



## Self-Cleaning Hermetic Cream Separators

MRPX 314 HGV-74C

MRPX 318 HGV-74C

★ MRPX 418 HGV-74C ★

MAINTENANCE REPAIR

Book No.: MR SO 1675E/7903

## **FOREWORD**

This manual is intended primarily for the maintenance personnel. It deals with the preventive maintenance as well as the disassembly and assembly of the machine.

The purpose of the manual is to enable the reader to overhaul the machine and make necessary repairs, with the exception of jobs requiring machining, heat treatment and balancing.

Knowledge of the safety precautions is important.

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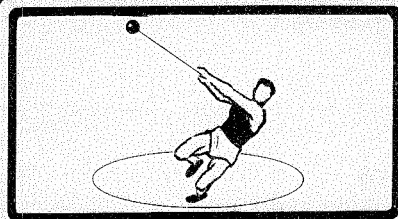
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**ENGINEERING DRAWINGS**

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# △ SAFETY PRECAUTIONS FOR CENTRIFUGAL SEPARATORS △

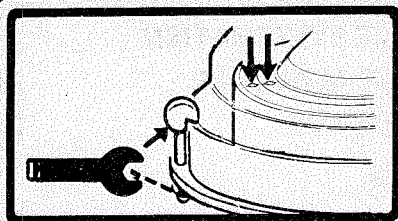


The bowl of a centrifugal separator rotates at a very high speed and great forces are generated.

To ensure your own safety, always carefully follow the instruction book(s) concerning installation, assembly of the components, operation and regular maintenance.

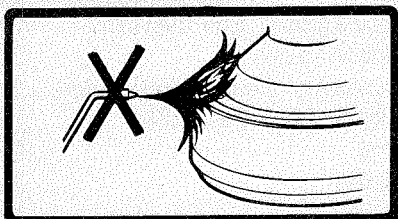
Always use Alfa-Laval spare parts and tools supplied with the machine.

## OPERATION



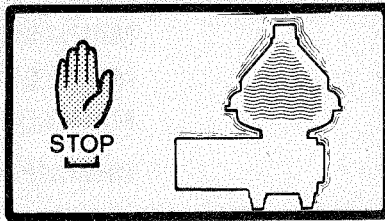
Never start the machine before the lock rings of the bowl inlet, outlet and other fastenings have been securely tightened. Note that the assembly marks Ø (arrowed) must be aligned or pass each other (due to thread wear) when the lock ring is fully tightened.

## MAINTENANCE

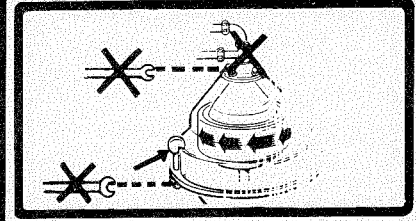


Never heat the bowl body, bowl hood or lock ring with a naked flame.

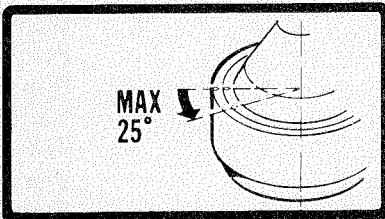
Never carry out any welding work on the components that rotate.



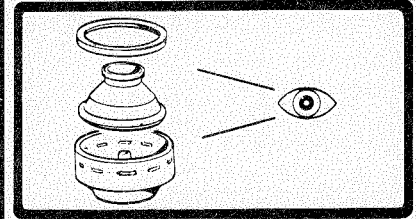
If excessive vibration occurs, IMMEDIATELY fill and keep the bowl full of liquid whilst stopping. Switch off and apply brakes, if fitted. After the bowl has stopped; dismantle, clean and check all parts carefully.



Never loosen any part of the machine until the bowl has completely stopped.



Never operate the machine when the Ø assembly mark on the lock ring can pass the corresponding mark on bowl body/bowl hood by more than 25 degrees. Consult your AL representative.



Check at regular intervals for damage due to corrosion and/or erosion. If in doubt, consult your AL representative.

- Switch off and disconnect the power supply to the machine before starting any dismantling work.
- Never use the machine for separating a liquid that is more corrosive or has a higher density, temperature, different characteristics of the solids, etc. than that for which the machine has been purchased.  
In case of doubt, consult your AL representative.

- A separator bowl is balanced as a complete unit. Do not interchange the components of a bowl with those of any other machine, even if it is the same type. Make sure that no parts are left out at assembly.
- Follow the safety instructions concerning inflammable, toxic or corrosive process media and cleaning agents. Affix information and warning notices in prominent places.

SO 2614E

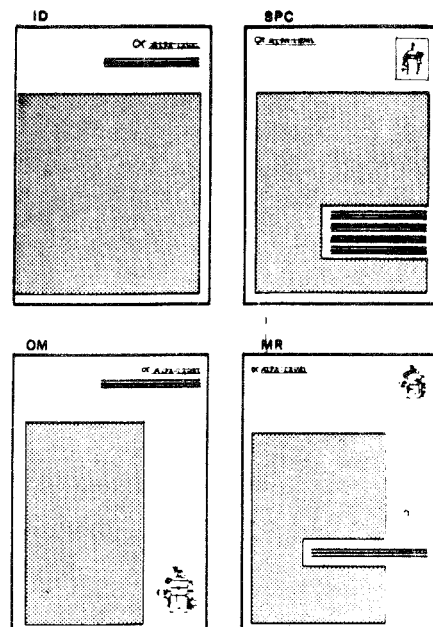
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publikationsbeteckning, maskintyp, tillverknings-  
nummer och spec. nr. eller prod. nr.

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manufacturing No., and specification- or product No.

Bei Druckschriftbestellung anzugeben:  
Bezeichnung der Druckschrift, Maschinentyp,  
Herstellungs-Nr. und Spez.-Nr. bzw. Prod.Nr.

Lors de commande des publications veuillez indiquer:  
Dénomination de la publication, Type de machine,  
Numéro de fabrication et Numéro de la spécification  
ou Numéro de production.

Al cursar pedidos de publicaciones sírvanse indicar:  
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número de fabricación y n.º. de especific. ó n.º. de prod.



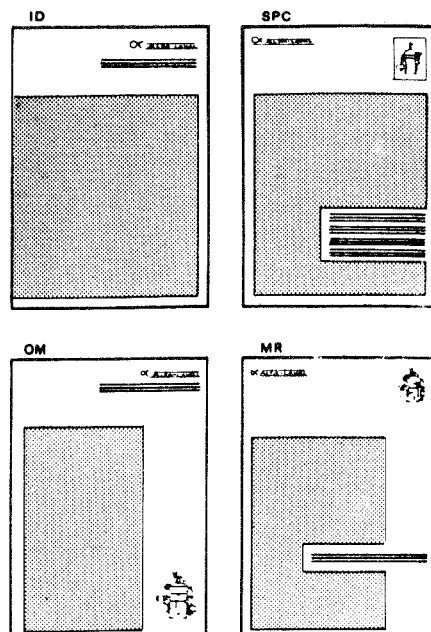
Publikation	Innehåll	Avsedd för
<b>ID</b> Installationsdata	Installation, måttuppgifter, tekniska data	Projektingenjörer. Konstruktörer. Installatörer. Driftsingenjörer
<b>OM</b> Driftsinstruktion	Körning och daglig skötsel	Maskinskötare
<b>SPC</b> Reservdelskatalog	Illustrerad reservdelsförteckning	Servicepersonal. Inköp
<b>MR</b> Underhållsbok	Översynsschema, demontering, montering, inställningsmått, reparation	Servicepersonal
Manual	Contents	Intended for
<b>ID</b> Installation Data	Installation, measurements, technical data	Project engineers, Design engineers. Fitters, Production engineers
<b>OM</b> Operator's Manual	Operation and daily maintenance	Machine operator
<b>SPC</b> Spare Parts Catalogue	Spare parts lists	Service personnel, Purchasing dept.
<b>MR</b> Maintenance	Maintenance schedule, disassembly, assembly, adjusting measurements, repair	Service personnel
Druckschrift	Inhalt	Beabsichtigt für
<b>ID</b> Installationsdaten	Installation, Massangaben, technische Daten	Planungsingenieure, Konstrukteure. Installateure, Betriebsingenieure
<b>OM</b> Betriebsanleitung	Betrieb, tägliche Wartung	Maschinenwärter
<b>SPC</b> Ersatzteilkatalog	Ersatzteilverzeichnis	Bedienungspersonal, Einkäufer
<b>MR</b> Wartung	Wartungsschema, Zerlegung, Zusammenbau, Einstellungsmasse, Instandsetzung	Bedienungspersonal
Publication	Contenu	Destiné aux
<b>ID</b> Particularités de l'installation	Installation, mesures, particularités techniques	Ingénieurs projecteurs. Constructeurs. Installateurs. Ingénieurs de service
<b>OM</b> Instructions pour le fonctionnement	Opération et maintien quotidien	Opérateurs de machine
<b>SPC</b> Liste de pièces de rechange	Listes de pièces de rechange	Personnel d'entretien. Service d'achats
<b>MR</b> Entretien	Schema de revision, démontage, assemblage, mesures de réglage, reparation	Personnel d'entretien
Publicacion	Contenido	Prevista para
<b>ID</b> Datos para instalación	Instalación, dimensiones, características técnicas	Ingenieros y proyectistas. Instaladores. Ingenieros de servicio
<b>OM</b> Instrucciones de funcionamiento	Funcionamiento y mantenimiento diario	Operarios de las máquinas
<b>SPC</b> Catálogo de piezas de recambio	Lista de piezas de recambio ilustrada	Personal de servicio. Sección de compras
<b>MR</b> Mantenimiento	Esquema de supervisión, desmontaje, montaje, dimensiones de ajuste, reparación	Personal de servicio

При заказе инструкции следует указать:  
название инструкции, тип машины, заводской номер и номер спецификации или производственный номер.

All'ordinazione delle pubblicazioni, si prega di indicarse:  
nome della pubblicazione, tipo di macchina, numero di fabbricazione e numero di specifica o numero di produzione.

Ao encomendar folhetos queira indicar:  
a denominação da publicação, tipo de máquina, número de fabrico e número de especificação ou número de produção.

Julkaisuja tilatessasi ilmoita:  
julkaisun nimitys, konetyyppi, valmistusnumero ja erittelynumero tai tuotenumero.



Инструкция	Содержание	Предназначена для:
<b>ID</b> Данные по монтажу	Монтаж, измерения, тех. данные	Инж.-проектировщиков, конструкторов, наладчиков, инж.-технологов
<b>OM</b> Инструкции для оператора	Обслуживание и ежедневный уход	Операторов
<b>SPC</b> Каталог запасных частей	Перечни запчастей	Обслуживающего персонала, отдела закупок
<b>MR</b> уход	График ухода, демонтаж, сборка, регулировочные измерения, ремонт	Обслуживающего персонала
Publicazione	Contenuto	Ad uso di
<b>ID</b> Dati di installazione	Installazione, misure, dati tecnici	Tecnici progettisti e costruttori, montatori, tecnici di servizio
<b>OM</b> Istruzioni d'impiego	Impiego e manutenzione giornaliera	Operatori macchina
<b>SPC</b> Catalogo parti di ricambio	Elenchi parti di ricambio	Personale di manutenzione. Ufficio acquisti
<b>MR</b> Manutenzione	Schema di revisione, smontaggio, montaggio, dati di registrazione, riparazione	Personale di manutenzione
Publicação	Conteúdo	Destinada a
<b>ID</b> Dados da instalação	Instalação, medidas, dados técnicos	Engenheiros de projectos. Construtores. Instaladores. Engenheiros de serviço
<b>OM</b> Instruções sobre o funcionamento	Funcionamento e cuidados cotidianos	Operador de máquinas
<b>SPC</b> Catálogo de peças sobressalentes	Lista ilustrada de peças sobressalentes	Pessoal de assistência. Secção de compras.
<b>MR</b> Manutenção	Esquema de revisão, desmontagem, montagem, medidas de ajuste, reparações	Pessoal de assistência
Julkaisu	Sisältö	Tarkoitettu
<b>ID</b> Asennusarvot	Asennus, mittatiedot, tekniset tiedot	Projekti-insinööreille. Suunnittelijoille. Asentajille. Käyttöinsinööreille.
<b>OM</b> Käyttöohjeet	Ajo ja päivittäinen huolto	Konehoitajille.
<b>SPC</b> Varosaluettelo	Kuvitettu varaosaluettelo	Huoltohenkilökunnalle. Sisäänostajille.
<b>MR</b> Huoltokirja	Huoltokaavio, purku, kasaaminen, säätömitat, korjaaminen	Huoltohenkilökunnalle

**WHY PREVENTIVE MAINTENANCE?**



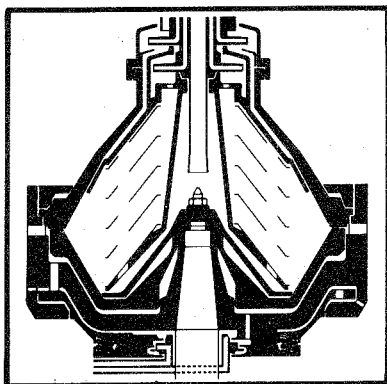
A centrifugal separator is capable of generating great forces in all directions and is subject to the law of centrifugal force.

The separator, like anything else, is subject to wear. Corrosion, erosion and just ordinary wear due to operation, all take their toll.

To continue safe and efficient operation, certain parts will by and by require replacement. Proper maintenance and operation will prolong parts life, and proper inspection will warn you when replacement is necessary.

- If the parts of the machine are worn, eroded, or improperly assembled, the forces generated may cause machine breakdown and injury to personnel.

**MAJOR BOWL PARTS**

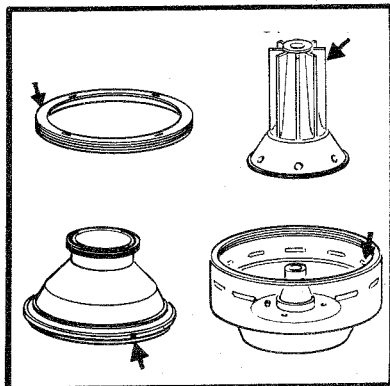


**Balancing**

ALFA-LAVAL separator bowls are statically and dynamically factory-balanced only as **complete** bowl assemblies.

- Therefore, major bowl parts cannot be replaced without re-balancing the **entire** bowl.

Bowl parts must never be interchanged from one machine to another. This is just as imperative where machines of the same or a similar type are concerned. The bowl parts of each machine are stamped with the machine manufacturing number or the last three digits of that number.

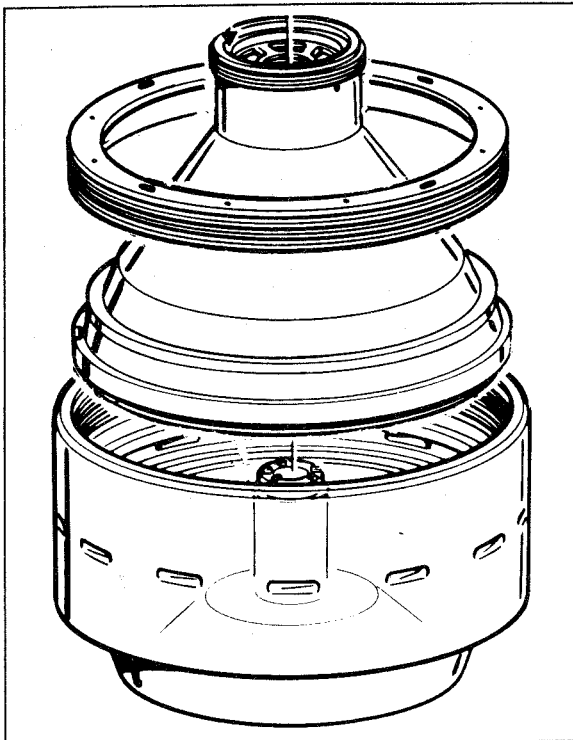


**Locating means**

The bowl parts are assembled in a certain relative position to each other. Alignment marks, guide pins and lugs are provided on major parts and must be undamaged and legible.

- Never operate the machine when these locating means are not in the proper relative position, or are illegible.

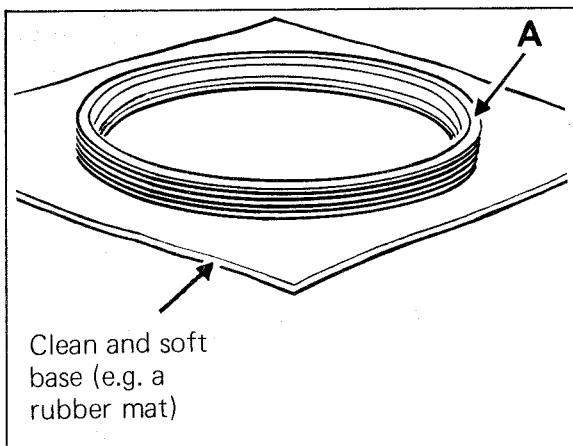
(Major Bowl Parts)



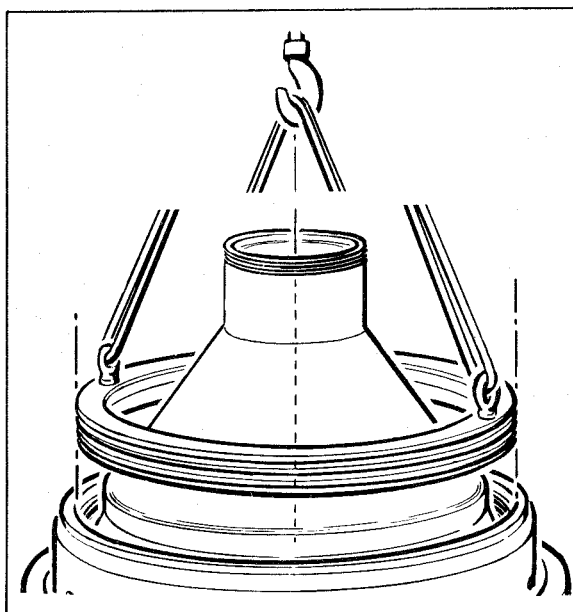
### Handling

Great forces are generated when a separator bowl rotates. Its parts must, therefore, be high-precision-made to ensure perfect relative fit. The size of the bowl parts may easily give the impression that they need not be handled with the care that is, in fact, essential where precision-made articles are concerned. Any carelessness in this respect will very likely result in seizure damage.

Besides, the risk of seizure will increase when two or more parts in contact with each other are made of stainless steel and not properly lubricated.



Handle all bowl parts very gently. Always put them on a **clean** and **soft** base. By way of example, the contact surface (A) of a lock ring provided with external thread should never rest on a dirty base. Scratches and dirt particles on contact and guiding surfaces as well as on threads must be avoided.

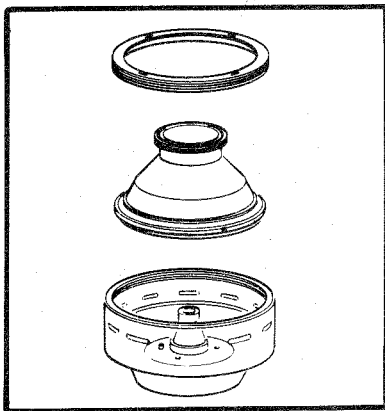


Use the lock ring lifting tools, if any. Even when the ring can be lifted by hand it may be difficult to put it gently on the bowl body. Denting may be the result if the ring thuds against the bowl body.

Align the hoisting device very exactly when assembling and disassembling. **Never** use a hoist that works jerkily.



**CORROSION**



- Corrosive attacks on bowl parts and particularly bowl body, bowl hood and lock ring should be watched with the utmost care.

**Parts of non-stainless steel and cast-iron**

Corrosion (rusting) occurs as a rule on unprotected components of non-stainless steel and cast-iron forming part of the bowl, bowl spindle and frame and exposed to the process liquid or aggressive atmosphere.

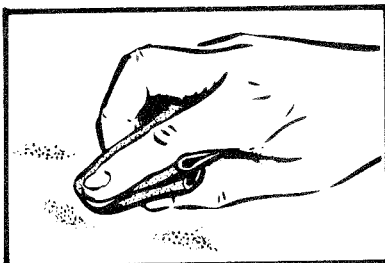
**Replace** the parts when corrosion is evidently jeopardizing their strength, relative location and play, or general function.

**Parts of stainless steel etc.**

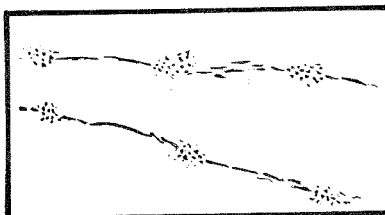
In certain circumstances corrosion can occur even on stainless bowl parts. The risk of attack will increase when the surface is isolated from the surroundings by a layer of solids.



Corrosion attacks on stainless steel are not easily detected. This applies for instance to attacks made by chlorides. Such attacks may begin merely as small dark spots.



- **Polish** such dark spots with a fine-grain abrasive cloth. In some cases this will prevent further attacks.



- Under special conditions corrosion on stainless steel can result in deeper attacks, so-called pits, to which special attention should be given.

Pits lying closely together or forming a regular pattern such as a straight or curved line may indicate that cracking has begun beneath the surface of the material. Such pits should be examined by an expert on materials and checked by means of crack-indicating agents – consult our representative.

- Always watch carefully any corrosion attacks found on stainless steel. Record the observations.
- In unfavourable circumstances even components of copper alloy and light metal etc. may become susceptible to corrosion and should, therefore, be kept under observation.

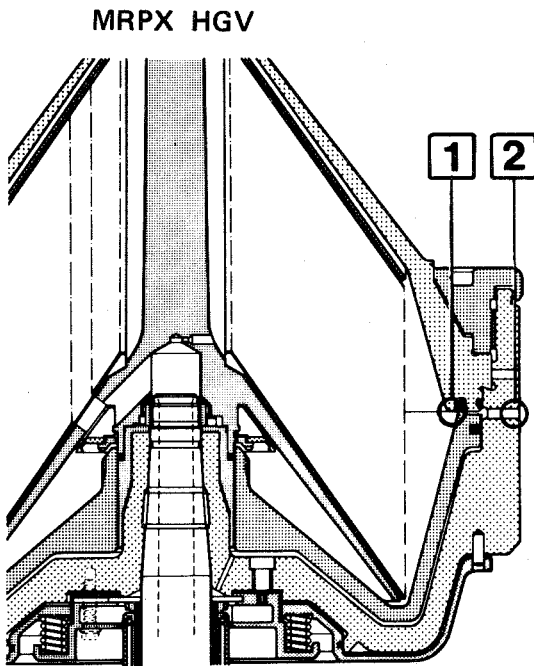
EROSION

Erosion can occur for instance when particles suspended in the process liquid slide along a surface or strike against a surface while passing through the bowl.

Erosion is characterized, in the former case by burnished traces in the material, and in the latter case by dents and pits with a granular and shiny surface.

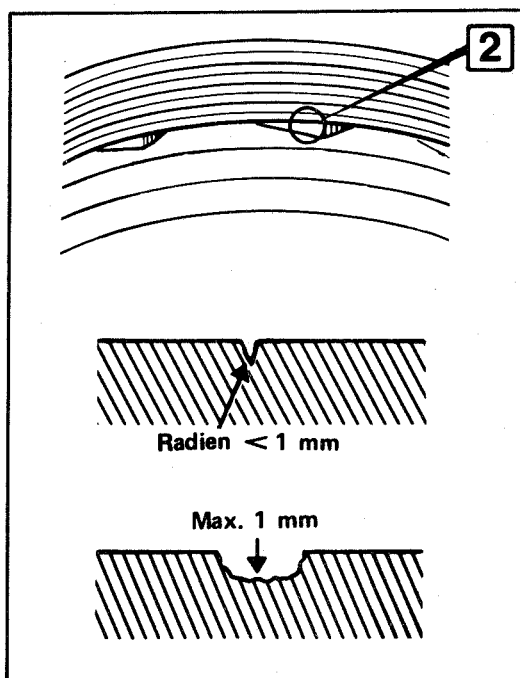
Erosion is intensified in some places by locally high flow rates.

**Always observe carefully any signs of erosion damage.** It may deepen rapidly and weaken the bowl parts by reducing metal thickness.



Surfaces subjected to erosion are, by way of example,

- 1 the sealing edge of the sliding bowl bottom, and the seal ring in the bowl hood.
- 2 the bowl wall portions ("pillars") between the sediment ports in the bowl body.

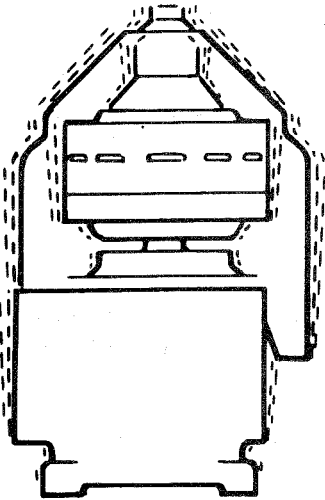


If one or more of the following observations are made on the said bowl wall portions (2), consult our representative:

- o that the bottom radius of the erosion trace is less than 1 mm in the narrowest place, or that coarse scratches are present,
- o that the largest depth of the trace exceeds 1 mm,
- o that defects presumably caused by corrosion are present.

Valuable information on the nature of the damage can be given by photos, plaster impressions, and hammered-in lead.

VIBRATION

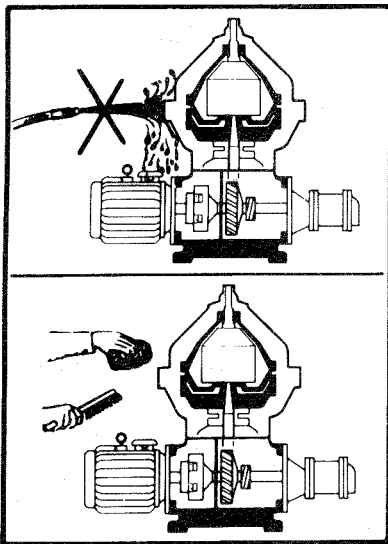


Abnormal vibration or noises are clues that something is wrong. **Stop the machine and look for the cause.**

If vibration analyzing equipment is available, use this equipment to periodically check and record the magnitude of vibration.

CLEANING

- When using chemical cleaning agents observe general rules and supplier's recommendations as to ventilation, personal protection etc.

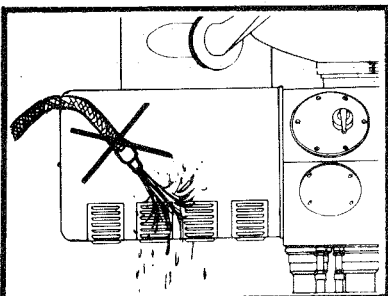


Frame/motor

Never wash down a separator with a direct water stream. **Totally enclosed** motors can be damaged by direct hosing to the same extent as **open** motors and even more than those, because:

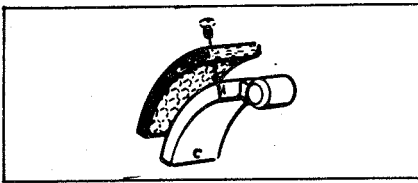
1. many operators believe that these motors are sealed, and normally they are not.
2. a water jet played on these motors will produce an internal vacuum, which will suck the water between the metal-to-metal contact surfaces into the windings, and this water cannot escape.
3. water directed on a hot motor may cause condensation, and subsequently produce grounding and internal corrosion.

The external cleaning of the machine should be restricted to brushing sponging or wiping while the motor is running or is still hot.



Be careful even when the motor is equipped with a protecting hood. Never play a water jet on the ventilation grill of the hood.

(Cleaning)



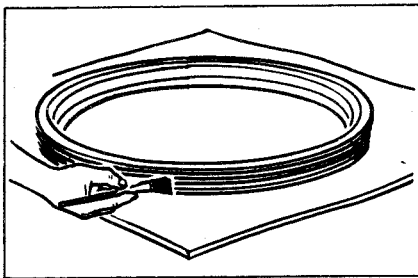
**Coupling Pads and Brake Lining**

To degrease pads or lining and the corresponding friction surfaces use a suitable degreasing agent.

**Other Parts**

Use white spirit, cleaning kerosene or an other solvent with equivalent properties.

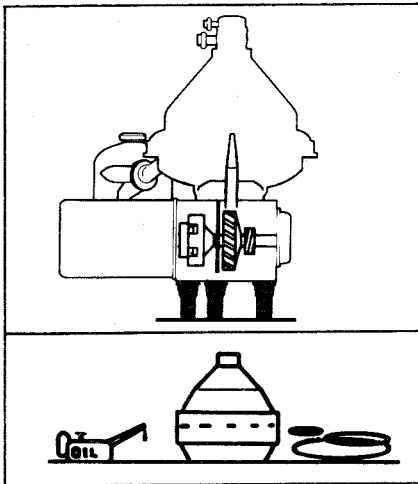
**LUBRICATION**



Wipe and oil all parts after cleaning. Protect the parts against dust and dirt when not to be mounted at once.

**Follow strictly the lubrication instructions given for the bowl lock ring joint.**

**SHUT-DOWNS**



If the machine is shut down for some time, the bowl should not be left on the spindle, and its O-rings should be removed.

**BEFORE STARTING THE OVERHAUL**

**TROUBLE TRACING**  
(Mechanical - Function - Assembly - Adjustment - Operation and Control - Safety)

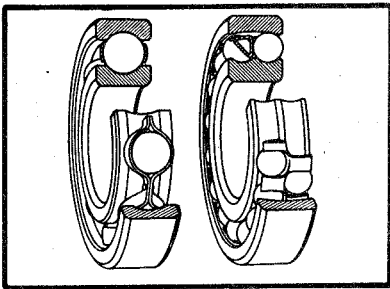
Problem	Mechanical	Function	Assembly	Adjustment	Operation and Control	Safety	Other	Remedy
Normal operation								None
Overheating								Check for excessive wear, check for correct oil level, check for correct speed, check for correct load.
Excessive vibration								Check for loose parts, check for correct alignment, check for correct speed.
Excessive noise								Check for loose parts, check for correct alignment, check for correct speed.
Excessive wear								Check for correct speed, check for correct load, check for correct oil level.
Excessive oil consumption								Check for correct oil level, check for correct speed, check for correct load.
Excessive power consumption								Check for correct speed, check for correct load, check for correct oil level.
Excessive heat								Check for correct speed, check for correct load, check for correct oil level.
Excessive dust								Check for correct speed, check for correct load, check for correct oil level.
Excessive sparks								Check for correct speed, check for correct load, check for correct oil level.
Excessive smoke								Check for correct speed, check for correct load, check for correct oil level.
Excessive fumes								Check for correct speed, check for correct load, check for correct oil level.
Excessive noise								Check for loose parts, check for correct alignment, check for correct speed.
Excessive vibration								Check for loose parts, check for correct alignment, check for correct speed.
Excessive wear								Check for correct speed, check for correct load, check for correct oil level.
Excessive oil consumption								Check for correct oil level, check for correct speed, check for correct load.
Excessive power consumption								Check for correct speed, check for correct load, check for correct oil level.
Excessive heat								Check for correct speed, check for correct load, check for correct oil level.
Excessive dust								Check for correct speed, check for correct load, check for correct oil level.
Excessive sparks								Check for correct speed, check for correct load, check for correct oil level.
Excessive smoke								Check for correct speed, check for correct load, check for correct oil level.
Excessive fumes								Check for correct speed, check for correct load, check for correct oil level.

Try to form a conception of the machine action. The observations may be very useful when you have to decide whether a part should be replaced.

- o Note visible leakage.
- o Initiate some ejections and check the ejecting function.

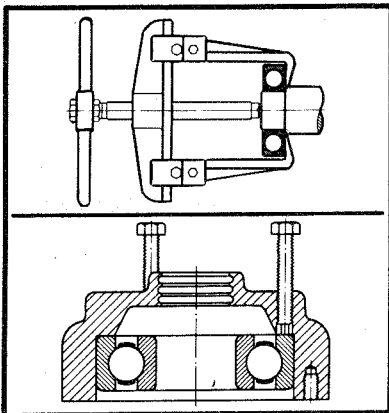
- o Note symptoms which you regard as differing from normal machine running. The trouble tracing schedules included in Operator's Manual "OM" may be of some help. However, the working experience gained from similar estimations will be the best aid.

**BALL BEARINGS. ROLLER BEARINGS**



Use the greatest cleanliness when handling roller bearings.

**Avoid unnecessary dismounting of bearings. They may suffer damage, or impurities may get into them during the handling.**

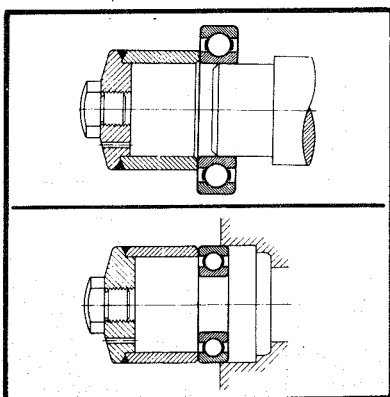


**Dismounting**

Detach the bearing from its seat by pressing against the race having the tightest fit. Use a puller or special tool. Thus, apply the pressure to the inner race when the bearing sits tightly on the shaft, and to the outer race when the bearing is tightly fitted in the housing respectively.

Arrange dismounted bearings and other parts in assembling order to avoid confusion.

Check the shaft end and the bearing seat in the housing for damage indicating that the bearing has rotated on the shaft, and in the housing respectively. Replace the damaged part, if the faults cannot be remedied by polishing or in some other way.

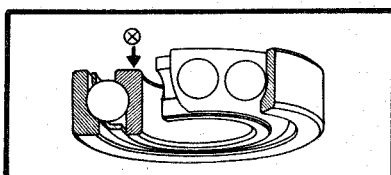


**Fitting**

Leave new bearings in original wrapping until ready to fit. The anti-rust agent protecting a new bearing need not be removed.

Fit a bearing on a shaft by pressure applied to the inner race and in a housing by pressure applied to the outer race. Use a suitable piece of pipe or a metal drift and a hammer. Never strike the bearing directly.

Bearings sitting with tight fit on a shaft should be heated in oil before assembly. The oil temperature should not exceed 100 °C. Never leave the bearing in the oil bath longer than required for thorough heating.



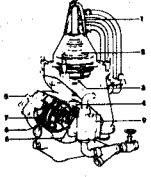
**Angular contact ball bearings**

Always fit single-row angular contact ball bearings with the stamped side of the inner race facing the axial load.

**MAINTENANCE SCHEDULE**

**MAINTENANCE SCHEDULE**  
 - Model No. 1681E

**PERIODICAL INSPECTION** The time intervals listed in this schedule are based on normal use, which may be adjusted to local conditions and conditions of use. A complete overhaul must be performed at least every two years.



ACTION	EXECUTION EVERY			
	100	500	1000	2000
<b>1. INLET OUTLET</b>				
Check for:				
• the presence of debris and objects that can be sucked in.				
• the air pressure (0.2 - 0.5 atm)				
• the oil level				
<b>2. BELT</b>				
Cleaning of steel discs and other parts in contact with debris.				
Check:				
• the tension of the belt				
• the condition of the belt				
• the condition of the pulleys				
• the condition of the bearings				
• the condition of the rollers				
• the condition of the rollers				
• the condition of the rollers				
• the condition of the rollers				
• the condition of the rollers				
• the condition of the rollers				
• the condition of the rollers				
• the condition of the rollers				
• the condition of the rollers				

To facilitate systematic service, we have made up a maintenance schedule. The schedule specifies the various condition checks to be performed after certain periods of operation — see page 2:2.

**MAINTENANCE LOG**

**OX ALFA-LAVAL**      **UNDERHÅLLSDIARIAL**  
**Model No. 1681E**      **Modell No. 1681E**

Uppdragsnr: \_\_\_\_\_      Datum: \_\_\_\_\_

Plats: \_\_\_\_\_

**VÅRIS RÄDÅ**      \* Användning i en fast installation av typen \_\_\_\_\_

Utslag (Går, Stopp): \_\_\_\_\_

Ja, ja, ja      \* Se till att alla delar är i god skick och fungerar som de ska.

**VÅRIS RÄDÅ för 1000 timmar**

Utslag (Går, Stopp): \_\_\_\_\_

Ja, ja, ja      \* Se till att alla delar är i god skick och fungerar som de ska.

**ÄNDRINGAR och ÖVRETTN. VID ARBETE TILLFÄLLE**

Arbetsbeskrivning	Utförd av	Datum	Utförd av	Datum
1. Rengöring av gylor, rengöring av skivorna och skivorna				
2. Skrivning av skivorna på gylor				
3. Rengöring av skivorna				
4. Rengöring av skivorna				
5. Rengöring av skivorna				
6. Rengöring av skivorna				
7. Rengöring av skivorna				
8. Rengöring av skivorna				
9. Rengöring av skivorna				
10. Rengöring av skivorna				
11. Rengöring av skivorna				
12. Rengöring av skivorna				
13. Rengöring av skivorna				
14. Rengöring av skivorna				
15. Rengöring av skivorna				
16. Rengöring av skivorna				
17. Rengöring av skivorna				
18. Rengöring av skivorna				
19. Rengöring av skivorna				
20. Rengöring av skivorna				

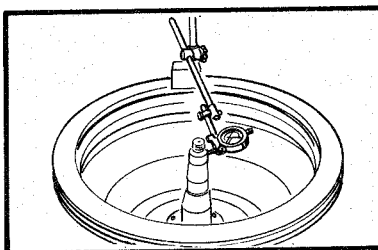
\* Användning: A - Vanligt, B - Järn, C - Fast, D - Fast, E - Fast, F - Fast, G - Fast, H - Fast, I - Fast, J - Fast, K - Fast, L - Fast, M - Fast, N - Fast, O - Fast, P - Fast, Q - Fast, R - Fast, S - Fast, T - Fast, U - Fast, V - Fast, W - Fast, X - Fast, Y - Fast, Z - Fast.

Keep a log of inspection and maintenance performed. Parts continually replaced should be given special consideration. The cause of repeated failures should be determined and corrected. Discuss your problems with our representative and, when necessary, request a visit.

Rate of corrosion and erosion should also be a part of this log. Note the extent of wear and date the log entries so that the rate of deterioration can be observed.

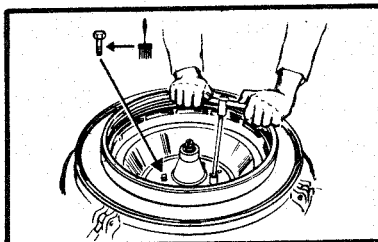
An example of a Maintenance Log with entries is found on page 2:6. Copies of the log are annexed at the end of this manual and can thus be used in your maintenance routine, if found compliant with local requirements.

**CHECKPOINTS**



How to perform the various condition checks is explained under »Checkpoints» — see page 3:1.

**DISASSEMBLY ASSEMBLY**

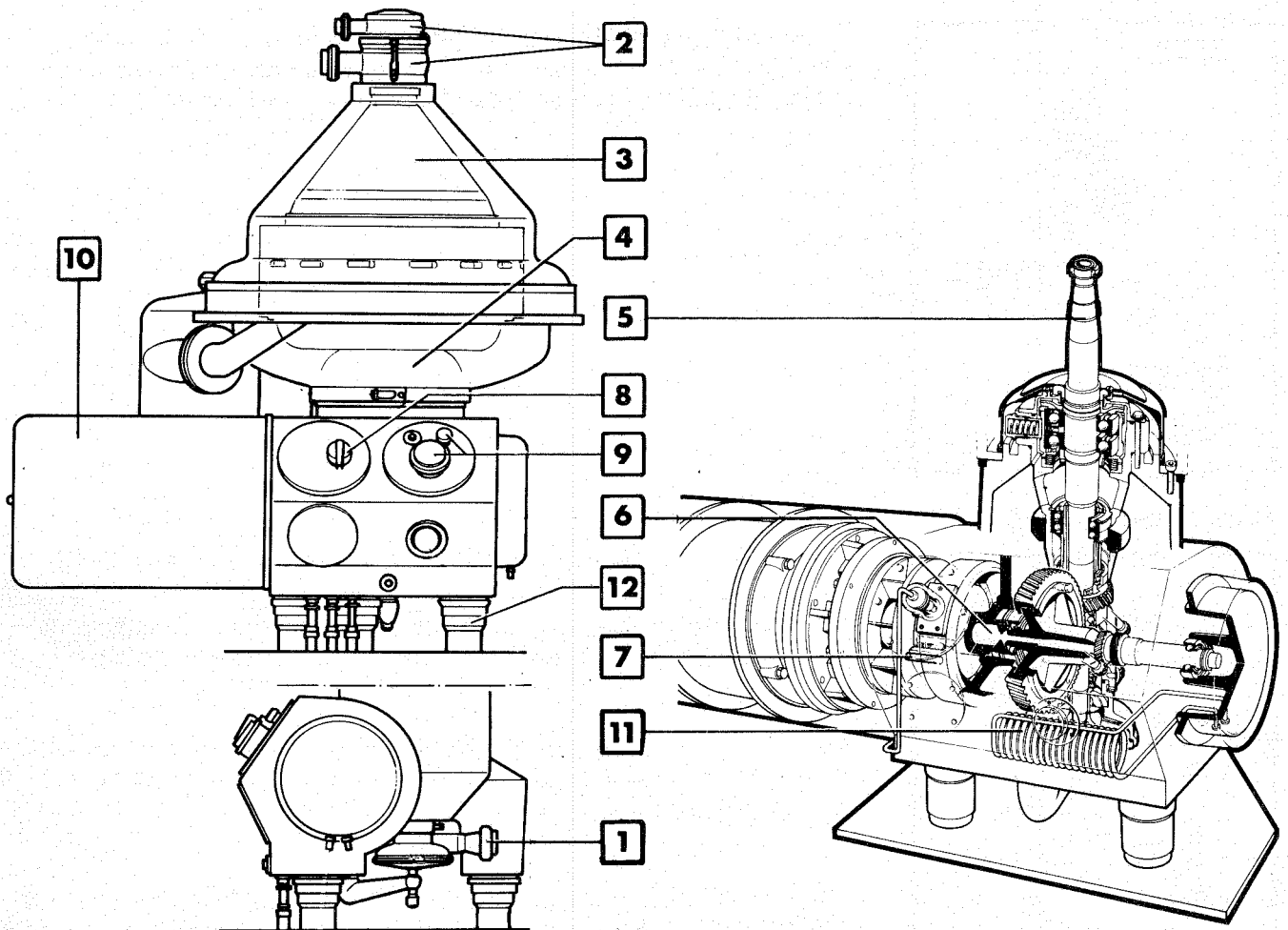


The identically named chapter beginning on page 4:1 describes how to disassemble and assemble the machine in the correct order by means of the proper tools.

- The chapter also indicates, at which stages of disassembly and assembly the various checks should be performed.

**PERIODICAL INSPECTION**

The time intervals stated in the schedule are guiding values, which can be adapted to local experience and conditions.



ACTION	See page	EXECUTION EVERY			
		750 h	1500 h	3000 h	9000 h
<b>1.2. INLET. OUTLET</b>					
o Cleaning of cooling water ducts and nozzles	3:1	x	(x)	(x)	(x)
o Check on cooling water flow rate: 15 - 30 lit/h per seal	—	x	(x)	(x)	(x)
Checking of:					
o impellers, threads	—	x	(x)	(x)	(x)
o seal rings, gaskets	—	x	(x)	(x)	(x)
o axial seals: rubber bellows with carbon ring, and wear ring	3:1	x	(x)	(x)	(x)
o washing efficiency	—	x	(x)	(x)	(x)
o Radial wobble of the outlet sleeve and guide sleeve (max. 0.3 mm)	3:2a	x			
o Excentricity of the outlet sleeve and guide sleeve (max. play 4 mm)	3:2b	x			
Replacement of:					
o rubber bellows with carbon ring	—		x	(x)	(x)
o wear ring	—			x	(x)
Checking of:					
o Height position — inlet = $14 \pm 0.3$ and $35 \pm 0.5$ mm; outlet MRPX 314 = $0 \pm 0.5$ mm; MRPX 318/418 = $3 \pm 0.5$ mm	3:20			x	(x)

**MAINTENANCE SCHEDULE  
MRPX 314/318/418 HGV-74C**

ACTION	See page	EXECUTION EVERY			
		750 h	1500 h	3000 h	9000 h
<b>3. BOWL</b>					
Checking of:					
o seal rings, gaskets .....	—	x	(x)	(x)	(x)
o disc set pressure .....	3:3			x	(x)
o wear of lock ring threads .....	3:4				x
o seizure damage — lock ring joint .....	3:5	x	(x)	(x)	(x)
o sealing surface sliding bowl bottom/bowl hood (nylon ring: depression max. 1 mm) .....	3:8	x	(x)	(x)	(x)
o washing efficiency .....	—	x	(x)	(x)	(x)
o erosion .....	1:9			x	(x)
o bowl body nave/bowl spindle cone .....	3:12	x	(x)	(x)	(x)
Cleaning and checking of ejection mechanism nozzles, guiding surfaces, sealing surfaces and springs .....	3:9	x	(x)	(x)	(x)
Replacement of:					
o seal ring in top disc outlet pipe .....	4:38	x	(x)	(x)	(x)
o operating slide valve plugs .....	3:11	x	(x)	(x)	(x)
<b>4. OPERATING WATER DEVICE</b>					
Checking of operating water flow rate. Cleaning of ducts .....	3:9	x	(x)	(x)	(x)
Checking of height position — MRPX 314 = 243 ± 0.5 mm, MRPX 318/418 = 224 ± 0.5 mm .....	3:20			x	(x)
<b>5. BOWL SPINDLE (vertical driving device)</b>					
Checking of:					
o radial wobble (max. 0.05 mm) .....	3:13			x	(x)
o worm (teeth) .....	3:15			x	(x)
o worm (grooves receiving driver wings: wear max. 5-6 mm) .....	3:15			x	(x)
o driver (cone and wings, wing wear max. 2 mm) .....	3:15			x	(x)
o ball bearing housing (indentations max. 0.5 mm) .....	3:14			x	(x)
o springs .....	3:14			x	(x)
o buffers .....	3:14			x	(x)
Replacement of:					
o all bearings (6) in vertical driving device .....	—			x	(x)
o seal rings, gaskets .....	—			x	(x)
<b>6. WORM WHEEL SHAFT (horizontal driving device)</b>					
Checking of:					
o worm wheel shaft (contact corrosion) .....	—			x	(x)
o worm wheel (teeth) .....	3:15			x	(x)
o worm wheel (gear rim screws; tightening torque 4 Kpm) .....	4:29			x	(x)
o bearings (two) .....	—			x	(x)
o sealing washer — frame facing coupling chamber .....	4:18			x	(x)
Replacement of:					
o bearings (two) .....	—				x
<b>7 COUPLING</b>					
Replacement of:					
o elastic plates (two) .....	3:17			x	(x)
Checking of:					
o axial play of elastic plates (2-5 mm) .....	3:17			x	(x)



**MAINTENANCE SCHEDULE  
MRPX 314/318/418 HGV-74C**

ACTION	See page	EXECUTION EVERY			
		750 h	1500 h	3000 h	9000 h
<b>3. BOWL</b>					
Checking of:					
o seal rings, gaskets .....	—	x	(x)	(x)	(x)
o disc set pressure .....	3:3			x	(x)
o wear of lock ring threads .....	3:4				x
o seizure damage — lock ring joint .....	3:5	x	(x)	(x)	(x)
o sealing surface sliding bowl bottom/bowl hood (nylon ring: depression max. 1 mm) .....	3:8	x	(x)	(x)	(x)
o washing efficiency .....	—	x	(x)	(x)	(x)
o erosion .....	1:9			x	(x)
o bowl body nave/bowl spindle cone .....	3:12	x	(x)	(x)	(x)
Cleaning and checking of ejection mechanism nozzles, guiding surfaces, sealing surfaces and springs .....	3:9	x	(x)	(x)	(x)
Replacement of:					
o seal ring in top disc outlet pipe .....	4:38	x	(x)	(x)	(x)
o operating slide valve plugs .....	3:11	x	(x)	(x)	(x)
<b>4. OPERATING WATER DEVICE</b>					
Checking of operating water flow rate. Cleaning of ducts .....	3:9	x	(x)	(x)	(x)
Checking of height position — MRPX 314 = 243 ± 0.5 mm, MRPX 318/418 = 224 ± 0.5 mm .....	3:20			x	(x)
<b>5. BOWL SPINDLE (vertical driving device)</b>					
Checking of:					
o radial wobble (max. 0.05 mm) .....	3:13			x	(x)
o worm (teeth) .....	3:15			x	(x)
o worm (grooves receiving driver wings: wear max. 5-6 mm) .....	3:15			x	(x)
o driver (cone and wings, wing wear max. 2 mm) .....	3:15			x	(x)
o ball bearing housing (indentations max. 0.5 mm) .....	3:14			x	(x)
o springs .....	3:14			x	(x)
o buffers .....	3:14			x	(x)
Replacement of:					
o all bearings (6) in vertical driving device .....	—			x	(x)
o seal rings, gaskets .....	—			x	(x)
<b>6. WORM WHEEL SHAFT (horizontal driving device)</b>					
Checking of:					
o worm wheel shaft (contact corrosion) .....	—			x	(x)
o worm wheel (teeth) .....	3:15			x	(x)
o worm wheel (gear rim screws; tightening torque 4 Kpm) .....	4:29			x	(x)
o bearings (two) .....	—			x	(x)
o sealing washer — frame facing coupling chamber .....	4:18			x	(x)
Replacement of:					
o bearings (two) .....	—				x
<b>7 COUPLING</b>					
Replacement of:					
o elastic plates (two) .....	3:17			x	(x)
Checking of:					
o axial play of elastic plates (2-5 mm) .....	3:17			x	(x)

**MAINTENANCE SCHEDULE  
MRPX 314/318/418 HGV-74C**

ACTION	See page	EXECUTION EVERY			
		750 h	1500 h	3000 h	9000 h
<b>8. BRAKE</b>					
Checking of:					
o lining (min. 2 mm to screw heads) . . . . .	3:18			x	(x)
o brake shoe . . . . .	3:18			x	(x)
o piston and cylinder (refers to pneumatic brake)	3:18			x	(x)
<b>9. TACHOMETER</b>					
Checking of:					
o functioning and protective glass of tachometer . . . . .	3:19			x	(x)
o play between transmitter and gear (1.5 - 2.5 mm) – only for remote indication and if transmitter has been dislocated . . . . .	3:19			x	(x)
<b>10. MOTOR</b>					
o Insulation test of motor . . . . .	3:19			x	(x)
o Lubrication of motor . . . . .	—			x	(x)
<b>11. WORM GEAR HOUSING</b>					
o Checking of cooling water flow rate: 100 lit/h approx. . . . .	—			x	(x)
o Oil change in worm gear housing every 1000 hours of operation – see also Lubrication Schedule in Operator's Manual "OM".					
Note: In a new installation or after replacement of gearing, change the oil after 300 hours of operation.					
o Checking of worm and worm wheel in connection with oil change . . . . .	3:15				
<b>12. FOUNDATION FEET</b>					
o Check that set screws of the feet are tightened . . . . .	—			x	(x)

*Example*

Place of operation <i>KYZ</i>		Machine type <i>MRPX 314 HGV-74C</i>	
Manufac. No. <i>2222223</i>	Process <i>Clarification and Skimming of hot milk</i>	Time for job: at a total of <i>6.750</i> operating hours	Job actually done after <i>6.800</i> operating hours
Reason for job		Other reason	
Preventive <input checked="" type="checkbox"/> 750 <input type="checkbox"/> 1500 <input type="checkbox"/> 3000 <input type="checkbox"/> 9000			
Job ordered by: <i>P. N. v.</i>	Date <i>3/4 - 78</i>	Job done by: <i>P. J. M.</i>	Date <i>10/4 - 78</i>

ACTION	EXECUTION EVERY			
	750 h	1500 h	3000 h	9000 h
<b>1.2. INLET. OUTLET</b>				
o Cleaning of cooling water ducts and nozzles	x✓	(x)	(x)	(x)
o Check on cooling water flow rate: 15 - 30 lit/h per seal	x✓	(x)	(x)	(x)
Checking of:				
o impellers. threads	x✓	(x)	(x)	(x)
o seal rings, gaskets	x✓	(x)	(x)	(x)
o axial seals: rubber bellows with carbon ring, and wear ring	⊙1	(x)	(x)	(x)
o washing efficiency	x✓	(x)	(x)	(x)
o Radial wobble of the outlet sleeve and guide sleeve (max. 0.3 mm)	x✓			
o Excentricity of the outlet sleeve and guide sleeve (max. play 4 mm)	x✓			
Replacement of:				
o rubber bellows with carbon ring		x	(x)	(x)
o wear ring			x	(x)
Checking of:				
o Height position — inlet = 14 ± 0.3 and 35 ± 0.5 mm; outlet MRPX 314 = 0 ± 0.5 mm; MRPX 318/418 = 3 ± 0.5 mm			x	(x)
<b>3. BOWL</b>				
Checking of:				
o seal rings, gaskets	⊙2	(x)	(x)	(x)
o disc set pressure			x	(x)
o wear of lock ring threads				x
o seizure damage — lock ring joint	x✓	(x)	(x)	(x)
o sealing surface sliding bowl bottom/bowl hood (nylon ring: depression max. 1 mm)	x✓	(x)	(x)	(x)
o washing efficiency	x✓	(x)	(x)	(x)
o erosion			x	(x)
o bowl body nave/bowl spindle cone	x✓	(x)	(x)	(x)
Cleaning and checking of ejection mechanism nozzles, guiding surfaces, sealing surfaces and springs	x✓	(x)	(x)	(x)
Replacement of:				
o seal ring in top disc outlet pipe	⊙3	(x)	(x)	(x)
o operating slide valve plugs	⊙4	(x)	(x)	(x)
<b>4. OPERATING WATER DEVICE</b>				
Checking of operating water flow rate. Cleaning of ducts	x✓	(x)	(x)	(x)
Checking of height position — MRPX 314 = 243 ± 0.5 mm, MRPX 318/418 = 224 ± 0.5 mm			x	(x)

Notes:

Example →

Note 1. Inlet carbon ring polished with abrasive cloth. Wear ring approved.

