

TECHNICAL MANUAL

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT
AND GENERAL SUPPORT MAINTENANCE
MANUAL INCLUDING REPAIR PARTS LIST**

FOR

**PRESS, HYDRAULIC
MODEL H200-14
(NSN 4940-00-273-1653)
NUGIER COMPANY**

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HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1981

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REPORTING OF ERRORS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS, Rock Island, IL 61299. A reply will be furnished directly to you.

NOTE

This manual is published for the purpose of identifying an authorized commercial manual for the use of the personnel to whom this equipment is issued.

Manufactured by: Nugier Company
12901 Coral Tree Place
Los Angeles, CA 90066

Procured under Contract No. DAA09-79-M-8457

This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

INSTRUCTIONS FOR REQUISITIONING PARTS

NOT IDENTIFIED BY NSN

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

- 1 - Manufacturer's Federal Supply Code Number - 94417
- 2 - Manufacturer's Part Number exactly as listed herein.
- 3 - Nomenclature exactly as listed herein, including dimensions, if necessary.
- 4 - Manufacturer's Model Number - H200-L]4
- 5 - Manufacturer's Serial Number (End Item)
- 6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.
- 7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50.

Complete Form as Follows:

- (a) In blocks 4, 5, 6, list manufacturer's Federal Supply Code Number - _____ followed by a colon and manufacturer's Part Number for the repair part.
- (b) Complete Remarks field as follows:
 - Noun: (nomenclature of repair part)
 - For: NSN: 4940-o0-273-l653
 - Manufacturer: Nugier Company
12901 Coral Tree Place
Los Angeles, CA 90066
 - Model: H'200-14
 - Serial: (of end item)

Any other pertinent information such as Frame Number, Type, Dimensions, etc.

OPERATING INSTRUCTIONS & PARTS MANUAL

MODEL _____ SERIAL _____

This manual covers models H40, H50, H60, H80, HI 00, HI 50, and H200 presses. When ordering parts or correspondence about these presses, always give the model number and serial number of the press.

The Company manufactures not only the H40, H50, H60, H80, HI 00, HI 50, and H200 model presses, but also larger and smaller sizes. The numbers designate the tonnage.

All sizes are available in either hand pumped, air hydraulic driven, or motor driven models. We also manufacture a variety of bearing removal fixtures, as well as a fixture and tools for removing and replacing broke drums. The above mentioned tools are designed for use in conjunction with a hydraulic press.

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A. PREPARING PRESS FOR SERVICE

Presses are shipped completely assembled so they are ready for service after filling the pump reservoir with the correct oil and after completing the following operations:

DO NOT MOVE PUMP PLUNGER BEFORE FILLING RESERVOIR WITH OIL.

1. Cut the straps which hold the various accessories and movable parts in place during shipment.
2. Fill the pump reservoir to just below the return elbow with clean SAE #10 or #20 engine oil. Light spindle oil also may be used. **DO NOT USE BRAKE FLUID.**
3. Turn the winch crank clockwise just enough to release the *table* supporting *pins*. After removing the pins, raise the table to the top of the frame. Carefully align the table and frame holes. Install the pins and back off just enough to relieve the cable tension. **NEVER EXERT PRESSURE ON THE TABLE WITH THE SUPPORTING PINS OUT OF PLACE.**
4. With both valves closed, RAM DOWN & SPEED FAST, stroke pump until the press ram is fully extended. Then open release valve, RAM UP position, allowing ram to retract. Repeat this operation several times to remove air from the system.
5. Put table blocks in position on the table. With both valves CLOSED, pump the *ram* down against the table blocks. Next open the high speed pump valve, SPEED SLOW, located on the right side of the pump. Now pump press to maximum pressure, causing relief valve to relieve, eliminating any remaining air from the system.

The press is now ready for service. Study the following instructions to become familiar with its use and features.

B. EXPLANATION OF HYDRAULIC CIRCUIT AND OPERATION OF CONTROLS

The hand operated pump is equipped with two plungers; the smaller one is, *for* developing high hydraulic pressure (6000-10, 000 PSI), the larger one is for delivering a larger volume of fluid at lesser pressure (1200-1500 PSI). The unit has two control valves: one for releasing fluid which has been pumped into the cylinder circuit, the other for eliminating or using the high volume pump as desired. Also incorporated in the circuit is a high pressure relief valve which controls a predetermined maximum pressure of the high pressure pump only.

