



MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

OPERATING AND MAINTENANCE MANUAL

J&M MODEL 70

HYDRAULIC IMPACT HAMMER

WITH MODEL 108 POWER PACK

SERIAL NUMBERS: 600001 AND ABOVE



**J&M FOUNDATION
EQUIPMENT, LLC**

OM-70-108-0306

SPECIALIZING IN PILE DRIVING EQUIPMENT



**MODEL 70 HIH
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IMPACT HAMMER**



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PREFACE

This manual was prepared to acquaint the owner, operator and serviceman with the construction, operation and servicing of the J&M Model 70 Hydraulic Impact Pile Hammer and the J&M Model 108 Power Unit. We strongly suggest that this manual be studied carefully and understood by all personnel involved in operating or performing maintenance work on the hammer. J&M equipment is engineered to provide reliable operation and a long service J&M life under normal operating conditions. Equipment reliability and service life can be improved by following the maintenance procedures in this manual.

This manual is divided into seven sections- Introduction, General information, Preparation for Operation, Operation, Maintenance, Trouble-Shooting and Ordering Parts.

The General Information section contains a brief description of the hammer and specification information.

The Preparation for Operation section contains information about maintenance and other work required before starting the hammer.

The Operation section includes general operating information plus details on hot and cold weather operation.

The Maintenance & Adjustments section contains routine maintenance procedures and instructions for making adjustments and repairs to the hammer.

The Trouble-Shooting section has suggestions for identifying and resolving operating difficulties.

The Ordering Parts section contains information for ordering parts including parts drawings and lists.



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**J&M FOUNDATION LLC
STANDARD WARRANTY**

J&M Foundation Equipment LLC, (J&M) warrants new products sold by it to be free from defects in material and workmanship for a period of 90 days after date of delivery to the first user and subject to the following conditions: J&M's obligation and liability under this warranty is expressly limited to repairing or replacing, at J&M's option, any parts which appear to J&M upon inspection to have been defective in material or workmanship. Such parts shall be provided at no cost to the user at the business establishment of J&M or at the J&M distributor of the product during regular working hours.

This warranty shall not apply to component parts or accessories of products not manufactured by J&M and which carry the warranty of the manufacturer thereof or to normal maintenance parts (such as filters).

Replacement or repair parts installed in the product covered by this warranty are warranted only for the remainder of the warranty as if such parts were original components of said product.

J&M's obligation under this warranty shall not include any transportation charges, costs of installation, duty, taxes or any other charges whatsoever, or any liability for direct, indirect, incidental, or consequential damage or delay.

If requested by J&M, products or parts for which a warranty claim is made are to be returned transportation prepaid to J&M.

Any improper use, including operation after discovery of defective or worn parts, operation beyond rated capacity, substitution of parts not approved by J&M or any alteration or repair by others in such manner as is J&M's judgment affects the product materially and adversely shall void the warranty.

For impact pile hammers, driving in excess of 10 blows per inch (set of 0.1 inch per blow) is considered practical refusal. Driving in excess of 10 blows per inch for more than 6 inches of driving or driving in excess of 20 blows per inch at all is considered improper use and will void the hammer warranty.

For vibratory drivers, driving when penetration is less than 1" per minute is considered practical refusal. Driving when penetration is less than 1" per minute for more than 5 minutes of driving or driving at all when penetration is less than 1" per minute is considered improper use and will void the vibrator warranty.

J&M makes no other warranty, expressed or implied, and makes no warranty of merchantability or fitness for any particular purpose.

No employee or representative is authorized to change this warranty unless such change is made in writing and signed by an officer of J&M.



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MODEL 70 HIH
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OPERATING INSTRUCTIONS

I. GENERAL INFORMATION

A. GENERAL DESCRIPTION

The J&M Model 70 Hydraulic Hammer is a Free-Fall hammer. The ram is lifted by the hydraulic actuator and then allowed to free-fall, impacting the pile. The hammer has been designed to provide maximum flexibility by enabling the contractor to vary the energy range of the hammer to suit job conditions. The 70 hammer design incorporates an all hydraulic control system, with no electrical or electronic controls used, to ensure reliability and field serviceability. Further, without the need for vulnerable umbilical cords, this unit is readily adaptable to alternate hydraulic power sources.

The 70 hammer is normally powered by the same Model 108 power unit that powers J&M Vibratory Hammers and J&M Earth Augers. This permits the contractor to use a single power unit on jobs where both the Impact Hammer and an Auger are needed. The Hammer can also be powered by any source providing the required flow, pressure, cooling and filtration. The 70 Hydraulic Hammer delivers 24,500 ft-lbs (3387 Kg-M) of energy at its full stroke of 3'-6" (1.1M) at a blow rate of 48 blows per minute.

B. MAJOR COMPONENTS

The hammer system consists of 8 major components (Fig. 1) page I-4:

- Hydraulic Actuator
- Ram
- Guide Structure
- Lifting Bale
- Drive Cap
- Controls
- Interconnecting Hoses
- Power Unit

Hydraulic Actuator

The hammer is driven by the hydraulic actuator. The actuator is coupled to the ram using a shock absorbing, self aligning, connection. Hydraulic oil flows from the power unit, at pressure, to the actuator which accelerates the ram upward. Attached to the ram is a trip bar which activates a trip valve after the ram has risen a predetermined distance. Activation of the trip valve stops the flow of oil to the actuator. The ram then decelerates and free falls to impact the pile. Power unit energy is stored in a hydraulic accumulator while the ram is falling.



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OPERATING INSTRUCTIONS

I. GENERAL INFORMATION

B. MAJOR COMPONENTS (CONTINUED)

Ram

The ram is a one piece high strength steel forging. The one piece construction of the ram eliminates slack in the driving system and provides maximum energy transfer to the pile. The one piece construction also eliminates the dangers of structural failure known to exist in rams constructed of separate segments. High performance, non-metallic, bearings, retained within the ram, prevent guide column wear and reduces maintenance and lubrication requirements. The shock and vibration, generated when the ram impacts the pile, are isolated from the hydraulic actuator by an elastomeric, self aligning, coupling.

Guide Structure

The guide structure consists of tubular steel guide columns and connection plates. The guide columns serve to guide the ram and provide the rigidity required to allow the driving of batter piles. Guide columns, connecting plates and lifting bale are held together by tensioned wire ropes which run from the base plate to the top of the lifting bale. These cables provide a resilient means of connection and eliminate the need for keys or bolted connections. The hammer is designed to fit in 20" x 6" and 26" x 8" rail leads produced by J&M and other manufacturers. The connecting plates provide mounting points for the lead guide rails necessary for J&M leads and various other hammer guidance systems.

Lifting Bale

The lifting bale surrounds and protects the hydraulic actuator and hoses from damage and is the attachment point for the lifting sheave. Two energy storing hydraulic accumulators are mounted to, and protected by, the lifting bale. Incorporated in the lifting bale design are the connection flanges for the hydraulic supply hoses, and a shock absorbing hose support.

Drive Cap Assembly

Striking energy of the ram is transmitted to the pile through the three elements of the drive cap assembly. The ram impacts the forged steel striker block which self aligns and self centers within the lower connecting plate. Ram energy is transferred through cushion material into the drive cap base. The drive cap base serves to retain the cushion material, guide the piling, and adapt to various styles of J&M piling inserts. Piling inserts adapt the hammer to most popular types of piling and retain additional cushion material when required.



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I. GENERAL INFORMATION

B. MAJOR COMPONENTS (CONTINUED)

Controls

The hammer is controlled by a remote electric/hydraulic system in the power unit which allows for both manual single blow operation or automatic continuous stroke operation. The stroke of the ram can be varied between 12" (.3M) and 42" (1.1M), on-the-fly, allowing control of the hammer energy to suit various types of piling and soil conditions. Under continuous operation, the hammer will operate at 48 blows per minute at the maximum energy setting. The blow rate will increase at lower energy settings. Control of the continuous cycling of the hammer is fully hydraulic (non-electric), operated by valves contained within the actuator assembly. No maintenance or adjustment of these valves is normally required. The hammer can be operated from the remote pendant control.

Interconnecting Hoses

Hydraulic power is transmitted from the power unit to the hammer through 100 ft. (30M) of steel braid reinforced hydraulic hoses (4). High pressure, threaded type, quick disconnects on these hoses facilitate connection to the power unit without oil loss. Dust covers are provided to keep disconnects clean when the hammer is disconnected.

Power Unit

Power for the hammer is normally provided by a free-standing, Model 108, diesel-hydraulic power unit. The Model 108 is powered by a Caterpillar 3054 engine which develops 108 Hp (80kW) at 2400 rpm. Central lifting of the power unit is facilitated by an integral lifting bale. A control panel at the side of the unit contains all the operating gages. A common reservoir supplies hydraulic oil to the main pump and the stroke control pump. Filtration and cooling means for the hydraulic oil are incorporated within the power unit. Electro/hydraulic valves are provided for hammer start/stop and stroke control. Pressure limiting valves are included for all systems. Four hydraulic hoses connect the power unit to the Model 70 hammer. This power unit can also be crane mounted for ease of operation.

If the crane is capable of providing the required flow, pressure, cooling and filtration to the hammer, it is possible to adapt it for hammer operation and eliminate the power unit



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- I. GENERAL INFORMATION
- B. MAJOR COMPONENTS (CONTINUED)

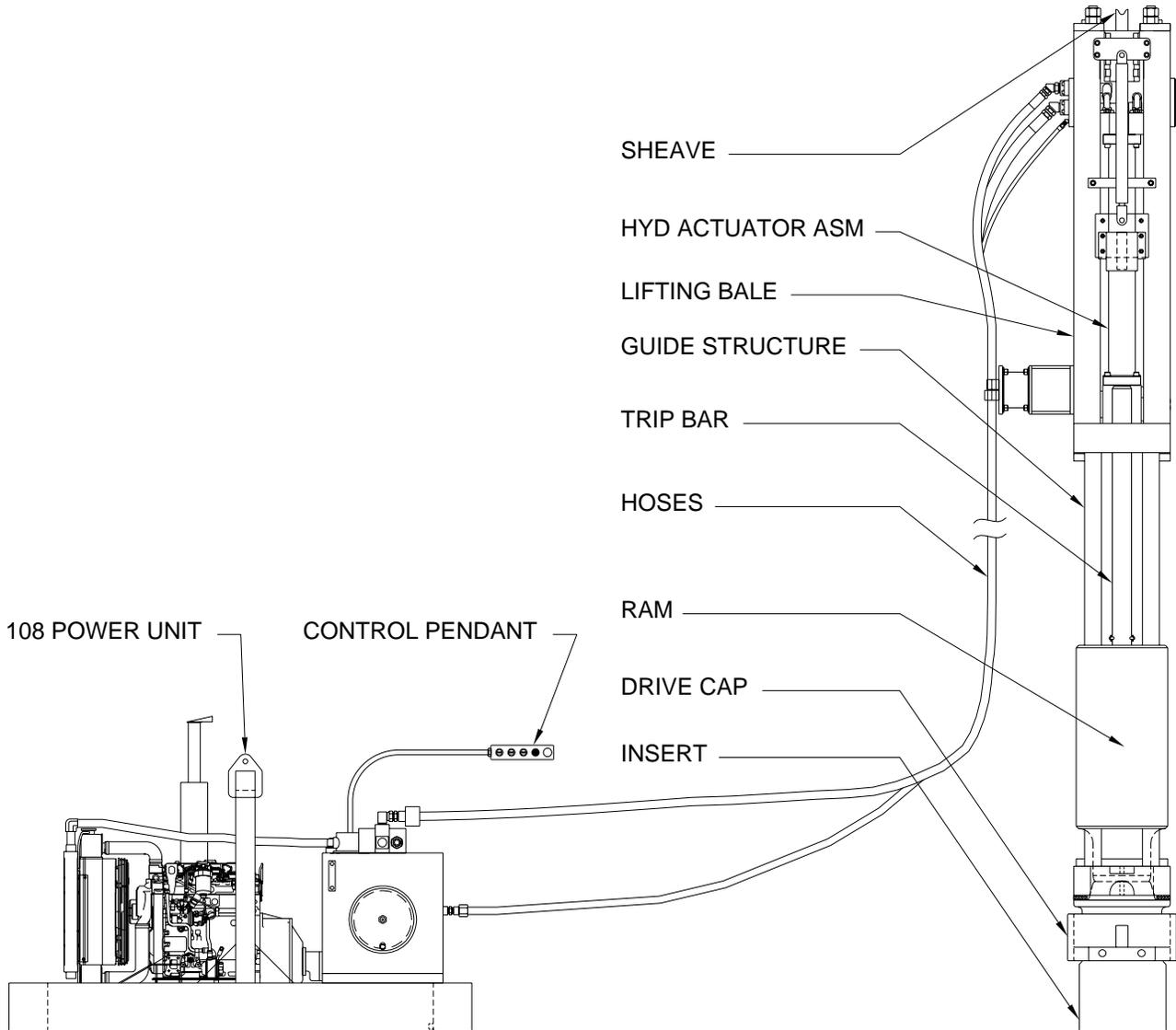


FIG 1



**MODEL 70 HIH
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OPERATING INSTRUCTIONS

I. GENERAL INFORMATION

C. SPECIFICATIONS

Working Specifications

Designation	J&M Model 70
Maximum stroke	3'-6" (1.1 Meter)
Rated energy @ maximum stroke	24,500 ft-lbs (33.2 kN-m)
Blow rate @ maximum stroke	48 bpm
Minimum stroke	1' (0.3 Meter)
Rated energy @ minimum stroke	7,000 ft-lbs (9.5 kN-m)
Blow rate @ minimum stroke	80 bpm

Weights and Dimensions

Ram weight	7,000 lbs (3,175 kg)
Hammer weight (bare)*	13,400 lbs (6078 kg)*
Complete operating weight with cap*, **	16,450 lbs (7,462 kg)**
Length (bare)**	15'-5" (4,699 mm)
Complete operating length with cap**	17'-7" (5,359 mm)**
Width (without guides)	20" (508 mm)
Depth	36" (914 mm)
Depth centerline to back	18" (457 mm)
Depth centerline to front	18" (457 mm)
Hydraulic hose length (standard)	100' (30 m)

*Weight includes one half of hydraulic hoses.

**Set up for 20" leads and 14" square concrete pile.

Power Unit

Designation	J&M Model 108
Engine	CAT 3054
Max. power	108 HP (130 kW)
Operating speed	2400 rpm
Max. drive pressure	2,500 psi (172 bar)
Drive flow	48 gpm (182 lpm)
Stroke control pressure	1,000 psi (69 bar)
Weight	8,500 lbs (3856 kg)*
Length	96" (244 cm)
Width	43" (109 cm)
Height	51.5" (131 cm)



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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

A. GENERAL

When loading and unpacking the hydraulic hammer and accessories, use extreme care. For your protection, make a thorough inspection of the unit immediately on delivery. In case of any damage or shortage, notify the transit agent at once and have the delivering carrier make a notation on the freight bill. Use timber, heavy duty banding, etc to block ram movement during shipment.
(SEE SECTION II C FOR LIFTING INSTRUCTIONS)

B. SAFETY PRECAUTIONS

Safety is basically a matter of common sense. There are standard safety rules, but each situation has its own peculiarities which can not always be covered by rules. Therefore, your experience and common sense will be your best guide to safety. Be ever watchful for safety hazards and correct deficiencies promptly.

Use the following safety precautions as a general guide to safe operations:

1. Read the manual thoroughly before operating or working on the equipment.
2. Read and follow any safety instructions in the CATERPILLAR engine operators manual.
3. Only well trained and experienced personnel should attempt to operate or maintain this equipment.
4. Never adjust, lubricate or repair the unit when it is in operation, or lifted above ground level.
5. Never remove, paint over or cover warning or safety labels. If labels become damaged or unreadable, replace immediately.
6. All personnel should wear approved safety clothing, including **HARD HATS, SAFETY SHOES, SAFETY GLASSES** and **HEARING PROTECTION** when in the vicinity of this machinery.
7. Do not stand any closer to this equipment than necessary when it is in operation. Parts may loosen and fall. Piling may shatter or break. Never stand under operating, or elevated, equipment.
8. When maintaining or repairing the equipment, never substitute parts not supplied, or approved in writing, by J&M.
9. Do not weld, or flame cut, on this equipment.
10. Never use or store flammable liquids on or near the engine.
11. Insure that all lifting equipment, including cranes, wire rope, slings, hooks, shackles, etc., are properly sized for the worst case loads anticipated during operations.
12. If there are any questions about the weights, specifications, or performance of the unit, contact J&M before handling or operating the equipment.
13. If the equipment is to be used for anything other than driving plumb piles, contact J&M before using the unit.
14. Check wire rope clips for tightness, and check wire ropes for wear, daily.
15. Insure that ground vibrations will not damage or collapse adjacent structures or excavations.



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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

B. SAFETY PRECAUTIONS (CONTINUED)

16. Remove all tools, parts and electrical cords before starting the unit.
17. When operating in an enclosed area, pipe exhaust fumes outside. Continued breathing of exhaust fumes may be fatal.
18. When servicing batteries, do not smoke or use open flames in the vicinity. Batteries generate explosive gas during charging. There must be proper ventilation when charging batteries.
19. When filling fuel tank, do not smoke or use open flame in the vicinity.
20. If abnormal equipment operation is observed, discontinue use immediately and correct the problem. Do not leave the equipment control pendant (radio control) unattended.
21. Store oily rags in approved containers, and away from engine exhaust system.
22. Make sure that the hammer is OFF before starting the power unit engine.
23. Do not adjust, or set, hydraulic pressures higher or lower than those specified in the manual.
24. Never operate this equipment with hydraulic hoses that are damaged or "kinked". Replace damaged hoses immediately.
25. Do not lift, or support, hydraulic hoses with wire rope slings.
26. Never attempt to connect quick disconnects when the power unit is running.
27. Do not pull on, or attempt to move equipment, with hydraulic hoses.
28. Do not attempt to locate hydraulic leaks with your hands. High pressure hydraulic leaks can penetrate the skin, causing severe damage, blood poisoning and infection. Do not attempt to repair leaks while the equipment is in operation.
29. Do not attempt to tighten, or loosen, fittings or hoses when the machine is in operation.
30. Power unit must always be placed on level, stable, ground.
31. Do not remove power unit heat shields, or operate power unit without heat shields. Severe fires may result.
32. A properly maintained fire extinguisher, suitable for oil fires, must be kept in the immediate vicinity of equipment operations.
33. When moving or transporting this equipment, insure that the vehicle or vessel is of sufficient capacity to handle the load, and that the equipment is properly tied down.
34. Always block the ram, to prevent movement during transport.
35. When moving or transporting this equipment, be sure that quick disconnect dust caps are tight, and that cap safety cables are in place. Be sure that all equipment parts are tight, or properly secured, before shipment. Unsecured parts may vibrate loose and fall, during transport, causing injury or property damage.
36. Keep crane boom, piles, leads, wire rope and other equipment at least 15' (5M) from electrical power lines, transformers and other electrical equipment, or at such distance as required by applicable safety codes.



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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

B. SAFETY PRECAUTIONS (CONTINUED)

37. Rounded or damaged bolt heads or nuts should be replaced so that proper torque values may be obtained. Proper torque values are necessary to prevent parts on this equipment, leads and crane boom from loosening and falling. Refer to Torque Chart, in the manual, for proper values.
38. Always be sure that the crane line is aligned with the centerline of the pile. Do not side load crane boom or hammer. Dangerous crane boom, or hammer, damage may result.
39. Use tag line to control hammer whenever possible.
40. When driving "batter" piles, insure that the leads, and crane boom, have sufficient bending strength to handle the worst case load. Consult J&M.
41. Do not attempt to service hydraulic accumulators without first venting all high pressure gas from these units.
42. Pre-charge accumulators only to pressures specified, and only with Nitrogen gas.
43. Pile ends must be cut square, and flat, before cushion material and/or drive cap are placed onto pile.
44. Use only pile caps that are correctly sized for the type, cushion material and pile size being driven.
45. Before starting driving operations, check that the hammer, striker block and pile cap are properly aligned with the centerline of the pile. Dangerous lateral forces, generated by misalignment, may damage hammer or break piling, with resultant hazard from falling objects.
46. Stay well clear of ram point, pile cap and striker block. Fragments of metal may be broken, or spalled off, and ejected at high speed.
47. Large amounts of heat are generated, within cushion material, during driving. Cushion material, or flammable materials in the vicinity, may ignite. Personnel should use extreme caution, and avoid contact with ram point, cushion material and drive cap.
48. It is the responsibility of the contractor to determine what, if any, hazardous materials, or gases, may be emitted from cushion materials due to deterioration, decomposition, excessive temperature or combustion. Contact the cushion material manufacturer.
49. Frequently inspect and tighten the wire ropes, wire rope clips and pins that secure the drive cap to the hammer. Replace these components at the first sign of wear or fatigue. Tighten clips regularly.

REMEMBER, SAFETY IS EVERYONE'S BUSINESS.



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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

C. HANDLING

Safe handling practices will insure protection of both the hammer and personnel working near the unit. Do not pick up the hammer by the guide columns. Doing so can scratch the surface finish on the columns and damage the ram bearings.

To lift hammer horizontally (See Fig 1):

The hammer is designed to be picked up by the lead guide rails. Use shackles at each of the four lifting holes provided in the lead guides to attach the four lifting cables. Alternately, the hammer can be picked up using the lifting sheave and a pin through the cable ears in the bottom plate. Ensure that the lifting cables are properly sized for the hammer weight and sling angle.

Always block the ram, to prevent movement during transport and / or lifting.

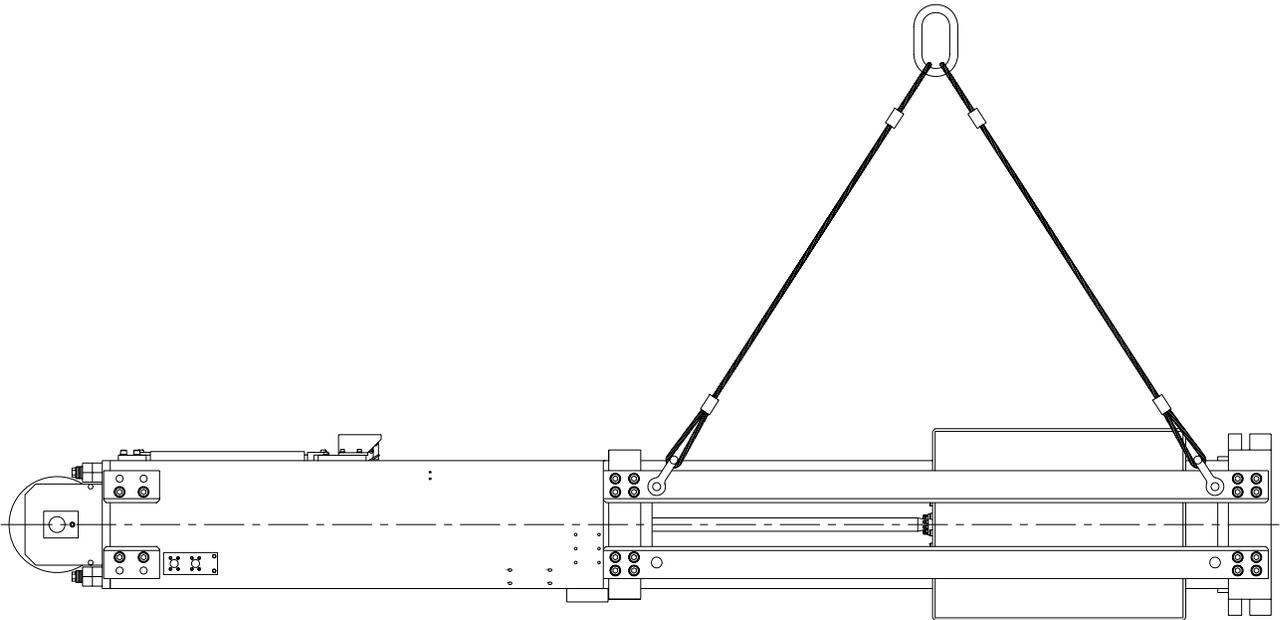


FIG 1



MODEL 70 HIH
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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

D. CONNECTING CRANE LINE TO HAMMER

Connect the crane line directly to the hammer using the lifting sheave. The hammer is designed to be used with a two-part line. If a single-part line is desired, the sheave can be replaced with a sleeve p/n 160777.

