



Technical Manual

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Track Link Repair

1. After track chain is separated, remove track shoe from damaged link (fig. 2-6).

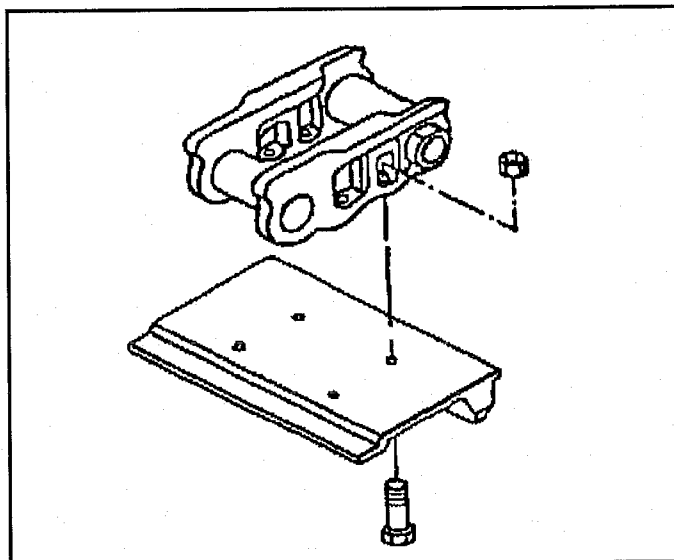


Fig. 2-6 Track Shoe Removal

2. To replace a damaged link, gas cut at the broken location (arrow, fig. 2-7). Cut the chain completely through at the damaged area and lay chain on ground.

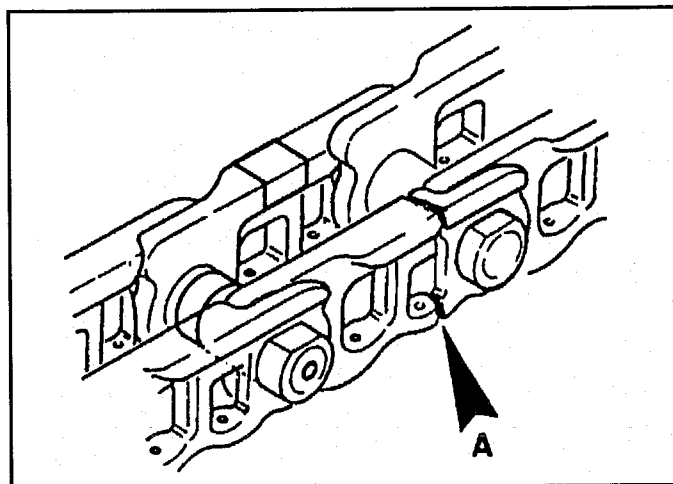


Fig. 2-7 Cut out damaged link

3. Now cut the links, bushings and pins of the damaged link as shown in fig. 2-8. Remove the cut up parts.

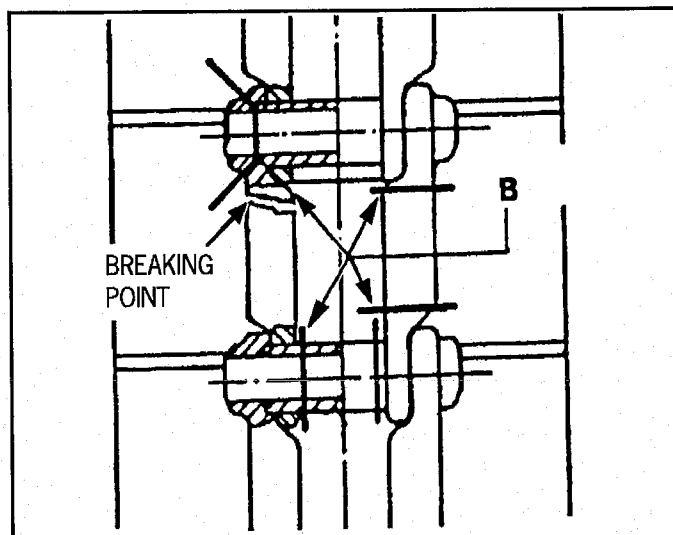
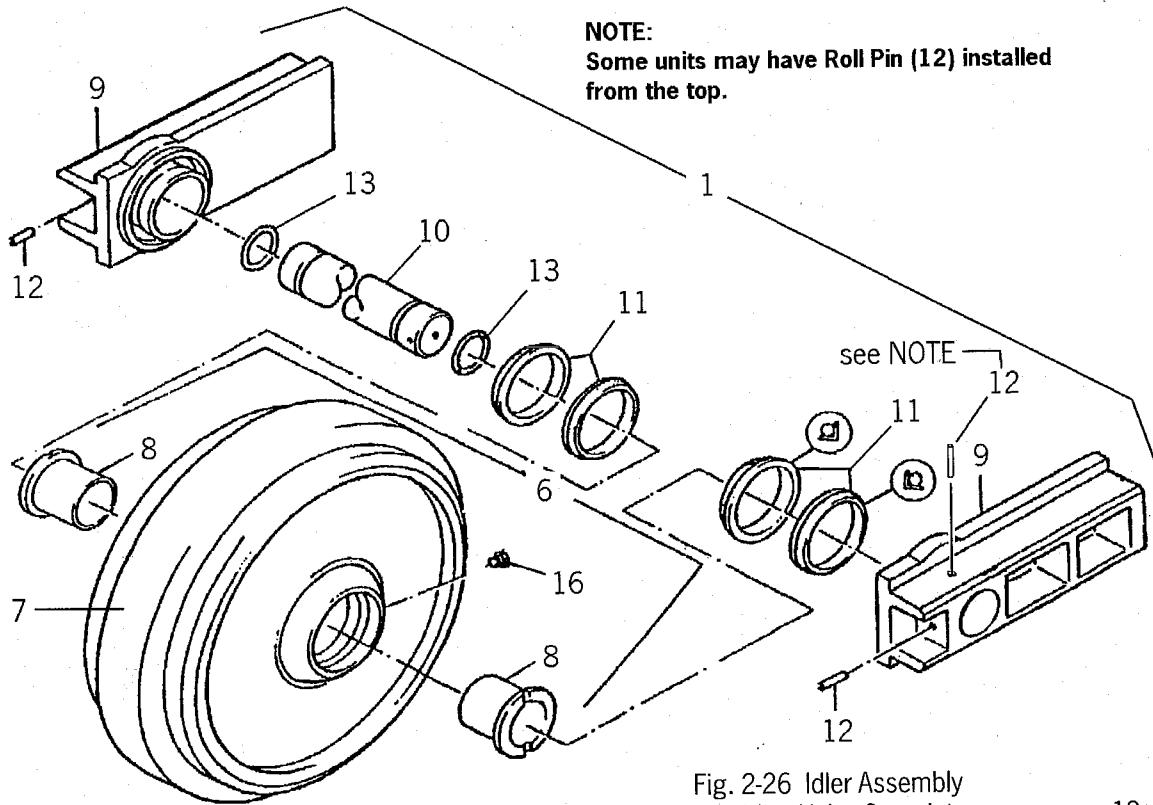


Fig. 2-8 Cut out links, bushings & pins as shown

Idler and Tensioner Assembly



NOTE:
Some units may have Roll Pin (12) installed from the top.

Fig. 2-26 Idler Assembly

- 1. Idler Unit - Complete
- 6. Idler with Bushings
- 7. Idler
- 8. Bushing (2)
- 9. Sliding Rail (2)

- 10. Shaft
- 11. Seal (2)
- 12. Roll Pin (2)
- 13. O Ring (2)
- 16. Plug

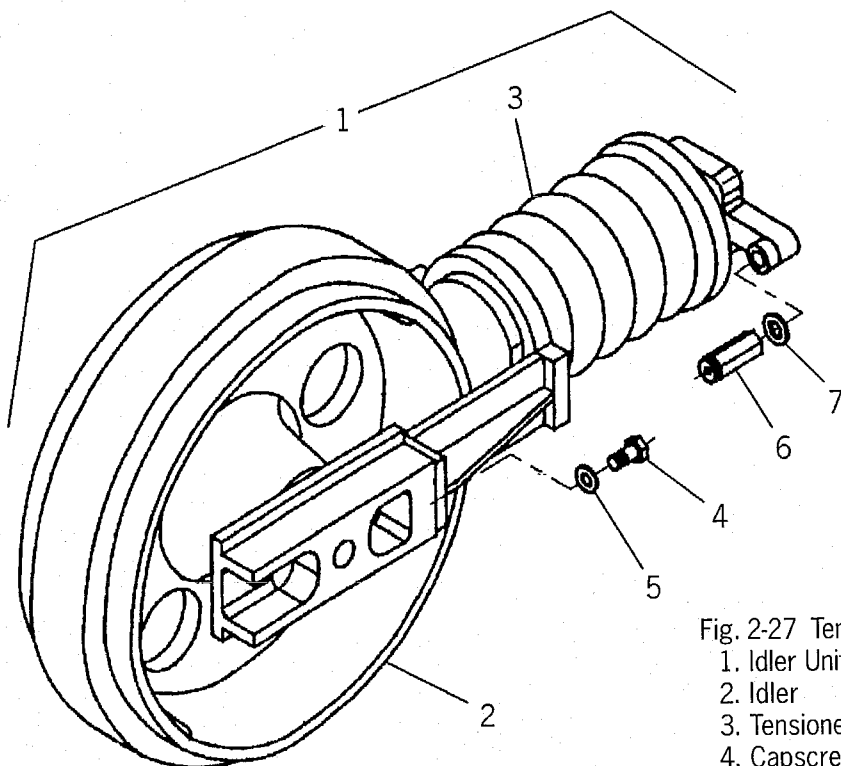


Fig. 2-27 Tensioner Assembly

- 1. Idler Unit - Complete
- 2. Idler
- 3. Tensioner - Complete
- 4. Capscrew, M12x35 (2)

- 5. Spring Washer (2)
- 6. Grease Fitting
- 7. Sealing Ring

Track Roller - Test & Install

7. Check the end play. Check for air tightness by inserting air pressure through the oil fill hole. Test pressure should be not more than 87 PSI (6 bar). Fig. 2-50.

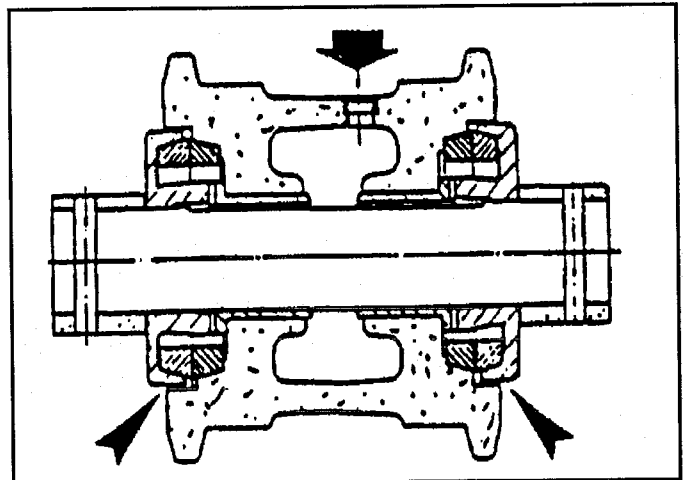


Fig. 2-50 Track Roller - pressure test.

8. If the air test is satisfactory, with no air leakage around the seals, fill roller with SAE 90 oil through the oil fill hole (fig. 2-51).

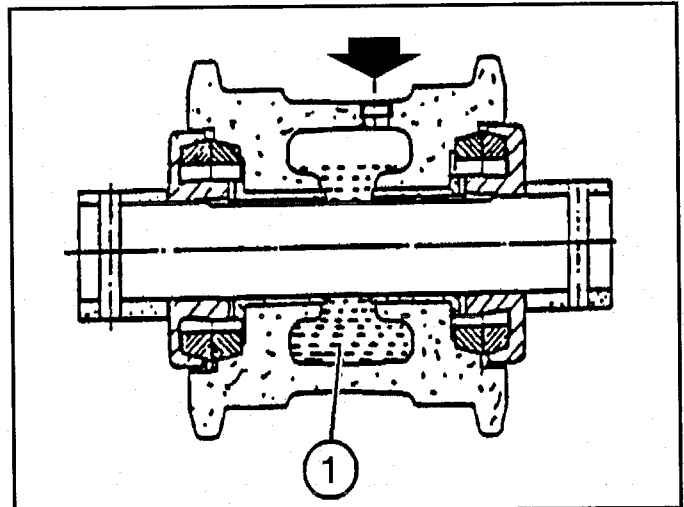


Fig. 2-51 Track Roller - fill with oil.

9. Hold the roller in such a way so the oil groove is at the bottom (remember the oil groove is aligned with the mounting surface of the bracket) and the oil fill hole is at the top. Now inset air pressure into the roller as in step 7 so the oil is pressed into the seal retaining spaces (9). Fig. 2-52.

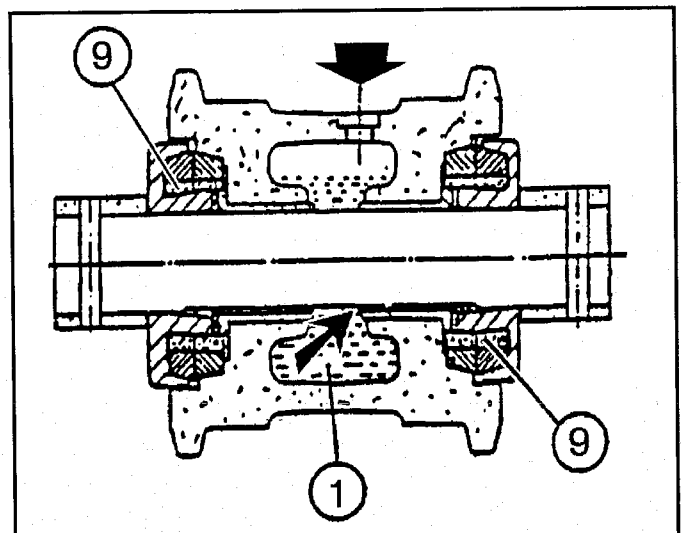
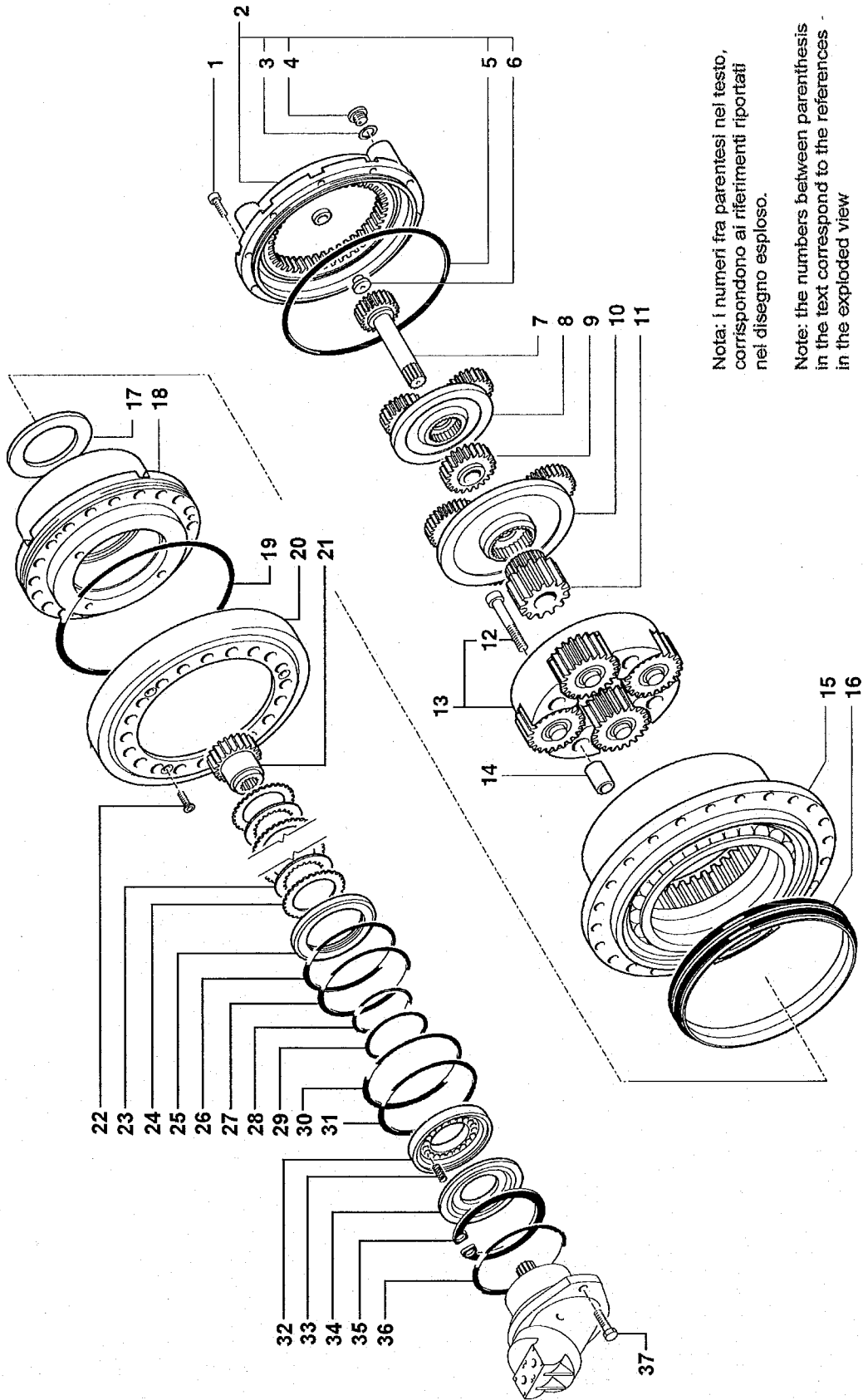


Fig. 2-52 Track Roller - air pressure on oil.



Nota: I numeri fra parentesi nel testo, corrispondono ai riferimenti riportati nel disegno esplosivo.

Note: the numbers between parenthesis in the text correspond to the references in the exploded view

Disegno esplosivo riduttore - Gearbox exploded view

7.0 MANUTENZIONE

In caso di normale funzionamento il motoriduttore non necessita di alcuna manutenzione ad eccezione del controllo e cambio olio. Sono necessari interventi di assistenza solo in seguito ad anomalie di funzionamento.

Eseguire i controlli ed attività secondo la tabella seguente:

7.0 MAINTENANCE

Under normal operating circumstances, no routine maintenance is required, except routine oil checks and oil changes. As recommended in this manual, unusual operating characteristics, such as noise or overheat, should indicate further investigation.

For a proper maintenance of the gearbox, the following checks and operations have to be done.

