

**NORTON**  
**8 x 24" HYDRAULIC SURFACE GRINDER**  
**INSTRUCTION & PARTS MANUAL**  
**No. 1915-6**

The descriptions, illustrations, and specifications as given, were correct at the time of printing. However, since it is the policy of Norton Company to constantly improve its products, those machines built at earlier or later dates may differ from these details.

For factory direct parts and service please contact us at the address below.

Chas. G. Allen, Inc.  
25 Williamsville Road  
Barre, MA 01005  
Tel: (978) 355-2911  
Fax: (978) 355-2917

## INDEX

Section I	<u>Page</u>
Operation	
Uncrating and Handling . . . . .	6
Mounting the Grinding Wheel . . . . .	7
Greasing and Oiling . . . . .	7
Oil for Hydraulic System . . . . .	7
Table Dogs . . . . .	7
Wet and Dry Grinding . . . . .	7
Operating Levers . . . . .	7
Starting the Table . . . . .	8
Bleeding the Hydraulic System . . . . .	8
Cross Feed Dogs . . . . .	8
Cross Feeds . . . . .	8
Cross Feed Motions . . . . .	9
Truing the Grinding Wheel . . . . .	9
Grinding the Work . . . . .	9
Section II	
Servicing	
Table Ways . . . . .	10
Saddle . . . . .	10
Changing the Wheel Spindle . . . . .	10
Mounting Spindle Belt . . . . .	10
Vee Type Belt . . . . .	10
Flat Belt . . . . .	11
Vertical Slide Adjustment . . . . .	11
Hydraulic Pressure . . . . .	11
Oil Filter . . . . .	11
Section III	
Construction	
The Hydraulic System . . . . .	12
Cross Feed . . . . .	13
Vertical Feed . . . . .	13
In the Event of Difficulty . . . . .	13
Section IV	
Parts Drawings . . . . .	17