C. TO PERFORM A PRESS OPERATION

Turn both the cylinder control valve (left side) and the high volume pump valve (right side) to the RAM DOWN & SPEED FAST position (right hand rotation). Now make complete strokes of the pump handle until the cylinder ram contacts the work piece. If possible, continue to use the high speed pump to do the work; if not, turn the high volume pump valve to the SPEED SLOW position (left hand rotation). Continue to pump until desired ram travel or cylinder thrust has been accomplished. Turn cylinder control valve to RAM UP position (left hand rotation) to release pressure or return ram to the retracted position.

Inasmuch as the fast pumping feature can be put in or out of the circuit at will, the following can be accomplished by correct valve manipulation. Some work can be pumped fast to start, but requires higher pressure to complete. In this case change from the high speed pumping position to low speed. (Turn high speed pump to the SPEED SLOW position.) This is usually true when assembling parts. Frequently when disassembling parts high pressure is required to start, but as completion nears, the high speed pump can be used. In this case, turn the high speed pump valve to the SPEED FAST position.

D. CYLINDER RAM TRAVEL

The cylinder is equipped with an automatic limit control valve which will open and stop the ram after its normal extension of 7' or 14', depending upon the press model.

Avoid using the press with the ram extended to its outermost position.

E. CAUTION

Never apply pressure against the table when suspended only by the cables. After inserting the table pins, back off the winch handle to avoid breaking its gear.

F. HOW THE PUMP WORKS

Referring to the hydraulic schematic circuit, page 4, it will be observed that the fluid in the reservoir (only under atmospheric pressure) is admitted to the pump chambers through the inlet check valves when the pump handle is moved upward. (Plungers move outward and the displaced area fills with fluid, then the inlet check valves close.) When the pump handle is pulled downward, moving the plungers in, the plungers force the fluid in the pump chambers through the outlet check valves and into the press cylinder. When the plungers stop moving upward, these outlet check valves close and retain the fluid in the press cylinder. Additional strokes continue this action, adding their charge to the press cylinder each time the pump is stroked, resulting in a movement of the cylinder ram or an increase in the cylinder pressure.

G. TWO SPEED PUMP ACTION

Both pumps move together resulting in simultaneous intake of fluid from the reservoir through their own inlet check valves. Also each pump will discharge its fluid through its own outlet check valve into the cylinder circuit, resulting in a comparatively fast pumping speed of fluid to the press cylinder. However, when the cylinder ram contacts the work and the resistance is too great to continue using the fast pumping speed, it is necessary to eliminate the high speed pump. This is accomplished by opening the high volume control valve (SPEED SLOW position), allowing the fluid to escape at the opened valve from where it can return to the reservoir at no pressure. This results in permitting the large plunger to continue moving in and out without the need of opening its outlet check valve connecting to the cylinder circuit. With this arrangement, only the small pump will deliver fluid to the cylinder circuit, permitting the attainment of high pressure. The smaller pump is equipped with a high pressure relief valve to avoid exceeding the normal operating pressure of the press. Note that this relief valve is installed in such a manner that when a predetermined pressure is attained, the relief valve will permit the fluid to escape on the compression stroke to the reservoir. This prevents a further build-up of pressure but does not relieve the pressure already attained in the cylinder.

