

SMALL BEIGN

MODEL H.C.R.S.-1

HYDRAULIC CYLINDER REPAIR STAND

******WARNING******

**FOR THE PROTECTION OF THE OPERATOR AND YOUR SERVICE EQUIPMENT,
WE RECOMMEND THAT ALL ELECTRICAL SERVICING BE COMPLETED BY A
QUALIFIED ELECTRICIAN.**

**WE STRONGLY SUGGEST THAT AN ELECTRICIAN BE USED WHEN REPLACING
ANY ELECTRICAL COMPONENT. DESIGN CHANGES OR MODIFICATIONS IN
REPLACEMENT PARTS (SUPPLIED THROUGH EITHER WOLFF MANUFACTURING
COMPANY AND/OR AN INDEPENDENT SUPPLY HOUSE) CAN CAUSE SERIOUS
PROBLEMS WITH THE EQUIPMENT AND ITS PROPER OPERATION.**

**AVOID THE THREAT OF EXTENDED "DOWN TIME" BY HAVING A GOOD SUPPLY
OF THE PROPER REPLACEMENT PARTS ON HAND. THE PART YOU NEED
MAY NOT ALWAYS BE A "KEPT ON SHELF ITEM" FROM OUR PARTS STOCK
INVENTORY.**

**IF EVER A PROBLEM DEVELOPS WITH A WOLFF PRODUCT THAT REQUIRES
ASSISTENCE, PLEASE CONTACT OUR FACTORY SERVICE DEPARTMENT FOR
HELP IN RESOLVING THIS DIFFICULTY.**

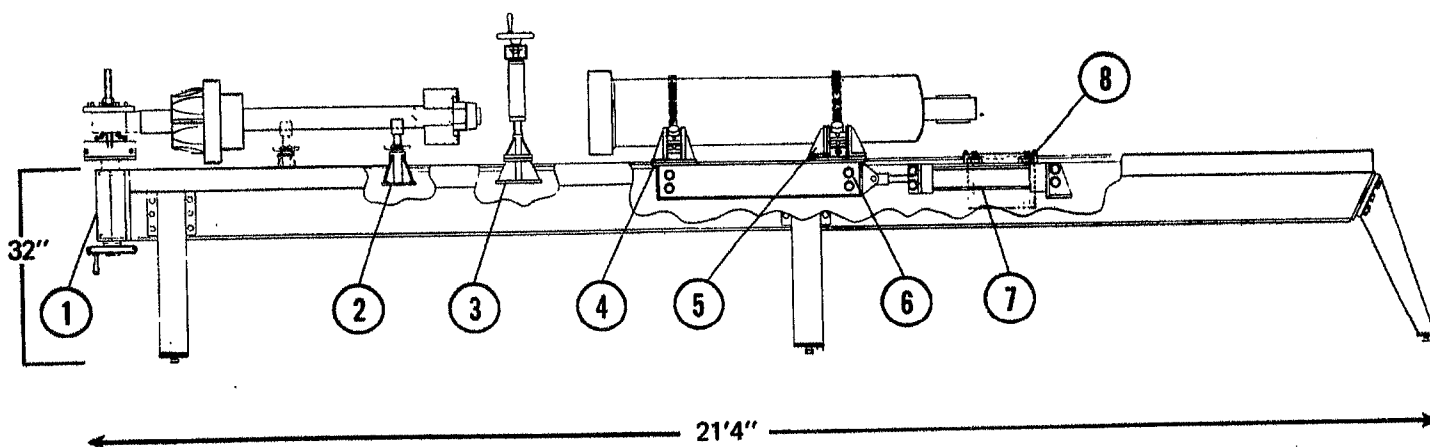
THANK YOU,

**PARTS ORDER DESK
SERVICE DEPARTMENT
WOLFF MANUFACTURING COMPANY**



10/79

MODEL H.C.R.S. HYDRAULIC CYLINDER REPAIR STAND



- | | |
|--|----------------------------------|
| 1. END POST ASSEMBLY (EYELESS ROD ADAPTER AVAILABLE) | 5. ADJUSTABLE VEE-BLOCK ASSEMBLY |
| 2. ROD SUPPORT ASSEMBLY | 6. CARRIAGE ASSEMBLY |
| 3. TORQUE MULTIPLIER MOUNTING ASSEMBLY | 7. TRAVEL CYLINDER CARRIAGE |
| 4. STATIONARY VEE-BLOCK ASSEMBLY | 8. POWER UNIT TRAVEL TRAY |

WOLFF MODEL H.C.R.S. (HYDRAULIC CYLINDER REPAIR STAND) FEATURES:

- Designed to handle all current production Caterpillar Hydraulic Cylinders.
- Rigid frame construction is designed to resist 10,000 ft./lbs. of torque while working 245 Excavator and 992 Loader cylinders.
- Heavy duty end post fixture holds the "eye" of the cylinder rod stationary.
- Cylinders are mounted on a heavy duty carriage assembly.
- The power cylinder on the travel cylinder carriage has an 18-inch stroke.
- The repair stand is 20 feet long and can handle a full cylinder extension of up to 13'.
- Designed for a convenient working height with adjustable legs for precise vertical alignment and an oil trough for holding excess hydraulic oil.
- Supplied with positioning fixture for the torque multiplier.
- The recommended Torque Multiplier for the repair stand is the 1P850 unit with accessories.
- The recommended power supply is the 3S6224 Hydraulic Pump Unit.

NOTE: The Hydraulic Pump Unit and the Torque Multiplier are not offered as standard with the Repair Stand but they can be supplied upon request, at additional cost.



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WOLFF WARRANTY

WOLFF MANUFACTURING COMPANY warrants its products to be free from defects in material and workmanship under normal use and service for a period of six (6) months from the date of installation by the original purchaser. Our warranty is not transferable or assignable to any subsequent users and/or buyers, unless specifically authorized in writing by Wolff Manufacturing Company.

WOLFF MANUFACTURING COMPANY shall have the option of requiring the return of all parts claimed defective. Parts proved to be defective, due to defect in workmanship and/or material, shall be either repaired or replaced free of charge, F.O.B. our designated factory. All parts warranty claims are subject to inspection by WOLFF MANUFACTURING COMPANY and acceptance at the factory.

Our warranty does not obligate us to bear the cost of labor or transportation charges in connection with the replacement or repair of defective parts and the removal and/or remounting of parts repaired or replaced under this warranty, unless specifically authorized in writing by Wolff Manufacturing Company. All parts returned to the factory must be shipped freight prepaid; no collect freight will be accepted by the factory. Forms authorizing such returns for inspection must accompany all returns.

This warranty shall not apply to products not manufactured by Wolff Manufacturing Company. Outside purchased equipment and accessories (not of Wolff manufacture) are warranted only to the extent of the original manufacturer's warranty and subject to their allowance to us. In this respect, our warranty obligations must conform and be limited to the warranty extended to WOLFF MANUFACTURING COMPANY by its suppliers as extended to the customer.

We shall, in no event, be liable for consequential damages or contingent liability arising out of the failure of any unit or part to operate properly, or that is subject to:

- ordinary operating wear, abuse, misuse, or overloading;

- repairs or alterations by parties other than Wolff Manufacturing Company;
- the use of improper fluids, contaminated fluids or improper filtering;
- the use of improper voltage hookup in the electrical connections of any equipment;
- negligence, accident or damages due to deterioration during periods of storage by the purchaser prior to installation and operation;
- damages incurred in shipment after leaving factory enroute to customer's delivery point, as title to equipment passes to customer when loaded onboard for shipment, f.o.b. factory, and customer must place his own claim against damaged goods directly to the shipping company and not against Wolff Manufacturing Company, its factory, or any of its personnel.
- damages due to circumstances beyond the control of Wolff Manufacturing Company and in connection with fulfilling any obligation under this warranty.

This warranty is exclusive and is in lieu of all other expressed and implied warranties, including but not limited to implied warranties or merchantability and fitness for a particular purpose. Wolff Manufacturing Company shall not be subject to any other obligations or liabilities whatsoever with respect to equipment manufactured or supplied by Wolff Manufacturing Company, or services rendered by it, nor liable to the purchaser for loss or injury to persons or property (including but without limitations, products handled by the equipment).



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MODEL H C R S

The Wolff Model H C R S (HYDRAULIC CYLINDER REPAIR STAND) is a shop service item used to disassemble hydraulic cylinders for repair purposes such as resealing or repacking.

The main function of the unit is to restrain the cylinder barrel during disassembly. The rod eye is locked on the end post and the cylinder cap fasteners are removed. The H C R S travel carriage is then used to pull the piston shaft free of the barrel. Support stands are used to keep the shaft in alignment with the cylinder barrel.

Additionally, this unit is designed to withstand the high torsion necessary for replacing the piston nut on hydraulic cylinders as well as the threaded crowns on certain types of cylinders.

The unit is designed to withstand 10,000 ft. /lbs. of torsion for replacing the nut on a piston and 2,000 ft. /lbs. for removing the threaded crown off the cylinder.

Cylinders from 3 1/2" O.D. to 13 1/2" O.D. can be worked in the Model H C R S. Rod extensions range from 12" to 13' in length.

I.D. NO. 06 81 III



SPECIFICATIONS

(MODEL HCRS)

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THE HYDRAULIC PUMP UNIT AND THE TORQUE MULTIPLIER ARE NOT OFFERED AS STANDARD WITH THE CYLINDER REPAIR STAND.

The recommended power supply is the Caterpillar 3S6224 (Wolff P/N 750 021) Hydraulic Pump Unit.

The recommended Torque Multiplier is the Caterpillar 1P850 (Wolff P.N. 740 040) unit with accessories.

For the best application, these accessories should be included.

<u>WOLFF NO.</u>	<u>CAT NO.</u>	<u>DESCRIPTION</u>
<u>740 041</u>	<u>6V109</u>	INPUT TORQUE MULTIPLIER FOR THE 1P850 UNIT.
<u>740 042</u>	<u>6V2040</u>	RATCHET DEVICE TO MAINTAIN TORQUE.
<u>740 043</u>	<u>5P2416</u>	SOCKET, 4½" HEX FOR 235 EXCAVATOR STICK CYLINDERS AND 992C LIFT CYLINDERS.
<u>740 044</u>	<u>3P2229</u>	SOCKET, 4.0" HEX FOR 225 EXCAVATOR STICK AND BUCKET CYLINDERS AND 983 AND 992 TILT CYLINDERS.
<u>740 045</u>	<u>5P304</u>	SOCKET, 3½" HEX.
<u>740 046</u>	<u>5P303</u>	SOCKET, 3 1/8" HEX FOR 988 TILT CYLINDERS.
<u>740 047</u>	<u>1P851</u>	SPLINE ADAPTER; MALE SPLINE TO 1½" FEMALE SQUARE DRIVE.
<u>740 048</u>	<u>1P853</u>	RATCHET ADAPTER; 3/4" MALE TO 3/4" FEMALE.
<u>740 049</u>	<u>1P852</u>	MALE ADAPTER; 1½" TO 1" SPLINE ADAPTER.
<u>740 050</u>	<u>5P3588</u>	ADAPTER, 1.0" FEMALE TO 3/4" MALE FOR USE WITH THE 1P850 TORQUE MULTIPLIER, THE 1P851 SPLINE ADAPTER FOR 3/4" DRIVE SOCKETS.
<u>740 051</u>	<u>5P8628</u>	SOCKET, 6½" HEX FOR USE WITH 245 EXCAVATOR STICK CYLINDER ROD.

The parts listed above are available through the Caterpillar parts system, or they may be purchased through Wolff Manufacturing Company.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



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OPERATION AND STORAGE AREAS

The Model H C R S should be located so that it fits into your shop's work flow system. Additional consideration for its placement should include:

1. The proper electrical supply for the equipment's power supply.
2. Adequate working and storage space that permits the free handling of all types of cylinders.
3. Adequate support components for the physical movement of the cylinders.
4. Adequate lighting and ventilation for the operator.

PARTS CHECK

Before the installation begins, an inventory check of the equipment should be made to see if any items have been damaged or lost while in transit.

MACHINE ACCESSORIES

For information concerning standard machine parts, reference the various assembly illustrations in the replacement parts section or consult the Parts Order Desk as indicated on page 6.1.

SETTING UP THE EQUIPMENT

1. After the equipment components have been uncrated, locate them near the location chosen for operating the equipment.
2. The main frame should be suspended (VERY CAREFULLY) so that the five (5) leg assemblies (P. N. 70 052 000) can be connected with the appropriate fasteners.

(REF. MAIN ASSEMBLY ILLUSTRATION ON PAGE 6.3)

NOTE: THE LEGS ARE CROSS-MARKED TO THE MOUNTING POSITIONS ON THE FRAME.

3. With the legs attached, set the frame in position on the floor and level it. It is critical to proper equipment operation that the frame be level along its entire length. Use the adjustment bolts on the legs for this and secure them with the locking nuts.

IMPORTANT

ONCE THE FRAME HAS BEEN LEVELED (BUBBLE GAUGE), THEN THE OPERATOR HAS AN ACCURATE WORK BENCH ON WHICH HE MAY LOCATE AND LEVEL THE CYLINDER SHELL TO THE END POST. WITHOUT PROPER LEVELING, THE CYLINDER SHELL AND SHAFT COULD TWIST AND BIND DURING EITHER DIS-ASSEMBLY OR REASSEMBLY.



INSTALLATION

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4. The first major component that is added to the repair stand must be the cylinder carriage assembly (P.N. 70 020 000). Set the carriage in the center of the bed with the clevis pin end away from the end post weldment. Roll the carriage forward until the front lower bearings drop into the pre-cut slots in the bed channel. Next, roll the carriage to the far end of the bed and let the bearings on the clevis end of the carriage drop into the slots pre-cut into that end of the bed.

NOTE: THE CLEVIS PIN (ITEM 10 ON PAGE 6.9) MUST BE IN PLACE ON THE CARRIAGE BEFORE THE BACK END OF THE CARRIAGE IS FITTED INTO THE SLOTS.

Move the cylinder carriage forward towards the front end (end post end) of the repair stand.

5. The cylinder mounting assembly (P.N. 70 010 000) should be located next. Reference the illustration on page 6.7 for component identification.
 - a. Unbolt the fasteners (items 8&9) so that the cylinder (item 1) may be freed from the two (2) cylinder mount weldments.
 - b. Unscrew the rod adapter (item 4) from the cylinder shaft.
 - c. Remove both cylinder mount weldments (items 2 & 3) from the cylinder.
 - d. Slip the rod end cylinder mount weldment (item 2) into the frame slots on the back end (furthest from the end post weldment) of the main frame and move it about six (6) feet down the center channel.
 - e. Slip the reaction end cylinder mount weldment (**WITH THE HYDRAULIC PACKAGE MOUNT LOOSELY ATTACHED**) into the same slot and move it forward a short distance.
 - f. Place the hydraulic cylinder (item 1) between the two mount weldments and use the fasteners that were removed earlier to reconnect the cylinder assembly.
 - g. Screw the rod adapter (item 4) back onto the end of the cylinder shaft.
 - h. Slide the entire cylinder assembly forward until the rod adapter (item 4) slips between the clevis plates of the carriage assembly. Then, slide the 1" dia. pin (item 10 on page 6.9) through the slotted hole of the rod adapter. Center the pin and then tighten the two set screws on the clevis plates.
6. The hydraulic package mount (P.N. 70 070 000) can now be attached to the cylinder mounting assembly (P.N. 70 010 000) as shown on page 6.7.
 - a. The entire hydraulic package mount will slip over the lip of the main frame on the operator's side as shown in the illustration on page 6.17.
 - b. Use the 1/2" fasteners (items 2 & 3) to attach the roller mounting angle



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- (item 5) to the hydraulic package mount (item 10).
- c. There is room for adjustment of the hydraulic package mount to the cylinder mounting assembly. The entire hydraulic package (power supply) mount must ride smoothly along the lip of the main bed frame.
7. Use the illustration on page 6. 21 to complete the hydraulic hookup for the H C R S relief valve assembly. Connect the hydraulic hoses from your power supply to the couplers (item 17) located under the mounting angle.

WARNING!

THE RELIEF VALVE (ITEM 9 ON PAGE 6. 21) IS PRESET AT THE FACTORY FOR 3000 PSI. ANY TAMPERING (BROKEN SEAL) WITH THE VALVE WILL AUTOMATICALLY VOID THE WOLFF WARRANTY ON THE CYLINDER REPAIR STAND.

8. The interior components of the end post assembly (P. N. 70 060 000) should now be added to the end post weldment. (REFERENCE PAGES 6. 14 & 6. 15)
- a. Place one (1) of the bronze thrustwashers (item 13) inside the end post tube (item 2) and set it over the hole in the bottom.
- b. Slip the lifting tube (item 7) and shaft (item 8) assembly into the larger tube so that the threaded end of the shaft extends through the hole in the base.
- c. Slip the second bronze thrustwasher (item 13) over the shaft and follow this with the handwheel (item 12). Insert a 1/4" dia. roll pin through the predrilled holes in both the handwheel and the shaft.
- d. Slip a 3/4" I. D. flat washer (item 18) over the remaining portion of the shaft and secure it with a 3/4"-10 NC hex nut.