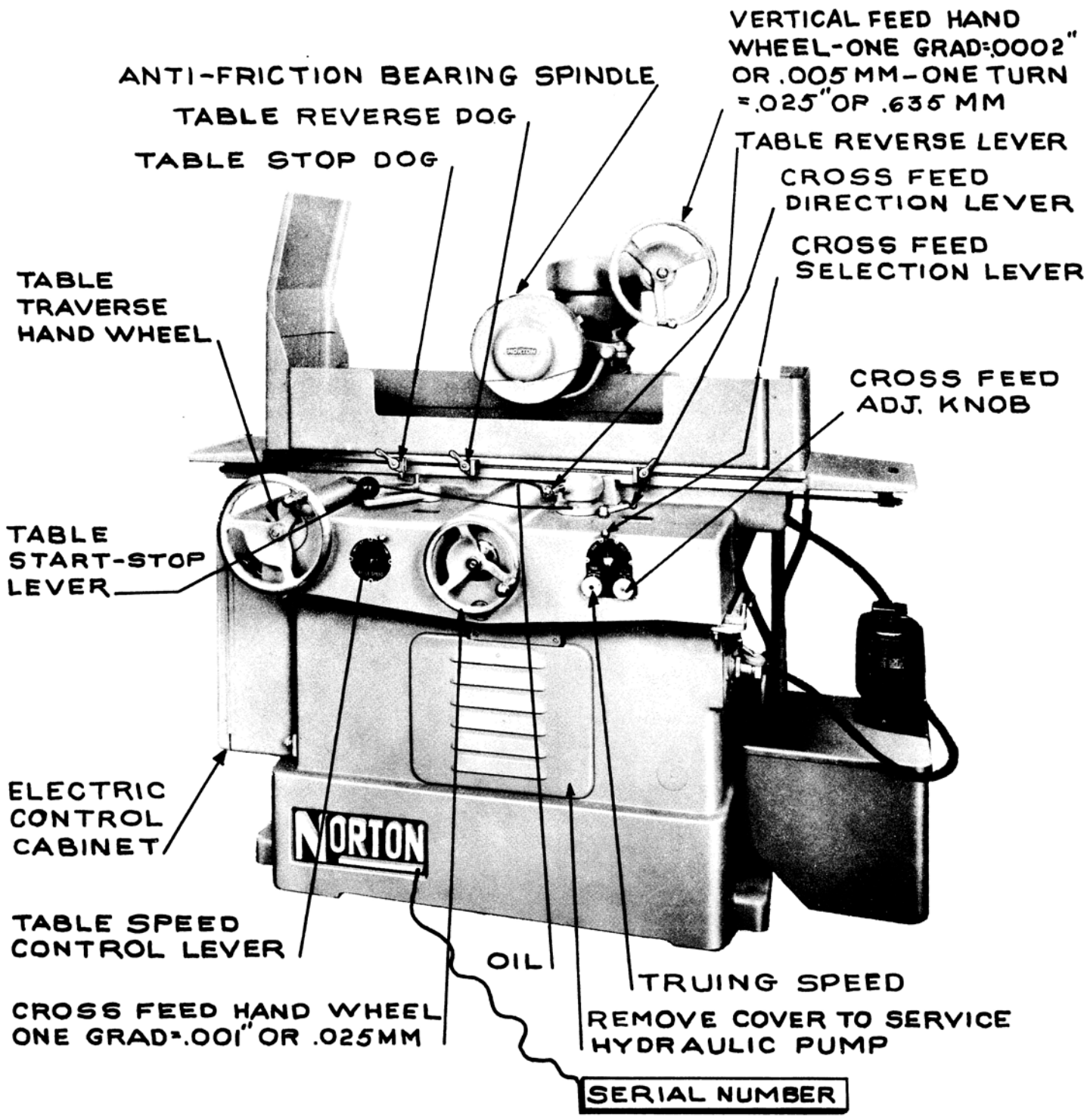
## ILLUSTRATIONS

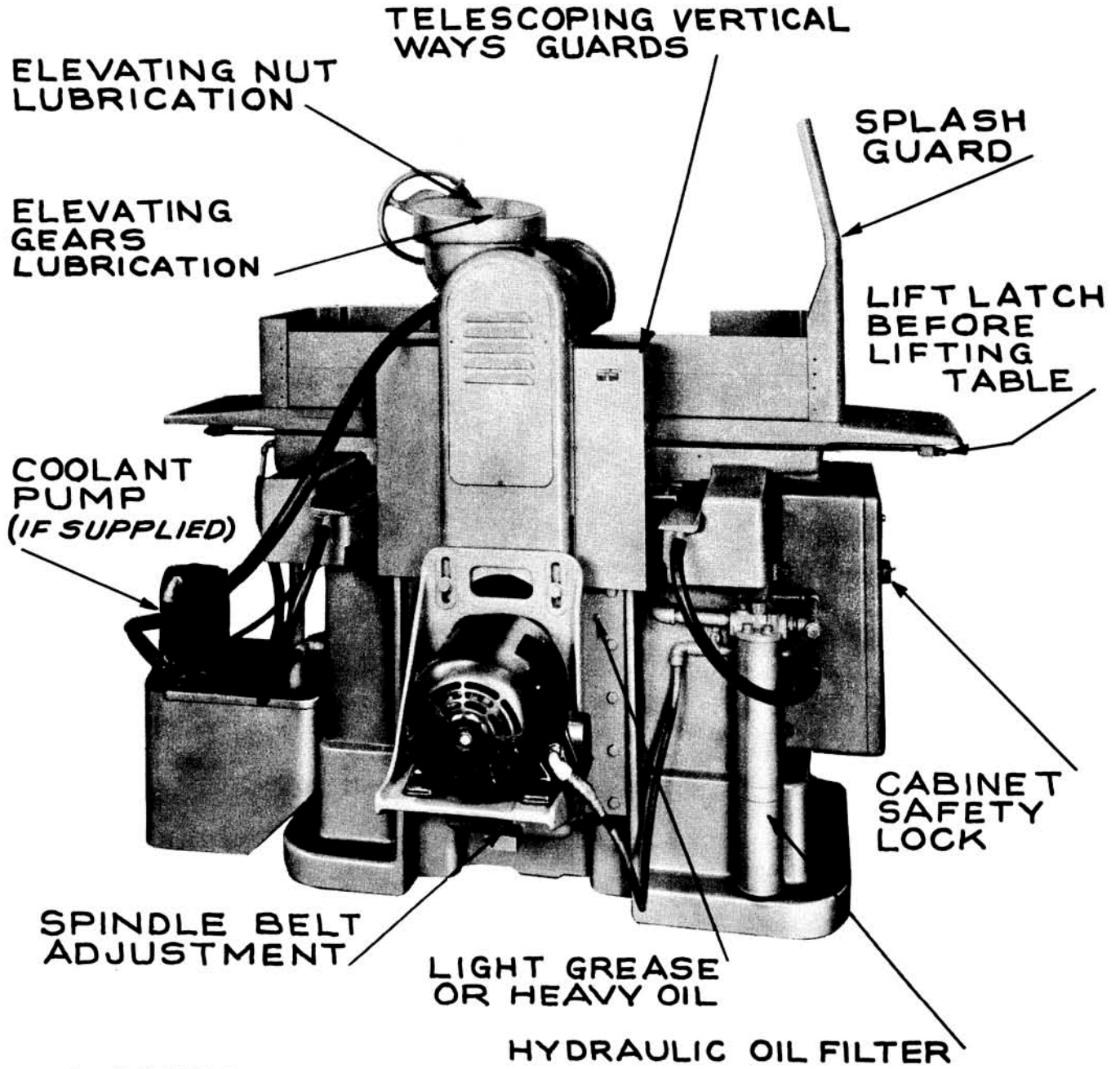
### Photographs

<u>Number</u>	<u>Title</u>	<u>Page</u>
N-6352-C	Front View of Machine . . . . .	4
N-6353-A	Rear View of Machine . . . . .	5
NC-5289	Hydraulic Diagram - Hand Operation . . . . .	14
NC-5287	Hydraulic Diagram - Automatic Cross Feed . . . . .	15
NC-5288	Hydraulic Diagram - Truing	16

### Drawings

SE-690-A	Vertical Wheel Feed . . . . .	18
SE-344-A	Cross Feed Half Nut Mechanism . . . . .	19
SE-394-A	Control Valve . . . . .	20
SE-694-A	Operating Levers . . . . .	21
SE-346-A	Table Hand Traverse Mechanism . . . . .	22
SE-688-A	Hydraulic Pump - Coolant Pump - Table Dogs . . . . .	23
SE-686-A	Table Cylinder and Valve . . . . .	24
SE-871-A	Flexible Hose Identification . . . . .	25





N 6353 A

## SECTION I

### OPERATION

There is very little reassembling to do upon receipt of a NORTON 8 x 24" Surface Grinder. On export shipments to some countries, customs requirements make it necessary to ship motors and other electrical equipment separately. In this case, of course, these units must be mounted after the machine is received. In the majority of cases, however, the motors and magnetic chucks are shipped mounted on the machine.

#### Uncrating and Handling

After uncrating the machine, remove the heavy grease from the bright parts with gasoline or kerosene. Move the machine to the position it is to occupy and level it from front to back and side to side, working from the finished surface of the sliding table. Be careful lifting the machine with a crane. Cored holes are provided in the base at each end and on the front and back sides to accept lifting bars. Sheet metal covers are provided to cover these holes when the machine is set up and in operation and may be in place when your machine is delivered. A sling can be rigged to these lifting bars and the machine lifted with little difficulty. Care must be exercised not to allow the sling to press against any of the lighter sections or members and break them when the machine is lifted. Use wooden wedges under edges of base to level machine. After the machine has been leveled it may be fastened to the floor by means of the lag screws through the holes provided in the base, if necessary.

After the machine has been located, remove the steel rods from around the pump unit within the base. These rods prevent the spring-mounted pump unit from swinging during transit. With their removal the unit should swing freely within the base.

Be sure that all interior hose and pipe connections are tight. Each hose is equipped at one end with a simple fitting and a union at the other end. Loosen the union before tightening the fitting. Otherwise the hose will take a twist which may ruin it. Be sure also, in tightening the union, that the hose does not twist. Hydraulic pulsation in a twisted hose will cause it to break quickly.

The hand wheels are readily mounted after which the motors can be connected. If an electromagnetic chuck is furnished, wire it to direct current with the proper characteristics.

### Mounting Grinding Wheel

The grinding wheels are packed separately, although included with the crate or box in which the machine is shipped. The grinding wheel is mounted on a sleeve or collet which in turn is mounted on the end of the spindle. Where a variety of work requires different wheels and frequent change, the best practice is to obtain a collet for each wheel so as to leave the wheel mounted permanently on this collet.

### Greasing and Oiling

Care should be taken in greasing and oiling this machine. The photographs on pages 4 and 5 indicate some of the points where lubrication should be applied, as will the special lubrication tags attached to the machine. All oil cups should be replenished and grease cups filled frequently. Follow maker's instructions for the anti-friction bearing spindle.

### Oil for Hydraulic System

A highest quality oil with inhibitors for rust, oxidation, and foam having a viscosity of 145-175 S. U. V. at 100 degrees F. is recommended for the hydraulic system. This oil should have lubricity additives for ways lubrication. Products to this specification are available from many refiners. This oil should be poured directly into the base through the front opening until the pump below the motor is completely submerged.

### Table Dogs

For experimental operation of the machine, place and lock the table reverse dogs approximately in line with the ends of the magnetic chuck. If this unit is not used, place them in line with the ends of the finished table surface.

### Wet and Dry Grinding

If the machine is equipped for wet grinding, fill the coolant tank with water and put in a quantity of grinding compound. Suppliers' instructions will give the correct proportions but in any event, do not have the coolant too rich. If special dust exhaust equipment for dry grinding is supplied, attach the dust hood to the wheel guard and connect the hood to either the central or individual exhaust system.

### Operating Levers

It is advisable at this point to become familiar with the various operating levers, especially the table start-stop lever, the cross feed selection lever and the hydraulic table speed control lever. (See Page 4)

Be sure the grinding wheel is clear of the table top or the magnetic chuck and also that the table start-stop lever is in the "stop" position.

### Starting the Table

Refer to page 4 and follow the procedure below:

1. Locate both the horizontal cross feed direction lever and the vertical selection lever in the "hand" positions.
2. Be sure the table dogs are properly in place and that the cross feed dogs are not set so as to tip down the table reverse lever. (See "Cross Feed Dogs" below)
3. Set the table speed control lever in the "slow" position.
4. Start the hydraulic motor.
5. Move the table start-stop lever to the "start" position and the table will traverse slowly back and forth.

### Bleeding the Hydraulic System

When a hydraulically operated machine stands idle for several hours, it may be necessary to "bleed" the system of air if this has found its way into the system with oil. Air in the system causes the units which are operated hydraulically to move in an unsteady or jerky manner. If a jerky motion of the table develops, it will continue until the air is removed. This is accomplished by unlatching the table piston at each end and traversing the piston several times by power the full length of its travel.

### Cross Feed Dogs

Now stop the table traverse and set the cross feed dogs which are mounted on the right end of the base. Move the saddle back and forth with the cross feed hand wheel and observe the action produced by these dogs. You will notice that, as the point on the side cam lever rides up onto the dog, the handle of the reverse lever is raised. Consequently, that portion of the reverse lever which normally contacts the table reverse dogs is depressed sufficiently to allow the left table reverse dog to pass over it. With the table traveling to the right it continues until the table safety stop dog contacts the table stop lever (see Page 4).

### Cross Feeds

With the automatic cross feed in use, a feed of zero to 3/16" per table reversal is obtainable.