Note 2. Seal ring between sliding bowl bottom and bowl body more defective.

Ring replaced.

Note 3. Seal ring replaced.

Note 4. Valve plugs replaced.

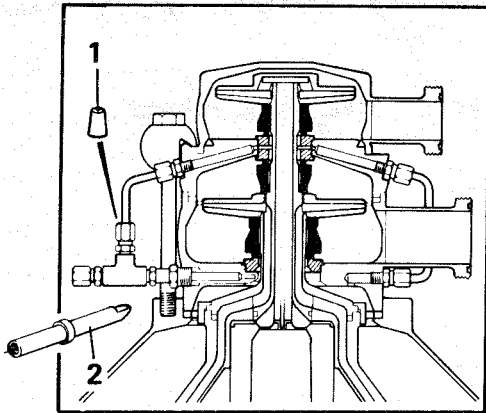
Machine test-run with water for about 1 hour. Partial and total ejections performed. No faults.

B.F.m

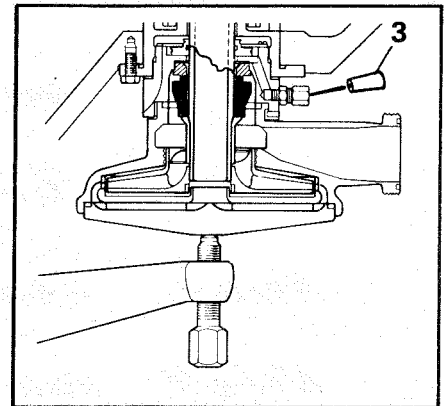
**AXIAL SEALS**

**Cooling Water Nozzles**

- o Cooling water must be fed to the seals during the starting and stopping periods. It is important, therefore, that the cooling water nozzles should not be obstructed.



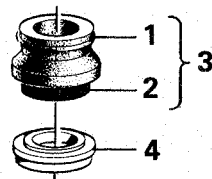
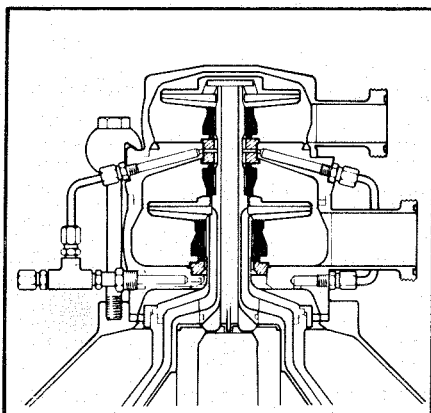
Clean nozzles (1) and (2) in the outlet and nozzle (3) in the inlet, using a nozzle cleaner (internal gauge).



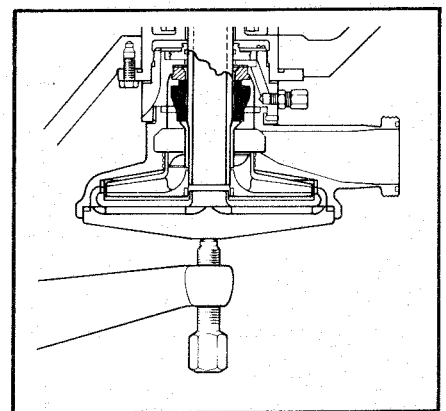
**Seals**

- o Defective axial seals will cause a leakage of process liquid from the machine.

**Note!** Even a new or repaired seal may leak a little in the beginning until broken in. Minor leakage may occur also a short time after ejection, which is, however, quite normal.



- 1 Rubber bellows (with support ring)
- 2 Carbon ring
- 3 Sealing element
- 4 Wear ring (stainless)



The sealing surfaces of carbon ring (2) and wear ring (4) must be free of deposits and defects which can give rise to leakage and exceptionally rapid wear.

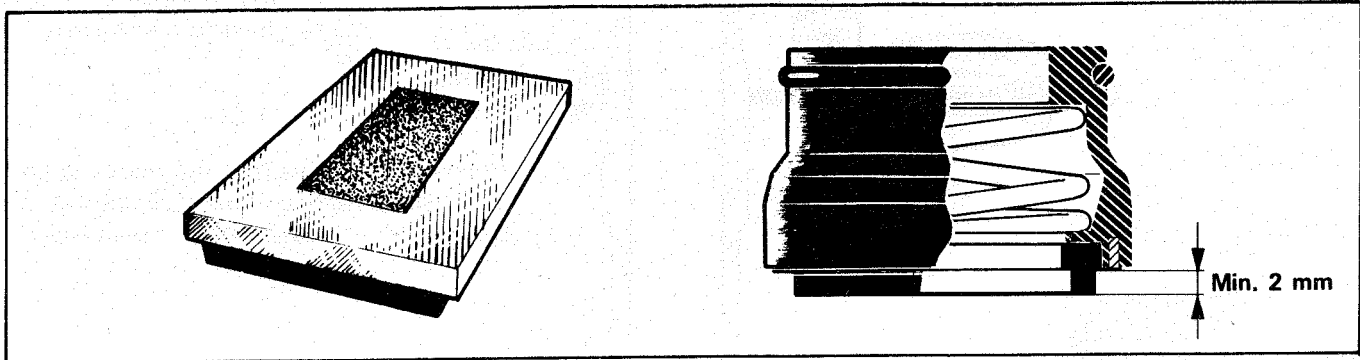
In certain cases damaged sealing surfaces can be remedied — see next page. However, for practical reasons it is best to have new or reconditioned seals available when inspecting the seals, so that

defective seals can be replaced at once when required. The old seals may then be repaired when convenient and put to use again at a later inspection.

If the carbon ring has excessive damage or fissures are present in the bellows, replace the whole sealing element (carbon ring with bellows).

(Axial Seals . . . )

**Repairing the Sealing Surface of Carbon Ring**

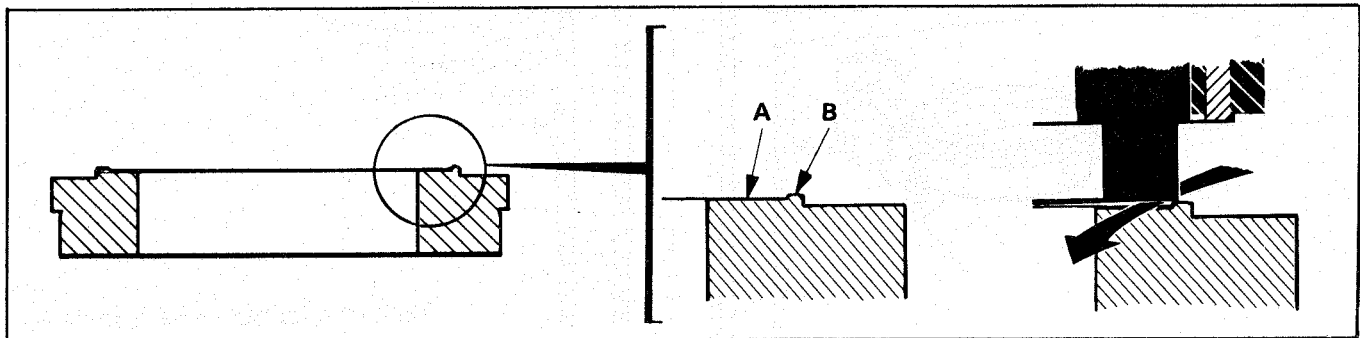


If the damage is not excessive, the sealing surface of the ring can be easily improved by polishing against an abrasive cloth (grain size 600) placed on a face plate or a high-class mirror glass.

**The sealing surface must be bright and perfectly smooth.**

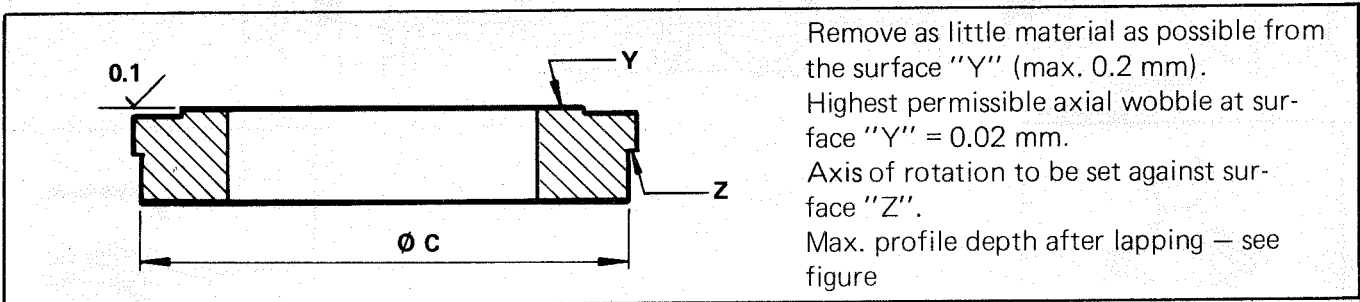
At least 2 mm of the sealing portion of the ring should remain after repair.

**Repairing the Sealing Surface of Wear ring**



Characteristic of a defective wear ring is as a rule that the working portion of the sealing surface (A) is in good condition but worn down relative to the

rest of the sealing surface (B). It can easily happen that the carbon ring comes to rest obliquely on the edge of (B), which will result in bad sealing.



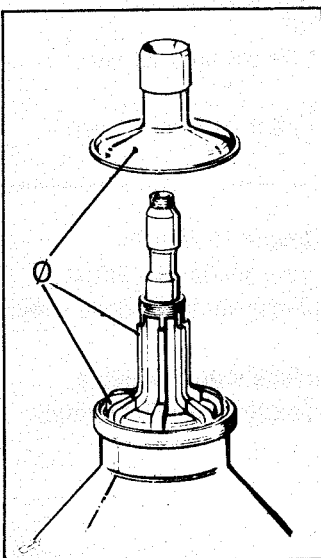
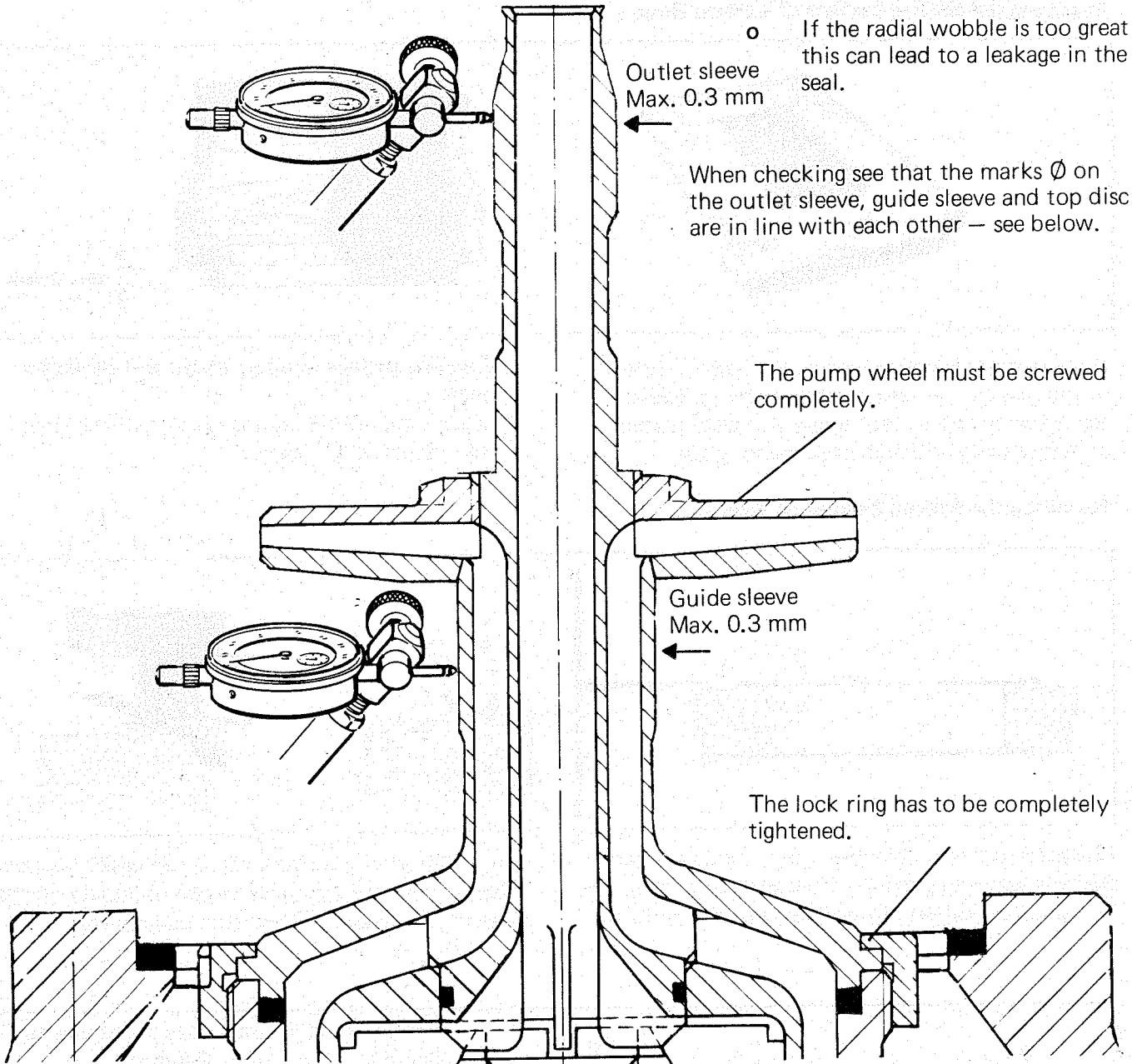
Remove as little material as possible from the surface "Y" (max. 0.2 mm).  
 Highest permissible axial wobble at surface "Y" = 0.02 mm.  
 Axis of rotation to be set against surface "Z".  
 Max. profile depth after lapping – see figure

If the damage is not excessive the sealing surface can be reconditioned by turning in a lathe and subsequent polishing against an abrasive cloth (grain size 600) placed on a face plate. In certain cases polishing alone will do. Carefully avoid deformations when setting up the part for machining. The best result is obtained by

using a special setting-up device (fixture). Careful indication measuring should be done against an intact portion of the surface to be machined.  
**After repair the sealing surface should have a polished, bright finish perfectly free of appreciable traces.**

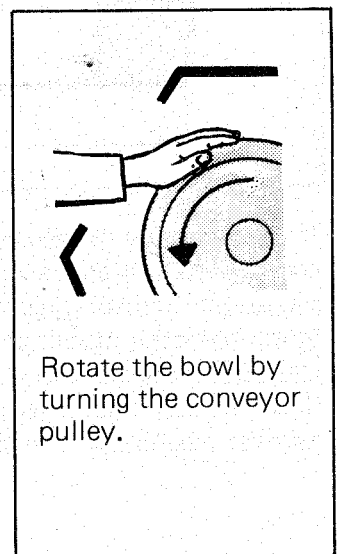
**CHECK POINTS**  
– Outlet

**OUTLET SLEEVE and GUIDE SLEEVE**  
– RADIAL WOBBLE



At the delivery of the machine the positions of the smallest radial wobbles of the outlet sleeve and guide sleeve are tested out. Then the parts are marked with  $\emptyset$  in line with the mark on the top disc.

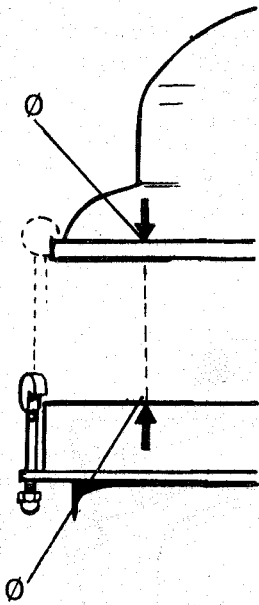
If one of the wobbles is found to be too great when overhauling in spite of the parts being assembled with the marks  $\emptyset$  in line, see first if a smaller wobble is obtained in another position. If not, either the outlet sleeve or the guide sleeve is damaged and should be replaced.



Rotate the bowl by turning the conveyor pulley.

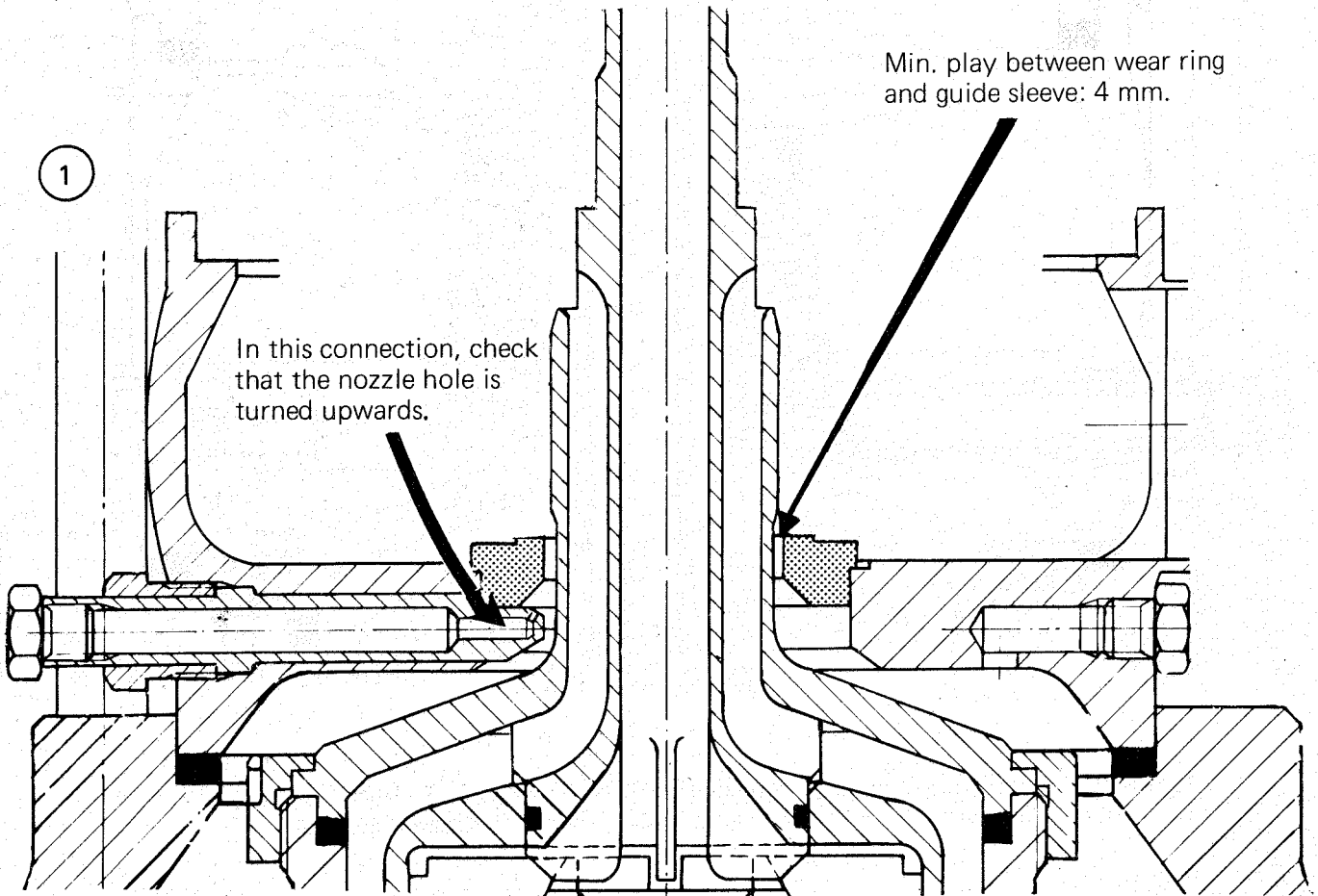
**OUTLET SLEEVE and GUIDE SLEEVE**  
– EXCENTRICITY

- o The outlet sleeve and guide sleeve ought to be in the middle of the holes of their wear rings.



See that the  $\emptyset$ -marks are in line with each other according to the figure.  
**Fasten the frame hood.**

Min. play between wear ring and guide sleeve: 4 mm.

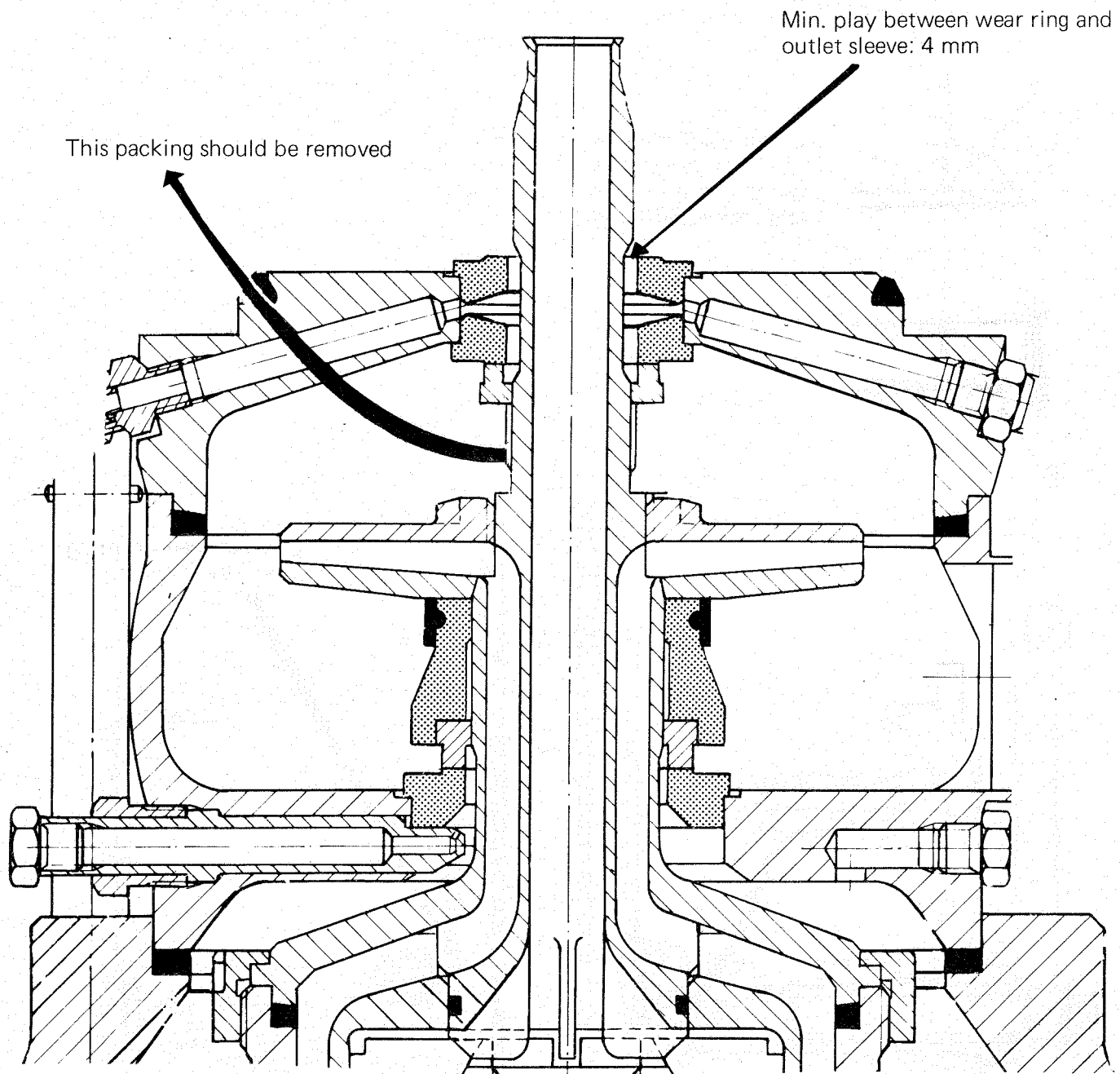




**CHECK POINTS  
– Outlet**

(Outlet sleeve – excentricity)

2

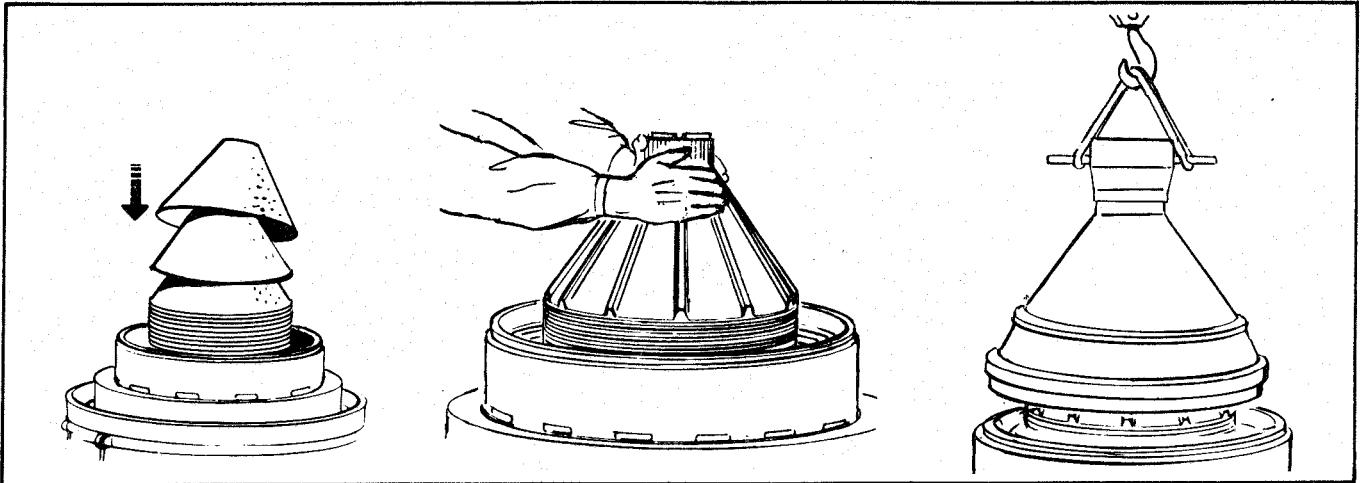


If one of the plays is found to be too small in spite of the marks of the frame hood and the rim of the frame being in line, turn the hood and check if the play increases.

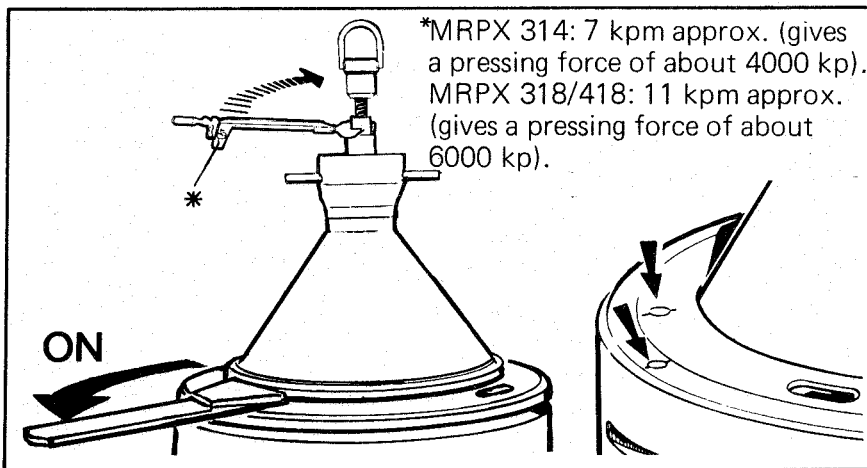
**DISC SET PRESSURE**

To check and, if necessary, adjust the disc set pressure proceed as follows:

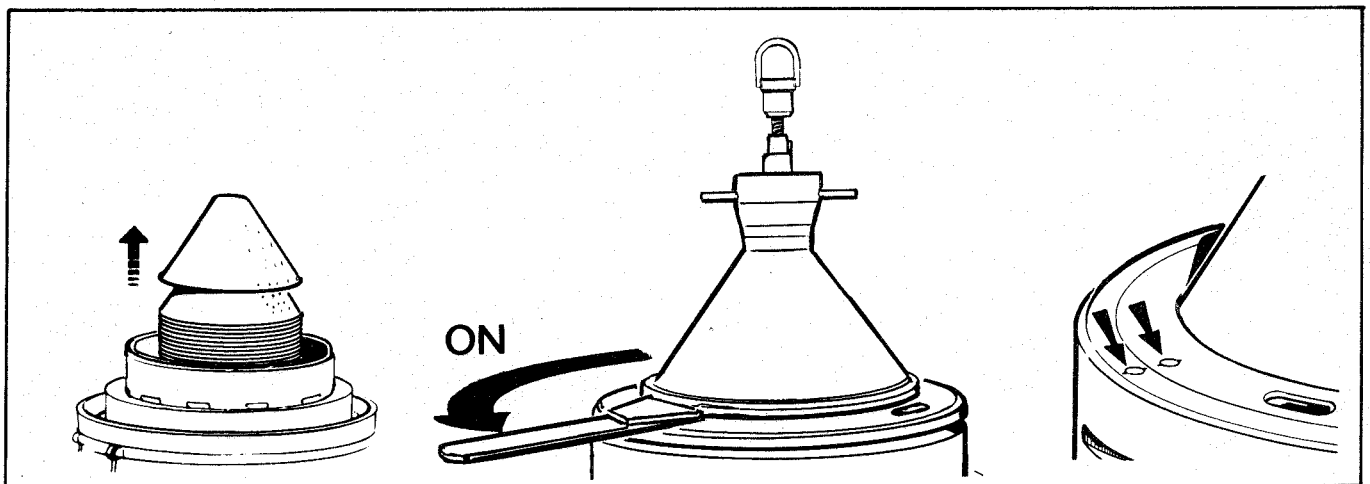
- o Insufficient compression of the disc set can affect the bowl balance, thus causing abnormal vibration.



Add one or more extra bowl discs to the top of the disc set.  
 Put on top disc and bowl hood.



Compress the disc set using the compressing tool.  
 Lubricate the lock ring and screw it on with the lock ring spanner. Tighten by hand as far as it goes.  
 Mark  $\emptyset$  on lock ring should now be positioned **before** mark  $\emptyset$  on bowl body. If this is not the case, add a further disc to the top of the disc set.

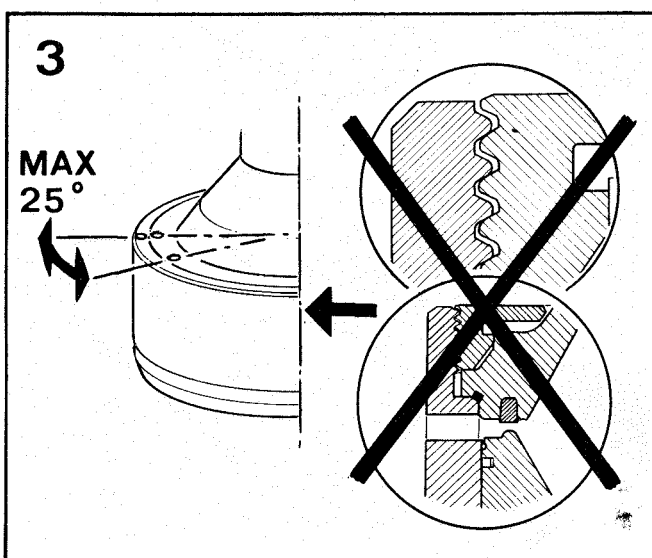
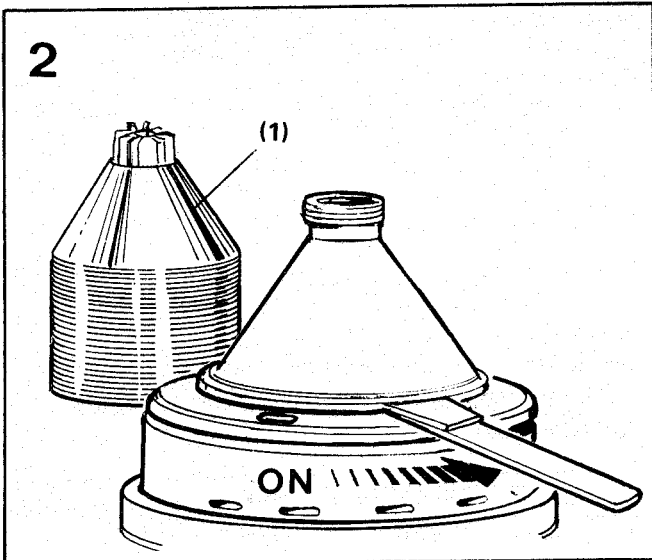
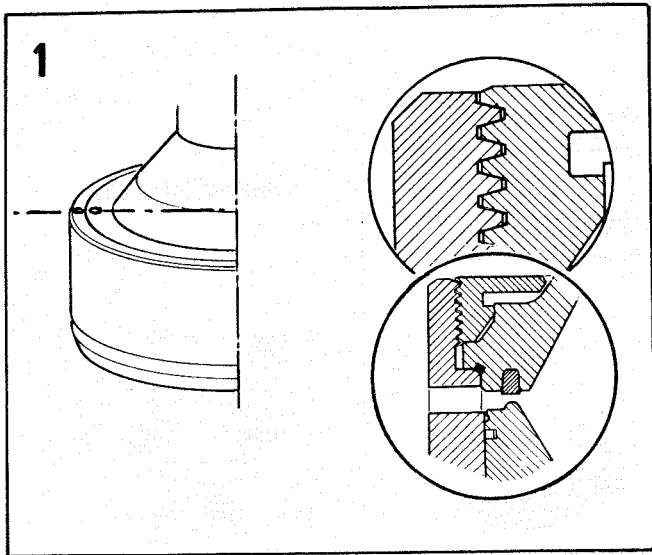


To obtain the correct pressure: remove one disc and check whether, with disc set compressed, the lock ring can be tightened by hand so that marks  $\emptyset$  are aligned. If not, repeat the procedure until the condition is fulfilled.

**Note!** If marks  $\emptyset$  are not in front of each other, it may be allowed to advance the ring by hitting the spanner handle some light blows, provided that the distance between the marks does not exceed 20 - 30 mm.

## CHECKPOINTS – Bowl

### THREADS OF LARGE LOCK RING AND BOWL BODY



- o Excessive wear of these threads can render the machine hazardous to personnel and plant

**Note!** Using the compressing tool for the disc set will reduce thread wear to a minimum.

1. In a new bowl, the alignment marks ( $\emptyset$ ) on bowl body and lock ring should be right in front of each other. However in time, due to thread wear, the lock ring mark can be drawn past the other mark.
2. Check the thread condition by tightening the lock ring after removing the disc set (1).

3. When mark  $\emptyset$  on lock ring can be drawn past the corresponding mark on bowl body by more than  $25^\circ$  :

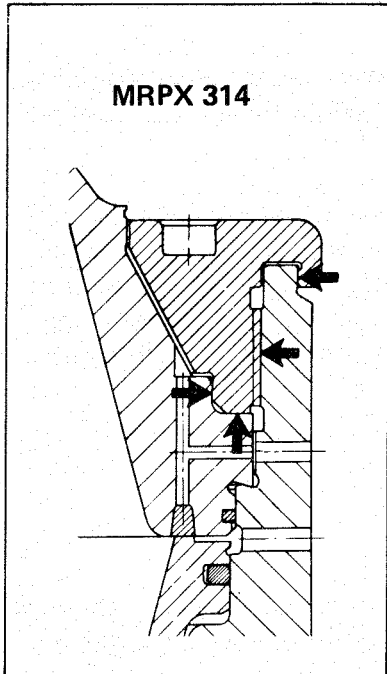
contact our representative immediately.

#### **Note!**

- o If thread wear has been observed, mark bowl body at the new position of alignment mark on lock ring, e.g. by punching.

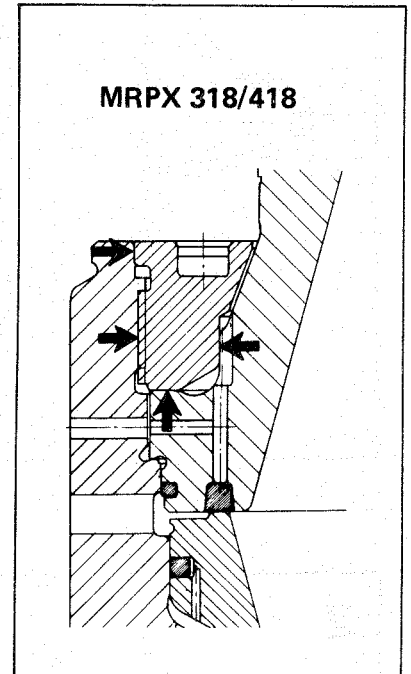
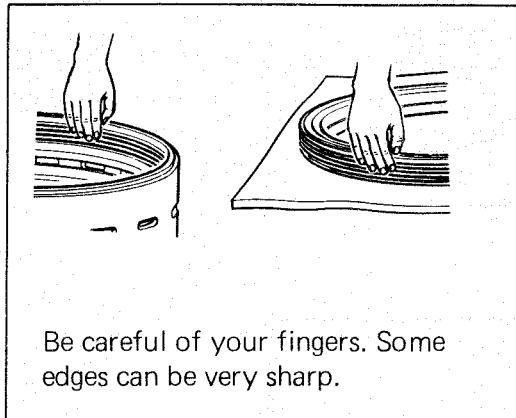
**LOCK RING JOINT**

**Seizure Damage**

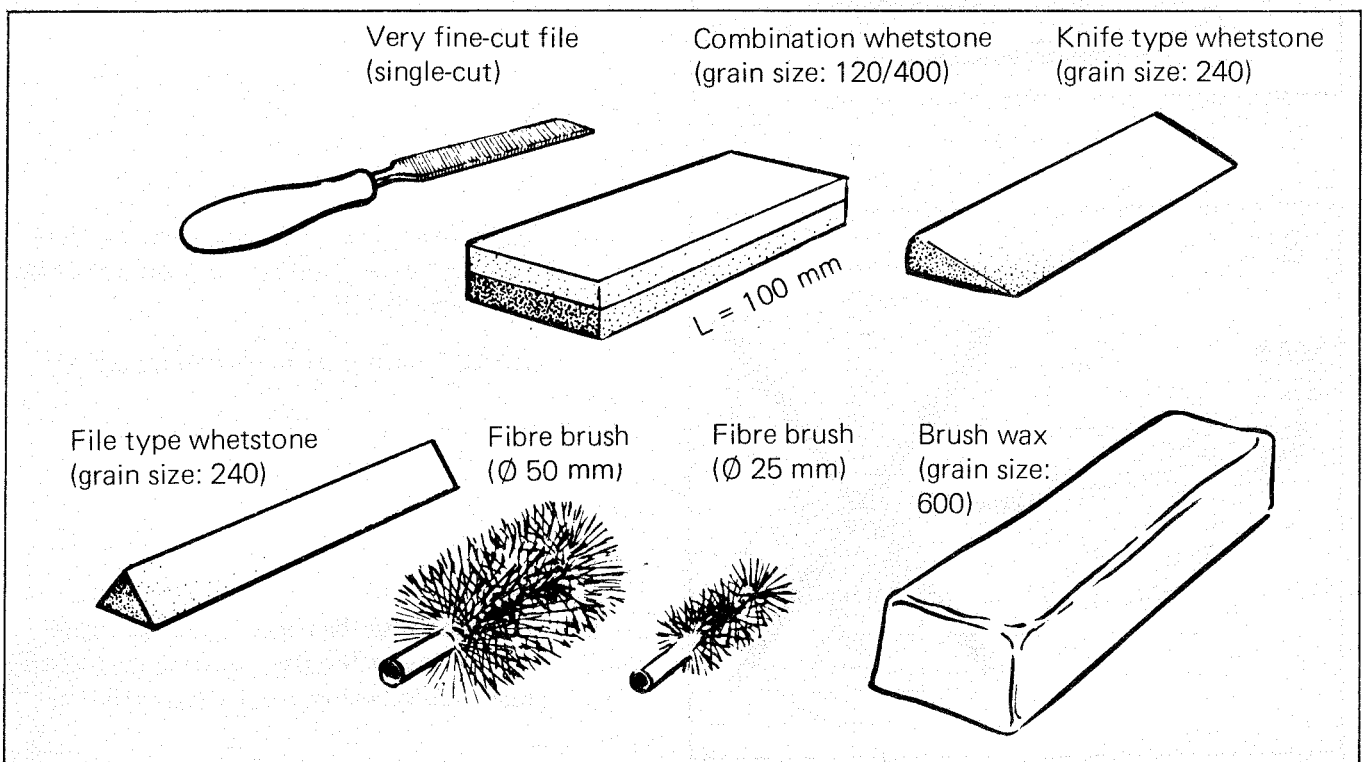


Impact marks and the like on the lock ring may cause seizure damage.

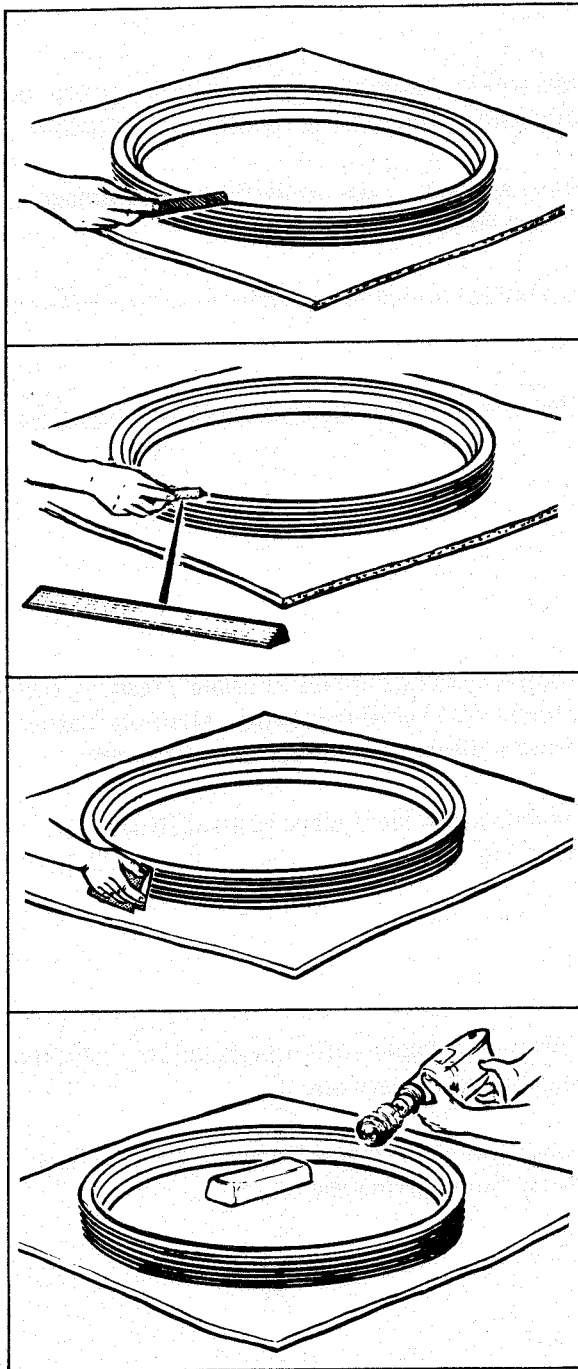
Check threads as well as contact and guiding surfaces — see arrows.



If damage has occurred due to seizure or otherwise, the following actions and agents are recommended.



(Lock Ring Joint)



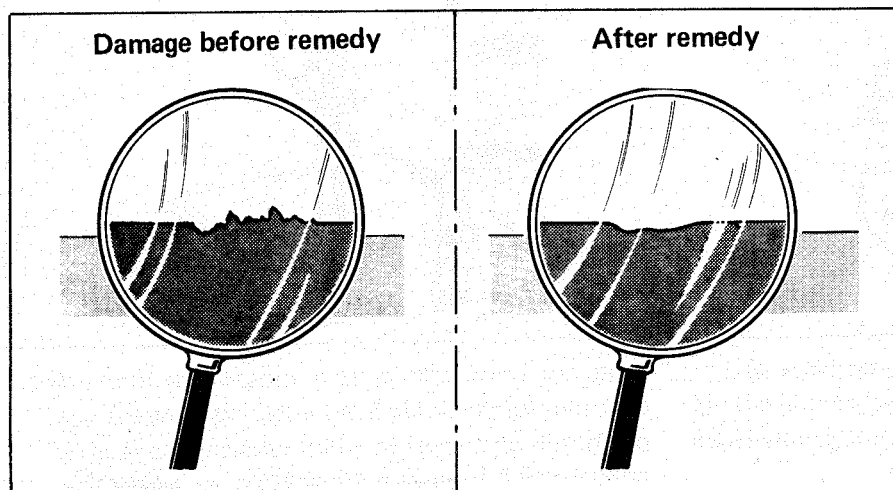
If the seizure damage is heavy, first use a fine- and single-cut file, but moderately. Otherwise the damage may get worse.

**When possible, avoid using the file!**

Then use a whetstone. The location of the damage decides which one of the above whetstones should be chosen.

A **fine-grain** emery cloth must be used if whetstones are not available.

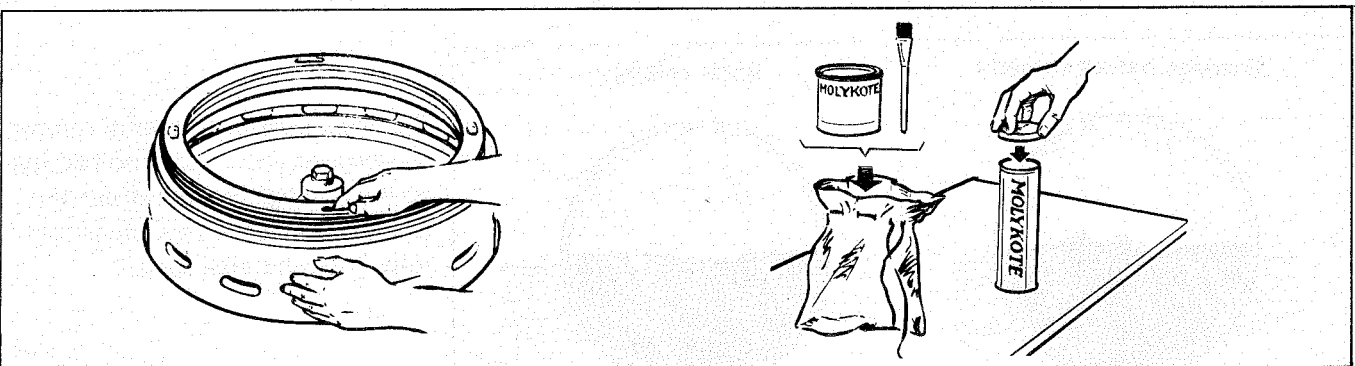
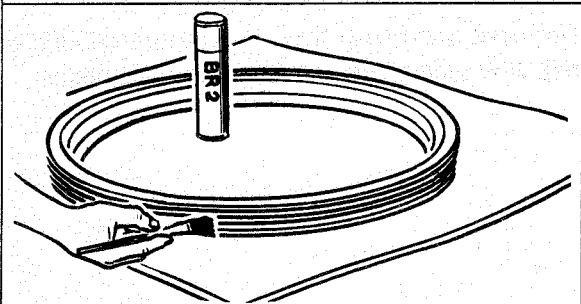
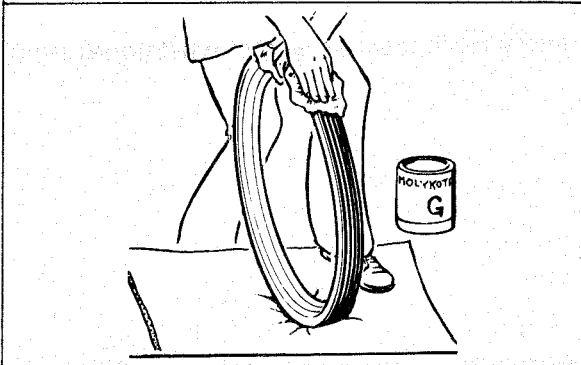
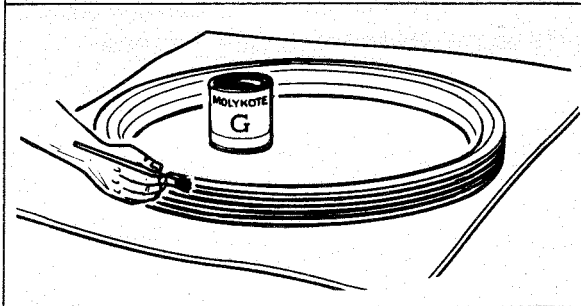
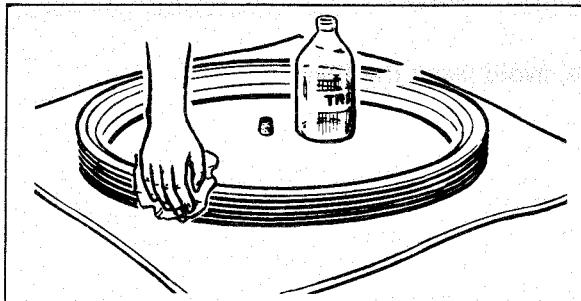
Accomplish the remedying by polishing the damaged spot with the fibre brushes and brush wax. It is recommended to polish the whole area where seizure damage might occur.



The least possible material removed, however so much, that no residues of the damage are left above the original surface, which smoothly joins the remedied spot.

(Lock Ring Joint)

**Lubrication**



- o When assembling the bowl: prevent future seizure damage by lubricating the joint as recommended below:

Lubrication surfaces – see under "Seizure Damage" (← - marked surfaces).

Clean threads, contact and guiding surfaces with a defatting agent.

**Prime** the surfaces with a thin layer of molybdenum disulphide paste.

As a rule, the paste must be rubbed in under pressure, using for instance a fairly stiff horse-hair brush, chamois leather or cotton rag – follow directions on lubricant wrapping.

Avoid excess paste. Never let it serve as a substitute for grease – see next Fig.

**Lubricate** the primed surfaces with molybdenum disulphide grease or some other equivalent agent.

Make sure no grains of sand, metal filings or the like have fastened on the surfaces during the work.

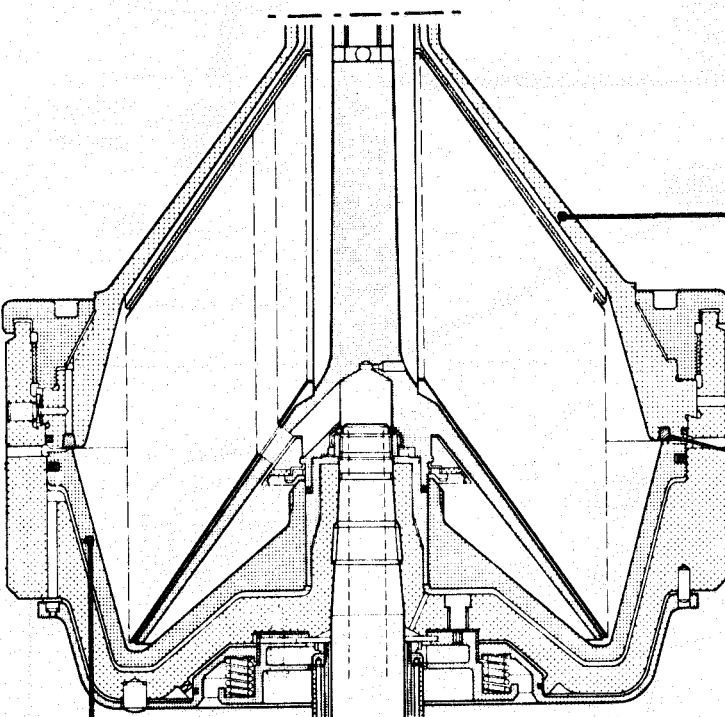
Before final mounting of the bowl parts check as a precaution that the lock ring turns easily on the bowl body threads. To this end the ring should be screwed on by hand without using the spanner.