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The Wolff Model H C R S (HYDRAULIC CYLINDER REPAIR STAND) has been designed to handle the full range of current Caterpillar production cylinders. The instructions that follow have been prepared to acquaint the operator with the general operational principles of the repair stand so that he may adapt them as necessary to fit the requirements of any given cylinder.

V-BLOCK ASSEMBLIES

There are two (2) V-Block Assemblies (CYLINDER RESTRAINERS) used on the repair stand. During each application they should be located on the carriage assembly in positions that will give the greatest spread (cylinder support) while still holding the cylinder shell level to the bed and frame.

1. Secure the V-Blocks to the carriage assembly (P.N. 70 020 000) with 1/2"-13 NC socket head cap screws X 1" lg. (P.N. 70 790 045)
2. For certain offset cylinders, a set of shims is supplied to raise the V-Block Assembly from 1/8" to 2 1/4". See the listing on page 6.3 for the correct part numbers and descriptions.

NOTE: IF OFFSET TYPE CYLINDERS REQUIRE THE USE OF SHIMS UNDER THE V-BLOCKS, BE CERTAIN THAT A PROPERLY SIZED BOLT IS USED TO HOLD THE ASSEMBLY SECURE. THE BOLTS RANGE IN LENGTHS OF 1", 1 1/2", 2", 2 1/2", 3" & 3 1/2".

3. Each V-Block Assembly has its own chain tightener assembly. Reference the illustrations on pages 6.19 & 6.23 during the following explanation for their proper use.
 - a) The illustration on page 6.23 shows the chain assembly in its "LOCKED" position. This is the final position which holds the cylinder secure against the teeth of the V-Block Assembly.
 - b. In order to get to this position, start with the chain completely free of the V-Block Assembly.

NOTE: USE STEP b) FOR THE INITIAL SETUP ONLY.

- 1) The bar knob (item 8 on page 6.19) should be backed off as far as possible.
- 2) Slip the open end of the chain (item 16 on page 6.23) through the guide block (item 2 on page 6.19) and pull it parallel to the locking handle until it hangs down out of the end of the block. Until the cylinder is positioned, the other end of the chain (with chain end; P.N. 70 000 005) should be laid back over the knob end of the V-Block.

NOTE: IN ORDER TO PREVENT THE CHAIN FROM ACCIDENTALLY SLIPPING



OPERATIONAL INSTRUCTIONS

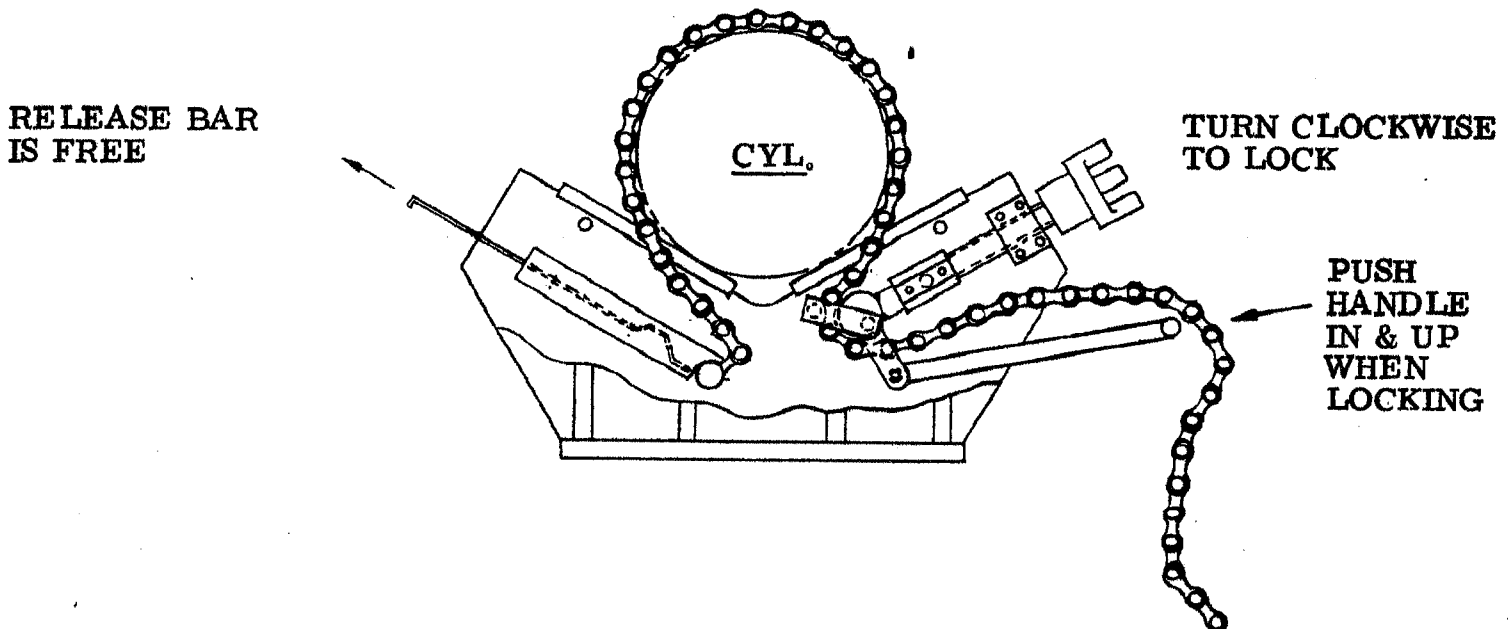
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NOTE: IN ORDER TO PREVENT THE CHAIN FROM ACCIDENTALLY SLIPPING THROUGH THE GUIDE BLOCK, A BOLT & NUT SHOULD BE ATTACHED TO THE OPEN END OF EACH LENGTH OF CHAIN.

- 3) After the cylinder has been positioned on the V-Blocks, the top section of chain should be laid over the top of the cylinder and the chain end slipped into the locking groove as shown in the illustration below. Pull the other end of the chain to take up the slack.

LOCKING THE CHAIN TO THE CYLINDER



- 4) When all the slack has been removed, depress the locking handle (item 15 on page 6.19) while pulling the chain tight.
- 5) With continued pressure on both the chain and locking handle, tighten down the bar knob (item 8 on page 6.19) until the chain is securely locked in place.

CAUTION

DO NOT OVER-TIGHTEN THE CHAIN. THE BAR KNOB CAN APPLY CONSIDERABLE PRESSURE TO THE LOCKING MECHANISM WHICH MAY CAUSE DAMAGE IF APPLIED TOO STRONGLY.

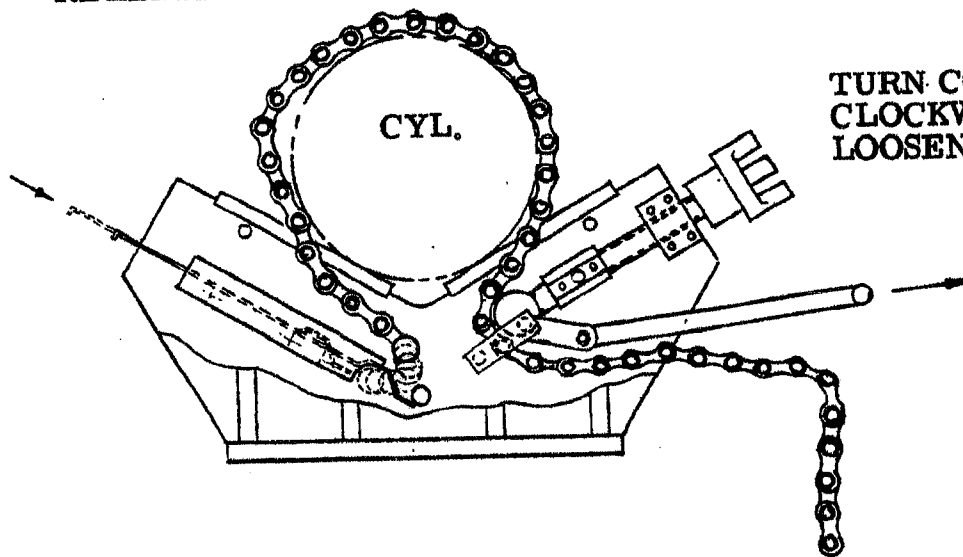


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- 6) The cylinder is now secured to the V-Block Assembly. Repeat the procedure with the second chain assembly.
- c) In order to release the chain, back the knob off while pulling out on the locking handle. As soon as it loosens, push the pin removal plate (item 11 on page 6.23) towards the center of the V-Block and the chain end will slip loose thereby freeing the cylinder.

RELEASING THE CHAIN FROM THE CYLINDER

**PUSH DOWN ON
RELEASE BAR
AFTER LOCKING
BAR HAS BEEN
BACKED OFF TO
GIVE SOME SLACK**



**TURN COUNTER-
CLOCKWISE TO
LOOSEN**

**PULL
OUT
WHEN
FREEING
CHAIN**

END POST ASSEMBLY: LOCKING THE CYLINDER SHAFT ROD EYE IN POSITION

The end post assembly is used to lock the cylinder shaft rod eye in place so that the cylinder shell may be pulled free of the end cap assembly.

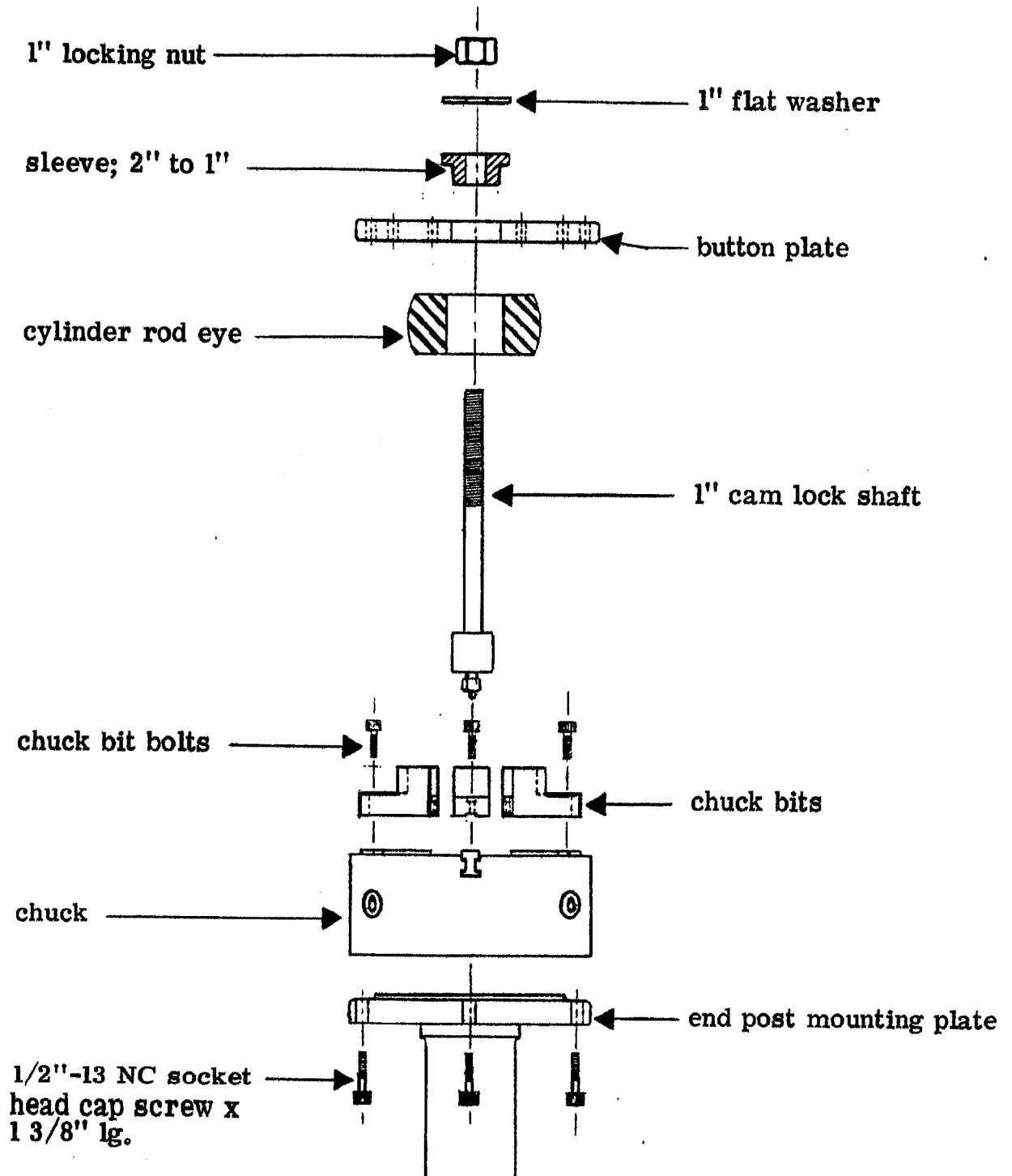
1. The eight inch chuck is attached to the end plate of the end post adjustment shaft with three 1/2"-13 socket head cap screws X 1 3/8" lg.
2. Depending upon the rod eye's I. D. on the cylinder being worked, either the large (P.N. 70 110 002) or the small (P.N. 70 110 001) chuck jaws are to be inserted and locked in place within the chuck.
3. Pull the carriage stop pin (item 24 on page 6.3) and the entire cylinder shell can be rolled down the frame until the rod eye is located over the chuck assembly.



OPERATIONAL INSTRUCTIONS

(continued)

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OPERATIONAL INSTRUCTIONS

(continued)



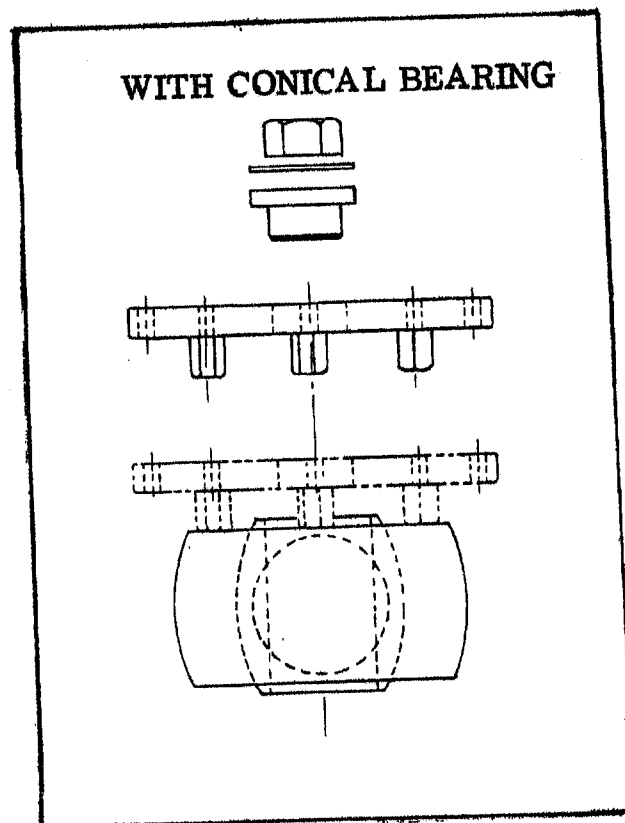
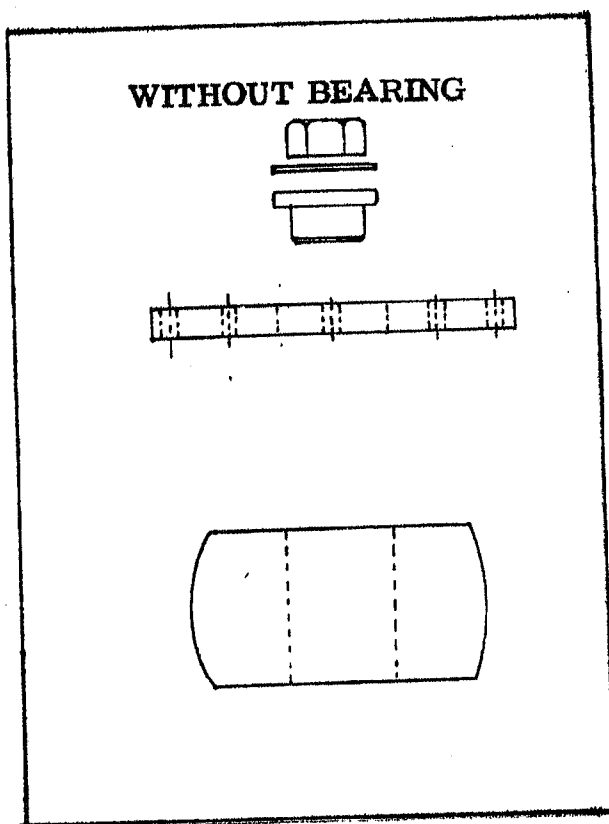
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NOTE: BEFORE THE CHUCK ASSEMBLY IS RAISED TO LOCK INTO THE ROD EYE, BE CERTAIN THAT THE CHUCK BITS HAVE BEEN CLOSED DOWN FAR ENOUGH TO CLEAR THE I.D. OF THE EYE.