Each graduation of the cross feed hand wheel represents .001" or .025mm. Each complete revolution of this hand wheel represents .200" or 5.08mm.

### Cross Feed Motions

The NORTON 8 x 24" Hydraulic Surface Grinder has a unique cross saddle motion in that not only may an intermittent cross feed be obtained, but also by means of proper positioning of the small vertical selector lever, a variable speed continuous motion may be obtained. This continuous motion is primarily used for wheel truing.

### Truing the Grinding Wheel

The next step is to true the grinding wheel. If a magnetic chuck is used the diamond holder can be held on the face of the chuck. If no chuck is used the diamond holder can be clamped to the table surface by means of a bolt in the tee slot of the table. Move the table until the diamond is directly under the center of the wheel. Then lower the grinding wheel until it touches the diamond lightly. Set the automatic cross feed for truing and allow the diamond to pass beyond the edge of the wheel and then feed down about 0.0005" and feed the diamond back across the wheel to the opposite edge. Repeat this procedure until, by the sound of the wheel in contact with the diamond, it is certain that the entire circumference of the wheel has been trued.

If a roughing operation is to be performed, a comparatively fast traverse of the diamond across the wheel face is used. A fine finish requires a slow traverse. In fact, for the finest finish possible, the diamond should be moved as slowly as possible across the wheel face without any down feed of the wheel during the last several passes.

### Grinding the Work

Before starting to grind, set the table reverse, cross feed and safety table-stop dogs, the first two for length and the third to stop the table in the loading position (if desired). Load the magnetic chuck and energize it.

Turn on the coolant, and with the wheel running, start the table. With one edge of the work under the wheel, feed down until sparks show.

Now position the cross feed direction lever so that the work will move into the wheel, and position the cross feed selection lever on "feed." This position will give an intermittent feed of the cross feed saddle at each table reversal.

After the work has passed under the wheel to the other limit of the saddle, the table will stop in the loading position. If the work has been ground sufficiently, the machine may be reloaded. After reloading, or to make a second pass to remove more stock, reverse the cross feed direction, again set the depth of cut and start the machine as before, repeating the cycle described.

## SECTION II

### SERVICING

#### Table Ways

To inspect the table ways, unlatch the table from each end of the hydraulic piston, after which two men can easily lift the table from the saddle.

#### Saddle

The saddle can also be readily removed. With the table removed as in the preceding paragraph, run the saddle into its rearmost position. Then remove the acorn nut shown at the bottom of the handwheel in drawing #SE-344-A. Now run the saddle as far forward as possible, and remove the guards at the rear. Now, by reaching through the front of the base, disconnect the supply and discharge pipes. After doing this, lift the saddle gently upward and off its ways using a rope sling with a crane or hoist. If the job must be done manually do not use fewer than six men. When replacing the saddle, have someone turn the cross feed hand wheel so that the nut may engage the screw properly.

#### Changing the Wheel Spindle

The cartridge type wheel spindle is held in place by three screws on the front of the spindle housing. To take out the spindle first remove the wheel guard and the drive belt sheave. When the three screws through the spindle flange have been removed the spindle can be drawn out of the housing. Be sure when replacing the spindle that the flat on the spindle flange is at the bottom. Establish the alignment of the spindle by placing a straight edge across the motor sheave and the spindle sheave, making allowance for float in the motor shaft.

#### Mounting Spindle Belt

In mounting the driving belts, it must be remembered that the better the alignment of the motor with the spindle, the better will be the production and the longer the belt life. A straight-edge must be used if correct alignment is to be achieved.

#### Vee Type Belt

To place the vee belt type of drive on the machine, raise the motor upward, hook the belt into the motor sheave and into the groove on the spindle pulley. Lower the motor until a slight tension is established in the belt. Since the vee belt obtains its traction through a wedging action, tension should be only enough to overcome vibration.

### Flat Belt

In locating the flat belt on its pulleys great care must be exercised. In the event the spindle has been removed from its housing, it must be replaced in exactly the same position. The belt pulleys must be exactly in alignment and any variation from this alignment will cause the belt to stretch on one side, and will result in short belt life. Pulley alignment should always be checked with a straight-edge. This belt requires that attention be paid to tension. With the belt in place, the pulleys should be allowed to run for a minute or more to distribute the tension evenly throughout the belt. The proper tension, obtained by adjustment of the motor up or down, should be just that amount that allows the belt to run without any tendency to flap. The belt itself is of a slightly elastic nature and is practically impervious to the effects of lubricants. Since it depends on its slightly tacky surface for its great driving power, no belt dressings of any variety should ever be used.

### Vertical Slide Adjustment

The guides for the vertical ways are adjustable from front to back and laterally. There are three set screws with check nuts on the back face of each guide and three more through the base casting along the outside edges of both guides. Make adjustments in small increments to avoid binding.

### Hydraulic Pressure

The hydraulic pressure relief valve, located inside the base is adjusted by removing the cap and turning down (clockwise) on the enclosed screw to increase the pressure and vice versa. The hydraulic pressure should be approximately 95# per sq. in.

On those machines that have separate pushbuttons for the wheel drive and pump drive motors, it is necessary to start and have the pump drive motor running when the machine is being used. The hydraulic pump also provides lubricating oil to the table ways. For small hand grinding jobs, very often, only the wheel drive motor is started and the table is moved without proper lubrication at the ways.

### Oil Filter

The standard arrangement of this machine includes a cartridge type oil filter. The hydraulic oil is pumped directly to the filter before it goes by the pressure relief valve and into the operating mechanisms so that only filtered oil circulates in the system. When the filter becomes clogged the filter cartridge can be changed easily by loosening the hex-head screw on the top of the unit to allow the casing and the enclosed cartridge to drop out. Two cartridges are used with this filter. Replacement cartridges may be purchased from NORTON COMPANY. Be sure to install a fresh gasket each time the cartridges are changed.

## SECTION III

### CONSTRUCTION

#### The Hydraulic System

Hydraulic diagrams will be found on pages 14, 15 and 16. The hydraulic pump, direct driven by its own motor through a flexible coupling, draws oil from the reservoir in the base, which has a capacity of about 20 gallons (75.7 liters). The proper height of oil in the base is to keep the pump completely submerged at all times. Oil is poured directly into the base through the front.

Use a highest quality oil with inhibitors for rust, oxidation, and foam (S. U. V. 150 at 100°F.) in the hydraulic system. This oil should also have lubricity additives.

The pump is mounted in the base on a spring-hung frame and turns in a clockwise direction. The hose leading upward on the left connects with the table traverse and speed control valves, while that on the right leads to the automatic cross feed valve. Each pipe and hose is fitted with a union accessible from the front of the machine which is disconnected when the motor pump unit is to be removed from the machine. The motor may then be pulled forward and out as the suspending springs are disengaged.

On replacing the unit, extreme care should be taken that the supply hoses are fastened without taking a twist. The simple fitting should be tightened in place first, after which the union should be tightened. In setting up the union, be sure that the hose does not twist, as this will either loosen the joint or cause the hose to break under the pulsation of the hydraulic pump.

The operator should see that both halves of the flexible coupling between the pump and motor are kept tight on their respective shafts and also pressed tightly together. Looseness of these flanges will cause rapid destruction of the coupling disc.

Oil from the pump enters the reverse valve in two places and passes to either side of the table cylinder, depending on the position of the valve. Oil exhausts from a vee port in the speed control piston, a notch which, when it is pushed inward seals the part allowing no oil to escape and hence stopping the table movement, the oil bypassing through the exhaust line.

Turning the table speed control lever to the right closes the vee port, reducing the speed of the table until it is brought to a stop. The table should not be stopped in this manner since it causes oil pressure to build up until the relief valve opens at a pressure which if vented continually

causes the oil to heat up and also throws an unnecessary load on the pump motor. Stop the table traverse only by positioning the table stop-start lever at the "stop" position so that oil under pressure will exhaust freely and an equal pressure will be established on both sides of the table traverse piston.