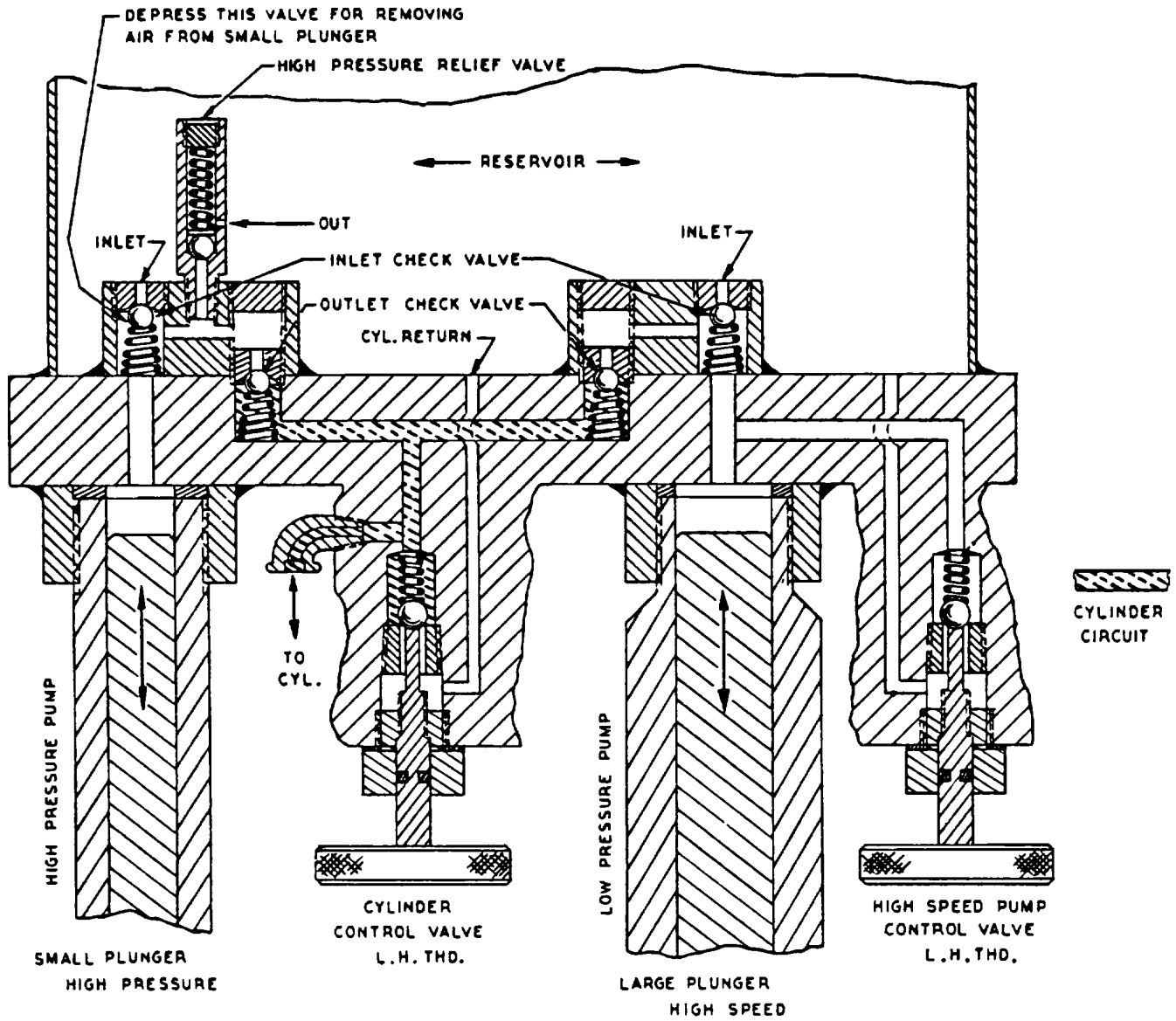
H. CYLINDER CONTROL VALVE

The pump unit is equipped with a cylinder control valve, its purpose being to release fluid which has been forced past the outlet check valves of the pumps into the cylinder circuit. The opening of the cylinder control valve (RAM UP position) allows fluid to escape at the valve seat and return to the reservoir, permitting the cylinder retracting springs to return the ram to its uppermost position.

I. CONTROL VALVES

A study of the schematic drawings will show that the control valve balls are located under the valve seats and are held in contact by springs. This arrangement prevents over-tightening of the valves which would damage the valve seats. It also has the advantage

HYDRAULIC SCHEMATIC CIRCUIT



THIS DRAWING FOR REFERENCE ONLY

of the fluid pressure being applied against the balls which creates sufficient pressure to seal the seat.

Bearing this in mind, it will be noted that in order to open the valve it is necessary to push the ball away from the valve seat. This is accomplished by using a left hand thread on the valve stem and bushing. By turning the valve handle to the left (Normal valve opening practice) the tip of the valve stem contacts the ball and pushes it off the seat, resulting in an open valve. By turning the valve handle to the right, the valve stems move away from the ball, allowing the spring to push the ball against the seat, resulting in a closed valve.

