

GEOPROBE® GH40 HYDRAULIC HAMMER

SERVICE MANUAL

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GEOPROBE GH40 HYDRAULIC HAMMER

Geoprobe® Systems

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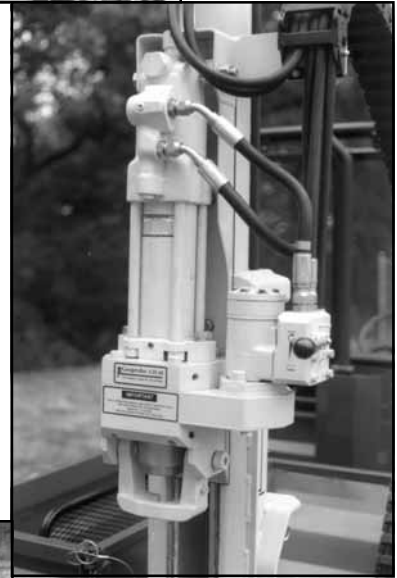
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GH40 Hydraulic Hammer

*Designed and built by Geoprobe Systems
specifically for subsurface investigations.*



Geoprobe® Systems has produced this GH40 Hydraulic Hammer Service Manual to assist our customers with maintenance and repair of the GH40 hammer. Every effort has been made to provide concise, easy-to-follow instructions and to accurately describe and portray the necessary steps for servicing hammer components. Any person performing service on the GH40 hammer should have a thorough mechanical background and experience in the overhaul of hydraulic machinery. Improper servicing of the GH40 hammer may interfere with the hammer warranty if such is still in effect.

We at Geoprobe take pride in our product and our service. If you have any questions regarding the operation, care, or service of the GH40 hammer, or if you'd just like to talk to any of our friendly Geoprobe personnel, please call us at 1-800-436-7762.

TABLE OF CONTENTS

Section 1.0	Introduction	5
Section 2.0	Safety Precautions	5
	Figure 1.1: GH-40 Hammer Major Components	6
Section 3.0	Servicing the GH-40 Hammer Member	7
Section 4.0	Hammer Member Removal	8
Section 5.0	Removal of Hammer Member Base Plate Seals	12
	Figure 5.1: GH-40 Hammer Member Seal Replacement	13
Section 6.0	Installation of Base Plate Seals	16
Section 7.0	Recharging Nitrogen in GH-40 Hammer	20
Section 8.0	Hammer Member Installation	28
Section 9.0	Servicing the Rotation Member	31
	Figure 9.1: GH-40 Rotation Member Service Diagram	32
Section 10.0	Valve Spool O-Ring Replacement	33
Section 11.0	Hammer Rotation Valve Removal and Disassembly	38
Section 12.0	Hammer Rotation Valve Assembly and Installation	43
Section 13.0	Hydraulic Motor Removal	47
Section 14.0	Hydraulic Motor Installation	52
Section 15.0	Drive Chain and 12-Tooth Sprocket Removal	57
Section 16.0	Drive Chain and 12-Tooth Sprocket Installation	61
Section 17.0	Hex Drive Gear, Bearings, and Seals Removal	63
Section 18.0	Hex Drive Gear, Bearings, and Seals Installation	71
Section 19.0	Hammer Latch Removal (Rotation Member Removed from Probe Unit)	81
Section 20.0	Hammer Latch Installation (Rotation Member Removed from Probe Unit)	83
Section 21.0	Hammer Latch Removal	87
Section 22.0	Hammer Latch Installation	89
Section 23.0	Removal of Hammer Brace Assembly	93
Section 24.0	Installation of Hammer Brace Assembly	94
Section 25.0	Removal of Rod Grip Pull Assembly	95
Section 26.0	Installation of Rod Grip Pull Assembly	96
Section 27.0	Trouble Shooting	97
Section 28.0	References	99

1.0 INTRODUCTION

1.1 Purpose

This manual provides step-by-step instructions for servicing the Geoprobe GH-40 hydraulic hammer.

1.2 Introduction to the GH-40 Hammer

The GH-40 Hydraulic Hammer is divided into two distinct parts for purposes of service. Those parts are: the upper portion (hammer) and the lower member (rotation). Figure 1.1 shows a GH-40 hammer with the two sections delineated and the critical parts identified.

1.3 Service Manual Organization

Safety instructions are provided in Section 2.0. Sections 3.0 through 8.0 cover servicing the hammer portion of the GH-40 hammer. Sections 9.0 through 22.0 detail servicing the rotation member of the GH-40 hammer.

1.4 Help From Geoprobe

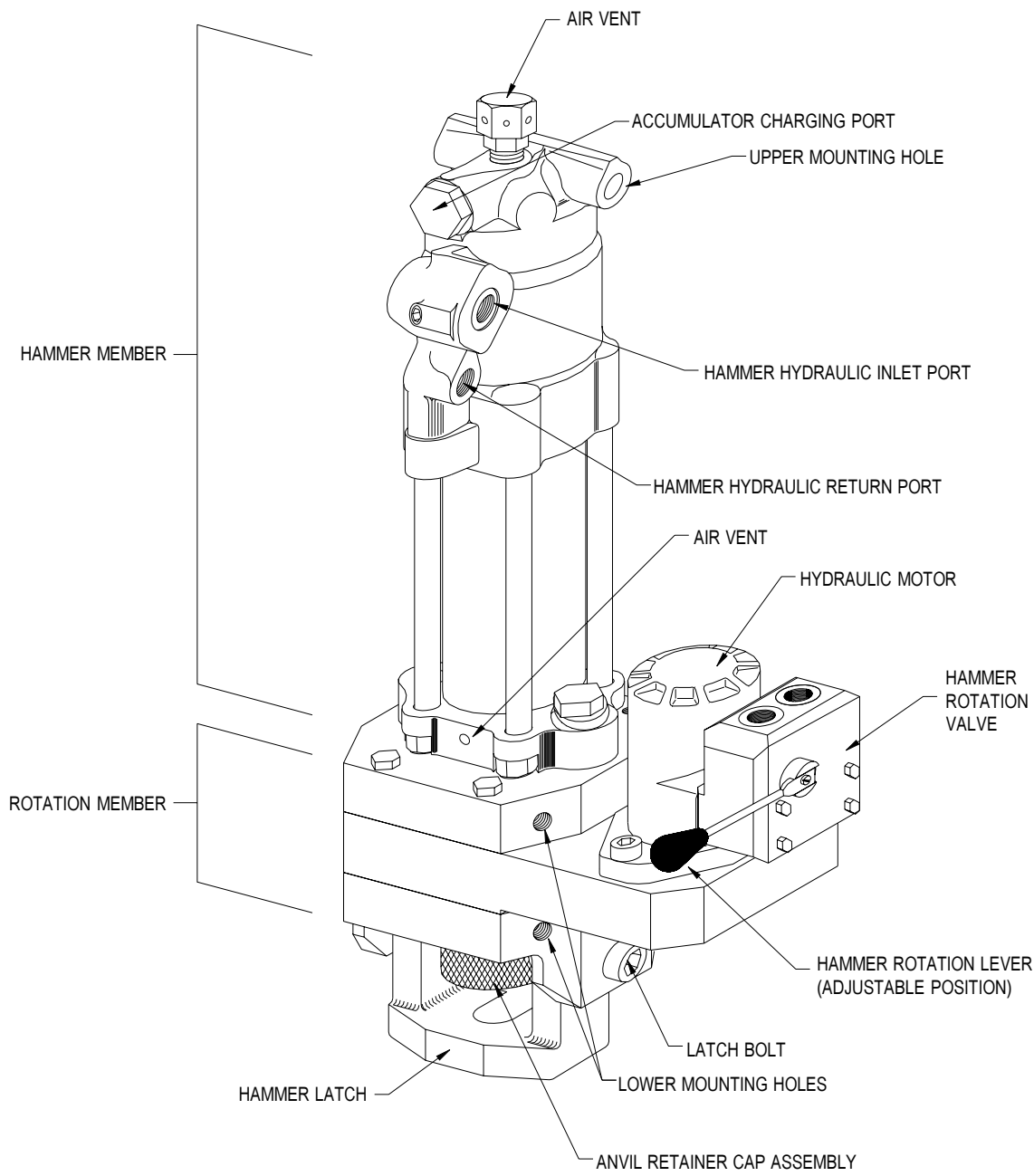
Help is available! In fact, why don't you call us before you tear into your hammer for the first time. The GH-40 hammer is our creation and, quite frankly, we are rather proud of it. We will be happy to discuss any problems you may have over the phone. Simply call us anytime between 8:00 a.m. and 5:00 p.m. central time, Monday through Friday at 1-800-GEOPROBE (1-800-436-7762). Just request customer service and we'll help you with troubleshooting, walking you through any servicing step that may seem difficult.

1.5 Which Way Is Which?

For purposes of clarity in this manual, "left" refers to the driver's side of the vehicle and "right" refers to the passenger side.

2.0 SAFETY PRECAUTIONS

- 2.1 Always deactivate the hydraulics and turn off vehicle engine before attempting to disassemble any parts of the Geoprobe unit.
- 2.2 Always seek assistance when removing the hammer member or the rotation member from the soil probing unit. These components are heavy!
- 2.3 Seek assistance when installing the hammer member or the rotation member on the soil probing unit. These components are heavy!
- 2.4 Any time impact is applied with a hammer or any other device to any object, safety glasses must be worn.
- 2.5 When removing, installing or servicing this hammer, always wear safety glasses.
- 2.6 When disconnecting hydraulic lines, always wear safety glasses. Hot or pressurized oil may be present and can cause injury.
- 2.7 Always wear steel-toe boots when removing or installing the hammer member or rotation member of the GH-40 Hydraulic Hammer.



**FIGURE 1.1
GH-40 HAMMER MAJOR COMPONENTS**

3.0 SERVICING THE GH-40 HAMMER MEMBER

3.1 When is service necessary?

- When the hammer seizes – fails to deliver percussion.
- When oil leaks from vents at the front or rear of the base plate or out of the top vent.
- When hydraulic oil in excess leaks down around anvil.

3.2 What servicing can be done in the field?

The only service which should be undertaken in the field is the removal and replacement of the lower hammer seals which are located in the base plate of the hammer assembly.

3.3 What servicing must be done at the factory?

The hammer member should be sent to the factory for any repairs above the base plate. These repairs may include recharging the hammer with nitrogen, replacing the top piston seal, replacing the accumulator diaphragm, etc.

NOTE: Certified technicians with access to the proper equipment may recharge the hammer member with nitrogen following the instructions in Section 7.0: Recharging Hammer With Nitrogen.

3.4 What tools are required to service the hammer member portion of the GH-40 Hammer?

ITEM	QUANTITY
Socket Wrench, 1/2" drive	1
Torque Wrench*, 1/2" drive	1
Socket, 15/16" and 3/4"	1
Open-Ended Wrench, 7/8" and 15/16"	2
Dead Blow Hammer (brass or plastic hammer head)	1
Small Pick (an ice pick or small screw driver will do)	1
8-MJ Hydraulic Fitting Caps (Optional)	2
8-MJ Hydraulic Fitting Plugs (Optional)	2
Small Pry Bar	1
Oil Can containing a small amount of hydraulic oil	
Small amount of multi-purpose grease or wheel bearing grease	

***NOTE: A torque wrench is a necessary item for servicing the hammer member of the GH-40 hammer. If you do not have a torque wrench available, DO NOT attempt to service this hammer.**

3.5 What tools are required to recharge the hammer with nitrogen?

ITEM	QUANTITY
Open-Ended Wrench, adjustable	1
Open-Ended Wrench, 1-3/8"	1
Socket Wrench, 3/8" drive	1
Socket, 5/8"	1
Cylinder of Industrial Quality Nitrogen	1
Pressure Regulator (Victor Model SR 4G)	1
Pressure Gauge (0-2000 psi)	1
Line Shut-off Valve	1
Charge Stem Adapter	1

4.0 HAMMER MEMBER REMOVAL

CAUTION: All hydraulic connections and hydraulic oil must be kept free from foreign materials. Failure to do so will severely damage the hydraulic system of the hammer unit.

CAUTION: The upper hammer member is heavy. Do not attempt to remove it on your own. Seek assistance when removing it from mounting brackets and rotation member.

NOTE: Refer to Section 23.0 or 25.0 for instructions on removing a Hammer Brace Assembly or Rod Grip Pull Assembly if either accessory is installed on your GH-40 Hammer.

- 4.1 Extend unit fully from vehicle.
- 4.2 Lower foot with Foot Control and raise hammer with Probe Control so that the rotation member of the hammer is approximately waist high (Fig. 4.1).
- 4.3 Turn off (deactivate) hydraulic system and vehicle engine.
- 4.4 Relieve remaining pressure in hydraulic lines by working all levers up and down several times (Fig. 4.2).
- 4.5 Mark and disconnect inlet and return hoses from hammer (Fig. 4.3) using a 7/8" open-ended wrench.
- 4.6 Cover hydraulic lines with a small plastic bag and secure with a rubber band (Fig. 4.4A), or plug the hydraulic lines with two 8-MJ plugs (Fig. 4.4B).
- 4.7 Seal hammer inlet and return fittings with two 8-MJ caps (Fig. 4.5).
- 4.8 Remove base plate bolts with a 15/16" socket and socket wrench (Fig. 4.6A,B).
- 4.9 Remove top mounting bracket bolt with a 15/16" socket, socket wrench and end wrench (Fig. 4.7).
- 4.10 Carefully pry hammer member loose with a pry bar placed under the side rod nut lip and on top of the rotation member bolts (Fig. 4.8).
- 4.11 Lift hammer member up and away from the top of the hammer cradle and rotation member (Fig. 4.9).
- 4.12 Removal of hammer member is complete (Fig. 4.10).



Fig. 4.1. Positioning the GH-40 hammer for servicing.

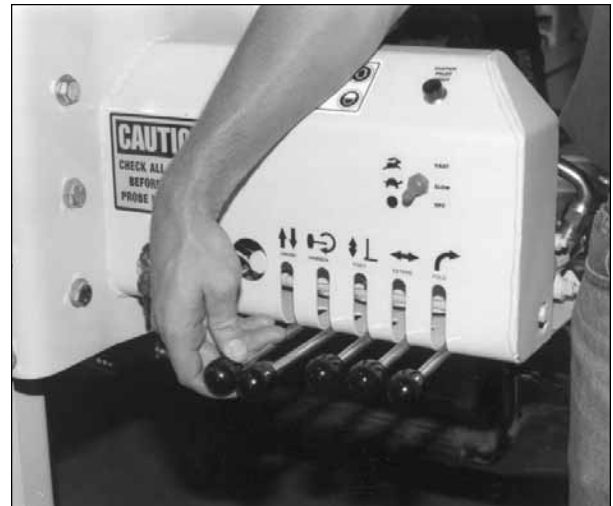


Fig. 4.2. Reduce hydraulic pressure in lines by working up and down.

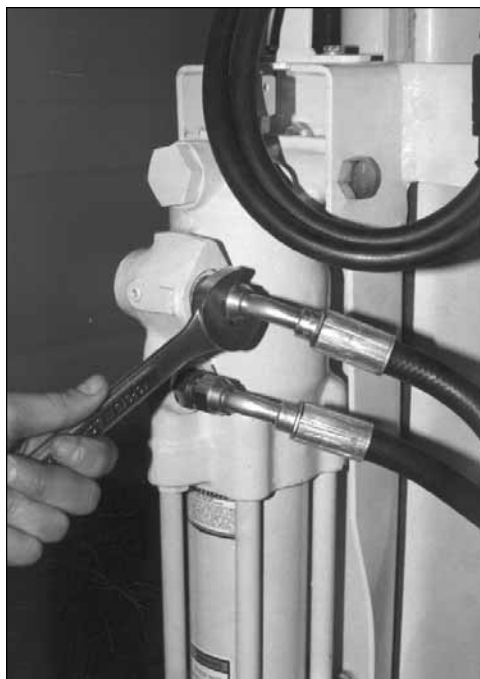


Fig. 4.3. Disconnect the hydraulic lines.



Fig. 4.4A. Cover ends on all hydraulic lines removed from hammer with small plastic bags. (Option 1)



Fig. 4.4B. Plug ends on all hydraulic lines with 8-MJ plugs. (Option 2)



Fig. 4.5. Cap hammer inlet and return openings after hoses have been removed.



Fig. 4.6A. Loosen base plate bolt which secures hammer member to rotation member.



Fig. 4.6B. Remove hammer base plate bolts.



Fig. 4.7. Remove top mounting bracket bolt.



Fig. 4.8. Loosen hammer member from lower (rotation) member.



Fig. 4.9. Remove hammer member.