If it becomes necessary to flush out the lubrication hydraulic system by opening any or all of the six valves inside the front opening, be sure to return them to the correct setting. Close the valve completely and open not more than 1/4 to 1/2 a turn.

### Cross Feed

The operation of this unit is comparatively simple and needs little explanation. As the table reverses, the reverse lever swings through a horizontal arc. To the reverse lever is attached a link which operates the table reverse valve piston, and at the same time, a small four-way control valve. This latter valve causes a shuttle valve to operate at each table reversal.

This back and forth movement of the shuttle valve causes the cross slide piston to move by metering out exhaust oil. The amount of oil allowed to escape from the cross slide in intermittent or continuous motion is governed by two small knurled valve knobs on the control panel of the machine as shown on page 4.

### Vertical Feed

The vertical feed for the grinding wheel is shown in the Parts Section. Review of this illustration will indicate the working of the vertical feed mechanism.

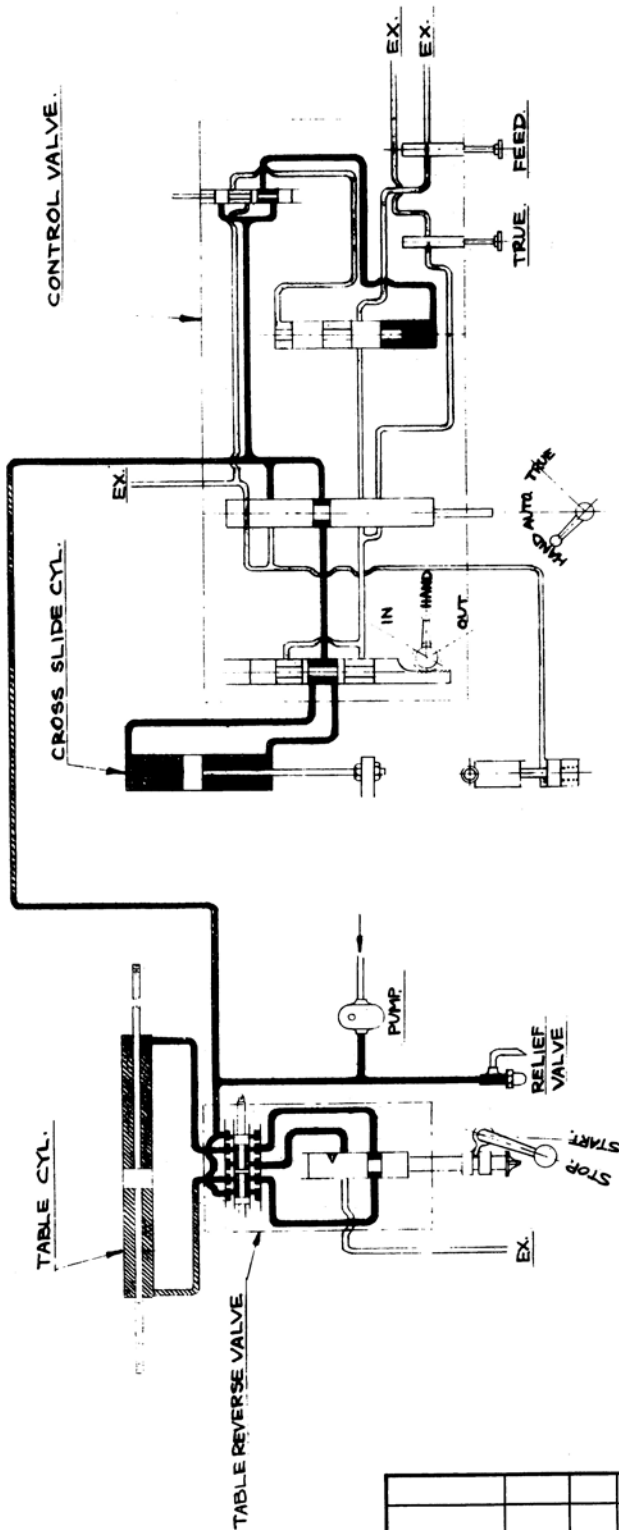
### In the Event of Difficulty

Should any problem with this machine arise, read this booklet through and in the majority of the cases the remedy will be found herein. For instance, should the table refuse to start it should be ascertained that the hydraulic pump motor is running. If it is not, trouble should be looked for in the motor itself, its wiring or starting switch. If the motor is running, trouble should be sought in the hydraulic line in the shape of a broken hose or loose connection.

Using this method of tracking down trouble, the average mechanic can run and maintain the Surface Grinder without difficulty. If, however, a difficulty arises that does not respond to this treatment, communicate with our home office or one of our branch offices. When this is done, information as to machine serial number, time of purchase, and full particulars on the nature of the trouble should be given.

PRINTS TO BE COLORED AS PER ORIGINAL AS REGARDS TO PRESSURE AND EXHAUST.

- PRESSURE.
- EXHAUST.



REPLACES ND-2042

SCALE NONE

SIMILAR TO PART ND-2042

NC-5289

UNLESS OTHERWISE SPECIFIED: TOLERANCES OF DIMENSIONS SHALL BE  $\pm \frac{1}{16}$ " ANGLES  $2^\circ$ ; REAMED HOLES  $1"$  DIAM. AND SMALLER; STD. TO  $.0008"$  SMALL LARGER THAN  $1"$  DIAM. STD. TO  $.001"$  SMALL; FILLETS SHALL NOT EXCEED  $\frac{1}{16}$ "; CHAMFERS SHALL BE  $45^\circ$ ; CENTER LINES ARE SHOWN ON SYMMETRICAL PARTS OF DRAWING AND MUST BE CENTRAL WITHIN  $\pm \frac{1}{16}$ ". TOLERANCES SHALL NOT BE CONSIDERED ADDITIVE. DO NOT SCALE R.I.P. WORK TO DIMENSIONS. REMOVE SHARP EDGES.

NAME HYDRAULIC DIAGRAM.  
 FOR HAND OPERATION  
 EX 24 SURFACE GR. MACH.  
 DATE 2-6-48  
 NORTON COMPANY GRINDING MACH. DIV. WORCESTER, MASS.