Keep the bowl lubricants in closed tins to prevent detrimental particles from entering. Always use **clean** rags and brushes when lubricating. It is recommended to have a lubricating set **solely** for bowl lubrication.

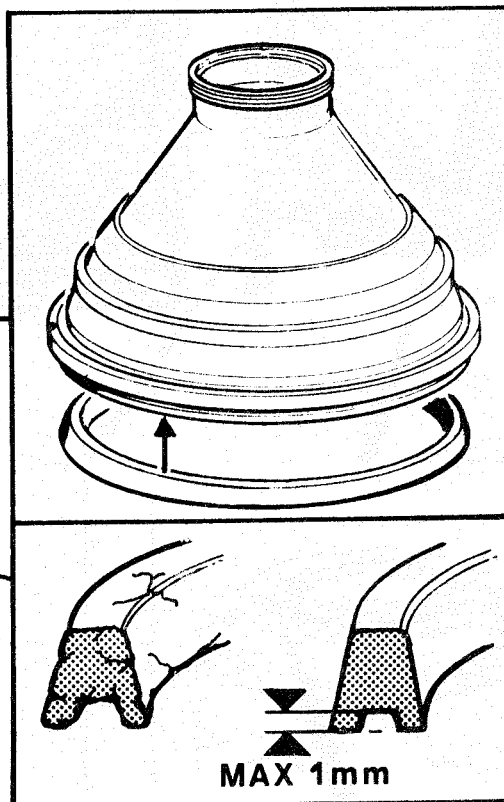
Instead of a primary treatment with Molykote Paste G and following lubrication with Molykote Grease e.g. BR2 only Molykote 1000 Universal Paste can be used very well. This paste could be applied on the surface in question with a brush, but not in a too thick layer.

**BOWL HOOD/SLIDING BOWL BOTTOM**

- o Poor sealing between the bowl hood seal ring and the sealing edge of the sliding bowl bottom will cause a leakage of process liquid from the bowl.

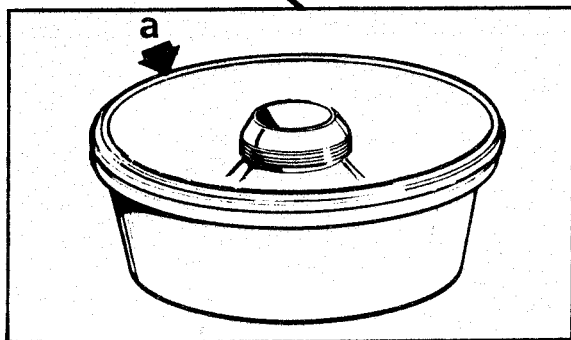


**Bowl hood**



Replace the bowl hood seal ring if it has fissures or pores, deep scratches or indentations made by coarse solid particles.

The ring should be replaced also when its sealing surface is depressed by more than 1 mm, even though acceptable in other respects.



Also check the sealing edge (a) of the sliding bowl bottom. If damaged through corrosion or erosion or in other ways it can be rectified by turning in a lathe, provided that suitable equipment is available. Maximum permissible reduction of the original profile height: 0.5 mm.

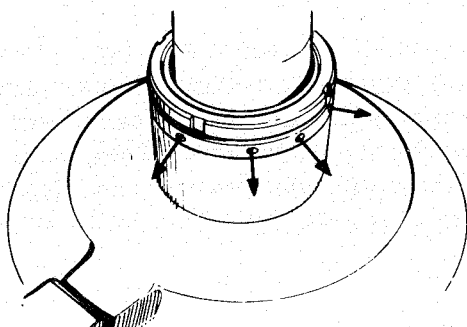
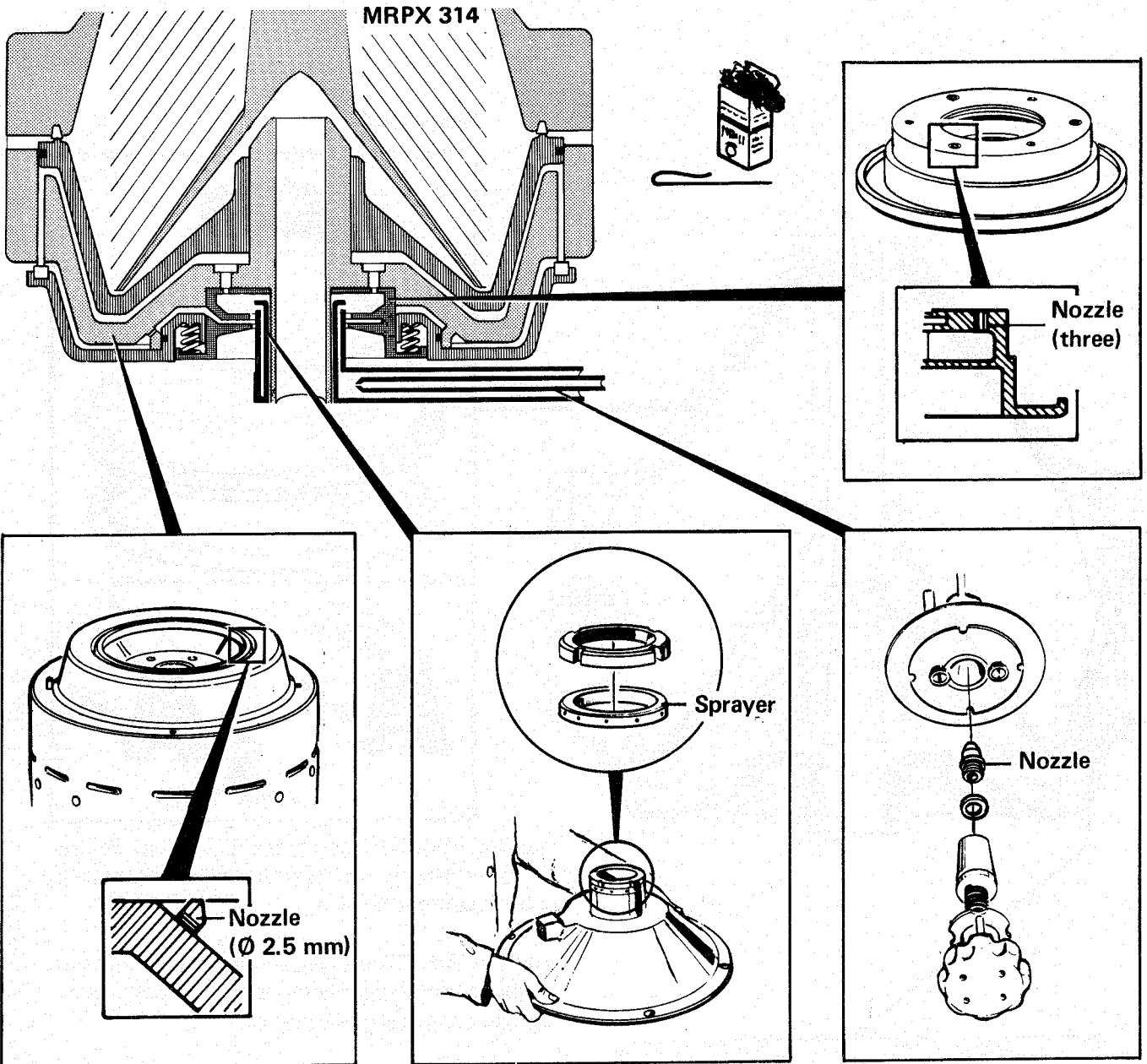


**EJECTION MECHANISM**

- o Dirt and lime deposits in the ejection mechanism may cause bad ejecting function or non at all.

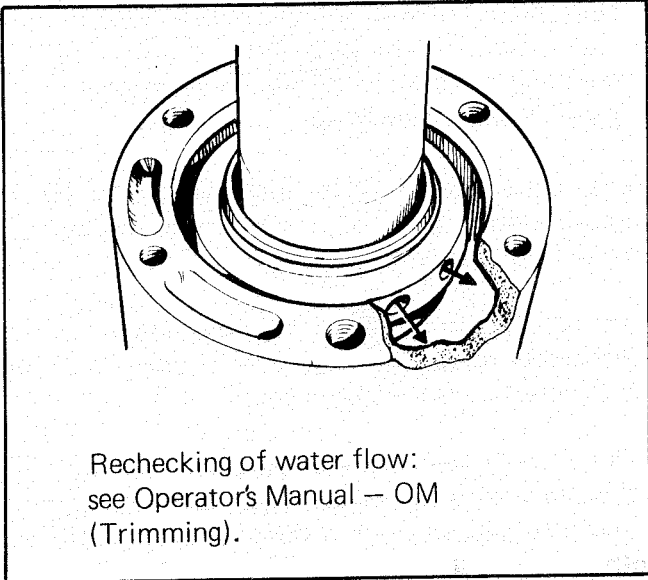
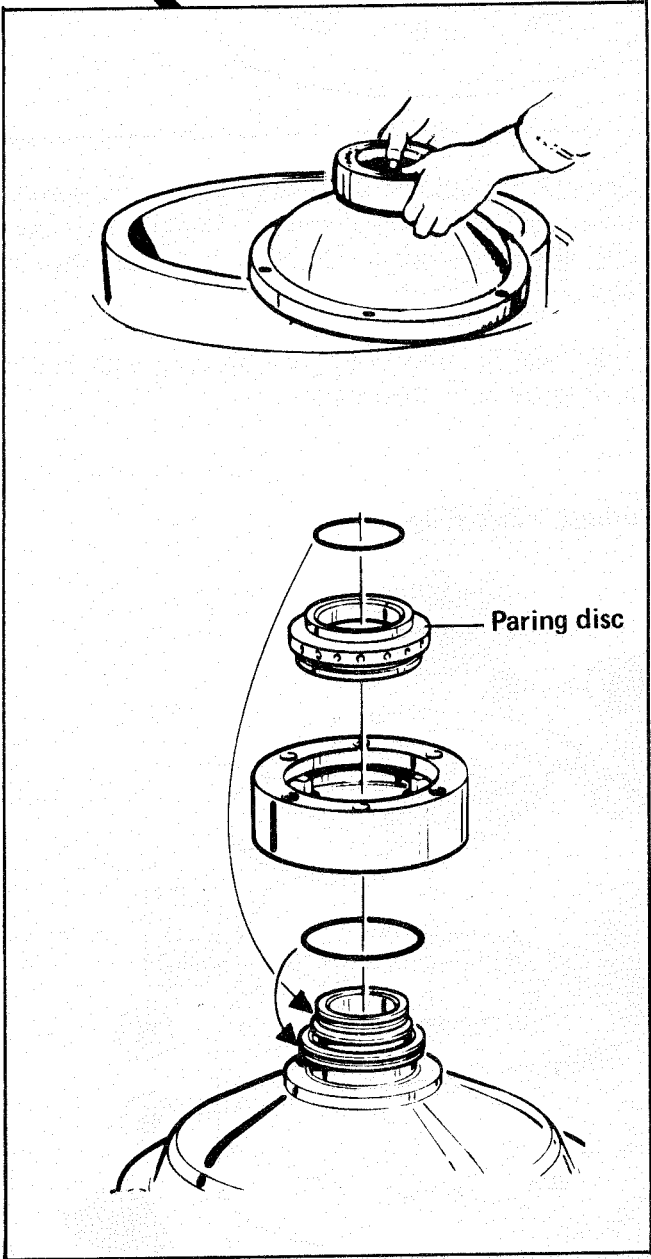
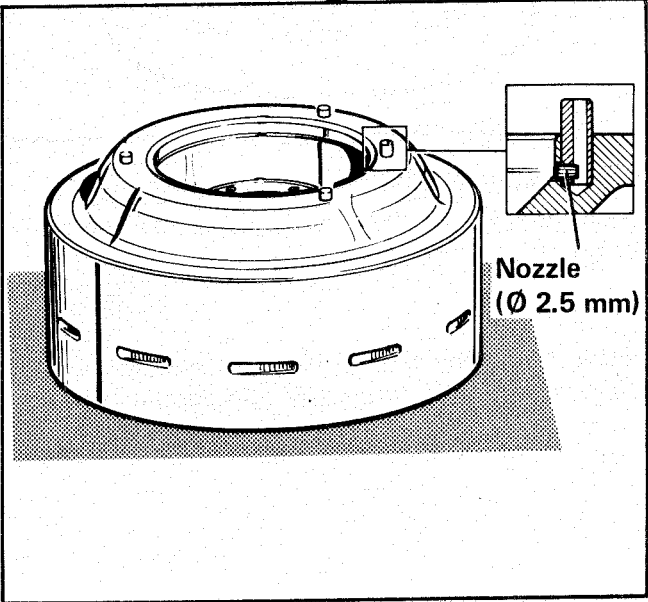
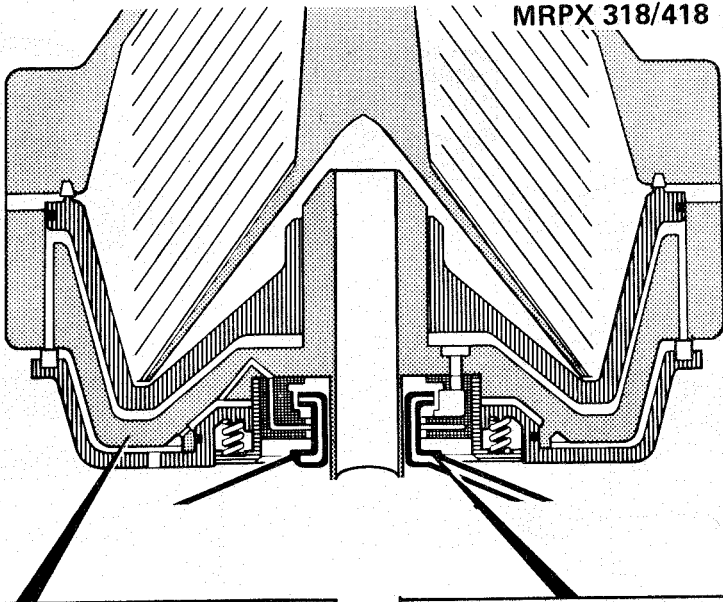
**Nozzles, Ducts**

Clean all nozzles and ducts with a soft iron wire or the like. Remove deposits on other surfaces with steel wool.

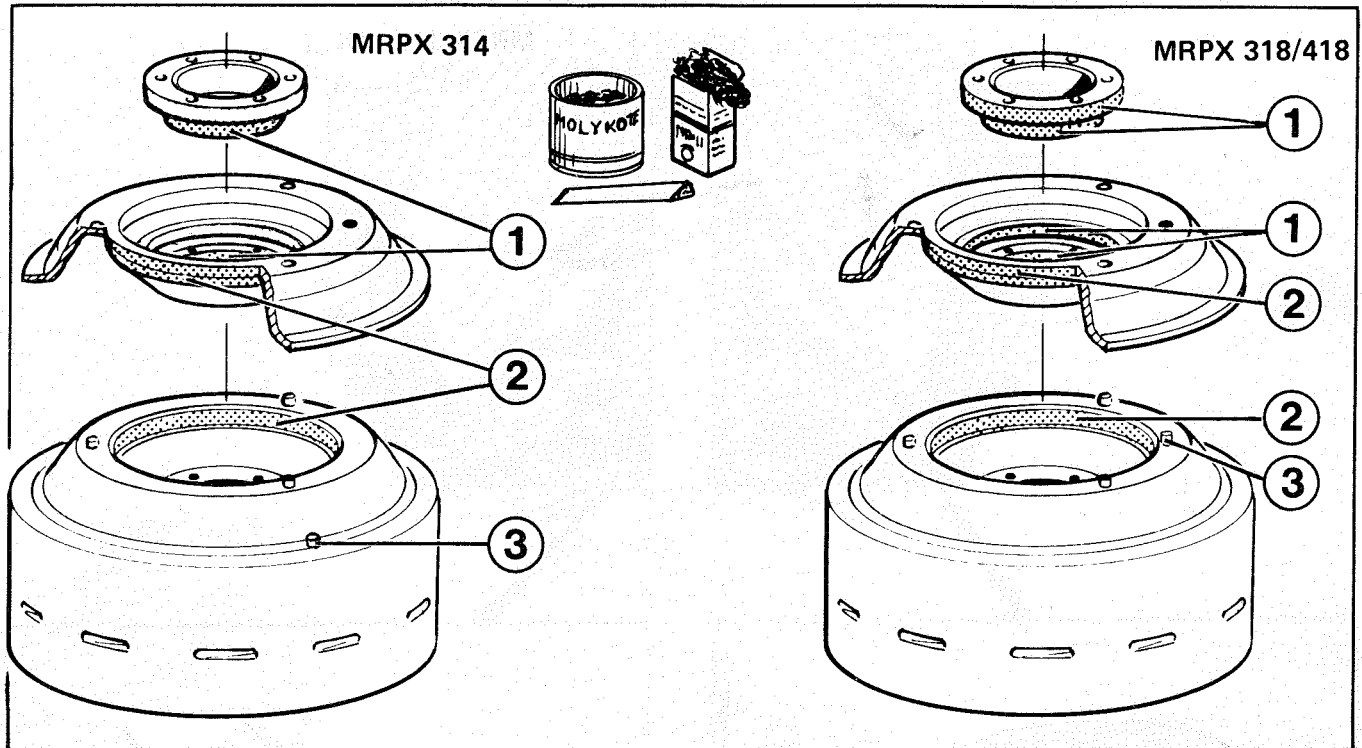


Rechecking of water flow:  
see Operators Manual – OM.  
(Trimming Instructions).

(Ejection Mechanism)



Guiding Surfaces etc.



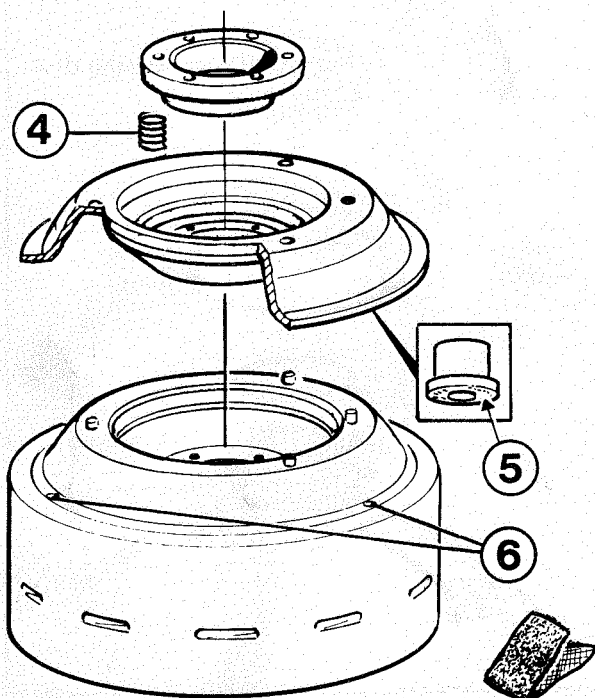
Examine the guiding surfaces (1) of spring support and operating slide respectively. Remove any marks with whetstone (grain size 240). Lubricate the surfaces with Molykote.

Polish sealing surfaces (2) of operating slide and bowl body with steel wool.

Inspect guide pin (3) for the operating slide. If worn (eroded) so much as to jeopardize the polar guidance of the slide, replace it.

**Note!** The other pins in the bowl bottom are supporting pins without any operational function.

Springs, Valve Plugs



o Defective or broken springs as well as poor sealing between the valve plugs of operating slide and the bowl body may prevent complete closing of the bowl.

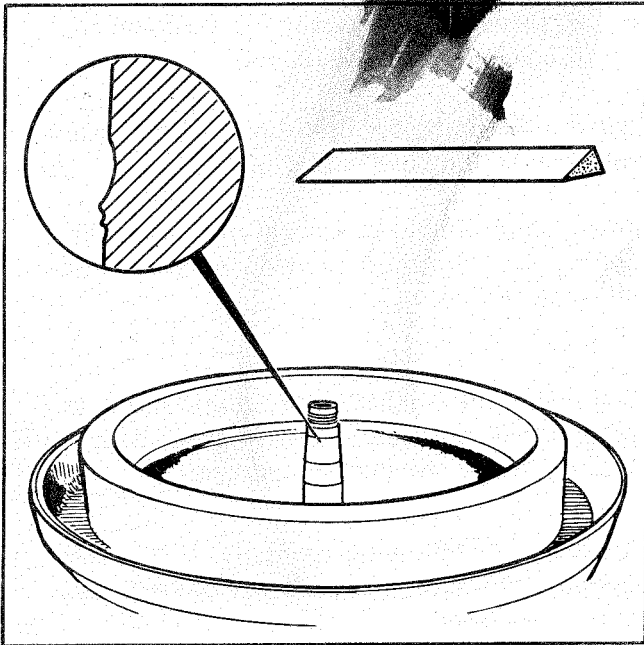
Replace springs (4) which differ appreciably from the other ones in regard to length or which seem to be defective in other respects.

Check the sealing surface (5) of the three valve plugs. Preferably replace all plugs even if only one of them is defective (scratches, pores).

Examine the three sealing surfaces (6) of the bowl body in contact with the valve plugs. Remove any marks and lime deposits with a **very fine-grain emery cloth**.

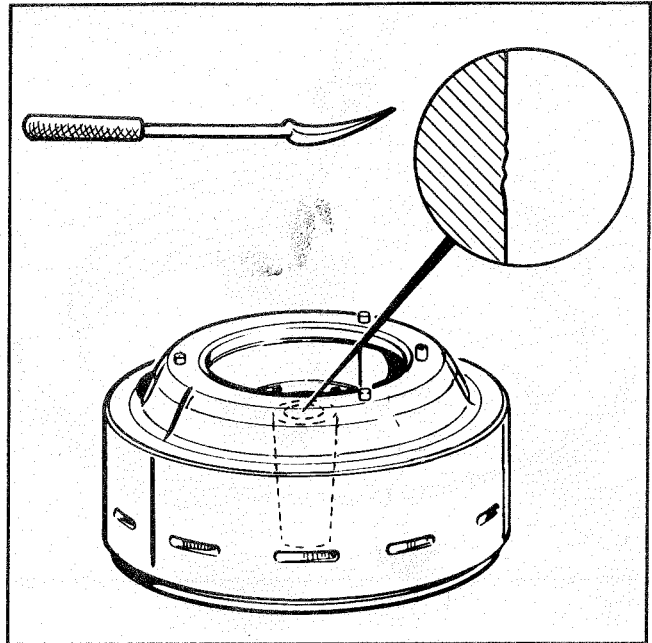
**CHECKPOINTS**  
– Bowl

**BOWL BODY NAVE/  
BOWL SPINDLE CONE**

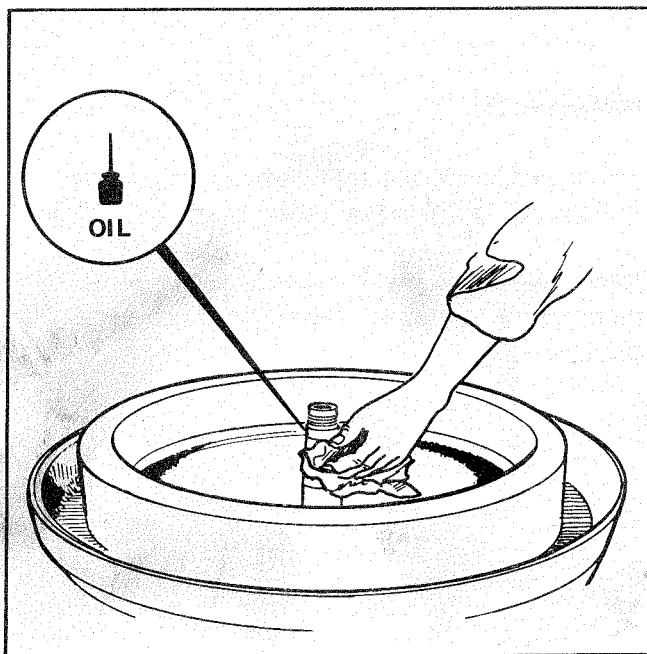


Clean spindle cone and bowl body nave with a suitable defatting agent. Remove any impact marks on nave and cone with a scraper, and an oil-stone respectively

- o Impact marks and similar on the spindle cone and/or in the nave may cause bad bowl run.

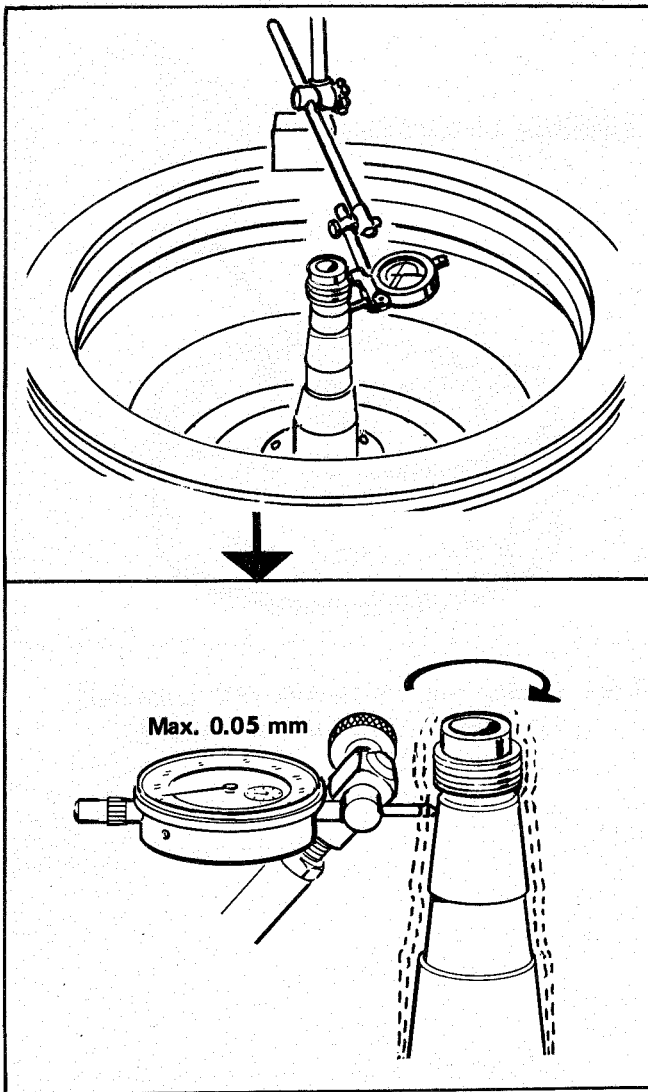


**Note! Always use the scraper with great care.  
The conicity must not be marred.**



Whenever fitting the bowl body on the spindle first lubricate the spindle cone and then wipe it with a clean cloth.

**RADIAL WOBBLE OF BOWL SPINDLE**



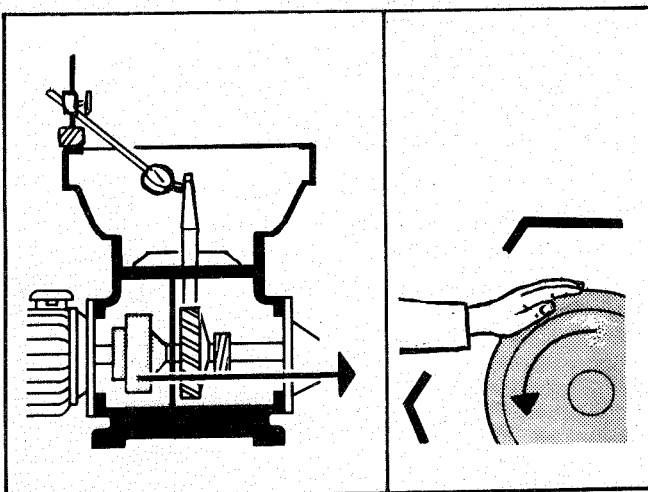
- o Excessive spindle wobble is indicated by rough bowl run (vibration).

Clamp a dial indicator in a support, and fasten the latter to the bowl casing of frame.

Measure the wobble at the top of the spindle tapered end. Maximum permissible radial wobble – see figure.

First check the wobble before dismounting the spindle. If wobble is too large: replace ball bearings in top and bottom bearings.

Remeasure wobble after assembly. If it is still excessive, the spindle is probably damaged and must be replaced.



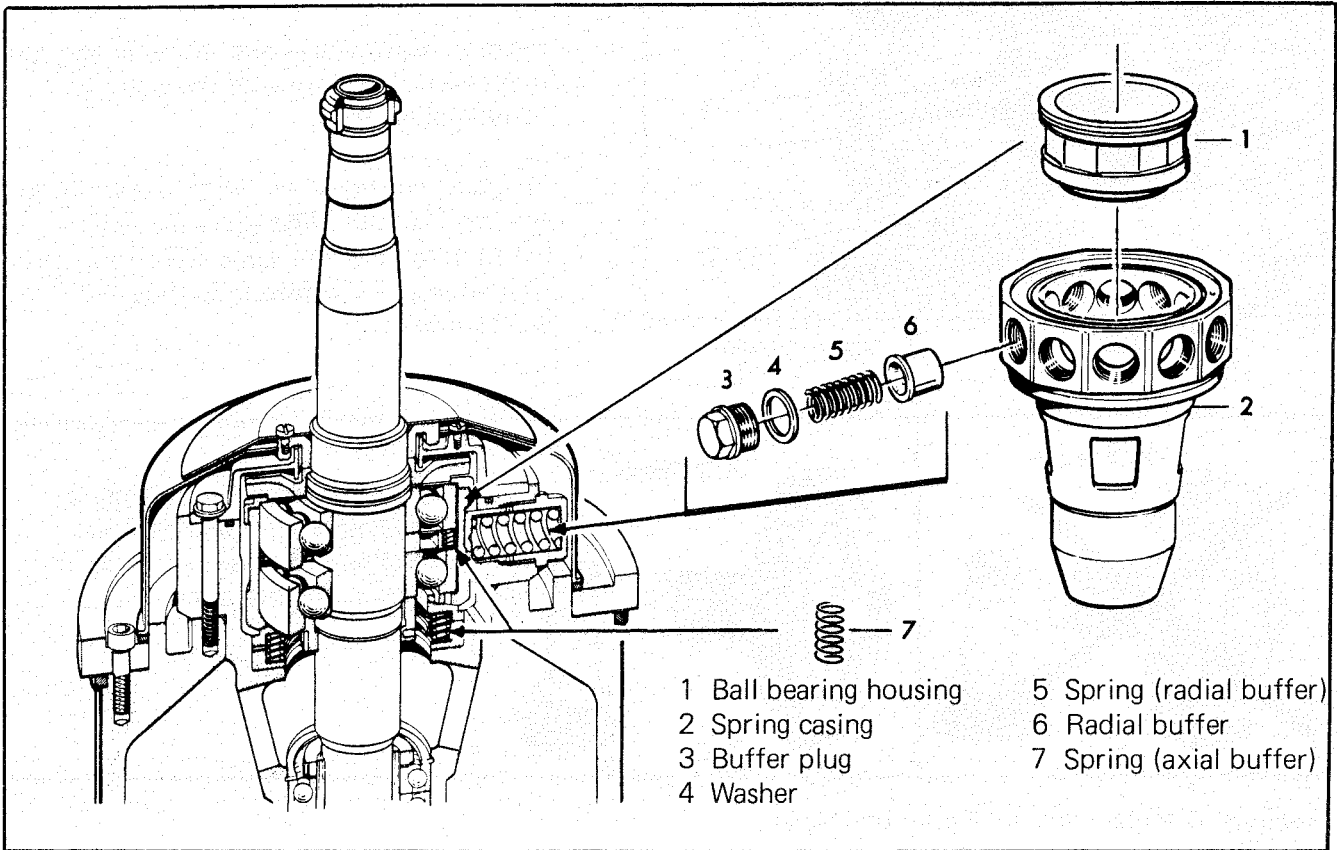
**IMPORTANT!**

During indication the spindle must be revolved by hand using the worm wheel shaft.

Before measuring make sure the buffer plugs are properly tightened – see " Top bearing springs . . . "

**TOP BEARING SPRINGS and BALL BEARING HOUSING**

- o Weakened or broken radial buffer springs as well as defective contact surfaces for the buffers on the ball bearing housing may give rise to machine vibration (rough bowl run).



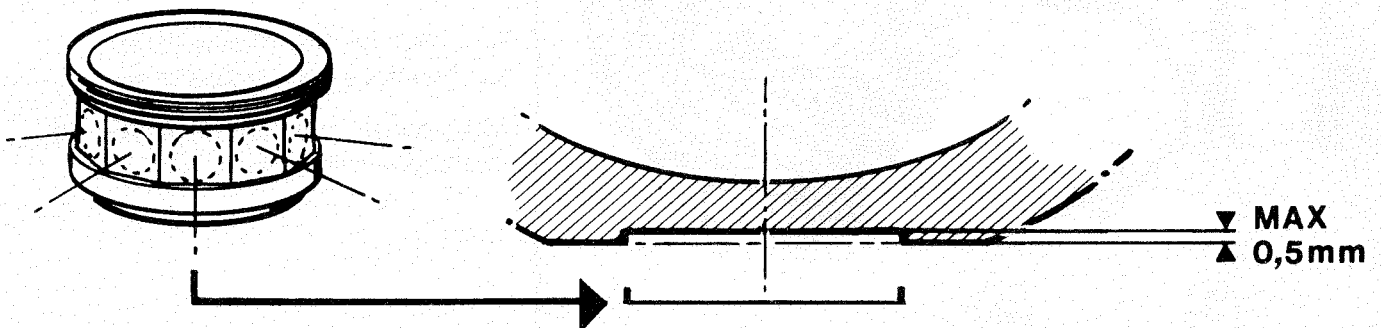
**Springs**

It is difficult to determine the condition (stiffness) of a spring without special testing equipment. So, an estimation of the spring condition must be based on the experience of the machine run before the overhaul.

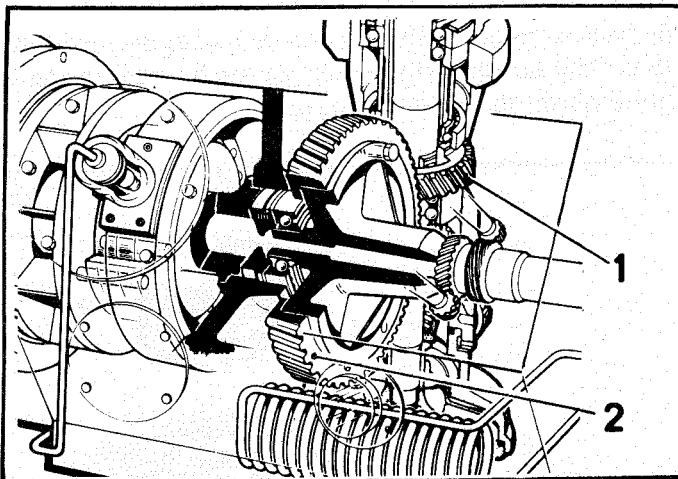
In case of sudden spring fracture, the complete set should be replaced even though only one spring is broken.

**Ball bearing housing**

Examine the contact surface of the buffers on the ball bearing housing. If defects (indentations deeper than 0.5 mm) are present, replace the housing as well as buffers and springs.



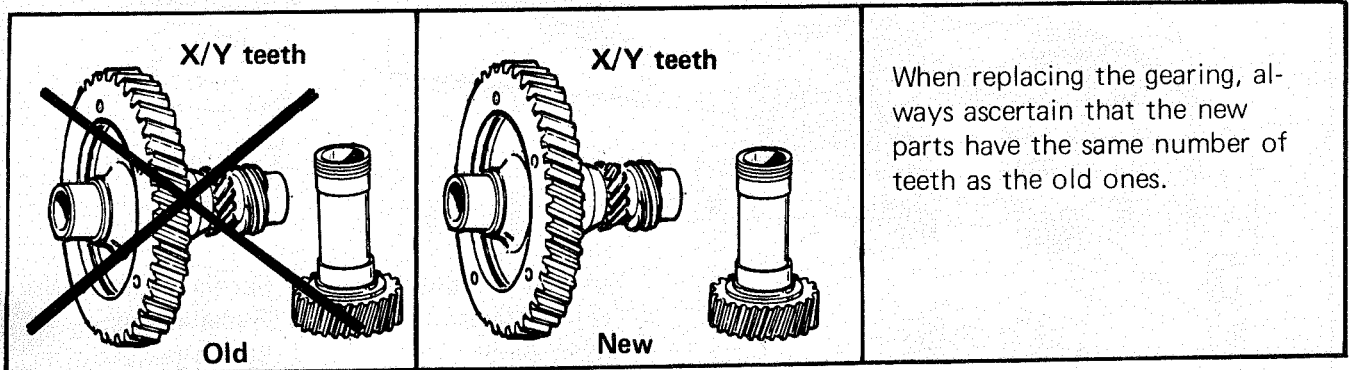
**WORM AND WORM WHEEL (WORM GEARING)**



**1** Worm      **2** Worm wheel

Check the teeth of worm wheel and worm for wear. Examine the contact surfaces and compare the tooth profiles. The gearing may work satisfactorily even when worn to some degree.

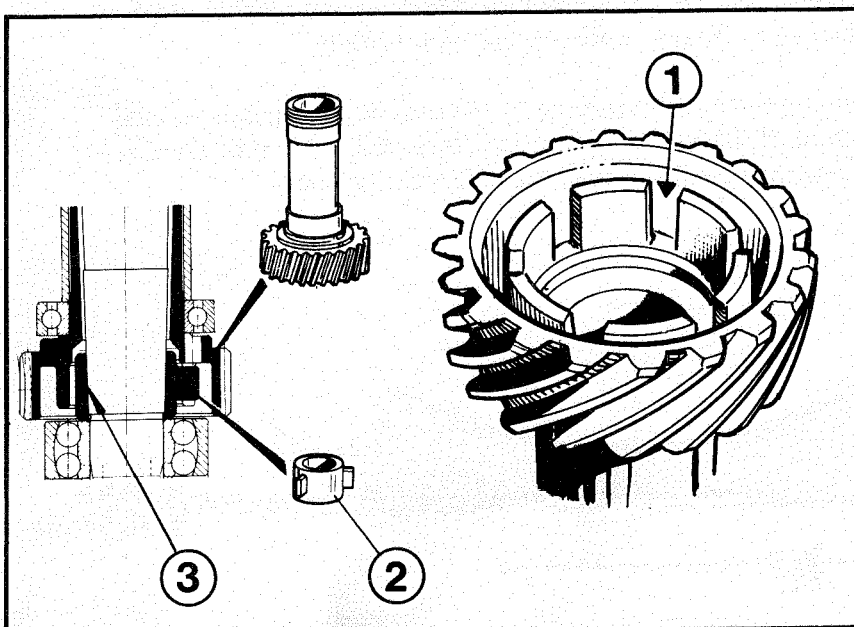
- o Replace worm wheel and worm at the same time, even if only one of the parts is considerably worn.
- o To avoid damaging the teeth when lifting the bowl spindle, **first** push the worm wheel aside. For the same reason put the spindle in place **before** mounting the worm wheel.



When replacing the gearing, always ascertain that the new parts have the same number of teeth as the old ones.

Presence of metal chips in the oil bath is an indication that the worm wheel is wearing abnormally.

**Grooves in Worm receiving the Driver Wings**



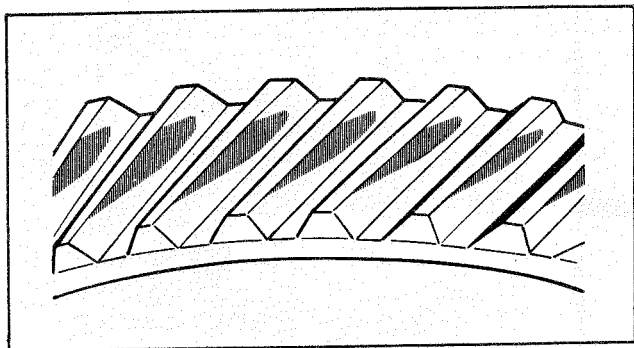
The wear of the grooves (1) should not exceed 5 - 6 mm.

Observe, however, that the worm has six grooves, whereas the driver (2) has only three wings. Thus, there are three " spare grooves".

Any wear on the grooves should not be allowed to exceed 2 mm.

Make certain the conical surface (3) of the driver is in good condition.

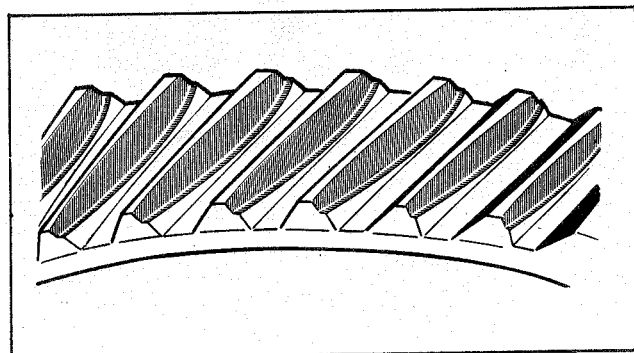
**Examples of various tooth appearances after operation**



**Satisfactory teeth**

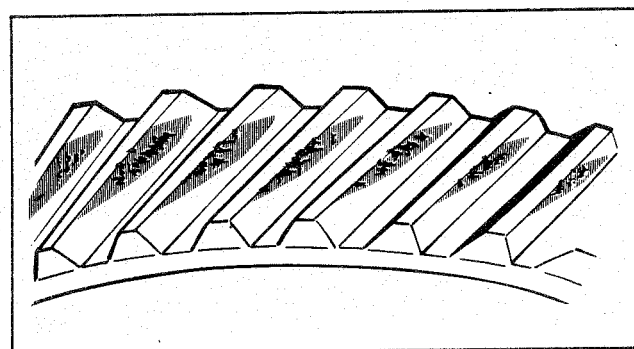
Uniform wear of contact surfaces. Surfaces are smooth.

Good contact surfaces will form on the teeth when the gearing is subjected only to moderate load during a running-in period.



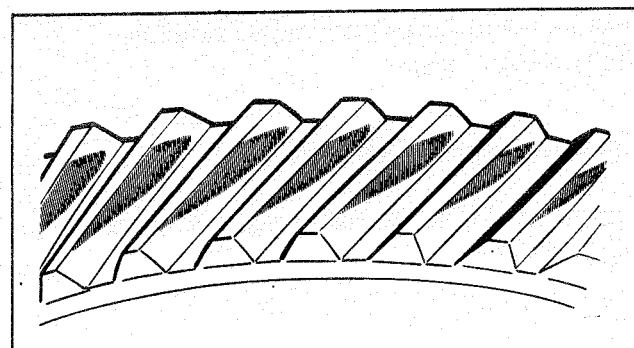
**Worn teeth**

Tooth wear, sometimes occurring only on some of the teeth. If the wear has advanced as far as shown in the illustration, replace worm wheel and worm.



**Spalling**

Small bits of the teeth have split off, so-called spalling. Generally due to excessive load or improper lubrication. Damage of this type need not necessitate immediate replacement, but careful checking at short intervals is imperative.



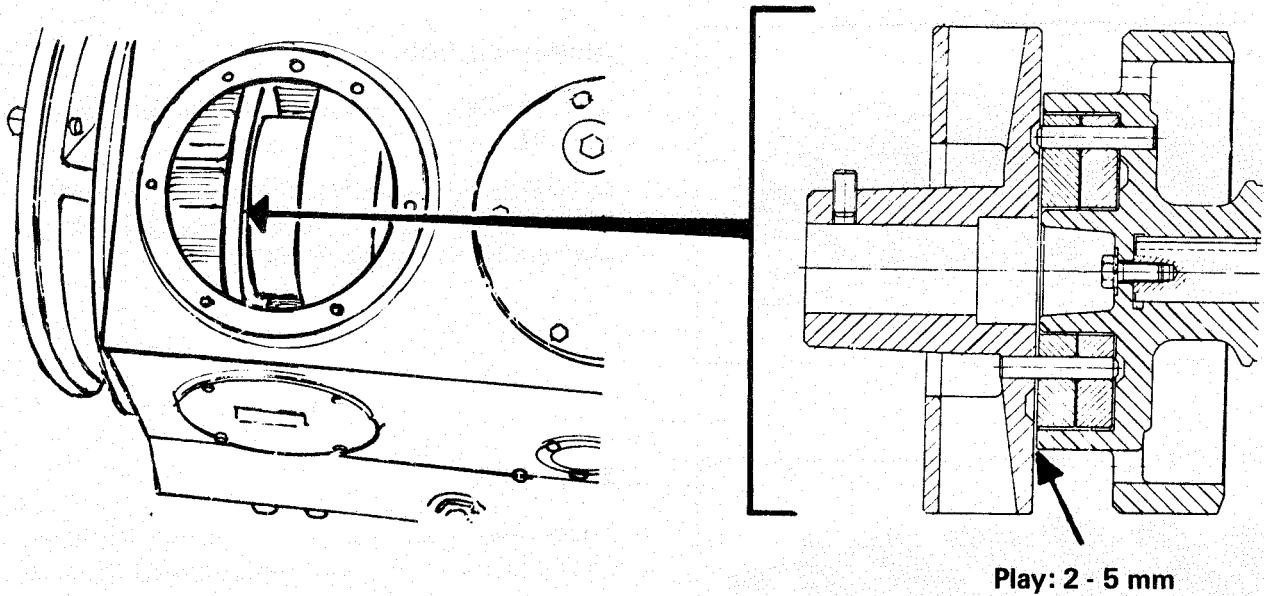
**Pitting**

Small cavities in the teeth, so-called pitting. Can occur through excessive load or improper lubrication. Damage of this type need not necessitate immediate replacement, but careful checking at short intervals is imperative.

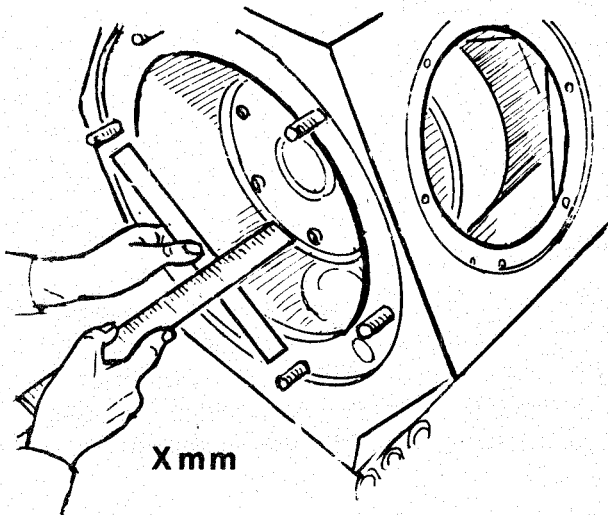


**ELASTIC PLATES**

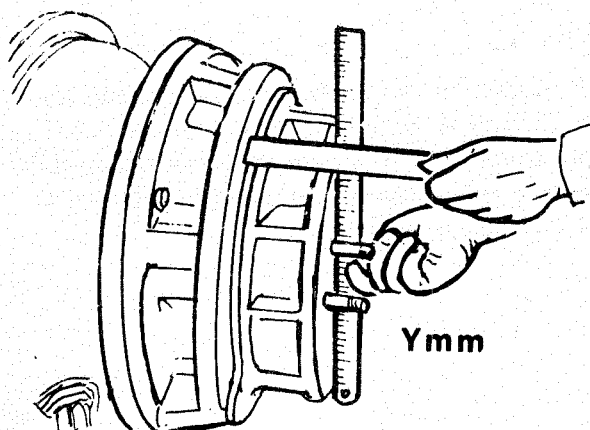
- o Replace the elastic plates if fissured
- o The axial play of the elastic plates should be 2 - 5 mm.



Check the axial play as follows:



- 1 Measure the distance from frame ring to coupling discs.



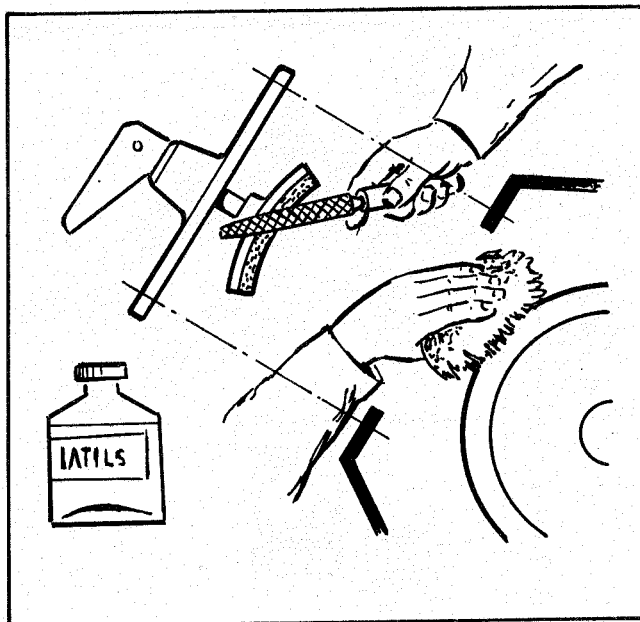
- 2 Measure the distance from motor coupling disc to motor flange.

- 3  $X \text{ mm} - Y \text{ mm} = 2 - 5 \text{ mm}.$

If required, adjust the position of the motor coupling disc.

**Hand-Brake**

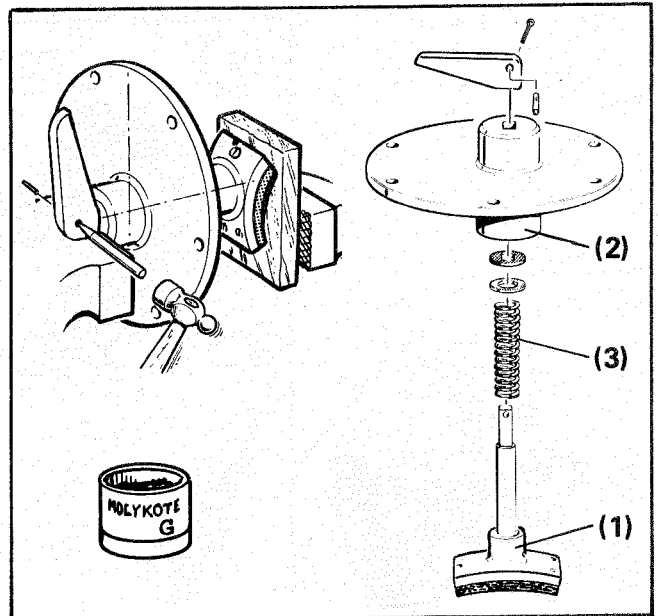
- o A worn or oily lining will lengthen the braking period.



If oiliness is the only fault: clean the lining and the coupling drum with a suitable defatting agent.

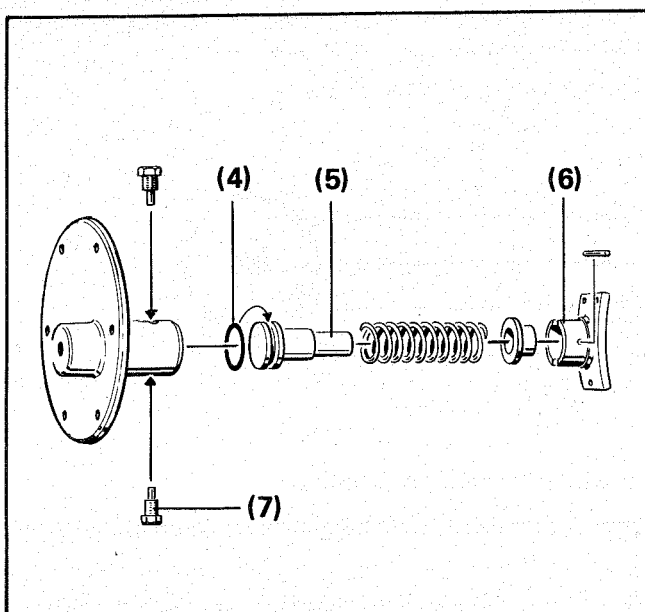
Roughen the friction surface of the lining with a coarse file.

- o Formation of rust on the brake parts may cause the brake to jam.



Remove any rust from surface (1) of the brake shoe and the corresponding guiding surface in the cap (2). Rub the surfaces for instance with Molykote Paste G. Replace the spring (3) if it has lost its stiffness. Oil the spring when mounting.