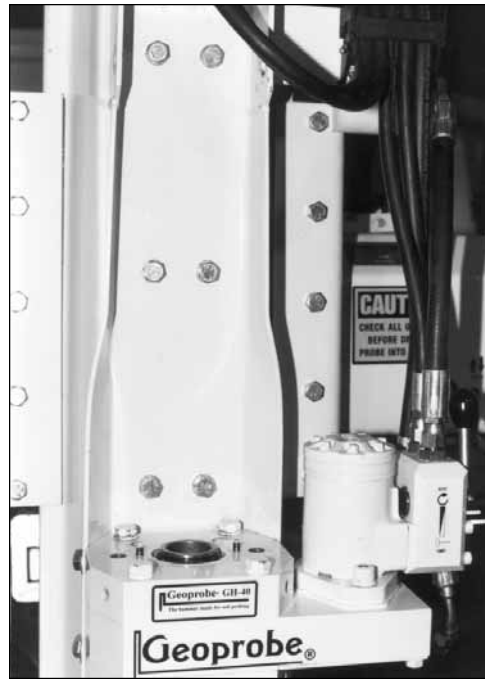


Fig. 4.10. Removal of hammer member is complete.

5.0 REMOVAL OF HAMMER MEMBER BASE PLATE SEALS

The hammer member base plate seals may need to be replaced if hydraulic oil is leaking from the vent holes or around the anvil.

NOTE: An exploded view of the hammer member base plate seals is shown in Fig. 5.1.

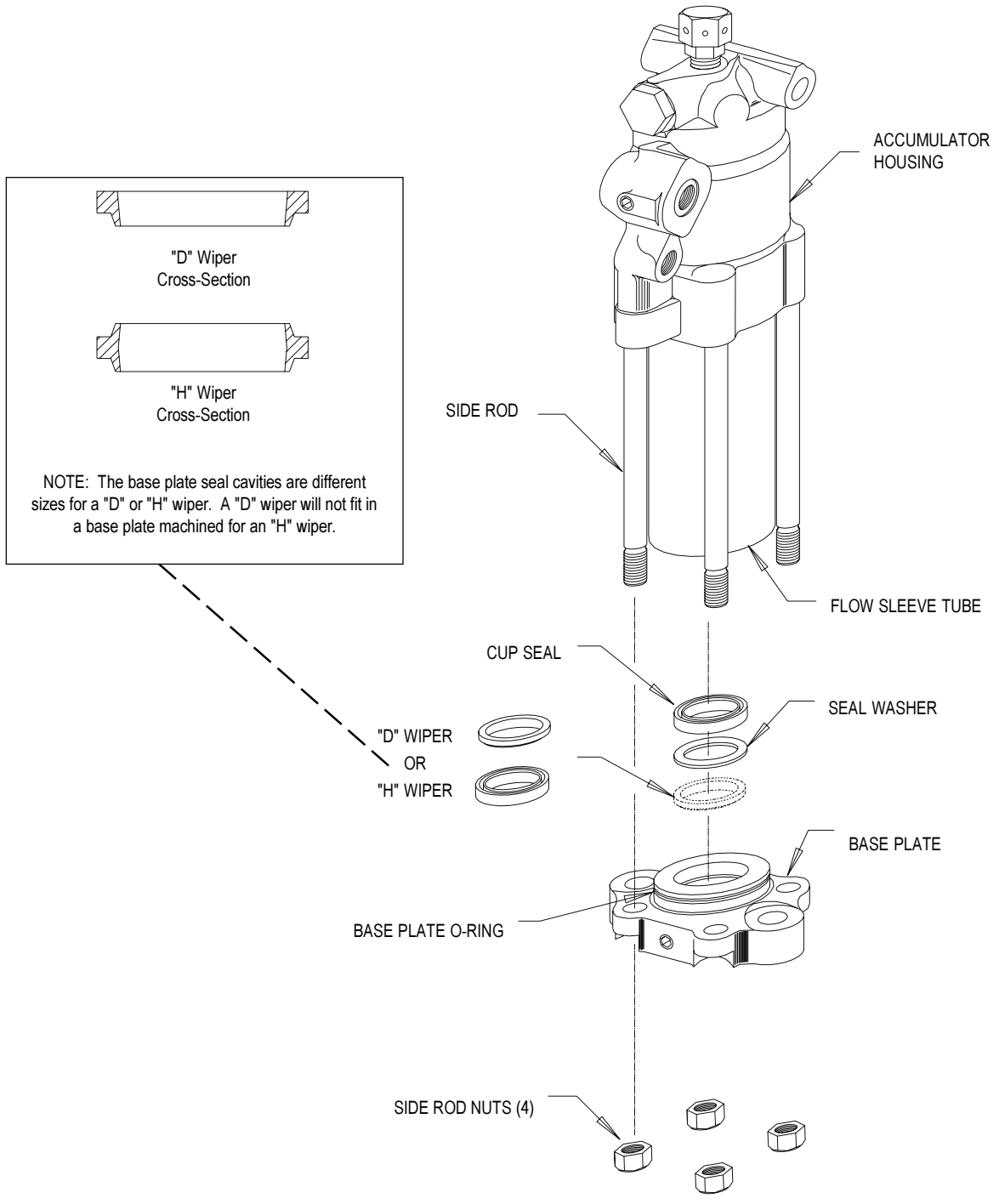
- 5.1 Clamp hammer member in a bench vice (Fig. 5.2). Vice jaws should contact hammer between the recessions on both sides of the accumulator housing. To prevent marring, a shop rag should be wrapped around the accumulator housing before clamping it in the vice.
- 5.2 Remove side rod nuts with a 15/16" socket wrench (Fig. 5.3).
- 5.3 Remove base plate by tapping base plate flange with a dead-blow hammer (Fig. 5.4). Be sure to check orientation of base plate to hammer body. A paint mark makes a good check. Cover exposed end of hammer with a clean shop rag.

NOTE: Recent hammer improvements have replaced the "D" wiper with an "H" wiper. The "H" wiper's physical appearance resembles that of the cup seal. The "H" wiper requires a different base plate to accommodate its lower sealing surface. Be sure to determine which wiper your hammer member utilizes. **THE "D" WIPER AND THE "H" WIPER ARE NOT INTER-CHANGEABLE.**

- 5.4 Cup seal, seal washer, and "D" (or "H") wiper should be contained in base plate (Fig. 5.5).

CAUTION: Do not scratch or nick any machine surface while replacing seals.

- 5.5 Cup seal may remain on the piston and can be easily removed by hand or with a small pick (Fig. 5.6).
- 5.6 Carefully pry cup seal, seal washer, and "D" (or "H") wiper out of the base plate with a small pick or screwdriver (Fig. 5.7). Observe seal location and orientation prior to removal.
- 5.7 Remove base plate O-ring with a small pick or screwdriver (Fig. 5.8).
- 5.8 Thoroughly wash base plate and side rod nuts in solvent. Dry all parts with compressed air.
- 5.9 Hammer member base plate seal removal is complete.



**FIGURE 5.1
GH-40 HAMMER MEMBER SEAL REPLACEMENT**

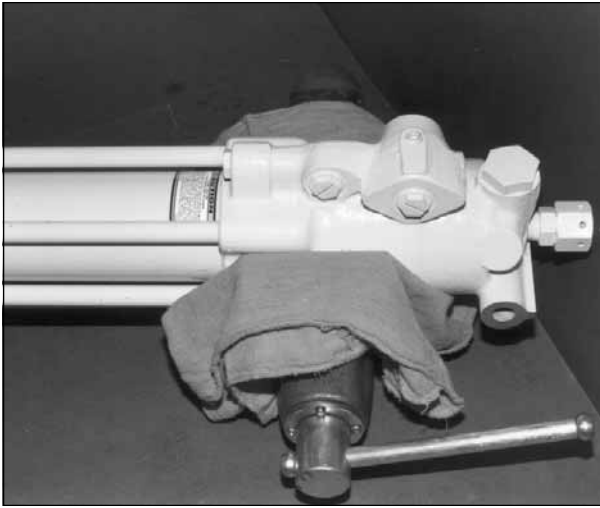


Fig. 5.2. Clamp hammer member in vise.



Fig. 5.3. Remove side rod nuts.



Fig. 5.4. Remove base plate.

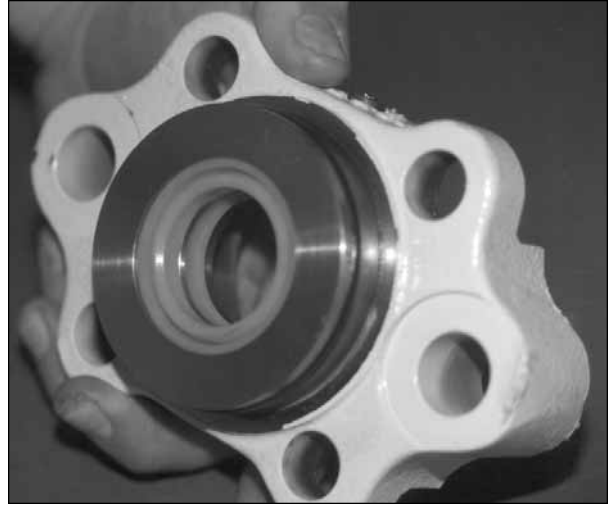


Fig. 5.5. Top view of base plate showing cup seal (top), seal washer (center), and "D" or "H" wiper (bottom).



Fig. 5.6. Remove cup seal.

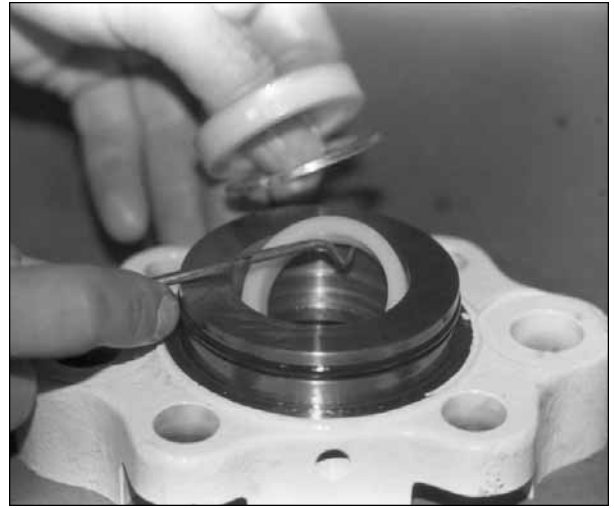


Fig. 5.7. Remove seal washer and "D" or "H" wiper.



Fig. 5.8. Remove base plate O-ring.

6.0 INSTALLATION OF BASE PLATE SEALS

NOTE: The Geoprobe Replacement Seal Kit (GH-4120K) contains a new cup seal, seal washer, "D" wiper, "H" wiper, and O-ring. This kit is required to complete the following procedure. Only one of the wipers will be used during the seal replacement process.

NOTE: Recent hammer improvements have replaced the "D" wiper with an "H" wiper. Determination of the correct wiper to be used can be made as follows: the "H" wiper's physical appearance resembles that of the cup seal and requires a chamfered base plate to accommodate its lower sealing surface. Be sure to determine which wiper your hammer member utilizes. **THE "D" WIPER AND "H" WIPER ARE NOT INTERCHANGEABLE.**

- 6.1 Place base plate on a clean work bench with seal cavity facing upwards (Fig. 6.1).
- 6.2 Depending upon your hammer, insert "D" wiper, with lip and shoulder facing downwards, into bottom seal cavity OR install "H" wiper with cup surface up. Push wiper in manually (Fig. 6.2). If using the "H" wiper, the small tapered, protruding surface should be inserted into the base plate first. This surface should mate with the chamfered shoulders.
- 6.3 Place seal washer on top of "D" or "H" wiper (Fig. 6.3).
- 6.4 Push cup seal, with lip and recession facing upwards, onto seal washer (Fig. 6.4).
- 6.5 Install base plate O-ring onto base plate taking care not to damage O-ring (Fig. 6.5).
- 6.6 Apply hydraulic oil on the sealing surface of the cup seal and "D" or "H" wiper (Fig. 6.6).
- 6.7 Apply a thin film of grease on the installed base plate O-ring (Fig. 6.7).
- 6.8 Lubricate the exposed surface of the hammer piston with a light film of hydraulic oil (Fig. 6.8).

CAUTION: Never use a hammer to force hydraulic components together.

- 6.9 Slide the base plate onto side rods and piston making sure that the seals and piston remain aligned (Fig. 6.10).
- 6.10 Push base plate forward until base plate O-ring contacts the flow sleeve tube (Fig. 6.11).
- 6.11 Install side rod nuts (4) loosely with a 15/16" socket and socket wrench (Fig. 6.12). Base plate and O-ring should be drawn into flow sleeve. Snug nuts very slightly in a crisscross pattern.

IMPORTANT: Always use a torque wrench to tighten side rod nuts. Failure to do so will void hammer warranty.

- 6.12 Using a torque wrench and a 15/16" socket, torque the side rod nuts to **30 foot pounds** in a crisscross pattern (Fig. 6.13). Torque side rod nuts to **45 foot pounds** in the same crisscross pattern.
- 6.13 Base plate seal installation is complete (Fig. 6.14).



Fig. 6.1. Seal cavity on base plate should face upwards during installation.



Fig. 6.2. Push "D" or "H" wiper into bottom seal cavity.



Fig. 6.3. Seal washer is placed on top of "D" or "H" wiper.



Fig. 6.4. Push cup seal onto seal washer.



Fig. 6.5. Installation of base plate O-ring onto base plate.

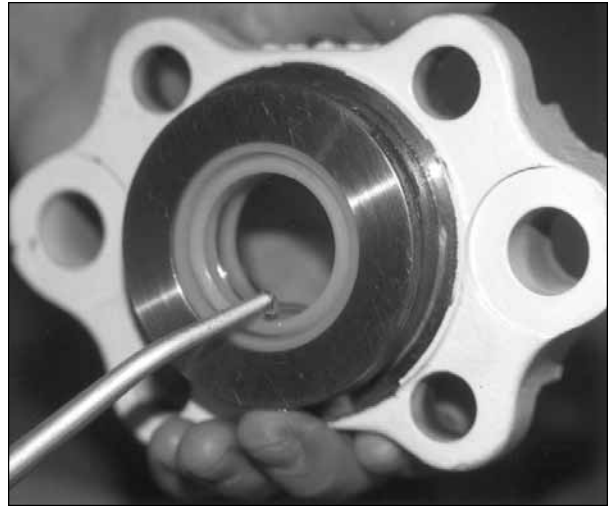


Fig. 6.6. Apply hydraulic oil to sealing surfaces of cup seal and "D" or "H" wiper.



Fig. 6.7. Apply grease to installed base plate O-ring.



Fig. 6.8. Lubricate exposed surface of hammer piston.



Fig. 6.9. Sub-seal vent port must face inlet and return fitting side of hammer.



Fig. 6.10. Slide base plate onto side rods and piston.

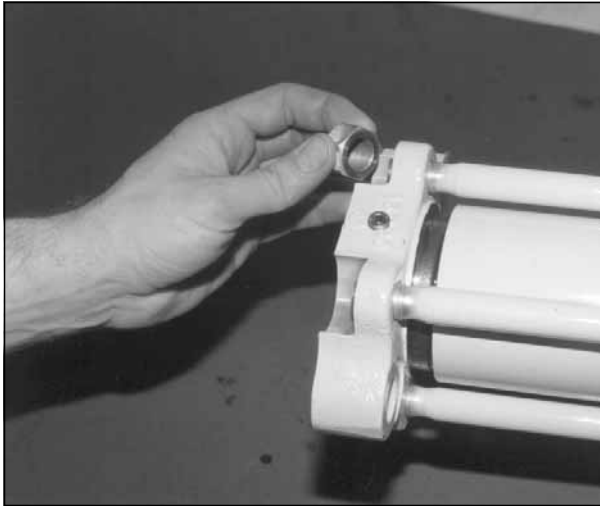


Fig. 6.11. Base plate O-ring rests against flow sleeve tube.



Fig. 6.12. Side rod nuts must be installed loosely and evenly.



Fig. 6.13. First, torque side rod nuts to 30 foot pounds in a crisscross pattern; then torque to 45 foot pounds in a crisscross pattern.

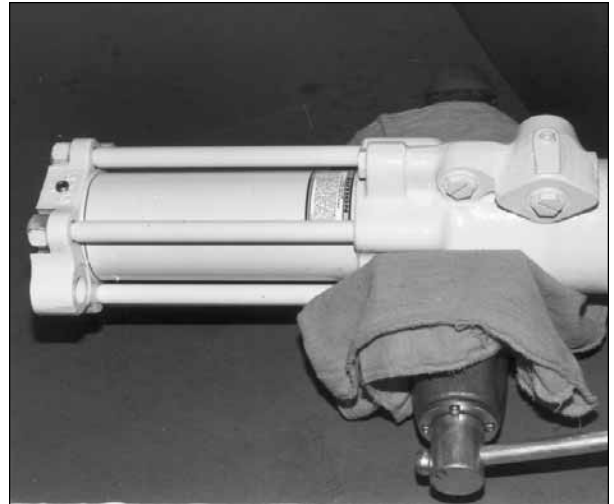


Fig. 6.14. Completed base plate seal installation.

