

February 10, 1994

DIRECTIONS
FOR
OPERATING AND MAINTAINING
THE

ROTTLER

MODEL SF-2 SURFACING MACHINE
MACHINE SERIAL NUMBER

MANUFACTURED BY:

ROTTLER MANUFACTURING COMPANY

8029 South 200th Street
Kent, Washington 98032
U.S.A.

NOTE: WHEN ORDERING REPLACEMENT PARTS, PLEASE GIVE THE MODEL AND SERIAL NUMBER.

ORDER BY PART NUMBER

THERE IS A MINIMUM ORDER OF \$25.00

CONTENTS

INTRODUCTION/SAFETY/INSTALLATION.....	1
Introduction/Description.....	1.1
Limited Warranty.....	1.1
Safety Information.....	1.2
Machine Installation.....	1.3
Air/Power Requirements.....	1.4
Electrical Hook Up Illustration.....	1.6
Control Definitions.....	2
Auto 1 Button.....	2.1
Auto 2 Button.....	2.1
Button Lights.....	2.1
Center Stop.....	2.2
Control Panel Illustration.....	2.6
Emergency Stop Button.....	2.5
Feed Adjust Knob.....	2.4
Feed Left Button.....	2.4
Feed Rate Display.....	2.4
Feed Right Button.....	2.4
Left Travel Limit Switch.....	2.4
Manual Button.....	2.1
Mill Clamp Button.....	2.3
Power On Light.....	2.1
Rapid Left Button.....	2.3
Rapid Right Button.....	2.4
Relief Up Button.....	2.2
Right Travel Limit Switch.....	2.4
Spindle R.P.M. Knob.....	2.4
Spindle Start/Stop Button.....	2.3
Surface Depth Dial Indicator.....	2.5
Up/Down Adjust.....	2.3
Vacuum Button.....	2.5
Vertical Travel Handwheel.....	2.4
Operating Instructions.....	3
Manual Operation with Left Limit Set.....	3.2
Auto 1 Operation.....	3.3
Auto 2 Operation.....	3.4
Maintenance.....	4
Lubrication.....	4.1
Machine Illustration.....	4.2
Two Axis Universal Machine Table.....	4.3
Head Fixture Illustration.....	4.4
Setting the Cutting Tool Inserts.....	4.5
Setting the Dial Indicator.....	4.6
Vertical Drive Chain Remove and Replace.....	4.7
Drive Belt Replacement.....	4.8
Drive Sprocket Replacement.....	4.9
Driven Sprocket Replacement.....	4.10
Cutterhead and Chip Guard Removal.....	4.11
Inner Spindle and Upper Bearing Removal.....	4.12
Air Adjustment SF-2 Machine.....	4.13
Air Adjustment Illustration.....	4.14
Cutter Head Tilt Adjustment.....	4.15

INTRODUCTION

This manual is divided into sections as listed in the table of contents.

It is required that the new user of the SF-2 read this manual, in particular the sections concerning safety, before operating the machine.

DESCRIPTION

The model SF-2 surfacing machine is a precision, high speed surfacing unit.

The model SF-2 can be equipped with tooling and accessories for surfacing most American passenger car and truck, inline, 90 and 60 degree V-type blocks as well as cylinder heads.

SF-2 machines may be readily tooled to resurface a wide variety of engines including European and Asian engines as well as perform various other surfacing operations.

This machine is designed for two purposes:

- (1) The alignment of the deck surface to the pan rails and main bearing locations, as have been done in the original factory surfacing.
- (2) A considerable savings in surfacing time and operator involvement as a result of fast block clamping, push button controls, and automatic cycling.

Change over or resetting time required to set up V-type or in-line engines is a minimum ,

making this machine highly suited to the jobber shop where engines cannot be run through, in model lots.

All feeds and rapid travels are power operated and controlled from the conveniently located operator pendant.

Power required is 200 - 240 volt, 1 phase, 50/60 Hz. This provides power to the variable speed AC motor controller, the horizontal stepper drive, the logic controller, and various relays and solenoid valves that actuate mechanical controls on the machine to engage feeds and travels. *See electrical section for proper electrical attachment.*

LIMITED WARRANTY

Rottler Manufacturing Company model SF-2 parts and equipment are warranted as to materials and workmanship. This limited warranty remains in effect for one year from the date of delivery, provided the machine is owned and operated by the original purchaser and is operated and maintained as per instruction in this manual.

Standard air and electric components are warranted by their respective manufacturers (NOTE: their individual warranty periods may vary significantly from Rottler manufacturing policy).

Tools proven defective within the warranty period will be repaired or replaced, at the factory's option.

We accept no responsibility for defects caused by external damage, wear, abuse, or mis-

use, nor do we accept any obligation to provide compensation for other direct or indirect costs in connection with cases covered by the warranty.

Freight charges on warranty items (non-air shipment only) will be paid by Rottler Manufacturing for a period of 60 days only from date of installation or set-up by a qualified service technician or sales rep.

Freight charges after the 60 day period are the customers responsibility.

SAFETY INFORMATION

CAUTION :

This machine is capable of causing severe bodily injury.

The operator of this surfacing machine should be a skilled machinist craftsman who is well versed in the caution, care, and knowledge required to safely operate metal cutting tools.

As with all machine tools Eye protection must be worn at all times by the operator or other personnel within in the area of the machine.

In particular, the operator should be very cautious of the cutting tool area.

When surfacing, the machine is capable of projecting chips over 10 feet from the cutting area. Always use Guards.

Operator should be very careful to provide adequate clearances around the set-up area

when using the machine in an automatic mode.

This SF-2 machine operates under computer control and is susceptible to extraneous electrical impulses internally or externally produced. The machine may make moves out of the control of the operator at any time. The operator should work in and around the machine with caution.

The operator and nearby personnel should be familiar with the location and operation of the Emergency Stop Button.

ELECTRICAL POWER - make sure all electrical equipment have the proper electrical overload protection.

MACHINE OPERATOR - Operator of this surfacing machine should be a skilled machinist craftsman, that is, well versed in the caution, care, and knowledge required to safely operate a metal cutting tool.

If the operator is not a skilled machinist, the operator must pay strict attention to the operating procedure outlined in this manual, and must get instruction from a qualified machinist in both the productive and safe operation of this surfacing machine.

Rottler Surfacing Equipment has the following areas of exposed moving parts, that you must train yourself to respect and stay away from when they are in motion:

1. **CUTTING TOOL AREA** - Any operation involving hands in the cutter head area,

such as inspection or alignment of the cutterhead or cutting tools, requires the power be turned off to the machine.

2. **SURFACING - Eye protection** must be worn during this operation and hands must be kept completely away from cutter head. All chip guards must be kept in their normal operating positions.
4. **OPERATOR PENDANT CONTROLS** Learn to identify and independently operate these control functions by habit while developing the awareness of keeping your fingers and hands well clear of any moving machinery.
5. **WORK LOADING AND UNLOADING** Carefully develop handling methods of loading and unloading work pieces, so that no injury can result if hoist equipment or lift connection should fail.

Periodically check lift components for damage that may cause failure of Block Handler Assembly. Lifting eye can eventually fail if the eye is reset in line with the 502-1-80 lift channel. Eye must be at right angle to this channel.
6. **MACHINE MAINTENANCE** - Any machine adjustment, maintenance or parts replacement absolutely requires a complete power disconnect to the machine. **THIS IS AN ABSOLUTE RULE.**

MACHINE INSTALLATION

LOCATION

The productivity of this machine will depend to a great extent on it's proper initial installation, particularly the means by which cylinder blocks/heads are lifted into the machine as well as the material handling to and from other operations in your shop.

The proper loading arrangement and location for your SF-2 machine is extremely important.

A slow travel (6' to 10'/min) power hoist, operated from either a bridge crane or a jib crane arrangement works very well. A 1000-lb hoist is generally adequate for lifting the engine block. An air hoist with speed control makes an ideal method for fast, convenient loading.

If some production surfacing with this machine is anticipated, and the cylinder blocks/heads are not directly loaded and unloaded from a conveyor, we would recommend considerable attention be given to the crane so that it covers an adequate area to allow the operator to back up and remove cylinder blocks/heads without cluttering up his own area. If two machines are to be operated by one operator, we would recommend that the open faces be placed at right angles to each other, with the machines approximately three feet apart.

UNPACKING

Use care in removing the crate from the SF-2 machine, being careful not to use force on any part of the spindle unit.

Remove the tool box, parallels, and optional tooling located at the lower portion of the machine. Completely clean these articles, as well as the machine base pads and upper table, with solvent. Rust inhibitor is applied to the machine at the time of shipment, and any of this inhibitor left on the machine will result in considerable collecting of cast iron dirt.

SHIPPING HOLD DOWN BOLT

Remove cover (#7036A) from the rear of the spindle base by removing it's four mounting screws. Remove the bolt located between the two limit switches in the bottom of the spindle base. Replace the cover and tighten the four mounting screws.

LEVELING

Four square-head set screws (502-1-12A), jam nuts (502-1-12F), and leveling pads (502-1-12J) are provided with the machine for leveling. Insert the screw and nut at the base support points, being careful that the screw point seats in the leveling pads below.

Use a precision level and level the upper table within .0005" per foot in both directions and make sure that the machine weight is equally supported at the four support points of the base.

AIR SUPPLY

It is very important the air source for the SF-2 machine be moisture free. Water and oil in the line will result in early cylinder and valve failure. Our recommendation is the installation of a water trap at the machine.

Attach a 100 p.s.i. air source to the appropriate intake at the air filter on the side of the rear control enclosure.

Check the gauge on the air regulator next to the filter on the lower portion of the enclosure to see if it is set to approximately 90 to 95 psi pressure after the air line is attached.

POWER SUPPLY

This machine requires 200 to 250 vac single phase, 50/60hz, (measured between L1 and L2). Current requirement is 15 amps.

When using two legs of a three phase supply The voltage from each leg to ground must be between 100-120 vac. connect per electrical hook-up directions below. If the voltage is outside this range machine will not operate properly and may be damaged.

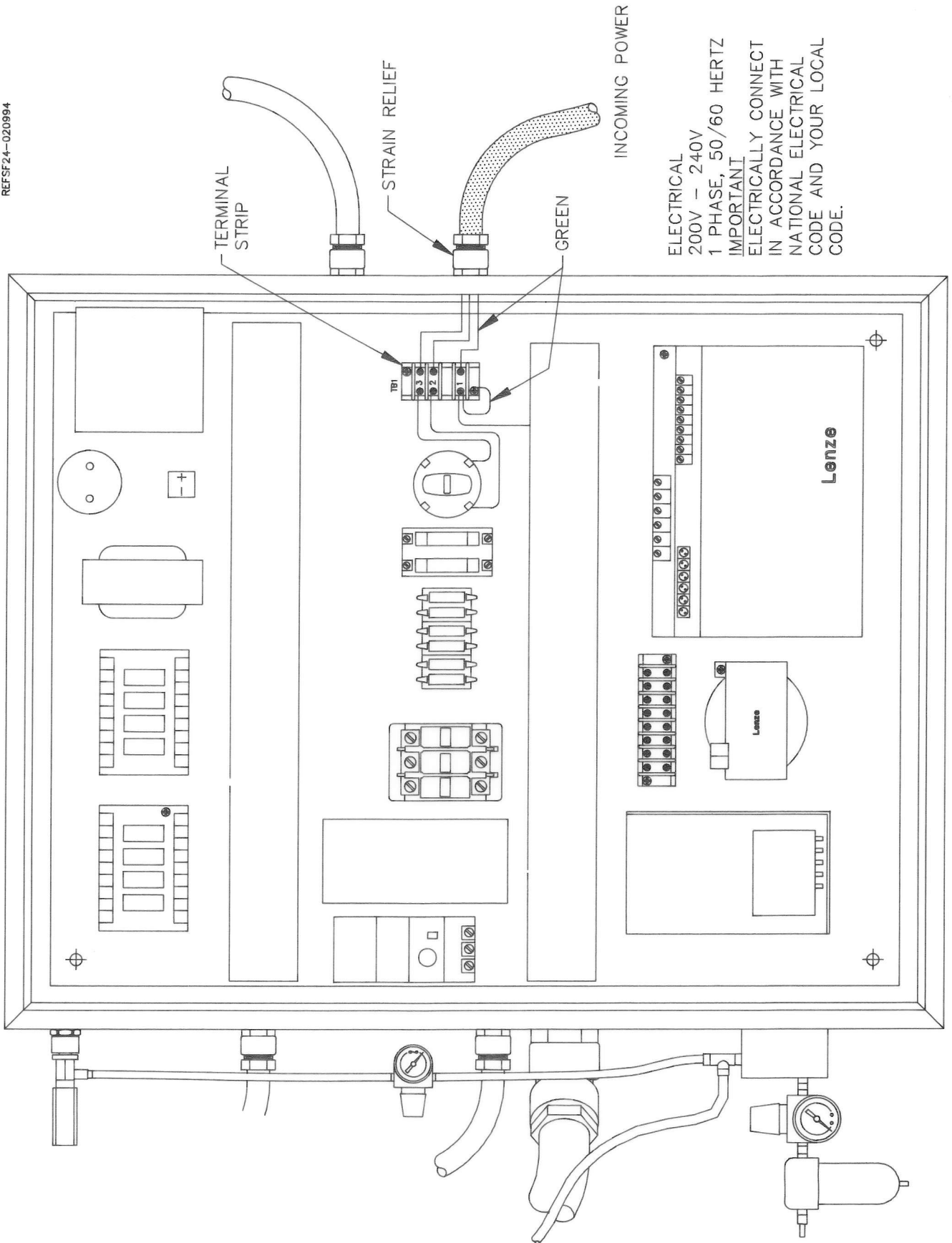
CAUTION: Do not attempt to attach three phase. The 3 phase spindle motor receives its power from a three phase variable frequency inverter located in the main electrical enclosure.

Connect single phase wiring to the 4 pole terminal strip located at the middle right side of the electrical enclosure. The machine is not sensitive to neutral/"hot" leg phasing. Two legs of a 200-250 VAC 3 phase supply can be used. Voltages over 250 VAC may cause damage to stepper motor drive.

CAUTION :

This machine must be connected to a good earth ground. Connect the earth ground wire to the terminal with the green grounding wire attached to it, on the terminal strip mounted at the middle right side of the electrical enclosure.

REFSF24-020994



INCOMING POWER

TERMINAL STRIP

STRAIN RELIEF

GREEN

ELECTRICAL
 200V - 240V
 1 PHASE, 50/60 HERTZ
IMPORTANT!
 ELECTRICALLY CONNECT
 IN ACCORDANCE WITH
 NATIONAL ELECTRICAL
 CODE AND YOUR LOCAL
 CODE.

Lenze

Lenze

POWER ON LIGHT

When display is lit, it indicates power is being supplied to the machine.

BUTTON LIGHTS

MANUAL OR AUTO MODE: When a button is pressed its light will indicate the function is active.

AUTO MODE ONLY: When in auto mode 1 or 2 the blinking lights designate which machine function will be activated when the CYCLE START button is pushed.

MANUAL BUTTON

Press this button to run the machine in manual mode. In manual mode all buttons will activate their designated function except CYCLE START.

Pushing the MANUAL button will stop and clear an auto cycle.

CAUTION :

When in automatic mode the machine performs moves automatically. Read the instructions on automatic operations before using this machine.

AUTO "1" BUTTON

This button selects a cycle that starts from the right limit switch.

When the AUTO 1 button is pressed and the machine is on the right limit switch the CYCLE START and RAPID LEFT buttons will blink, indicating that when the CYCLE START button is pressed the machine

will rapid to the left until the CENTER STOP position is reached.

At this stop the spindle is adjusted vertically for the proper stock removal amount.

When CYCLE START is pushed a second time the spindle rotation and feed start. This operation continues until the left limit switch is contacted. Now the spindle rotation and feed stop. The UP RELIEF solenoid activates, the spindle lifts up .020 to .040 of an inch and the machine rapids right to the right limit switch.

When the right limit switch is contacted the UP RELIEF solenoid turns off, the spindle drops down to the UP/DOWN ADJUST position, and the machine changes to MANUAL mode.

NOTE: The Center Stop must be programmed before the Auto 1 cycle will operate. See Center Stop for directions on programming the center stop distance.

AUTO "2" BUTTON

This button selects a cycle that starts from the right limit switch.

When the AUTO 2 button is pressed and the machine is on the right limit switch the CYCLE START and RAPID LEFT buttons will blink, indicating that when the CYCLE START button is pressed the machine will rapid to the left until

the CENTER STOP position is reached.

At this stop the spindle is adjusted vertically for the proper stock removal amount.

When CYCLE START is pushed a second time the spindle rotation and feed start. This operation continues until the left limit switch is contacted. The spindle rotation continues but the feed rate reverses direction and feeds to the right until the right limit switch is contacted.

Now the machine will change to MANUAL mode.

NOTE: See Center Stop for directions on programming the center stop distance.

CENTER STOP

This is a computer programmable stop. When properly set the machine will rapid travel from the right limit switch to the Center Stop where the machine will stop and wait for the cutting depth to be adjusted.

After the cutting depth is adjusted Cycle Start is pressed and the machine will finish the cutting cycle.

Following are the directions for setting the stop:

- (1) If the machine is not on the right limit switch move the machine to the right limit switch.

- (2) Press Auto 1 or Auto 2 depending on which program is desired.

- (3) Press and hold the rapid left button until the surface indicator is positioned close to, or over, the surface to be cut then release the button. As the machine rapids to the left the display shows the distance from the right limit switch as it moves. If the rapid button is pressed a second time the machine will rapid left at a slower rate for more accurate positioning. The machine will not move to the right when in programming mode.

- (4) Once the desired Center Stop position is reached adjust the machine for the proper depth of cut and press the Cycle Start button.

Pressing the Cycle Start button saves the Center Stop position in memory, starts the machine and completes the automatic cycle.

The Center Stop distance will remain in memory until it is changed, the emergency stop is pressed, or the machine is turned off.

RELIEF UP BUTTON

Lifts the cutterhead assembly up .020" to .040".

Relief Up occurs automatically at the end of a cut when in automatic mode.

Use Relief Up in manual mode to clear the cutterhead from the work piece before traveling back to the right.

Relief Up allows easy upward movement of the vertical adjust handwheel.

CAUTION :

Do not adjust the machine for depth of cut when in relief up.

When the machine is changed to Up/Down Adjust or Mill Clamp the spindle drops .020" to .040" The machine will not allow a cut to be made in relief up mode.

UP/DOWN ADJUST BUTTON

Allows easy up and down adjustment of cutterhead. The vertical spindle lock is off, but there is light air pressure in the vertical air cylinders. (see maintenance section for directions on adjusting air pressure.)

The machine will not feed forward when the control is in Up/Down Adjust mode. In Auto 1 or 2 mode the machine automatically changes from Up/Down adjust to Mill Clamp when the cycle start button is pressed.

It is normal for a small amount of compressed air to escape from the air regulator on the back of the spindle

unit when the machine is in the Up/Down Adjust mode. (See maintenance section for details on regulator adjustment.)

MILL CLAMP BUTTON

This button locks the cutterhead spindle assembly in the vertical position ready to mill. The clamp goes on and off automatically when the machine is in Auto mode.

SPINDLE START BUTTON

This button starts and stops the spindle rotation.

If the spindle button is pressed in an auto cycle the spindle and the feed will stop. To restart auto cycle, press the cycle start button twice.

During spindle deceleration the spindle button light will blink until the cutterhead has stopped rotation.

RAPID LEFT BUTTON

Travels the spindle unit at 180 in/min. to the left until the left limit switch is contacted or the button is released.