To lift the hammer to a vertical position, first remove the rope guide bolt and sleeve. (See Fig 2) Pass the crane wire rope around the lifting sheave and re-attach to crane boom. Lift hammer to the vertical position. Re-install rope guide bolt and sleeve.

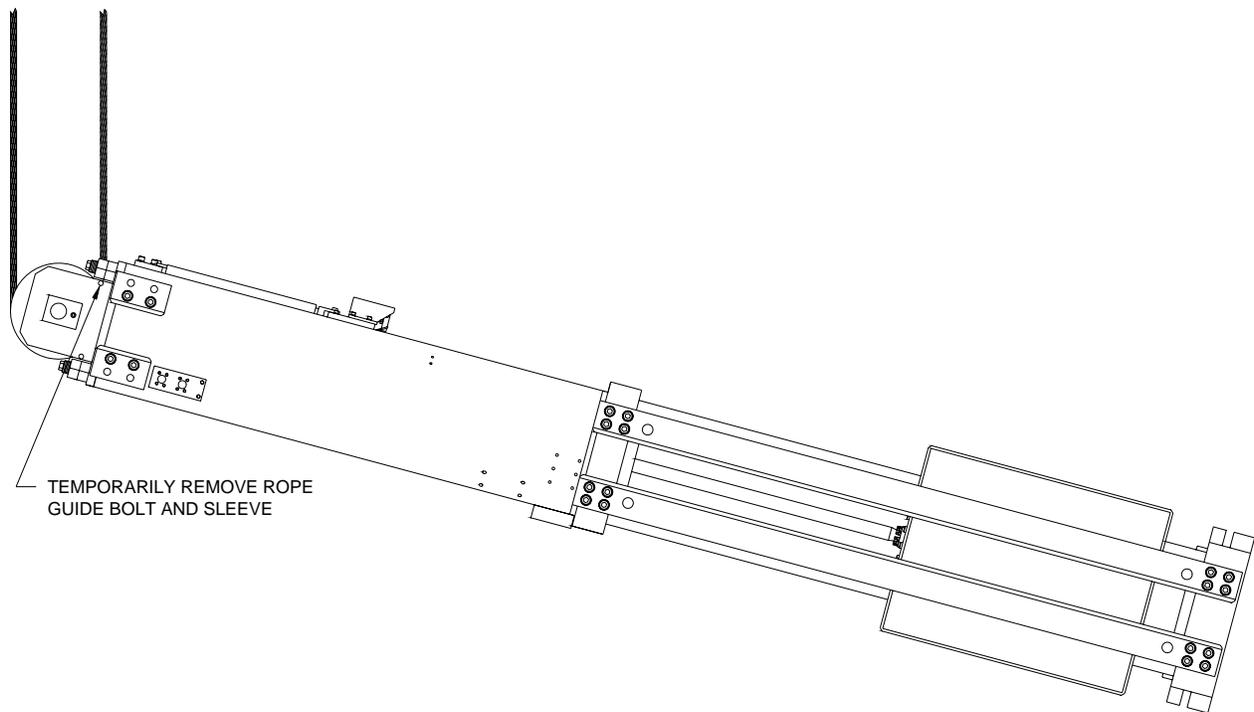


FIG 2



**MODEL 70 HIH
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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

E. ATTACHMENT OF LEAD GUIDES

The hammer is usually shipped with lead or spud guides already in place. If they are not attached, bolt them into place at the sides of the hammer using the twenty bolt holes provided on each side of the hammer.

With fixed leads, it is sometimes convenient to stand the hammer in the leads prior to attachment of the back lead guides.

The lead guide attachment bolts should be properly torqued, using the lock washers provided, to prevent their coming loose. Torque 1.00-8UNC SHCS to 1,009 Ft-lbs (139 Kg-M).

Do not weld on hammer.

F. ATTACHMENT OF DRIVE CAP (See Fig. 3)

To attach drive cap: Set drive cap insert [11] on dunnage or firm ground. Set drive cap base [4] onto drive cap insert. Attach with wire rope through two holes provided.

Place 2"(50mm) thick and 22 1/2"(571mm) diameter cushion material [8] into top of drive cap base (2"(50mm) thick and 25"(635mm) diameter for drive cap base). Place 1/2"(13mm) thick aluminum plate [7] on top of cushion material. This plate holds the cushion material in place if it fractures during driving.

Place the 9 1/2" (243mm) thick tapered steel striker block [3] on top of the aluminum plate

Place the recoil dampener [9] around the top of the striker block.

Set the hammer onto the assembled drive cap set-up. The tapered striker block fits inside the bottom of the hammer and will lift the ram [1] as the hammer is lowered onto it. The hammer base plate [2] should sit squarely on the recoil dampener.

Attach the drive cap to the hammer with 3/4"(19mm) wire rope [10]. Insert bolt [6] through the holes in the cable ears on hammer base plate [2] to keep the 3/4"(19mm) wire rope [10] in place. Secure bolt [6] with the locking nut provided and fully tighten. Provide enough slack in the wire rope so that, when the hammer is lifted, 1"-2" (25-50mm) of space should exist between the bottom of the hammer and the recoil dampener.



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II. PREPARATION FOR OPERATION

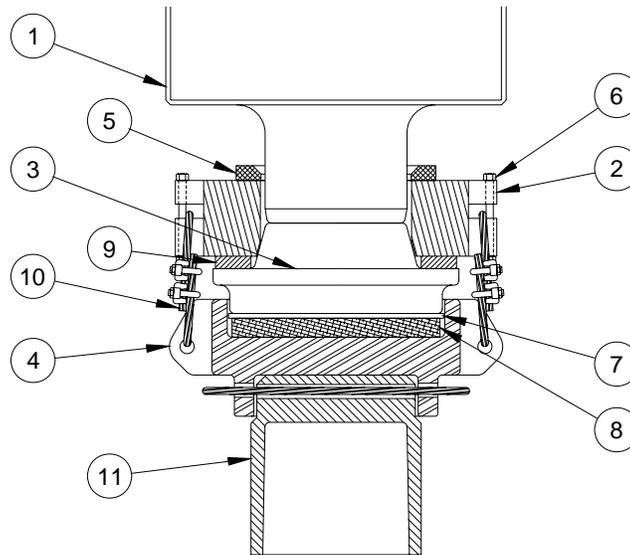


FIG 3

1	Ram	810799
2	Hammer Base Plate	160946
3	Striker Block	160904
4	Drive Cap Base	
5	Bumper	160906
6	Bolt & Nut	
7	Aluminum Plate	
8	Cushion	
9	Recoil Dampener	160902
10	3/4" Wire Rope	
11	Drive Cap Insert	

G. MOUNTING HAMMER IN LEAD

To slide the hammer into swinging leads, in horizontal position, pick up hammer as described in Section II-C.

For vertical installation into leads, first attach the crane line to the hammer as described in Section II-D. and lift hammer carefully into vertical position. Position leads over the hammer and lift the hammer into the lead guide rails.

Alternately, remove the rear lead guide angles from the hammer. Position the hammer on the lead guide rails and re-install the rear guide angles. Be sure to torque the guide angle attachment bolts per Section II-E.



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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

H. CONNECTION OF HYDRAULIC HOSES

Connection of hoses at the Power Unit

The hammer is connected to the power unit by four hydraulic hoses.
(See Fig. 4)

CAUTION: The power unit must be shut down during connection of the hydraulic hoses.

The hoses connect to the power unit with quick-disconnect couplings. The hose couplings are arranged so that the hoses can only be connected in the correct manner.

Clean the couplings with a lint-free cloth before making connections.

Make sure that the couplings are fully run up (tightened). They should be firmly hand tight. If wrenches are used, be careful not to over-tighten. Pipe wrenches are not recommended.

Connection of hoses at the Hammer

The Model 70 is normally shipped with the hoses attached to the hammer. If the hoses have been shipped separately, they must be connected to the hammer. Figure 4 shows the correct hose arrangement.

After the hoses have been connected, and tightened, to their respective fittings, they must be secured in the hose clamps on the hose bracket (See hammer assembly drawing in the PARTS LIST section). Be sure to leave enough slack in the hoses, above the hose clamps, to permit 3-4" (76-101mm) of downward movement by the hose clamp shock mounting elastomer.



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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

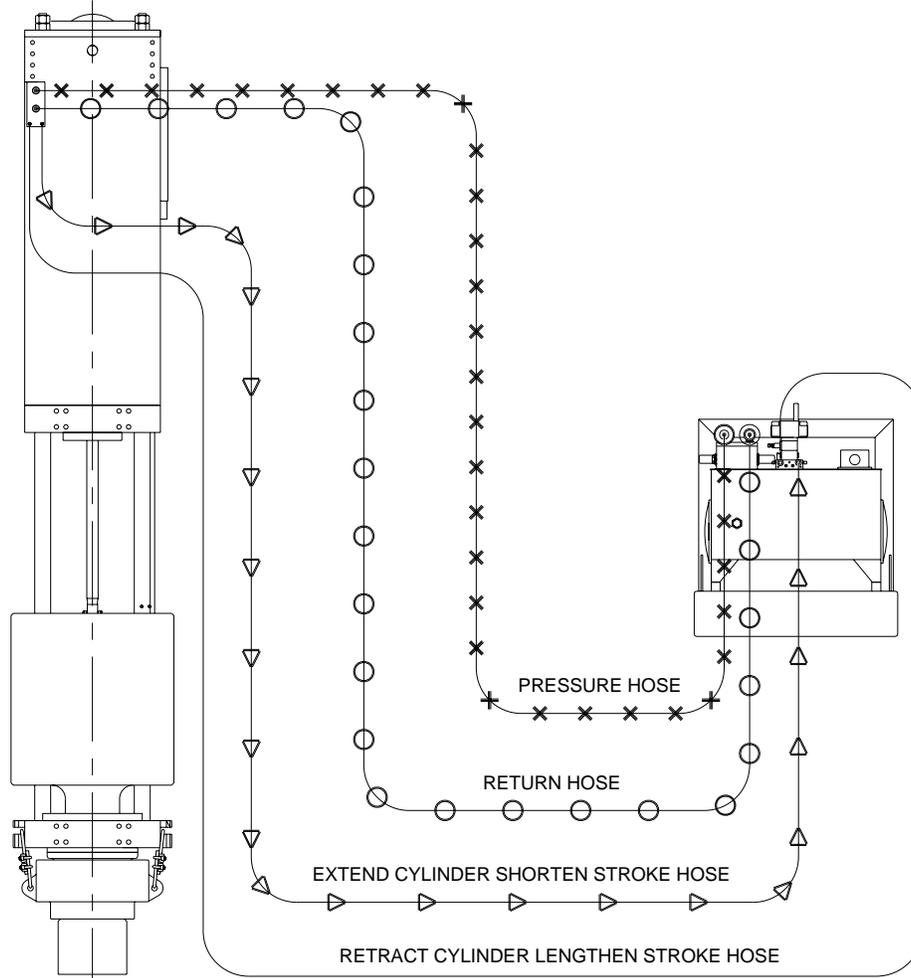


FIG 4

I. FILLING THE HAMMER PRESSURE HOSE

The hammer is normally shipped with the hammer hydraulic hoses full of oil and the unit may be used immediately. However, if the pressure hose has been removed from the hammer, the hose may need to be filled with hydraulic oil prior to full speed operation. It is not necessary to fill the return hose with oil.

Read SECTION III - OPERATING INSTRUCTIONS

Start and warm-up the engine in accordance with SECTION III C. With the engine warmed-up and running at 1500 rpm, turn and hold the hammer switch to the REVERSE position. The hoses will fill with oil in approximately two minutes. Do not engage any other switches on the control pendant during this two minute period.



**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

J. BLEEDING THE VARIABLE STROKE CYLINDER LINES

The hammer is normally shipped with the two 3/8" hoses full of oil and the unit may be used immediately. However, if the hoses have been removed from the hammer, the hoses may need to be filled with hydraulic oil prior to driving operations.

Remove the hose from its fitting at the cylinder (P/N 160817) retract end. Place and hold the end of the hose in an adequate container or bucket.

Read SECTION III - OPERATION INSTRUCTIONS

Start and warm-up the engine in accordance with SECTION III C. With the engine warmed-up and running at 1000 rpm, turn the clamp switch, on the control pendant, to the CLOSE position. Oil should start flowing from the hose within 20 seconds. When the flow of oil is bubble free, return the clamp switch to the OFF position, and stop the diesel engine.

Reconnect and tighten the hose to the cylinder.

Remove the hose from its fitting at the cylinder extend end. Place and hold the end of the hose in an adequate container or bucket.

Start and warm-up the engine in accordance with SECTION III C. With the engine warmed-up and running at 1000 rpm, turn the clamp switch, on the control pendant, to the OPEN position. Oil should start flowing from the hose within 20 seconds. When the flow of oil is bubble free, return the clamp switch to the OFF position, and stop the diesel engine.

Reconnect and tighten the hose to the cylinder.

K. VARIABLE STROKE CYLINDER PRESSURE

The variable stroke cylinder pressure should be approximately 1500 PSI (103 Bar). If the J&M Model 108 power unit is always used with the Model 70 hydraulic impact hammer, the variable stroke cylinder pressure should already be properly set. Whenever a new job is started, or when the 108 power unit has been used to drive a vibratory driver/extractor, or when an alternate power unit is to be used, the variable stroke cylinder pressure should always be checked before starting driving operations.

Read SECTION III - OPERATING INSTRUCTIONS.



MODEL 70 HIH
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OPERATING INSTRUCTIONS

II. PREPARATION FOR OPERATION

K. VARIABLE STROKE CYLINDER PRESSURE (CONTINUED)

Disconnect the variable stroke cylinder lines (3/8" ID hoses) at the power unit quick disconnects. Start and warm-up the engine in accordance with SECTION III C???. With the engine warmed-up and running at 1000 RPM, turn the clamp switch, on the control pendant, to the OPEN position. Observe the pressure on the clamp gage at the control panel. If the pressure is not 1500 PSI (103 Bar), the clamp relief valve will have to be re-adjusted to 1500 PSI (103 Bar) using the procedure in Section IV-N of the maintenance and adjustments chapter.

NOTE: DO NOT SET THE VARIABLE STROKE CYLINDER PRESSURE BY ADJUSTING THE CLAMP PRESSURE SWITCH. The clamp light [q] on the pendant should NOT come ON.

L. FUEL, LUBRICATING OIL AND GREASE

The following are reminders for lubrication maintenance procedures that should be performed in preparation for operation of the Model 70 hydraulic impact hammer. See the Caterpillar engine manual and the MAINTENANCE AND ADJUSTMENTS section of this manual for a description of these procedures.

1. Power Unit

- a. Check engine oil level
- b. Check hydraulic oil level
- c. Check for adequate fuel supply
- d. Check engine coolant level

2. Hammer

- a. Grease Columns
- b. Grease sheave
- c. Oil trip valve lever pivot



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A. COMPLETION OF SET-UP AND MAINTENANCE

1. Complete all preparation as described in Section II.
2. Read Section IV - MAINTENANCE AND ADJUSTMENTS and perform any required maintenance.
3. Read the Caterpillar engine manual and perform any required maintenance.

B. CONTROL PANEL

1. The control panel, at the side of the power pack, contains the controls and gages for the diesel engine. The remote pendant, which controls the operation of the hydraulic impact hammer, is connected to a panel on the hydraulic reservoir.
2. Control panel contains the following controls and gages:
 - a. Engine oil pressure gage.
 - b. Engine water temperature gage.
 - c. Engine ammeter.
 - d. Engine shut-down reset button - Must be held in, when starting engine, until oil pressure exceeds 30 PSI (2 Bar).
 - e. Emergency Stop Button - Push to stop engine.
 - f. Engine hourmeter.
 - g. Engine "ON/OFF/START" switch - for diesel engine.
 - h. Engine throttle.

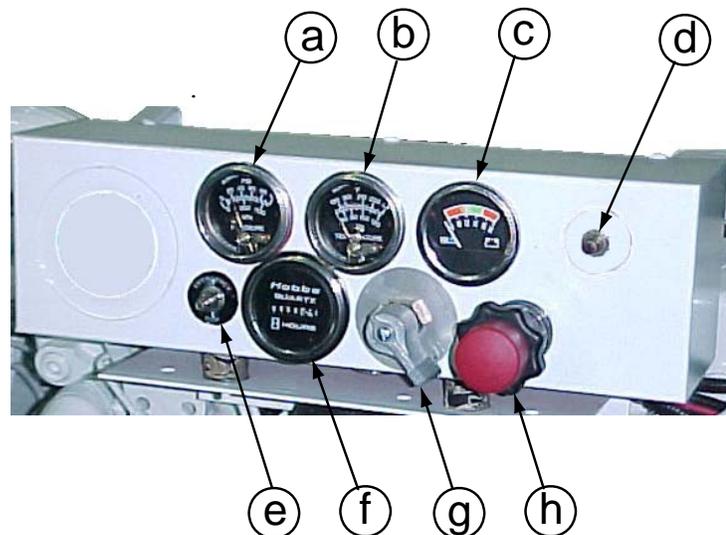


FIG 1 CONTROL PANEL



MODEL 70 HIH
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OPERATING INSTRUCTIONS

III. OPERATING INSTRUCTIONS

C. STARTING AND WARMING UP THE ENGINE

Before starting the engine, read the Caterpillar operation guide carefully. Follow the engine starting, operation and maintenance procedures in that manual.

The diesel engine should not be started if the temperature of the hydraulic oil is below 0°F (-18°C). The temperature may be read at the gage on the hydraulic reservoir. If ambient temperatures below 0°F (-18°C) are anticipated, an immersion heater for the hydraulic oil is available. Consult J&M for details.

Turn the hammer drive FORWARD/OFF/REVERSE switch on the control panel to OFF.

NOTE: Engine will not start unless the hammer switch is in the OFF position.

Pull out the ENGINE THROTTLE about half way.

Hold the shutdown reset button in and turn the ENGINE START SWITCH to START position. Hold the reset button in until the oil pressure reaches 30 psi 2 Bar. If the engine fails to start after 30 seconds of cranking, allow the starter to cool for two minutes before repeating the starting procedure.

As the engine starts, release the ENGINE START SWITCH. It will return to the RUN position.

Adjust the throttle until the engine is running slightly above idle and allow the engine to warm-up for five minutes.

Allow the temperature of the hydraulic oil to come up to at least 30°F (17°C) before starting the hammer.



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OPERATING INSTRUCTIONS

III. OPERATING INSTRUCTIONS

D. WARMING HYDRAULIC OIL

The hydraulic hammer should not be operated at full pressure if the temperature of the hydraulic oil is below 60°F (16°C). Check the temperature gage on the reservoir.

If the temperature of the hydraulic oil is below 60°F (16°C), set the diesel engine at 1500 RPM and run the hammer until the temperature of the hydraulic oil exceeds 60°F (16°C). The engine rpm may now be set to the desired setting.

CAUTION: Do not operate the hammer if the hydraulic oil temperature exceeds 160°F (71°C) as this may damage hydraulic components.

E. OPERATION OF THE HAMMER

The Model 70 hydraulic hammer is a free-fall type hammer. The ram is lifted by the hydraulic cylinder and then allowed to free-fall.

1. Rated Hammer Energy

Rated hammer energy of 24,500 ft-lbs (33.2 kN-m) is achieved at an operating stroke of 3'-6" (1.1 m). Minimum operating energy of 7,000 ft-lbs (9.5 kN-m) occurs at an operating stroke of 1' (.3 m). The energy at which the hammer is operating may be determined by measuring the operating stroke, in feet (m), and multiplying the stroke by the weight of the ram 7,000 lbs (3,175 kg) to get energy in ft-lbs (kN-m).

2. Maximum blows per inch

Driving in excess of 10 blows per inch (25.4mm) is considered practical refusal. Driving in excess of 10 blow per inch is considered improper use and will void the hammer warranty.

3. Stroke Control

Stroke of the Model 70 hammer is controlled hydraulically via the location of the trip valve lever. The hammer may be operated at infinitely variable stroke length within the 3'-6" (1.1 m) to 1' (.3m) limits. The full stroke setting is the normal operating mode for the hammer. The reduced stroke setting is engaged via the control pendant.



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III. OPERATING INSTRUCTIONS

E. OPERATION OF THE HAMMER (CONTINUED)

4. Stroke Setting

Stroke setting is controlled by the CLAMP OPEN-CLOSE switch. The full stroke mode is the normal hammer mode. The hammer will run in at any stroke length as long as the clamp switch remains in the middle, neutral position. To reduce stroke setting, turn the clamp switch to the OPEN position briefly. This will extend the variable stroke cylinder shortening the stroke. When stroke is at the length required, release the clamp switch. The switch will spring return to its neutral position. To lengthen the stroke turn the clamp switch to the CLOSE position briefly. This will retract the variable stroke cylinder lengthening the stroke. When stroke is at the length required, return the clamp switch to its neutral position. The stroke length may be changed while hammer is in operation.

The hammer is controlled by two, two-way switches. These switches are labeled CLAMP OPEN-CLOSE and FORWARD-REVERSE. The switches are labeled in this manner because Model 108 also operates J&M Earth Augers and Vibratory Hammer.



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OPERATING INSTRUCTIONS

III. OPERATING INSTRUCTIONS

F. STARTING THE HAMMER

After choosing the desired stroke setting, the hammer is started by turning the FORWARD-REVERSE switch to the FORWARD position. The hammer will continue to run as long as the switch is in the FORWARD position.

G. STOPPING THE HAMMER

The hammer is stopped by turning the FORWARD-REVERSE switch from the FORWARD position to the neutral position. The hammer may be stopped at any point in its cycle.

H. SINGLE BLOW OPERATION

The hammer can be made to deliver a single blow or a short series of blows using the FORWARD-REVERSE switch. To deliver a single blow, start the hammer as described above and as the ram begins to descend, turn the FORWARD-REVERSE switch back to the neutral position. The ram will fall, delivering a single blow. The hammer may be stopped after delivering any number of blows.

I. EMERGENCY STOP

When the diesel engine is running, pressing the EMERGENCY STOP button on the pendant, energizes the coil on the SHUTDOWN RESET. The Shutdown Reset opens and the engine and the hammer are stopped.

J. ENGINE SHUT DOWN

Stop the hammer. Allow the diesel engine to run for 5 minutes at 1500 RPM. Reduce engine rpm to 1000 RPM for 30 seconds. Stop the engine by turning the ENGINE START switch to OFF. The MAIN SWITCH on the control panel should be OFF.