Controllo / Inspection	Frequenza / Frequency	Azione / Action
Serraggio viti <i>Tightening screws</i>	Dopo le prime 50 ore di lavoro del riduttore <i>After the first 50 operating hours of the gearbox</i>	Verificare serraggio viti <i>Screws tightening torque check</i>
Livello olio <i>Oil level</i>	Ogni 100 ore di lavoro del riduttore <i>Every 100 operating hours of the gearbox</i>	Aggiungere olio <i>Refill oil</i>
Primo cambio olio <i>1st oil change</i>	A 150 ore di lavoro del riduttore <i>At 150 operating hours of the gearbox</i>	Sostituire olio <i>Oil replacement</i>
Cambi olio successivi <i>Next oil change</i>	Ogni 1000 ore di lavoro del riduttore o 1 volta l'anno <i>Every 1000 operating hours or at least one a year</i>	Sostituire olio <i>Oil replacement</i>

1 Informazioni In caso di manutenzioni importanti e complesse, fare riferimento ai Disegni Esplosi e Liste Ricambi fornibili su richiesta ed alle prescrizioni contenute nel presente manuale tecnico.

Se sono necessarie istruzioni supplementari o se dovessero nascere problemi particolari, non esitate a contattare il distributore o direttamente il nostro servizio tecnico.

1 Information In case of important and complex maintenance operations, make reference to The Spare Part Lists Exploded View which can be supplied under request or the suggestions of this manual.

Do not hesitate to contact the gearbox distributor or manufacturer if further instructions are necessary or in case of particular problems.

9.0 RIMONTAGGIO

9.1 NOTE IMPORTANTI PRIMA DEL RIMONTAGGIO

Quando si procede al rimontaggio del riduttore occorre attenersi ad alcune regole fondamentali:

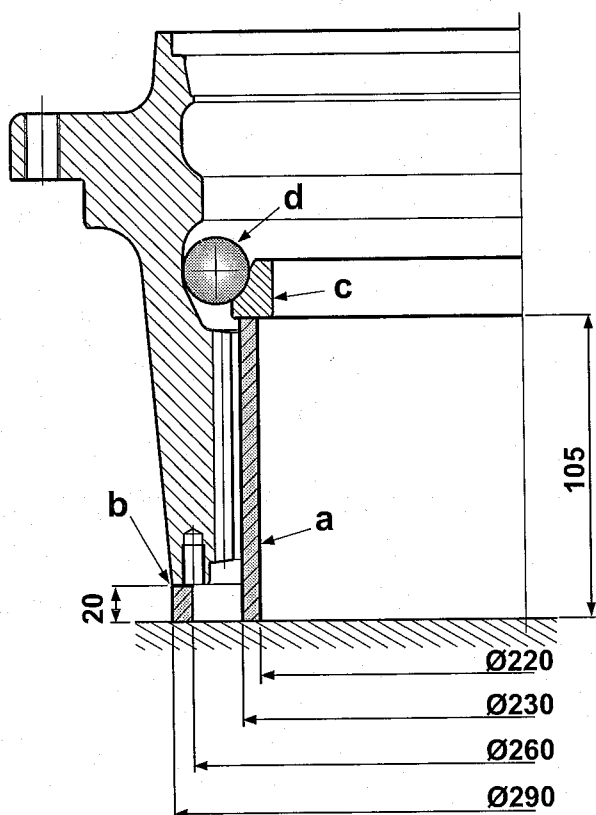
1. Nel caso di ingranaggi danneggiati, esempio un planetario, non sostituire il singolo ingranaggio ma tutta la riduzione.
2. Sostituire sempre le guarnizioni O-ring ed gli anelli di tenuta interessati alla parte da rimontare dopo aver pulito con attenzione le sedi di montaggio ed aver aggiunto un film di grasso sulle sedi stesse e sulle guarnizioni per facilitarne il montaggio.
3. sostituire sempre le parti che risultano danneggiate o usurate, con ricambi originali.

9.0 REASSEMBLY

9.1 IMPORTANT NOTES BEFORE REASSEMBLY

When proceeding with the gearbox reassembly, it is necessary to follow the rules listed below:

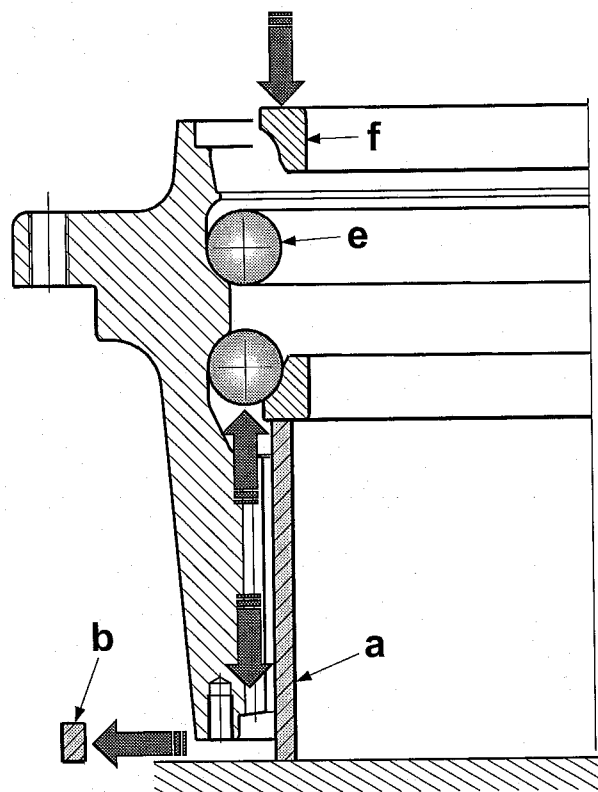
1. In case of damaged gears, for example a planet, do not replace the single gear, but the whole reduction stage.
2. Replace always the O-rings and seal rings of the part to be reassembled after having carefully cleaned the seats and having buttered some grease on the seats themselves and on the O-rings to make easier the reassembly.
3. always replace all the components that seems to be damaged or with excessive wear, with original spare parts.



30.

Montare sul corpo riduttore (15) il giro di sfere inferiore (d), sostenendo l'anello interno (c) tramite i distanziali (a-b).

Fit the lower ball row (d), into the gearbox housing (15) holding the inner raceway (c) with spacers (a-b).



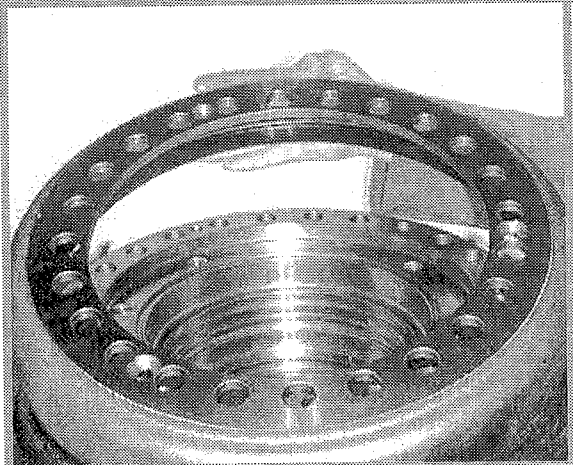
31.

Sfilare il distanziale (b).
 Montare il giro di sfere superiore (e).
 Inserire l'anello interno del cuscinetto (f).

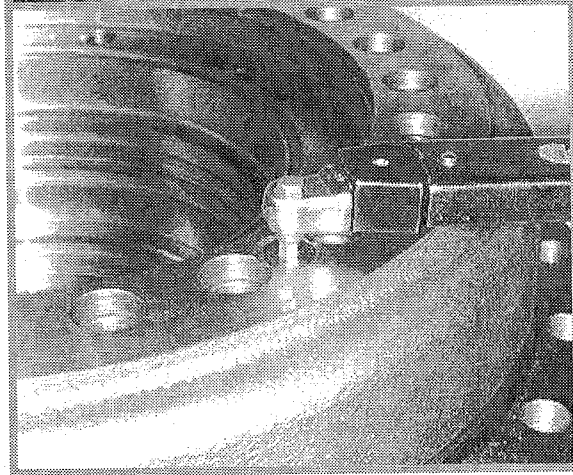
*Remove the spacer (b).
 Drop the upper ball row (e)
 Assemble the inner raceway (f).*

9.0 RIMONTAGGIO

9.0 REASSEMBLY



63.
Montare l'anello di ritegno (20) sul mozzo flangiato (18).
Assemble the cover (20) on the flanged hub (18).



64.
Fissare l'anello ritegno (20) al mozzo flangiato (18) con n°3 viti TSPEI M10x25 (22), classe di resistenza 10.9, serrate con chiave dinamometrica esagonale maschio alla coppia di 50 Nm.
Fix the cover (20) to the flanged hub (18) by using nos.3 flathead screws M10x25 (22) grade 10.9, tightened by a male hex head torque wrench at 50 Nm torque.



Fuel System - Isuzu Engine

Fuel System - Priming

The fuel system will need to be primed, if air has entered the system. This can be caused by any of the following circumstances:

- Machine runs out of fuel.
- Machine has not been started for a long time.
- Fuel filters have been changed.
- Maintenance has been performed on the fuel system and lines have been disconnected.

To Prime with Manual Priming Pump

1. Loosen the bleed screw (fig. 3-5)
2. Turn priming plunger knob counterclockwise to unlock. Operate plunger until no air bubbles are visible from the bleed screw.
3. Tighten bleed screw, and turn knob on plunger clockwise to lock.
4. Start engine. If engine does not start or starts, but misfires or smokes, prime again. If engine runs rough, continue running engine at low idle until it starts running smoothly.

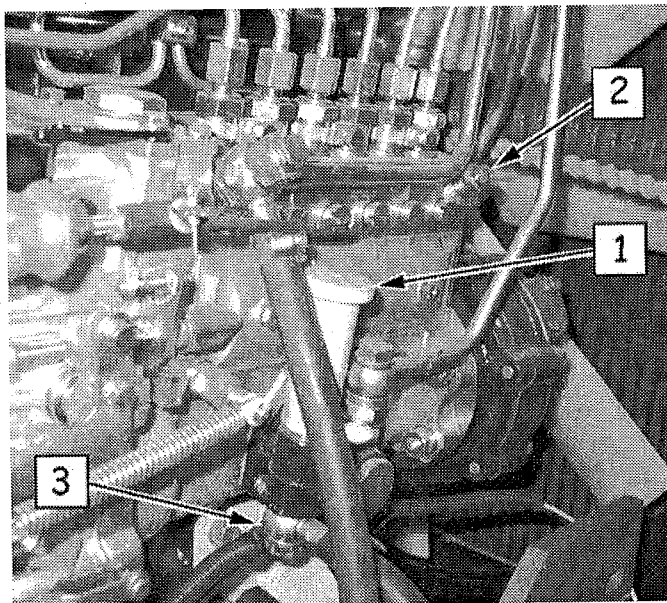


Fig. 3-5 Fuel Injector Unit

1. Priming Pump
2. Air Bleed Screw
3. Banjo Bolt - Fuel Strainer Inside (see fig. 3-5a)

Fuel Priming Pump Strainer - Clean

Clean the priming pump strainer every 500 hours of operation.

The strainer is located in the inlet side banjo bolt (see fig. 3-5 & 3-5a). Remove strainer and clean with compressed air. Rinse in diesel fuel.

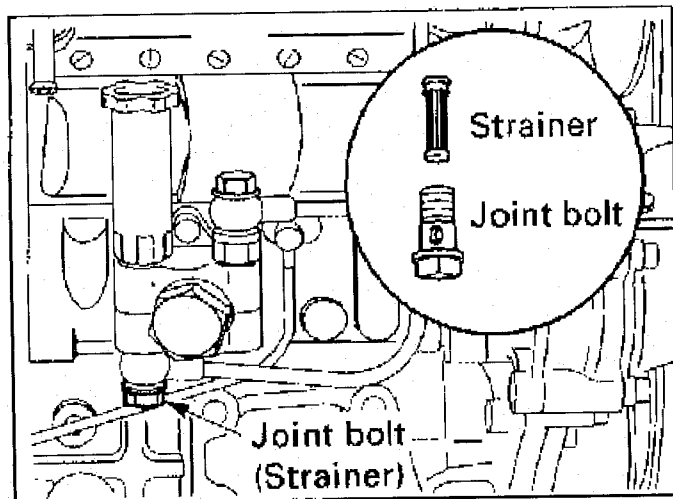
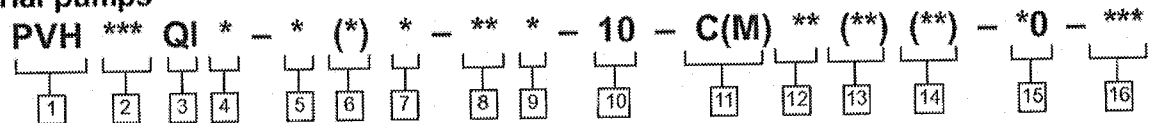


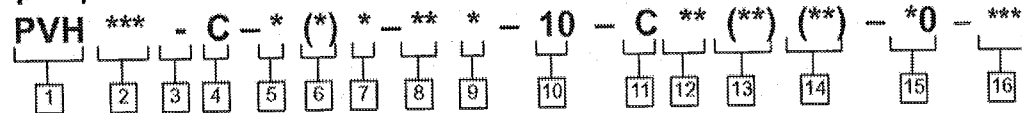
Fig. 3-5a Fuel Priming Pump Strainer

Model Code

Industrial pumps



Mobile pumps



1 Piston pump, variable displacement

2 Maximum geometric displacement

57 = 57.4 cm³/r (3.5 in³/r)
 74 = 73.7 cm³/r (4.5 in³/r)
 98 = 98.3 cm³/r (6.0 in³/r)
 131 = 131.1 cm³/r (8.0 in³/r)

3 Industrial version

4 Mounting flange, prime mover end

C = SAE "C" 4-bolt type
 (SAE J744-127-4)
 M = ISO 3019/2-125B4HW
 (Option for PVH57QI and
 PVH74QI only)

5 Shaft rotation, viewed at prime mover end

R = Right hand, clockwise
 (Standard on QI models)
 L = Left hand, counterclockwise
 (Optional on QI models)

6 Configuration

Blank = Non-thru-drive (single pump)
 A = Thru-drive pump with SAE
 "A" 2-bolt rear flange mounting
 (SAE J744-82-2)
 B = Thru-drive pump with SAE "B"
 2- and 4-bolt rear flange
 mountings* (SAE J744-101-2/4)
 C = Thru-drive pump with SAE
 "C" 2- and 4-bolt rear
 flange mountings♦ (SAE
 J744-127-2/4)
 S = Adjustable maximum volume
 stop (non-thru-drive and
 non-torque-control pumps only)

7 Main ports

F = SAE 4-bolt flange pads
 (standard)
 M = SAE 4-bolt pads with metric
 mounting bolt threads (PVH57 &
 PVH74 only)

8 Shaft-end type, at prime mover end

N = ISO 3014/2- E32N Short straight keyed
 1 = SAE "C" (J744-32-1) Straight keyed
 2 = SAE "C"* (J744-32-4) Splined 14 tooth 12/24 D.P.
 3 = SAE "CC" (J744-38-4) Splined 17 tooth 12/24 D.P.
 12 = SAE "D" (J744-44-4) Splined 13 tooth 8/16 D.P.
 13 = SAE "C" (J744-38-1) Straight keyed
 16 = SAE "D" (J744-44-1) Straight keyed

9 Shaft seal, prime mover end

S = Single, one-way (standard)
 D = Double, two-way (optional)
 Recommended on second pump
 of tandem assembly
 (PVH**/ PVH**)

10 Pump design number

10 (Subject to change. Installation
 dimensions unaltered for design
 numbers 10 to 19 inclusive.)

11 Pressure compensator adjustment range

C = 70-250 bar (1015-3625 psi)
 (standard)
 CM = 40-130 bar ((580-1885 psi)
 (optional QI version)
 IC = Industrial control
 UV = Unloading valve control for
 accumulator circuits

12 Pressure compensator factory setting in tens of bar

25 = Normal factory setting of 250
 bar for "C" models.
 7 = Normal factory setting of 70
 bar for "CM" models.

13 Additional control functions

Blank = No additional controls
 V = Load sensing, 20 bar differential
 pressure setting
 T = Torque limiter
 VT = Load sensing and torque limiter

14 Torque limiter factory setting

** = Customer desired torque limiter
 setting specified in ten bar
 (145 psi) increments, e.g.:
 8 = 80 bar (1160 psi);
 18 = 180 bar (2610 psi).
 The torque setting range is from
 30-80% of the specified
 compensator setting.

15 Control design number

31 = C, CM, or C**V controls.
 13 = C**T controls
 14 = C**VT controls
 10 = UV and IC controls

16 Special features suffix

027= Composite 2-bolt/4-bolt mounting
 conforming to SAE "C" (except
 PVH131)
 031= Thru-drive SAE "A" pad cover
 041= No case-to-inlet relief (for use with
 supercharged circuits)
 057= Shaft-up operation (vertical mount)

*Torque restrictions apply to #2 shaft in
 PVH74 and 98 thru-drive, and PVH131
 single and thru-drive, pumps. Vickers is
 not responsible for misapplied usage of
 these shafts. Please contact a Vickers
 representative for review of your
 application.

♦ Built from pump with SAE "A" rear
 pad to which suitable flange adapter is
 bolted. For best availability and flexibility,
 order PVH SAE "A" thru-drive pump and
 SAE "B" or "C" adapter kit separately.

Note

Replace all parts that do not meet the following specifications:

1. Inspect the threads and o-ring grooves and adjustment screw (2). If threads are worn, replace. If o-ring grooves have burrs, remove the burrs with an India stone.
2. Inspect spring (7) for wear on the outside edge of the spring. Check spring ends for squareness. The spring ends must be parallel within (3°). If spring is bent or worn, replace the spring.
3. Check spring guides (5) for burrs. Clean up with an India stone if burrs are present.
4. Check spool (16) for erosion, burrs, and scratches. If the spool is eroded or scratched across a land, check body (17) for the same problem. If erosion is heavy in both parts, replace the valve. If the spool is scratched and the scratch cannot be removed by light polishing with 500 grit paper or crocus cloth, replace both the body and spool. Clean up burrs with an India stone.

Note

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and materials are used in the manufacture of our parts. Substitutions may result in early failure.

Assembly

Note

Obtain seal kit for the control (check service drawing for part number). Replace all seals and back-up rings with new ones from the kit. Refer to Figure 15 during assembly. Special assembly procedures will be noted in the step-by-step procedure.

Lubricate all parts with system fluid at assembly. O-rings and back-up rings require a viscosity improver to facilitate assembly.

1. Assemble spool (16) into valve body (17) with rounded end of spool pointing toward adjustment plug end of valve. Assemble O-rings (12 and 15) on plugs (13 and 14), (install orifice plug 11 if removed) then, thread plugs (13 and 14) into body (17). Torque plugs (13 and 14) to 9.8-10.2 N.m. (7-7.5 lb.ft.).
2. Install spring guides (5), spring (7) and pin (6) into body (17). Install o-ring (4) over plug (3) and thread screw into body (17). Install adjusting screw (2) and nut (1).

