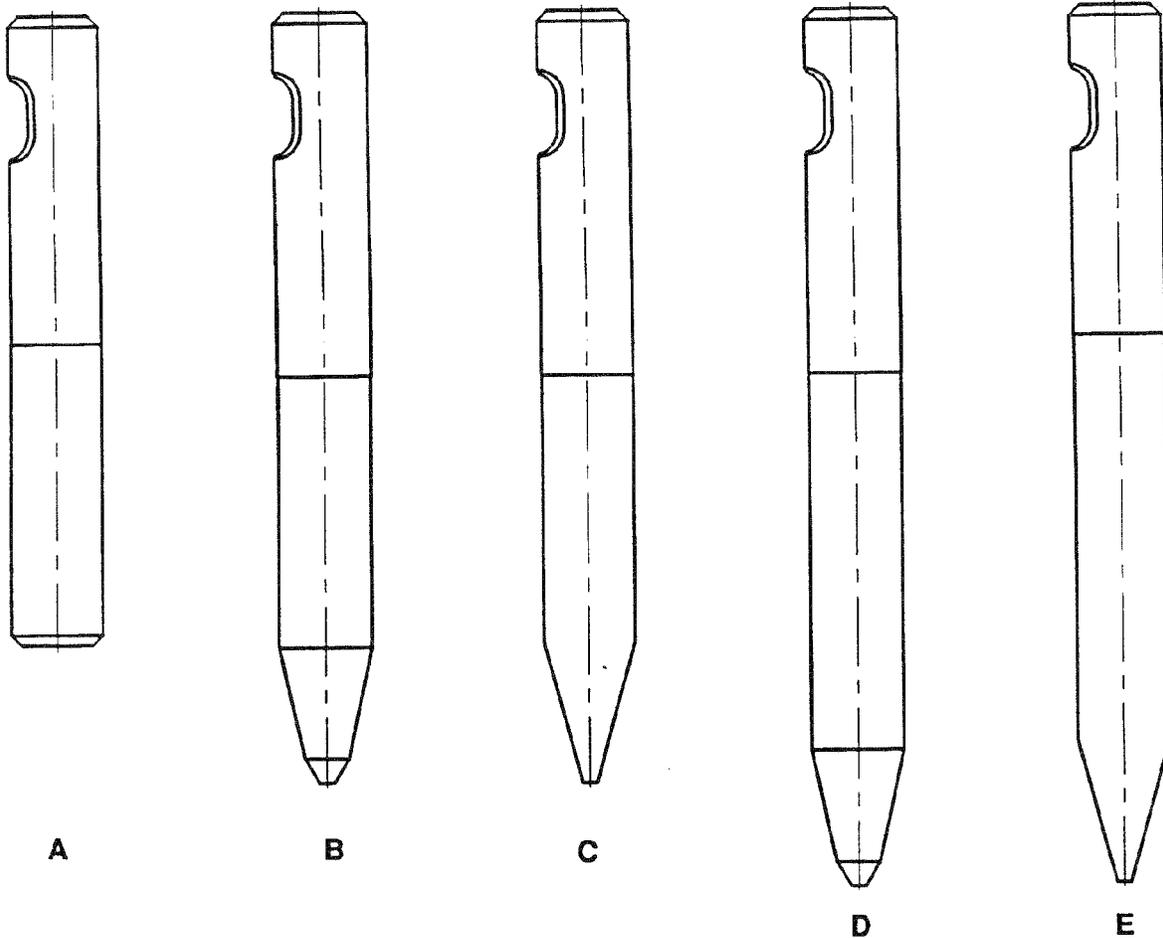
FINLAND

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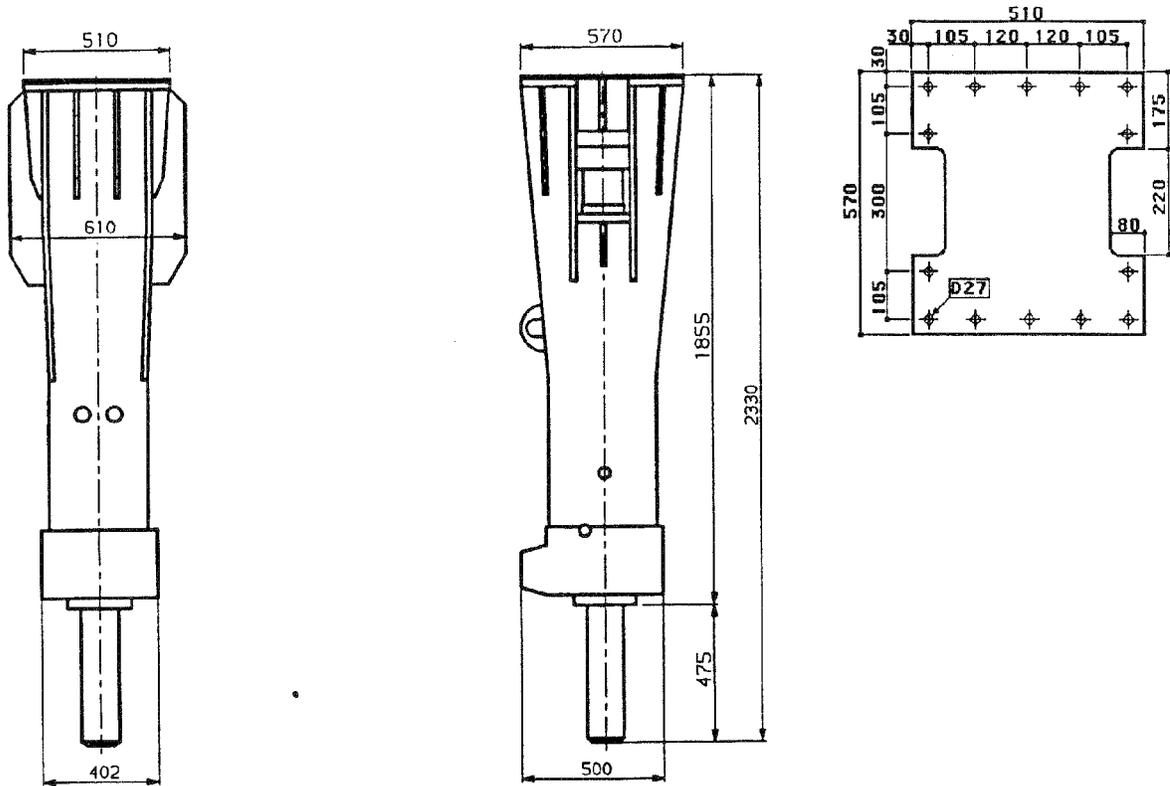


Standard tools : lengths mm:s

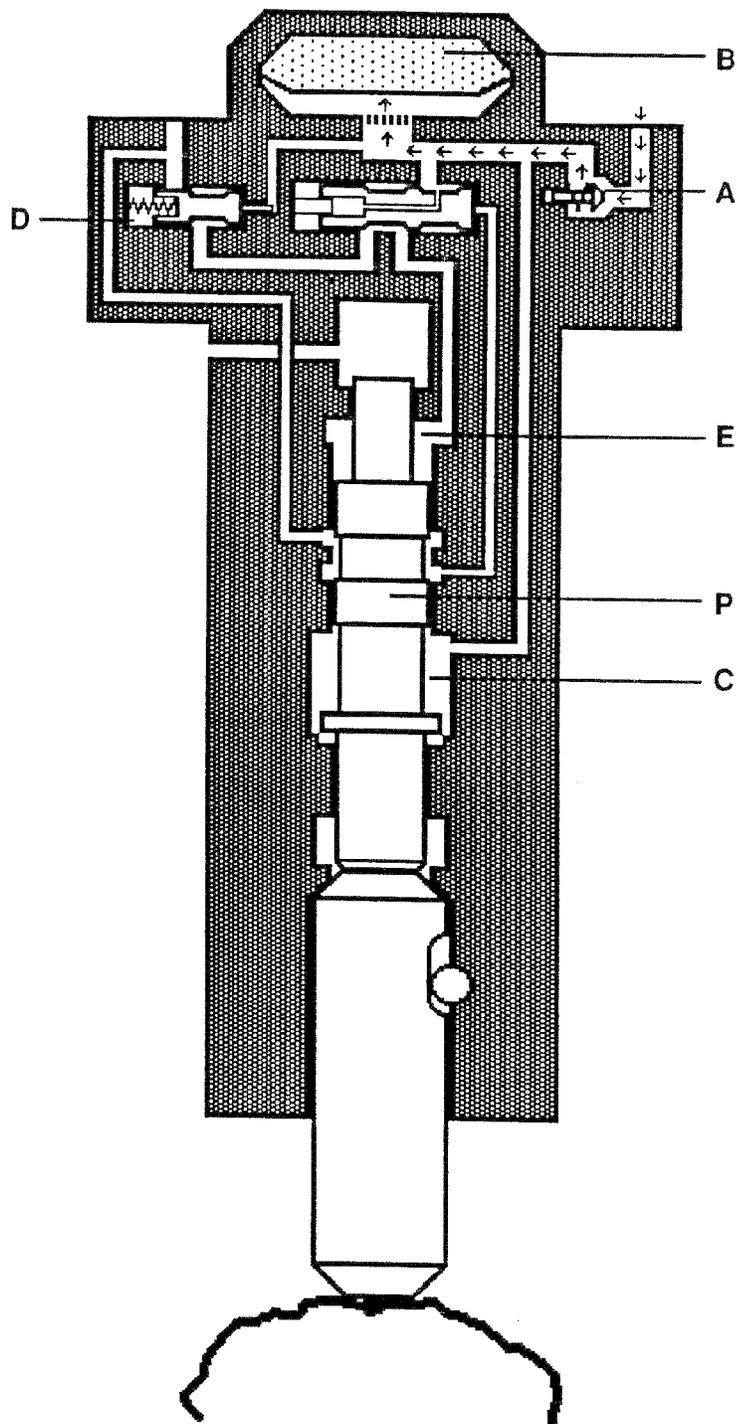
	Name	Part no.	Total length	Working length	Weight (kg)	Diameter (mm)	Note
A	Blunt tool	30210	900	475	94	130	
B	Moil point	31617	1100	675	99	130	
C	Chisel tool	31616	1100	675	103	130	