This button does not function when the machine is in Auto 1 or Auto 2 mode.

Note: The 'center stop' must be programmed before cycle start will function.

RAPID RIGHT BUTTON

Travels the spindle unit at 180 in/min. to the right until the right limit switch is contacted or the button is pressed again.

This button does not function in an auto cycle or if the spindle is rotating.

FEED LEFT BUTTON

Feeds to the left at a rate of inch per rev. (as shown in display) x RPM (as set on the Spindle RPM dial). (example: .020 in/rev. x 1000 RPM = 20 in/min.)

Note: if spindle is not rotating, machine will feed at 20 in/min. Button does not function in an auto cycle.

FEED RIGHT BUTTON

Feeds to the right at a rate of inch per rev. (as shown in display) x RPM (as set on the Spindle RPM dial). (example: .020 in/rev. x 1000 RPM = 20 in/min.)

Note: if spindle is not rotating, machine will feed at 20 in/min. Button will not function in an auto cycle.

FEED ADJUST KNOB

Selects the feed in inches per revolution. (example: .020 in/rev x 1000 RPM = 20 in/min.) Range is from .25 to 76 inches per minute.

The feed rate can be changed at anytime during the cut or when the feed is not running.

FEED RATE DISPLAY

The display shows the feed rate in inches per revolution.

The display shows the distance to the 'center stop' when setting the center stop (with the fast left switch in auto 1 or auto 2, or when moving to the 'center stop' in cycle start.

SPINDLE RPM KNOB

Selects the spindle RPM.

The spindle RPM can be changed at anytime during a cut or when the spindle is not running.

RPM range is 250 to 1250.

RIGHT TRAVEL LIMIT SWITCH

The right travel limit switch stops the machine from traveling to the right. If in automatic cycle, the machine will switch to manual mode and up/down adjust.

LEFT TRAVEL LIMIT SWITCH

The left travel limit switch stops the machine when it is moving to the left, and can be set at any distance. In auto mode it automatically returns the spindle to the right.

VERTICAL TRAVEL HANDWHEEL

The vertical handwheel moves the spindle up and down.

Press the up/down adjust button for small up, and all down adjustments. Long up movements are made with the up relief button engaged.

SURFACE DEPTH DIAL INDICATOR

This dial indicator is mounted on the surfacing cutterhead guard.

When properly adjusted this indicator will show the position of the cutterhead relative to the surface to be cut. *It should be used only in the up/down adjust mode or mill mode.*

VACUUM BUTTON

Press button to start vacuum, press again to stop.

Vacuum automatically starts when the spindle starts, but can be stopped by pressing the vacuum button. NOTE: Vacuum is an option on this machine

EMERGENCY STOP

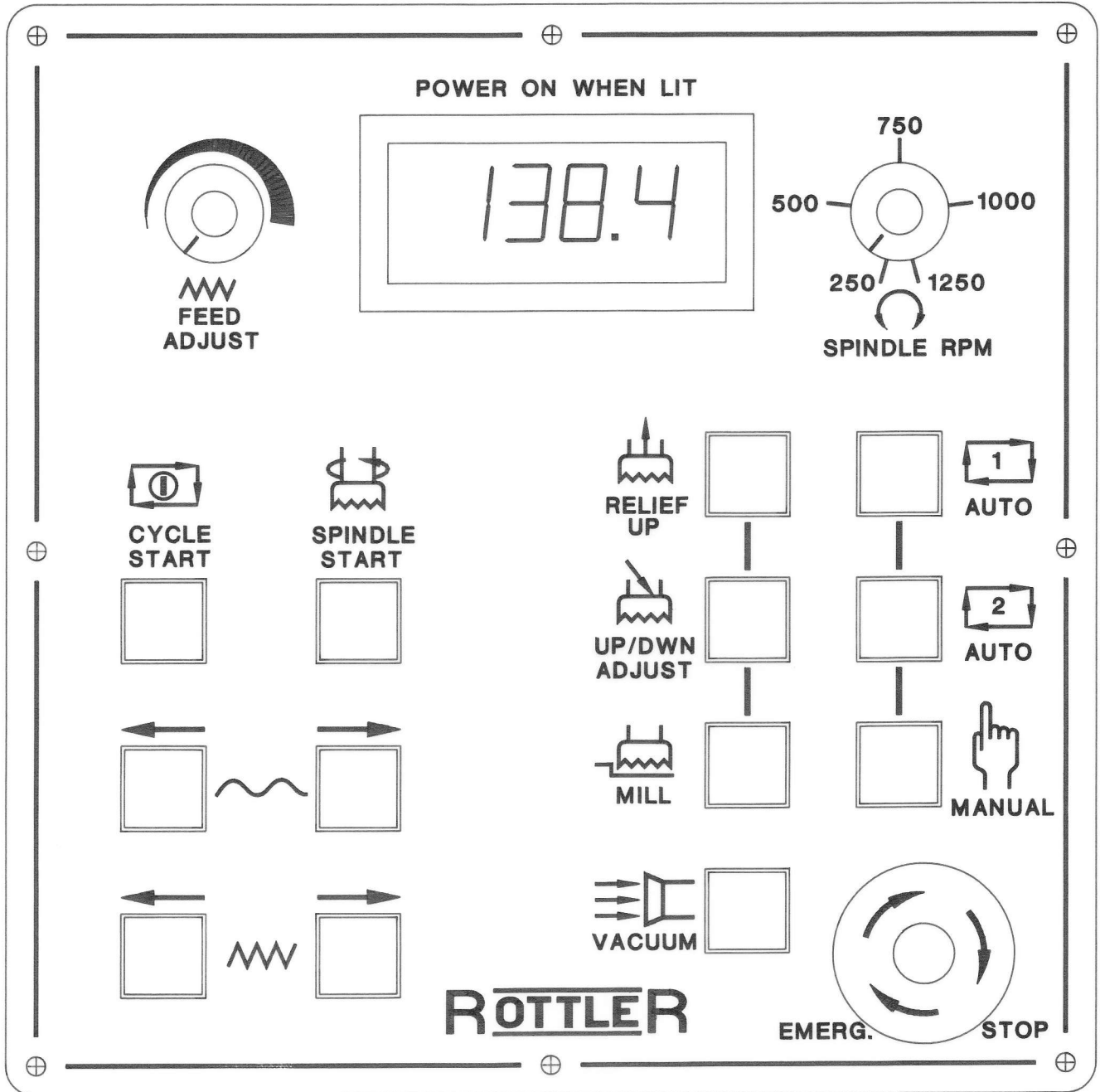
Stops all movement of machine. Also removes the programmed Center Stop distance from memory.

Power is turned off to all electrical components except the display.

CAUTION:

Power is stored in Capacitors that supply electrical power to motors. Allow five minutes for power to drain before opening electrical panel.

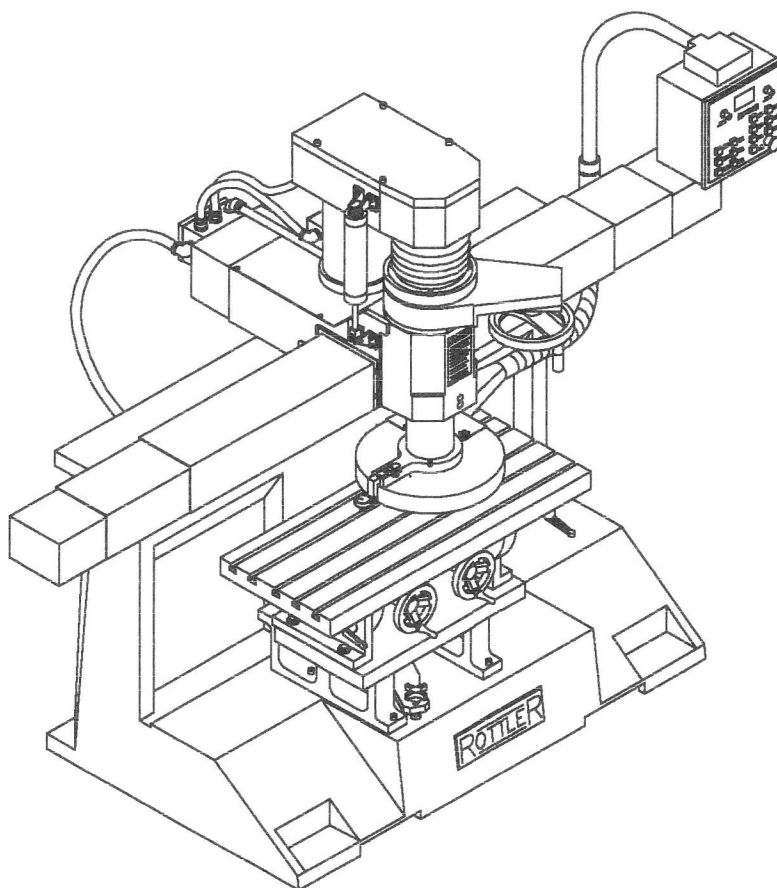
When Emergency stop is released horizontal travel may move as much as one inch.



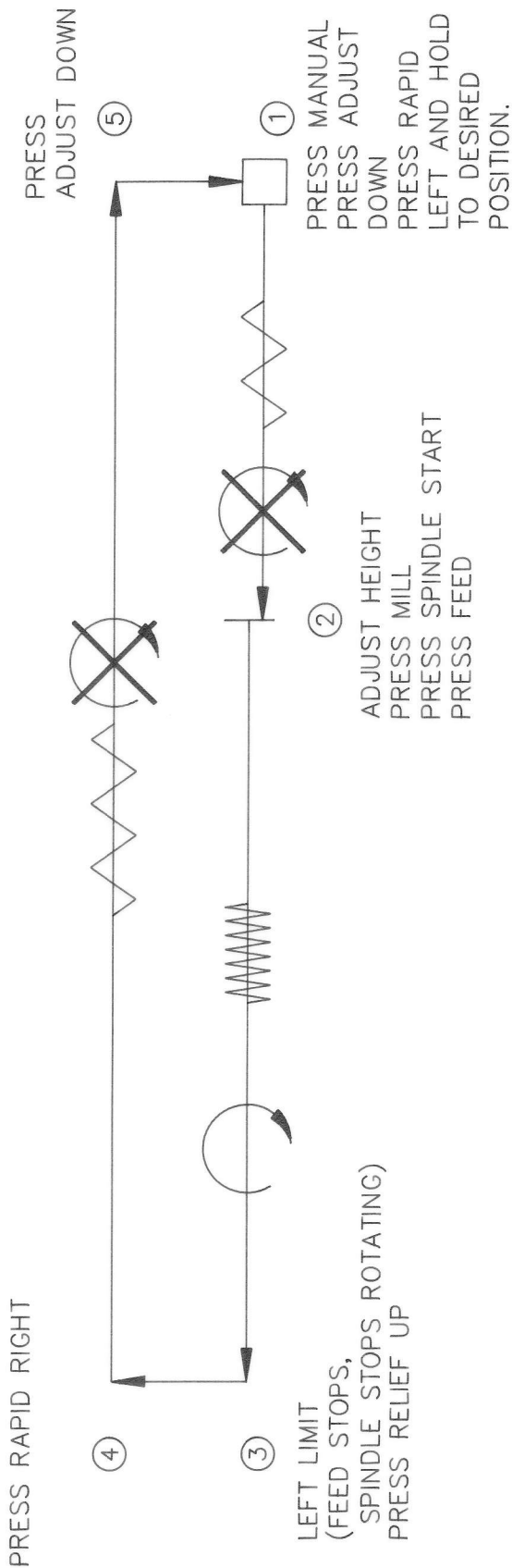
OPERATING THE SF-2

On the following pages is a general description and diagrams of how to use the basic machine for surfacing, whether it is a cylinder head, cylinder block, or other type of job.

For details of operating the specific fixtures available for this machine refer to the Opt. Parts section of this manual.

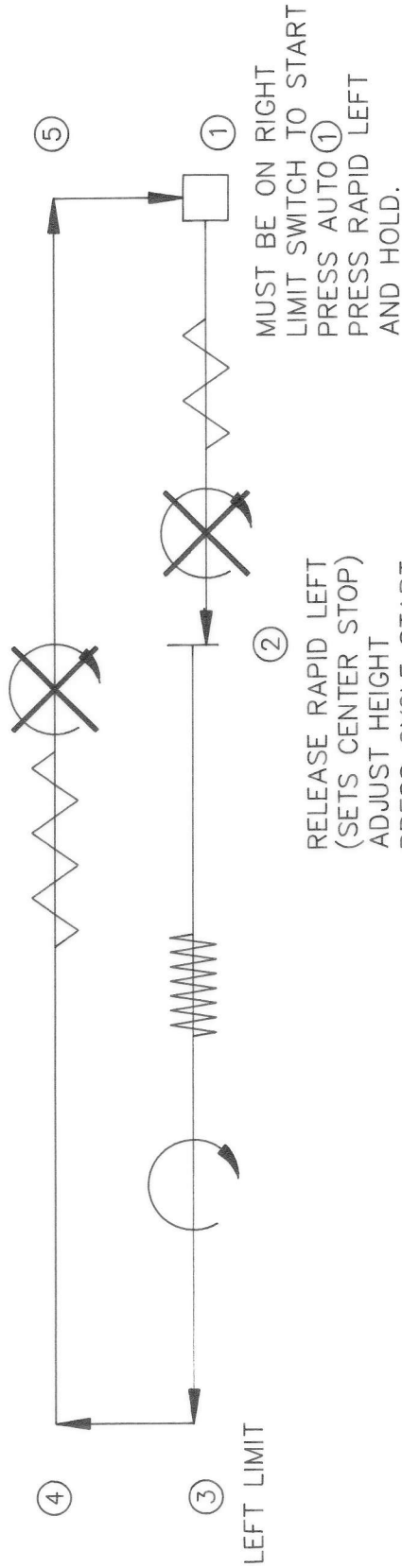


MANUAL OPERATION W/
LEFT LIMIT SET.



SFZ-2

AUTO ①
(CUT IN ONE DIRECTION)



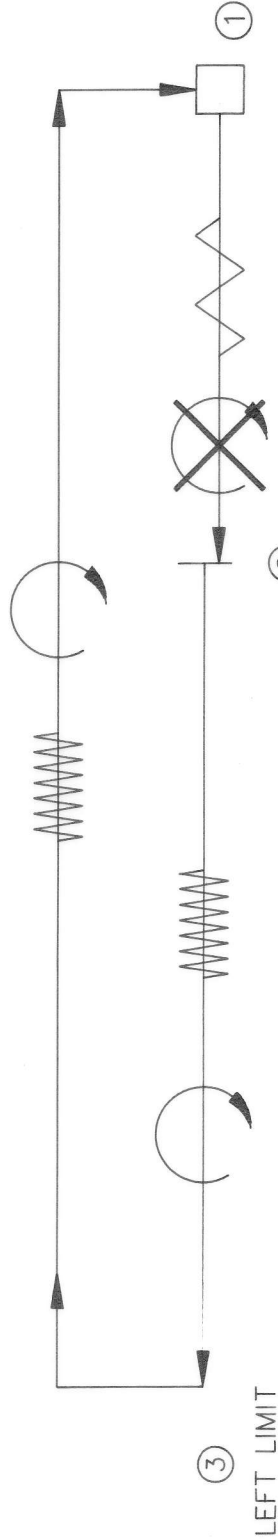
LEFT LIMIT

MUST BE ON RIGHT
LIMIT SWITCH TO START
PRESS AUTO ①
PRESS RAPID LEFT
AND HOLD.

RELEASE RAPID LEFT
(SETS CENTER STOP)
ADJUST HEIGHT
PRESS CYCLE START
MACHINE WILL COMPLETE
THE REST OF THE CYCLE
AUTOMATICALLY, WITH A
RELIEF UP RETURN.

SF2-3

AUTO ②
(CUT IN BOTH DIRECTIONS)



MUST BE ON RIGHT
LIMIT SWITCH TO START
PRESS AUTO ②
PRESS RAPID LEFT
AND HOLD

RELEASE RAPID LEFT
(SETS CENTER STOP)
ADJUST HEIGHT
PRESS CYCLE START
MACHINE WILL COMPLETE
THE REST OF THE CYCLE
AUTOMATICALLY, WITH A
CUT ON THE RETURN.

There are several ways to use the SF cutting system depending on what type of work you do and your personal preferences. Following are some details that will help you decide which method will work best for you.

CUTTING INSERTS

Rottler offers several different cutting inserts for the SF machines, below is a description of each.

CBN - CUBIC BORON NITRIDE:

This is a very high performance insert used for cutting cast iron. Using the 14 inch diameter cutterhead of the SF machines the RPM can be run between 500 and 1250. The lower end of the speed range is used primarily for cutting diesel blocks and heads since they are usually harder. The upper end of the speed range is used primarily for automotive blocks and heads. The optimum RPM for automotive work is about 950 RPM. This will give tool life resulting in insert cost per head of 5 to 15 cents. If a higher RPM is used tool life will be reduced, increasing tool cost per head to between 30 and 50 cents.

CBN can be used for cutting aluminum and usually is when you are cutting a few aluminum heads among a lot of cast iron heads. When the quantity of aluminum heads is higher it is more economical to change to an insert designed for aluminum. When cutting aluminum with CBN use some type of lubricant (WD40, PAM,

or any type of oil) otherwise the aluminum will build up on the edge of the insert, The tool life of a CBN insert is no greater than a coated carbide insert when machining aluminum so it is much less expensive to use coated carbide when machining quantities of aluminum.

CBN does not cut cylinder heads with pre-combustion chambers. CBN can be used to cut heads with exposed hard seats such as some Cummins heads but a slower RPM should be used and tool life will be reduced. Some shops dress the seats down with a seat and guide machine before surfacing.

CBN can be used to cut soft weld material. If you have a variable speed machine set the RPM between 500 and 800.

COATED CARBIDE:

Rottler Manufacturing has developed a special round high positive rake insert for cutting aluminum. In applications where a high percentage of the work is aluminum this insert will surface heads, more economically, with smoother finishes, without oil, and it is designed for chip removal. Considering the price of the insert and tool life the coated carbide insert is roughly 1/10 the cost of CBN. When cutting aluminum the spindle RPM can be run at it's maximum speed. Coated carbide can be used to cut cast iron but the RPM must be reduced to between 500 and 1000.

ONE VS. TWO INSERTS:

Rottler SF machines can be run effectively with either one or two inserts installed in the cutterhead. NOTE: Never remove one tool holder that holds the insert and run the machine with one tool holder. This creates an out of balance situation.

If two inserts are installed and aligned within .0001 of an inch the feed rate can be run 2 times faster than if using only one insert.

The depth of the grooves made by the inserts for a typical finish is approx. .0003. Therefore for a second insert to be of any advantage in obtaining a smoother finish for a given feed rate or a similar finish at a higher feed rate the inserts must be aligned within .0003. Aligning them within .0001 will give you a significantly smoother finish than aligning them within .0002. Therefore for maximum quality and consistency Rottler recommends aligning the inserts within .0001 in a vertical plane,

alignment of the horizontal plane within .002 is sufficient.

If aligning the inserts within .0001 is too time consuming Rottler recommends misaligning them between .0003 and .0015. With the inserts misaligned you will get the same finish for a set RPM and feed rate that you would using on insert. The benefit on using two inserts is for stock removal. Since the one misaligned insert is removing some material the depth of cut can be increased up to .010 and acceptable tool life obtained.

If one insert is used (50 percent of our customers use one insert) you do not have to worry about alignment. It makes it very easy to change from CBN to coated carbide inserts.

The data below assumes you are using a 3/8" diameter insert, either CBN or Coated Carbide.

