

INSTRUCTION AND MAINTENANCE

MANUAL

SERIES " R "

PACIFIC HYDRAULIC SHEARS

General Description (Continued)

Servo-Valve levelling device to automatically compensate for the normally unbalanced cutting load. This system holds the ram at a fixed "rake angle" during the stroke, yet allows the operator to change the "rake angle" quickly when he desires.

The illustrations in this book are of a typical hydraulic shear. Your shear may be larger, heavier or longer, or it may include features not illustrated on these lithos.

GENERAL INSTRUCTIONS

PACIFIC HYDRAULIC PLATE SHEARS

The total length of the stroke may be adjusted with the depth and back travel stops. The depth of stroke can rapidly be adjusted for slitting or notching. The advance speed of the ram is deliberately reduced to eliminate shearing shock and to add to the safety of the operator. High speed shearing is obtained by reducing the length of stroke to produce the minimum length of cut required. Since it takes quite a few minutes to handle and position a long plate or sheet, ready for shearing; a couple of seconds longer actually cutting time is relatively unimportant. Speed is important in cutting short small pieces. Thus, if it is necessary to cut a large number of small pieces, the stroke should be reduced to the minimum for the piece to be cut and to match the rhythm of the operator.

There are three Principal Grades of Shear Knives available, as follows:

GRADE I STANDARD TOOL STEEL KNIVES

This grade is relatively inexpensive and is satisfactory for intermittent shearing of mild steel, brass, and aluminum. The depth of hardness is not as uniform as the better grades and this grade would not offer as many possible re-grinds.

GRADE II INTERMEDIATE ALLOY

This grade is the most satisfactory for heavier (5/16" and over) plate shearing and also will handle intermittent light gauge shearing with reasonable life. This alloy will stand up much longer than Grade I and the added cost is usually well justified.

GRADE III HIGH CARBON - HIGH CHROME ALLOY

This grade will offer the best knife life when shearing up to 1/4" mild steel. It is recommended for continuously shearing stainless steel up to 3/16". Because this grade is fairly hard and somewhat brittle, it is not recommended for shearing over 1/4" mild steel because of edge chipping and spalling.

Refer also to Page 17.1.

UNLESS OTHERWISE SPECIFIED, KNIVES WILL BE FURNISHED IN THE GRADE ORDERED WITH THE PROPER HEAT TREATMENT FOR THE MAXIMUM MILD STEEL RATING OF THE SHEARS.

DEALER'S START-UP REPORT

CUSTOMER _____

Date _____

MODEL NO. _____

PLANT SUPERINTENDENT:

DEALER REPRESENTATIVE PRESENT AT START-UP:

GENERAL CONDITION OF SHEAR AS RECEIVED:

Go Over Instruction Book with Operator Before Start-Up.

CHECK LIST AT START-UP

REMARKS

1. Side housing alignment. Check for level front to back using level buttons on side housings and machinists level - - -
2. Slideway and slidebar assembly, rust preventative washed out, greased - - - - -
- . Capscrews tightened - - - - -
3. Slideways parallel and in line - - - - -
4. Slideway clearance (feeler measurement)

LEFT HAND SIDE

RIGHT HAND SID

A

B

C

A

B

C

TOP

BOTTOM

Outboard

Face

5. Piston stud nuts checked for proper tightness - - - - -
6. Level Control band free from dirt and rust preventative.
Sheaves revolve freely - - - - -
7. Knife clearance open to about .030" - - - - -
8. Check bed stud nuts for tightness - - - - -
9. Check power unit tank for water - - - - -
10. Oil in power unit tank at proper level - - - - -
11. Pump(s) greased if required - - - - -
12. Electrical hook-up checked (disconnect control power) -
13. Motor rotation as per arrow on motor or pump - - - - -
14. Pressurize pump(s), (lubricate by starting under pressure)
*See Note - - - - -
15. Control power connected and operational - - - - -
16. Check made as per Start-Up Check List (see table of contents)
17. Condition of grease film on front face of slideways - - -
18. Operation of back gauges - - - - -
19. Check for lateral movement of hold-down feet - - - - -
20. Knife clearance reset for shearing - - - - -
General condition sheared edge - - - - -
Instruction: Operator and maintenance man on operation
of shear - - - - -
General Remarks - -

*Note: Pressurize pumps by closing the down, one up and holddown advance valves manually at the control box.

B.Y.:

Form:

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THE PACIFIC HYDRAULIC SHEAR

General Description

This instruction book has been prepared for your assistance in setting up, operating and maintaining this shear for efficient, satisfactory service. It has certain parts and features found only in an hydraulic operated machine. We have endeavored to illustrate and describe such features for your information. We strongly recommend that, before starting up the shear, you carefully read this book through several times and get thoroughly familiar with the shear and its component parts.

The Pacific Hydraulic Shear is fabricated of heavy plate steel and basically consists of two side housings, a ram (or knife holder) assembly, a bed (or table) weldment, and an hydraulic power system of two cylinders and a self-contained power unit.

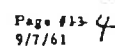
The ram assembly consists of a heavy upper blade (or knife holder) and a rigid triangular stiffener member. Adjusting screws are provided between the stiffener and the ram for eliminating any "bowing" of the upper knife. The piston rods of the main cylinders are connected to each end of the ram assembly.

The bed is a rigid, self-contained triangular weldment consisting of a heavy horizontal "table" member, and a heavy steel plate with reinforcing ribs welded to the lower face at an approximate 60° angle, serving as the table stiffener. The table supports the work and is provided with hand slots for handling of plates, a full length cover plate over the lower knife bolt cut-outs and a front dovetail slot for mounting front gauge brackets. The bed section is sometimes closed with a third heavy plate, comprising an additional stiffener. The table is "keyed" to each side housing by wedge-type assembly. "Key-holes" are machined into each end of the bed, and a key lug is machined on each side housing.

Adjustable wedges are provided in the upper part of each wedge assembly. The bed can be moved up and down at the 60° angle of the side housings by moving these wedges. This movement has a horizontal forward and backward component thus providing knife setting adjustment. Heavy studs and nuts are provided to lock the table into place after adjustment.

The hydraulic power unit consists of an electric motor with a direct driven hydraulic pump, a group of hydraulic valves and the necessary connecting piping. The components are mounted on the top plate of a tank which is mounted between the side housings. High pressure oil is pumped into the two large ram actuating cylinders, one of which is mounted on each side housing, as well as to the hold-down cylinders.

Hydraulic power is controlled by an electrical circuit. The downward and upward travel of the ram can be adjusted by moving the "depth travel" and "back travel" stops respectively. The ram movement up or down is initiated by an electric foot pedal that is attached to a long cable and that can be easily moved about by the operator. The Pacific Shear is equipped with a cable-actuated



ASSEMBLY INSTRUCTIONS

- 1) Set up side housings on foundation and install rear and front spreader pipes. The side housings will usually have the main cylinder assemblies, slideways, electrical control cabinet(s) and leveling buttons installed when shipped by Pacific.
- 2) Level and align the side housings. Two level buttons are provided on each side housing to assist in leveling. When a line across the buttons shows exactly level, the slideway will be inclined forward 2° off the vertical. The side housings are to be spaced according to the outline drawings, and are to be vertical and with the slideway bearing surfaces aligned. A jacking screw is provided on each foundation lug to assist in leveling and shimming.
- 3) Install the ram and stiffener.
 - a. Lift the ram into position, with the guide bars against the slideways. Lower the ram as far as possible while maintaining a level line across the tops of the pressure pads. Be especially careful not to damage the knives, if they are already installed.
 - b. Check the ram location. Center the holes in the pressure pads with respect to the ram-piston studs.
 - c. On adjustable rake shears, install the pivot pins, pivot journals and pin keepers. Install the ram retainer shims at this time.
 - d. Lower the pistons until the ram piston stud nuts can be installed. On fixed rake machines, the bottom spherical washer set will be installed. Do not yet tighten the nuts.
 - e. Carefully raise the ram.
 - f. Install the slide bars, guide bar flanges, and respective shims.
 - g. Tighten the ram-piston stud nuts.Install the balance system. On most machines, this is a chain with spring tensioning located at each end of the ram. Tension the spring sufficiently to hold the bottom of the guide bars against the slideways. Extreme over-tensioning may result in the slideways galling. Some larger machines use a hydraulic balance system; a print of this type of assembly will be supplied when required.
- 4) Install power unit in the side housing brackets. Connect electrical and hydraulic circuits according to numerical and/or color coding. Check the hold-down line to be sure the cap is secure. Fill the tank with the recommended quantity and quality of oil. Check instructions regarding pump start-up, then start the power unit and bleed all air out of the system. Raise both pistons to extreme top of stroke.
- 5) Thoroughly clean all bearing surfaces, including slideways, guide bars, slide bars, flanges, pivot pins and journals (Adjustable Rake), spherical washer sets, and back finished surfaces of the ram (Adjustable Rake) liberally apply Mobleplex EP grease.