Note

Reassemble the control to the pump and connect all tubing and applicable relief valves. Perform the final adjustment of control assembly.

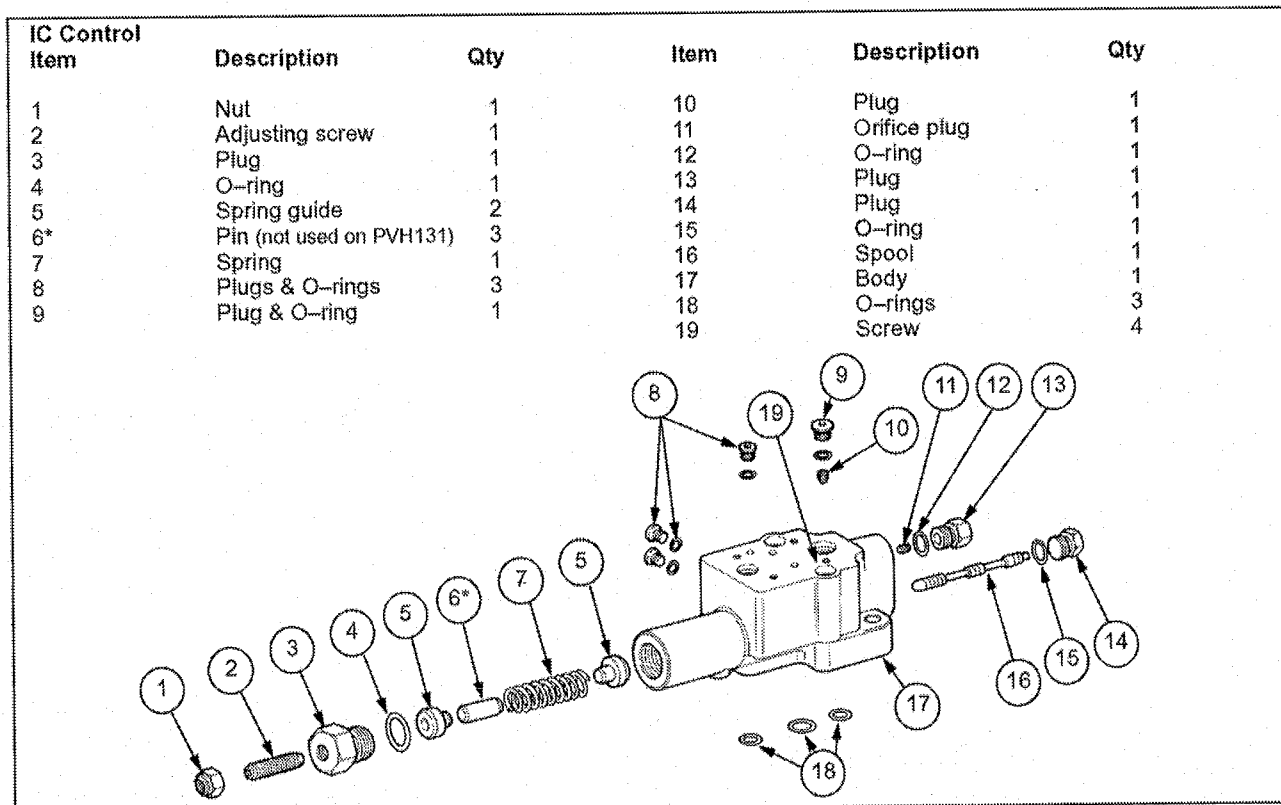


Figure 15: Industrial Control Exploded View

Pump Overhaul

C. Unit Removal

Refer to Figure 29.

1. Block the machine to prevent uncontrolled movement.

Caution

Before breaking the circuit connection, make sure power is OFF and system pressure is released. Lower all vertical cylinders, discharge accumulators, and block any load that could generate pressure.

2. Drain the fluid from the system.
3. Remove drain plug (1) from the pump's valve block (8) and drain the fluid from the pump.
4. Before breaking any circuit connections at the pump, clean the pump exterior to prevent dirt from entering the system.
5. Disconnect all hydraulic lines at the pump.
6. Remove the unit from the machine.
7. Put the unit on a clean, work bench that will support the unit's weight.
8. Before unit disassembly, cap or plug all open circuit connections on the machine so dirt does not enter the system.

D. Unit Disassembly

Note

All parts within the unit must be kept clean during the overhaul process. Handle each part with great care. The close tolerance of the parts makes this requirement very important. Clean all parts that are removed from the unit with a commercial solvent that is compatible with the system fluid. Compressed air may be used in the cleaning process, however, it must be filtered to remove water and other contamination.

Valve Block Disassembly

Note

Refer to Figure 29, PVH exploded view, for the following disassembly procedure.

1. Remove plug (3) and o-ring (4) from valve block (8).
2. Loosen six screws (5, 6, 7) that attach the valve block to the pump housing (51).

3. At this time, remove two screws (6 and 7) that are opposite of each other and replace these screws with two eight inch studs. The studs are referenced under Special Tools at the beginning of this section.

4. Remove the remaining four screws from the valve block.
5. Remove the valve block from the pump housing.

Note

To dislodge valve block (8) from pump housing (51), tap on side of valve block with a rubber hammer. Slowly remove the valve block away from the housing. The studs will act as a guide during this procedure. (Note: The valve plate (21) may stick to cylinder block (29) or valve block (8) during removal of the valve block.) Be careful not to damage the valve plate or valve block during this operation. Once the valve block moves away, do not allow the valve block to move back against the pump housing (51) because the valve plate may get damaged.

6. Remove valve plate (21).
7. Remove and discard housing gasket (20).
8. Remove pins (19) from valve block (8).
9. Remove control piston (9), bias piston (12), and bias spring (13). *DO NOT* remove control rod (10), o-ring (11), bias rod (14), and o-ring (15) from valve block (8) unless they are damaged.

Note

If control rod (10) or bias rod (14) need to be removed from valve block (8), secure the valve block in a sturdy vise. Make sure the vise jaws do not damage the valve block face. Insert a hex key wrench into the stem and turn the wrench counterclockwise. It may be necessary to use an extension on the wrench because the control and bias stem are secured to the valve block with Loctite 270 cement. Remove o-ring (11) and o-ring (15) from the rods.

10. Take a blunt screwdriver and push down on poppet (17). The poppet is located in the valve block face underneath seat (16).

Release the screw driver from the poppet and check to see if the poppet returns against seat (17). *DO NOT* remove seat (16), poppet (17), and spring (18) from valve block (8) if the poppet returns against the seat.

11. Remove tail roller bearing (23) and shim (22) from ends of shaft (39).

Test

2. Close valve A rapidly. There should be no indication of pump instability. (Note: Pump instability is when outlet pressure oscillations exceed ± 3.5 bar (50 psi) around control pressure setting of 250 bar (3625 psi). When valve A is closed, the pressure at P2 should be within ± 4.0 bar (58 psi) of the initial pressure setting.

3. Close needle valve V. The differential pressure between P3 and P4 must be 0.9-1.7 bar (13-25 psid). Open needle valve V.

Unloading Valve: (refer to Figure 31)

NOTE

Testing for a pump with unloading valve requires an external pressure source of 207 bar (3000 psi).

1. Install unit in the test circuit and fill pump case.
2. Fully open load valve A.
3. Operate unit at rated speed as specified in Table 5 and adjust outlet pressure to 28 bar (400 psi) until all air is removed from the circuit.
4. Increase unit outlet pressure P1 to 150 bar (2175 psi) by adjusting valve A and hold for 1 minute followed by 15 seconds at 28 bar (400 psi). Increase the outlet pressure to 250 bar (3625 psi) for 1 minute. Unit must be able to meet flow and flow loss requirements as specified in Table 5 at both conditions.

Pressure limiting and case-to-inlet check valve calibration

1. With valve A closed, adjust the pressure limiting setting (P1) to the pressure specified by model code ± 4.0 bar (58 psi).
2. With pump at rated speed, maximum flow, and outlet pressure (P1) of 28 bar (400 psi), close valve A rapidly. There should be no indication of yoke hunting or pump instability. Instability is evidenced by sustained pump outlet pressure oscillations greater than ± 3.5 bar (50 psi) about nominal pressure limiting setting. With valve A closed, the pressure should be within ± 4.0 bar (58 psi) if initial setting in paragraph 1.
3. Operate pump at rated speed with valve A closed and unit operating at pressure limiter setting. Block off case drain flow by closing valve C. The case pressure should be maintained at 0.9-1.7 bar (13-25 psi) above inlet pressure.

Unloading valve standby pressure & leakage

1. Apply 207 ± 2 bar (3000 ± 30 psi) from external supply to the accumulator port of unloading valve (Pe). Close valve A and adjust the load sensing screw on the control so the pump operates at zero flow and at the outlet pressure (P1) as listed in Table 7:

Unit	Model Code Suffix	Outlet Pressure P1
PVH74	083	440 \pm 15 psi
PVH131	072	440 \pm 15 psi
PVH131	077	440 \pm 15 psi

Table 7

2. Plug all ports and apply air to case at a pressure of 3.5 bar (50 psi) while unit is immersed in a non-corrosive fluid. No external leakage is permitted.

Alternate testing method, if no external pressure source is available:

1. Assemble pump without unloading valve and tubing attached but with CV control attached directly to the valve block. Complete test steps for the CV control.
2. Shut off test stand and assemble unloading valve and tubing onto the pump.
3. Install pump onto stand and run at rated speed and at 35 bar (500 psi) below compensator setting. Testing is complete if no oil leaks are observed.
4. Plug all ports and apply air to case at a pressure of 3.5 bar (50 psi) while unit is immersed in a non-corrosive fluid. No external leakage is permitted.

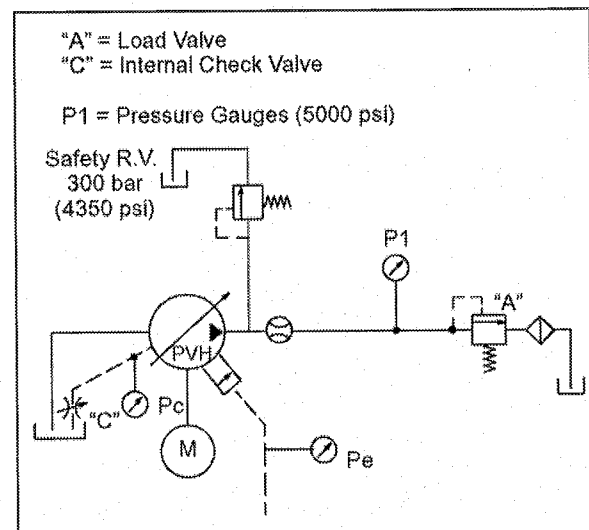


Figure 31: Unloading Test Circuit

11. Double check, to be sure all connections to canopy have been removed. Use caution when lifting to not damage hydraulic hoses to auxiliary valve bank at left front of machine.

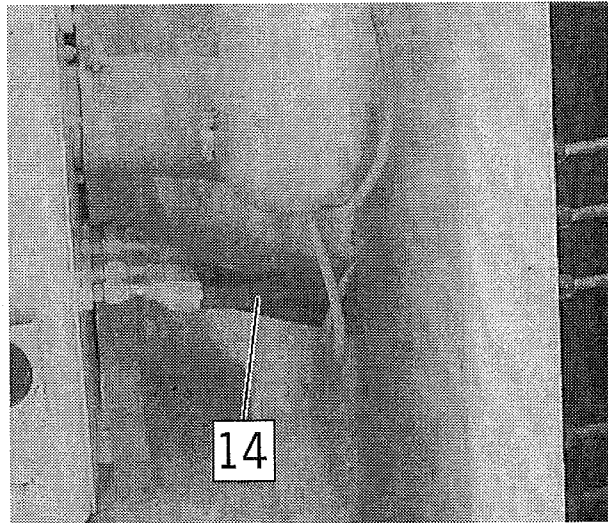


Fig. 3-21 Left Front of Canopy
14. Hydraulic hoses

12. Use a suitable lifting device, able to lift at least 2000 lbs. (907 kg.). Attach lifting cables to the lifting eyes (15) on top of the canopy. Carefully guide the canopy as it is being lifted off. Watch area around radiator/oil coolers as this is a close fit.
13. Installation is basically the reverse of removal.

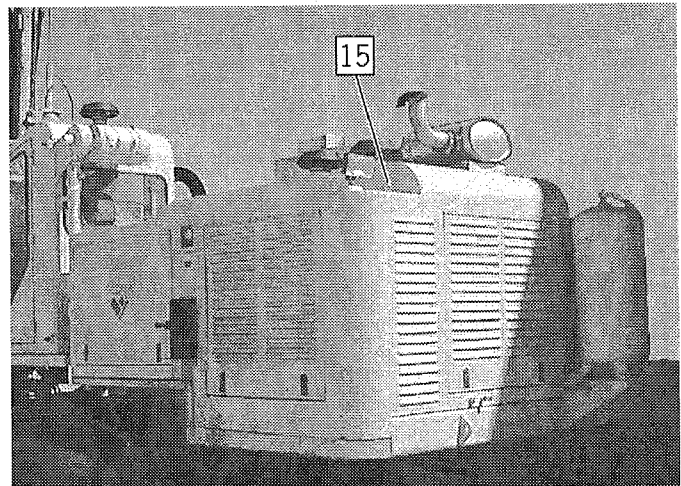


Fig. 3-22 Canopy
15. Lifting eye, located front and rear.

INSPECT HEAD: Visually inspect the inside bore for scratches or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading and when this occurs, the bore should be checked for out-of-roundness. If out-of-roundness exceeds 0.007", this is unacceptable. Check the condition of the dynamic seals looking particularly for metallic particles embedded in the seal surface. It is normal to cut the static seal on the retaining ring groove upon disassembly. Remove the rod seal, static o-ring and backup and rod wiper. Damage to the seal grooves, particularly on the sealing surfaces, is unacceptable. In the event that an unacceptable condition occurs, the head should be replaced.

INSPECT PISTON: Visually inspect the outside surface for scratches or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading and when this occurs, the diameter should be checked for out-of-roundness. If out-of-roundness exceeds 0.007", this is unacceptable. Check the condition of the dynamic seals and bearings looking particularly for metallic particles embedded in the bearing and in the piston seal surface. Remove the seals and bearings. Damage to the seal grooves, particularly on the sealing surfaces, is unacceptable. In the event that an unacceptable condition occurs, the piston should be replaced.

INSPECT TUBE ASSEMBLY: Visually inspect the inside bore for scratches and pits. There should be no scratches or pits deep enough to catch the fingernail. Scratches that catch the fingernail but are less than 0.5 inch long and primarily in the circumferential direction are acceptable provided they cannot cut the piston seal. The roughness of the bore should be between 10 and 20 μ inches RMS. Significant variations (greater than 8 μ inches difference) are unacceptable. In the event that an unacceptable condition occurs, the tube assembly should be repaired or replaced.

Rebuild

Thoroughly rinse the inside of the tube and allow to drain. A high-pressure rinse followed by a wipe with a lint-free rag is preferable. Clean all internal components of any foreign material.

Visually inspect for material defects and contamination.

Lubricate the head and all seals with hydraulic fluid prior to installation. Rebuild the head and seals per the specific practice for this design.

Lubricate the piston and all components with hydraulic fluid. Rebuild the piston and seals per the specific practice for this design.

Place the rod on a clean table. Install the static o-ring seal per the recommended practice. Install the head followed by the piston onto the rod noting the proper orientation of each component. Torque the piston nut to the proper torque.

When the rod assembly is ready to be installed in the tube, liberally apply an anti-seize lubricant per the below specification to the head outer surface, especially the static seal.

Permatex Industrial Division of Loctite

Anti-Seize Lubricant

Brush-on: P/N 80208

Spray-on: P/N 80470

Dip the entire rod assembly into hydraulic fluid and stuff this assembly into the tube. Watch the seals as they pass over the rod port (if visible) to be sure they are not nicked or cut.

Tighten the head per the specific procedure for this design.

Test

Set test stand pressure to the recommended test pressure and attach hose fittings to cylinder.

The cylinder shall be stroked its full length in both directions to fill it with oil and remove trapped air.

Pressurize to recommended test pressure at each end, beginning with the rod end, for a minimum of 10 seconds per end. While under pressure, cylinder shall be checked for leaks at welds, pipe fittings, and at all external static and dynamic seals.

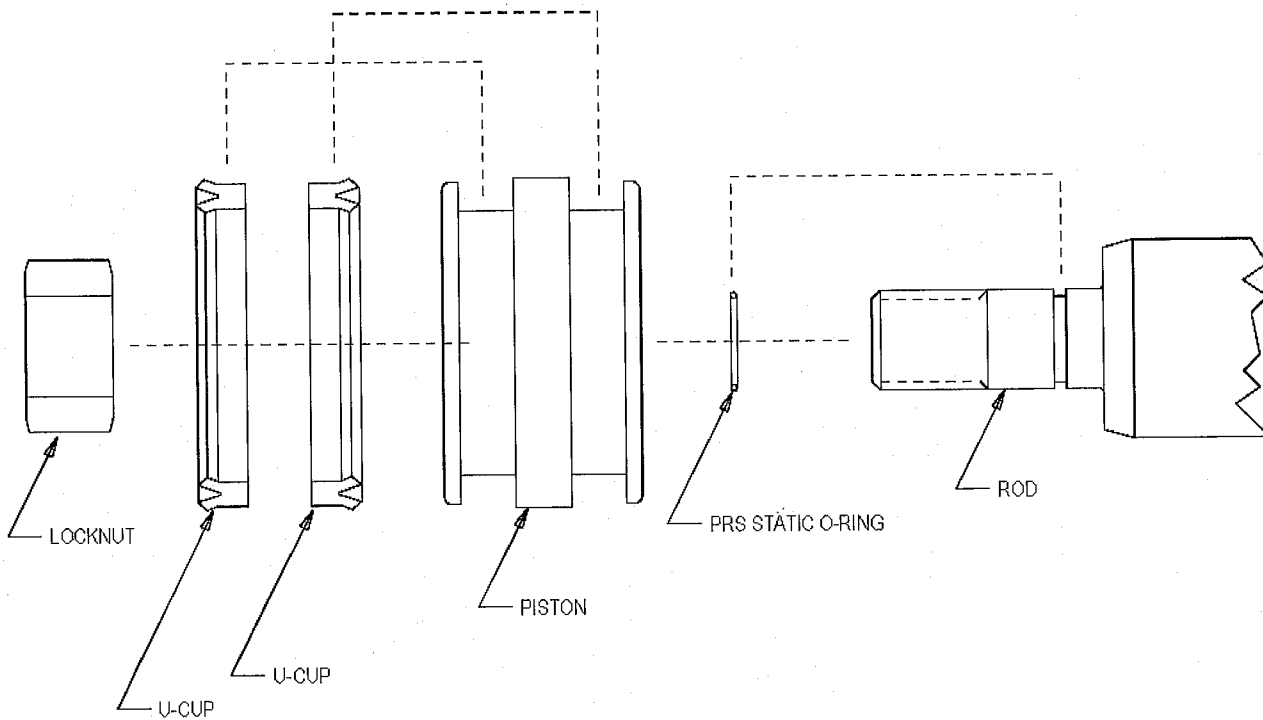
When testing is complete, retract the cylinder using air in the rod port to remove oil.