	1 INSERT	2 INSERTS .0003-.0015	2 INSERTS .0001
RPM 1000 FR 2"/min.	12 rms	12 rms	10 rms
RPM 1000 FR 5"/min.	20 rms	20 rms	15 rms
RPM 1000 FR 10"/min.	30 rms	30 rms	25 rms
RPM 1000 FR 20"/min.	60 rms	60 rms	40 rms
RPM 1000 FR 30"/min.	90 rms	90 rms	60 rms

The above figures are to be used as a general guide line. Actual results may vary.

LUBRICATION

Refer to illustrations on pages 4.3, 4.4 and 4.5

BALLSCREW NUT

The ballscrew nut is located under the rear spindle base cover.

Every 175 hours, The ball screw nut should be greased using *F2 Multi-purpose Grease*, or *Unoba F1 Grease*, or equivalent. Wipe a small amount of grease on the ballscrew just ahead of the nut.

OUTER SPINDLE

The Outer Spindle is the cylinder that travels up and down. It is supported in outer spindle bushings.

Every 40 hours, The Outer Spindle should be cleaned with *Kerosene*. And occasionally a *light weight* oil applied to prevent excessive dryness.

INNER SPINDLE

The Inner Spindle is located inside the Outer Spindle. The Inner Spindle is directly connected to the cutterhead.

Every 40 hours, Add 2 or 3 drops of oil, *Union oil 315 klondyke oil*, or any *SAE #10 oil (non detergent motor oil)*

Every 175 hours, Add one shot of, *Union oil - Unoba F1*

or *F2 lube*, *Lubriplate #930 AAA*, *Mobil oil - Mobilith A.W. grades 1 or 2*, *Chevron Durolith EP1 or EP2*, or any equivalent lithium barium grease. Run the spindle down near the lower limit and you will see a grease fitting located in the keyway. Add lubrication to the fitting in the spindle keyway. If the inner spindle is removed clean the lower bearing and repack it with the same grease.

VERTICAL ADJUSTMENT NUT

This nut is what makes the spindle travel up and down when the handwheel is turned.

Every 40 hours, Add 3 squirts of *spindle oil* to the oil cap located as shown on the illustration.

LUBRICATION MANUAL HEAD FIXTURE 7119F

Every 40 hours, Apply *multi-purpose grease* to the grease fittings.

Every 40 hours, Apply *multipurpose grease* to the sliding surfaces.

**LUBRICATION 2-AXIS UNIVERSAL
MACHINE TABLE 71190**

Every 175 hours, Add 2 or 3 shots of grease to the grease fittings shown.

Every 40 hours, clean and apply grease to the bearing surfaces of the journals.

Every 1,000 hours, Disassemble clean and grease the spherical washer.

Use *F2 Multi-purpose Grease, Chevron Duroolith,* or equivalent.

**Coalescing
Filter**

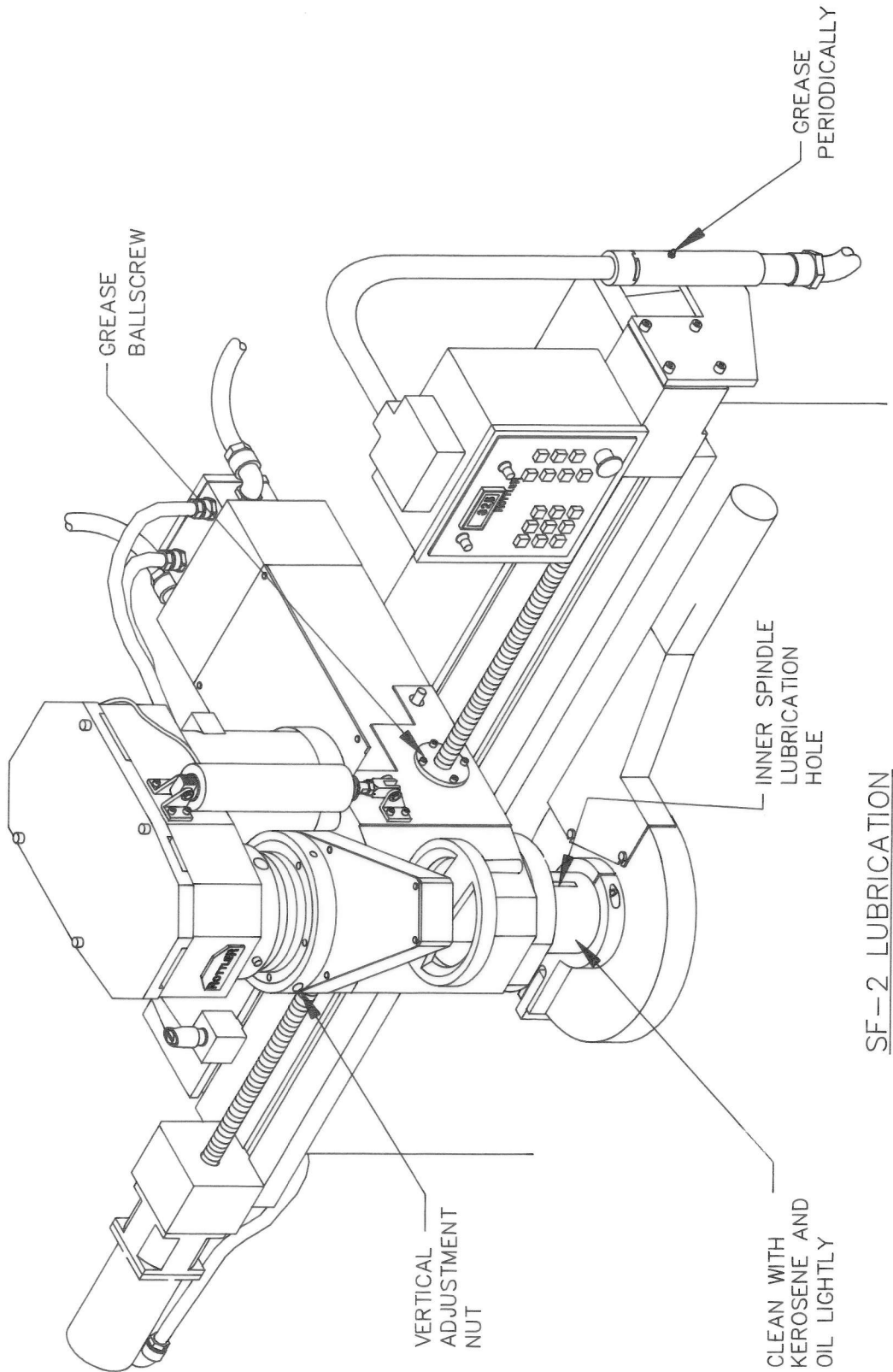
The coalescing filter is the second filter on the incoming air supply. This filter removes the majority of the liquid (oil, water etc...) in the air supply. The filter and incoming air is located on the rear electrical enclosure. (see page 6.4).

WARNING :

Every 8 hours, this filter must be checked for accumulation of water. If the sight glass reaches 1/4 to 1/2 full the water must be manually emptied. To empty water, open valve on the bottom of filter, allow all water to drain, close valve.

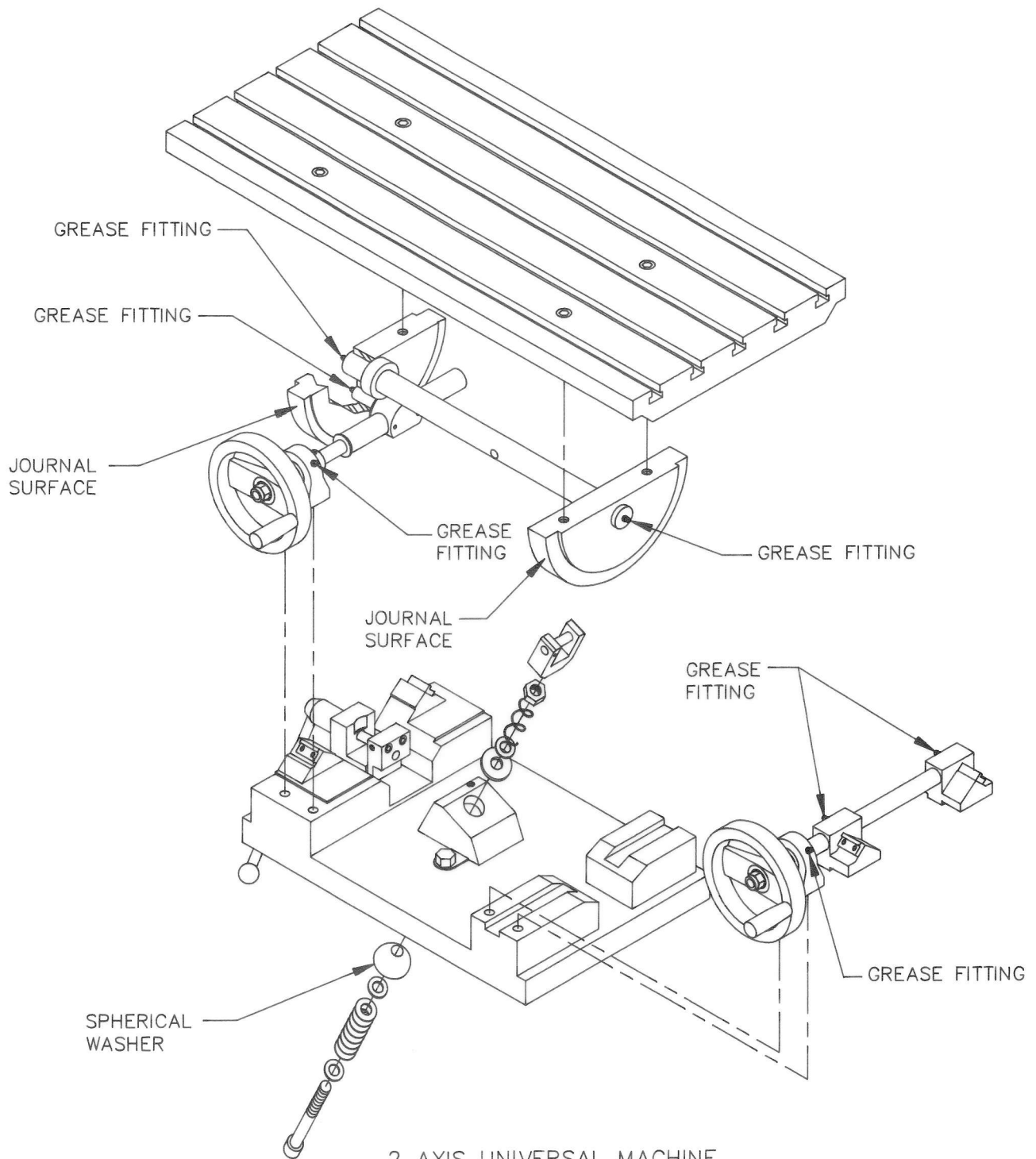
**Cleaning the
Way Surface**

DO NOT clean way surfaces with abrasive or harsh cleaners. The sliding way material used under the spindle base, must "break-in" which will deposit a small amount of the material into the top of the main base. Discoloration will occur in the areas the way material slides. If the way surface is cleaned of these deposits, the "break-in" action will start all over. If this cycle is repeated premature wear will result.

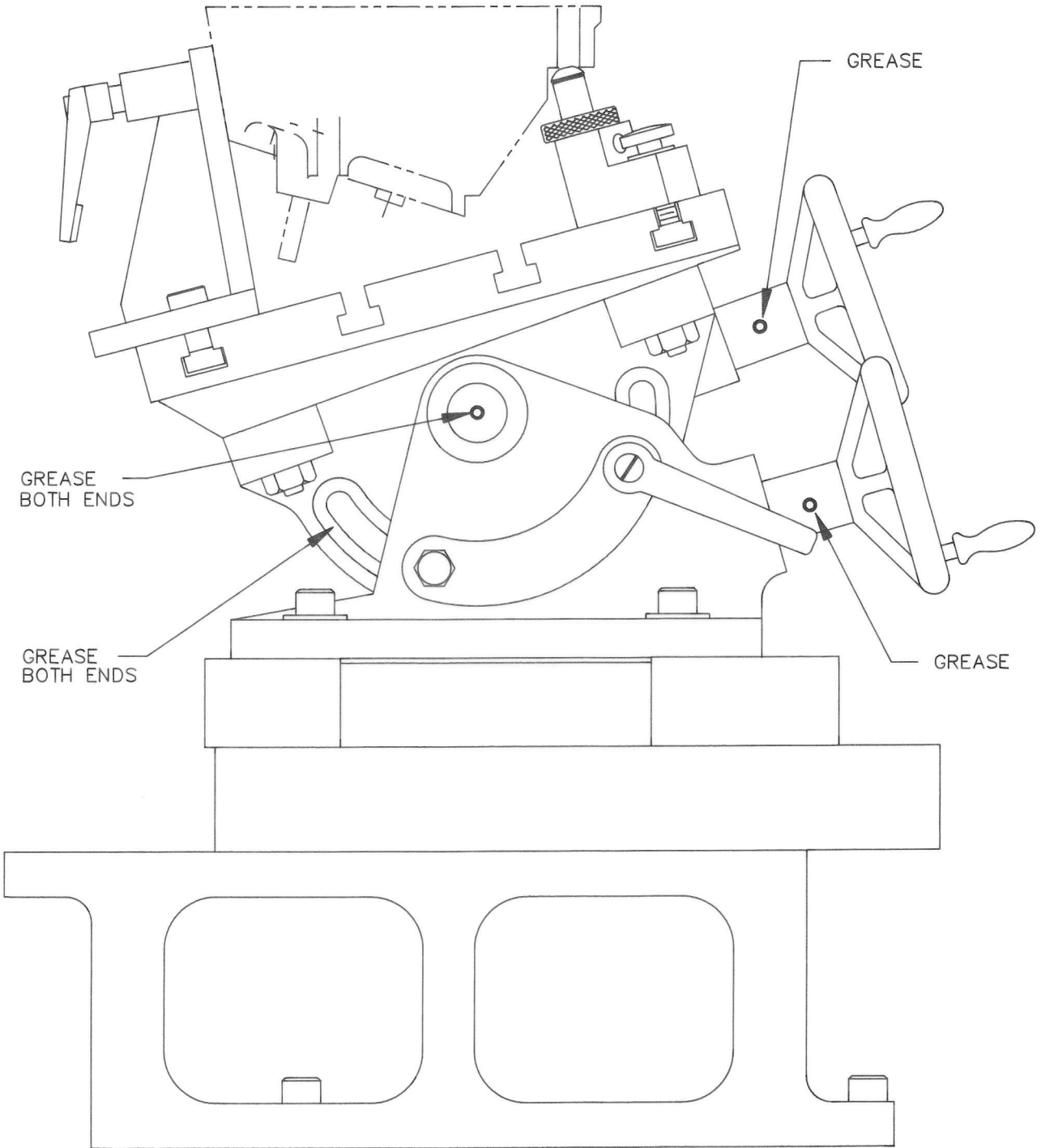


SF-2 LUBRICATION

SF2-C



2 AXIS UNIVERSAL MACHINE
TABLE 7119Q LUBRICATION



MANUAL HEAD FIXTURE LUBRICATION 7119F

SETTING THE CUTTING TOOL INSERTS

Place the UP/ADJUST/MILL toggle switch into mill mode.

Switch to left travel and run the spindle base to the center of the main base.

CAUTION:

Turn off all power to machine before proceeding.

Remove vacuum housing from chip shield. Attach a dial runout indicator to a cylinder head or engine block, etc.

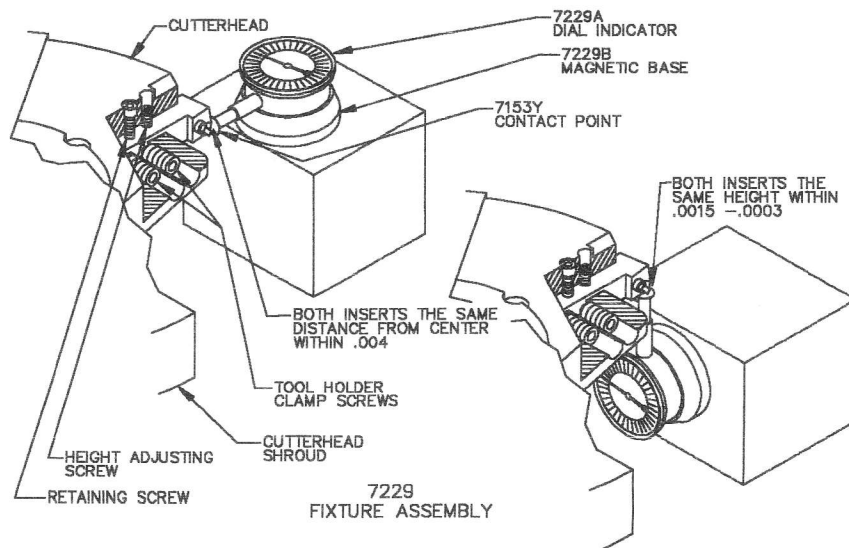
Rotate cutter head and check to see that both inserts are the same distance from the center of the spindle, within .004. If adjustment is necessary loosen the two tool holder clamp screws, and the up adjustment screw. Move tool holder in or out required distance. Retighten all screws and recheck both inserts.

Rotate cutter head and check to see that both inserts are

the same height within .0015-.0003. If adjustment is necessary loosen the two tool holder clamp screws then alternately loosen and tighten the up and down adjusting screws. Retighten all screws and recheck both inserts.

Production Cutting Aluminum & Cast Iron

For faster tooling set up, this machine can be set up with one cast iron cutting tool bit and one aluminum cutting tool bit. The set up is very simple. Set the cast iron style toolholder with no down or out adjustment. Set the aluminum style toolholder .02 farther out and .005 lower than the cast iron style toolholder. With the cutter head set up this way, aluminum work can be easily cut. To cut cast iron simply remove the cutting insert from the aluminum style toolholder.



DIAL INDICATOR SETTING

(See also illustration page 6.15)

If chip shield, cutting insert, or dial indicator have been moved, the dial indicator should be reset.

To reset, switch the UP/ADJUST/MILL toggle switch into adjust mode.

With surfacing cutter in the for and aft position, switch to left travel and move spindle left until the cutter head over laps the cylinder head surface by 1/2" when rotated.

CAUTION:
TURN OFF POWER TO THE MACHINE WHEN HANDLING CUTTER.

Touch off cylinder head surface, by turning hand wheel clockwise until cutter insert just touches cylinder head

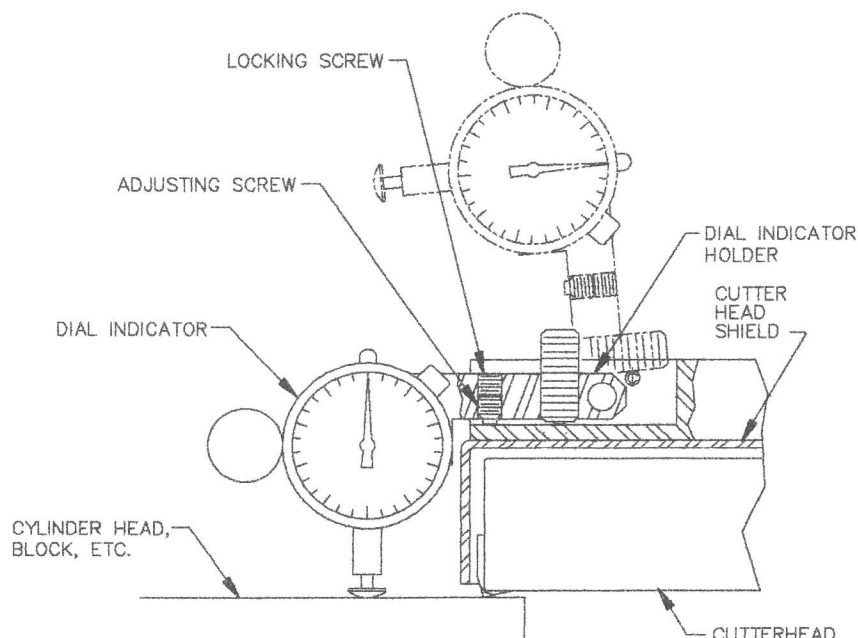
surface when rotated back and forth over this surface.

