

HCM-B/M3

HCM-B

USM HYTRONIC CUTTING MACHINE
MODEL-B



MACHINERY DIVISION
USM CORPORATION
ELLIOTT STREET
BEVERLY, MA 01915

OPERATING AND SERVICE
INSTRUCTIONS
AND PARTS CATALOG

An **EMHART** Unit

SERVICE INSTRUCTIONS

USM HYTRONIC CUTTING MACHINE - MODEL B

(SYMBOL HCM) see# 2302-381

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Frontispiece - USM Hytronic Cutting Machine - Model B

SECTION I

GENERAL INFORMATION

A. GENERAL

The USM Hytronic Cutting Machine - Model B (Figure 1) is a motor driven, hydraulically powered, floor model machine which may be either electronically or manually controlled by an alternate stroke control mechanism.

The USM Hytronic Cutting Machine - Model B is used for forcing a cutting die through sheet materials such as leather, fabric, paper, plastic and various kinds of conductive and nonconductive flat material.

Basically, the machine consists of a table and frame unit, which supports the cutting surface and beam spindle and beam. The base of the machine serves as a hydraulic oil sump and has the motor pump and control valve mounted to it. The hydraulic cylinder is attached to the frame and coupled to the beam spindle for operation. A handle on the beam enables the operator to swing the beam to the selected position over the cutting die on the cutting surface. The machine is cycled by depressing a thumb-operated trip switch, located in the handle, with one hand and simultaneously depressing a trip button, located on the side of the beam, with the other hand. This actuates the machine cutting stroke in both the electronic and stroke control mode of operation.

Since there is no impact in cutting, no blow or vibration is transmitted to the floor and therefore the machine is virtually noiseless. When electronically controlled a cut is made every time because of a sensitive electronic control which releases the hydraulic pressure the instant that the die cuts through the work and contacts the cutting surface. In the case of stroke control, the release of the hydraulic pressure is determined by the actuation of a microswitch which is attached to the piston rod of the beam cylinder. This may be adjusted manually to suit various conditions by a knob located on the front of the machine.

The electronically-controlled hydraulic mechanism, when used, makes the machine capable of handling various heights of dies (within reason) provided that the beam is set to accommodate the highest die. The machine may be set up to incorporate up to a 2 1/4 inch stroke.

The beam and spindle assembly, when in the up position, rests on a thrust bearing, making it easy to swing. The machine, for the most part, is self-lubricated.

B. MACHINE DATA

1. Over-all Dimensions

Length-----36-1/4" base
57-1/4" including
beam swing
Depth-----40"
Height-----58" to 62-1/2"

2. Gross Weight of Machine-----1968 lbs.

3. Motor

Horsepower-----1-1/2
Speed-----1200 rpm
Direction of rotation-----Counterclockwise
Electrical requirements-----See Commercial
Catalogue

4. Lubrication

General Lubrication-----USM Spec. No.
300A Oil
Oil Reservoir (6 Gal.)-----USM Spec No.
150B Oil
Beam Spindle-----Socony Vacuum
Mobilux #2 grease.
Motor-----USM Spec. No.
300SL36 Grease

Consult USM Machinery Handbook for commercial equivalents of
USM Specification Number Lubricants.

C. SAFETY INSTRUCTIONS

IMPORTANT: Keep these instructions with this machine manual for your records. Make sure all personnel involved in machine setup, operation and service read, understand and are instructed to follow the rules given.

1. Machine Setup

- a. Make sure machine is properly connected to the required electrical service by a competent electrician. Also make sure the machine is grounded in accordance with all applicable National and local electrical codes.
- b. Before operating the machine, make sure all covers are securely attached and that all personnel are thoroughly familiar with the instructions contained in this manual.

2. Operation of Machine

- a. Make no attempt to use this machine for other than its intended purpose as stated in the service manual.
- b. ALWAYS KEEP HANDS OR FINGERS OUT FROM UNDER THE CUTTING AREA OF THE BEAM. Always operate the machine with one hand at each of the two-hand control buttons. This two-hand control system is provided for your protection. Make no attempt to alter or otherwise defeat its purpose. Also, see that no other person in the vicinity violates these rules.
- c. Use extreme caution in servicing the machine spindle. The high force stored in the compressed beam return spring must be released by the procedures given in the Service Manual Instructions.
- d. When the machine is set for Hytronic operation, remember that this setting is to gauge the cut depth and is NOT A RELIABLE PROTECTION FROM DANGER. NEVER ATTEMPT TO USE IT AS SUCH.
- e. Keep hands clear of die area when swinging the beam into position.
- f. Allow no one in the vicinity to place hands in the area between machine base and spindle or over the positive stop spacers in order to avoid possible severe injury.
- g. In the event of power failure, be sure to press the red stop button to prevent the machine starting up on power return.
- h. Do not tamper with the setting of the pressure relief valve of the hydraulic system. This setting is adjusted at the factory to prevent machine damage.

- i. When operating the machine on Stroke, be sure the die height is not changed without readjusting the die height control.
- j. Be sure the cutting surface ground jumper is properly installed in order for the Hytronic feature to prevent over-driving of the die.

3. Machine Service

- a. Use only qualified personnel for electrical or mechanical repairs or adjustments.
- b. Always disconnect power from machine before attempting repairs or entering enclosures for any reason unless it is necessary to have power on for testing.
- c. Removing or replacement of flywheel should be done only by qualified personnel to ensure proper tightening of taperlock mount with flywheel aligned in all planes.
- d. Be sure electrical enclosures are never opened except by qualified electricians.
- e. Do not leave the machine unattended with covers removed or with power on.

4. Safety Devices and Covers (Panels)

Front Panel - - - - -	HCM-516
Right Side Panel - - - - -	HCM-517
Left Side Panel - - - - -	HCM-518
Beam Side Control Switch (13" & 18" Beam) - - - - -	HCM-627
Beam Side Control Switch (24" Beam) - - - - -	HCM-629*
Control Enclosure Cover - - - - -	HCM-523
Manual Motor Starter - - - - -	ED-12124
Relief Valve - - - - -	HCM-581
Beam Safety Stop (1 9/16" to 4 5/8" Spacing) - - - - -	HCM-394
Beam Safety Stop (1/8" to 1 3/16" Spacing) - - - - -	HCM-327*
Beam Safety Stop (1/8" to 1 13/16" Spacing) - - - - -	HCM-329*
Beam Safety Stop (1/8" to 2 15/16" Spacing) - - - - -	HCM-331*
Danger Plate - - - - -	XE315C4
Ground Plate - - - - -	XE315C3
Ground Terminal - - - - -	ED-4256
Safety Instructions - In Service Instructions Manual	

* Not Regular Equipment

SECTION II
INSTALLATION

A. LOCATION

1. The location chosen for the installation of the USM Hytronic Cutting Machine - Model B must have the space of at least the dimensions given in Section I, Paragraph B, 1.
2. The floor must be able to withstand the weight of the machine.
3. The electrical requirements of the machine must correspond with the electrical service. Standard available services for the machine are 220/440 and 550 volts, 3 phase, 60 cycle, AC service. (220 volt and 380 volt, 50 cycle, 3 phase service are available on made-to-order basis only.)

B. INSTALLATION AND STARTING

1. Uncrate and place machine in desired location.
2. By means of the handwheel, raise and swing the beam to one side.
3. Remove the cutting surface from the table.
4. Accurately level the machine with a spirit level placed on the table from front to back, and side to side. Place a felt pad, cemented to floor, under each foot of the machine. These will eliminate further need of anchoring.
5. Replace cutting surface on table, using dowel pins for proper location.

CAUTION

MAKE SURE THAT CUTTING SURFACE
GROUND WIRE IS CONNECTED.

6. Fill the reservoir with 6 gallons of USM Spec. No. 150B oil, or its commercial equivalent.

CAUTION

DO NOT PERMIT MOTOR AND PUMP TO
RUN WITHOUT OIL IN THE RESERVOIR.

7. The machine should be wired to the power source by an electrician (see Figures 4 and 5).

CAUTION

When a change of location is made, the machine should be carefully checked to determine whether the ratings of the transformer and motor correspond with the service of the new location.

If the primary voltage is under 125 volts, the black/yellow wires should be connected to transformer 2T as shown on Figure 5. However, if the primary voltage is over 125 volts, the black and black/red wires should be connected to transformer 2T. Tape wire that is not used with electrical tape to prevent short circuits.

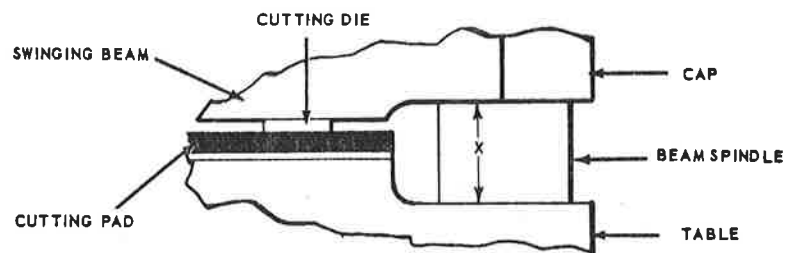
NOTE

- a. It is important that this machine be properly grounded to insure proper performance. Installation of a wall switch is recommended to provide a cut off for power to the machine.
 - b. The direction of rotation of the pump and motor is important since the pump will only operate in one direction. An arrow cast on the pump body indicates pump rotation.
8. Check to see that the pressure setting control (Figure 1) is set on number "1".
 9. Lubricate the machine. See lubrication Chart (Figure 15).
 10. Adjust the positive stop spacers as instructed in paragraph C of this section.
 11. Place material to be cut and die on the cutting surface.
 12. Adjust Rod Handwheel (Figure 1) to bring the striking face down until a clearance of approximately $\frac{3}{16}$ of an inch is noted between the top of the die and the striking face.
 13. Remove the material to be cut and adjust the stroke of the beam by turning Cable Handwheel until the striking face just touches the top of the die.

C. POSITIVE STOP SPACERS

The positive stop spacers are provided in two thicknesses namely 1/16 and 1/8 of an inch. These spacers are installed around the periphery of the beam spindle. They are held in position by a locating pin which, in turn, is locked in position by a setscrew when the spacers have been properly positioned.

The number and size of spacers used on the machine will vary with the height of the cutting pad and die. To determine the number of spacers required set the lowest height die on the cutting surface and turn the rod handwheel (Figure 1) until the striking face just touches the top of the die as shown below.



Measure distance "x" and subtract 1/4 of an inch. This value will give the amount of spacers required for this setup (Round off value obtained for "x" to nearest 1/16 of an inch). Now raise the swinging beam by turning rod handwheel and insert spacers. Tighten the setscrew against the locating pin to secure spacers in place.

As the cutting surface wears and is serviced or a smaller die is used, the stack of stop spacers must be readjusted as described to obtain the specified clearance. This is necessary because the reduction of the cutting surface thickness will decrease the clearance between the spacers and the base of the beam. This is especially true of the pad. If the spacers are not readjusted, no cutting will result because the beam will strike the spacers before it hits the cutting die.

CAUTION

NEVER LEAVE THE MACHINE UNATTENDED
IF RUNNING.

D. CUTTING SURFACES

There are two types of cutting surfaces available for use on the USM Hytronic Cutting Machine - Model B

1. Composition Pad

One cutting surface is a chemical composition pad 1 inch thick made to be electrically conductive so as to complete the electronic control circuit within the machine. Because the pad rests directly on wooden blocks, a ground wire is led from the pad to the machine frame to complete the circuit.

Die penetration into the cutting surface causes some surface strains to be set up in the pad. To minimize the possibility of bowing, the cutting surface should be rotated. Systematic rotating of the cutting surface will tend to decrease its upkeep. For best results, rotate the cutting surface 180° at noontime each day. A system should be set up and followed to prevent overlooking this change. Servicing of the cutting surface may be accomplished with a 3 inch or 4 inch belt sander. When using a belt sander, be careful that only the high outer perimeter is removed.

If a die is driven into the cutting surface, all that need be done is to remove the die, correct the cause for overdrive, and continue cutting. The impression of the die will not be deep because the stop spacers will prevent excessive penetration in the event of maladjustment or failure. The impression will disappear in a day or two and cause no inconvenience in future cutting. Closure can be hastened by using a ball pein hammer and tapping lightly all around the impression. Pounding must be avoided as this will cause low spots. Refer to Section V for Care and Maintenance of Cutting Surface.

2. Aluminum Cutting Plate

The aluminum cutting plate is coated on each side with three layers of tape. The purpose of the tape is to compensate for the variables which make it necessary to increase the depth of cut to insure severing of the fibers. These variables are the unevenness of the cutting edge of the die, the aluminum cutting plate is not of uniform thickness, and the uneven wear of the striking plate. In addition to compensating for variables, the tape also provides a support for the material being cut and acts as a cutting surface, thereby permitting minimum contact with the aluminum, which, when contacted, reverses the machine cycle. The tape also causes the material being cut to be set up into the die so the cut piece can be picked up with the die.

A jumper provides a ground between the aluminum plate and the machine frame. This jumper MUST be installed to complete the circuit because the tape nearest the table insulates the plate from the table.

CAUTION

UNDER NO CIRCUMSTANCES MUST THIS MACHINE BE OPERATED WITHOUT THE GROUND JUMPER.

NOTE

The taped aluminum plate should be rotated and inverted regularly. After rotating or inverting the plate, always be sure that the ground jumper is in place.

CAUTION

A CONVENTIONAL CUTTING SURFACE AS USED ON MECHANICAL MACHINES, MAY BE USED ON THIS MACHINE ONLY WHEN THE STROKE CONTROL MODE OF OPERATION IS USED. WITHOUT STROKE CONTROL, THE SURFACE MAY BE DAMAGED BEYOND REPAIR ALONG WITH THE CUTTING DIE.

E. CUTTING DIES

Cutting dies from 5/16 inch to 2-1/4 inches may be used on the subject machine. Dies of various heights may be intermingled, within the limits of the downward stroke of the beam, provided that the beam height is initially adjusted to accommodate the highest die of the group to be used. However, since the distance and time of beam travel is related, it is recommended that the amount of space between the beam and die be kept to a minimum. This adjustment is best left to the discretion and operating manner of the operator.

The condition of the cutting dies has a most important effect on the life of the cutting surface. This is reflected in: (1) the depth of penetration of the die into the cutting surface which increases the time to make a cut and decreases the life of the cutting surface; (2) the pressure setting required to perform cutting because a dull or nicked die requires more pressure to make a complete cut, hence deeper penetration into cutting surface, and a greater pressure must be exerted to accomplish cutting; (3) strains or deflection back into the machine with related wear and breakage.

Dies to be used on the HCM-B must be parallel between the striking side and the cutting edge, and the cutting edge must be sharp, for best results. Good die manufacturing practice requires no more than $\pm .004$ inch tolerance in height. Nicked or wavy cutting edges require higher pressure settings with resultant greater die penetration into the cutting surface. For die maintenance procedures refer to Section V - Care and Maintenance.

Upper leather dies with increased height in deep inward features, dies with high corners, or with stabs protruding beyond the cutting edge tend to cause poor cutting results. These die irregularities can be compensated for by increasing the pressure setting, however, it is recommended dies be even, that the stabs be reduced and the dies kept sharp as instructed in Section V - Care and Maintenance. The practice of increasing the pressure setting to obtain a cut with dull dies reduces the cutting surface life.

CAUTION

Handle all cutting dies carefully to avoid nicking or dulling the cutting edges.

F. COMBINING TWO HCM-B MACHINES

To improve the handling of cloth lining or similar material, particularly wide fabric, two HCM - Model B machines are installed with the front of one table against the front of the second table.

With two machines installed in this manner, wide material can be drawn across the cutting surface from a laying-up table on the opposite side of the machines from the operator.

Machines installed in this manner are equipped with tables for 20 inch by 40 inch cutting surface. With the machine tables butted together the cutting surface covers half of each table. Complete coverage of the cutting surface can be accomplished when the cutting surface is placed 4 to 5 inches in from the front edge of

the machine table (operator's side).

The machines should be equipped with beams 31 inches long with the width being determined by the size of the dies to be used.

The following steps should be observed when installing two machines to obtain a simulated twin.

1. Select a location with a minimum width equal to the depth of two HCM-B machines and with sufficient room for a suitable laying-up table in back of the machines opposite the operator.
2. Locate one machine in its proper location, then level this machine with a spirit level placed on the table from front to back, and side to side.
3. Install the second machine with the front of its table butting against the front of table of the machine previously positioned.
4. Level the table on this second machine until it coincides with the level of the first machine table.
5. Lag both machines securely to the floor.
6. Check the level of the tables by placing a spirit level across both tables. If either table is not level, make necessary adjustments until it is.

NOTE

The tables on these machines must be absolutely level with respect to each other.

7. Place cutting surface across tables. The front edge of the cutting surface should be located 4 or 5 inches in from the front edge of the machine table.
8. The ground jumper must be connected between the cutting surface and the machine frame. This is especially important when an aluminum cutting plate, taped on both sides, is to be used. A ground connection between both machines can be made with a ground jumper connecting the cutting surface to one machine or; the cutting surface can be grounded to both machine frames via two ground jumper wires.
9. Have each machine wired to the power source with a wall switch installed to cut off the power to the machines.

SECTION III

ELECTRICAL AND ELECTRONIC SYSTEM

A. FUNCTIONAL FEATURES

1. When the motor is started, electric energy is transferred into the control panel through a transformer reducing it to 110 volts AC. This energy is further reduced through the Control Panel Transformer to energize the control panel.

CAUTION

Before starting this machine, check and be sure the motor plate and transformer ratings are correct in accordance with the service available at the location of installation.

2. The machine cycle is initiated by pressing the thumb-operated trip switch, located on top of the beam handle, with one hand while simultaneously pressing the trip button, located on the side of the beam, with the other hand.
3. When the trip switches are operated, the beam moves downward until the cutting die passes through the material on the cutting surface and comes in contact with the cutting surface. The beam automatically returns to its elevated position when the cutting die contacts the cutting surface and will remain there until the trip switches are operated again.
4. Both trip switches MUST be held until cycle is completed. They must then be released before another cycle can be initiated.
5. The pressure setting control is located on the beam. The setting of this control should be maintained as low as possible and still accomplish good cutting. An increase in pressure setting is used to compensate for such variables as irregularities of the die edge, cutting pad, etc. An extreme increase in the pressure setting is an indication that the variables need correction.

B. ELECTRONIC CONTROL (Figure 6)

The striking face, although completely insulated from the swinging beam, even though attached to it, is appropriately connected electrically to the electronic unit.

When the beam is tripped and starts its downward stroke, a pressure is applied to the die by the striking face. As the die is pressed through the material being cut and contacts the cutting surface, a circuit is made to de-energize the hydraulic solenoid valve and cut off the hydraulic pressure to the beam. If effect, the pressure of the beam on the die stops and the beam returns to its uppermost position ready for the next trip. The pressure setting control on the beam permits selection of the best pressure consistent with good cutting.

C. PRESSURE SETTING CONTROL (Figure 1)

The pressure setting control functions to control the pressure exerted and regulates the depth of die penetration. Increasing the dial setting increases the pressure build-up creating a greater cutting force and causing the die to penetrate deeper into the cutting surface. A minimum setting of this switch is sufficient for normal cutting.

To test the pressure setting control to see if it is functioning properly follow the procedure listed below. BE SURE THE POSITIVE STOP SPACERS ARE IN PLACE BEFORE STARTING THE TEST.

1. Place the beam in the center position so the front edge of the STRIKING PLATE protrudes beyond the cutting surface.
2. Place a finger of one hand on the striking plate screw WHERE IT PROTRUDES ABOVE THE INSULATING NUT.

CAUTION

BE SURE THE FINGERS ARE NOT
BETWEEN THE STRIKING PLATE
AND THE CUTTING SURFACE.

3. Have the operator or an assistant trip the beam. If the pressure setting control is functioning properly, there will be no movement at all.

The procedure listed below should be followed to test the pressure setting control at all the settings.

1. Place a die on the cutting surface and adjust the beam so there is approximately 1/8 inch clearance between the top of the die and the striking plate.
2. Set the pressure setting control on "1" and trip the beam. There should be only a very light outline of the cutting edge of the die in the cutting surface.
3. Swing the beam to one side, then move the die about 1/4 inch to one side of the previous position.
4. Swing the beam over the die and set the pressure setting switch on "2". Trip the beam. The outline left by the die should be a little more pronounced than the previous one.

Repeat the above procedure moving the die over about 1/4 inch each time and increasing the setting of the pressure setting control one number each time. The outline of the die should become increasingly pronounced with each setting of the switch if it is functioning properly. It is seldom necessary to go beyond the No. 6 setting to see the results.

D. ELECTRONIC CONTROL PANEL (Figures 6 and 8)

The power transformer of the machine has a 120 VAC primary input and three secondary outputs. Two of the secondary winding supply 23 VAC on each side of a center tap and the third secondary winding supplies a 6 VAC on each side of a center tap.

Each of the secondaries feed power supply circuits through diode rectifiers D1 to D6. The diodes produce full wave rectification filtered by capacitors C2, C7 and C8 to supply a smooth DC voltage.

The first power supply (1) produces approximately 30 VDC (-) across capacitor C2 to feed sensing, voltage amplifying, and time delay stages.

The second power supply (2) produces approximately 30 VDC (+) across capacitor C7 to feed fixed time delay and filtering stage and power control section.

The third power supply produces approximately 8 VDC (+) across capacitor C8 and this voltage is used as a reverse bias voltage on the base of power transistor Q5 to hold the transistor off (non-conducting).

The transistor control panel is explained from this point in a series of step-by-step discussion with accompanying illustrations to further simplify the understanding of the panel.

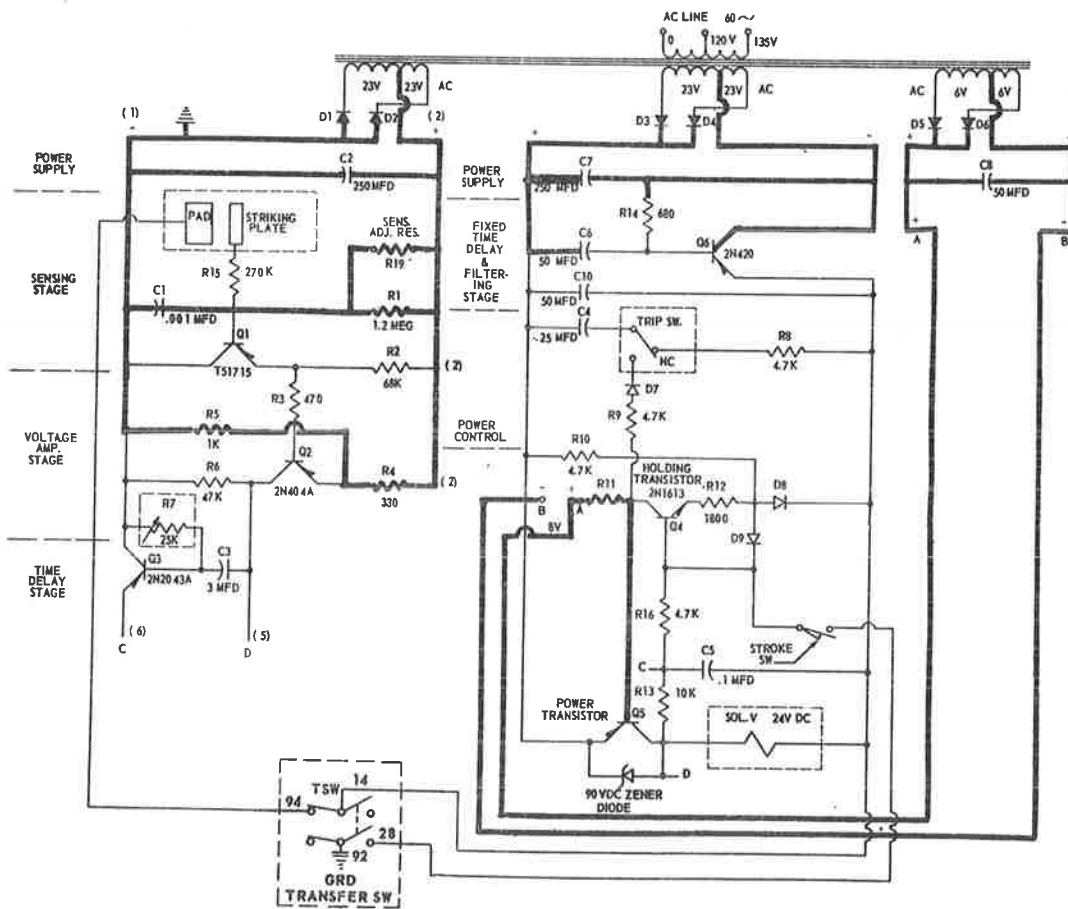
Step 1 - Power On

Under conditions I through IV inclusive, the sensing, voltage amplifying, and time delay stages are held in an idle condition by connecting the base of transistor Q1 to the emitter through resistors R1 and R2. This keeps the base at a plus value and the transistor is shut off (non-conducting).

Transistor Q2 in the voltage amplifying stage is held shut off (non-conducting) by a bleeder voltage of approximately 7.8 volts set up by resistors R4 and R5. The base of transistor Q2 is connected to the positive side of the line through resistors R2 and R3 to make the base positive and non-conducting. Since transistor Q2 is shut off (non-conducting) no current can flow through resistor R6 or the time delay stage.

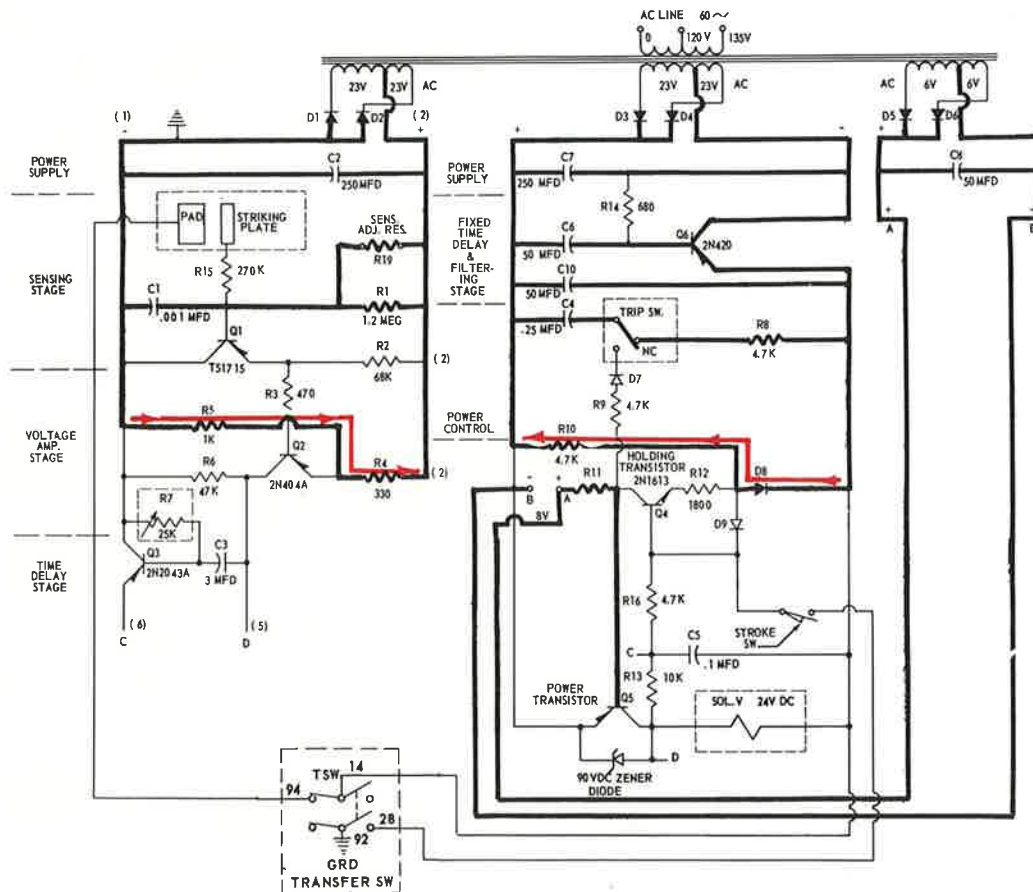
When the power is turned on, approximately 30 VDC (+) appears across capacitor C7. This voltage is applied to capacitor C6 through current limiting resistor R14.