4. Use the handwheel (item 11 on page 6.15) to raise the chuck assembly until it rests against the bottom of the rod eye with the chuck jaws inside the eye.
5. Use the chuck adjustment tool to lock the chuck jaws against the inside area of the rod eye.
6. Again, depending upon the size of the rod eye and the clearance space between the chuck jaws in their tightened-down position, insert the appropriate cam lock shaft (P.N. 70 000 001-small)(P.N. 70 000 002-large) into the top plate of the end post assembly.

NOTE: ALWAYS USE THE LARGER SHAFT (P.N. 70 000 002) WHENEVER POSSIBLE.

Slip the shaft through the rod eye and chuck jaws until it drops between the roll pins in the top plate of the end post vertical adjustment shaft. Turn the shaft clockwise until it locks itself in place.





OPERATIONAL INSTRUCTIONS

(continued)

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7. Secure the rod eye with the button plate and the appropriate fasteners. Reference the main assembly illustration on page 6.3.
 - a. A rod eye "WITHOUT" the conical swivel bearing uses the button plate (P.N. 70 000 010) turned so that the adjustment screws are UP and therefore clear of the rod eye facing surface.
 - 1) With the two inch (2") cam lock shaft, use a 2" hex nut (P.N. 70 790 192) with a 2" washer (P.N. 70 790 190).
 - 2) With the one inch (1") cam lock shaft, a spacer (P.N. 70 000 009) is placed through the center hole of the button plate and then all components are secured with a 1" hex nut (P.N. 70 790 193) and a 1" washer (P.N. 70 790 191).
 - b. A rod eye "WITH" a conical swivel bearing uses the button plate (P.N. 70 000 010) turned so that the adjustment screws may be positioned to bear against the face side of the rod eye at a point that is furthest from the center hole

NOTE: THE HEADS OF THE CONTACT BOLTS MUST ALL CONTACT THE FACE SURFACE TO ENSURE THAT TORQUING PRESSURE IS DISTRIBUTED EVENLY ALONG THE ROD EYE.

8. On certain types of cylinders (NO ROD EYE), a special adapter (available through Caterpillar under their Part Number FT 649) must be used to secure the end of the shaft to the end post assembly.

OPERATION OF THE CYLINDER REPAIR STAND FOR CYLINDER

DISASSEMBLY

1. The cylinder head retaining bolts should now be loosened and removed from the cylinder and the repair stand.

CAUTION

DO NOT LEAVE ANY BOLTS, BOLT GUARDS OR MISCELLANEOUS TOOLS OR ANY OTHER ITEMS IN THE BED OF THE FRAME!

2. Replace the carriage stop pin (item 24 on page 6.3) in its guide tube.

OPERATIONAL INSTRUCTIONS

(continued)



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OPERATION OF THE CYLINDER REPAIR STAND FOR CYLINDER DISASSEMBLY

(continued)

3. Extend the ram on the cylinder mounting assembly (P.N. 70 010 000) until the carriage stop pin drops into one of the pre-drilled holes in the base of the bed frame.

WARNING

THE RELIEF VALVE (ITEM 9 ON PAGE 6, 21) FOR THE POWER SUPPLY SYSTEM IS PRESET AT THE FACTORY FOR 3000 PSI. ANY TAMPERING (BROKEN SEAL) WITH THE VALVE WILL AUTOMATICALLY VOID THE WOLFF WARRANTY ON THE CYLINDER REPAIR STAND.

4. Reverse the direction on the power supply pump and retract the ram on the cylinder mounting assembly. This will pull the cylinder shell away from the end post, thereby extending the work cylinder's ram shaft.
5. When the cylinder mounting assembly's ram has bottomed out, again remove the carriage stop pin, reverse the direction of the ram and extend it until the carriage stop pin (which is replaced in its slot after the ram extension is started) drops into the next hole along the main frame's bed.
6. Continue the pushing/pulling process until the cylinder shaft starts to bottom out against the cylinder head. When the head (cap) starts to separate from the cylinder, install either one or two Rod Support Assemblies (P.N. 70 040 000) under the ram shaft and adjust them to hold it parallel to the cylinder shell center line.
7. With the rod support assemblies in position (see below), continue pulling until the cylinder and ram shaft are fully separated.

ROD SUPPORT ASSEMBLIES

Reference page 6, 12 for descriptions of all components for the rod support assemblies. With the assembly in its collapsed or closed position, place the unit over the slot in the base of the frame. Use the adjustment nut (item 6) to raise the shaft (item 5) until the "V" rest is touching the cylinder shaft. After checking to be certain that the unit is centered, spread the guide bars (item 4) until they contact the channel edges in the bed. Tighten down the 3/8"-16 NC hex head cap screws X 3/4" lg. (item 10).

TORQUE MULTIPLIER MOUNTING ASSEMBLY

Reference page 6, 10 for the descriptions of all the components of the torque multiplier mounting assembly.

1. Place the Torque Multiplier Mounting Stand (P.N. 70 030 000) into the main



OPERATIONAL INSTRUCTIONS

(continued)

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TORQUE MULTIPLIER MOUNTING ASSEMBLY

(continued)

frame bed between the cylinder shell and the extracted ram shaft.

NOTE: USE AN OVERHEAD JIB ASSEMBLY TO LIFT THE TORQUE MULTIPLIER MOUNTING STAND ASSEMBLY BY THE LIFTING EYE ON THE TOP FRAME.

2. Once located on the bed frame, raise the mounting plate weldment (item 2 on page 6.10) until the torque multiplier (not shown) is of the proper height to slip over the cylinder shaft retaining nut.
3. Be certain that the properly sized tooling is used for the particular cylinder retaining nut; then, push the entire mounting assembly towards the cylinder nut until the two pieces are securely joined.
4. Lock the mounting stand to the bed frame with the two (2) locking wedge assemblies (R. H. 70 034 000 & L. H. 70 035 000). Start with the wedges spread as far apart as possible and then close them until the top piece contacts the base of the mounting stand. A sharp tap on the wide end of the top bar will lock the wedge in place. Use a nylon tipped or rubber hammer on the wedge assemblies.
5. Use the torque multiplier to remove the retaining nut. Once the nut is freed, a light tap on the small ends of the locking wedges will free the mounting stand and the entire assembly can be pushed free of the cylinder's ram shaft.
6. After all repair work has been completed on the rod packings of the cylinder shaft and the new or rebuilt components have been properly located, the torque multiplier mounting stand should be repositioned to the retaining nut so that it may be properly retorqued.
7. Clear the mounting stand assembly from the cylinder shaft retaining nut and remove the entire assembly from the Model H C R S's bed.

OPERATION OF THE CYLINDER REPAIR STAND FOR CYLINDER REASSEMBLY

The procedures used in reassembling the cylinder shaft to the cylinder barrel are simply the reverse of the disassembly process. However, certain cautions must be stressed; these include:

1. The cylinder shell and cylinder shaft must be level to the bed and they must be on a centerline to each other. Otherwise, when they are pressed together, they may wedge and damage the cylinder components and possibly freeze up the entire assembly.
2. Before the cylinder shaft's rod packing end can be inserted into the cylinder shell, move them until they almost touch and then visually inspect the items to be certain that the alignment is correct.



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POWER UNIT

Be sure to follow the manufacturers recommendations for fluid type and replacement procedures.

WORKING CYLINDER: P. N. 531-250

The cylinder has a shock rating of 5000 PSI, BUT, its maximum operating pressure is pre-set at 3000 PSI. Any tampering with the relief valve (P. N. 750035) will automatically void the Wolff Warranty on the Repair Stand.

CARRIAGE ROLLERS

Use a chasis lubricant on the nut ends of the carriage rollers once a month.

END POST ASSEMBLY

Raise the end post to its highest position once a month and lubricate the shaft with SAE 30 oil.

CAUTION

1. KEEP ALL TOOLS, LOOSE NUTS AND BOLTS, MUD GUARDS AND ANY OTHER MISCELLANEOUS ITEMS OUT OF THE BED OF THE MODEL H C R S.
2. IF THE LOCKING MECHANISM FOR THE CHAIN TIGHTENER ASSEMBLY STARTS TO STIFFEN, THERE IS PROBABLY DIRT OR PAINT CHIPS IN THE THREADED SHAFT. DISASSEMBLE AND CLEAN WITH SOLVENT.



The Model H C R S (HYDRAULIC CYLINDER REPAIR STAND) has been designed for simplicity of operation and maintenance. With its power unit's relief valve pre-set at a safe operating pressure (3000 PSI), the problems that could develop with the unit will probably be mechanical.

Items to be checked on the cylinder repair stand on at least a weekly basis are:

CYLINDER MOUNTING ASSEMBLY: P. N. 70 010 000

Fasteners should be checked and tightened if they have worked loose. Special care should be taken for the fasteners that hold the hydraulic package mounting arm (item 11 on page 6. 7) in place. If the fasteners continue to work loose, use liquid loctite to seal them in place.

TORQUE MULTIPLIER MOUNTING ASSEMBLY: P. N. 70 030 000

Fasteners (especially set screws) should be checked and tightened if they have worked loose. If the lifting mechanism is working improperly, check for a loose or broken chain or possibly a sheared roll pin.

END POST ASSEMBLY: P. N. 70 060 000

If the end post raises too slowly or not at all, coat the shaft (item 2 on page 6. 15) with SAE 30 oil and check the roll pin (item 8) to see if it has been sheared.

HYDRAULIC PACKAGE MOUNT: P. N. 70 070 000

Fasteners should be checked and tightened if they have worked themselves loose.

CHAIN TIGHTENER ASSEMBLY: P. N. 70 080 000

This assembly is very critical to the operation of the V-Block assemblies. The fasteners should be checked each time the equipment is used. Clean all dirt and paint chips away from critical sliding areas and specifically from the shaft (item 4 on page 6. 19) and threaded block (item 3).

MODEL H C R S RELIEF VALVE ASSEMBLY: P. N. 70 120000

Inspect for leaking fittings. Remember, the relief valve (item 4) is pre-set at the factory for 3000 PSI. Any tampering (broken seal) with the valve will automatically void the Wolff Warranty on the Cylinder Repair Stand.



TROUBLESHOOTING

(continued)

10/79

FIXED V-BLOCK ASSEMBLY: P. N. 70 100 000

The problems with the chain locking mechanism are covered under Chain Tightener Assembly (described above). Other than the positioning of the chain in the locking mechanism (see illustration on page 6.23) and the placement of the height adjustment shims, the only problems with this assembly should be loosened fasteners.

SPECIAL PROBLEMS: EASILY OVERLOOKED HANDLING MISTAKES

1. Rod eye will not lock securely in place.
 - a. Incorrect shaft being used.
 - b. Correct shaft incorrectly positioned in end post.
 - c. Button plate incorrectly used.
 - 1) The flat surface of the button plate (no bolts) faces down on the bearing-less rod eyes.
 - 2) The buttons (bolts) must be properly located against the flat surface of the rod eye when it is fitted with a conical bearing.
 - d. Button plate spacer not in place when using the small shaft.
 - e. Wrong size jaw bits being used.
 - f. Chuck is not fully closed.
2. The Torque Multiplier Mounting Stand will not lock in place; locking wedges being improperly used.
3. The Chain Assembly will not lock down; locking handle not being properly positioned.
4. The Cylinder Mounting Assembly will not move freely in the track of the bed.
 - a. The locking pin is still in the locking slot.
 - b. Foreign material in the bed is blocking the travel path of the assembly.
5. The Hydraulic (working) cylinder is not functioning properly.
 - a. Power unit is not plugged in.
 - b. Directional lever on the Power Unit is in the wrong position.
 - c. The Relief Valve has been tampered with.



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HOW TO ORDER PARTS

All parts listed herein may be ordered through the factory.

Write or phone:

PARTS ORDER DESK
WOLFF MANUFACTURING COMPANY
1611 Adrian Road
Burlingame, California 94010

Phone: (415) 692-5010

Telex: 349-414 Cable: SALENCO Burlingame

WHEN ORDERING, ALWAYS GIVE THE FOLLOWING INFORMATION:

- 1) Part Number(s) listed on the component or assembly illustration.
(Never order by Item Number or Code Number.)
- 2) Complete Part Description.
- 3) Serial Number found on the metal label of each machine.
- 4) State quantity desired.
- 5) State when delivery is required.
- 6) List the manual identification number as shown in the bottom right hand corner of the introduction page.

Selling prices will be furnished on request, or parts will be shipped at prevailing prices and you will be billed accordingly.



MODEL H CRS MAIN ASSEMBLY PARTS LISTING

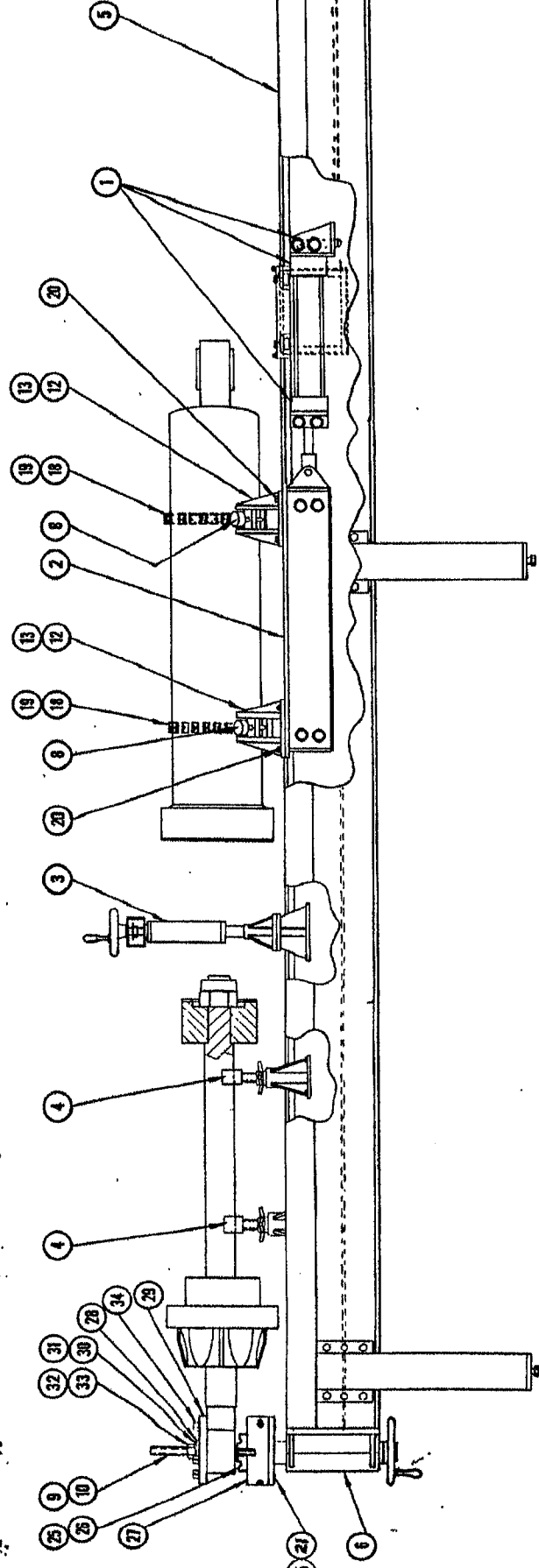
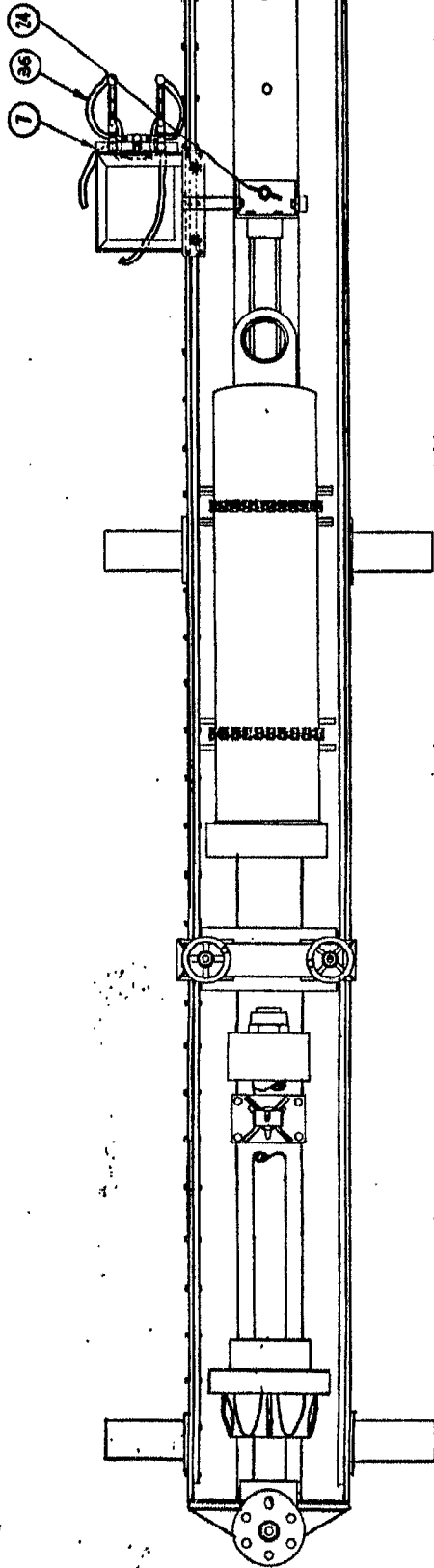
P.N. 70 000 000