Attach guide bars to the ram.

- a. On adjustable rake machines, attach the guide bars with the slide washers and studs at the bottom, and the ram retainer at the top. The ram retainer shims should be temporarily removed so that the retainer will have a good grip on the guide bar during set up.
- b. On fixed rake machines, bolt the guide bars to the ram. If the ram was shipped with the guide bars installed, remove the slide bars and guide bar flanges.

7) Install table and bed assembly.

- a. Place shims over studs on side housing.
- b. Place bed over studs, centering the holes on the studs. Place washers and nuts on studs and take up tight.
- c. Refer to knife clearance adjusting unit detail. Clean bearing surfaces of the bearing blocks, wedges and bearing pads, and liberally apply Mobilplex EP grease. Install the adjusting screws and lock nuts and place the bearing blocks, wedges and bearing pads as shown. Install the set screws and nuts but do not take them up tight.
- d. Loosen the stud nuts just enough to allow the bed to settle on the adjusting unit assembly.
- e. Center the table and bed on the shear with the set screws; tighten lock nuts and stud nuts.

The knives will be shipped installed if they are available at our shop sufficiently in advance of the shipping date.

- 8) Install the hold-down beam. The beam will be vertical, as compared to the 2° forward tilt of the ram. Beveled wedges are provided to compensate for this difference. Once located, dowel pins should be installed at the mounting pads to prevent movement of the beam. Hold-down cylinders are shipped assembled on the beam.

9) Install Scrap Chute.

Your Pacific Hydraulic Shear is now assembled to the same extent as a "set-up" machine. Refer to the instruction manual for further steps in connection with initial start-up.

GENERAL INSTRUCTIONS (Con't)

Pacific Hydraulic Plate Shears

Increased knife life can be had by modifying alloy and heat treatment slightly to suit the type of thickness of material to be sheared. Therefore, if possible, please specify the anticipated requirements giving range, thickness, material and percentage of total shearing. See "Table of Contents" for Knife Application Table.

INSTALLATION INSTRUCTIONS

A Certified Foundation Plan is supplied in advance as well as with each machine. There is very little shock in a Pacific Hydraulic Plate Shear and the foundation does not have to be designed for shock. Likewise the center of gravity of the shear is low because of the absence of heavy overhead gears, shafting, clutches, flywheels, etc. It is essential that the shear be accurately levelled, shimmed, bolted and grouted. Certified Outline Drawings are also supplied in advance as well as with the shear, showing the assembled machine.

Whenever possible, the Pacific Hydraulic Shear is shipped set-up so that it is only necessary to set it on its foundations, level it up, put the proper amount of oil in the tank and connect up the electrical supply. When size and weight exceed practical limits, it is necessary to ship the shear "knocked down". Naturally, we disassemble the shear as little as possible to save time and cost at final assembly in our shop. Thus such disassembly will vary from merely removing the bed in many cases to complete disassembly and skidding of five major members; ram, bed, two side housings and power unit. In all such cases the major parts are match marked. A special instruction sheet is included in this book.

LEVELLING

An out-of-level machine may twist during the shearing action, drawing the stock under the holddowns and forming an objectionable burr on the underside of the sheared edge. The effect on the shear is much the same as overload, and may damage the knives and the slides. Compressible foundation pads are not recommended because they may cause an out-of-level condition to develop even though the shear checks level.

When checking the installation of a Pacific Hydraulic Shear a "Precision Level" must be used. It is essential that the slideways be parallel and in the same plane. The ways could be thrown out of true if the side housings are not in alignment, "front to back", or if they are not exactly level. Levelling buttons are provided to properly level the side housings. Each set consists of two buttons located on the outside face of each side housing toward the rear edge at about shoulder height. These buttons have been accurately levelled and tightened in place at the factory during assembly of the shear. Follow the instruction nameplate attached near each set of buttons.

The front to back alignment of the side housings can be checked by inserting feelers between the guide bars and the slideway. The range of clearance between these parts at the top and bottom should be within .002" that is, the total slideway clearance should be between .003" and .005". Having carefully checked the clearance, the side housings should be bolted down tightly on the metal plates and shims used for levelling, checked again for level, and then grouted in place.

REMOVAL OF BLOCKING

SET UP SHEARS are shipped with the ram blocked in an open position. These blocks under each cylinder can be removed by splitting them before starting the shear, or the ram can be run up or jacked up and the blocks easily removed.

ELECTRICAL CONNECTIONS

Pacific Shears may be ordered with or without starting equipment and control transformer. In either event, the shear Electrical Control Circuit is completely wired (See "Electrical Control Circuit" drawing) and thoroughly tested at our works.

In the case of standard machines, the customer must provide his own starting equipment and control transformer. We recommend a combination magnetic starter to provide overload, under-voltage, and short circuit protection. Hook-up should be as shown on the Motor Control Circuit, where you will also find the recommended starter and transformer sizes.

When starting equipment and transformer are ordered, they will be mounted and wired, and, of course, thoroughly tested prior to shipment. The customer must then "hook-up" to his shear according to the Motor Control Circuit drawing.

The motor branch circuit should have a wire size of one larger than normal, as the motor will occasionally draw more than its rated nameplate amperage.

HYDRAULIC OIL

- A. The quantity of oil required to initially fill the hydraulic system is shown in the "Basic Data Sheet" (page No. II) in the front of this book. The oil used must be high quality, manufactured by a reputable petroleum supplier and suitable for the type hydraulic pumps used. It must also meet the following requirements.

HYDRAULIC OIL

A. (Continued)

- | | |
|--|---------------------------|
| 1. A.P.I. Gravity. | 28 Min. |
| 2. Vickers Vane Pumps (High Performance) | 175 to 230 SSU at 100° F. |
| Denison Vane Pumps | 175 to 230 SSU at 100° F. |
| SSU Viscosity at Cold Start | 4000SSU Max. |
| SSU Viscosity at operating temperature | 60 SSU Min. |
| 3. Viscosity Index (Dean & Davis) | 95 Min. |
| 4. Neutralization Number (new oil) | 1.0 Max. |
| 5. ASTM Oxidation Test D-943-54 at 2500 Hrs. | 2.0 Max. |
| 6. Government Emulsion Test-Minutes to 0 ML Emulsion | 10 |
| 7. Must provide the high level of wear protection required in new generation hydraulic pumps. | |
| 8. Use of Automotive MS type oil not recommended. Consult your oil supplier for sampling to determine condition of system oil and to establish oil change periods. | |

- B. In addition to the above checkpoints, IT IS VERY IMPORTANT THAT THE OIL BE CLEAN. All precautions should be taken to keep the oil clean, free from chips, grit, water, sludge, coolants, cutting oils, etc. Use a high quality oil, strain it carefully when putting it into the shear. Have your oil supplier sample and analyze the system oil to establish oil change periods.
- C. If the oil is to be replaced the tank should be cleaned. After the oil is drained the hoses and wiring to the power unit will have to be disconnected. The wiring should be color or number coded for exact reconnecting. Then the tank top should be unfastened and raised so that the entire surface of the tank can be cleaned, using clean lint free rags. Under normal operation conditions it is not necessary to disassemble the valves, cylinders, pumps or connecting piping. Replace the filter cartridge, if equipped.
- D. The maximum safe operating temperature of hydraulic oil is 155° F. If the temperature exceeds this figure, consideration should be given to adding a water cooled Pacific Heat Exchanger.