Special tools:

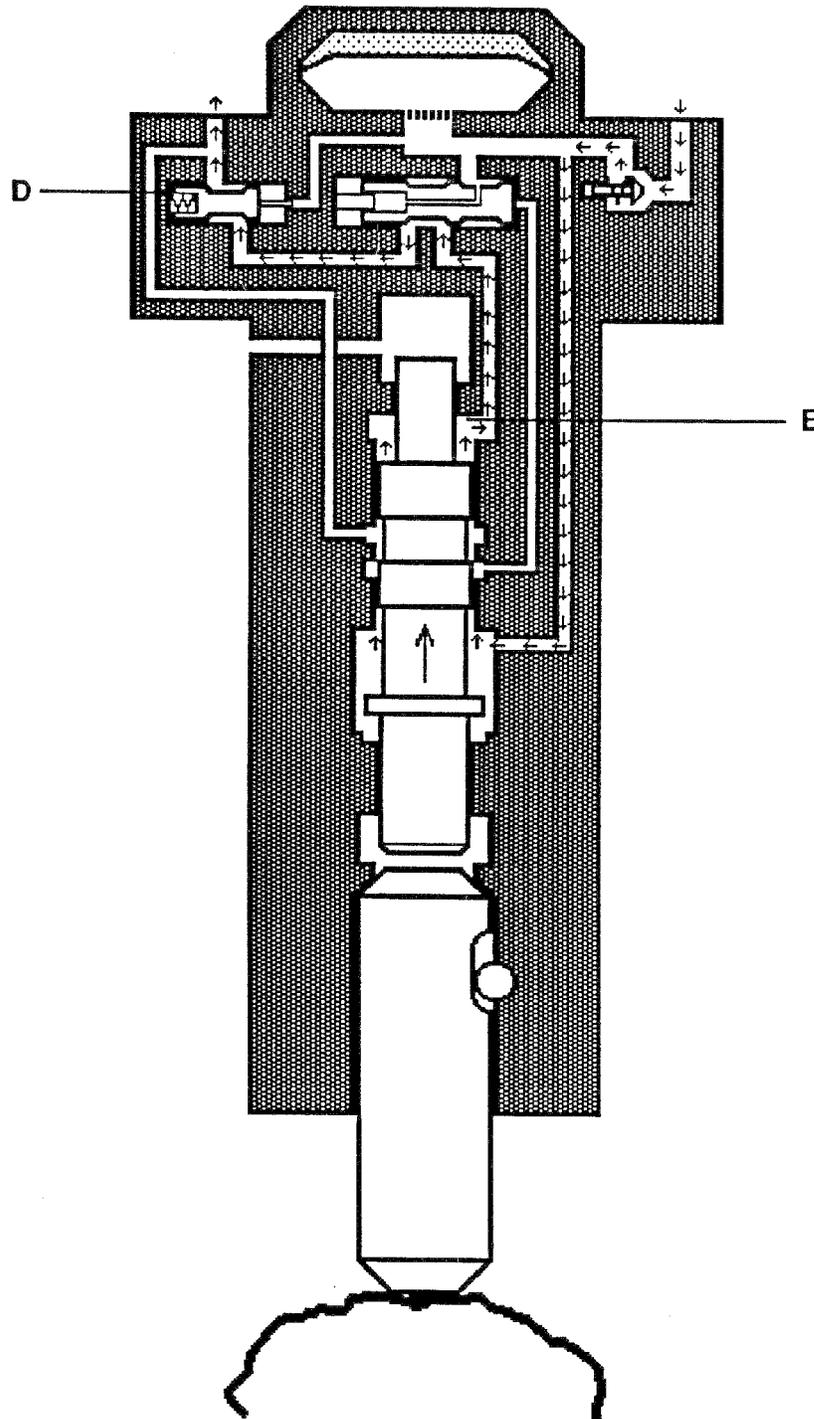
D	Long moil point	30169	1250	825	110	130	
E	Long chisel	30163	1250	825	115	130	
F							



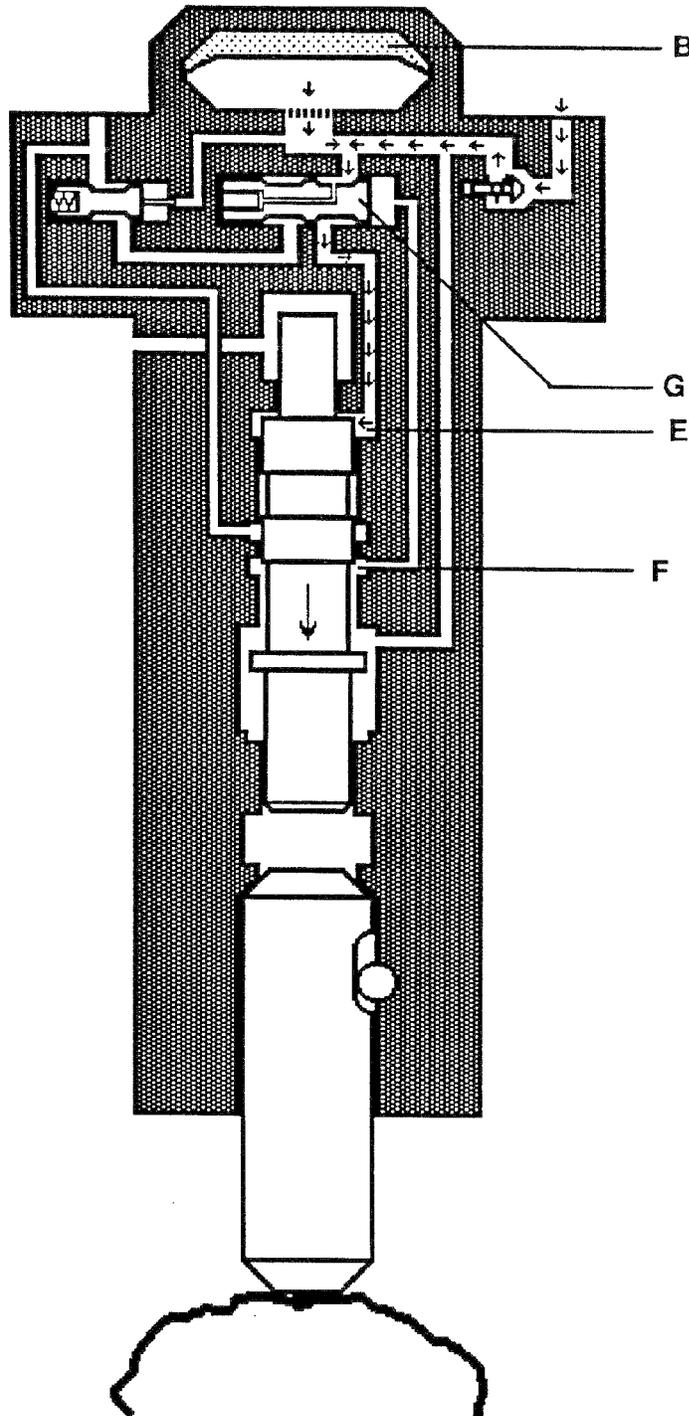
<b>WORKING WEIGHT (with mounting bracket and tool)</b>	<b>1690</b>	<b>kg</b>
<b>IMPACT ENERGY</b>	<b>3500</b>	<b>J</b>
<b>IMPACT FREQUENCY</b>	<b>350....500</b>	<b>bpm</b>
<b>OPERATING PRESSURE</b>	<b>140</b>	<b>bar</b>
<b>PRESSURE LIMITS</b>	<b>175....185</b>	<b>bar</b>
<b>OIL SUPPLY</b>	<b>120...160</b>	<b>L/min</b>
<b>RETURN LINE COUNTER PRESSURE</b>	<b>max.5</b>	<b>bar</b>
<b>INPUT POWER</b>	<b>max. 37</b>	<b>kW</b>
<b>OUTPUT POWER</b>	<b>max. 29</b>	<b>kW</b>
<b>EFFICIENCY</b>	<b>0,8</b>	
<b>TOOL SHANK DIAMETER</b>	<b>130</b>	<b>mm</b>
<b>CONNECTIONS IN HAMMER</b>	<b>/PRESSURE LINE /RETURN LINE</b>	<b>(BSP) R 3/4" -int (BSP) R 1 1/4" - int</b>
<b>LINE SIZE / INNER DIA /</b>	<b>PRESSURE LINE</b>	<b>25 mm</b>
	<b>RETURN LINE</b>	<b>25 mm</b>
<b>OIL TEMPERATURE</b>	<b>-20...+80</b>	<b>° C</b>
<b>HYDRAULIC OIL VISCOSITY</b>	<b>1000...15</b>	<b>cSt</b>
<b>CARRIER WEIGHT, ALLOWED</b>	<b>18...30</b>	<b>ton</b>
<b>CARRIER WEIGHT, OPTIMUM</b>	<b>20...26</b>	<b>ton</b>