7.0 RECHARGING NITROGEN IN GH-40 HAMMER

Should the Geoprobe® operator experience inconsistency with the percussion function of the GH-40 Hammer, one possible culprit could be a lack of nitrogen charge in the hammer member accumulator chamber. The percussion function may lack snap or completely fail as a result of inadequate nitrogen charge. Though hammer failure due to a lack of nitrogen is rare, recharging the hammer member will eliminate the possibility that an inadequate nitrogen charge is contributing to hammer member failure.

NOTE: The following recharge procedure requires the use of a cylinder of industrial quality nitrogen gas, a pressure regulator assembly (Fig 7.1), and a charge valve adapter (Fig 7.2) These are included in the GH-40 Nitrogen Charge Kit (FA3000K) available from Geoprobe Systems.

- 7.1 Fold the probe derrick into the vertical position, lower the foot onto the ground, and raise the hammer to approximately waist level. Shut off the power unit engine.
- 7.2 Remove the cap from the nitrogen charge port using a 1-3/8" wrench or socket as shown in Figure 7.3. This will provide access to the nitrogen charge valve shown in Figure 7.4.
- 7.3 Loosen the lock nut on the nitrogen charge valve by turning it counterclockwise one complete revolution with a 5/8" socket (Fig. 7.5)
- 7.4 Thread the large hex cap of the charge valve adapter into the nitrogen port on the hammer (Fig 7.6). Install the adapter finger tight but with sufficient torque to seat the O-ring within the port.
- 7.5 Thread the center stem of the charge valve adapter in toward the hammer until it is finger tight. (Fig 7.7).
- 7.6 Attach the quick-connect coupler on the end of the nitrogen fill hose to the quick-connect nipple on the charge valve adapter as shown in Figure 7.8.
- 7.7 Ensure that the line pressure in the nitrogen fill hose is set at zero by turning the regulator tee-handle (Fig 7.9) counterclockwise until it turns freely.
- 7.8 Open the main valve on the nitrogen cylinder (Fig 7.10) by turning the handle counterclockwise.
- 7.9 Slowly turn the regulator tee-handle (Fig 7.9) clockwise until the line pressure gauge reads 650 psi.

IMPORTANT: DO NOT overcharge the system. Charging the system beyond 650 psi will rupture the accumulator diaphragm or otherwise damage the hammer.

- 7.10 Close the main valve on the nitrogen gas cylinder (Fig 7.10) by turning the handle clockwise.
- 7.11 Unthread the charge valve adapter center stem several revolutions out from the hex cap (Fig. 7.11)
- 7.12 Rotate the regulator tee handle (Fig 7.9) counterclockwise until the line pressure gauge reads 650 psi (pressure is released).
- 7.13 Remove the charge valve adapter from the hammer by unthreading the large hex cap. Detach the adapter from the nitrogen fill hose at the quick-connect fittings.

7.14 Snug the lock nut on the nitrogen charge valve (loosened in Step 7.3) using a ratchet and a 5/8" socket (Fig. 7.20). **DO NOT OVERTIGHTEN.**

7.15 Listen for a hissing sound around the charge valve and accumulator housing. Check for dripping oil around the base plate and piston if hammer member is removed as in Figure 7.12, or from the hex drive if the hammer is installed as in Figure 7.13.

Obvious leaks, such as those described above, would indicate a defective accumulator diaphragm in the hammer member. If the accumulator diaphragm has failed, the hammer member must be sent to the Geoprobe factory in Salina, Kansas, for repair.

7.16 Reinstall the nitrogen charge port cap that was removed in Step 7.2.

7.17 Nitrogen recharge is complete.

IMPORTANT: Do not transport the nitrogen gas cylinder without first removing the regulator assembly. Always secure the cylinder during transport to prevent shifting or rolling while the vehicle is in motion. These are important safety issues as the cylinder can be propelled at a high rate of speed if the regulator or valve were to be damaged during transport.



Fig. 7.1. Nitrogen gas cylinder with pressure regulator assembly.

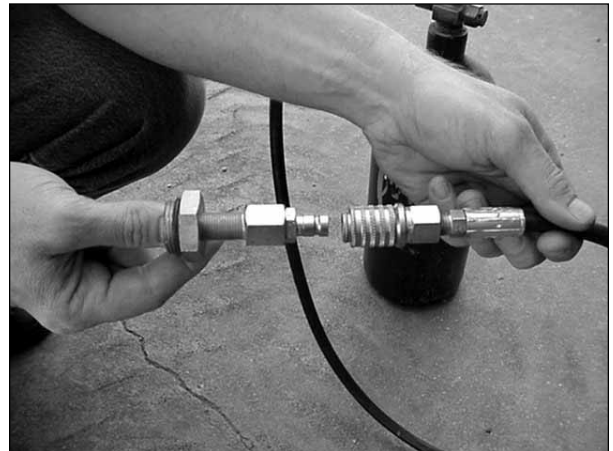


Fig. 7.2. Charge valve adapter (left) shown with nitrogen fill hose quick-connect coupler.

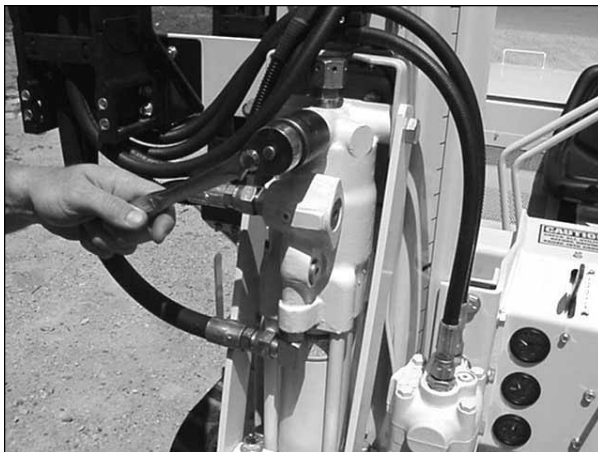


Fig. 7.3. Remove cap from nitrogen charge port.



Fig. 7.4. Nitrogen charge valve and lock nut.

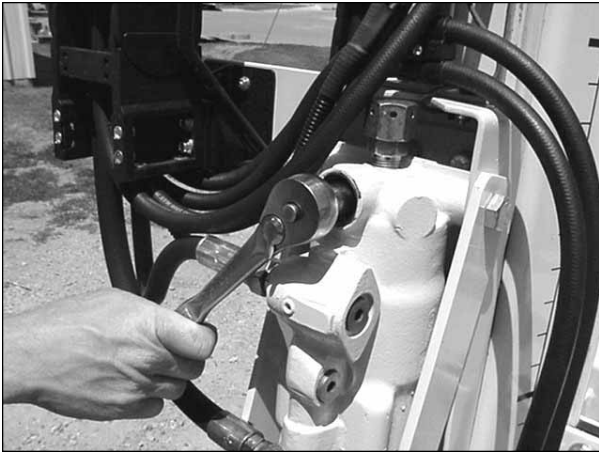


Fig. 7.5. Loosen lock nut on nitrogen charge valve one full revolution.



Fig. 7.6. Thread hex cap of charge valve adapter into nitrogen charge port until hand tight.

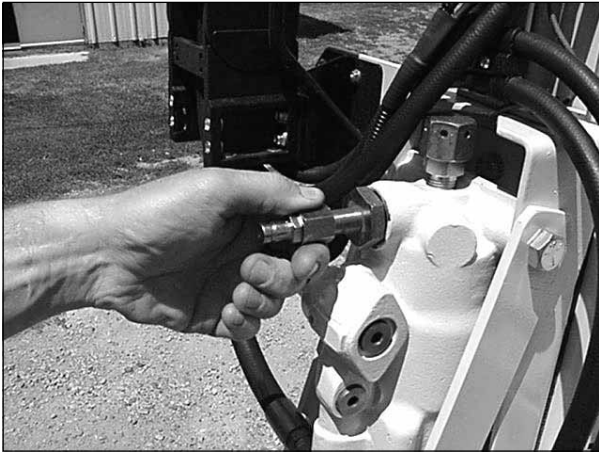


Fig. 7.7. Thread charge valve adapter center seam into hex cap until stem is hand tight.

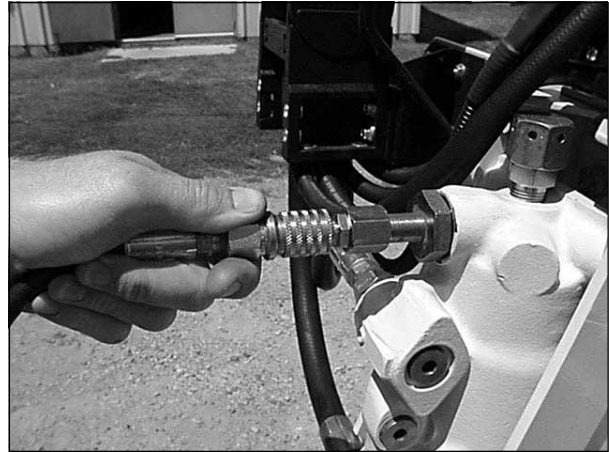


Fig. 7.8. Attach nitrogen fill hose to charge valve adapter at quick-connects.



Fig. 7.9. Nitrogen gas regulator tee-handle

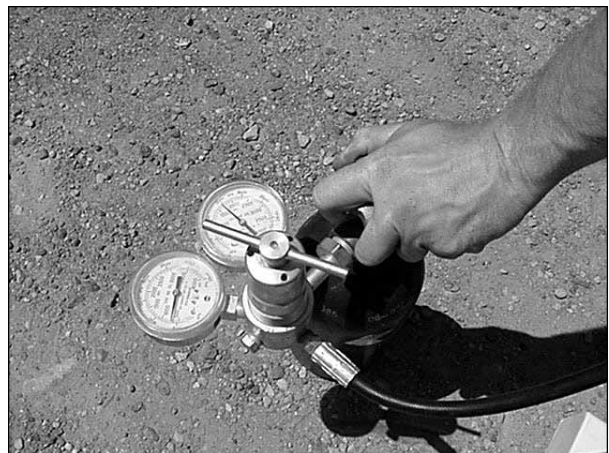


Fig. 7.10. Nitrogen gas cylinder main valve.



Fig. 7.11. Unthread the charge valve adapter center stem out from the hex cap.



Fig. 7.12. Check for dripping oil around base plate and piston.

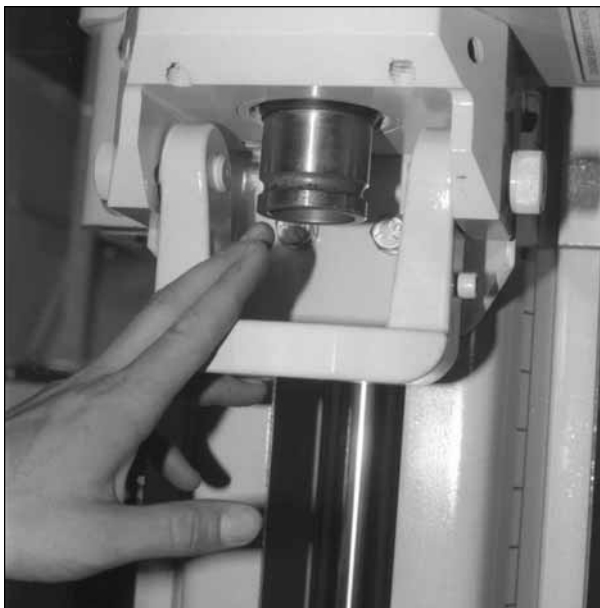


Fig. 7.13. Check for dripping oil from hex drive.

8.0 HAMMER MEMBER INSTALLATION

CAUTION: Upper hammer member is heavy. Do not attempt to install it on your own. Seek assistance when installing it in mounting brackets and rotation member.

NOTE: Refer to Section 24.0 or 26.0 for instructions on reinstalling the Hammer Brace Assembly or Rod Grip Pull Assembly if this accessory has been installed on your GH-40 Hammer.

- 8.1 With assistance, place hammer member onto the rotation member so that hammer alignment pins in the rotation member fit into their respective holes in the hammer member base plate. Base plate bolt holes should be aligned (Fig. 8.1). This process will require some manipulation of the hammer member so that it will clear the top of the hammer cradle and hydraulic hoses as it is lowered onto the hammer alignment pins.
- 8.2 Loosely install base plate bolts and lock washers with a 15/16" socket and socket wrench (Fig. 8.2).
- 8.3 Loosely install top mounting bolt, lock washer, and nut (Fig. 8.3).
- 8.4 Tighten base plate bolts evenly and securely with a 15/16" end wrench or a 15/16" socket and a socket wrench (Fig. 8.4).
- 8.5 Securely tighten top mounting bracket bolt, lock washer, and nut with a 15/16" end wrench, a 15/16" socket, and a socket wrench (Fig. 8.5).
- 8.6 Remove plastic bags or hydraulic fitting caps from the hammer inlet and return hoses (Fig. 8.6).
- 8.7 Reconnect the identified hammer inlet and return hoses to original positions on the hammer member using a 7/8" end wrench (Fig. 8.7).
- 8.8 Check all bolts and fittings for tightness.
- 8.9 Hammer member installation is complete.



Fig. 8.1. Lower hammer member onto hammer alignment pins.



Fig. 8.2. Install base plate bolts.



Fig. 8.3. Install top mounting bolt, lock washer, and nut.



Fig. 8.4 Tighten base plate bolts evenly and securely.



Fig. 8.5. Tighten top mounting bolt, lock washer, and nut.



Fig. 8.6. Remove plastic bags or caps from hammer inlet return hoses.

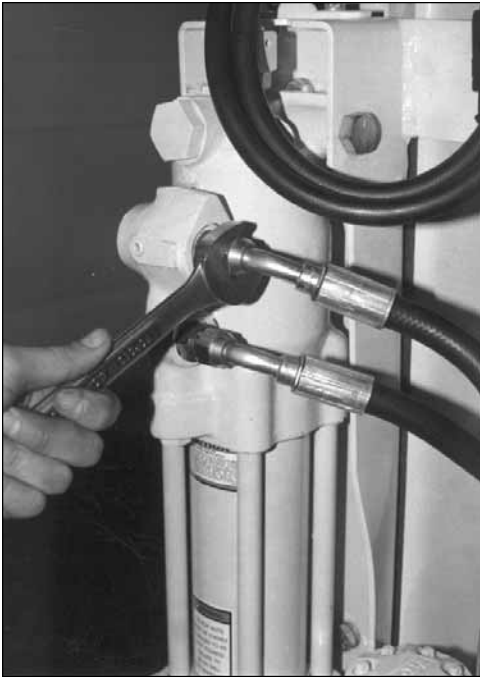


Fig. 8.7. Reconnect hammer inlet and return hoses to hammer member.