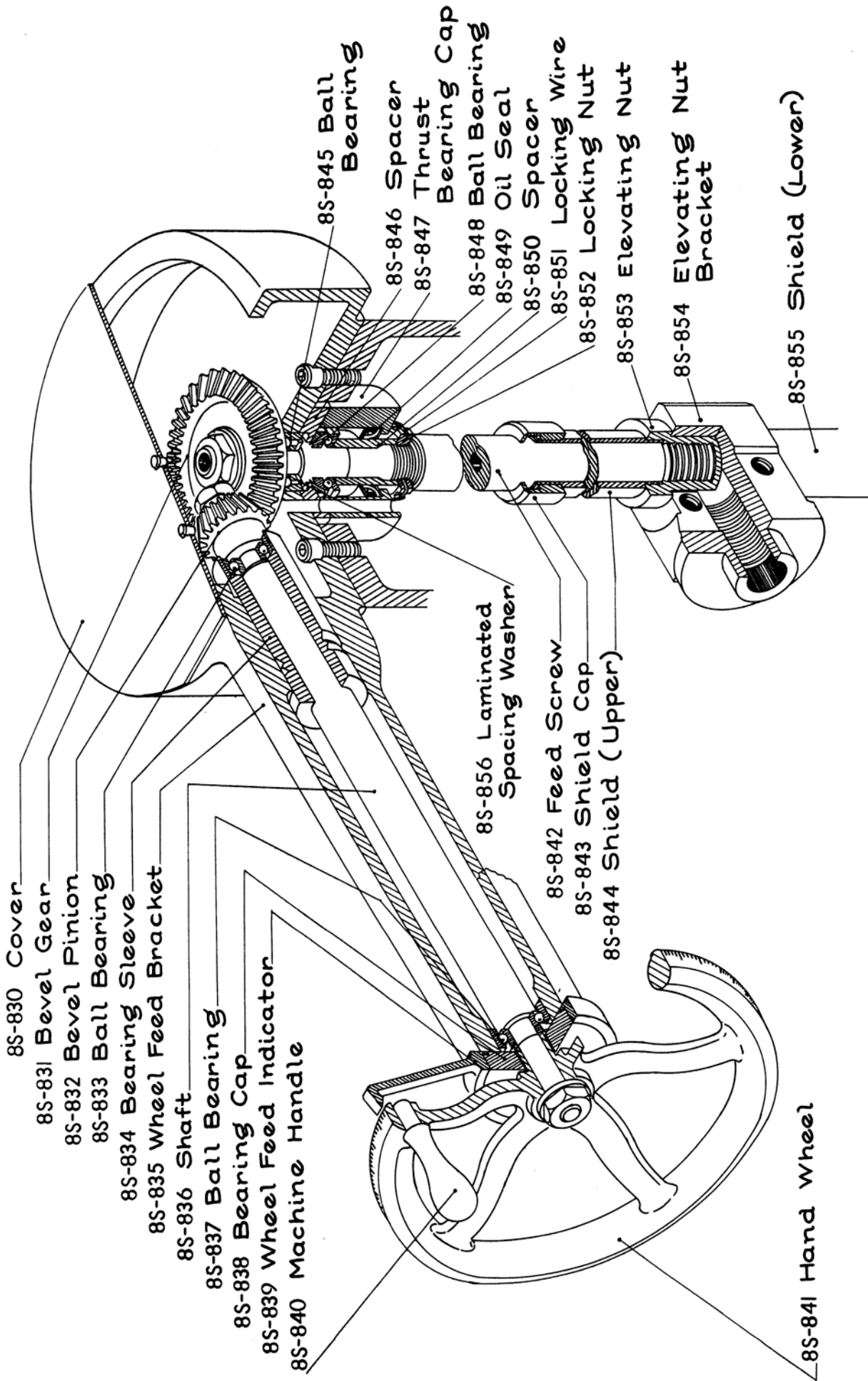
**SECTION IV****PARTS DRAWINGS****I M P O R T A N T**

**When ordering parts, use the following procedure:-**

- 1. Give size, type, and serial number of the machine. This information will be stamped on a pad directly beneath the cast letters "NORTON" to be found near the bottom at the front side of the base.**
- 2. Give the complete number of the part desired as shown in drawing.**
- 3. Give name of drawing in which part is illustrated.**

For factory direct parts and service please contact us at the address below.

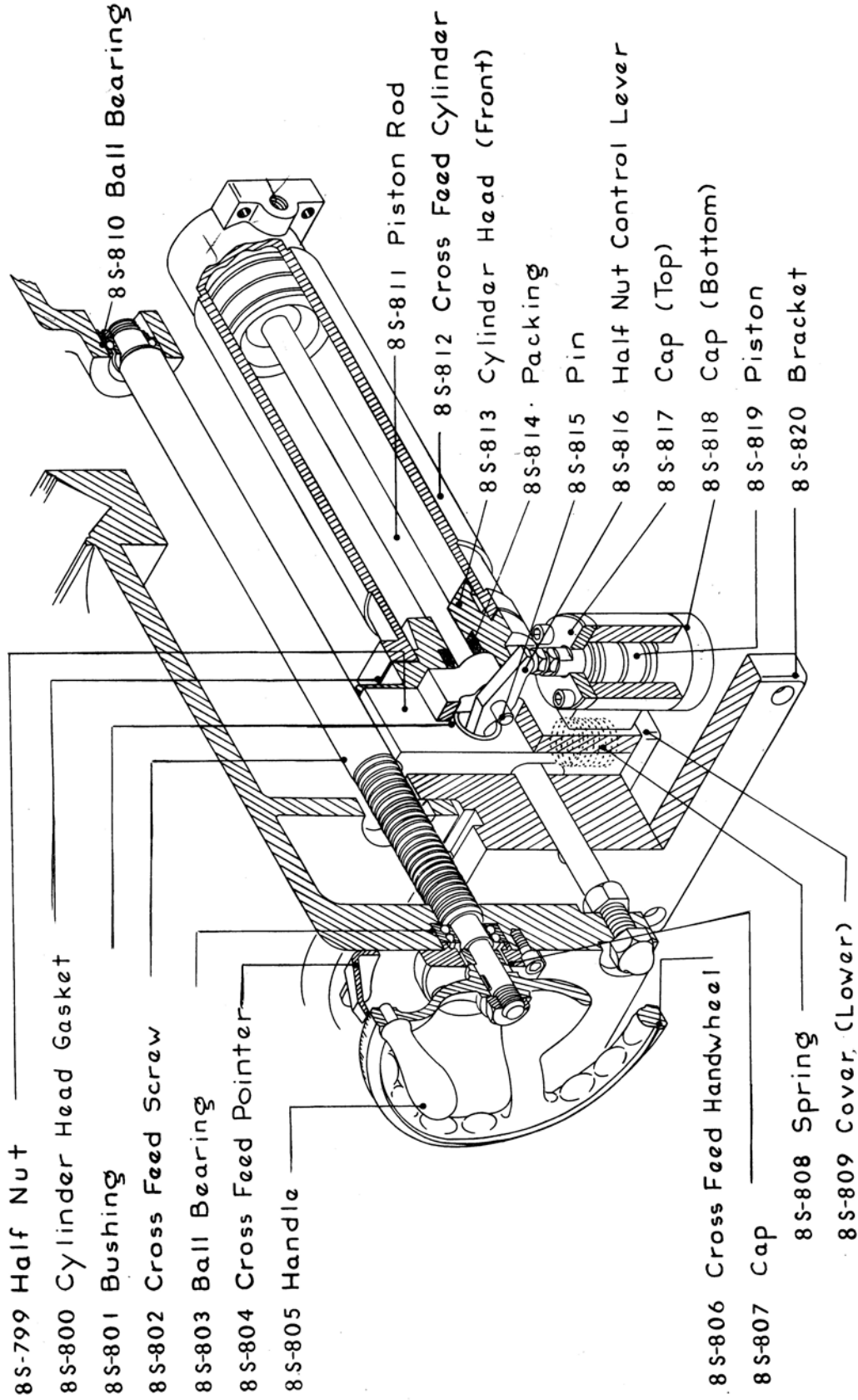
Chas. G. Allen, Inc.  
25 Williamsville Road  
Barre, MA 01005  
Tel: (978) 355-2911  
Fax: (978) 355-2917