(NOTE: DO NOT LOWER CUTTER HEAD DIRECTLY ONTO CYLINDER HEAD SURFACE, IT MAY CHIP THE CUTTING TOOL INSERT).

Press the dial indicator down on the cylinder head surface. Adjust it by: Removing the lock screw. Then turn adjusting screw up or down until the dial indicator is half way between it's minimum and maximum range. Replace the lock screw and tighten firmly.

Set dial to zero.

The indicator may be checked periodically by making a cut and, without raising or lowering the spindle, go back to the start of the cut and see if the indicator reads zero.



VERTICAL TRAVEL CHAIN REMOVAL AND REPLACEMENT

CAUTION :

All power to this machine must be disconnected before continuing.

(See illustration page 6.6)

Remove four screws from the chain cover, and lift it off.

Remove half round cover by removing its three screws.

Loosen the locknut, and the two bolts, on the adjusting block. Move the sprocket all the way in by turning the adjusting bolt.

Locate a master link in the chain and remove it. Remove the chain. Slide the new chain thru the opening around the large sprocket and reconnect

the master link.

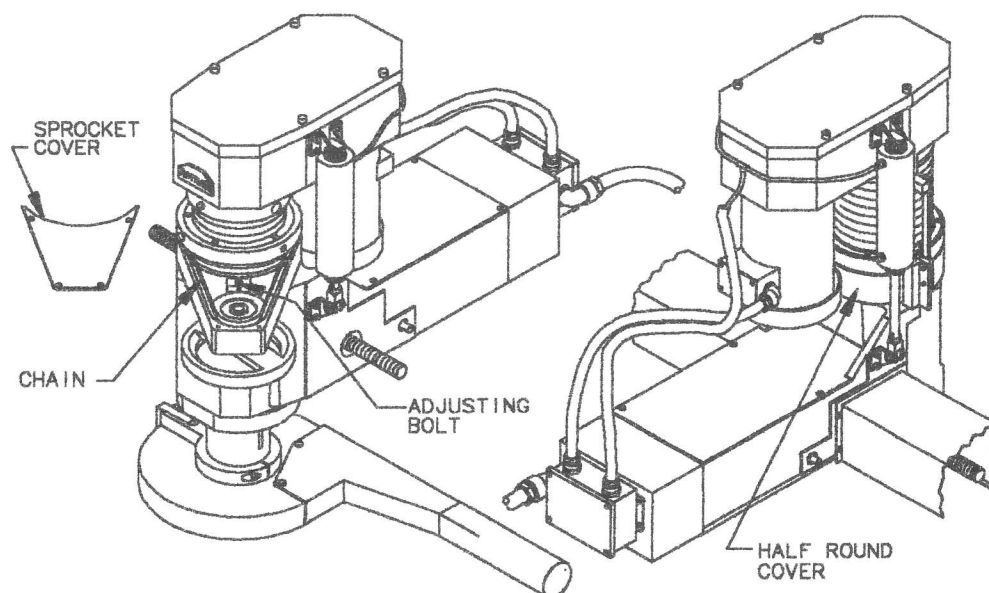
Place the chain over both sprockets, and take up the slack by turning the adjusting bolt. The chain should have approximately 1/4 inch play measured midway between the sprockets.

CAUTION :

Do not Over tighten the chain, or the vertical spindle positioning system could fail.

Lock the adjusting bolt with the locknut. Tighten the two bolts in the adjusting block.

Replace both covers, and tighten the mounting screws.



DRIVE BELT REPLACEMENT

CAUTION:

Turn off all power to surfacing machine before replacing belt.

(See also illustration
page 6.5)

Remove the four screws holding the upper cover. Lift cover off.

Loosen the four motor mount screws.

Loosen the belt tension screw.

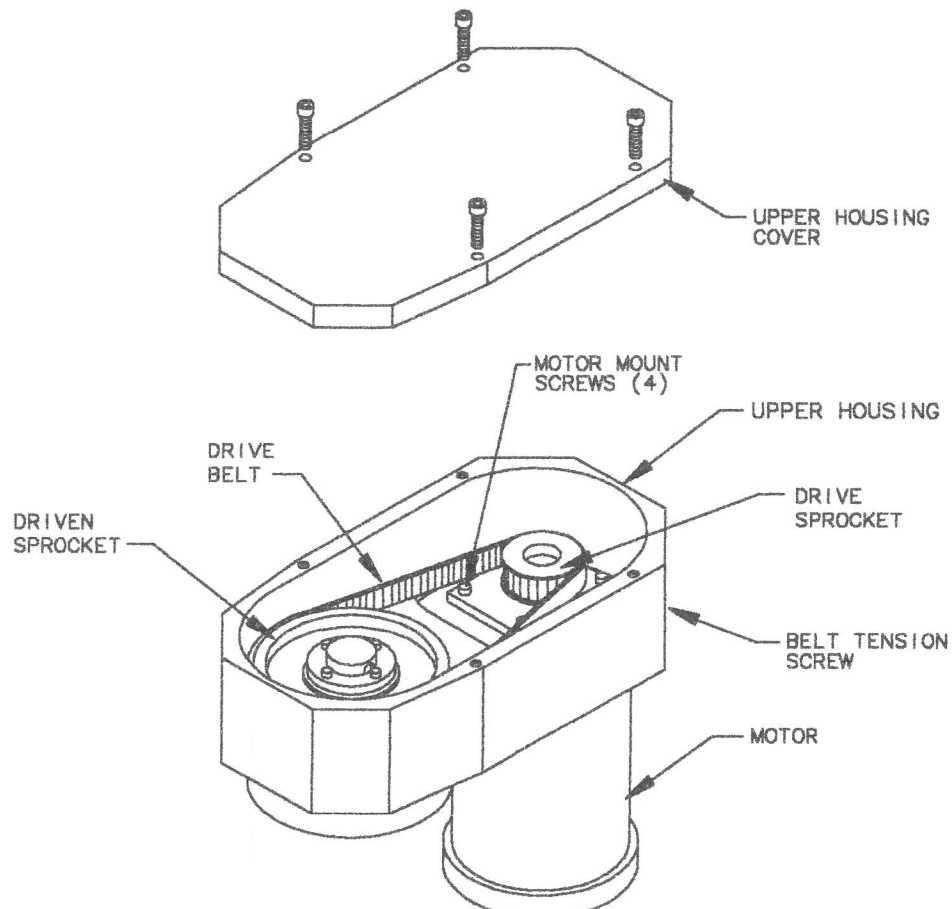
Lift the belt off.

Replace with new belt (7014F).

Tighten belt tension screw, until belt has 1/8 to 3/16 inch deflection, with 1-1/2 to 3 pounds pressure, measured in the middle of the belt.

Tighten the four motor mount screws.

Replace the upper housing cover and tighten the four screws.



DRIVE SPROCKET/MOTOR REMOVE AND REPLACE

CAUTION:

All power to this machine must be disconnected before continuing.

REMOVAL OF DRIVE SPROCKET (SMALL SPROCKET)

Remove the upper housing cover, and drive belt, (as explained on page 4.9).

Place something under the spindle drive motor to support it. Remove the four 3/8-16 motor mounting screws from inside the upper housing. Lower the motor, with the drive sprocket attached, out of the upper housing.

Remove three screws, located on the bottom of the sprocket bushing, between the bushing and the motor. Use three screws, in the threaded holes in the bushing, to loosen the bushing from the sprocket. Lift off sprocket.

REPLACEMENT OF DRIVE SPROCKET (SMALL SPROCKET)

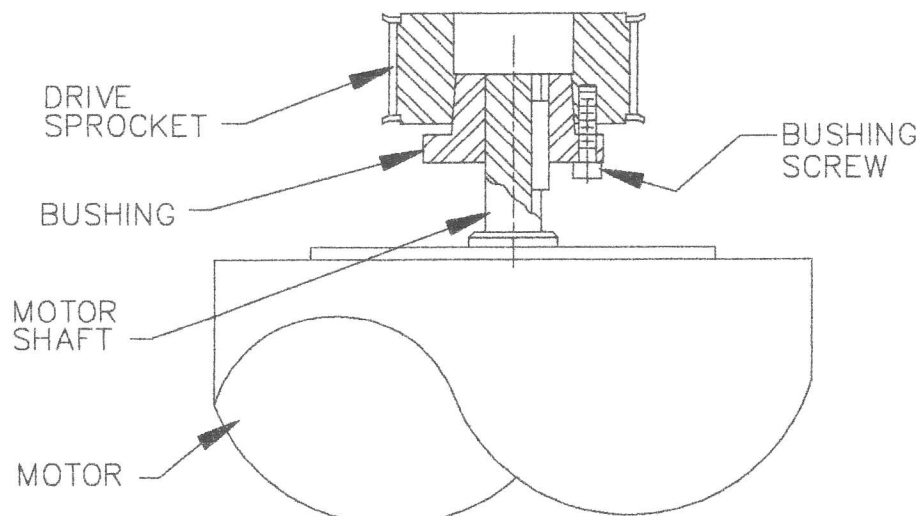
Clean bushing, and sprocket. Do not use any lubrication on bushing, sprocket, or screws.

Locate BUSHING flush with the end of the motor shaft. Tighten the #10-24 UNC screws in the bushing EVENLY to 5 to 6 ft. lbs.

Install motor back into upper housing and tighten the four motor mounting screws.

Replace the drive belt, and adjust, as indicated in drive belt replacement.

Replace upper housing cover and tighten the four screws.



DRIVEN SPROCKET REMOVE AND REPLACE

CAUTION:

All power to this machine must be disconnected.

REMOVAL OF DRIVEN SPROCKET (LARGE SPROCKET)

Remove the upper housing cover, and drive belt, (as explained on page 4.9).

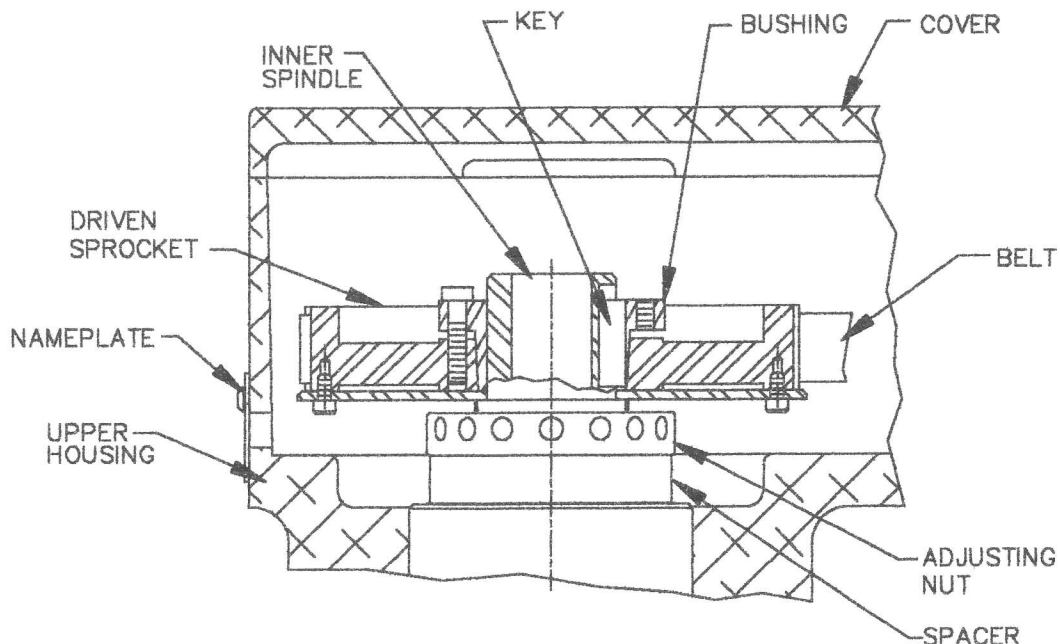
Remove the three 1/4-20 screws located on top of the sprocket bushing. Insert these bolts into the threaded holes in the top of the bushing. Turn these screws in evenly to force the bushing and sprocket apart.

Remove driven sprocket, the bushing, and the key.

REPLACEMENT OF DRIVEN SPROCKET (LARGE SPROCKET)

Clean bushing, and sprocket. Do not use any lubrication on bushing, sprocket, or screws.

Align the driven sprocket so that the bottom edge is slightly lower than the drive sprocket. Tighten the four 1/4-20 screws, located on top of the driven sprocket bushing, EVENLY to 9 to 10 ft. lbs. Check to see that it does not wobble.



CUTTERHEAD AND CHIPGUARD REMOVAL

CAUTION:

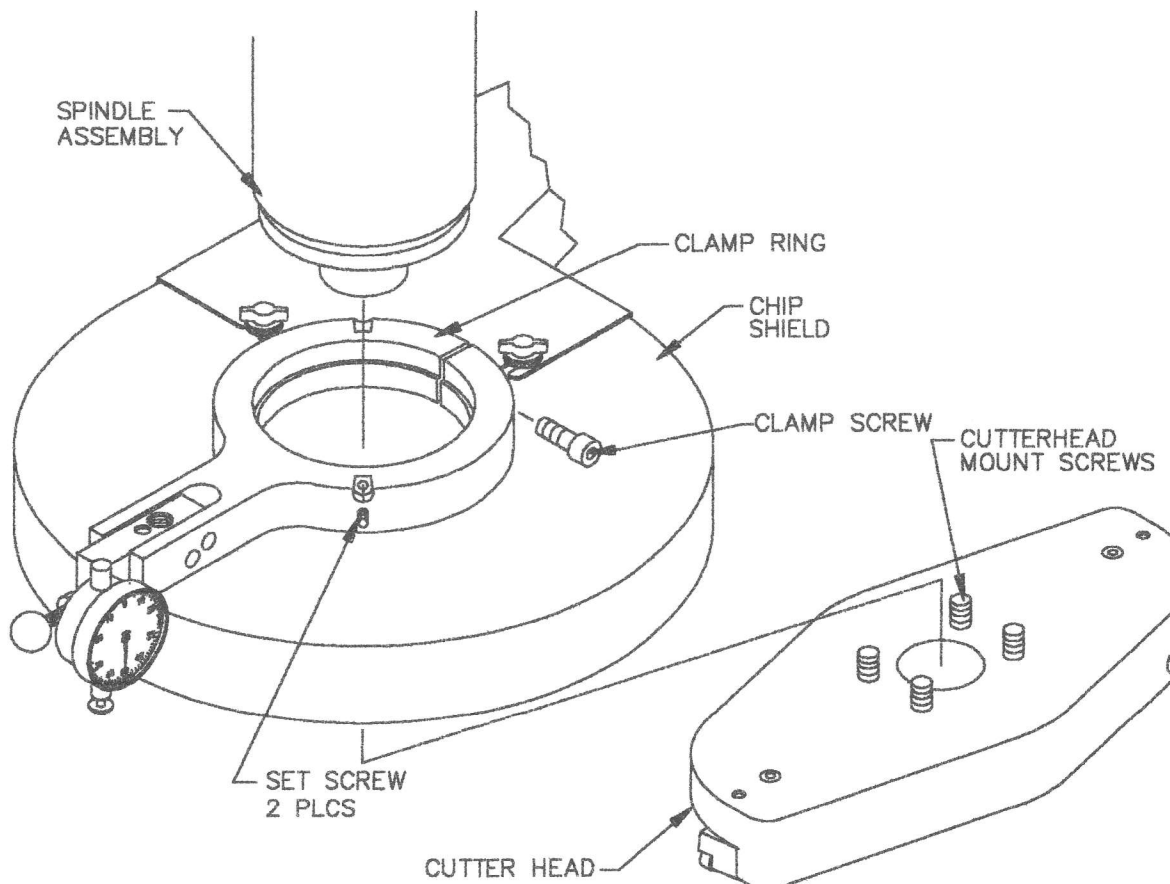
Disconnect power to surfacing machine before handling cutterhead.

Mark cutterhead and spindle so they can be reassembled in the same position.

Remove cutterhead by removing its (4) 3/8-16 screws.

Remove chip guard by removing its (2) 1/4-20 set screws that go into the clamp ring at an angle, and loosen the 3/8-16 capscrew in the split line of clamp ring.

Remove cover.



INNER SPINDLE REMOVAL

Remove the upper housing cover, and drive belt, (as explained on page 4.9).

Remove the driven sprocket (as explained on page 4.11).

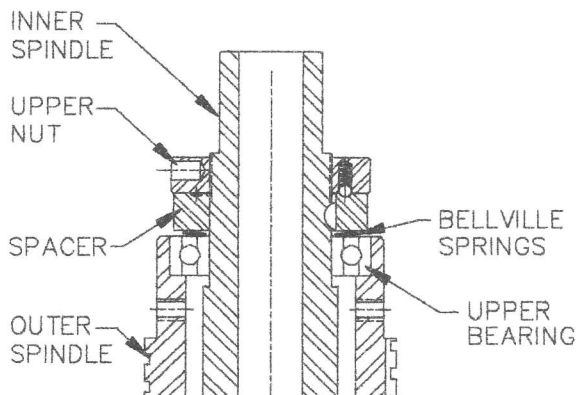
Remove the cutterhead and chip guard (as explained on page 4.12).

Crank spindle up to its full up position.

Remove the Rottler nameplate from the front of the upper gear housing.

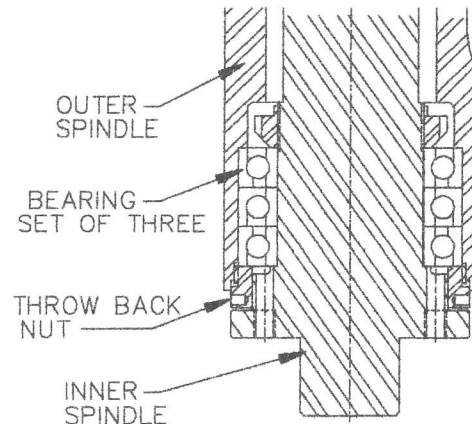
Insert a rod or punch thru this opening and into the upper adjusting nut (7020). Holding the cutterhead, loosen this nut by turning it counter-clockwise. Remove nut, spacer (7019), key (6043), and (2) Belleville springs (7052).

Thread upper adjusting nut (7020) back onto inner spindle to keep the spindle from falling out, after throwback nut is unthreaded.



Take a rod or punch and insert it into one of the holes in the outside of the throwback nut. This nut is located between the bottom of the outer spindle and the lower flange of the inner spindle.

Turn the nut counter-clockwise to loosen. As you back off the nut, tap on top of the inner spindle with a soft mallet. Do this until the nut is threaded out of the outer spindle.



Place something under inner spindle, then unthread the upper adjusting nut.

Slowly lower the inner spindle out of the outer spindle.

UPPER SPINDLE BEARING REMOVAL

Use a puller or a long bar from inside the outer spindle, to carefully remove the upper bearing.