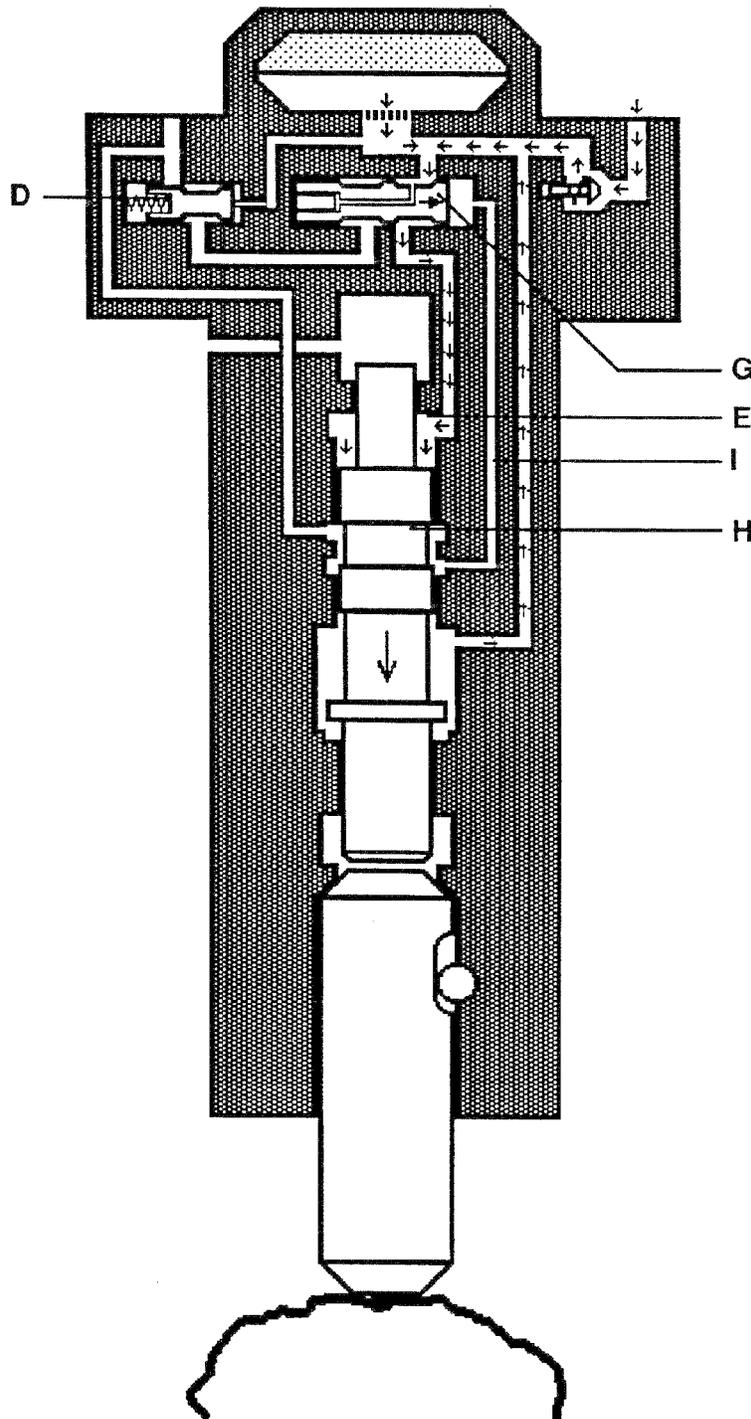
1. Oil flows through the check valve A into the accumulator B and to the space C under the piston P.  
The pressure control valve D has closed the outlet channel from space E and prevents the piston to move.  
Pressure inside the hammer increases and compresses the nitrogen gas in the accumulator.



2. When the preset operating pressure has been reached, the valve D opens the outlet channel from space E to tank line.  
Piston starts the return stroke, due to the pressure under the piston.



3. In its highest position the piston allows the pilot pressure to pass through the channel F to the other end of the main valve G. Main valve changes position and opens the space E to the accumulator B. The piston starts its impact stroke, during which oil is supplied from the accumulator.



- 4. Piston moves downwards with high velocity.**  
**Groove H in the piston connects pilot channel I to tank line.**  
**Main valve G starts to move back and connects space E to outlet channel.**  
**Moving of piston causes reduction in the accumulator pressure and activates the valve D to close the outlet channel.**  
**After the impact the piston remains in position until the oil pressure rises and the cycle is repeated (phase 1).**

### 3. DISASSEMBLING AND ASSEMBLING OF S 56

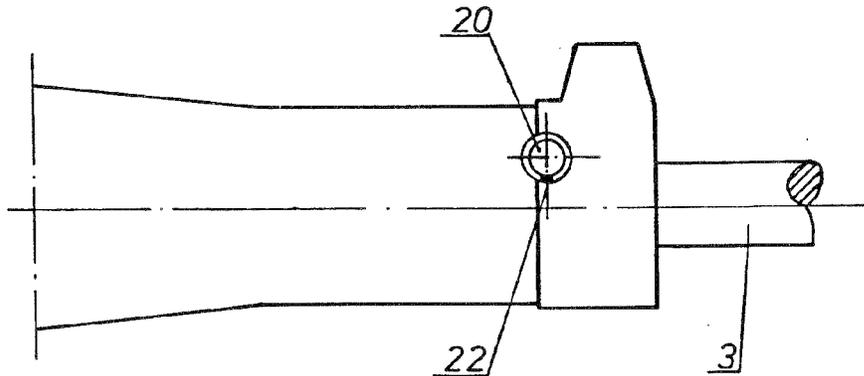
#### 3.1 Removing and inserting of tool

##### 3.1.1 Removing

Turn the hammer into a horizontal position so that pin 22 is in upright position with the spring beneath it. Push pin 22 down and simultaneously pin 20 from the opposite side. Remove tool 3.

##### 3.1.2 Inserting

Turn the hammer into a horizontal position so that pin 22 is in upright position with the spring beneath it. Clean and lubricate tool 3 and pin 22. Insert the tool, check that the groove of the tool allows the pin to be inserted. Insert pin 20 so that its slanting edge presses pin 22 down on its way in.



THE TOOL WEARS ONLY ON TWO SIDES. IT HAS TO BE REJECTED IF THE SMALLEST DIAMETER OF THE SHANK IS LESS THAN 128 MM.

### 3.2 Removing and installing of hammer, changing of wearing plates

#### 3.2.1 Hammer, removing and installing

Remove the tool and put the hammer in a vertical position, on two wooden supports 1. It is convenient to have a trough under neath to collect oil.

Loosen the housing from the mounting bracket.

Disconnect the hoses and put a plug in them, as well as in the hammer inlet and outlet.

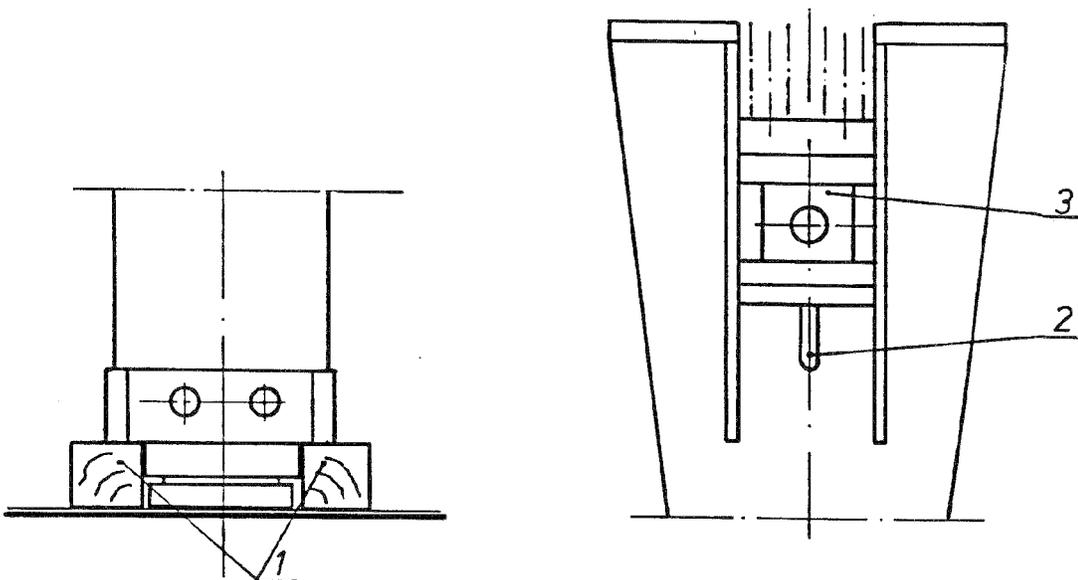
The carrier can be taken aside.

Lift the housing (and hammer) using eyes 2, remove pieces 1 and set the housing on the floor.