A 8 VDC (+) is applied to base of transistor Q5 instantly.



Step 2 - Power On, 30 Millisecond Time Delay

When capacitor C6 becomes fully charged, the base of transistor Q6 is made negative and Q6 conducts. Capacitor C10 now becomes fully charged further filtering the DC voltage supply. The time for capacitor C6 to become fully charged is 30 milliseconds. Capacitor C4 is now charged through the normally closed trip switch and current limiting resistor R8. Resistor R10 and diode D8 form a bleeder circuit with diode D8 having a voltage drop of approximately 0.5 volts across it to prevent transistor Q4 from conducting by reverse biasing the emitter.

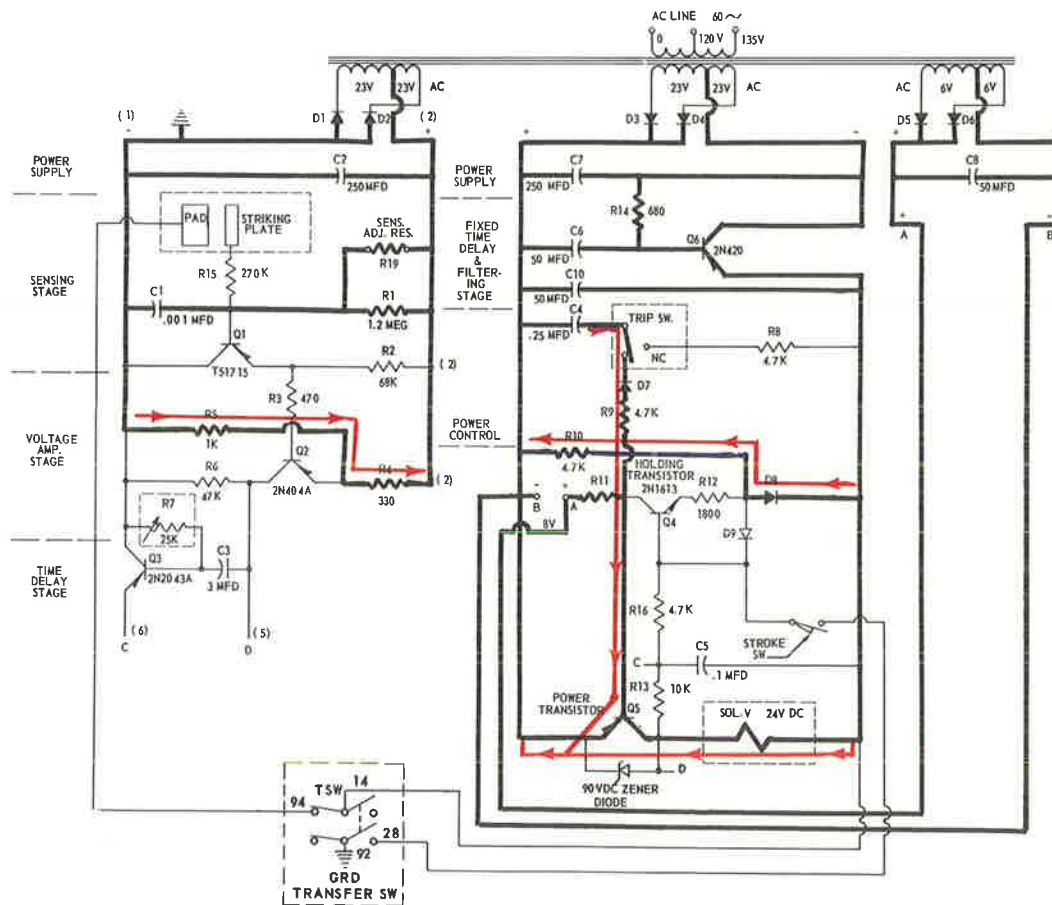


NOTE

This will be "trip to initiate".

Step 3 - Tripping Switches

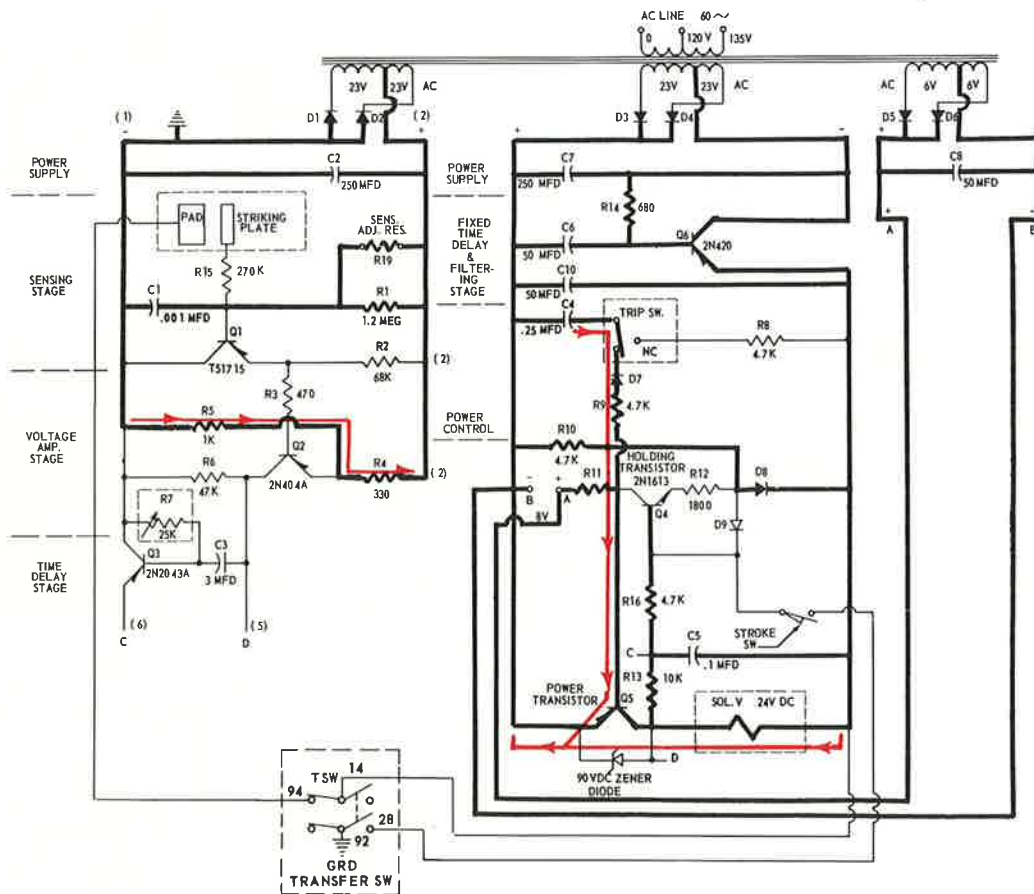
When the trip switches are depressed, the negative 30 VDC potential stored in capacitor C4 is directed through diode D7 and resistor R9 directly to the base of transistor Q5, thus forward biasing Q5 by over-coming the positive 8 VDC reverse bias. This causes transistor Q5 to conduct (close) allowing current to flow through the 24 VDC solenoid vent valve coil, which opens the valve. As the valve opens, the beam starts downward.



Step 4 - Transistor Q4. Base to +

The instant that transistor Q5 starts conducting, the base of transistor Q4 is tied to the positive side of the power supply making Q4 base forward biased and causing Q4 to conduct.

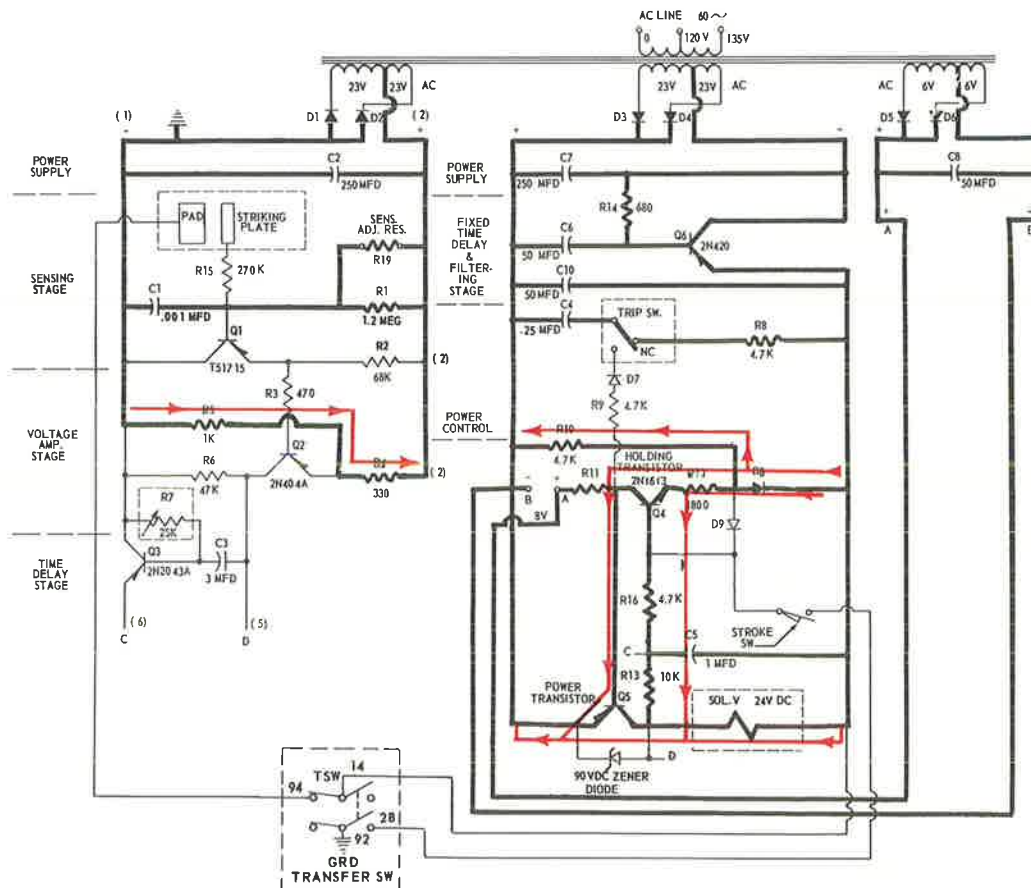
NOTE: This condition is for TRIP TO INITIATE ONLY.



Step 5 - Trip Switch Released

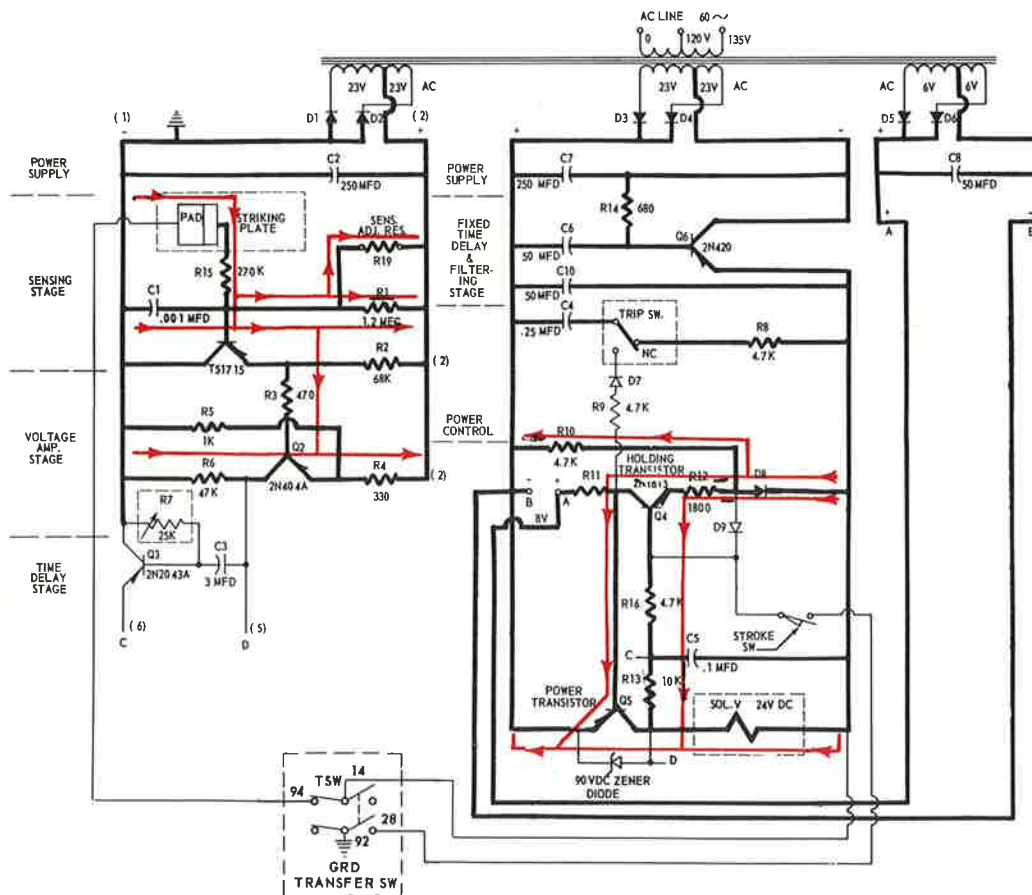
The conducting of transistor Q4 makes the base of transistor Q5 firmly tied to the negative side of the power supply, thus serving as a holding circuit the trip switch is now released and transistor Q4 will hold Q5 conducting. The beam will now continue to move downward until some action releases the solenoid vent valve.

NOTE: This condition is for TRIP TO INITIATE ONLY.



Step 6 - Striking Plate to Ground

When the cutting die makes electrical contact between the striking face and the cutting surface, the base of transistor Q1 is connected to the negative side of the power supply causing current to flow through resistor R15, base of Q1, emitter of Q1 and resistor R2. The resultant voltage drop of approximately 12.5 VDC across R2 causes current to flow through resistor R3, transistor Q2 base to emitter, and resistor R4 in the voltage amplifying stage. The current flow through transistor Q2 base to emitter causes Q2 to conduct allowing current to pass through resistor R6 producing a large voltage drop across R6. The sensitivity of this stage may be changed by installing a resistance of a different value for resistor R19 (Sense Adjusting Resistor).



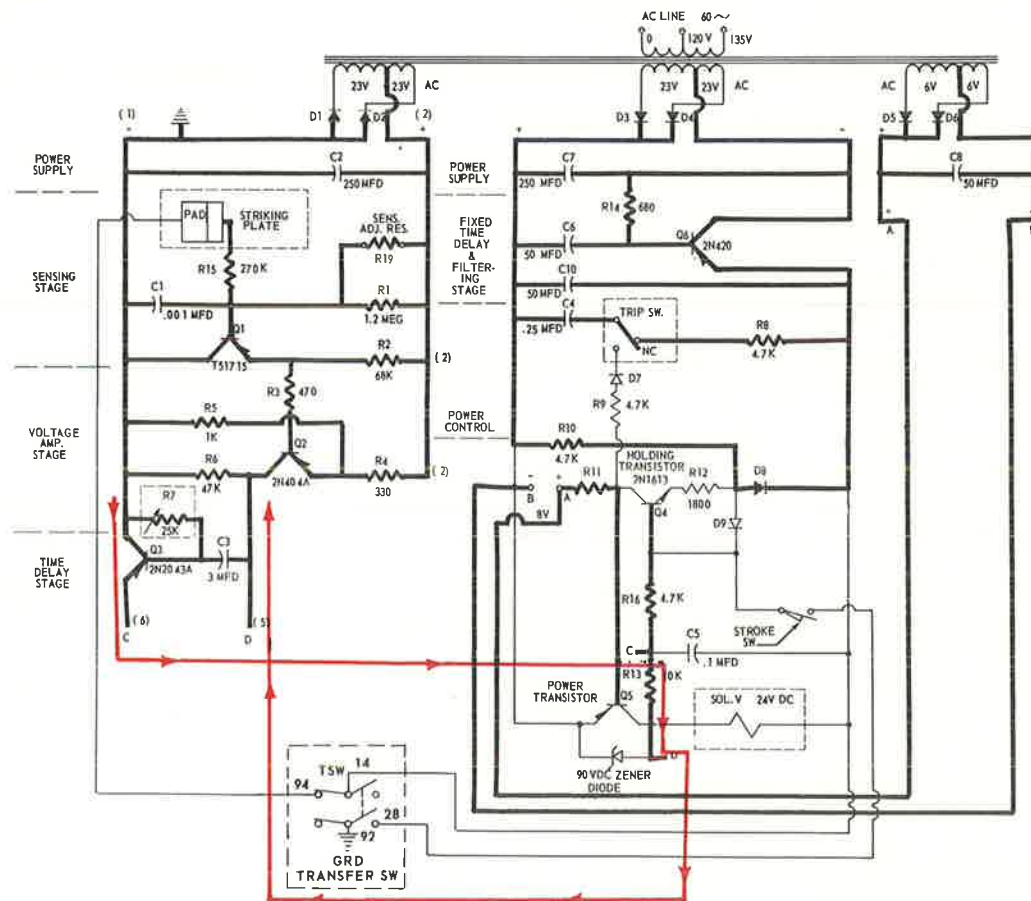
Step 7 - Finish of Stroke

The voltage across resistor R6 is applied to capacitor C3 through potentiometer R7. The setting of R7 will determine the rate of charge of C3, i.e. - a low value of resistance produces a fast charge and vice versa. When capacitor C3 becomes fully charged, transistor Q3 is made to conduct and a voltage of approximately 18 VDC is introduced at points C and D.

NOTE

The setting of potentiometer R7 produces a controllable time delay by determining the amount of time necessary to charge capacitor C3.

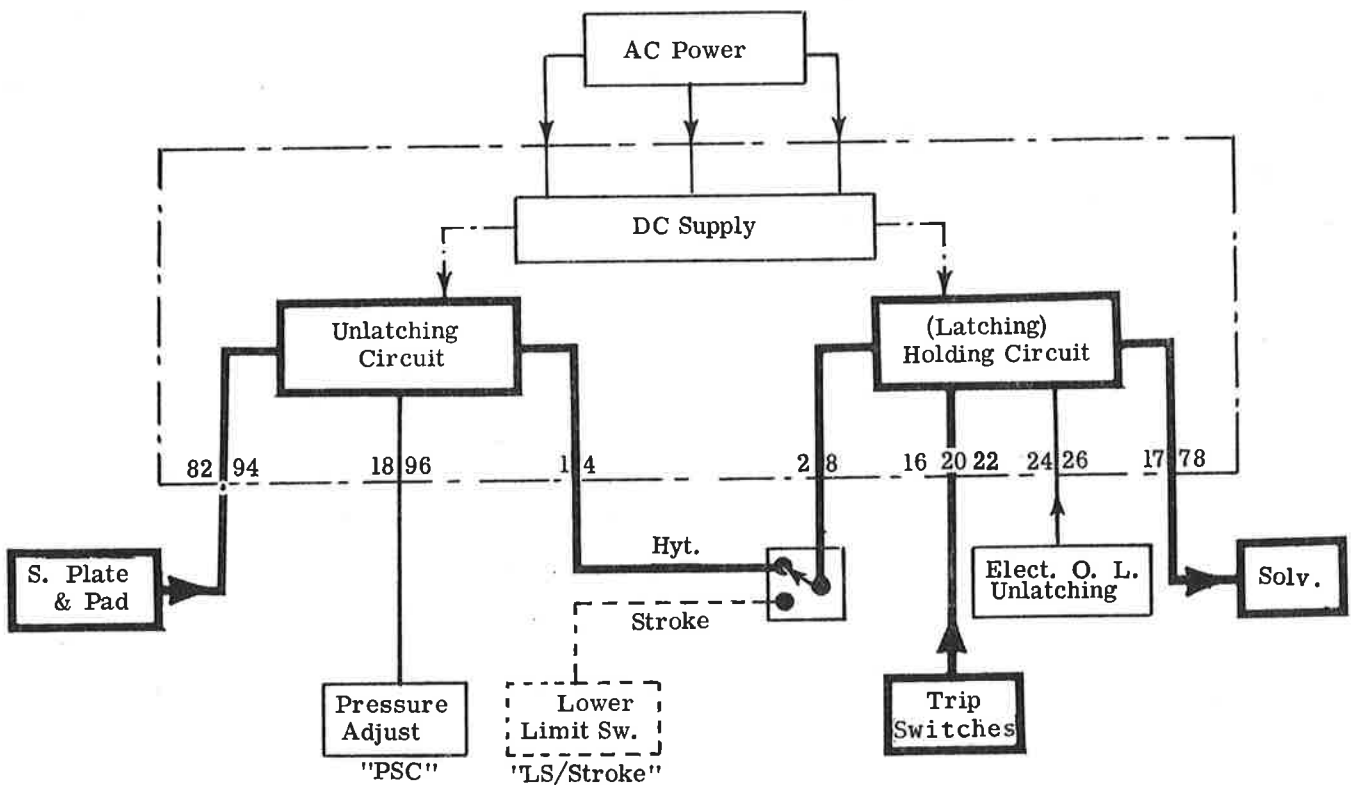
With point C at a negative 18 VDC, the base of transistor Q4 is reverse biased causing Q4 to shut off (non-conducting). This stoppage is aided by a bleeder circuit of resistor R10 and diode D8. When Q4 stops conducting, the negative value is removed from the base of transistor Q5 and the reverse bias circuit on the base of Q5 of a positive 8 VDC causes it to stop conducting thus deenergizing the coil of the solenoid vent valve. The solenoid vent valve returns to normal and the beam returns to the rest position.



E. STROKE SWITCH

There is one additional way by which the solenoid vent valve may be released. In the case of the stroke switch, the normally open switch is connected between the negative side of the line and the base of transistor Q4. When the switch is tripped closed, the base of Q4 is reverse biased along with Q5 and Q4 and Q5 stops conducting. Thus the solenoid vent valve is deenergized.

BLOCK DIAGRAM - HYTRONIC PANEL



F. ELECTRONIC CONTROL PANEL TESTING.(Figure 9)

In testing the electronic control panel, the collector to emitter voltage drop of high quantity indicates non-conducting or only partial conducting whereas a low voltage drop indicates near complete or complete conducting.

The high voltage reading will be close to the line voltage value.

The low voltage reading will be less than 4 volts, usually a value in the tenths of a volt.

Base polarity in relation to emitter indicates if circuit is prepared to conduct. Base current limiting resistor will indicate if adequate current is flowing to make transistor conduct. The voltage drop of a base current limiter should be a known value.

Individual resistors must have one lead disconnected unless they are in Open End Circuits, such as leading to open contacts or switches, to be checked for correct values of resistance in ohms.

1. Diode Test Procedure

NOTE

If the leads of the meter have reverse polarity for this testing place the red lead in the common jack and the black lead in the volt-ohmmeter jack; this need only be done in testing diodes and transistors. Test for polarity of meter leads with a volt meter.

The meter power is supplied from a battery and electron current flows out from the negative side of the battery to the positive side therefore the diode would conduct with the negative probe attached to the end toward which the arrow points and positive at the opposite end. Current would be flowing in the direction against the arrow.

- a. Disconnect power from electronic control panel.

- b. Remove outside secondary tap from "push on" terminals, 2 red, 2 blue, and 2 green.
- c. With this end of each diode disconnected, set the test meter on RX 1 scale and zero the meter. Connect the positive probe to the common side of the line on the first power supply and touch the negative probe to the AC end of each diode separately. The meter should read about six to twelve ohms resistance. Any other reading with the probes as above may mean the diode is not good.
- d. Reverse the probes connecting the negative probe to the common side of the power supply and touch the positive probe to the AC side of each diode separately. There should be no action of the needle whatsoever, (infinity resistance) on a good diode.

On the second and third power supplies the diodes are arranged in the opposite manner to the common side of the line, so that the leads should be connected in reverse of the above to get the desired results.

When connected as above a reading of zero or near zero resistance in both directions of polarity means a dead short through the diode.

This test is called, "Front to back resistance check." Any diode which does not read correctly must be replaced as trouble will immediately reoccur when the power is turned on with a damaged diode in use.

To check one's self, first test a new diode. This will show the correct resistance reading on your meter.

NOTE

Use the RX 1 scale only and zero the meter by placing the probes together momentarily first.

2. Power Supply Check (Figure 9)

Throughout Power Supply Check section, Transistor Check section and Readable Voltage Tests section, the conditions described are as follows:

Condition I - Striking face not grounded.

Condition II - Striking face grounded.

Condition III - Power section not tripped, not grounded.

Condition IV - Power section is tripped, not grounded.

Check Power Supplies 115 volt AC Primary input
 23 VAC Secondary

	<u>VDC</u>
1st Section DC	
Negative probe on #1 Positive probe on #15	30.2
2nd Section DC	
Positive on #14 Negative on #23	30.8
3rd Section DC	
Positive on #24 Negative on #22	7.9

3. Transistor Check (Figure 9)

- a. Q1 Collector to Emitter
Condition I Positive on #4 Negative on #7 25 to 30
Condition II Positive on #4 Negative on #7 18.
- R15 Base Resistor Voltage Drop
Condition I (+ on top) 0.
Condition II (- on bottom) 17.
- b. Q2 Collector to Emitter
Condition I Positive on #5 Negative on #6 23.
Condition II Positive on #5 Negative on #6 0.
- R3 Base Resistor
Condition I (+ on top) 0.
Condition II (- on bottom) 1.3 to 3
- c. Q3 Collector to Emitter
Condition I Positive on #9 Negative on #7 0.
Condition II Positive on #9 Negative on #7 .45 to 1
- d. Q4 Collector to Emitter
Negative Probe on Right Hand of R12
Positive Probe on Bottom of R11
- Condition III 37.
Condition IV 1.6 to 2.7
- R16 Condition III (+ on top) .13
 (- on bottom)
- R13 Condition III (+ on top) .1
 (- on bottom)

	<u>VDC</u>
R16 Condition IV (- on top) (+ on bottom)	.85
R13 Condition IV (- on top) (+ on bottom)	.6
e. Q5 Collector to Emitter Negative Probe on #22 Positive Probe on #8	
Condition III	30.8
Condition IV	.1
R12 (- on left hand) (+ on right hand)	
Condition III	0.
Condition IV	22.
f. Q6 Collector to Emitter Negative Probe on #23 Positive Probe on #13	
Condition III	.1
Condition IV	1.7
R14 (+ on right hand) (- on left hand)	
Condition III	0.
Condition IV	1.3
4. Readable Voltage Tests (Figure 9)	
D8 (- on #25 + on #10)	to .65 .67
R10 Condition III (+ on top)	30.
Condition IV (- on bottom)	24.3
R11 Condition III (+ on top)	to .7
(- on bottom)	1.
Condition IV	8.
R1 and R19 (+ on top)	
Condition I (- on bottom)	0.
Condition II	11.3
R2 Condition I (+ on top)	.1 to 2
Condition II (- on bottom)	12.5
R4 Condition I (+ on top)	7.6
Condition II (- on bottom)	10.8
R5 Condition I (+ on top)	23.
Condition II (- on bottom)	19.5
R6 Condition I (+ on top)	0.
Condition II (- on bottom)	19.5

SECTION IV
HYDRAULIC SYSTEM

A. OPERATION (Figure 11)

The vane pump takes a strainer and discharges the hydraulic fluid to a high pressure relief valve. In the idle condition the fluid passes through the relief valve to a solenoid-operated vent valve and through the vent valve back to the sump.