Seal ports with port plugs to prevent contamination from entering cylinder.

H & K Piston

General

The K and H series piston uses aluminum material and has back-to-back polyurethane u-cups as primary sealing elements. A small o-ring is used to seal the static side and it fits in a groove in the rod. General procedures for teardown, inspection, and rebuild are contained in the General Procedures Maintenance Manual. See your Texas Hydraulics Sales Engineer if you have any questions.



Teardown

After removing the piston, remove and discard the PRS static o-ring from the groove in the rod. Remove the u-cups by means of blunt instruments of bronze or aluminum. Be sure there are no sharp edges on these tools. Be particularly careful of scratching the groove surface finish.

Rebuild

Lubricate the piston and all components with hydraulic fluid. Stretch the u-cups into the grooves noting their proper orientation. Do not use sharp edged tools. Be extremely careful to avoid damaging the seal grooves during installation. Scratching the groove may cause by-pass leakage. Verify that the u-cups are fully seated and that the sealing lips are not trapped or twisted. If possible, allow the piston/seal assembly to sit at least one hour to allow the seals to elastically restore.

Discharge Valve

Discharge Valve

1. Install a new seal kit in the discharge valve (1). See fig. 5-6.

NOTE

IMPORTANT! After assembling the valve, leave a .080" (2mm) gap between the bottom of the nut (13) and the cover (16).

2. Install the discharge valve housing assembly and tighten the four capscrews alternately to even tightness.

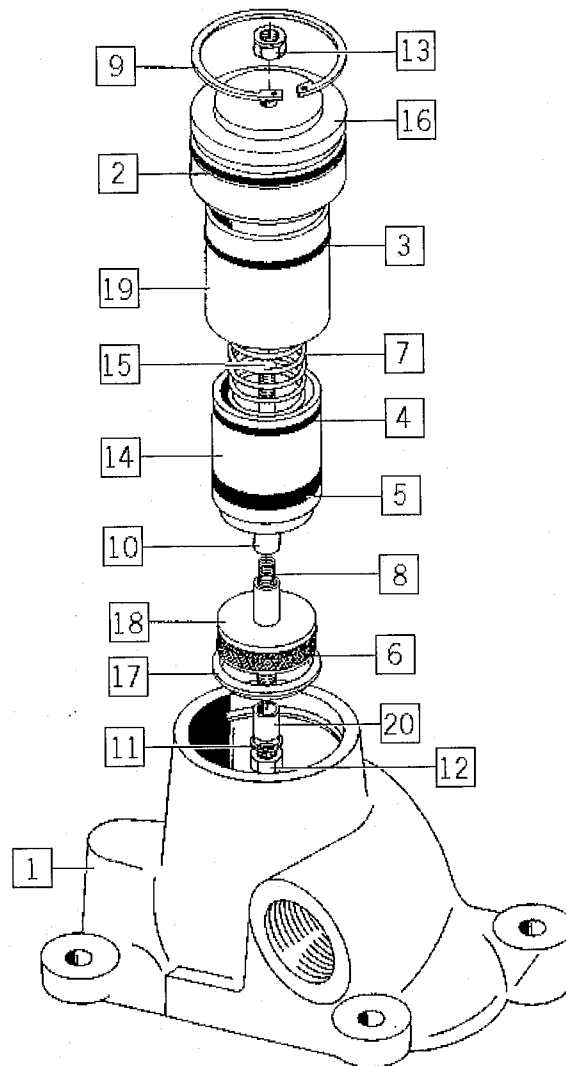


Fig. 5-6 Discharge Valve

- | | |
|---------------------|-----------------|
| 1. Housing | 11. Gasket |
| 2. O Ring | 12. Nut |
| 3. O Ring | 13. Nut |
| 4. Piston Seal | 14. Piston |
| 5. Slide Ring | 15. Screw |
| 6. Plate Gasket | 16. Cover |
| 7. Spring | 17. Thrust Ring |
| 8. Spring | 18. Plate |
| 9. Retaining Ring | 19. Tube |
| 10. Bearing Bushing | 20. Bushing |

Air End Assembly

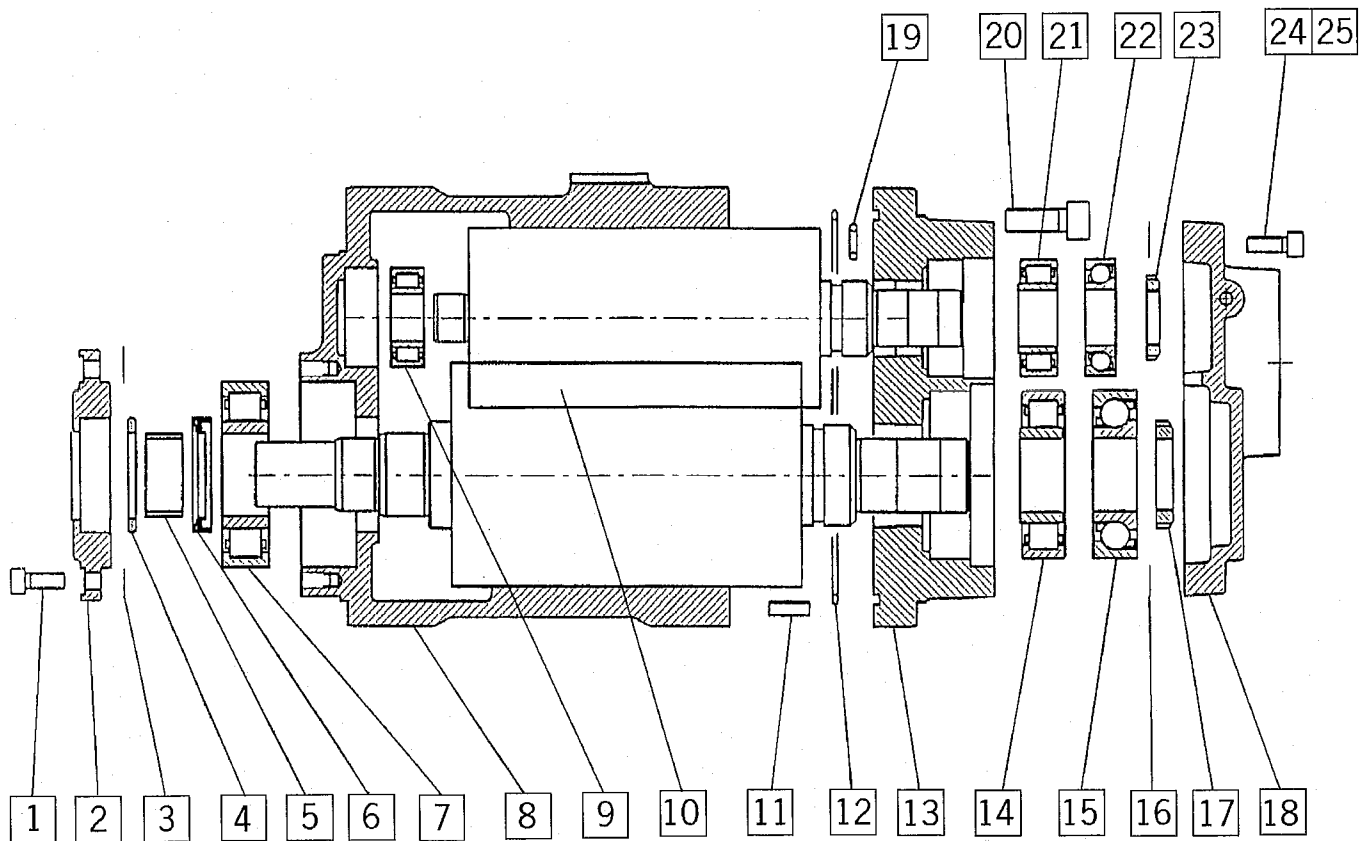


Fig. 5-11 Air End Assembly

- | | | | |
|-------------------------|---------------------|--------------------|--------------------------|
| 1. Hex Socket Screw (6) | 8. Rotor Casing | 14. Roller Bearing | 20. Hex Socket Screw (4) |
| 2. Seal Cover | 9. Roller Bearing | 15. Ball Bearing | 21. Roller Bearing |
| 3. Gasket | 10. Rotor Pair | 16. Gasket | 22. Ball Bearing |
| 4. Dust Retainer | 11. Spring Pin (2) | 17. Lock Nut | 23. Lock Nut |
| 5. Inner Ring | 12. O Ring | 18. Outlet Cover | 24. Hex Socket Screw (9) |
| 6. Shaft Seal | 13. Discharge Cover | 19. O Ring (2) | 25. Hex Socket Screw (2) |
| 7. Roller Bearing | | | |

Inspection

Rotors; do not reuse if:

- ends have seizure marks
- contact surface marks are uneven
- rotors have scratches or dents
- bearing seats are worn
- rotors have touched body or end flanges

Rotor Casing; do not reuse if:

- rotors have touched body
- body shows signs of overheating (blue color)

Discharge Cover; do not reuse if:

- cover shows signs of overheating (blue color)
- rotors have touched cover
- o-ring groove is damaged

Drill String Grease System

Air Powered Grease Pump

Fig. 5-16 shows the air powered grease pump and cover assembly. The grease pump is located on the right side of the machine between the dust collector and the radiator/oil cooler. The following pages outline service and maintenance procedures for the basic pump assembly.

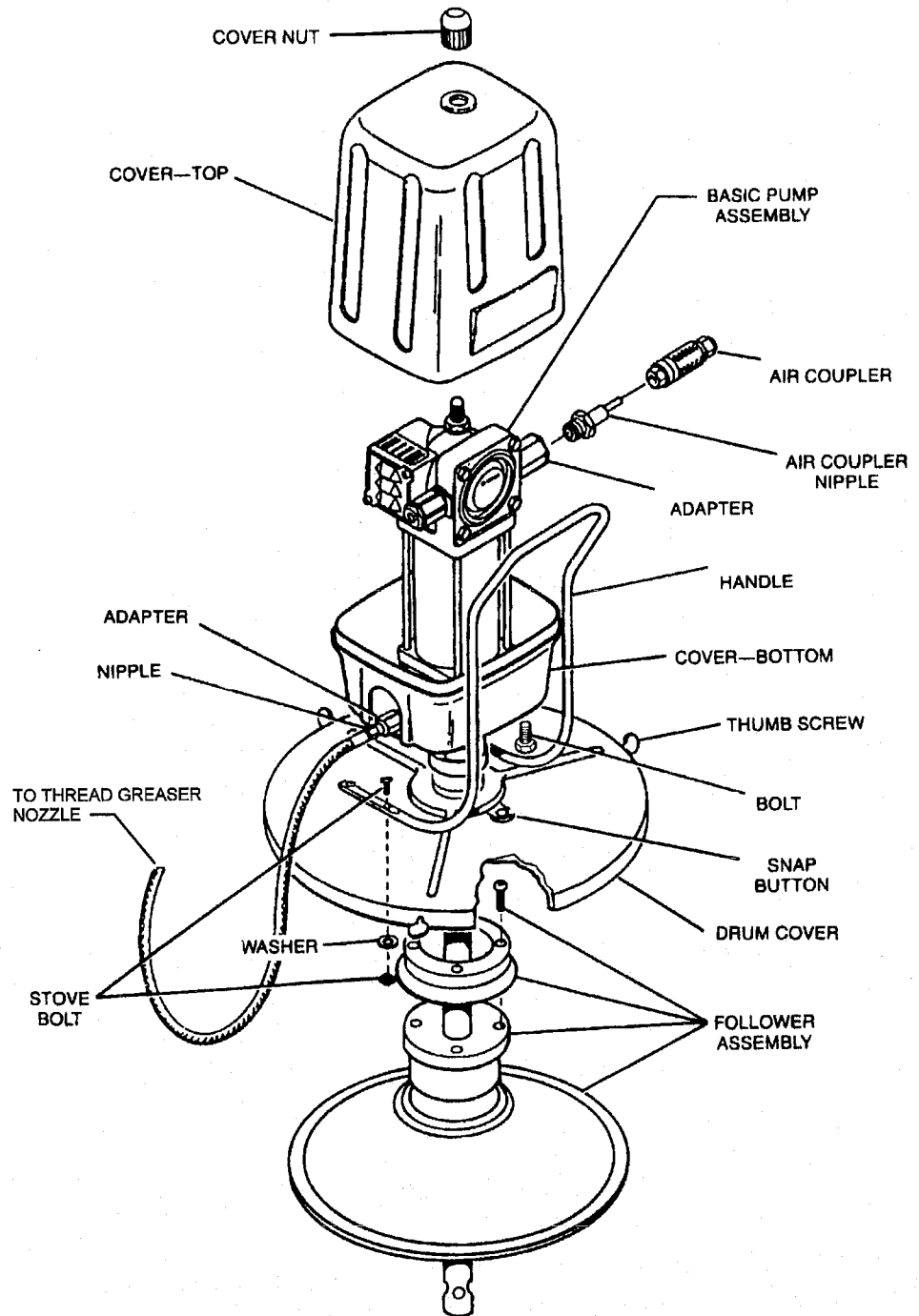


Fig. 5-16 Grease Pump and Cover Components

Filter/Regulator for Dust Collector

The filter/regulator for the dust collector is mounted on the inside of the front bulkhead where the boom pivot is attached (fig. 5-17). The filter/regulator is accessed by swinging the dust collector out.

Refer to parts manual for repair parts.

Refer to section 7 for adjustments. Normal pressure setting is 60 PSI (4 bar).

Refer to following page for maintenance and repair information.

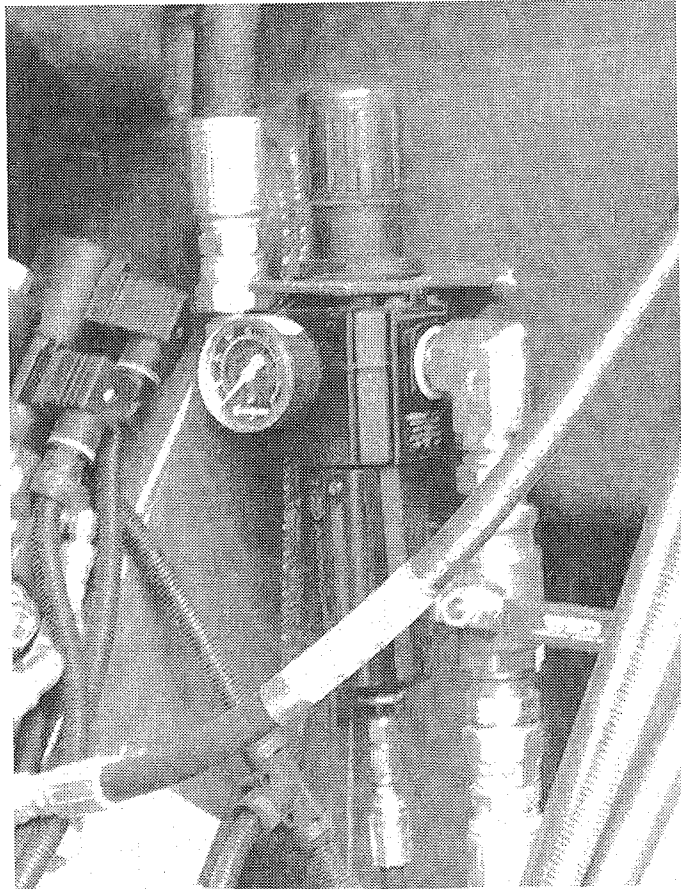


Fig. 5-17 Filter/Regulator for Dust Collector

Boom Swing Cylinder



WARNING

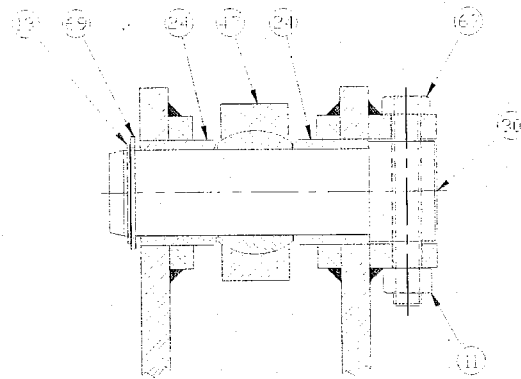
BEFORE repairing or replacing boom, feed, or positioner cylinders, secure feed and boom to prevent sudden collapse or shift when servicing cylinder(s).
BE SURE hydraulic cylinder bleed screws are installed and tightened before starting machine.

Hydraulic Cylinder - Repair

See end of section 4 of this manual for repair information. Refer to parts manual for identifying and ordering replacement parts.

Boom Swing Cylinder - Removal

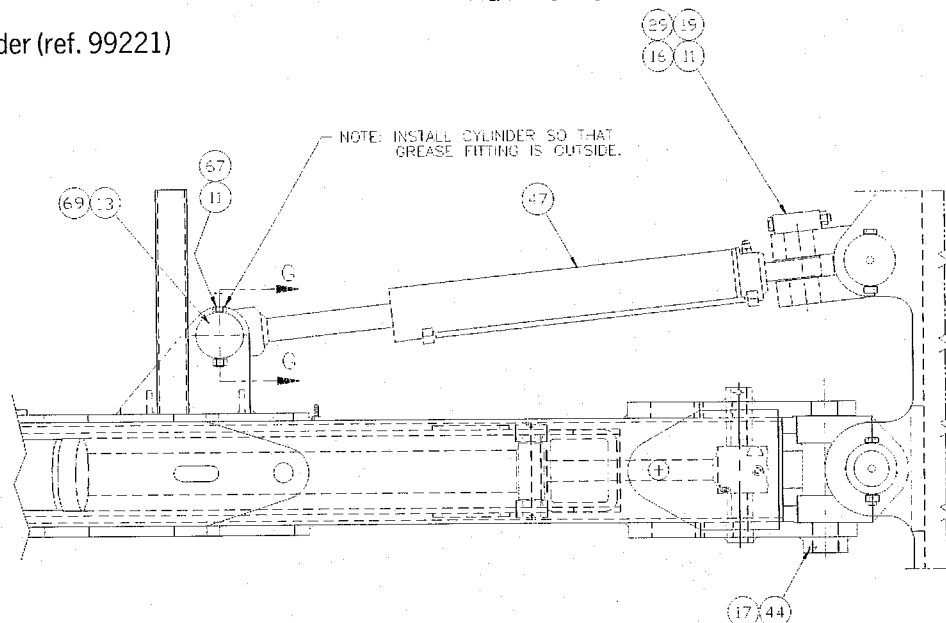
1. Secure feed so that it cannot fall to prevent boom from sudden collapse when boom swing cylinder is removed.
2. Shut down the hydraulic system.
3. Bleed any pressure from the boom swing cylinder by loosening the two bleed screws (these are hex plugs marked "TE" and "TR").
4. Tag and remove the two hydraulic hoses from the cylinder.
5. Cap the hose ends and remove the hose adapters from the cylinders.
6. Support the boom swing cylinder and remove the pin retainer and pin from each end of the cylinder.
7. Lift the cylinder free of its pivot points.