BLEEDING AIR FROM THE HYDRAULIC HOLD-DOWN CIRCUIT

It is important that the hydraulic hold-downs build up pressure quickly and maintain an even pressure during the entire shearing stroke. The principal cause of slow pressure build-up is air in the system. It is essential that this air be bled by loosening the plugs slightly at each end of the hold-down beam and allowing air to escape. When the oil seeps out free from air, the plugs should be tightened and the shear operated.

HOLDDOWNS

The hydraulic holddowns are mounted on the lower edge of a separate hold-down beam. The beam is rigidly fixed between the two main cylinders. The holddown pistons are advanced to the table or the work by the main high volume pump. This oil flow is controlled "on" and "off" by the action of the holddown advance valve. The time delay relay in the control panel controls the closing speed of this valve and should be set for approximately 1/2 second. After the holddowns have been advanced to the work at a relatively low pressure, the holddown pumps (small volume) takes over at the pressure as determined by the holddown relief valve.

When the ram starts the up stroke, the holddown release valve opens and the holddown pistons are returned by internal springs, or, in some cases by hydraulic pressure.

ELECTRICAL CONTROL SWITCHES

The electrical control circuit of the Pacific Hydraulic Shear may include the following control switches. Those marked with a star (*) are optional and will be included provided that feature was included at the time of purchase of the shear.

1. "Inching Switch" All shears have an inching switch. In the "cycle" position the ram will return to the top of its stroke whenever the foot switch is released (open). In the "inch" position the ram will stop and hold position whenever the foot switch is released; the ram will not return upward until the depth limit switch is contacted or the inching switch is changed to the "cycle" position.
2. "Foot Switch" The foot switch is a safety type, pedal operated two position switch on a long flexible cable, permitting it to be used at any point in the front of the shear. It is "on" when the pedal is depressed and "off" when the pedal is released. It is used in conjunction with the inching switch and also the single stroke control switch.
3. "Depth Limit Switch" This is a small microswitch which controls the depth of stroke of the ram. It is normally closed until contacted by the depth limit stop on the stroke adjustment scale. When the switch is contacted, the contact is opened and the ram returns to the top of the stroke.
4. "Back Travel Switch" This is also a small microswitch which controls the height to which the ram returns on the upward or return stroke. It is a normally closed switch but is opened when it is contacted by the back travel stop on the stroke adjustment scale during the return stroke.

ELECTRICAL CONTROL SWITCHES (Con't)

5. "Holddown Advance Switch" With beam mounted holddowns, a small toggle switch is mounted on the side of the control box. It has two positions, "automatic" and "manual". When in the "automatic" position, the holddowns will automatically advance and contact the plate to be cut in advance of the cutting stroke; will hold the plate during the cut and will release as soon as the cut has been completed. In the "manual" position the holddown will continue to hold the plate until the switch is returned to "automatic". In either case, the footswitch must be closed to make the cut.

The switch also serves to provide pressure to the back gauge elevating system. With the switch in the "manual" position, the back gauges can be raised by opening the needle valve in the back gauge cylinder circuit. To lower the gauge, place the holddown switch in the automatic position and open the needle valve to bleed oil out of the back gauge cylinder circuit. At the end of the stroke, either "up" or "down", the needle valve should be closed tightly.

6. "Reset Button" The emergency microswitches interrupt the power supply to the control circuit when the ram is tilted beyond the safe range of operation. This may occur at the start-up due to air in the system or to some malfunction in the hydraulic or electrical circuits. The reset button circuit by-passes the emergency stop microswitches. When stroking the ram by the use of the reset button (following the stopping of the shear by one of the emergency stop microswitches) it is important to check the ram to see that it is automatically levelling itself. Stop the shear if the ram should continue to remain out-of-level and determine the cause of the trouble.

- * 7. The "Single Stroke Switch", is a small toggle switch mounted on the side of the control box. It is used in conjunction with the foot switch. When in the "single stroke" position and the foot switch closed, the ram will advance to the bottom of the stroke and stop. When the foot pedal is released the ram will return to the top of the stroke and stop. When in the "off" position the switch is inoperative and the ram will operate in its normal cycle.

- * 8. "Power Back Gauge Control" This consists of two three position push buttons conveniently mounted on the front of the shear and controlling the back gauge hydraulic motor. As the "in or out" button is depressed slightly, the hydraulic motor operates slowly. Further depression of the button opens a high volume valve and causes the motor to speed-up. Thus we have high speed for positioning the gauge and low speed for a accurate setting.

9. "Rake Control Push Button" This switch is normally open. It is used in conjunction with the rake adjusting unit, as described in paragraph 5. This must be done with the main motor running to provide oil under pressure to the upper or lower left-hand cylinder connections.

START-UP - CHECK LIST

1. Refer to certified foundation plan for recommended foundation details.
2. Level the side housings using a precision level and the special levelling buttons provided on each side housing. (See levelling instruction).
3. Check front and back side housing alignment by inserting a feeler gauge between the guide bar and slideways. Maintain a total slideway clearance of .003" to .005" at the top and bottom of slideways.
4. Install magnetic starter and disconnect switch in accordance with motor control drawings and complete wiring.
5. Fill power unit tank with clean hydraulic oil. The required quantity, depth and oil specifications are given in the Basic Data and Hydraulic Oil sections of this instruction book.
6. Install stroke adjustment scale on control end of shear. See illustration.
7. Set knife clearance at each end of shear to .030" by first loosening top and bottom bed clamping nuts and then moving adjusting screw to the .030" position. Lock adjusting screws at this position and also tighten the top and bottom stud nuts. This adjustment is made at each end of the shear. Check clearance with feeler gauge.
8. Open control power disconnect switch and close main disconnect switch in the motor circuit.
9. Jog motor a few revolutions and note direction of the rotation. If rotation is opposite to the indicated by arrow on pump, open main disconnect switch and reverse two of the three "line" leads.
CAUTION: Incorrect rotation or lack of oil will cause permanent damage to pumps.
10. Start main pump and motor and check for vibration and binding.
11. Close control power switch. With back travel stop on stroke adjusting scale all the way down and the depth travel stop all the way up, place the inching switch in the "cycle" position and jog ram up with main foot switch. (Depress reset button if necessary).
12. With the ram up, remove wooden support blocks.
13. Place the inching switch in the "inch" position.
14. Jog ram down with foot control switch but **DO NOT LET THE KNIVES MEET**. Press reset button frequently if ram will not move.
15. Place inching switch in "cycle" position. Ram should automatically return to the top of the stroke. If not, press reset button.
16. Repeat steps #14 and #15 at least 10 times or more if reset button must be used.

NOTE: Set the "Dial-A-Rake" control for the desired rake and press the adjustable rake control push button until ram ceases its levelling motion. The ram will hold this rake position.