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<u>TEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1	70 010 000	1	CYLINDER MOUNTING ASSEMBLY
2	70 020 000	1	CARRIAGE ASSEMBLY
3	70 030 000	1	TORQUE MULTIPLIER MOUNTING ASSEMBLY
4	70 040 000	2	ROD SUPPORT ASSEMBLY
5	70 050 000	1	FRAME ASSEMBLY
6	70 060 000	1	END POST ASSEMBLY
7	70 070 000	1	HYDRAULIC PACKAGE ASSEMBLY
8	70 080 000	2	CHAIN TIGHTENER ASSEMBLY
9	70 000 001	1	END POST ROD, SMALL
10	70 000 002	1	END POST ROD, LARGE
11	70 000 003	1	END POST CONICAL PLATE
12	70 001 000	1 set	V-BLOCK SHIM SET SEE LIST BELOW
13	70 100 000	2	STATIONARY V-BLOCK
14	70 000 004	2	V-BLOCK CHAIN CATCH
15	70 000 005	2	CHAIN END
16	70 000 006	8	CYLINDER BEARING PLATE
17	70 000 007	2	PIN REMOVAL PLATE
18	780 013	2	CHAIN
19	780 014	2	CONNECTING LINK
20	790 045	8	1/2"-13 NC SOCKET HEAD CAP SCREW X 1" LG.
21	790 009	3	1/2" LOCKWASHER
22	790 047	2	1/4"-20 NC SOCKET HEAD CAP SCREW X 1/2" LG.
23	790 048	2	1/4" FLATWASHER
24	70 000 008	1	CARRIAGE STOP PIN
25	70 110 001	3	SMALL CHUCK JAW
26	70 110 002	3	LARGE CHUCK JAW
27	740 014	1	8" CHUCK
28	70 000 009	1	SLEEVE, 2" to 1"
29	70 000 010	1	BUTTON PLATE
30	790 190	1	2" I.D. WASHER
31	790 191	1	1" I.D. WASHER
32	790 269	1	2"-12 NF HEX NUT
33	790 001	1	1"-14 NF HEX NUT
34	790 275	6	SCREW REST BUTTON
35	790 220	3	1/2"-13 NC SOCKET HEAD CAP SCREW X 1 3/8" LG.
36	70 120 000	1	RELIEF VALVE ASSEMBLY
	70 001 000	1 set	V-BLOCK SHIM SET (CONSISTS OF:)
	70 001 001	1	PLATE, 1" X 10" X 10"
	70 001 002	2	PLATE, 1/2" X 10" X 10"
	70 001 003	1	PLATE, 1/4" X 10" X 10"
	70 001 004	1	PLATE, 1/8" X 10" X 10"
	70 001 005	1	PLATE, 3/16" X 10" X 10"
	790 162	4	1/2"-13 NC HEX HEAD CAP SCREW X 1" LG.
	790 029	4	1/2"-13 NC HEX HEAD CAP SCREW X 1 1/2" LG.
	790 174	4	1/2"-13 NC HEX HEAD CAP SCREW X 2" LG.
	790 091	4	1/2"-13 NC HEX HEAD CAP SCREW X 2 1/2" LG.
	790 195	4	1/2"-13 NC HEX HEAD CAP SCREW X 3" LG.
	790 196	4	1/2"-13 NC HEX HEAD CAP SCREW X 3 1/2" LG.

MODEL H C R S

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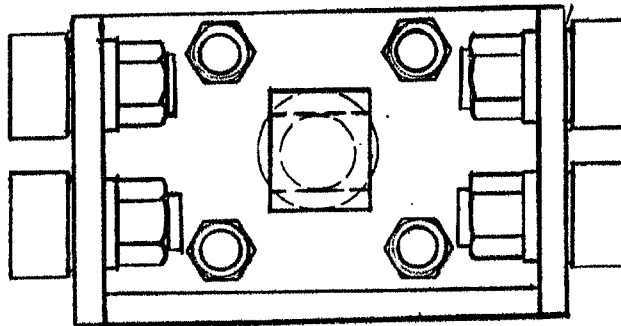


CYLINDER MOUNTING ASSEMBLY
P.N. 70 010 000

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PARTS LISTING

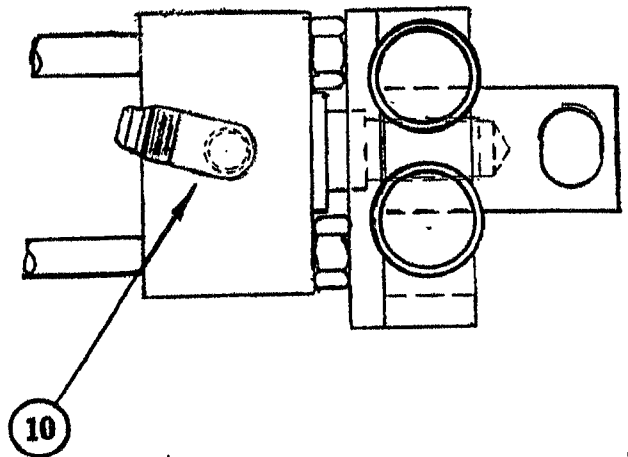
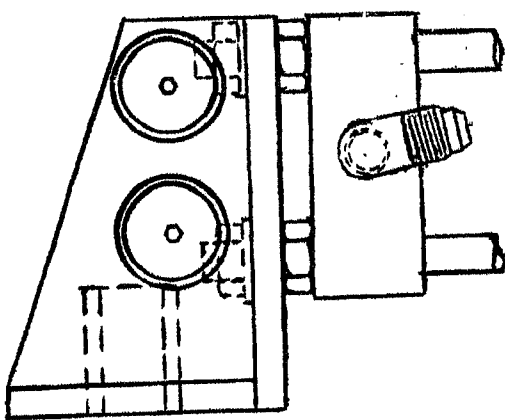
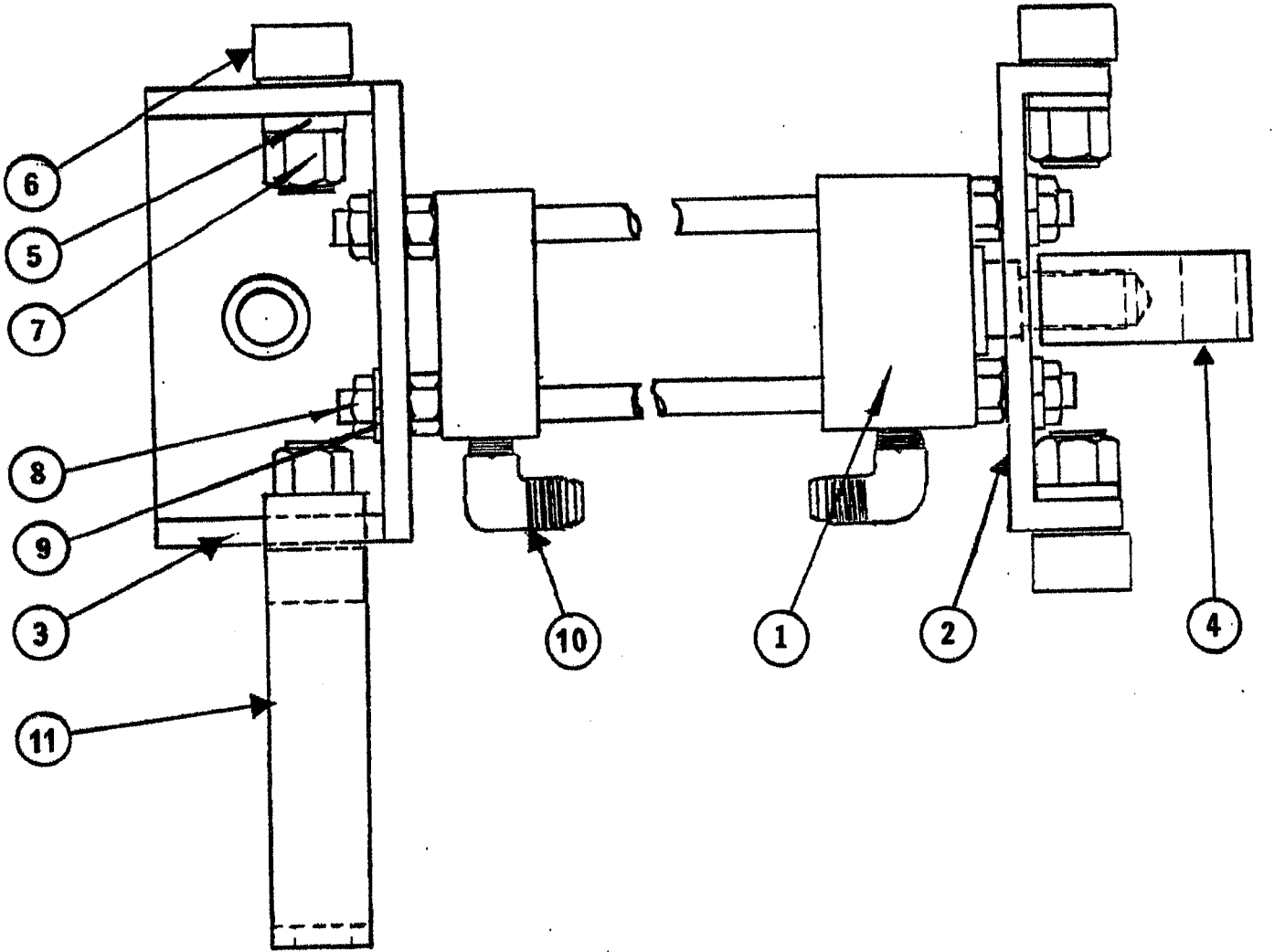
<u>ITEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1	750 001	1	HYDRO-LINE CYLINDER
2	70 011 000	1	CYLINDER MOUNT WELDMENT, ROD END
3	70 012 000	1	CYLINDER MOUNT WELDMENT, REACTION END
4	70 010 001	1	ROD ADAPTER
5	70 010 002	6	SPACER WASHER, 1 3/8" DIA. 1018 CR RD. x 1/2"
6	780 001	8	CAMROLL BEARING
7	790 001	8	1"-14 U.N.S. HEX NUT
8	790 002	8	5/8"-18 NF HEX JAM NUT
9	790 003	8	5/8" SPRING LOCKWASHER
10	750 008	2	ELBOW, 90°
11	70 010 003	1	HYDRAULIC PACKAGE MOUNT



CYLINDER MOUNTING ASSEMBLY
P.N. 70 010 000



10/81



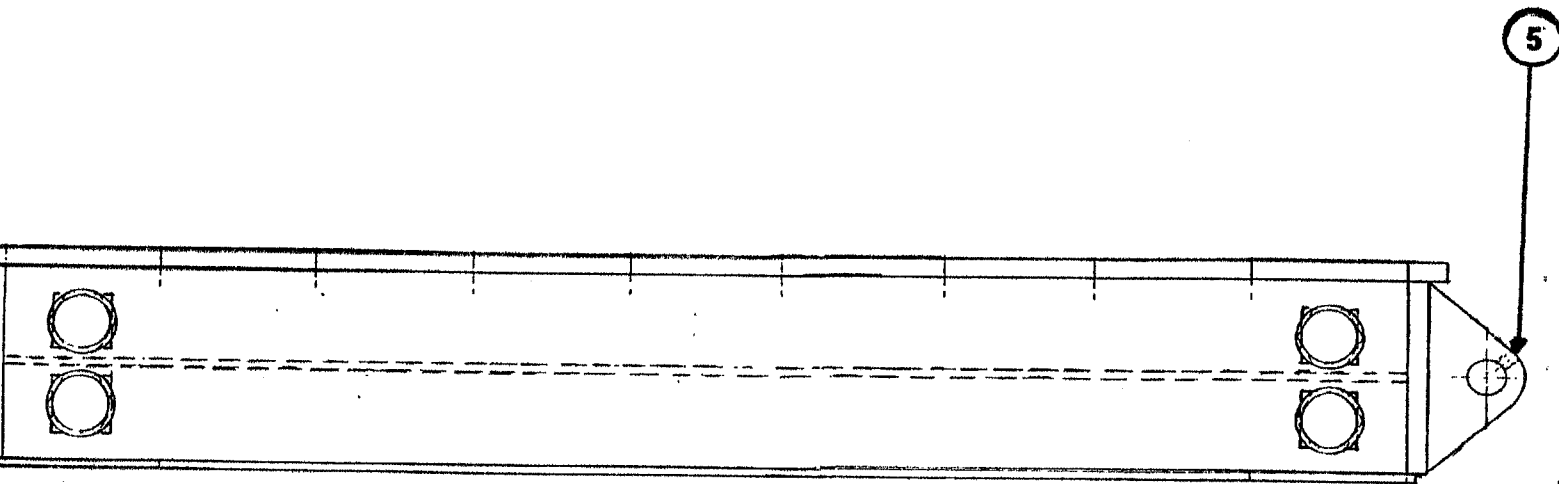
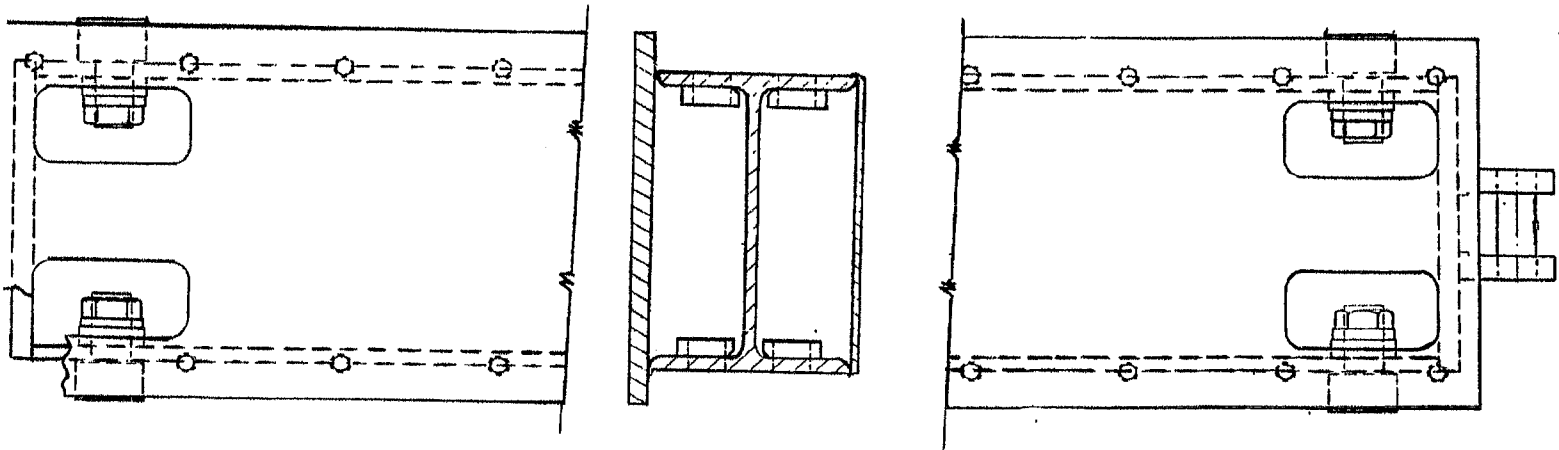


CARRIAGE ASSEMBLY

P.N. 70 020 000

REVISION C

10/82



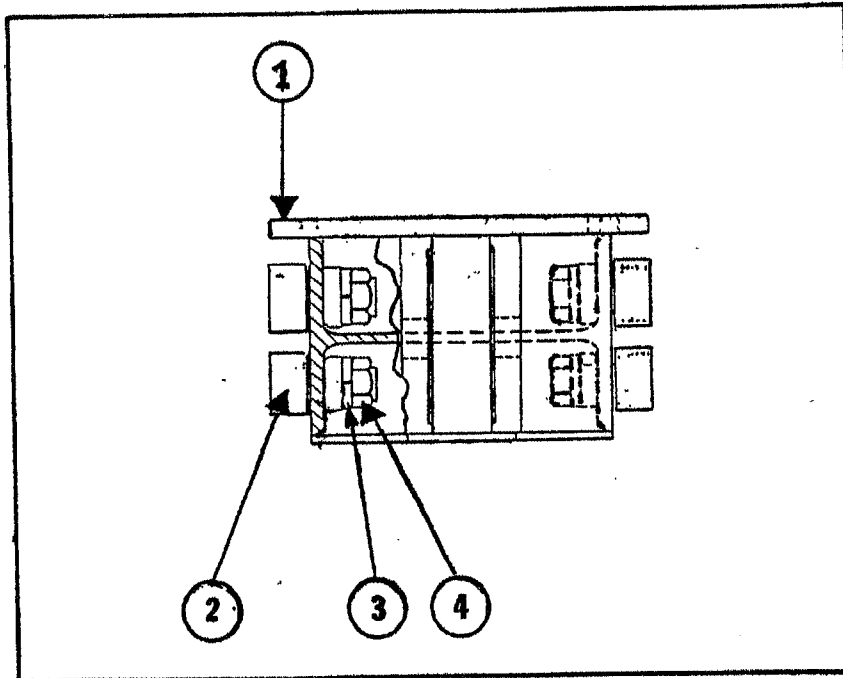
**CARRIAGE ASSEMBLY
PARTS LISTING
P.N. 70 020 000**



10/82

REVISION C

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1	70 020 008	1	CARRIAGE WELDMENT
2	780 001	8	BEARING
3	790 013	8	1" I.D. LOCKWASHER, SPLIT
4	790 038	8	1"-14 NF JAM NUT
5	790 014	1	#10-24 SOCKET HEAD SET SCREW X 1/2" LG.