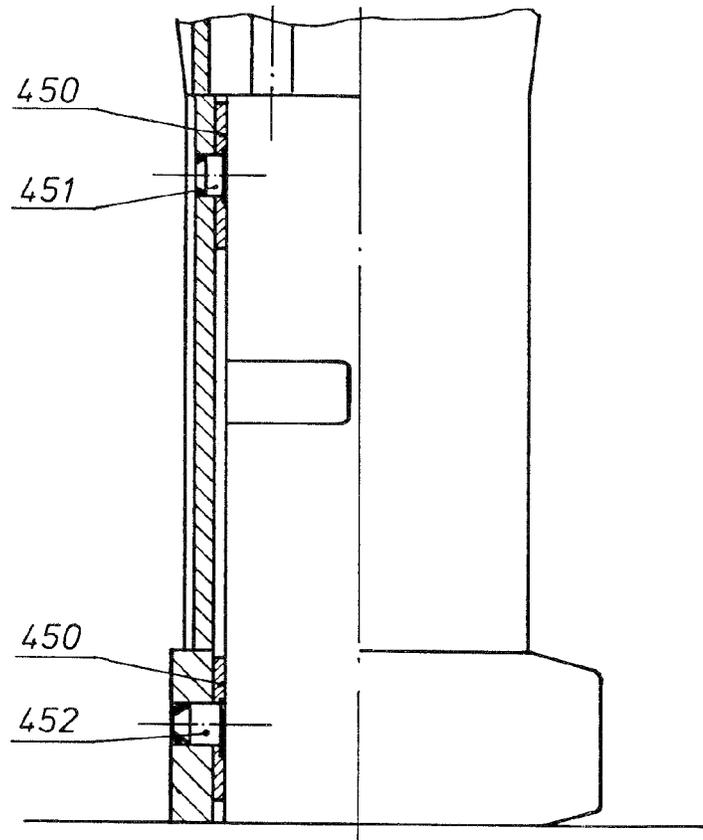
Put a lifting belt round the valve housing shoulders and lift the hammer about 10 mm. Wag the hammer. If the hammer moves more than  $\pm 10$  mm at shoulder level, the clearance between the hammer and wearing plates 450 has to be reduced. Lift the hammer out of the housing. See 3.2.2.

After changing the wearing plates lift hammer in to the housing and check clearance by wagging the hammer. After placing the hammer into the housing, springs and intermediate plate with buffer are put in their places.

The mounting bracket and hoses are connected to the hammer.



## 3.2.2 Changing the wearing plates



The distance between the wearing plates has to be 301...302 mm. Wearing plates 450 can be changed or fitting plates 453 added between wearing plates and housing by cutting the welding round pins 451 and 452.

Plates 450 or 453 shall be added so that the hammer lies in the middle of the housing.

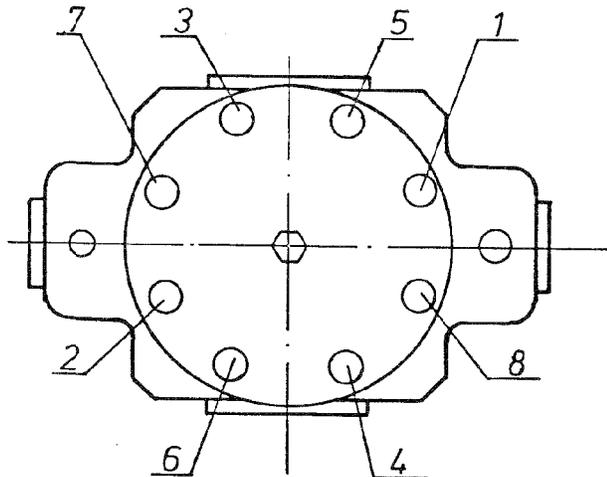
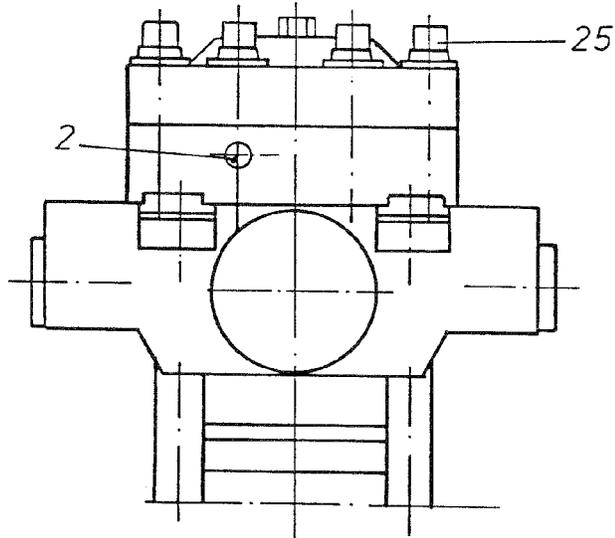
The plates will be fastened by welding new pins 451 and 452.

### 3.3 Assembling and installing of accumulator

#### 3.3.1 Removing

Open socket screws 25 in the order shown in the picture below.

Screw the lifting eyes in holes 2 and remove the accumulator.



**WARNING: DO NOT OPEN THE SCREWS OF THE COVER (16 PCS) WHEN THERE IS PRESSURE INSIDE!**

### 3.3.2 Disassembling

Remove sealing 107.

Set the accumulator on the assembly tool (20 160)\*

Remove cup nut 103.

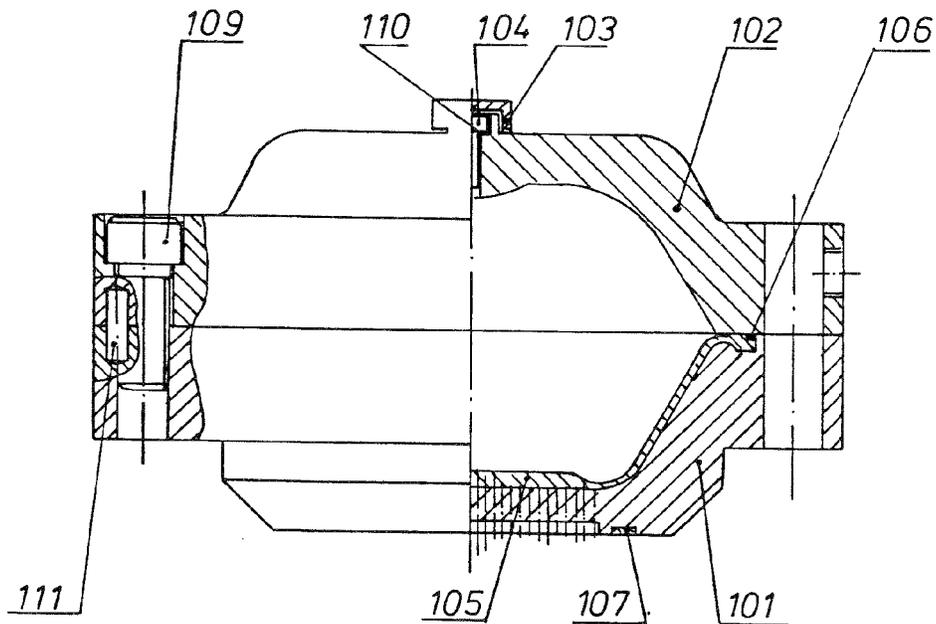
Connect the charging hose assembly. Check that the charging hose is connected with the nitrogen bottle and that the exhaust screw of the charging device is closed. Open screw 104.

Notice the gauge pressure which should be from 3.5 to 4.0 MPa (35 to 40 kp/cm<sup>2</sup>).

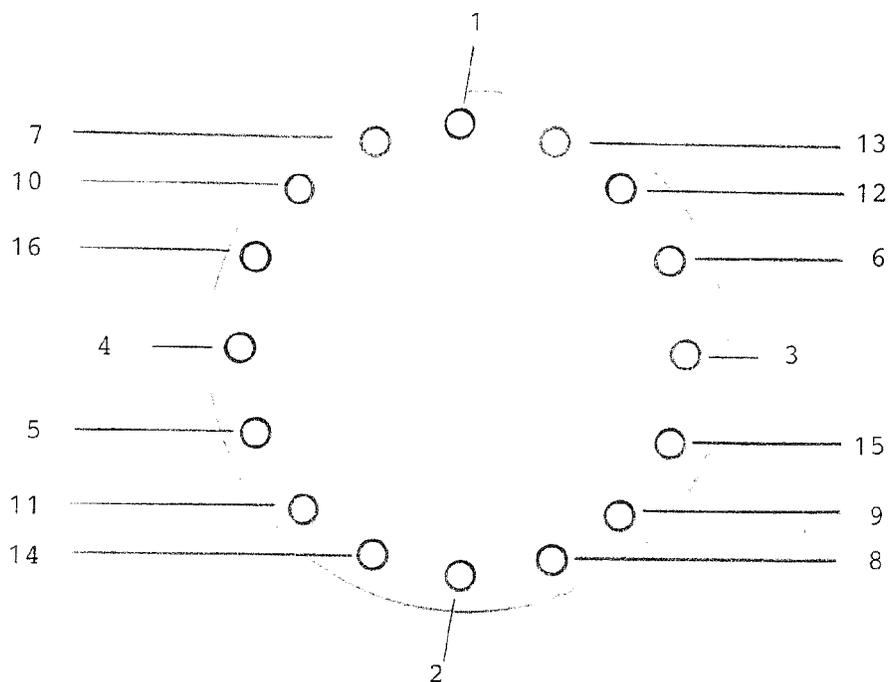
Open the exhaust screw of the charging device and let the nitrogen flow out.

When there is no pressure in the accumulator, remove the charging equipment, screw 104 and gasket 110.

\*) See service tool set.



Open socket screws 109 (16 pieces) in the order shown below.  
Remove cover 102, pins 111, supporting ring 9 and membrane 105.



### 3.3.3 Assembling

Cleand and dry parts carefully.

Set the accumulator bottom on the assembly tool \*).

Insert guide pins 111, put a new membrane 105 and supporting ring 106 in their places.

Furnish the cover with a new Usit-gasket 110 and fasten screw 104.  
Tighten screws 109 with a torque wrench first to 200 Nm (20 kpm) and then to a final torque of 500 Nm (50 kpm) in the order shown above.

\*) See service tool set

### 3.3.4 Charging of the accumulator

Connect the charging hose assembly to the accumulator cover.  
Open screw 104 through the charging equipment.

Open carefully the valve of the nitrogen bottle and observe the gauge pressure. Shut the bottle valve, when the pressure is 4,3 MPa (43 kp/cm<sup>2</sup>).