**Pneumatic Brake**

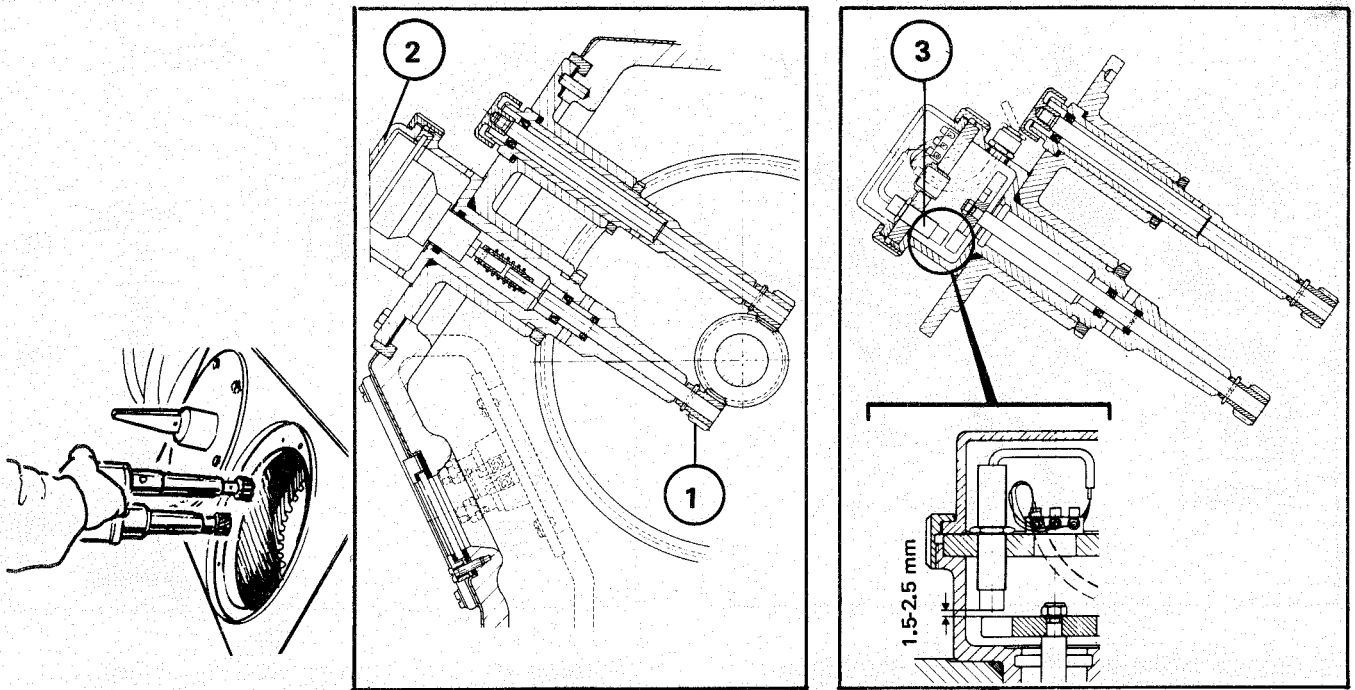


Check and treat as above. Furthermore inspect O-ring (4) as well as piston (5) and its cylinder. Rub the cylinder for instance with Molykote paste G.

**Note!** When assembling depress the brake shoe entirely in the brake cap before tightening set screws (7), otherwise the set screws may jam the brake shoe.

**Supply compressed air to check the brake function.**

**REVOLUTION COUNTER  
 TACHOMETER**



Rotate the tachometer shaft (1) and check whether the tachometer works. If glass (2) is broken replace it.

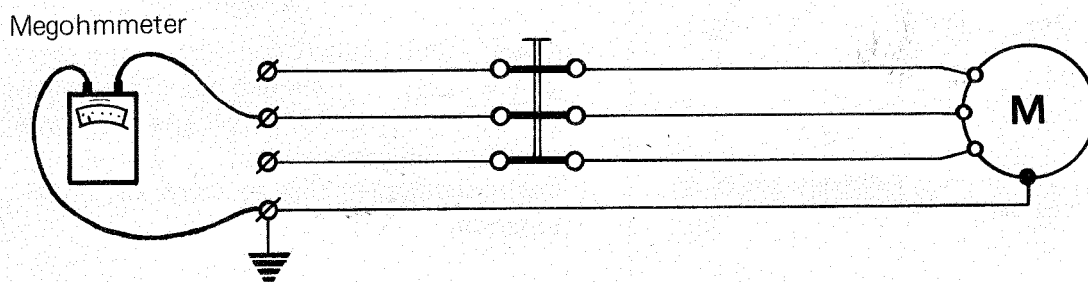
For remote indication: if the transmitter has been dislocated, make an impression of the play between transmitter and gear for instance by means of modelling clay. Play according to Fig.

**MOTOR**

Test the motor insulation.

Procedure: Unscrew the fuses. Measure with an insulation tester (megohmmeter) between phase and earth on the motor wire connection terminals in the electric cabinet, or between winding and goods on the motor terminal block.

**Note.** Switch on the safety switch, if any.



Insulation resistance – see manufacturer's instructions.

**Note.** Use the insulation tester judiciously, particularly with high measuring voltage.

Leave the thermistors alone. They won't stand more than 6 volts.

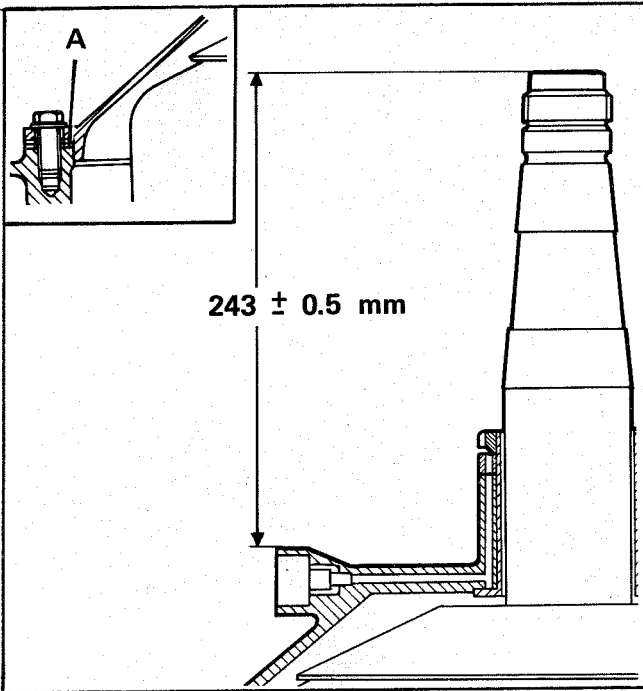
**HEIGHT POSITION**

If the bowl is replaced or the bowl spindle stripped, the height positions must be checked. Any adjustment is made by means of one or more height adjusting rings A.

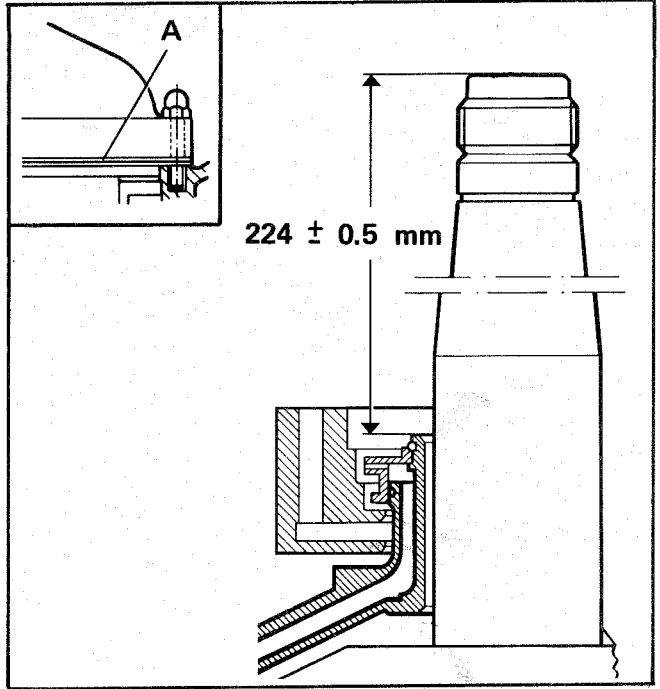
The tolerances are narrow, and it is important, therefore, that parts should be well cleaned and free of burrs.

**Operating Water Device**

**MRPX 314**



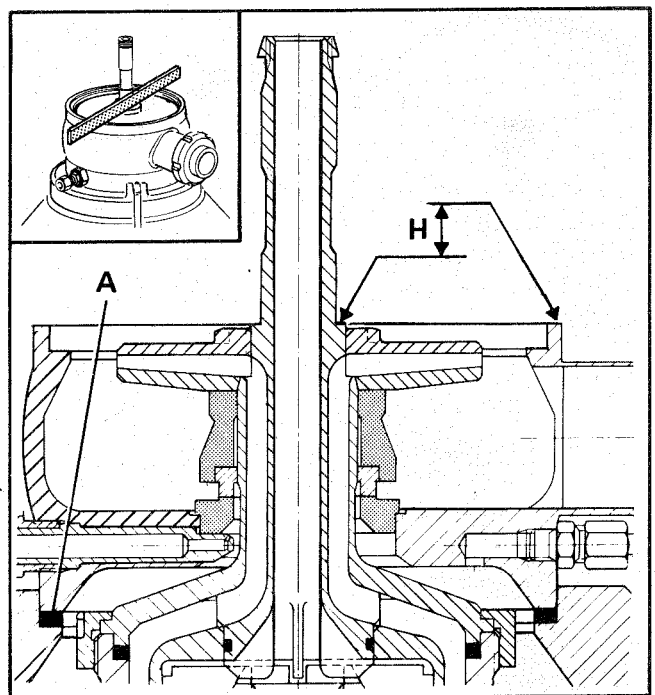
**MRPX 318/418**



**Outlet**

MRPX 314:  $H = 0 \pm 0.5 \text{ mm}$

MRPX 318/418:  $H = 3 \pm 0.5 \text{ mm}$



**CHECK POINTS**

– Inlet

(Height adjustment)

**INLET**

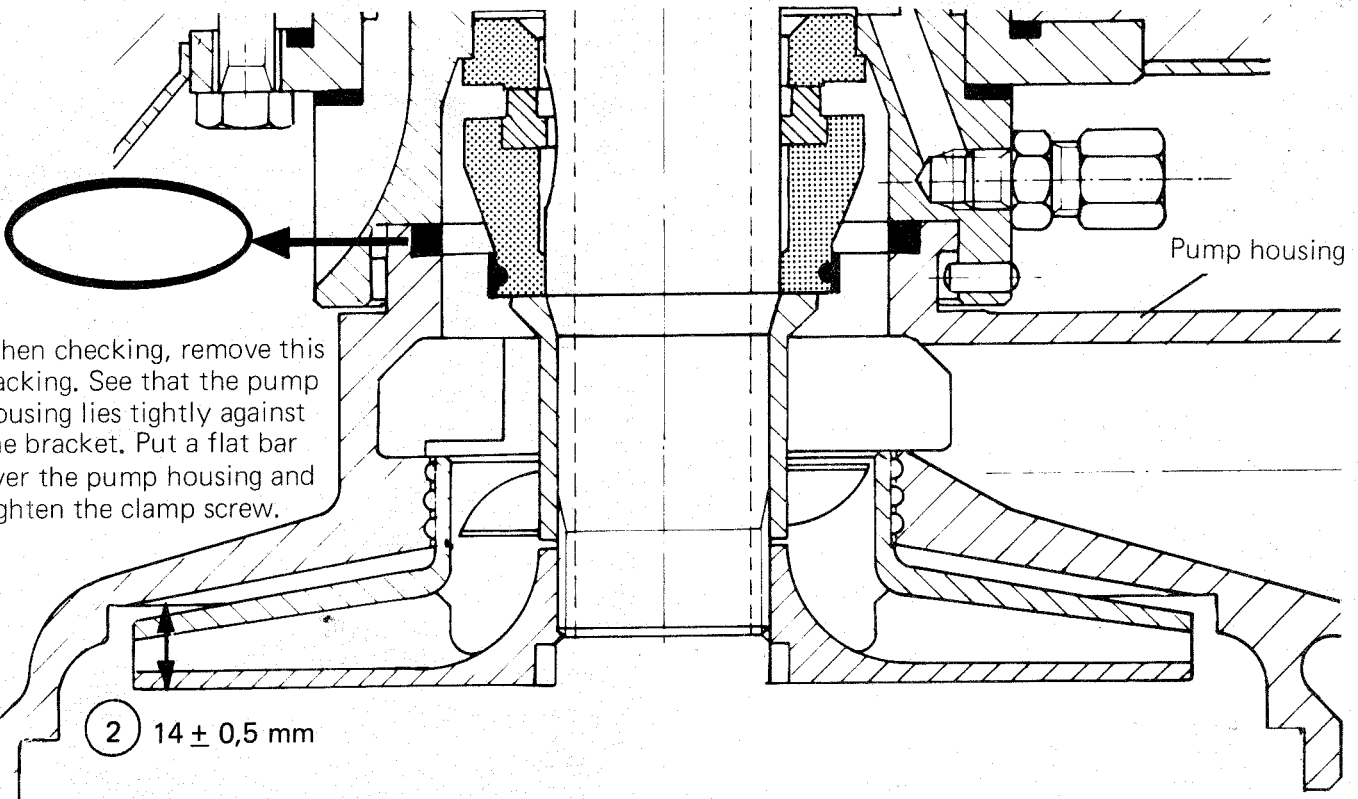
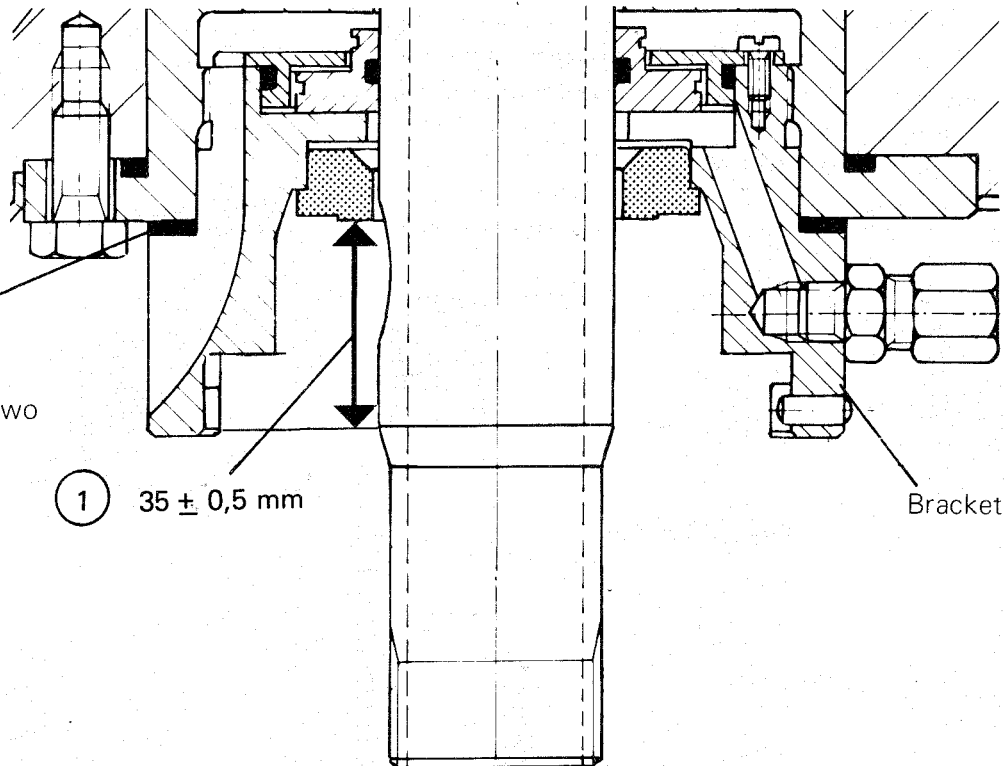
The inlet has got two measures, (1) and (2).

A

(Height adjusting ring with two different thicknesses, 1 mm or/and 0.5 mm)

①  $35 \pm 0,5 \text{ mm}$

Bracket



When checking, remove this packing. See that the pump housing lies tightly against the bracket. Put a flat bar over the pump housing and tighten the clamp screw.


②  $14 \pm 0,5 \text{ mm}$

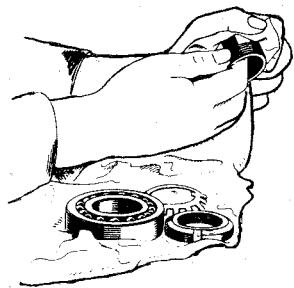
Pump housing

**Note!** Recheck the height position of operating water device and inlet by revolving the bowl spindle with bowl fitted in place. A scraping noise may be an indication of wrong positioning –readjust.

The height position of the outlet is checked in immediate connection with the start. Stop the machine immediately if a scraping noise occurs.

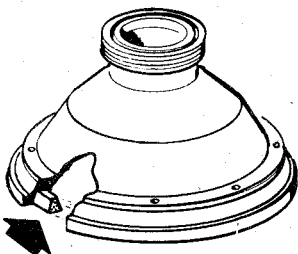
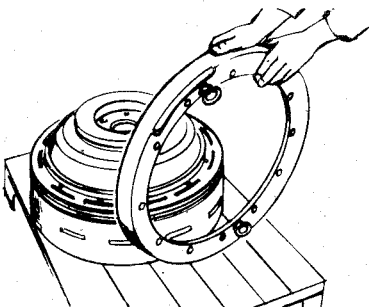
This chapter describes how to disassemble and assemble the machine in the correct order by means of the proper tools. **The relative positions of the parts appear from the machine drawings inserted at the end of the manual. Each part is illustrated and its part number is stated in the Spare Parts Catalogue.**

The symbol  appear here and there in text and illustrations. It refers to the page where description of the checking method/ recommendation is found.




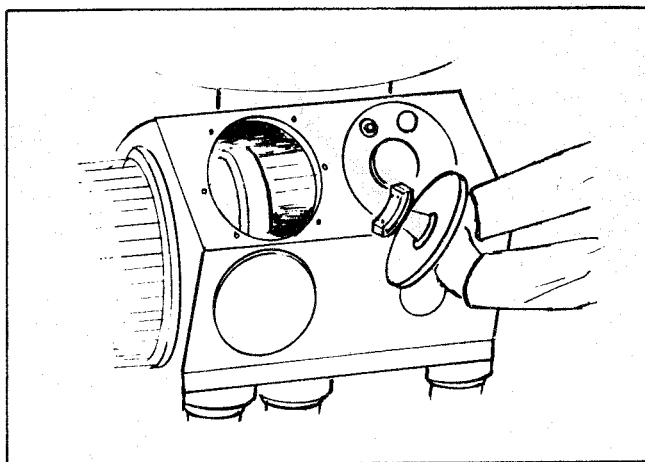
#### REMINDER

- Handle the parts with care. Protect them against damage, dust, and dirt. Make sure the parts are clean and free of burrs when mounting.
  
- Don't place parts directly on the floor. Use a clean rubber mat, fibreboard or a suitable pallet as base.
  
- Be'specially careful of the bowl hood seal ring. It may easily get scratched if the hood is put down carelessly and on a dirty base.
  
- Position the hoisting device very exactly when assembling and disassembling. **Never** use a hoisting device that works jerkily.  
  
An electrically operated hoist should have two speeds; 1.5 metre/minute and 6 meters/minute approx.  
**The lower speed is used when lifting the parts out of the machine, and into it respectively.**

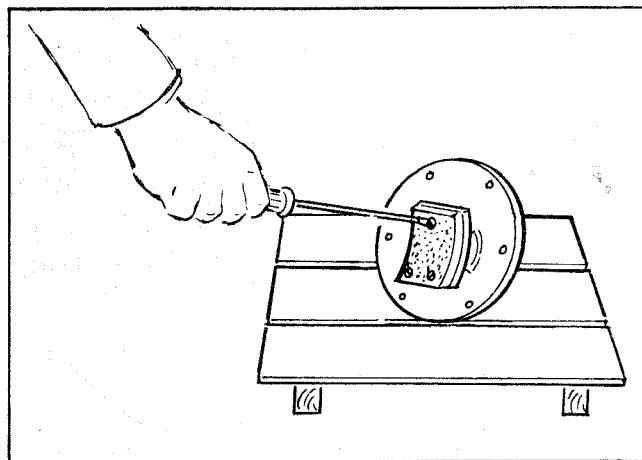


## EXCHANGE OF BRAKE LINING

 page 3:18



**1** Remove the brake cap.

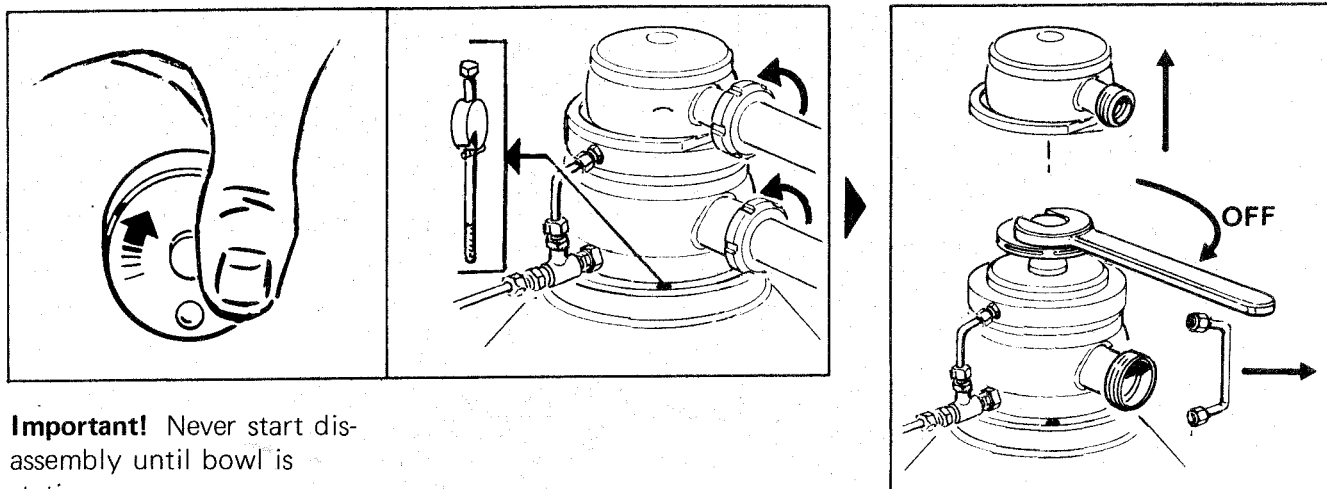


**2** Remove the screws and exchange the lining.  
Note: The screws are slotted in both ends.

REPLACEMENT OF OUTLET AXIAL SEALS (sealing element/wear ring)

page 3:1

DISASSEMBLY

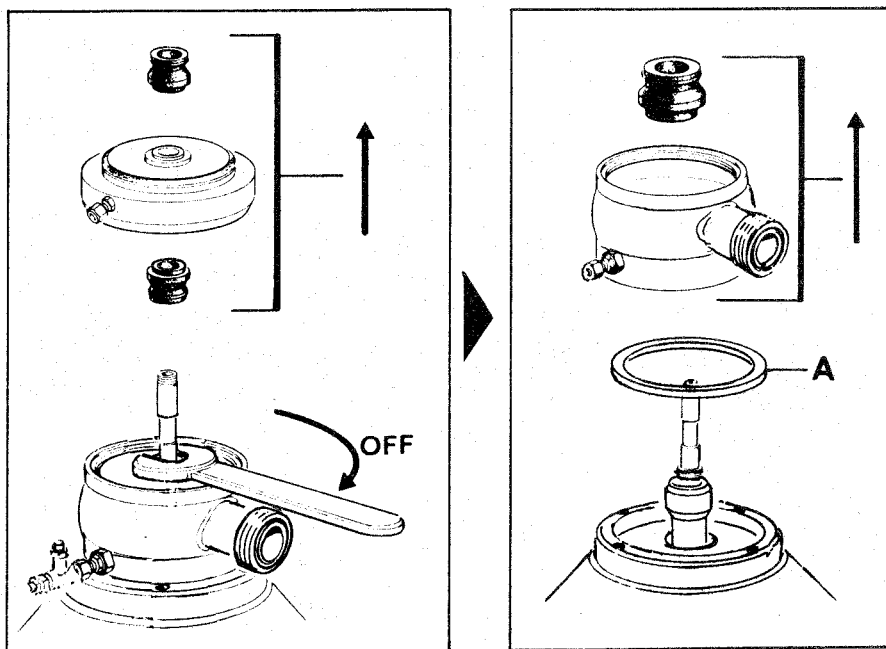


**Important!** Never start disassembly until bowl is stationary.

Upper impeller has left-hand thread and unscrews **clockwise**.

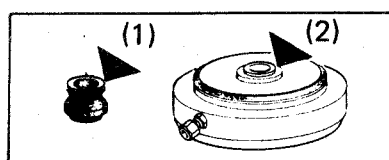
**Note!**

- o Observe where the rubber bellows belong if they are to be reused after disassembly. Bellows of equal dimensions must not be confused, as their carbon rings are broken in against their "old" wear rings.
- o The inside of a rubber bellows must in no circumstances be oiled to facilitate fitting (risk of slipping). Moisten the inside with water instead.



Lower impeller has left-hand thread and unscrews **clockwise**.

**A** = height adjusting ring



Replace sealing elements (1).

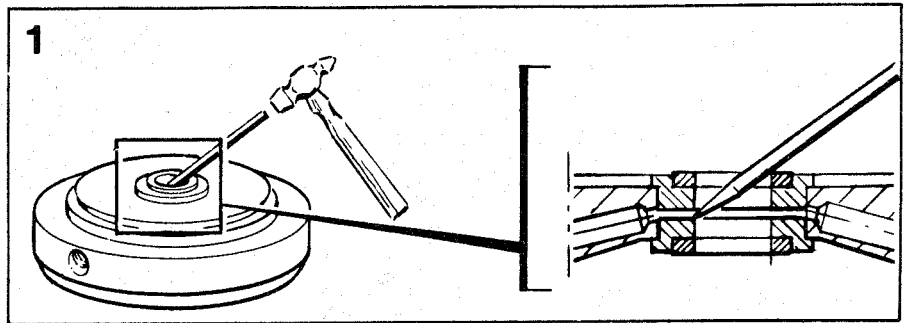
Check wear rings (2). When necessary replace them according to instructions on next page.



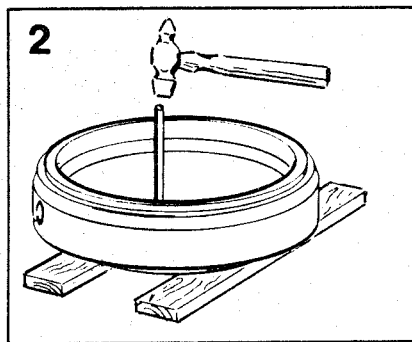
### REPLACEMENT OF WEAR RINGS

#### Rings of Intermediate Part

#### Disassembly

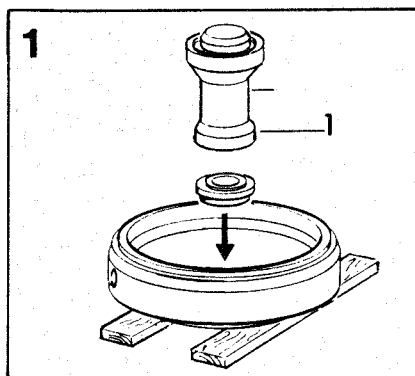


Apportion the blows evenly around the ring.

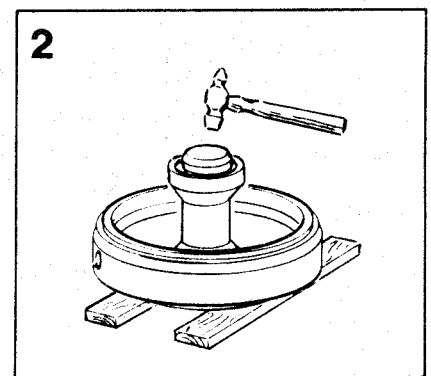


Invert the intermediate part. Put for instance two pieces of wood under it. Knock out the other ring.

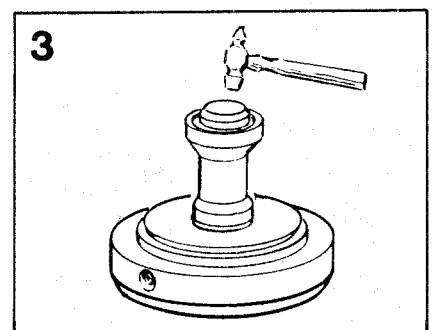
#### Assembly



Use the mounting tool (1).



Knock the new ring in place\*.

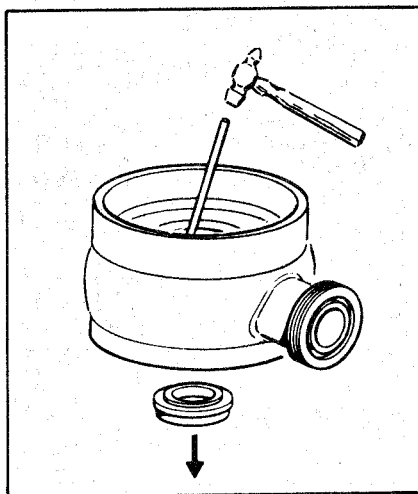


Invert the intermediate part.  
Knock the other ring in place.\*

**(Replacement of Wear Rings)**

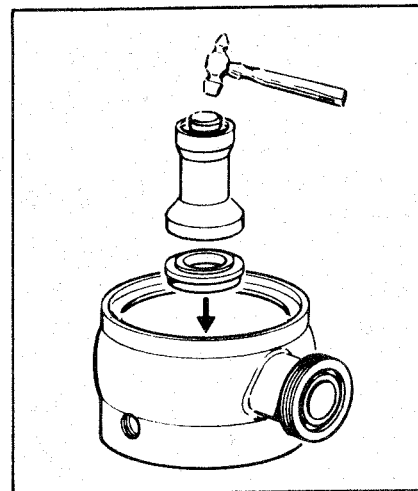
**Ring of Lower Outlet Housing**

**Disassembly**



Knock out the ring by means of a drift.

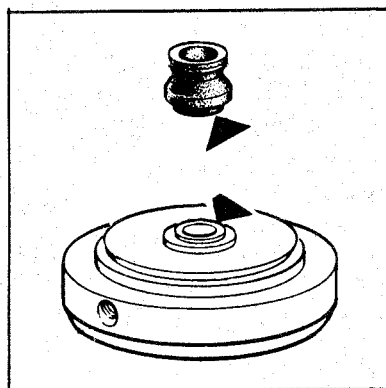
**Assembly**



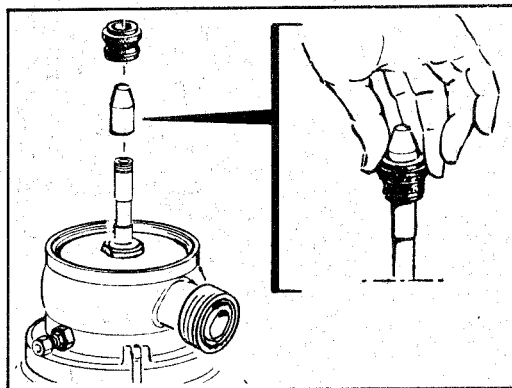
Knock the ring in place, using the mounting tool \*

**ASSEMBLY**

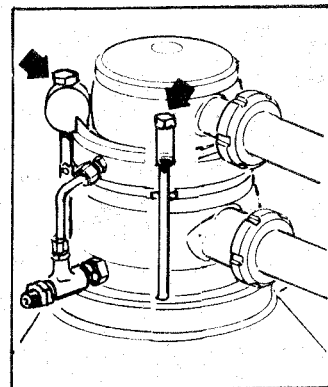
Assembly takes place in reverse dismantling order. Observe the following:



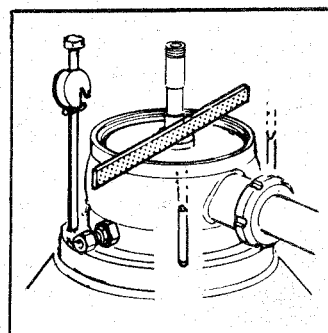
Make certain the axial seals are clean and have no defects. Lubricate the wearing surfaces with a few drops of castor oil.




Use the special sleeve from the tool set when mounting the two upper sealing elements.



Remember to tighten the hinged bolts firmly.



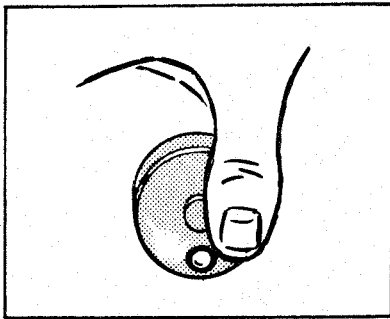
The height position has been properly adjusted before delivery from the works. However, whenever the bowl spindle has been stripped or the bowl replaced, recheck the height position.

 page 3:20.

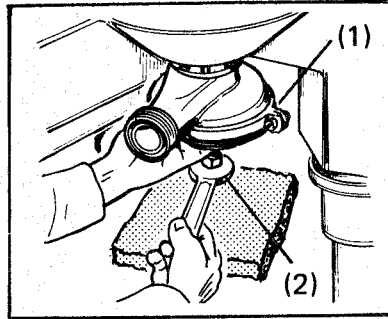
REPLACEMENT OF INLET AXIAL SEAL (sealing element/wear ring)

👁️ – page 3:1

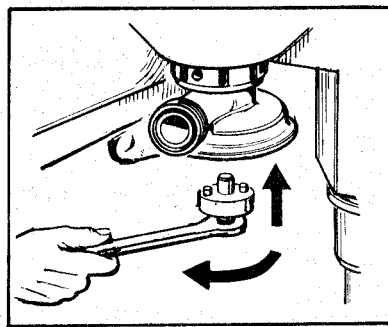
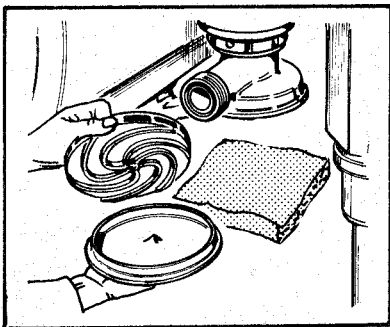
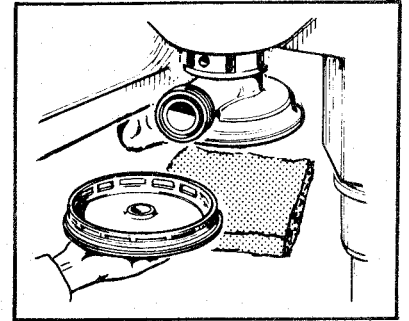
DISASSEMBLY



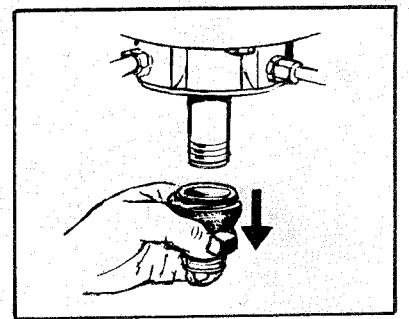
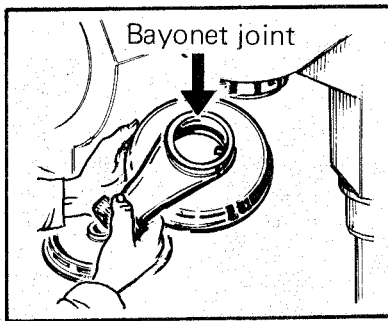
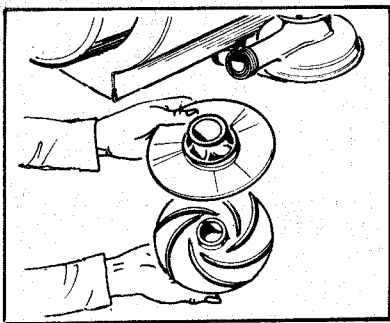
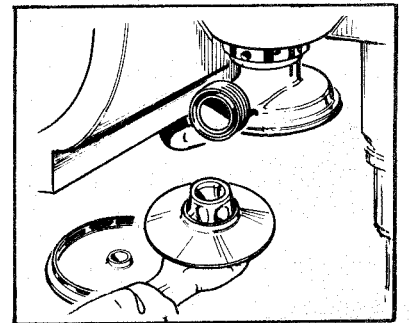
**Important!** Never start disassembly until bowl is stationary.



Remove the clamp coupling (1).  
Slacken centre screw (2).  
Support the pump housing cover.

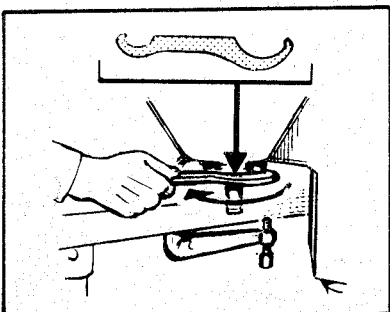


Unscrew the impeller with  
pin spanner from tool set.

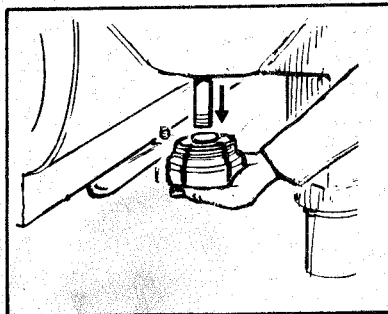


Remove the sleeve with sealing  
element.

Replace the sealing element.  
Inspect the wear ring in place.  
When necessary, remove holder  
(see next Fig.) and exchange the  
ring as explained on next page.

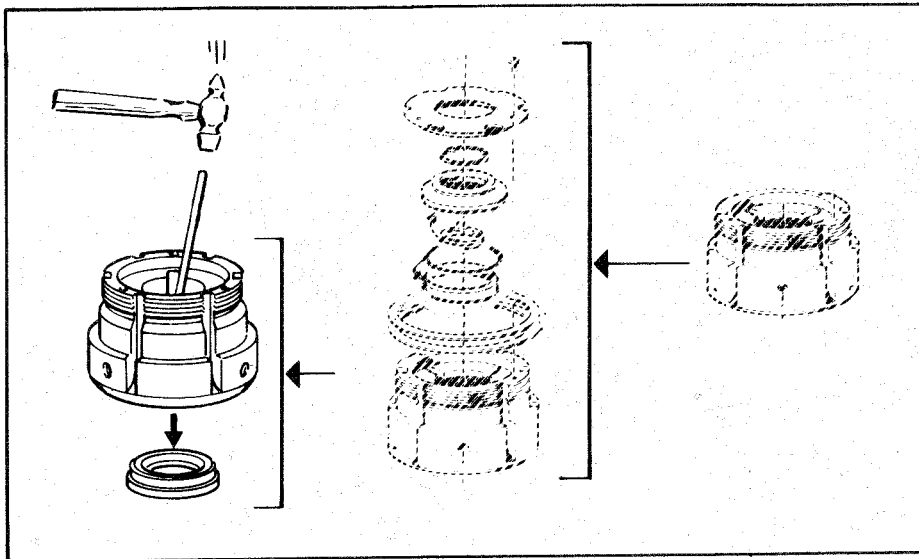


Remove the flushing water connection  
nipples. Loosen the holder.



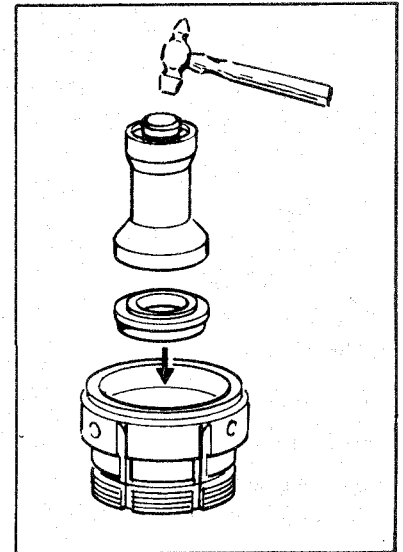
**REPLACEMENT OF WEAR RING**

**Disassembly**



Knock out the ring by means of a drift.

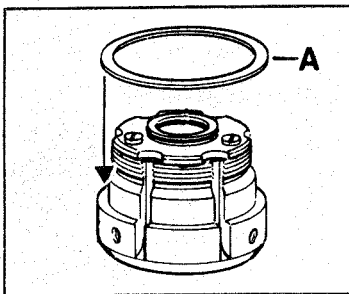
**Assembly**



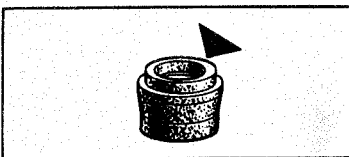
Knock the ring into place using the mounting tool \*.

**ASSEMBLY**


Assembly takes place in reverse dismantling order. Observe the following:



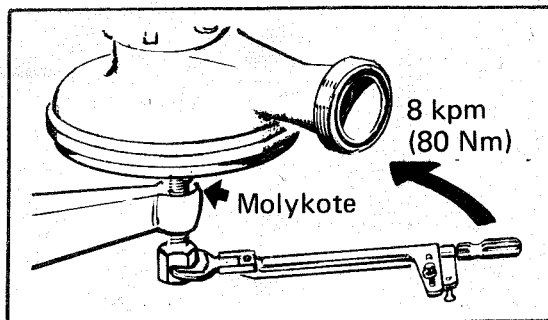
o The height position is properly adjusted before delivery from the works by means of one or more height adjusting rings (A). Accordingly, if the pump is disassembled for replacement of for instance wear ring, be sure to put in the same number of height adjusting rings as was originally provided.



o Whenever the bowl spindle has been stripped or the bowl replaced the height position must be rechecked.

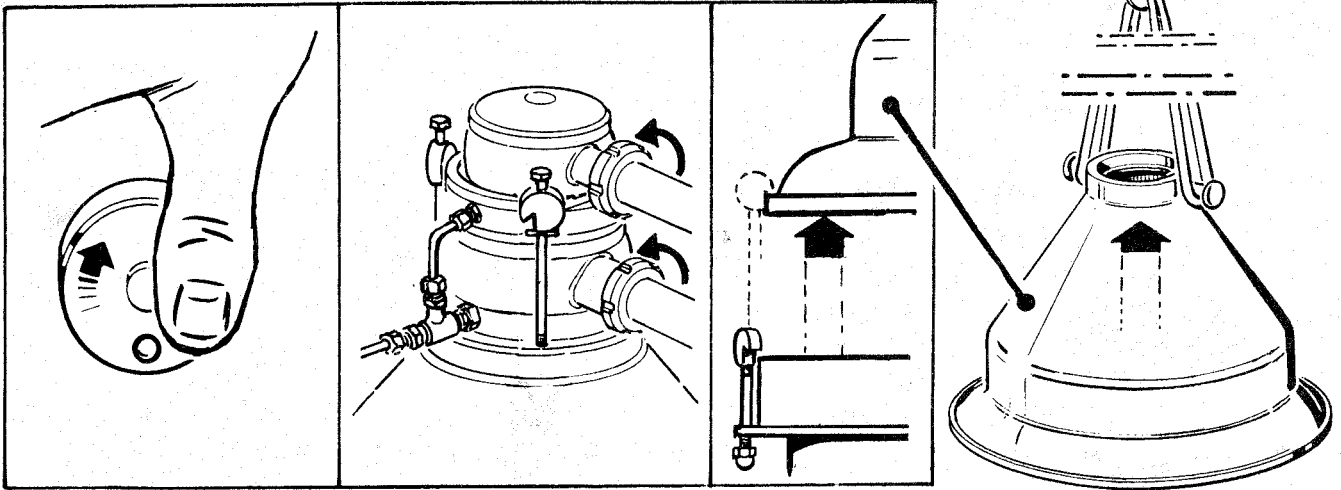
 Height adjustment – page 3:20.

Make certain the wearing surface of sealing element and wear ring is clean and undamaged. Apply a few drops of castor oil to one of the surfaces.



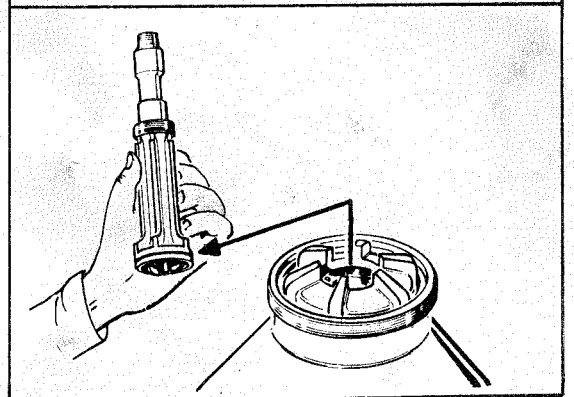
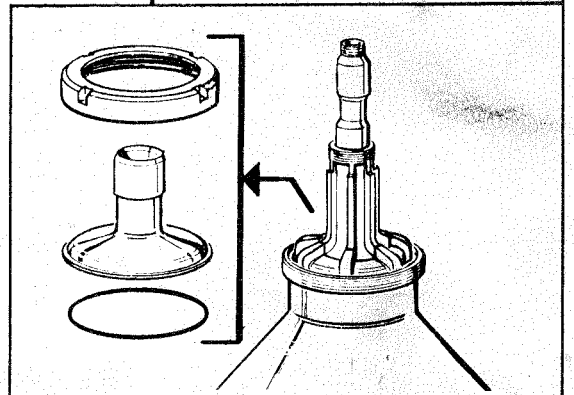
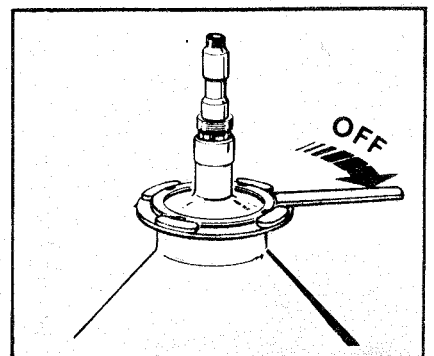
The central screw of the pump housing cover must not be tightened at a higher torque than that indicated in the figure.

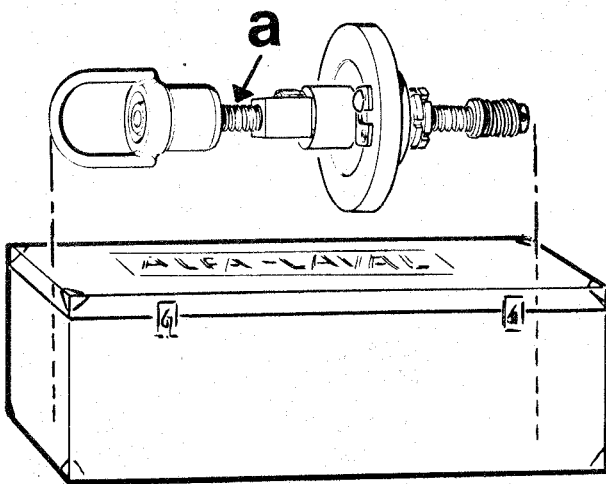
COMPLETE DISASSEMBLY



**Important!** Never start disassembly until bowl is stationary.

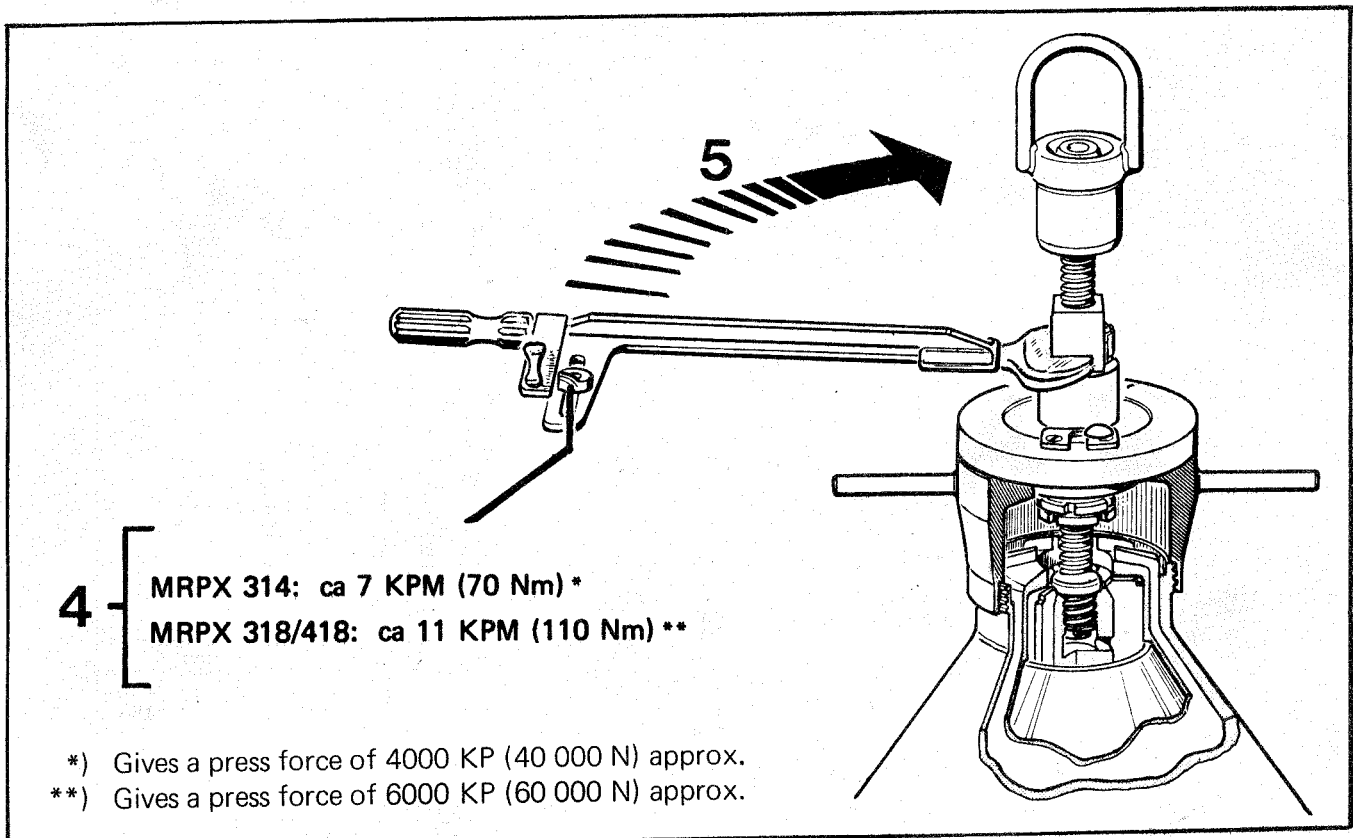
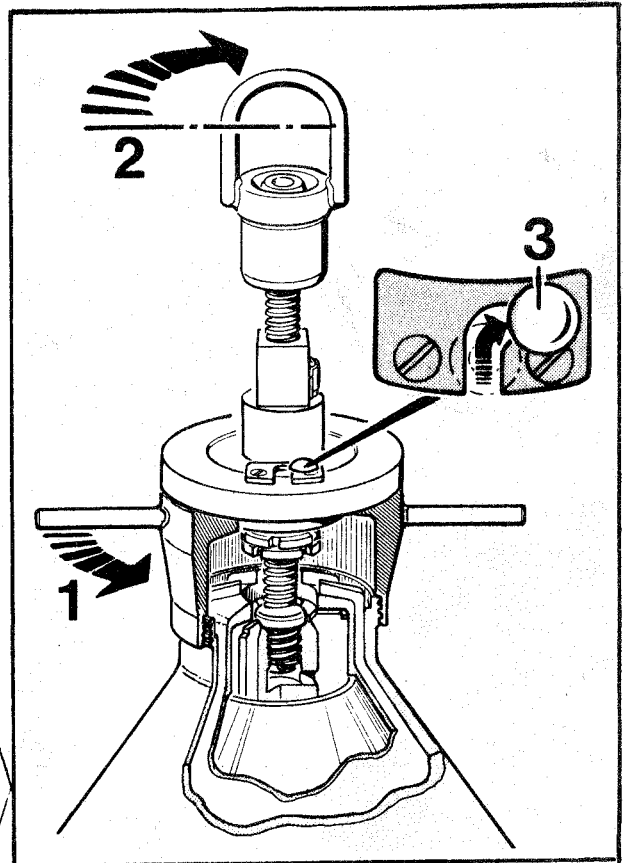
Dismantle outlet parts as advised on page 4:3.