AIR ADJUSTMENT SF-2 MACHINES

Up-Relief Air Setting

1. Move control panel toggle switch to adjust position.
2. Adjust, relief up air regulator, to 0 pressure.
3. Move control panel toggle switch to up relief.
4. Adjust relief up regulator pressure until the spindle lifts (Note air pressure reading.)
5. Continue to adjust air pressure up until the vertical handwheel does not turn smoothly. (Note air pressure reading.)
6. Set the regulator half way between these two readings.
7. This pressure should be approximately 45 to 50 P.S.I.

Adjust Air Setting

1. Move control panel toggle switch to adjust position.
2. Turn adjust air regulator to 0 pressure.
3. Increase regulator pressure until vertical handwheel can be turned clockwise with moderate resistance. (Note air pressure reading.)

4. Continue to adjust air pressure up until the spindle will snap up into a relief position while the vertical handwheel is turned counter-clockwise vigorously. (Note air pressure reading.)

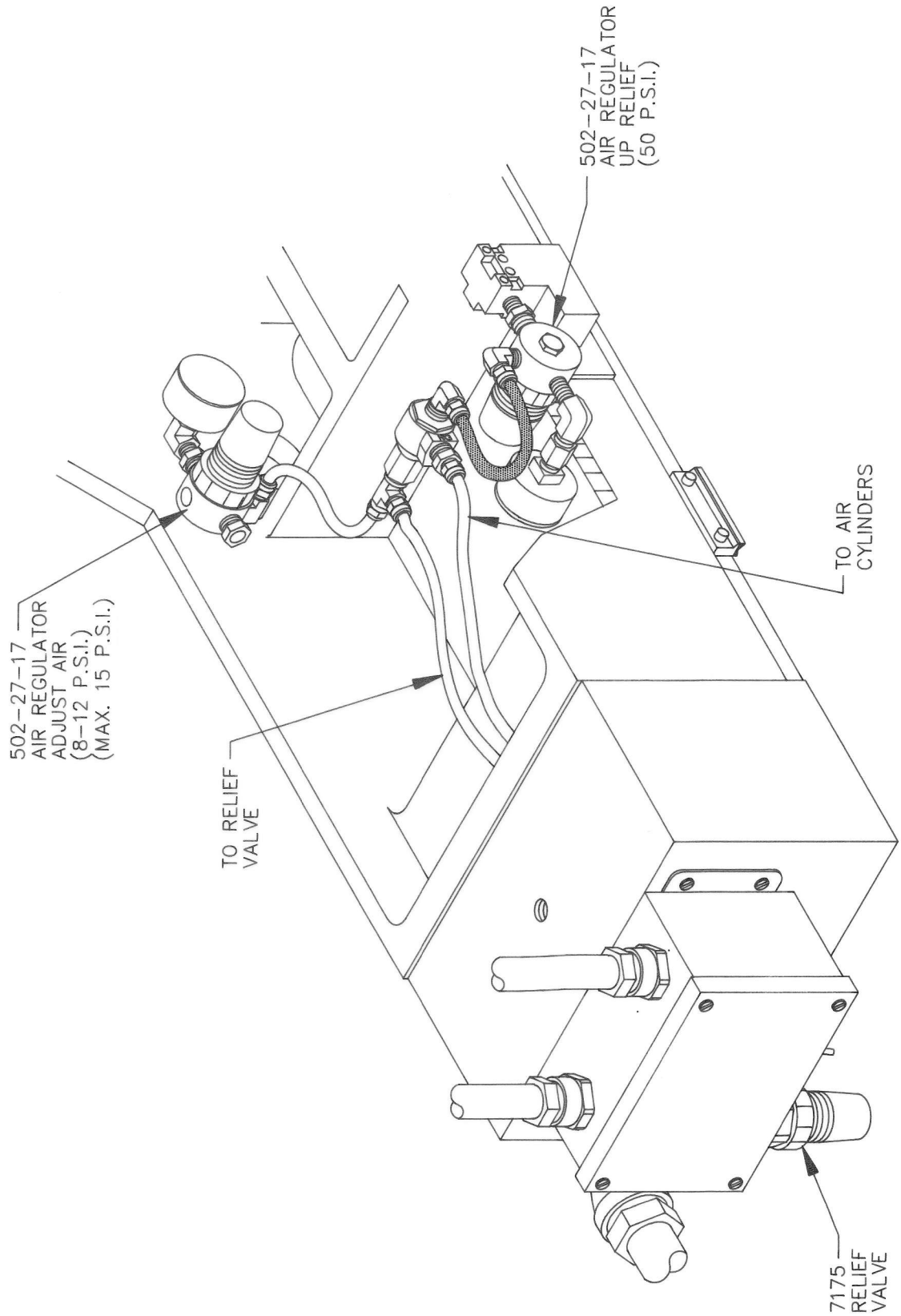
5. Set the regulator half way between these two readings.

6. This pressure should be approximately 8 to 12 P.S.I.

(CAUTION: Max 15 P.S.I.)

Relief Valve Setting

1. Note: adjust air setting, procedure must be completed first.
2. Move control panel toggle switch to adjust position.
3. Adjust relief valve clockwise until air is heard escaping. Then turn counter-clockwise until air just barely escapes.
4. While viewing the adjust air regulator gauge, crank the vertical handwheel rapidly counter-clockwise several turns. (Note air pressure reading.) If the setting is correct there should be an increase of 5 to 7 P.S.I.



SF-2-25

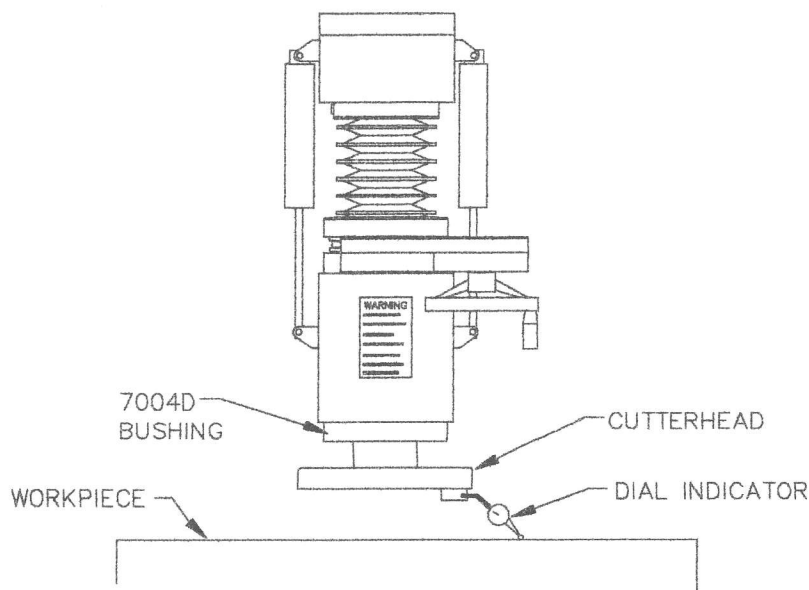
CUTTER HEAD TILT ADJUSTMENT

1. Load workpiece (scrap head or block) into the machine. Operate the machine normally and surface the workpiece.
2. Travel the spindle unit over to the center of the workpiece. Raise the cutterhead as far as possible.

NOTE :

Turn off all power before continuing.

3. Attach the magnetic base of a dial indicator to the bottom of the cutterhead at approximately 6-1/2 inches from the center.
4. Zero the indicator on the surface of the workpiece.
5. Manually rotate the cutter head left to right. The indicator should show the left, leading edge of the cutterhead to be .0025 to .004 lower than the right, trailing edge.
6. If the tilt is not within this tolerance, it will need to be adjusted. Loosen the six allen head bolts holding the 7004D bushing to the bottom of the spindle base. (see illustration page 6.7). Snug the bolts up very lightly.
7. Use a large mallet to knock the 7004D bushing to the right or to the left until you have the proper tilt in the spindle as described in step 5.
8. Tighten the six allen head bolts firmly.
9. Recheck tilt to make sure nothing moved.
10. Remove the indicator turn power back on and operate the machine normally.



INNER SPINDLE ADJUSTMENT

WARNING: Disconnect all power to this machine before continuing.

Remove the two screws holding the small nameplate (502-1-19C) to the front of the upper housing. Inside the exposed opening is the spindle adjustment nut (7020). The spindle adjustment nut has holes drilled around it's perimeter to accept an adjustment rod.

Insert an adjustment rod into the spindle adjustment nut. The adjustment rod should be 1/4 - 5/16 inch diameter and 8 - 10 inches long.

Carefully rotate the cutterhead counter-clockwise, (looking from above the cutterhead) letting the adjustment rod move against the end of the slot. This

tightens the inner spindle adjustment. The cutterhead will be easy to turn and you should be able to feel the spring loaded detent in the adjustment nut.

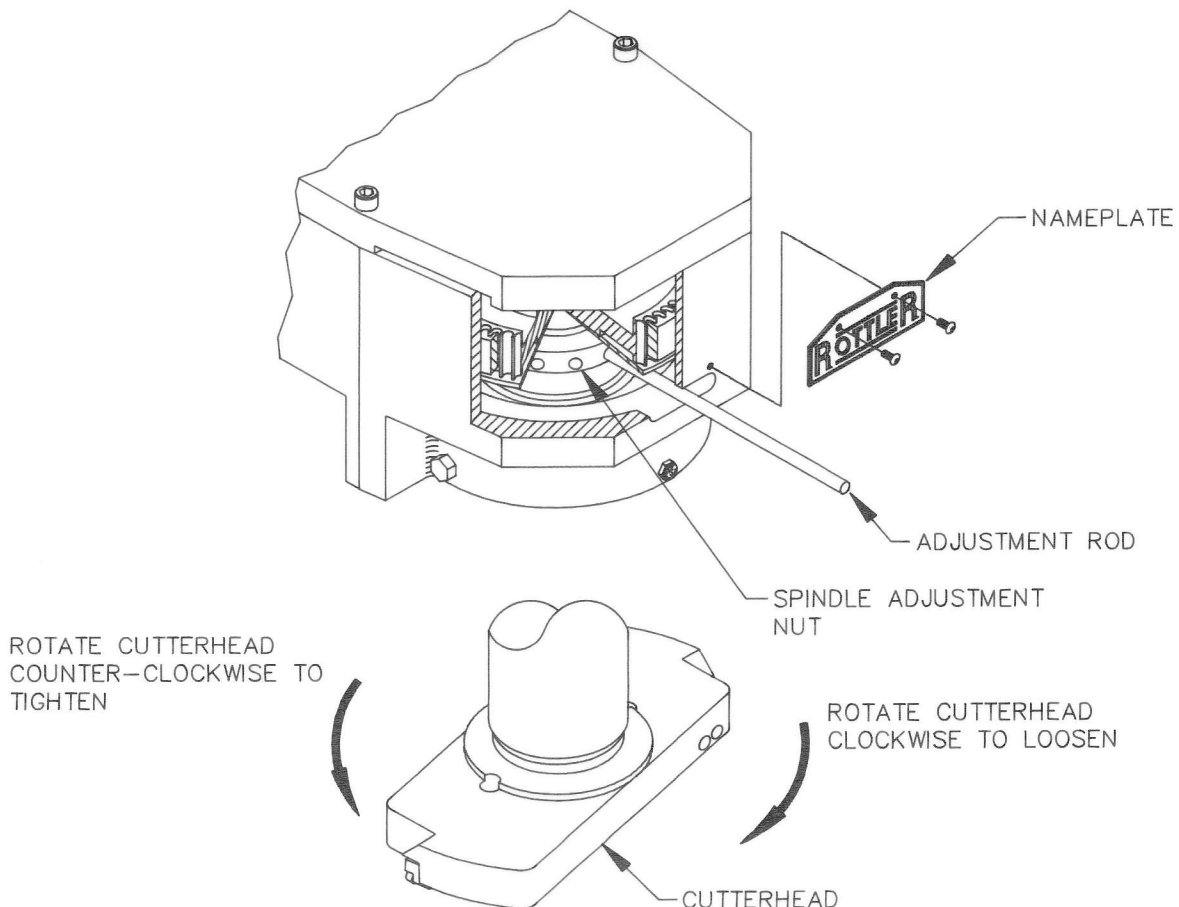
At some point the torque required to turn the cutterhead will sharply increase, immediately stop turning the cutterhead.

CAUTION: Do not overtighten or severe bearing damage will occur.

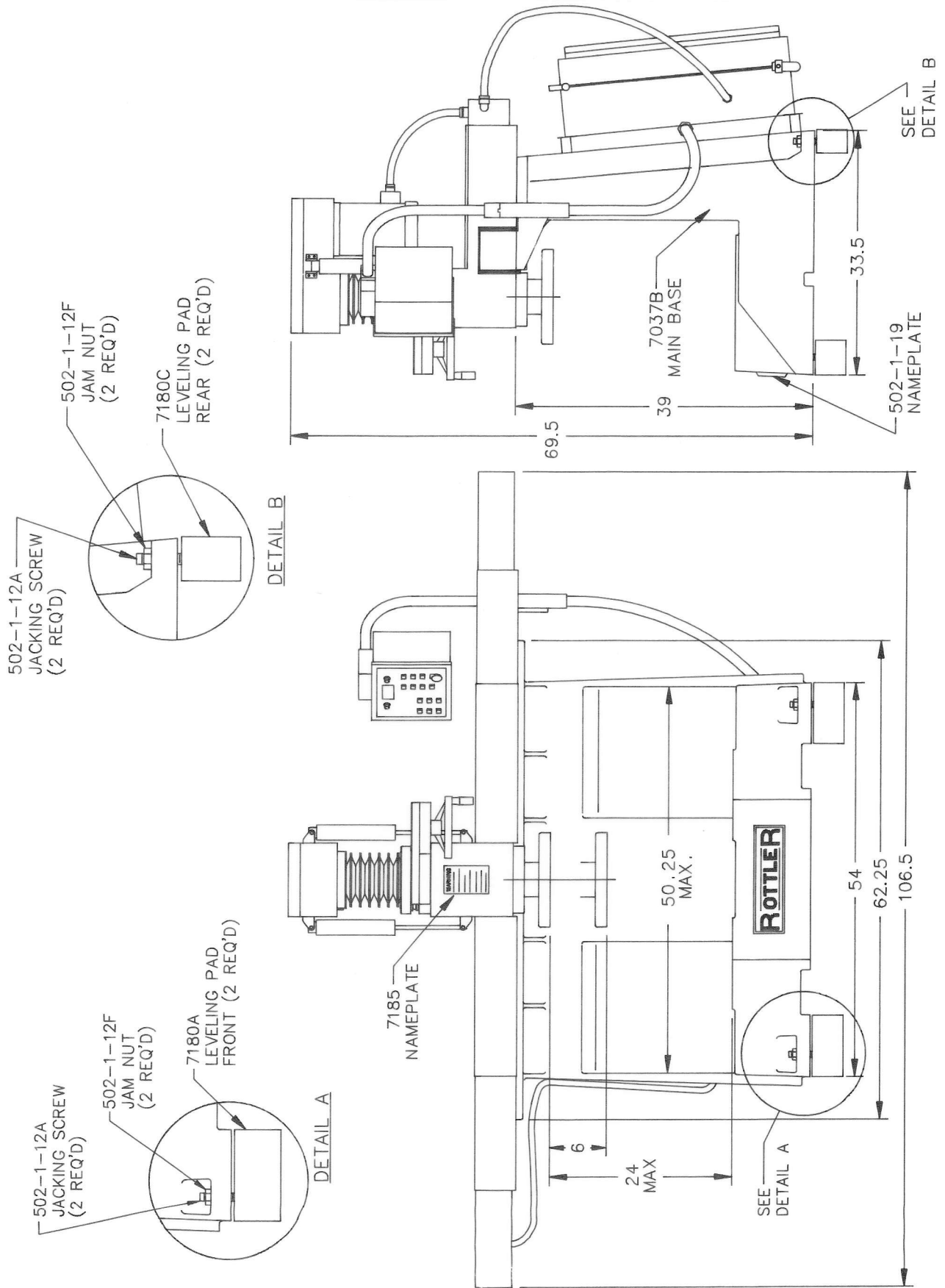
Turn the cutterhead clockwise one or two detents.

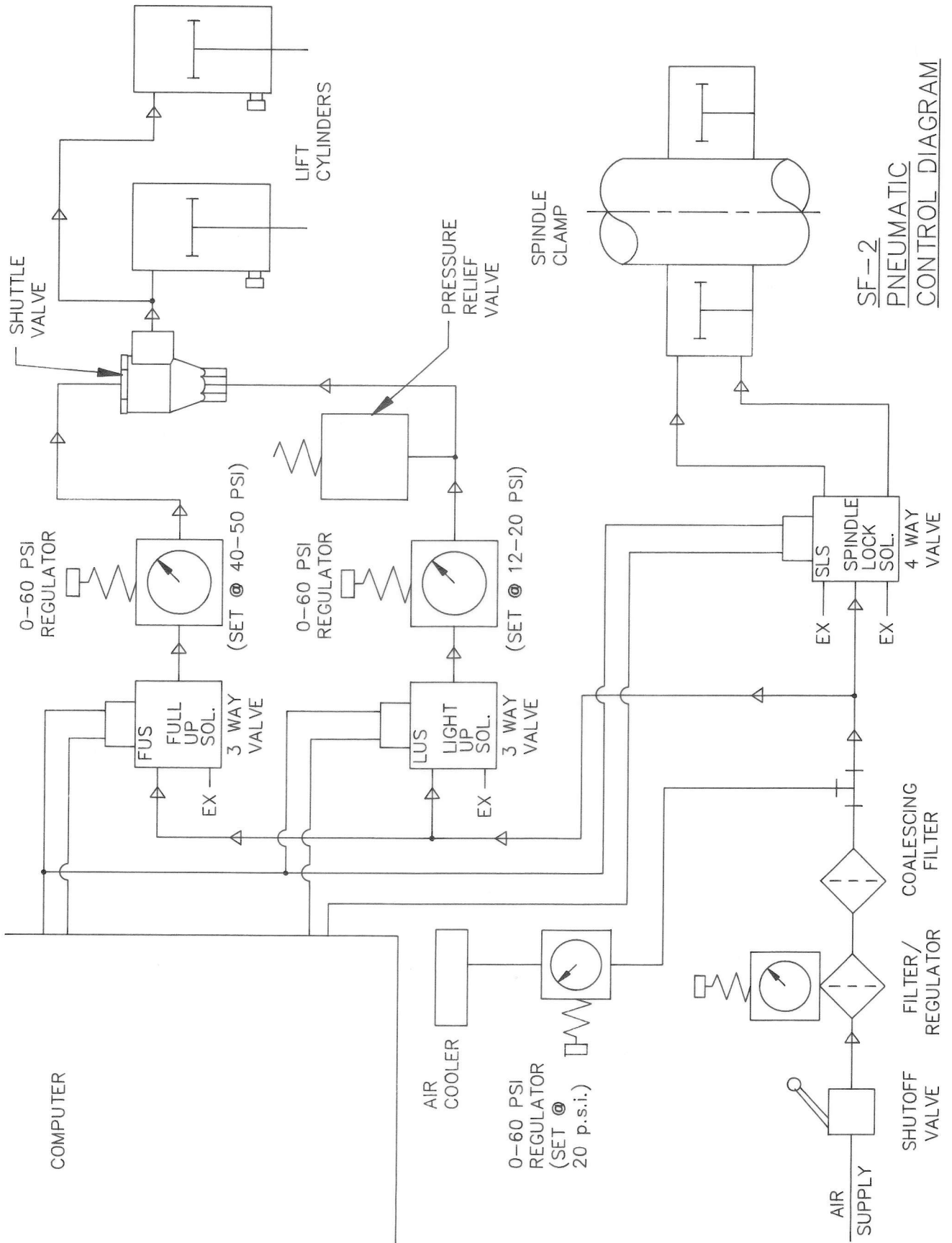
Remove the adjustment rod and replace the nameplate.