VIEW G-G

Fig. 6-2 Boom Swing Cylinder (ref. 99221)

- 11. Lock Nut
- 13. Retainer Ring
- 16. Pin
- 19. Capscrew
- 24. Bushing (2)
- 29. Bushing (2)
- 30. Pin
- 47. Cylinder
- 67. Capscrew
- 69. Washer



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Boom Shim/Wear Pad Replacement

Feed and Inner Boom Tube - Removal

The feed and feed mounting must be removed from the positioner and the inner boom tube must be removed from the outer boom tube to install the rear wear pads and shims. This procedure is best done in a shop with an overhead crane; however, it can be done in the field using an adequate truck mounted crane.



WARNING

DO NOT remove feed swing cylinder pin until feed is secured with lifting straps and crane. If feed swing cylinder pin is removed, the feed is free to pivot which could cause equipment damage, injury or death.

Feed and Feed Table - Removal from Boom

1. Position the machine on a level surface. Remove drill steel and position feed and boom in as near horizontal position as possible with the hydraulic rock drill centered over the positioner pivot. Extend boom all the way out.
2. Remove any hose retainers so hoses will not be pulled when feed is lowered to ground.
3. Install adequate lifting straps to support feed in a balanced position. Lift slightly to put enough tension on feed so it can not pivot when the feed swing cylinder pin is removed.
4. Remove the two retaining caps (item 6, fig. 6-7) by removing the four socket head capscrews and washers from each cap.
5. With feed supported so it can not swing; remove the feed swing cylinder pin at the rod end and swing cylinder clear of positioner.
6. Remove the 6 capscrews and the retaining cap that retains the feed mounting pin in the positioner (fig.6-8).

continued next page . . .

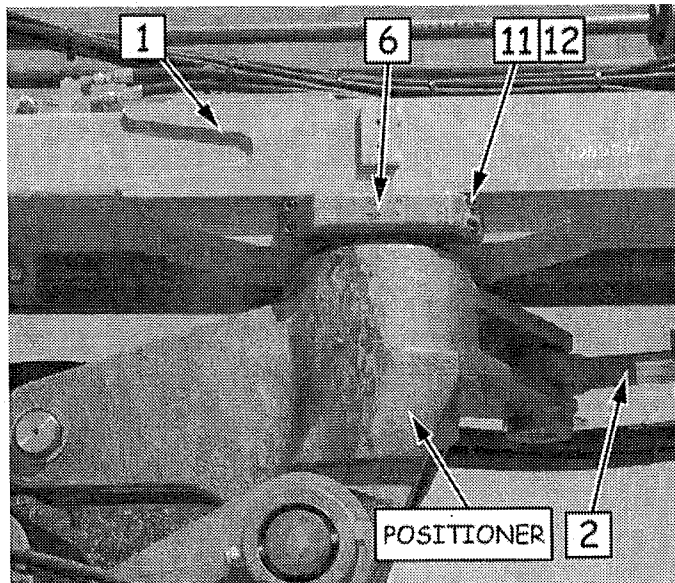


Fig. 6-7 Feed Table

NOTE: item numbers correspond to drawing bubble numbers.

- | | |
|------------------------|----------------------------|
| 1. Feed Table | 11. Lock Washer (8) |
| 2. Feed Swing Cylinder | 12. Capscrew, soc. hd. (8) |
| 6. Retaining Cap (2) | |

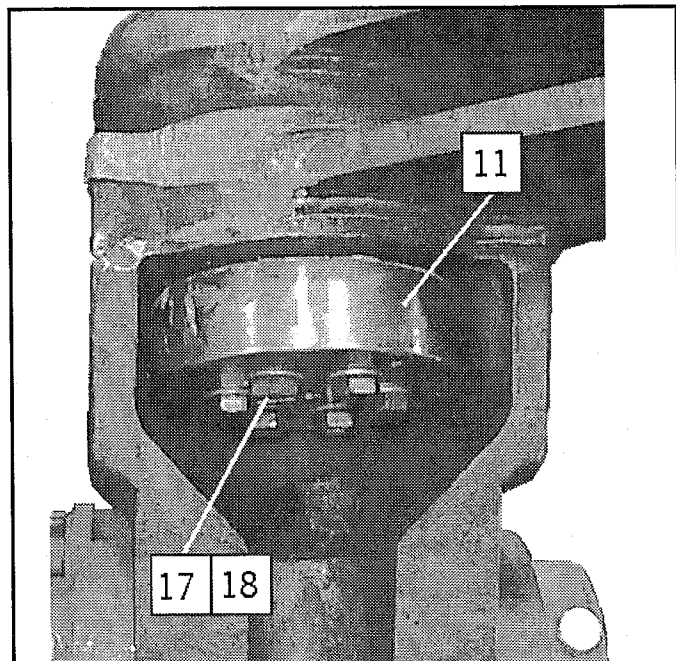


Fig. 6-8 Feed Table Pivot Pin

- | |
|-----------------------|
| 11. Retainer Cap |
| 17. Capscrew (6) |
| 18. Spring Washer (6) |

HPR45 Hydraulic Rock Drill

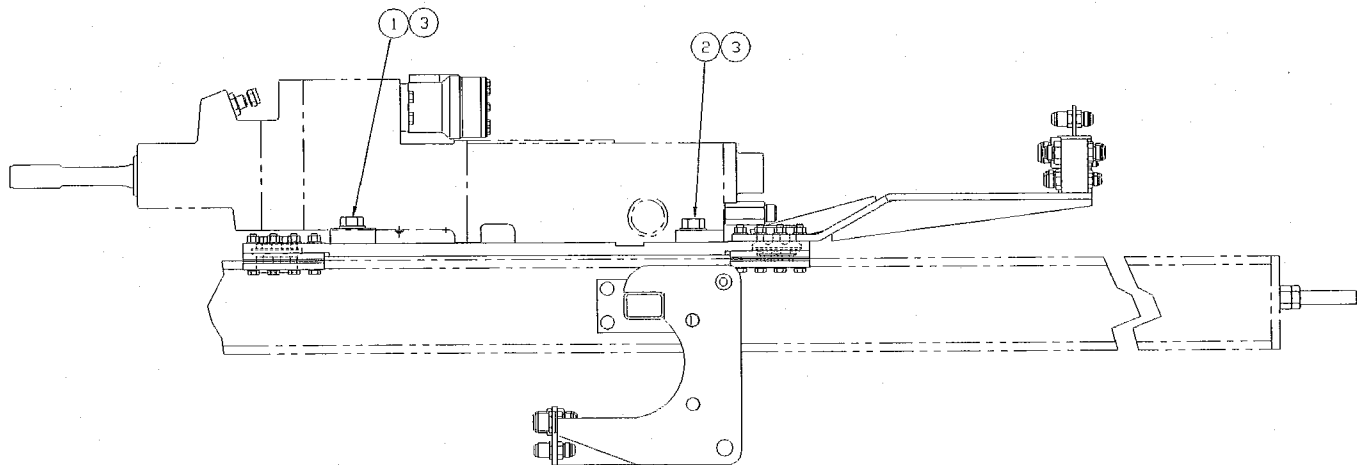


Fig. 6-16 HPR45 Drill Mounting Bolts (ref. 418546)

1. Front Mounting Bolts (2), 1-14 UNS x 2" Long, GR 5
2. Spring Washers (4)
3. Rear Mounting Bolts (2), 1-14 UNS x 2-1/4" Long, GR 5

Removal from Mounting Slide

1. Remove drill steel and place the feed in a horizontal position (or as close as possible).
2. Shut down the engine.
3. Tag and remove all hoses connected to the drill.

NOTE

If drill is being removed for repair, loosen the four side rod nuts and the six nuts that hold the rotation housing to the cylinder while it is still bolted to the mounting slide. This is much easier than trying to loosen these nuts on the work bench.

4. Attach two lifting straps to drill and using a 1/2 ton (454 kg.) hoist, put a slight amount of tension on the drill. Remove the four drill mounting bolts carefully and lift the drill free of the mounting slide.

Installation on Mounting Slide

1. Raise the drill into position using a 1/2 ton (454 kg.) hoist and two lifting straps.
2. Be sure the keyway in the drill cylinder fits into the milled slot of the mounting slide. Install the 2" long mounting bolts and spring washers in the front mounting holes. Install the 2-1/4" long mounting bolts and spring washers in the rear mounting holes.
3. Torque to all four mounting bolts to 483 ft. lbs. (657 Nm).
4. Clean and install the hoses to the drill. Note that on the HPR45 drill the supply line is on the right side (as viewed from the rear) and the return is on the left. This is opposite of an HPR1H drill.
5. Charge the accumulators (if necessary). Refer to drill service manual.

Feed Drive

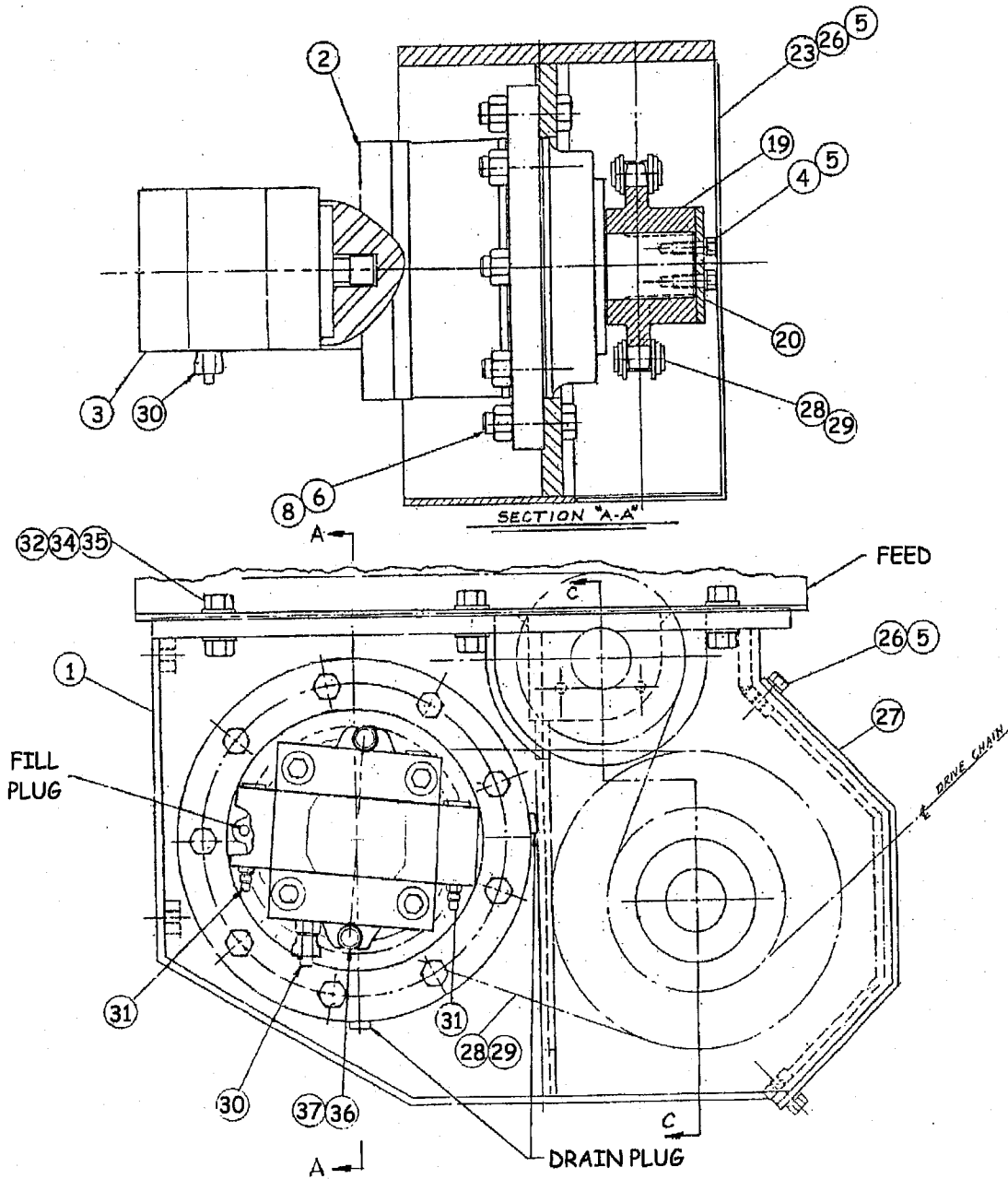
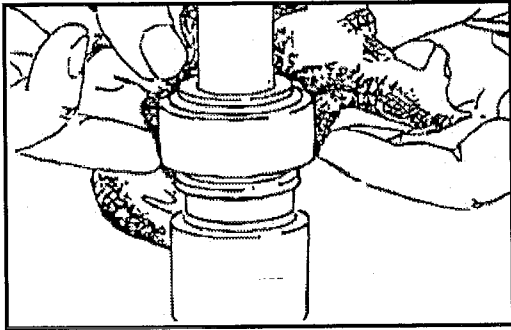


Fig. 6-21 Feed Drive Assembly (ref. 1410373-T1)

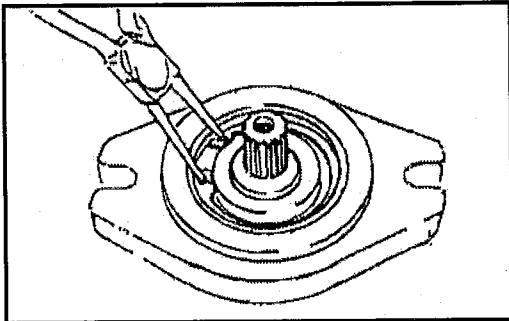
- | | | |
|------------------------|------------------------|---------------------------|
| 1. Chain Drive Box | 14. Thrust Washer (4) | 26. Capscrew (9) |
| 2. Gear Reducer | 15. Spring Washer (4) | 27. Cover |
| 3. Hydraulic Motor | 16. Sprocket | 28. Chain Assembly |
| 4. Capscrew (2) | 17. Shaft | 29. Connecting Link |
| 5. Lock Washer (11) | 18. Inner Race (4) | 30. Adapter, Straight |
| 6. Capscrew (9) | 19. Sprocket | 31. Adapter, Straight (2) |
| 8. Locknut (9) | 20. Retainer | 32. Capscrew (2) |
| 9. Sprocket | 21. Grease Fitting (2) | 34. Locknut (6) |
| 10. Shaft | 22. Bar (2) | 35. Beveled Washer (6) |
| 11. Roller Bearing (4) | 23. Cover | 36. Capscrew (2) |
| 12. Felt Packing (2) | 24. Spacer (2) | 37. Lock Washer (2) |
| 13. Spacer | 25. Spacer | |

Feed Drive Motor

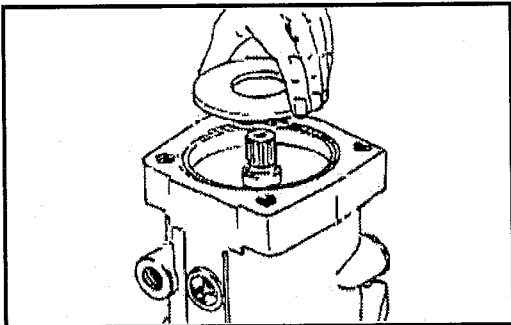
Rotary Group - Assembly



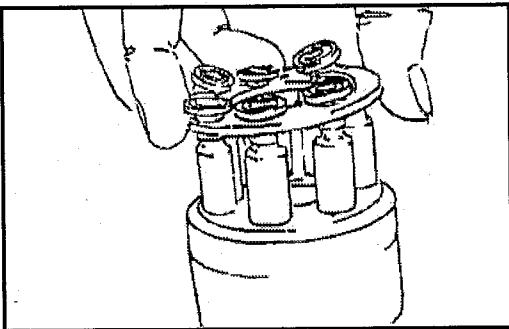
26. Heat bearings to 176° F (80° C). Ensure parts are correctly placed and finally secure.



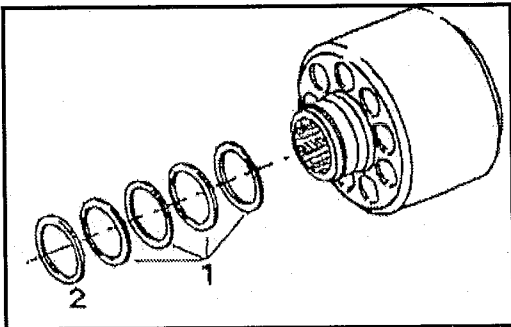
27. Grease new o-ring and assemble. Fit the shaft seal and assemble the retaining ring.



28. Put a coat of grease on the bearing plate, and install into housing.

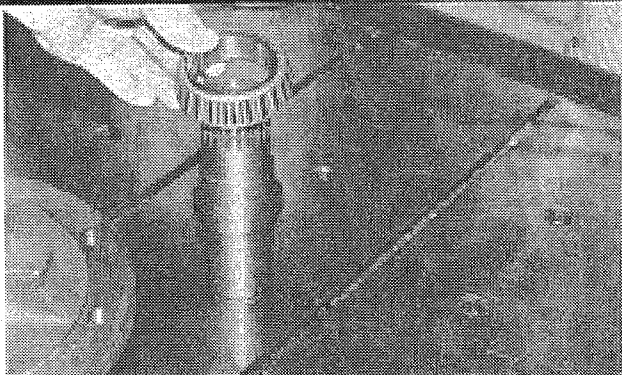


29. Pre-assemble the cylinder block group.

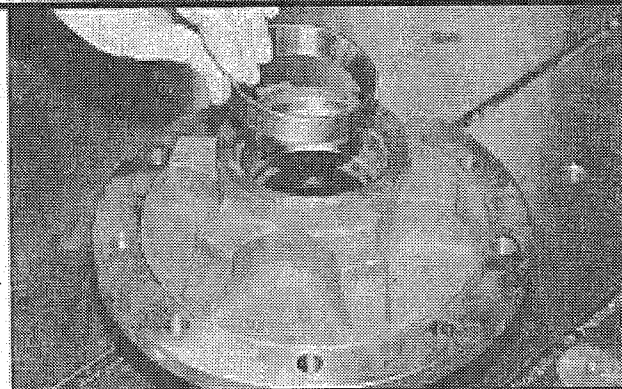


30. In this operation, check the correct arrangement of the 4 Belleville washers (1) and adjusting shims (2).

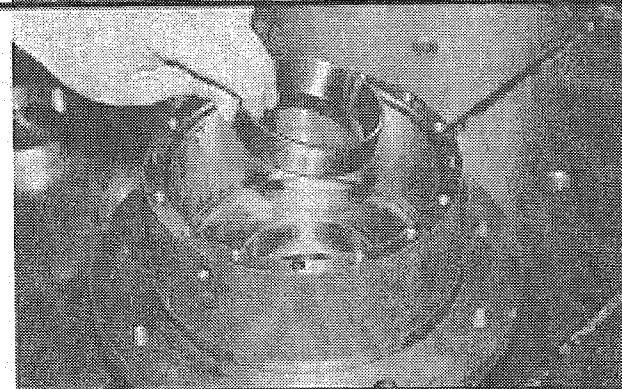
Hub Shaft Sub-Assembly



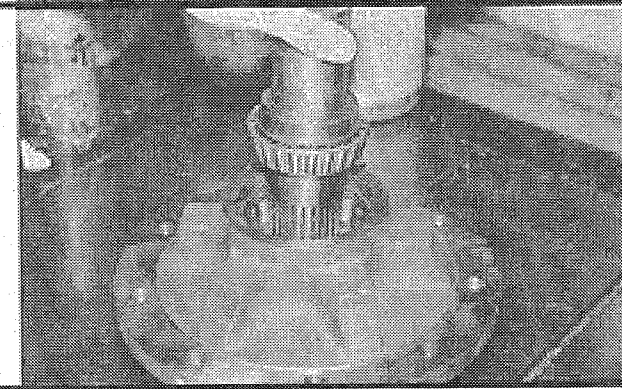
1. Press Bearing Cone (1D) onto Shaft (1A).