Wait 10 minutes (because of temperature changes).

Adjust the pressure to 4,0 MPa (40 kp/cm<sup>2</sup>).

Shut screw 104, torque **20 Nm (14,5 lbft)**. Let the pressure out from the hose and remove the charging equipment (90 602)\*.  
Check the gas-tightness by dropping some oil on screw 104.

Tighten cup nut 103.

\*) See service tool set

### 3.3.5 Fastening of the accumulator

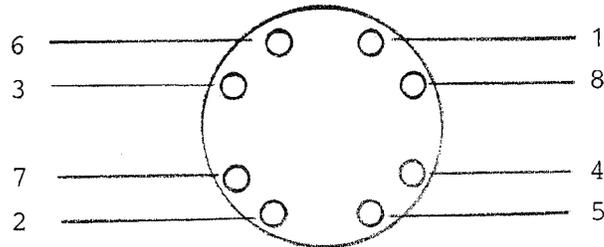
Install sealing 107 into the groove in the bottom of the accumulator.

Use some grease to prevent the ring from falling down during the mounting.

Install guide pins 42 into the holes on the valve housing.

Lift the accumulator into its place. Install washers 24 and socket screws 25.

Using a torque wrench tighten the socket screws first to 200 Nm (20 kpm) and then to a final torque of 450 Nm (45 kpm) in the order shown below.



### 3.4 Removing and installing of main valve

#### 3.4.1 Removing

Loosen screws 46 of covers 15 and 16.

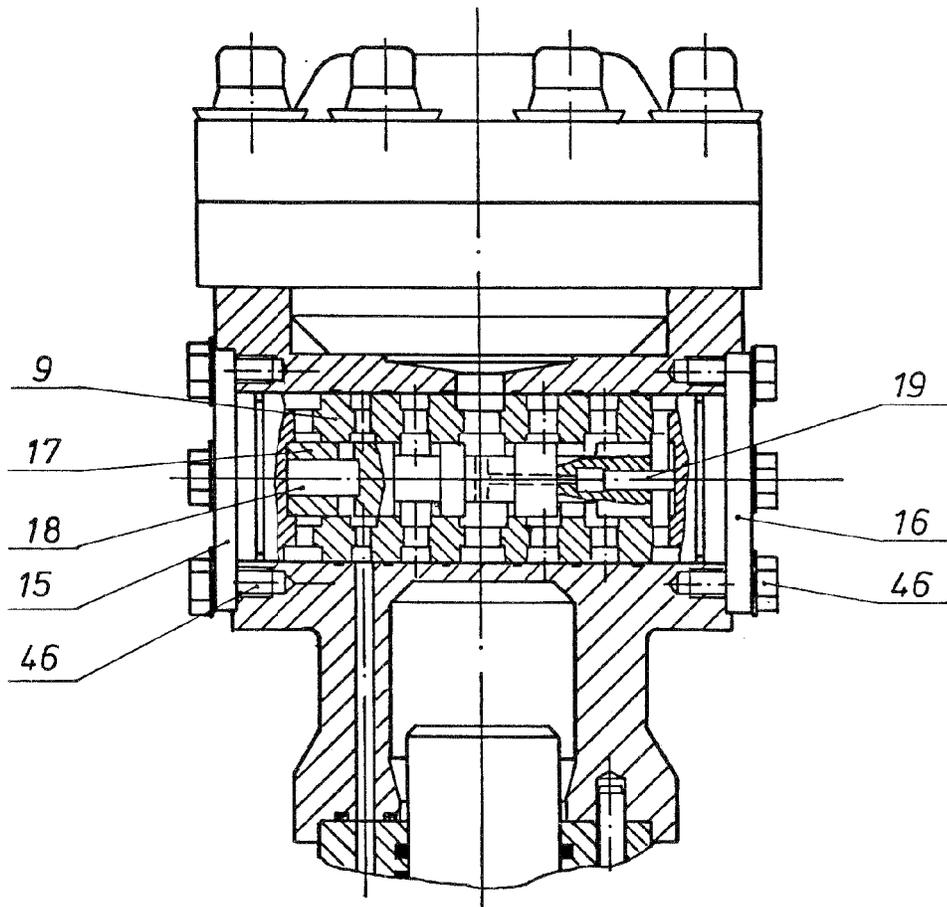
Using a screwdriver pry out the covers.

Push out spool 17. Take care of small spools 18 and 19 in the ends of spool 17.

Fasten the puller (40 210) \* in the holes of screws 46.

Put the tool flange against bushing 9 and drive the bushing carefully out.

Remove O-rings from bushing 9 and covers 15 and 16.



\*) See service tool set

### 3.4.2 Installing

Check the parts carefully. If necessary, use fine emery cloth or grinding agent. Clean and oil the parts.

Set new O-rings on bushing 9 and covers 15 and 16.

Fasten the puller (40 210)\* on the valve housing side marked with and X. Install bushing 9 so that the X on its end comes to the same side with the X on the valve housing. Using the tool flange against the bushing, drive the bushing in.

Install spool 17 so that the X on its end will be again on the X-side of the valve housing. Don't forget spools 18 and 19.

Install cover 15 marked with X on the X-side of the valve housing.

Install cover 16. Tighten screws 46 to a torque of 120 Nm (12 kpm). Use locking plates under the screws.

\*) See service tool set.

### 3.5 Removing and installing of pressure control valve

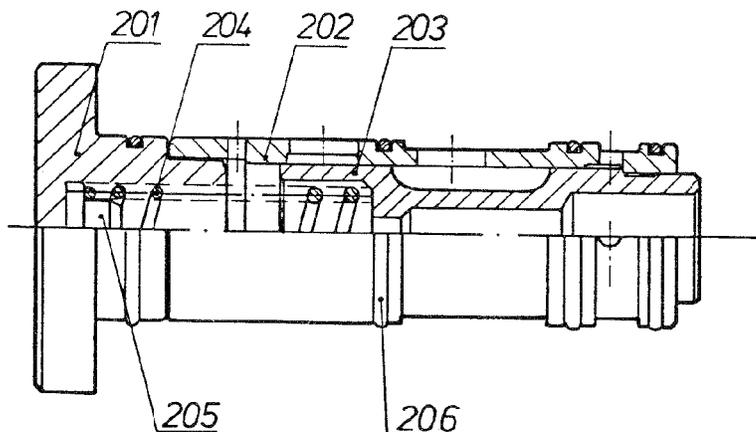
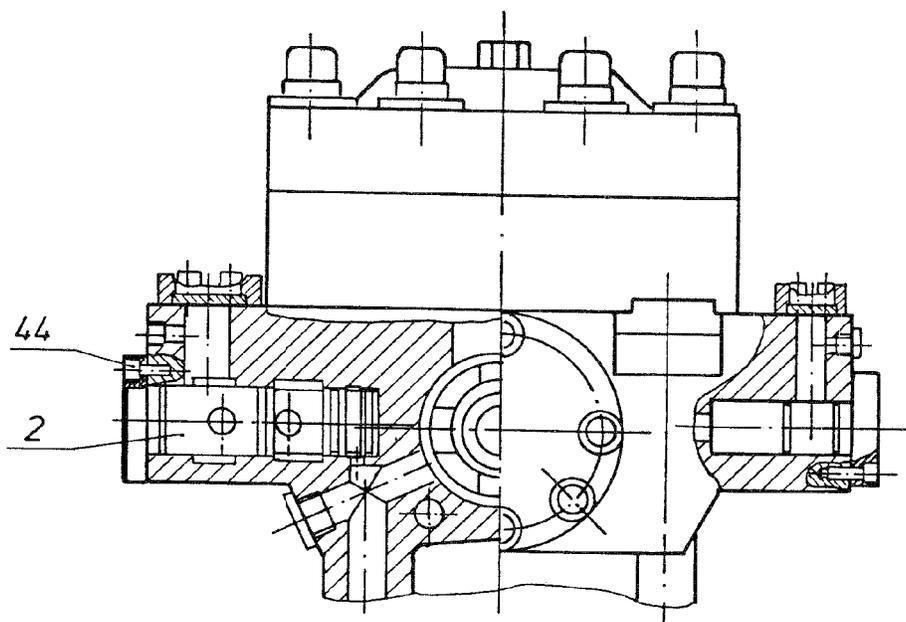
#### 3.5.1 Removing

Loosen screws 44. (The pressure control valve is located under the return oil connection.)

Using a screwdriver pry out valve 2.

Fix valve cover 201 onto a vise bench and loosen the valve by turning guide bushing 202 with the hook spanner (90 621)\*.

Loosen the valve from the vise bench.



\*) See service tool set

Push spool end 203 against a piece of wood (to eliminate to spring force) and screw out guide bushing 202. Remove spring 204, spring guide 205 and O-rings 206.

### 3.5.2 Installing

Check the parts carefully. If necessary use fine emery cloth or grinding agent.

Clean and oil the parts.

Insert spring guide 205 and spring 204 into cover 201. Insert spool 203 into guide bushing 202. Put spool 203 with guide bushing 202 onto the spring, push the spool against a piece of wood and screw guide 202 into its place. Fasten the valve cover onto a vise bench and tighten the guide bushing with a hook spanner (90 621)\*. After tightening check that the spool moves properly against the spring.

Install O-rings.

Push the valve assy into the valve housing and hit it with a plastic hammer into its place. Take care of the O-rings. Tighten socket screws 44 to a torque of 5,0 kpm.

\*) See service tool set.

### 3.6 Removing and installing of check valve

#### 3.6.1 Removing

Loosen screws 44 and pry the valve out using a screwdriver.  
Push in spring guide 306 and remove spring ring 304.  
Parts 306, 303 and 305 come out now.