17. Move the inching switch to the "inch" position. Carefully "inch" ram downward with footswitch until knives almost touch. Check to be sure there is ample front to back clearance (about .030") between knives. Move depth limit stop to top of scale. Continue to jog ram downward and check knife clearance progressively toward open end until ram reaches the bottom of its stroke.
18. Move inching switch to "cycle" position. Ram will automatically return to the up position.
19. Cycle ram for approximately fifty complete strokes with footswitch.
20. Adjust the knife clearance to approximately .010" at each end of shear and again place inching switch in the "inch" position. Jog knife blade down to the bottom of stroke stopping repeatedly and checking for knife clearance with feeler gauge.
21. Shear a piece of 10 gauge x 48" long x 12" wide mild steel plate being sure that the sheet is always placed under at least one holddown foot.
22. Shear a piece of mild steel plate of the rated thickness and length.
23. If shear is equipped with a hydraulically operated back gauge, jog the gauge through part of its stroke and check for possible binding. Move back gauge both forward and reverse and, if no binding develops, cycle back gauge through its full travel approximately ten times.
24. If shear is equipped with cut lighting, turn on the lighting switch and check to be sure all lamps are installed correctly and light properly.

OPERATION

Start the power unit motor, close the control power switch, and turn on the cut illumination (if provided). The shear is controlled with an electric foot switch. In the released (up) position, the ram will move upward until the back travel stop opens the back travel limit switch. Pressing the foot pedal (down position) starts the ram down.

There are two possible sequences of operation -- "inch" and "cycle". These are selected by positioning the Inching Switch mounted on the side of the electric control panel.

"CYCLE" OPERATION. Place inching switch in the "cycle" position. Pressing the foot pedal causes the ram to move down. Releasing the pedal causes the ram to return upward until the back travel stop opens the back travel limit switch and the ram stops. The shear will cycle continuously between the depth desired, length of stroke can be pre-set by positioning the depth and back travel stops on the scale.

"INCH OPERATION." Place the inching switch in the "inch" position. Pressing the foot pedal causes the ram to move downward but it will hold position and not return upward whenever the pedal is released. If the ram moves down to the depth stop, it will return automatically to the up position as set by the back travel stop. This "inching" procedure is usually used in checking knife clearances, or checking for exact alignment before shearing critical sections "by eye".

SHORT STROKE OPERATIONS. Place the inching switch on "inch" and move the ram down to the desired depth with the foot switch. Move the depth stop down until it touches the depth limit switch. Now move the back travel stop up until it allows the required length of stroke. Place the inch switch on "cycle"; the ram will raise to the back travel setting. The short stroke length is now set.

NOTE: Uniform knife wear can be obtained by proper selection of short stroke position along the length of the shear.

SLITTING. Slitting of a plate longer than the shear can be done if the width of the cut or drop is less than the depth of the throat in the side housing. Move the depth stop to the full up position and back travel stop to the full down position. Place the inching switch on "inch". Place a small plate of the desired thickness at the left-hand end of the shear. Inch the ram down until the knife is approximately 1/4" above the plate. Turn the single stroke control switch off (if supplied). Move the depth stop down until it just touches the depth limit switch. Place the inch switch on "cycle" and the single stroke switch at "on". The ram moves to the up position. The shear stroke is now set for slitting. Mount the Pacific slitting gauge on the right-hand end of the shear and set its gauge face in line with the face of the ram knife. Place the plate in the shear and make a full cut as

set by the stops. Slide the plate to the right until the left-hand end of the cut is approximately 1 foot from the right-hand end of the shear. The cut portion of the plate (or "drop") will bend down through the throat and allow the table section edge to ride lightly against the slitting gauge. The plate is now set for the next slitting cut.

NOTCHING. Notching out the corner of a sheet or plate can be done at any point along the length of the Pacific by shortening the cutting length accordingly. Set the cutting length of the knife as explained under "slitting" and note where the cut "runs out". Mark the notch to be cut on both sides of the piece. Position the plate with reference to the above-mentioned "runout" point. After making the first cut turn the work over and make the second cut. The heavier the plate and the flatter the rake angle, the more severe the shear marks will be beyond the notch. Be sure the work is held under at least two holddowns. If a quantity of parts are to be notched, a positioning gauge will be worthwhile.

SHEARING NARROW WIDTHS. To double the holddown tonnage when shearing narrow widths of stock, use a heavy notched bar long enough to span at least two holddowns. The notch in the bar should be slightly wider than the width of the stock but the depth of the notch should be somewhat less than the stock thickness.

KNIFE CLEARANCE ADJUSTMENT. Loosen the top and bottom bed plate clamping nuts at one end of the shear. Turn the adjusting screw to the desired knife clearance as shown on the knife clearance indicator. Lock the adjusting nut and tighten the clamping nuts. Make similar adjustment at the other end of the shear. Put the inching switch at the "inch" position and carefully inch the ram down checking the knife clearance with feeler gauges at every 12" of knife length.

CAUTION: Do not allow the knives to touch. If the knife clearance differs from the desired setting from one end of the shear to the other, repeat the above operation. The clearance in the center of the shear should be reduced by .002" when shearing 16 gauge and lighter sheets. This adjustment is made by adjusting the ram stiffener stud nuts.

Large shears may be equipped with a power operated device on the clearance adjustment, consisting of a hydraulic piston driving a rod connected to the wedge at each end of the shear. The pistons are controlled by adjacent hand valves, and are manually locked by the large hand wheel.

HOLDDOWN TONNAGE CONTROL (FOR SHEAR SO EQUIPPED). With the power unit operating, turn the hand-wheel of the holddown tonnage control valve to the desired tonnage as indicated on the holddown tonnage gauge.

HOLDDOWN PRESSURE. The holddown pressure should be kept at the rated pressure, except on shears equipped with a pressure control device. When shearing soft material which might mark at full holddown pressure, we suggest using a piece of protective material such as masonite under the holddown feet. If the shear is equipped with holddown pressure control, the valve will be mounted on the right hand side housing. It is equipped with a gauge indicating the holddown pressure. If the sheet or plate is allowed to whip up and wedge between the knives, serious damage may be done. Thus, always BE SURE THAT THE MATERIAL IS HELD UNDER HOLDDOWNS. Serious damage and possible injury to the operator can be done if a narrow strip is placed between the holddown feet and shearing attempted.

Note: Make certain full rated holddown pressure is obtained at each down-stroke of the ram by observing the pressure gauge.

OPERATION: BACK GAUGES. Pacific Hydraulic Plate Shears can be equipped with a manually operated or a power operated back gauge. When setting the gauge, it should be deliberately moved back beyond the required position and then slowly moved forward. This eliminates error due to back lash. The manually operated back gauge is controlled from the rear of the shear and indicator is provided to show the setting. Power operated back gauges are optional equipment and are powered by an hydraulic motor. A throttling valve controls the speed of these gauges and provides a rapid advance as well as a slow inching speed. Back gauges are hydraulically lifted so that the stop may be moved out of place for shearing off wide drops beyond the normal range of the gauge.

MAINTENANCE

KNIVES:

Each knife is ground to have four cutting edges. When it becomes necessary to turn a knife to a new edge, it should be removed from the machine, carefully inspected and cleaned before replacing. A slight burr and possibly some nicks and galled metal may have developed on the last cutting face. Such high spots should be removed with a coarse oil stone and the faces of the knife seats in both the ram and bed should be thoroughly cleaned so that the knife when replaced will fit "metal to metal". We suggest that the knives edges be used in the following sequence: 1-2-3-4- (see sketch), as this will mean turning the knives "end for end" only once, that is for the change from 2 to 3. Knife edges are very sharp and must be handled with extreme care.

The procedure is as follows:

Upper Knife:

- a. Raise ram to full top position.
- b. Block ram in this position with a wooden block at each side housing. Allow the ram to come down and rest on these blocks.
- c. Open main disconnect switch.
- d. Place 2" x 4" timbers across table on about 3 foot centers allowing to project several inches under and in back of knife. Each timber should have a suitable height block under the knife to almost touch the knife. Hold timbers firmly in place with "C" clamps at the front edge of the table.
- e. Remove bolts, drop the knife on the blocks and slide it out at the low end of the ram.
- f. Clean up the knife and the knife seat carefully as outlined at start of this section.
- g. Rotate or turn the knife "end for end" with the new cutting edge in position. Tighten all bolts gradually with a final maximum pull on each.