When the trip switches are depressed, the solenoid-operated vent valve is shifted and the flow of fluid is now directed to the rod end of the hydraulic cylinder piston. As the pressure in the cylinder builds up, the piston is moved downward, thus driving the cutting beam down to force the cutting die through the material being cut.

When the cutting die touches the cutting pad under hytronic control or when the trip switches are tripped under stroke control, the current to the solenoid-operated vent valve is shut off and the valve is returned to its idle position by a spring. The fluid discharge of the pump is now directed back to the sump by the vent valve. The hydraulic fluid in the cylinder is now directed back to the sump by the high pressure relief valve and the piston is returned to its idle position by two springs located on the head end of the piston.

B. HYDRAULIC PUMP (Figures 10 and 12)

The operation of the hydraulic pump used on the machine is as follows: a slotted rotor containing twelve vanes is driven by the drive shaft of the electric motor. The rotation of the rotor sets up a centrifugal action on the vanes which causes them to be thrown outward from the center of the rotor to follow the inside cam-shaped contour of a hardened ring. As the pressure builds up in the system, the vanes are held to this contour by fluid under pressure in the rotor slots behind the vanes. The hardened ring is so shaped that two opposing pumping chambers are formed in conjunction with a pressure plate.

The inlet flow through the ports in the pump body is created by a partial vacuum produced by a radial movement of the vanes on the pumping chambers. This action causes oil to be drawn from the sump and into the pumping chambers where it becomes trapped between the rotating vanes. Each volume of fluid passes through the porting in the pressure plate and out through the discharge port in the cover.

C. PRESSURE RELIEF VALVE (Figures 10 and 13)

The pressure relief valve found in the hydraulic system of the machine is set at manufacture to relieve the system of pressure exceeding 2600 pounds and return the fluid to the sump as described herein.

1. Closed Position

In the closed position, oil at pump pressure flows through the inlet port, around valve piston (1) and out the outlet port. It should be noted that the inlet and outlet ports may be used interchangeably. By means of passage (Y) in valve piston (1) oil also flows into chamber (X) and onto valve (2), which is held on its seat by spring (3). The size of spring (3) and the position of adjusting screw (4) are set at manufacture at 2600 pounds and should not be tampered with.

2. Open Position

Piston (1) will remain in the closed position by the action of spring (5) as long as the pressure in chambers (Z) and (X) remain equal. It will continue to remain closed until the pressure in chamber (X) exceeds the force of spring (3). As soon as this occurs, valve (2) will be forced off its seat and the pressure in chamber (X) will be limited by the escape of fluid past valve (2) and down through the drilled passage in the center of piston (1) to the return port. If the pressure in chamber (Z) increases further, until it is sufficient to overcome the pressure in chamber (X) and the force of spring (5), it will lift piston (1) off its seat. This will allow the fluid in chamber (Z) to escape through the return port.

SECTION V
CARE AND MAINTENANCE

A. GENERAL

The following instructions are directed to personnel who will be responsible for the care and maintenance of the machine. The intervals at which these instructions will be carried out is somewhat dependent upon the amount of use of the machine and the existing factory conditions.

B. STRIKING FACE (Figure 16)

The time interval between replacement of Striking Face will be determined by the amount of usage it receives. The life of the striking face may be extended considerably by rotating the plate 180° periodically, however, no attempt should be made to turn the plate over.

The striking face should be replaced when it has received an amount of wear equivalent to 1/32 of an inch. This may be determined by stretching a piece of string or flat bar on edge across the face from the front to the rear and measuring the amount of wear.

The procedure for replacing the striking face is fully described in paragraph B of Section VI.

C. LUBRICATION

1. Changing Hydraulic Oil in the Sump (Figure 14)

Once a year it is recommended that the oil in the sump of the machine be changed. To change the oil, proceed as follows:

- a. Disconnect exhaust hose from hose elbow and place the hose in a container capable of holding 6 gallons of liquid or more.
- b. Start the pump and the fluid will be drawn out of the sump and into the container.
- c. Remove base oil filler and fill the sump with 6 gallons of USM Spec. No. 150B oil or commercial equivalent. See USM Machinery Handbook for commercial equivalents of USM oils.

d. Reconnect exhaust hose to hose elbow and reassemble base oil filler to the machine.

2. General Lubrication (Figure 15)

The machine should be lubricated as directed in Figure 15. The time intervals recommended may change somewhat dependent on the amount of usage of the machine and the environmental conditions of the factory where the machine is installed.

D. PUMP INTAKE FILTER (Figures 10 and 14)

From time to time, it may become necessary to remove Pump Intake Filter for cleaning. To clean the filter proceed as follows:

1. Disconnect Pump Intake Nipple from Pump with a stilson wrench.
2. Remove Access Panel Screws and remove Access Panel, Pump Intake Nipple, Pump Intake Nipple Seal, and Pump Intake Filter as a unit.
3. Remove filter from Pump Intake Nipple.
4. Immerse the filter in a bath of kerosene or equivalent cleaning solvent and dry with compressed air.
5. Reverse procedure outlined to reassemble.

SECTION VI

DISASSEMBLY AND ASSEMBLY

A. BEAM

The procedure which follows is applicable for replacing a damaged beam or if the size of the beam is to be changed to suit a particular application.

1. Disassembly (Figures 7, 16 and 17)
 - a. Disconnect the power supply to the machine.
 - b. Raise the beam by turning Handwheel and remove the beam safety stop, then lower the beam until it rests on the cutting surface.
 - c. Remove Post Bracket Screw and Washers and tilt Post Bracket outward to disconnect the electrical connections.
 - d. Disconnect Wire Nos. 16, 20 and 22 from the post bracket noting the connections for reassembly.
 - e. Disconnect Pressure Setting Control Knob from Pressure Setting Control and remove Pressure Setting Control by pulling the electrical harness through the opening provided in the spindle end of the beam. Disconnect Wire Nos. 18 and 96 from the pressure setting control.
 - f. Remove Handwheel Nut and Washer and remove Rod Handwheel.
 - g. Remove five Screws from Spindle Cap and remove spindle cap.
 - h. Remove Beam Screw and Washer from the inside of Beam Spindle.
 - i. Remove Beam Cap Retaining Nuts, Washers, Beam Cap - Lower and Beam Cap Studs - Lower from the beam.
 - j. Pull the beam forward to clear the beam spindle and turn the beam to permit easy access to the insulation nuts and striking face screws.

NOTE

If the present beam is being replaced with a beam of a different size, steps j through m inclusive, are not applicable.

- k. Remove Striking Face Screws and Nuts.
- l. Remove striking face and insulation from the beam.
- m. Remove Striking Face Contactor by pushing the contactor downward from inside the beam.

2. Assembly

The assembly of the beam is the reverse of the disassembly procedures outlined above. During assembly of the beam, make sure that Insulation is correctly aligned on the beam to permit Striking Face Contactor to protrude through the hole provided and contact Striking Face. Secondly, make sure that copper contact strip of the trip switch is clean and that it is engaged by Bracket Screw when Post Bracket is secured in place.

NOTE

When tightening Beam Cap Retaining Nuts, set torque wrench at a setting of 325. The light of the torque wrench will light when 325 is reached. The setting of 325 is equivalent to 1300 ft-lbs of torque due to a 4 to 1 differential in the torquing tool.

B. STRIKING FACE INSTALLATION (Figure 16)

In order to install a new striking face, simply swing the beam to one side so it clears the cutting surface and remove Insulation Nuts and Striking Face Screws. The insulation and striking face are now removed and a new striking face may be installed.

NOTE

In reinstalling the insulation, care must be taken to insure that the insulation is correctly aligned. Contactor must protrude through the hole provided in the insulator to contact the striking face.

C. SPINDLE (Figure 17)

1. Disassembly

- a. Shut off the power supply to the machine.
- b. Place a steel block approximately 2 inches square by 3-1/4 inches long on top of Bumper Block and turn Handwheel to lower Spindle Adjusting Screw until Piston Connecting Nut is fully exposed at the bottom of Spindle.
- c. Remove Screw, Washers and Piston Connecting Nut (both halves).
- d. Turn Handwheel to raise the spindle and remove the steel block, Bumper Block and Screws.
- e. Lower the beam until it rests on the cutting surface.
- f. Remove Handwheel Nut, Washer, Rod Handwheel, Screw and Spindle Cap.
- g. Remove Beam Screw and Washer from the inside of Beam Spindle.
- h. Remove Beam Cap Retaining Nut, Washer, Beam Cap - Lower and Beam Cap Studs - Lower.
- i. Insert two Screws into the upper end of Beam Spindle and hoist the spindle out of the machine.

2. Assembly

The assembly of the beam spindle is essentially the reverse of disassembly, however, if Cylinder has been removed for some reason it will be necessary to install the spindle first and then the cylinder. The reason for this is that the spindle serves as the alignment means for the cylinder in attaching the cylinder to the machine base.

D. PUMP (Figure 18)

1. Disassembly

If, during the process of repairing the machine, all the possible sources of the trouble have been checked and it becomes imperative to disassemble the pump, proceed as follows:

CAUTION

The pump should only be disassembled as a last resort and not arbitrarily since some of the parts contained in the pump must be replaced when disassembled. If these parts are not readily available, do not attempt to disassemble the pump but replace the unit entirely.

- a. Remove the four cover screws.
- b. Remove cover noting position of outlet port for reassembly purposes.

CAUTION

Cover will force out by spring so care should be taken in removal.

- c. Remove pressure plate and O-ring.
- d. Remove ring and O-ring noting position of ring for reassembly.
- e. Remove rotor and vanes from drive shaft of electric motor.
- f. Remove body from motor by removing fastening screws.
- g. Remove oil seal by pulling it out with a hooked tool by catching the underside of the seal. Seal must be replaced once removed.
- h. Remove bearing by tapping it out with a drift punch from the ring end of the pump.

2. Inspection

- a. Inspect bearing and seal for wear and replace if necessary.
- b. Check ring, rotor and vanes for wear.
- c. Check elliptical surface of the ring for scoring marks.
- d. Check vanes for corresponding scoring marks.
- e. Check rotor for wear at shaft engagement and vane slots.

- f. Check pressure plate opposite spring seal for scoring marks.

3. Assembly

Assembly is essentially the reverse of disassembly, however, care must be taken to make sure that the cover and pressure plate are installed exactly as they were originally. Secondly, the spring between the pressure plate and cover must be seated correctly to produce correct pumping results.

E. CYLINDER (Figure 19)

1. Disassembly

- a. Place wooden blocks under the beam and turn Rod Handwheel until Beam Spindle clears Cylinder.
- b. Remove Cylinder Screws, Cylinder Drain Elbow and Hose Elbow from cylinder. Remove Stroke Device.
- c. Remove top Screws of Piston Connecting Nut.
- d. Turn Rod Handwheel until cylinder reaches bottom of frame.
- e. Remove bottom Screws and Piston Connecting Nut.
- f. Slide cylinder to one side of the machine base and tip to remove.

NOTE

The cylinder must be tipped in such a manner as to take advantage of the beveled surface in the upper flange of the cylinder.

- g. Once the cylinder has been removed, it should be disassembled to the point to correct any trouble encountered, i.e. - seal leakage, etc.

h. The disassembly from this point is shown on figure 19 however, extreme caution must be exercised in removing Piston Return Spring Cap. The reason is that the Piston Return Springs are preloaded at manufacture. By backing off the Screws evenly on all sides, Spring Cap can be loosened to a point where the springs are in a state of rest (non-loaded).

2. Assembly

Assembly is the reverse of disassembly. To insure a good seal with Piston Packing, special care must be taken to make sure that the lips of the seal rings are oriented downward toward Piston. The shaft is chamfered as indicated in Figure 19 to facilitate the assembly of the packing.

SECTION VII

TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
A. Motor won't start with switch on.	1. Wall fuses burned out or loose connections.	1. Check fuses and all wiring connections.
	2. Motor burned out.	2. Replace motor.
B. No downward movement of beam when switch is tripped.	1. Trip plunger not contacting microswitch.	1. Check switch operation and replace if defective.
	2. Short circuit between striking plate and ground.	2. Remove wires #82 and #90 from panel and check plate to ground with volt-ohm-meter.
	3. Solenoid vent valve not actuated.	3. Valve stuck or broken. Repair or replace.
	4. No current reaching solenoid of vent valve.	4. Check voltage readings at panel terminals #17 and #78 and at solenoid with volt-ohm-meter.
	5. Sensing adjustable resistor value too low.	5. Replace with a resistor of a higher value.
	6. Transistor Q1 opened.	6. See Section III, par. F.
	7. Transistor Q2 opened or not switching.	7. See Section III, par. F.
	8. Pressure setting control R2 opened.	8. See Section III, par. F.
	9. Transistor Q3 open or not switching.	9. See Section III, par. F.

TROUBLE	PROBABLE CAUSE	REMEDY
	10. Oil level in sump to low.	10. Check oil and add as required.
	11. Strainer in sump clogged.	11. Remove strainer and clean. Replace if defective.
C. Erratic Cutting.	1. Loose wiring connection.	1. Check all wiring connection.
	2. Intermittent short between striking plate and ground.	2. Remove striking plate and insulator. Clean thoroughly and replace insulating nuts as necessary.
	3. Pump intake strainer partially clogged.	3. Remove and clean thoroughly.
	4. Faulty function of control circuit.	4. Check out control panel as described in Section III, par. F
	5. Safety stops spacers too high.	5. Check and readjust for heaviest cutting and lowest die.
	6. Material being cut becomes conductive.	6. Where possible, insulate or permit material to dry out.
D. Stiff swinging beam.	1. Dry spindle.	1. Lubricate spindle. See Section V, par. C2.
	2. Machine not level.	2. Accurately level machine.
	3. Connecting nut halves out of alignment.	3. Realign connecting nut.
	4. Dry thrust bearing.	4. Remove, wash and pack with grease.
	5. Thrust bearing damage.	5. Remove and replace.

TROUBLE	PROBABLE CAUSE	REMEDY
E. Stalling or cutting out.	1. Overload heaters of improper rating.	1. Replace with correct heaters for motor amperage rating.
	2. Pump intake strainer partially clogged.	2. Remove and clean thoroughly.
F. Machine noisy.	1. Loose cover panels.	1. Tighten all cover panel screws.
	2. Loose beam spindle cap and/or handwheel.	2. Tighten all screws and nuts.
	3. Pump air bound.	3. Check oil level in sump and all hydraulic connections for tightness.

SECTION VIII
PARTS CATALOG

USM HYTRONIC CUTTING MACHINE
MODEL B
(SYMBOL HCM)

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

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USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

READ THESE SPECIAL INSTRUCTIONS BEFORE
ORDERING PARTS

AS IT IS NOT PRACTICABLE, OWING TO THE SMALL SIZE OF SOME OF THE PARTS, TO MARK THE INITIAL LETTERS ON THEM, IT IS BEST TO ALWAYS CONSULT YOUR CATALOG AND OBTAIN THE FULL NUMBER BEFORE ORDERING DUPLICATE PARTS --- THE NUMBER MARKED UPON THE BROKEN PART SERVING TO IDENTIFY IT IN THE CATALOG. COIL SPRINGS HAVE NO NUMBERS STAMPED ON THEM.

WRITING THE ORDER

WHEN THE PART HAS THE SAME SYMBOL AS THE MACHINE FOR WHICH IT IS ORDERED, THE SYMBOL SHALL BE USED AS A PREFIX.

EXAMPLE: 1-ORL-523A+

IF THE PART IS "BORROWED" FROM ANOTHER MACHINE, THEN THE SYMBOL OF THE MACHINE FROM WHICH IT IS BORROWED SHALL BE USED AS A PREFIX AND THE SYMBOL OF THE MACHINE IT IS TO BE USED ON SHALL FOLLOW THE PART NUMBER.

EXAMPLE: 3-GUS-53 USL

LETTER SUFFIXES FOR STANDARDIZED PARTS MUST BE INCLUDED AS A PART OF THE STANDARDIZED PART NUMBER. IN SOME INSTANCES THE PART NUMBER WILL NOT INCLUDE A SUFFIX IN THE PART NUMBER DESIGNATION.

EXAMPLE: 1-SPGL-1301S OR 1-SL-7K17

NOTE

PARTS WITH THE DESIGNATION "DO NOT SHIP" MAY BE PURCHASED FOR REPLACEMENT PURPOSES BY ORDERING THE BASE NUMBER.

EXAMPLE: HCM-187 LEG, TABLE (REAR) - UNIT ASSEMBLY
HCM-186 END, (BOTTOM) (DO NOT SHIP)
HCM-188 END, LEG (TOP) (DO NOT SHIP)

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL					PART NUMBER	NOMENCLATURE	QTY.
	1 & 2	3	4	5			
01	HCM=B					USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM) <u>BASE AND TABLE PARTS</u>	
03	HCM=604					BASE AND TABLE - COMPLETE (LARGE TABLE) (40" X 20")	1
04	HCM=535					BASE	1
04	HCM=531A					TABLE (FOR 40" X 20" PAD)	1
04	HCM=530A					TABLE (FOR 36" X 18" PAD)	1
04	HCM=560					TABLE (FOR 40" X 20" PAD) (can be used in place of 531A) *	1
04	HCM=559					TABLE (FOR 36" X 18" PAD) (can be used in place of 530A) *	1
04	HCM=519					LEG, TABLE (FRONT) - UNIT ASSEMBLY	2
05	HCM=186					END, LEG (DO NOT SHIP)	1
04	NL=34M3					NUT, TABLE LEG (FRONT) (HEX., 1"-14UNF X 7/8")	2
04	WL=515T					LOCKWASHER, NUT (positive, 1" X 1-5/8")	2
04	SL=11K11					BOLT, TABLE LEG (SQ. HD. MACH., 1/2"-13UNC X 1-3/4")	4
04	WL=1862T					LOCKWASHER, BOLT (positive, 1/2" X 11/64" X 1/8")	4
04	HCM=187					LEG, TABLE (REAR) - UNIT ASSEMBLY	1
05	HCM=186					END, LEG (BOTTOM) (DO NOT SHIP)	1
05	HCM=188					END, LEG (TOP) (DO NOT SHIP)	1
04	NL=34M3					NUT, TABLE LEG (BOTTOM) (HEX., 1"-14UNF X 7/8")	1
04	WL=515T					LOCKWASHER, TABLE LEG NUT (BOTTOM) (positive, 1" X 1-5/8")	1
04	NL=30M3					NUT, TABLE LEG (TOP) (HEX., 3/4"-16UNC X 7/8")	1
04	WL=513T					LOCKWASHER, TABLE (TOP) (positive, 3/4" X 1-1/4")	1
03	HCM=534					COVER, BASE	1
03	HCM=564					GASKET, BASE COVER - LEFT REAR	1
03	HCM=565					GASKET, BASE COVER - RIGHT FRONT	1
03	SL=19D15					SCREW, BASE COVER (RD. HD. MACH., 5/16"-18UNC X 1/2")	6
* NOT SENT UNLESS ORDERED							

USM HYTRONIC BUTTING MACHINE MODEL B (SYMBOL HCM)

LEVEL	PART NUMBER				NOMENCLATURE	QTY.
	1 & 2	3	4	5		
03	SL=9E11				SCREW, BASE COVER (FIL; HD, CAP, 7/16"-14UNC X 3/4")	4
03	HCM=542				FILLER, BASE OIL	1
03	UAL=363				GASKET, OIL FILLER	2
03	SL=11H7				SCREW, OIL FILLER (HEX; HD, CAP #10-24UNC X 1/2")	3
03	HCM=538				PANEL, FILTER ACCESS	1
03					FORM-A-GASKET (PERMATEX-AVIATION)	
03	SL=9015V				SCREW, ACCESS PANEL	8
03	HCM=532				DEFUSER, OIL	1
03	UA=712				ELBOW, DEFUSER	1
03	UA=772				NIPPLE (3/4" X 2" long)	1
03	HCM=540				COUPLING	1
03	WL=2049T				GASKET, COUPLING	2
03	WL=3018T				WASHER, COUPLING	2
03	NL=1387K				NUT, COUPLING	1
03	HCM=515				SPACER, PANEL	6
03	HCM=516				PANEL, FRONT (FRONT)	1
03	HCM=517				PANEL, SIDE (RIGHT)	1
03	HCM=518				PANEL, SIDE (LEFT)	1
03	SL=19D15				SCREW, PANEL (RO, HD, MACH, 5/16"-18UNC X 1/2")	6
03	WL=509T				LOCKWASHER, PANEL SCREW(positive, 5/16" X 9/16")	6
					<u>CYLINDER PARTS</u>	
03	HCM=645				CYLINDER	1
03	SL=25H23				SCREW, CYLINDER (HEX; SOCK, HD; CAP 3/4"-10UNC X 2")	4
03	WL=2022T				LOCKWASHER, CYLINDER SCREW(lock, 3/4" X .981" X .188")	4
03	HCM=527				PISTON	1
03	HCM=526				RING, PISTON	3
03	HCM=566				BUFFER, PISTON	1
03	HCM=533				PACKING, PISTON	1
03	HCM=507				RETAINER, PISTON PACKING	1
03	SL=15H13				SCREW, RETAINER (HEX, SOCK, HD; CAP 5/16"-18UNC X 7/8)	4

USM HYTRONIC CUTTING MACHINE MODEL B (SYMBOL HCM)

L C M I	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
03					WL=1941T	LOCKWASHER, RETAINER SCREW (lock, 5/16"x27/64"x.078")	4
03					SPGL=4024S	SPRING, PISTON RETURN INSIDE (compression, 2-15/16"x13")	1
03					SPGL=4025S	SPRING, PISTON RETURN OUTSIDE (compression, 4-5/16"x 11-1/2")	1
03					HCM=501	CAP, PISTON RETURN SPRING	1
03					HCM=1169	DECAL, CAUTION	1
03						FORM-A-GASKET (PERMATEX-AVIATION)	
03					SL=9016V	SCREW, PISTON RETURN SPRING CAP	2
03					SL=15H17	SCREW, PISTON RETURN SPRING CAP (HEX, SOC, HD, CAP, 5/16"-18UNC X 1-1/4")	6
03					WL=1941T	LOCKWASHER, CAP SCREW	8
03						SCREW, SPINDLE ADJUSTING (SEE 183A)	
03					AETA=225	SHIM, SPINDLE ADJUSTING SCREW ***	
03					HCM=60	BEARING, PISTON THRUST	1
03					HCM=388+	NUT, PISTON CONNECTING - ASSEMBLED	1
04					SL=14H18	SCREW, NUT (HEX, SOCK, HD, CAP 5/16"-24UNF X 1-1/2")	4
04					WL=1941T	LOCKWASHER, NUT SCREW (lock, 5/16"x27/64"x.078")	4
						<u>STROKE CONTROL PARTS</u>	
03					HCM=554	UNIT, TRIP SLIDE - UNIT ASSEMBLY	1
04					HCM=503	MOUNT, TRIP SLIDE (DO NOT SHIP)	1
04					HCM=555	COVER, TRIP SLIDE (DO NOT SHIP)	1
03					SL=13H7	SCREW, TRIP SLIDE UNIT (HEX, SOCK, HD, CAP 1/4"-20UNC X 1/2")	2
03					WL=1396T	LOCKWASHER, TRIP SLIDE SCREW (positive, 1/4" X 15/32")	2
03					HCM=556	BAR, TRIP SLIDE - UNIT ASSEMBLY	1
04					HCM=506	BAR, TRIP SLIDE (DO NOT SHIP)	1
04					HCM=505	ACTUATOR, TRIP SLIDE BAR (DO NOT SHIP)	1
04					HCM=557	GUIDE, TRIP ROD (DO NOT SHIP)	1
03					HCM=558	COVER, TRIP SLIDE (ADJUSTABLE)	1
03					SL=13H7	SCREW, COVER (HEX, SOCK, HD, CAP 1/4"-20UNC X 1/2")	2
03					WL=3006T	WASHER, COVER SCREW	2
						*** QUANTITY AS REQUIRED;	

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
03					WL=1396T	LOCKWASHER, COVER SCREW(positive, 1/4" X 15/32")	2
03					NL=17M1	NUT, COVER SCREW (1/4"-20UNC X 7/16" HEX.)	2
03					SPGL=38S	SPRING, TRIP ROD(tension, 3/8" X 4-5/8")	1
03					HCM=276	ROD, TRIP - UNIT ASSEMBLY	1
04					HCM=277	COLLAR, ROD (DO NOT SHIP)	1
03					NL=16U1	STOP, TRIP ROD (HEX, 1/4"-20UNF X 5/32")	2
03					HCM=278	END, TRIP SLIDE CABLE	1
03					HCM=279	CABLE, FLEXIBLE	1
03					SL=11S5	SCREW, CABLE (HEX, SOCK. SET FL. PT, #10-24UNC X 3/16")	1
03					NL=16U1	LOCKNUT, CABLE END (HEX. 1/4"-20UNF X 5/32")	2
03					HCM=280	TUBE, CABLE	1
03					HCM=281	FERRULE, CABLE TUBE	2
03					HCM=282	HANDWHEEL, CABLE	1
04					SL=10N14	SCREW, HANDWHEEL SET (FOR REPLACEMENT) (FOR 202) (HEX, SOCK SET SCREW, #10-32UNF X 1/2")	
03					HCM=524	BRACKET, CABLE TUBE	1
03					SL=7815V	SCREW, CABLE TUBE BRACKET	2
03					NL=12M1	NUT, CABLE TUBE BRACKET SCREW (HEX, #10-32UNC X 1/8")	2
03						SUPPORT, BRACKET (SEE 1138)	
03					ED=5869	CLIP, CABLE TUBE	1
03					SL=7815V	SCREW, CLIP	1
03					NL=1150K	NUT, CLIP SCREW	1
BEAM SPINDLE PARTS							
03					HCM=312A	SPINDLE, BEAM - UNIT ASSEMBLY	1
04							
03					HCM=183A	SCREW, SPINDLE ADJUSTING	1
03						SHIM, SPINDLE ADJUSTING SCREW (SEE ALPHA-225)	
03					HCM=48A+	BLOCK, SPINDLE BUMPER - ASSEMBLED	1
					HCM=46	BUMPER, SPINDLE	2
03					SL=6J20	SCREW, BLOCK (HEX, HD. CAP 3/8"-24UNF X 2-1/4")	2