#### 3.6.2 Installing

Check the condition of parts carefully.

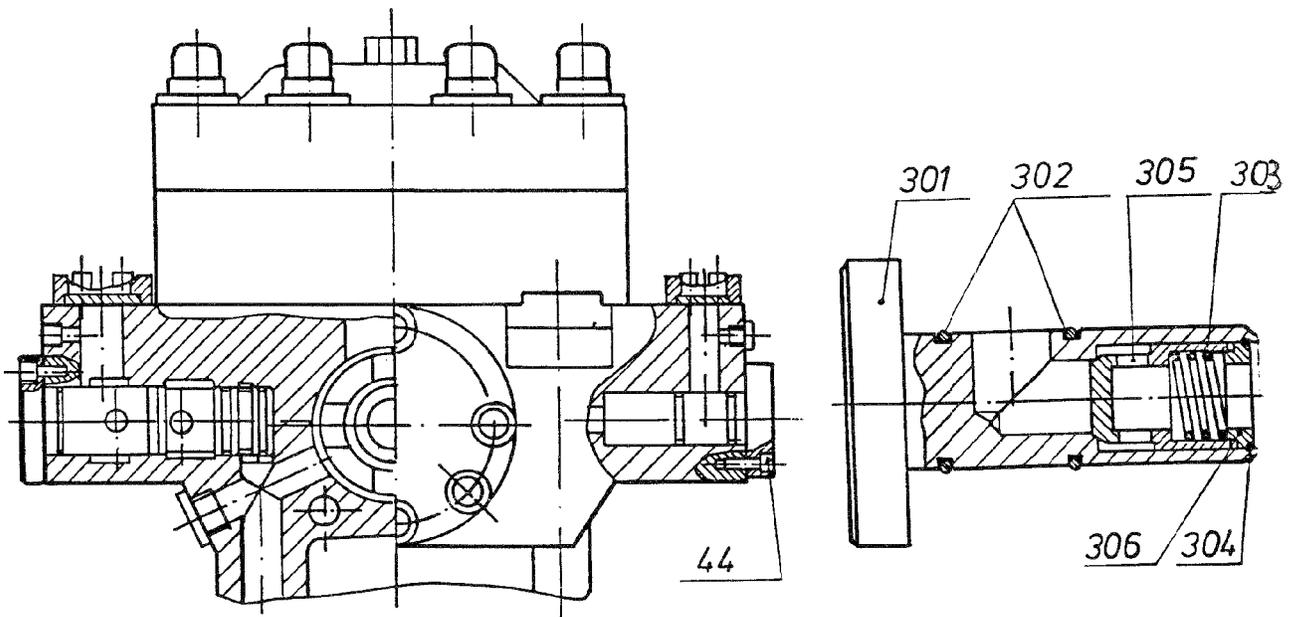
Insert spool 305, spring 303 and spring guide 306 into housing 301. Install spring ring 304 and O-rings into their places.

Check that the spool moves properly.

Push the valve into the valve housing and hit it with a plastic hammer to get it into its place.

Take care of O-rings.

Tighten screws 44 to a torque of 4,8 kpm.



### 3.7 Loosening and tightening of tie rods

#### 3.7.1 Loosening

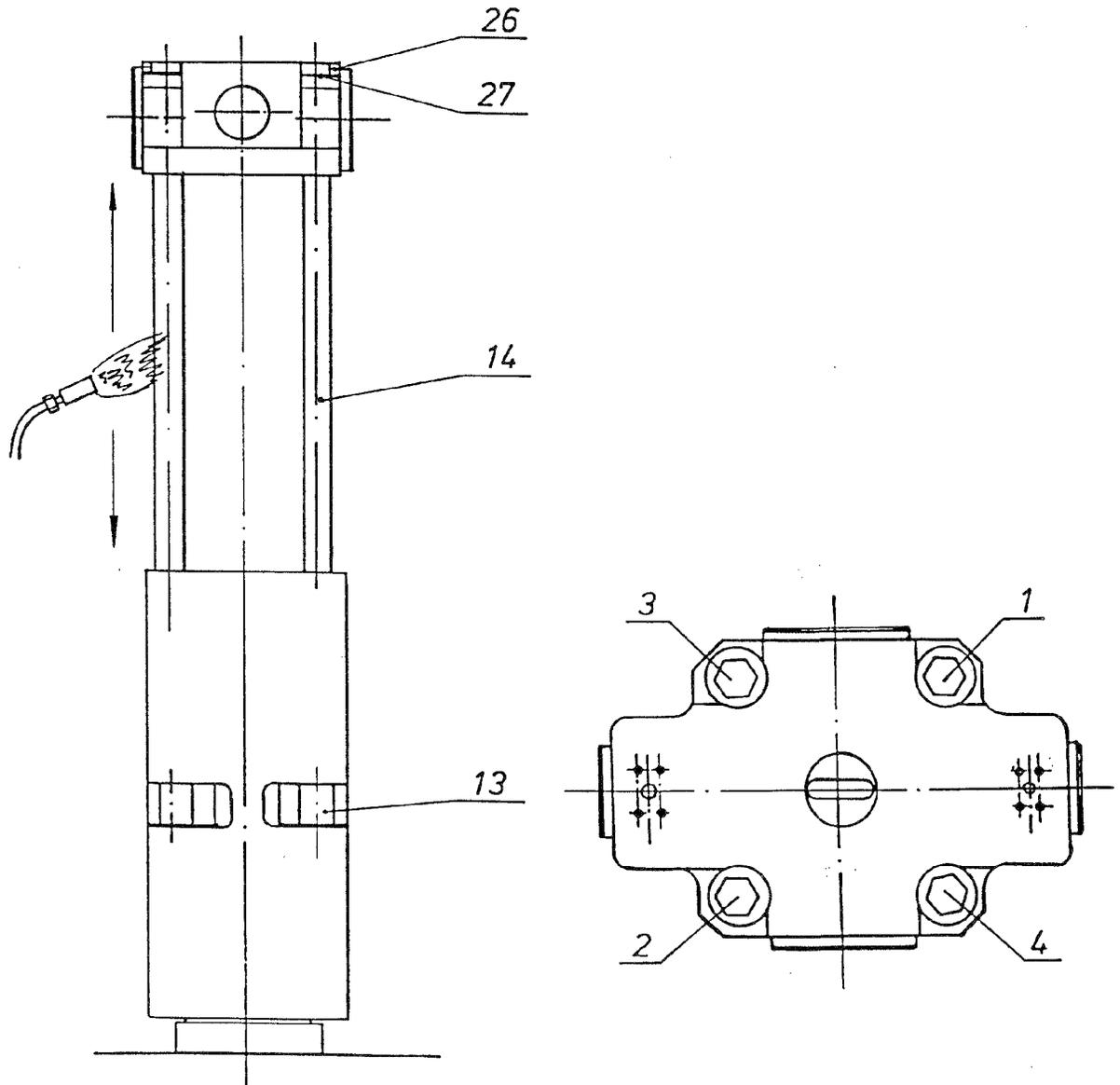
Remove the accumulator, rings 26 and locking plates 27.

- mark each tie rod and its nut as a pair
- mark the upper end of each nut
- mark each tie rod's location in the hammer

Heat the tie rods with propane flame so much that the rods can be opened. See the opening order. Remove the nuts 13.

#### 3.7.2 Tightening

Clean and grease the threads. Spread corrosion resistant paint on the part of the tie rod going inside front head. Install the tie rods and nuts to the same places they were before disassembling. Check that each tie rod has the right nut as its pair, and that the installation direction of the nut is correct.



Tighten the screws crosswise first to the torque of 100 Nm, then to 300 Nm and finally to 500 Nm.

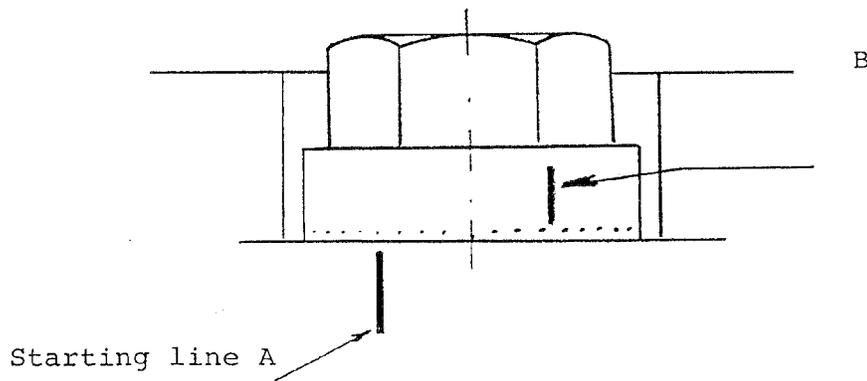
Mark the starting line A on the valve body and mark line B on the tie rod head at **120 degrees** distance from the mark A.

Heat the tie rods with propane flame and tighten the tie rods 14 in the order shown before so that mark B on tie rod head comes to the point of starting line.

Install the locking plates 27 and rings 26 on tie rod heads so that they cannot loosen.

Install the accumulator.

Apply silicone compound between screws and front head.



### 3.8 Disassembling and assembling of cylinder

#### 3.8.1 Disassembling

After the accumulator and valve housing have been removed, screw two eye bolts M24 into the holes in the side of the cylinder. Screw an eye bolt M12 into the hole in the head of the piston.

Hang a jigger (90 608)\* and a lift chain (90 609)\* on the hook of a crane.

Hook the cylinder on the chain and the piston on the jigger.

Lift the cylinder out of the front end.

Observe that ring 8 follows the cylinder.