9.0 SERVICING THE ROTATION MEMBER

9.1 When is service necessary?

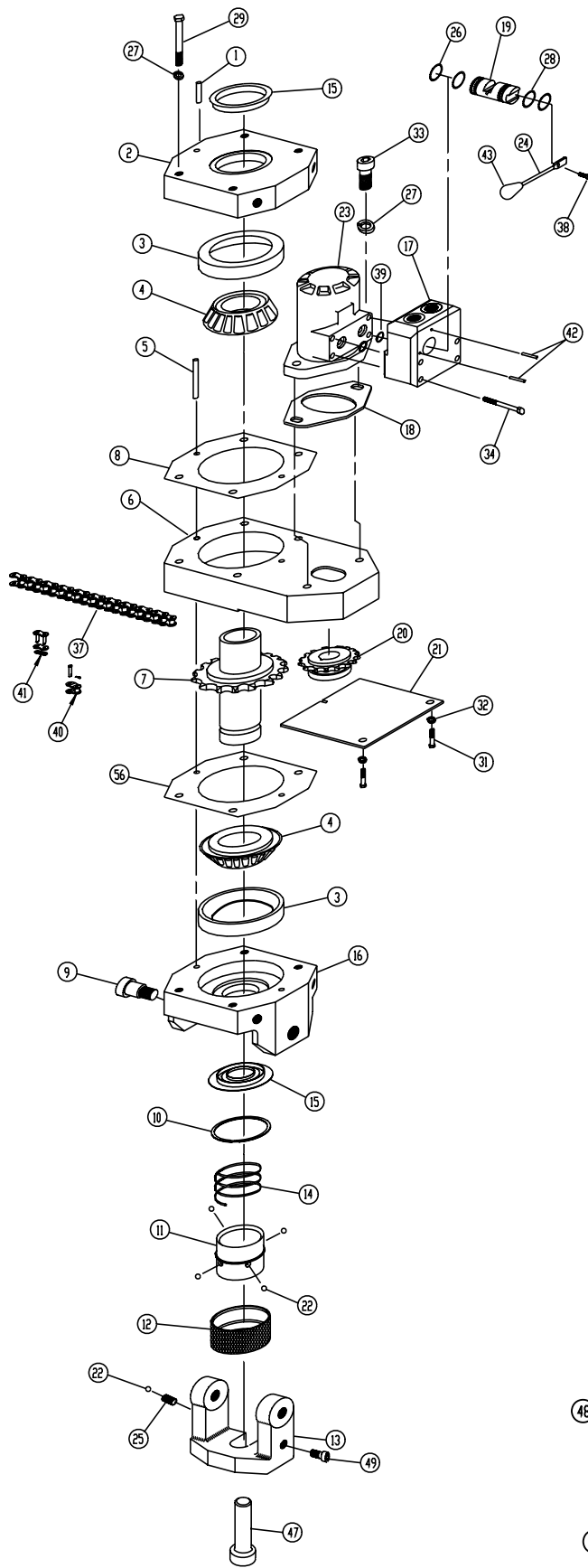
- When the hex drive no longer rotates.
- When the lower stem of the hex drive gear exhibits noticeable lateral (side-to-side, fore or aft) movement.
- When the chain develops noticeable slack indicated by easy manual rotation of the hex drive gear stem before chain tension halts stem rotation.
- When the retainer groove at the bottom of the hex drive exhibits excessive wear.

9.2 What servicing can be done in the field?

Except for emergencies, rotation member service should be undertaken in a shop setting. Rotation member service demands special tools and a clean work environment usually not present in the field.

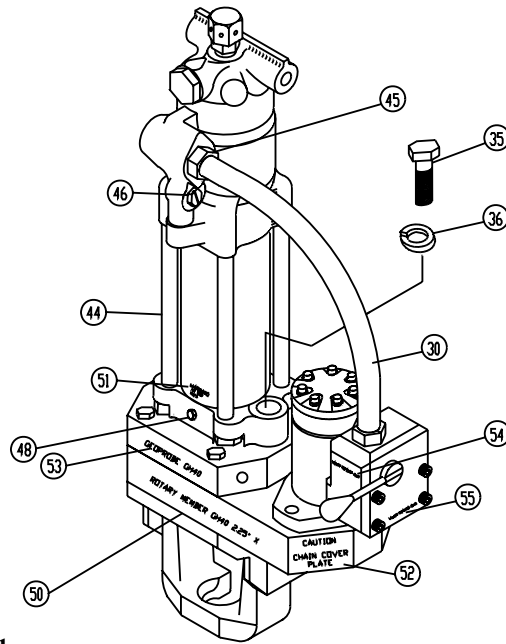
9.3 What tools are required to service the rotation member portion of the GH-40 Hammer (Fig. 9.1)?

ITEM	QUANTITY
Socket Wrench, 1/2" drive	1
Socket Wrench, 3/8" drive	1
Socket, 7/8"	1
Socket, 3/4"	1
Socket, 9/16"	1
Open-Ended Wrench, 9/16"	1
Allen Wrench, 1/8"	1
Allen Wrench, 5/32"	1
Hex Bit, 1/4" (or Allen Wrench)	1
Hex Bit, 3/8" (or Allen Wrench)	1
Hex Bit, 7/16" (or Allen Wrench)	1
Flat-blade Screwdriver	1
8-MJ Hydraulic Fitting Caps (Optional)	2
8-MJ Hydraulic Fitting Plugs (Optional)	2
Small Pick (An ice pick or small screw driver will do)	1
Small Crow Bar (1.5 to 2 feet in length)	1
U.S. Tsubaki, No. D-35 Chain Detacher, or equivalent	1
Permatex Aviation Forma-Gasket, or equivalent	
Hercules Real-Tuff Teflon Paste Thread Sealant, or equivalent	



GH-40 HAMMER MATERIAL LIST

NO.	Qty	Pt.No.	Description
1	2	1254	Pin Spg 0.25 x 1
2	1	1127	Plate Top
3	2	1255	RB TPR Cup 4.375 OD
4	2	1256	RB TPR Cone 2in. Bore
5	2	1257	Pin Dowel 0.25 x 2.25
6	1	1126	Plate Middle
7	1	1073	Sprkt 5021T 1in. Hex Drive
8	1	1129	Shim Gearbox 0.005
9	2	1263	Bolt Shld Sh 3/4-10NC x 7/8 x 7/8
10	1	1258	Ring Rtnng 2.95 OD x 0.049 Thk
11	1	1077	Cap Rtnng
12	1	1076	Collar Rtnng
13	1	1121	Latch Hammer
14	1	1259	Spg Comp 2.57 ID x 1.62 x 0.11 Wire
15	1	1260	Seal 2in. Sft
16	1	1128	Plate Bottom
17	1	1095	Valve Body
18	1	1107	Spacer Mot Hyd
19	1	1096	Valve Spool
20	1	1108	Sprkt #50 12T x 1in. Bore
21	1	1105	Plate Cover
22	6	1264	SS Ball 0.375
23	1	1261	Motor Hyd 9.7 cu in. LH Rotn
24	1	1262	Lever
25	1	1265	Spg Comp 0.345 OD x 1.25 x 0.07 Wire
26	2	1266	Ring Rtnng 0.889 OD x 0.031 Thk
27	6	1267	Wash Split Lock 1/2 Zn
28	2	1268	O-ring 116 Buna 70
29	4	1269	Bolt HH 1/2-13NC x 4.5 GR5 Zn
30	1	3446	Hose Hyd 8M3K-8FJX45S-8FJX 14in.
31	2	1271	Bolt HH 3/8-16NC x 0.75 x GR5 Zn
32	2	1272	Wash Split Lock 3/8 Zn
33	2	1273	Bolt Sh 1/2-13NC x 1.75
34	4	1274	Bolt Sh 5/16-18NC x 2.5
35	2	1275	Bolt HH 5/8-11NC x 2 GR5 Zn
36	2	1276	Wash Split Lock 5/8 Zn
37	1.75	9730	Chain Roller #50
38	1	1249	Screw Mach Rh Sl 10-32 x 0.5 Zn
39	2	1319	O-ring 112 Buna 80
40	1	1321	Chain Link Offset #50
41	1	1322	Chain Link Conn #50
42	2	3045	Pin Spg 0.188 x 1
43	1	3047	Knob Plstc 7/16-20NF
44	1	7111	Hammer Upper Assm
45	2	4478	Fig Hyd 8MB-8MJ
46	1	6863	Plug Stl HH 8MB
47	1	AT225	Anvil Hammer GH40
48	1	1223	Plug Pipe Stl 1/8-27 NPT
49	1	8600	Bolt Sh 5/16-18NC x 0.375
50	1	4582	Decal Al Rotqry Member GH40
51	1	5320	Decal Vinyl Warning Tie Rod Nuts
52	1	3309	Decal Vinyl Caution Chain Cover Plate
53	1	3307	Decal Vinyl Geoprobe GH40
54	1	3308	Decal Vinyl Hammer Rotation GH40
55	1	8605	Decal Vinyl Hammer Rotation GH40
56	1	1546	Shim Gearbox 0.01



**FIGURE 9.1
GH-40 ROTATION MEMBER SERVICE DIAGRAM**

10.0 VALVE SPOOL O-RING REPLACEMENT

The valve spool O-ring may need to be replaced if hydraulic oil is leaking from around the spool on either side of the gear box valve body.

CAUTION: All hydraulic connections and hydraulic oil must be kept free from foreign materials. Failure to do so will severely damage the hydraulic system of the hammer.

- 10.1 Fully extend unit from vehicle.
- 10.2 Lower foot with Foot Control and raise hammer with Probe Control so that the hammer rotation valve and hydraulic motor are at chest level (Fig. 10.1).
- 10.3 Turn off (deactivate) hydraulic system and vehicle engine.
- 10.4 Relieve remaining pressure in hydraulic lines by working all levers up and down several times (Fig. 10.2).
- 10.5 Using an O-ring pick, remove the small retainer ring which is situated between the hydraulic motor and the valve body (Fig. 10.3).
- 10.6 With a clean rag, wipe the area around the spool where the retainer ring was removed (Fig. 10.4). If compressed air is available, blow debris from around retainer ring area.

CAUTION: Take special care to be sure spool is free of any dirt or burrs.

- 10.7 Note location of rotation valve handle (Fig. 10.5).
- 10.8 Using a slight back-and-forth rotation movement, pull the spool out of the valve body (Fig. 10.6).

CAUTION: Do not scratch valve spool or valve cylinder when removing O-rings.

- 10.9 Use an O-ring pick to remove the O-rings on the valve spool (Fig. 10.7).
- 10.10 Leave hammer rotation valve handle attached to valve spool for proper spool alignment during installation.
- 10.11 Thoroughly wash valve spool in solvent and dry with compressed air.
- 10.12 Lubricate valve spool cylinder with a coat of oil or grease (Fig. 10.8).
- 10.13 Install new O-rings on valve spool taking care not to nick them on the sharp edges of valve spool (Fig. 10.9).
- 10.14 Lubricate new No. 116 O-rings and valve spool with a coat of oil or grease (Fig. 10.10).

CAUTION: A lack of lubrication on the O-rings or simply pushing the valve spool straight into the valve body may damage the O-rings.

- 10.15 With a slight back-and-forth rotation, gently push the valve spool into the valve body (Fig. 10.11).
- 10.16 The rotation valve lever should be placed in its original position between the rotation valve stop pins (between the 9 o'clock and 12 o'clock position as viewed from the passenger side of the vehicle, Fig. 10.12).
- 10.17 Clean valve body around the area where the valve spool was installed (Fig. 10.13).

- 10.18** Install the retainer ring on the spool between the hydraulic motor and the valve body (Fig. 10.14). Start one end of the ring in the groove and gently work it around the spool with a flat-blade screwdriver.
- 10.19** Pull out gently on valve spool handle to ensure proper engagement of valve spool retainer ring.
- 10.20** Start unit and check for proper operation of the hammer and rotary unit.



Fig. 10.1. Position the GH-40 Hammer.



Fig. 10.2. Move hydraulic levers on control panel to relieve pressure in lines.

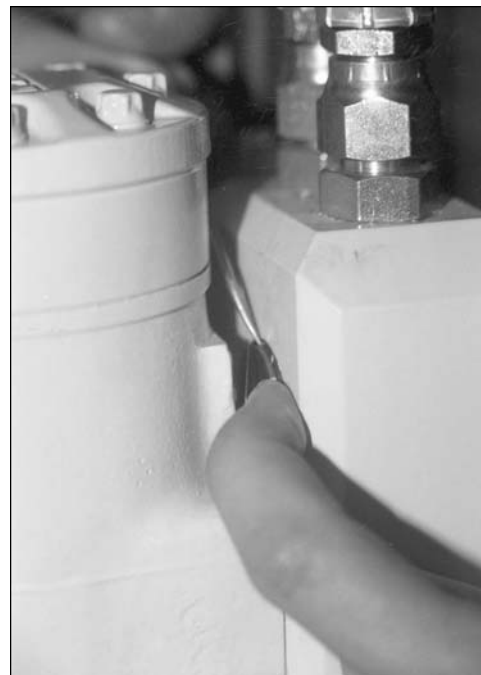


Fig. 10.3. Remove retainer ring.



Fig. 10.4. Clean around spool area where retainer ring was removed.

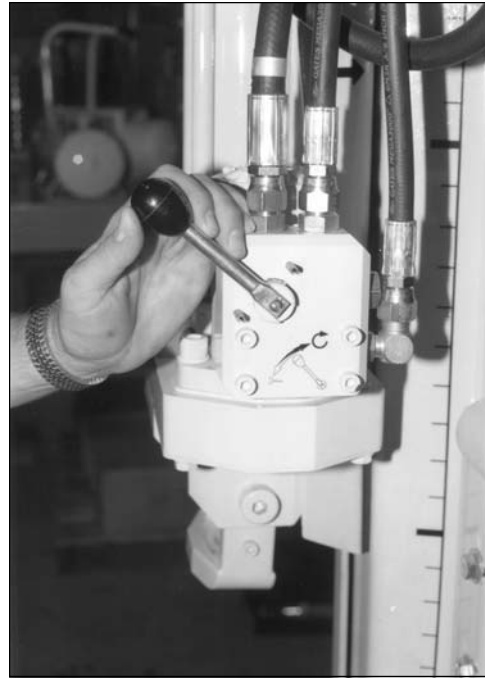


Fig. 10.5. Location of rotation valve lever.



Fig. 10.6. Remove spool from valve body.

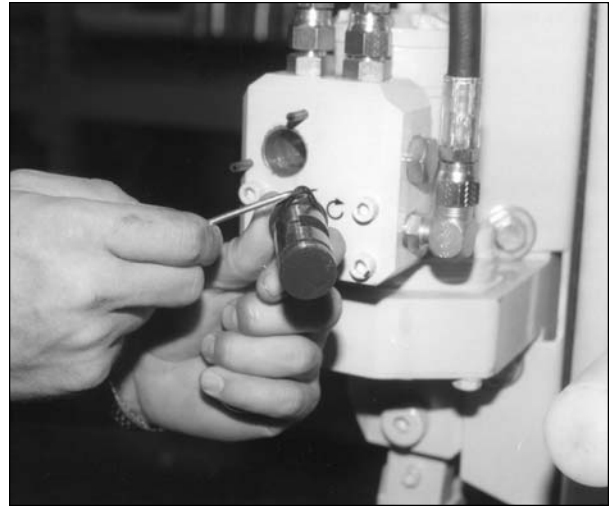


Fig. 10.7. Remove O-rings on valve spool.



Fig. 10.8. Lubricate valve spool cylinder.



Fig. 10.9. Install new O-rings.

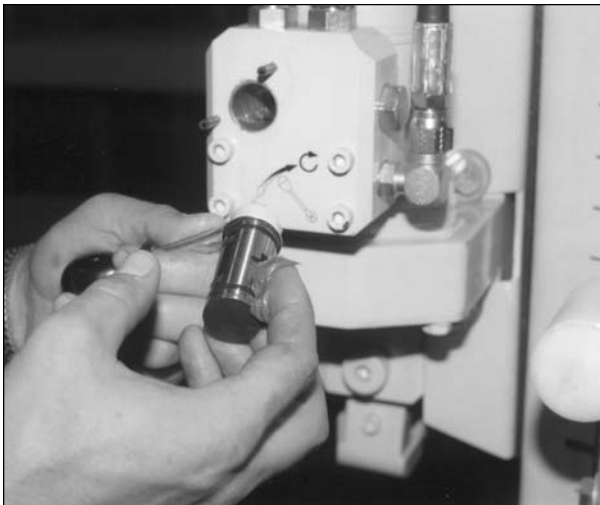


Fig. 10.10. Lubricate new O-rings and valve spool with oil or grease.

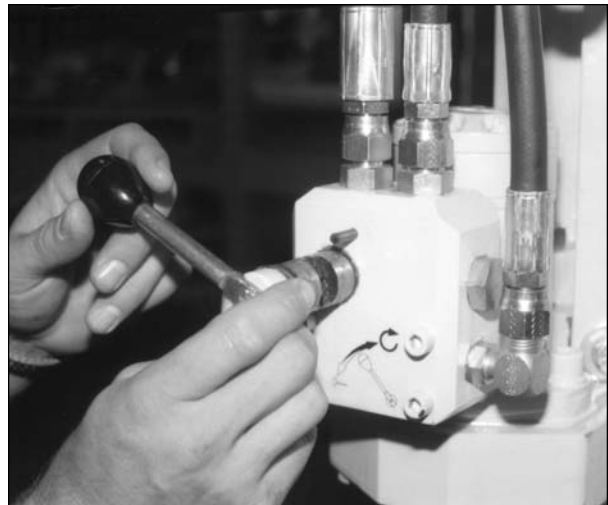


Fig. 10.11. Insert valve spool into valve body using a back-and-forth rotation.