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OPERATING INSTRUCTIONS

III. OPERATING INSTRUCTIONS

K. HOT & COLD WEATHER OPERATION

Field experience has shown that certain modifications to normal operating procedures can improve hammer performance in hot or cold weather. Use the following procedures in hot weather:

1. DO NOT set engine RPM any higher than is necessary to achieve useful penetration or stroke length. Excessive RPM (oil flow) generates heat.
2. Observe the Drive Pressure Gage while the hammer is operating. The pressure should approach the relief valve setting only momentarily when the ram impacts the pile. If the pressure is observed to remain at, or near, the relief valve setting for a prolonged portion of the operating cycle, reduce engine RPM.
3. When operating at short stroke, reduce engine RPM as far as possible.
4. Be sure that the engine water/anti-freeze ratio is in the recommended range. insufficient or excessive anti-freeze will reduce the cooling capacity of the radiator.
5. Check coolant level regularly and keep full.
6. Be sure that the power unit main relief valve is set at the maximum allowable setting. See Section IV-M.
7. Check the engine radiator and oil cooler often and carefully for dirt, dust or debris. Blow out cooler and radiator with air or a pressure washer whenever a build up is observed to maintain maximum cooling efficiency.
8. Be sure that adjacent structures or equipment are not obstructing air flow into or out of the power unit.



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OPERATING INSTRUCTIONS

III. OPERATING INSTRUCTIONS

K. HOT & COLD WEATHER OPERATION (CONTINUED)

Use the following procedures in cold weather: Below freezing weather calls for particular care so that the hammer is gradually brought up to operating temperature before submitting it to the shock loading of full driving force.

1. Be sure that the engine water/anti-freeze ratio is in the recommended range.
2. Always warm up the engine before applying any load.
3. In very cold weather (below 20°F / -7°C) the use of a reservoir heater is recommended.
4. In extremely cold, arctic, conditions (below 0°F / -18°C) it may be necessary to use a special, Arctic type, hydraulic oil. Consult J&M or your hydraulic oil supplier for recommendations.
5. Consult the Caterpillar engine manual for appropriate, cold weather, engine lubricant.
6. After the engine is warmed up, set engine speed to 1500 RPM. Turn the FORWARD/REVERSE switch to REVERSE for 5 minutes. This will circulate warmer hydraulic oil through, and warm, the Hydraulic Actuator.
7. With the engine running at 1500 RPM, operate the hammer in the short stroke mode for approximately 3 minutes
8. The hammer may now be operated in the long stroke mode at 1500 engine RPM.
9. DO NOT operate the engine above 1500 RPM until the hydraulic oil temperature reaches 60°F (16°C)
10. In extreme cold climates, where 24 hour / day engine running is appropriate, contact J&M for special "Arctic Circuit" information.



MODEL 70 HIH
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OPERATING INSTRUCTIONS

IV. MAINTENANCE AND ADJUSTMENTS

A. GENERAL

Preventive maintenance includes normal servicing that will keep the hydraulic hammer in peak operating condition and prevent unnecessary trouble from developing. This servicing consists of periodic lubrication and inspection of the moving parts and accessories of the unit. J&M equipment is engineered to provide reliable operation and a long service life under normal operating conditions. Equipment reliability and service life can be improved by following the maintenance procedures in this manual.

Lubrication is an essential part of preventative maintenance, controlling to a great extent the useful life of the hammer. Different lubricants are needed and some components require more frequent lubrication than others. Therefore, it is necessary that the instructions regarding types of lubricants and frequency of their application be closely followed.

To prevent minor irregularities from developing into serious conditions that might involve shut-down and major repair, several other services or inspections are recommended for the same intervals as the periodic lubrications. The purpose of these services or inspections is to assure the uninterrupted operation of the hammer. Thoroughly clean all lubrication fittings and caps and their surrounding surfaces before servicing. Prevent dirt from entering with lubricants and fuel.

The intervals given in the schedule are based on normal operation. Perform these services, inspections, etc. more often as needed for operation under abnormal or severe conditions.



MODEL 70 HIH
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OPERATING INSTRUCTIONS

IV. MAINTENANCE AND ADJUSTMENTS

B. MAINTENANCE - DAILY

PRIOR TO STARTING THE POWER UNIT AT EACH SHIFT CHECK THE FOLLOWING ITEMS.

Check wire rope on drive cap for wear, and rope clamps for tightness.

Check for proper slack in wire rope holding drive cap. Adjust for 1"-2" (25mm-51mm) of space between hammer and recoil DAMPENER

Check for loose bolts, nuts, tie-wires or other components. Re-torque bolts and nuts on new hammer after 4 hours.

Check recoil dampener for damage. Dampener should not be less than 1-1/4" (32mm) thick with hammer weight on dampener(See Section II-F).

Check for adequate cushion material (See Section II-F).

Check Engine oil level.

Check engine water level.

Lubricate trip valve lever at pivot and wheel on valve.

Lubricate hammer guide columns.

Torque 12 ram / cylinder rod connection bolts.

Check the oil level in the hydraulic reservoir and refill if necessary.

CAUTION: It is absolutely imperative that no dirt or other impurities be permitted to contaminate the hydraulic oil. Any contamination will drastically shorten the life of the hydraulic system.

Visually check all hoses for signs of damage or cuts that might cause hose failure during operation. Be sure all connections are tight, especially the quick-disconnect couplers.

Electrical components need no maintenance except periodic wiping with a clean, dry, lint-free cloth to remove dust.

Perform all daily maintenance checks and lubrication indicated in the caterpillar operation guide.



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OPERATING INSTRUCTIONS

IV. MAINTENANCE AND ADJUSTMENTS

C. AFTER START-UP, CHECK THE FOLLOWING

Check all hydraulic hoses for leaks. Make sure they hang freely with no kinks.

Check both pumps and all hydraulic manifolds for leaks.

Check the filter indicator. The return filter on the power unit must be checked with the diesel engine running at maximum RPM and oil temperature at or above 60°F (16°C).

D. MAINTENANCE -MONTHLY

Re-Torque ALL hammer bolts per Torque Table Page VIII-52???.

Retorque set screws on cylinder rod super nut.

Inspect ram bumpers at top of stroke.

E. MAINTENANCE - EVERY 4 MONTHS

Have the hydraulic oil tested by a local hydraulic service center. Replace if required.

Disassemble, inspect and lubricate the connection between cylinder rod and the ram.

Check the nitrogen gas charge in both accumulators.

F. ANNUALLY

Remove, inspect, lubricate and re-tension the four wire rope assemblies that hold the hammer together. (Tensioning tool required)

Replace 8 Ram Bearings (P/N 160900).



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OPERATING INSTRUCTIONS

IV. MAINTENANCE AND ADJUSTMENTS

G. SEVERE CONDITIONS

The servicing intervals specified are based on normal operation conditions. Operation under unusual conditions require some adjustments in servicing intervals.

When the average temperature is above 89°F (31°C) or below 10°F (-12°C), reduce servicing intervals to one half of those specified above.

When operating in the presence of dust or sand reduce servicing intervals to one-third of those specified.

When operating in air with a high salt or moisture, the servicing intervals need not usually be changed. However, the unit should be inspected weekly to determine if additional servicing might be required. Have hydraulic oil tested every 2 months.

During stand-by or inactive periods, the servicing interval may be twice those specified. The unit should be exercised every 30 days or less, depending on conditions.

H. LUBRICATION

Diesel Engine (Crankcase)

Follow the engine manufacturer's maintenance schedule and the lubricating oil specifications outlined in the CATERPILLAR OPERATION GUIDE.

The lubricant shall meet the performance requirements of API Service Classification for example "CD" or MIL-L-2104C.

For operation in extreme sub-zero climate, refer to the CATERPILLAR OPERATION GUIDE, Crankcase Lubricating Oils, or contact the nearest Caterpillar representative. (CAT bulletin #SEBU5898-06)

New units are shipped with ASHLAND 400M + HDT, 15W40, but the following multi-grade crankcase oils are recommended for use or replacement in normal operation (10°F to 90°F) (-12°C to 32°C).



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IV. MAINTENANCE AND ADJUSTMENTS

H. LUBRICATION (CONTINUED)

AMOCO	15W-40	300
ARCO	15W-40	Fleet S3 Plus
BORON (BP)	15W-40	Vanellus C Extra
CHEVRON	15W-40	Delo 400
CITGO	15W-40	C500 Plus
CONOCO	15W-40	Fleet Supreme
EXXON	15W-40	XD3
GULF	15W-40	Super Duty Plus
MOBIL	15W-40	Delvac Super
PHILLIPS	15W-40	Super HD II
SHELL	15W-40	Rotella T
SUN	15W-40	Sunfleet Super C
TEXACO	15W-40	URSA Super 3
UNION	15W-40	Guardol
VALVOLINE	15W-40	All Fleet

I. HYDRAULIC OIL

Hydraulic System

To maintain the maximum operating efficiency in the precision parts of the hydraulic system, it is extremely important to eliminate factors which can cause breakdowns or unsatisfactory performance in the system. Among the most common of these factors are rust, corrosion, contamination and products of oil deterioration. Most problems can be minimized or avoided simply by maintaining a disciplined preventive maintenance program.

Some simple steps to follow as part of that program are:

- a. Keep stored oil dry and clean at all times and always store in clean containers.
- b. Always clean tools, spouts, lids, funnels, etc. when used in conjunction with the transfer of oil.
- c. Never put dirty oil into the hydraulic system. Use only clean, uncontaminated oil of the types recommended below. Never return to the system any oil which has leaked out.

CAUTION: When replacing or adding oil, be extremely careful to keep foreign material from entering the system. Foreign material in the hydraulic system can drastically effect the life and operation of many hydraulic component parts.



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OPERATING INSTRUCTIONS

IV. MAINTENANCE AND ADJUSTMENTS

I. HYDRAULIC OIL (CONTINUED)

- d. Clean or replace filter elements at the first indication that they are dirty or ineffective.
- e. Have hydraulic oil tested by the local supplier on a regular basis. Laboratory oil analysis can detect contamination, products of hydraulic component wear, water, oxidation or loss of viscosity long before it is visible to the eye and before significant component damage has occurred.
- f. Prevent water from entering the hydraulic system. Even minute amounts of water in the hydraulic oil will accelerate oil deterioration and oxidation.
- g. DO NOT operate the unit if oil temperature exceeds 160°F (71°C). Excessive hydraulic oil temperature will accelerate oil deterioration and oxidation.

Mixing of different manufacturers' hydraulic oil is not recommended. However, it can be done if the oils are miscible (contain the same base and additive). It may be necessary to contact an oil supplier to determine this.

New power units are shipped with CHEVRON Clarity AW46 hydraulic oil. This oil exceeds the requirements of both the E.P.A. and U.S. Fish and Wildlife Service for non-toxicity and is inherently biodegradable. **ADDING ANY OTHER OIL FROM THE LIST BELOW, WILL CONTAMINATE THE CLARITY OIL AND THE SYSTEM WILL NO LONGER BE ENVIRONMENTALLY FRIENDLY.**

Should the customer choose to use an alternate oil, the following recommendations may be used when replacing oil in the hydraulic system.

FIRST Preference Group:

CHEVRON	Clarity AW46
MOBIL	DTE-15
SUN	2105

SECOND Preference Group:

ARCO	Duro AW46
CHEVRON	Hydraulic AW46
PHILLIPS	Magnus A46
SHELL	Tellus 46



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IV. MAINTENANCE AND ADJUSTMENTS

I. HYDRAULIC OIL (CONTINUED)

THIRD Preference Group:

BORON	Energol HLP46
CITGO	A.W. Hydraulic 46
CONOCO	Super 46
EXXON	Nuto H46
GULF	Harmony 46AW
SUN	Sunvis 846
TEXACO	Rando HD AZ46
UNION	Unax AW46

Whenever oils from the second preference group are used, it is necessary to test the oil more often to insure that viscosity remains within recommended limits while in service. Using oils from the third preference group requires even a more discerning inspection than use of oils from the second group.

The recommended oils were chosen based on the hydraulic system operating temperature range being 5°F (-15°C) (cold ambient start-up) to 160°F (71°C) (maximum operating).

When operating in arctic conditions, it is recommended to use an immersion heater to pre-heat the oil prior to starting. Contact J&M for other arctic operating procedures. It may also be necessary in extremely cold or hot climates to use a different viscosity oil which is better adapted to adverse conditions. Contact the nearest oil supply representative for suggested procedures.

CHEVRON Clarity AW46 hydraulic oil is available from J&M in five gallon cans.

J. CAPACITIES

1. Diesel Engine Crankcase	16	Quarts
2. Hydraulic System (Reservoir)	60	Gallons
3. Fuel Tank Sub-Base (Diesel)	85	Gallons
4. Engine Cooling System	40	Quarts

K. DRAINING AND FILLING HYDRAULIC OIL RESERVOIR

1. The Hydraulic reservoir is drained by removing a plug on the bottom of the reservoir.
2. The hydraulic reservoir is filled by removing the fill cap and pouring hydraulic oil into filler screen. The hydraulic reservoir may also be filled by pumping hydraulic oil through return filter (F2) to insure no dirt enters the hydraulic system.



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IV. MAINTENANCE AND ADJUSTMENTS

L. CHANGING HYDRAULIC RETURN FILTER ELEMENTS

1. The return filter is located on the hydraulic reservoir.
2. To remove the return filter element, you must remove the three bolts that holds the cover. Pull filter element from housing.
3. Clean filter housing with a lint free rag.
4. Install the new filter element. Apply a light coating of multi-purpose grease to each side of gasket, if using a new gasket.
5. Place cover on the filter element and housing and replace the three bolts. Tighten enough to prevent leakage.
6. With a new return filter element installed, start the power unit and run for approximately three minutes. CHECK FOR LEAKS.



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IV. MAINTENANCE AND ADJUSTMENTS

M. SETTING MAIN RELIEF VALVE

1. Locate main relief valve (P/N 170685) on power unit directional control valve. Valve is located behind the large quick disconnects on top of the hydraulic reservoir. See page VIII-31 item 7.
2. While holding the valve adjusting screw with a hex key, loosen the adjusting screw jam nut with an open end wrench.
3. Make an initial adjustment of the screw by turning it approximately 1/8th turn in the desired direction. (Turning the screw clockwise will increase the pressure setting. Turning counter-clockwise will decrease pressure.)

CAUTION: NEVER ADJUST THE RELIEF VALVE WHILE THE SYSTEM IS UNDER PRESSURE.

4. Disconnect the pressure and return (largest) disconnects at the power unit.
5. Start and warm up diesel engine. When engine is warmed up, increase engine RPM to maximum.
6. While observing the DRIVE pressure gage, turn the FORWARD/REVERSE switch to FORWARD. The pressure should read 3000 PSI (207 Bar).
7. If the pressure is not correct, repeat steps 3 thru 8.
8. When the desired pressure is achieved, hold the adjusting screw with a hex key and tighten the adjusting screw jam nut.



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OPERATING INSTRUCTIONS

IV. MAINTENANCE AND ADJUSTMENTS

N. SETTING VARIABLE STROKE CONTROL (CLAMP) RELIEF VALVE

1. Locate stroke control relief valve (P/N 100898) on power unit clamp manifold. Manifold is located behind the small quick disconnects on top of the hydraulic reservoir. See page VIII-35 item 4.
2. While holding the valve adjusting screw with an open end, loosen the adjusting screw jam nut with an open end wrench.
3. Make an initial adjustment of the screw by turning it approximately 1/8th turn in the desired direction. (Turning the screw clockwise will increase the pressure setting. Turning counter-clockwise will decrease pressure.)

CAUTION: NEVER ADJUST THE RELIEF VALVE WHILE THE SYSTEM IS UNDER PRESSURE.

4. Disconnect the variable stroke control (smallest) disconnects at the power unit.
5. Start and warm up diesel engine. When engine is warmed up, increase engine RPM to maximum.
6. While observing the CLOSE pressure gage, turn the CLAMP switch to CLOSE. The pressure should read 1000 PSI (69 Bar).
7. If the pressure is not correct, repeat steps 3 thru 8.
8. When the desired pressure is achieved, hold the adjusting screw with an open end wrench and tighten the adjusting screw jam nut.
9. Do not reset the variable stroke control pressure by adjusting the "Clamp Pressure Switch".

O. TENSIONING WIRE ROPES

1. Clean dirt and excess paint from the threads on the wire rope assembly. Check that the centering nut and the lock nut can be fully threaded onto these threads by hand.
2. Install the wire rope assembly from the bottom plate of the hammer. If the rope gets stuck between the bottom plate and the top plate, it is often helpful to twist the rope while pushing the rope through. After the threaded end of the rope assembly exits the top plate, it will be necessary to hand guide the end of the rope through the lifting bale to the top rope mounting hole. **USE EXTREME CAUTION NOT TO DAMAGE THE THREADS.** Grease the threads.



**MODEL 70 HIH
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OPERATING INSTRUCTIONS

IV. MAINTENANCE AND ADJUSTMENTS

O. TENSIONING WIRE ROPES (CONTINUED)

3. When fully inserted, rotate the wire rope assembly until the anti-rotation roll pin on the wire rope lower fitting slides into the hole in the bottom plate.
4. Thread the centering nut onto the threaded wire rope fitting until it is fully hand tight. Be sure the machined extension on the nut fits into the hole in the lifting bale. Repeat steps 1 thru 4 to all four wire rope assemblies.
5. Install the 1.00-8UNC pulling stud (P/N 160781) into the female threaded hole in the wire rope assembly. Pulling stud must be screwed into the threaded hole as far as it will go.
6. Slide the cylinder support frame (P/N 160737) over the pulling stud and position on the lifting bale.
7. Slide tensioning cylinder (P/N 160783) onto pulling stud and secure with two nuts (P/N 400051). Tighten nuts to remove "slack" from the wire rope. When tightening this 1.00-8UNC nut, hold rope from turning with the flats on the threaded rope fitting.
8. Connect a hydraulic hand pump (P/N 160785), with gage, to the tensioning cylinder.
9. Operate hand pump, extending cylinder, until gage reads 6,800 PSI (469 Bar) (12 ton).
10. Tighten the centering nut onto the lifting bale by hand.
11. Retract the extending cylinder, re-tighten the 1" nuts, and repeat steps 9 - 11 until correct tension (step 9) is achieved.
12. Remove the tensioning cylinder, pulling stud and cylinder support frame.
13. While holding the centering nut, thread the locking nut onto the threaded rope fitting and fully tighten against the centering nut. Repeat steps 5-13 to all 4 wire rope assemblies.

THE TOOLS LISTED ABOVE ARE INCLUDED IN WIRE ROPE TENSIONING KIT (P/N 810713).



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IV. MAINTENANCE AND ADJUSTMENTS

P. CHARGING ACCUMULATORS

CAUTION: DO NOT CHARGE (FILL) ACCUMULATORS WITH ANY OTHER GAS THAN NITROGEN. DO NOT ATTEMPT TO DISASSEMBLE EITHER ACCUMULATOR WITHOUT REMOVING (VENT) THE ENTIRE GAS CHARGE.

1. Connect the charging kit (P/N 810833) to a 2000+ PSI (138 Bar) nitrogen gas bottle.
2. Unscrew the dirt cover from the accumulator gas valve.
3. Connect accumulator adapter assembly (charge kit) to the accumulator, gas valve, to be charged.
4. Screw in (CW) "T" screw, on accumulator adapter assembly to depress (open) the accumulator gas valve.
5. Read the existing accumulator charge pressure on the charge kit gage. See page V-4 ???for correct pressures.
6. To increase charge pressure, carefully "crack" open the nitrogen gas bottle valve until the charge kit gage pressure reaches the specified pressure level.

CAUTION: DO NOT OPEN NITROGEN VALVE RAPIDLY, AS GAS BOTTLE PRESSURE MAY EXCEED ACCUMULATOR PRESSURE RATING.

7. To decrease charge pressure, open the bleed valve, on the accumulator adapter, until the charge kit gage reaches the specified pressure level.
8. After the desired charge pressure has been attained, allow the system temperature to stabilize for 10 to 15 minutes, then recheck the charge pressure.
9. Unscrew the "T" screw, on accumulator adapter assembly to close the accumulator gas valve.
10. Remove charge kit and re-install the gas valve dirt cover.



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IV. MAINTENANCE AND ADJUSTMENTS

Q. REPLACING RAM CONNECTION

Lay hammer down on flat surface or dunnage, with the trip bar up.

Loosen the set screws, in the super nut (P/N 160313).

Remove 12 3/4" SHCS in the top plate (P/N 160962) holding the cylinder rod in the ram.

Push the cylinder rod into the actuator cylinder until the threaded end of the cylinder rod is well clear of the ram.

Remove the nylon insert (P/N 160956), the two elastomers (P/N 160964) the two back-up rings (P/N 160966) and the bottom plate (P/N 160960) from the ram cavity.

Remove the rod flange (P/N 160958), the super nut, the other nylon insert and the top plate (P/N 160962) from the cylinder rod.

Carefully clean and lubricate the threads on the cylinder rod, the super nut and the rod flange. All nuts should thread onto the cylinder rod by hand. Clean any grime or loose pieces from cavity.

Place the top plate and one of the nylon inserts on the cylinder rod without touching or marking threads.

Thread the super nut onto cylinder rod, with the hex heads up (toward the top plate), until the top of the nut is approximately 1.25 inches from the top end of the cylinder rod threads.

Thread the rod flange, with the flange end down, onto the cylinder rod until it contacts the super nut.

Torque super nut set screws to 233 Ft-Lbs (32.2Kg-M) (torque wrench required) in a circular pattern. Increase torque value in three equal steps. Re-check the final torque values at least three times to be sure it is not affected by adjacent screws.

Re-install bottom plate, the back-up rings, the elastomers, the other nylon insert and all of the insert spacers in the cavity of the ram.

Apply Hi-Molly grease to both sides of the rod flange.

Slide cylinder rod assembly in the ram cavity until the rod flange comes in contact with the nylon insert.

Position the other nylon insert on the insert spacers and then the top plate. Line up bolt holes, thread and torque all 12 SHCS.



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IV. MAINTENANCE AND ADJUSTMENTS

R. BOLT TORQUE INFORMATION

The only way to actually tighten high strength bolts is with a torque wrench. Proper use of the torque wrench is important. To obtain the listed torques, a steady pull should be exerted to the handle until the desired torque is reached.

The following torque specifications apply to the bolts from the component assemblies listed. Whenever any of these bolts, are replaced, the given torque specifications should be adhered to.

LIFTING BALE Page VIII-6

Item 72 5/8"-11 234 Ft-Lbs (32.3Kg-M)

Item 35 1"-8 1009 Ft-lbs (139.4Kg-M)

RAM ASSEMBLY Page VIII-8

Item 20 3/4"-10SHCS 417 Ft-Lbs (57.6Kg-M)

ACTUATOR MOUNTING Page VIII-9

Item 4 3/4"-10SHCS 417 Ft-Lbs (57.6Kg-M)

ACTUATOR ASSEMBLY Page VIII-14 & 15

Item 7 3/8"-16 48 Ft-Lbs (6.6Kg-M)

Item 3, 30, 37 1/2"-13 119 Ft-Lbs (16.4Kg-M)

Item 14, 23, 34 3/4"-10 417 Ft-Lbs (57.6Kg-M)



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IV. MAINTENANCE AND ADJUSTMENTS

S. CHECKING & REPLACING RECOIL DAMPENER

The thickness of a new recoil dampener with hammer weight on dampener is 1 1/2"(38mm). If the thickness is less than 1 1/4"(32mm), the dampener should be replaced.