Lower Knife:

- a. Remove plate on table over knife bolt cut-outs.
- b. While loosening knife bolt nuts at the front of the shear, have one of the operators at the back of the shear to take out bolts and also hold the knife in place.
- c. Remove knife. Clean the knife and knife seat as outlined at the start of this section.
- d. Rotate or turn the knife "end for end" with new cutting edge in position. Tighten all bolts gradually with final maximum pull on each.



SHEAR KNIFE CLEARANCES

The clearance between shear knives is adjustable and has an important effect upon shearing tonnage, angularity of cut, appearance of cut, and amount of burr. Other factors that effect the quality of cut are: The type of material being sheared, physical properties of the material sheared such as hardness, rake angle of the upper knife, size of the piece, size of the machine, and sharpness of the knives.

The following recommended knife clearances are for shearing mild steel plate (60,000 psi tensile strength).

CASE 1

For trim cuts, where appearance is important:

<u>PLATE THICKNESS</u>	<u>KNIFE CLEARANCE</u>
1/4"	.010" to .018"
3/8"	.020" to .028"
1/2"	.030" to .040"
5/8"	.045" to .065"
3/4"	.050" to .065"
1"	.070" to .090"
1-1/4"	.090" to .120"
1-1/2"	.110" to .150"

CASE 2

For trim cuts where appearance is not too important, and a wide variety of thicknesses are being sheared, set the clearance for the minimum thickness being sheared. This will keep the amount of "Burr" to a minimum.

CASE 3

When shearing large plates with wide drops, the following clearances should provide minimum tonnage (load) and give minimum "Secondary" shear to the edge. This is more important with heavier (thicker) plate.

<u>PLATE THICKNESS</u>	<u>KNIFE CLEARANCE</u>
1/4	.025 to .030
3/8	.038 to .050
1/2	.050 to .070
3/4	.075 to .110
1	.100 to .150
1-1/4	.125 to .180
1-1/2	.150 to .220

When setting knives, the upper knife should be put in the machine first, using a wooden lever to wedge it tightly against the knife seat. Then make certain that all bolts are drawn up tightly. The lower knife should then be put in place with the cutting edge slightly above the top of the table. The ram should be inched down carefully, until the knives pass each other. By means of the knife clearance adjustment, the lower knife and bed should be moved as necessary in order that a .010" feeler gauge will go between the knives. At this point the knives should be made exactly parallel with respect to each other, by adjusting the bolts in the front edge of the ram stiffener. If the shear is to cut 16 gauge and lighter material, the center of the upper knife should now be bowed forward approximately .002" by adjusting the ram stiffener bolts. The table should then be moved in or out to the desired clearance by the knife adjusting screws, then thoroughly tighten the four bed plate nuts. The clearance should again be checked with a feeler gauge.

One of the important factors governing the knife life is the care with which adjustments in settings are made. No single setting can be given to fit all shearing situations. In the absence of specific instructions, a clearance between knives of about 7 percent of the thickness of the material being sheared is generally satisfactory. The following clearances are given as a general guide, and have been found to be satisfactory for most shearing operations.

Stainless Steel & Silicon Steel up to 1/4" Thick	.002" .003"
Copper & Aluminum up to 1/4" Thick	.002" .002"
Mild Steel Sheet & Strip up to 1/4" Thick	.003" .005"
Mild Steel Plate, 3/8" & 1/2" Thick	.008" .010"
Mild Steel Plate, over 3/4" Thick	.015" .020"

When shearing 16 gauge or lighter material, the clearance at the center of the shear should be reduced by about .002". This is not necessary when shearing plate 3/16" and over. Knife clearance should be set for the normal lightest thickness of material to be sheared.

It is important that the knife bolts be checked weekly for tightness. Knife bolts can lose their initial tightness due to creep and the constantly fluctuating shearing load. Clearance should be checked carefully to insure that the knives will not cross each other and cause damage.

SHIMMING LOWER KNIFE

After the lower knife has been reground, it will be necessary to shim under it to bring it back to its original height. Bolt holes in the ram and bed are amply large to allow for maximum practical grinding. The upper knife can be reground to the point where it still clears the front and lower faces of the ram. The upper knife is not to be shimmed.

KNIFE CARE

When shearing stock coated with a rust preventative material, the lower blade should be swabbed with oil several times a day. The upper blade will pick up its lubrication from the stock.

Knives should be kept clean and free of metal particles. If knives become magnetized, remove and de-magnetize to prevent further damage.

APPLICATION TABLE

Material To Be Cut	Thickness	Grade I Tool Steel	Grade 2 Intermediate Alloy	Grade 3 High Carbon High Chrome
Aluminum	Any	Second		Best
Brass	Any	Second		Best
Mild Steel	Up to 1/4"	Second		Best
	Over 1/4"	Second	Best	
Silicon Steel				Best
Low Alloy and High Carbon Steel		Second	Best	
Stainless Steel	Up to 3/16"			Best
	Over 3/16"		Best	

Refer to Pages #3 and #5.

HYDRAULIC HOLDDOWNS

The holddowns may need occasional packing replacement in the event of oil leakage. Proceed as follows:

1. Refer to holddown assembly drawing.
2. Run the ram up to the top position and then open the main disconnect switch.
3. Drain oil from beam.
4. Remove the holddown cylinder from the beam. The spring bolt and washer assembly must be removed for access to the cup packing.
5. When installing the quad rings, make sure that they fit squarely in the groove and will not tend to roll. Install the cup packing with the flange pointing upward. Use the cylinder as a guide to center the cup accurately on the piston. To do this, place the packing of the top of the piston, tighten slightly, place the assembly into the cylinder, and tighten up.
6. Replace the cylinder. Bleed air from system.

MAIN CYLINDERS

A. Servicing Chevron Packing.

The piston rod packing is adjustable and will keep the rod surface wiped practically dry. A very thin film of oil is desired. If the rod is too dry or if the packing squeals, the glands should be loosened slightly. However, if the packing tends to leak oil, it should be tightened. When either loosening or tightening the gland, care should be taken to see that the adjustment is uniform. The capscrews should be adjusted by quarter turn intervals (about 90 degrees) and the assembly checked for freedom from leaks. The space between the lower face of the cylinder head and the upper face of the gland should be carefully measured at intervals around the gland and should be equal within about 1/64". After several years it may become necessary to either add an extra chevron ring or to replace the complete set of packing. We recommend the use of complete rings rather than cut strips. Proceed as follows:

1. Place the inching switch in the "inch" position and run the ram down to about 2" below the top stroke position.
2. Open the main disconnect switch.
3. Using jacks, crane, or other means, take the weight of the ram and prepare to lower it following step #4.
4. With the ram securely supported remove the nut on the ram - piston stud on both piston ends.