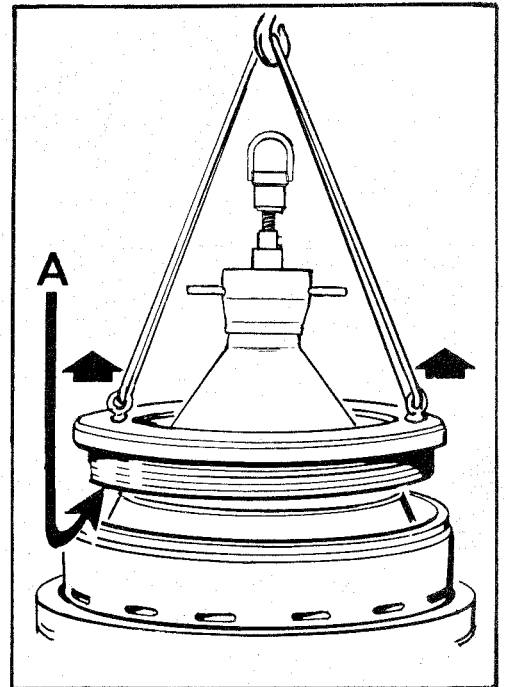
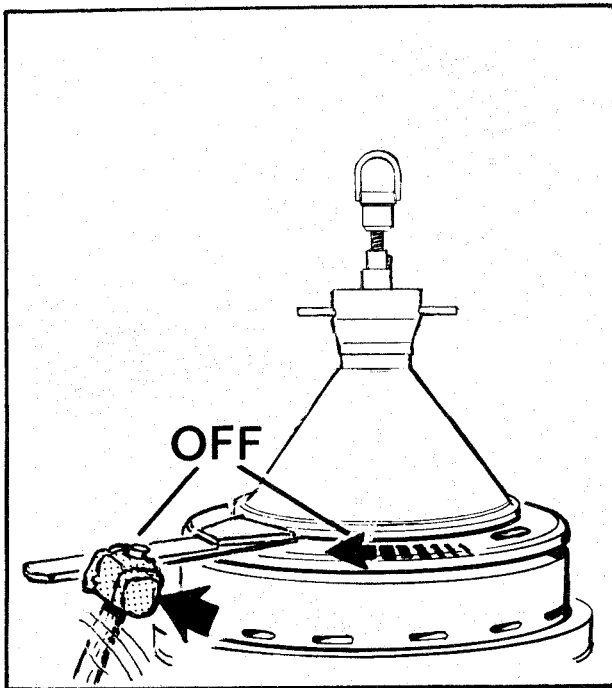





**a)** Make certain the thread of the compression tool is free of dirt and is greased.

Before unscrewing the large lock ring neutralize the disc set pressure.

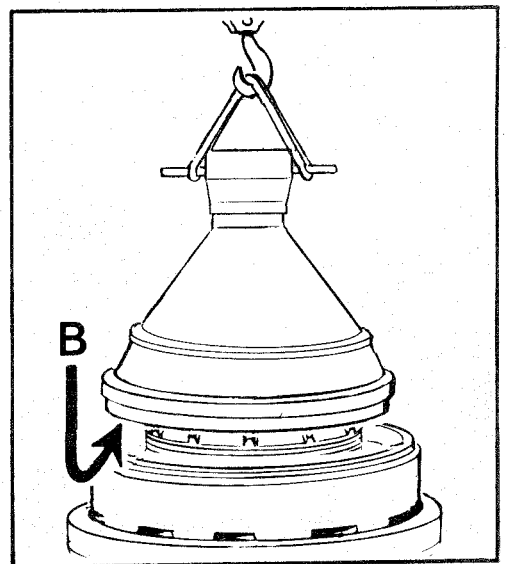
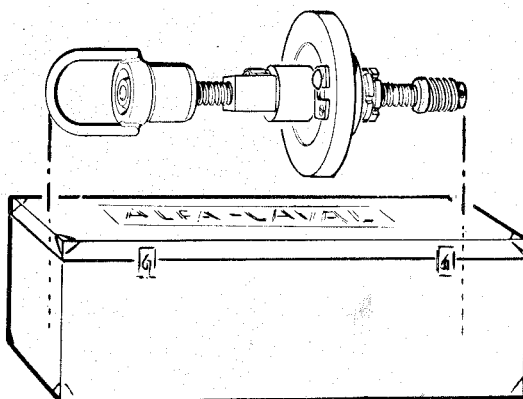
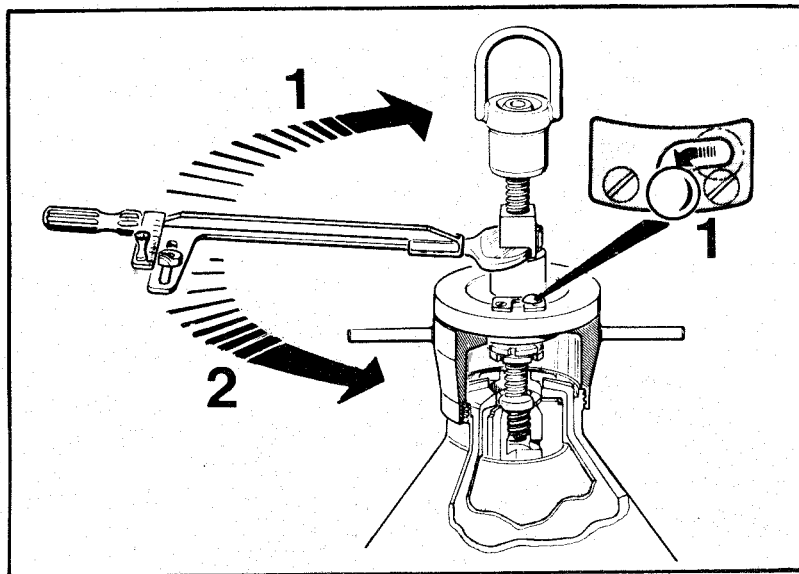





**Note!** Take care not to damage the contact surface (A).

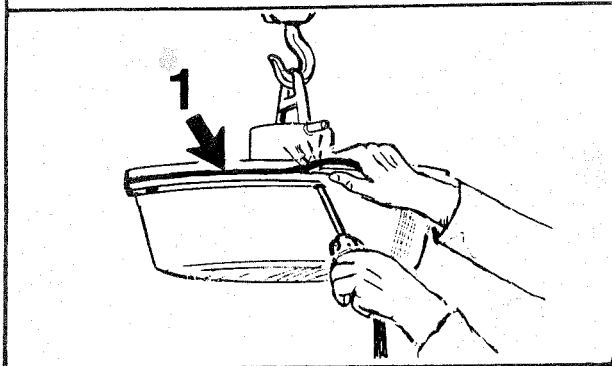
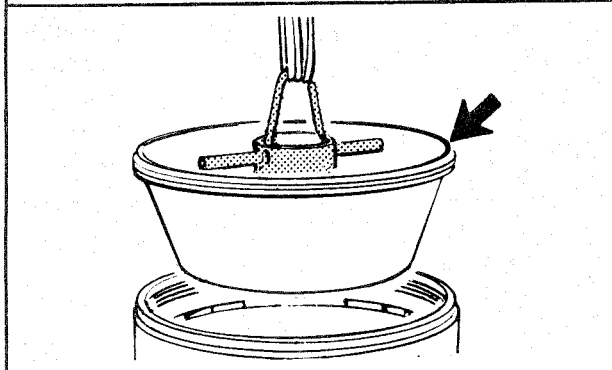
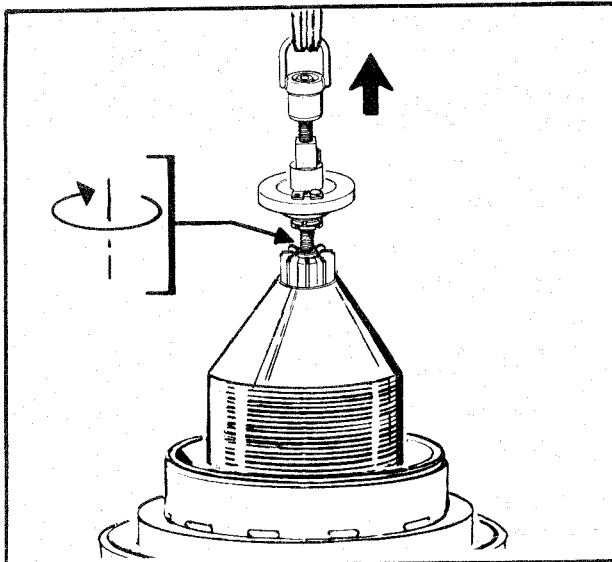
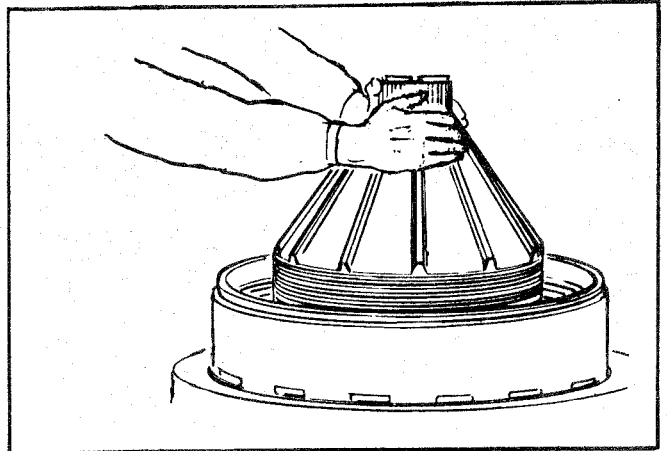
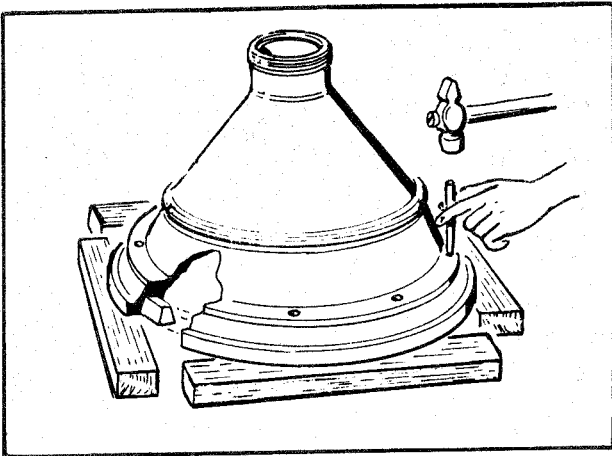
 — page 3:5


Neutralize press force of tool.




**Note!** Take care not to damage the seal ring (B).

 — page 3:8.

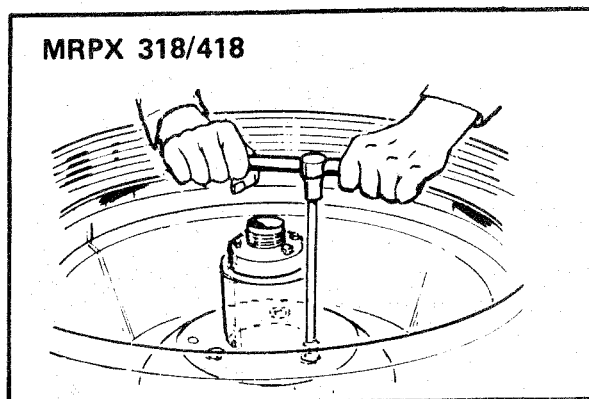
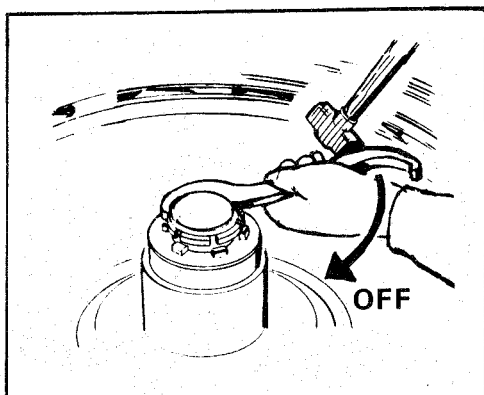


 Check washing efficiency — see Operator's Manual "OM".

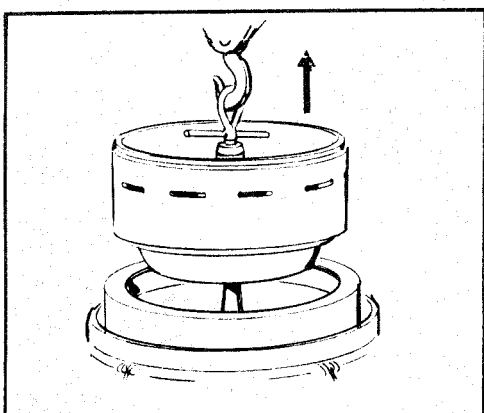
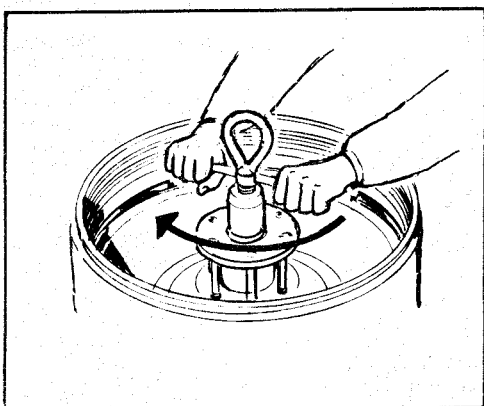
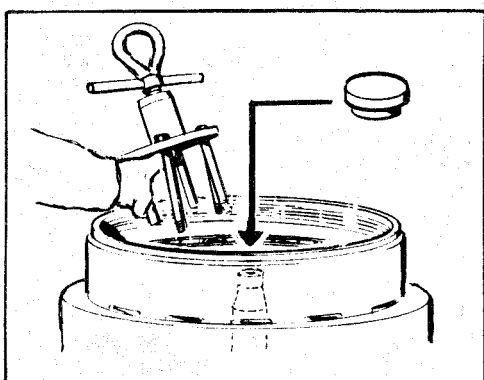
 The sliding bowl bottom edge sealing against the bowl hood — page 3:8.  
Erosion — page 1:10.

If seal ring (1) of sliding bowl bottom should be replaced and compressed air is available, inject compressed air through the hole on the underside. This will press the ring out of the groove far enough to make it easily graspable.





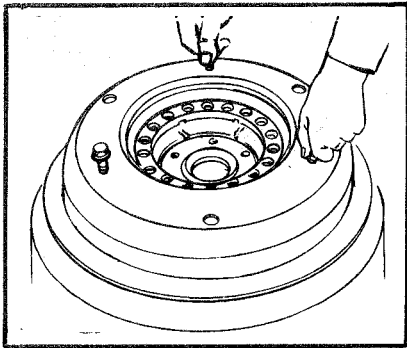
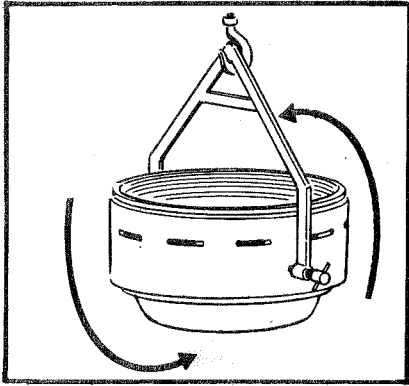
Remove the three screws from the bowl body.



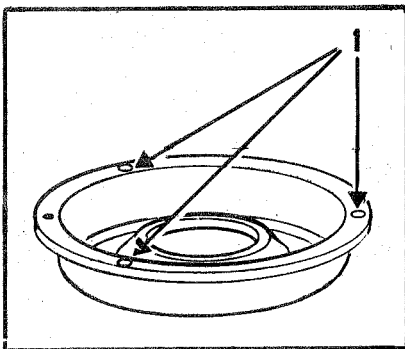
**Note!** Put down the bowl body carefully. Bumping against the base may cause damage to the ejection mechanism.

MRPX 314 (Ejection Mechanism)

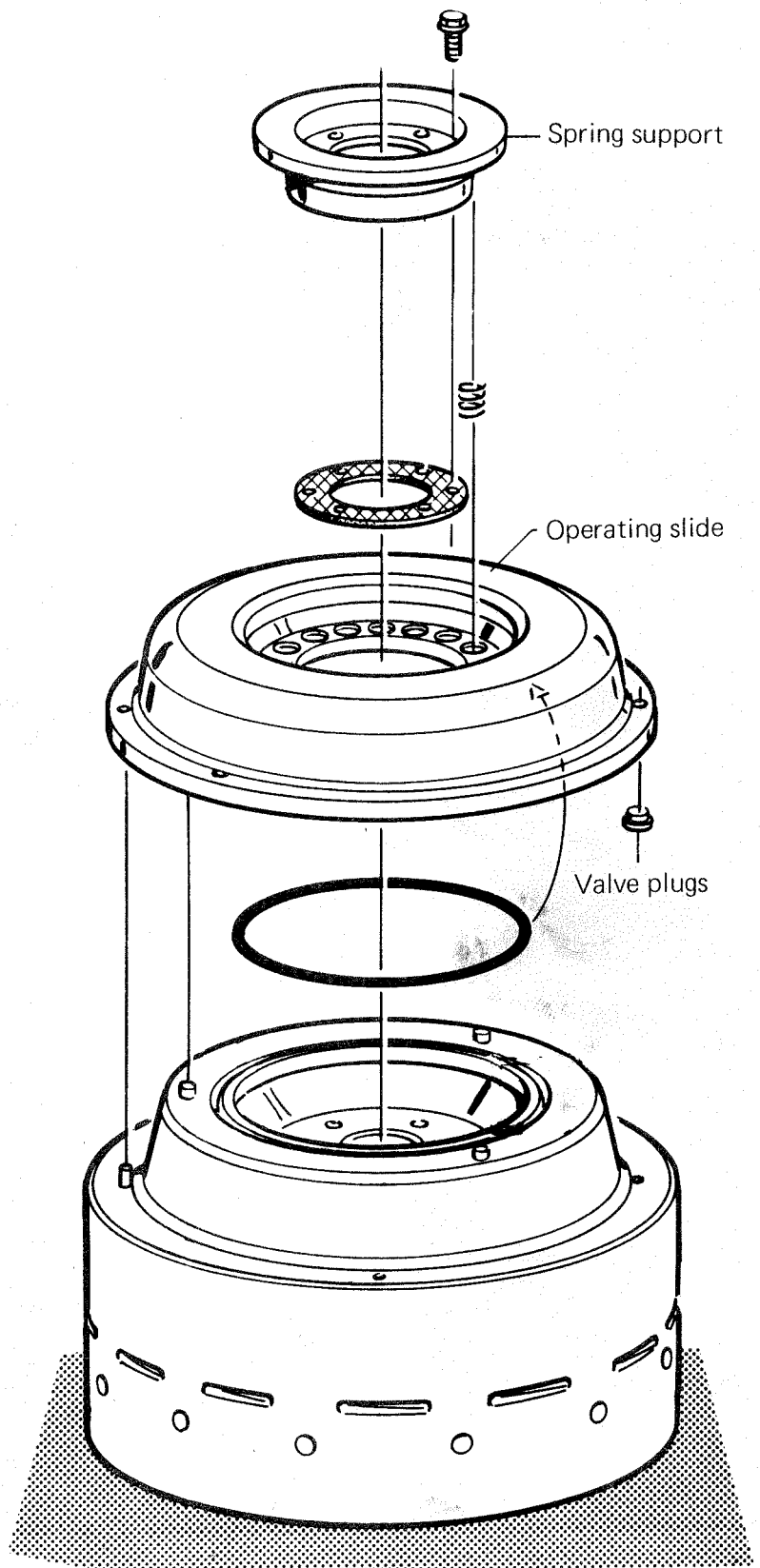
 — page 3:9




Loosen the operating slide using the screws of the spring support.

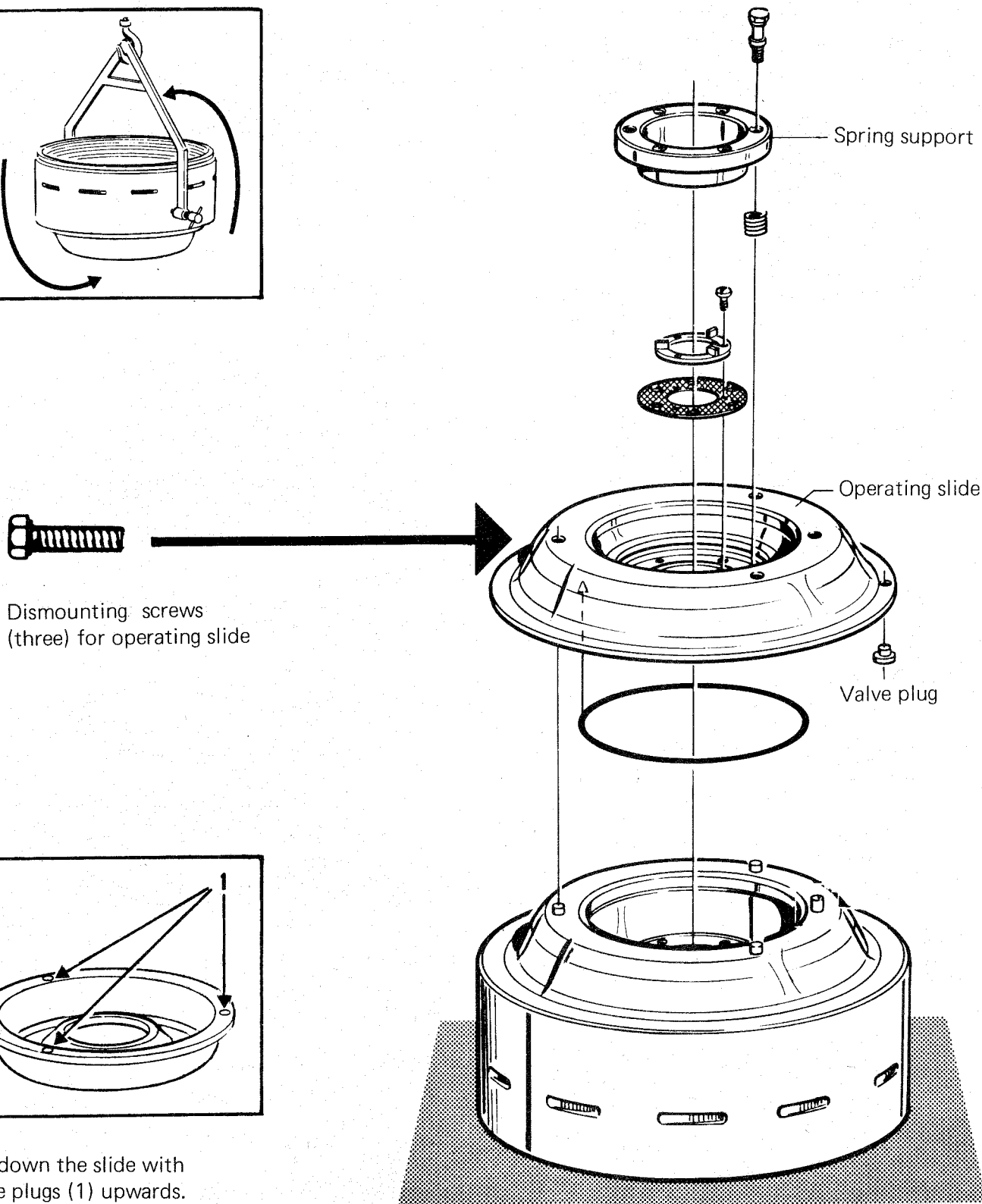
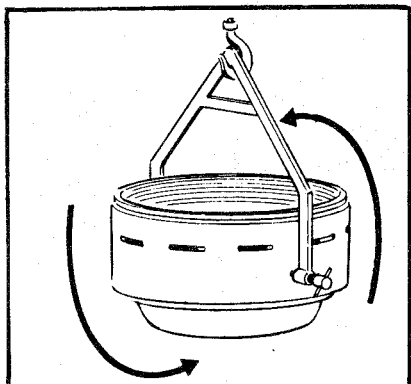


Put down the slide with screw plugs (1) facing upwards.

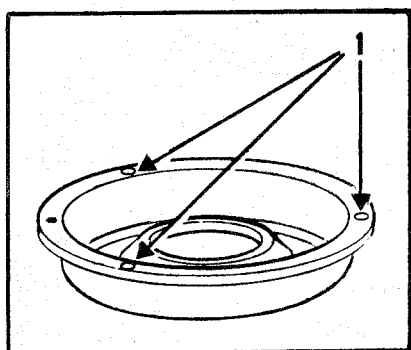


MRPX 318/418 (Ejection Mechanism)

 — page 3:9



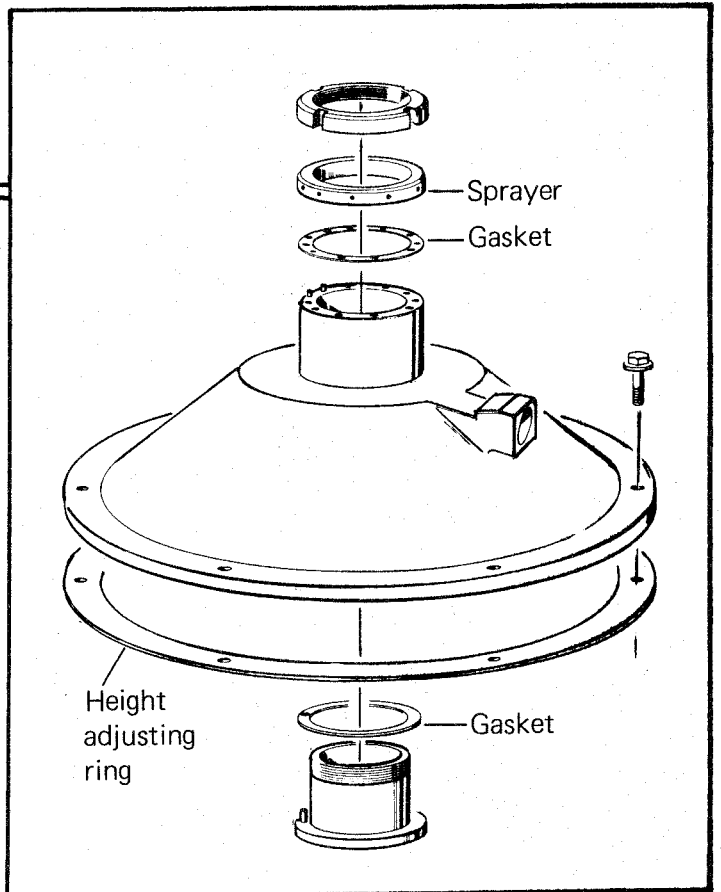
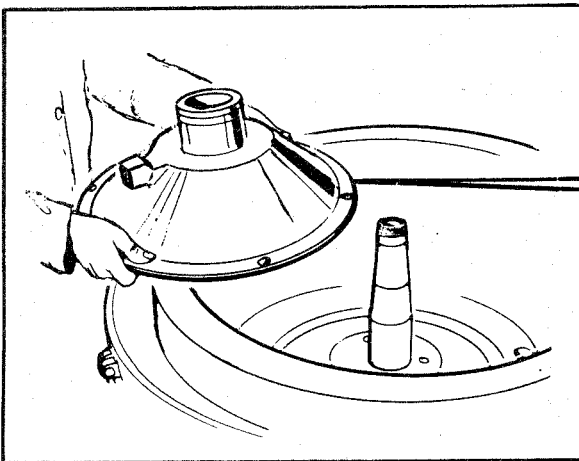
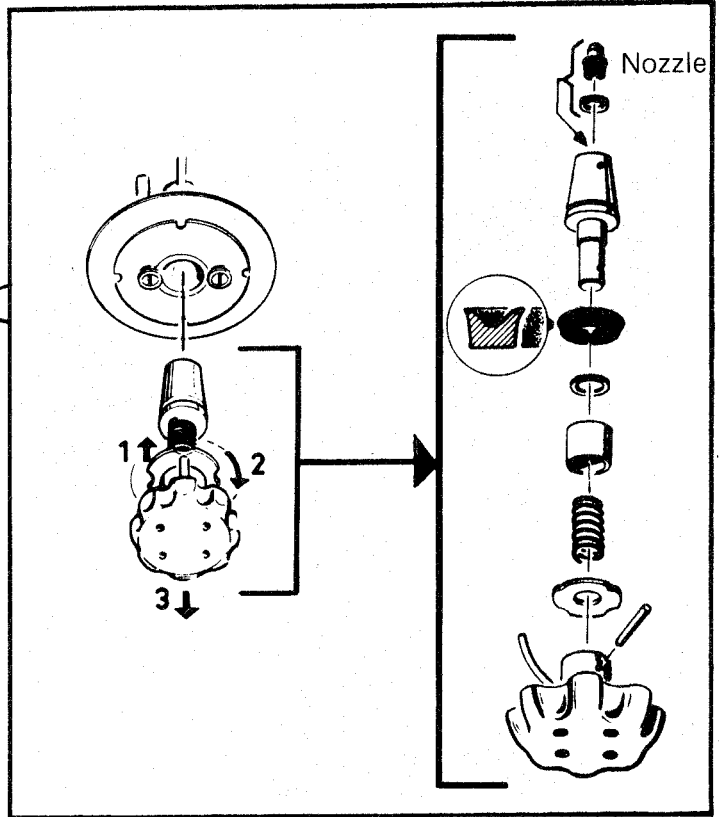
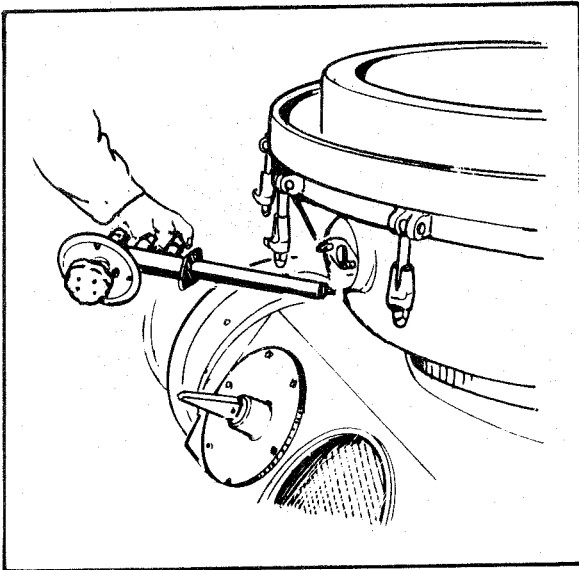
Dismounting screws  
(three) for operating slide



Put down the slide with  
valve plugs (1) upwards.

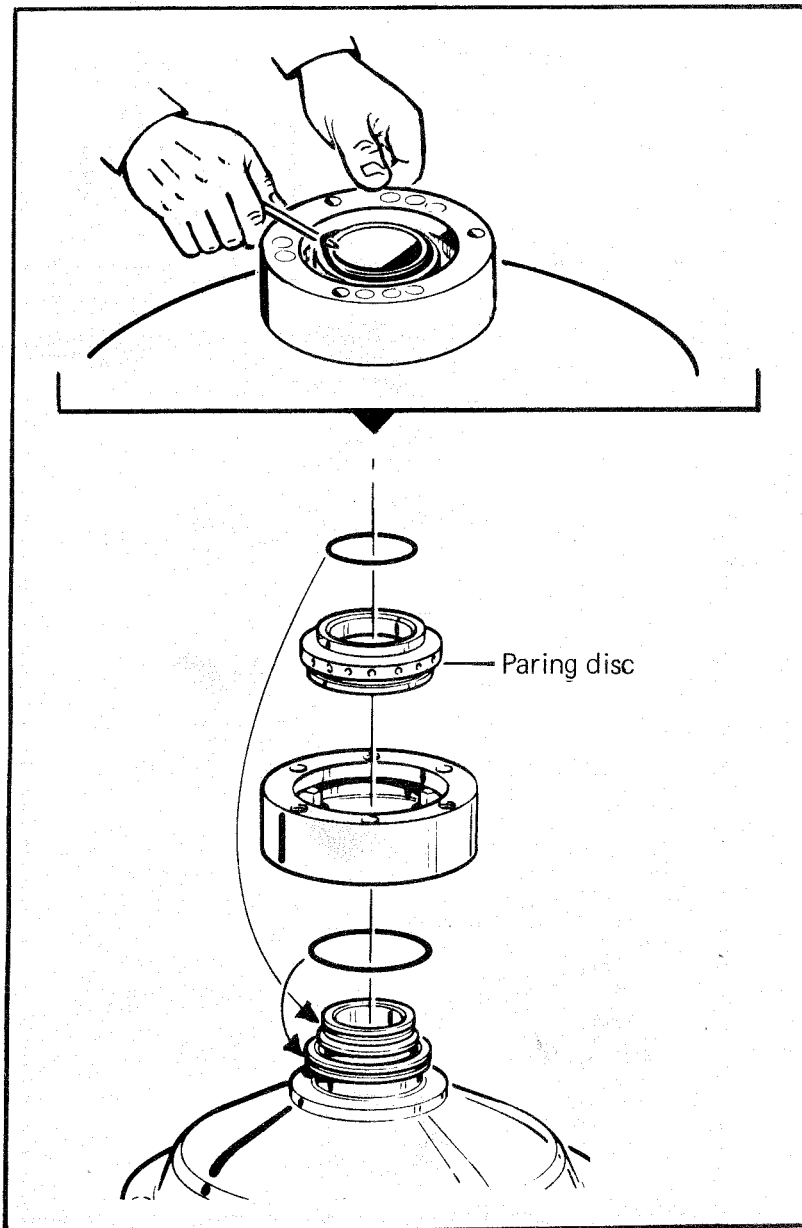
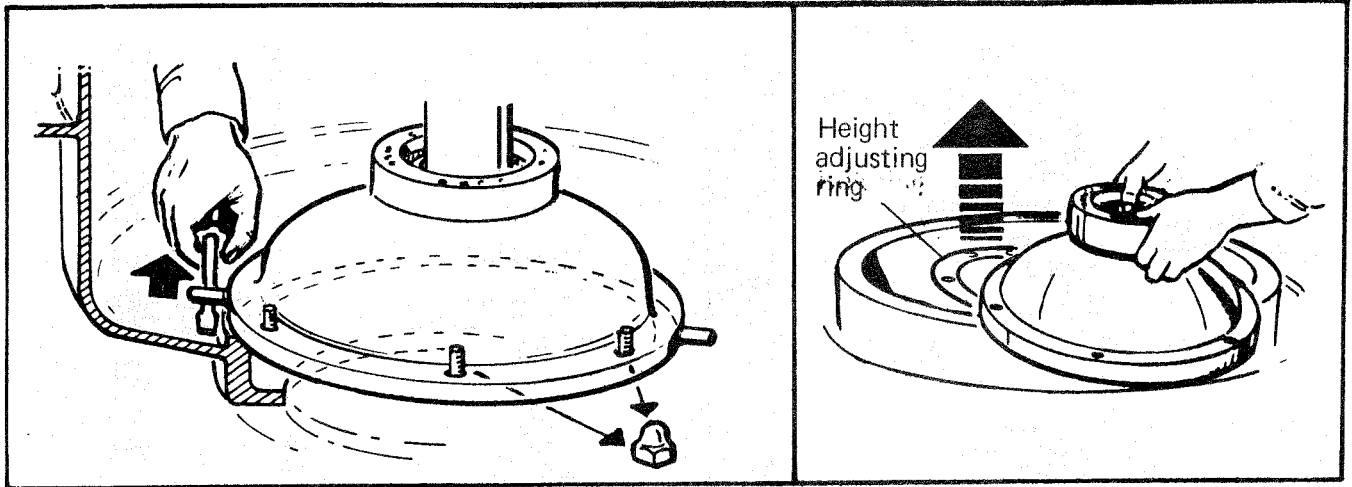
MRPX 314 (Control Valve and Operating Water Distributor)

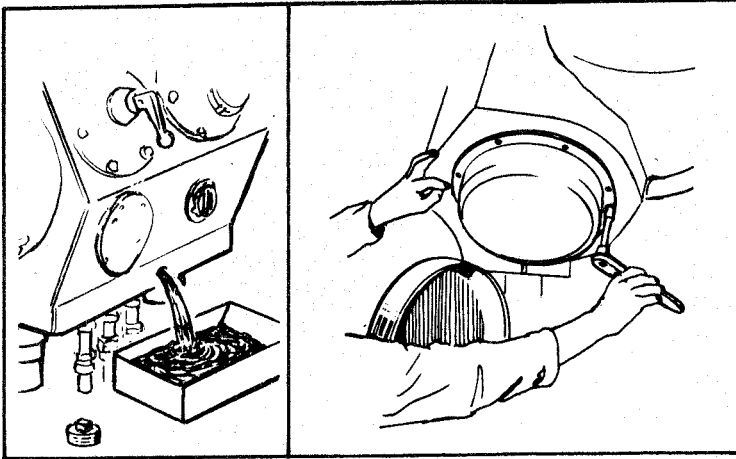
— page 3:9




MRPX 318/418 (Paring Disc Device)

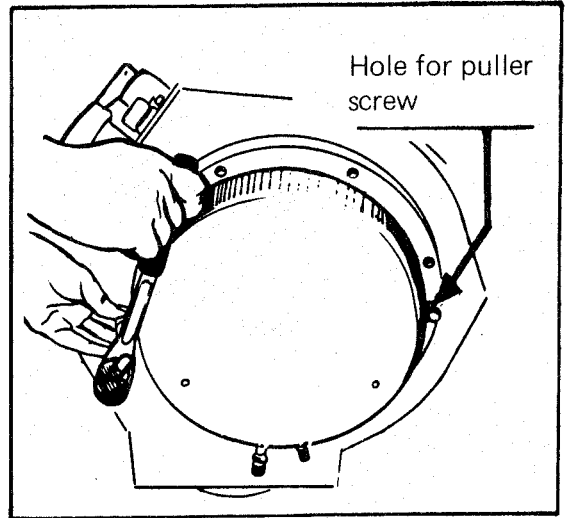
— page 3:9



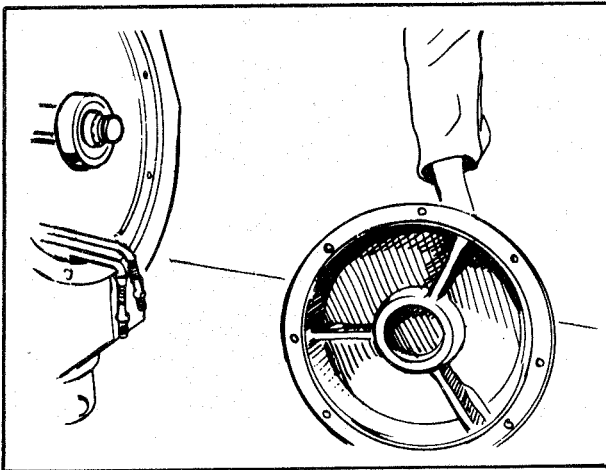


Drain off oil in worm gear housing.  
**Note!** The oil may be hot.

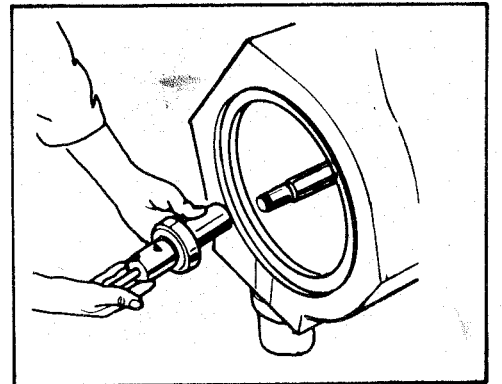
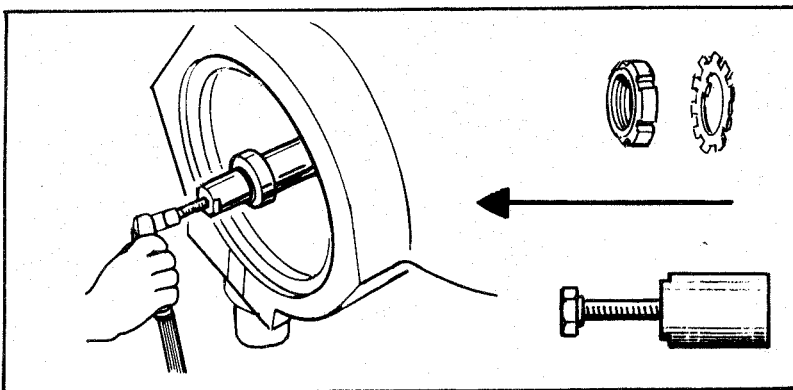
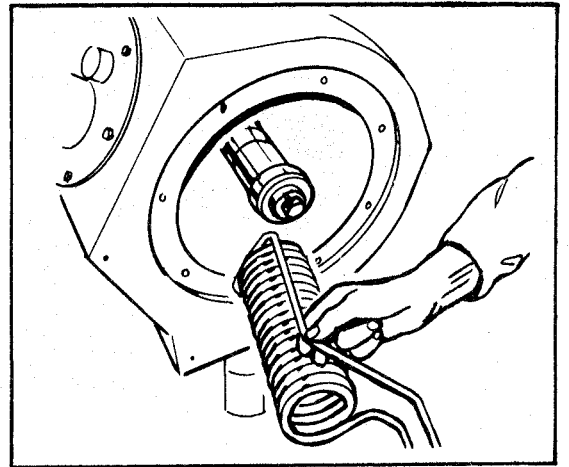
 Radial wobble of bowl spindle — page 3:13

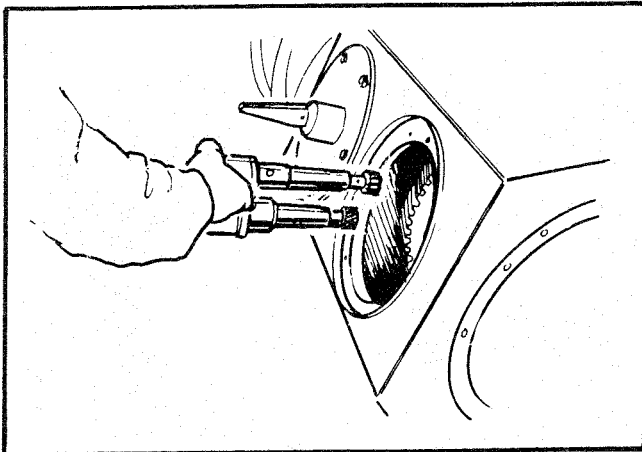


Ease off the bearing shield, using two of its screws.

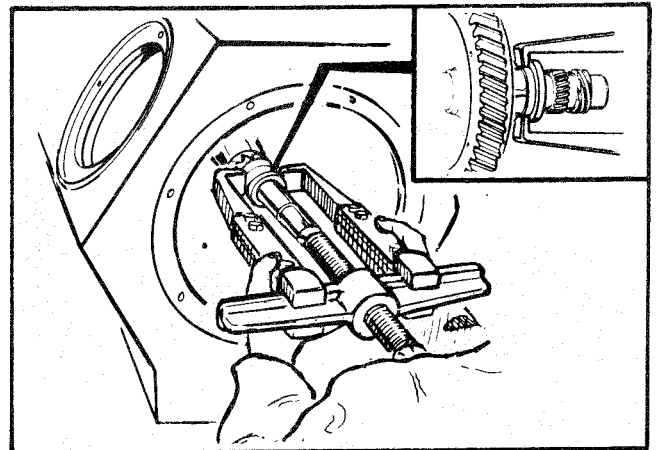


**Note!** Mind your feet. Shield is quite heavy.

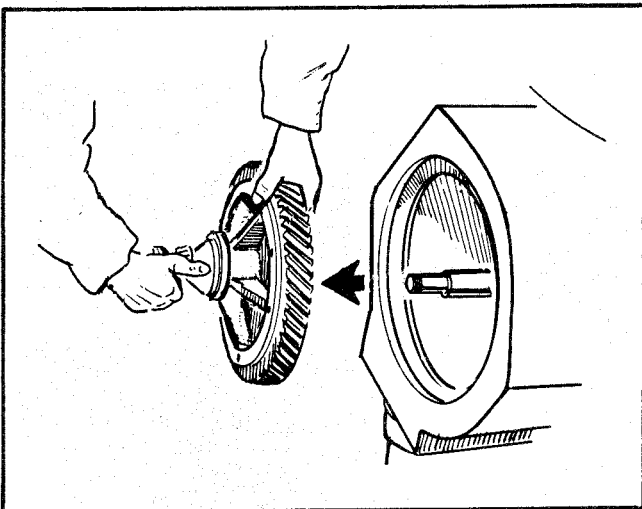




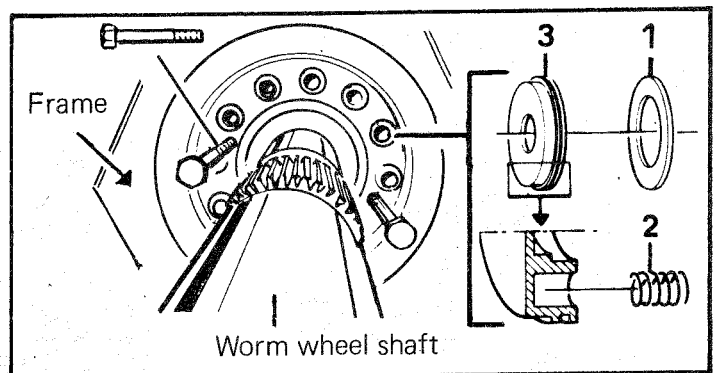
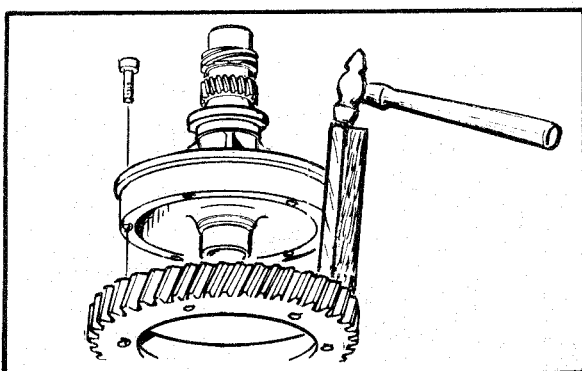
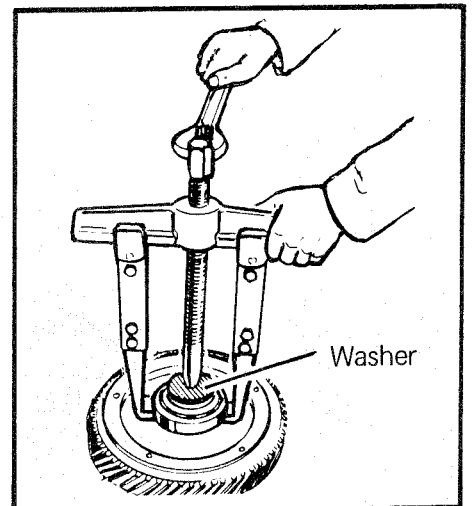
👁️ Tachometer — page 3:19.



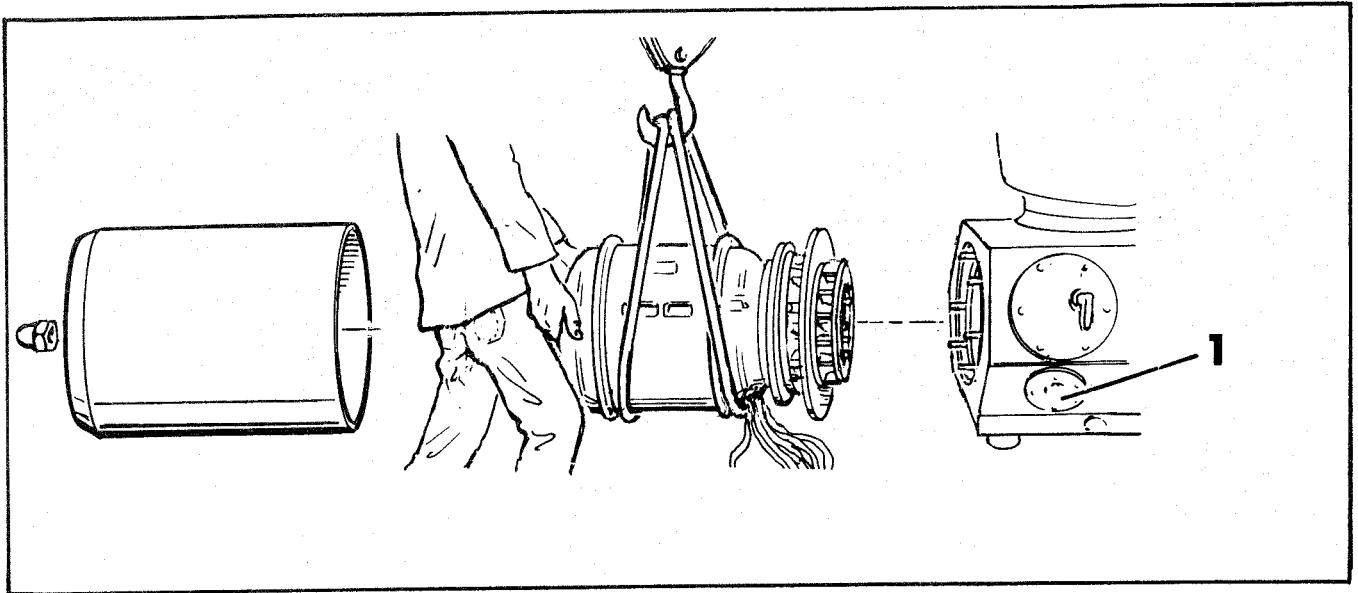
If worm wheel is stuck: use a puller.