To replace recoil dampener: Loosen wire rope holding drive cap to hammer. Pick up hammer to allow old dampener to be removed. Replace with new dampener. Re-tighten clamps on wire rope. Wire rope should be adjusted so that with hammer lifted 1-2"(25-50mm) gap exists between recoil dampener and hammer base plate.

See FIG 3, Page II-7, for location of recoil dampener

T. CHECKING & REPLACING CUSHION MATERIAL

With new cushion material, the striker plate flange should be 2" (45mm) above the top of a Drive Cap. If this dimension is reduced by more than 1/2"(13mm), replace the cushion material.

See Section II F Page II-6 ATTACHMENT OF DRIVECAP for instructions on replacing cushion material.



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V. HYDRAULIC CIRCUITRY

A. DRIVE PUMP

With the diesel engine running, hydraulic oil is taken from the reservoir by the drive pump (P1). The drive pump flow returns to the reservoir as long as the drive switch remains in its NEUTRAL position.

Turning the FORWARD/REVERSE switch to FORWARD operates the DIRECTIONAL CONTROL VALVE (V1B) directing the pump flow to the hammer through a 1.25" hose. Hammer operating pressure is indicated by the drive PRESSURE GAGE (GA1). Maximum drive pressure is limited to approximately 3000 PSI (207 Bar) by the drive pressure RELIEF VALVE (RV1). The quick-disconnect couplings (QD1 and QD2) permit de-coupling of the drive hoses at the power unit.

The CONTROL VALVE (V3), in the hammer, sends the pump flow directly to the lower (rod end) of the CYLINDER (CY1). The CONTROL VALVE also sends pressure to the DUMP VALVE (DV) holding it closed. The ram lifts. Additional hydraulic oil, stored under pressure in the PRESSURE ACCUMULATOR (A1), adds to the pump flow causing an upward velocity of the ram that is greater than the pump flow, alone, would generate. As the CYLINDER raises the ram, oil in the upper (blind end) of the CYLINDER is exhausted back to the power unit through a 1.25" return hose. Flow resistance in the return hose causes a portion of this exhaust flow to be, temporarily, stored in the TANK ACCUMULATOR (A2).

As the ram nears the top of its stroke, the trip bar activates the TRIP VALVE (V4), which is hydraulically connected to the main pump flow via check valve CV6. Activating the TRIP VALVE directs a pressure signal to shift the CONTROL VALVE (V3). Pump flow is disconnected, and blocked, from the rod end of the CYLINDER when the CONTROL VALVE shifts. Shifting the CONTROL VALVE also removes pressure from the DUMP VALVE, which opens, and allows the ram to fall. High upward velocity of the ram, however, causes it to continue upward movement, decelerating, even after the DUMP VALVE is opened. While the CYLINDER is decelerating to a stop, the rod end is kept full of oil by REPLENISHMENT CHECK valve (CV4).



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V. HYDRAULIC CIRCUITRY

A. DRIVE PUMP (CONTINUED)

After the upward movement of the ram stops, it begins to fall because the DUMP VALVE is already open. While the ram is falling, and during the deceleration phase of the cycle, pump flow is stored in the PRESSURE ACCUMULATOR. While the ram is falling, the CONTROL VALVE is held in its shifted position by a pilot signal generated by the DUMP VALVE. Oil exiting the DUMP VALVE, at high speed, goes directly to the blind end of the CYLINDER and does not restrict the downward movement of the ram. When the ram impacts the pile, the downward movement of the cylinder stops, and the pilot signal is removed from the CONTROL VALVE. A spring returns the CONTROL VALVE to its normal (lift) position, and another lift cycle begins. The CYLINDER will continue cycling, as described above, until the DIRECTIONAL CONTROL VALVE (V1A) is de-energized by returning the FORWARD/REVERSE switch to the NEUTRAL position. When the trip valve is activated by the trip bar, a pilot pressure signal is sent to the CONTROL VALVE (V3) pilot piston, shifting the CONTROL VALVE. The balance of the cycle is the same as in the long stroke position, above.

B. STROKE CONTROL PUMP

With the diesel engine running, hydraulic oil is taken from the reservoir by the stroke control pump (P2). The stroke control pump oil returns to the reservoir if the clamp switch is in the NEUTRAL position. Returning oil is filtered by the return filter (F1).

Turning the clamp switch to CLOSE retracts the variable stroke cylinder (CLY2). Returning the switch to neutral allows the hammer to run at that stroke length. Turning the clamp switch to OPEN momentarily, extends the variable stroke cylinder (CLY2). Pressure is indicated by the pressure gage (GA-2). Pilot pressure in the stroke control circuit is limited to 1000 PSI (69 Bar) by the STROKE RELIEF valve (RV2). Adequate pressure to extend and retract the variable stroke cylinder is insured by relief valve (RV2).

The quick-disconnect coupler (QD3 and QD4) permits de-coupling of the stroke control hose at the power pack.

The stroke control pump also provides the pilot flow for control valve (V1A). This pilot flow is directed to DIRECTIONAL CONTROL VALVE (V1B) when the FORWARD/REVERSE switch is turned to FORWARD. Pressure is indicated by the pressure gage (GA4). Pilot pressure in the directional control pilot circuit is limited to 500 PSI (34.5 Bar) by the PILOT RELIEF valve (RV3).



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V. HYDRAULIC CIRCUITRY

C. OTHER

Returning oil is filtered by the return filter (F1) before entering the reservoir. INDICATOR GAGE (GA5) shows condition of FILTER (F1).

The shut-off VALVE (MV1) may be closed to permit removal of the PUMP (P1) and shut-off VALVE (MV2) may be closed to permit removal of PUMP (P2) without draining the reservoir. CAUTION: DO NO start engine with MV1 or MV2 closed.

The oil cooler (HE) cools the hydraulic oil returning from the hammer.

Check valve CV8 and orifice OF2 control the movement of the DUMP VALVE, allowing rapid closing and slower opening.

CONTROL VALVE orifice OF1 provides controlled leakage of pilot signals.

Check valve CV7 prevents loss of pilot pressure signal into the CONTROL VALVE.



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V. HYDRAULIC CIRCUITRY

D. HYDRAULIC COMPONENT LIST

<u>Notation</u>	<u>Description</u>	<u>Part Number</u>	<u>Page Number</u>
A1	Pressure accumulator	160950	VIII-11
A2	Tank accumulator	160950	VIII-11
CV1	Clamp check valve	110149	VIII-35
CV4	Replenishment check valve Asm	810683	VIII-16
CV6	Trip valve supply check valve	160323	VIII-16
CV7	Control valve check valve	160323	VIII-19
CV8	Dump valve check valve (in cover)	160939	VIII-16
CYL1	Ram lifting (Actuator) cylinder	810819	VIII-14
CYL2	Variable stroke cylinder	160817	VIII-11
DV	Dump valve	810701	VIII-16
E	Diesel engine	170443	VIII-31
F1	Return filter	170437	VIII-31
GA-1	Drive pressure gage	400850	VIII-32
GA-2	Close clamp pressure gage	400850	VIII-35
GA-3	Open clamp pressure gage	400850	VIII-35
GA-4	Pilot pressure gage	400856	VIII-32
GA-5	Return filter gage	100436	
HE	Oil Cooler	170441	VIII-31
MV1	Shut-off valve	170435	VIII-31
MV2	Shut-off valve	170433	VIII-31
OF1	Control valve orifice	810777	VIII-19
OF2	Dump valve orifice	810827	VIII-17
P1	Drive Pump	170699	VIII-33
P2	Stroke control pump		VIII-33
QD1	Hammer pressure disconnect	170413	VIII-31
QD2	Hammer return disconnect	170415	VIII-31
QD3	Shorten stroke disconnect	100777	VIII-31
QD4	Lengthen stroke disconnect	100245	VIII-33
RV1	Drive relief valve		VIII-31
RV2	Stroke relief valve	100898	VIII-35
RV3	Pilot relief valve	170421	VIII-31
V1A	Directional flow control valve	170685	VIII-31
V1B	Directional pilot control valve	400786	VIII-33
V2	Stroke control valve	130033	VIII-35
V3	Control valve	810621	VIII-18
V4	Trip valve	810815	VIII-11



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VI. ELECTRICAL CIRCUITRY

A. DIESEL ENGINE

The BATTERY provides 12 volt current to start the diesel engine. With the FORWARD-REVERSE switch turned to OFF, turning the ENGINE START SWITCH to START energizes the START RELAY which energizes the START MOTOR and turns over the diesel engine. If fuel is available, the diesel engine will start. In order for fuel to be available to the engine, the SHUTDOWN RESET must be closed to energize the FUEL SOLENOID. The FUEL SOLENOID opens the fuel rack and allows fuel to flow to the engine. With the diesel engine running, the AMMETER indicates charging amperes. The HOUR METER indicates engine operating hours.

A system of safety controls shuts off the fuel supply, thereby stopping the diesel engine, in the event that engine water temperature is too high or engine oil pressure is too low. The heart of the safety system is the SHUTDOWN RESET which is normally closed, thereby providing current to operate the HOUR METER and to energize the fuel rack and allows fuel to flow to the diesel engine. The SHUTDOWN RESET must remain closed so that fuel continues to flow to the diesel engine.

If the coil in the SHUTDOWN RESET is momentarily energized, the SHUTDOWN RESET will open shutting off the fuel to the diesel engine. The engine will stop. The coil may be energized by any one of the following devices:

1. Engine Oil Pressure Gage - If oil pressure is below 15 PSI (1 Bar), the contacts of the gage will be closed providing current to energize the coil. On start-up, the reset button of the SHUTDOWN RESET (on the control panel) must be held until oil pressure exceeds 30 PSI (2 Bar).
2. Engine Water Temperature Gage - If water temperature exceeds 210°F (99°C), the contacts of the gage will close energizing the SHUTDOWN RESET coil.
3. Emergency Stop: - Pressing the emergency stop button, on the remote pendant, or control panel will energize the SHUTDOWN RESET coil.

The diesel engine is stopped by turning the ENGINE START SWITCH to OFF. This will de-energize the FUEL SOLENOID shutting off the fuel to the engine. Turning the ENGINE START SWITCH to OFF also disconnects all other electrical circuits.



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VI. ELECTRICAL CIRCUITRY

B. STROKE RANGE SELECT

With the diesel engine running and the MAIN POWER switch ON, turning the Clamp switch (OPEN-CLOSE) to OPEN energizes the open-clamp solenoid (OPEN SOL). This extends the variable stroke cylinder, fully extending this cylinder puts the hammer in minimum stroke mode. Release the switch to the neutral position, for regular operation. This is the recommended starting position.

With the diesel engine running and the MAIN POWER switch ON, turning the Clamp switch (OPEN-CLOSE) to CLOSE energizes the close-clamp solenoid (CLOSE SOL) on the clamp valve (V2). This retracts the variable stroke cylinder, fully retracting this cylinder puts the hammer in full stroke mode. Returning the switch to the neutral position. De-energizes the close clamp solenoid and holds the stroke control cylinder at the desired position.

Adjusting the position of the variable stroke cylinder to where the stroke length most adequately suits the job conditions. This can be done at any time as described above.

C. HYDRAULIC HAMMER

With the diesel engine running and the MAIN POWER switch ON, turning the hammer switch (FORWARD-REVERSE) to FORWARD energizes the hammer-start solenoid (V1A) on the DIRECTIONAL CONTROL valve. The DIRECTIONAL CONTROL valve shifts, sending hydraulic oil to the hammer and the hammer begins to run. Turning the hammer switch to the OFF position will stop the hammer from lifting again.

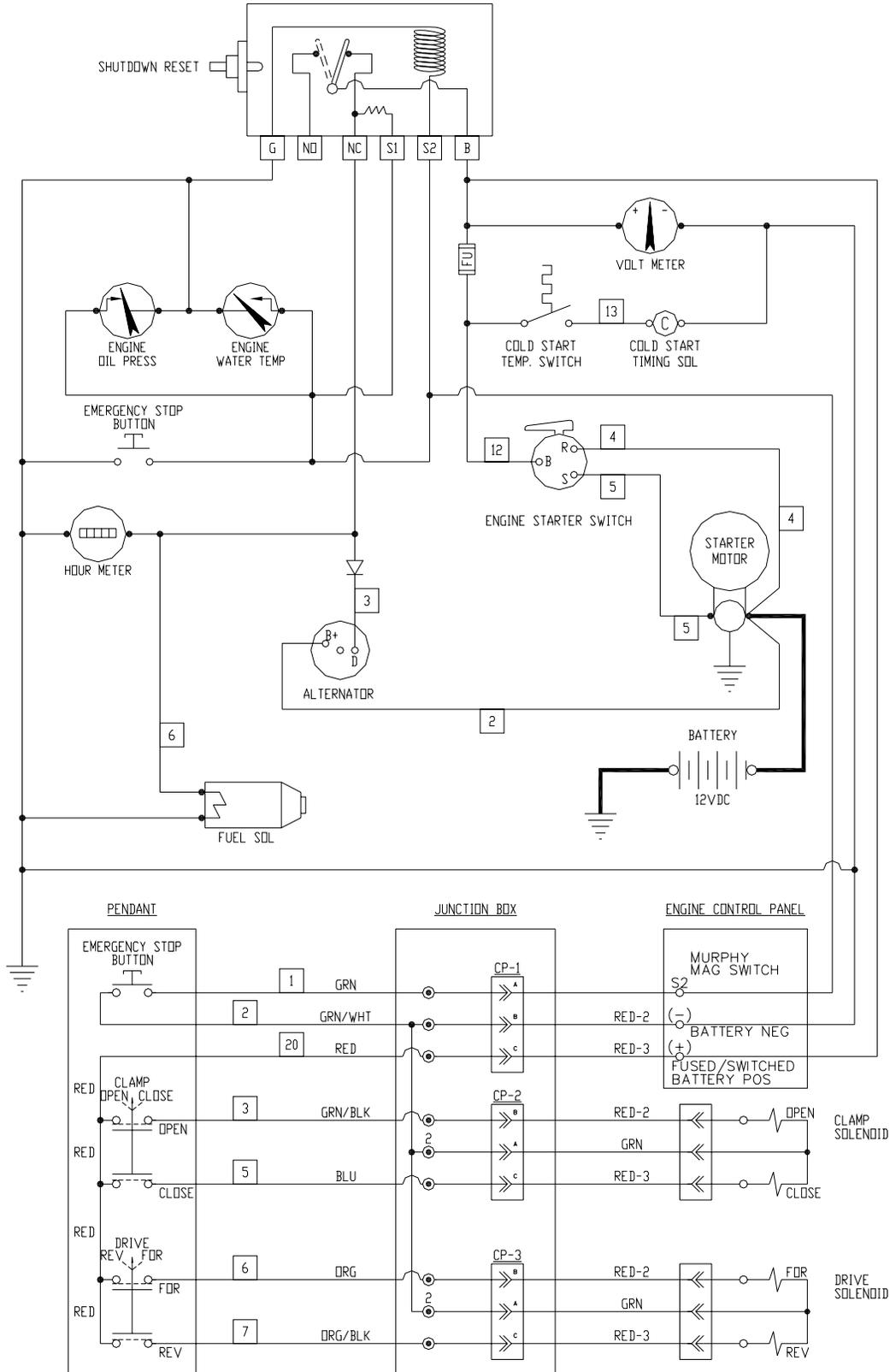


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ELECTRICAL SCHEMATIC





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VI. ELECTRICAL CIRCUITRY

E. ELECTRICAL COMPONENTS LIST

<u>NOTATION</u>	<u>REFERENCE</u>	<u>PART NUMBER</u>
ALTERNATOR	Battery charging alternator	See Caterpillar Parts Book
AMMETER	Ammeter	110371
BATTERY	12-volt battery	400890
CLOSE SOL.	Close-clamp solenoid	130033
EMERG STOP	Emergency stop button	130507
ENGINE OIL PRESS	Engine oil pressure switch and gage	100329
ENGINE WATER TEMP	Engine water temperature switch and gage	130251
ENG. START SW.	Engine start switch	130259
FORWARD	Hammer start solenoid	
FUEL SOL	Fuel valve solenoid	See Caterpillar Parts Book
HOUR METER	Hour Meter	100343
OIL PRESSURE	Oil pressure gage-switch	100329
OPEN-CLOSE	Clamp switch	130155
OPEN SOL.	Open-clamp solenoid	130033
SHUTDOWN RESET	Engine Saftey Shutdown	130257
START MOTOR	Engine starter	See Caterpillar Parts Book



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PARTS LIST

VII GENERAL DATA

A. ABBREVIATIONS

The abbreviations shown below are used throughout the parts lists and various other parts of the manual.

ASM.	Assembly
BHCS	Button Head Cap Screw
Cyl.	Cylinder
DC	Direct Current
FHCS	Flat Head Cap Screw
FLCS	Flanged Head Cap Screw
Gr	Grade
HC	High Collar
HHCS	Hex Head Cap Screw
HHPP	Hex Head Pipe Plug
HSSS	Hex Socket Set Screw
Hyd.	Hydraulic
ID	Inside Diameter
Lg.	Long
mm	Millimeter
Mtg.	Mounting
NPT.	National Pipe Thread
OD	Outside Diameter
PHMS	Phillips Head Machine Screw
P/N	Part Number
Qty.	Quantity
RHMS	Round Head Machine Screw
Sch.	Schedule
SHCS	Socket Head (Allen) Cap Screw
SHPP	Socket Head Pipe Plug
SHSS	Socket Head Shoulder Screw
S/N	Serial Number
Sol.	Solenoid
UNF	Unified National Fine thread
UNC	Unified National Course thread



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PARTS LIST

VII. GENERAL DATA

B. SCREWS AND BOLTS

1. Practically all connections on the unit are made with socket head (Allen) cap screws. These high-strength screws are available at most industrial supply houses.
2. Screws and bolts are designated in the PARTS LIST in abbreviated form. (Refer to sub-section A, above, for specific abbreviations). Listed below is a typical screw description: .50 - 13 UNC x 1.50 Lg SHCS

.50 = Diameter 13 UNC = Threads Per Inch
1.50 Lg = Length SHCS = Screw Type Abbreviation

3. Some screws or bolts require a specific torque when replacing. For identification of these bolts and a more thorough understanding of torque, refer to page IV-14???

C. SERIAL NUMBER LOCATIONS

1. The following J&M units are serial numbered separately:
 - a. Impact Hammer
 - b. Power Unit
2. In addition to the serial number plate itself (on impact hammers and power units), the serial number is stamped into each unit in one or more places as follows:
 - a. Impact Hammer stamped twice - once on the base of the transfer tube, once on the top plate near trip bar.
 - b. Power unit stamped twice - once on control panel side of unit at upper right corner of reservoir, once on sub-base near the battery.



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PARTS LIST

VIII. ORDERING PARTS

A. PROCEDURE

1. When ordering parts, be sure to include the model and serial number of the unit or component. The serial number may be located by referring to SECTION VII, SERIAL NUMBER LOCATION. Confirm all telephone orders immediately to avoid duplicating shipment.
2. ORIGINAL EQUIPMENT; Where component serial numbers are given, these apply only to equipment and components originally furnished with the unit. Where equipment has been changed or upgraded these numbers may not be an adequate description.
3. SHIPMENT; Specify shipping address, phone number, billing address and method of shipment. UPS and air express shipments must have street address for delivery. All shipments will be made freight collect unless instructed otherwise.
4. SHORTAGES; Claims for shortages, damage or errors should be made immediately upon receipt of parts. No responsibility will be assumed for delay, damage or loss of material while in transit. Broken, damaged or lost material should be refused or a full description made of damage or loss to the carrier agent on the freight or express bill.
5. RETURN OF PARTS; If for any reason you desire to return parts to the factory or to any distributor from whom these parts were obtained, you must first secure permission to return the parts. Shipping instructions will be given along with this permission. A fifteen percent handling charge must be assessed against the returned shipment unless an error is made by the factory or by the distributor when filling your order.



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PARTS LIST

VIII. ORDERING PARTS

B. FITTING DESCRIPTION KEY

A Fitting Description code is used to describe all fittings in the Parts Identification section of this manual. The key below explains the structure of the code number in detail.