J. ADJUSTING VALVE STEM CLEARANCE

Each valve knob is equipped with a stop pin located on its back side, which contacts a stationary mating pin in the pump base after one revolution. This limits the valve opening to one turn, which is desirable. However, the valve must be adjusted to insure proper closing and opening. To adjust proceed as follows:

Loosen the socket head screw holding the valve knob and valve stem together, then remove the knob. Using a screwdriver, turn the valve stem left-handed, until it just touches the valve ball. The spring which keeps the valve against its seat will offer resistance. Now turn the valve stem, right-handed, one fourth turn. Next, install the valve knob so that the stop pins are engaged and the valve is at the RAM DOWN position. At this position, lock the valve knob and valve stem together.

When properly adjusted, the valve knob will turn 1/4 turn to the left before pushing the ball off its seat. This represents about 0.016' clearance between the end of the valve stem and the valve seat ball. The remaining ^{3/4} revolution of the knob, before striking the stop pins, will open the valve fully.

K. PRESS CYLINDER

The cylinder is of the single acting type, using a leather cup to seal the fluid which extends the ram. Retraction of the ram is accomplished by springs, when the cylinder fluid is allowed to escape to reservoir.

The ram bushing is equipped with "O" rings which serve as static seals to hold a small amount of oil in the lower end of the cylinder which is intended as a lubricant to the ram.

Also there is incorporated in the ram assembly a travel limit valve intended to stop the ram travel at a predetermined point to protect the cylinder assembly. This is accomplished in the following manner (see detail of cylinder assembly parts):

A pin in a hole drilled at right angle to the ram contacts the cylinder bushing at the end of the normal ram travel (7' or 14'). This in turn lifts a push rod which raises a ball off its seat, allowing fluid to escape from the upper end of the cylinder into the lower cylinder area, then to the pump reservoir by way of a drain hose.

L. MOVABLE CYLINDER

The press cylinder can be moved and locked to the extreme sides of the frame. This feature permits a variety of accommodations such as being able to work on the end of some long parts. Also, temporarily idle fixtures can be left on one side of the press while working on the other side.

To move cylinder, turn cam locks 1/4 turn to release the clamping action furnished by the cylinder retracting springs. Adjustable push rods are used to facilitate this clamping and releasing feature.

M. CYLINDER PRESSURE GAUGE

The press cylinder is equipped with a pressure gauge (which has a special dial) and is calibrated to record the tons of force exerted by the ram. As well as the special calibration (required for various diameters of cylinders and sizes of presses), the gauge is of the high pressure type, that is, for 0 to 15000 PSI, and should not be confused with ordinary low pressure gauges. The following is an explanation of the calibration used on our model H40 press:

the H40 cylinder has a bore or piston diameter of 3 ¹/₄" which is on area of 8.295 sq. in., therefore the piston will have a thrust of 8.295 times the amount of fluid pressure applied to the cylinder, as indicated on a standard pressure gauge calibrated in pounds per square inch (PSI).

Example: 40 tons = 80,000 pounds thrust + 8.295 area = 9644 PSI fluid pressure applied to the cylinder or 9644 PSI X 8.295 area = 80,000 pounds or 40 tons.

N. TABLE WINCH

The table is raised and lowered by means of a mechanism comprised of a worm and gear, worm crank handle, and cable drum. The only required attention is lubrication and proper adjustment of the cable lengths so that all table pin holes will align simultaneously. Loosen set screw in cable drum to equalize lengths. Caution: after inserting table pins, back off winch to slacken cables, thus avoiding breaking winch gear.

O. CAUSES AND CURES OF TROUBLES IN HYDRAULIC PUMP CIRCUIT

Normally very little trouble will be experienced with the hydraulic circuit and usually can be attributed to dirt or lack of fluid. Cleanliness and the proper oil is an absolute requirement for proper operation. Also, all valve seats must have perfect contact with their mating balls and the valve seats should be as narrow as possible.

The following is intended as a test procedure and cure for trouble in the system. If the problem is in the pump, it is much easier, cheaper and faster to order an exchange *rebuilt* pump from our factory. These are sold on an exchange basis and are minimal cost, FOB our plant, Los Angeles, California. Most sizes are in stock, and can be shipped immediately, resulting in a minimum of down time. Be sure to specify model and serial number of *press* when ordering pump unit.