# VERTICAL WHEEL FEED

RAND

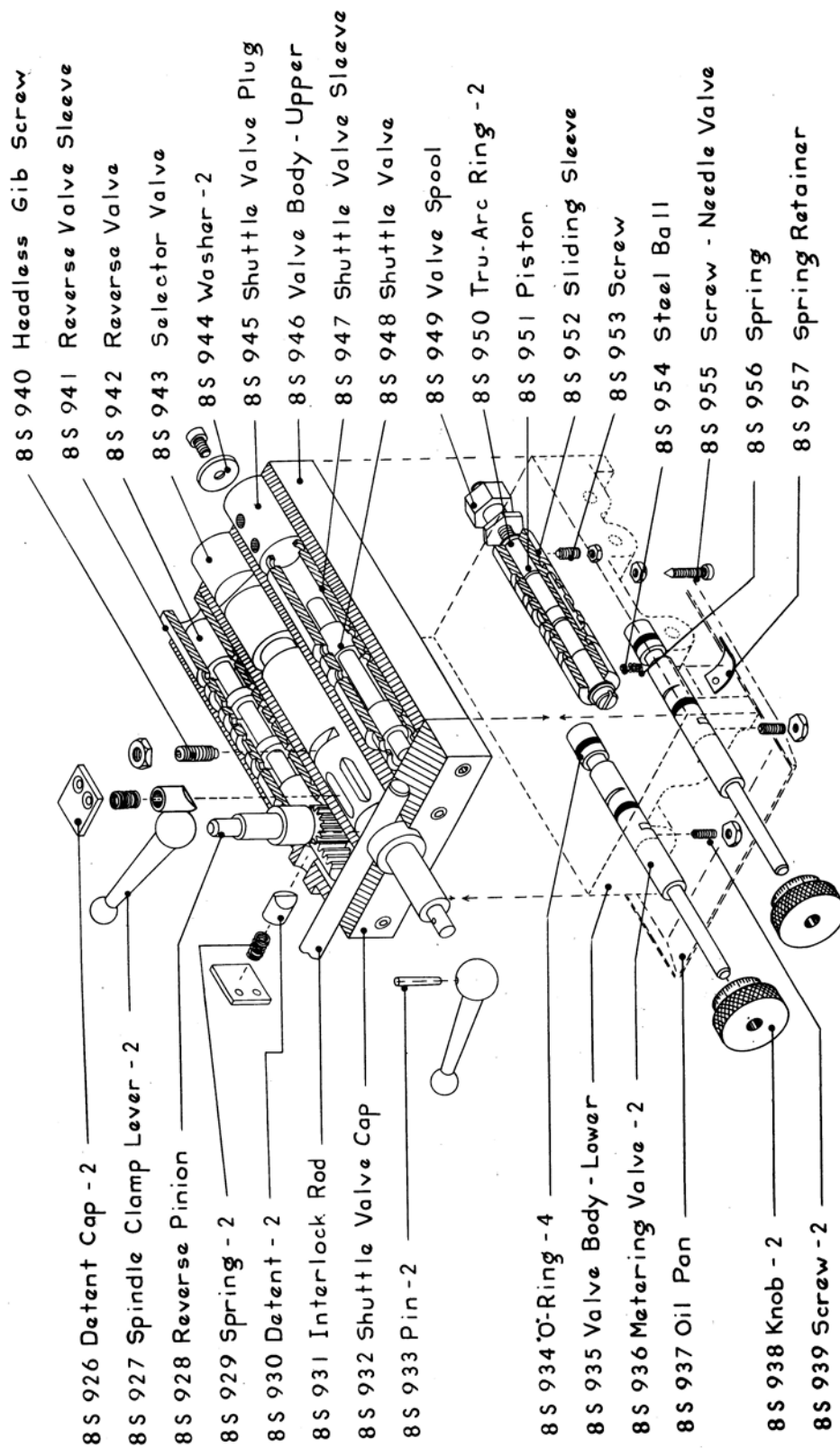
SE-3290-A  
 SE-3291-A



1987 Surface Grinder  
 18-5-52  
 Drawing by G. H. H. H. H.

### CROSS FEED HALF NUT MECHANISM

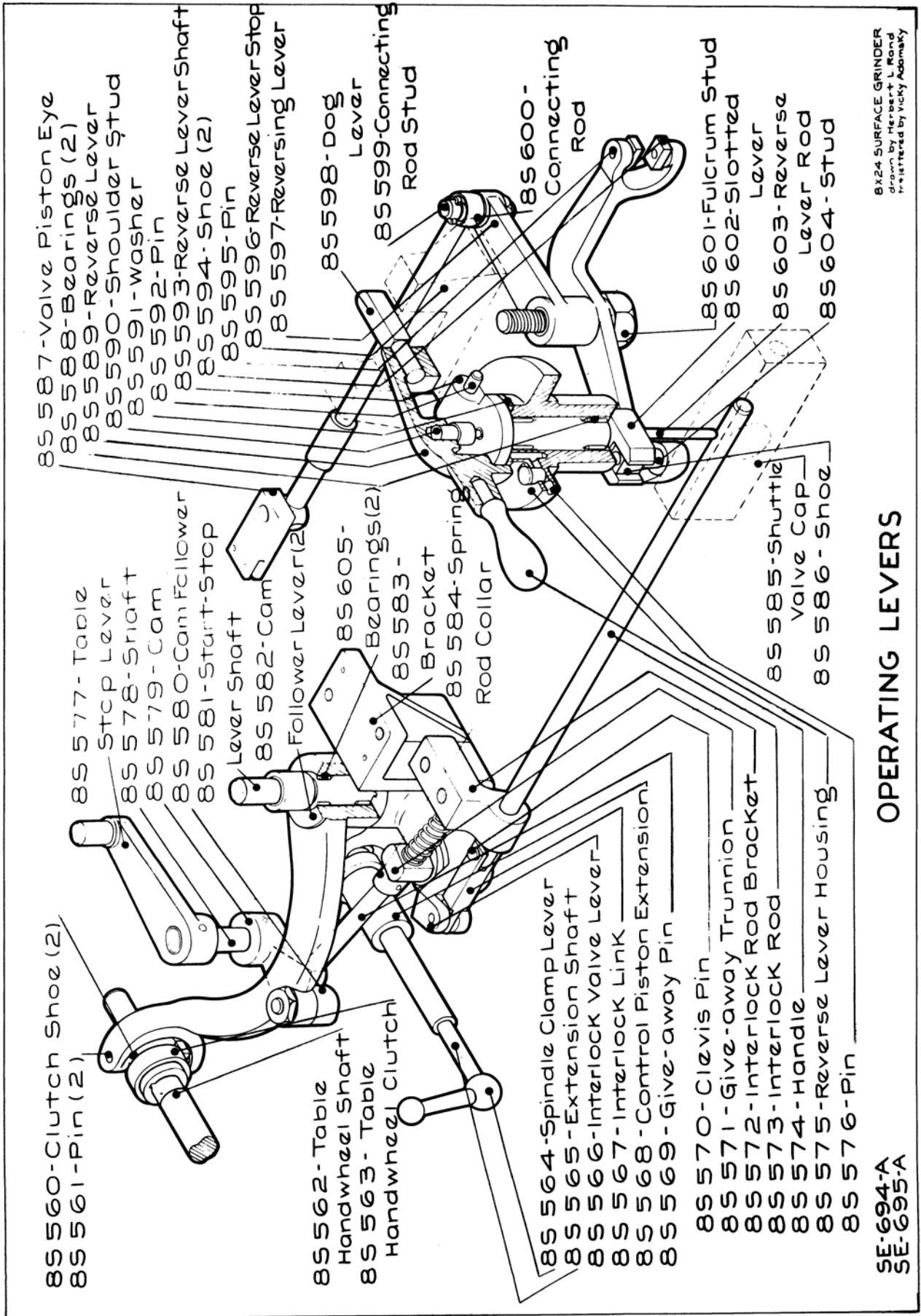
SE-344-A  
 SE-345-A



1-20-53  
 Drawn By H.L. Brown  
 Checked By S. K. Kinsler

# CONTROL VALVE

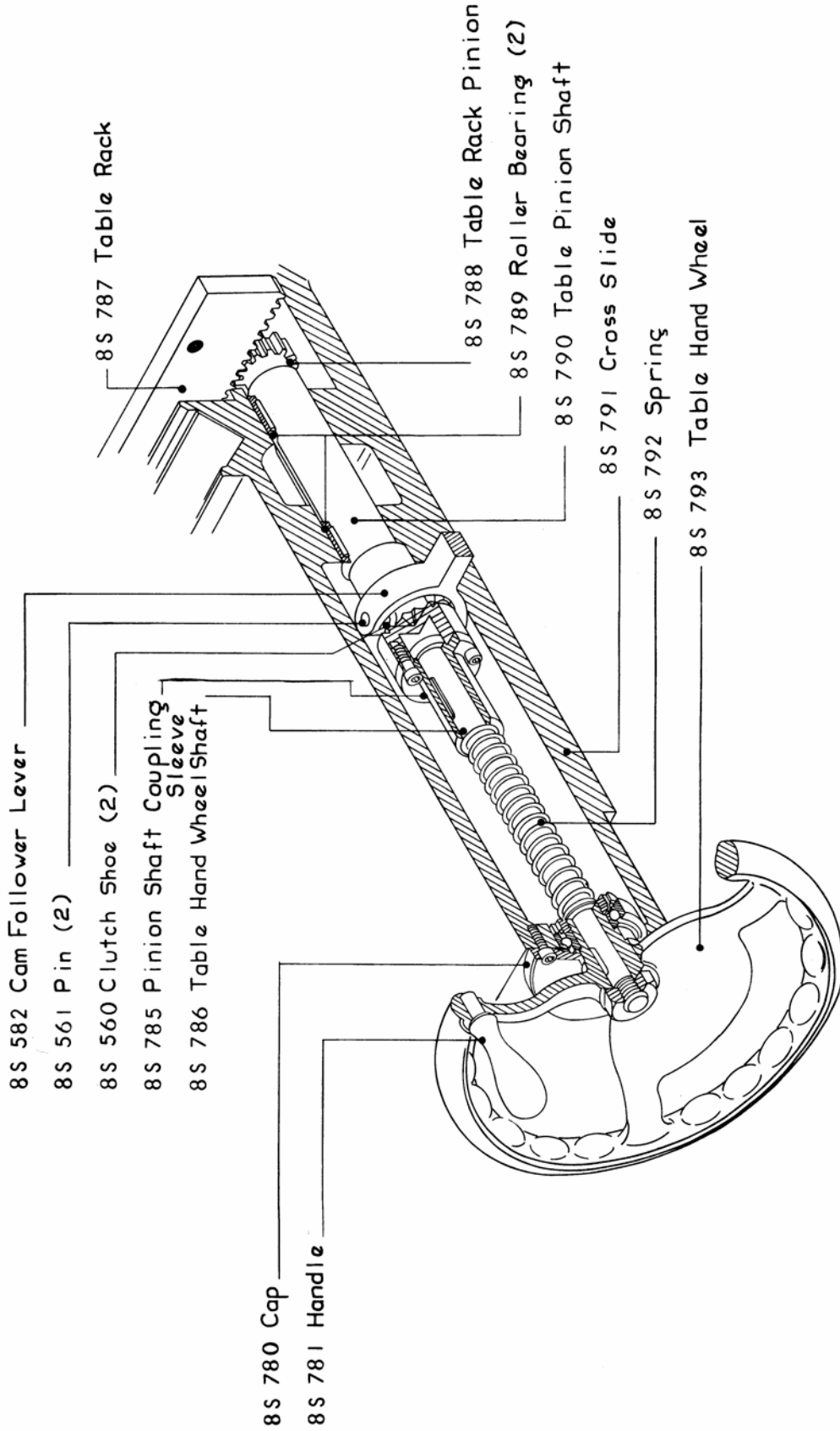
SE 394 A  
 SE 395 A



8 X 24 SURFACE GRINDER  
 drawn by Herbert L. Rond  
 re-illustrated by Vicky Adamsky

OPERATING LEVERS

SE-694-A  
 SE-695-A