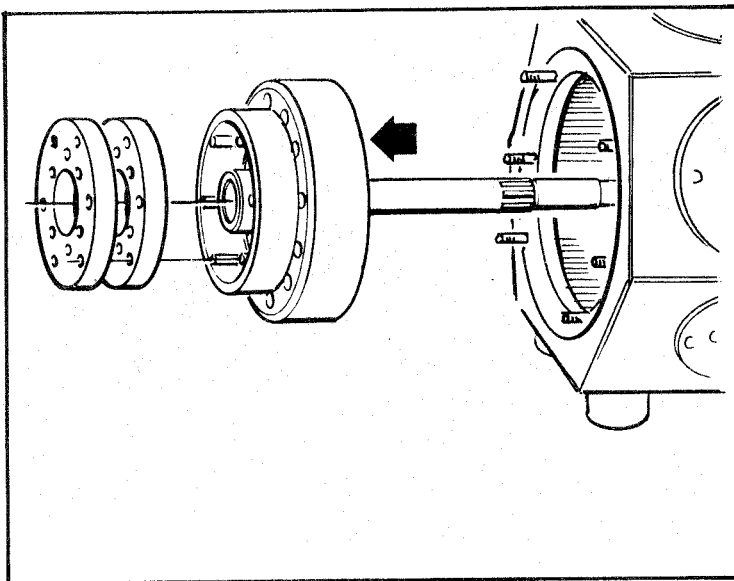
👁️ Worm wheel — page 3:15




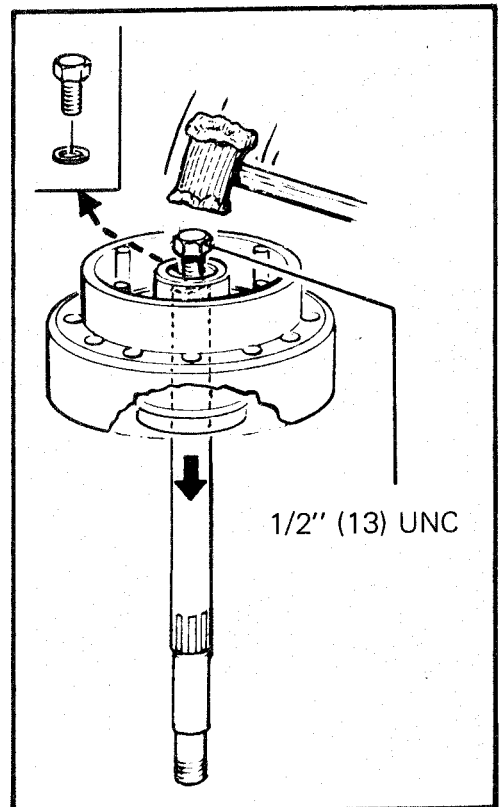
1.. Thrust disc    2. Spring    3. Seal washer



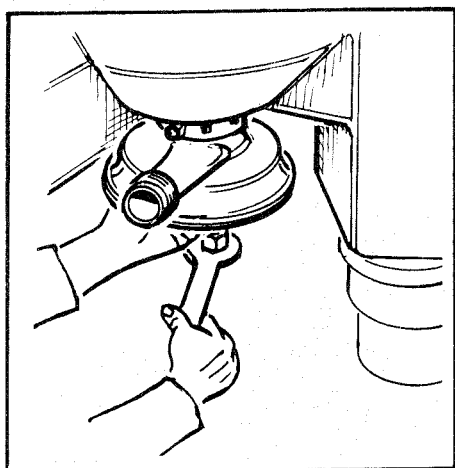
**Note!** Mark the cables before disconnecting



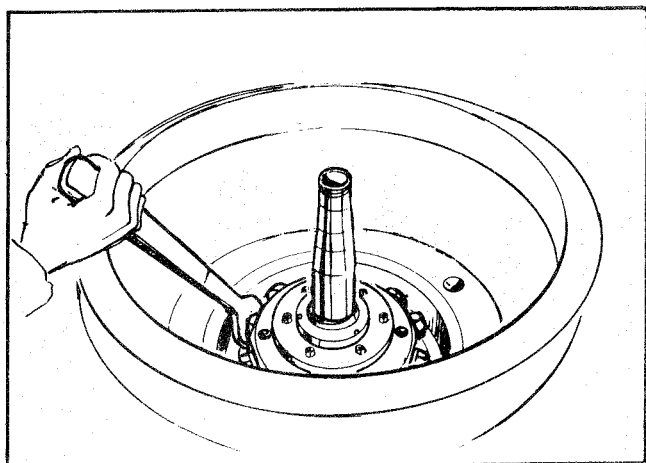
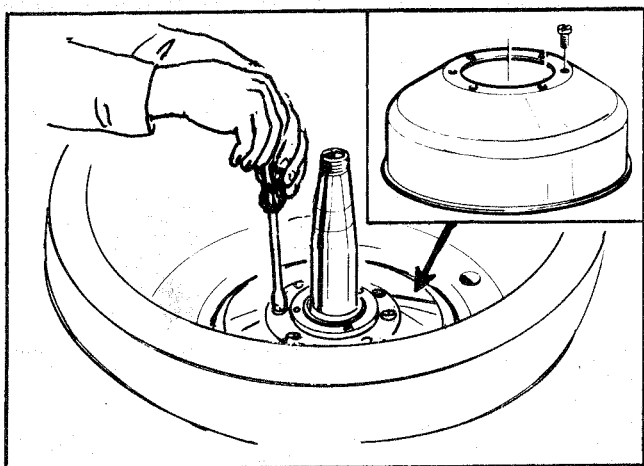
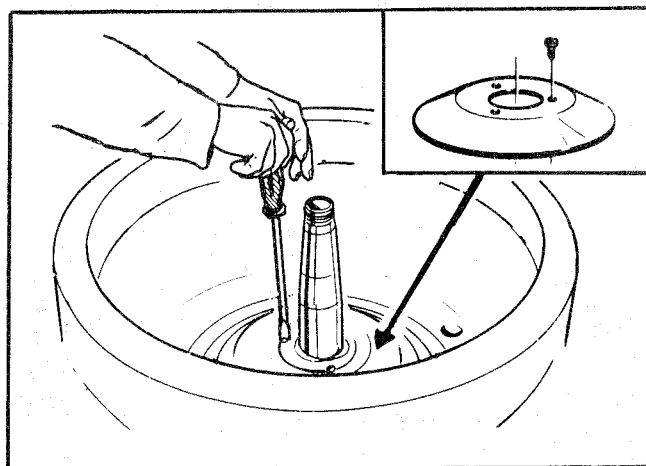
 Elastic plates — page 3:17



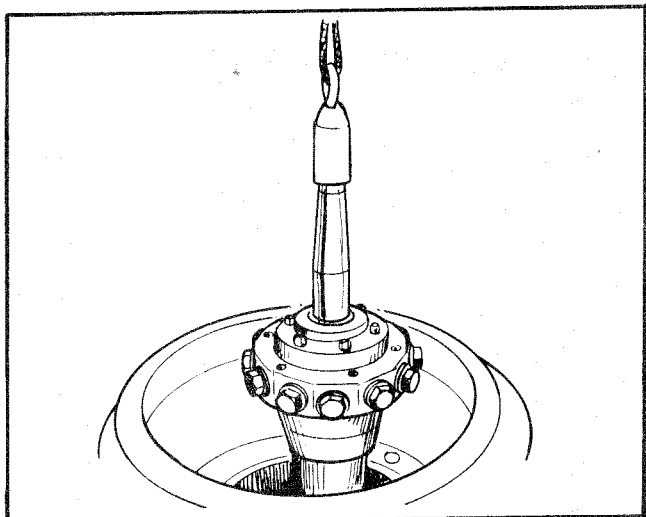
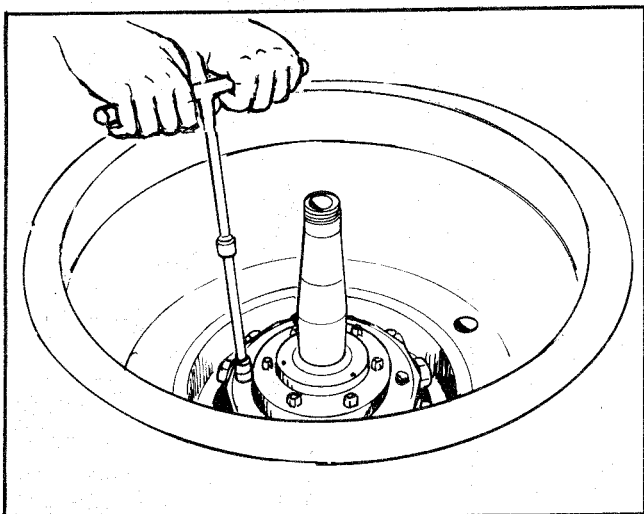




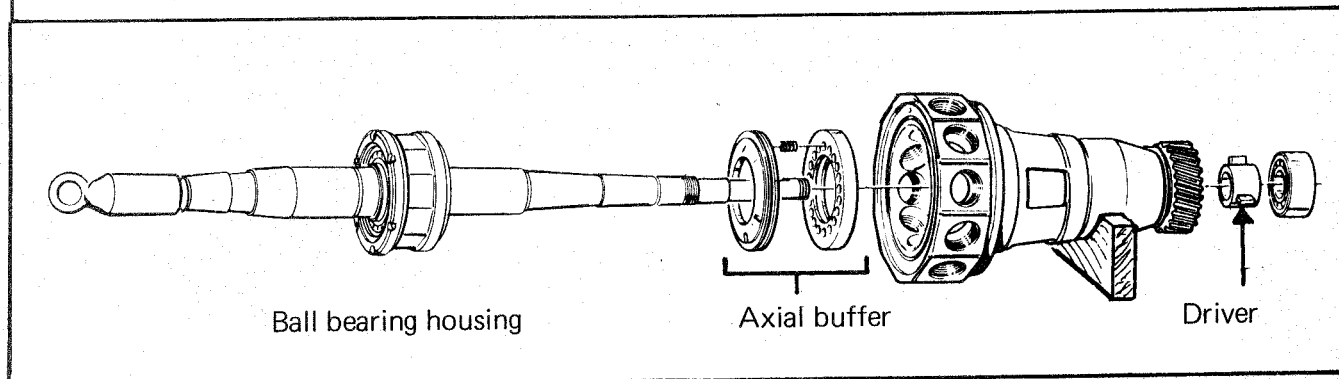
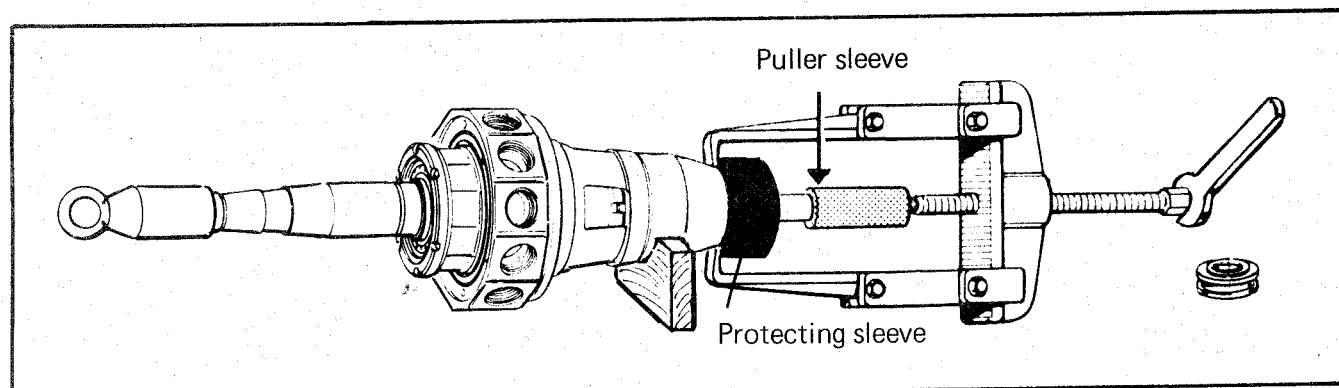
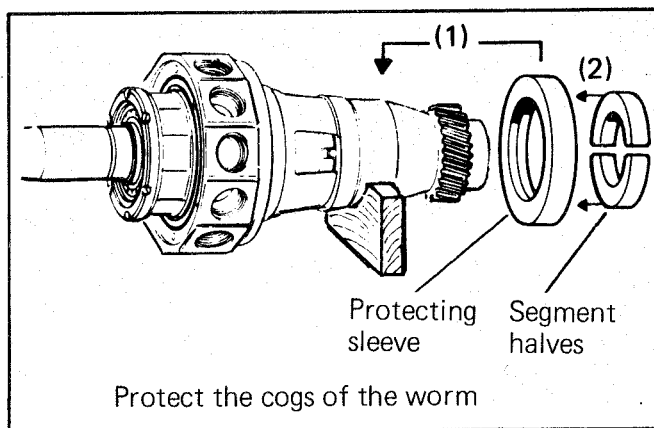
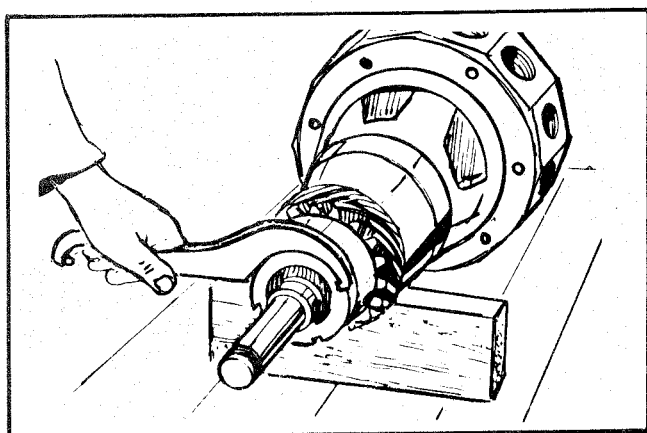
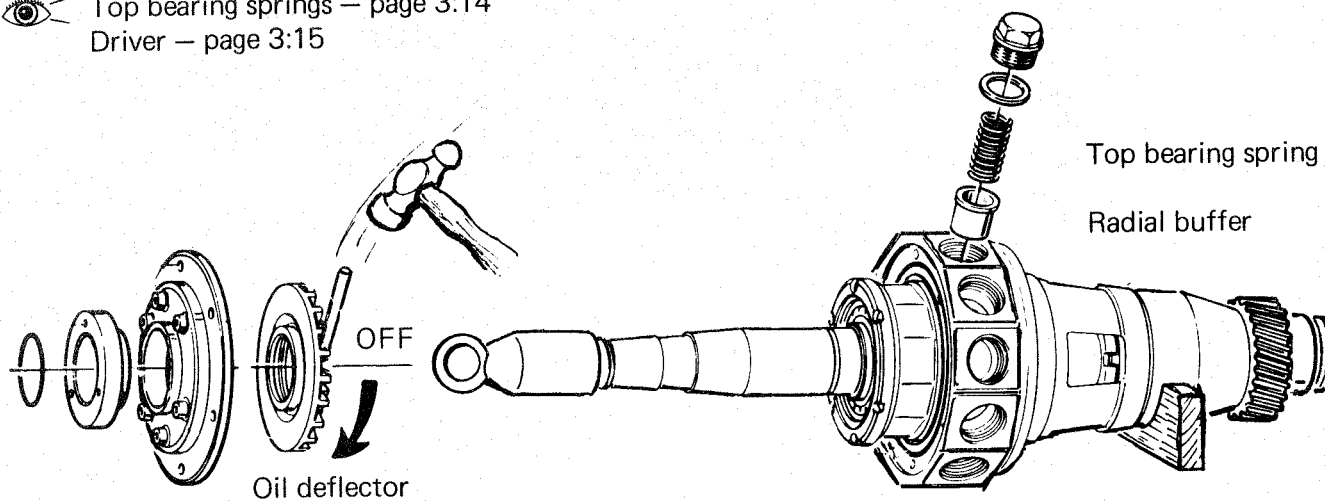
Remove inlet pump  
— see page 4:6



Slacken plugs one turn.

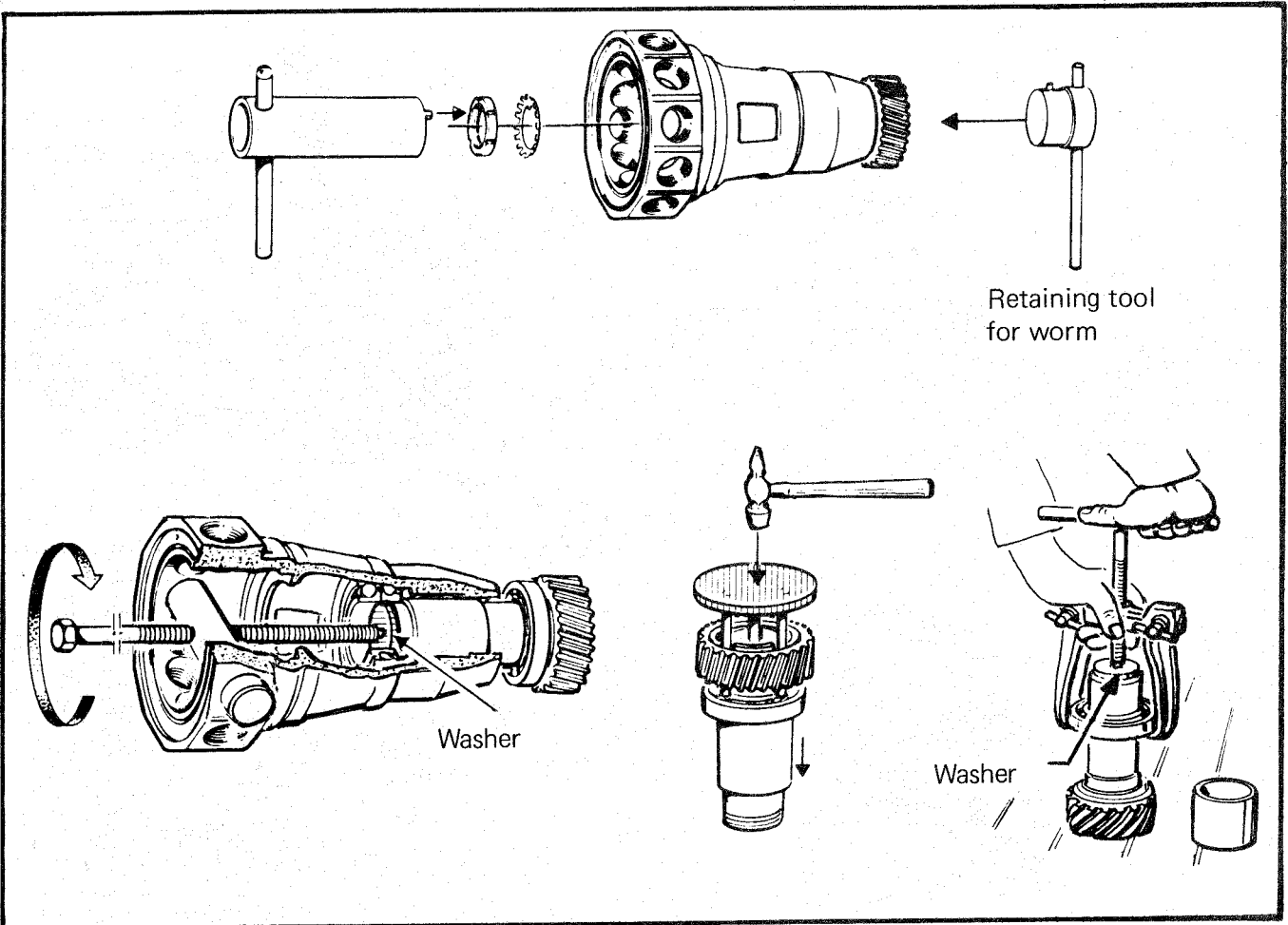


👁 Top bearing springs — page 3:14  
Driver — page 3:15

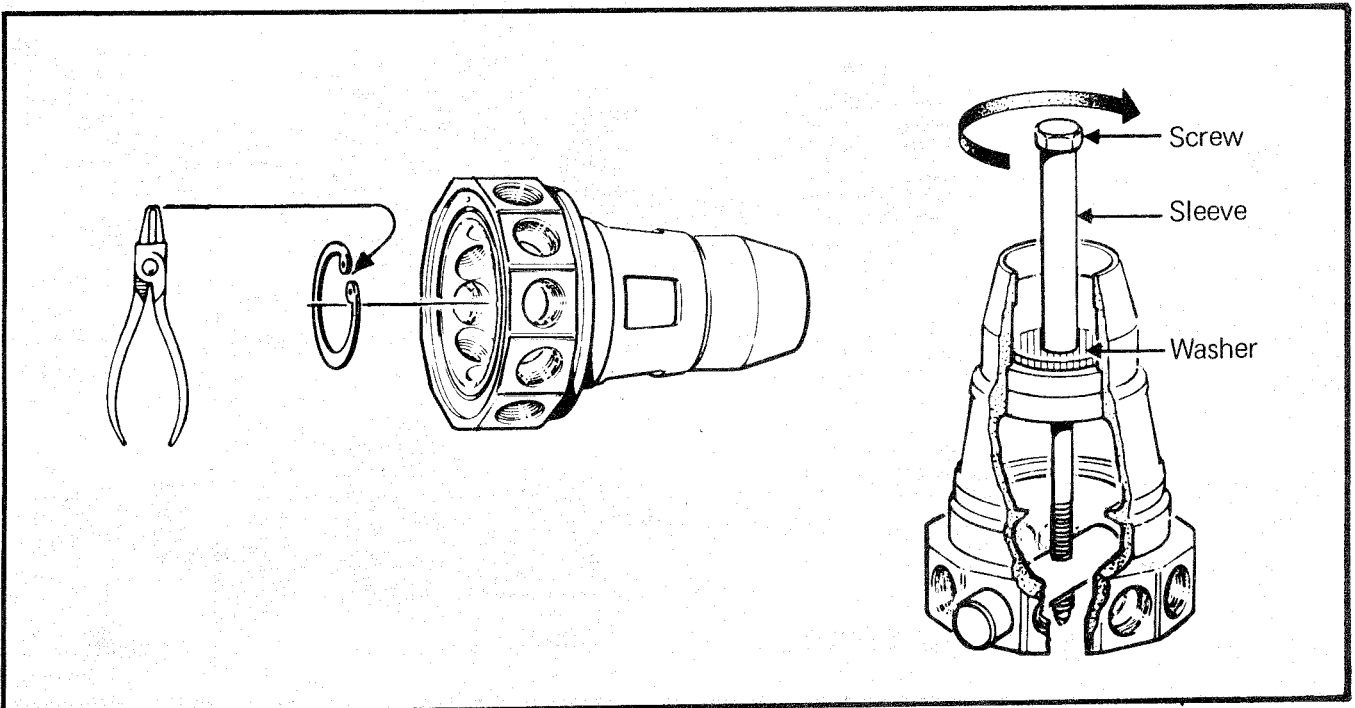


Worm

👁️ — page 3:15

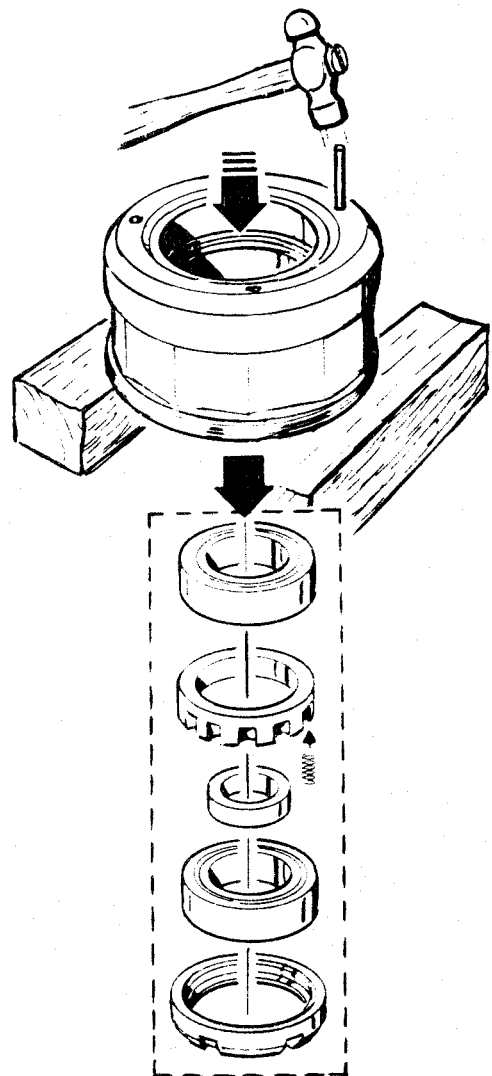
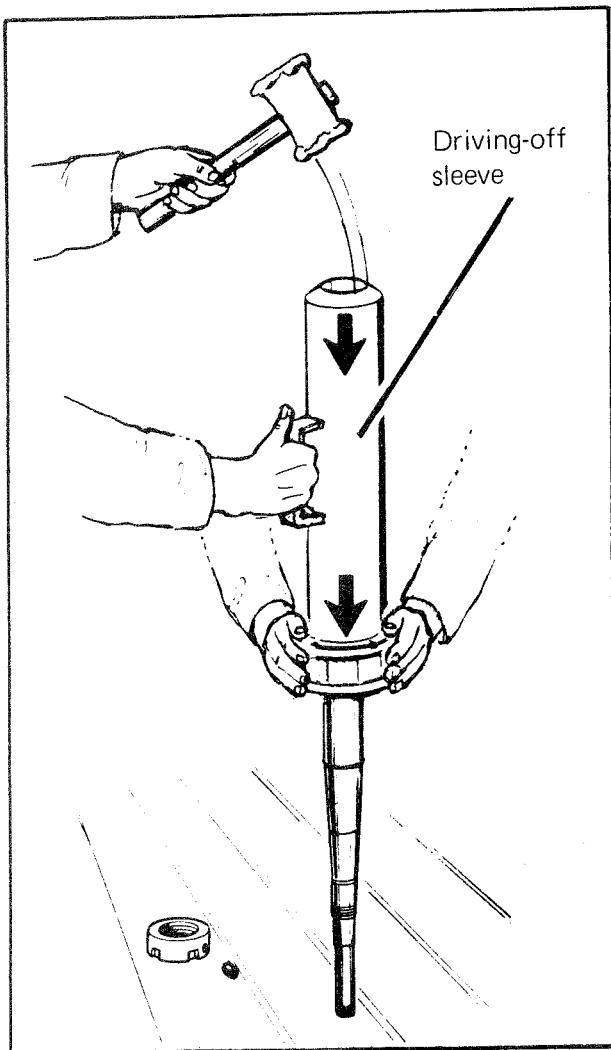
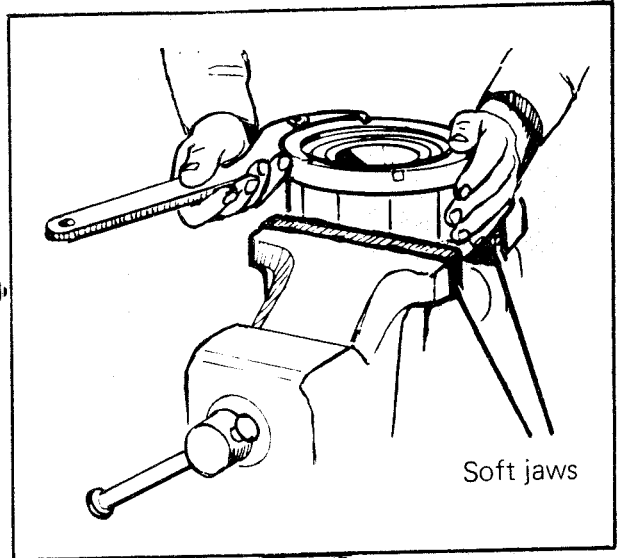
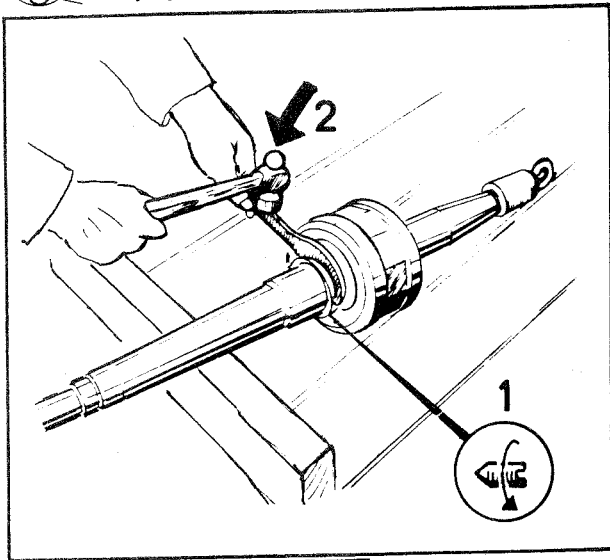


Spring Casing Bearing



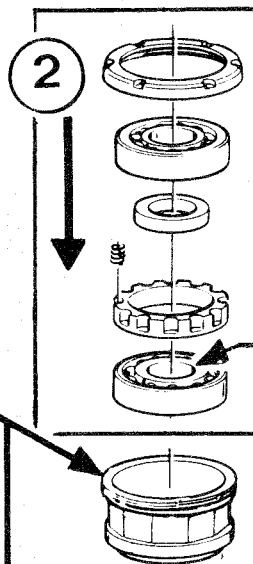
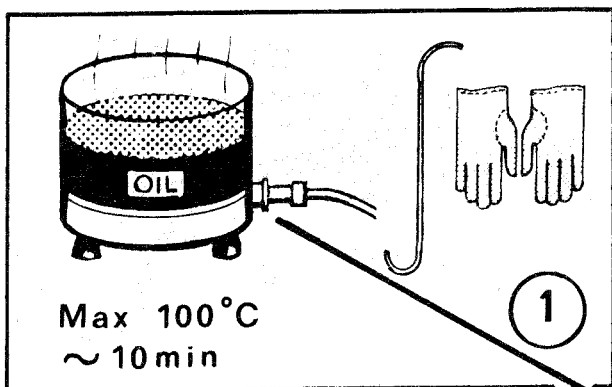
Ball Bearing Housing

— page 3:14

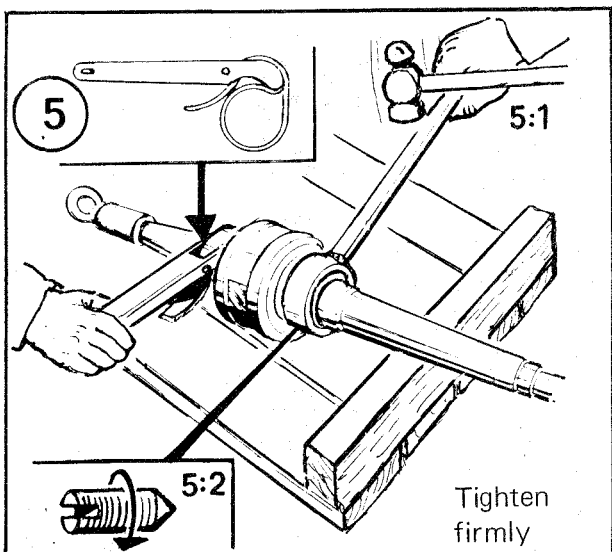
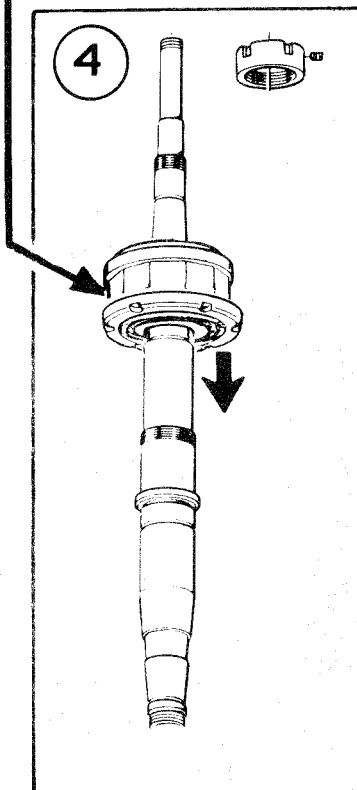
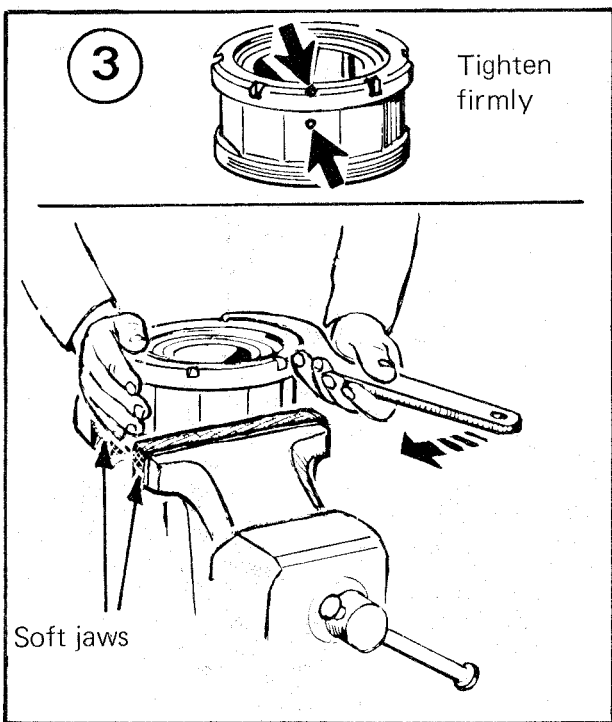


ASSEMBLY (after complete disassembly)

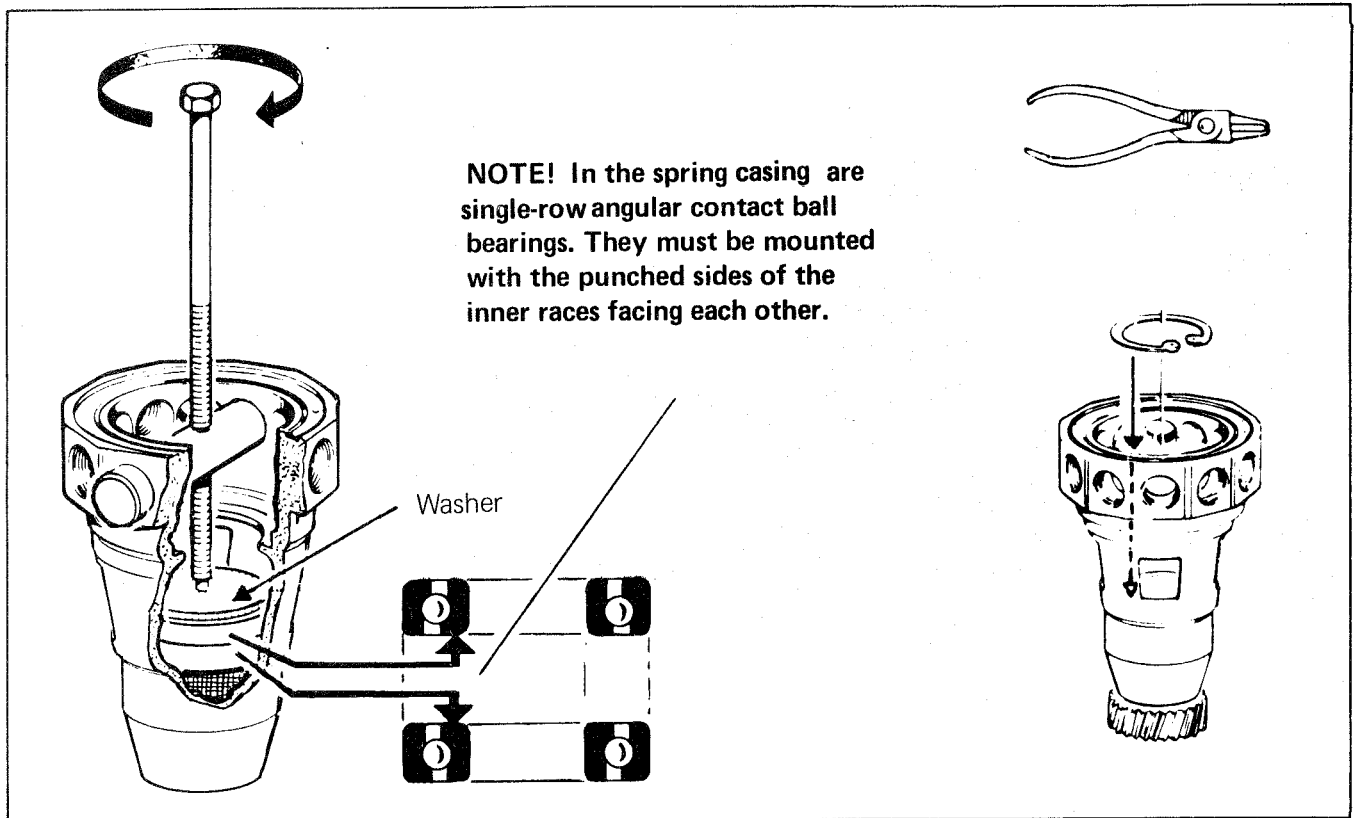
Ball Bearing Housing of Bowl Spindle



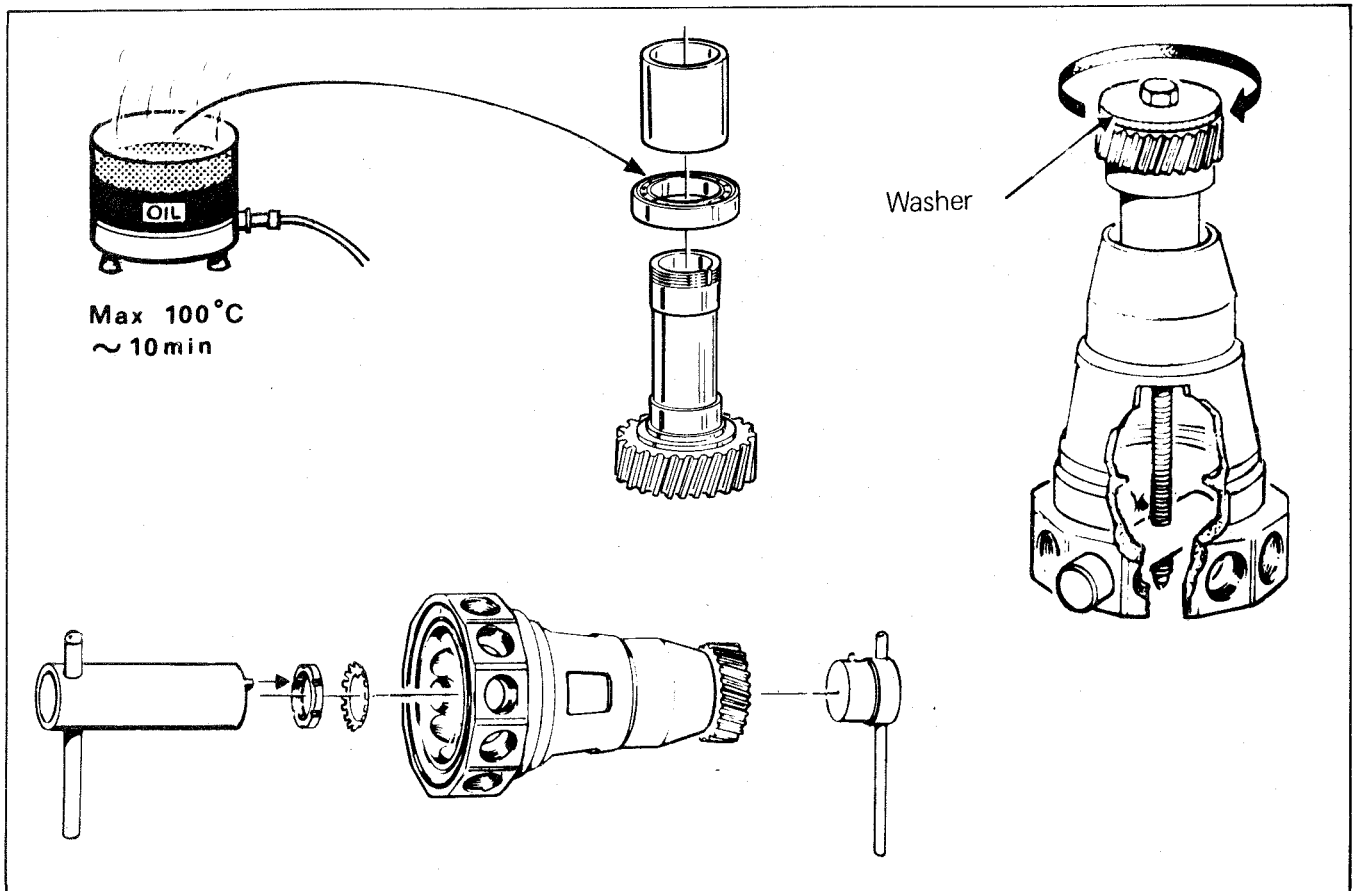
NOTE! The lower bearing is a single-row angular contact ball bearing. Turn it the right way when mounting – the punched side of the inner race upward.



Bearing of Spring Casing

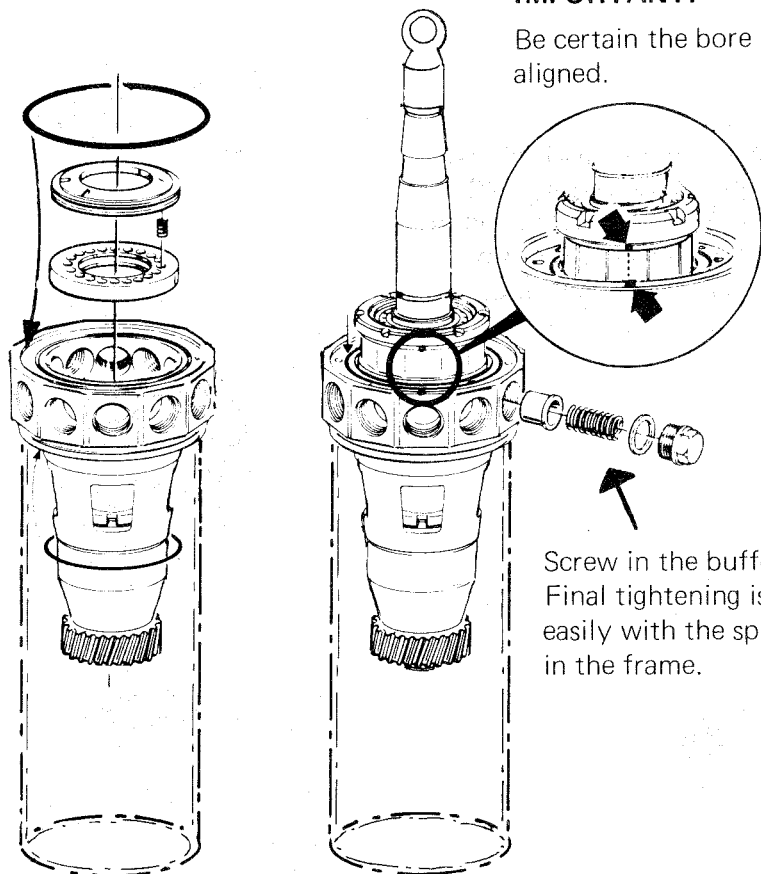


Worm

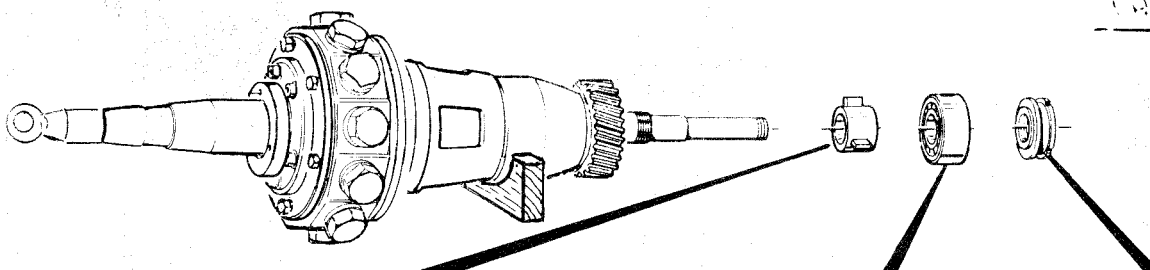
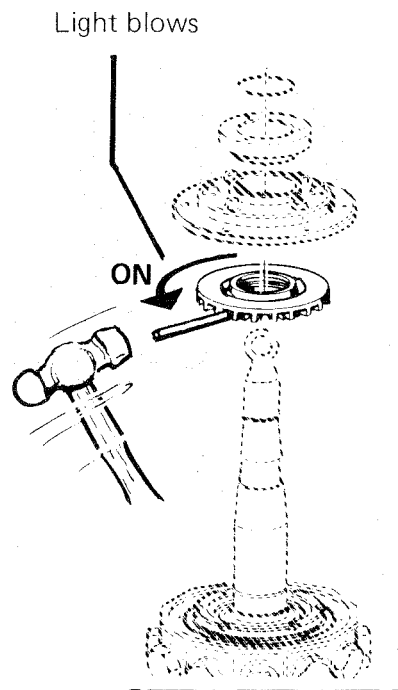


**IMPORTANT!**

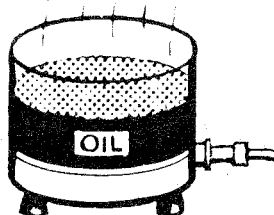
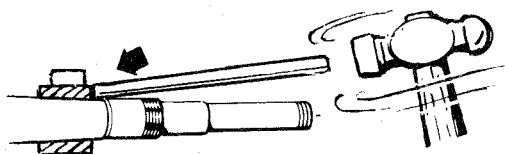
Be certain the bore marks are aligned.



Screw in the buffers by hand. Final tightening is done more easily with the spindle fitted in the frame.

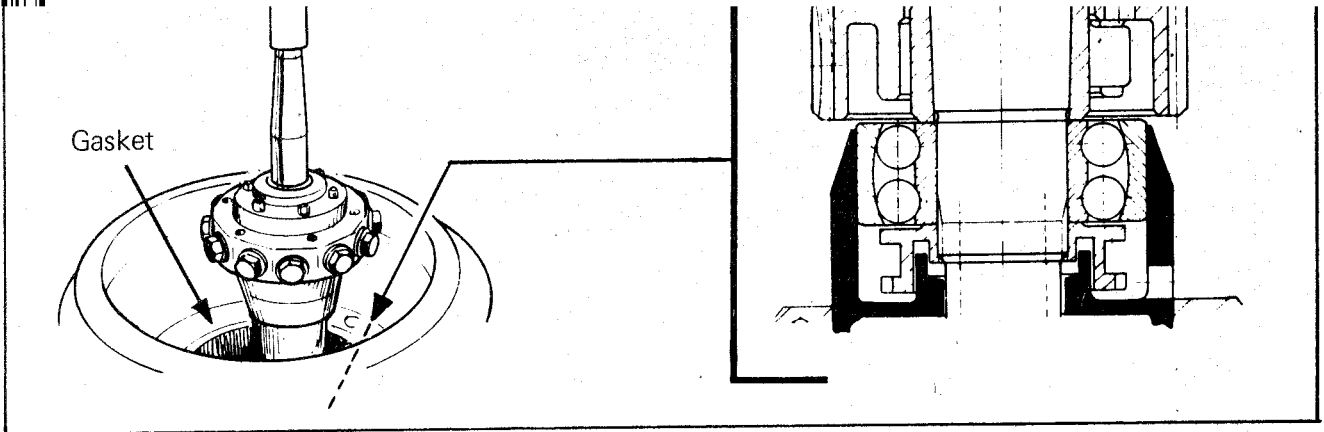


See that the driver cone is **clean and free of oil**. Fit the driver. Ensure cone engagement by knocking lightly on the driver with a suitable sleeve, drift or the like.



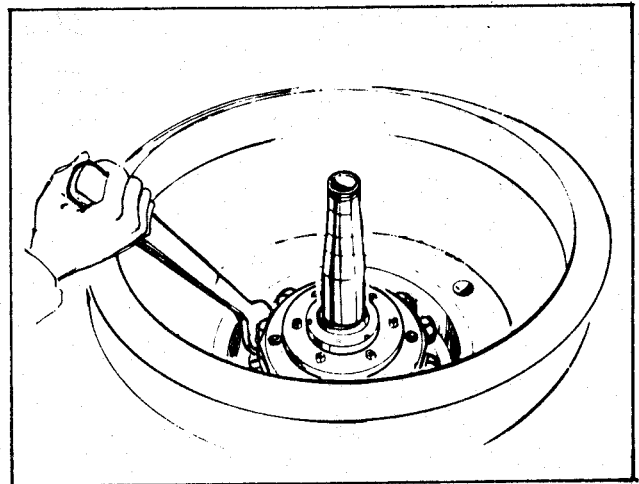
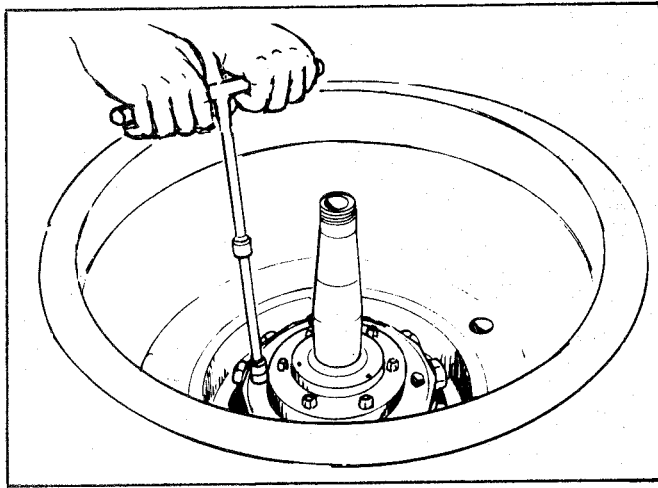
Max 100 °C  
~ 10 min



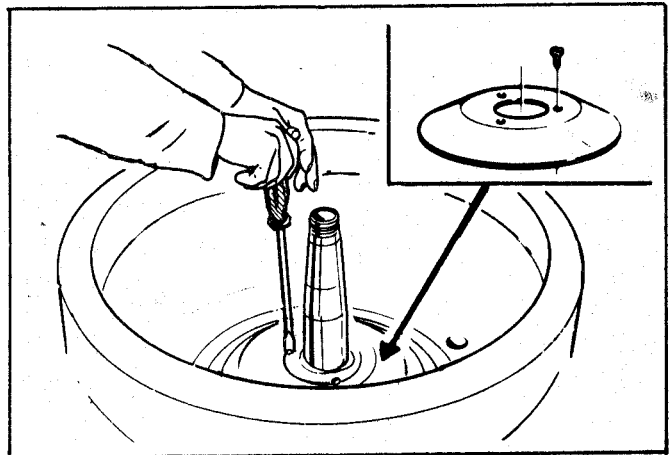
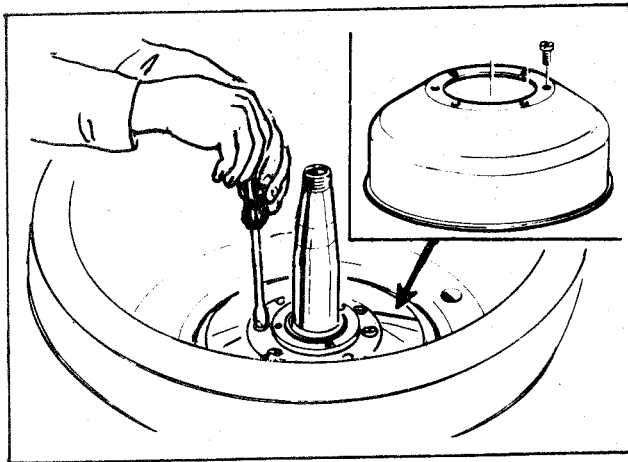


Lower the spindle gently.

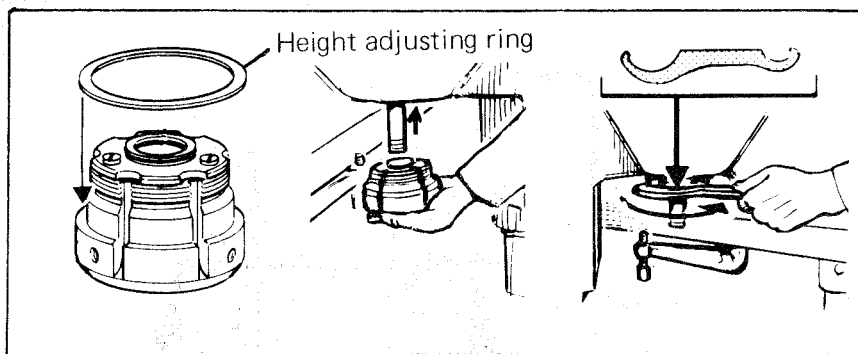
Lead the bearing into the bottom bushing. If it does not quite bottom in its seat, knock lightly on the spindle top with a tin hammer.




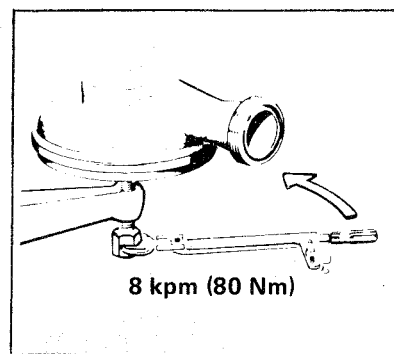
Tighten plugs, first **diametrically** and then **all around**. Tighten firmly.