<p style="text-align: center; margin-bottom: 0;"><u>FITT</u> 2 L - 16 M 12 J 00 0 - 00L 0 0 0 1</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><u>SELECTOR INDEX</u> 2 - INCH FITTING 9 - METRIC FITTING</p> <p><u>CONFIGURATION OR SHAPE OF FITTING</u> S - STRAIGHT FITTING L - 90 Deg. ELBOW V - 45 Deg. ELBOW T - TEE C - CAP P - PLUG U - UNION X - CROSS (FOURTH END FITT'G REQ'D.)</p> <p><u>FIRST END SIZE</u> * IN 1/16THS OF AN INCH (INDEX 2) IN MILLIMETERS (INDEX 9) SEE GENERAL SPECIFICATION SHEET FOR SEQUENCE OF ORDER</p> <p><u>FIRST END FITTING STYLE</u> SEE FITTING STYLE SELECTOR CHART SC-1</p> <p><u>SECOND END SIZE</u> IF APPLICABLE - SEE FIRST END SIZE</p> <p><u>SECOND END FITTING STYLE</u> IF APPLICABLE - SEE FIRST END FITTING STYLE</p> <p><u>THIRD END SIZE</u> IF APPLICABLE - SEE FIRST END SIZE</p> <p><u>THIRD END FITTING STYLE</u> IF APPLICABLE - SEE FIRST END SIZE</p> <p><u>* EXCEPTIONS</u> 90 = 10" 96 = 6" 92 = 12" 98 = 8" 94 = 14" 99 = NON CODE SIZE</p> </div> <div style="width: 45%;"> <p><u>MATERIAL</u> 1 - CARBON STEEL 2 - BRASS 4 - STAINLESS STL 5 - AAR MAL IRON 6 - MALEABLE IRON 8 - FORGED STEEL</p> <p><u>SPECIAL NOTATIONS</u></p> <p><u>PRESSURE RATING</u> 0 - NONE 1 - 125 LB. 3 - SCH 40 4 - SCH 80</p> <p><u>INSTALLATION AID OR STYLE OF HEAD</u> 0 - NOT APPLICABLE H - REGULAR HEX Q - SQUARE HEAD (EXT.) R - SQUARE HEAD (INT.) S - HEX HEAD (INT SOCKET) T - HEX HEAD (EXT.)</p> <p><u>LENGTH CODE</u> (ELBOWS & NIPPLES) __L - LONG (ELBOW) __X - EXTRA LONG (ELBOW) __C - CLOSE (NIPPLE)</p> <p>PIPE NIPPLES (LONG) ONLY IN DEC. INCHES FOR INDEX 2 050 = 5.0 INCHES 105 = 10.5 INCHES</p> <p>IN MILLIMETERS FOR INDEX 9 120 = 12.0 MILLIMETERS 084 = 8.4 MILLIMETERS</p> <p><u>FOURTH END SIZE & FITTING STYLE</u> (CROSSES ONLY) SEE FIRST END FITTING SIZE OR END STYLE</p> </div> </div>	
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PARTS LIST

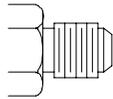
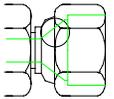
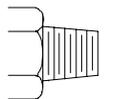
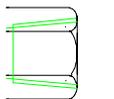
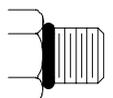
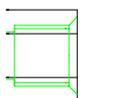
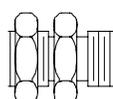
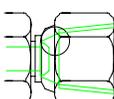
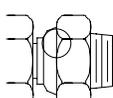
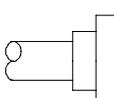
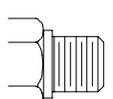
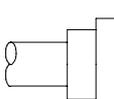
VIII. ORDERING PARTS

B. FITTING DESCRIPTION KEY (CONTINUED)

FITTING STYLE SELECTOR CHART

SC-1

FOR END FITTING STYLE SELECTION

M		JIC MALE 37 Deg. FLARE	J		JIC FEMALE 37 Deg. FLARE (& SWIVEL)
P		MALE PIPE NPT	Q		FEMALE PIPE NPTF
R		S.A.E. MALE O-RING (& ADJUSTABLE)	K		S.A.E. FEMALE O-RING
B		JIC MALE 37 Deg. FLARE BULKHEAD	N		FEMALE PIPE NPSM-SWIVEL
D		MALE PIPE NPT SWIVEL	F		SPLIT FLANGE 3000 PSI. CODE 61
S		B.S.P. MALE PIPE	H		SPLIT FLANGE 6000 PSI. CODE 62



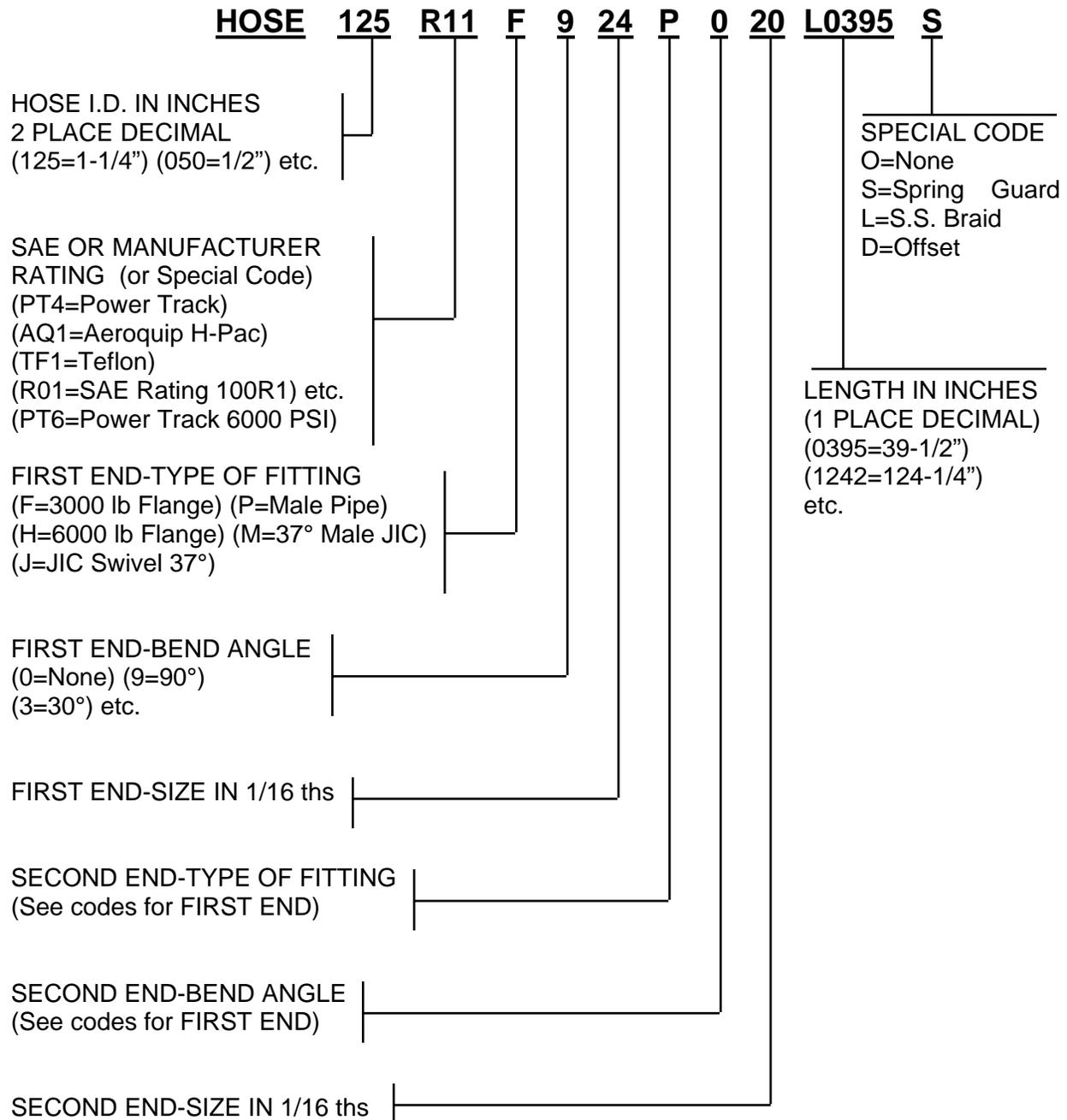
**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

VIII. ORDERING PARTS

C. HOSE DESCRIPTION CODE

The HOSE DESCRIPTION CODE is a 24 digit number enabling easier and quicker identification whenever a hose replacement is desired. The key below explains the structure of the coded number in detail.





**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

VIII. ORDERING PARTS

D. PARTS IDENTIFICATION

1. Parts lists and drawings are included on the following pages for the equipment components shown below:

a. Impact Hammer Asm	800543	VIII-6
b. Actuator Asm	810819	VIII-14
c. Control Valve Asm	810621	VIII-18
d. Check Valve Asm	810683	VIII-16
e. Din Cartridge Asm	810701	VIII-21
f. 20" Lead Guides	800557	VIII-22
g. 26" Lead Guide Spacer Kit	800832	VIII-24
h. Hose Assemblies - Interconnecting	175059	VIII-25
i. Power Unit	175057	VIII-26
j. Clamp Manifold Asm	173019	VIII-34

2. The spare parts list SECTION VIII - RECOMMENDED SPARE PARTS contains spare parts which may be very useful in keeping down-time to a minimum, especially in remote or secluded job sites where unforeseen communication problems could cause delay of the delivery of an awaited part.

These RECOMMENDED SPARE PARTS may be ordered beforehand, individually or as a package group as shown in the PARTS LIST.

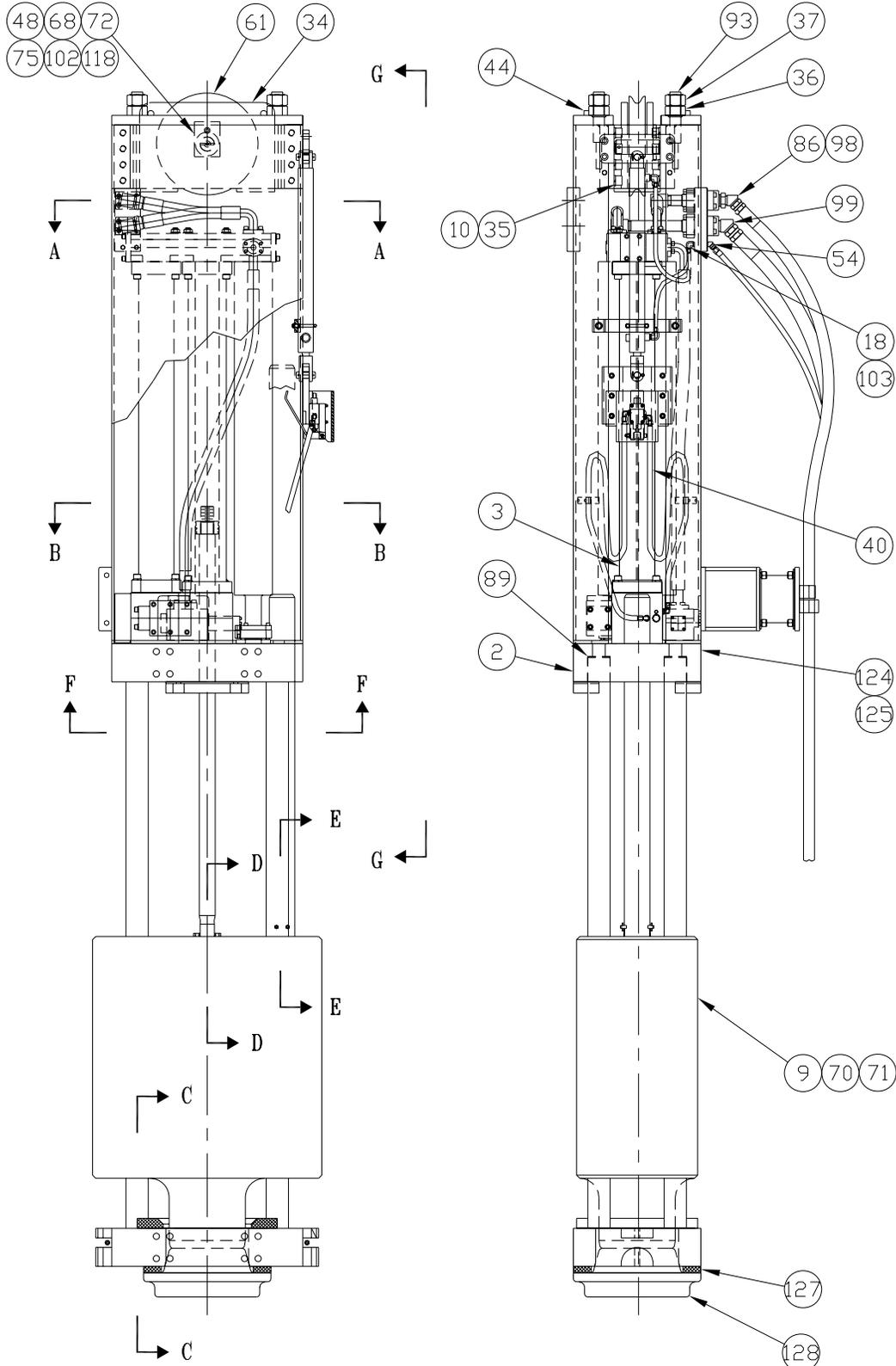


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

IMPACT HAMMER ASM

800543



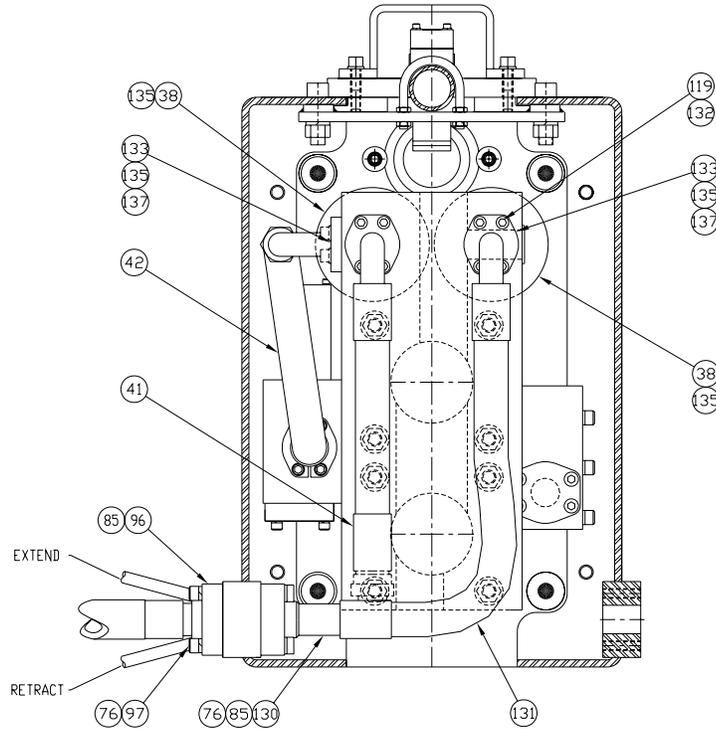


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

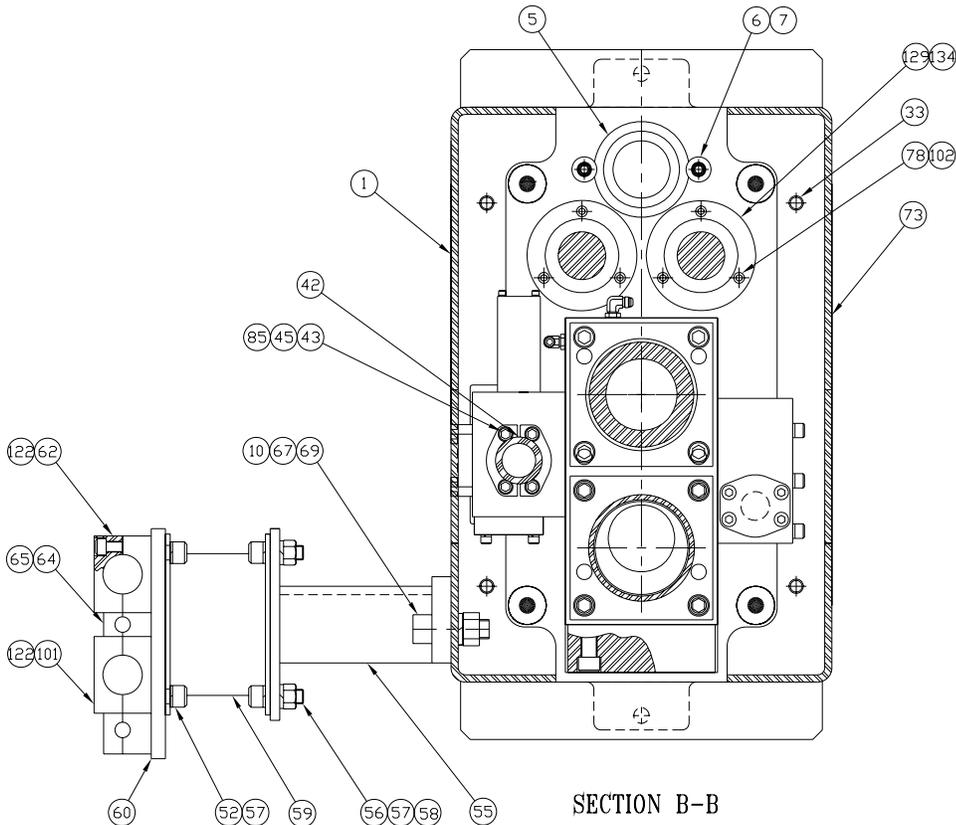
PARTS LIST

IMPACT HAMMER ASM

800543



SECTION A-A



SECTION B-B

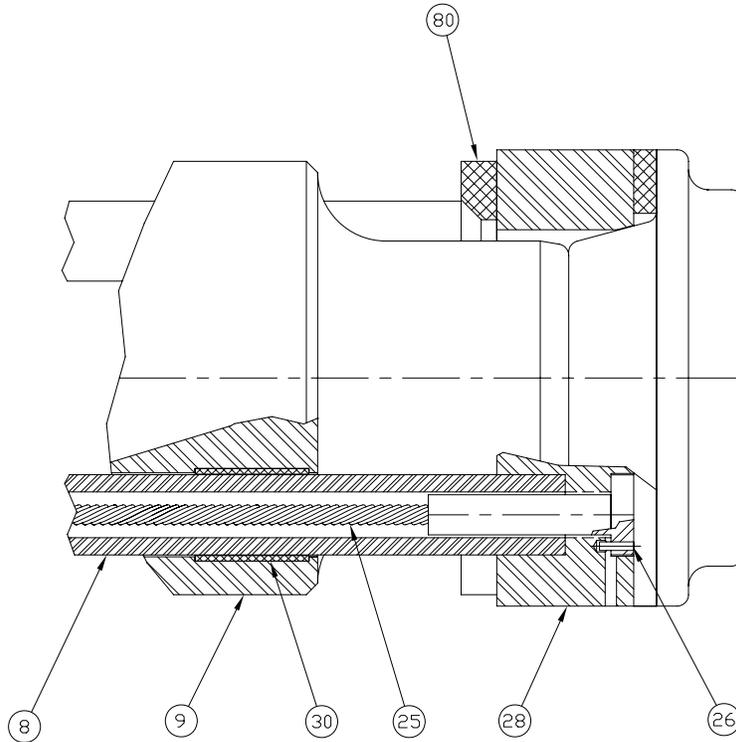


MODEL 70 HIH
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IMPACT HAMMER

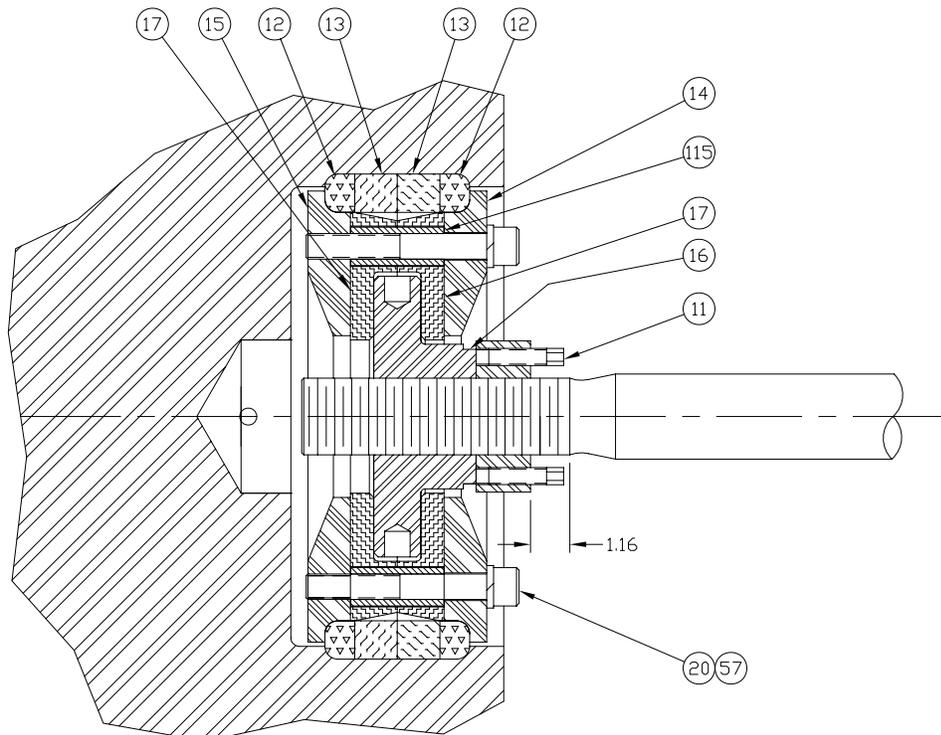
PARTS LIST

IMPACT HAMMER ASM

800543



SECTION C-C



SECTION D-D

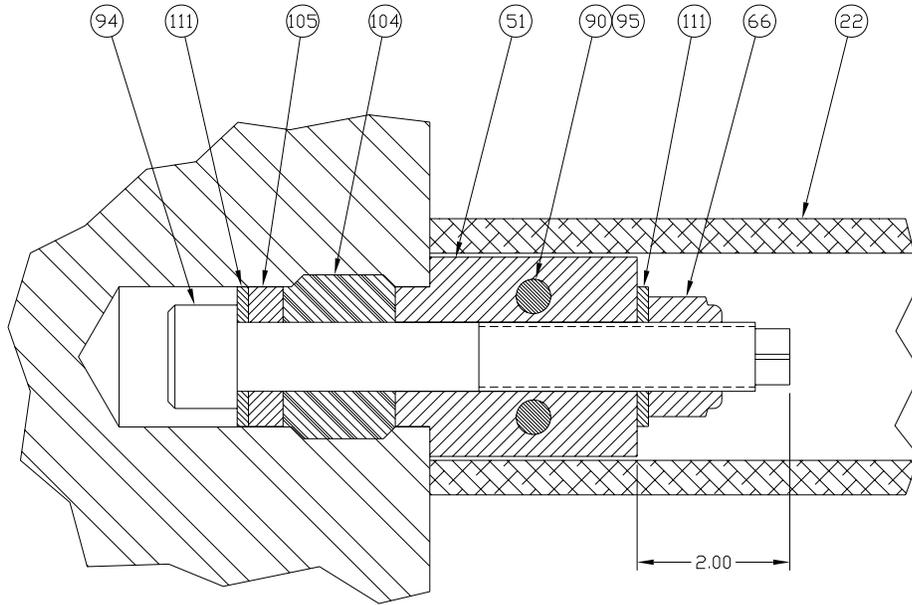


MODEL 70 HIH
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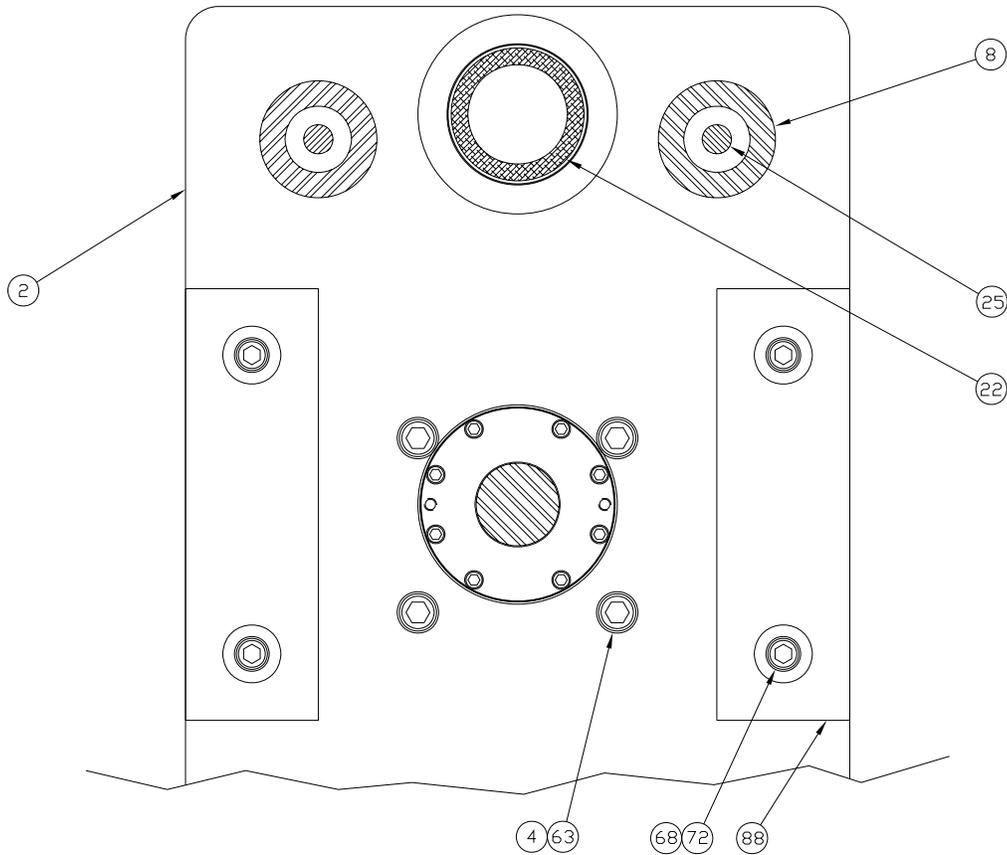
PARTS LIST