USM HYTRONIC CUTTING MACHINE MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
03					HCM=400	CAP, SPINDLE	1
03					PLU=592=1/4"	OILER, SPINDLE CAP	1
03					SL=18H14	SCREW, CAP (HEX, SOCK. HD, 7/16"-20UNF X 1")	5
03					HCM=199	ROD, SPINDLE ADJUSTING	1
03					HCM=243	HANDWHEEL, ROD	1
03					USA=71	KEY, HANDWHEEL	1
03					GR=266	BALL, HANDWHEEL LOCKING	1
03					NL=28U2	NUT, HANDWHEEL (HEX, 5/8"-18UNF X 3/8")	1
03					WL=3012T	WASHER, ROD HANDWHEEL SPRING	1
03					WL=3012T	WASHER, HANDWHEEL NUT	1
03					SPGL=358S	SPRING, LOCKING BALL (compression, 23/64"x1-1/16")	1
03					ICM=1512	FITTING, SPINDLE GREASE (UPPER)	1
03					ICM=1512	FITTING, SPINDLE GREASE (LOWER)	1
SWINGING BEAM PARTS							
03					HCM=661	BEAM (13" X 28-1/2") AND SAFETY SWITCH PARTS - COMPLETE *	1
04					HCM=358	BEAM, SWINGING (13" X 28-1/2") - COMPLETE	1
05					HCM=201A	BEAM, SWINGING (13" X 28-1/2") (DO NOT SHIP)	1
05					HCM=202	INSULATOR, CONTACTOR	1
05					SPGL=329S	SPRING, STRIKING FACE CONTACTOR (compression, .359"x1-1/4")	1
05					HCM=13	CONTACTOR, STRIKING FACE	1
05					HCM=355	INSULATION, STRIKING FACE	1
05					NL=1204K	NUT, CONTACTOR	2
05					HCM=206	FACE, STRIKING - COMPLETE	1
06					HCM=204	FACE, STRIKING	1
06					ICM=1369A	SCREW, STRIKING FACE	10
06					HCM=205	NUT, SCREW INSULATING	10
05					HCM=296	PLATE, CAUTION	1
05					UPRA/D32/ABS	PIN, CAUTION PLATE	4
04					HCM=627	SWITCH, BEAM SAFETY (TWO HAND TRIP) MECHANICAL - COMPLETE (SEE HCM=693)	1
* NOT SENT UNLESS ORDERED							

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL MCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					HCM=596	ROD, SWITCH MOUNTING BRACKET - SHORT	1
05					THCM=24	BRACKET, SWITCH MOUNTING	1
05					NL=1284K	NUT, BRACKET RETAINING	1
05					THCM=204	SUB-PLATE, SWITCH	1
05					SL=13D15	SCREW, SUB-PLATE (RO, HD, MACH, #10-24UNC X 1/2")	2
05					NL=13M1	NUT, SUB-PLATE SCREW (HEX, #10-24UNC X 1/8")	2
05					WL=1922T	LOCKWASHER, SUB-PLATE SCREW (external tooth, 13/64" X 13/32" X .027")	2
05					XE379D4	SWITCH, TRIP	1
05					HCM=1243	SPACER, TRIP SWITCH	1
05					SL=9D21	SCREW, SWITCH (RO, HD, MACH, #6-32UNC X 7/8")	2
05					WL=3002T	WASHER, SWITCH SCREW	2
05					NL=1336K	NUT, SWITCH SCREW	2
05					NL=29U2	NUT, BRACKET RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05					WL=512T	LOCKWASHER, SWITCH MOUNTING ROD (positive, 5/8" X 1-1/8")	1
05					NL=29U2	NUT, SWITCH MOUNTING ROD RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05					HCM=601	PLUNGER, SWITCH OPERATING - SHORT	1
05					TCF=496	RING, PLUNGER RETAINING	1
05					SPGL=1676S	SPRING, PLUNGER (compression, .333" X 1-3/16")	1
05					HCM=1240	BUTTON, PLUNGER OPERATING	1
05					XH400E39	SCREW, BUTTON (HEX, SQ. SET, #8-32UNC X 3/8")	1
05					XE860A54-1	PANEL, ELECTRONIC - ASSEMBLY	1
06					XE861A54-1	BOARD, PRINTED CIRCUIT (DO NOT SHIP)	1
06					ED=4344	TERMINAL	11
06					XE881A2	DIODE	6
06					ED=14893	SOCKET, RELAY	2
06					XE403A2	SPRING, RELAY HOLD DOWN	2
06					ED=14856	RELAY	2
05					ED=19462	CONNECTOR	2
05					HCM=600	BRACKET P,C, BOARD	2

USM HYTRONIC BUTTING MACHINE MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					SL-11D9	SCREW, BRACKET (RO, HD, MACH, #8-32UNC X 5/16")	4
05					WL-1989T	WASHER, BRACKET SCREW	4
05					NL-11M1	NUT, BRACKET SCREW (HEX, #8-32UNC X 1/8")	4
04					FF8331	DIAGRAM, WIRING (SEE HCM-693)	1
04					GIS-2296	PLUG, BUTTON	1
04					LWL-71	LIST, LEAD WIRE	1
04					LWL-72	LIST, LEAD WIRE (OUTSTANDING MACHINES ONLY) (SEE HCM-693)	1
04					FF8329	INSTRUCTIONS, INSTALLATION (OUTSTANDING MACHINES ONLY) (SEE HCM-693)	1
03					HCM-662	BEAM (13" X 31") AND SAFETY SWITCH PARTS - COMPLETE *	1
04					HCM-359	BEAM, SWINGING (13" X 31") - COMPLETE	1
05					HCM-207A	BEAM, SWINGING (13" X 31") (DO NOT SHIP)	1
05					HCM-202	INSULATOR, CONTACTOR	1
05					SPGL-329S	SPRING, STRIKING FACE CONTACTOR (compression, .359"x1-1/4")	1
05					HCM-13	CONTACTOR, STRIKING FACE	1
05					HCM-356	INSULATION, STRIKING FACE	1
05					NL-1204K	NUT, CONTACTOR	2
05					HCM-211	FACE, STRIKING - COMPLETE	1
06					HCM-209A	FACE, STRIKING	1
06					ICH-1369A	SCREW, STRIKING FACE	10
06					HCM-205	NUT, SCREW INSULATING	10
05					HCM-296	PLATE, CAUTION	1
05					UFRA/D32/ABS	PIN, CAUTION PLATE	4
04					HCM-627	SWITCH, BEAM SAFETY (TWO HAND TRIP) MECHANICAL - COMPLETE (SEE HCM-693)	1
05					HCM-596	ROD, SWITCH MOUNTING BRACKET - SHORT	1
05					THCM-24	BRACKET, SWITCH MOUNTING	1
05					NL-1284K	NUT, BRACKET RETAINING	1
05					THCM-204	SUB-PLATE, SWITCH	1

* NOT SENT UNLESS ORDERED

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1	2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05						SL-13D15	SCREW, SUB-PLATE (RO; HD, MACH., #10-24UNC X 1/2")	2
05						NL-13M1	NUT, SUB-PLATE SCREW (HEX, #10-24UNC X 1/8")	2
05						WL-1922T	LOCKWASHER, SUB-PLATE SCREW (external tooth, 13/64" X 13/32" X .027")	2
05						XE375D4	SWITCH, TRIP	1
05						HCM-1243	SPACER, TRIP SWITCH	1
05						SL-9D21	SCREW, SWITCH (RO, HD, MACH., #6-32UNC X 7/8")	2
05						WL-3002T	WASHER, SWITCH SCREW	2
05						NL-1336K	NUT, SWITCH SCREW	2
05						NL-29U2	NUT, BRACKET RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05						WL-512T	LOCKWASHER, SWITCH MOUNTING ROD (positive, 5/8" X 1-1/8")	1
05						NL-29U2	NUT, SWITCH MOUNTING ROD RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05						HCM-401	PLUNGER, SWITCH OPERATING - SHORT	1
05						TOF-496	RING, PLUNGER RETAINING	1
05						SPGL-1676S	SPRING, PLUNGER (compression, .333" X 1-3/16")	1
05						HCM-1240	BUTTON, PLUNGER OPERATING	1
05						XH400E39	SCREW, BUTTON (HEX, SOC, SET, #8-32UNC X 3/8") (PATCH)	1
05						XE860A54-1	PANEL, ELECTRONIC - ASSEMBLY	1
06						XE861A54-1	BOARD, PRINTED CIRCUIT (DO NOT SHIP)	1
06						ED-4344	TERMINAL	11
06						XE881A2	DIODE	6
06						ED-14893	SOCKET, RELAY	2
06						XE603A2	SPRING, RELAY HOLD DOWN	2
06						ED-14856	RELAY	2
05						ED-15462	CONNECTOR	2
05						HCM-600	BRACKET, P.C. BOARD	2
05						SL-11D9	SCREW, BRACKET (RO; HD, MACH., #8-32UNC X 5/16")	4
05						WL-1989T	WASHER, BRACKET SCREW	4
05						NL-11M1	NUT, BRACKET SCREW (HEX, #8-32UNC X 3/8")	4

USM HYTRONIC BUTTING MACHINE MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
04					FF8331	DIAGRAM, WIRING (SEE HCM-693)	1
04					GIS-2296	PLUG, BUTTON	1
04					LWL-71	LIST, LEAD WIRE	1
04					LWL-72	LIST, LEAD WIRE (OUTSTANDING MACHINES ONLY) (SEE HCM-693)	1
04					FF8329	INSTRUCTIONS, INSTALLATION (OUTSTANDING MACHINES ONLY) (SEE HCM-693)	1
03					HCM-663	BEAM (18" X 31") AND SAFETY SWITCH PARTS - COMPLETE	1
04					HCM-360	BEAM, SWINGING (18" X 31") - COMPLETE	1
05					HCM-263	BEAM, SWINGING (18" X 31") (DO NOT SHIP)	1
05					HCM-202	INSULATOR, CONTACTOR	1
05					SPGL-329S	SPRING, STRIKING FACE CONTACTOR (compression, .359" x 1-1/4')	1
05					HCM-13	CONTACTOR, STRIKING FACE	1
05					HCM-264A	INSULATION, STRIKING FACE	1
05					NL-1204K	NUT, CONTACTOR	2
05					HCM-216	FACE, STRIKING - COMPLETE	1
06					HCM-215A	FACE, STRIKING	1
06					ICM-1369A	SCREW, STRIKING FACE	22
06					HCM-205	NUT, SCREW INSULATING	22
05					HCM-296	PLATE, CAUTION	1
05					UPRA/D32/ABS	PIN, CAUTION PLATE	4
04					HCM-627	SWITCH, BEAM SAFETY (TWO HAND TRIP) MECHANICAL - COMPLETE (SEE HCM-693)	1
05					HCM-596	ROD, SWITCH MOUNTING BRACKET - SHORT	1
05					THCM-24	BRACKET, SWITCH MOUNTING	1
05					NL-1204K	NUT, BRACKET RETAINING	1
05					THCM-204	SUB-PLATE, SWITCH	1
05					SL-13D15	SCREW, SUB-PLATE (RO, HD, MAGN., #10-24UNC X 1/2")	2
05					NL-13M1	NUT, SUB-PLATE SCREW (HEX, #10-24UNC X 1/2")	2
05					WL-1922T	LOCKWASHER, SUB-PLATE SCREW (external tooth, 13/64" X 13/32" X .027")	2

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					XE379D4	SWITCH, TRIP	1
05					HCM-1243	SPACER, TRIP SWITCH	1
05					SL-9D21	SCREW, SWITCH (RO, HD, MACH, #6-32UNC X 7/8")	2
05					WL-3002T	WASHER, SWITCH SCREW	2
05					NL-1336K	NUT, SWITCH SCREW	2
05					NL-29U2	NUT, BRACKET RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05					WL-512T	LOCKWASHER, SWITCH MOUNTING ROD (positive, 5/8" X 1-1/8")	1
05					NL-29U2	NUT, SWITCH MOUNTING ROD RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05					HCM-601	PLUNGER, SWITCH OPERATING - SHORT	1
05					TCF-496	RING, PLUNGER RETAINING	1
05					SPGL-1676S	SPRING, PLUNGER (compression, .333" X 1-3/16")	1
05					HCM-1240	BUTTON, PLUNGER OPERATING	1
05					XH400E39	SCREW, BUTTON (HEX, SOC, SET, #8-32UNC X 3/8") (PATCH)	1
05					XE860A54-1	PANEL, ELECTRONIC - ASSEMBLY	1
06					XE861A54-1	BOARD, PRINTED CIRCUIT (DO NOT SHIP)	1
06					ED-4344	TERMINAL	11
06					XE881A2	DIODE	6
06					ED-14893	SOCKET, RELAY	2
06					XE603A2	SPRING, RELAY HOLD DOWN	2
06					ED-14856	RELAY	2
05					ED-15462	CONNECTOR	2
05					HCM-600	BRACKET, P/C, BOARD	2
05					SL-11D9	SCREW, BRACKET (RO, HD, MACH, #8-32UNC X 5/16")	4
05					WL-1989T	WASHER, BRACKET SCREW	4
05					NL-11M1	NUT, BRACKET SCREW (HEX, #8-32UNC X 5/8")	4
04					FF8331	DIAGRAM, WIRING (SEE HCM-693)	1
04					GIS-2296	PLUG, BUTTON	1
04					LWL-71	LIST, LEAD WIRE	1
04					LWL-72	LIST, LEAD WIRE (OUTSTANDING MACHINES ONLY) (SEE HCM-693)	1

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
04					FF8329	INSTRUCTIONS, INSTALLATION (OUTSTANDING MACHINES ONLY) (SEE HCM-693)	1
03					HCM-664	BEAM (24" X 31") AND SAFETY SWITCH PARTS - COMPLETE *	1
04					HCM-361	BEAM, SWINGING (24" X 31") - COMPLETE	1
05					HCM-218A	BEAM, SWINGING (24" X 31") (DO NOT SHIP)	1
05					HCM-202	INSULATOR, CONTACTOR	1
05					SPGL-329S	SPRING, STRIKING FACE CONTACTOR (compression, .359" x 1-1/4")	1
05					HCM-13	CONTACTOR, STRIKING FACE	1
05					HCM-357	INSULATION, STRIKING FACE	1
05					NL-1204K	NUT, CONTACTOR	2
05					HCM-221	FACE, STRIKING - COMPLETE (FOR SHIPPING)	1
06					HCM-220	FACE, STRIKING	1
06					ICM-1369A	SCREW, STRIKING FACE	22
06					HCM-205	NUT, SCREW INSULATING	22
05					HCM-563	FACE, STRIKING - LARGE - COMPLETE *	1
06					HCM-561	FACE, STRIKING - LARGE	1
06					HCM-562	SCREW, STRIKING FACE	22
06					HCM-205	NUT, SCREW INSULATING	22
05					HCM-296	PLATE, CAUTION	1
05					UPRA/D32/ABS	PIB, CAUTION PLATE	4
04					HCM-629	SWITCH, BEAM SAFETY (TWO HAND TRIP) MECHANICAL - COMPLETE (SEE HCM-694)	1
05					HCM-598	ROD, SWITCH MOUNTING BRACKET	1
05					THCM-24	BRACKET, SWITCH MOUNTING	1
05					NL-1284K	NUT, BRACKET RETAINING	1
05					THCM-204	SUB-PLATE, SWITCH	1
05					SL-13D15	SCREW, SUB-PLATE (RO. HD, MACH), #10-24UNC X 1/2"	2
05					NL-13M1	NUT, SUB-PLATE SCREW (HEX, #10-24UNC X 1/8")	2
05					WL-1922T	LOCKWASHER, SUB-PLATE SCREW (external tooth, 13/64" X 13/32" X .027")	2
05					XE375D4	SWITCH, TRIP	1

* NOT SENT UNLESS ORDERED

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					HCM=8243	SPACER, TRIP SWITCH	1
05					SL=9D21	SCREW, SWITCH (RO. HD, MACH., #6-32UNC X 7/8")	2
05					WL=3002T	WASHER, SWITCH SCREW	2
05					NL=1336K	NUT, SWITCH SCREW	2
05					NL=29U2	NUT, BRACKET RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05					WL=512T	LOCKWASHER, SWITCH MOUNTING ROD (positive, 5/8" X 1-1/8")	1
05					NL=29U2	NUT, SWITCH MOUNTING ROD RETAINING (HEX, 5/8"-11UNC X 3/8")	1
05					HCM=602	PLUNGER, SWITCH OPERATING	1
05					TCF=496	RING, PLUNGER RETAINING	1
05					SPGL=1676S	SPRING, PLUNGER (compression, .333" X 1-3/16")	1
05					HCM=1240	BUTTON, PLUNGER OPERATING	1
05					XH400E39	SCREW, BUTTON (HEX, SOC. SET, #8-32UNC X 3/8")	1
05					XE860A54-1	PANEL, ELECTRONIC - ASSEMBLY	1
06					XE861A54-1	BOARD, PRINTED CIRCUIT (DO NOT SHIP)	1
06					ED=4344	TERMINAL	11
06					XE881A2	DIODE	6
06					ED=14893	SOCKET, RELAY	2
06					XE603A2	SPRING, RELAY HOLD DOWN	2
06					ED=14856	RELAY	2
05					ED=15462	CONNECTOR	2
05					HCM=600	BRACKET, P/C, BOARD	2
05					SL=11D9	SCREW, BRACKET (RO. HD, MACH., #8-32UNC X 5/16")	4
05					WL=1989T	WASHER, BRACKET SCREW	4
05					NL=11M1	NUT, BRACKET SCREW (HEX, #8-32UNC X 1/8")	4
04					FF8331	DIAGRAM, WIRING (SEE HCM=694)	1
04					GIS=2296	PLUG, BUTTON	1
04					LWL=71	LIST, LEAD WIRE	1
04					LWL=72	LIST, LEAD WIRE (OUTSTANDING MACHINES ONLY) (SEE HCM=694)	1
04					FF8329	INSTRUCTIONS, INSTALLATION (OUTSTANDING MACHINES ONLY) (SEE HCM=694)	1

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	PART NUMBER				NOMENCLATURE	QTY.
	1	2	3	4		
03				HCM-324	STUD, BEAM CAP - LOWER	2
03				HCM-32	CAP, BEAM - LOWER	1
03				HCM-676	NUT, BEAM CAP RETAINING	2
03				WL-2074T	WASHER, RETAINING NUT	2
03				SL-23H23	SCREW, BEAM (UPPER) (HEX, SOC, HD, CAP, 5/8"-11UNC X 2")	1
03				HCM-325	WASHER, BEAM SCREW (UPPER)	1
BEAM TRIPPING PARTS						
03				HCM-582	ROD, BEAM TRIPPING - UNIT ASSEMBLY	1
04				HCM-111	BUTTON, TRIPPING ROD (DO NOT SHIP)	1
03				SPGL-1676S	SPRING, TRIPPING ROD (compression, .333" X 1-3/16")	1
03				HCM-112	POST, TRIPPING ROD SUPPORT	1
03				WL-179T	SPACER, TRIPPING ROD SUPPORT POST	1
03				SL-17921	SCREW, POST SET (HEX, SOCK, SET, FLAT PT., 3/8"-16UNC X 7/8")	1
03				HCM-113	HANDLE, POST	1
03				UN-30	RING, TRIPPING ROD RETAINING	1
03				HCM-575	BRACKET, POST - UNIT ASSEMBLY	1
04				HCM-115	BUSHING, POST SUPPORT (DO NOT SHIP)	1
04				HCM-116	BUSHING, TRIPPING SWITCH SUPPORT (DO NOT SHIP)	2
04				HCM-576	STRIP, BRACKET CONDUCTOR (DO NOT SHIP)	1
03				SL-15H19	SCREW, BRACKET (HEX, SOCK, HD, CAP, 5/16"-18UNC X 1-1/2")	2
03				WL-365T	WASHER, BRACKET SCREW	2
03				HCM-298	DECAL, CAUTION	1
03					SWITCH, TRIPPING (SEE BD-17619)	
03					SCREW, SWITCH (SEE SL-9D23)	
BEAM SAFETY STOP PARTS						
03				HCM-327	STOP, BEAM SAFETY - COMPLETE (1/8" TO 1-3/16" GRACING) *	1
04				HCM-328*	STOP, BEAM SAFETY (TOP) - ASSEMBLED	1
05				PL-3027P	PIN, BEAM SAFETY STOP	1
* NOT SENT UNLESS ORDERED						

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

L I T E R	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
04					HCM-254	STOP, BEAM SAFETY - 1/16" THICK	1
04					HCM-255	STOP, BEAM SAFETY - 1/8" THICK	8
04					SL-1359	SCREW, LOCATING RIN (HEX, SOC, SET 1/4"-20UNC X 5/16")	1
03					HCM-329	STOP, BEAM SAFETY - COMPLETE (1/8" TO 1-13/16" SPACING) *	1
04					HCM-326+	STOP, BEAM SAFETY (TOP) - ASSEMBLED	1
05					PL-3027P	PIN, BEAM SAFETY STOP	1
04					HCM-254	STOP, BEAM SAFETY - 1/16" THICK	1
04					HCM-255	STOP, BEAM SAFETY - 1/8" THICK	8
04					HCM-328	STOP, BEAM SAFETY - 5/8" THICK	1
04					SL-1359	SCREW, LOCATING RIN (HEX, SOC, SET 1/4"-20UNC X 5/16")	1
03					HCM-331	STOP, BEAM SAFETY - COMPLETE (1/8" TO 2-15/16" SPACING) *	1
04					HCM-326+	STOP, BEAM SAFETY (TOP) - ASSEMBLED	1
05					PL-3027P	PIN, BEAM SAFETY STOP	1
04					HCM-254	STOP, BEAM SAFETY - 1/16" THICK	1
04					HCM-255	STOP, BEAM SAFETY - 1/8" THICK	8
04					HCM-328	STOP, BEAM SAFETY - 5/8" THICK	1
04					HCM-330	STOP, BEAM SAFETY - 1-1/8" THICK	1
04					SL-1359	SCREW, LOCATING RIN (HEX, SOC, SET 1/4"-20UNC X 5/16")	1
03					HCM-394	STOP, BEAM SAFETY - COMPLETE (1-9/16" TO 4-5/8" SPACING) *	1
04					HCM-393+	STOP, BEAM SAFETY (TOP) - ASSEMBLED	1
05					PL-2832P	PIN, BEAM SAFETY STOP	1
04					HCM-254	STOP, BEAM SAFETY - 1/16" THICK	2
04					HCM-255	STOP, BEAM SAFETY - 1/8" THICK	8
04					HCM-330	STOP, BEAM SAFETY - 1-1/8" THICK	3
04					SL-1359	SCREW, LOCATING RIN (HEX, SOC, SET, 1/4"-20UNC X 5/16")	1
						CONDUCTIVE CUTTING SURFACES *	
						* NOT SENT UNLESS ORDERED	
						* NOTE: CONDUCTIVE CUTTING	
						SURFACES NOT INCLUDED AS PART OF	
						THE MACHINE. MUST BE ORDERED	
						SEPARATELY FROM SHOE PRODUCTS	
						SALES DIVISION. CONSULT SALES	
						BULLETIN FOR INFORMATION.	

L I N E I	1 & 2			PART NUMBER	NOMENCLATURE	QTY.
	3	4	5			
03				07304226	PAD & BACKING, CONDUCTIVE CUTTING (BLOND 1") (36" X 18") - UNIT ASSEMBLY (HCM-389) *	1
04				07304220	PAD, CONDUCTIVE CUTTING (CEMENTED ON) (HCM-390)	1
04				07304220	PAD, CONDUCTIVE CUTTING (36" X 18") WITHOUT LOCATING HOLES (REPLACEMENT PART FOR 07304226) (HCM-390)	
03				07304227	PAD & BACKING, CONDUCTIVE CUTTING (BLOND 1") (40" X 20") - UNIT ASSEMBLY (HCM-391) *	1
04				07304222	PAD, CONDUCTIVE CUTTING (CEMENTED ON) (HCM-392)	1
04				07304222	PAD, CONDUCTIVE CUTTING (40" X 20") WITHOUT LOCATING HOLES (REPLACEMENT PART FOR 07304227) (HCM-392)	
03				07304228	PAD & BACKING, CONDUCTIVE CUTTING (WOOD 3") (36" X 18") - UNIT ASSEMBLY (HCM-552) *	1
04				07304220	PAD, CONDUCTIVE CUTTING (CEMENTED ON) (HCM-390)	1
04				07304220	PAD, CONDUCTIVE CUTTING (36" X 18") WITHOUT LOCATING HOLES (REPLACEMENT PART FOR 07304228) (HCM-390)	
03				07304229	PAD & BACKING, CONDUCTIVE CUTTING (WOOD 3") (40" X 20") - UNIT ASSEMBLY (HCM-553) *	1
04				07304222	PAD, CONDUCTIVE CUTTING (CEMENTED ON) (HCM-392)	1
04				07304222	PAD, CONDUCTIVE CUTTING (40" X 20") WITHOUT LOCATING HOLES (REPLACEMENT PART FOR 07304229) (HCM-392)	
03				07303950	PAD, CONDUCTIVE CUTTING (36" X 18") (HCM-236A) *	1
03				07303951	PAD, CONDUCTIVE CUTTING (40" X 20") (HCM-237A) *	1
03				07303952	PAD, CONDUCTIVE CUTTING - COMPLETE (FOR INVERTED CUTTING) (HCM-365) *	1
04				HCM-362	PAD, CONDUCTIVE CUTTING (FOR 31" X 24" BEAM) (DO NOT SHIP)	1
04				HCM-363-20	TAPE, CUTTING PAD	4
04				HCM-364	FOIL, CUTTING PAD (ALUMINUM)	3
<u>CUTTING PAD ASSOCIATED PARTS</u>						
03				HCM-305	PIN, CUTTING PAD LOCATING * NOT SENT UNLESS ORDERED	2

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
					HCM-303	INSULATOR, CUTTING PAD (36" X 18") *	1
					HCM-304	INSULATOR, CUTTING PAD (40" X 20") *	1
					HCM-134	WEDGE, CUTTING PAD (36" X 18") *	1
					HCM-135	WEDGE, CUTTING PAD (40" X 20") *	1
					HCM-306	PIN, PAD LOCATING - LONG (USED WITH CUTTING PAD WEDGE) *	2
					HCM-306	PIN, PAD LOCATING - LONG (USED WITH CUTTING PAD WEDGE) *	2
					<u>ALUMINUM CUTTING PLATES</u>		
					HCM-238	PLATE, ALUMINUM CUTTING (36" X 18" X 3/8"TH,) (TAPED) *	1
					HCM-246	PLATE, ALUMINUM CUTTING (36" X 18" X 3/8"TH,) (WITHOUT TAPE) *	1
					HCM-299	PLATE, ALUMINUM CUTTING (36" X 18" X 1"TH,) (TAPED) *	1
					HCM-300	PLATE, ALUMINUM CUTTING (36" X 18" X 1"TH,) (WITHOUT TAPE) *	1
					HCM-239	PLATE, ALUMINUM CUTTING (40" X 20" X 3/8"TH,) (TAPED) *	1
					HCM-247	PLATE, ALUMINUM CUTTING (40" X 20" X 3/8"TH,) (WITHOUT TAPE) *	1
					HCM-301	PLATE, ALUMINUM CUTTING (40" X 20" X 1"TH,) (TAPED) *	1
					HCM-302	PLATE, ALUMINUM CUTTING (40" X 20" X 1"TH,) (WITHOUT TAPE) *	1
					HCM-338	PLATE, ALUMINUM CUTTING (40" X 41" X 1"TH,) (WITHOUT TAPE) FOR TWIN INSTALLATION * MTO	1
					HCM-339	PLATE, ALUMINUM CUTTING (40" X 42" X 1"TH,) (WITHOUT TAPE) FOR TWIN INSTALLATION * MTO	1
					HCM-340	PLATE, ALUMINUM CUTTING (40" X 43" X 1"TH,) (WITHOUT TAPE) FOR TWIN INSTALLATION * MTO	1
					HCM-332	PLATE, ALUMINUM CUTTING (40" X 44" X 1"TH,) (WITHOUT TAPE) FOR TWIN INSTALLATION * MTO	1
					<u>HYDRAULIC PUMP PARTS</u>		
					HCM-543	PUMP	1
					SL-17H17	SCREW, PUMP (HEX, SOC. HD, CAP, 3/8"-16UNC X 1-1/4")	2
					* NOT SENT UNLESS ORDERED		
					MTO Made To Order.		