5. Lower the ram to the bottom of its stroke. Do not permit it to go out of level enough to bind the guide bars. Remove the spherical washers and shims, if any, keeping the latter with the adjacent washer. The piston rods will be held up by vacuum.
6. Lay the new ring or the replacement set of packing on the pressure pads (with the "V" up) ready to raise in position.
7. With suitable lengths of wood blocking, prop the pistons in place.
8. Remove the gland capscrews and slide the gland down free from the piston rod.
9. If it is desired to add one ring to the existing packing, carefully extract the outside packing ring using a suitable sharp pointed tool; be carefully not to damage the ring. Drop this ring off the piston rod end. Carefully manipulate the new packing ring up through the gland and the outside ring and place it over the rod. Now place the new ring, the outside ring and the gland into the stuffing box and install capscrews. Proceed to steps #12, 13, and 14.
10. If it is desired to replace the entire packing, remove the plug in the lower end of the cylinders (opposite the return line connections) and drain the oil from underneath the pistons. At this point the pistons will be supported by the wood blocks.
11. Remove all of the old packing rings. Be careful not to score the rod. As each ring is extracted cut it off the rod. Manipulate the new packing rings up through the gland. As each ring is moved into place it is necessary to drive it by tapping lightly with a hard wood packing tool and a hammer. It may be necessary to relieve air in the stuffing box by sliding the rings up with a piece of smooth wire between the rings and the piston rod or between the rings and the outside of the stuffing box. Be careful not to damage the edges of the rings.
12. When the rings are snugly in place, remove the above mentioned air vent wire if used, raise the gland and replace the gland capscrews. Give the new packing a preliminary adjustment sufficient to prevent gross leakage. Do not tighten excessively. Replace the plug mentioned in #10. Remove the wood blocks.
13. Raise the ram to the pistons and replace the spherical washers and nuts on the ram - piston stud.
14. Close the main disconnect switch.
15. Fill the connecting line between the two cylinders by adding oil through the plug in the flange of the "in level" valve. Stroke the ram a few cycles to check that no air is present in the system.
16. Correctly adjust the gland and packing as mentioned above. Wire the heads of the gland capscrews.

SERVICING CUP PACKING

Remove the hydraulic cylinder from the shear and place the cylinder vertically on the floor with the piston rod up. Secure the cylinder rigidly to a bench or column where hoist facilities are available for handling the piston. Remove the cylinder head and gland assembly. The piston rod assembly may be lifted out of the cylinder as a complete unit. Remove the old packings and install new packing cups. Make certain that the cup packings are concentric with the piston and that the head does not protrude beyond the edge of the piston. If so equipped, tighten the follower ring screws uniformly and wire the heads with soft wire. Make certain that the entire assembly is clean and the cylinder walls are in good condition. If there is any galling of the cylinder walls, they should be honed. There is a slight taper at the entrance to the cylinder bore to assist in entering the upper cup. Re-assemble the piston in the reverse order as outlined above, using extreme care not to damage the cups as they enter the cylinder.

BALL TRANSFERS

Ball transfers may be removed and cleaned by pushing them up out of their sockets using the hole under each. They may be adjusted in three different ways:

1. By screw adjustment of the pipe plug underneath the ball transfer.
2. By changing the thickness of the spacer at the bottom of the ball transfer.
3. By grinding down the thickness of the rubber ring.

BED SHIM ADJUSTMENT

Shims are installed at the factory between the bed and the side housings to provide for adjustment of the bed as the knives are reground. As the knives are reground and as no shimming in back of the knives is permitted, it is evident that the bed must be moved back to compensate for the reduction in knife thickness. The range of the knife adjustment screws and wedges is limited and therefore after each regrinding it will be necessary to remove some shims. They are provided at each clamping stud.

A jacking screw is provided at each end of the bed to lift it off the sloping part of the side housings. First loosen the clamping stud nut, then lift up with the jacking screws, knowing the amount ground off the two knives, remove shims as follows:

Total Amount Ground Off Both Knives	Take Out Shims as Below
.020"	.025"
.030"	.035"
.040"	.045"
.050"	.060"
.060"	.070"

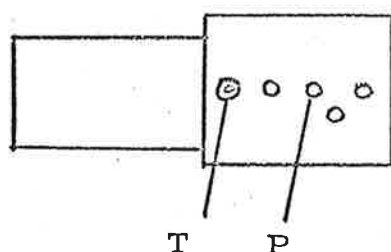
Remove the same thickness of shims at each of the four studs. Lower the jacking screws, tighten the four clamping nuts and set the two adjusting screws to the same knife clearance as you have been using. It will then be necessary to "zero in" the indicator point bringing it to agree with the feeler gauge setting of the knives. A slotted hole is provided in the indicator point for this purpose. No adjustment of these shims will be necessary until all four edges of the knives have been used.

PILOT VALVES

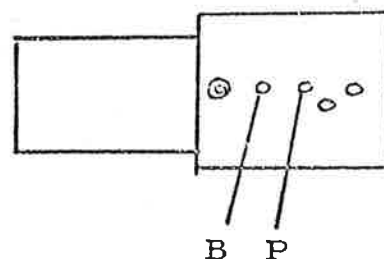
This machine is equipped with solenoid operated pilot valves which are mounted directly on the various heads of the main valves. No external tubing or mounting brackets are required. These pilot valves are furnished in two models:

Model 237	(Normally Open)
Model 238	(Normally Closed)

Although there are added port connections in the pilot valve, only two ports are actually used.



(Mounting Holes
not shown)



View of mounting face of #237 Valve

Inlet	Port "P"
Outlet	Port "T"

(Other ports not used, although O-rings must be used on all connections to provide proper sealing).

View of Mounting face of #238 Valve

Inlet	Port "P"
Outlet	Port "B"

(Other ports not used, although O-rings must be used on all connections to provide proper sealing)

PILOT VALVES (Con't)

#237 Pilots are used on the
following valves:

Main Valve

1-1/4" Relief
1-1/4" Dump
1-1/4" Foot
1-1/4" Holddown Release
3/4" Relief

#238 Pilots are used on the
following valves:

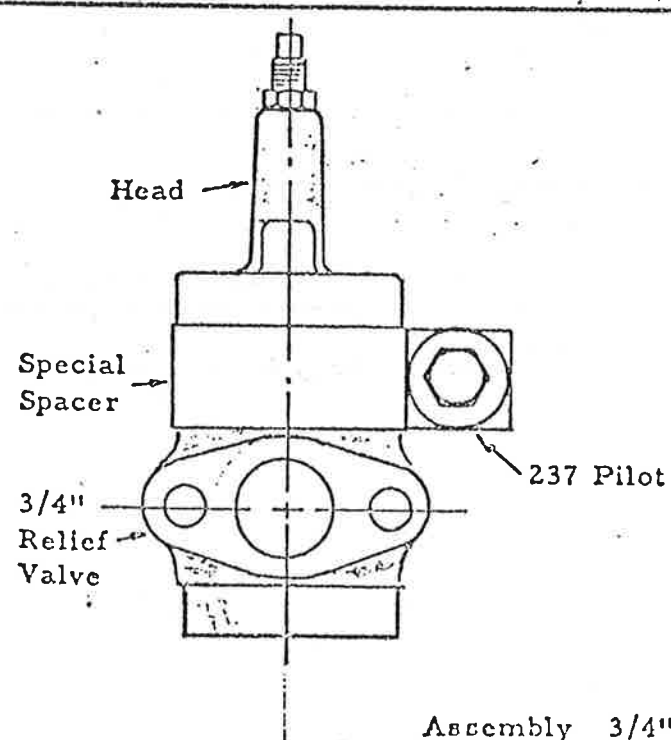
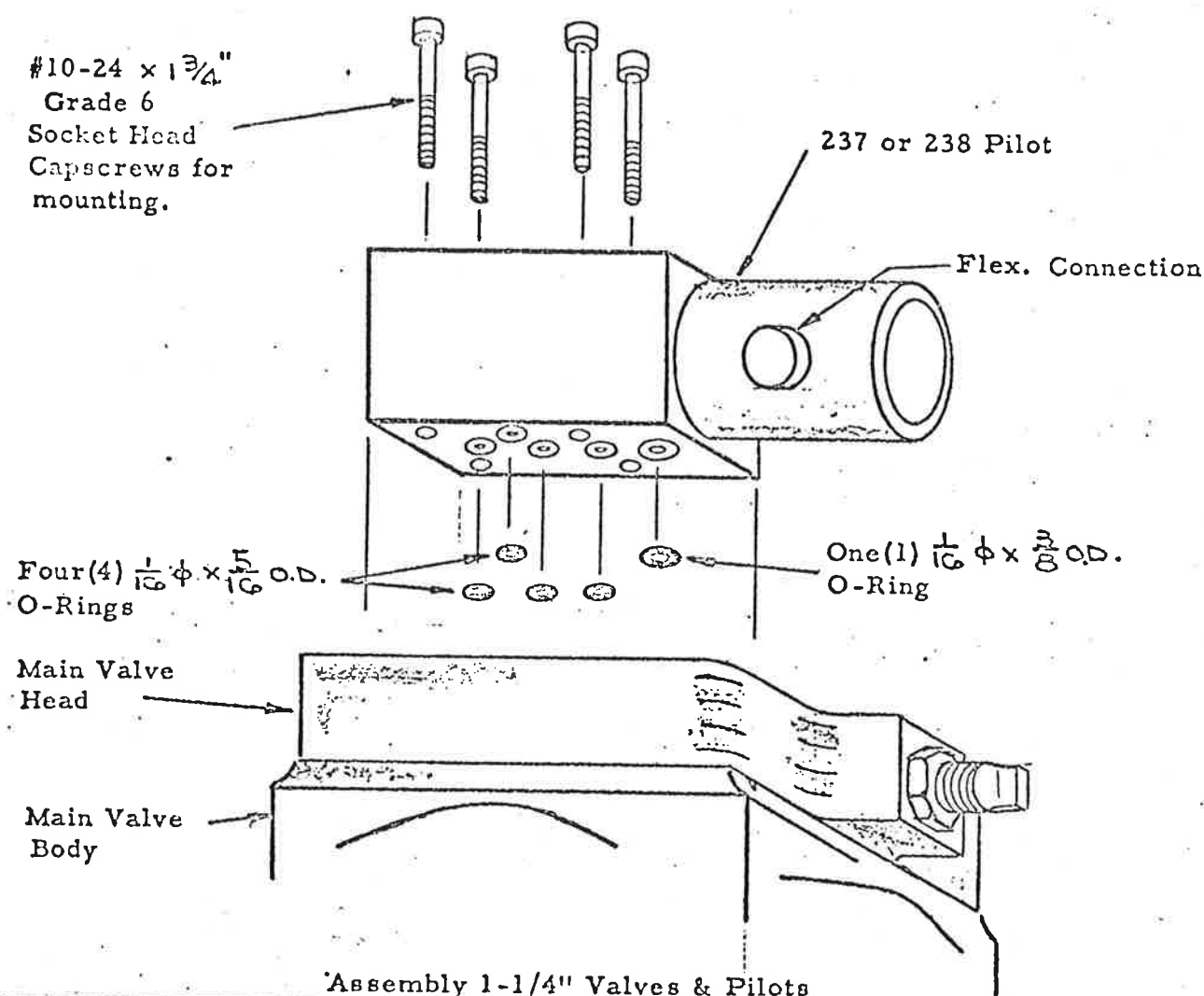
Main Valve

1-1/4" Up
1-1/4" Down

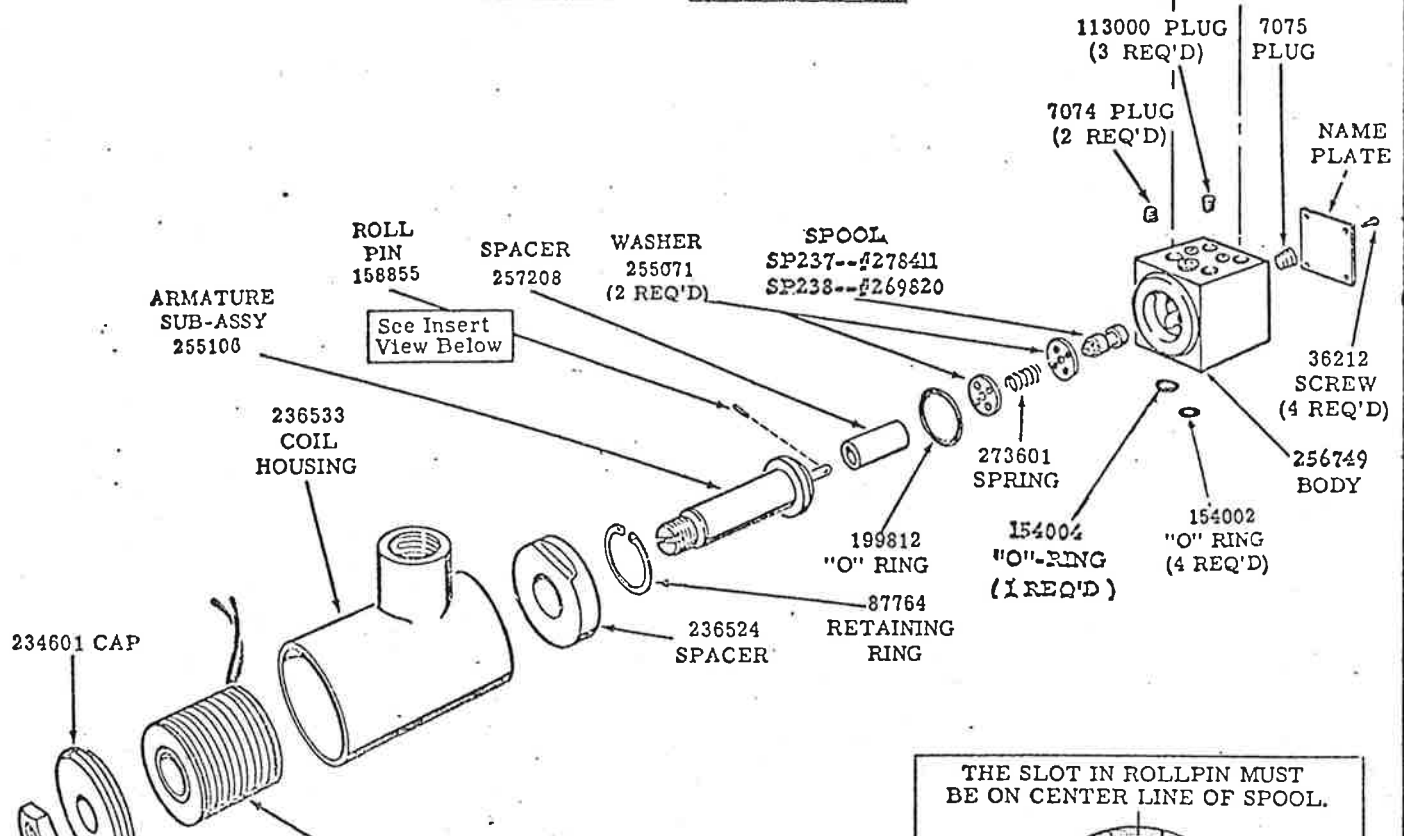
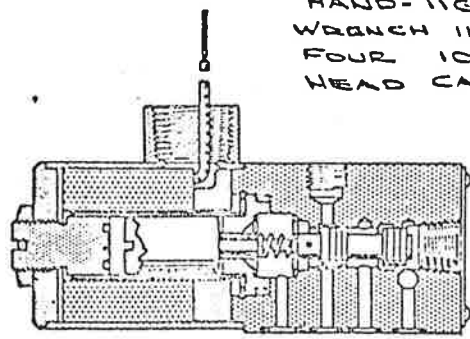
1-1/4" Holddown Advance

Both 237 and 238 pilots are for use on 115 VAC 60 cycle service.
A special coil is required for 50 cycle use.

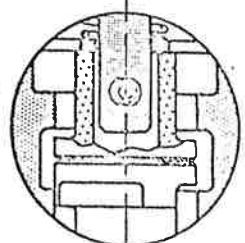
Refer to Diagrams Pages 23 & 24.