2. Press Bearing Cup (1C) into Hub (1G) taking care to insure cup start square with the bore of Hub (1G).



3. Invert Hub (1G) and press Bearing Cup (1E) into intercounterbore of Hub (1G).



4. Returning the Hub (1G) to locate on the large diameter end, the Output Shaft (1A) is carefully installed into the Hub (1G).

Drill and Positioning Valves

Pressure Settings

NOTE

Two people are required for this procedure
Use a 6mm allen wrench to make adjustments.
Hammer Relief and Warm Oil Relief adjustments are
opposite for cab and non-cab machines.
See fig's. 7-3 and 7-3a.

The auxiliary valve bank is located on the left side of the machine, directly behind the operator's station or cab. All the adjustment screws are on the back side of the valves and not visible.

Fig. 7-3 shows the back side of the valves so you can see the location of the adjustment screws.

"A" port is on the handle side, "B" port is on the end cap side.



WARNING

RELIEVE all pressure before attempting service or maintenance procedures to this machine.
RELIEVE pressure in both hydraulic and pneumatic systems before loosening any connections or parts.

Procedure:

1. Tag and remove lines to drill rotation and drill pressure and return ports (see fig. 7-4). Cap or plug all hose ends and fittings.
2. Start machine and allow time to warm up to operating temperature.
3. Place drill/tram switch in DRILL position.
4. Have a helper read pressures from drill console or operator's cab while you make adjustments.

Rotation Pressure

1. Position valve for REVERSE rotation ("A" port) and set "A" port adjustment to 2500 PSI (172 bar).
2. Position valve for FORWARD rotation ("B" port) and set "B" port adjustment to 2500 PSI (172 bar).

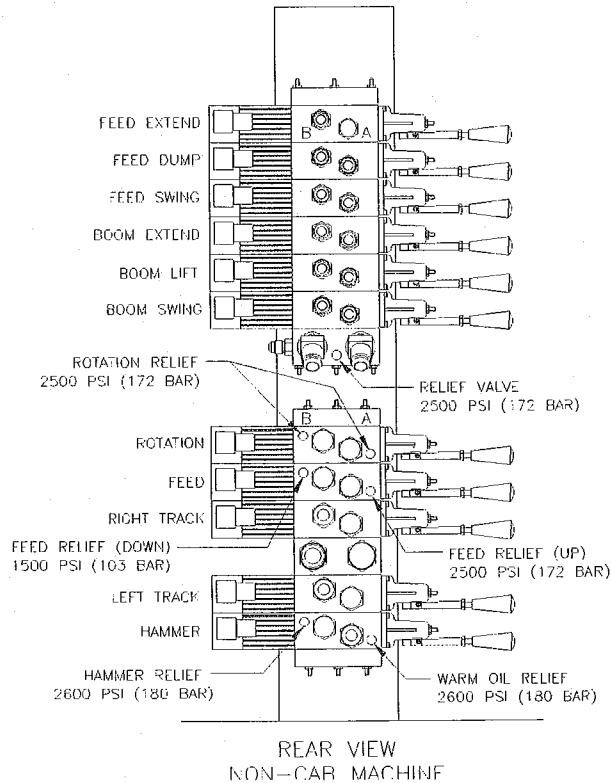


Fig. 7-3 Auxiliary Valve Bank on Non-Cab Machine (ref. 414445)
Note position of Hammer Relief and Warm Oil Relief adjustments.

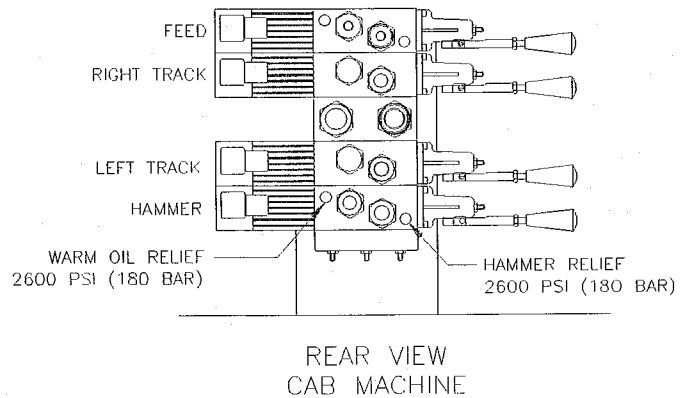


Fig. 7-3a Auxiliary Valve Bank on Cab Machine (ref. 414445)
Note position of Hammer Relief and Warm Oil Relief adjustments.

Dust Collector Assembly



WARNING

ALWAYS wear eye protection when on or around machinery.
NEVER look directly into the fan outlet. Loose particles in the fan housing may exit at high velocity and cause eye damage.

Setting Fan Speed

1. Install a 3000 psi (207 bar) gauge in the between the dust collector motor and the manifold (fig. 7-14).
2. Start machine and place in DRILL position. Switch dust collector to ON. Toggle the air switch to fully ON position. Dust collector fan should now be running.
3. Adjust fan pressure on Auxiliary 1 Manifold (fig. 7-14) to 1750 PSI (121 bar). **DO NOT EXCEED 3400 RPM on fan motor!**
4. Make sure the pickup pot is at least 6" clear of the ground and all hoses are connected.
5. Set air pressure regulator to 60 PSI (4 bar). See fig. 7-15.
7. Remove plastic hose from the lower test port (fig. 7-13) and attach to one of the elbows at the top of the manometer valve (see manometer setup instructions). Leave the other elbow free.
8. You are now reading the suction pressure in the top chamber (after the filters) of the dust collector.
9. Adjust Hydraulic Fluid Flow to obtain a reading of 17-18" (43-46 cm) of water. The flow is adjusted by turning the flow control adjustment in fig. 7-14.

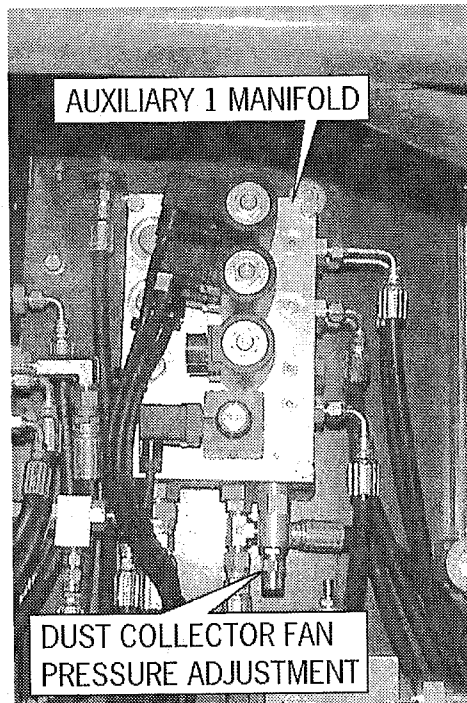


Fig. 7-14 Auxiliary 1 Manifold (mounted on right side of hydraulic tank).

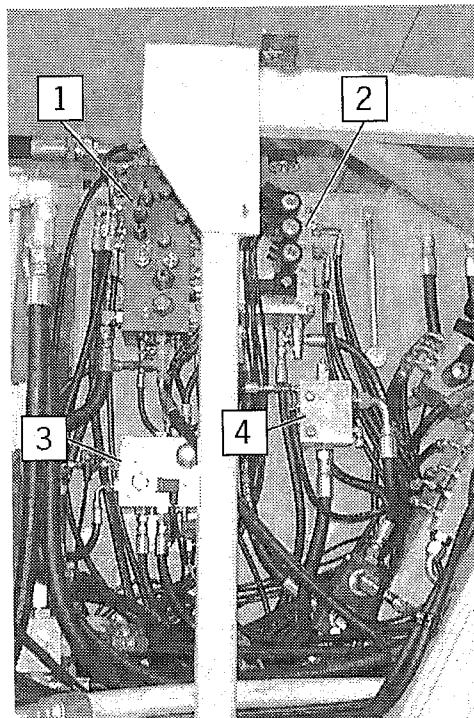


Fig. 7-14A Hydraulic Tank - Right Side

1. Smart Valve
2. Auxiliary 1 Manifold
3. Auxiliary 3 Manifold
4. Backpressure Valve for Drill

Vertical Indicator

Description

The angular display is connected to the sensor mounted on the feed. There are 10 display lights in each axis (Y+Y-, X-and X-). The maximum angle from plumb is ± 6 degrees, thus each light represents 0.6 degrees. The lights remain lit if the feed is more than 6 degrees from plumb. The lights will go out successively as the feed approaches plumb in each direction.

Vertical Adjustment

1. Position feed vertical (plumb) and adjust the sensor to indicate plumb (no lights on).
2. Move feed to non-vertical position, then move back until all lights go out (plumb). Feed should be plumb within ± 0.6 degrees..

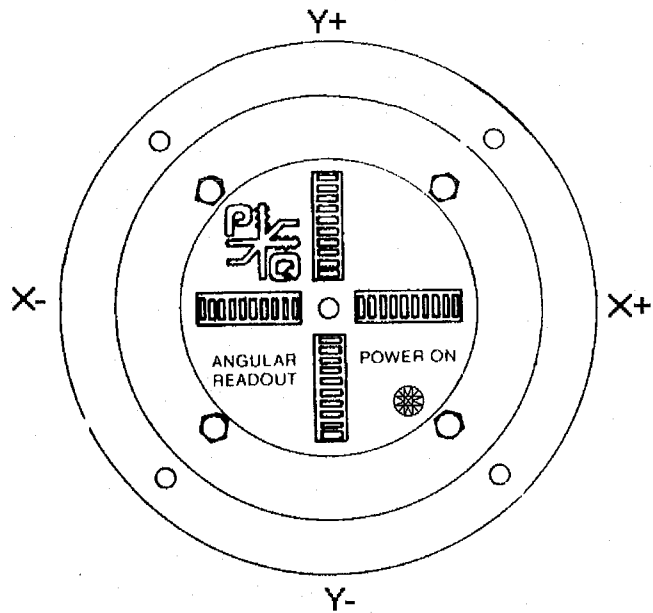


Fig. 7-24 Vertical Indicator Display

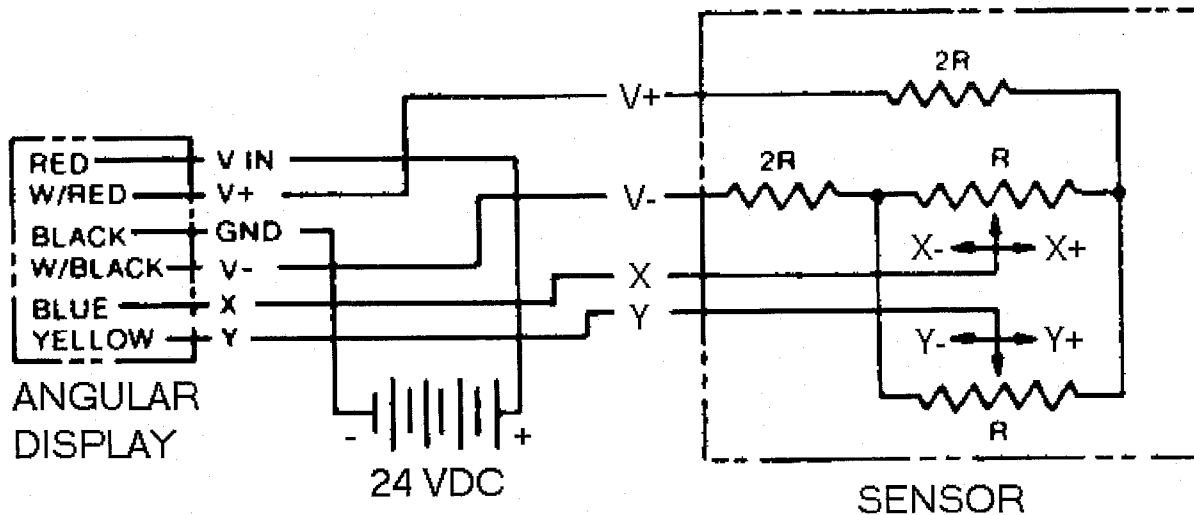


Fig. 7-24a Wiring Diagram

Notes

Notes

General Tips on Drill Overhaul



CAUTION:
ALWAYS wear proper eye and foot protection.
DO NOT wear loose clothing that can get caught in rotating parts.

These general instructions will be helpful when using the overhaul and adjustment procedures outlined on the following pages.

1. Cover all hydraulic or air openings with an appropriate dust cover whenever any hydraulic or air openings are exposed. A clean part in a dirty opening does little good.
2. Carefully examine all filters for evidence of metal or rubber particles. Replace the filters as necessary.
3. Before servicing the drill or any part of the hydraulic system, neutralize the pressure in the complete hydraulic system.
4. Before reassembling hydraulic components, clean all metal parts in a nonflammable cleaning fluid. Carefully lubricate all components with hydraulic fluid to aid in reassembly.
5. ALWAYS lubricate threaded fasteners before assembly, especially if parts have been cleaned with solvent.
6. Thorough checks must be made of all components to be sure they are assembled properly according to instructions. Do not drill until all checks have been made.
7. Frequent inspection of the HPR45 is very good practice. A minor adjustment can many times prevent costly repairs later on.
8. Maintenance of hammer, bearings, accumulators or valve assembly must be performed in a clean and sheltered area.
9. Maintenance of chuck end or rotation assemblies may be performed on a mounted drill.
10. It is not necessary to bleed off nitrogen charge in accumulators unless maintenance is performed on accumulator assemblies themselves.
11. To avoid damage to new parts, replace mating parts that appear worn.

NOTE All Reedrill parts are manufactured with care and precision. Each part is heat treated for strength and carefully inspected before and after assembly. Every step has been taken to provide you with the quality product you expect. Eventually some parts or your drill will become worn. The description of damaged parts in this section is general, and is intended to help the serviceman in the field to service and repair the HPR45. It is not meant to imply that all such parts will fail in the described manner, or that the damage is due to faulty manufacture.

NOTE It is good practice to replace all seals when drill is being disassembled for rebuild. Refer to parts manual for seal kits.

Drill Disassembly

Water Swivel Housing - Repair

Special Tools Required:

Part Number	Description
1411247	Driver - Used with insert set 1411245 to remove water swivel bushing.
1411245	Insert Set - Used with driver 1411247 to remove water swivel bushing.

Check the seals and wiper for wear and replace as needed. All seals should be replaced during drill overhaul.

Replacement of the bushing is necessary only if it is worn beyond the wear tolerance listed in section 7. To remove bushing (2):

1. Drive out roll pins (3).
2. Remove seal (5) from bushing (2).
3. Drive out bushing with the special tools listed above.
Place inserts (two halves) where seal (5) was removed. Place driver against inserts and drive out bushing, or use a hydraulic press if available.

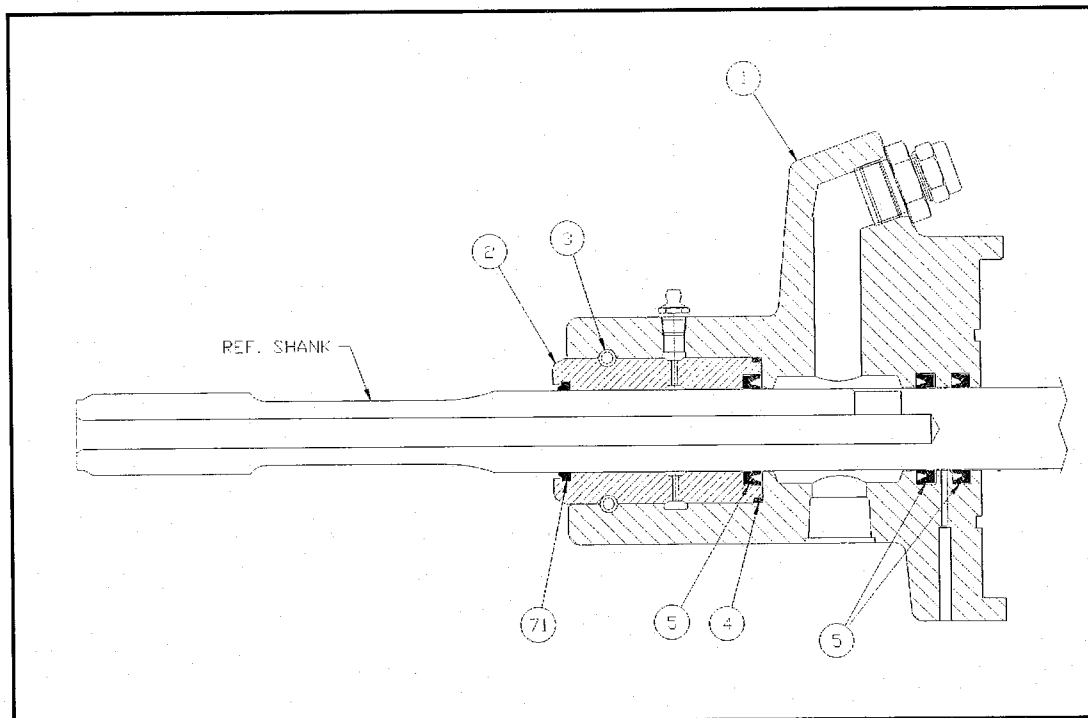


Fig. 4-10 Water Swivel Assembly (ref. 407596)

NOTE Item numbers correspond with items on parts list.