IMPACT HAMMER ASM

800543



SECTION E-E



SECTION F-F

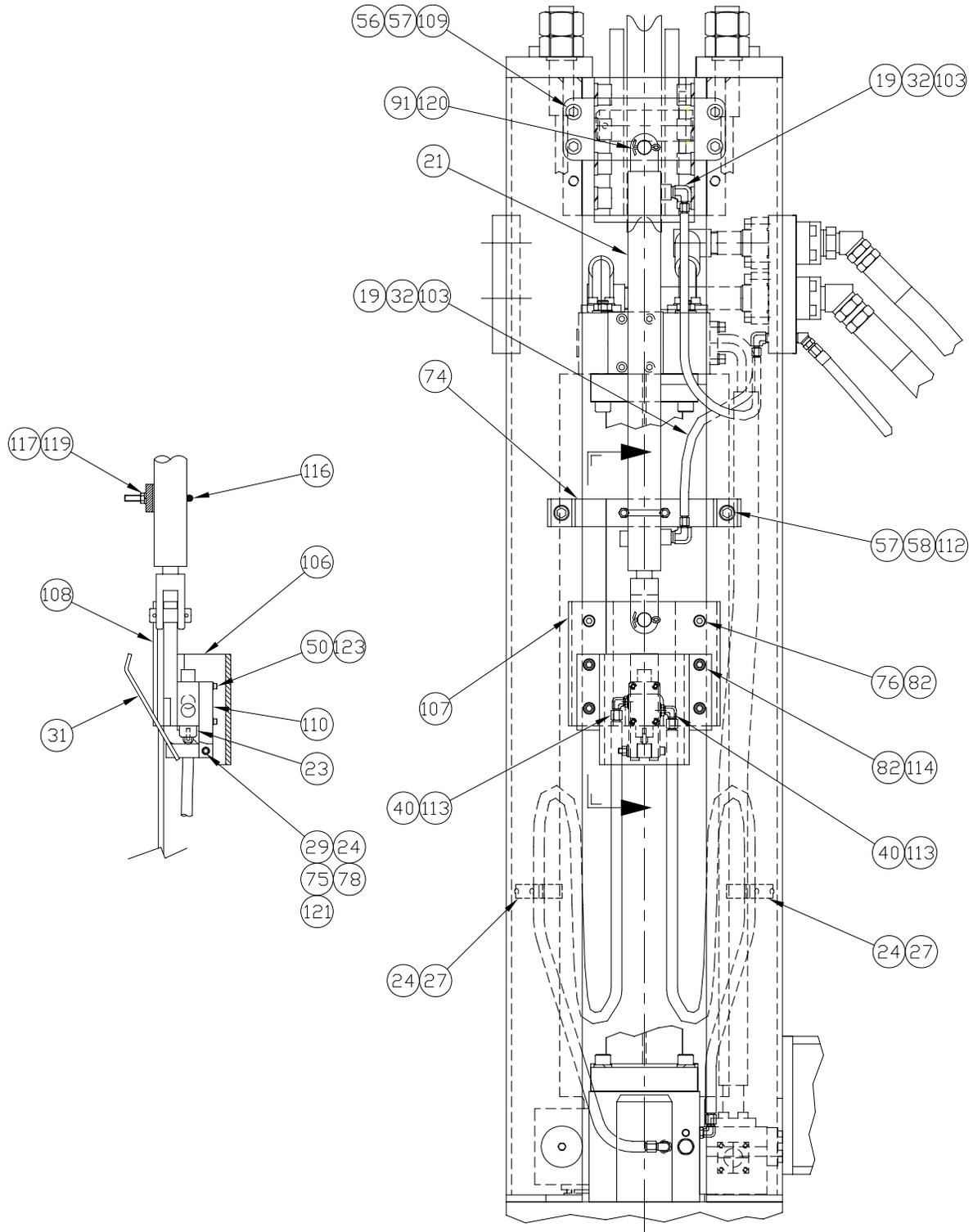


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

IMPACT HAMMER ASM

800543



SECTION G-G



MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

IMPACT HAMMER ASM

800543

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	160928	1	LEFT LIFTING BALE
2	160944	1	Top Plate
3	810819	1	Actuator Assembly (70)
4	160311	6	.75-10UNC X 6.50 LG SHCS
5	160881	1	Trip Bar Bushing
6	160285	2	.50 Belleville Washer
7	100445	2	.5-13 X 1.0 Lg SHCS LOC WEL
8	160920	4	Guide Column
9	810799	1	Ram 70B
10	100209	18	1.00 Lock Washer Medium
11	160313	1	2.25-12 Supernut
12	160966	2	Back-Up Ring
13	160964	2	Elastomer
14	160962	1	Ram Conn. Top Plate
15	160960	1	Ram Conn. Bottom Plate
16	160958	1	Rod Flange
17	160956	2	Nylon Insert
19	810813	2	Orifice Plug
20	400441	12	.75-10 X 5.50 Lg SHCS
21	160817	1	Cylinder
22	160894	1	Trip Bar
23	810815	1	Trip Valve Modified
24	110913	5	.38-16 X 3.00Lg SHCS
25	160916	4	Wire Rope Asm
26	120521	4	Spring Pin .375 X 2.0 Lg
27	160821	2	Hose Clamp
28	160946	1	Base Plate
29	160823	2	Brass Bushing
30	160900	8	Column Bearing
31	160825	1	Trip Lever
32	810811	2	Orifice Fitting
33	160529	4	Spiral Pin .75 X 2"
34	160914	1	Sheave Bracket
35	400401	16	1.0-8 X 2.0 Lg SHCS
36	810817	4	Centering Nut
37	160707	4	175-5UNC Hex Nut
38	160950	2	Accumulator
39	160774	1	FITT2L-20F20M000-0000008
40	130561	2	HOSE038R02J006J006L0700C
41	160866	2	HOSE125PT4F920J020L0187C
42	160776	1	HOSE125PT4F020F024L0660C



MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

IMPACT HAMMER ASM

800543

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
43	100596	2	#24 Split Flange Half
44	130321	9	.75 X .75 Bar Per In
45	100119	4	.5-13 X 1.25 Lg SHCS LOC WEL
48	160247	1	Sheave Pin
50	160861	4	.25-20UNC X 3.00 Lg SHCS
51	160913	1	Nylon Anchor
52	400037	4	.75-10 X 1.25 Lg SHCS
53	110954	2	1500 PSI "NITRO" Precharge
54	160493	2	FITT2V-06P06N000-0000001
55	160908	1	Hose Bracket
56	400069	8	.75-10 X 2.0 Lg SHCS
57	100069	26	.75 Lock Washer Medium
58	100587	6	.75-10 Hex Nut
59	100796	1	Elastomer
60	160211	1	Clamp Mounting Plate
61	160263	1	Sheave
62	100009	1	Hose Clamp
63	400727	6	.75 Hi-Collar Lock Washer
64	100015	2	Hose Clamp
65	130117	4	.375 X1.5 Lg SHCS
66	160905	1	1.00-8UNC Flex-Lock Nut
67	100207	2	1.0-8 X 3 Lg SHCS LOC WEL
68	100007	5	.625 Lock Washer Medium
69	400051	2	1.0-8 Hex Nut
70	100299	2	Primer/Gal
71	110156	2	J&M Yellow Paint/Gal
72	100575	5	.625-11 X 1.25 Lg SHCS
73	160926	1	Right Lifting Bale
74	160863	1	Cylinder Support
75	100762	2	.375-16 UNC Esna Nut
76	100011	18	.50-13 UNC X 2.00 Lg SHCS
78	400149	7	.375 Lock Washer
80	160906	1	Bumper
81	100829	8	.5-13 X3.5 Lg SHCS
82	100121	6	.50 Lock Washer Medium
85	110119	5	2-225 O-Ring
86	400159	1	FITT2S-24P20Q000-000H001
88	160549	2	Top Bumper
89	160874	4	Belleville Washer
90	160915	2	Pin
91	160935	2	Cylinder Pin
93	160531	4	1.0-8UNCX1.0Lg HHCS
94	810761	1	Modified 1.00-8 UNC X 8.00 SHCS



MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

IMPACT HAMMER ASM

800543

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
95	160917	4	Spring Pin .19dia X 1.25 Lg
96	110057	2	1.5 Solid Flange
97	100027	8	.5 Hi-Collar Lock Washer
98	160557	1	FITT2V-20P20N000-0000001
99	160559	1	FITT2V-24P24N000-0000001
101	110317	1	Hose Clamp
102	100827	7	.375-16 X 3.5 LG. SHCS
103	160846	2	HOSE025R02J004J004603800
104	160911	1	Urethane Bushing
105	160909	1	Nylon Washer
106	160829	1	Guard
107	160831	1	Slide
108	160910	2	Clip
109	160898	1	Cylinder Mtg Pl
110	160839	1	Pivot Plate
111	120299	2	1.00 H. S. Flat Washer
112	100067	2	.75-10 X 2.5 Lg SHCS LOC WEL
113	130057	2	FITT2L-06M06R000-000H001
114	400043	4	.5-13 X 2.25 Lg SHCS
115	160941	12	Insert Spacer
116	160865	1	2" U-Bolt
117	160867	2	.44-14UNC Hex Nut
118	100229	1	Grease Fitting
119	100443	8	.437 Lock Washer
120	300447	4	.1875 X 2 Lg Cotter Pin
121	400151	1	.375 Flat Washer
122	100163	4	.5-13 X 1.75 Lg SHCS LOC WEL
123	100559	4	.25 Lock Washer
124	160753	1	70 Serial Number Plate
125	130381	4	Rivet
127	160902	1	Recoil Dampener
128	160904	1	Striker Block 20"
129	810825	2	Modified Bushing Hub
130	160870	1	Pipe Adapter
131	160872	1	HOSE125PT4F024F920L03100
132	400813	8	.437-14 UNC X 6" LG SHCS
133	100047	12	.437-14 X 1.0 Lg SHCS LOC WEL
134	160868	2	Split Bushing
135	100037	5	2-222 O-Ring 90 Duro
137	100045	6	#20 Pa Split Flange Half

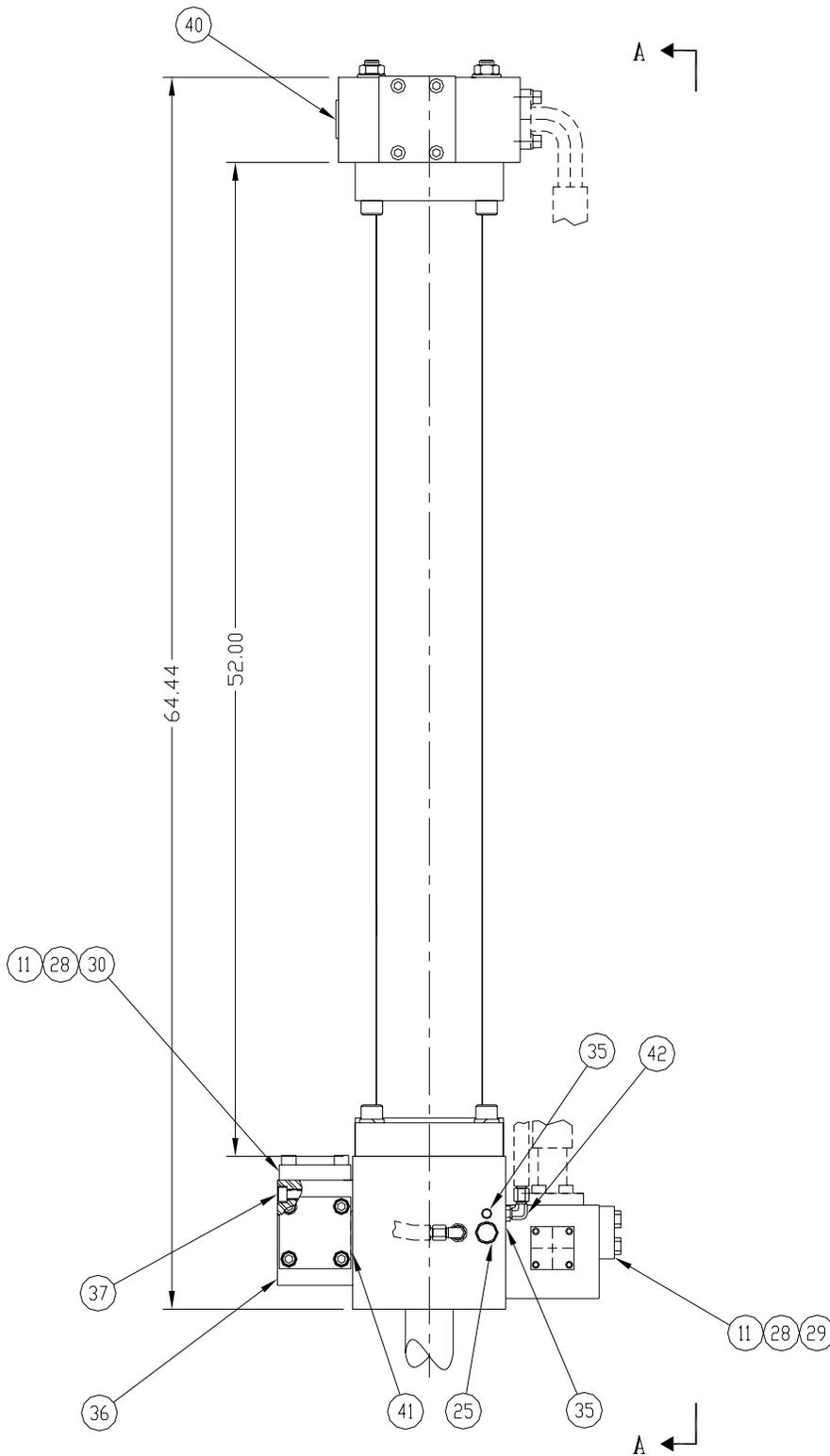


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

ACTUATOR ASM

810819



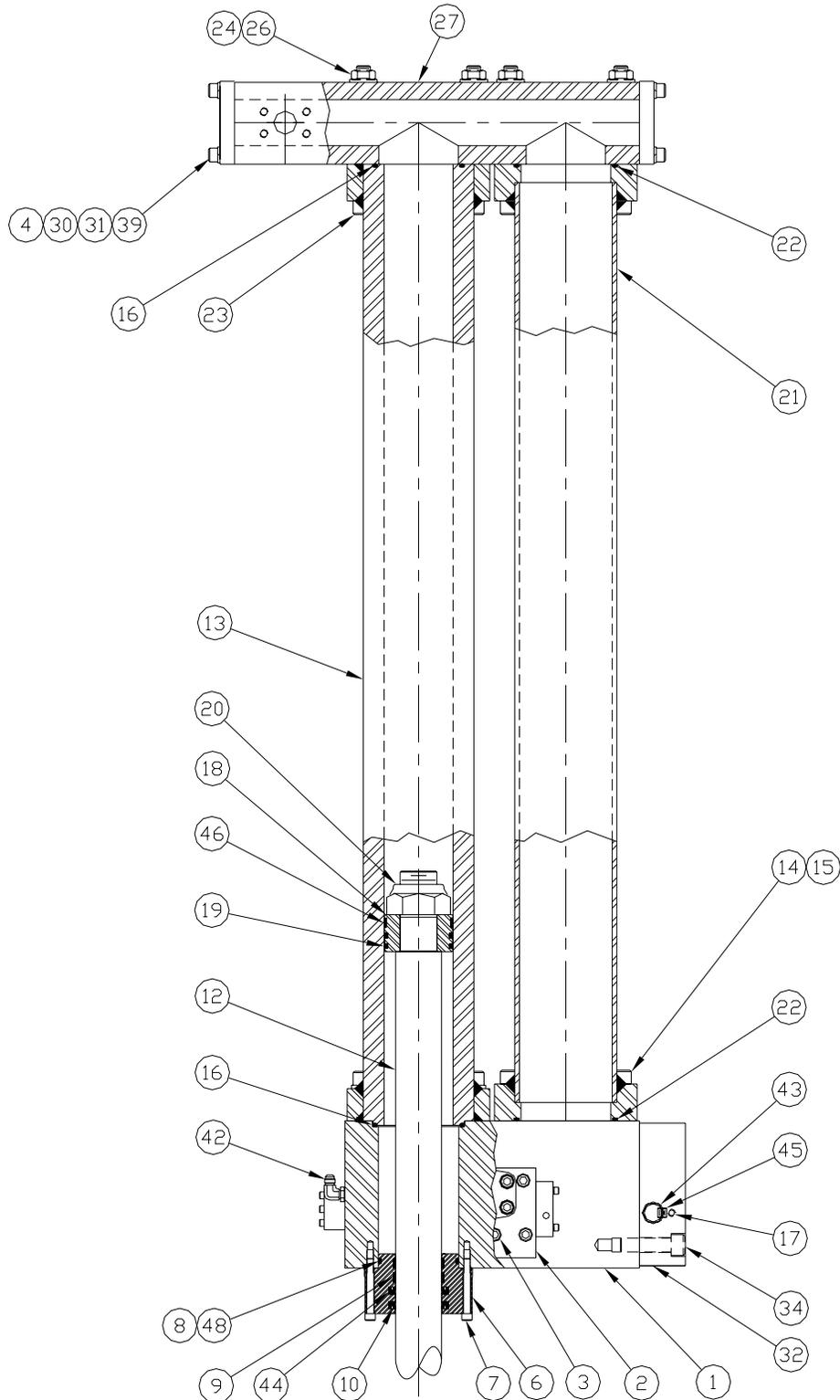


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

ACTUATOR ASM

810819





**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

ACTUATOR ASM

810819

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	160889	1	Actuator Base
2	810621	1	Control Valve Asm.
3	160337	4	.5-13UNC X 5.50 Lg SHCS
4	100121	8	.50 Lock Washer Medium
5	110602	1	111 O-Ring
6	160203	1	Gland
7	110913	8	.38-16 X 3.00 Lg SHCS
8	160255	1	345-O-Ring
9	160253	2	Rod Wear Ring
10	160251	1	Rod Wiper
11	110119	4	2-225 O-Ring
12	160912	1	Rod
13	160705	1	Cylinder
14	400045	8	.75-10 X 3.5 Lg SHCS
15	100069	8	.75 Lock Washer Medium
16	160257	2	350-O-Ring
17	100646	1	FITT2P-02P000000-000S007
18	160713	1	Piston
19	160862	2	Piston Seal
20	160347	1	2.00-12unf Esna Nut
21	160948	1	Tube
22	130717	2	-355 O-Ring
23	160349	8	.75-10UNC X 7.50 Lg SHCS
24	160281	8	.75 Belleville Washer
25	160323	1	Cartridge
26	160315	8	.75-10UNC Esna Nut
27	160942	1	Transfer Housing
28	160943	2	1.50 Blank Flange
29	100614	4	0.50-13UNC X 1.50 Lg HHCS
30	100513	12	.5-13 X 1.5 Lg SHCS
31	400379	2	2-232 O-Ring 90 Duro
32	160193	1	Cartridge Cover
33	810701	1	Din Cartridge Size 80
34	400039	4	.75-10 X 2.75 Lg SHCS
35	100845	2	FITT2P-04P000000-000S007
36	810683	1	HIH Check Valve Asm
37	160343	6	.5-13UNC X 4.25 Lg SHCS
39	160533	2	2.50 Blank Flange Code 61
40	160503	1	FITT2P-20R000000-0000001



MODEL 70 HIH
HYDRAULIC
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PARTS LIST

ACTUATOR ASM

810455

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
41	110929	2	2-226 O-Ring 90 Duro
42	130057	2	FITT2L-06M06R000-000H001
43	160939	1	Check Valve Cartridge
44	160077	1	Rod Seal
45	810827	1	Orifice Plug
46	160892	1	Wear Ring
47	160871	1	-352 O-Ring 90 Duro
48	160899	1	-345 Back-Up Ring

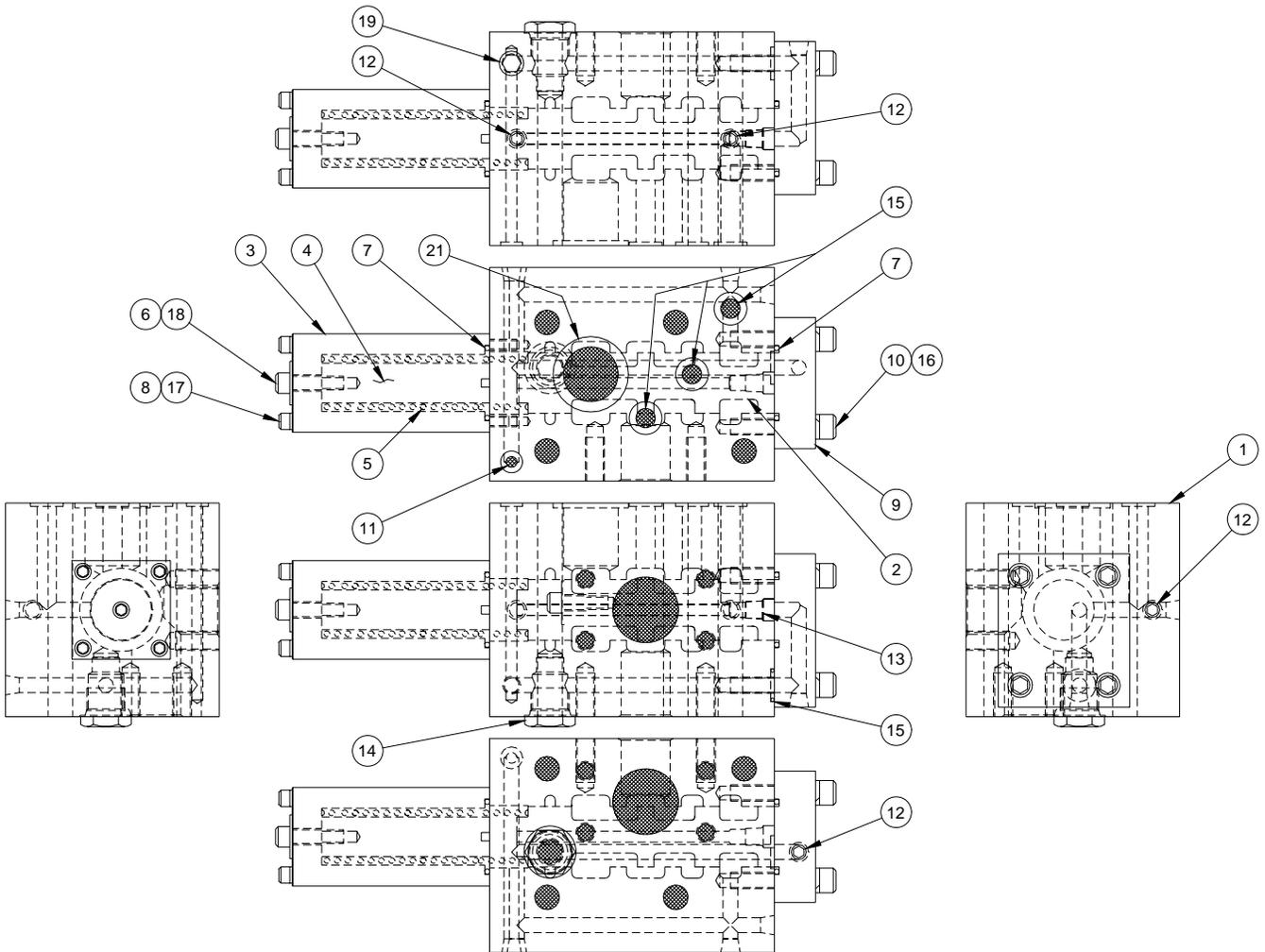


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

CONTROL VALVE ASM

810621





MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

CONTROL VALVE ASM

810621

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	160157	1	Valve Body
2	160159	1	Spool
3	160147	1	Spring Cap
4	160153	1	Spool Stop
5	160275	1	Spool Spring
6	100105	1	.312-18 X 1.0 Lg SHCS Loc Wel
7	100037	2	2-222 O-Ring 90 Duro
8	160856	4	.25-20unc X 5.00 Lg SHCS
9	160161	1	Cover
10	160333	4	.375-16UNC X 1.75 Lg SHCS
11	160329	1	109-O-Ring 90 DURO
12	100646	4	FITT2P-02P000000-000S007
13	810777	1	Orifice Plug
14	160323	1	Cartridge
15	140255	4	2-113 O-Ring 90 Duro
16	400149	4	.375 Lock Washer
17	100559	4	.25 Lock Washer
18	100293	1	.312 Flat Washer
19	100845	1	FITT2P-04P000000-000S007
21	110119	1	2-225 O-Ring