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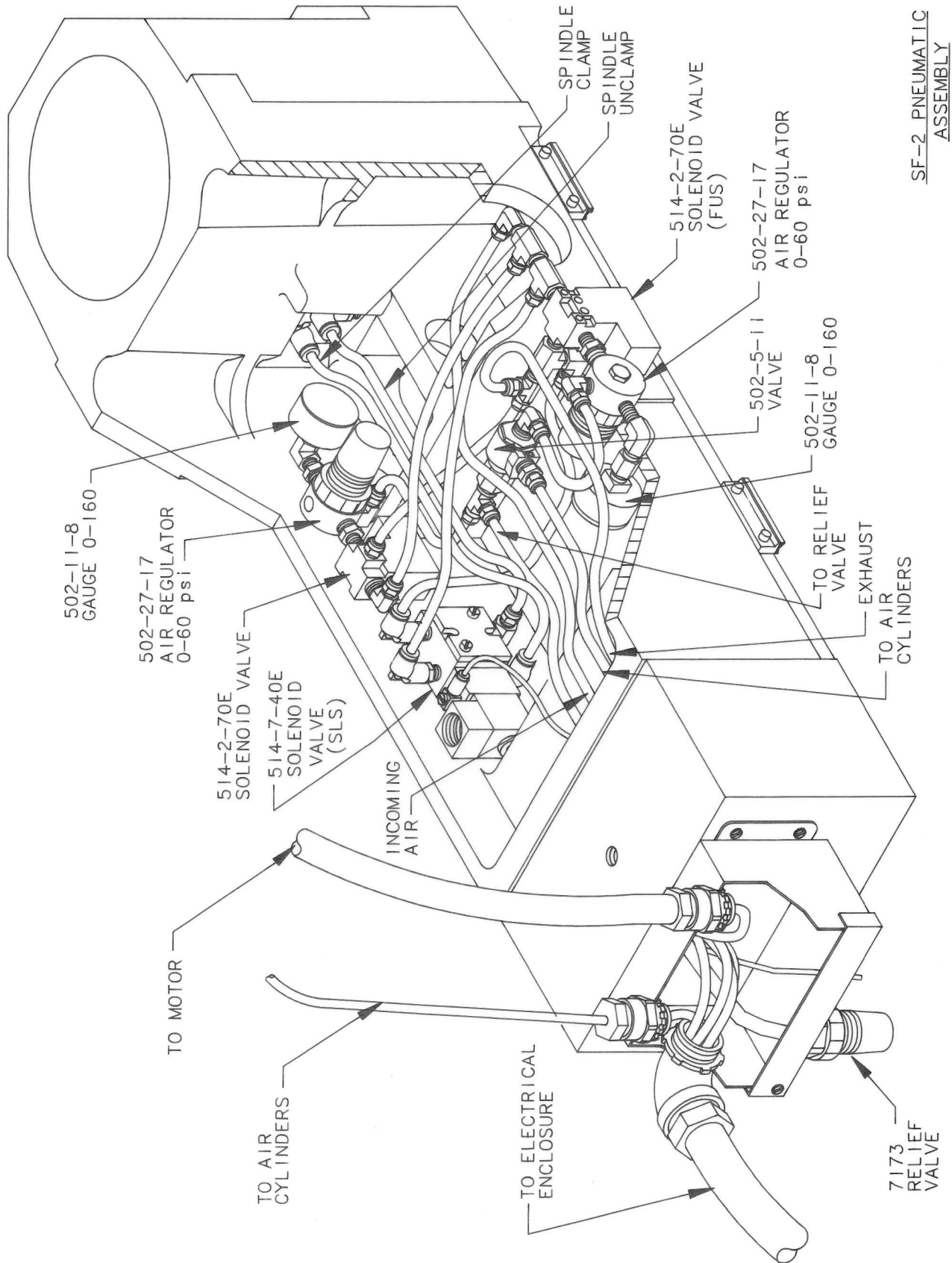


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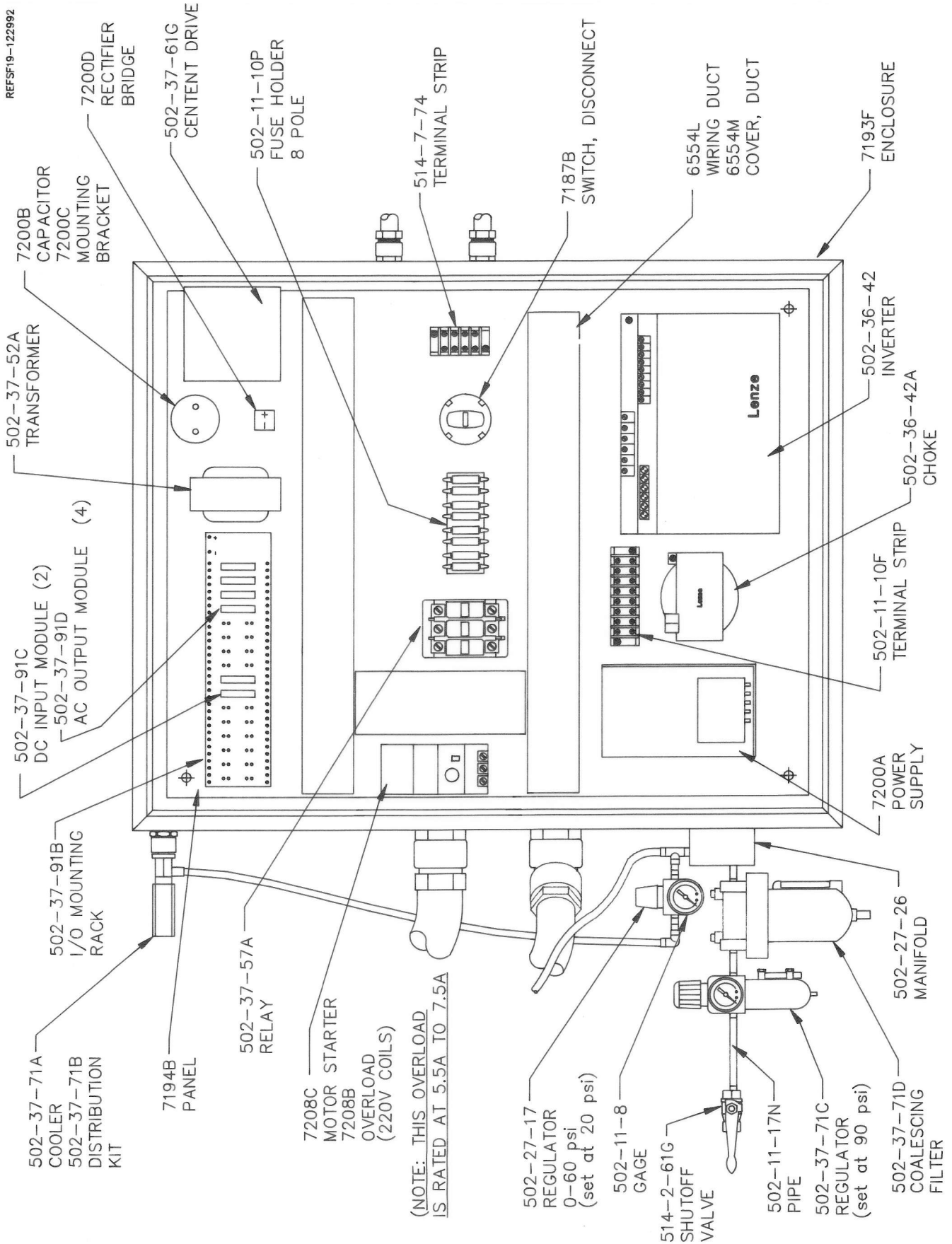


SF-2
PNEUMATIC
CONTROL DIAGRAM

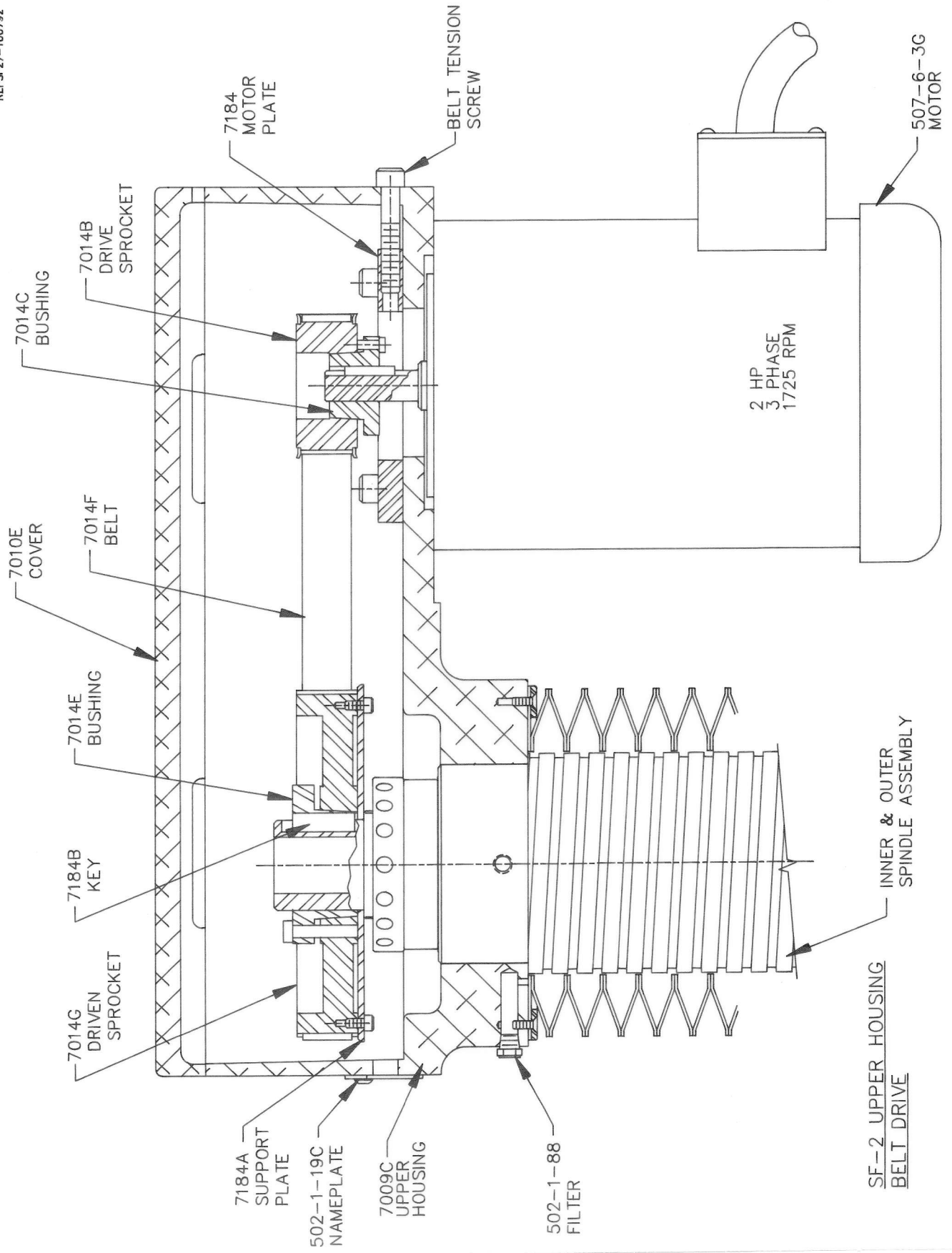


SF-2-12

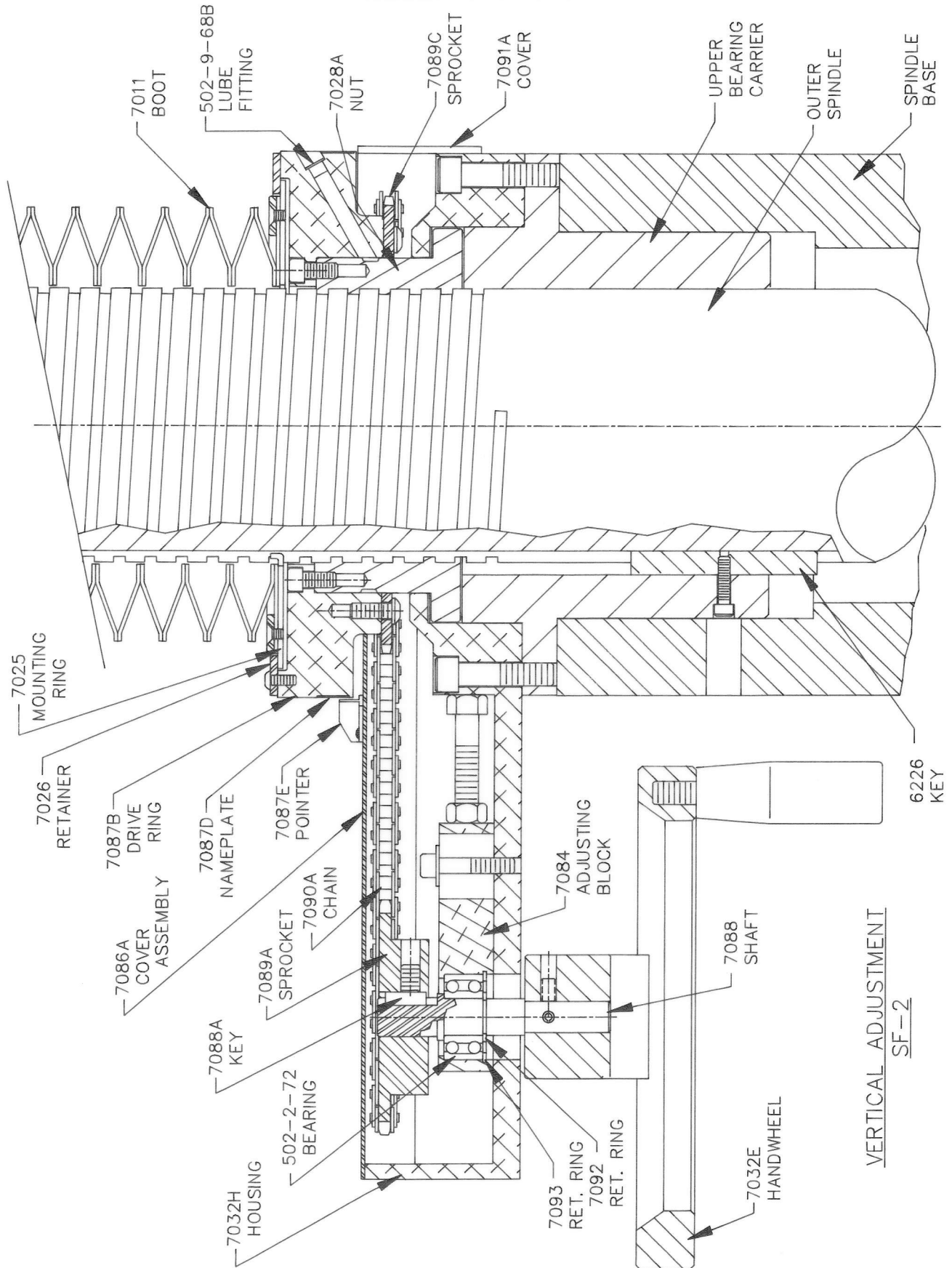
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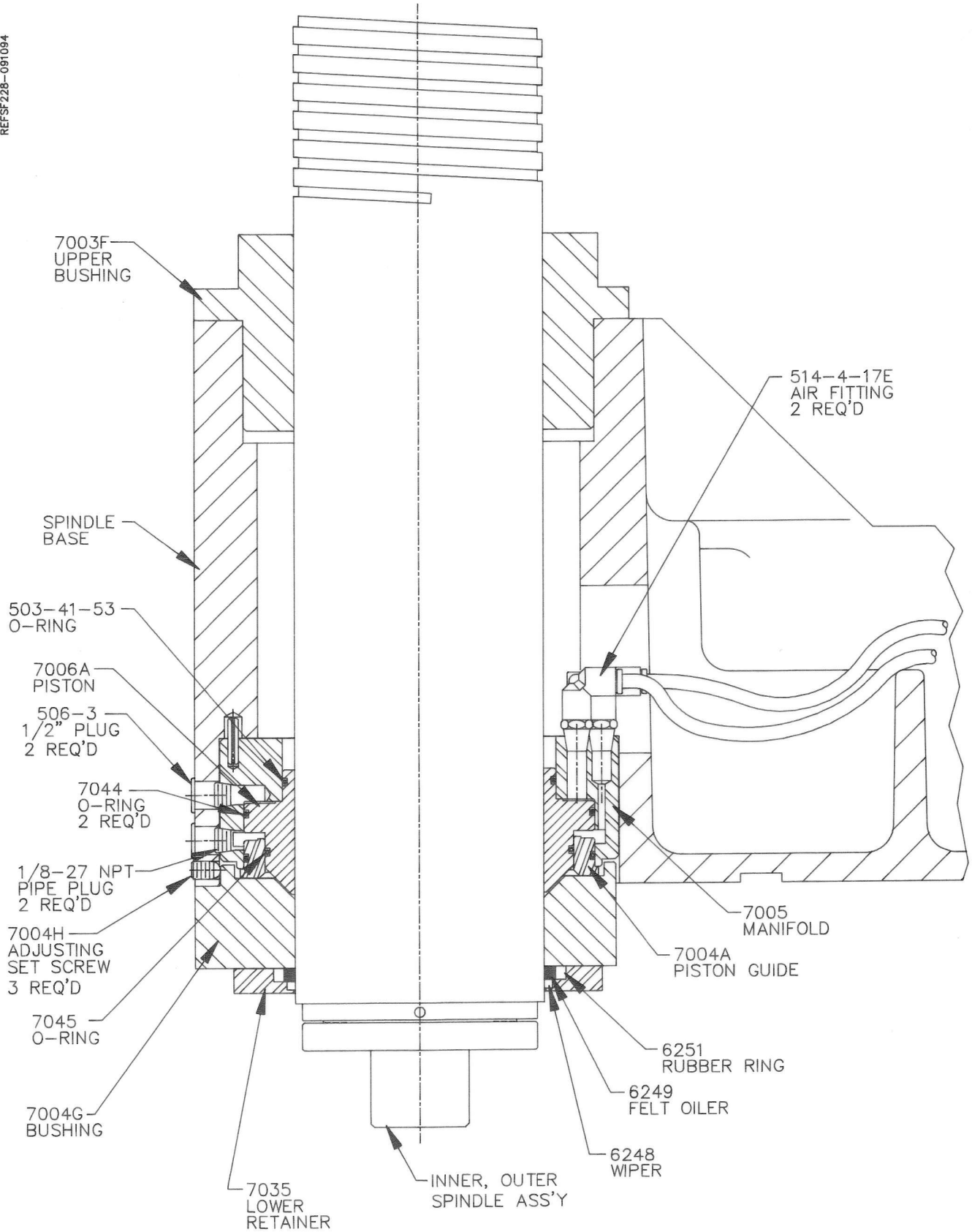
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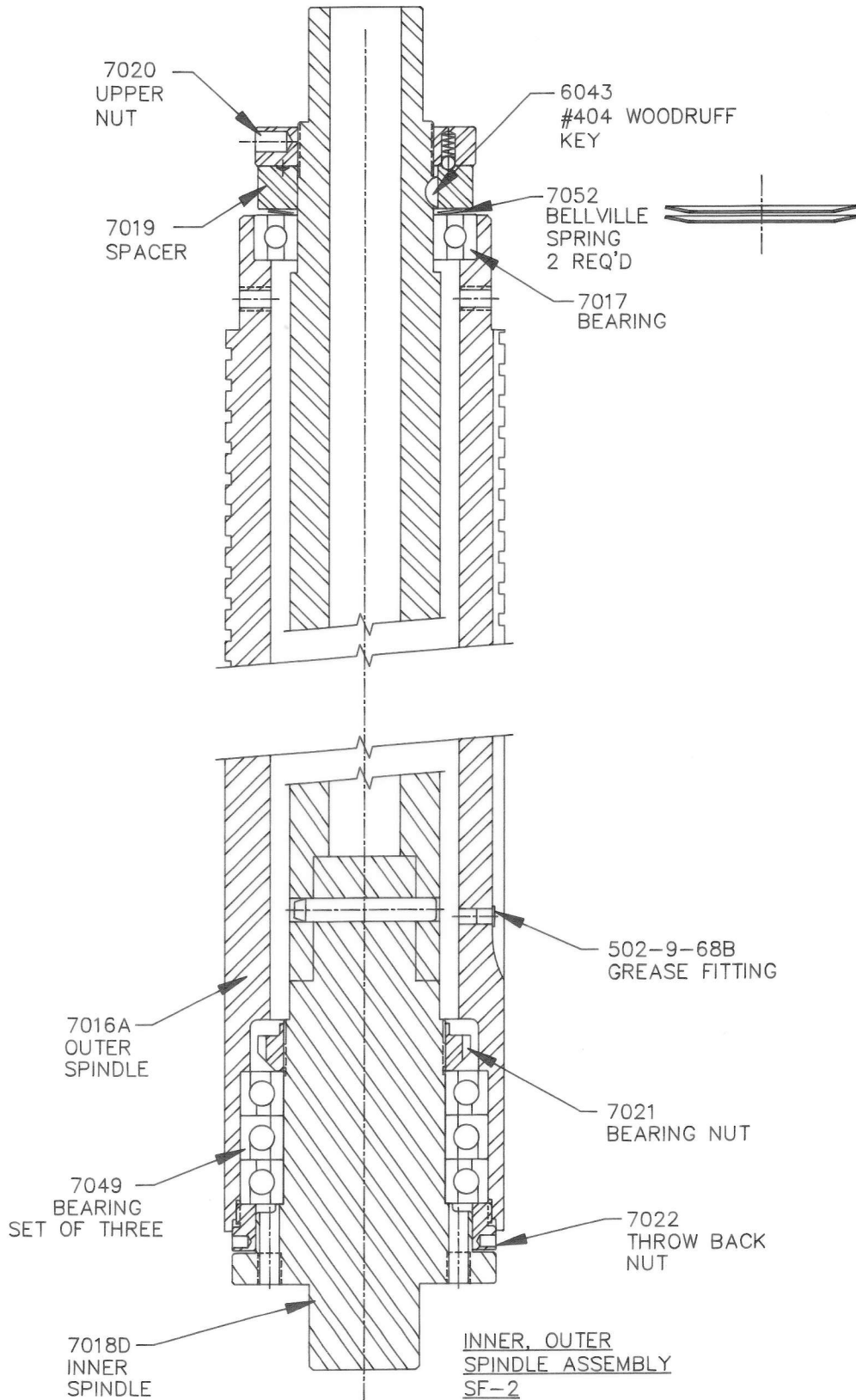
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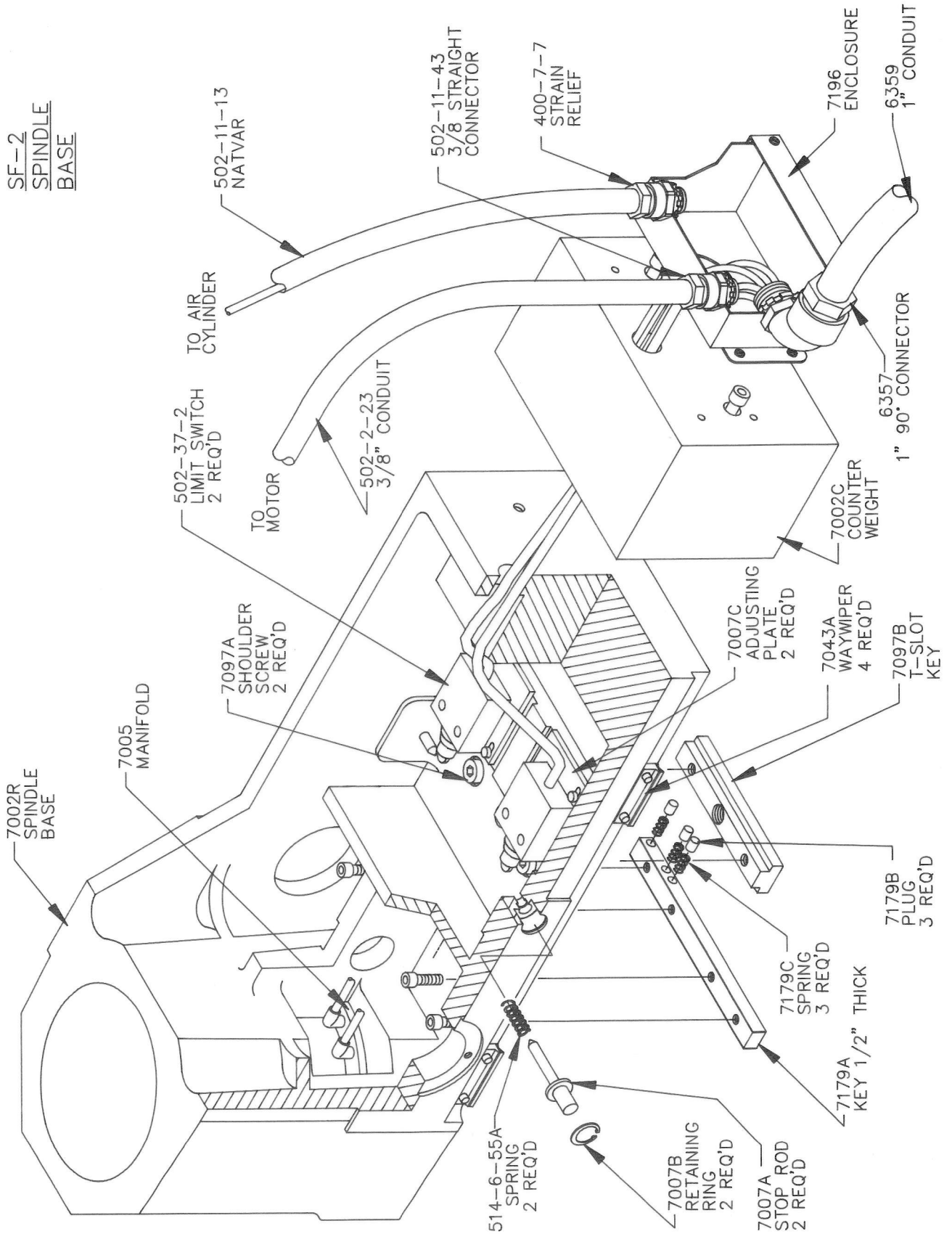