- | | |
|--------------------------|---------------|
| 1. Housing, Water Swivel | 4. O Ring |
| 2. Bushing | 5. Seal (3) |
| 3. Roll Pin (2) | 71. Rod Wiper |

Drill Disassembly

Cylinder - Internal Parts

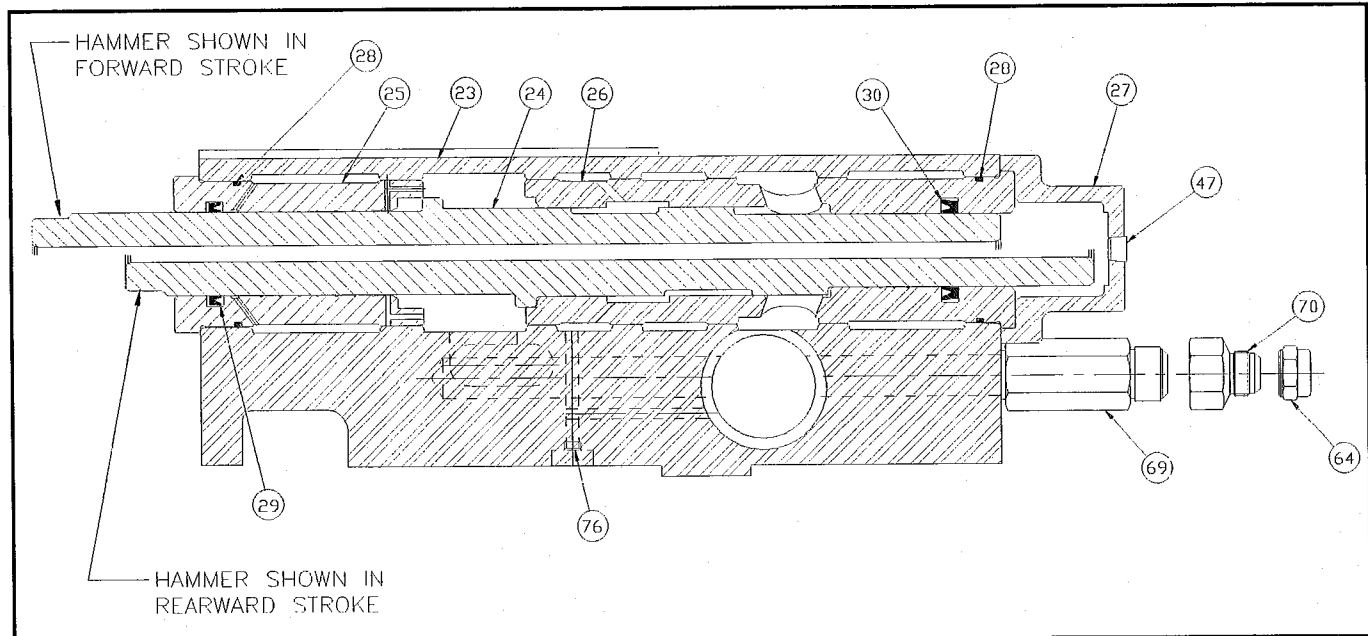


Fig. 4-25 Cylinder Assembly (ref. 407596)

NOTE Item numbers correspond with item on parts list.

23. Cylinder	28. O Ring (2)	64. Capnut (2)
24. Hammer	29. U Cup Seal	69. Adapter (2)
25. Front Cylinder Bushing	30. U Cup Seal	70. Adapter-Reducer (2)
26. Rear Cylinder Bushing	47. Sockethead Plug	76. O Ring Plug
27. Backhead		

Backhead - Removal and Inspection

Remove the four capscrews that hold the backhead to the cylinder, using a 1-1/2" socket wrench. Inspect rear of cylinder and backhead for rust or oil. If rust is present, clean the mounting surface of the backhead and apply a thin coat of Loctite® 518 sealant before installing, to prevent water from entering in. If oil is present, the rear hammer seal or o ring are leaking and need to be replaced.

Hammer and Bushings - Removal and Inspection

Special Tools Required:

Part Number	Description
1420352	Driver - Used against the hammer to drive out front and rear cylinder bushings.

1. Push hammer forward until it seats against the front cylinder bushing. Place driver (1420352) against rear face of hammer and drive out front cylinder bushing.
2. Push hammer back in until it seats against rear cylinder bushing. Place driver against front face of hammer and drive out rear cylinder bushing.
3. Carefully slide the hammer and bushing out of the cylinder. Inspect hammer and bushing surfaces for scratches and scoring. Light scratches can be cleaned up with crocus cloth. Replace hammer and bushings if scratches or scoring are deep and can not be cleaned up with crocus cloth.

Notes

Drill Assembly

Cylinder - Internal Parts

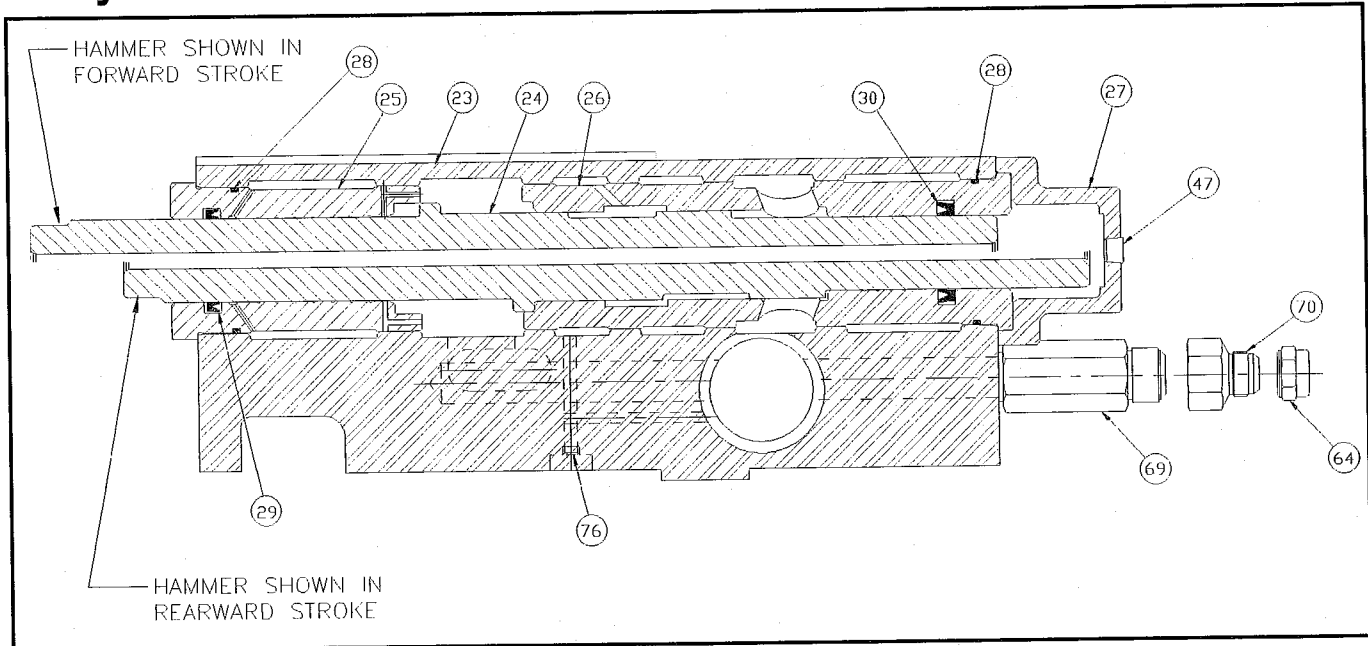


Fig. 5-1 Cylinder Assembly (ref. 407596)

NOTE Item numbers correspond with item on parts list.

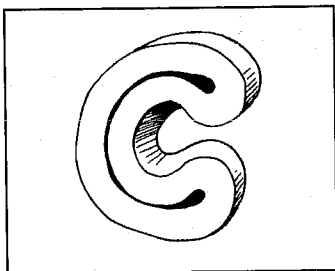
23. Cylinder	28. O Ring (2)	64. Capnut (2)
24. Hammer	29. U Cup Seal	69. Adapter (2)
25. Front Cylinder Bushing	30. U Cup Seal	70. Adapter-Reducer (2)
26. Rear Cylinder Bushing	47. Sockethead Plug	76. O Ring Plug
27. Backhead		

Front Cylinder Bushing - Installation

NOTE DO NOT freeze the front and rear cylinder bushings before installing. Damage to o-rings and seals can result.

Refer to fig. 5-1 for assembly and item number reference.

1. Install the u-cup seal (29) in the front cylinder bushing (25). **Note the u-cup side of the seal faces inward.** The seal is easier to install with the tool shown in fig. 5-7 and as listed in the tool list at the beginning of section 4. If the tool is not available, you can use long nose pliers and fold the seal into a "C" shape to install as shown below.



Seal Installation:
Fold seal as shown and insert into groove
then expand seal into place.

Drill Assembly

Rotation Housing - Assembly

4. Install the chuck driver bushing (13) into the chuck end cover, using an arbor press if available.

NOTE The chuck driver bushings are a press fit as is the bearing plate; they are easier to install if they are chilled in a freezer for about 30 minutes prior to installation.

5. The wear plate (15) is the same on both side and can be installed either way. With the wear plate installed, press the pinion gear roller bearing (17) into the chuck end cover.

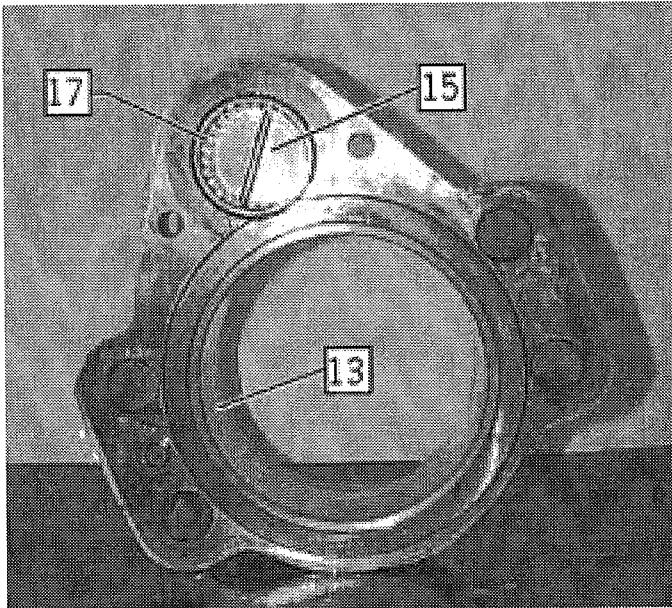


Fig. 5-26 Chuck End Cover Assembly
13. Chuck Driver Bushing
15. Wear Plate
17. Pinion Gear Roller Bearing

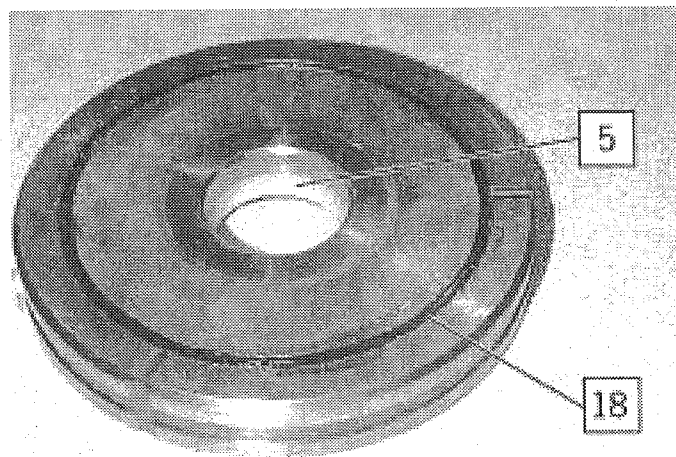


Fig. 5-27 Bearing Plate
5. Seal
18. O Ring

6. Install seal (5) into bearing plate (14) with lip of seal facing away from side with o ring groove. Coat o ring (18) with Loctite® 518 and place in o ring groove on back side of bearing plate (fig. 4-64). The Loctite® 518 will keep the o ring from falling out when the bearing plate is pressed into the rotation housing.

NOTE Before pressing bearing plate into rotation housing, be sure to remove all nicks or burrs with a file. It is a good idea to line up one of the three grease grooves with one of the grease fittings. In this way you will be able to tell if the bearing plate has turned in the housing on the next inspection. If the bearing plate has turned, it is an indication that the chuck driver bushing has turned also, possibly due to lack of lubrication. If the bearing plate has turned, then the o ring (18) needs to be replaced.

7. Press bearing plate (14) into housing, being careful that the o ring (18) does not fall out of the groove. To check this, insert a feeler gauge (fig. 5-28a) from the back of the rotation housing. It will be easiest to make a gauge, by placing a .002" or .003" piece of shim stock on the end of a long bolt as shown in fig. 5-28a. You should not be able to insert the feeler gauge behind the bearing plate. If the feeler gauge does go under the bearing plate, it means the o ring has come out of the groove. The bearing plate will then have to be pressed out and installed again.

Drill Assembly

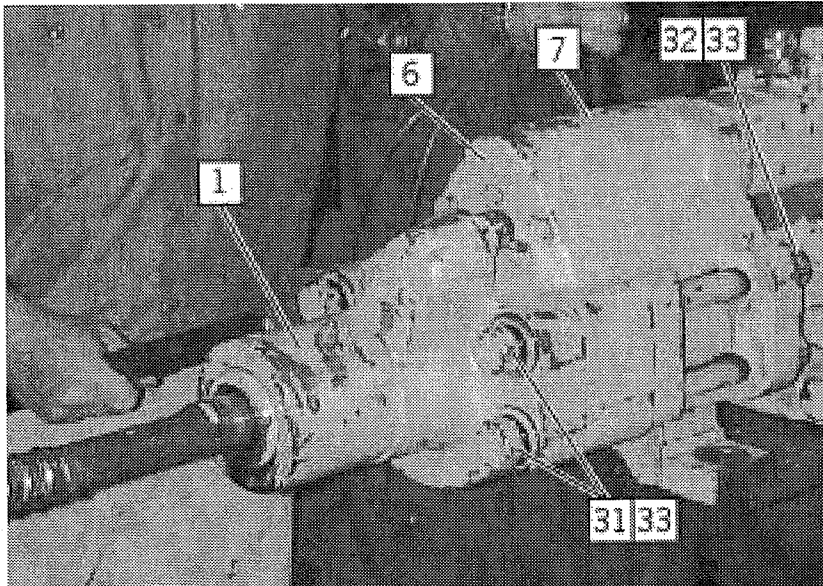


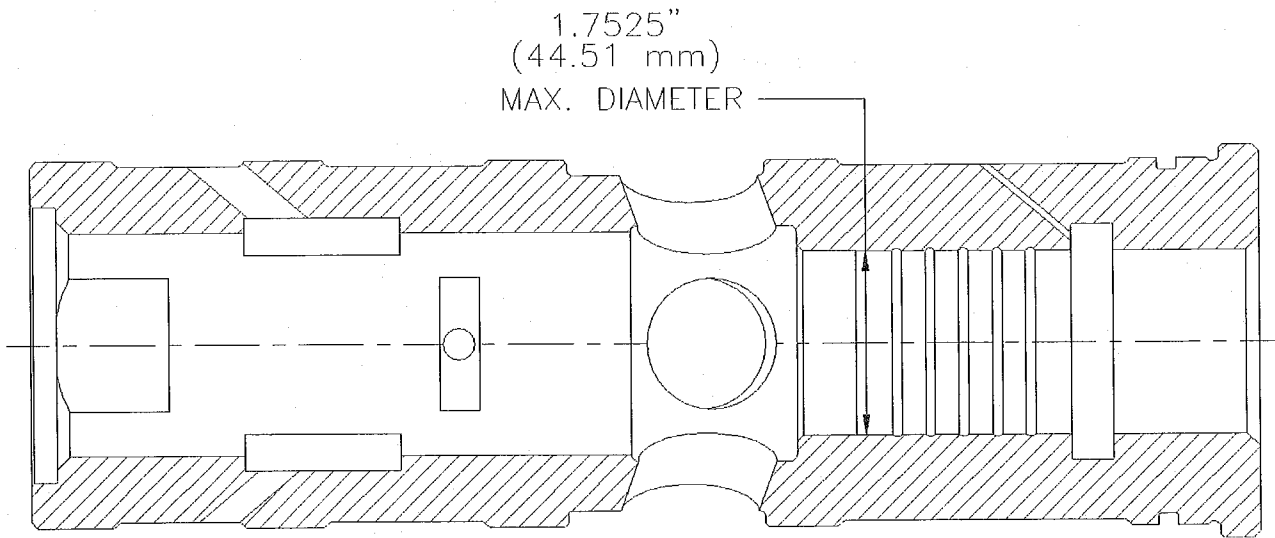
Fig. 5-49 Water Swivel Housing Installation

- | | |
|-------------------------|-----------------------|
| 1. Water Swivel Housing | 31. Capscrew (4) |
| 6. Chuck End Cover | 32. Lock Nut (4) |
| 7. Rotation Housing | 33. Spring Washer (8) |

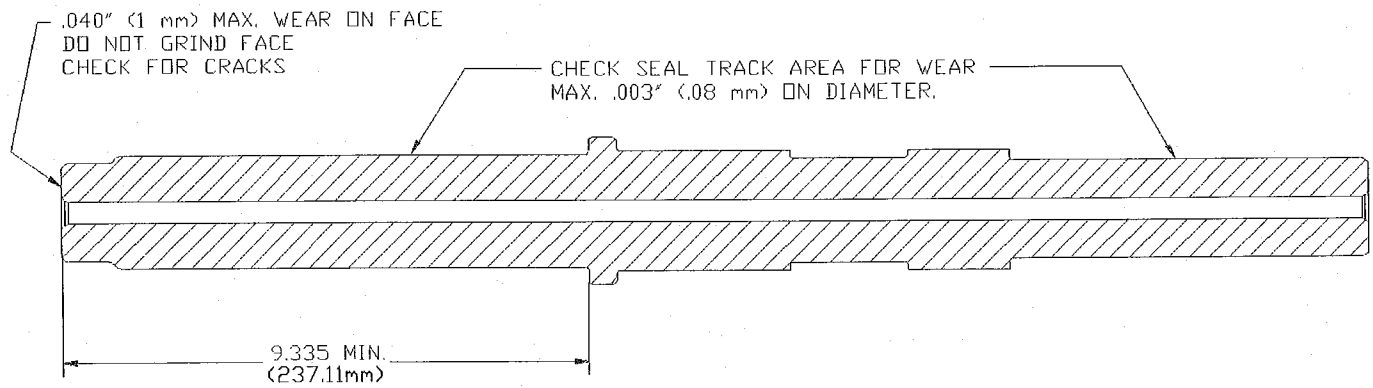
5. Install water swivel housing assembly (1) to chuck end cover (6). Install the four 1-14 UNS capscrews, eight spring washers (33) and four lock nuts (32). Torque capscrews to specifications on page 5-3.