1. If ram movement and low pressure can be attained by using the high speed pump, but pressure cannot be developed by the high-pressure pump (smaller plunger), the most probable cause is that the pump is air bound. This is usually caused by low oil level. This small diameter and short stroked plunger has little sucking ability.

To remove air from small plunger, use a wire or rod about 1/8 in diameter to hold the inlet check ball down (compressing the spring under it) while the pump handle is stroked 10 to 12 times. The inlet check ball is located at the bottom of the pump reservoir directly above and to the right of the small plunger when looking down into the reservoir from the front of the press. The location of the inlet check ball is shown on the TANK INTERIOR drawing, page 12. If air bubbles rise while pumping, this will confirm the fact that the plunger was air bound. Now pump the press to maximum pressure to remove a small amount of remaining air trapped under the relief valve ball. Refer to HYDRAULIC SCHE- MATIC CIRCUIT, page 4, for clarification of instructions. The low pressure pump (large plunger) has the ability to prime itself so it does not require removing air.

2. The only other reason for failure of the high-pressure pump to develop pressure is oil escaping around the inlet check while on the compression stroke, 'caused by dirt or a faulty valve seat. Also, but most improbable, is the possibility of leakage of the relief valve.
3. In the low pressure circuit the two possible reasons for leakage of fluid to the reservoir (not developing pressure) during the compression stroke are leakage of the inlet check valve located above the large plunger, or fluid escaping at the high volume pump control valve (right side of pump unit).

If any of the above mentioned check valves leak, it is best to order a rebuilt pump unit as described above. If you wish to repair it yourself, remove by using a 5/16 hexagon wrench. After examination of same, clean, reseat, or replace as indicated. If the valve seat is to be resealed, squeeze the ball and valve seat together in a vise, using only enough force to perfect the seat, avoid making a wide seat. A narrow valve seat is essential. Re-machine or replate if necessary.

4. If the pump handle rebounds, that is, if the pump handle lifts up, this indicates a faulty outlet check valve of one of the pumps (fluid under pressure leaking from the cylinder circuit back through the outlet check valve into the pump area, resulting in moving the plunger out). If this occurs while using only the high pressure pump (small plunger), then obviously the high pressure pump is at fault.
5. If rebounding occurs while using both pumps but stops rebounding when the high speed pump (large plunger) is turned to the SPEED SLOW position, this proves the high speed pump check valve is leaking. This condition allows fluid to leak from the cylinder circuit, resulting in a pressure drop which is indicated by the pressure gauge.

The pump outlet check valves are located above the pumps under the solid 3/4 pipe plugs as shown in the schematic hydraulic circuit drawing.