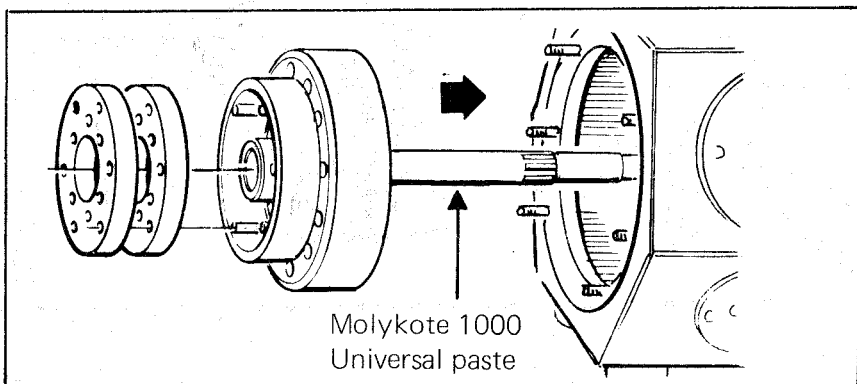
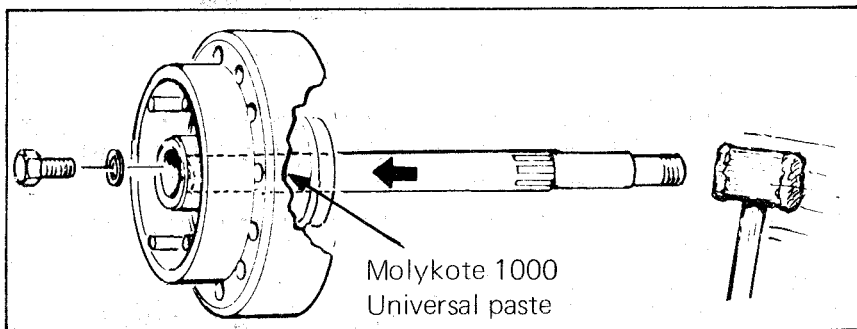
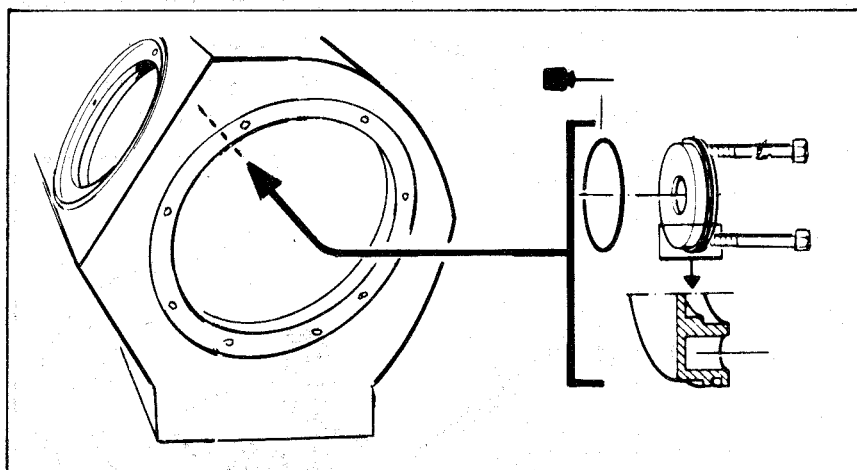




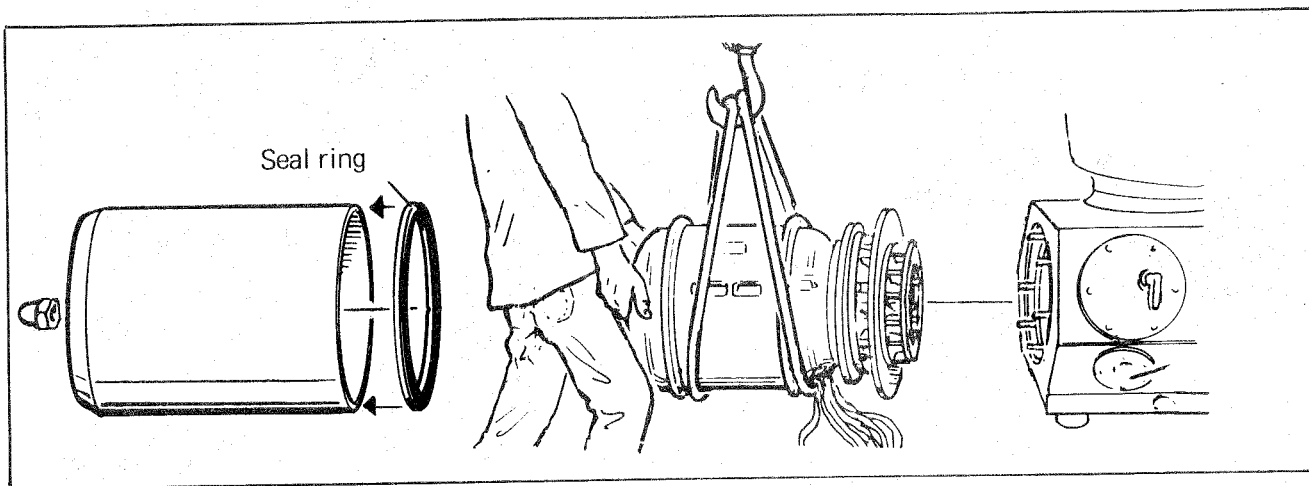
Screw on the holder.  Height position – page 3:21.



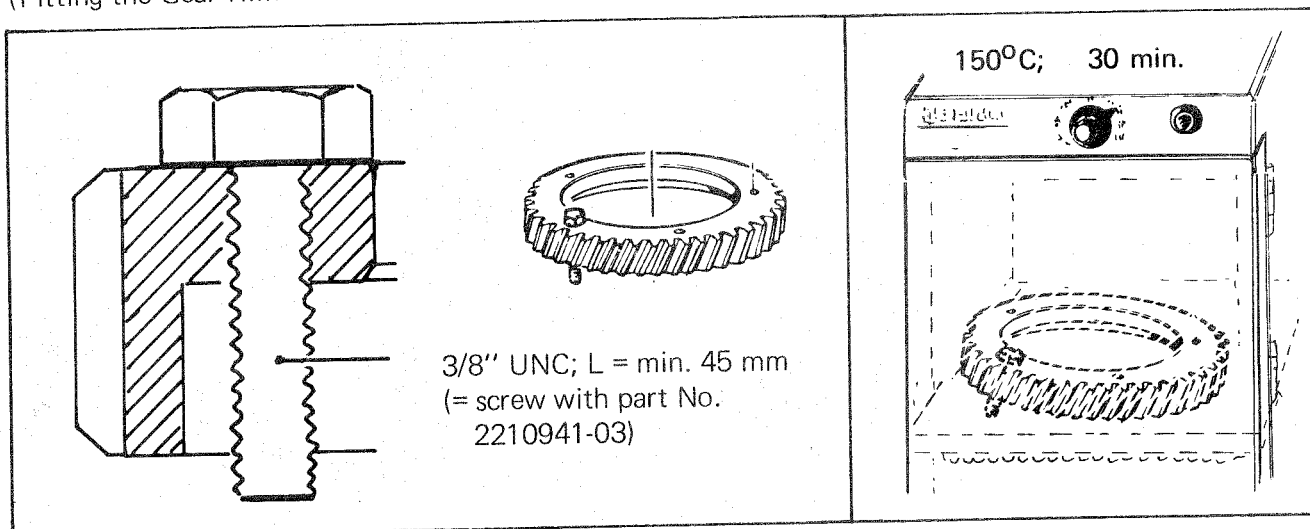
Assemble inlet parts as instructed on page 4:6.



 Axial play of elastic plates – page 3:17.

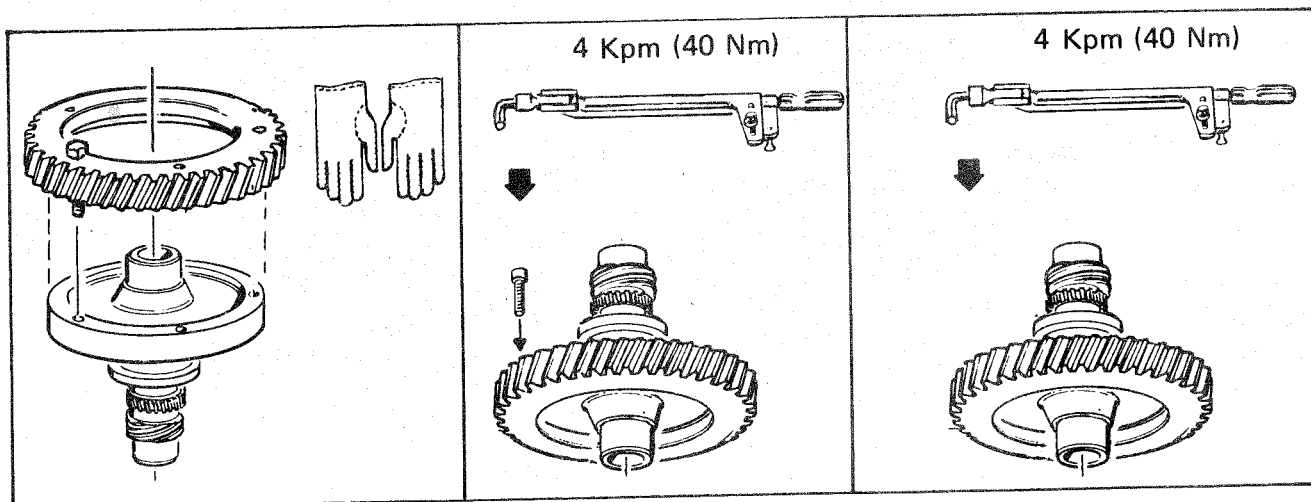


(Fitting the Gear Rim of Worm Wheel)



Fit one guide screw as above.

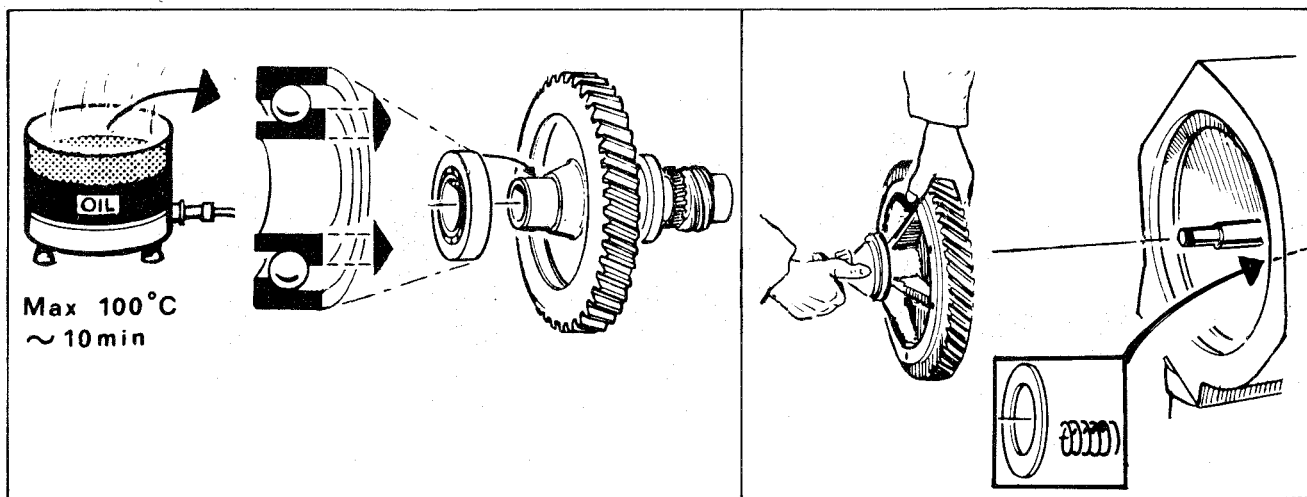
Heat gear rim in a heating cabinet.



Fit rim on nave. Remove guide screw.

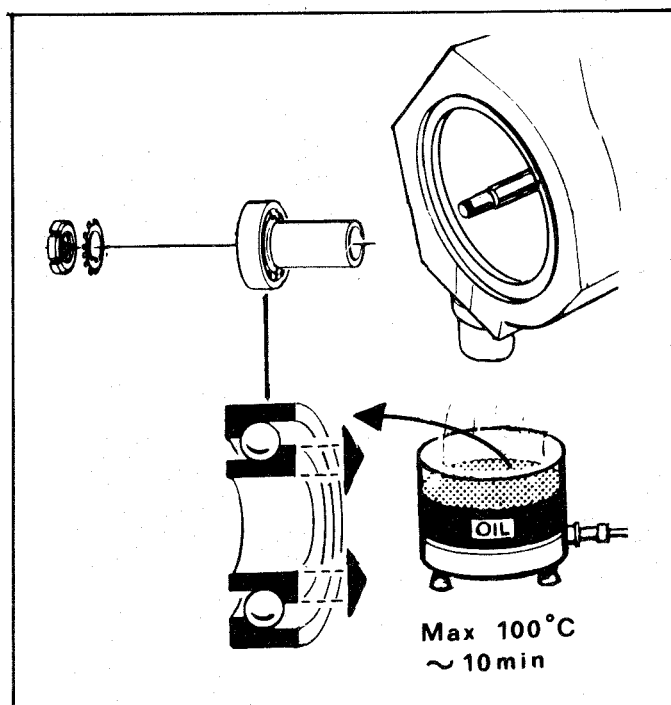
Tighten screws while rim is still warm.

Check screw tightening when rim has cooled down.

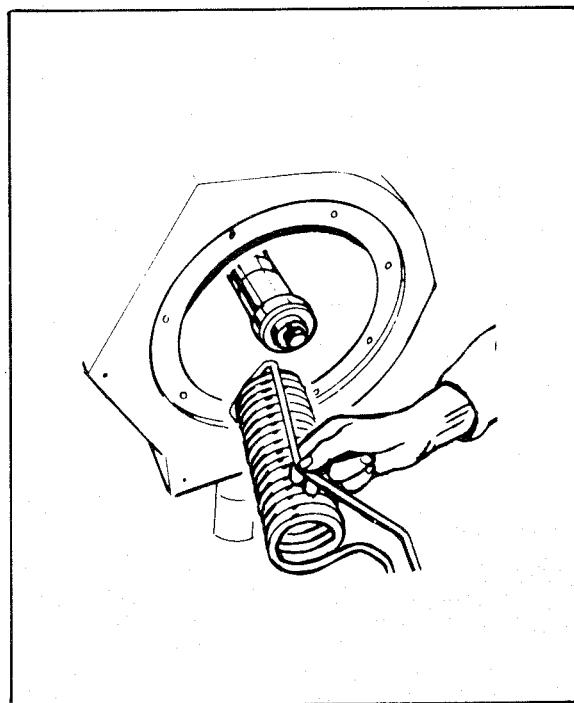


**Note!** The bearing is a single-row angular contact ball bearing. It must be mounted with the punched side of its inner race facing the worm wheel.

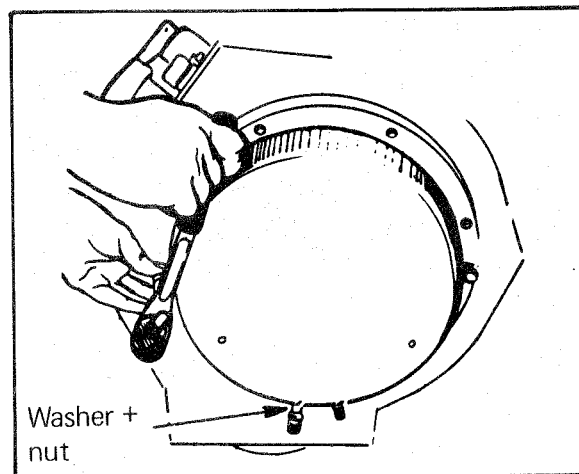
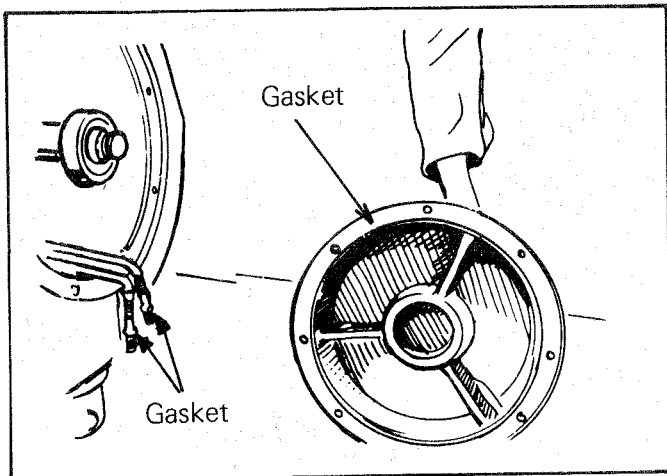
**Note!** Make certain the springs and thrust washer are correctly placed before mounting the worm wheel finally.



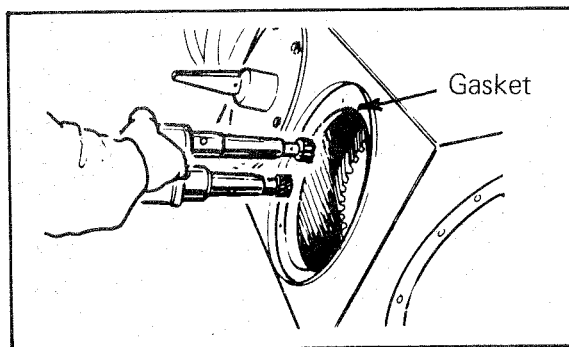
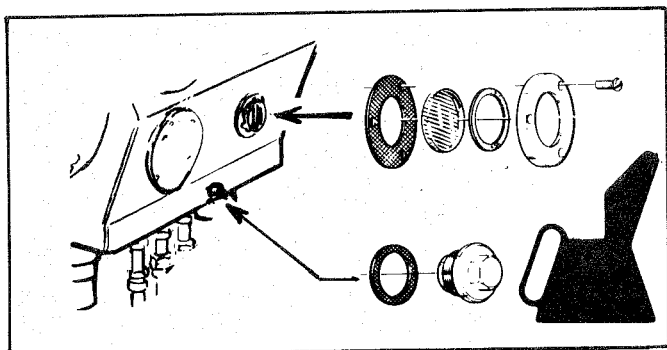
**Note!** The bearing is a single-row angular contact ball bearing. It must be mounted with the punched side of its inner race facing the sleeve (worm gear housing).



**Note!** Make certain the worm gear housing and the magnet of the cooling coil are well cleaned.

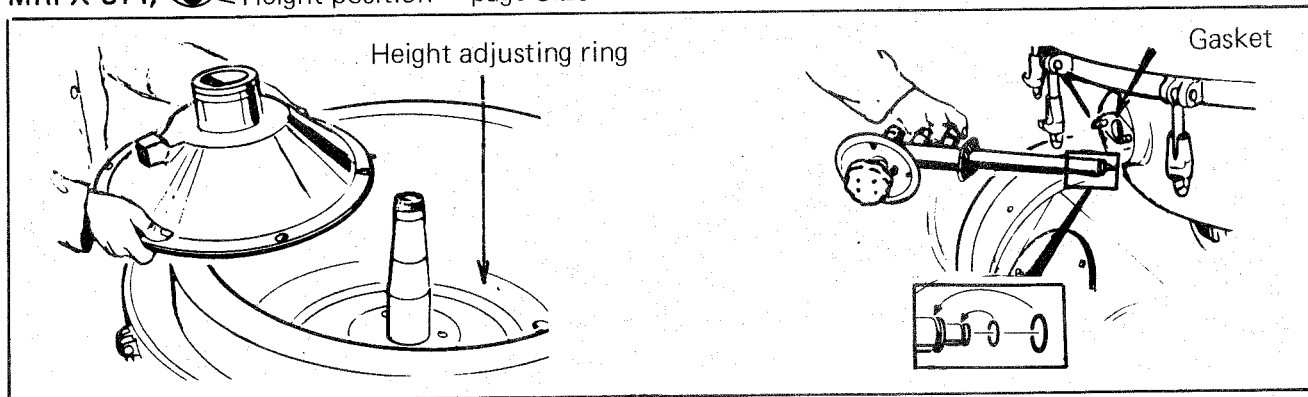


When necessary: press in the shield by tightening its screws.

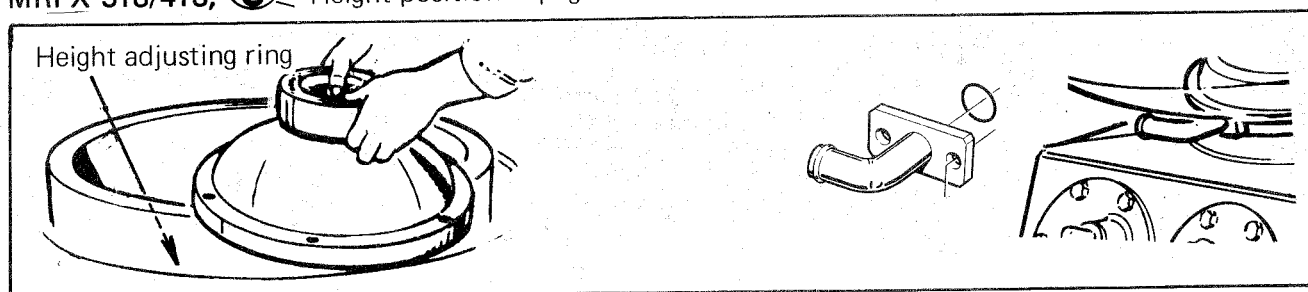


Supply oil – see Lubrication Schedule in "OM".

MRPX 314; Height position – page 3:20

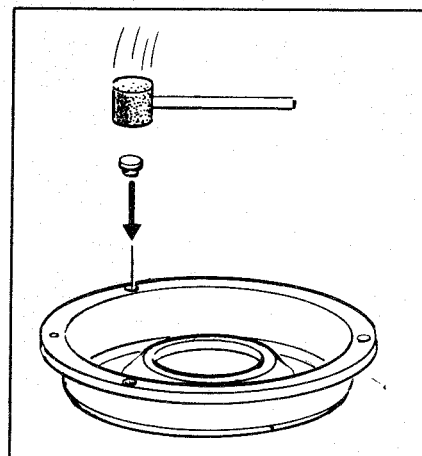
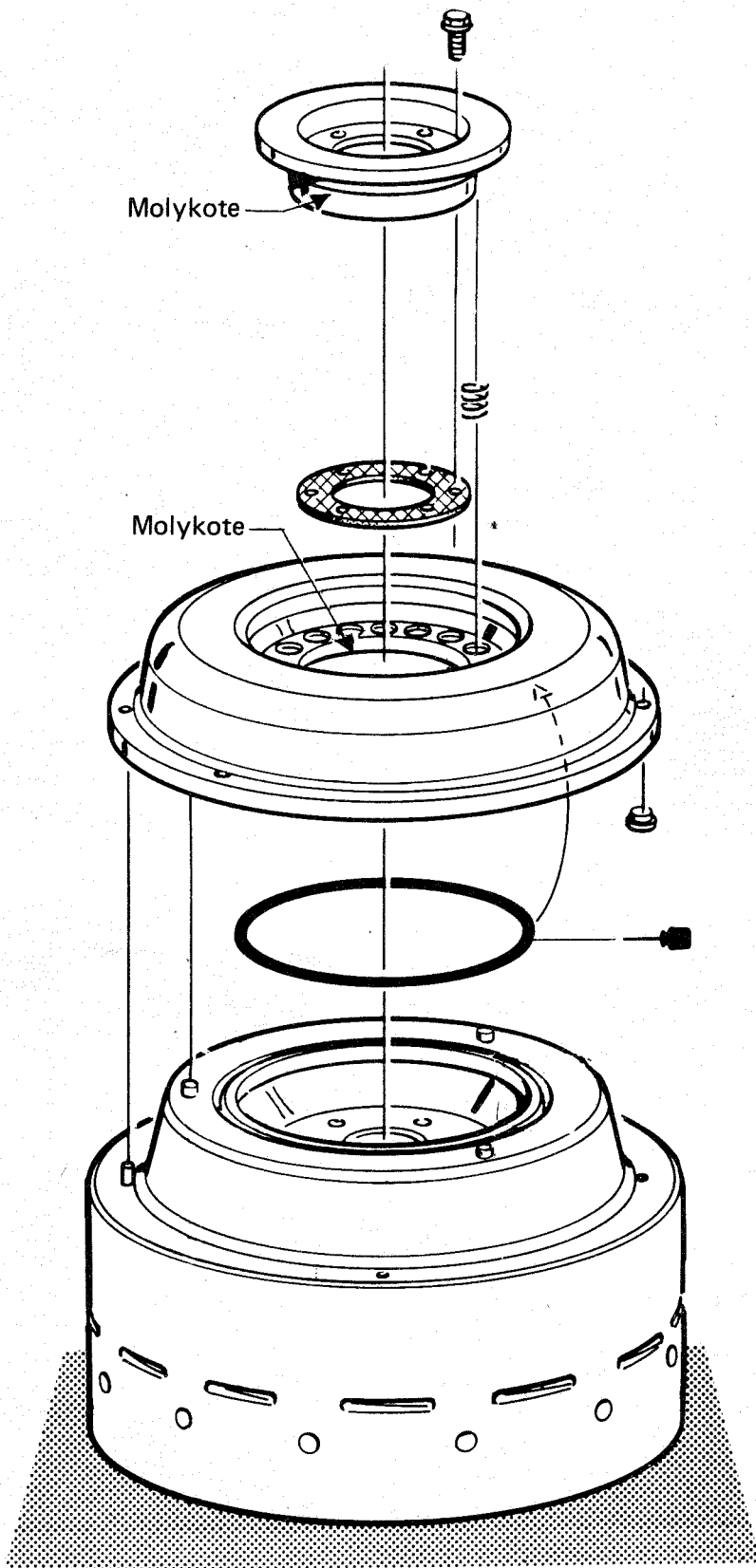


MRPX 318/418; Height position – page 3:20

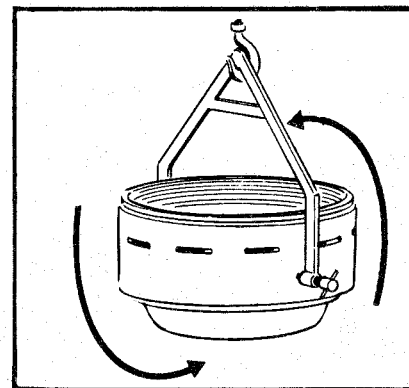


MRPX 314 (Ejection Mechanism)


👁️ — page 3:11

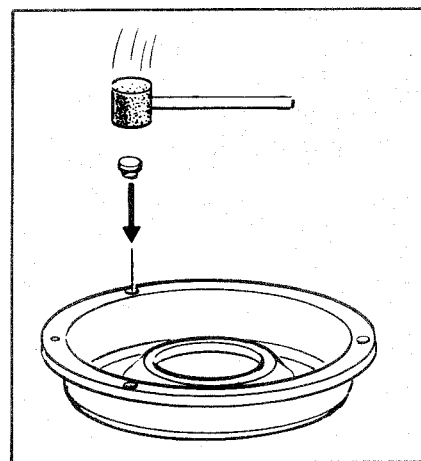
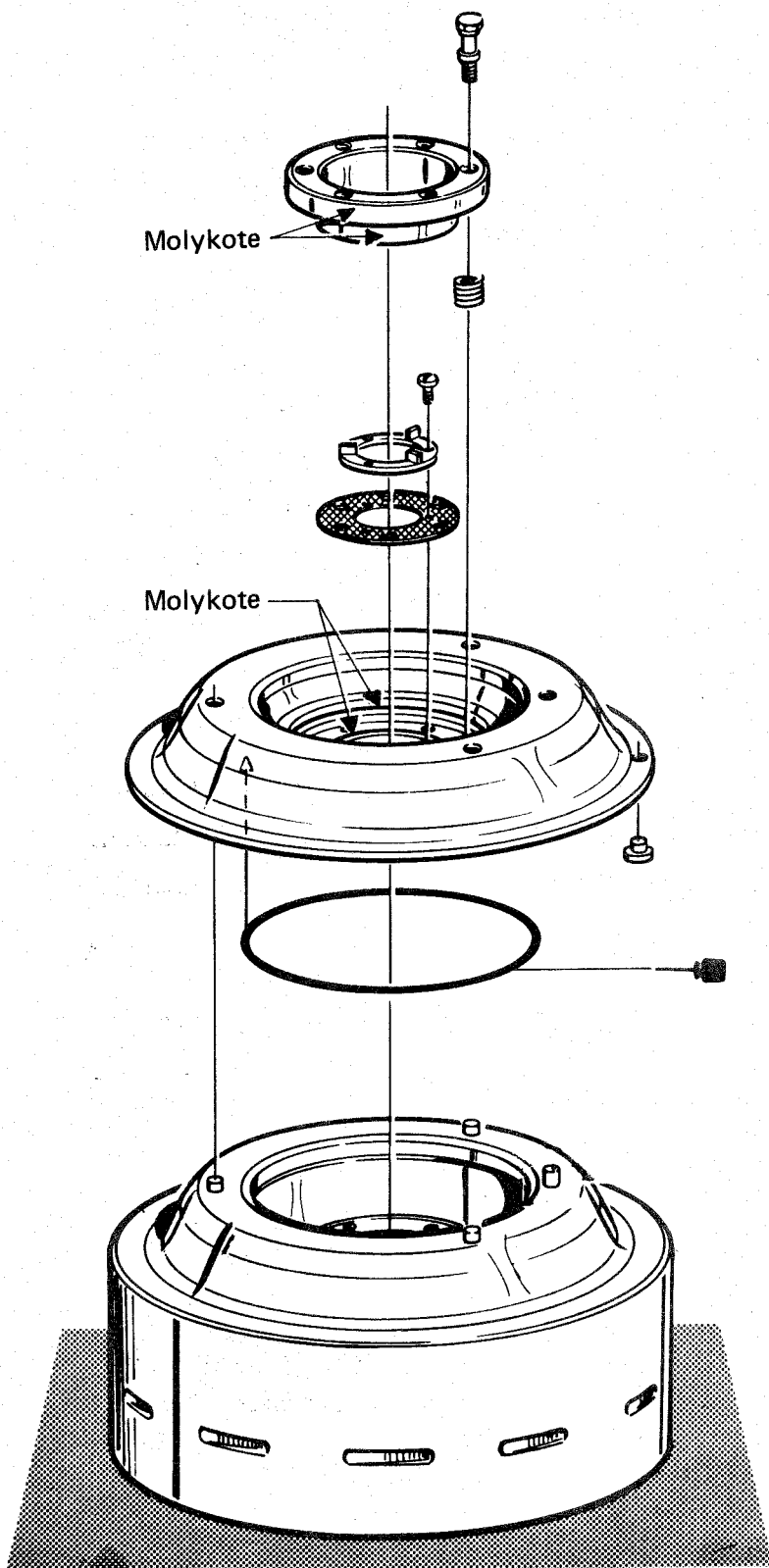


When inserting new plugs use a rubber hammer or the like so as not to damage the sealing surface.

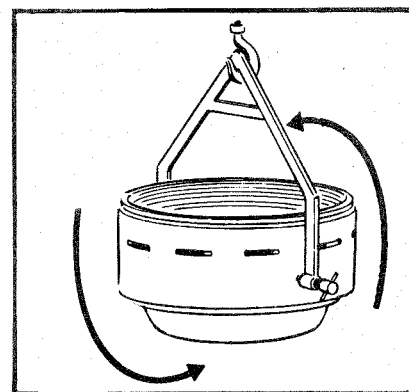


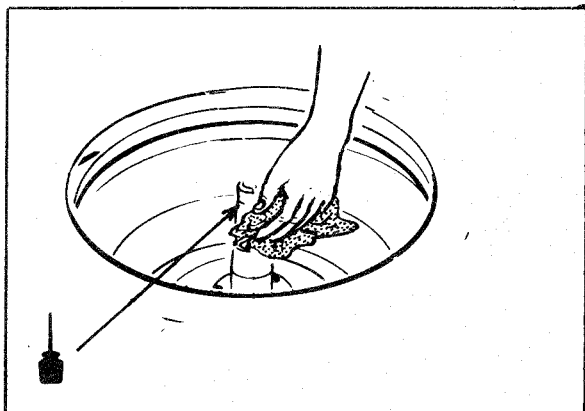
MRPX 318/418 (Ejecting Mechanism)

 — page 3:11

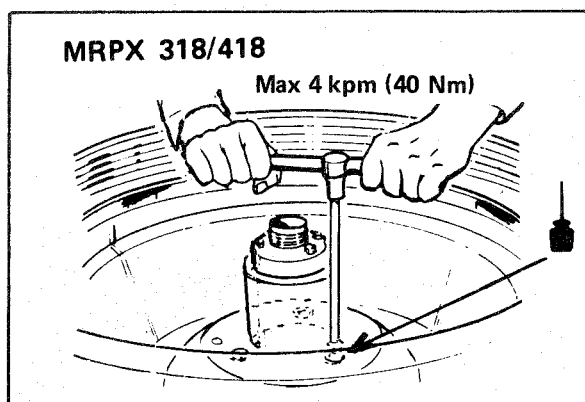
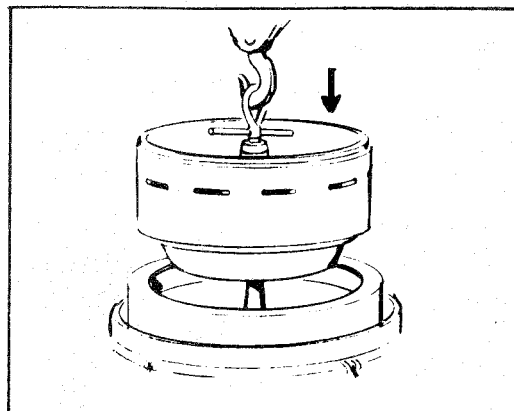


When inserting new plugs use a rubber hammer or the like so as not to damage the sealing surface.

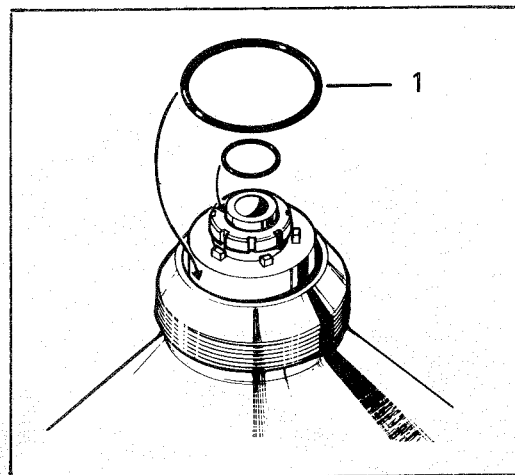
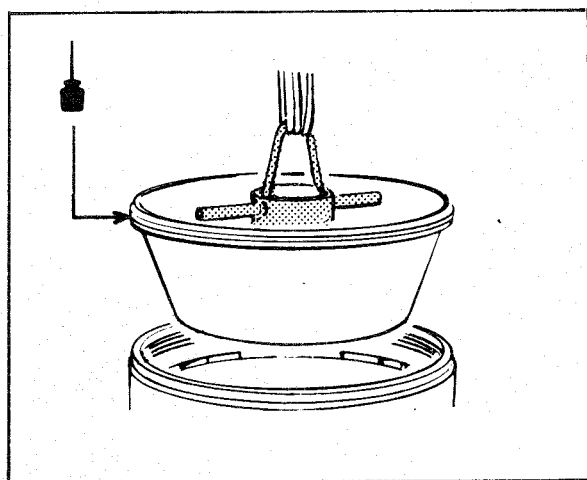
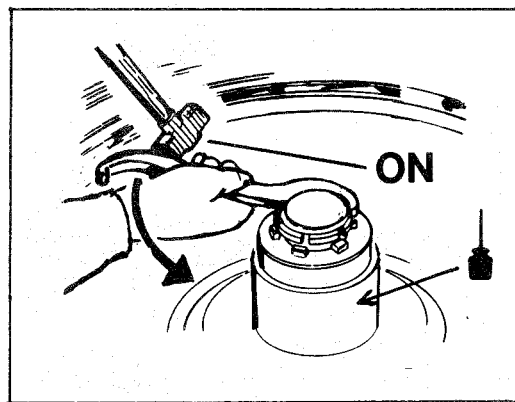




Clean spindle cone and navel bore in bowl body. Lubricate cone and wipe it with a clean cloth.



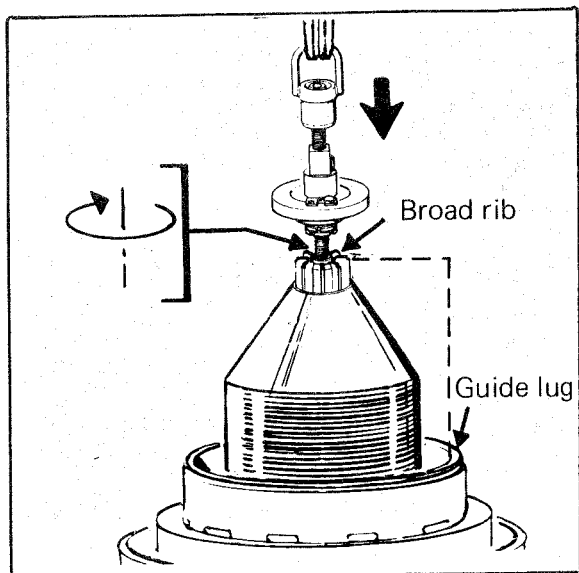
If screws tend to seize:  
lubricate with Molykote 1000 Universal Paste.



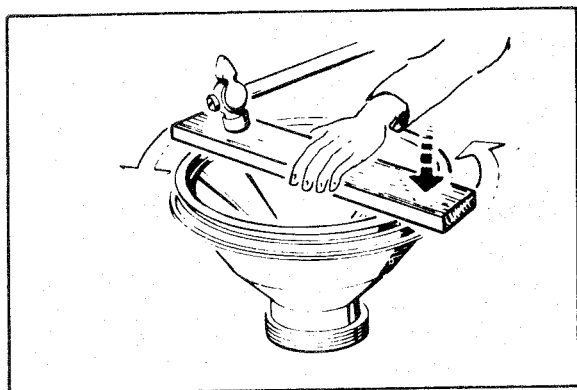
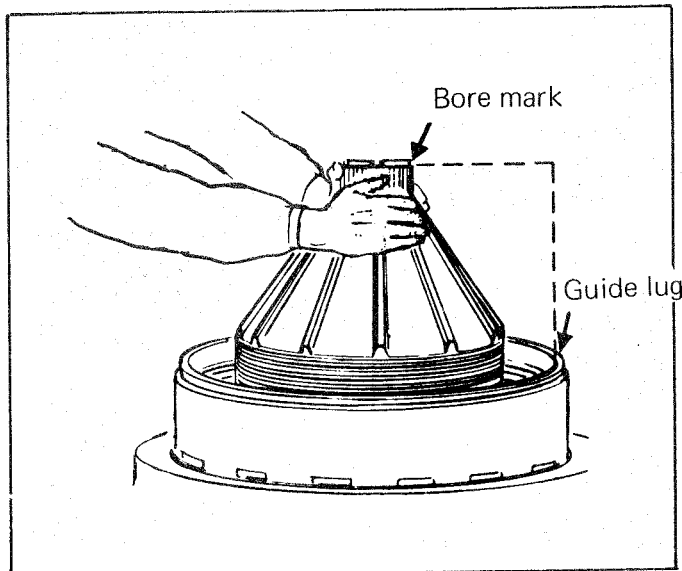
Avoid the risk of deforming the seal ring (1) by fitting it after the sliding bowl bottom. As the bowl is completely full of process liquid under pressure, a defective seal ring can cause leakage of process liquid into the operating water system.

Instead of a primary treatment with Molykote Paste G and following lubrication with Molykote Grease e.g. BR2 only Molykote 1000 Universal Paste can be used very well. This paste could be applied on the surface in question with a brush, but not in a too thick layer.





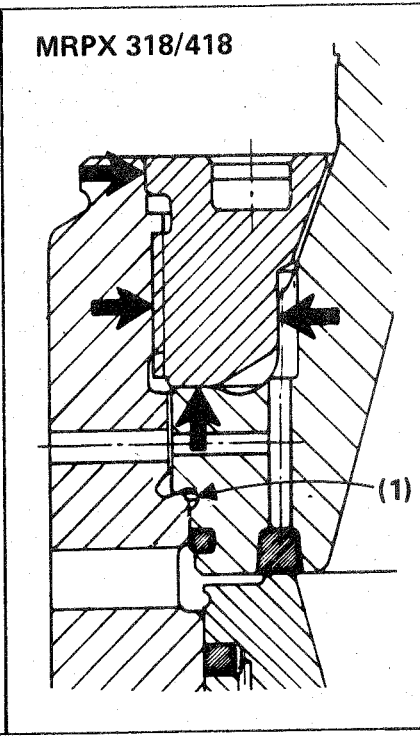
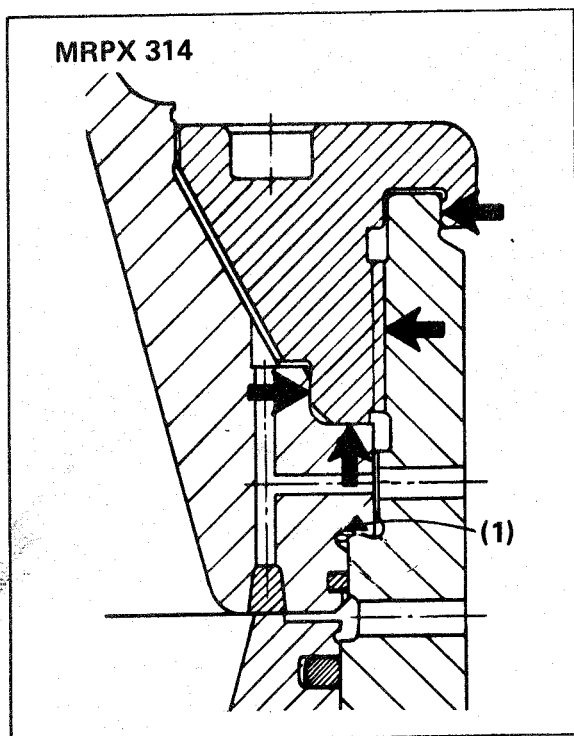
Disc set pressure — page 3:3



When fitting a new seal ring in bowl hood:

If a new seal ring of nylon (polyamide) proves too wide when mounted, this is due to absorption of moisture. It will recover correct dimensions after drying for about 24 hours at a temperature of 80° - 90° C. (175° - 195° F).

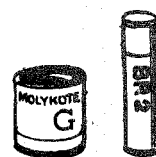
If the ring is too narrow, put it in hot water, 70° - 80° C (160° - 175° F) for 5 minutes (approx.).

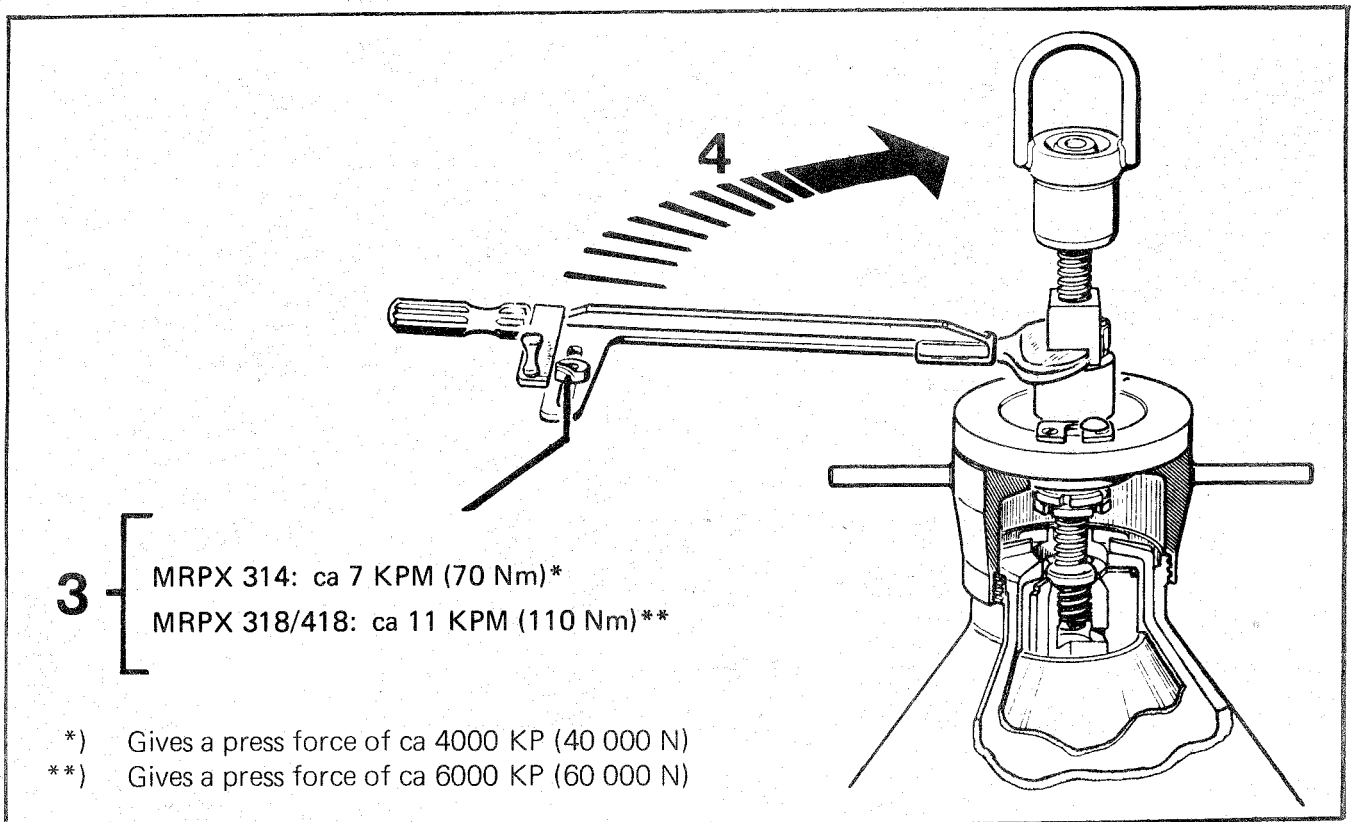
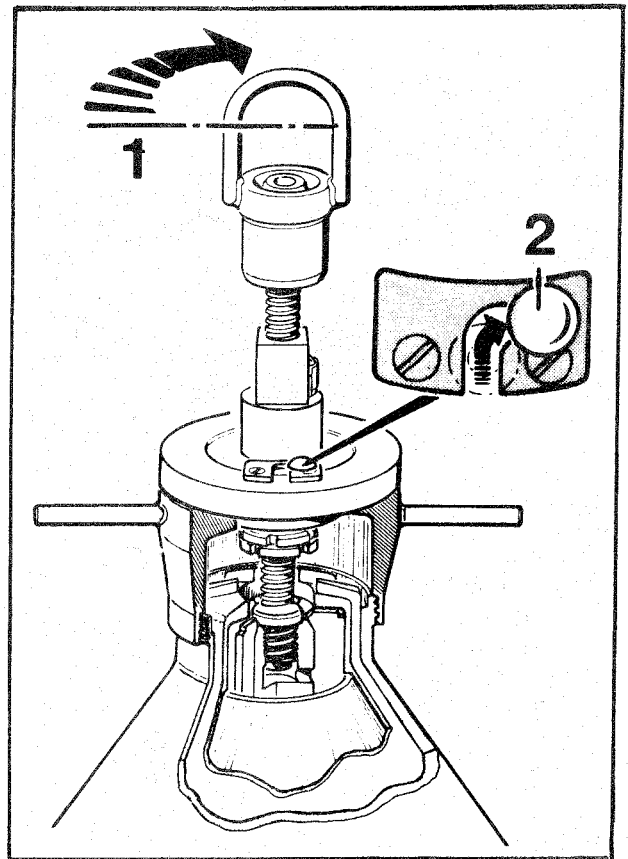
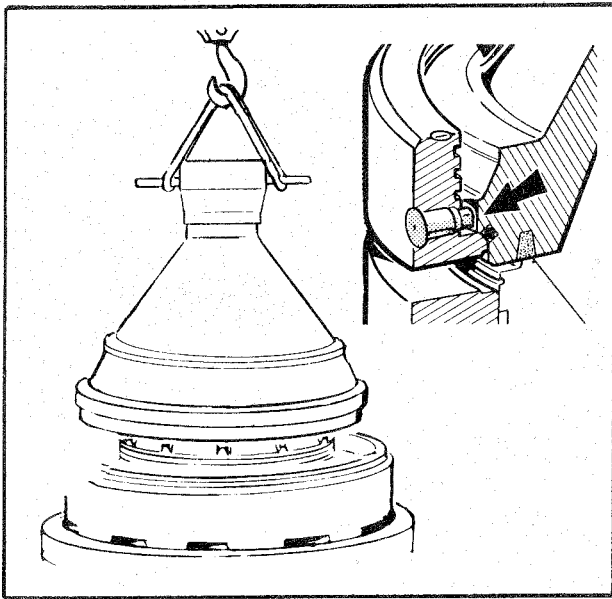


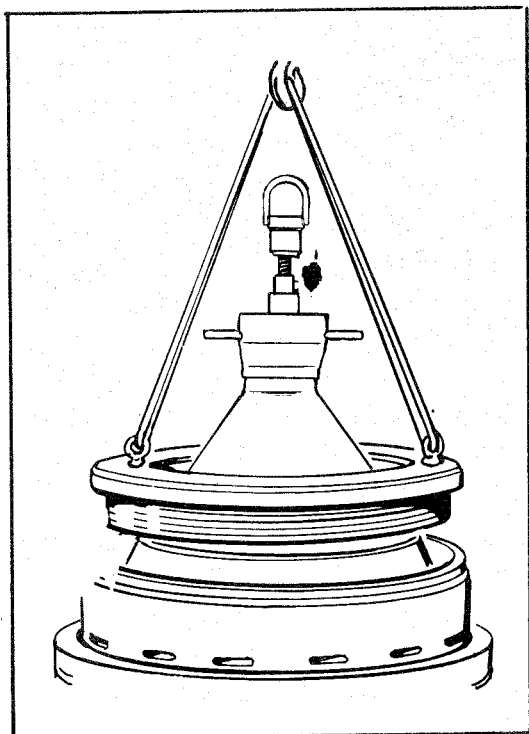
— page 3:5

Inspect and lubricate threads as well as contact and guiding surfaces (indicated by ).

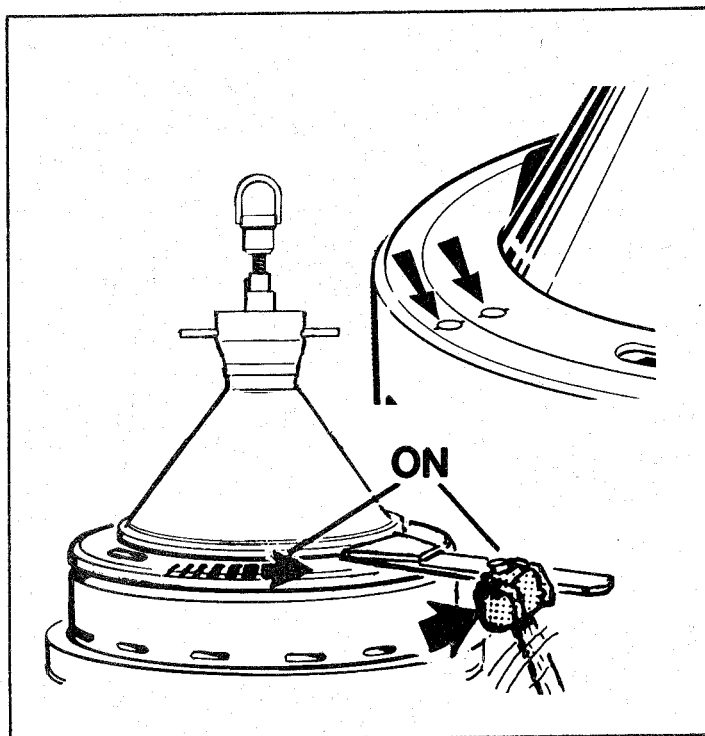
Make certain the surfaces (1) of the so-called dovetail slot are well cleaned.





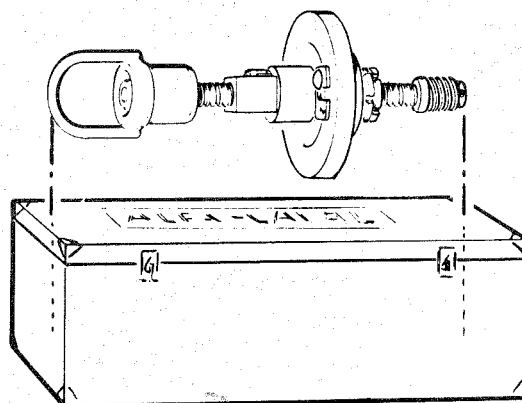
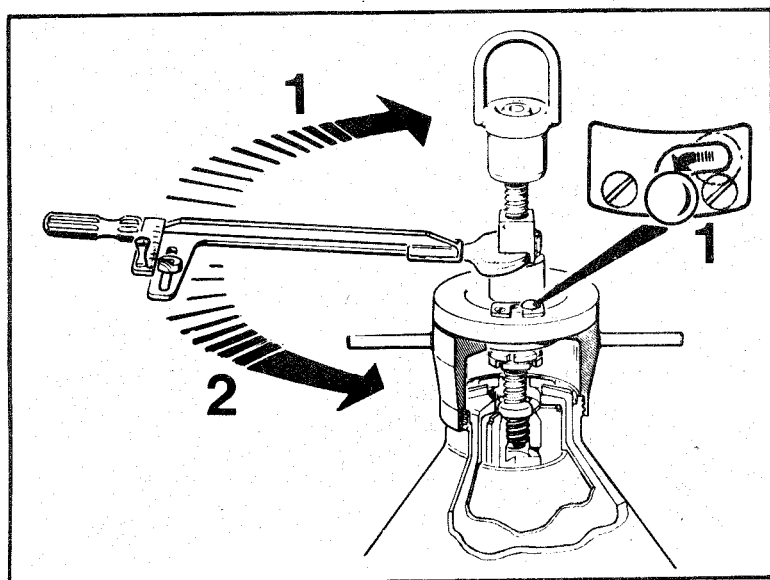


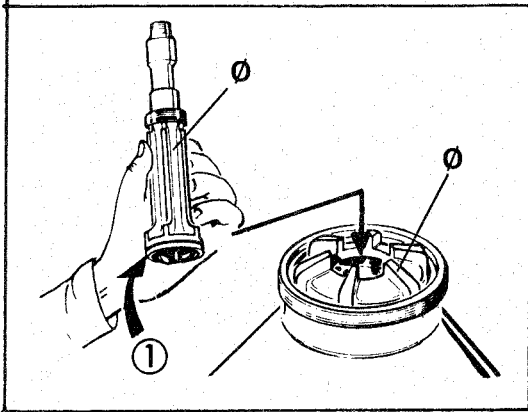
Lower the lock ring gently onto the bowl body.