This completes the drill assembly. Be sure to charge the accumulators before putting the drill into service. Do a final bolt torque check after drill is mounted on the feed.

HPR45 Wear Tolerances



REAR CYLINDER BUSHING - 414966



HAMMER - 406862

Maintenance Schedule

Interval Hours	Service Points	Service or Maintenance	Lubricant/Notes	Capacity
Every 2 Hours	Drill Chuck End	Lubricate with Grease Gun, unless fitted with oil lubrication.	PG55 Grease (Part No. 312810) 14oz. tube	
10 Hours or Daily	Engine Oil (Isuzu 6BG1 TRW-Q2S50)	Check Level - Refill as Required	*SAE 15W-40 +5°F (-15°C) and up SAE 10W-30 -22°F + 86°F (-30°C + 30°C) use API, CD Grade	22.7 Qt. / 21.5 L
	Pump Drive Gearbox	Check Level - Refill as Required	*HD 80W-90 Gear Oil	4.5 Qt. / 4.3L
	Fuel Tank	Check Level - Refill as Required	No. 2 Diesel Fuel	80 Gal. / 303 L
	Engine Coolant	Check Level - Refill as Required	Water/Anti-freeze, 50/50 mix	**30.7 Qt./29 L
	Engine Belts	Check and Adjust		
	Fuel/Water Separator-Engine	Check. Drain if Required		
	Hydraulic Oil	Check Level - Refill as Required	*Chevron AW MV, ISO 46	100 Gal. / 380 L
	Air Compressor Oil	Check Level - Refill as Required	*Chevron Tegra Synthetic Compressor Oil, ISO 68	9.5 Qt. / 9 L
	Engine Air Filter	Check - Clean if Required		
	Air Compressor Air Filter	Check - Replace if Required		
	Hydraulic Oil Filters	Check - Replace if Required		
	Radiator / Oil Cooler	Check - Clean if Required		
	Cylinder / Boom Pivots	Lubricate and Inspect	EP - NLGI No. 2 Grease	
	Feed Cylinder Sheaves or Sprockets	Lubricate and Inspect	EP - NLGI No. 2 Grease	
	Drill Steel Centralizer	Lubricate and Inspect	EP - NLGI No. 2 Grease	
	Batteries	Check Level - Refill as Required	Distilled Water	
Drill Oil Lube Reservoir	Check Level - Refill as Required	Extreme Pressure Rock Drill Oil Chevron Vistac ISO 32	2.1 Qt./ 2 L	
Every 50 Service Hours or Weekly	Track Chain Tension	Check and Adjust	EP - NLGI No. 2 Grease	
	Track Drive Gearcase Oil	Check Level - Refill as Required	*HD 80W-90 Gear Oil	
	Positioner Pivot Bolts	Check and Tighten		
	Rock Drill Side Rods and Mounting Bolts	Check, Torque HPR1H side rods to 355 - 500 ft. lbs. (483 - 680 Nm)		
	Drill Slide Wear Pads	Check and Adjust		
	Feed Table Wear Pads	Check and Adjust		
	Dust Collector Filters	Check - Clean or Replace if Required		
	Detergent System Strainer	Check - Clean if Required		
Every 250 Service Hours or Monthly	Engine Oil & Filters	Drain Oil and Replace (initial change)	*15W-40 use API, CD Grade	22.7 Qt./21.5 L
	Engine Coolant Conditioner	Replace (1405131, 1 qt. bottle)		2 quarts / 1.9 L
	Engine Air Filter	Replace		
Every 500 Service Hours	Drill Accumulators	Check Charge Pressure	see Drill Service Manual	
	Air Compressor Air Filter	Replace		
	Air Compressor Oil Filter	Replace		
	Engine Oil and Filters	Drain Oil and Replace Filters	*15W-40 use API, CD Grade	22.7 Qt./21.5 L
	Pump Drive Gearbox	Drain Oil and Replace Initial change at 500 hours, then every 6 months.	*HD 80W-90 Gear Oil	4.5 Qt. / 4.3 L
	Feed Table Bushing	Inspect and Replace (if necessary)		
	Hydraulic Oil Filters	Replace		
Every 1000 Service Hours	Fuel Filter	Replace		
	Engine Fan Drive Bearing	Grease	Special Purpose Grease (SPG)	
	Fuel Priming Pump Strainer (see Section 3 of Service Manual)	Clean and Replace		
Every 1500 Service Hours	Compressor Oil	Drain Oil and Replace	*Chevron Tegra Synthetic Compressor Oil, ISO 68	9.5 Qt. / 9 L
	Track Drive Gear Case Oil	Drain Oil, Flush and Replace	*HD 80W-90 Gear Oil	2.5 Qt./2.4 L
Every 2000 Service Hours	Engine Coolant	Replace, Clean and Flush System	Water/Anti-freeze, 50/50 mix	**30.7 Qt./29 L
	Hydraulic Oil	Drain, and Replace Oil	*Chevron AW MV, ISO 46	100 Gal. / 380L
	Compressor Oil Separator Element	Replace		

* Filled at factory unless special request.

**Cooling capacity of system - including Radiator 14 Qts. (13.2 L), Shunt Tank 4 Qts. (3.8 L) and Engine 12.7 Qts. (12 L)

Instrument Panel (non-cab machine)

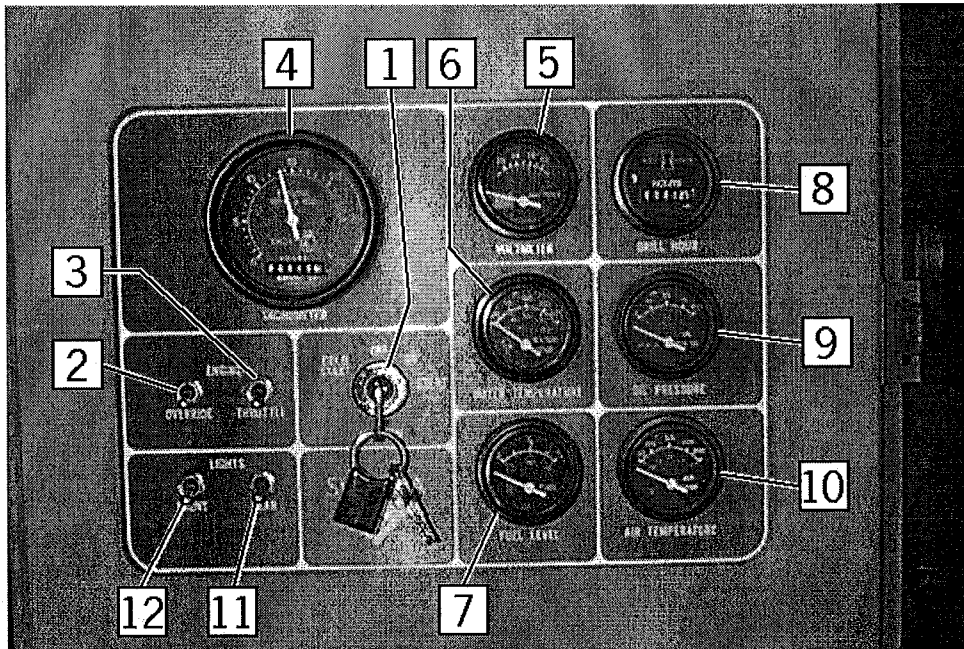


Fig. 3-1 Instrument Panel (located on left side of machine)

1. Ignition Switch
2. Low Oil Pressure Override Switch
3. Throttle Switch
4. Engine Tachometer/Hourmeter
5. Voltmeter
6. Water Temperature Gauge
7. Fuel Gauge
8. Drill Hourmeter
9. Engine Oil Pressure Gauge
10. Compressor Air Temperature Gauge
11. Rear Lights Switch
12. Front Lights Switch

Cab Controls

Component Locations

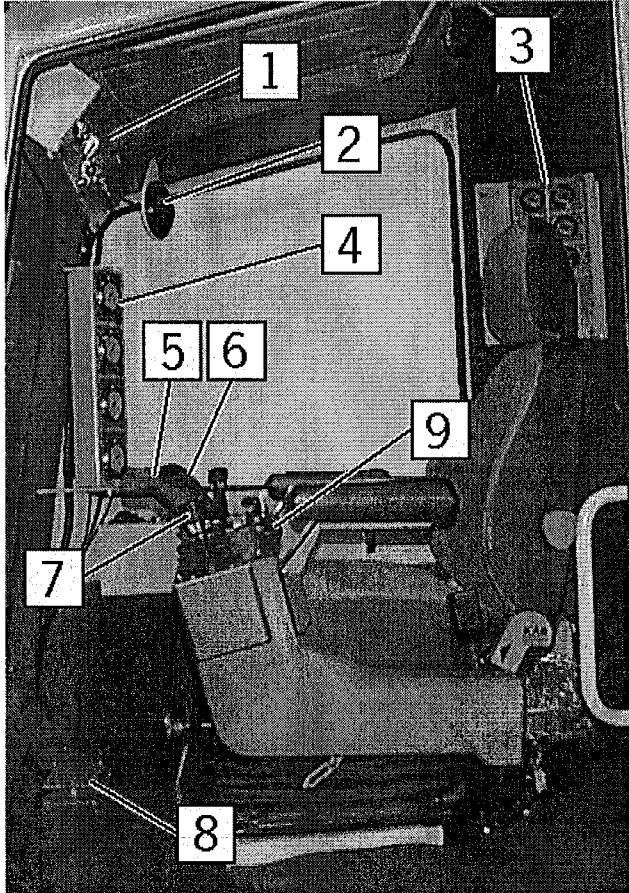


Fig. 3-8 Cab Components

1. Overhead Drill/Tram Console
2. Vertical Indicator
3. Engine Instrument Panel
4. Drill Instrument Panel
5. Left Tram/Feed Joystick
6. Right Tram/Boom Joystick
7. Feed Control
8. Deadband Pedal - depress to activate 2 axis Joysticks (items 5 & 6).
9. Arm Rest Latch Release Lever - pull up to release latch and raise arm rest for entry and exit of cab.

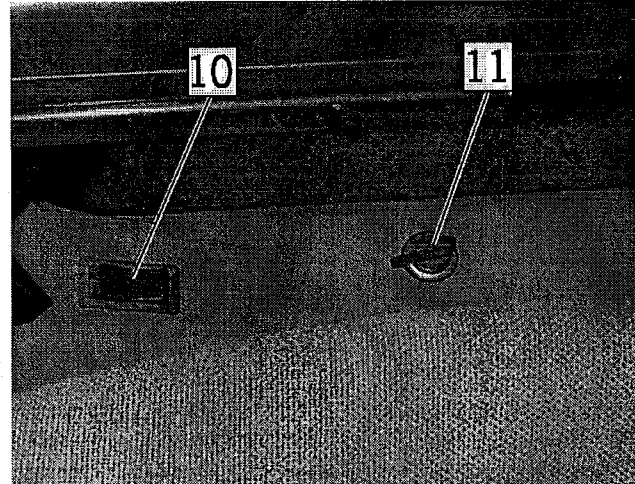


Fig. 3-9 Operator's Seat - Right Side

10. Washer Switch
11. 12 VDC Power Outlet

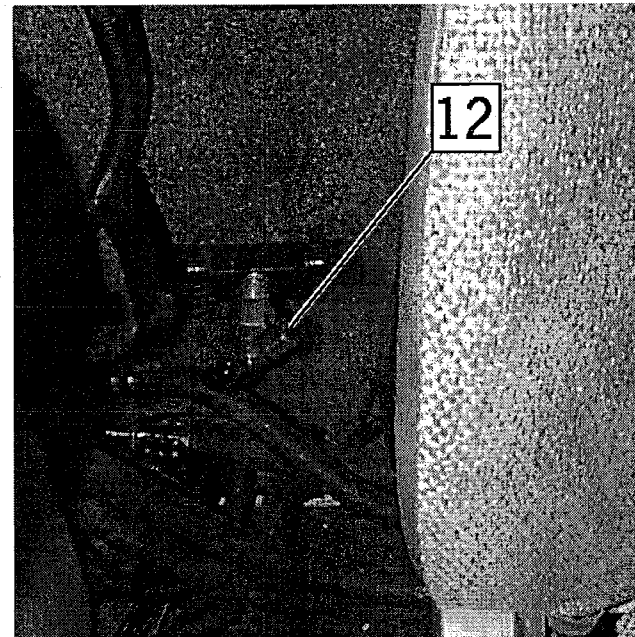


Fig. 3-10 Operator's Seat - Behind Right Side

12. Water Metering Valve (for detergent system)

Vertical Indicator

Description

The angular display is connected to the sensor mounted on the feed. There are 10 display lights in each axis (Y+, Y-, X+ and X-). The maximum angle from plumb is + or - 6 degrees, thus each light represents 0.6 degrees. The lights remain lit if the feed is more than 6 degrees from plumb. The lights will go out successively as the feed approaches plumb in each direction.

Vertical Adjustment

1. Position feed vertical (plumb) and adjust the sensor to indicate plumb (no lights on).
2. Move feed to non-vertical position, then move back until all lights go out (plumb). Feed should be plumb within + or - 0.6 degrees.

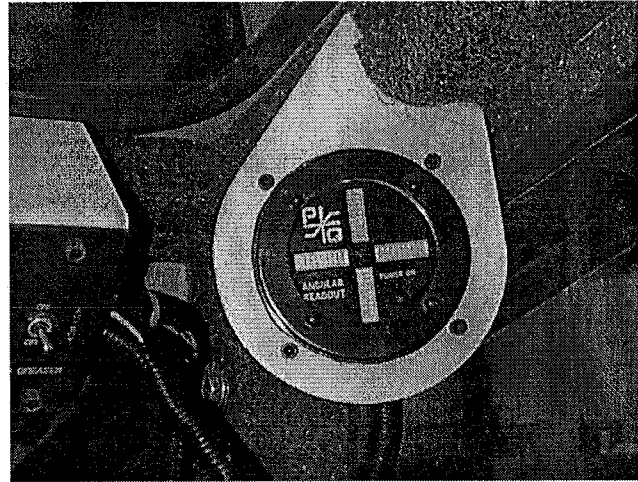
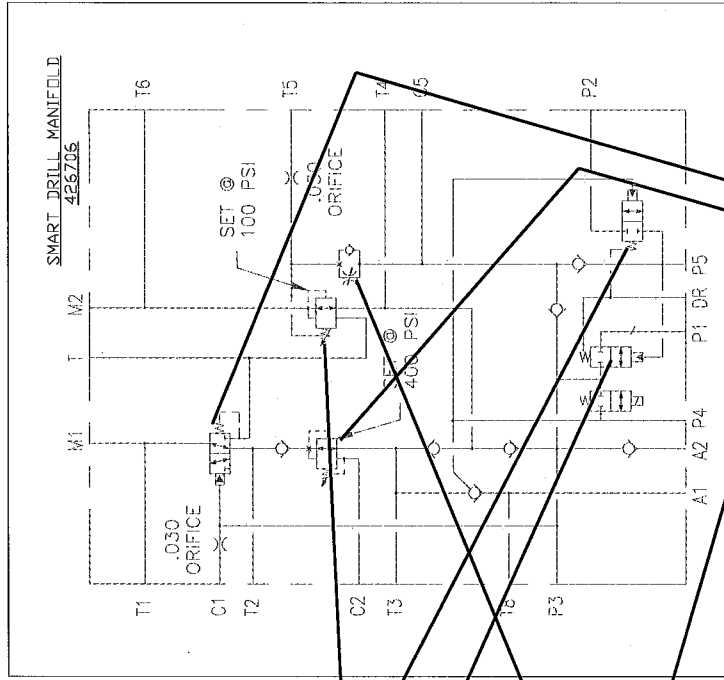
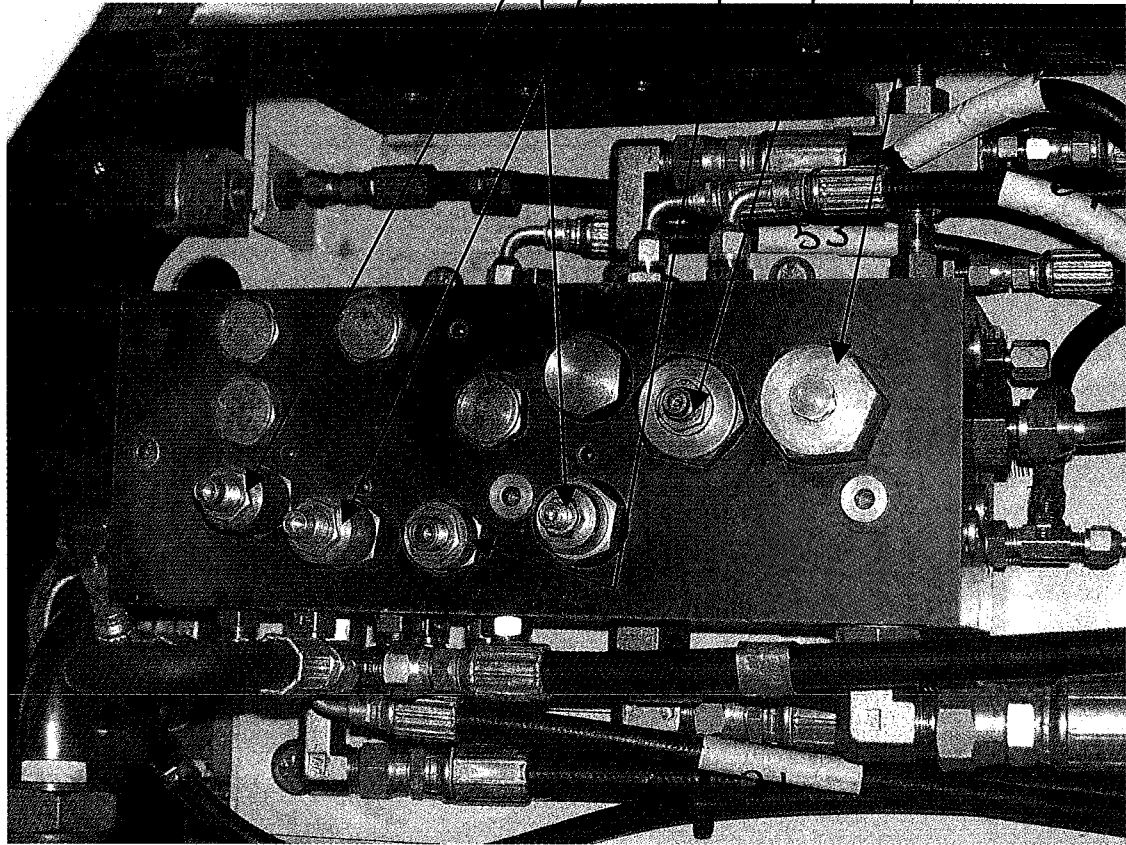


Fig. 3-20 Vertical Indicator

SMART DRILL VALVE



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