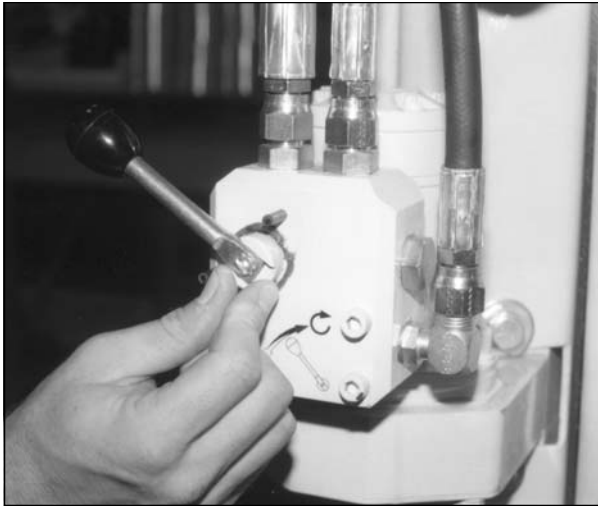


Fig. 10.12. Position rotation valve lever.

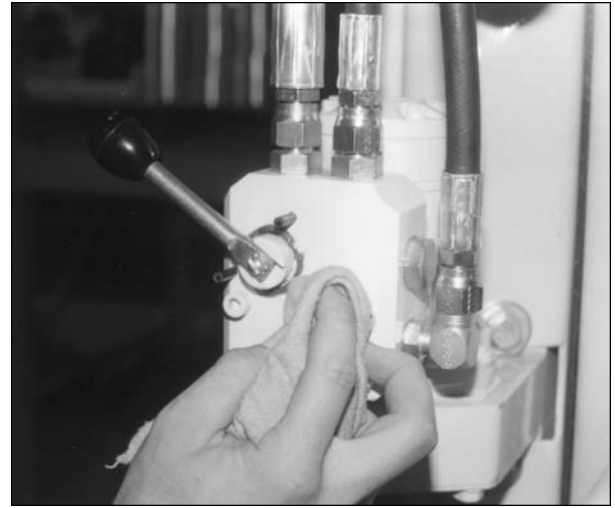


Fig. 10.13. Clean area around valve spool on valve body.



Fig. 10.14. Install retainer ring on spool between hydraulic motor and valve body.

11.0 HAMMER ROTATION VALVE REMOVAL AND DISASSEMBLY

CAUTION: All hydraulic connections and hydraulic oil must be kept free from foreign materials. Failure to do so will severely damage the hydraulic system.

NOTE: This section is provided so that the technician, if desired, can completely disassemble and reassemble the entire hammer rotation valve. Minor repairs, such as oil leaks, will not require complete disassembly and should be repaired as outlined in Section 10.0, Valve Spool O-Ring Replacement.

11.1 Fully extend unit from vehicle.

11.2 Lower probe foot approximately 1.5 to 2 feet off the ground.

11.3 Raise hammer so that hammer rotation valve and hydraulic motor are at chest level (Fig. 11.1).

11.4 Turn off (deactivate) hydraulic system and vehicle engine.

11.5 Relieve remaining pressure in hydraulic lines by working all levers up and down several times (Fig. 11.2).

11.6 Identify the hydraulic hoses connected to the valve body (Fig. 11.3).

11.7 Use two 7/8" open-ended wrenches to remove the hydraulic fittings at the top and rear of the hammer rotation valve (Fig. 11.4). Use one wrench as a backup wrench. The boss fittings which screw into the valve itself do not need to be removed.

11.8 Pull hoses away from valve body and cover open hose ends with plastic bags (Fig. 11.5A) or with three 8-MJ hydraulic fitting plugs (Fig. 11.5B).

11.9 Remove the four socket-head cap screws securing the hammer rotation valve to the hydraulic motor using a 1/4" hex bit and socket wrench (Fig. 11.6).

NOTE: Early model GH-40 rotation members utilize lock washers in securing the valve body to the hydraulic motor.

11.10 Pull valve away from hydraulic motor (Fig. 11.7).

11.11 Remove hydraulic motor O-rings with small pick and store in a safe place (11.8).

11.12 Plug hydraulic motor oil ports with plastic plugs (Fig. 11.9A) or enclose entire hydraulic motor in a plastic bag (Fig. 11.9B).

11.13 Place rotation valve on a work bench.

11.14 Remove valve spool retainer ring from hydraulic motor side of valve body with a small pick or screwdriver (Fig. 11.10).

CAUTION: Do not scratch valve spool while removing it from valve body or when removing O-rings.

11.15 Pull valve spool out of the valve body (Fig. 11.11).

- 11.16** If necessary, remove screw and lock washer securing the hammer rotation valve handle to the valve spool and remove handle (Fig. 11.12).
- 11.17** Remove remaining retainer ring (Fig. 11.13)
- 11.18** Remove the two O-rings from their grooves in the valve spool using a pick or small screwdriver (Fig. 11.14).
- 11.19** Wash all hammer rotation valve parts in solvent and blow dry with compressed air.
- 11.20** Inspect all parts for excessive wear.



Fig. 11.1. Position the GH-40 hammer for service.



Fig. 11.2. Move hydraulic levers on control panel to relieve pressure in lines.



Fig. 11.3. Identify and tag hydraulic hoses going into valve body.



Fig. 11.4. Disconnect hydraulic fittings.



Fig. 11.5A. Cover hoses with small plastic bags. (Option 1)



Fig. 11.5B. Plug hose ends with 8-MJ hydraulic fitting plugs. (Option 2)



Fig. 11.6. Remove socket-head cap screws.



Fig. 11.7. Pull valve away from hydraulic motor.



Fig. 11.8. Remove O-rings in hydraulic motor ports.



Fig. 11.9A. Plug hydraulic motor oil ports with plastic plugs. (Option 1)



Fig. 11.9B. Enclose hydraulic motor in a plastic bag. (Option 2)

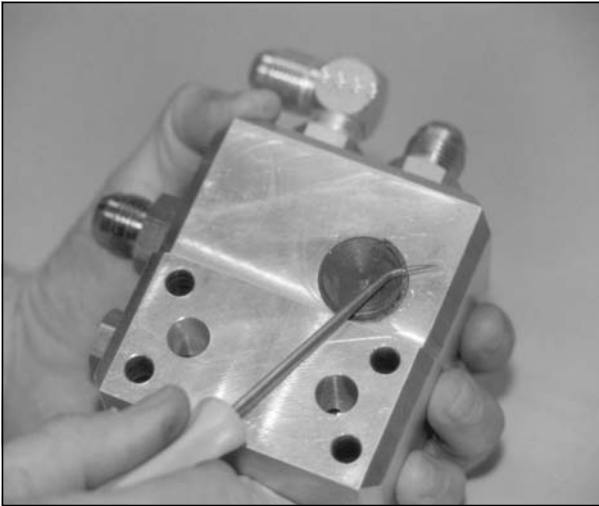


Fig. 11.10. Remove valve spool retainer ring.

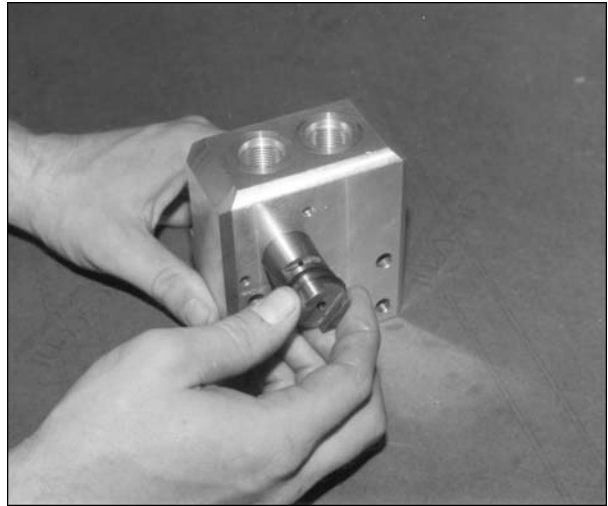


Fig. 11.11. Remove valve spool from valve body.

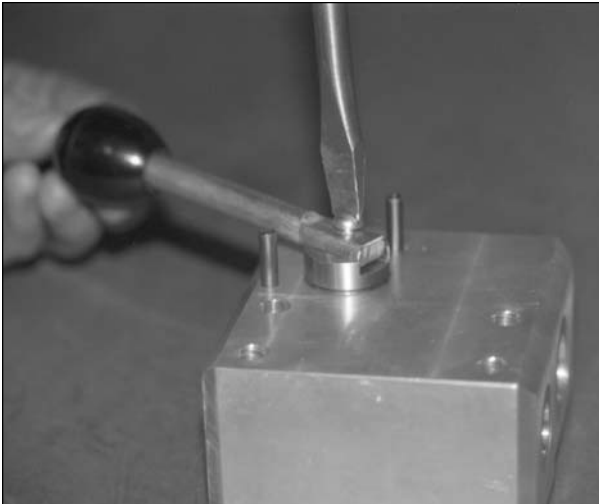


Fig. 11.12. Remove hammer rotation valve handle.



Fig. 11.13. Remove remaining retainer ring from valve spool.



Fig. 11.14. Remove O-rings from valve spool.

12.0 HAMMER ROTATION VALVE ASSEMBLY AND INSTALLATION

CAUTION: Do not scar or scratch valve spool or bore of cylinder during assembly.

- 12.1 Make sure all parts used in this procedure are clean.
- 12.2 Lubricate new No. 116 O-rings with a coat of hydraulic oil or grease (Fig. 12.1).
- 12.3 Install one O-ring in each of the two grooves provided on the valve spool taking care not to nick them on the sharp edges of valve spool (Fig. 12.2).
- 12.4 Install one valve spool retainer ring at the slotted (handle) end of the valve spool (Fig. 12.3).
- 12.5 Reattach valve spool handle to the valve spool cylinder with the original lock washer and screw (Fig. 12.4). The valve spool slots and handle position should correspond to the alignment as shown in the photograph.
- 12.6 Liberally coat the valve spool (Fig. 12.5A) and the inside diameter of the valve spool cylinder with hydraulic oil or grease (Fig. 12.5B).
- 12.7 Align the valve spool with the valve spool cylinder in the valve body. Recheck the valve spool handle position (Fig. 12.6). **Rotate the spool back and forth** while pushing the valve spool into the valve body. This is an important step because pushing the valve spool directly into the valve body without rotation can cause the sharp edges of the valve body to damage the valve spool O-rings. Damaged O-rings will leak hydraulic fluid.
- 12.8 Once the valve spool bottoms out against the valve spool retainer ring, install the second retainer ring on the hydraulic motor side of the valve body (Fig. 12.7). The valve spool handle should be positioned between the 9 and 12 o'clock position or between the two stop pins.
- 12.9 Install O-rings into hydraulic motor making sure O-rings are completely seated in their ports (Fig. 12.8).
- 12.10 The hammer rotation valve is ready to be reattached to the hydraulic motor (Fig. 12.9A). Attach the hammer rotation valve to the hydraulic motor with the original socket head cap screws (Fig. 12.9B) using a 1/4" hex bit and socket wrench to tighten the cap screws securely in a criss-cross pattern.

NOTE: Early model GH-40 rotation members utilize lock washers in securing the valve body to the hydraulic motor.

- 12.11 Reattach marked hydraulic hoses to their original positions (Fig. 12.10).
- 12.12 Check all nuts, bolts, and fittings for tightness.
- 12.13 Assembly and installation of hammer rotation valve is complete (Fig.12.11).

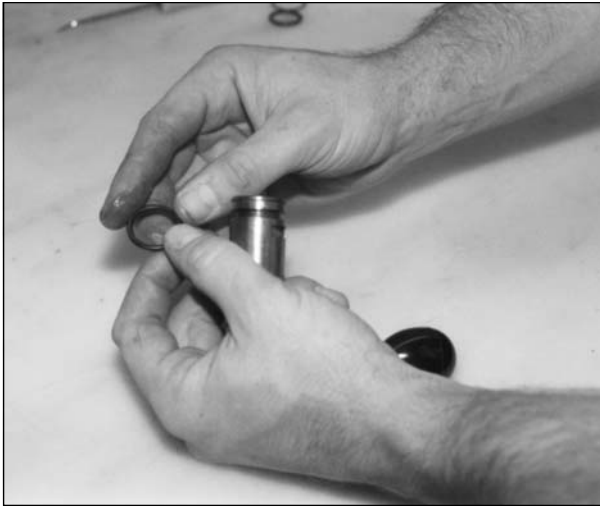


Fig. 12.1. Lubricate new O-rings with oil or grease.

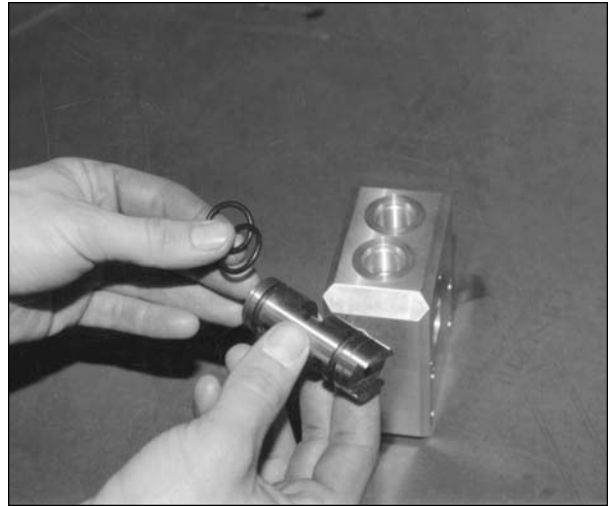


Fig. 12.2. Install O-rings on valve spool.

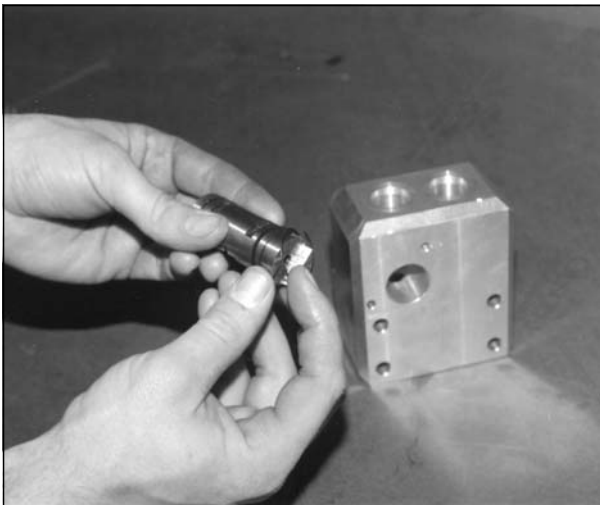


Fig. 12.3. Install valve spool retainer ring at handle-end of valve spool.

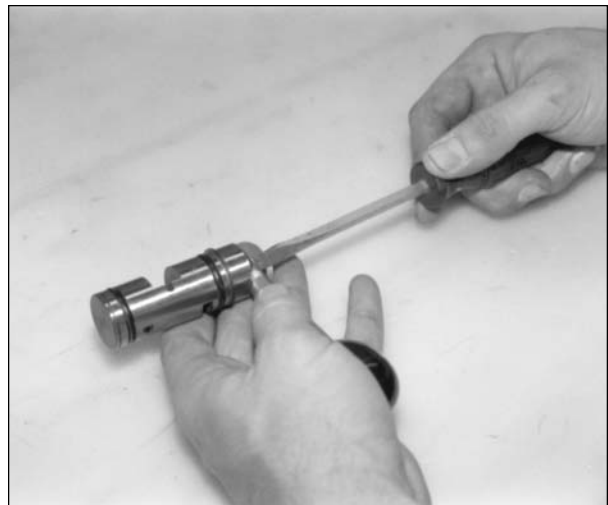


Fig. 12.4. Reattach rotation valve handle on valve spool aligning valve spool slots and handle position as shown.



Fig. 12.5A. Apply hydraulic oil or grease to valve spool.



Fig. 12.5B. Apply hydraulic oil or grease to inside diameter of valve spool cylinder.

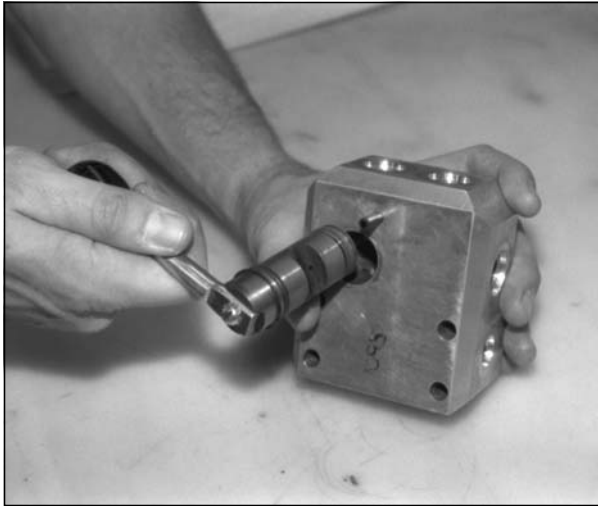


Fig. 12.6. Rotate valve spool while inserting into valve body.