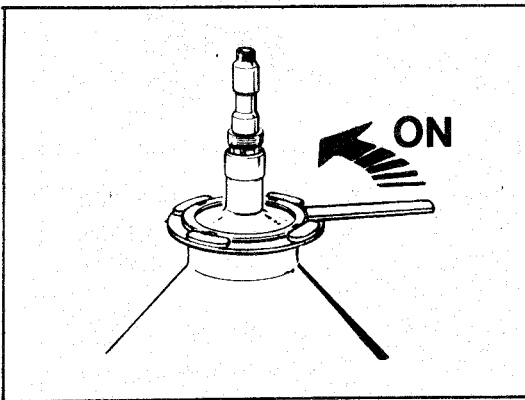
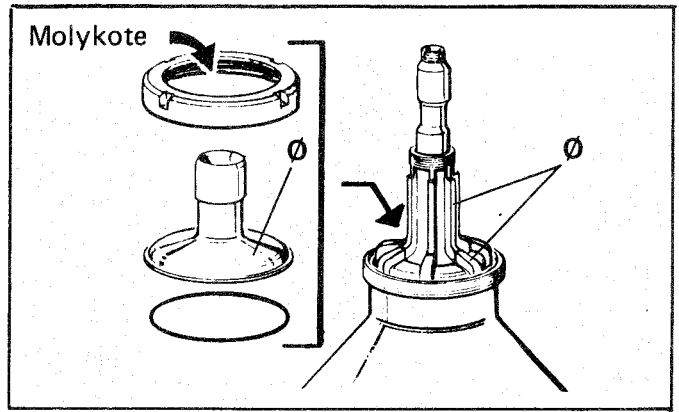
Screw on the lock ring quietly and without using force. Finally hit the spanner handle a few blows. The marks  $\emptyset$  on lock ring and bowl body should now be right in front of each other.

**Note!** If marks  $\emptyset$  are not aligned and the distance between them does not exceed 20 - 30 mm, the ring may be advanced by knocking lightly on the spanner handle until alignment is obtained.

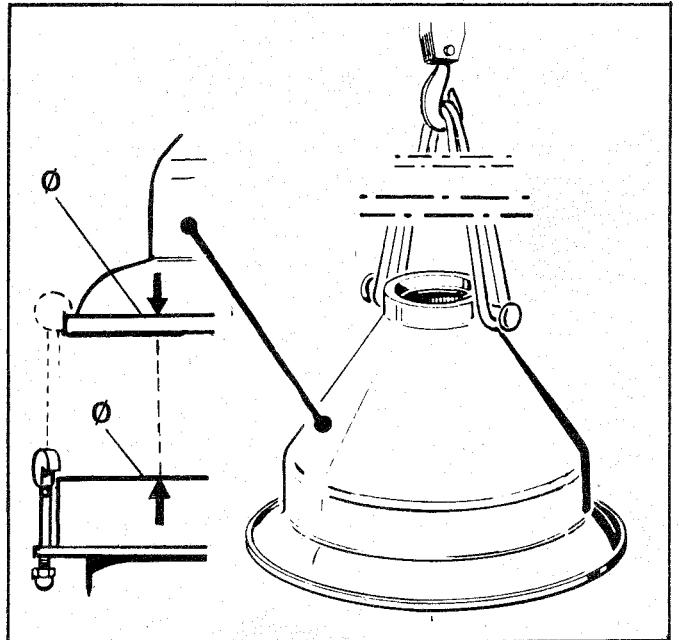




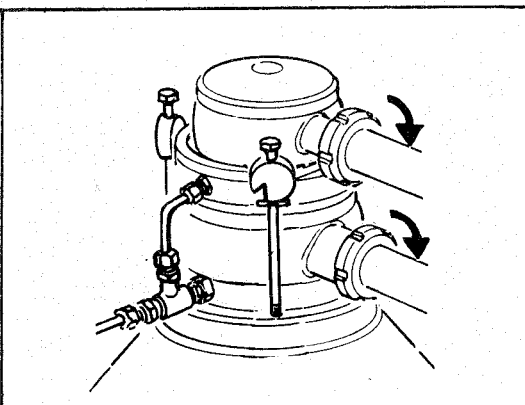
**Note!** Make certain the seal ring (1) is in perfect condition.



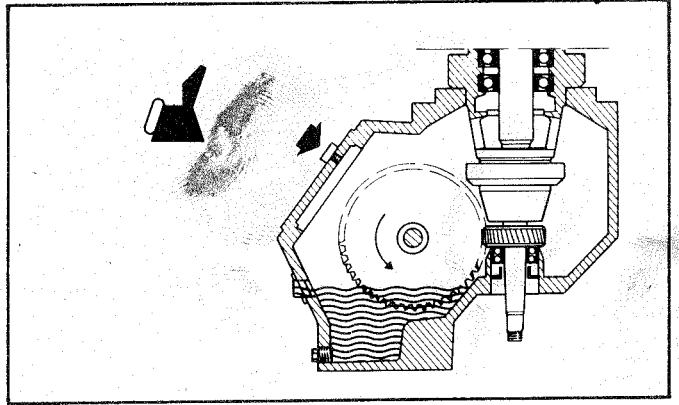
👁 Radial wobble and excentricity  
— page 3:2a



See that the frame is centered relative to the top disc outlet pipe. Mark the hood and the frame rim with a centre-punch or the like (if not done already).

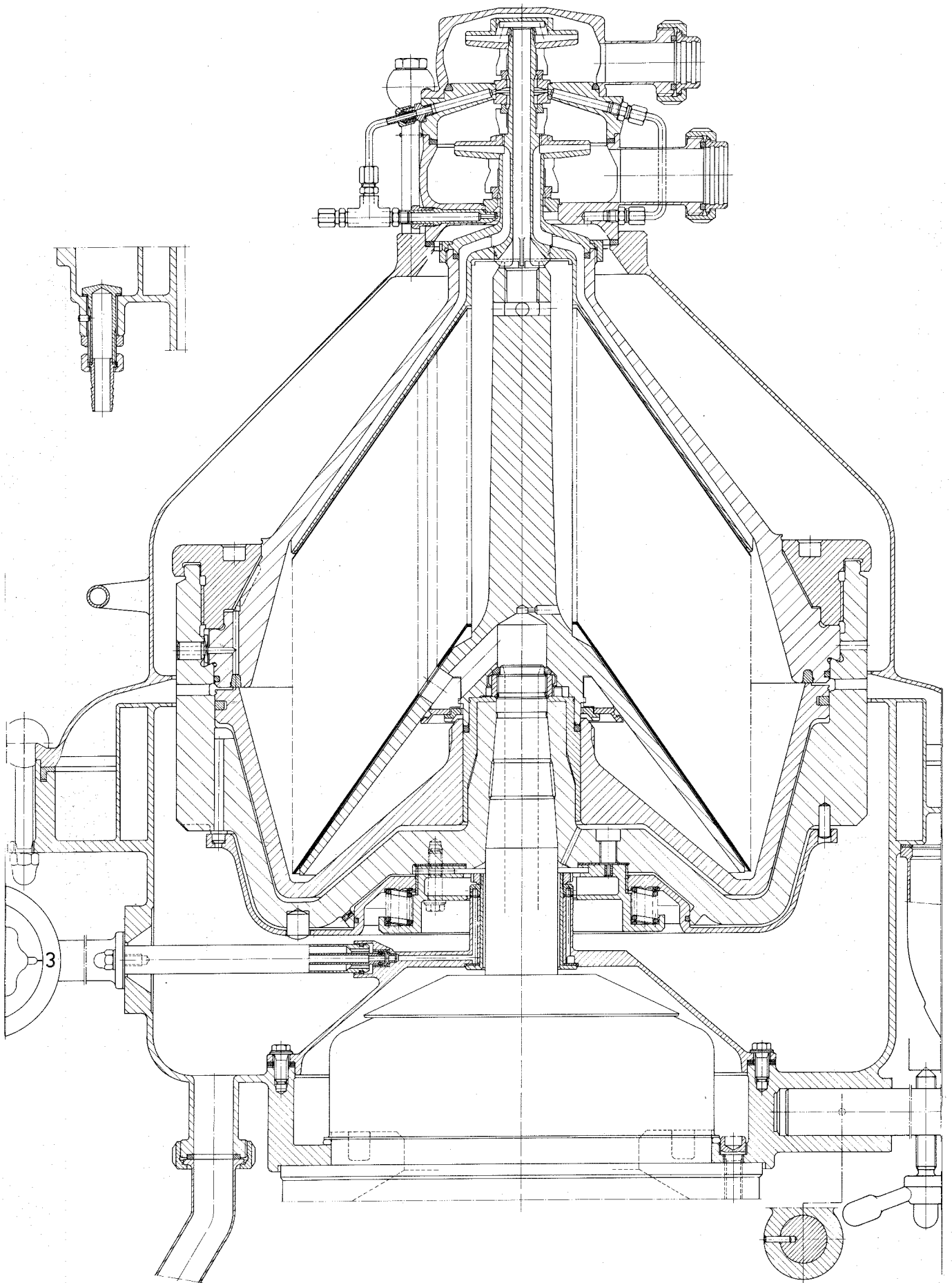


Assemble the outlet parts as instructed on page 4:5.

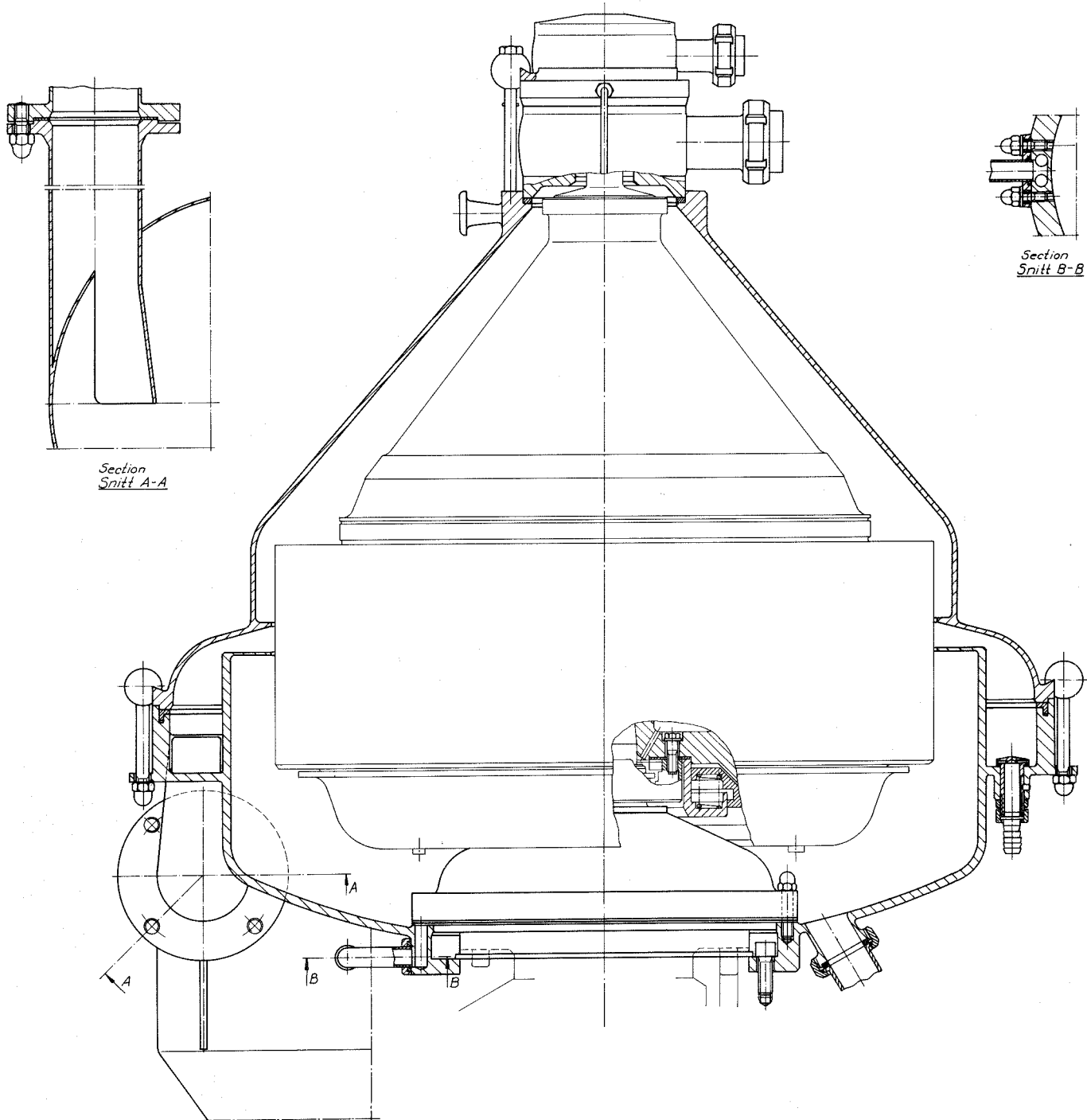


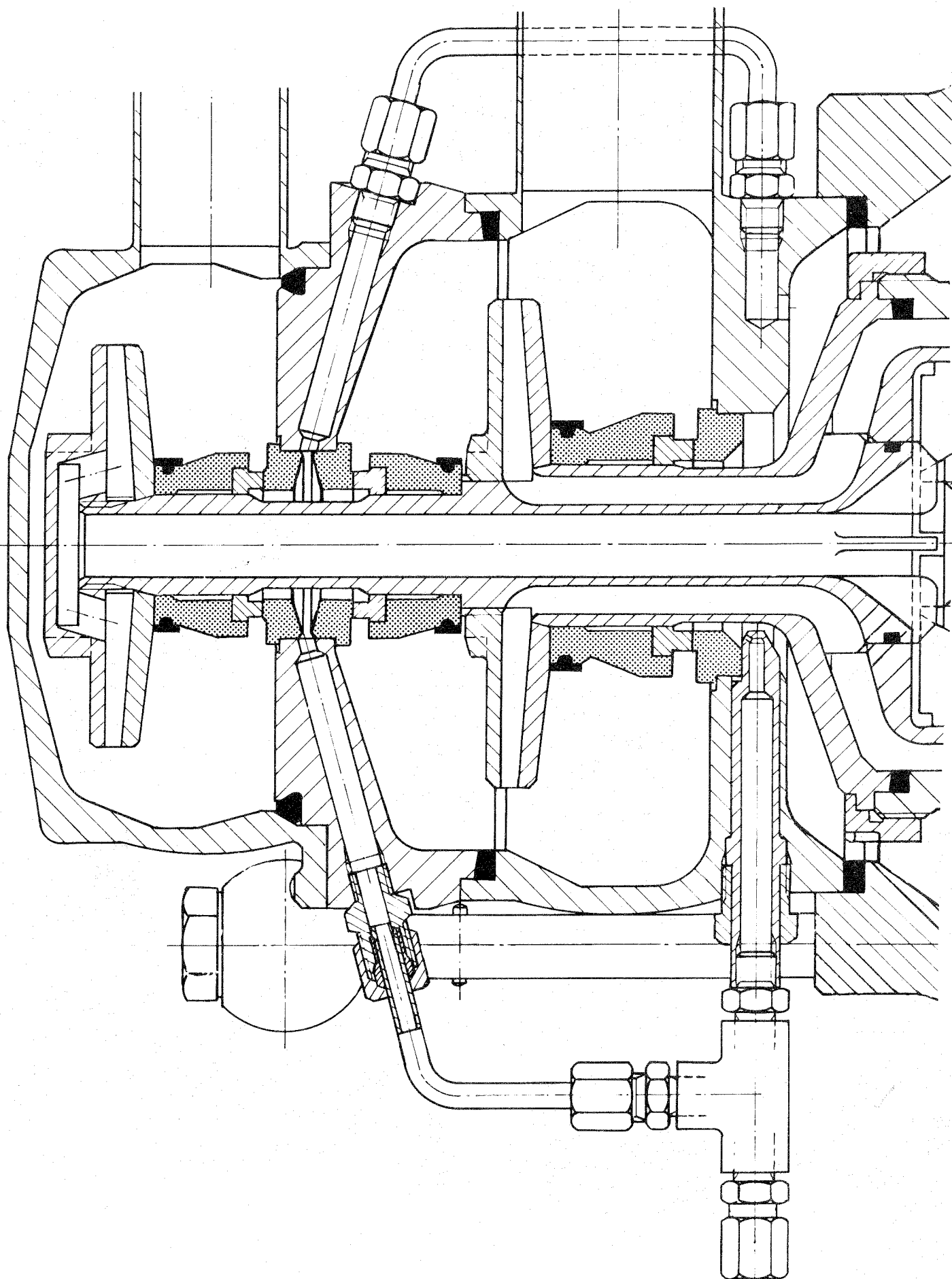
Pour oil into the worm gear housing if not done already.  
See also **Lubrication Schedule in Operators Manual "OM"**.

MRPX 314 HGV-74C

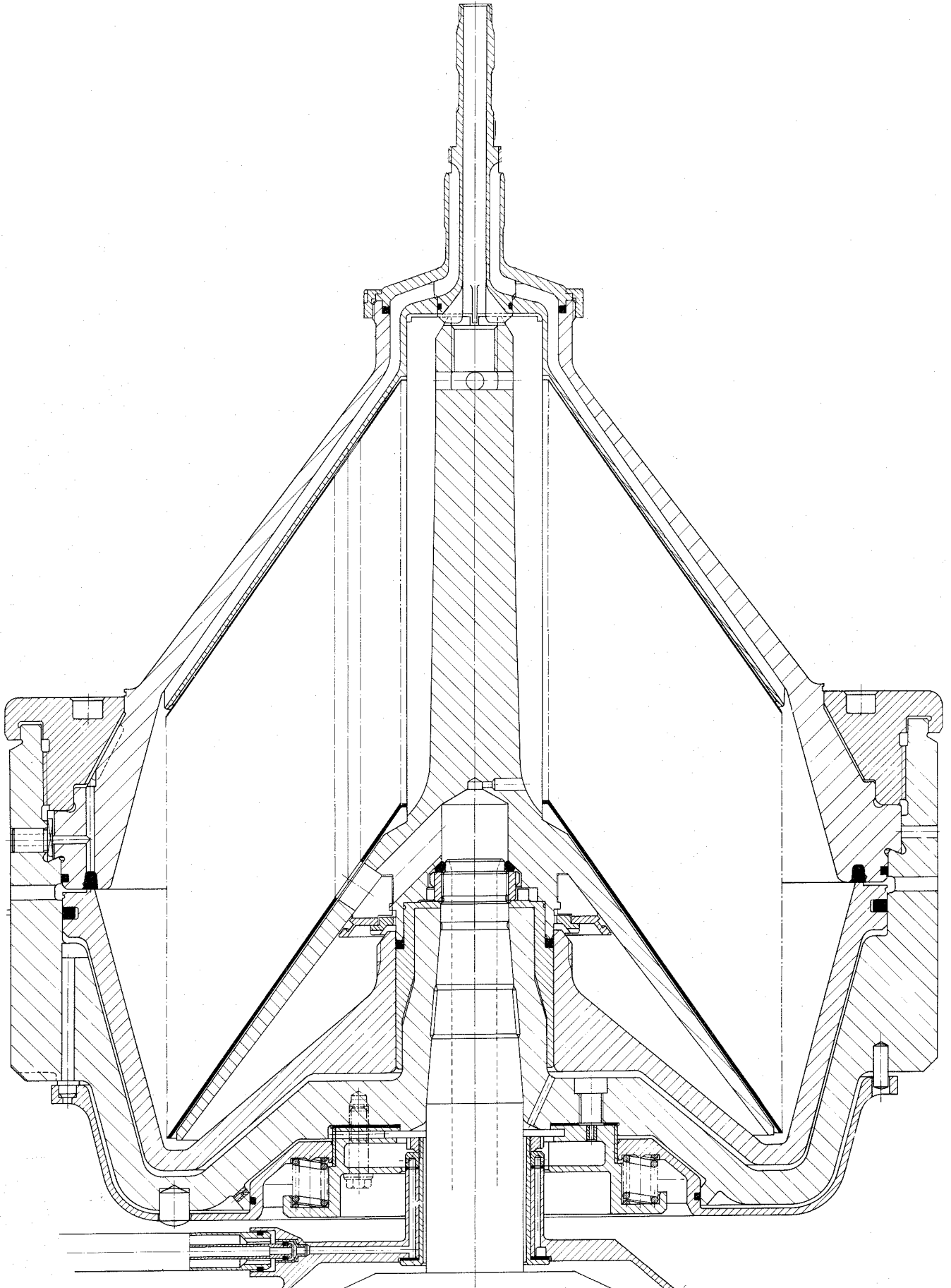


MRPX 318/418 HGV-74C





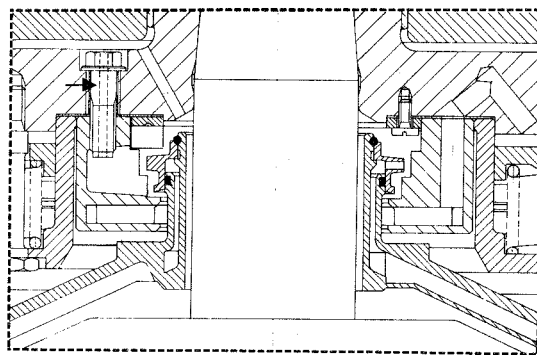
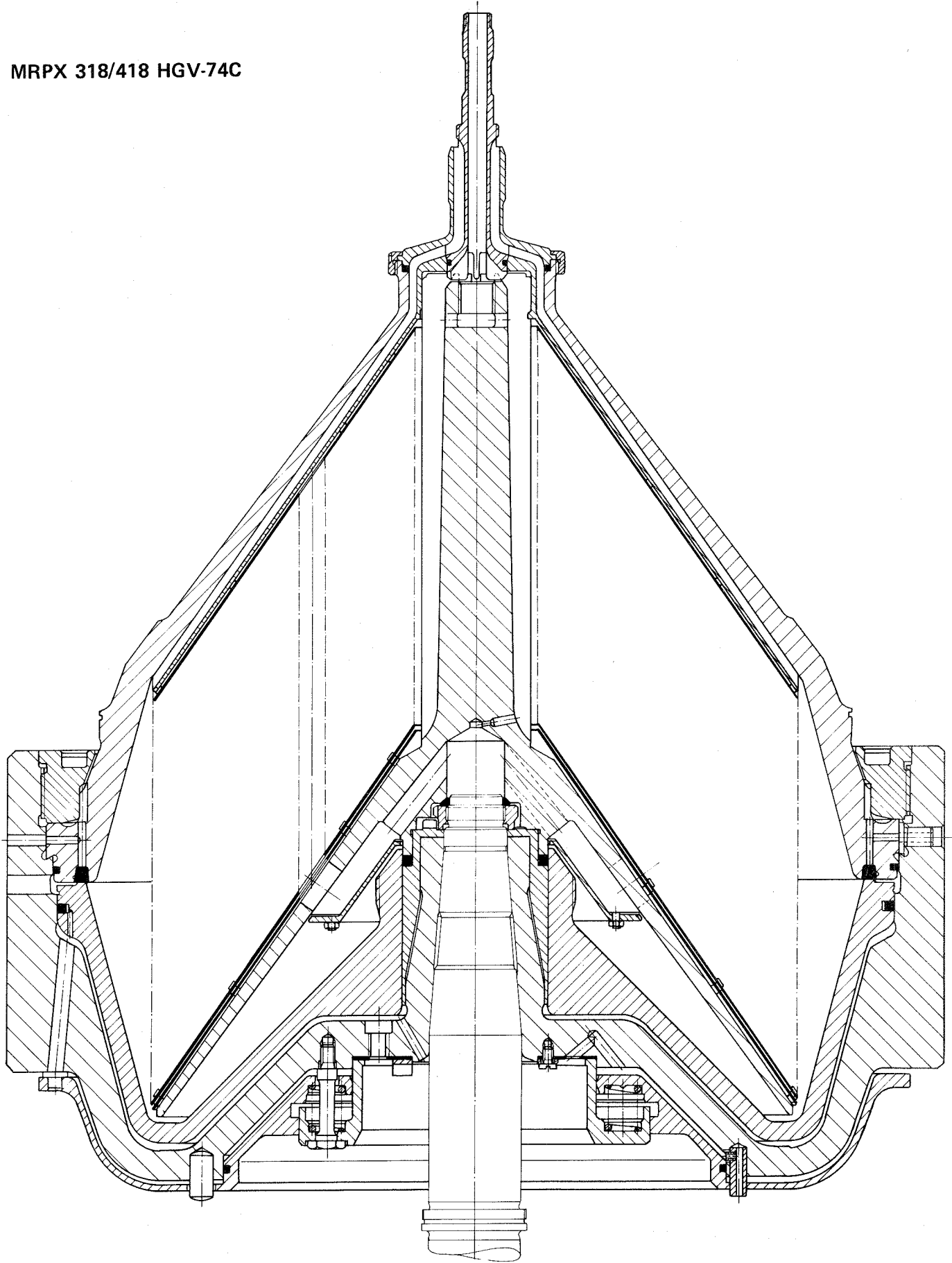
MRPX 314 HGV-74C



537872-Z

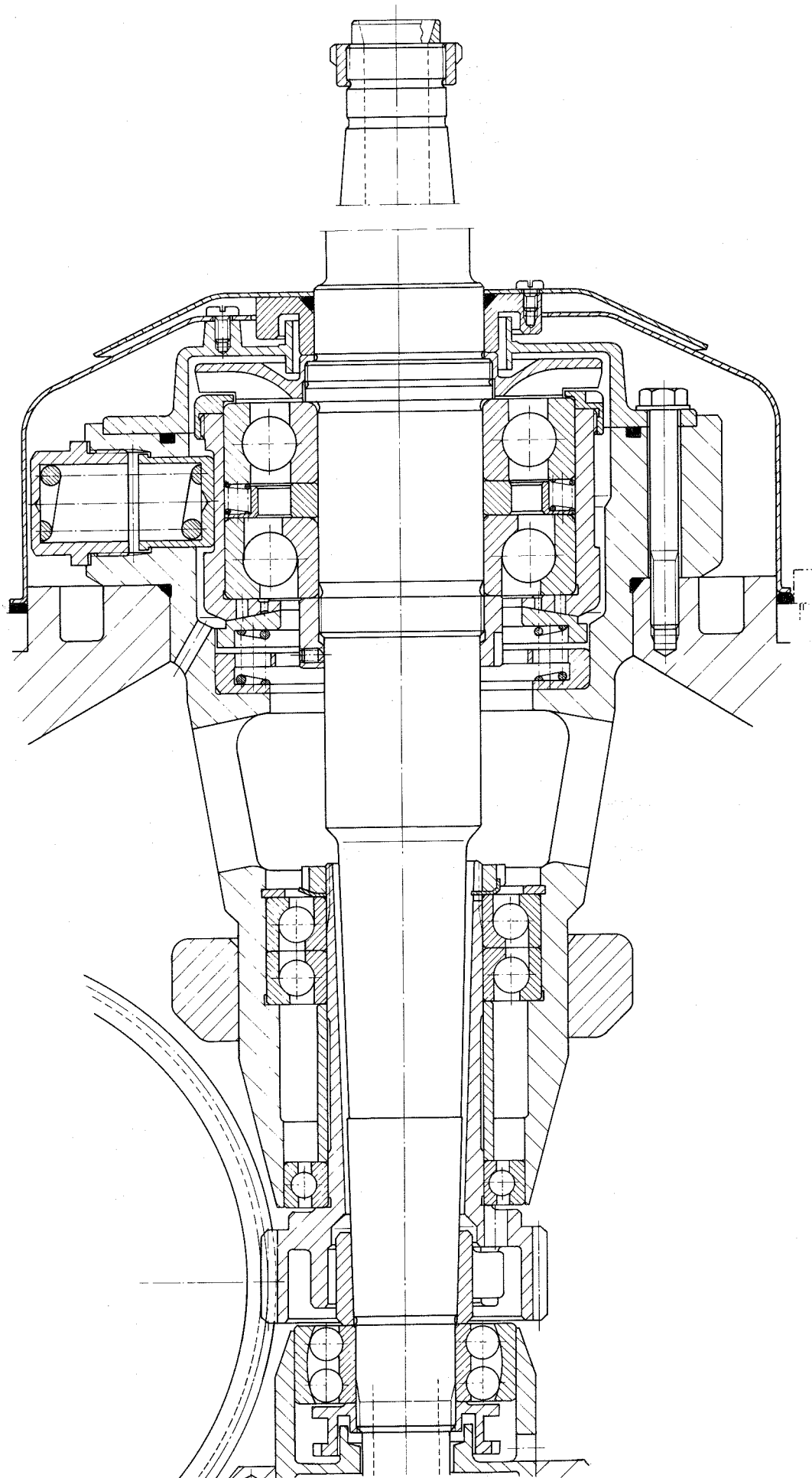


MRPX 318/418 HGV-74C



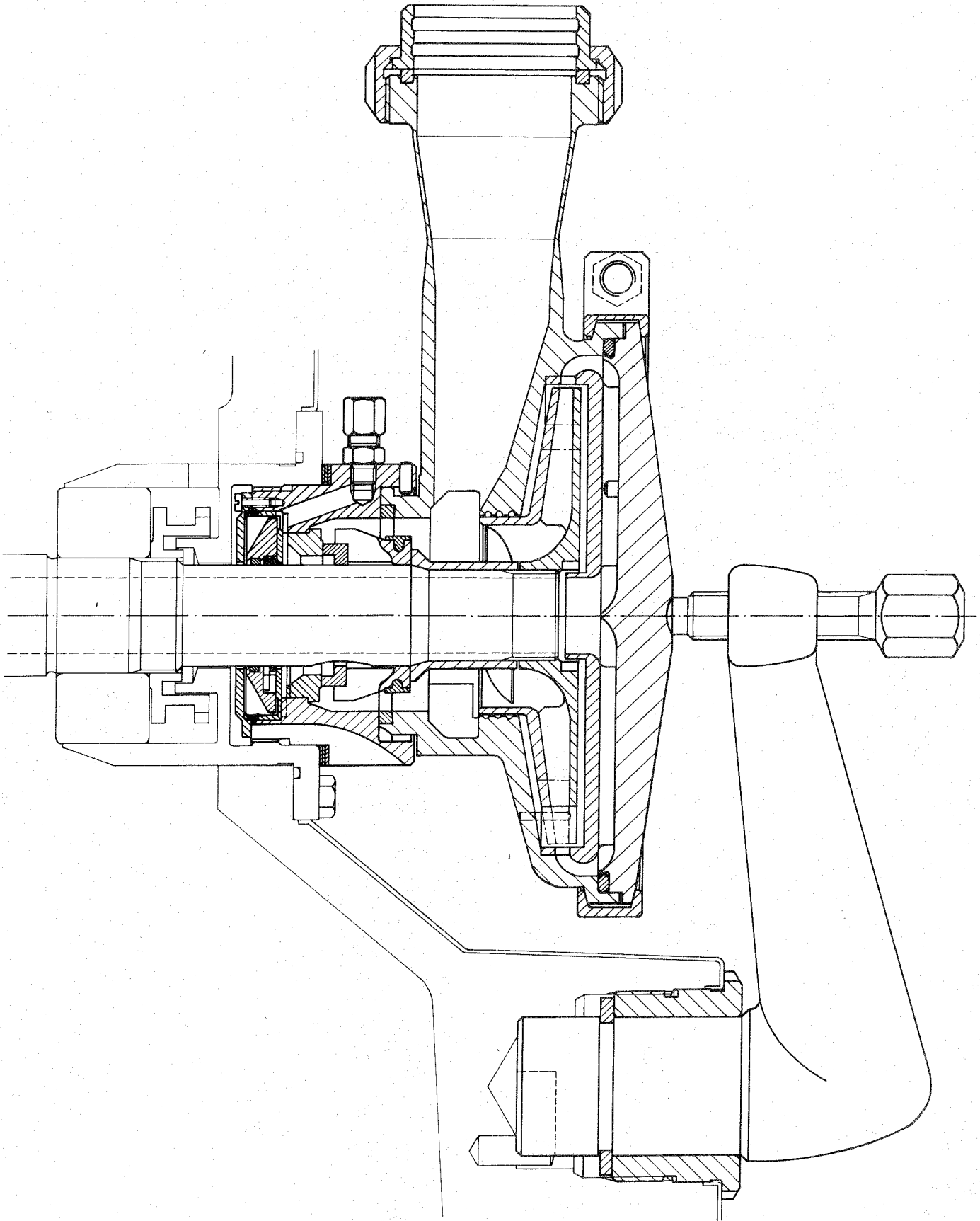
536295-Z

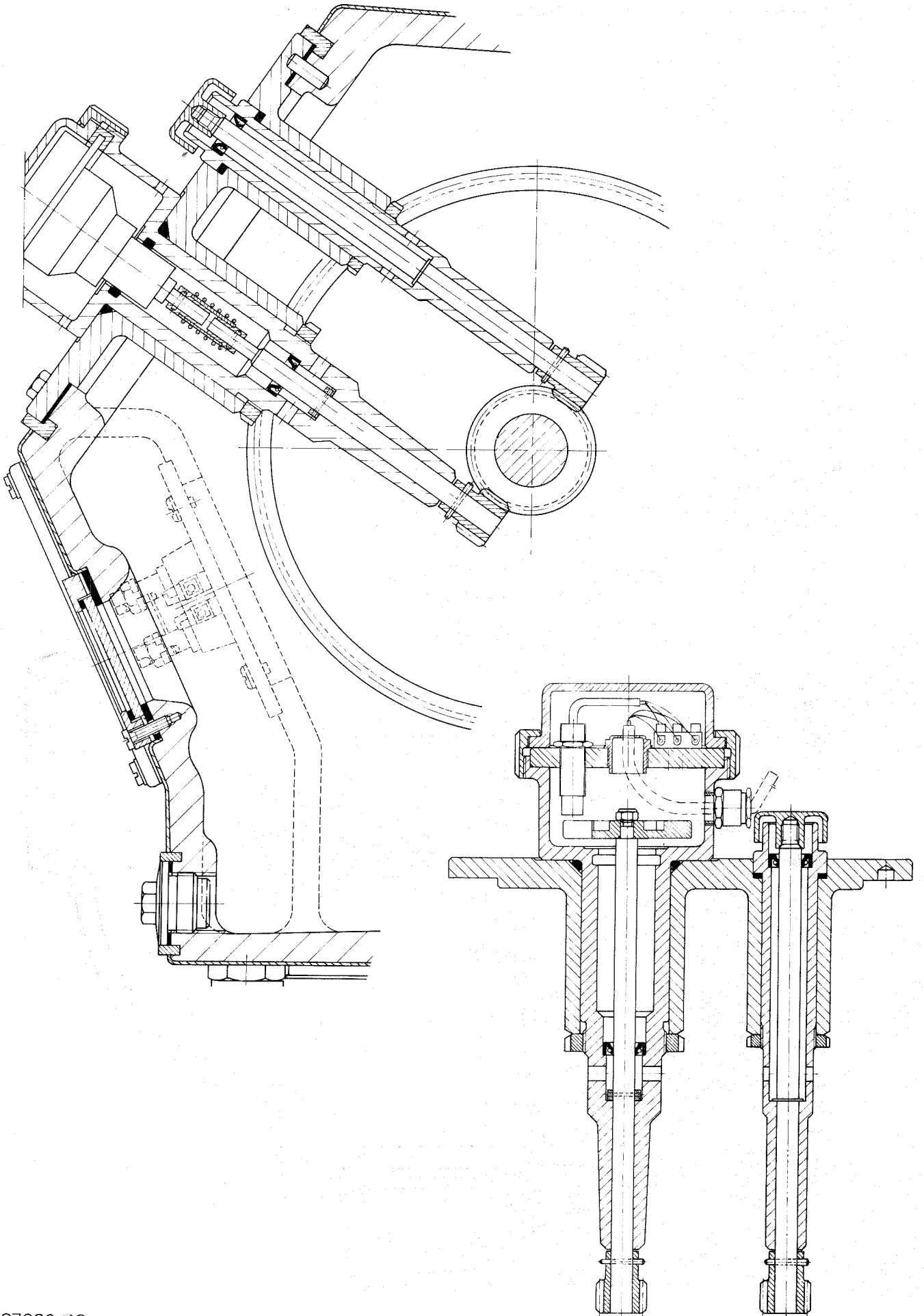
MRPX 314/318/418 HGV-74C

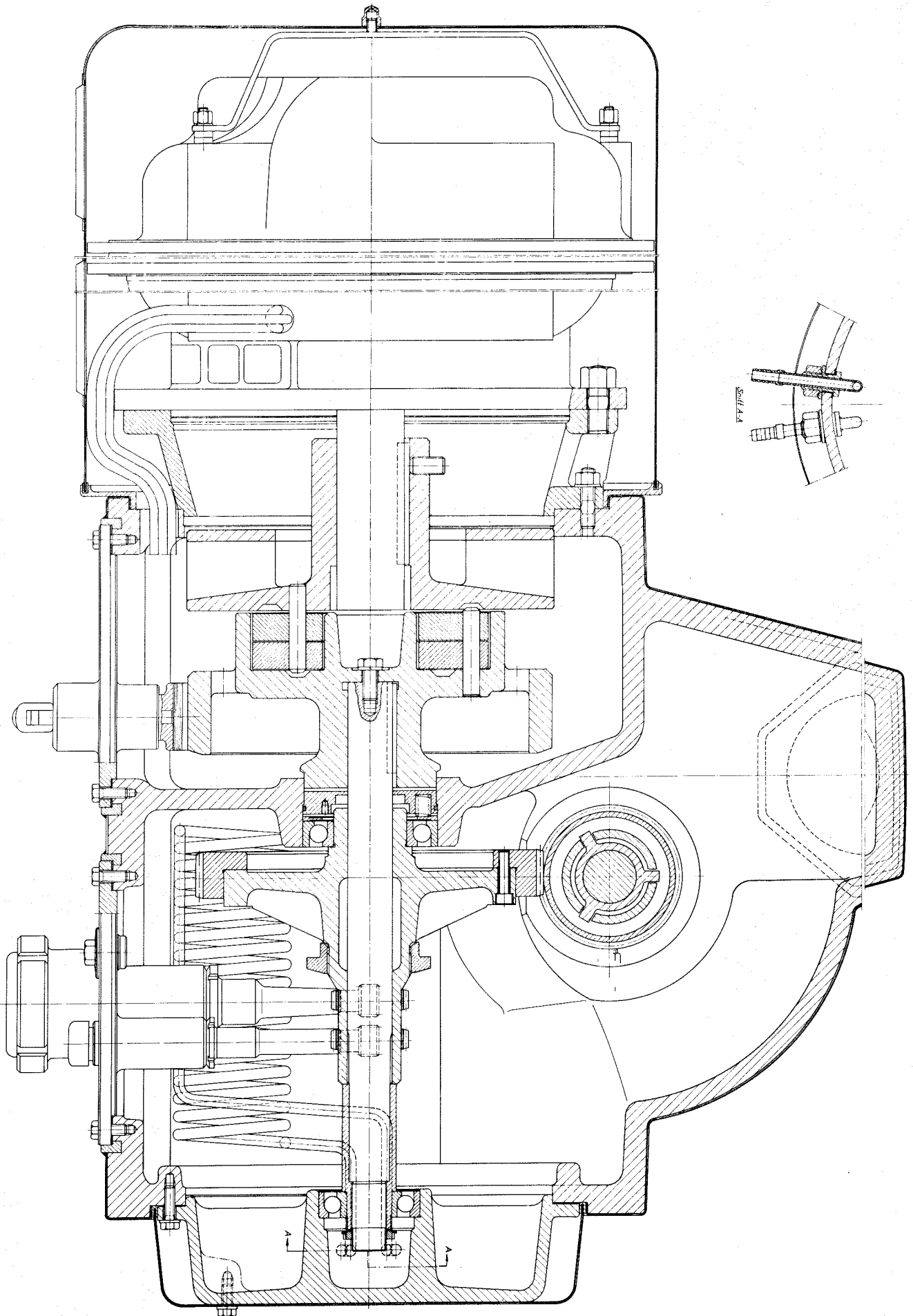


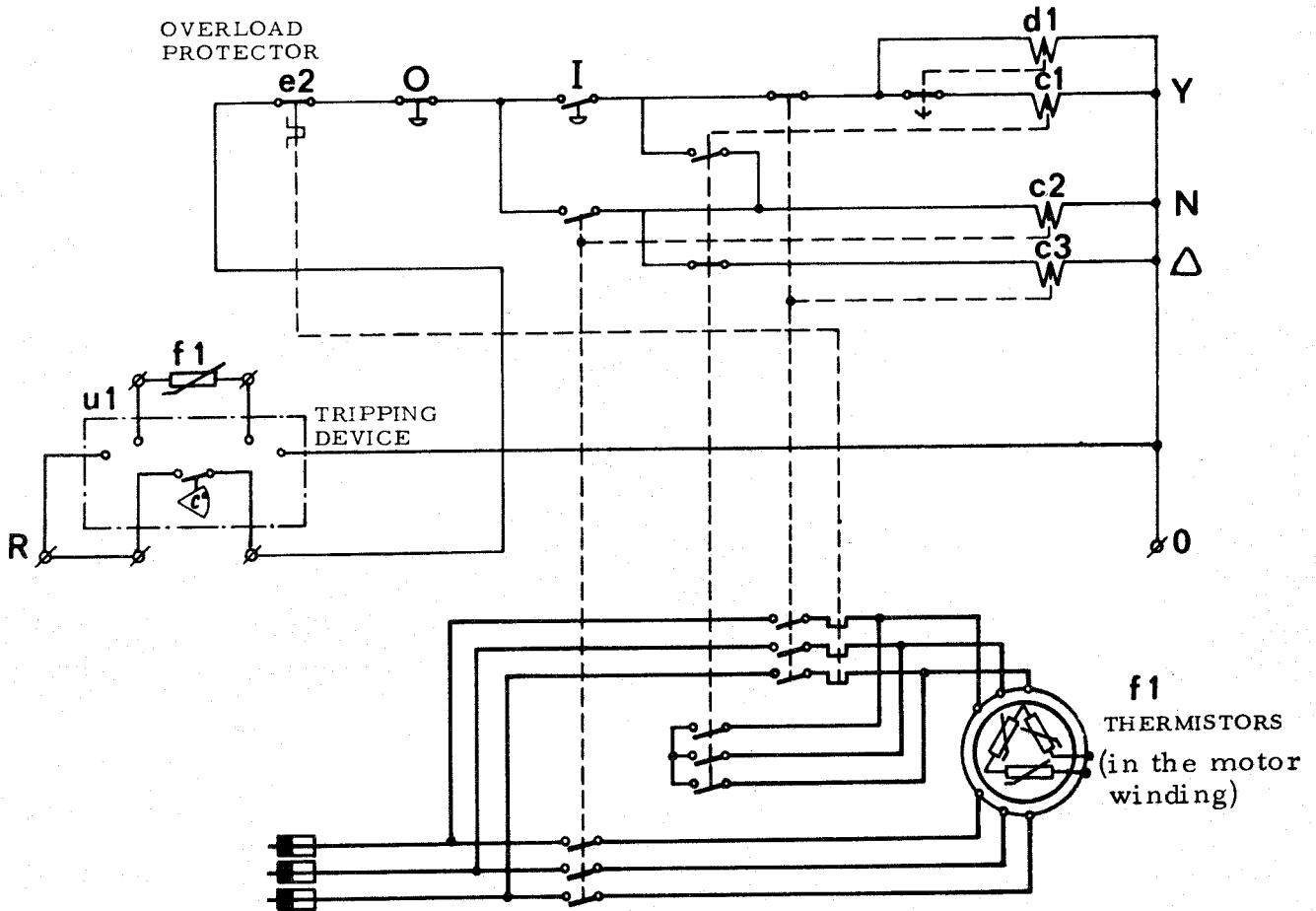
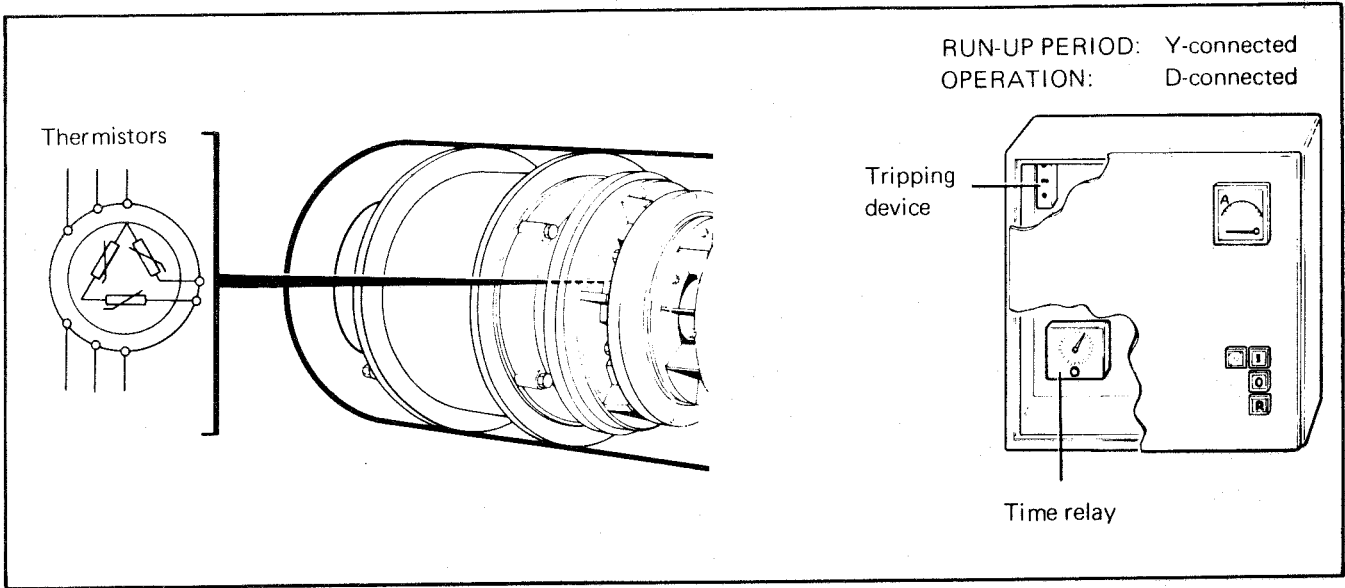
537920-ZA

MRPX 314/318/418 HGV-74C









Place of operation			Machine type	
Manuf. No.	Process	Time for job: at a total of ..... operating hours		Job actually done after ..... operating hours
Reason for job		Other reason		
Preventive				
<input type="checkbox"/> 750 <input type="checkbox"/> 1500 <input type="checkbox"/> 3000 <input type="checkbox"/> 9000		..... ..... .....		
Job ordered by:		Date	Job done by:	

ACTION	EXECUTION EVERY			
	750 h	1500 h	3000 h	9000 h
<b>1.2. INLET. OUTLET</b>				
<input type="checkbox"/> Cleaning of cooling water ducts and nozzles	x	(x)	(x)	(x)
<input type="checkbox"/> Check on cooling water flow rate: 15 - 30 lit/h per seal	x	(x)	(x)	(x)
Checking of:				
<input type="checkbox"/> impellers, threads	x	(x)	(x)	(x)
<input type="checkbox"/> seal rings, gaskets	x	(x)	(x)	(x)
<input type="checkbox"/> axial seals: rubber bellows with carbon ring, and wear ring	x	(x)	(x)	(x)
<input type="checkbox"/> washing efficiency	x	(x)	(x)	(x)
<input type="checkbox"/> Radial wobble of the outlet sleeve and guide sleeve (max. 0,3 mm)	x			
<input type="checkbox"/> Excentricity of the outlet sleeve and guide sleeve (max. play 4 mm)	x			
Replacement of:				
<input type="checkbox"/> rubber bellows with carbon ring		x	(x)	(x)
<input type="checkbox"/> wear ring			x	(x)
Checking of:				
<input type="checkbox"/> Height position — inlet = $14 \pm 0,3$ and $35 \pm 0,5$ mm; outlet MRPX 314 = $0 \pm 0,5$ mm; MRPX 318/418 = $3 \pm 0,5$ mm			x	(x)
<b>3. BOWL</b>				
Checking of:				
<input type="checkbox"/> seal rings, gaskets	x	(x)	(x)	(x)
<input type="checkbox"/> disc set pressure			x	(x)
<input type="checkbox"/> wear of lock ring threads				x
<input type="checkbox"/> seizure damage — lock ring joint	x	(x)	(x)	(x)
<input type="checkbox"/> sealing surface sliding bowl bottom/bowl head (nylon ring: depression max. 1 mm)	x	(x)	(x)	(x)
<input type="checkbox"/> washing efficiency	x	(x)	(x)	(x)
<input type="checkbox"/> erosion			x	(x)
<input type="checkbox"/> bowl body nave/bowl spindle cone	x	(x)	(x)	(x)
<input type="checkbox"/> Cleaning and checking of ejection mechanism nozzles, guiding surfaces, sealing surfaces and springs	x	(x)	(x)	(x)
Replacement of:				
<input type="checkbox"/> seal ring in top disc outlet pipe	x	(x)	(x)	(x)
<input type="checkbox"/> operating slide valve plugs	x	(x)	(x)	(x)
<b>4. OPERATING WATER DEVICE</b>				
<input type="checkbox"/> Checking of operating water flow rate. Cleaning of ducts	x	(x)	(x)	(x)
<input type="checkbox"/> Checking of height position — MRPX 314 = $243 \pm 0,5$ mm, MRPX 318/418 = $224 \pm 0,5$ mm			x	(x)

ACTION	EXECUTION EVERY			
	750 h	1500 h	3000 h	9000 h
<b>5. BOWL SPINDLE (vertical driving device)</b>				
Checking of:				
o radial wobble (max. 0.05 mm) .....			x	(x)
o worm (teeth) .....			x	(x)
o worm (grooves receiving driver wings: wear max. 5-6 mm) .....			x	(x)
o driver (cone and wings, wing wear max. 2 mm) .....			x	(x)
o ball bearing housing (indentations max. 0.5 mm) .....			x	(x)
o springs .....			x	(x)
o buffers .....			x	(x)
Replacement of:				
o all bearings (6) in vertical driving device .....			x	(x)
o seal rings, gaskets .....			x	(x)
<b>6. WORM WHEEL SHAFT (horizontal driving device)</b>				
Checking of:				
o worm wheel shaft (contact corrosion) .....			x	(x)
o worm wheel (teeth) .....			x	(x)
o worm wheel (gear rim screws; tightening torque 4 Kpm) .....			x	(x)
o bearings (two) .....			x	(x)
o sealing washer — frame facing coupling chamber .....			x	(x)
Replacement of:				
o bearings (two) .....				x
<b>7 COUPLING</b>				
Replacement of:				
o elastic plates (two) .....			x	(x)
Checking of:				
o axial play of elastic plates (2-5 mm) .....			x	(x)
<b>8. BRAKE</b>				
Checking of:				
o lining (min. 2 mm to screw heads) .....			x	(x)
o brake shoe .....			x	(x)
o piston and cylinder (refers to pneumatic brake) .....			x	(x)
<b>9. TACHOMETER</b>				
Checking of:				
o functioning and protective glass of tachometer .....			x	(x)
o play between transmitter and gear (1.5 - 2.5 mm) — only for remote indication and if transmitter has been dislocated .....			x	(x)
<b>10. MOTOR</b>				
o Insulation test of motor .....			x	(x)
o Lubrication of motor .....			x	(x)
<b>11. WORM GEAR HOUSING</b>				
o Checking of cooling water flow rate: 100 lit/h approx. ....			x	(x)
o Oil change in worm gear housing every 1000 hours of operation — see also Lubrication Schedule in Operator's Manual "OM".				
Note: In a new installation or after replacement of gearing, change the oil after 300 hours of operation.				
o Checking of worm and worm wheel in connection with oil change ..				
<b>12. FOUNDATION FEET</b>				
o Check that set screws of the feet are tightened .....			x	(x)



**Notes:**

A series of horizontal dotted lines for writing notes, spanning the width of the page.