HAND-TIGHTEN WITH
WRENCH IN THIS POSITION,
FOUR 10-24 NC SOCKET
HEAD CAPSCREWS.



THE SLOT IN ROLL PIN MUST BE ON CENTER LINE OF SPOOL.



VIEW SHOWING ASS'Y OF ROLL PIN (STAKE BOTH ENDS AT ASSY).

VOLTAGE & CYCLE	COIL
115AC60	288867
208AC60	252940
230AC60	245443
115AC50	309663
230AC50	247160

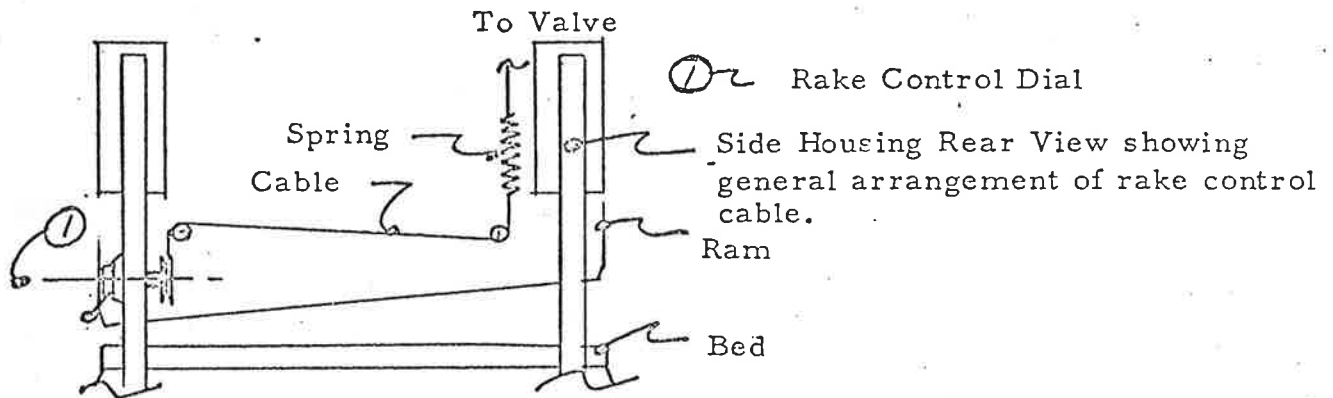
To insure sustained efficiency and maximum trouble-free life of this precision equipment, initial and continuous filtration of the fluid medium is essential.

RAKE CONTROL

Rake Control is accomplished with a cable controlled servo valve.

SERVO VALVE. As the position of this valve changes, the volume of oil in the series circuit between the right and left pistons is adjusted. In this manner the relative elevation of the ram ends ("rake") is controlled.

CABLE. The cable is so reeved that undesired rake changes actuate the Servo Valve (see diagram). When the cable is "shortened" or "lengthened" by re-setting the rake control dial to a new position, the Servo Valve is actuated. A safety spring connects the cable and valve.



RAKE CHANGE PUSH BUTTON. Minor corrective, or automatic, rake changes are accomplished while the ram is stroking. Several strokes would be required to make a major, or operator controlled, rake change. Inclusion of the "Rake Change Push Button" allows the operator to change rake without stroking the ram.

MAINTENANCE. The most common causes of mal-function in the rake control system are:

1. Dirt in Servo Valve, causing erratic operation, and, frequently, a "dropping" ram.
2. A stretched cable or spring. No obvious malfunction will exist, however, the ram rake will be greater than the rake indicator setting. Since an excessively over-rake condition can seriously damage the machine, a rake angle check should be part of the "Monthly Maintenance Check". Set the rake control for an "easy to figure" rake ($1/4$ " per foot or $1/2$ " per foot, for example) give the ram ample time to assume the desired setting. Then measure the knife open height at two spots, say 5' apart. Subtract the lesser open height from the larger open height and divide by 5 (or whatever distance you use). If the actual rake angle is within $1/32$ " per foot of the selector setting, best to leave things alone. If a greater difference exists, reset the cable on the selector pulley. If their condition so dictates, replace the cable or spring, taking care to first block the ram.

MONTHLY MAINTENANCE CHECK

- a. Open main disconnect switch.
- b. Inspect rake control cable and spring. Check for correct reeving and wear on cable and pulleys. Remove dirt. Check rake angle per "Rake Control - Maintenance" section.
- c. Check spring balance system. Guide bars should be snug to bottoms of slideways. On shears equipped with hydraulic balance systems, this check must be made with the motor running.
- d. Inspect the stroke adjustment scale, the travel limit switches and tighten the scale mounting screws.
- e. Check the tightness of the following capscrew and nuts for tightness using a suitable wrench.
 1. Ram-piston studs, cylinder nuts and slide bar capscrews.
- f. Check the electrical control box for cleanliness, loose wires and general condition of contact points.
- g. Visually inspect the power unit for free rotation of the motor, correct oil level, cleanliness of oil and any oil leaks.
- h. Visually inspect foot switch for proper action.
- i. Remove covers from the Waterman Valves, checking for freedom of movement, tightness of fulcrum pins, jam nuts and electrical connections. (Power back gauge speed valve)

LUBRICATION

The correct hydraulic oil is described in the paragraph under the heading in the front of this instruction book.

Lubrication of the shear should be made in accordance with the attached maintenance chart using Mobil Flex EP-1 or equivalent.

PERIODICAL MAINTENANCE

The principal maintenance on the shear consists of the following:

1. Grease the slideway assemblies daily with Mobil Flex EP-1 or equivalent.
2. Grease the electric motor bearing yearly with suitable bearing grease.
3. Replace oil filter cartridge as indicated on instruction sheet.
4. Should oil require replacement, wash out the tank with a solvent to remove sludge before adding new oil.
5. Rotate, or regrind the knives whenever they become dull.
6. The knife adjusting wedges should be greased whenever the knives are rotated or changed.

There are a few parts of the shear that are subject to wear. We recommend a periodic inspection so that these can be repaired or replaced before causing a shut-down or serious damage. These parts are as follows:

1. Solenoids, which are integral parts of some of the valves on the power unit. These solenoids can get out of adjustment or the frames may crack or bind.
2. Electric relay contact points in the electric control panel. These should be periodically checked for contact burning and replaced as necessary.
3. Hydraulic Pump. Occasionally a pump may have a bearing failure, or the motor may bind. In dis-assembling the pump, follow the manufacturer's service instructions carefully.
4. Main cylinder rod packing. There should be a small leakage through the rod packing so that there is always a slight oil film on the main rods. Loosen the packing if the rod is too dry. Tighten the packing if oil leaks excessively. The gland bolts should be pulled up slowly and uniformly with a small wrench. **DON'T TIGHTEN GLAND BOLTS EXCESSIVELY.**
5. Occasionally there may be a hydraulic hose failure. The hoses should be installed carefully with maximum radii, and have no twist or sharp kinks at the couplings.

8 April, 1971

WARNING

THIS IS A HYDRAULICALLY POWERED UNIT. ONLY AUTHORIZED PERSONNEL SHOULD OPERATE THIS EQUIPMENT. ALL CARE AND PRECAUTION SHOULD BE USED. INJURIES TO OPERATING PERSONNEL COULD RESULT THROUGH MISUSE. SAFETY FEATURES ARE INCLUDED WITH THIS EQUIPMENT. IT IS THE EMPLOYER'S RESPONSIBILITY TO PROVIDE ADDITIONAL SPECIAL GUARDS, DEVICES, TOOLS OR OTHER MEANS, IF REQUIRED, THAT WILL EFFECTIVELY PROTECT ALL PERSONNEL FROM SERIOUS INJURY THAT MAY OTHERWISE OCCUR AS A RESULT OF THE USE OF THIS EQUIPMENT.

PACIFIC PRESS & SHEAR CORP.

MT. CARMEL, ILLINOIS