TORQUE MULTIPLIER MOUNTING ASSEMBLY

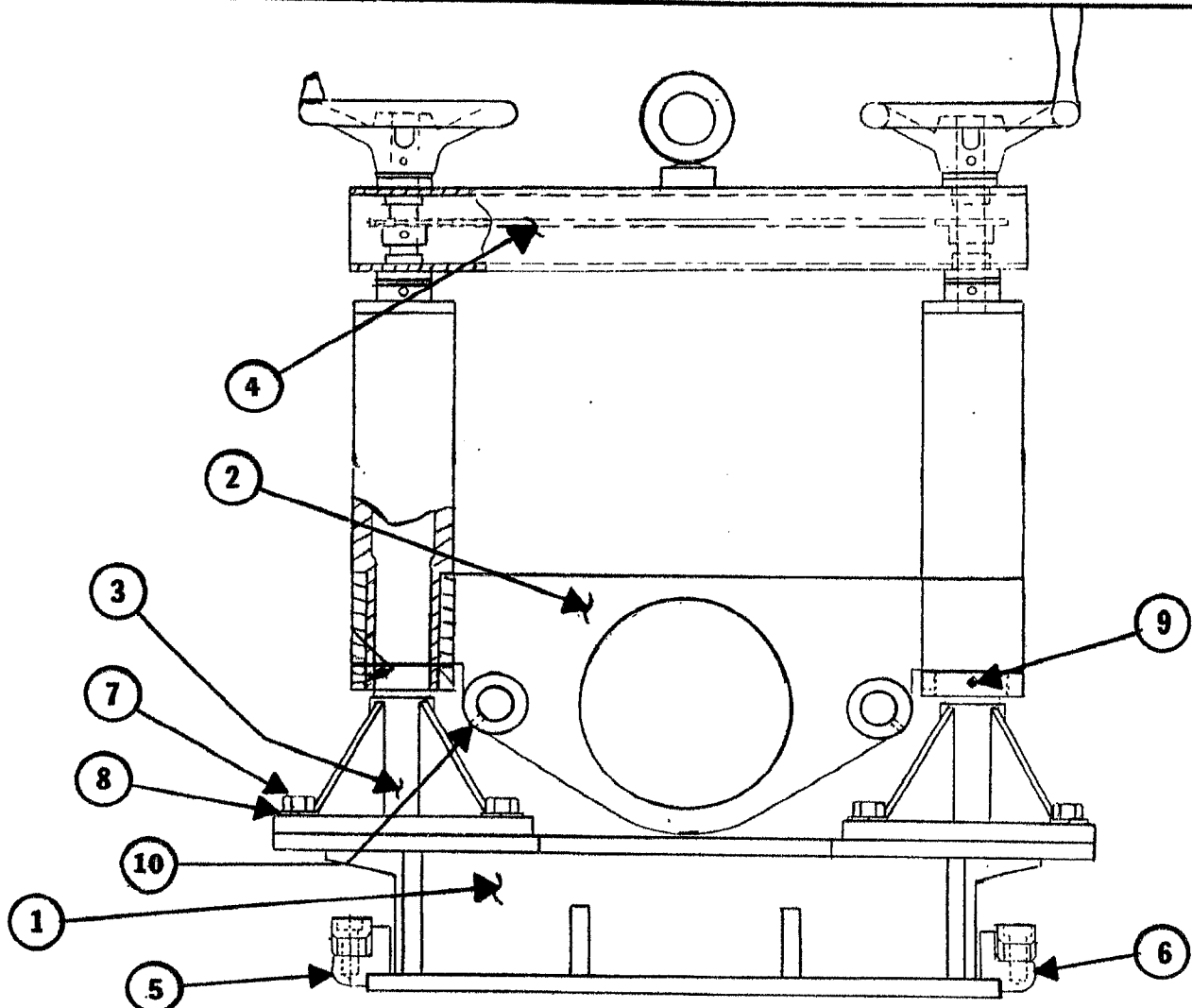
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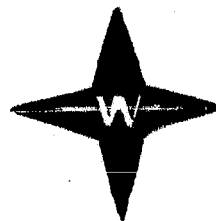
REVISION B

1/85

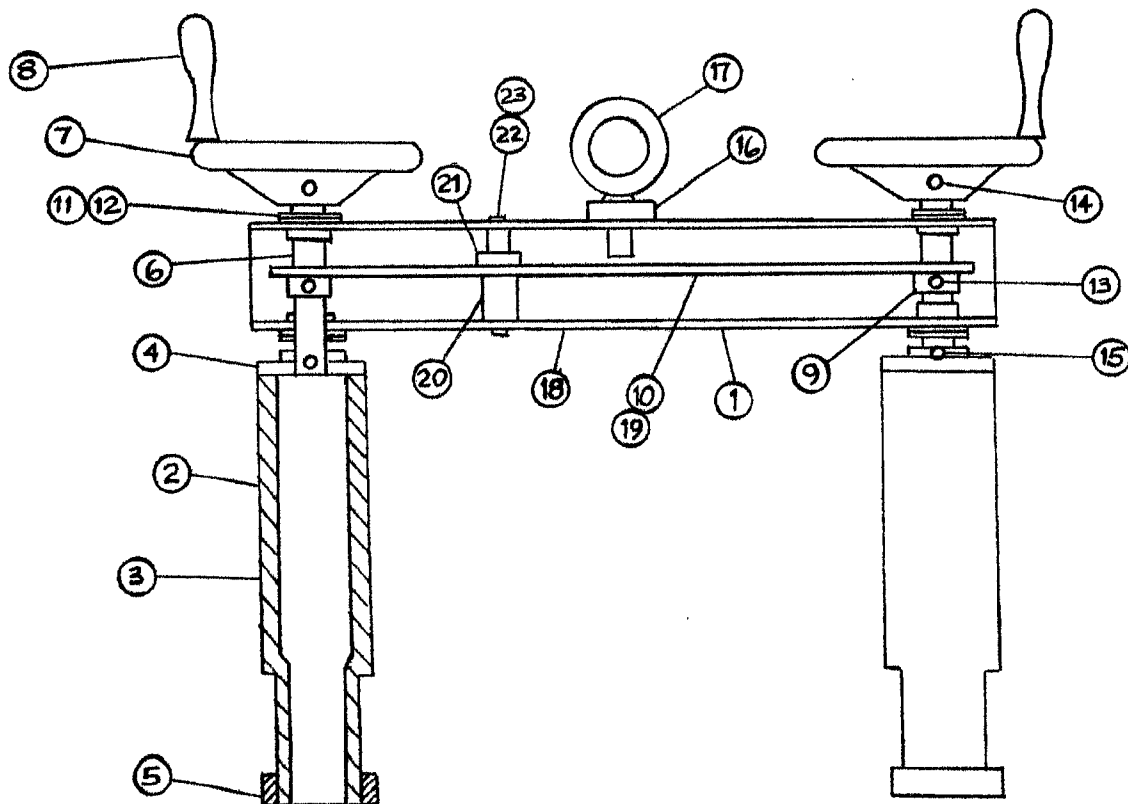
<u>ITEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1	70 031 000	1	BASE WELDMENT
2	70 032 000	1	MOUNTING PLATE WELDMENT
3	70 033 000	2	POST WELDMENT
4	70 036 000	1	VERTICAL CHAIN ADJUSTMENT ASSEMBLY
5	70 037 000	1	RIGHT WEDGE LOCK ASSEMBLY
6	70 038 000	1	LEFT WEDGE LOCK ASSEMBLY
7	790 008	8	½"-13 NC HEX HEAD CAP SCREW X 1½" LG.
8	790 009	8	½" I.D. SPLIT LOCKWASHER
9	790 010	4	5/16"-18 NC SOCKET HEAD SET SCREW, HALF DOG, X 3/8" LG.
10	790 011	2	3/8"-16 NC SOCKET HEAD SET SCREW X ½" LG.

CAUTION: CUT OUT ON BASE WELDMENT MUST BE LOCATED ON THE SIDE OPPOSITE TO THE TORQUE MULTIPLIER LOCKING COLLARS ON THE MOUNTING PLATE WELDMENT. THIS PERMITS PROPER ATTACHMENT OF TORQUE MULTIPLIER TO THE ENTIRE MOUNT.





<u>ITEM</u>	<u>PART NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1.	70036001	2	CHANNEL
2.	70036002	2	WELDMENT
3.	70036003	2	TUBE
4.	70036004	2	BAR
5.	70036005	2	TUBE
6.	70036006	2	BAR
7.	A70036009	2	HANDWHEEL
8.	70780099	2	HANDLE
9.	A510-083	2	SPROCKET, MACHINING
10.	511-046	1	#35 ROLLER CHAIN
11.	70780004	4	FLANGED BEARING
12.	70780005	4	THRUST BEARING
13.	529-363	2	ROLL PIN
14.	529-362	2	ROLL PIN
15.	529-017	2	ROLL PIN
16.	70036007	1	BAR
17.	70790007	1	LIFTING EYE
18.	70036008	1	WELDMENT
19.	511-006	1	#35 ROLLER CHAIN CONNECTING LINK
20.	A512-1365	1	IDLER CAMSHAFT
21.	A530-658	1	IDLER ASSEMBLY
22.	529-843	2	HEX NUT
23.	529-1142	2	SOCKET HEAD SET SCREW





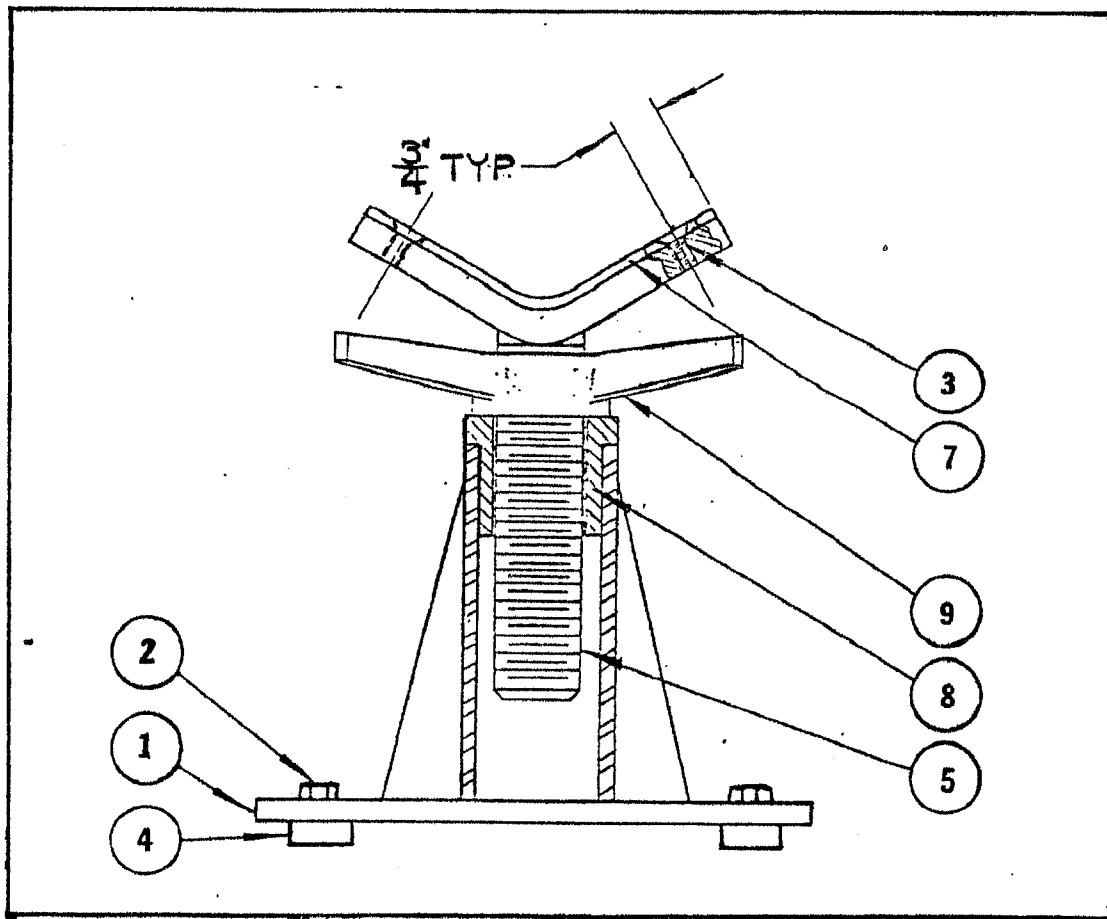
ROD SUPPORT ASSEMBLY

P.N. 70 040 000

REVISION B

10/82

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1	70 040 010	1	BASE PLATE WELDMENT
2	790 016	4	3/8"-16 NC HEX HEAD CAP SCREW X 3/4" LG.
3	790 017	2	1/4"-20 NC SLOTTED STEEL FLAT HEAD SCREW X 1/2" LG.
4	70 040 004	2	GUIDE BAR
5	70.040 009	1	SHAFT & "V" REST WELDMENT
6			NO LONGER USED
7	70 040 007	1	PROTECTION PLATE
8	70 040 008	1	2 1/2" DIA. BRONZE BUSHING
9	70 040 011	1	VERTICAL ADJUSTMENT NUT



FACTORY SUGGESTED SPARE PARTS
ONE YEAR SUPPLY



11/80

<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>RECOMMENDED QUANTITY</u>
70 110 002	CHUCK JAW (LARGE)	3
70 110 001	CHUCK JAW (SMALL)	3
70 080 000	CHAIN TIGHTENER ASSEMBLY	1
70 000 006	BEARING PLATE	2
790 269	2"-8 NC HEX NUT	1
790 001	1"-8 NC HEX NUT	1
790 275	SCREW REST BUTTON, 3/8"-16 NC	6

FOR ORDERING SPARE PARTS OR REPLACEMENT PARTS, SEE PAGE 6.1
FOR INSTRUCTIONS ON HOW TO CONTACT THE PARTS ORDER DESK.
FOR BEST RESULTS, FOLLOW ALL OF THE INSTRUCTIONS LISTED THERE.



END POST ASSEMBLY PARTS LIST
P.N. 70 060 000

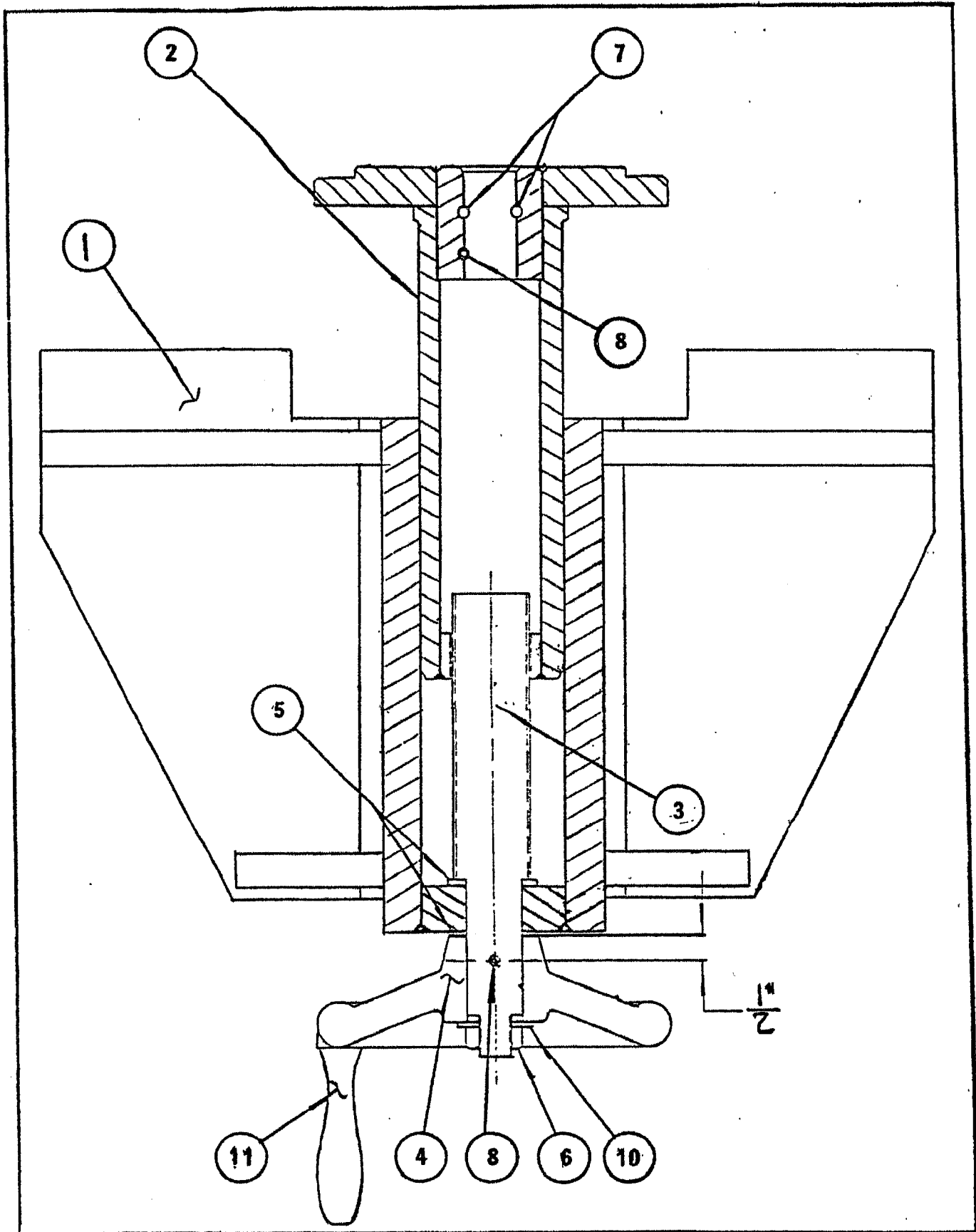
REVISION E

3/86

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	70 061 000	1	END POST MOUNTING PLATE WELDMENT
2	70 062 000	1	MOUNTING SHAFT WELDMENT
3	70 060 001	1	2" DIA. 4130 HR X 10 13/16" LG.
4	70 060 006	1	HANDWHEEL
5	780 009	2	1½" I.D. BRONZE THRUSTWASHER X 1/8" THICK
6	790 021	1	3/4"-10 NC HEX NUT
7	790 022	2	½" DIA. DOWEL PIN X 2" LG.
8	790 023	2	½" DIA. ROLL PIN X 2" LG.
9	790 024	1	½"-20 NC FULL DOG SET SCREW X 1½" LG.
10	790 025	1	3/4" I.D. FLAT WASHER
11	780 007	1	HANDWHEEL HANDLE