Set two pieces of wood on the table under ring 8.

Screw two eye bolts into the holes in the side of the ring.

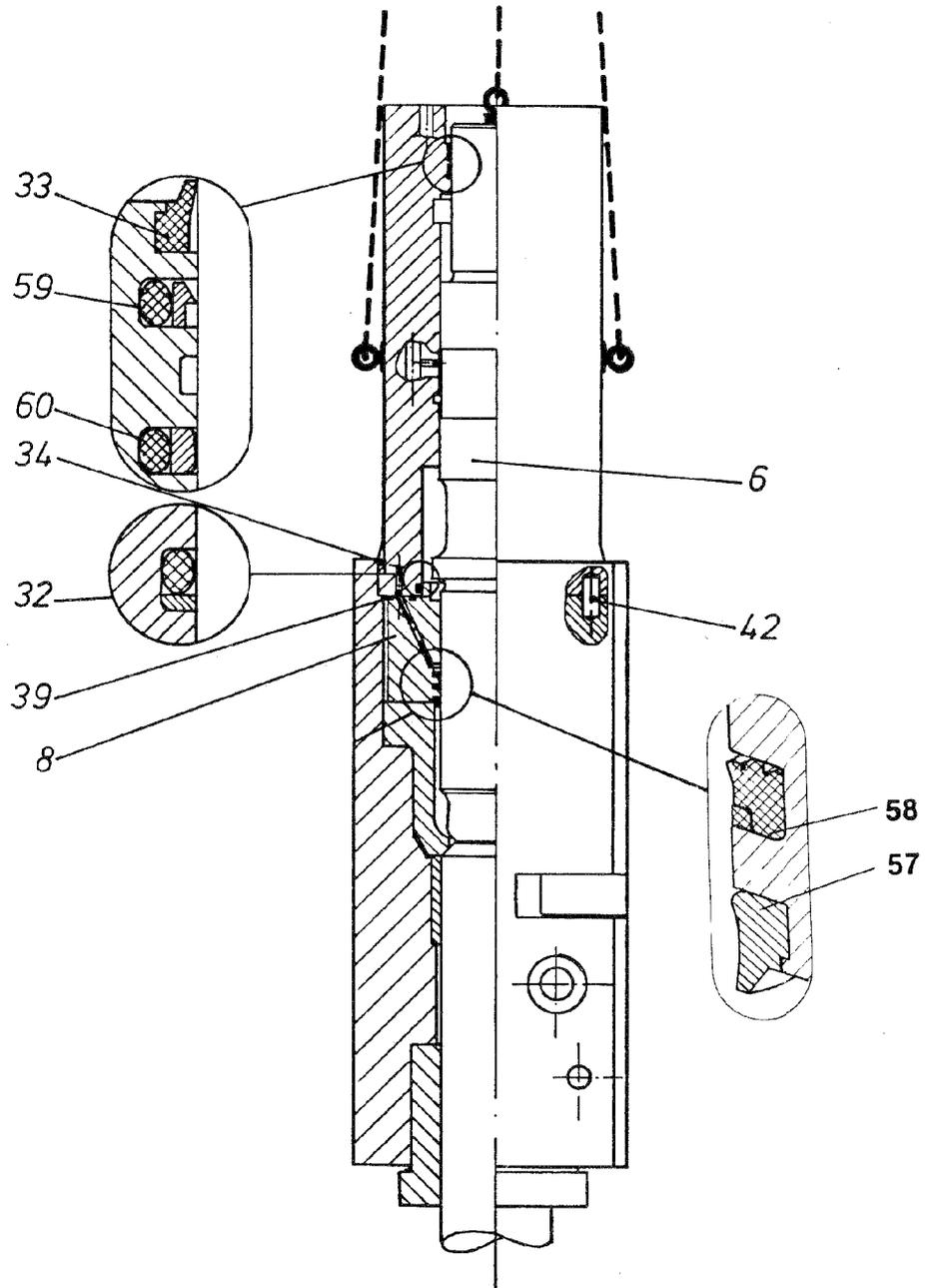
Keep the ring approx. 20 mm above the pieces of wood.

Hit on the eye bolts with a hammer so that the ring falls down on the pieces of wood.

Lift the cylinder piston assy aside and lower the piston down with the jigger.

Remove sealings 32 and 34, wiper 33 and gaskets 59 and 60 from cylinder, and O-ring 39 guide pin 42, sealing 58 and wiper 57 from ring 8.

\*) See service tool set.



### 3.8.2 Assembling

Clean carefully cylinder 5, piston 6 and ring 8.

Install gaskets 59 and 60, wiper 33, O-ring 34 and sealing 32 into the cylinder and sealing 58 , wiper 57, O-ring 39 and guide pin 42 into ring 8.

Hang the lifting chain and the jigger on the crane.

Lift the cylinder with the chain, draw the rope of the jigger through the cylinder and lift the piston with the jigger into the cylinder.

Place ring 8 on two pieces of wood on the table.

Set the cylinder-piston-assembly on the ring. Pull draw the ring into the cylinder with the installing screws (90 524)\*. Remove the screws before installing the cylinder-piston-ring-assembly into the front end.

Take care that the ring does not fall off.

\*) See service tool set.

### 3.9 Disassembling and assembling of front end

#### 3.9.1 Disassembling

Remove wedge 23.

Remove thrust ring 12.

Remove grease nipple 50.

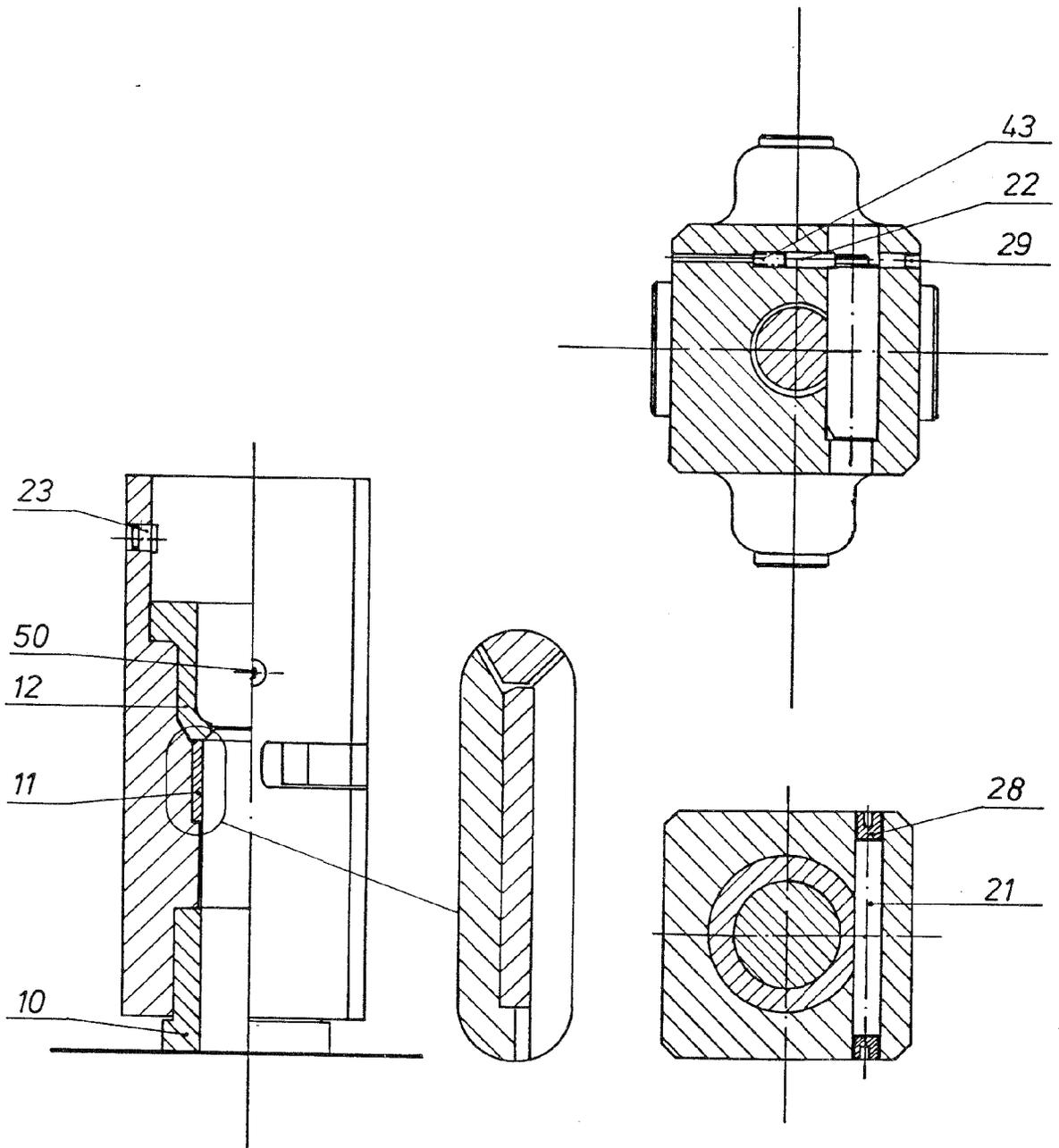
Using a drilling machine remove plastic cap 29.

Remove pin 22 and spring 43.

Remove pin 21 and caps 28 by hitting on them. Turn the front end into a horizontal position.

Remove bushing 11.

Remove bushing 10 by hitting on it.



### 3.9.2 Assembling

Check the parts carefully.

BUSHINGS 11 AND 10 WILL WEAR ONLY ON TWO SIDES.  
IF THE BIGGEST DIAMETER IS MORE THAN 132 MM, THE BUSHING  
HAS TO BE REJECTED.