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL					PART NUMBER	NOMENCLATURE	QTY.
	1	2	3	4			
03					WL-1988T	LOCKWASHER, PUMP SCREW(1ock, 3/8" X 35/64" X .125")	2
03					HCM-539	NIPPLE, PUMP INTAKE	1
03					HCM-1050	FILTER, PUMP INTAKE	1
03					HCM-510	SEAL, PUMP INTAKE NIPPLE	1
03					UIM-383	NIPPLE, PUMP	1
03					HCM-581	VALVE, RELIEF	1
03					UIM-382	ELBOW, RELIEF VALVE STREET (TO CYLINDER)	1
03					HCM-545	ELBOW, HOSE (TO CYLINDER)	1
03					HCM-508	HOSE - COMPLETE (TO CYLINDER)	1
03					XF234A7	ELBOW, HOSE (ON CYLINDER)	1
03					HCM-546	ELBOW, RELIEF VALVE HOSE (TO SUMP)	1
03					HCM-547	HOSE, EXHAUST - COMPLETE (TO SUMP)	1
03					HCM-548	ELBOW, HOSE (IN SUMP COVER BUSHING)	1
03					UIM-407	BUSHING, RELIEF VALVE REDUCING	1
03					UIM-408	NIPPLE, SOLENOID VALVE PIPE	1
03						VALVE, SOLENOID (SEE ED-13027-2)	1
03					TLA-1083	PLUG, SOLENOID VALVE PIPE	1
03					UIM-395	ELBOW, TUBE (IN RELIEF VALVE)	1
03					HCM-580	TUBE, SOLENOID VALVE	1
03					UIM-390	CONNECTOR, TUBE	1
03					UAL-592	ELBOW, CYLINDER DRAIN	1
03					HCM-514	HOSE, CYLINDER DRAIN	1
03					UAL-592	ELBOW, CYLINDER DRAIN (IN SUMP)	1
						CLOTH HOLDING DEVICE *	
03					HCM-133	DEVICE, CLOTH HOLDING - COMPLETE *	1
04					ICM-1110	ARM, CLOTH CLAMPING - UNIT ASSEMBLY	2
05					ICM-1302	BLOCK, CLOTH CLAMPING ARM (DO NOT SHIP)	1
04					ICM-1111+	BRACKET, CLOTH CLAMPING ARM ASSEMBLED * R,H,	1
						* NOT SENT UNLESS ORDERED.	

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					PL-3416P	PIN, BRACKET SPRING	1
04					ICM-1112+	BRACKET, CLOTH CLAMPING ARM - ASSEMBLED - L,H,	1
05					PL-3416P	PIN, BRACKET SPRING	1
04					SL-6535V	SCREW, BRACKET BINDING	2
04					WL-505T	WASHER, BRACKET BINDING SCREW	2
04					HCM-132A	SPACER, BRACKET SUPPORT	2
04					SL-5J11	SCREW, SPACER (HEX, HD, CAP, 5/16"-18UNC X 1")	4
04					ICM-1114	SUPPORT, BRACKET	2
04					SL-4J16	SCREW, SUPORT (HEX, HD, CAP, 5/16"-24UNF X 1-5/4")	4
04					NL-18M1	NUT, SUPPORT SCREW (HEX, 5/16"-24UNF X 1/2")	4
04					WL-509T	WASHER, SUPPORT SCREW(positive, 5/16" X 9/16")	4
04					ICM-1115+	LEVER, CLOTH CLAMPING ARM STOP - ASSEMBLED - R,H,	1
05					PL-3416P	PIN, LEVER SPRING	1
04					ICM-1116+	LEVER, CLOTH CLAMPING STOP - ASSEMBLED - L,H,	1
05					PL-3416P	PIN, LEVER SPRING	1
04					SL-925V	SCREW, ARM STOP SET	2
04					SPGL-2643S	SPRING, ARM STOP(tension, 5/8" X 4-3/8")	2
04					ICM-1178	COLLAR, ARM STOP SPRING RETAINING	2
04					SL-3194V	SCREW, RETAINING COLLAR	2
04					CL-50J	COLLAR, ARM ADJUSTING	2
04					SL-3748V	SCREW, ARM ADJUSTING COLLAR SET	2
04					ICM-1117+	SUPPORT, CLOTH - ASSEMBLED - FOR 36" TABLE *	1
05					ICM-1118	STIFFENER, CLOTH SUPPORT	1
05					SL-9P11	SCREW, CLOTH SUPPORT STIFFENER (FLAT HD, WOOD, #10- X 3/4")	5
04					ICM-1119+	SUPPORT, CLOTH - ASSEMBLED - FOR 40" TABLE *	1
05					ICM-1120	STIFFENER, CLOTH SUPPORT	1
05					SL-9P11	SCREW, CLOTH SUPPORT STIFFENER (FLAT HD, WOOD, #10 X 3/4")	5
04					SL-9811	SCREW, CLOTH SUPORT BINDING (SQ) NECK CARRIAGE, 3/8"-16UNC X 1-1/2")	4

* NOT SENT UNLESS ORDERED

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2			PART NUMBER	NOMENCLATURE	QTY.
	3	4	5			
04				WL-510T	WASHER, CLOTH SUPPORT BINDING SCREW	4
04				ICM-1121	BOX, CLOTH	1
04				SL-11V17	BOLT, CLOTH BOX SUPPORTING (RO, HD, STOVE, 5/16"-18UNC X 1-1/4")	2
04				NL-19U1	NUT, BOX BINDING (HEX, 5/16"-18UNC X 13/64")	2
04				WL-3007T	WASHER, NUT	2
04				FF5728	SKETCH #	1
<p><u>ELECTRICAL PARTS (208, 230</u> (220-240); 480 (440-480); 575 (550-600)-3-60); (220, 380-3-50), (230 (220-240); 480 (440-480)-2-60) SERVICES</p>						
<u>CONTROL ENCLOSURE PARTS</u>						
04				HCM-1138	ENCLOSURE, CONTROL - UNIT ASSEMBLY	1
05				HCM-1138-1	ITEM #2 (DO NOT SHIP)	1
05				HCM-1138-2	ITEM #3 (DO NOT SHIP)	1
04				SL-19D15	SCREW, ENCLOSURE (RO, HD, MACH, 5/16"-18UNC X 1/2")	4
04				WL-509T	LOCKWASHER, ENCLOSURE SCREW(positive, 5/16" X 9/16")	4
04				HCM-522	PLATE, ENCLOSURE	1
04				HCM-521	PANEL, ENCLOSURE SWITCH	1
04				SL-7815V	SCREW, PANEL	4
04				NL-12M1	NUT, PANEL SCREW (HEX, #10-32UNC X 1/8")	4
04				HCM-523	COVER, CONTROL ENCLOSURE	1
04				ED-16003	SCREW, COVER	4
04				UHL-2243	RING, COVER SCREW RETAINING	4
04				TRAN-75-11	GASKET, COVER	2
04				TRAN-75-30	GASKET, COVER	2
04				ED-10669	PLATE, RATING ##	1
04				UPRA/D32/ABS	RIVET, RATING PLATE	4
<p># SHOWING LOCATION OF TAPPED HOLES TO BE ADDED TO TABLE FOR ATTACHING CLOTH HOLDING DEVICE. ** STAMP CONTROL CIRCUIT = 15 VOLTS, 60 CYCLES, 1 PHASE, 1 AMP. ** 115V, 50 CYCLES, 1 AMP. ** MOTOR CIRCUIT = 115V, 50 CYCLES, 1 AMP. ** DATA FROM ORDER AND SERVICE MOTOR NAME PLATE.</p>						

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
04					HCM-1123	ARROW, STROKE CONTROL DIRECTIONAL	1
04					HCM-284	GROMMET, LEAD (FOR CUTTING PLATE LEAD)	1
04					ED-11074	SWITCH, TRANSFER (HYTRONIC - STROKE)	1
04					HCM-297	DECAL, CAUTION - UPPER	1
04					HCM-285	COVER, SWITCH - UNIT ASSEMBLY	1
05					FR-Y94	HINGE, SWITCH COVER (DO NOT SHIP)	1
04					HCM-286	DECAL, SWITCH (APPLY TO SWITCH COVER)	1
04					TDA-33	SCREW, SWITCH COVER	2
04					TDA-28	NUT, SWITCH COVER SCREW	2
04					WL-1919T	LOCKWASHER, NUT(external tooth, 9/64" X 9/32"	2
04					ED-6653	STATION, PUSH BUTTON X .018")	1
04					SL-8789V	SCREW, PUSH BUTTON STATION	2
04					TDA-28	NUT, PUSH BUTTON STATION SCREW	2
04						FOR MAGNETIC MOTOR STARTER SEE MOTOR DRIVE	
04					ED-4C-RP	LEAD, 6T2 BLACK (STARTER JUMPER)	1
04					SL-7815V	SCREW, STARTER	3
04					WL-1922T	WASHER, STARTER SCREW	4
04					NL-12M1	NUT, STARTER SCREW (HEX, #10-32UNC X 1/8")	3
04						FOR CONTROL POWER TRANSFORMER SEE MOTOR DRIVE	
04					SL-7815V	SCREW, TRANSFORMER	4
04					WL-1922T	WASHER, TRANSFORMER SCREW	4
04					NL-12M1	NUT, TRANSFORMER SCREW (HEX, #10-32UNC X 1/8")	4
04					ED-4794	FUSE, TRANSFORMER (DUAL ELEMENT, 1 AMP)	1
04					HCM-525A	SHIELD, HIGH VOLTAGE	1
04					SL-8792V	SCREW, SHIELD	2
04					ABM-161	STUD, SHIELD	2
04					NL-1335K	NUT, SHIELD STD	2
04					ED-14478-1	RESISTOR - ASSEMBLED, CODE #17	1

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL MCM)

L C M P M	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					ED-14478	RESISTOR	1
05					ED-4327	TERMINAL	2
04					ED-4332	ADAPTER, TERMINAL, AT TOP OF PANEL AT G/Y FOR RESISTOR	1
04					HCM-578	PANEL, ELECTRONIC - ASSEMBLY	1
05					HCM-579	BOARD, PRINTED CIRCUIT (DO NOT SHIP)	1
05					ED-13412	LUG, TURRET	2
05					ED-4344	TAB, TERMINAL	25
05					ED-1539	RESISTOR = R1 (1.2M)	1
05					ED-1540	RESISTOR = R2 (68K)	1
05					ED-1541	RESISTOR = R3 (470)	1
05					ED-1542	RESISTOR = R4 (330)	1
05					ED-14409	RESISTOR = R5 (1K)	1
05					ED-14425	RESISTOR = R6, R8, R10, R16 (4.7K)	4
05					ED-1544	RESISTOR = R9 (1.8K)	1
05					ED-14453	RESISTOR = R11 (2.2K)	1
05					ED-14454	RESISTOR = R12 (1.3K)	1
05					ED-14423	RESISTOR = R13 (10K)	1
05					ED-1545	RESISTOR = R14 (68)	1
05					ED-1546	RESISTOR = R15 (270K)	1
05					##	RESISTOR = R19	1
05					ED-17000	DIODE	9
05					ED-14125	CAPACITOR = C1 (.001 MFD.)	1
05					XE832Q250	CAPACITOR = C2, C7 (250 MFD.)	2
05					XE839A32	CAPACITOR CRADLE - C2, C7	2
05					HCM-241A	EYELET, CAPACITOR CRADLE (SE-46 TIN PLATED)	4
05					ED-14160	CAPACITOR = C3 (4 MFD.)	1
05					ED-14150	CRADLE, CAPACITOR = C3	1
						## Selected from one of the following Resistors ED-14441 (4.7M) ED-14442 (3.9M) ED-14443 (3.3M) ED-14444 (2.7M) ED-14445 (2.2M) ED-14432 (1.8M) ED-14433 (1.5M) ED-1539 (1.2M) ED-14434 (1.0M) ED-14435 (.82M)	

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					HCM-241A	EYELET, CAPACITOR CRADLE (SE-46 TIN PLATED)	2
05					ED-14149	CAPACITOR - C4 (.1 MFD,)	1
05					ED-14129	CAPACITOR - C5 (.1 MFD,)	1
05					ED-14152	CAPACITOR - C6, C10 (30 MFD, - 50 V)	2
05					ED-14134	CRADLE, CAPACITOR - C6, C10	2
05					HCM-241A	EYELET, CAPACITOR CRADLE (SE-46 TIN PLATED)	4
05					ED-14131	CAPACITOR - C8 (50 MDG, - 25 V)	1
05					ED-14133	CRADLE, CAPACITOR - C8	1
05					HCM-241A	EYELET, CAPACITOR CRADLE (SE-46 TIN PLATED)	2
05					ED-17003	TRANSISTOR - Q1	1
05					ED-17004	TRANSISTOR - Q2 (2N404A)	1
05					ED-17009	TRANSISTOR - Q3 (2N2043A)	1
05					ED-17010	TRANSISTOR - Q4 (2N1613)	1
05					ED-17019	TRANSISTOR - Q5 (B10747)	1
05					ED-17006	TRANSISTOR - Q6 (2N420)	1
05					TDA-27	SCREW, TRANSISTOR - Q5, Q6	4
05					WL-1919T	LOCKWASHER, TRANSISTOR SCREW	4
05					ED-17011	DIODE, ZENER (Z1) (VR90)	1
05					ED-15686	WIRE, JUMPER (MAKES 6 JUMPERS)	1
04					SL-8792V	SCREW, ELECTRONIC PANEL	4
04					WL-1920T	LOCKWASHER, SCREW (external tooth, 11/64" X 3/8" X .022")	4
04					APC-105	STUD, ELECTRONIC PANEL	4
04					NL-1335K	NUT, ELECTRONIC PANEL STUD FOR TRANSFORMER SEE MOTOR DRIVE	4
04					SL-7815V	SCREW, TRANSFORMER	4
04					NL-1335K	NUT, TRANSFORMER SCREW	4
04					ED-15462	RECEPTACLE, LEADS #12 & #13	2
04					ED-13581	TIE, CABLE	1
04					SL-7815V	SCREW, CABLE TIE	1
04					NL-12M1	NUT, CABLE TIE SCREW (HEX, #10-32UNC X 1/8")	1

USM HYTRONIC CUTTING MACHINE MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
04					ED-15462	RECEPTACLE, TERMINAL (FOR LEADS 103 FROM 3P8 AND SOLV.)	1
04					ED-8C-PP	LEAD, 6T2 BLACK, CODE #2	1
04					ED-8C-PP	LEAD, 6T2 BLACK, CODE #3	1
04					ED-23C-LL	LEAD, 6T2 RED, CODE #4	1
04					ED-20C-PP	LEAD, 6T2 RED, CODE #8	1
04					ED-12C-PP	LEAD, 6T2 RED, CODE #10	1
04					ED-26C-FP	LEAD, 6T2 RED, CODE #12	1
04					ED-20C-FL	LEAD, 6T2 RED, CODE #13	1
04					ED-31C-FF	LEAD, 6T2 RED, CODE #28	1
04					ED-32C-FT	LEAD, 6T2 GREEN, CODE #90	1
04					ED-17C-FT	LEAD, 6T2 GREEN, CODE #92	1
04					ED-13579	TIE, WIRE	10
04					ED-15815-2	LEAD, ASSEMBLED, CODE #94 (TO PLATE)	1
05					ED-15815	LEAD	1
05					ED-4327	TERMINAL	2
04					ED-13529	TERMINAL (CUTTING PLATE TERMINAL)	2
04					SL-9173V	SCREW, TERMINAL	2
04					ED-4256	TERMINAL, GROUND WIRE	1
04					ED-13581	TIE, CABLE	2
					<u>BEAM ELECTRICAL PARTS</u>		
					ED-17619	SWITCH, TRIP	1
04							
04					WL-2154T	SPACER, TRIP SWITCH	2
04					SL-9D23	SCREW, TRIP SWITCH (RO, HD, MACH, #6-32UNC X 1")	2
04					WL-3002T	WASHER, TRIP SWITCH SCREW	2
04						CONTACTOR, STRIKING FACE (SEE 13)	
04					NL-1336K	NUT, TRIP SWITCH SCREW	2

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
04					HCM-577	BRACKET, TRIP SWITCH	1
04					SL-9D17	SCREW, BRACKET (RO, HD, MACH; #6-32UNC X 1/2")	2
04					WL-1923T	LOCKWASHER, BRACKET SCREW (lock, .141" X .237"	2
04					ED-13587A+	CORD, ASSEMBLED - BEAM TO CONTROL ENCLOSURE X .028")	1
05					ED-4314	TERMINAL	1
05					ED-4327	TERMINAL	11
04					ED-15104	CLAMP, CORD	1
04					SL-11A13	SCREW, CLAMP (FIL, HD, MACH, #8-32UNC X 7/16")	1
04					WL-3003T	WASHER, CLAMP SCREW	1
04					HCM-573	BRACKET, CORD	1
04					SL-17D11	SCREW, BRACKET (RO, HD, MACH; 1/4"-20UNC X 3/8")	2
04					ED-3245	GRIP, CORD (AT TABLE)	1
04					ED-3245	BUSHING, STRAIN RELIEF (AT CONTROL ENCLOSURE)	1
04					HCM-583	CONTROL, PRESSURE SETTING - ASSEMBLY	1
05					ED-1550-2	CONTROL, PRESSURE SETTING - ASSEMBLY, CODE #18 AND #96	1
06					ED-1550	CONTROL, PRESSURE SETTING	1
06					ED-4327	TERMINAL	2
05					ED-15476	PLATE, DIAL	1
05					ED-1552	KNOB	1
05					HCM-590	PLATE, CONTROL MOUNTING	1
04					ED-15462	RECEPTACLE, FASTON - "IN LINE CONNECTOR"	2
04					SL-17D11	SCREW, MOUNTING PLATE (RO, HD, MACH, 1/4"-20UNC X 3/8")	2
						<u>STROKE CONTROL SWITCH PARTS</u>	
04					HCM-584	SWITCH, LIMIT CONTROL STROKE - ASSEMBLY	1
05					ED-10302	SWITCH, STROKE, LIMIT	1
05					ED-61C-FL	LEAD, 6T2 RED, CODE #14	1
05					ED-40C-FL	LEAD, 6T2 RED, CODE #30	1
05					ED-3FPC28	CONDUIT, LEAD (SWITCH TO CONTROL ENCLOSURE)	1

USM HYTRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	1 & 2	3	4	5	PART NUMBER	NOMENCLATURE	QTY.
05					ED-STCON3	CONNECTOR	2
						<u>SOLENOID VALVE PARTS</u>	
04					ED-13027-2	VALVE, SOLENOID - ASSEMBLED, CODE #103 AND #78	1
05					ED-13027	VALVE, SOLENOID (24 VOLT D.C.)	1
05					ED-4327	TERMINAL	2
05					ED-13029-2	COIL, SOLENOID VALVE, CODE #103 AND #78 ASSEMBLED (REPLACEMENT PART FOR ED-13027-2)	
06					ED-13029	COIL, SOLENOID VALVE	1
06					ED-4327	TERMINAL	2
04					ED-3FPC19	CONDUIT, LEAD - VALVE TO CONTROL ENCLOSURE	1
04					ED-STCON3	CONNECTOR	2
						<u>OIL</u>	
						USM 150B OIL - 6 GALLONS	1
						1 LB. CAN OF SOCONY VACUUM MOBILUX #2 GREASE	1
						<u>LUBRICATION</u>	
						FOR GENERAL LUBRICATION, USE USM SPECIFICATION NO. 300A OIL	
						FOR OIL RESERVOIR, USE USM SPECIFICATION NO. 150B OIL	
						FOR BEAM SPINDLE, USE SOCONY VACUUM MOBILUX #2 GREASE	
						FOR MOTOR LUBRICATION, USE USM SPECIFICATION NO. 300SL36 GREASE	
						FOR COMMERCIAL EQUIVALENT, REFER TO THE USM MACHINERY HANDBOOK	
						<u>MISCELLANEOUS</u>	
03					NP-3CS	PLATE, USM CORPORATION SYMBOL	1
03					UPRA/D32/ABS	RIVET, PLATE "POP"	4
03					NP-2066D1	PLATE, NAME (DOMESTIC - LEASE)	1
03					NP-2066DS1	PLATE, NAME (DOMESTIC - SALE) *	1
03					UPRA/D32/ABS	RIVET, PLATE "POP"	4
						<u>COLLECTIVE NUMBERS</u>	
03					HCM-693	COLLECTIVE NUMBER COVERING NECESSARY PARTS TO APPLY TWO HAND TRIP TO AN OUTSTANDING MACHINE WITH 13" OR 18" BEAM.	1
						* NOT SENT UNLESS ORDERED	

USM HYTRONIC BUTTING MACHINE MODEL B (SYMBOL HCM)

LEVEL	PART NUMBER			NOMENCLATURE	QTY.
	1 & 2	3	4 5		
04			HCM-627	COLLECTIVE NUMBER COVERING NECESSARY PARTS TO APPLY TWO HAND TRIP TO AN OUTSTANDING MACHINE WITH 24" BEAM.	1
04			FF8329		1
04			FF8331		1
04			LWL-72		1
03			HCM-694		1
04			HCM-629		1
04			FF8329		1
04			FF8331		1
04			LWL-72		1

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

MANUFACTURER'S CATALOG LISTING

ED-4794	GEO. H. WAHN CO. CATALOG NO. FRN-1AMP
ED-10522	GENERAL ELECTRIC CO. CATALOG NO. 55-153472G7
ED-11074	ARROW HART & HEGEMAN ELECTRIC CO. CATALOG NO. 82611-P
ED-11095	GENERAL ELECTRIC CO. CATALOG NO. CR106A002
ED-12124	GENERAL ELECTRIC CO. CATALOG NO. CR106R002
ED-13579	PANDUIT CORP. CAT. NO. SST1.5
ED-13581	PANDUIT CORP. CAT. NO. SSC2
ED-14952	GENERAL ELECTRIC CO. CATALOG NO. 9T55Y2138G2, 811 FRAME
ED-14953	GENERAL ELECTRIC CO. CAT. NO. 9T55Y63G2, 811 FRAME
ED-14954	GENERAL ELECTRIC CO. CAT. NO. 9555Y83G2, 811 FRAME
ED-15104	WECKESSER CO. CAT. NO. 1/2-6R
ED-15462	A.M.P. INC., CAT. NO. 321235
ED-15476	CRAMER ELECTRONICS INC., CATALOG NO. 380
ED-17619	McGILL MFG. CO. INC., CAT. NO. 1901-012304
HCM-60	ATNA CATALOG NO. 1402, MRC CATALOG NO. 1103U OR SKF CATALOG NO. 702U
HCM-284	HERMAN H. SMITH INC., CATALOG NO. 2174
HCM-510	ATLANTIC INDIA RUBBER WORKS INC., CATALOG NO. 2803A
HCM-526	KOPPERS CO. INC., CATALOG NO. 14022
HCM-542	VICKERS CO. MODEL NO. SP-113-B
HCM-543	VICKERS CO. MODEL NO. V210-9W-A-12-S217
HCM-545	FLODAR CORP. CATALOG NO. A-2000C-12
HCM-548	FLODAR CORP. CATALOG NO. A-4500C-12
TCF-496	WALDES TRUARC CATALOG NO. 5133-25
UAL-592	AEROQUIP CORP. CATALOG NO. 2024-4-6

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

MANUFACTURER'S CATALOG LISTING - CONT'D.

UHL-2243	FASTEX CORP. CATALOG NO. 213-080509
UIM-382	FLODAR CORP. CATALOG NO. PF46-12
UIM-383	FLODAR CORP. CATALOG NO. PF42-12
UIM-390	FLODAR CORP. CATALOG NO. BA-1000-6-2
UIM-395	FLODAR CORP. CATALOG NO. BA-2000-6-2
UIM-407	FLODAR CORP. CATALOG NO. PF40-6-2
UIM-408	FLODAR CORP. CATALOG NO. PF42-2
UN-30	FASTEX CORP. CATALOG NO. 214-060307-00-2303
USA-71	WOODRUFF CATALOG NO. 6
XE375D4	MCGILL MFG. CO. INC., CAT. NO. 1901-012704
XE603A2	POTTER & BRUMFIELD CO. CAT. NO. 9KH3
XE729B1	GENERAL ELECTRIC CO. CAT. NO. CR124-C024
XF234A7	FLODAR CORP. CATALOG NO. RA-2000C-12

USM HYDROMIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

L E V E L	1 3 4 5	PART NUMBER	MOTOR DRIVE PARTS	MOTOR (NOT SENT UNLESS ORDERED). SPECIFY MOTOR RATING PLATE READING WHEN ORDERING N O M E N C L A T U R E	3-PHASE			2-PHASE			1-PHASE		
					CYCLES & VOLTS								
					60	50	60	60	60	60	60	60	50
03	ED-01638			<u>MOTOR DRIVE PARTS</u> MOTOR (SPECIAL-1-1/2 H.P.-1200RPM - NEMA - 104CZ FRAME)	1	1	1	1	1	1	1	1	1
03	ED-01639			MOTOR (SPECIAL-1-1/2 H.P. - 1200RPM - NEMA - 104CZ FRAME)	1	1	1	1	1	1	1	1	1
03	ED-01640			MOTOR (SPECIAL-1-1/2 H.P. - 1000RPM - NEMA - 104CZ FRAME)	1	1	1	1	1	1	1	1	1
03	ED-01641			MOTOR (SPECIAL-1-1/2 H.P. - 1200RPM - NEMA - 104CZ FRAME)	1	1	1	1	1	1	1	1	1
03	XH200E46			SCREW, MOTOR (HEX. HD. CAP, 3/8"-16UNC X 1-3/4")	4	4	4	4	4	4	4	4	4
03	XH603A8			NUT, MOTOR SCREW (HEX. 3/8"-16UNC X 29/64") (SELF-LOCKING)	4	4	4	4	4	4	4	4	4
03	WL-30087			WASHER, MOTOR BOLT	4	4	4	4	4	4	4	4	4
03	HCM-536			BRACKET, MOTOR (REAR)	1	1	1	1	1	1	1	1	1
03	HCM-537			BRACKET, MOTOR (FRONT)	1	1	1	1	1	1	1	1	1
03	SL-9J13			SCREW, MOTOR BRACKET	3	3	3	3	3	3	3	3	3
03	WL-0117			WASHER, MOTOR BRACKET SCREW	3	3	3	3	3	3	3	3	3
03	HCM-541			FLYWHEEL, MOTOR - ASSEMBLED	1	1	1	1	1	1	1	1	1
04	UHN-107A			BUSHING, MOTOR FLYWHEEL	1	1	1	1	1	1	1	1	1
04	WL-13907			LOCKWASHER, BUSHING(positive, 1/4" X 15/32")	3	3	3	3	3	3	3	3	3
03	ED-42D-77			LEAD, #T2 BLACK, CODE #T1	1	1	1	1	1	1	1	1	1
03	ED-43D-77			LEAD, #T2 BLACK, CODE #T2	1	1	1	1	1	1	1	1	1
03	ED-45D-77			LEAD, #T2 BLACK, CODE #T3	1	1	1	1	1	1	1	1	1

ØØ - MADE TO ORDER BASIS

USM HYDRONIC BUTTING MACHINE - MODEL B (SYMBOL HCM)

L E V E L	1 & 2	3	4	5	PART NUMBER	MOTOR DRIVE PARTS	CYCLES & VOLTS																
							3 PHASE				2 PHASE				1 PHASE								
							60	55	50	45	60	55	50	45	60	55	50	45					
03	03	03	03	03	ED-48D-1T	MOTOR (NOT SENT UNLESS ORDERED). SPECIFY MOTOR RATING PLATE READING WHEN ORDERING NOMENCLATURE LEAD: 672 BLACK; CODE #P1 LEAD: 672 BLACK; CODE #P2 LEAD: 672 RED; CODE #5 CONDUIT, LEAD STARTER, MAGNETIC MOTOR KIT, RELAY 3RD OVERLOAD COIL, MAGNETIC MOTOR STARTER (USED IN CONJUNCTION WITH ED-11095) STARTER, MAGNETIC MOTOR HEATER, STARTER OVERLOAD TRANSFORMER, CONTROL POWER (10T) TRANSFORMER, CONTROL POWER (10T) TRANSFORMER, CONTROL POWER (10T) TRANSFORMER, CONTROL POWER (10T) TRANSFORMER = ASSEMBLED (2T) TRANSFORMER TERMINAL, LEAD TERMINAL, LEAD ## G.E. CO. TYPE CR123---HEATER TO BE SELECTED FROM CURRENT RATING STAMPED ON MOTOR AND HEATER CHART.	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
03	03	03	03	03	ED-40D-1T		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
03	03	03	03	03	ED-48D-1T		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-39C-PP		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-4FPC13H		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-11095		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	XE72981		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-10522		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-12124		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	##		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-14952		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-14953		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-14953		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-14954		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
03	03	03	03	03	ED-14945-2		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
04	04	04	04	04	ED-14945	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
04	04	04	04	04	ED-4313	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
04	04	04	04	04	ED-4327	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

00 = MADE TO ORDER BASIS

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

LEVEL	PART NUMBER	MOTOR DRIVE PARTS MOTOR (NOT SENT UNLESS ORDERED). SPECIFY MOTOR RATING PLATE READING WHEN ORDERING NOMENCLATURE	NUMBER OF UNITS	CYCLES & VOLTS															
				3 PHASE			2 PHASE			1 PHASE									
				60	50	60	50	60	50	60	50	60	50						
03	ED-14944-2	TRANSFORMER ASSEMBLED (2T) TRANSFORMER TERMINAL, LEAD TERMINAL, LEAD CONNECTOR, CONDUIT - MOTOR END CONNECTOR, CONDUIT - ENCLOSURE END TIE, CABLE	1	200	230	460	575	220	230	460	575	115	230	460	575	115	230	460	575
04	ED-14944		1	200	230	460	575	220	230	460	575	115	230	460	575	115	230	460	575
04	ED-4313		1	200	230	460	575	220	230	460	575	115	230	460	575	115	230	460	575
04	ED-4327		3	200	230	460	575	220	230	460	575	115	230	460	575	115	230	460	575
03	ED-9000N4		1	200	230	460	575	220	230	460	575	115	230	460	575	115	230	460	575
03	ED-4500N4		1	200	230	460	575	220	230	460	575	115	230	460	575	115	230	460	575
03	ED-13579		20	200	230	460	575	220	230	460	575	115	230	460	575	115	230	460	575

THE INDEX ON THE FOLLOWING PAGES COVERS BOTH ACTIVE AND SUPERSEDED PARTS. PART NUMBERS APPEARING IN THE INDEX BEARING NO NOTATIONS, AND AGAINST WHICH NO PAGE NUMBERS ARE SHOWN, ARE SUPERSEDED PARTS FURNISHED ON ORDER. PART NUMBERS BEARING THE CODE SYMBOL "M.T.O." ARE SUPERSEDED PARTS MADE TO ORDER.