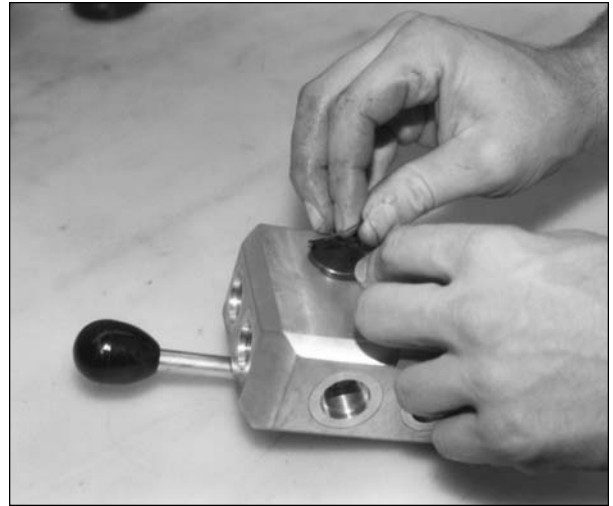


Fig. 12.7. Install second retainer ring on hydraulic motor side of valve body.

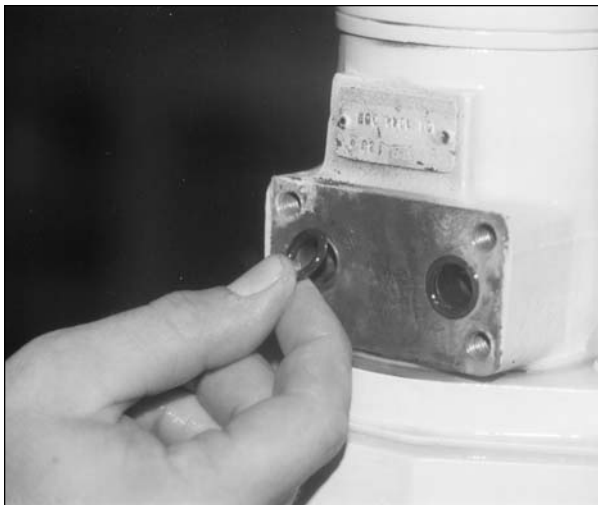


Fig. 12.8. Install O-rings in hydraulic motor ports.



Fig. 12.9A. Hammer rotation valve is ready to be attached to hydraulic motor.



Fig. 12.9B. Attach hammer rotation valve to hydraulic motor.

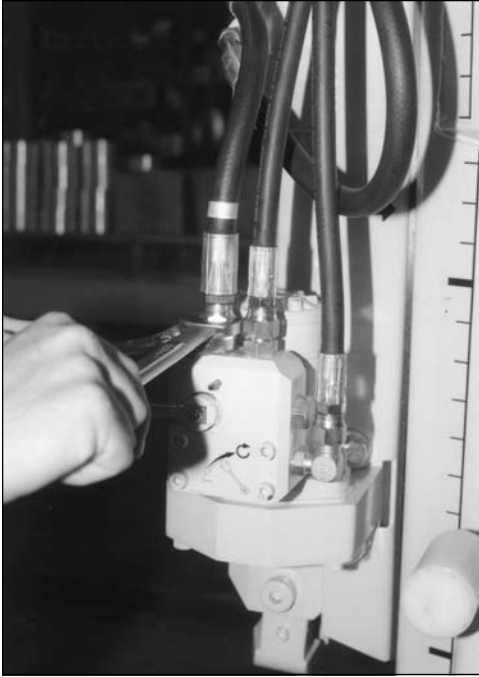


Fig. 12.10. Reattach hydraulic hoses to rotation valve.

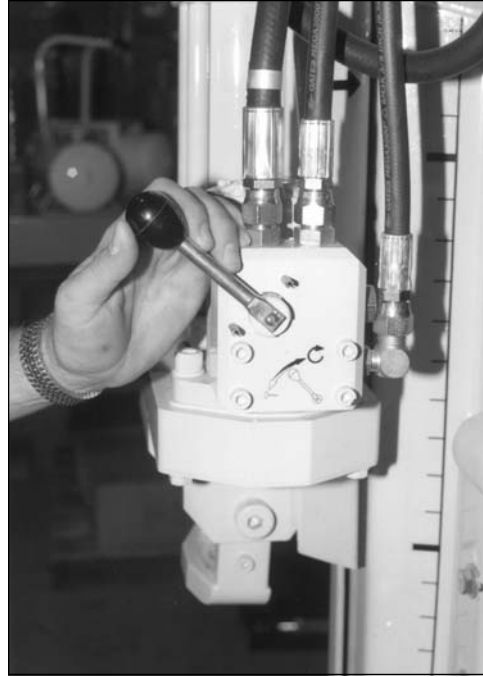


Fig. 12.11. Assembly and installation of hammer rotation valve is complete.

13.0 HYDRAULIC MOTOR REMOVAL

CAUTION: All hydraulic connections and hydraulic oil must be kept free from foreign materials. Failure to do so will severely damage the hydraulic system.

- 13.1 Fully extend unit from vehicle.
- 13.2 Adjust derrick with Fold Control so derrick is approximately at a 60-degree angle relative to the ground.
- 13.3 Lower probe foot approximately 1.5 to 2 feet.
- 13.4 Raise the rotation member with the Probe Control to approximately chest high (Fig. 13.1).
- 13.5 Deactivate hydraulics and shut off vehicle engine.
- 13.6 Remove the two chain cover bolts and lock washers using a 9/16" wrench (Fig. 13.2).
- 13.7 Remove chain cover plate (Fig. 13.3).
- 13.8 Loosen set screws at the base of the 12-tooth sprocket with a 1/8" or 5/32" allen wrench (Fig. 13.4).
- 13.9 Remove the four socket-head cap screws securing the hammer rotation valve to the hydraulic motor (Fig. 13.5) using a 1/4" hex bit and socket wrench.

NOTE: Early model GH-40 rotation members utilize lock washers in securing the valve body to the hydraulic motor.

- 13.10 Pull the hammer rotation valve straight away from the hydraulic motor (Fig. 13.6).
- 13.11 Plug ports on hammer rotation valve with 1/2" plastic plugs or place the valve in a plastic bag and secure with a rubber band (Fig. 13.7).
- 13.12 Remove the two O-rings from the hydraulic motor, one from each port, from their respective grooves and place in a safe location (Fig. 13.8).
- 13.13 Plug hydraulic motor oil ports with plastic plugs (Fig. 13.9).
- 13.14 If the derrick has been placed at the proper angle, the rotation valve will automatically hang to the side of the hammer, clear of the work area (Fig. 13.10).
- 13.15 Remove the two socket head cap screws from the hydraulic motor mounting holes (Figs. 13.11A,B) using a 3/8" hex bit and socket wrench.
- 13.16 To release the hydraulic motor, place the foot of a small crow bar between the 12-tooth sprocket and the top of the gear drive box (Fig. 13.12). A small amount of prying may be necessary to release the sprocket from the hydraulic motor shaft.
- 13.17 Lift the hydraulic motor off the gear drive box (Fig. 13.13). Hold hand under 12-tooth sprocket to catch the sprocket once the hydraulic motor shaft releases it.

13.18 Place hydraulic motor in a plastic bag, even if ports have been plugged, to ensure foreign objects do not contaminate hydraulic system (Fig. 13.14).

13.19 Remove hydraulic motor spacer (Fig. 13.15).

13.20 Removal of the hydraulic motor is complete.



Fig. 13.1. Position GH-40 Hammer to chest height for hydraulic motor removal.



Fig. 13.2. Remove chain cover bolts and lock washers.

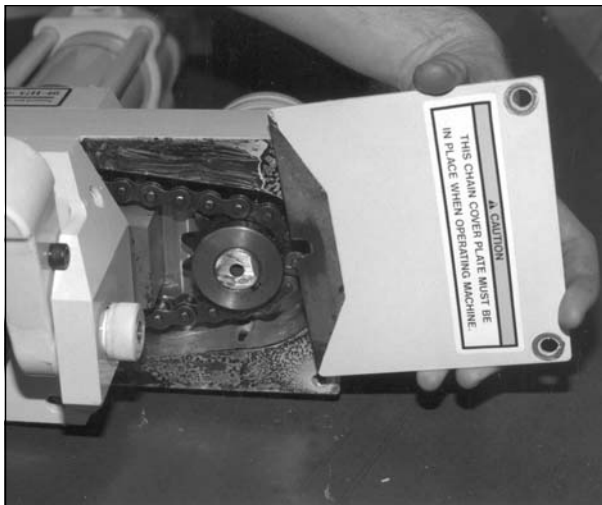


Fig. 13.3. Remove chain cover plate.

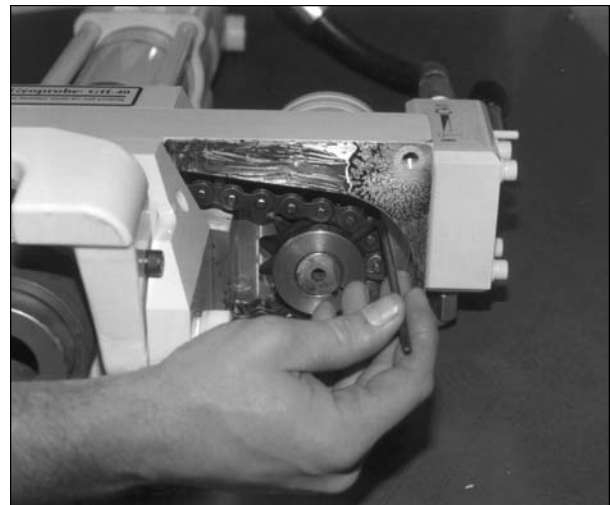


Fig. 13.4. Loosen set screws at base of 12-tooth sprocket.

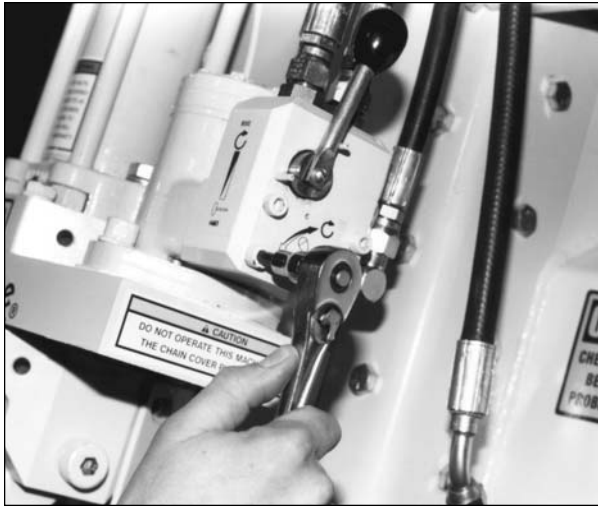


Fig. 13.5. Remove socket-head cap screws.

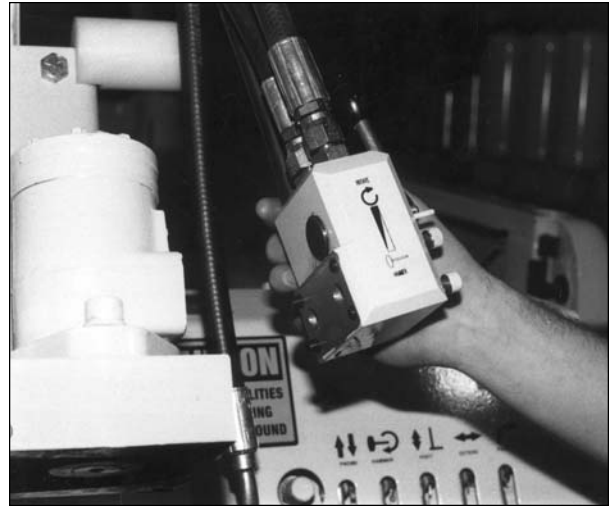


Fig. 13.6. Pull hammer rotation valve away from hydraulic motor.



Fig. 13.7. Place hammer rotation valve in plastic bag and securely close.

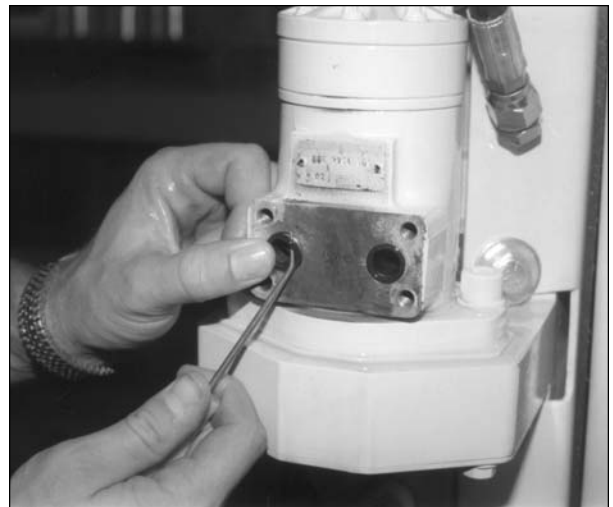


Fig. 13.8. Remove O-rings in hydraulic motor ports.



Fig. 13.9. Plug hydraulic motor oil ports with plastic plugs.



Fig. 13.10. Rotation valve should hang away from hammer.



Fig. 13.11A. Loosen socket head cap screws from hydraulic motor mounting holes.



Fig. 13.11B. Remove socket head cap screws.

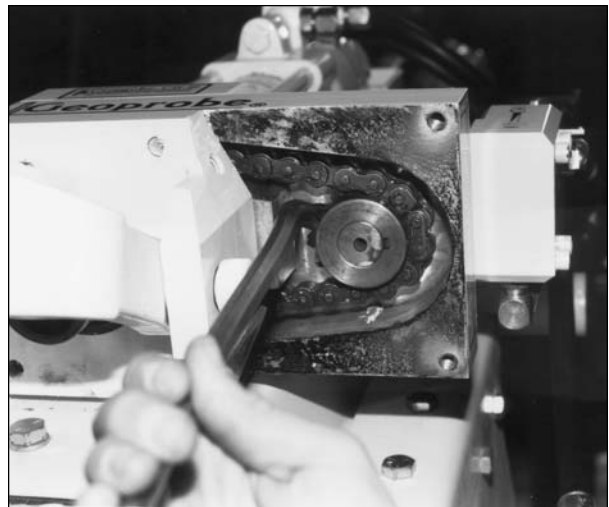


Fig. 13.12. If necessary, carefully pry sprocket from hydraulic motor shaft.



Fig. 13.13. Lift hydraulic motor off gear drive box.



Fig. 13.14. Place entire hydraulic motor in a plastic bag.



Fig. 13.15. Remove hydraulic motor spacer from gear drive box.

14.0 HYDRAULIC MOTOR INSTALLATION

CAUTION: All hydraulic connections and hydraulic oil must be kept free from foreign materials. Failure to do so will severely damage the hydraulic system.

- 14.1 Lightly coat both sides of hydraulic motor spacer with Permatex Aviation Forma-Gasket or equivalent (Fig. 14.1).
- 14.2 Place hydraulic motor spacer on gear drive box and align bolt holes (Fig. 14.2).
- 14.3 Align the half moon key in hydraulic motor shaft with the key way in the 12-tooth sprocket (Fig. 14.3). Turn hex drive manually or with a 1" hex tool to achieve this alignment (Fig. 14.4). Assistance may be required to hold the 12-tooth sprocket in the drive chain.
- 14.4 Lower the hydraulic motor onto the gear drive box (Fig. 14.5). Care must be taken to support the 12-tooth sprocket and drive chain during this process.
- 14.5 Adjust the hydraulic motor spacer for an even fit at the hydraulic motor base (Fig. 14.6).
- 14.6 Apply Hercules Real-Tuff Teflon Paste Thread Sealant or its equivalent on both socket head cap screws which secure the hydraulic motor to the drive gear box (Fig. 14.7).
- 14.7 Securely tighten socket head cap screws using a 3/8" hex bit and socket wrench or allen wrench (Fig. 14.8).
- 14.8 Using a small crow bar and manual pressure, position 12-tooth sprocket on hydraulic motor shaft so distance between the chain and the top of the gear drive box is approximately the same at all locations (Fig. 14.9).
- 14.9 Measure chain height with a caliper to achieve proper sprocket location by taking two measurements: one beside 12-tooth sprocket (Fig. 14.10) and one as close as possible to bottom plate of rotation member (Fig. 14.11).
- 14.10 Tighten the 12-tooth sprocket set screws with a 1/8" or 5/32" allen wrench (Fig. 14.12).
- 14.11 Apply a thin film of Permatex Aviation Forma-Gasket to the chain cover plate mating surface on the gear drive box (Fig. 14.13).
- 14.12 Attach chain cover plate to gear drive box with original two cap screws and lock washers using a 9/16" wrench (Fig. 14.14).

IMPORTANT: The lower gear box shim must rest between the chain cover plate and the bottom plate of the hammer. Take care not to wrinkle this shim when installing the chain cover plate.