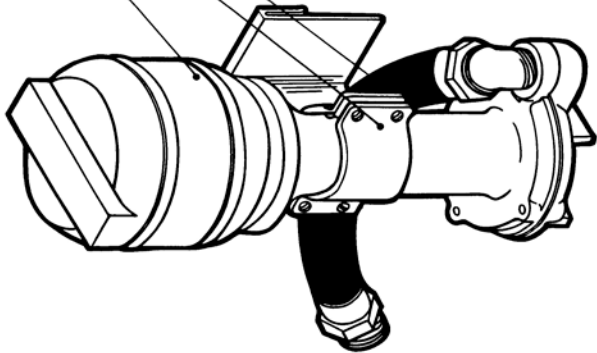


11-21-22  
 Drawn by H.L. Reed, Jr.  
 S. K. Kinsler

### IMPROVED HAND TRAVERSE MECHANISM

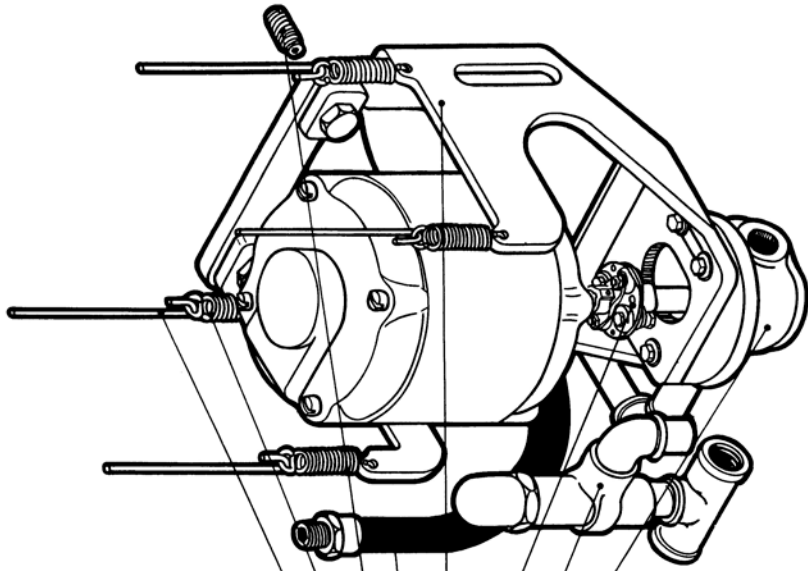
8E-346-A  
 8E-347-A

- 85 650-Coolant Pump
- 85 651-Pump Bracket
- 85 652-Water Hose



COOLANT PUMP

- 85 653-Extension Hook (4)
- 85 654-Spring (4)
- 85 655-Sleeve
- 85 656-Flexible Hose (2)
- 85 657-Pump Motor Base
- 85 658-Coupling
- 85 659-Relief Valve
- 85 660-Pump



HYDRAULIC PUMP

- 85 661-Lever-L.H.
- 85 662-Tee Bolt-L.H.
- 85 663-Table Stop
- 85 664-Table Stop Dog Latch