10/82

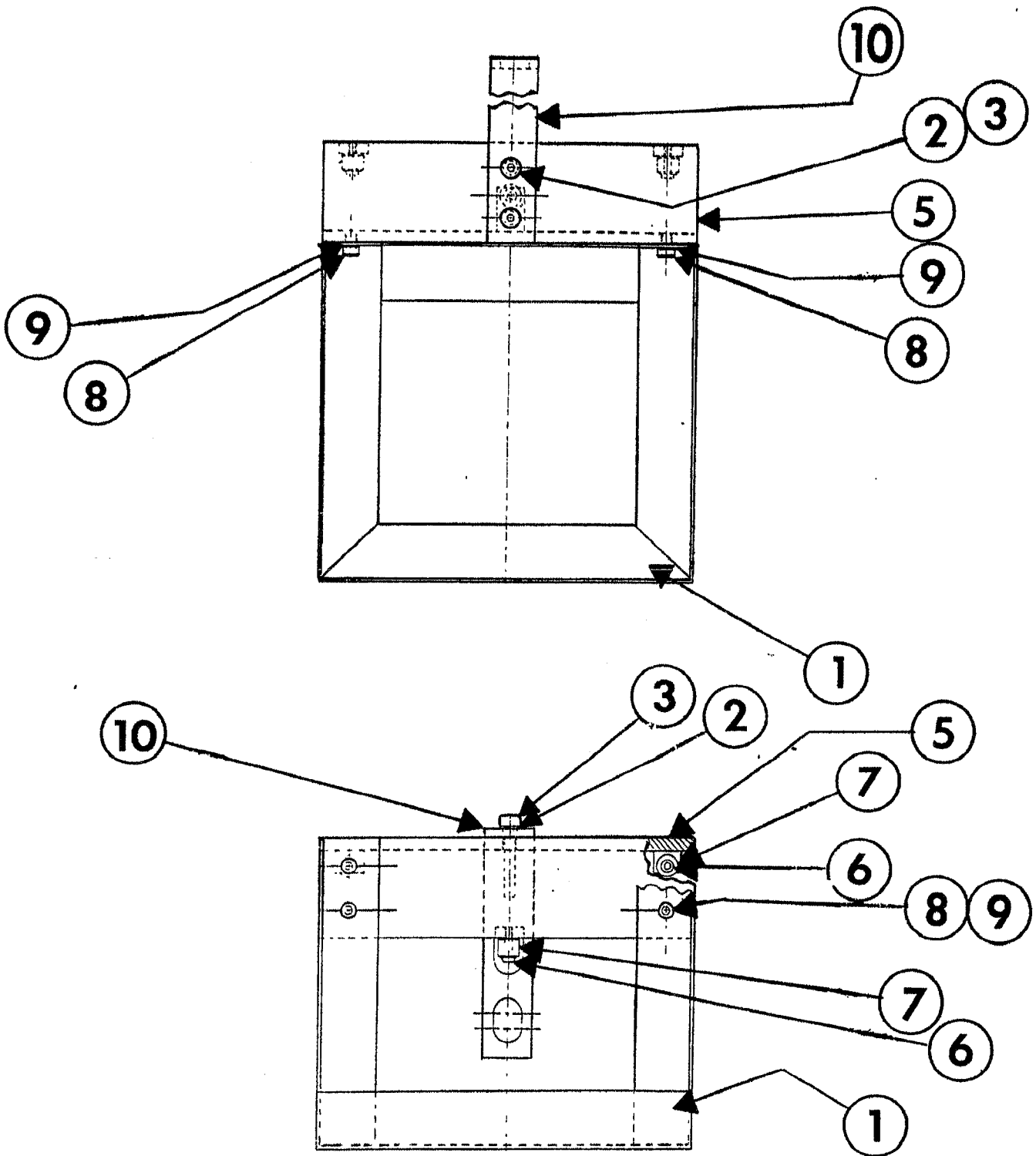




HYDRAULIC PACKAGE MOUNT

P. N. 70 070 000

11/80



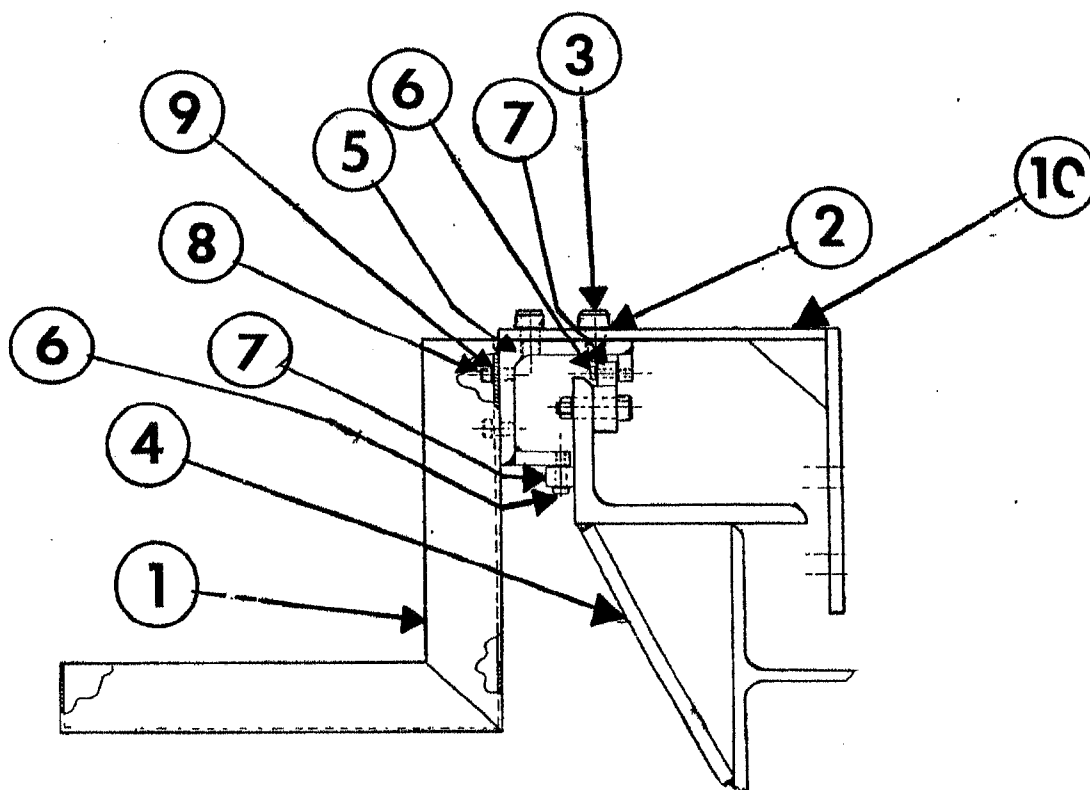
HYDRAULIC PACKAGE MOUNT

P.N. 70 070 000



11/80

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1.	70 072 000	1	ANGLE WELDMENT
2.	790 009	2	1/2" SPLIT LOCKWASHER
3.	790 187	2	1/2"-13 NC SOCKET HEAD CAP SCREW X 7/8" LG.
4.	70 051 000	1	REFERENCE ONLY: HCRS MAIN BED
5.	70 071 000	1	ROLLER MOUNTING ANGLE
6.	790 031	3	1/4"-20 NC BUTTON HEAD CAP SCREW X 7/8" LG.
7.	780 012	3	CAM YOKE ROLLER
8.	790 039	4	3/8"-16 NC SOCKET HEAD CAP SCREW X 5/8" LG.
9.	790 028	4	3/8" SPLIT LOCKWASHER
10.	70 010 003	1	REFERENCE ONLY: HYDRAULIC PACKAGE MOUNTING





CHAIN TIGHTENER ASSEMBLY

P.N. 70 080 000

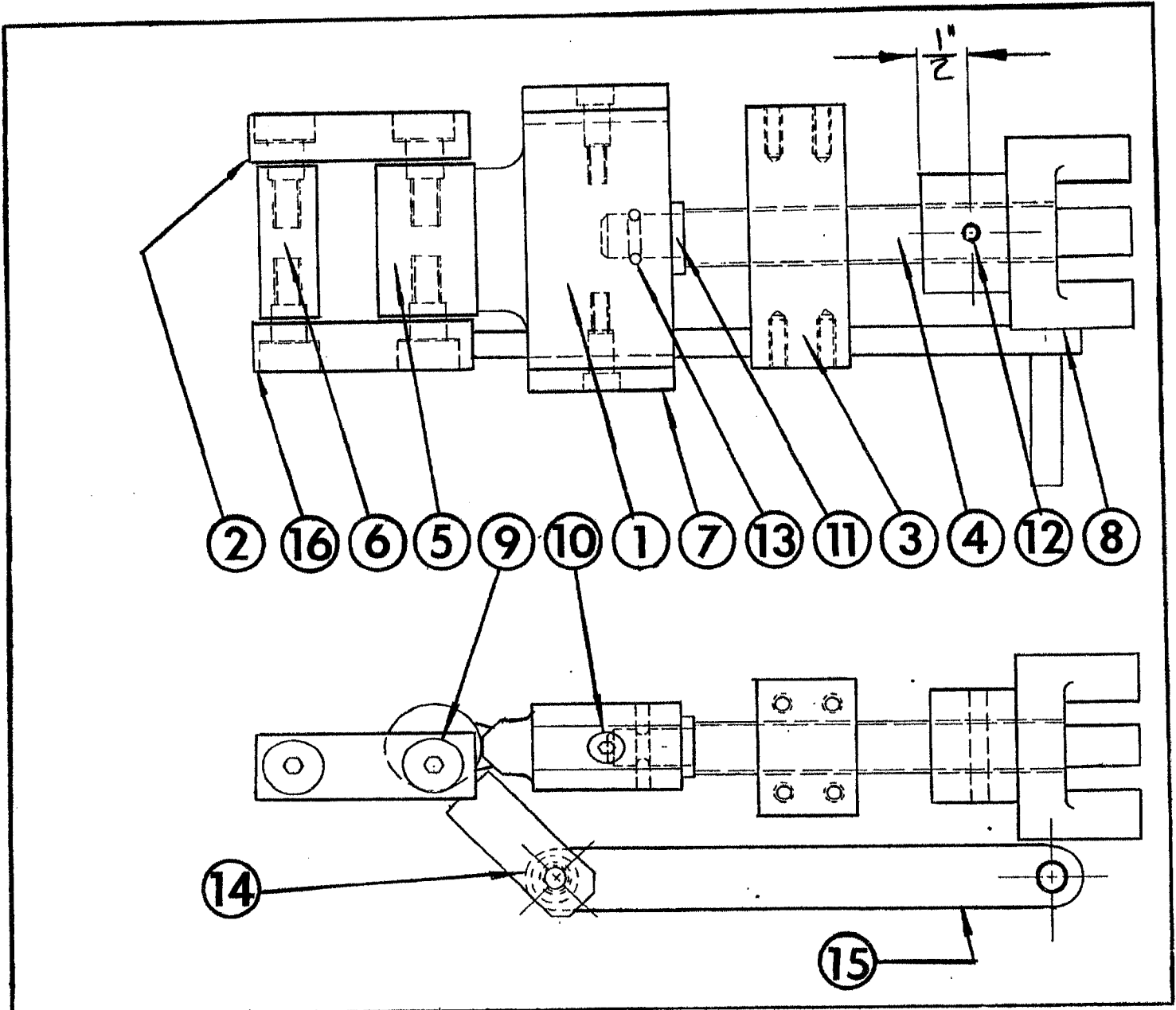
11/80

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1	70 080 001	1	GUIDE BLOCK
2	70 080 002	1	BAR
3	70 080 003	1	THREADED BLOCK
4	70 080 004	1	5/8" DIA. SHAFT X 4 5/8" LG.
5	70 080 005	1	FIXED ROLLER
6	70 080 006	1	FREE ROLLER
7	70 080 007	2	GUIDE PLATE
8	780 010	1	BAR KNOB
9	790 037	4	3/8" SOCKET HEAD SHOULDER BOLT X 3/8" LG.
10	790 036	2	1/4" SOCKET HEAD SHOULDER BOLT X 3/8" LG.
11	70 080 008	1	7/16" I.D. BRONZE THRUSTWASHER
12	790 035	1	3/16" DIA. SPRING ROLL PIN X 1 1/4" LG.
13	790 034	2	1/8" DIA. SPRING ROLL PIN X 1" LG.
14	790 137	1	5/16" DIA. SOCKET HEAD SHOULDER BOLT X 3/8" LG.
15	70 080 009	1	HANDLE
16	70 081 000	1	BAR AND TAB WELDMENT

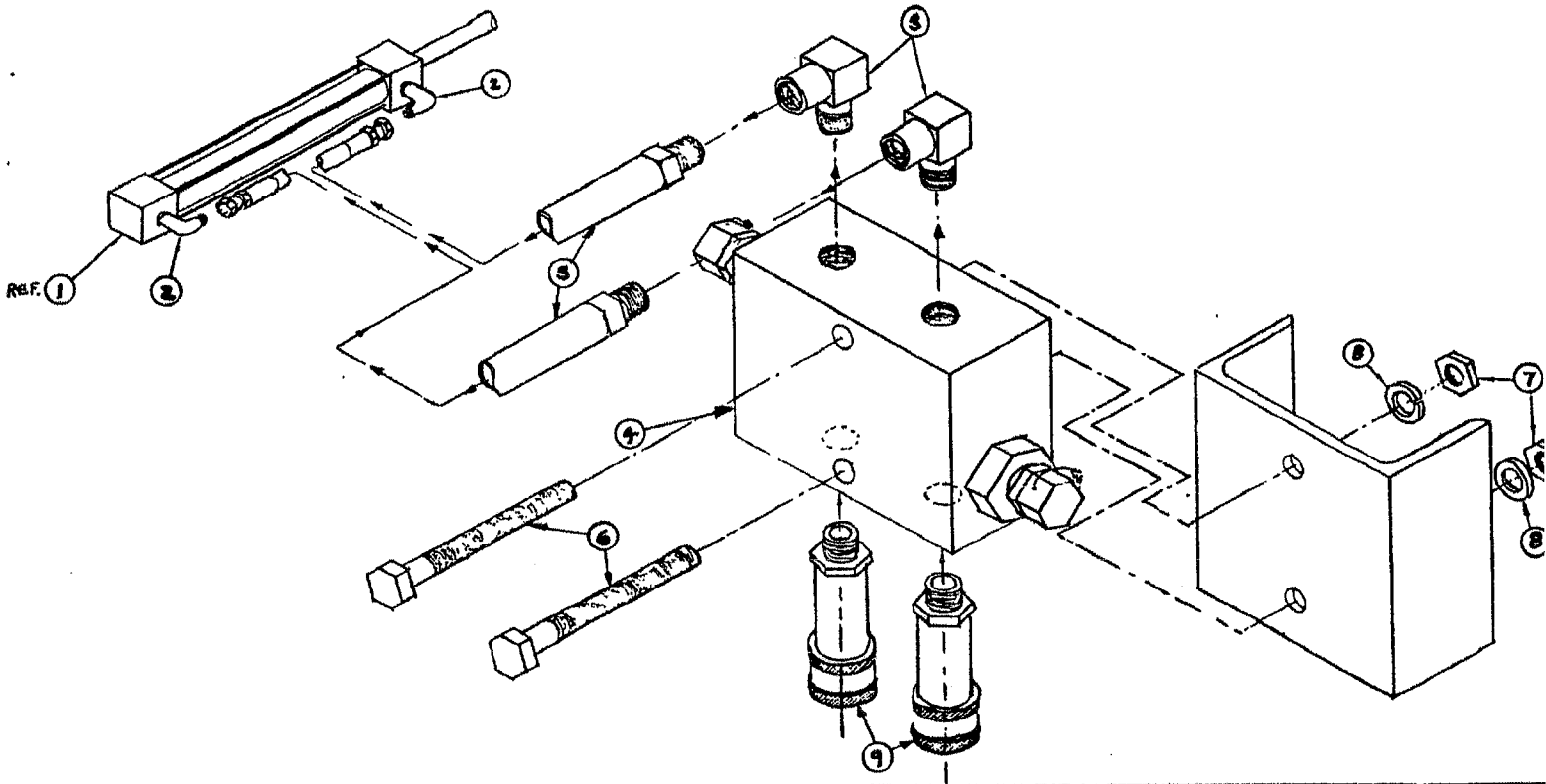
CHAIN TIGHTENER ASSEMBLY
P.N. 70 080 000