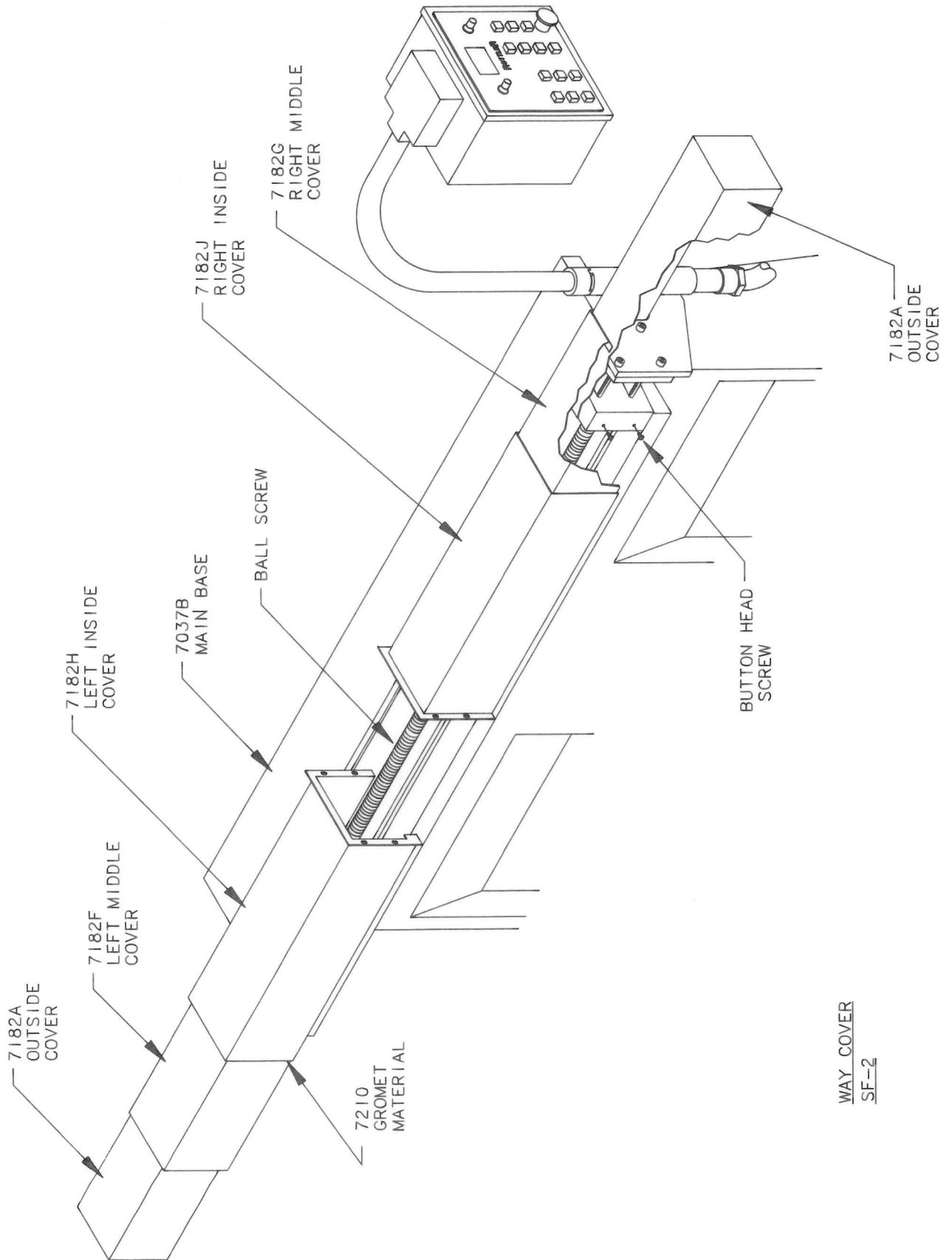
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REFSF210-123092



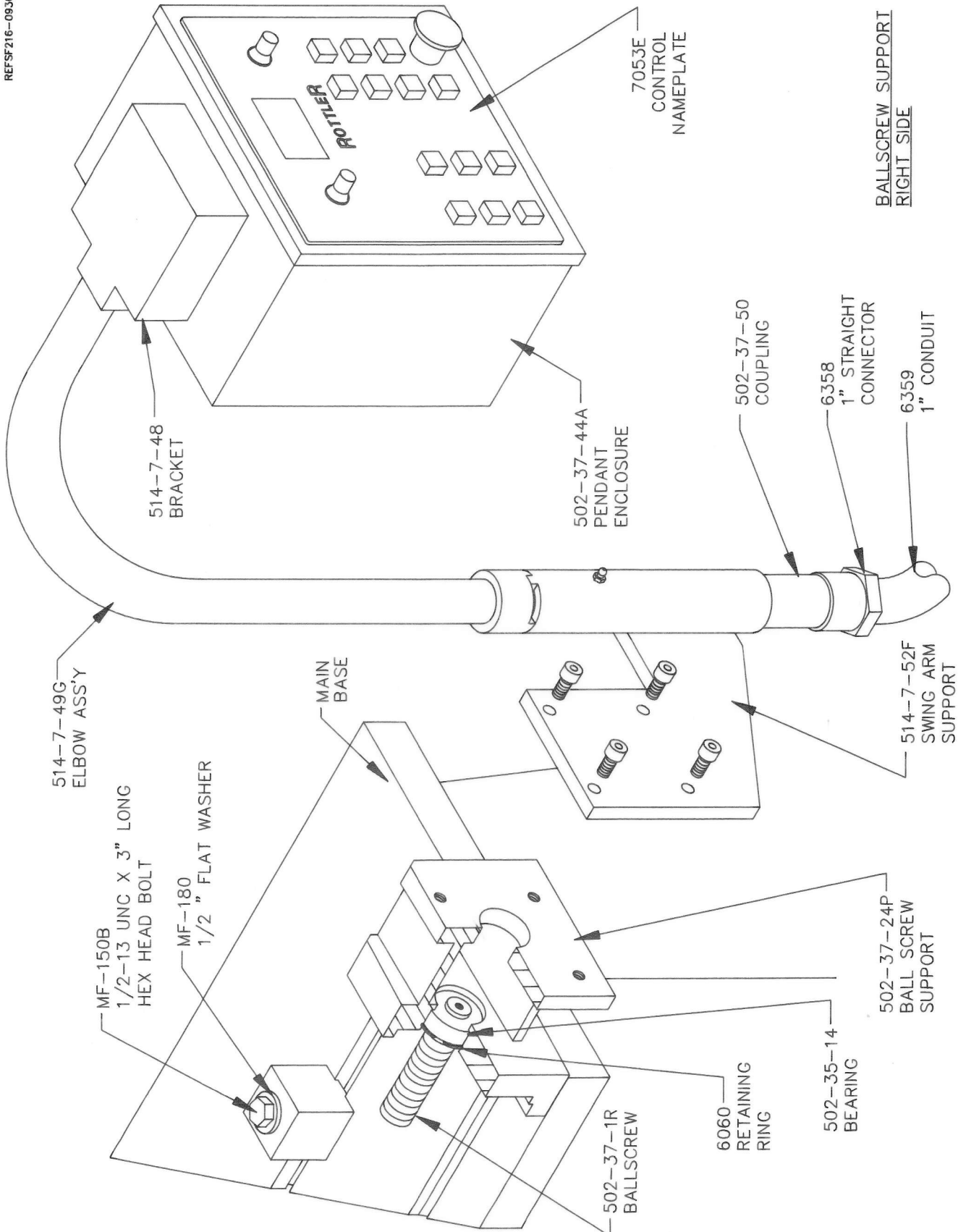




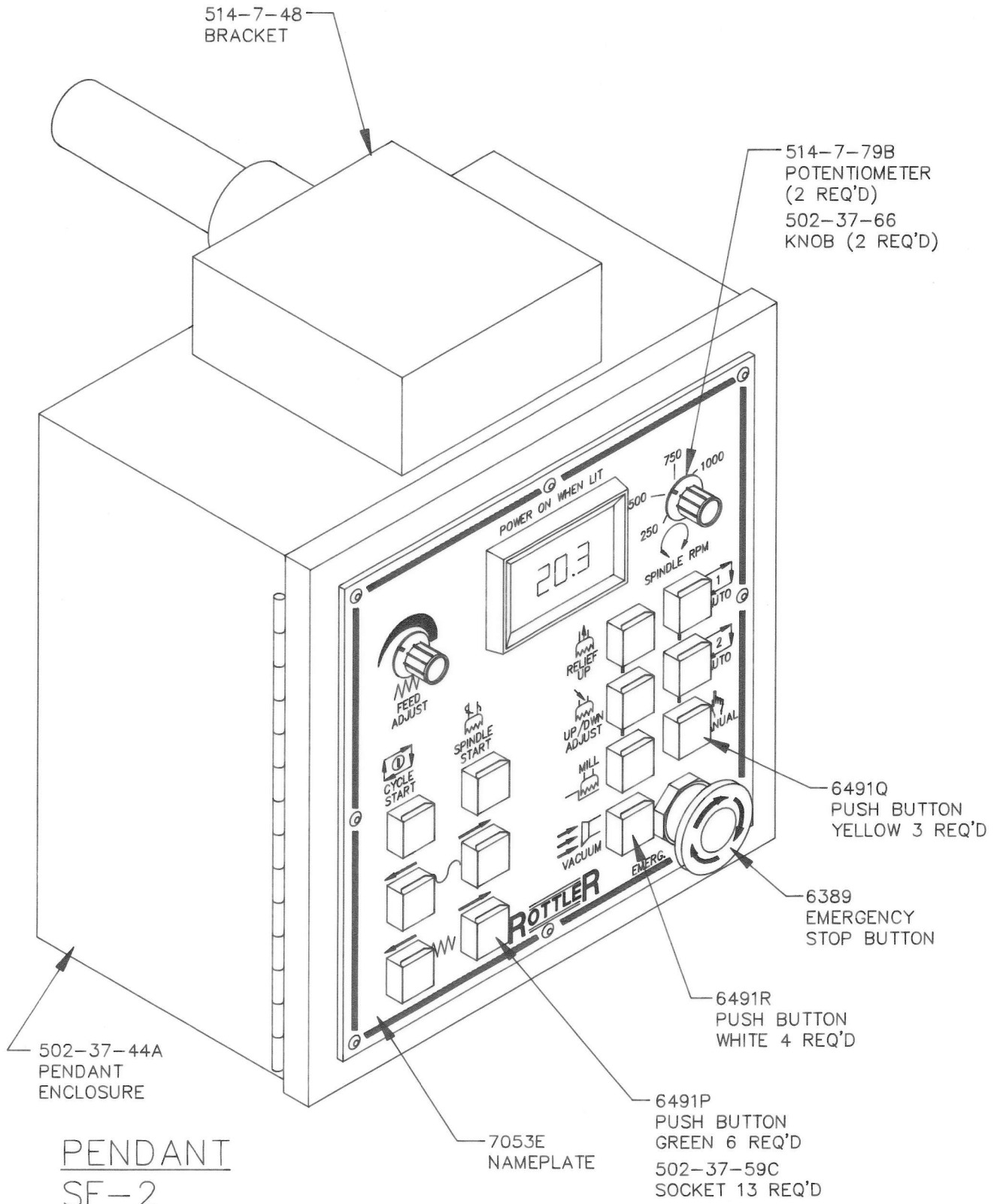
WAY COVER
SF-2

(see also old style parts assemblies at the end of this section)