THE FOLLOWING IS A KEY TO VARIOUS SYMBOLS FREQUENTLY USED IN CONJUNCTION WITH INDEX.

- B.B. - BLUE BULLETIN
- G.B. - GREEN BULLETIN.
- C.N. - COMPLETE OR COLLECTIVE NUMBER.
- C.T. - CONSULT TEXT BEFORE ORDERING.
- M.T.O. - MADE TO ORDER.
- S.N. - SERIAL NUMBER PART.
- Y.B. - YELLOW BULLETIN.
- S.F.P. - SEMI FINISHED PART.
FINISHED BY ROADMAN WHEN ASSEMBLING.

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

NUMERICAL INDEX OF PARTS

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USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

NUMERICAL INDEX OF PARTS

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USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

NUMERICAL INDEX OF PARTS

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FR-Y94	20			HCM-204	5	16	2
GIS-2296	7,9,10,12			HCM-205	5,7,9,11	16	21
GR-266	5	17	8	HCM-206	5	7	1
HCM-13	5,7,9, 11,23	7	9	HCM-207A	7		
HCM-32	13	16	20	HCM-209 Use HCM-209A			
HCM-46	4			HCM-209A	7		
HCM-48A+	4	17	14	HCM-210 Use HCM-358			
HCM-60	3	17	2	HCM-210A Use HCM-358			
HCM-110							

USM HYTRONIC CUTTING MACHINE - MODEL B (SYMBOL HCM)

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HCM-211	7			HCM-282	4	2	2
HCM-215A	9			HCM-284	20		
HCM-216	9			HCM-285	20	14	10
HCM-218A	11			HCM-286	20		
HCM-220	11			HCM-296	5,7, 9,11		
HCM-221	11			HCM-297	20		
HCM-236A	15			HCM-298	13		
HCM-237A	15			HCM-299	16		
HCM-238	16			HCM-300	16		
HCM-239	16			HCM-301	16		
HCM-241 Use HCM-241A				HCM-302	16		
HCM-241A	21,22			HCM-303	16		
HCM-243	5	1	5	HCM-304	16		
HCM-246	16			HCM-305	15		
HCM-247	16			HCM-306	16		
HCM-254	14			HCM-312A	4	17	6
HCM-255	14			HCM-324	13	16	19
HCM-263	9			HCM-325	13	16	15
HCM-264A	9			HCM-326+	13,14		
HCM-267 Use HCM-1123				HCM-327	13		
HCM-276	4	3	1	HCM-328	14		
HCM-277	4			HCM-329	14		
HCM-278	4	3	9	HCM-330	14		
HCM-279	4	3	8	HCM-331	14		
HCM-280	4	3	7	HCM-332	16		
HCM-281	4	3	6	HCM-338	16		
				HCM-339	16		

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HCM-340	16			HCM-503	3		
HCM-355	5	7	8	HCM-505	3		
HCM-356	7			HCM-506	3		
HCM-357	11			HCM-507	2	3	5
HCM-358	5	16	14	HCM-508	17	14	6
HCM-359	7	16	14	HCM-509			
HCM-360	9	16	14	HCM-510	17	10	1
HCM-361	11	16	14	HCM-511			
HCM-362	15			HCM-512			
HCM-363-20	15			HCM-513			
HCM-364	15			HCM-514	17	10	8
HCM-365	15			HCM-515	2		
HCM-380 Use HCM-578				HCM-516	2	2	6
				HCM-517	2		
HCM-380A Use HCM-578				HCM-518	2	2	1
HCM-388+	3	17	16	HCM-519	1		
HCM-389	15			HCM-521	19		
HCM-390	15			HCM-522	19		
HCM-391	15			HCM-523	19	1	1
HCM-392	15			HCM-524	4		
HCM-393+	14			HCM-525 Use HCM-525A			
HCM-394	14			HCM-525A	20		
HCM-400	5	17	7	HCM-526	2	19	9
HCM-500				HCM-527	2	17	17
HCM-501	3	19	12	HCM-528 Use HCM-566			
HCM-502 Use 1-HCM-554, 1-HCM-556, 1-HCM- 558, 2-NL-17M1, 2-SL-13H7, 2-WL- 3Q06T, 2-WL-1396T				HCM-529 Use 1-HCM-645, 1-XF234A7			

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HCM-529A Use 1-HCM-645, 1-XF234A7				HCM-549			
HCM-530 Use HCM-530A				HCM-550	24		
HCM-530A (S.N.)	1			HCM-551			
HCM-531 Use HCM-531A				HCM-552	15		
HCM-531A (S.N.)	1			HCM-553	15		
HCM-532	2			HCM-554	3	3	2
HCM-533	2	19	2	HCM-555	3		
HCM-534	1	14	2	HCM-556	3		
HCM-535	1			HCM-557	3		
HCM-536	29			HCM-558	3		
HCM-537	29			HCM-559 (S.N.)	1		
HCM-538	2	14	17	HCM-560 (S.N.)	1		
HCM-539	17	10	2	HCM-561	11		
HCM-540	2			HCM-562	11		
HCM-541 Use HCM-541+				HCM-563	11		
HCM-541+	29	10	3	HCM-564	1	14	1
HCM-542	2	14	19	HCM-565	1	14	1
HCM-543	16	10	9	HCM-566	2	19	6
HCM-544 Use 1-HCM-580, 1-HCM-581				HCM-573	24		
HCM-545	17	14	8	HCM-574 Use 1-HCM-582, 1-UN-30			
HCM-546	17			HCM-575	13	7	3
HCM-547	17	14	5	HCM-576	13	7	2
HCM-548	17	14	4	HCM-577	24		
				HCM-578	21	6	8
				HCM-579	21		
				HCM-580	17		

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HCM-581	17	10	7	HCM-1169	3		
HCM-582	13	1	3	HCM-1240	6,8, 10,12	2	4
HCM-583	24			HCM-1243	6,8, 10,12	16	31
HCM-584	24	1	5	ICM-1110	17		
HCM-596	6,7,9			ICM-1111+	17		
HCM-598	11	16	30	ICM-1112+	18		
HCM-600	6,8, 10,12			ICM-1114	18		
HCM-601	6,8,10			ICM-1115+	18		
HCM-602	12	16	29	ICM-1116+	18		
HCM-604 (C.N.) (S.N.)	1			ICM-1117+	18		
HCM-627 (C.N.)	5, 7,9			ICM-1118	18		
HCM-629 (C.N.)	11			ICM-1119+	18		
HCM-645	2	19	1	ICM-1120	18		
HCM-661 (C.N.)	5			ICM-1121	19		
HCM-662 (C.N.)	7			ICM-1178	18		
HCM-663 (C.N.)	9			ICM-1302	17		
HCM-664 (C.N.)	11			ICM-1369A	5,7, 9,11	16	1
HCM-676	13	16	19	ICM-1512	5		
HCM-693	25			LWL-71	7,9, 10,12		
HCM-694	26			LWL-72	7,9, 10,12		
HCM-1050	17			NL-11M1	7,8, 10,12		
HCM-1123	20			NL-12M1	4,19, 20,22		
HCM-1138	4,19	6	1	NL-13M1	6,8, 9,11		
HCM-1138-1	19						
HCM-1138-2	19						

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NL-16U1	4	3	4	SL-9D17	24		
NL-17M1	4			SL-9D21	6,8, 10,12		
NL-18M1	18			SL-9D23	13,23		
NL-19U1	19			SL-9E11	2	14	15
NL-28U2	5	17	12	SL-9J13	29		
NL-29U2	6,8, 10,12	16	26	SL-9P11	18		
NL-30M3	1			SL-10N14	4		
NL-34M3	1			SL-11A13	24		
NL-1150K	4			SL-11D9	7,8, 10,12		
NL-1204K	5,7, 9,11	16	6	SL-11H7	2		
NL-1284K	6,7, 9,11	16	22	SL-11K11	1		
NL-1335K	20,22			SL-11S5	4		
NL-1336K	6,8,10, 12,23			SL-11V17	19		
NL-1387K	2			SL-13D15	6,8, 9,11		
NP-3CS	25			SL-13H7	3		
NP-2066D1	25			SL-13S9	14		
NP-2066DS1	25			SL-14H18	3	17	1
PL-2832P	14			SL-15H13	2	19	5
PL-3027P	13,14			SL-15H17	3		
PL-3416P	18			SL-15H19	13	16	11
PLU-592-1/4"	5			SL-17D11	24		
SL-4J16	18			SL-17H17	16		
SL-5J11	18			SL-17S21	13		
SL-6J20	4	17	15	SL-18H14	5	17	13
SL-9B11	18			SL-19D15	1,2,19	14	3

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SL-23H23	13	16	16	THCM-204	6,7, 9,11	16	24
SL-25H23	2			TLA-1083	17	14	12
SL-925V	18			TRAN-75-11	19		
SL-3194V	18			TRAN-75-30	19		
SL-3748V	18			UA-712	2		
SL-6535V	18			UA-772	2		
SL-7815V	4,19, 20,22			UAL-363	2	14	18
SL-8789V	20			UAL-592	17	14	14
SL-8792V	20,22			UHL-2243	19		
SL-9015V	2	14	16	UHN-107A	29		
SL-9016V	3	19	14	UIM-382	17	14	11
SL-9173V	23			UIM-383	17		
SPGL-38S	4	3	3	UIM-390	17		
SPGL-329S	5,7, 9,11	16	5	UIM-395	17		
SPGL-358S	5	17	9	UIM-407	17	10	6
SPGL-1676S	6,8, 10,12,13	16	27	UIM-408	17		
SPGL-2643S	18			UN-30	13		
SPGL-4025S	3	19	11	UPRA/D32/ABS	5,7, 9,11, 19,25		
SPGL-4026S	3	19	10	USA-71	5	17	5
TCF-496	6,8, 10,12			WL-179T	13		
TDA-27	22			WL-365T	13		
TDA-28	20			WL-505T	18		
TDA-33	20			WL-509T	2,18,19		
THCM-24	6,7, 9,11	16	32	WL-510T	19		
				WL-512T	6,8,10,12	16	25

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WL-513T	1			XE729B1	30		
WL-515T	1			XE832G250	21		
WL-811T	29			XE839A32	21		
WL-1396T	3,4,29			XE860A54-1	6,8, 10,12	6	9
WL-1862T	1			XE861A54-1	6,8, 10,12		
WL-1919T	20,22			XE881A2	6,8, 10,12		
WL-1920T	22			XF234A7	17	14	13
WL-1922T	6,8,9, 11,20			XH200E46	29		
WL-1923T	24			XH400E39	6,8, 10,12		
WL-1941T	3	19	4	XH603A8	29		
WL-1988T	17						
WL-1989T	7,8, 10,12						
WL-2022T	2						
WL-2049T	2						
WL-2074T	13	16	17				
WL-2154T	23						
WL-3002T	6,8,10, 12,23						
WL-3003T	24						
WL-3006T	3						
WL-3007T	19						
WL-3008T	29						
WL-3012T	5	17	11				
WL-3018T	2						
XE375D4	6,8, 10,11	7	5				
XE603A2	6,8, 10,12						

SECTION IX
ILLUSTRATIONS

LEGEND FOR FIGURE 1

Ref. No.		Part No.
1	Control Enclosure Cover	523
2	Post Handle	113
3	Beam Tripping Rod	582
4	Pressure Setting Control Knob	ED-1552
5	Rod Handwheel	243
6	Stroke Control Limit Switch Assembly	584

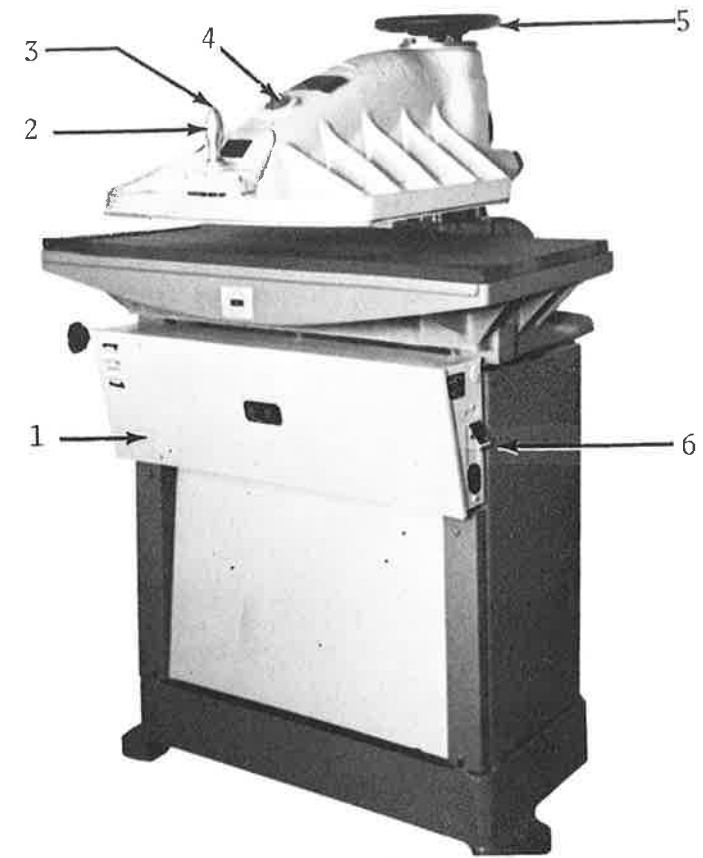


Figure 1 - HCM-B Right Front View

LEGEND FOR FIGURE 2

Ref. No.		Part No.
1	Side Panel (Left)	518
2	Cable Handwheel	282
3	Ground Wire	---
4	Plunger Operating Button	HCM-1240
5	Control Enclosure Cover	523
6	Front Panel (Front)	516

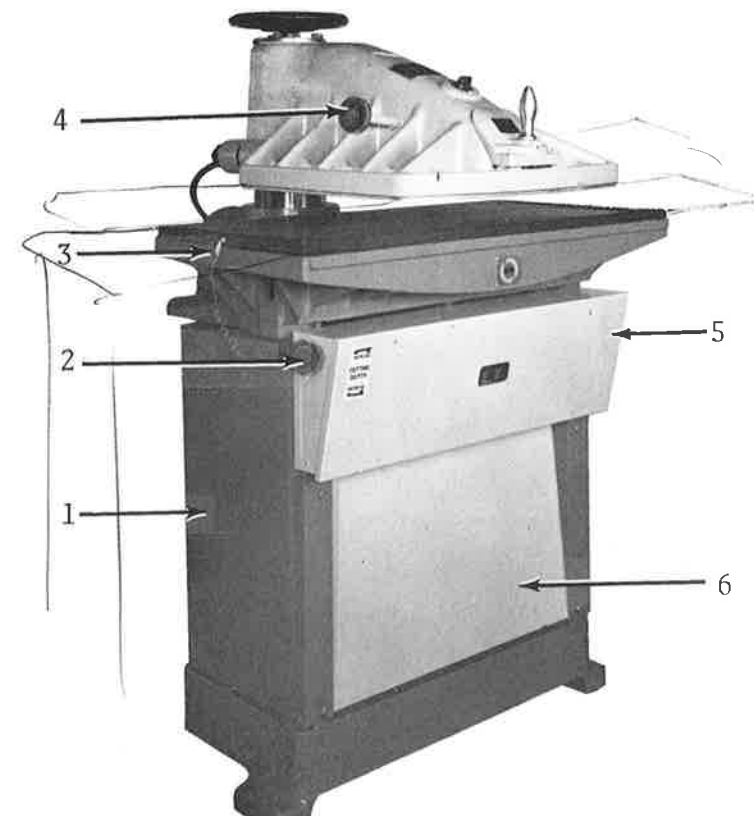


Figure 2 - HCM-B Left Front View

LEGEND FOR FIGURE 3

Ref. No.		Part No.
1	Trip Rod	276
2	Trip Slide Unit	554
3	Trip Rod Spring	SPGL-38S
4	Trip Rod Stop	NL-16U1
5	Piston Packing Retainer	507
6	Cable Tube Ferrule	281
7	Cable Tube	280
8	Flexible Cable (Inside)	279
9	Trip Slide Cable End	278
10	Cable End Locknut	NL-16U1
11	Stroke Limit Switch	ED-10302

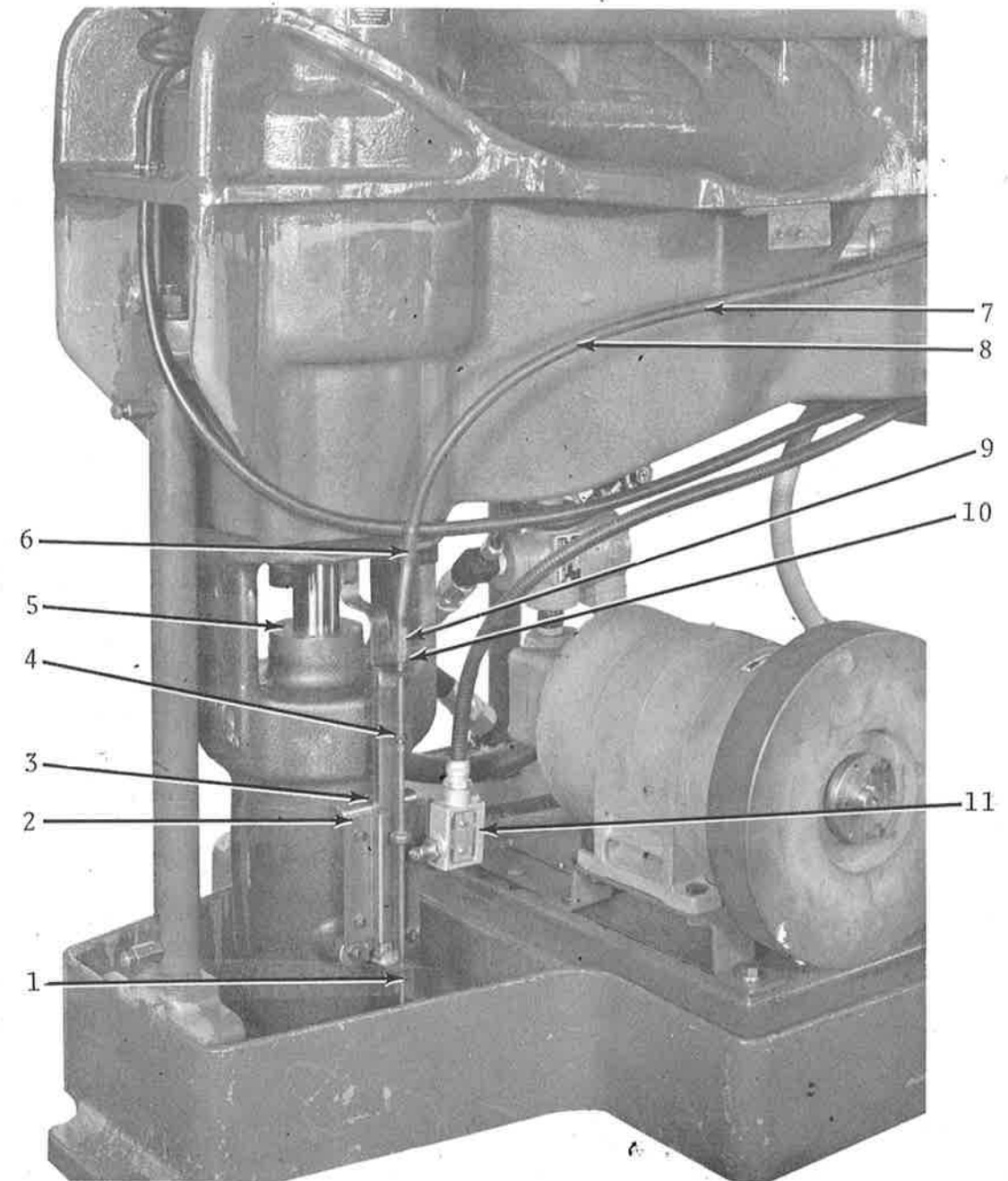


Figure 3 - Beam Tripping Mechanism

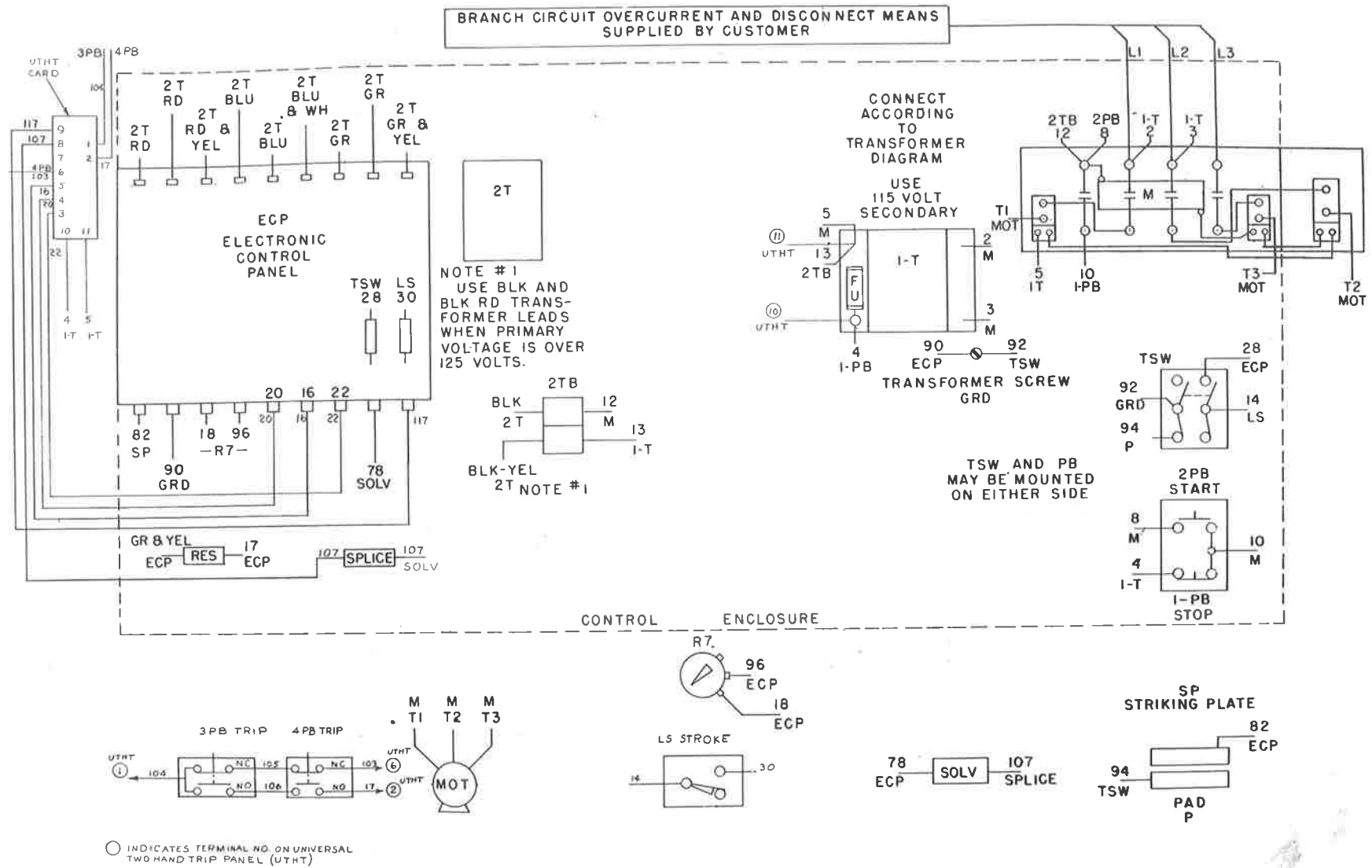


Figure 4 - Connection Diagram

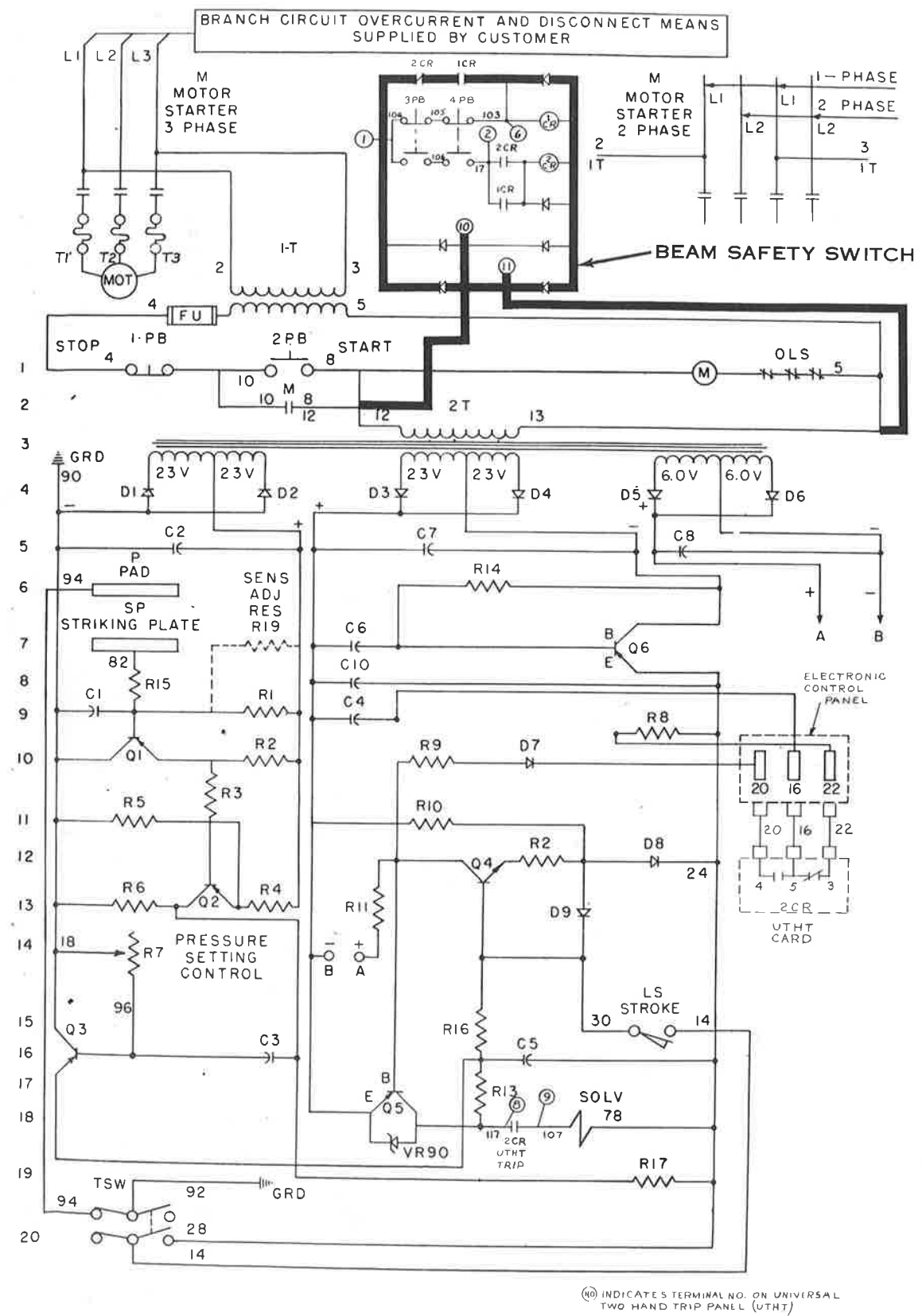


Figure 5 - Schematic Diagram

LEGEND FOR FIGURE 6

Ref. No.		Part No.
1	Control Enclosure	1138
2	Transformer	ED-14945
3	Transformer Fuse (Dual Element 1 amp)	ED-4794
4	Control Power Transformer	ED-14952
5	Magnetic Motor Starter	ED-11095
6	Transfer Switch (Hytronic-Stroke)	ED-11074
7	Pushbutton Station	ED-6653
8	Electronic Panel Assembly	578
9	Beam Safety Switch Electronic Panel	XE860A54-1