11/80



<u>ITEM</u>	<u>PART NO.</u>	<u>QUANTITY</u>	<u>DESCRIPTION</u>
1	750 001	1	HYDRAULIC CYLINDER
2	750 008	2	ELBOW, MALE
3	750 009	2	ELBOW, STREET
4	750 035	1	DUAL CROSS OVER RELIEF VALVE
5	70 120 002	2	HOSE ASSEMBLY, ½"X60" LG
6	790 303	2	H.H.C.S., 5/16"IBNC.X2½"LG
7	790 207	2	HEX NUT, 5/16"-IBNC
8	790 126	2	LOCKWASHER, 5/16"
9	750 027	2	RAM HALF COUPLER & DUSTCAP





FIXED V-BLOCK: CYLINDER RESTRAINER
P.N. 70 100 000

11/83

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
* 1	70 100 001	2	½" X 7" FLAT BAR X 17½" LG.
* 2	70 100 002	1	½" PLATE, 10" X 10"
* 3	70 100 003	4	½" X 1½" FLAT BAR X 4 ¾" LG.
* 4	70 100 004	4	¾" X 2" FLAT BAR X 3" LG.
5	70 000 004	1	V-BLOCK CHAIN CATCH
6	70 000 005	1	CHAIN END
* 7	70 100 005	1	½" DIA. 1018 CR ROUND X 3 ¾" LG.
8	70 080 000	1	CHAIN TIGHTENER ASSEMBLY
9	790 039	8	3/8"-16 NC SOCKET HEAD CAP SCREW X 5/8" LG.
10	70 000 006	4	CYLINDER BEARING PLATE
11	70 000 007	1	PIN REMOVAL PLATE
12	790 042	4	¼"-20 NC SOCKET HEAD CAP SCREW X 1" LG.
13	790 040	4	¼" SPLIT LOCKWASHER
14	790 043	8	#10-24 SOCEY HEAD CAP SCREWS X 1" LG.
15	790 041	8	#10 SPLIT LOCKWASHER
16	780 013	1	CHAIN
17	780 014	1	CONNECTOR LINK

* 70 100 006 WELDMENT



STORAGE:

If it is necessary to store a cylinder for a period of time prior to installation, the following procedures should be adhered to:

1. Do not store out of doors or in a high humidity or corrosive atmosphere without a positive method of internal and external corrosion protection.
2. Where any adverse storage conditions exist, coat all unpainted external parts, including the piston rod, with corrosion inhibitive material. Fill both ends of the cylinder with a corrosion preventative fluid compatible with the system fluid.
3. If possible, store the cylinder in a vertical position, piston rod up.
4. Dirt protector plugs should be kept in the ports during storage.

INSTALLATION:

Details on each specific mount are given in our HH Series Bulletin and reference should be made to the section on "Mountings". In addition, the following general procedures should be followed:

1. On all rigidly mounted cylinders, be sure that the part which attaches to the piston rod exactly "lines up" with the piston rod travel, or make provision for axial misalignment.
2. Flange mounted cylinders should be solidly mounted to a rigid section of the machine with high tensile bolts (socket head type recommended). When a pilot diameter cannot be used for alignment, the cylinder must be aligned to the work, tightened in place, and the flange drilled for a dowel and pinned to prevent shifting. For horizontal installations of flange mount cylinders with 48" of stroke and longer, we recommend supporting both ends of the cylinder.
3. Side mounted cylinders (Styles SL, CL, EL, PB and SF) used under shock conditions or at high pressure ranges (over 1500 psi) should be doweled or keyed to the machine. Styles SL, CL and EL have room for dowel pins in the mounting lugs. On Style FB mounts, two pins and one bolt can be used on one end to take the thrust. Cylinders should be pinned or keyed at one end only (especially important on long stroke cylinders) due to the deflection that takes place under load. On long stroke applications, the addition of an intermediate support (between the cylinder heads to support the tube and tie rods) is very important and is recommended. Care should be exercised in fastening the intermediate support so that no "humping" of the cylinder occurs. An intermediate support is utilized to afford additional cylinder support and is not designed to absorb thrust.
4. All clevis and trunnion mount cylinders need provisions on both ends for pivoting in one direction. Alignment in the other direction is essential to avoid excessive side loading. Where alignment in one direction is not possible, the cylinder must be equipped with two-direction pivoting such as can be obtained with a spherical bearing. See HH Series Bulletin for a complete line of mounting accessories.
5. On trunnion mount cylinders, use pillow blocks of ample size, rigidly mounted as

close to the cylinder heads as possible. Bearing should be provided for the full length of the trunnion pins. Lubrication should be provided to the pins.

PIPING:

Standard ports in the Sheffer "HH" series cylinders are N.P.T. (American standard taper pipe thread). These threads are designed to be used with a sealing compound. Sealing compounds should be used sparingly. Teflon tape forms an excellent pipe thread sealer. No compound or tape should be used on the first 1½ threads. This will prevent sealing compound or tape from entering the system. Tapered pipe threads should be tightened only enough to prevent leakage. Over tightening can result in permanently distorted threads that will never give a leak-proof seal.

BLEEDING:

If a cylinder is equipped with optional air bleeds, after the cylinder has been fully connected and the system has been filled with fluid, cycle the cylinder and bleed the air by loosening the air bleed plugs alternately. Loosen just enough to release the air bubbles. Tighten when no more air escapes.

MAINTENANCE:

Please note when doing maintenance work on Sheffer "HH" series cylinders:

1. The tie rod nuts need not be loosened or removed to service the rod bearing or gland except on mounting styles, BX, C, FF, FFX, FX, RF, RFX, RHF, and T on 1½" through 2½" bores, and ¾" bore with 2" diameter rod.
2. One piece piston construction eliminates the need for removing the piston from the piston rod.
3. All parts removed from the cylinder that are to be reused should be thoroughly cleaned. Be sure to carefully clean all cavities and grooves prior to replacing parts. All parts, new and old, should be lightly lubricated with a clean lubricant of the same type as, or compatible with, the fluid being used in the cylinder.
4. When a cylinder is disassembled, it is a good practice to replace all static and moving seals.

TO REPLACE ROD BEARING, ROD PACKING, ROD WIPER, OR ROD GLAND SEAL extend the piston rod (item 3) ¼ of the stroke. CAUTION! Support the rod end at all times to prevent nicking and to avoid cocking the piston in the tube. Inspect the piston rod wrench flats for burrs. Remove any burrs to prevent damage to the rod packing, rod wiper, or bearing when it is slipped off the rod. Remove rod packing gland retainer screws (item 10) and the rod gland retainer (item 6) or the rod gland (item 6A) on the single piece construction. On front flange and front flange extra mounts, 1½" through 2½" bores and ¾" bore with 2" rod, the tie rod nuts (item 13) on the rear face of the cap must be removed as the tie rods are threaded into the flange. On rear flange, rear flange extra, clevis, and intermediate trunnion mounts, 1½" through 2½" bores and ¾" bore with 2" rod, the tie rod nuts on the face of the gland retainer must be removed. After the gland or gland retainer has been removed, the rod packing may be removed from the gland. Place the

rod gland on a clean, flat surface with the rod packing end up. Use a small screwdriver to remove the rod packing set (item 25) being careful not to nick or scratch the bore of the packing cavity. Remove the rod wiper in the same manner, being careful not to nick or scratch the wiper cavity. When replacing the rod wiper be sure it is fully seated in the groove. When replacing the rod packing, apply a light coating of clean lubricant to each packing ring and pack down tightly with the fingers, one packing ring at a time. Be sure to insert the flat, bottom ring first as shown in the cut-away illustration.

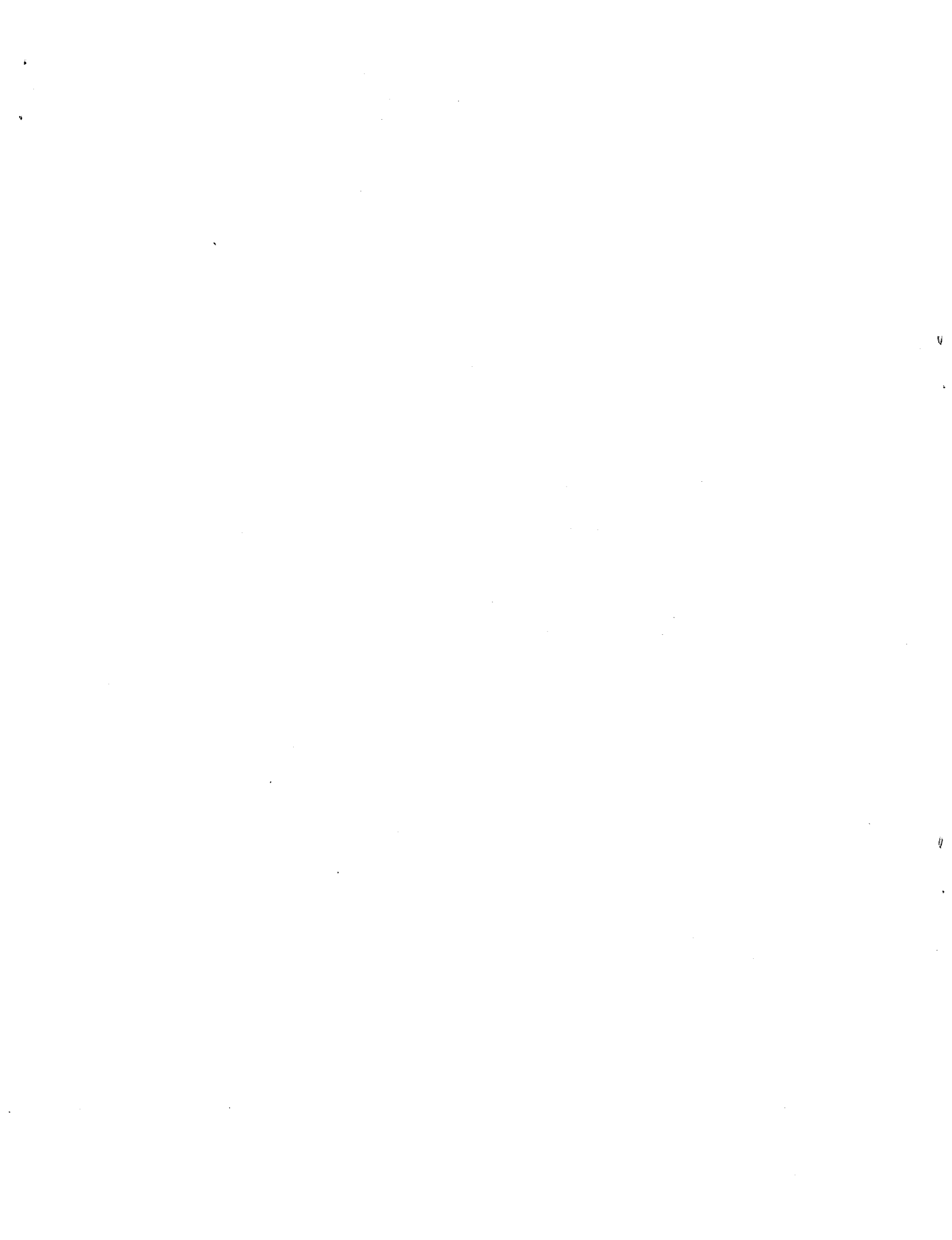


To remove the rod bearing (item 21), first remove the rod gland seal (item 22). This will expose the chamfer on the outside edge of the bearing against the head. Place two small pry bars or screwdrivers into the chamfer and pry the bearing gently out of the cylinder. Be sure to support the end of the rod. Inspect the bearing and rod for scoring, galling, etc. Replace any damaged parts. Replace the bearing by pushing or lightly tapping with a plastic hammer until it's seated into the head. Lubricate the gland seal and place around the bearing. Slide the rod packing gland onto the rod taking care that the rod packing set is not damaged when being passed over the rod end threads and wrench flats. Be careful that the gland seal is not pinched or cut as the packing gland is brought up against the head. Replace the gland retainer screws. See chart for proper torque value for retainer screws. If the tie rod nuts have been removed, tighten them using the values shown on the tie rod torque chart. If the piston packings or tube seals are to be serviced, do not replace the rod gland or bearing until this service has been completed.

TO REPLACE TUBE SEALS, PISTON SEAL, AND PISTON BEARING STRIP. Remove the tie rod nuts (item 13) and remove the tie rods (item 5) CAUTION! Support the piston rod and piston assembly at all times. Remove the cap (item 2) and the tube (item 4). Examine the tube seals (item 16) for nicks, cuts, or grooves, and replace if necessary. The new seals should be lubricated before inserting into the grooves. (NOTE: When a cylinder has been disassembled to this degree, it is always wise to replace all seals and bearings.)

If the cylinder has cast iron piston ring seals (item 18) the joints should be equally staggered around the circumference of the piston. When reinserting the piston into the tube, use of a piston ring compressor is recommended.

If the cylinder has a Teflon piston seal and bearing strip, cut the piston seal (item 18A) to remove from groove, being careful not to nick or scratch the sides of the groove. Remove the expander ring (item 18B) using a blunt screwdriver, again being careful not to damage bottom or sides of groove. For ease of installation and to minimize the time the piston seal is in the stretched condition, the expander and piston seal should be placed into the groove from the rod side of the piston. The leading edge of the piston at the top of the chamfer must be free of any deep nicks or burrs, before installing the piston seal. Lubricate this edge prior to putting the piston seal into the groove. Lightly lubricate the expander and stretch



It over the end of the piston into the groove. Lift a segment of the piston seal over the lips of the piston and place as much of the seal into the groove as possible by pushing down on the outside of the ring to seat the I.D. on the expander. Place a small rod or screwdriver without sharp edges or points under the I.D. of the piston seal that is outside the groove. Pulling outward and inward toward the piston, stretch the seal up and over the lip to align it with the groove. Remove the screwdriver and the seal will snap into the groove. The stretching of the seal into the groove must be done rapidly due to Teflon's memory characteristics. The longer the seal remains in the stretched condition the longer it takes the seal to return to its original shape.



The piston bearing strip is a single piece that has scarfed out ends that is simply wrapped around the piston. It is not intended that the cut ends meet to make a seal.

To replace the piston and rod assembly into the tube, the end of the piston containing the bearing strip should enter first. Lubricate the O.D. of the bearing and seal before inserting it into the tube. The piston and rod assembly should enter straight into the tube, but sometimes it is helpful to rock the component being moved up and down or sideways in order to move the piston into the tube. It may be necessary to apply a pressure on the bearing strip at the leading edge in order to get it started into the tube. To do this, use a small screwdriver with rounded edges and corners and push inward on the bearing strip (toward the center of the piston) at the point where it is entering the tube, and at the same time pushing the piston into the tube. This procedure will be helpful when the piston seal starts to enter the tube, especially if the seal was stretched a little more than need be and has not returned completely to its proper size.

If it becomes necessary to dis-assemble the piston rod (item 3) and the piston (item 9), remove the piston dowel screw or screws (item 15) apply heat (approximately 450°F.) to break the chemical lock, and unscrew the piston. When doing so, be careful not to scratch or otherwise damage the polished surface of the piston rod or the piston.

When replacing the piston on the rod, apply a locking sealant, such as Loctite Grade AVV to the first 3-4 threads closest to the shoulder on the rod. Follow the manufacturer's recommendations for cleaning the threads prior to application of the sealant. Tighten the piston securely using the spanner wrench holes in the rear face of the piston. **DO NOT ATTEMPT TO LINE UP ORIGINAL DOWEL SCREW HOLE.** After tightening the piston in place, use a hand drill and relocate the dowel screw or screws in a new position. Dowel Screw size and drilling requirements: 1½" bore, drill #21 (.159) x ¾ DP., half in piston and half in rod, tap #10-32 UNF x ¼ DP., bottom the dowel screw (#10-32 UNF x ¼" socket set screw); 1½" through 8" bores, drill #3 (.213) x ¾ DP., half in piston and half in rod, tap ¼-28 UNF x ¾ DP., bottom the dowel screw (¼-28 UNF x ¾" socket set screw); 10" bore sizes and larger — drill Q (.332) x ½ DP., half in piston and half in rod, tap ¾-24 UNF x ¾ DP., bottom the dowel screw (¾-24 UNF x ¾" socket set screw).