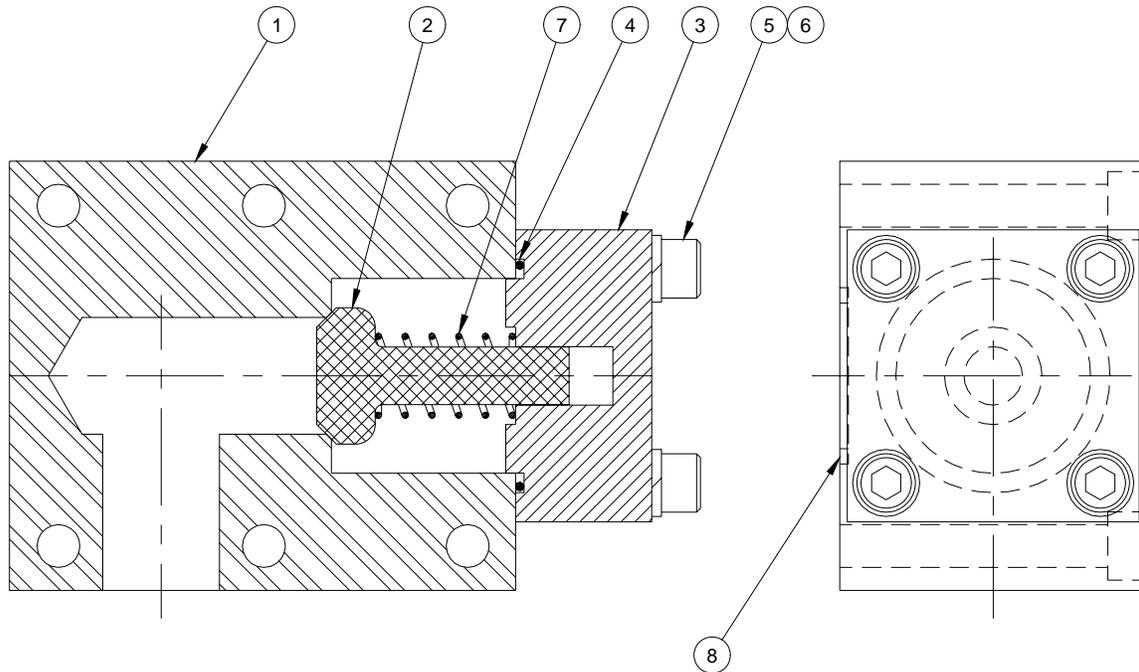


**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

CHECK VALVE ASM

810683



HIH CHECK VALVE

810683

Item	Part Number	Qty.	Description
1	160411	1	Check Body
2	160441	1	Check Poppet
3	160443	1	Check Cover
4	400379	1	2-232 O-Ring 90 Duro
5	110735	4	.50-13 X 2.50 Lg SHCS
6	100121	4	.50 Lock Washer
7	160765	1	Spring
8	110929	2	2-226 O-Ring 90 Duro

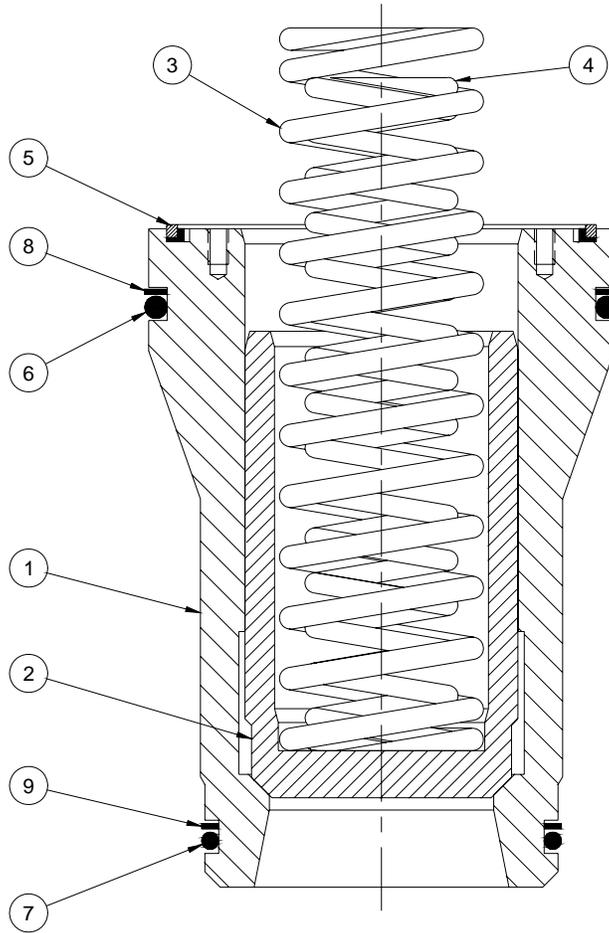


**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

DIN CARTRIDGE ASM

810701



DIN CARTRIDGE ASM

810701

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	160795	1	Cartridge Housing
2	160797	1	Cartridge Piston
3	160373	1	Outer Spring
4	160375	1	Inner Spring
5	160836	1	80 Din Face Seal
6	160893	1	-431 O-Ring 90 Duro
7	160255	1	-345 O-Ring 90 Duro
8	160897	1	-431 Back-up Ring
9	160899	1	-345 Back-up Ring
10	160834	1	80 Din Shim Pack

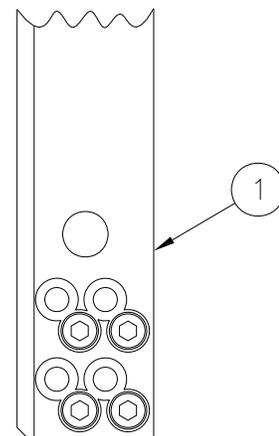
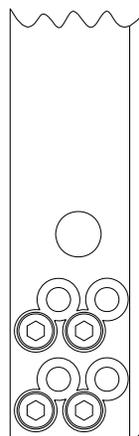
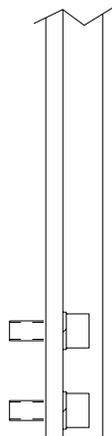
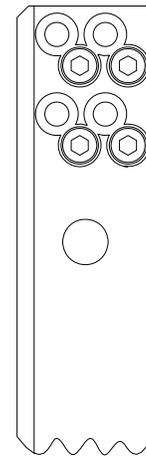
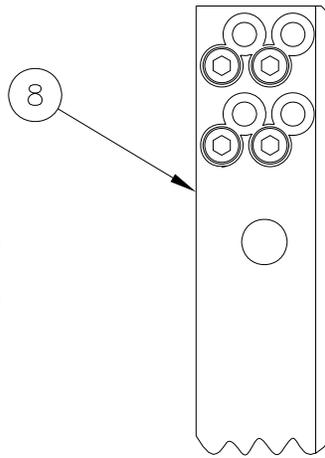
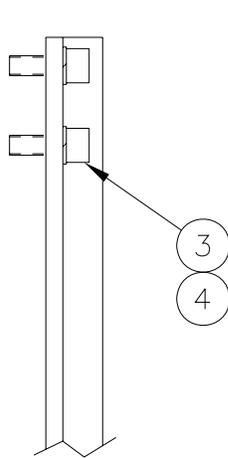
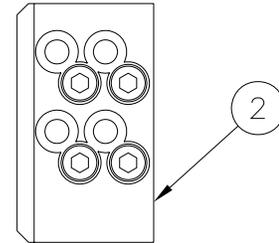
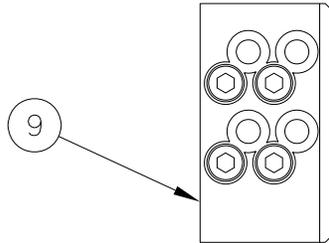
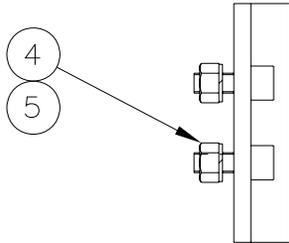


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

20" LEAD GUIDES

800557





MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

20" LEAD GUIDES

800557

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	160918	2	Left Long Guide Clip
2	160852	4	Left Guide Clip
3	100213	48	1.00-8UNC X 2.50 Lg SHCS
4	100209	48	1.00 Lock Washer
5	400051	16	1.00-8UNC Hex Nut
8	160830	2	Right Long Guide Clip
9	160828	2	Right Guide Clip

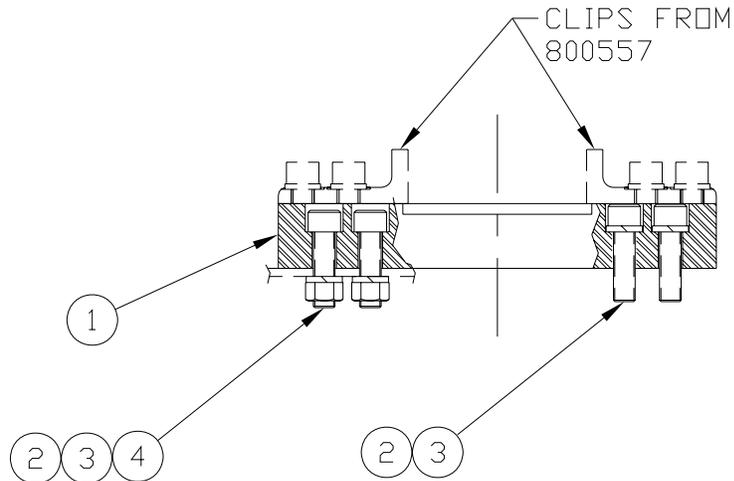


**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

26" LEAD GUIDE SPACER KIT

800832



<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	160854	6	Spacer Plate
2	140145	48	1.00-8UNC Lg SHCS
3	100209	48	1.00 Lock Washer
4	400051	16	1.00-8UNC Hex Nut

Note: Hex nuts are used to mount plates to lifting bales.

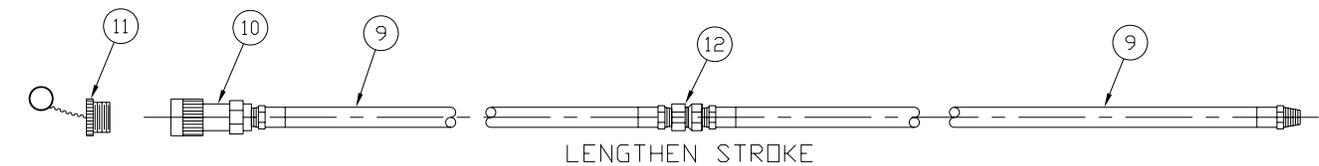
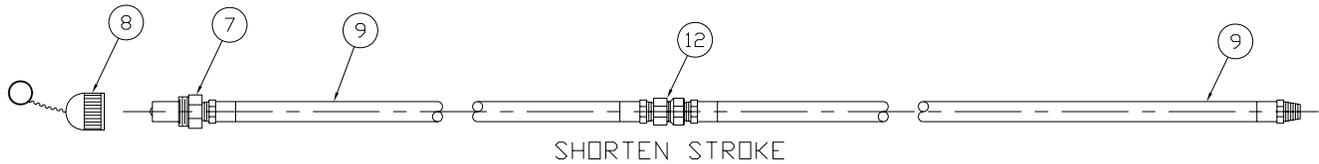
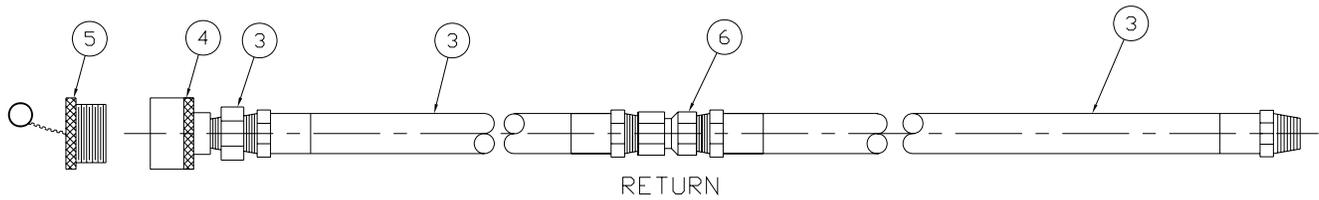
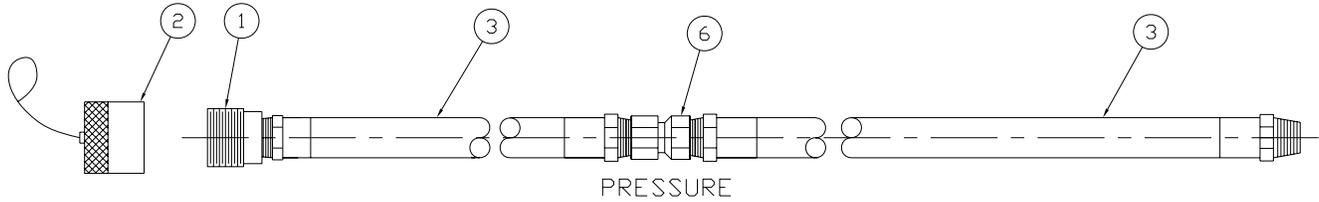


**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

INTERCONNECTING HOSES

175059



Item	Part Number	Qty.	Description
1	170415	1	1.25 Male Disconnect
2	170419	1	1.25 Dust Cap
3	100233	4	HOSE125PT4P020P020L60000
4	170413	1	1.25 Female Disconnect
5	170417	1	1.25 Dust Plug
6	100235	2	FITT2S-20Q20N000-000H001
7	100245	1	.375 Male Disconnect
8	100257	1	.375 Dust Cap
9	100247	4	HOSE038R02P006P006L62000
10	100777	1	0.375 Female Disconnect
11	100737	1	0.375 Dust Plug
12	100249	2	FITT2S-06Q06N000-000H001
13	130243	10	Rubber Tie Down