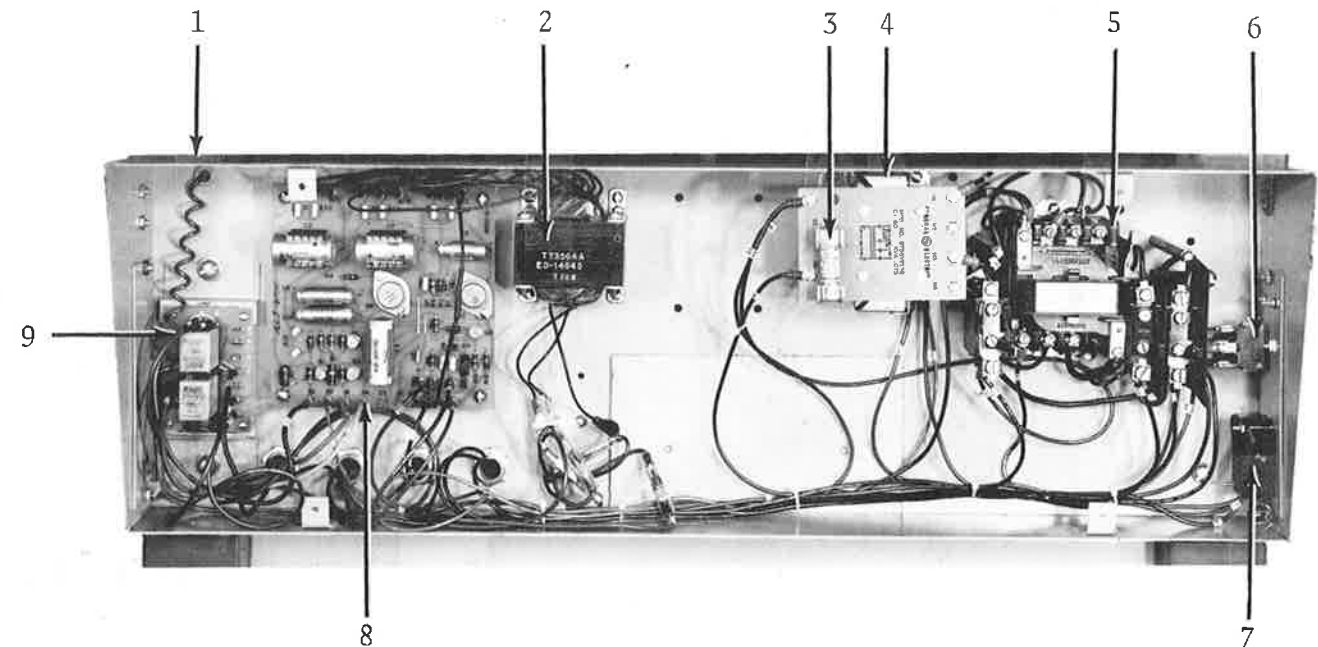


Figure 6 - Control Enclosure (Cover Removed)

LEGEND FOR FIGURE 7

Ref. No.		Part No.
1	Striking Face (13" Beam)	206
2	Bracket Conductor Strip	576
3	Post Bracket - Unit Assembly	575
4	Trip Switch	ED-17619
5	Beam Safety Switch (Two Hand Trip)	XE-375D4
6	Beam Height Adjusting Rod Handwheel	243
7	Pressure Setting Control Knob	ED-1552
8	Striking Face Insulation (13" Beam)	355
9	Striking Face Contactor	13

BEAM SIZES

	13"x28-1/2"	13"x31"	18"x31"	24"x31"
Swinging Beam	358	359	360	361
Striking Face Insulation	355	356	264A	357
Striking Face - Complete	206	211	216	221
Two Hand Trip Kits (Field Installation)	693	693	693	694

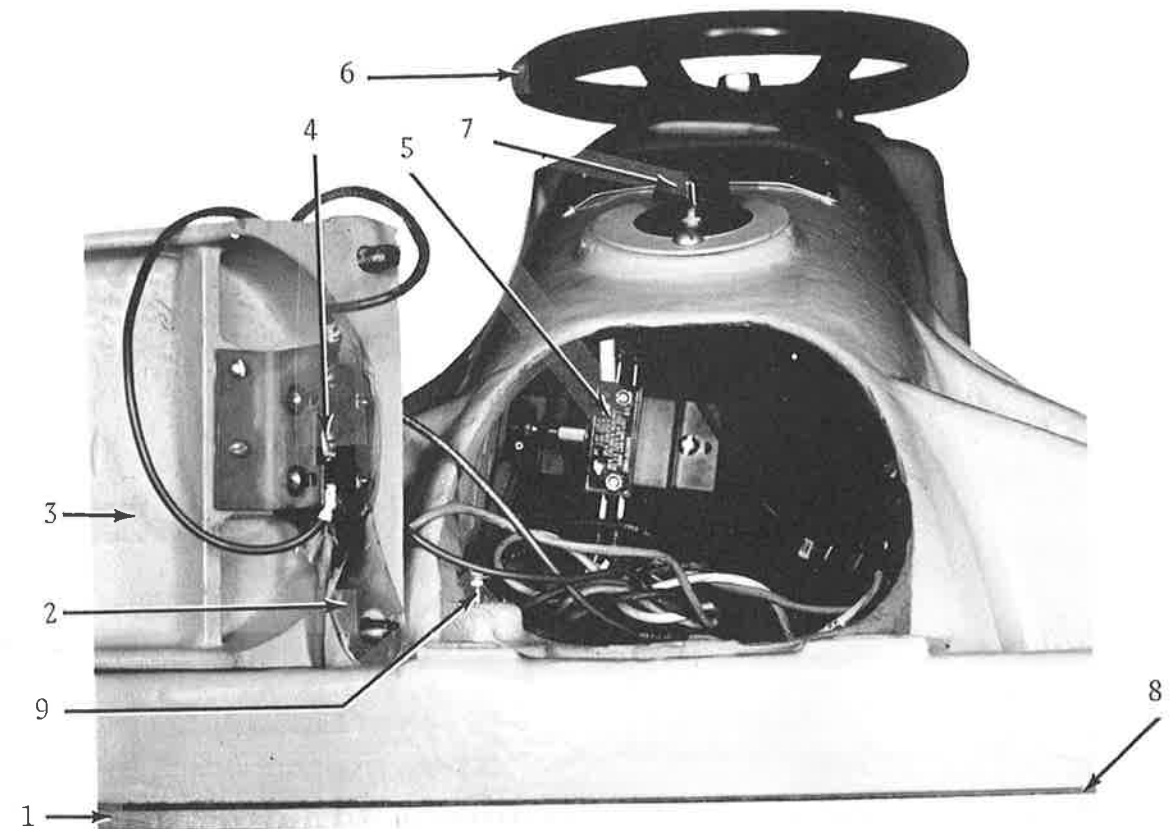


Figure 7 - Swinging Beam Components

COMPONENT LIST

DESIGNATION	NAME	USM PART NO.	VALUE
R1	Resistor	ED-1539	1.2M
R2	Resistor	ED-1540	68K
R3	Resistor	ED-1541	470
R4	Resistor	ED-1542	330
R5	Resistor	ED-14409	1K
R6, R8, R10, R16	Resistor	ED-14425	4.7K
R9	Resistor	ED-1544	1.8K
R11	Resistor	ED-14453	2.2K
R12	Resistor	ED-14454	1.3K
R13	Resistor	ED-14423	10K
R14	Resistor	ED-1545	68
R15	Resistor	ED-1546	270K
R19	Resistor	Selected at manufacture	
D1 thru D9	Diode	ED-17000	-----
C1	Capacitor	ED-14125	.001 MFD
C2, C7	Capacitor	XE-832G250	250 MFD
C3	Capacitor	ED-14160	4MFD
C4	Capacitor	ED-14149	.1MFD
C5	Capacitor	ED-14129	.1MFD
C6, C10	Capacitor	ED-14152	30MFD
C8	Capacitor	ED-14131	50MFD
Q1	Transistor	ED-17003	-----
Q2	Transistor	ED-17004	2N404A
Q3	Transistor	ED-17009	2N2043A
Q4	Transistor	ED-17010	2N1613
Q5	Transistor	ED-17019	B10747
Q6	Transistor	ED-17006	2N420
Z1	Zener Diode	ED-17011	VR90

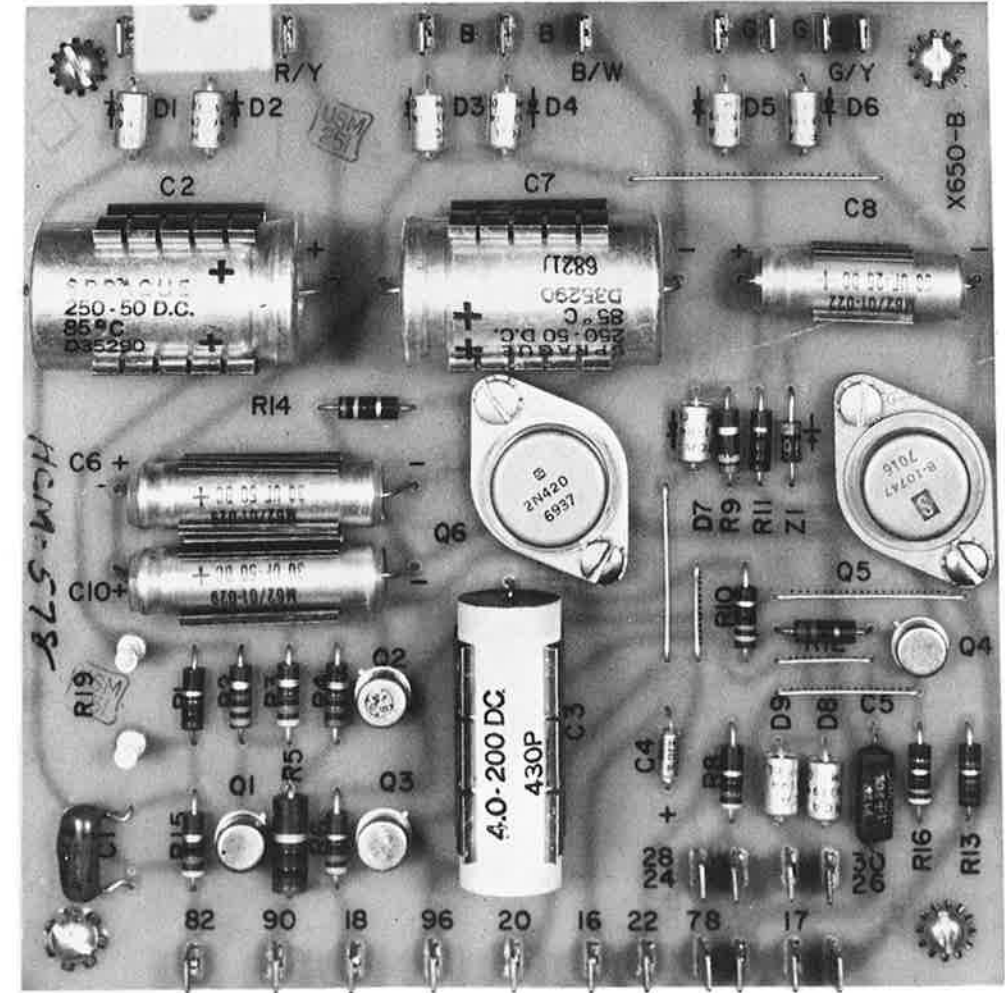


Figure 8 - Electronic Components

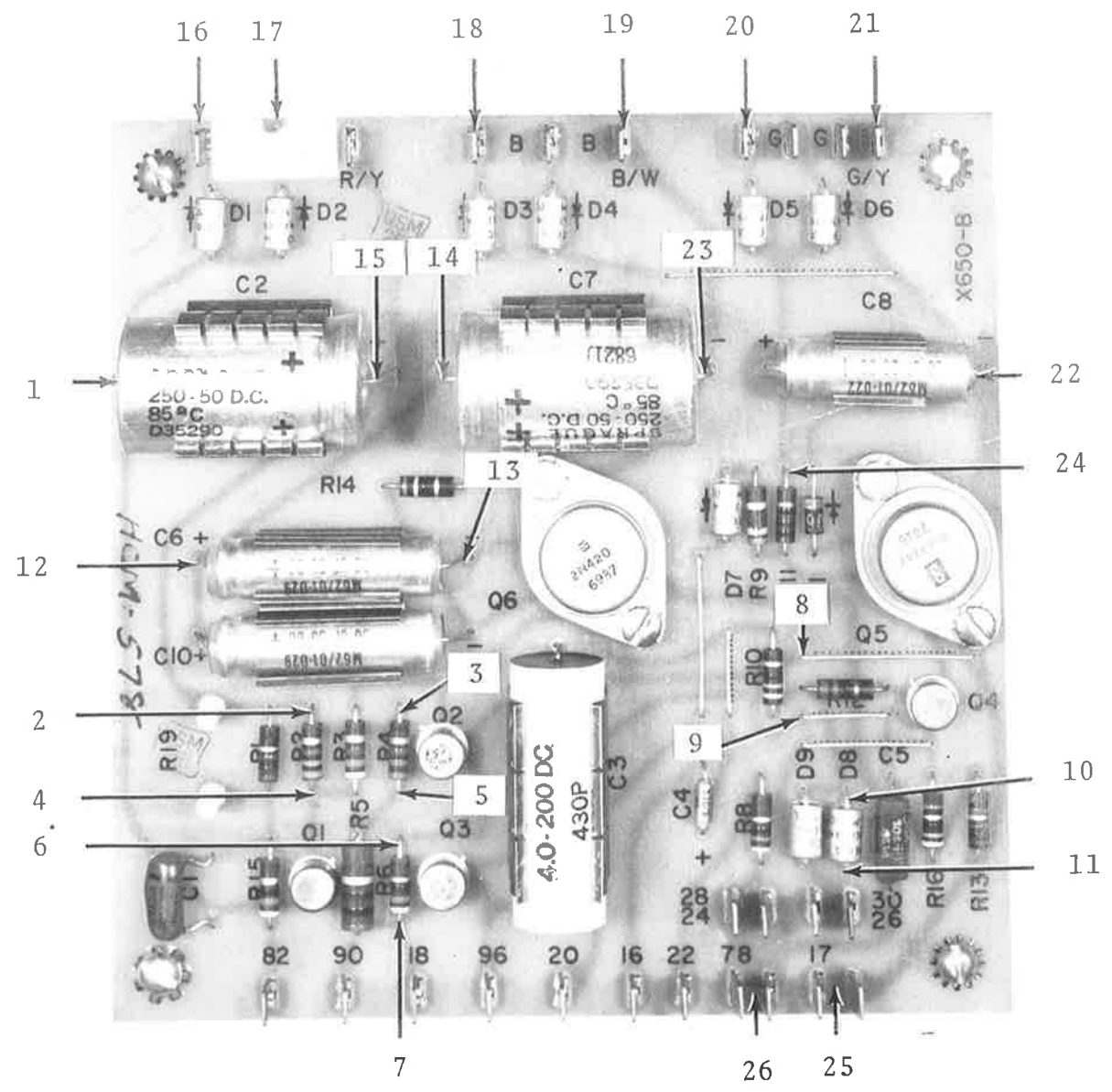


Figure 9 - Panel Test Points

LEGEND FOR FIGURE 10

Ref. No.

- 1 Pump Intake Nipple Seal
- 2 Pump Intake Nipple
- 3 Motor Flywheel
- 4 Motor
- 5 Solenoid Valve
- 6 Relief Valve Reducing Bushing
- 7 Relief Valve
- 8 Cylinder Drain Hose
- 9 Pump

Part No.

- 510
- 539
- 541+
-
- ED-13027-2
- UIM-407
- 581
- 514
- 543

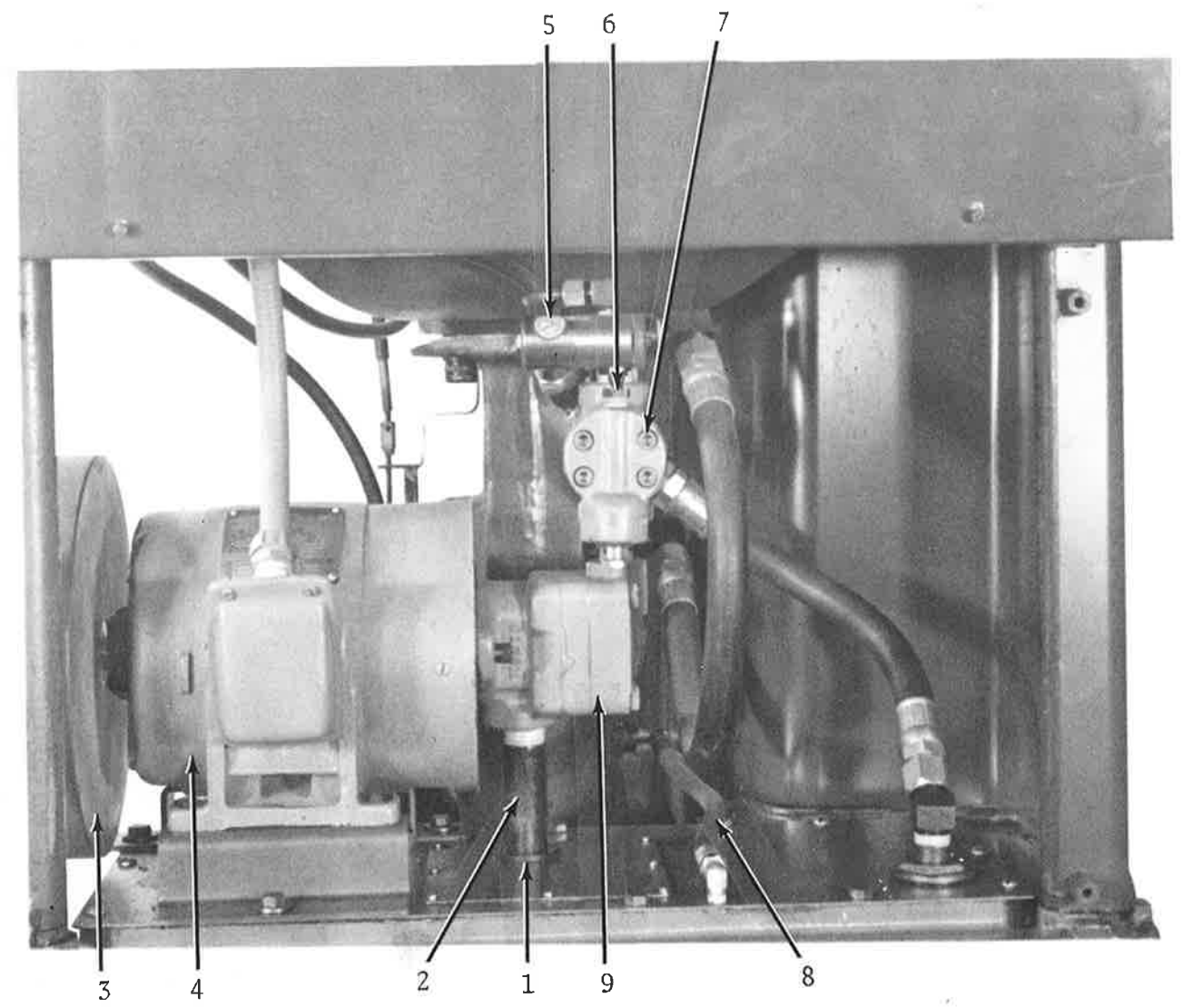


Figure 10 - Front View - Hydraulic Components

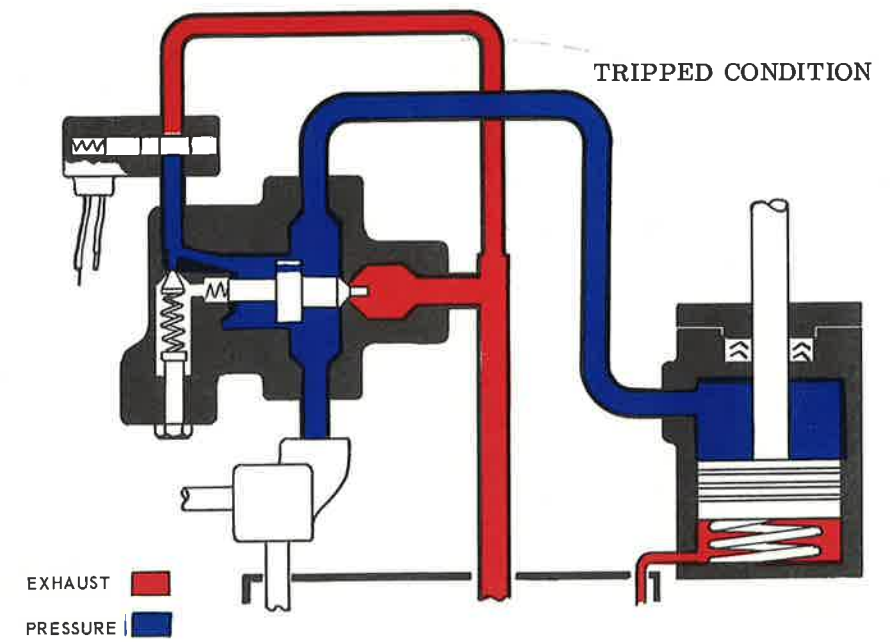
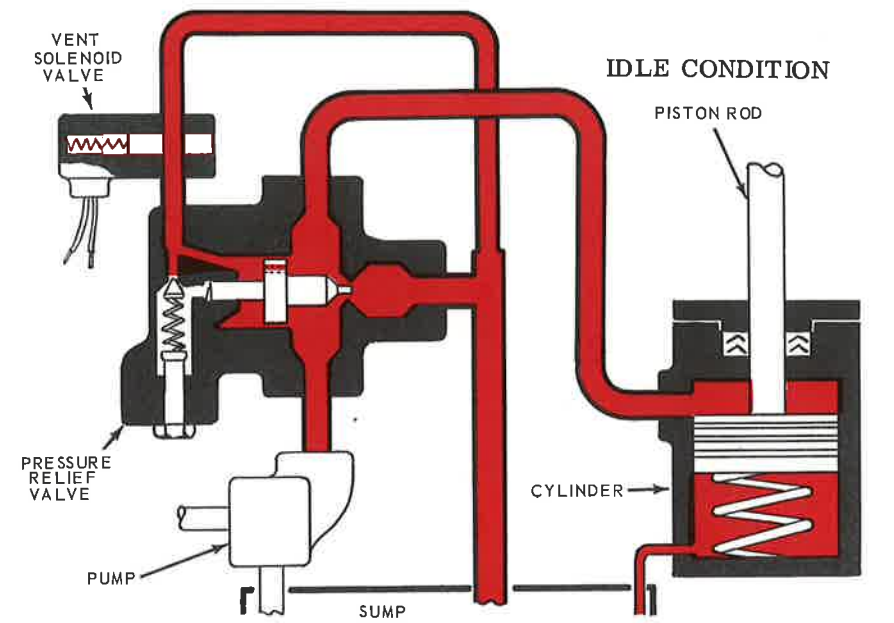