After bottoming set screw, stake set screw

by centerpunching ¼" from edge of screw deep enough to upset the first couple of threads. Staking should be done on the piston rod where possible.

When inserting the piston rod through the head, use care not to scrape the piston rod. Insert head and cap onto tube and replace the rods and tie rod nuts. Use the torque charts shown below.

The cushion check plug (item 38 or item 48)

and the cushion adjusting screw (item 30 or item 40) are interchangeable on the same head, but not necessarily between the head and cap. Both adjusting screw and plug use a back-up washer (item 66A or item 66B) and an "O" ring seal (item 31 or item 41). If leakage occurs around the seal, replace the back-up washer and seal. First, place the back-up washer against the shoulder, then the "O" ring. Lubricate the seal before replacing the plug into the cavity.

ROD GLAND RETAINER (OR ROD GLAND) SCREW TORQUE INFORMATION

SCREW TORQUE IN FOOT POUNDS

BORE SIZE	PISTON ROD DIAMETER	HEX HEAD CAP SCREW	SOCKET HEAD CAP SCREW
1½"	¾"		7.7
1½"	ALL	13.6	
2"	ALL	33	
2½"	ALL	33	
3¼"	ALL	66	3.8
4"	ALL		7.7
5"	ALL		7.7
6"	ALL		7.7
7"	ALL		33
8"	ALL		33
10"	4", 5" & 5½"		33
10"	7"		39
12"	5½" & 7"		39
12"	8"		95
14"	7"		39
14"	10"		95

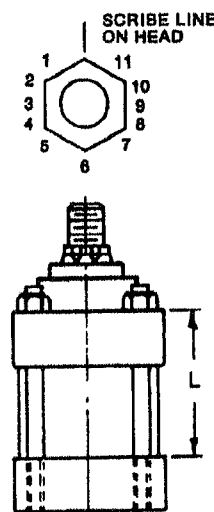
TIE ROD TORQUE INFORMATION

TIE ROD FOR 1½" THROUGH 6" BORES

BORE	TORQUE IN FOOT POUNDS	BORE	TORQUE IN FOOT POUNDS
1½"	8	3¼"	110
1½"	30	4"	130
2"	50	5"	325
2½"	50	6"	480

TIE ROD TORQUE FOR 7" BORE AND LARGER

COLUMN 1 TURN (T) IN 12THS	"L" LENGTH	ONE FULL TURN PLUS "L" LENGTH	TWO FULL TURNS PLUS "L" LENGTH	THREE FULL TURNS PLUS "L" LENGTH
1	2¾	36½	70	103½
2	5¾	39¼	72¾	106½
3	8½	42	75½	109¼
4	11¼	44¾	78½	112
5	14	47¾	81¼	114¾
6	16¾	50½	84	117¾
7	19¾	53¼	86¾	120½
8	22½	56	89¾	123¼
9	25¼	58¾	92½	126
10	28	61¾	95¼	128¾
11	30¾	64½	98	131½
12	33¾	67¼	100¾	134½



For 7" bore cylinders and larger, the tie rods are given an initial torque, the tie rods are heated, and then the tie rod nuts are turned a calculated amount. First torque all 4 tie rod nuts to 200-250 foot pounds. Measure the cylinder to obtain length "L" as shown in the illustration. Scribe a line on the cylinder head at one point of each hex nut and a matching mark on the hex nut point. Using the derived "L", consult the chart for the proper number of turns or fractions (in 12ths). The figures in Column 1 shown in 12ths corresponds to the points and flats of the hex nut (see illustration). The piston rod of the cylinder should be either fully retracted or fully extended prior to heating. Place an asbestos sheet between the tube and tie rod and heat to 800°F. for as long a length as possible. When the distance between the cylinder

heads is 18" or less, do not heat closer than 3" of either head. On longer cylinders, do not heat closer than 8" of either head. Tie rods should be heated and tightened in cross corner rotation and in steps up to full tension. Allow the tie rods to cool before testing or installation.

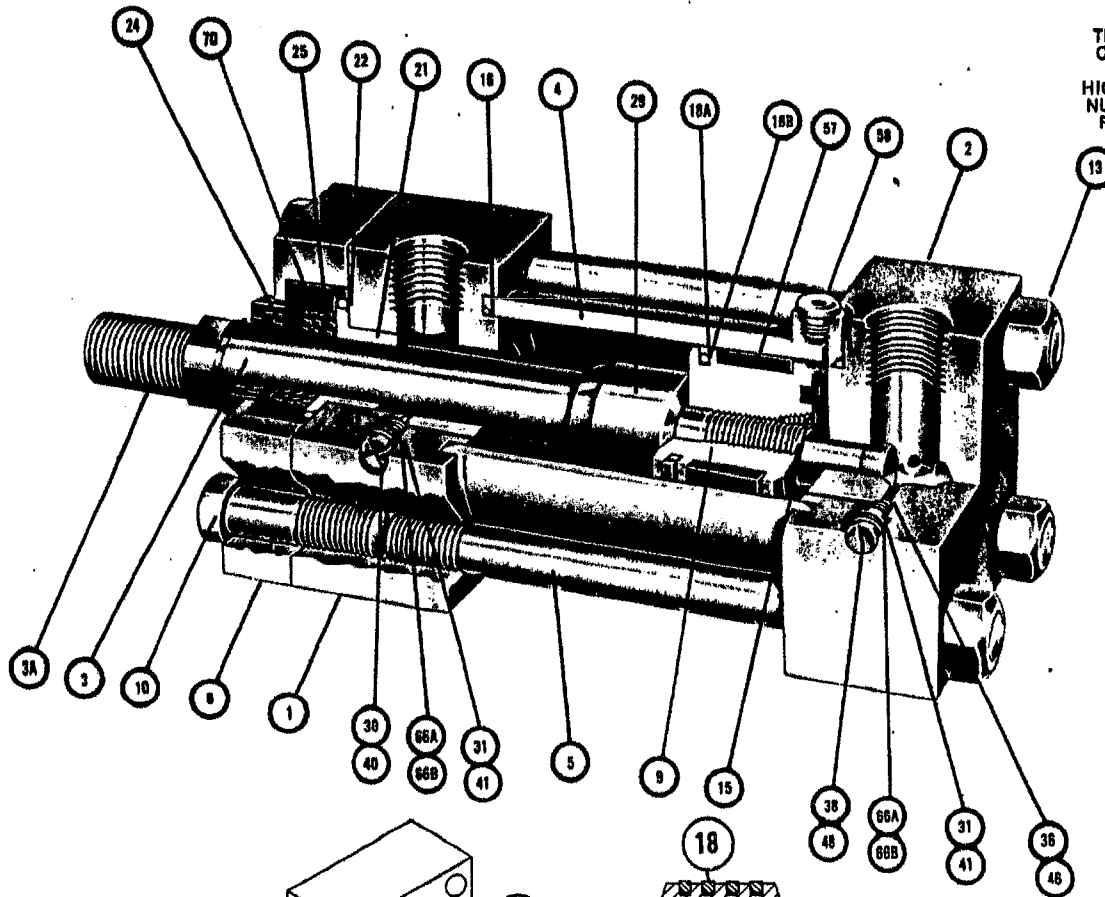
ORDERING INFORMATION:

When ordering parts, the following information must be specified, Model No., Serial No., Stroke, Pressure, Pressure Medium (air, oil or water) and any special features. Give item no., name and quantity of part desired. The Model No. and Serial No. will be found on a metal plate that has been drive-screwed to either the head or the cartridge retainer.

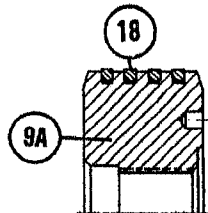
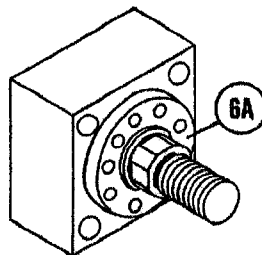




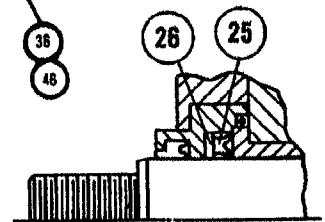
THIS BULLETIN APPLIES TO CYLINDERS WITH A SERIAL NUMBER OF 503495 OR HIGHER. FOR LOWER SERIAL NUMBER MODELS, CONSULT FACTORY FOR PARTS LIST.



ROUND, SINGLE PIECE ROD GLAND & RETAINER USED ON BORE SIZES OVER 2 1/2" EXCEPT 3 1/4" BORE WITH 2" DIAMETER ROD



ALTERNATE PISTON CAST IRON RING SEAL TYPE



ROD SEAL CONFIGURATION 1 1/4" BORE ONLY

ITEM NO.	DESCRIPTION	QTY. REQ'D.
1	HEAD	1
2	CAP	1
3	PISTON ROD	1
3A	STUD-STYLE II THREAD THRU 2" ROD DIA.	1
4	TUBE	1
5	TIE ROD	4
6	ROD GLAND RETAINER	1
6A	ROD GLAND AND RETAINER — Single Piece	1
9	PISTON — Slipper Seal Type	1
9A	PISTON — Cast Iron Ring Seal Type	1
10	RETAINER SCREW	‡
13	TIE ROD NUT	4
15	PISTON DOWELL SCREW	††
16†	TUBE SEAL	2
18	PISTON SEAL — Cast Iron Ring	4
18A†	PISTON SEAL — Slipper Seal	1
18B†	EXPANDER — For Slipper Seal	1
21†	ROD BEARING	1

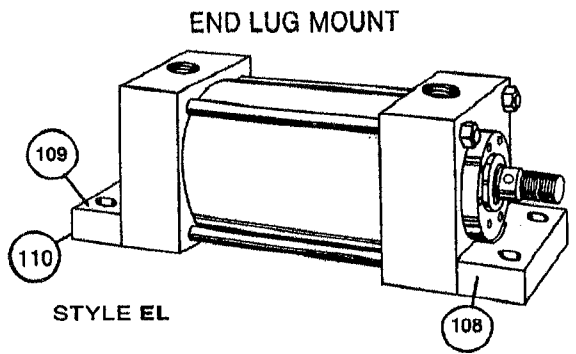
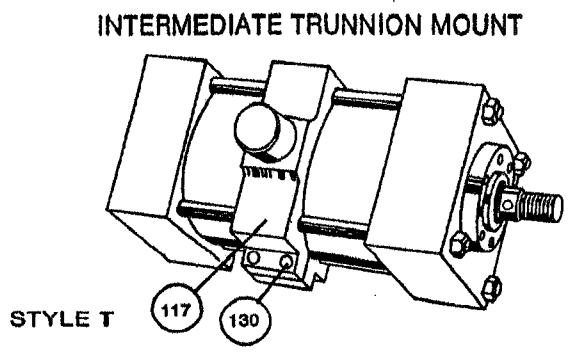
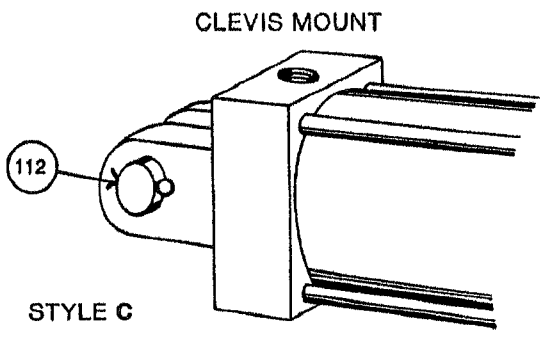
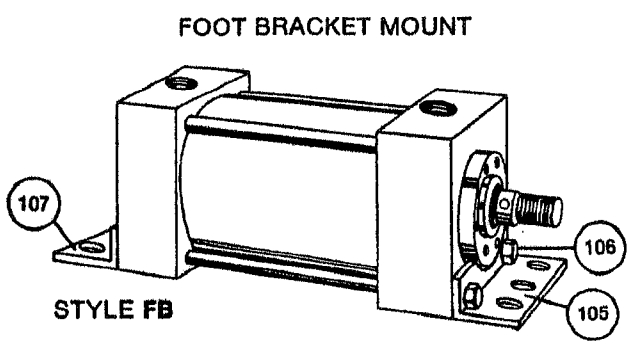
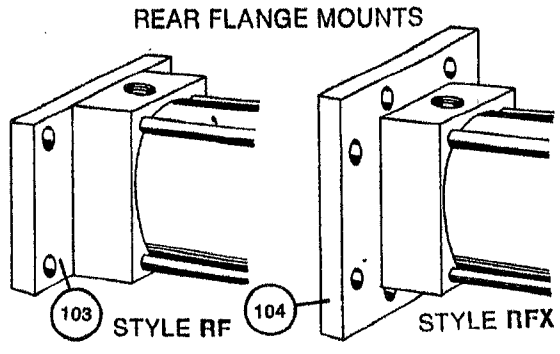
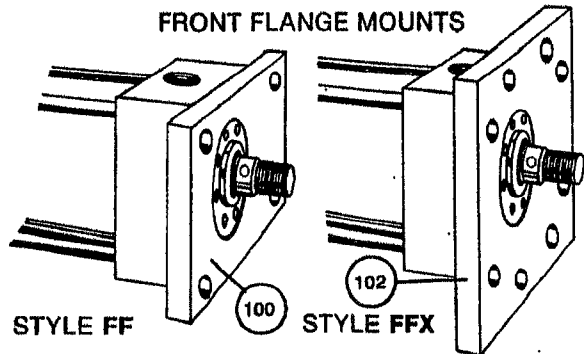
ITEM NO.	DESCRIPTION	QTY. REQ'D.
22†	ROD GLAND SEAL	1
24†	ROD WIPER/SEAL	1
25†	ROD PACKING SET	1
26†	ROD PACKING BACK-UP WASHER	1
29	CUSHION PISTON — Front	**
30	CUSHION ADJ. SCREW — Front (Cross Slot)	**
31	SEAL — Cushion Adj. & Cush. Check — Front	**
36	CUSHION CHECK BALL — Front	**
38	CUSHION CHECK PLUG — Front	**
40	CUSHION ADJ. SCREW — Rear (Cross Slot)	**
41	SEAL — Cush. Adj. & Cush. Check — Rear	**
46	CUSHION CHECK BALL — Rear	**
48	CUSHION CHECK PLUG — Rear	**
57	PISTON BEARING STRIP	*
58	AIR BLEED PLUG	**
66A	BACKUP WASH.—Cush. Adj. & Check—Front	**
66B	BACKUP WASH.—Cush. Adj. & Check—Rear	**
70	ROD GLAND	1

‡ RETAINER SCREWS REQUIRED — See Chart
 † RECOMMENDED SPARE PARTS
 †† ONE REQUIRED THRU 3 1/4" BORE, 2 REQUIRED ON 4" BORE AND LARGER
 * ONE REQUIRED THRU 4" BORE, 2 REQUIRED 5" THRU 8" BORES, 3 REQUIRED ON 10 & 12" BORES, 4 REQUIRED ON 14" BORE.
 ** AS REQUIRED; SPECIFY IF CUSHIONED FRONT, CUSHIONED REAR OR CUSHIONED BOTH ENDS.

BORE SIZE	ROD DIAMETER	NO.
1 1/4, 1 1/2, 2 & 2 1/2	ALL	4
3 1/4	1 1/4 & 1 1/2	8
3 1/4	2	4
4, 5, 6, 7 & 8	ALL	8
10	4 1/2, 5 & 5 1/2	8

BORE SIZE	ROD DIAMETER	NO.
10	7	12
12	5 1/2	8
12	7 & 8	12
14	7	12
14	10	16





ITEM NO.	DESCRIPTION	QTY. REQ'D.
100	FRONT FLANGE	1
102	FRONT FLANGE EXTRA	1
103	REAR FLANGE	1
104	REAR FLANGE EXTRA	1
105*	FOOT BRACKET — Front	1
106*	FOOT BRACKET — Screw	2
107*	FOOT BRACKET — Rear	1
112	CLEVIS PIN	1

ITEM NO.	DESCRIPTION	QTY. REQ'D.
117	INTERMEDIATE TRUNNION	1
130	INTERMEDIATE TRUNNION SCREW	1
108*	END LUG — Front	1
109*	END LUG — Screw	2
110*	END LUG — Rear	1

*Not available on 10", 12" and 14" bore cylinders.

Complete replacement packing kits are available. For purposes of economy and less down-time, it is recommended that replacement packing kits be stocked. They are described and priced in the current Sheffer Replacement Parts Price List. Contact your distributor or the factory for these lists.

HH SERIES CYLINDER WEIGHT CHART

Bore	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5	6	7	8	10	12	14
Zero Stroke	3	8	14	19	37	50	90	140	210	290	660	975	1600
Add Per Inch of Stroke	.25	.5	.8	1.3	1.8	2.5	4	5.8	6.5	9	16	25	35

NOTE: The above weights are based on an average value for cushioning, rod size, and the various types of mountings for uncrated cylinders to establish approximate shipping weights. Add 10% of cylinder weight to determine estimate weight of crated cylinder.