P. LOSS OF PRESSURE FROM PRESS CYLINDER

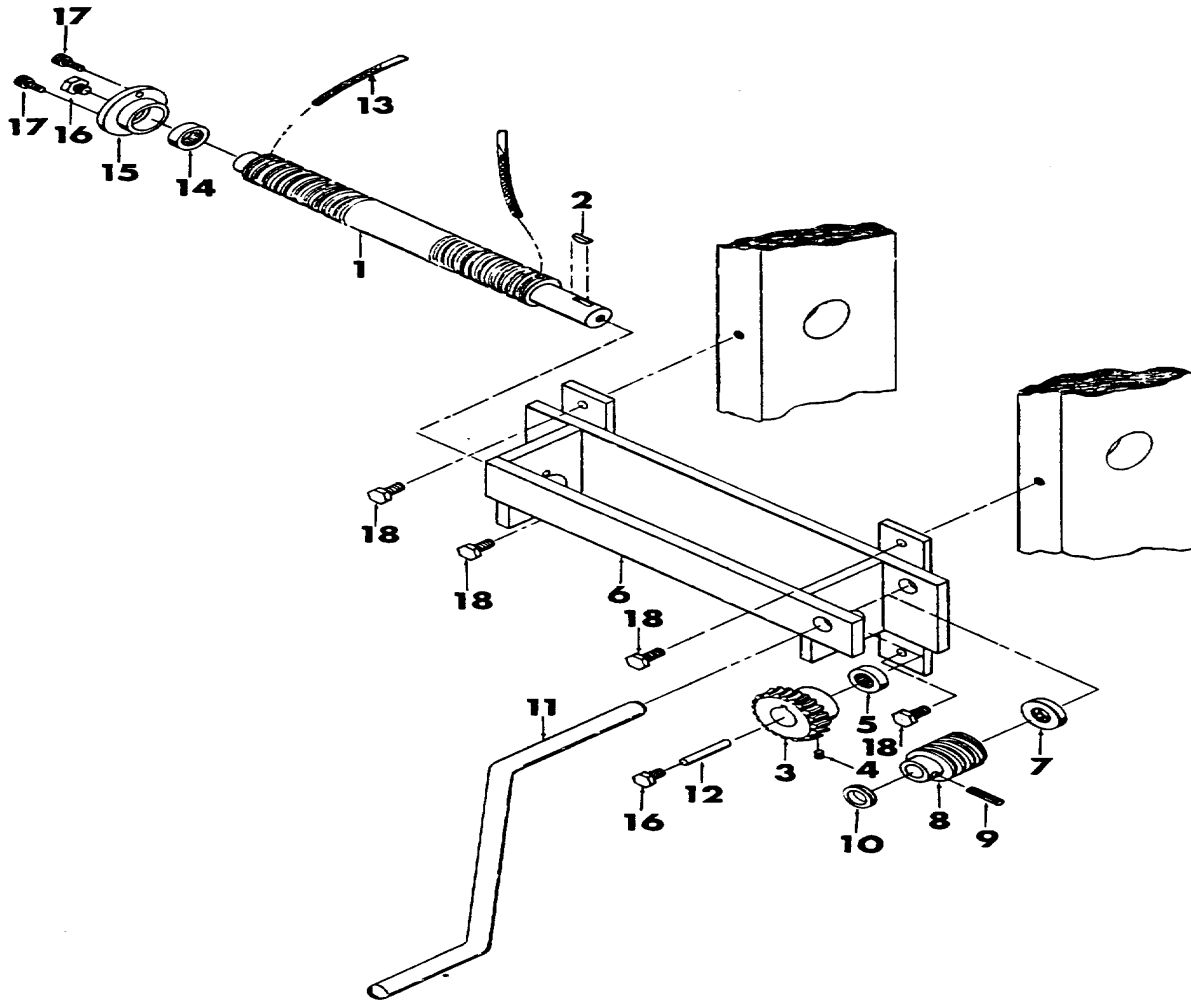
There are four ways that fluid can escape from the cylinder: by a leaking ram cup, through the ram limit valve, by way of the pump outlet check valves, and at the cylinder release valve located in the pump unit.

If a leak exists at the ram cup or through the ram limit valve, fluid will come out of the fitting in the lower end of the cylinder which connects to the top of the pump reservoir. Dis- connect the drain hose at the cylinder and maintain pressure on the cylinder (continue to pump if necessary) to see if fluid continues to come out of the drain line fitting on the side of the cylinder. If so, one of the two above mentioned conditions exist. Remember that fluid will escape if the ram is at the end of its normal travel.

Sometimes, if dirt is causing the limit valve to leak, it can be washed away by pumping the cylinder ram all the way out with the fast pumping speed and continuing to pump after the limit valve opens. Allow ram to retract and test. If necessary, remove ram from cylinder to inspect leather cup and limit valve. The limit valve must have from .010 to .015 clearance between the ball and its push rod. Before reassembly clean thoroughly.

If it is determined that the cylinder ram cup and ram travel limit valve do not leak, and the pump handle does not rebound, then the cylinder control valve located in the pump is at fault. If it is at fault, purchase an exchange rebuilt pump from our factory as described above.

1. Roller Shaft (1)
2. 3/16 Woodruf key (1) #91
3. Roller shaft gear (1)
- A. Gear sot screw (1) 5/16- 18 x 3/8 cup head
5. Roller shaft bearing (gear end) (l)
6. Winch housing weldment (1)
7. Worm thrust bearing (1)
8. Warm (1)
9. Roll pin (1)



10. Spacer bushing 1 l)
11. Crank handle (l)
12. Cable clamp pin -x 2CRS (11
13. aircraft galvanized cable 111
14. Roller shaft needle bearing (short end) (l)
15. Bearing flange (11
16. 3/8-16x 'h NC cap screw (11
17. 1/4-20 x % Allen cap screw (2)
18. 3/8 16 x 1 NC hex head cap screw

TM 9-4940-539-14&P PRESS, HYDRAULIC MODEL H200-14—1981

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