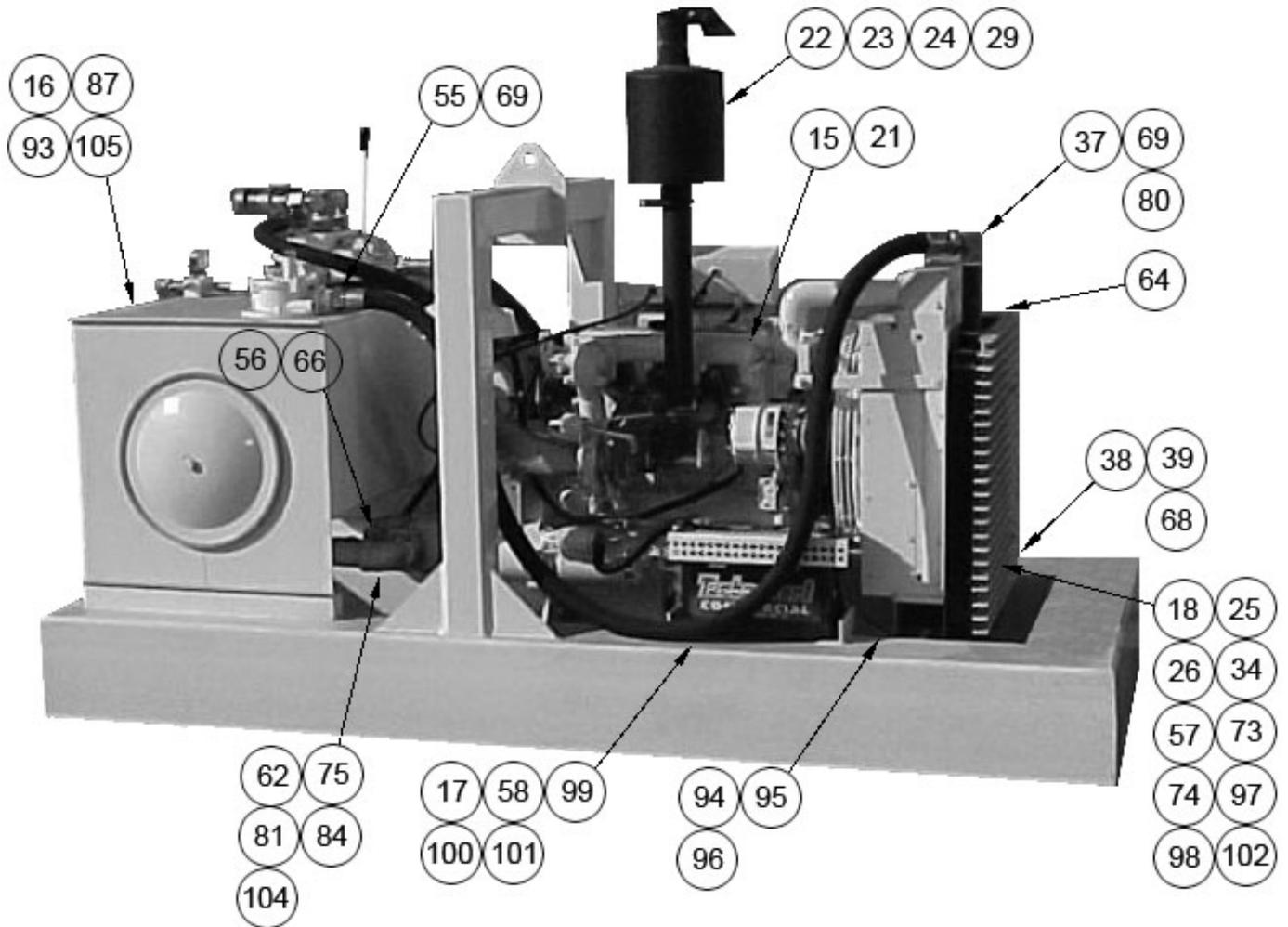


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

POWER UNIT FINAL ASSEMBLY

175057



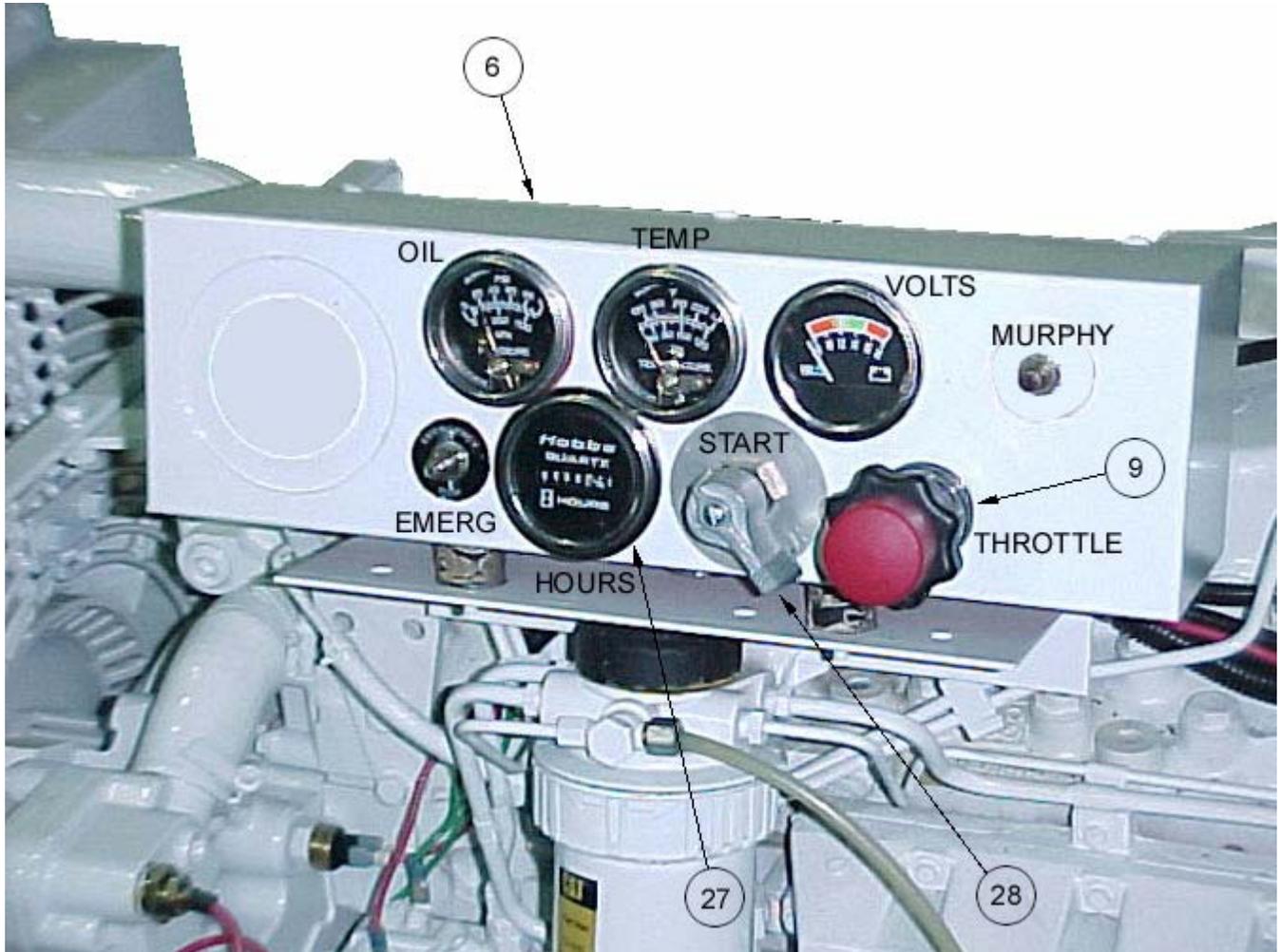


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

POWER UNIT FINAL ASSEMBLY

175057



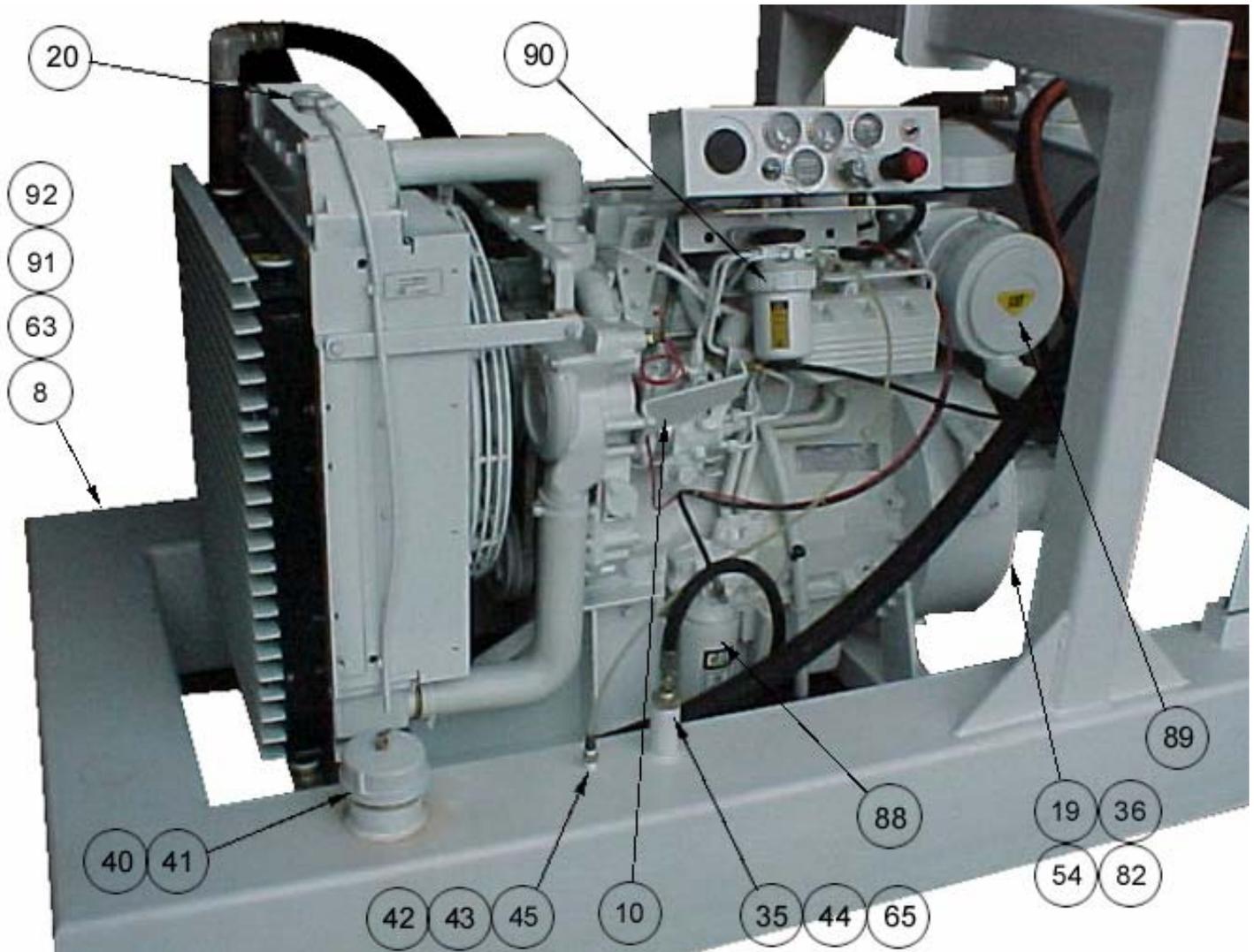


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

POWER UNIT FINAL ASSEMBLY

175057



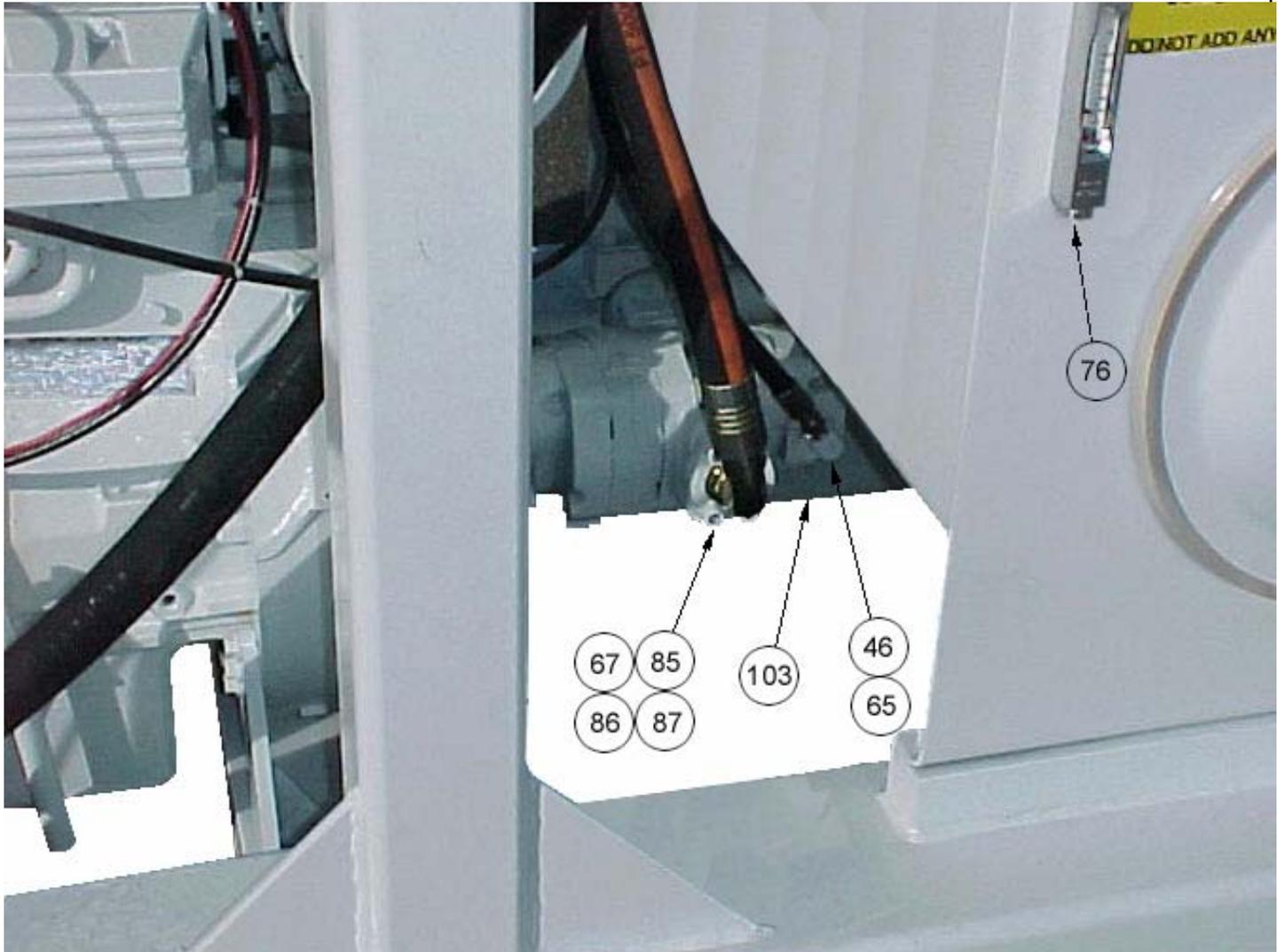


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

POWER UNIT FINAL ASSEMBLY

175057





**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

POWER UNIT FINAL ASSEMBLY

175057

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	170413	1	1.25 Female Disconnect
2	170415	1	1.25 Male Disconnect
3	170417	1	1.25 Dust Plug
4	170419	1	1.25 Dust Cap
5	170421	1	Relief Valve
6	170425	1	Gage Panel
7	170685	1	Control Valve
8	173009	1	Sub-Base Asm
9	170429	1	Throttle Cable Asm
10	170431	1	Cable Bracket
11	170433	1	.75 Ball Valve
12	170435	1	2.00 Ball Valve
13	170437	1	Filter Asm
14	170439	1	Filter Element
15	400247	16	Engine Oil/Quart
16	140415	60	Hydraulic Fluid / Gal
17	400890	1	Battery
18	170441	1	Heat Exchanger
19	400259	1	Pump Adapter
20	100726	10	Antifreeze / Gal
21	170443	1	Engine 3054 Dit
22	170445	1	Muffler
23	170447	1	Exhaust Pipe
24	170449	1	2.50" Rain Cap
25	170337	1	Left Cooler Bracket
26	170339	1	Right Cooler Bracket
27	100343	1	Hourmeter
28	130259	1	Start Switch
29	170451	1	2.50" Muffler Clamp
30	100777	1	.375 Female Disconnect
31	100737	1	.375 Dust Plug
32	120025	1	1" Female Disconnect
33	120027	1	1" Dust Plug
34	170377	1	Cooler Guard
35	400203	2	FITT2S-06M06P000-000H001
36	100143	12	.375-16 X 1.25 Lg SHCS Loc Wel
37	170453	1	FITT2L-20M20Q000-0000001
38	400221	1	FITT2L-20M20P000-0000001
39	130043	1	FITT2L-20M20J000-000H001
40	100419	1	Petcock



**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

POWER UNIT FINAL ASSEMBLY

175057

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
41	100417	1	FITT2C-48Q000000-0000306
42	110369	1	FITT2S-06P04Q000-000H001
43	100337	1	FITT2S-04P04E000-000H002
44	100715	1	FITT2S-16P06Q000-000H001
45	110415	3	.250 Oil Pressure Tube/Ft
46	170455	1	FITT2L-06M08R000-0000001
47	170457	1	FITT2S-20M20R000-0000001
48	170459	2	FITT2S-20R20Q000-0000001
49	170461	2	FITT2L-20P20P000-0000001
50	170463	2	FITT2S-20P20Q000-0000001
51	170465	1	FITT2L-20M20R000-0000001
52	170830	1	FITT2L-16P16P000-000H001
53	110794	2	FITT2S-06P06P000-000H001
54	130933	8	.38-24UNF X 1.00 Lg SHCS
55	400185	1	FITT2S-20M20P000-000H001
56	100590	1	FITT2L-12M12R000-000H001
57	100293	12	.312 Flat Washer
58	110755	2	Battery Cable-15
59	170475	1	FITT2L-12P12P000-0000001
60	170477	1	Flex Master 2" Pipe
61	170467	2	FITT2S-32P000000-0650301
62	100549	2	FITT2L-32P32Q000-0000406
63	100423	2	FITT2P-08P000000-000S007
64	110055	1	FITT2P-20P000000-000S007
65	170399	2	HOSE038R02J006J006L05000
66	170401	1	HOSE075R01P012J012L01700
67	170403	1	HOSE100PT4J020F920L06400
68	170405	1	HOSE125R01J020J020L07200
69	170407	1	HOSE125R01J020J020L09600
70	140773	2	.25-20UNC X 2.38 Lg SHCS
71	130131	3	.375-16 X 4.50 Lg SHCS
72	100051	3	.375-16 X 1.0 Lg SHCS Loc Wel
73	100105	8	.312-18 X 1.0 Lg SHCS Loc Wel
74	100396	4	.312-18UNC x 1.50 Lg SHCS
75	100011	4	.5-13 X 2.0 Lg SHCS
76	170409	1	Sight Gage W/ Thermometer
77	170411	1	Filler Cap / Breather
78	400856	1	Gage (0-600)
79	400850	1	Gage (0-6000PSI)
80	300459	1	FITT2S-20P20P000-0800301



MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

POWER UNIT FINAL ASSEMBLY

175057

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
81	100027	4	.50 Hi-Collar Lock Washer
82	400149	26	.375 Lock Washer
83	100559	2	.25 Lock Washer
84	140233	1	2-228 O-Ring 90 Duro
85	100037	1	2-222 O-Ring 90 Duro
86	100045	2	#20 PA Split Flange Half
87	100119	8	.50-13 X 1.25 Lg SHCS Loc Wel
88	170481	1	Oil Filter
89	170483	1	Air Filter
90	170485	1	Fuel Filter
91	100299	3	Primer/Gal
92	100298	3	APE / J&M Yellow Paint
93	173007	1	Reservoir Asm
94	100067	4	.75-10 X 2.50 Lg SHCS Loc Wel
95	100069	4	.75 Lock Washer Medium
96	160315	4	.75-10UNC Esna Nut
97	100398	4	Saddle Clip
98	100287	12	.312 Lock Washer
99	400231	2	Hold Down Stud
100	100831	2	.312 Wing Nut
101	170487	1	Battery Holddown
102	100289	4	.312-18 Hex Nut
103	170699	1	Pump
104	400109	1	2.0 Solid Flange
105	100121	4	.50 Lock Washer Medium
106	170507	1	FITT2S-06P06P000-1000301
107	170509	1	FITT2S-32P32P000-02000301
108	170545	1	Serial Number Plate
109	130381	4	Rivet
110	173019	1	Clamp Manifold Asm
111	100245	1	.375 Male Disconnect
112	100257	1	.375 Dust Cap
113	170709	1	Sub-Plate
114	400786	1	Valve

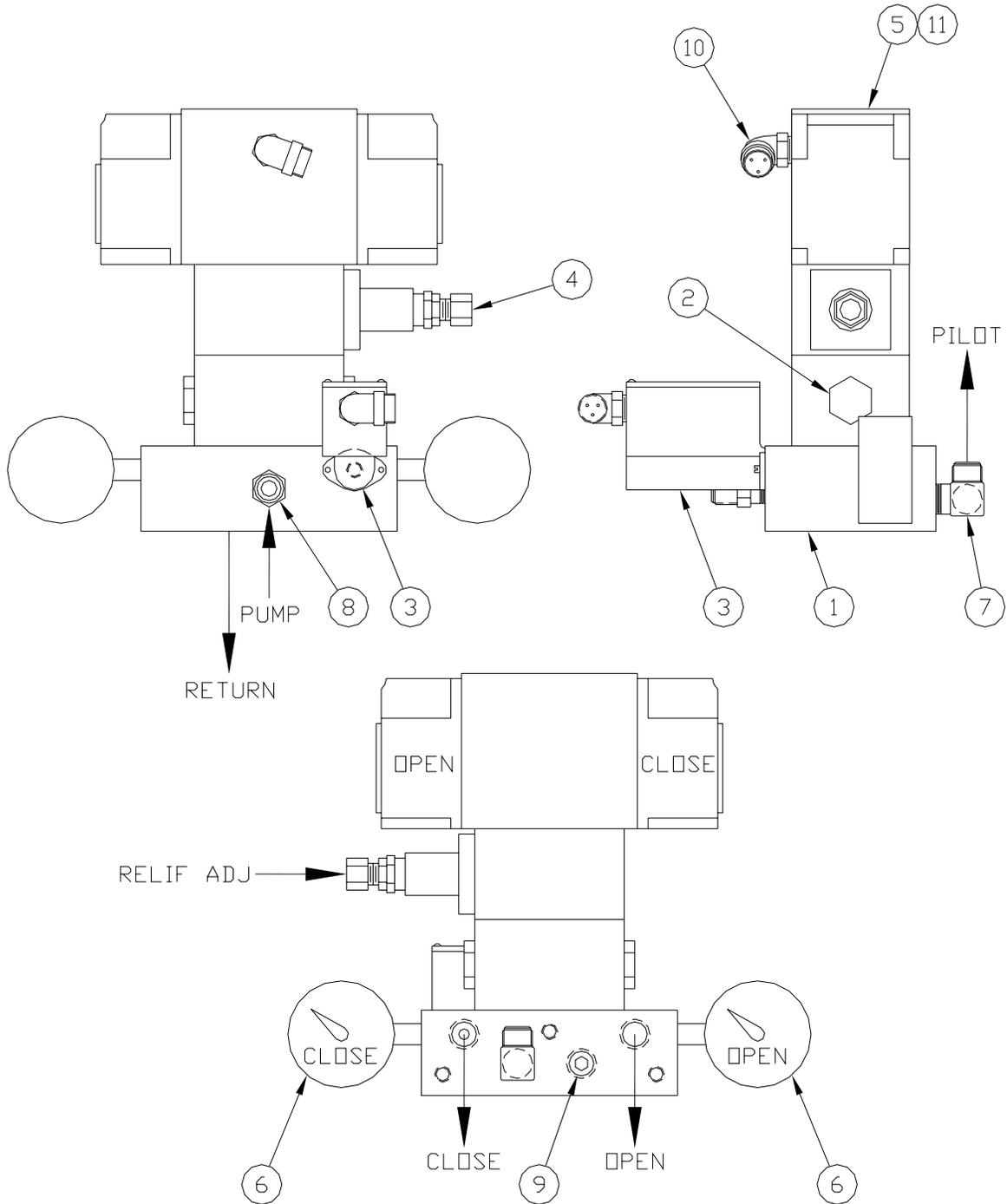


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

CLAMP MANIFOLD ASSEMBLY

173019





**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

CLAMP MANIFOLD ASSEMBLY

173019

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	110642	1	Clamp Manifold Block
2	110149	1	Check Valve (CV1)
3	810033	1	Pressure Switch Assembly (PS1)
4	100898	1	Sandwich Relief (RV2)
5	130033	1	4-Way Valve 12 V DC (V1)
6	400850	2	Gage (0-6000 PSI)
7	110632	1	FITT2L-12M06P000-000H001
8	110630	1	FITT2S-08M06P000-000H001
9	400213	2	FITT2P-06P000000-000S007
10	110235	1	90 Deg S/O Cord Adapter
11	110634	4	.25-20 X 7.50 Lg SHCS

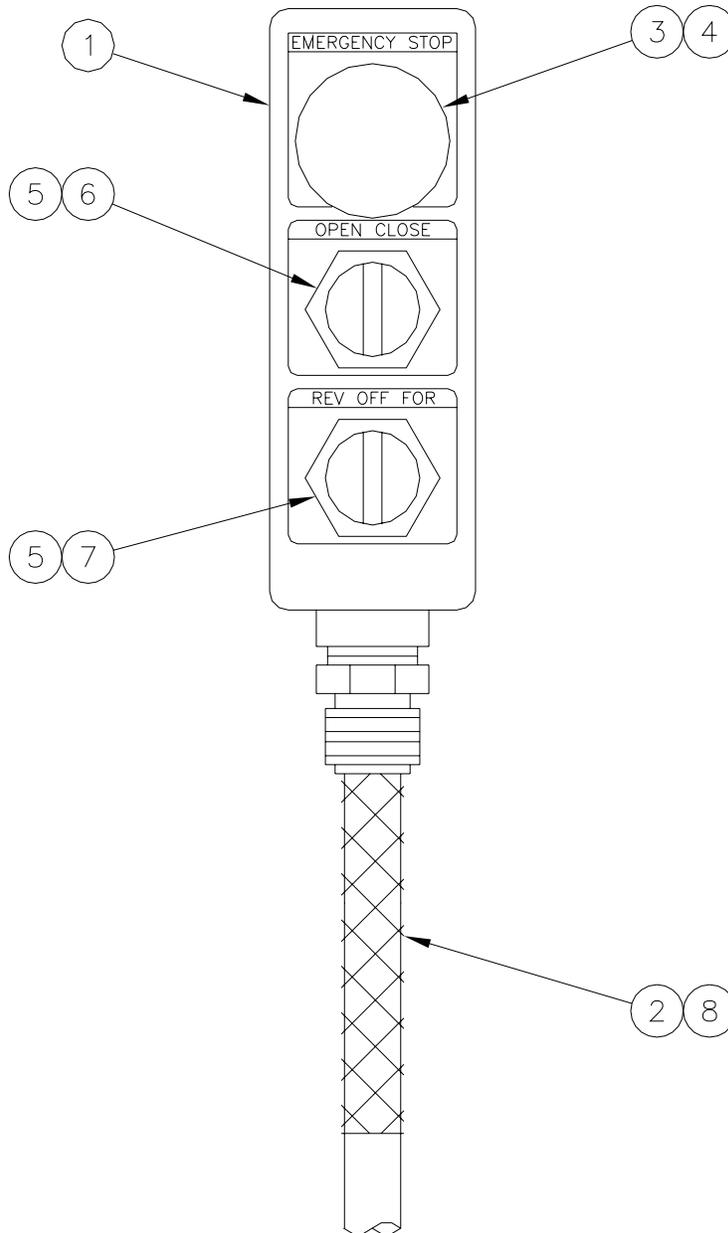


MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

PENDANT ASSEMBLY

173021





MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

PENDANT ASSEMBLY

173021

<u>Item</u>	<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
1	130153	1	Pendant Enclosure
2	110603	1	Strain Relief
3	130507	1	Emergency Stop Button
4	130509	1	Emergency Stop Label
5	130155	2	Switch
6	100401	1	Open / Close Nameplate
7	100864	1	Rev-Off-For Nameplate
8	100506	50	Pendant Cable / Ft



MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST



MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER

PARTS LIST

E. MISCELLANEOUS ACCESSORIES

70 SEAL KIT

850183

<u>Item</u>	<u>P/N</u>	<u>Qty.</u>	<u>Description</u>
1	100037	7	2-222 O-Ring 90 Duro
2	160255	2	345-O-Ring 90 Duro
3	160253	2	Rod Wear Ring
4	160251	1	Rod Wiper
5	110119	5	2-225 O-Ring
6	160257	2	350-O-Ring
7	160862	2	Piston Seal
8	130717	2	-355 O-Ring
9	400379	2	2-232 O-Ring 90 Duro
10	110929	2	2-226 O-Ring 90 Duro
11	160077	1	Rod Seal
12	160982	1	Wear Ring
13	160871	1	-352 O-Ring 90 Duro
14	160899	2	-345 Back-Up Ring
15	160329	1	109 O-Ring 90 Duro
16	140255	4	2-113 O-Ring 90 Duro
17	160836	1	80 Din Face Seal
18	160893	1	2-431 O-Ring 90 Duro
19	160897	1	-431 Backup-Ring



**MODEL 70 HIH
HYDRAULIC
IMPACT HAMMER**

PARTS LIST

F. RECOMMENDED TIGHTENING TORQUE

Nominal Screw Size	Nominal Socket Size	Tightening Torque Ft-Lbs. (Kg-M)	Nominal Screw Size	Nominal Socket Size	Tightening Torque Ft-Lbs. (Kg-M)
#10-24	5/32	6 Ft-Lbs. (.83 Kg-M)	#10-32	5/32	6 Ft-Lbs. (.83 Kg-M)
1/4-20	3/16	13 Ft-Lbs. (1.8 Kg-M)	1/4-28	3/16	15 Ft-Lbs. (2.1 Kg-M)
5/16-18	1/4	27 Ft-Lbs. (3.7 Kg-M)	5/16-24	1/4	30 Ft-Lbs. (4.2 Kg-M)
3/8-16	5/16	48 Ft-Lbs. (6.6 Kg-M)	3/8-24	5/16	55 Ft-Lbs. (7.6 Kg-M)
7/16-14	3/8	77 Ft-Lbs. (10.6 Kg-M)	7/16-20	3/8	86 Ft-Lbs. (11.9 Kg-M)
1/2-13	3/8	119 Ft-Lbs. (16.4 Kg-M)	1/2-20	3/8	133 Ft-Lbs. (18.4 Kg-M)
5/8-11	1/2	234 Ft-Lbs. (32.3 Kg-M)	5/8-18	1/2	267 Ft-Lbs. (36.9 Kg-M)
3/4-10	5/8	417 Ft-Lbs. (57.6 Kg-M)	3/4-16	5/8	467 Ft-Lbs. (64.5 Kg-M)
7/8-9	3/4	676 Ft-Lbs. (93.4 Kg-M)	7/8-14	3/4	742 Ft-Lbs. (102.5 Kg-M)
1-8	3/4	1,009 Ft-Lbs. (139.4 Kg-M)	1-12	3/4	1,126 Ft-Lbs. (155.6 Kg-M)
1-1/4-7	7/8	1,600 Ft-Lbs. (221.1 Kg-M)	1-1/4-12	7/8	1,800 Ft-Lbs. (248.8 Kg-M)
1-1/2-6	1	2,800 Ft-Lbs. (387 Kg-M)	1-1/2-12	1	3,000 Ft-Lbs. (414.6 Kg-M)

NOTE: These values are for Socket head cap screws only. Button heads, Flat heads and Set screws have different values. Check the Allen Hand Book for correct torque specifications.