Figure 11 - Hydraulic Flow Diagram

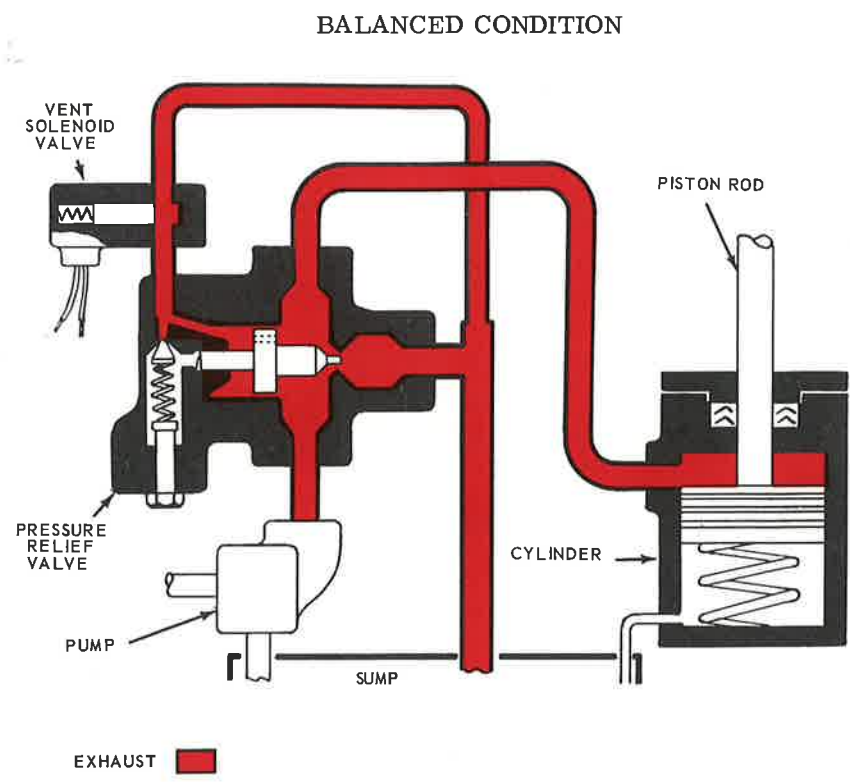


Figure 11A - Hydraulic Flow Diagram

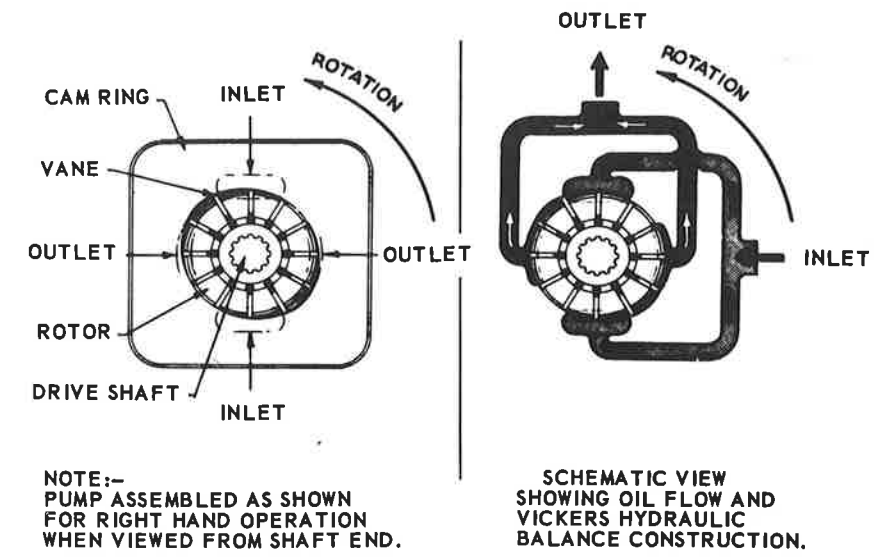


Figure 12 - Pump Flow Diagram

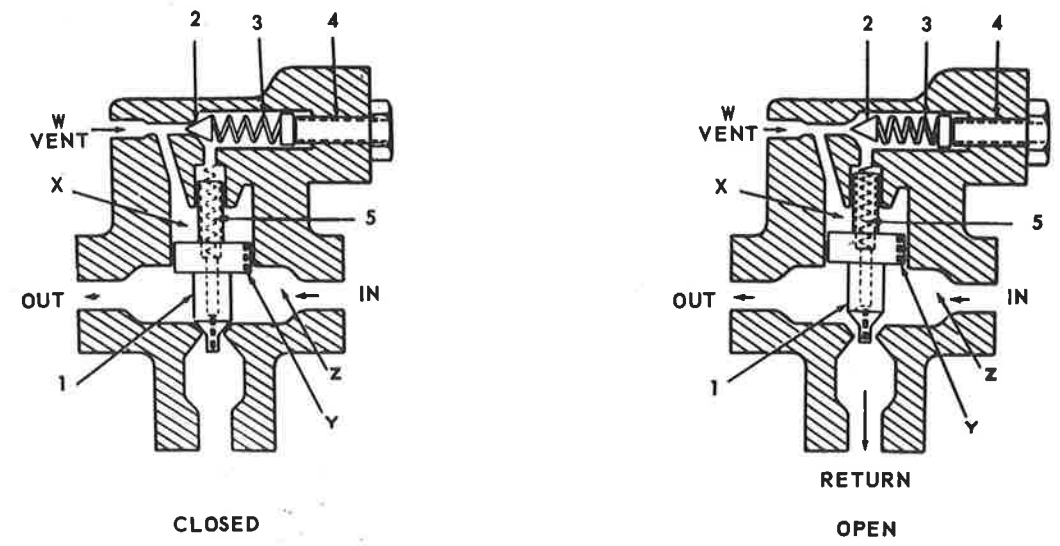


Figure 13 - Pressure Relief Valve

LEGEND FOR FIGURE 14

Ref. No.

Part No.

1	Base Cover Gasket - Right Front	565
	Base Cover Gasket - Left Rear	564
2	Base Cover	534
3	Base Cover Screw	SL-19D15
4	Hose Elbow (In Sump Cover Bushing)	548
5	Exhaust Hose - Complete (To Sump)	547
6	Hose - Complete (To Cylinder)	508
7	Relief Valve	581
8	Hose Elbow (To Cylinder)	545
9	Transfer Switch (Hytronic - Stroke)	ED-11074
10	Switch Cover	285
11	Relief Valve Street Elbow (To Cylinder)	UIM-382
12	Solenoid Valve Pipe Plug	TLA-1083
13	Hose Elbow	XF234A7
14	Cylinder Drain Elbow	UAL-592
15	Base Cover Screw	SL-9E11
16	Access Panel Screw	SL-9015V
17	Filter Panel	538
18	Oil Filter Gasket	UAL-363
19	Base Oil Filler	542
20	Cylinder Drain Elbow	UAL-592

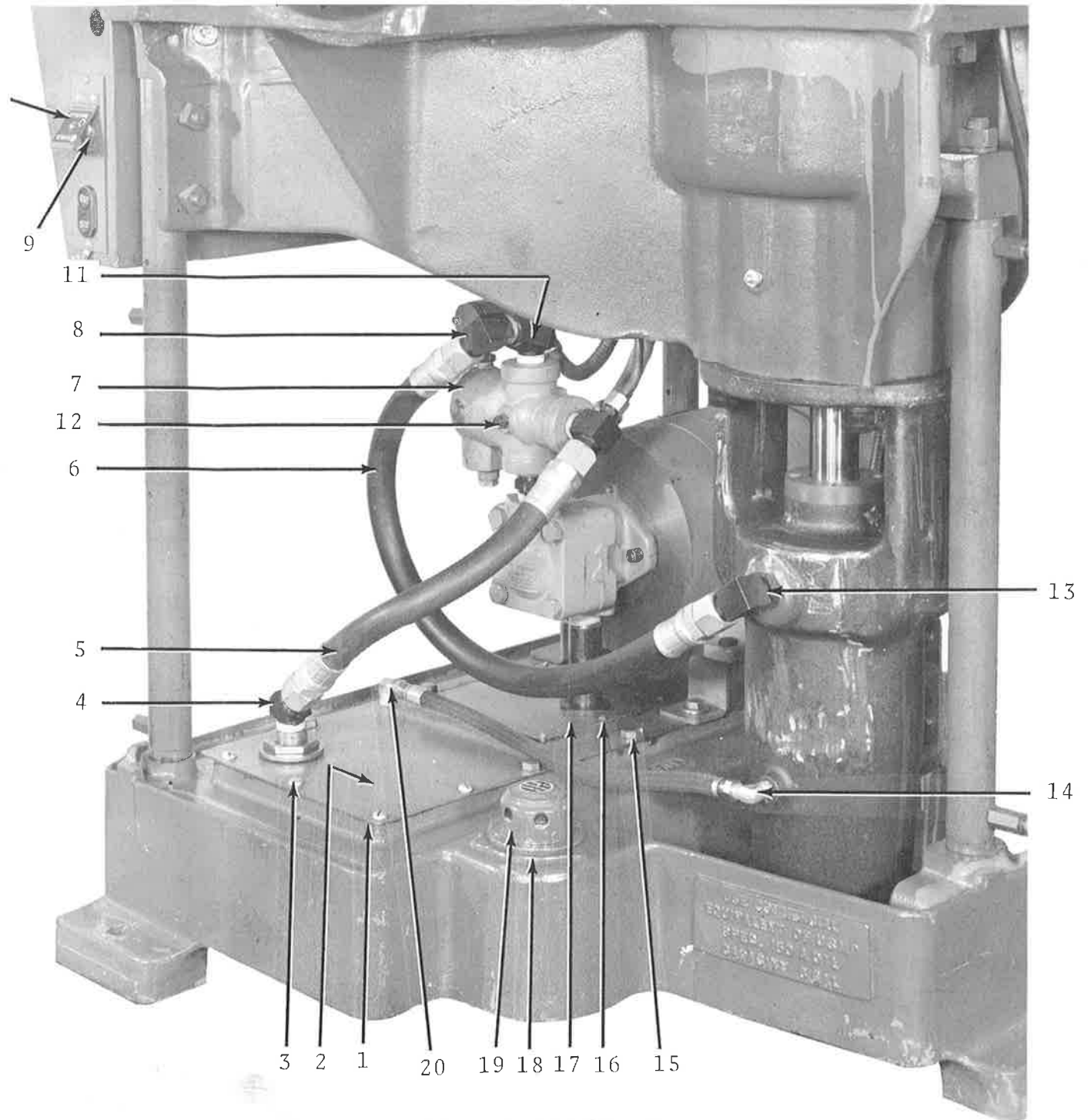


Figure 14 - Hydraulic Components

OIL ELEVATING SCREW
THROUGH HOLE IN SPINDLE
CAP. USE USM SPEC. NO.300A
OIL WEEKLY

SPINDLE CHAMFER
USM SPEC. NO. 300A
OIL DAILY

SPINDLE BEARING (INSIDE)
GREASE LIGHTLY EACH WEEK.

FILL RESERVOIR WITH 6
GALLONS OF USM SPEC.
NO. 150B OIL. CHANGE
ANNUALLY. CHECK
PERIODICALLY AND ADD
OIL IF NEEDED. OIL
LEVEL SHOULD BE APPROX.
2-1/4" BELOW TOP.

NOTE: SEE USM MACHINERY HANDBOOK FOR COMMERCIAL EQUIVALENTS
OF USM LUBRICANTS.

Figure 15 - Lubrication Chart

LEGEND FOR FIGURE 16

Ref. No.

Part No.

1	Striking Face Screws		ICM-1369A
2	Striking Face	(13"x28-1/2")	204
3	Striking Face Insulation	(13"x28-1/2")	355
4	Striking Face Contactor		13
5	Striking Face Contactor Spring		SPGL-329S
6	Contactor Nut		NL-1204K
7	Contactor Insulator		202
8	Post Bracket		575
9	Post Handle		113
10	Tripping Rod Support Post		112
11	Bracket Screw		SL-15H19
12	Beam Tripping Rod		582
13	Tripping Switch		ED-17619
14	Swinging Beam -	12"x28-1/2"	358
		13"x31"	359
		18"x31"	360
		24"x31"	361
15	Beam Screw Washer (Upper)		325
16	Beam Screw (Upper)		SL-23H23
17	Retaining Nut Washer		WL-2074T
18	Beam Cap Retaining Nut		676
19	Beam Cap Stud (Lower)		324
20	Beam Cap (Lower)		32
21	Screw Insulating Nut		205
22	Bracket Retaining Nut		NL-1284K
23	Trip Switch		XE375D4
24	Switch Sub-Plate		THCM-204
25	Switch Mounting Rod Lockwasher		WL-512T
26	Switch Mounting Rod Retaining Nut		NL-29U2
27	Plunger Spring		SPGL-1676S
28	Plunger Operating Button		1240
29	Switch Operating Plunger		602
30	Switch Mounting Bracket Rod		598
31	Trip Switch Spacer		1243
32	Switch Mounting Bracket		THCM-24

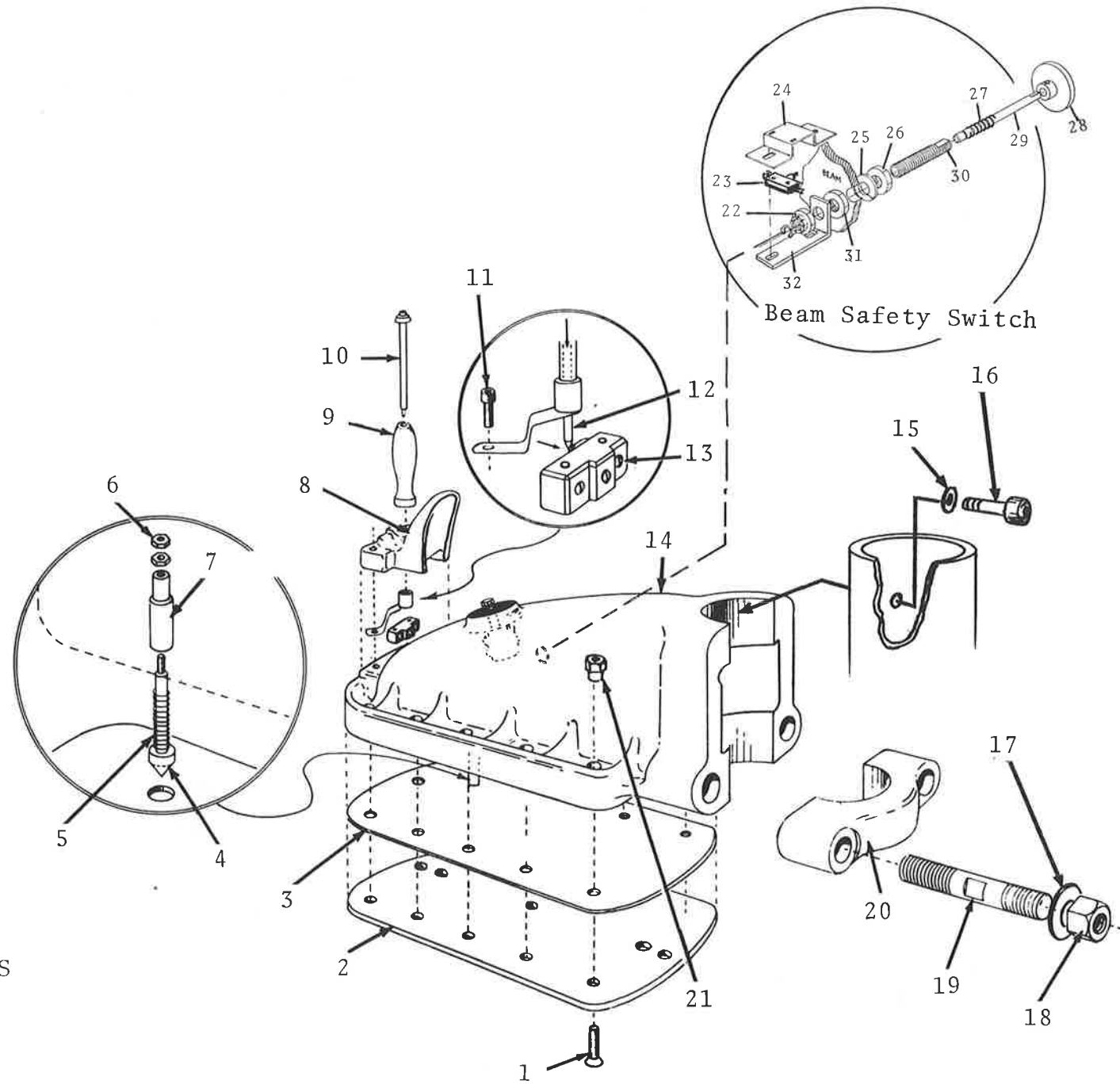


Figure 16 - Swinging Beam Parts - Exploded View

LEGEND FOR FIGURE 17

Ref. No.		Part No.
1	Piston Connecting Nut Screw (4)	SL-14H18
	Nut Screw Lockwasher (4)	WL-1941T
2	Piston Thrust Bearing	60
3	Spindle Adjusting Screw	183A
4	Spindle Adjusting Rod	199
5	Handwheel Key	USA-71
6	Beam Spindle	312A
7	Spindle Cap	400
8	Handwheel Locking Ball	GR-266
9	Locking Ball Spring	SPGL-358S
10	Rod Handwheel	243
11	Rod Handwheel Spring Washer	WL-3012T
12	Handwheel Nut	NL-28U2
13	Cap Screw	SL-18H14
14	Spindle Bumper Block	48A+
15	Block Screw	SL-6J20
16	Piston Connecting Nut	388+
17	Piston	527

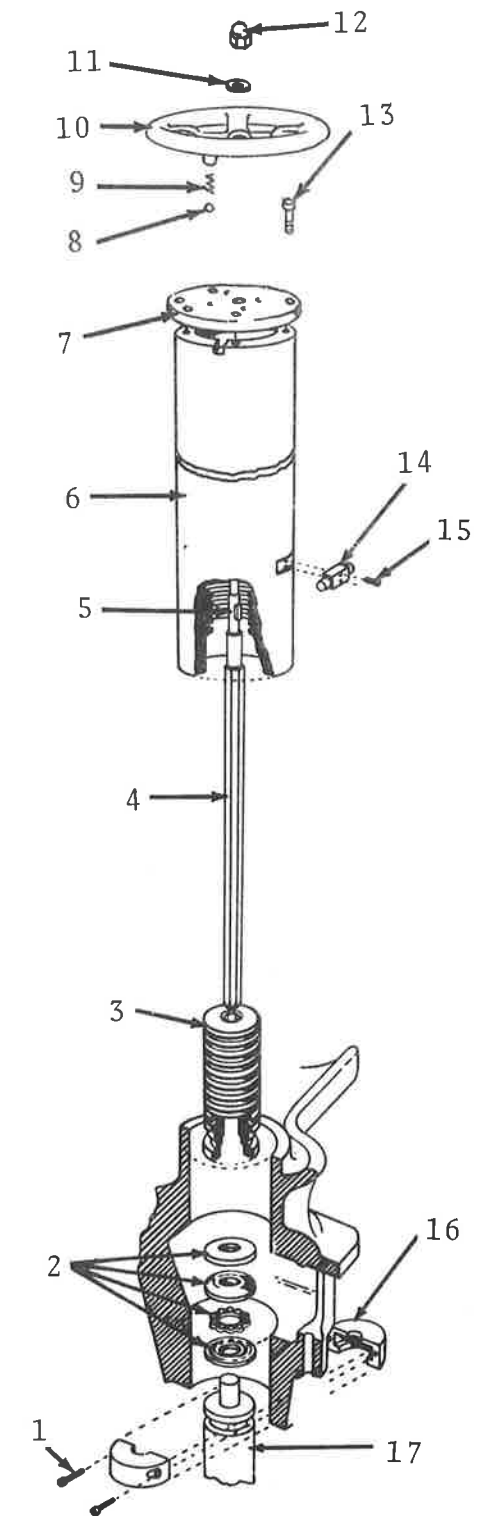


Figure 17 - Beam Spindle and Connecting Parts - Exploded View

LEGEND FOR FIGURE 18

Ref. No.	
1	Cover
2	Spring
3	Pressure Plate
4	O-Rings
5	Body
6	Bearing
7	Lock Ring
8	Spacer
9	Seal
10	Pin (2 used)
11	Vane (12 used)
12	Rotor
13	Ring
14	Screw (4 used)

Pump - HCM-543

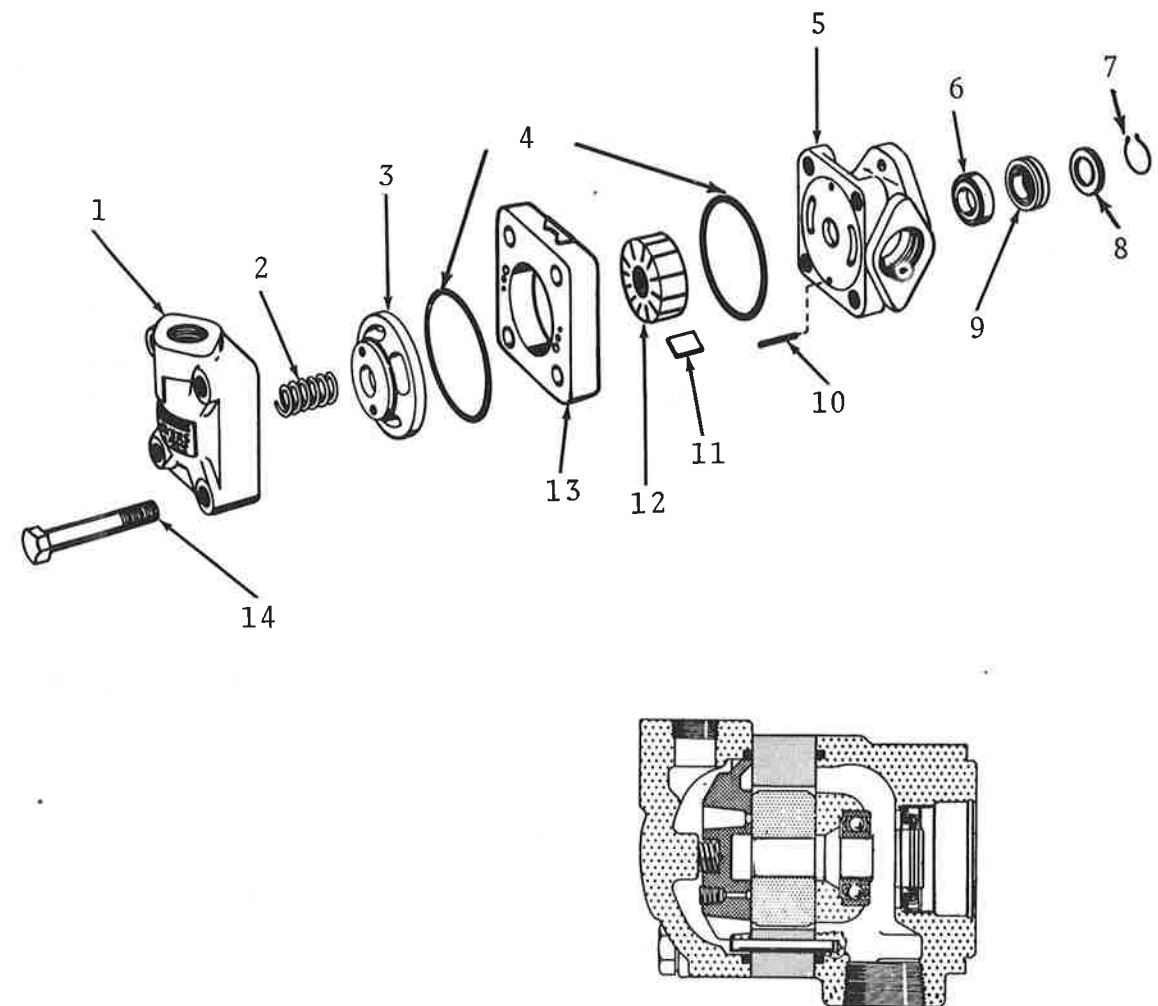


Figure 18 - Hydraulic Pump - Exploded View

LEGEND FOR FIGURE 19

Ref. No.		Part No.
1	Cylinder (Exhaust)	645
2	Piston Packing	533
3	Piston Packing Retainer	507
4	Retainer Screw Lockwasher	WL-1941T
5	Retainer Screw	SL-15H13
6	Piston Buffer	566
7	Chamfers	----
8	Piston	527
9	Piston Ring (3 used)	526
10	Piston Return Spring - Inside	SPGL-4026S
11	Piston Return Spring - Outside	SPGL-4025S
12	Piston Return Spring - Cap	501
13	Cap Screw Lockwasher (8 used)	WL-1941T
14	Piston Return Spring Cap Screw (8 used)	SL-9016V

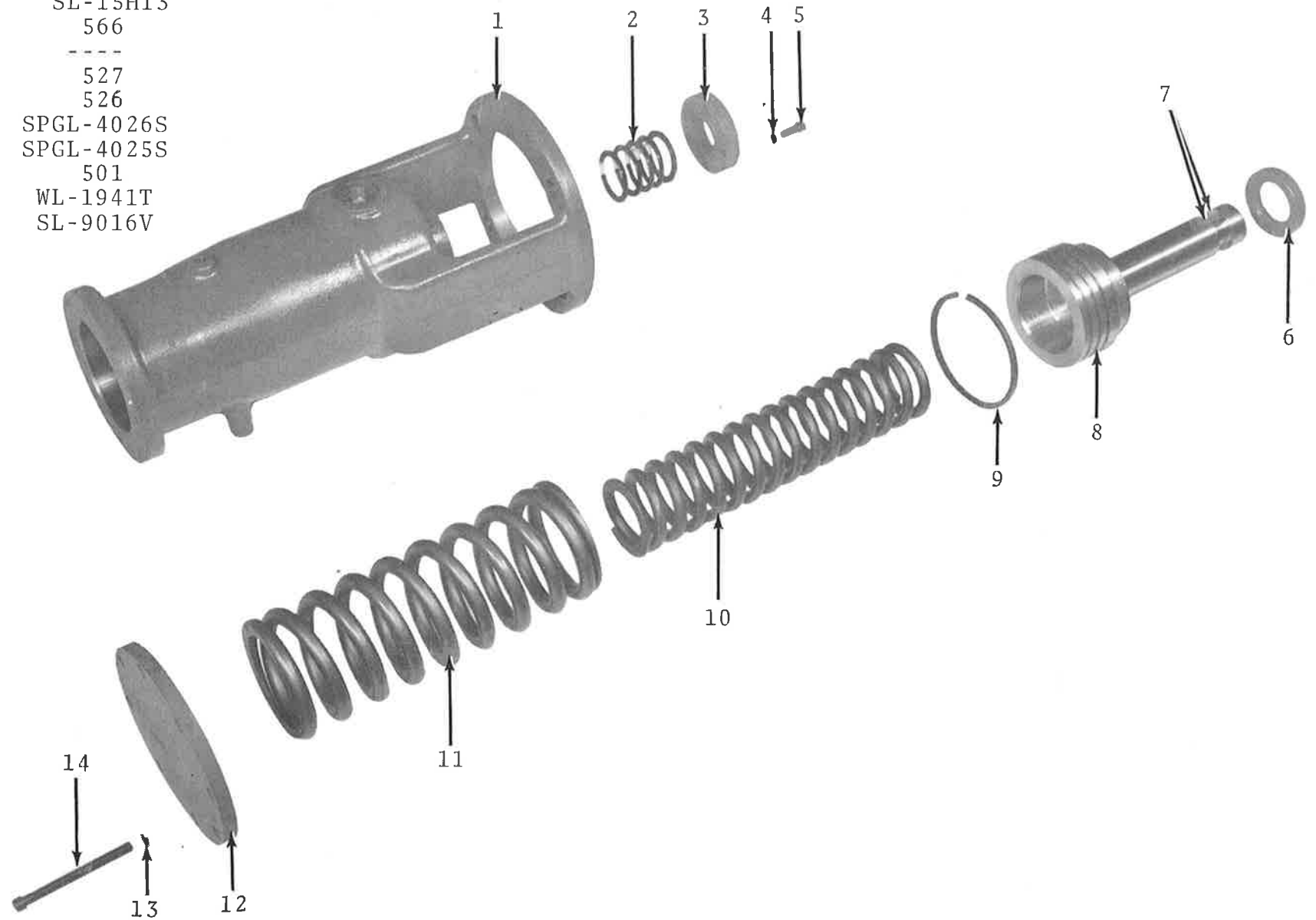


Figure 19 - Cylinder Parts - Exploded View