- 14.13 Install both hydraulic motor O-rings, one in each port (Fig. 14.15).
- 14.14 Secure hammer rotation valve to hydraulic motor with the four socket-head cap screws originally used (Fig. 14.16). Using a 1/4" hex bit and socket or allen wrench, tighten cap screws securely in a crisscross pattern.

NOTE: Early model GH-40 rotation members utilize lock washers in securing the valve body to the hydraulic motor.

- 14.15 Check all fasteners for tightness.
- 14.16 Installation of hydraulic motor is complete (Fig. 14.17).

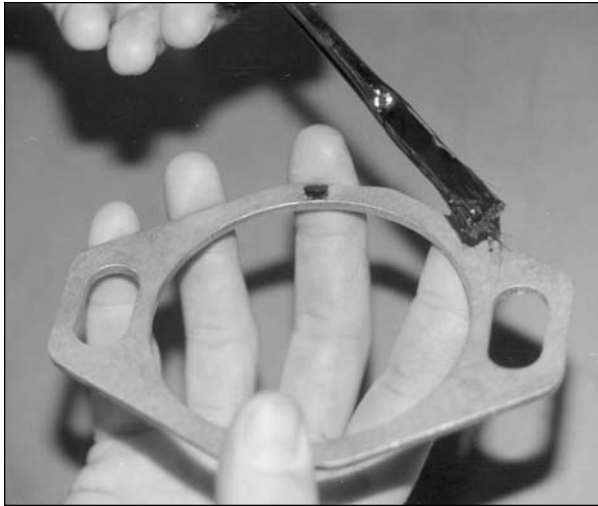


Fig. 14.1. Apply sealant to both sides of hydraulic motor spacer.



Fig. 14.2. Place hydraulic motor spacer on gear box and align bolt holes.

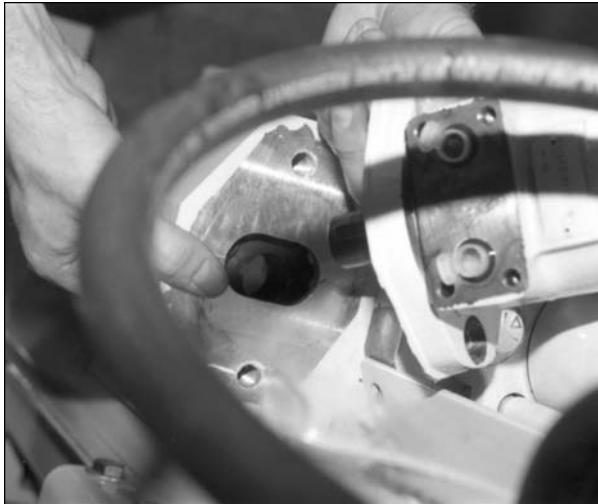


Fig. 14.3. Align half moon key in hydraulic motor shaft with key way in 12-tooth sprocket.



Fig. 14.4. Turn hex drive by hand or with 1" hex (a drill steel may be used) to achieve alignment.

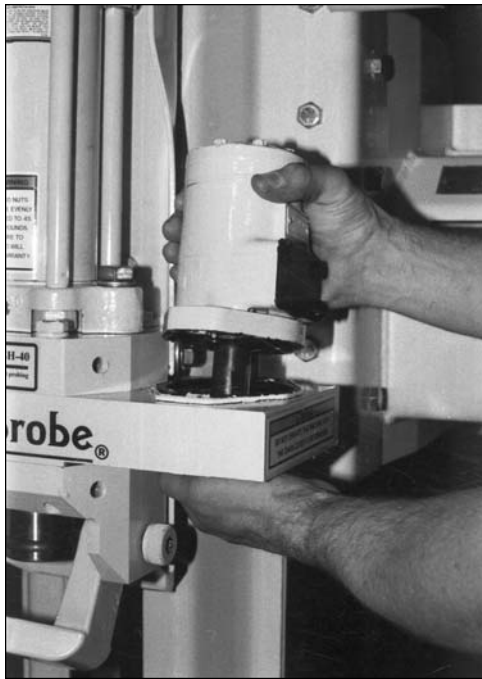


Fig. 14.5. Lower hydraulic motor onto gear drive box.



Fig. 14.6. Adjust hydraulic motor spacer for even fit.



Fig. 14.7. Apply sealant to the socket head cap screws.



Fig. 14.8. Securely tighten socket head cap screws.

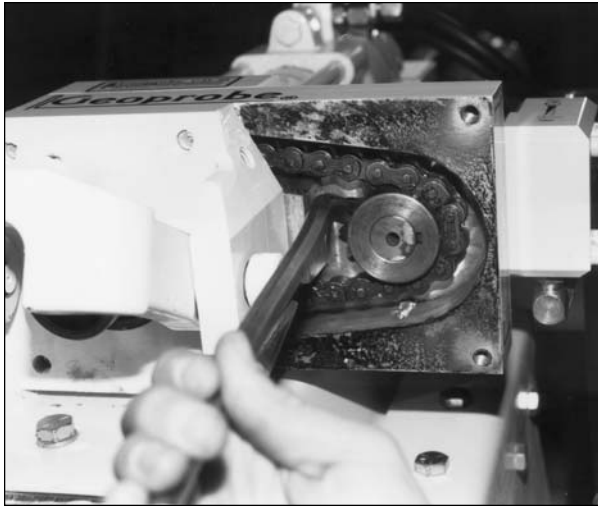


Fig. 14.9. Position 12-tooth sprocket on hydraulic motor shaft.

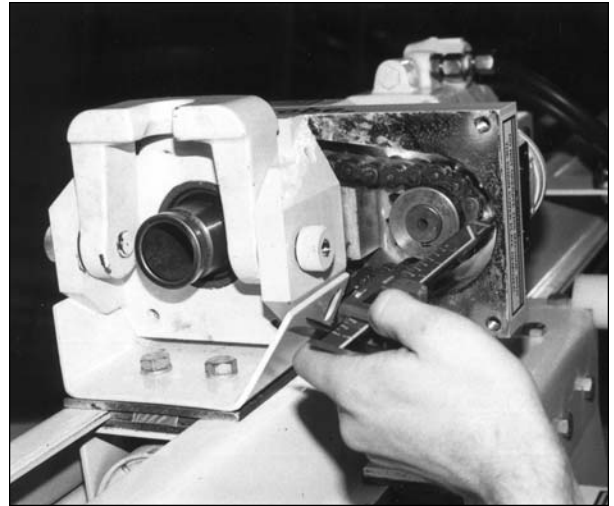


Fig. 14.10. Measure chain height beside 12-tooth sprocket.

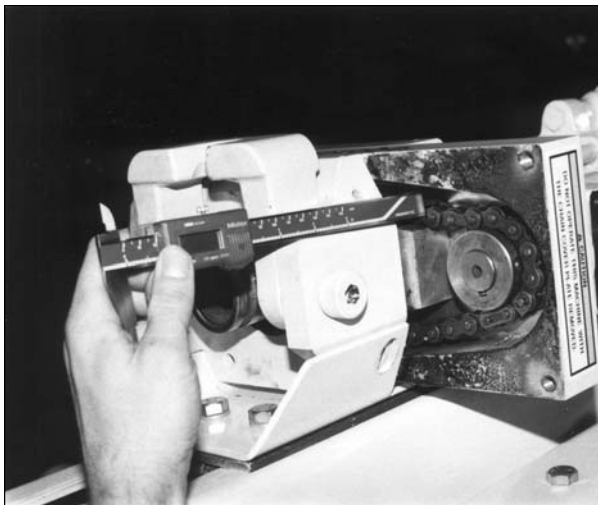


Fig. 14.11. Measure chain height near bottom plate of rotation member.



Fig. 14.12. Tighten 12-tooth sprocket set screws.



Fig. 14.13. Apply sealant to chain cover plate mating surface.

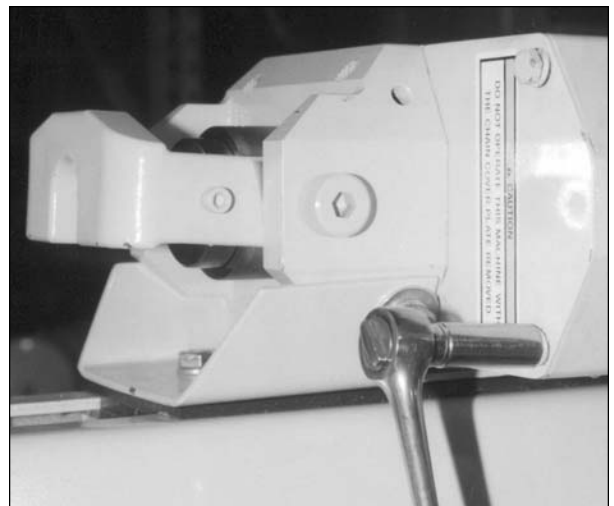


Fig. 14.14. Attach chain cover plate to gear drive box.

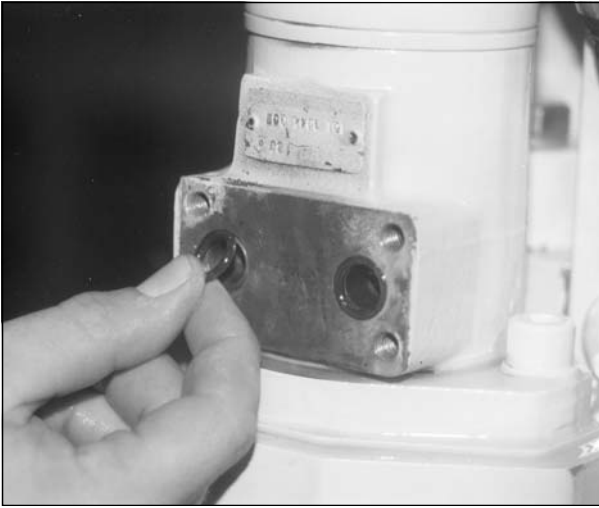


Fig. 14.15. Install both hydraulic motor O-rings.

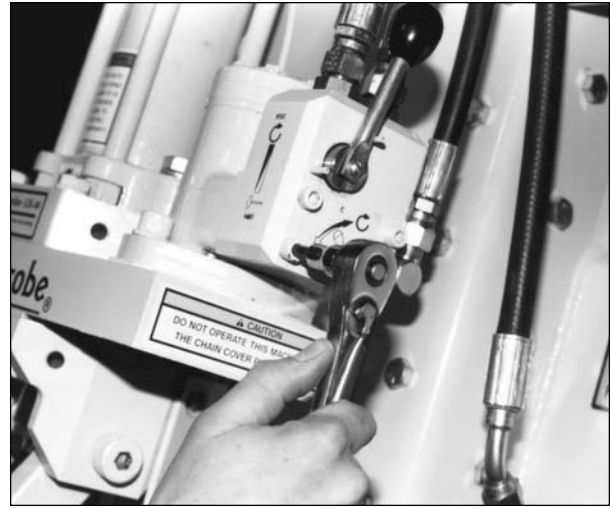


Fig. 14.16. Secure hammer rotation valve to hydraulic motor.

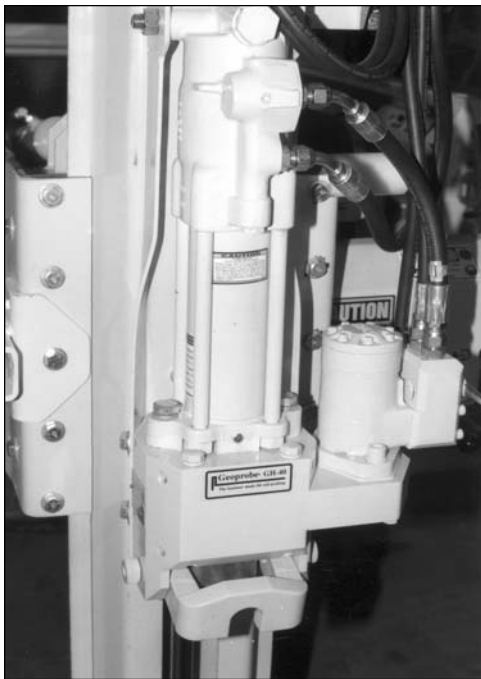


Fig. 14.17. Hydraulic motor installation is complete.

15.0 DRIVE CHAIN AND 12-TOOTH SPROCKET REMOVAL

- 15.1 Extend foot approximately 2 feet from the rear of the vehicle using Probe Control lever and move hammer towards the front of the vehicle approximately 6 to 8 inches (Fig. 15.1). **Do not move the hammer too far forward. The probe cylinder may damage the carrier vehicle if overextended.**
- 15.2 Turn off (deactivate) hydraulic system and shut off vehicle engine.
- 15.3 Remove the two chain cover bolts and lock washers using a 9/16" wrench (Fig. 15.2).
- 15.4 Remove chain cover plate (Fig. 15.3).
- 15.5 Loosen set screws at the base of the 12-tooth sprocket with a 1/8" or 5/32" allen wrench (Fig. 15.4)
- 15.6 Loosen the two socket head cap screws in hydraulic motor mounting holes using a 3/8" hex bit and socket wrench (Fig. 15.5).
- 15.7 Remove socket head cap screws (Fig. 15.6).
- 15.8 Place the foot of a small crow bar between the 12-tooth sprocket and the top of the gear drive box. Using a small amount of prying, if necessary, release the sprocket from the hydraulic motor (Fig. 15.7).
- 15.9 Pull hydraulic motor away from gear drive box (Fig. 15.8).
- 15.10 Rest hydraulic motor against the control panel (Fig. 15.9).
- 15.11 Remove 12-tooth sprocket from drive chain (Fig. 15.10).
- 15.12 Insert drill steel into hex drive and rotate drill steel until the connector link is near the hydraulic motor slot (Fig. 15.11). The chain may need to be guided around the hex drive sprocket.
- 15.13 Using a small pick, remove connector link keeper (Fig. 15.12).
- 15.14 Place connector link under hydraulic motor shaft slot and remove remaining two pieces of the connector link from drive chain (Fig. 15.13).
- 15.15 To remove the chain from the gear drive box, gradually pull one end of the drive chain from the rotation member. If necessary, rotate hex drive in a corresponding direction to assist in removal.
- 15.16 Removal of drive chain and 12-tooth sprocket is complete.



Fig. 15.1. Position unit for servicing.



Fig. 15.2. Remove chain cover bolts and lock washers.



Fig. 15.3. Remove chain cover plate.



Fig. 15.4. Loosen 12-tooth sprocket set screws.

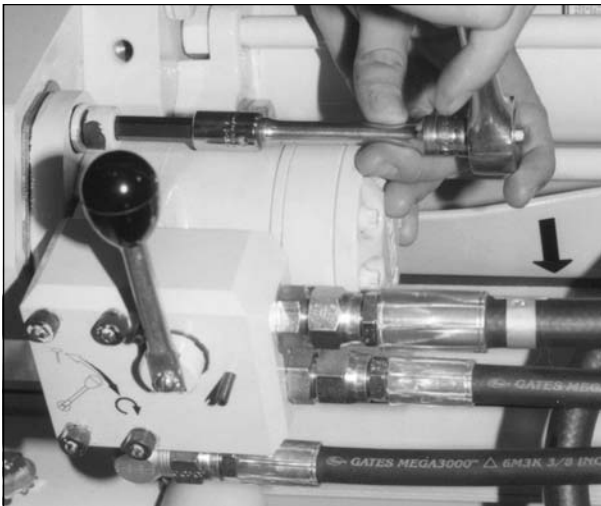


Fig. 15.5. Loosen socket head cap screw in hydraulic motor mount.



Fig. 15.6. Remove socket head cap screws.

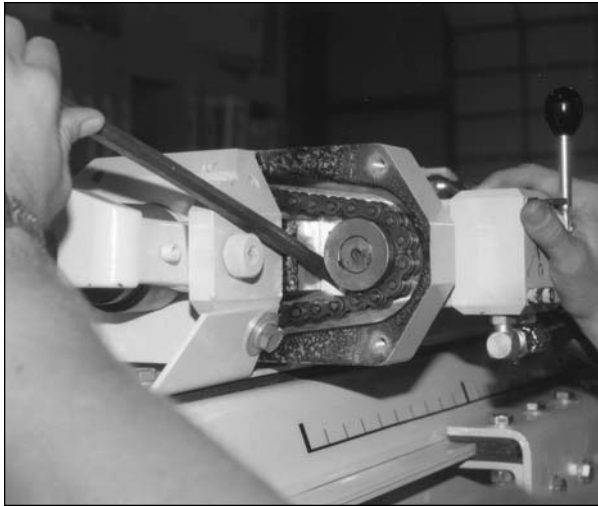


Fig. 15.7. Carefully pry sprocket from hydraulic motor shaft.