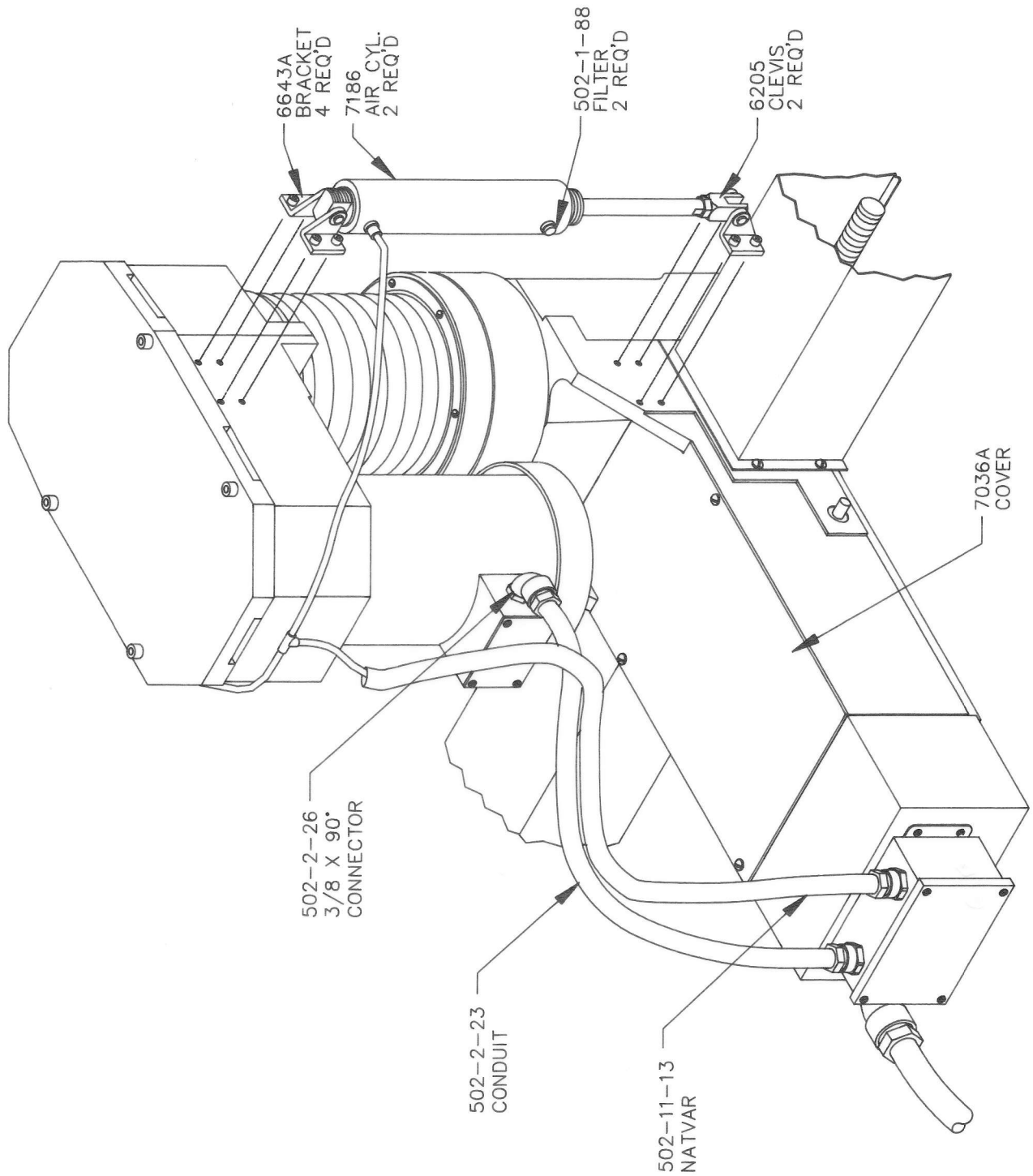
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SF-2-17



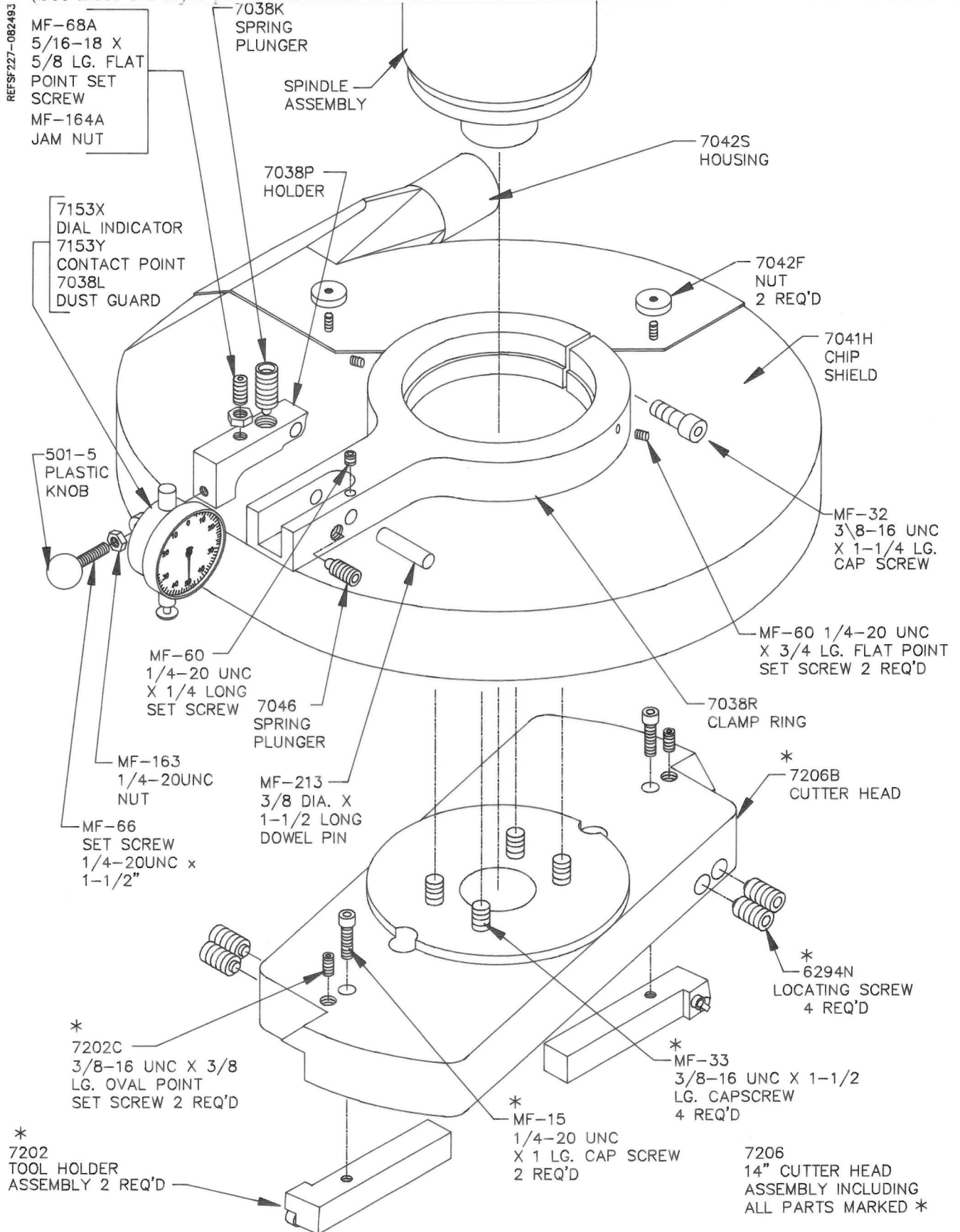
PENDANT
SF-2



SF2-1B

(See also: old style parts assemblies at the end of the manual)

REFSF227-082493



MF-68A
5/16-18 X
5/8 LG. FLAT
POINT SET
SCREW
MF-164A
JAM NUT

7153X
DIAL INDICATOR
7153Y
CONTACT POINT
7038L
DUST GUARD

501-5
PLASTIC
KNOB

MF-60
1/4-20 UNC
X 1/4 LONG
SET SCREW

MF-163
1/4-20UNC
NUT

MF-66
SET SCREW
1/4-20UNC x
1-1/2"

*
7202C
3/8-16 UNC X 3/8
LG. OVAL POINT
SET SCREW 2 REQ'D

*
7202
TOOL HOLDER
ASSEMBLY 2 REQ'D

MF-213
3/8 DIA. X
1-1/2 LONG
DOWEL PIN

7046
SPRING
PLUNGER

*
MF-15
1/4-20 UNC
X 1 LG. CAP SCREW
2 REQ'D

7038R
CLAMP RING

*
7206B
CUTTER HEAD

*
6294N
LOCATING SCREW
4 REQ'D

*
MF-33
3/8-16 UNC X 1-1/2
LG. CAPSCREW
4 REQ'D

7206
14" CUTTER HEAD
ASSEMBLY INCLUDING
ALL PARTS MARKED *

7042S
HOUSING

7042F
NUT
2 REQ'D

7041H
CHIP
SHIELD

MF-32
3/8-16 UNC
X 1-1/4 LG.
CAP SCREW

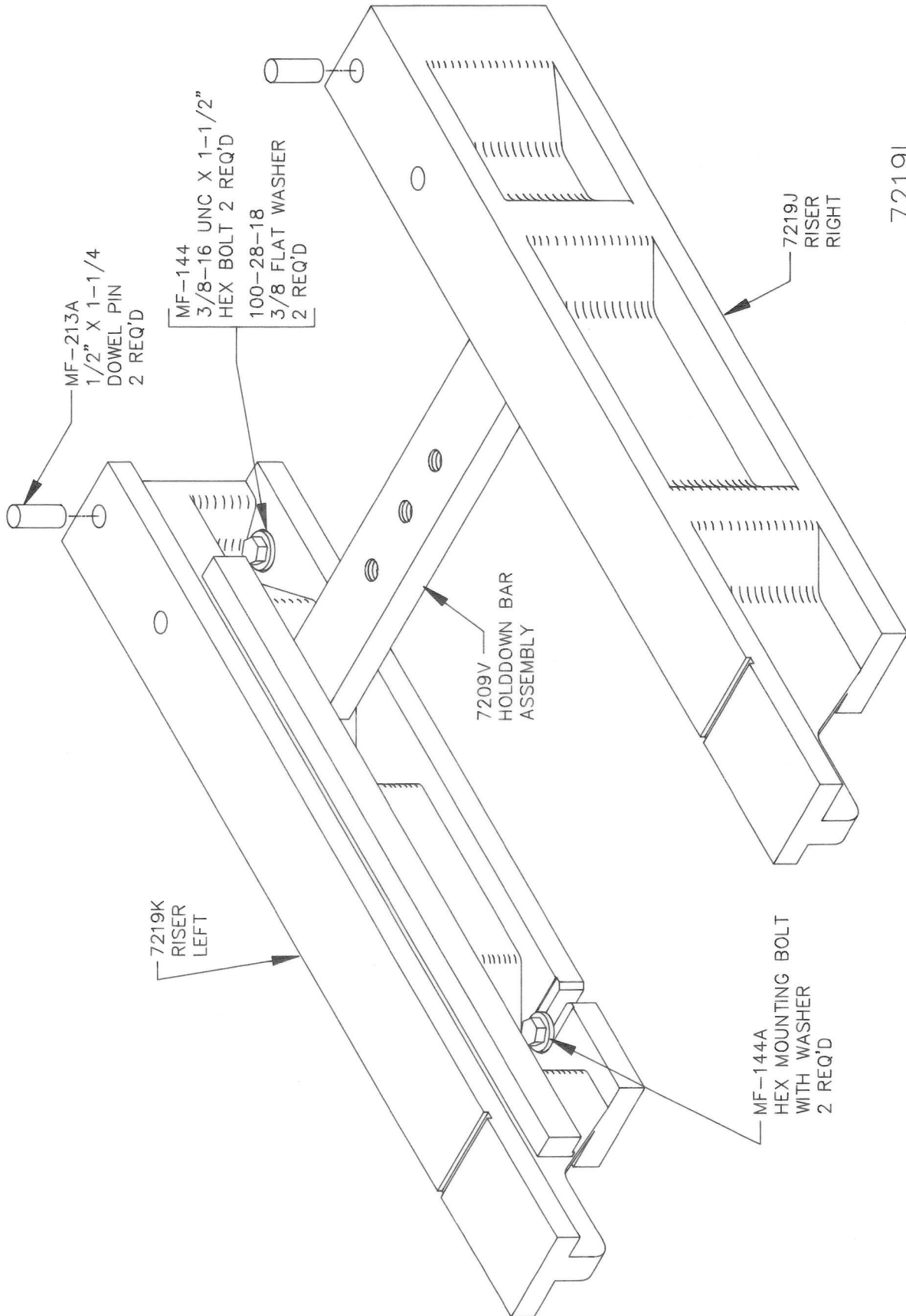
MF-60 1/4-20 UNC
X 3/4 LG. FLAT POINT
SET SCREW 2 REQ'D

SPINDLE
ASSEMBLY

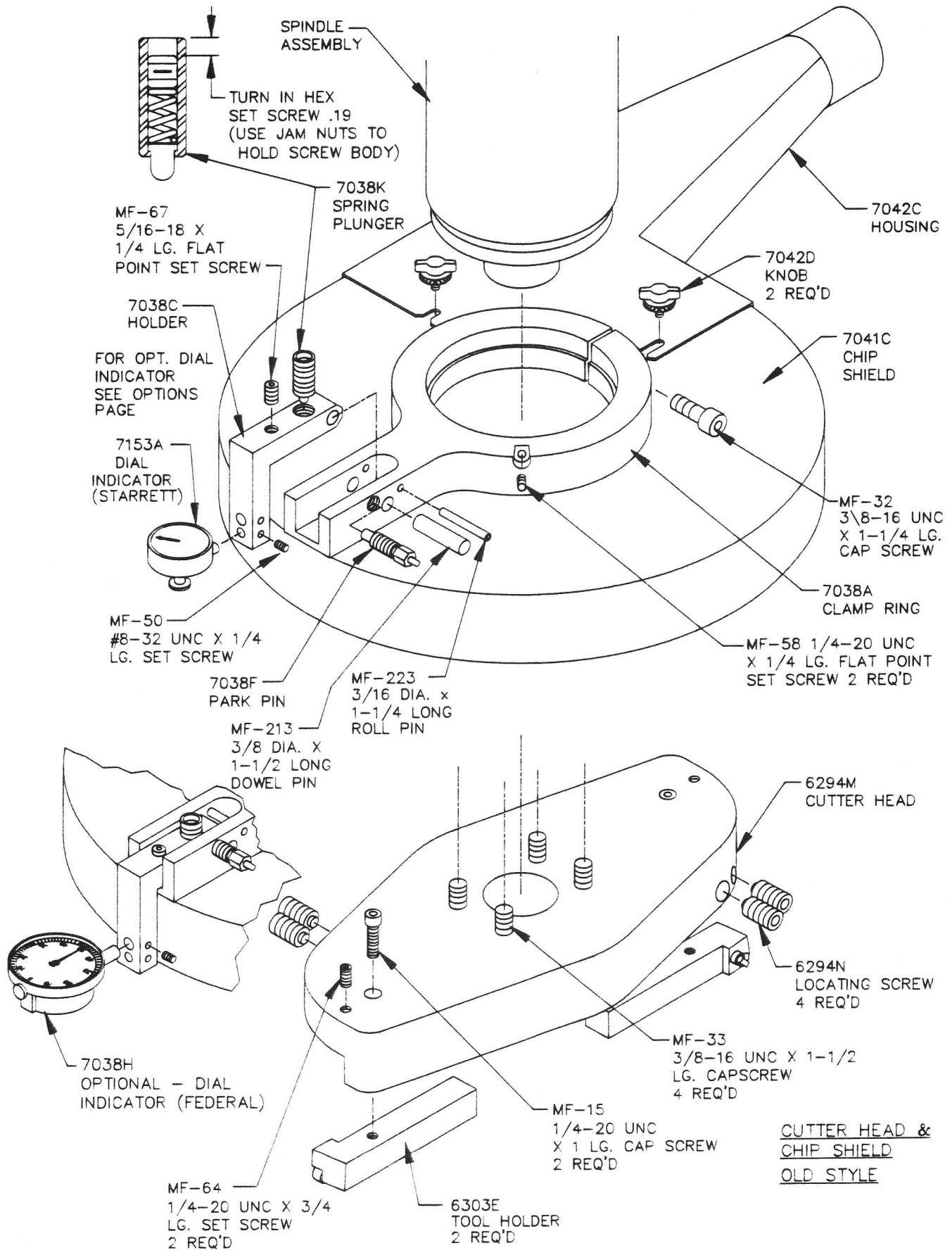
7038P
HOLDER

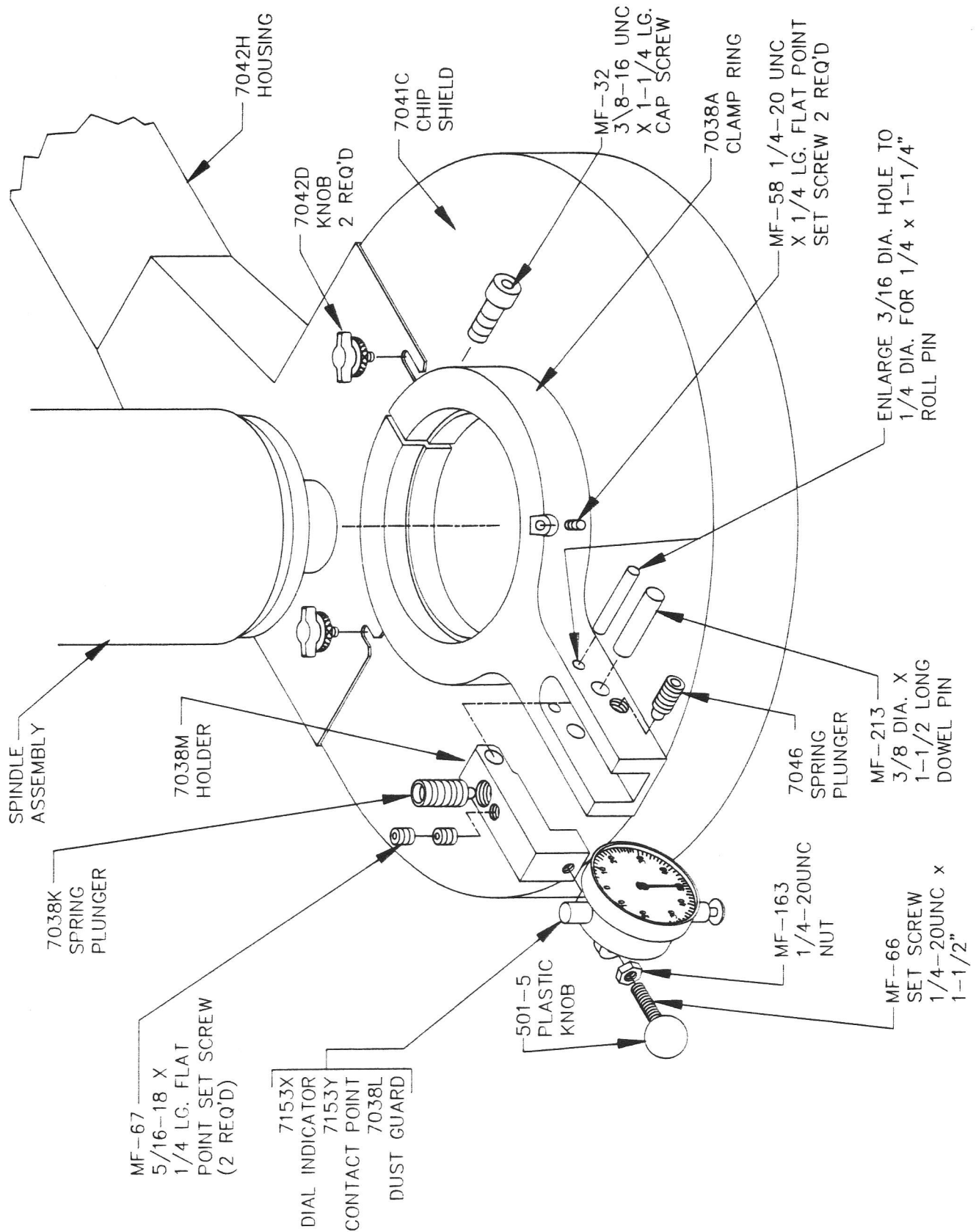
7038K
SPRING
PLUNGER

REFFITUR67-021194



7219L
RISER SET





REFSF223-123092