Clean, dry and oil the parts carefully.  
Heat the front end with a propane flame.

Push in the bushings.  
Observe that the groove on bushing 10 has to allow pin 21  
to be inserted.

Insert pin 21, spring 43, pin 22 and plastic caps 28 and 29.

Install thrust ring 12.

Install the grease nipple and wedge 23 including on O-ring.

The front end is ready for the cylinder to be installed.

## TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
1 The hammer does not start	1 The relief valve in the hydraulic circuit opens at too low a pressure. The actual hammer operating pressure 14.0 MPa (140 kp/cm <sup>2</sup> , 2000 PSI) is not reached	Measure the pressure of the high pressure line in the hammer. Adjust the relief valve in hydraulic circuit to open at a pressure of 17.5 MPa (175 kp/cm <sup>2</sup> , 2540 PSI).
	2 The piston is in its lower hydraulic brake	Keep the hammer control valve open and push the tool strongly against an object. The tool head lifts the piston out of the brake.
	3 The hammer control valve does not open	When operating the hammer control valve, check that high pressure line pulsates (this means the hammer control valve opens). If the valve does not operate, check the operating means: mechanical connections, pilot pressure or electrical control.
	4 The pressure control valve in the hammer does not open and the piston cannot take a return stroke	Remove the pressure control valve. Push the valve spool against a piece of wood and check that the spring works and the spool moves properly.
	5 The check valve in the hammer does not open	Remove the check valve. Press the spool with finger and check that spring works and the spool moves properly.
	6 The main valve in the hammer does not operate properly	Check that covers 15 and 16 of the main valve housing are firmly tight. If so, remove the covers and check that spools 17, 18 and 19 move properly. Remove main valve bushing 9 and check O-rings.
	7 Piston failure	Disassemble the whole hammer.

TROUBLE	PROBABLE CAUSE	REMEDY
2 The hammer operates irregularly but the blow has full power	1 The relief valve in hydraulic circuit opens at too low a pressure	Check the relief valve operation Adjust to open at the pressure of 17.5 MPa (175 kp/cm <sup>2</sup> , 2540 PSI)
	2 The pressure control valve in hammer tackles	Remove the valve and check the spring and spool operation.
	3 Strange particles prevent the small spools 18 and 19 in the main valve from operating	Remove covers and main spool and check spools 18 and 19
	4 The main valve spool touches the breaks in covers 15 and 16	Remove covers and main spool and check them.
	5 A side rod is broken	Disassemble the whole hammer.
3 The hammer operates poorly and the blow has no power	1 The relief valve in the hydraulic circuit opens at too low a pressure	Check the relief valve operation and adjust it to open at the pressure of 17.5 MPa (175 kp/cm <sup>2</sup> , 2530 PSI).
	2 The pressure control valve in the hammer allows the hammer to operate at too a low pressure	Remove the pressure control valve. Check that the spring is not damaged and the spool moves properly.
	3 The membrane of the accumulator is broken	Check the accumulator pressure. Discharge the accumulator, remove the cover and change the membrane. Recharge the accumulator.
	4 There is no nitrogen pressure in the accumulator	Check the accumulator pressure. If there is no pressure or the pressure is less than 4 MPa (40 kp/cm <sup>2</sup> ), 580 PSI) <u>discharge the accumulator, remove the cover and check the membrane.</u>
	5 A side rod is broken	Disassemble the whole hammer.

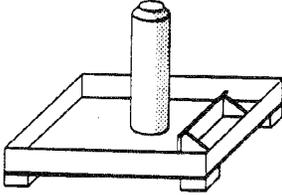
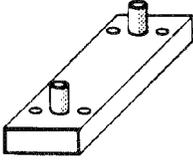
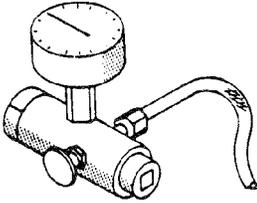
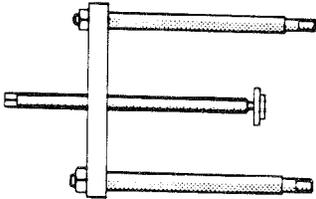
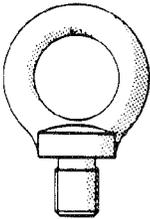
TROUBLE	PROBABLE CAUSE	REMEDY
4 Oil warms up strongly	1 The relief valve in the hydraulic circuit leaks	Check the relief valve.
	2 Sealing failure	The hammer needs to be serviced.
5 The hammer bleeds oil between the tool and the front end bushing	1 Sealing 58 in the ring has failed	Disassemble the hammer and change all sealings in the cylinder and ring if necessary.
6 The hammer bleeds oil between the hammer and the housing	1 A plug in the borings of the valve housing has got loose	Lift the hammer out of the housing and change the plug.
	2 O-ring between the ring and the cylinder valve housing and the accumulator has failed	Disassemble the hammer and change all O-rings.
7 The hammer swings in its housing	1 Wearing plates between the hammer and the housing have worn strongly	Lift the hammer out of the housing and replace wearing plates.



SERVICE TOOL SET 40 439 1 (2)  
TYÖKALUSARJA

RAMMER S 56L,S 56,S 56W

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Muutos 8.8.88 ti

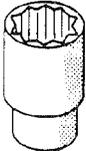
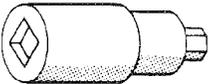
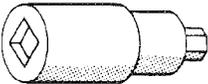
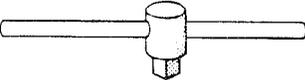
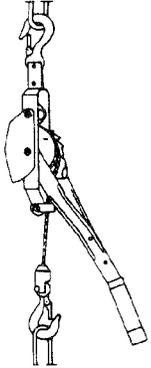
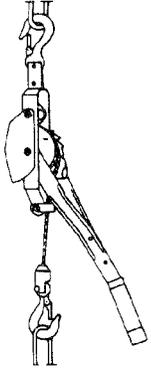
	Ref.No.	Description	Qty
	Viite no	Nimitys	Kpl
	30 905	Hammer assembly stand Vasaran kokoonpanoteline	1
	30 276	Accumulator assembly stand Akun kokoonpanoteline	1
	90 602	Accumulator charging equipment Akun täyttölaite	1
	40 210	Sleeve puller Ulosvedin	1
	90 605	Lifting eye M24 Nostosilmukka	2
	40 212	Lifting eye M24 x 2 Nostosilmukka	2
	90 607	Lifting eye M12 Nostosilmukka	1
	90 624	Lifting eye M20 Nostosilmukka	2
	90 609	Lifting chain Nostoketju	1



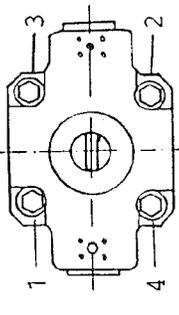
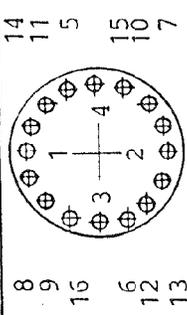
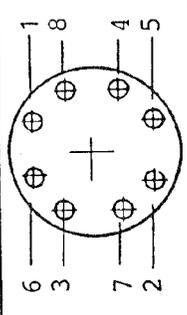
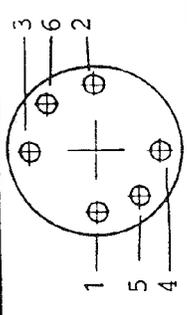
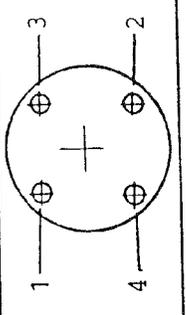
SERVICE TOOL SET 40 439 2 (2)  
TYÖKALUSARJA

RAMMER S 56L,S 56,S 56W

11.11.1985 003lv TH/peh  
Muutos 8.8.88 ti

	Ref.No.	Description	Qty
	Viite no	Nimitys	Kpl
	90 610	Torque wrench 15-70 kpm Momenttiavain	1
	90 611	Socket 50 mm/ 3/4" Holkki	1
	90 612	Adaptor 17 mm/ 3/4" Kuusiokolovääntiö	1
	90 613	Adaptor 19 mm/ 3/4" Kuusiokolovääntiö	1
	90 614	Allen wrench 6 mm Kuusiokoloavain	1
	90 615	" 8 mm	1
	90 616	" 10 mm	1
	90 617	" 12 mm	1
	90 625	Sliding T-handle SALT 5355 T-väännin 3/4"	1
	90 608	Jigger Talja	1
	90 621	Hook spanner 45/50 mm Haka-avain	1
	40 214	Drift pin Lyöntituurna	1
	90 524	Screw M12x140 Kuusioruuvi	3

TORQUE MOMENTS OF THE SCREWS S56

Screw	Ref. no.	Part no.	Qty	First tightening	Second tightening	Tightening order
Side rods	14	30485	4	first 100 Nm (75 lbft) second 300 Nm (220 lbft) third 500 Nm (370 lbft)	+120° tightening see 3.7 *)	
Screws of accumulator M22x1,5x70	109	40416	16	200 Nm (145 lbft)	500 Nm (360 lbft)	
Screws of accumulator	25	40336	8	200 Nm (145 lbft)	450 Nm (330 lbft)	
Screws of main valve covers M12x1,5x30	46	90508	12		120 Nm (90 lbft)	
Screws of valves M10x20	44	90501	8		50 Nm (35 lbft)	
Plug of accumulator M8	104	40106	1		<b>20 Nm (14,5 lbft)</b>	

\*) Side rods will be warmed after tightening to 500 Nm (360 lbft)