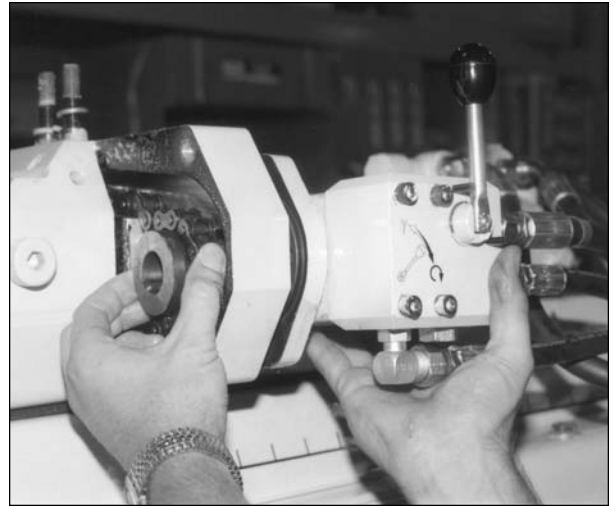


Fig. 15.8. Pull hydraulic motor away from gear drive box.



Fig. 15.9. Rest hydraulic motor against control panel.

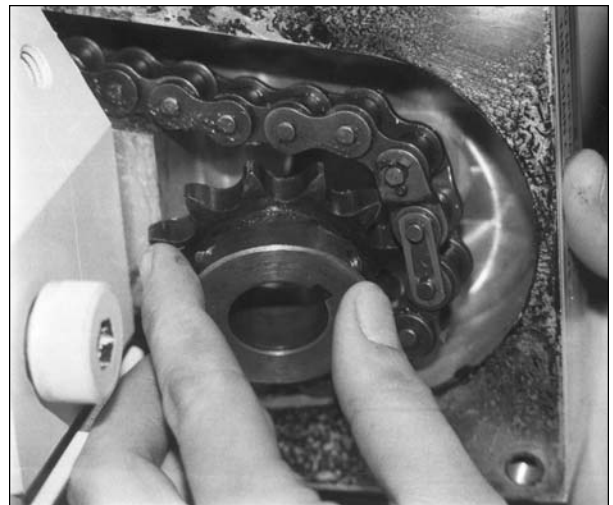


Fig. 15.10. Remove 12-tooth sprocket from drive chain.

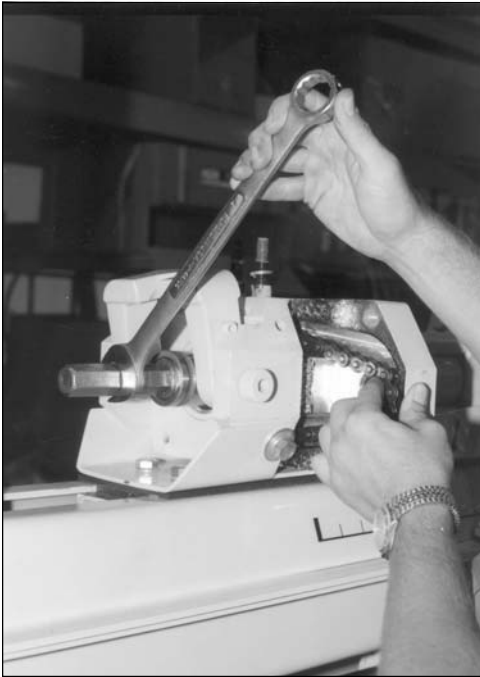


Fig. 15.11. Insert drill steel into hex drive to achieve proper connector link position.



Fig. 15.12. Remove connector link keeper.

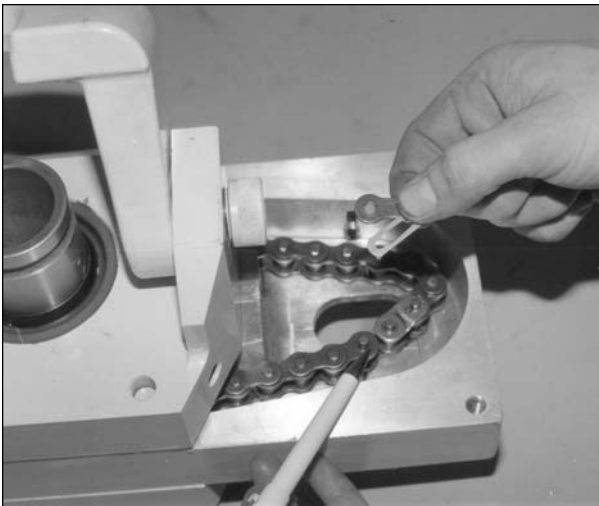


Fig. 15.13. Remove remaining pieces of connector link.

16.0 DRIVE CHAIN AND 12-TOOTH SPROCKET INSTALLATION

- 16.1 Cut a new piece of #50 drive chain with a chain detacher (U.S. Tsubaki, No. D-35 Chain Detacher, see Fig. 16.1) so that the chain measures 21 inches or 17 links (Fig. 16.2).
- 16.2 Attach one new offset link to the drive chain (Fig. 16.3). The eye of the cotter pin should rest against the flat side of the offset link connector pin. Bend both fingers of the cotter pin so that it will not slip out of the half-link connector pin.
- 16.3 Coil chain so that it fits into gear drive box. The offset link cotter pin should face the cover plate side of the gear drive box (Fig. 16.4).
- 16.4 Install drill steel, or equivalent tool with 1" hex, into hex drive and feed the end of the chain without the half link into and around the hex drive gear (Fig. 16.5).
- 16.5 Once the chain has started to engage the drive sprocket, slowly and carefully rotate the drill steel in a corresponding direction. When the chain is visible on the opposite side of which it entered, guide the chain out with your finger. If it is not guided, the chain will jam between the drive gear box.
- 16.6 Continue to rotate the drill steel and feed the chain until the leading edge of the chain, the link which first engaged the hex drive gear, extends far enough to reach the hydraulic motor shaft slot (Fig. 16.6).
- 16.7 Connect the loose ends of the chain with a new connector link and connector link keeper (Fig. 16.7).
- 16.8 Place a new 12-tooth sprocket in the chain under the hydraulic motor shaft slot (Fig. 16.8).
- 16.9 Install hydraulic motor (See Section 14.0, Hydraulic Motor Installation) eliminating Steps 14.13 and 14.14.

NOTE: Hydraulic hoses remain attached to the hammer rotation valve during installation of the hydraulic motor.

16.10 Installation of drive chain and 12-tooth sprocket is complete.



Fig. 16.1. Cut new section of #50 drive chain with chain detacher.

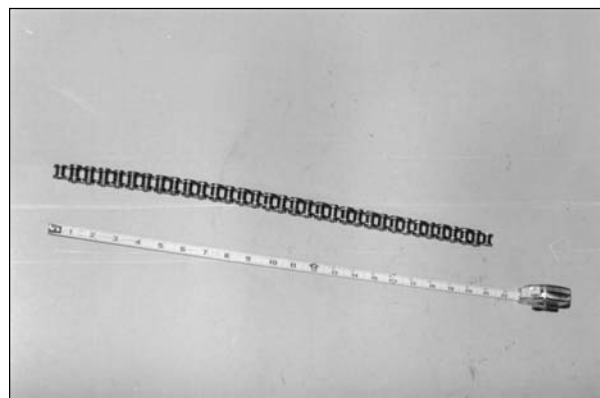


Fig. 16.2. New drive chain should measure 21 inches or 17 links.

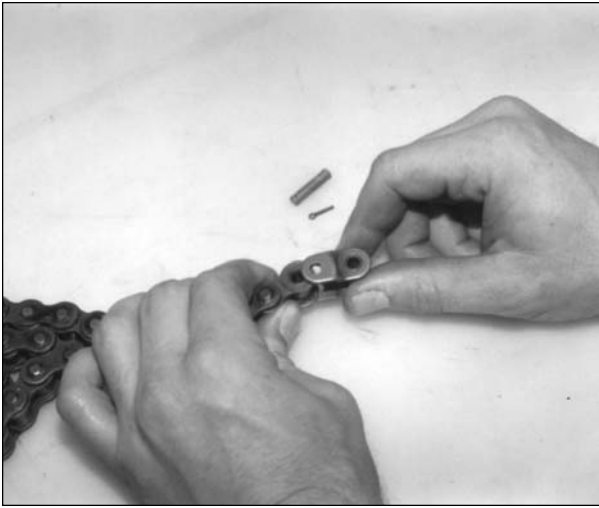


Fig. 16.3. Attach new offset link to drive chain.



Fig. 16.4. Coil chain to fit into gear drive box.



Fig. 16.5. Feed end of drive chain into and around hex drive gear using a drill steel.

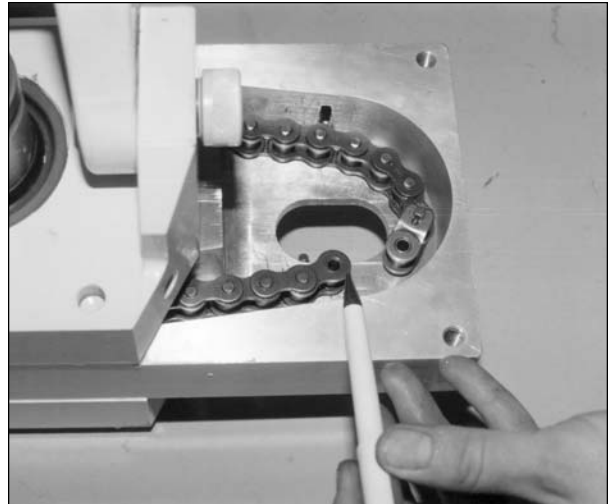


Fig. 16.6. Leading edge of chain should reach hydraulic motor shaft slot.

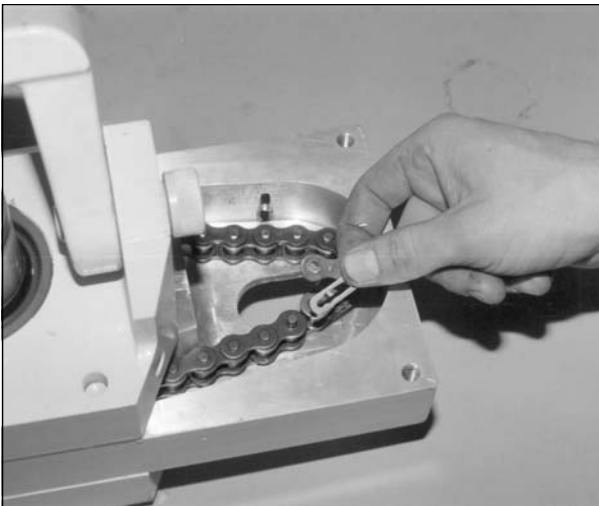


Fig. 16.7. Connect loose ends of chain with connector link and link keeper.

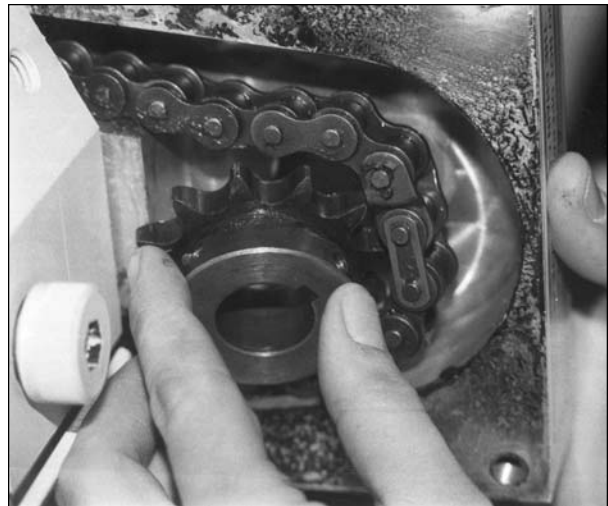


Fig. 16.8. Place 12-tooth sprocket in chain under hydraulic motor shaft slot.

17.0 HEX DRIVE GEAR, BEARINGS, AND SEALS REMOVAL

NOTE: Internal parts in this section are pictured free of grease. Normally, internal parts will be coated with grease.

This section describes the process required to remove the innermost working parts of the rotation member of the Geoprobe GH-40 hammer. The parts described include the hex drive assembly, two roller bearings, and two grease seals. Most disassembly of the rotation member will occur on the work bench in order to centralize the work area. For the removal of the hydraulic motor, drive chain, and 12-tooth sprocket, the technician is referred to previous sections which describe the removal of these components.

CAUTION: Hammer member and rotation member are heavy. Assistance is required to handle them safely. Do not attempt to lift them by yourself.

- 17.1 Remove hammer member (See Section 4.0, Hammer Member Removal) (Fig. 17.1).
- 17.2 Leave unit in hammer member removal position.
- 17.3 Hydraulic system should still be turned off (deactivated) and vehicle engine should be turned off.
- 17.4 Remove the two chain cover plate bolts and lock washers using a 9/16" wrench (Fig. 17.2).
- 17.5 Remove chain cover plate (Fig. 17.3).
- 17.6 Loosen the set screw at the base of the 12-tooth sprocket with a 1/8" or 5/32" allen wrench (Fig. 17.4).
- 17.7 Remove the two socket head cap screws from hydraulic motor mounting holes using a 3/8" hex bit and socket wrench (Fig. 17.5).
- 17.8 Lift hydraulic motor off gear drive box (Fig. 17.6). A small amount of prying may be necessary to release the sprocket from the hydraulic motor shaft. Place a small crow bar between the 12-tooth sprocket and the top of the gear drive box if prying is necessary. Hold hand under sprocket to catch sprocket when hydraulic motor shaft releases it.
- 17.9 Remove the 12-tooth sprocket from the drive chain (Fig. 17.7).
- 17.10 Rest hydraulic motor on control panel (Fig. 17.8).
- 17.11 Remove the four lower mounting bolts on the rotation member using a 3/4" socket and socket wrench (Figs. 17.9A,B). Assistance will be required to hold the rotation member while removing the final two bolts.
- 17.12 Lift rotation member out of hammer cradle (Fig. 17.10A). Hammer, rotation member and hydraulic motor are now removed from hammer cradle (Fig. 17.10B).
- 17.13 Lay rotation member on a work bench.
- 17.14 Remove drive chain and 12-tooth sprocket (See Section 15.0, Drive Chain and 12-Tooth Sprocket Removal).
- 17.15 Remove the four bolts and lock washers from the top plate using a 3/4" socket and socket wrench (Fig. 17.11).

NOTE: The most efficient method used to disengage the top and bottom plates from the gear drive box is to install the four bolts just removed from the top plate into the mounting holes on the side of the top and bottom plates. Gently tap the bolts to help separate the plates from the gear drive box (Fig. 17.12).

17.16 If necessary, use a screwdriver to pry the top plate away from the gear drive box (Fig. 17.13). Take care not to damage the aluminum gear drive box or plastic shims.

17.17 Remove top plate from gear drive box (Fig. 17.14).

17.18 Note location of the plastic shims which separate the gear drive box from the top and the bottom plate.

IMPORTANT: Wear safety glasses during all hammering procedures.

17.19 A large screwdriver may be necessary to pry the bottom plate of the gear drive box free in the same manner as the top plate. Take care not to damage the aluminum gear drive box and plastic shims. If the gear drive box will not readily separate, tap the exposed edge of the box with a dead blow hammer to jar it loose. Then, manually work the gear drive box free. Lift the gear drive box off the bottom plate (Fig. 17.15).

17.20 Pull the hex drive gear out of the bottom plate (Fig. 17.16). The top and bottom tapered roller bearings should remain attached to the upper and lower stems of the hex drive.

17.21 Remove bearings from the hex drive by hand (Fig. 17.17). If this fails, use a chisel or bearing puller to loosen bearings. If the bearings are to be reused, take care not to damage them during removal.

17.22 Remove top and bottom grease seals from the top and bottom plates using a seal remover or hammer and punch (Fig. 17.18).

NOTE: The use of a bench vise may aid in the removal of the alignment pin and bearing race.

17.23 In order to ease the bearing race removal process from the top plate, the hammer alignment pins should be removed from the top plate with a large pair of vice grips (Fig. 17.19).

17.24 Insert a dowel pin or punch through hammer alignment pin holes and hammer bearing race out of top plate (Fig. 17.20).

17.25 The bottom bearing race will be more difficult to remove. Hammer race out of bottom plate by angling a small drift punch or chisel through the hex drive hole in the bottom plate to the exposed shoulder of the bearing race (Fig. 17.21). The most effective hammering technique is to hammer downward at an angle. Turn the bottom plate over in the bench vise every few strikes so the bearing race will be pushed out of the bottom plate evenly.

17.26 Removal of hex drive gear, bearings, and seals is complete.