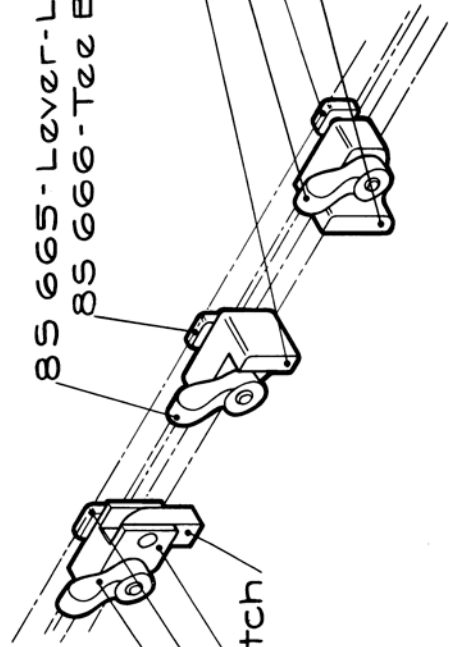
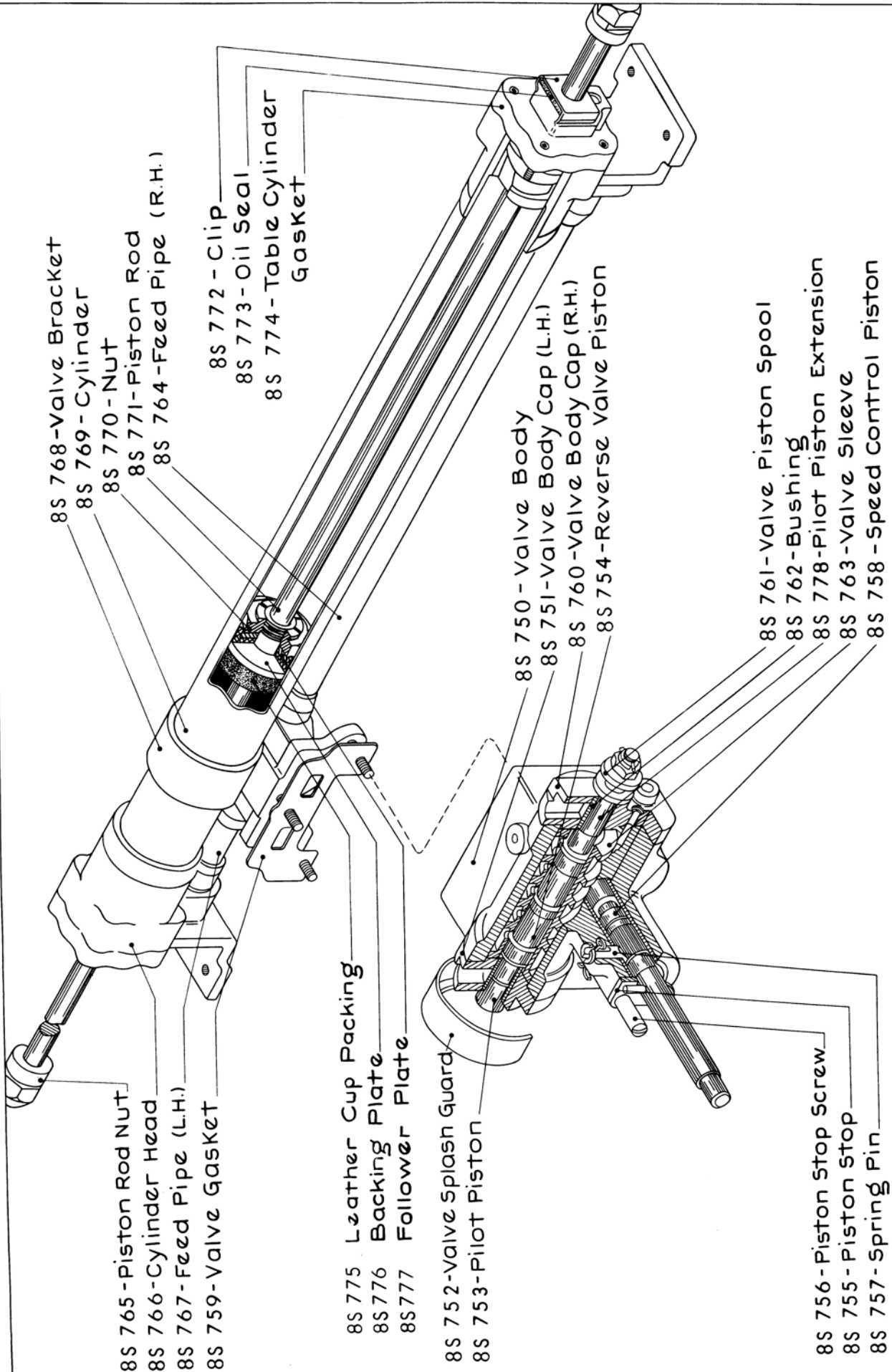


TABLE DOGS

- 85 665-Lever-L.H.
- 85 666-Tee Bolt-L.H.

- 85 667-Table Dog-L.H.
- 85 668-Lever-R.H.
- 85 669-Tee Bolt-R.H.
- 85 670-Table Dog-R.H.

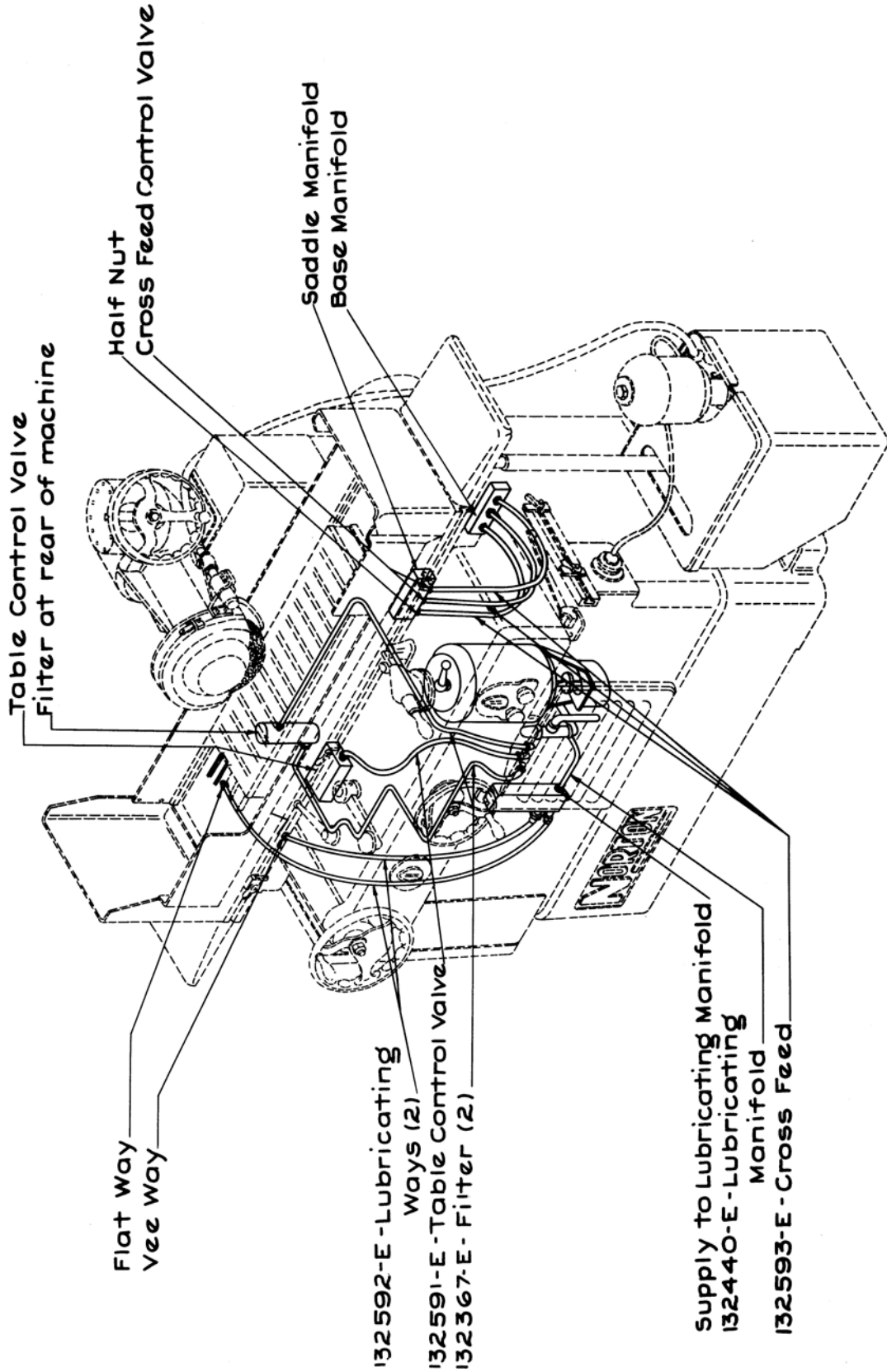


DRWG BY 1/26/51  
 H. RAND  
 V. FONTAINE

TABLE CYLINDER & VALVE

SE-686-A  
 SE-687-A





Drwg by H.Rand 7/16/51  
V Fontaine

SE-871-A

**FLEXIBLE HOSE IDENTIFICATION-8X24 HYDRAULIC SURFACE GRINDER**